SEP 13 2021

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September 9, 2021

Mary Alice Evans, OPSD Director
State of Hawai'i
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Room 702
Honolulu, Hawai'i 96813

Dear Ms. Evans:

SUBJECT: Proposed Ku'ikahi Affordable Housing Project at TMK No. (2)3-5-002:003 (Por.), Wailuku, Maui, Hawai'i; Publication of the Draft Environmental Assessment and Anticipated Finding of No Significant Impact Determination

With this letter, the County of Maui, Department of Housing and Human Concerns hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact determination (DEA-AFNSI) for the proposed Ku'ikahi Affordable Housing Project at TMK (2)3-5-002:003 (Por.) in Wailuku, on the island of Maui, for publication in the next available edition of the Environmental Notice.

Enclosed are an Adobe PDF file of the DEA-AFNSI and a zip file that contains the shapefile of the project's location. The publication form was submitted through the online portal.

If there are any questions, please contact Buddy Almeida of the Housing Division at (808) 270-7351 or Charlene Shibuya of Munekiyo Hiraga at (808) 244-2015.

Sincerely,

Lori Tsuhako

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

Enclosures
cc: Buddy Almeida, Housing Administrator (w/o enclosures)
Doyle Betsill, Kuikahi Properties LLC (w/o enclosures)
Lawrence Carnicelli, Kuikahi Properties LLC (w/o enclosures)
Charlene Shibuya, Munekiyo Hiraga (w/o enclosures)

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Wednesday, September 29, 2021 11:14:23 AM

Action Name

Kuikahi Affordable Housing Project

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

Wailuku, Maui

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

(2)3-5-002:003 (por.)

Action type

Applicant

Other required permits and approvals

Chapter 11-46, Community Noise Control; Chapter 11-60.1-33, Fugitive Dust; National Pollutant Discharge Elimination System; County of Maui; Construction permits (building, grading); Work on County Roadway approval

Discretionary consent required

State District Boundary Amendment by Maui County Council and County of Maui, Maui County Code Chapter 2.97 Affordable Housing Application by Maui County Council

Approving agency

County of Maui, Department of Housing and Human Concerns

Agency contact name

Lori Tsuhako

Agency contact email (for info about the action)

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United States
Map It

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Was this submittal prepared by a consultant?

Yes

Consultant

Munekiyo Hiraga

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Consultant address

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Wailuku, Hawaii 96793
United States
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Action summary

Kuikahi Properties, LLC proposes a new residential community to include a variety of residence types such as multi-family, duplex, live-work, tiny home, and single family units on an approximately 14.9-acre portion of land identified as TMK (2)3-5-002:003 in Wailuku, Maui, Hawaii. The proposed development also involves a minor residential business component through the live-work units, which are envisioned to be for neighborhood services or office types of businesses. The proposed project will be comprised of 204 residential units anticipated for sale at affordable levels per the Area Median Index. Related improvements to be developed with the project include onsite parking for residents and visitors, internal roadways and sidewalks, bike paths, landscaping, a pavilion, playground, spot parks, drainage improvements, underground utility connections, and 2 access connections to Ku‘ikahi Drive. A

roundabout at the intersection of Ku‘ikahi Drive and Kehalani Mauka Parkway is proposed.

Reasons supporting determination

Refer to Chapter IX, Significant Criteria Assessment of Draft EA.

Attached documents (signed agency letter & EA/EIS)

- Kuikahi_Affordable-Housing-Project_Draft-EA_Sept-2021.pdf
- Kuikahi_Draft-EA-2021-09.09-AFNSI-DHHC-Letter.pdf

Action location map

- Kuikahi_Project_Boundary.zip

Authorized individual

Charlene Shibuya

Authorization

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

Draft Environmental Assessment

KUIKAHI AFFORDABLE HOUSING PROJECT
WAILUKU, MAUI, HAWAI‘I
TMK NO. (2)3-5-002:003 (POR.)

Prepared for:

Kuikahi Properties, LLC

Approving Agency:

County of Maui,
Department of Housing and Human Concerns

September 2021

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MUNEKIYO HIRAGA

Planning. Project Management. Sustainable Solutions.

Draft Environmental Assessment

KUIKAHI AFFORDABLE HOUSING PROJECT
WAILUKU, MAUI, HAWAI‘I
TMK NO. (2)3-5-002:003 (POR.)

Prepared for:

Kuikahi Properties, LLC

September 2021

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by Munekiyo Hiraga

MUNEKIYO HIRAGA

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Executive Summary

Project Name:	Proposed Kuikahi Village Affordable Housing Project
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawaiʻi Revised Statutes
Anticipated Determination:	Anticipated Finding of No Significant Impact (AFNSI)
Applicable Environmental Assessment review "Trigger":	Use of County lands for roadway improvements
Location:	Maui Island Wailuku TMK No. (2)3-5-002:003(por.)
Landowner:	Kuikahi Properties, LLC
Applicant:	Kuikahi Properties, LLC Contact: Doyle Betsill 191 Waiheʻe Valley Road Wailuku, Hawaiʻi 96793
Approving Agency:	County of Maui Department of Housing and Human Concerns 2200 Main Street, Suite 546 Wailuku, Hawaiʻi 96793
Consultant:	Munekiyo Hiraga 305 High Street, Suite 104 Wailuku, Hawaiʻi 96793 Contact: Charlene Shibuya Phone: (808) 244-2015
Project Summary:	Kuikahi Properties, LLC proposes a new residential community to include a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units on an approximately 14.9-acre portion of land identified as Tax Map Key (2)3-5-002:003 in Wailuku, Maui, Hawaiʻi. The proposed development is also involves a minor commercial component through the live-work units, which are envisioned to be for neighborhood services or office-types of businesses.

The site is located mauka of Honoapiʻilani Highway, which is located to the east, and adjacent to Kuʻikahi Drive, which borders the site to the north. Beyond Kuʻikahi Drive to the north is the Kehalani Master Plan development which includes existing residential homes, park areas and a public elementary school. There are existing residential homes to the west of the project site which are a portion of the Wailuku Heights area. Further south of the property are existing residential areas of Waikapu, including Waiolani Mauka.

The proposed project will be comprised of 204 residential units anticipated for sale at affordable levels per the Area Median Index (AMI). Related improvements to be developed with the project include onsite parking for residents and visitors, internal roadways and sidewalks, bike paths, landscaping, a pavilion, playground, spot parks, drainage improvements, underground utility connections, and two (2) access connections to Kuʻikahi Drive. A roundabout at the intersection of Kuʻikahi Drive and Kehalani Mauka Parkway is proposed. It is noted that Kuʻikahi Drive is a County of Maui roadway.

The project site is not located within the County of Maui, Special Management Area (SMA), is designated "Agricultural" by the State Land Use Commission (LUC), is zoned as "Agricultural" by Maui County, is located within the Maui Island Plan's (MIP), Rural Growth Boundary (RGB), and Urban Growth Boundary (UGB), and is designated "Agriculture" in the Wailuku-Kahului Community Plan. As a 100 percent affordable housing development, the Applicant will apply for Chapter 2.97, Maui County Code approval and request a District Boundary Amendment (DBA) from the Maui County Council.

The use of County lands triggers the preparation of an Environmental Assessment (EA) to comply with the environmental review requirements of Hawaiʻi Revised Statutes (HRS), Chapter 343. As such, an EA is being prepared to evaluate potential impacts of the proposed project. The County of Maui, Department of Housing and Human Concerns will serve as the approving agency for the EA.

List of Acronyms

AFNSI	Anticipated Finding of No Significant Impact
AIS	Archaeological Inventory Survey
ALISH	Agricultural Lands of Importance to the State of Hawai‘i
AMI	Area Median Income
amsl	above mean sea level
BMPs	Best Management Practices
cfs	cubic feet per second
CIA	Cultural Impact Assessment
CO2 EQ	Carbon Dioxide Equivalent
DEM	Department of Environmental Management
DHHC	Department of Housing and Human Concerns
DLNR	Department of Land and Natural Resources
DOE	Department of Education
DOH	Department of Health
DPW	Department of Public Works
DWS	Department of Water Supply
EA	Environmental Assessment
ECA	Education Contribution Agreement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gases
GIS	Geographical Information Systems
GPD	gallons per day
HRS	Hawai‘i Revised Statutes
HUD	U.S. Department of Housing and Urban Development
IaA	Iao Silty Clay
IAL	Important Agricultural Lands
IbB	Iao Cobbly Silty Clay
IcB	Iao Clay
kWh	Kilowatt Hours
MCC	Maui County Code
MDG	Million Gallons Per Day
MG	Million Gallons
Mph	Miles per Hour
NPDES	National Pollutant Discharge Elimination System
PER	Preliminary Engineering Report
s.f.	Square Feet
SDOT	State Department of Transportation
SHPD	State Historic Preservation Division
SLUC	State Land Use Commission
SLUD	State Land Use Designation

TIAR	Traffic Impact Assessment Report
WKWWRF	Wailuku Kahului Waste Water Reclamation Facility
WWPS	Wailuku Wastewater Pump Station

PROJECT OVERVIEW

I

I. PROJECT OVERVIEW

A. PROJECT BACKGROUND

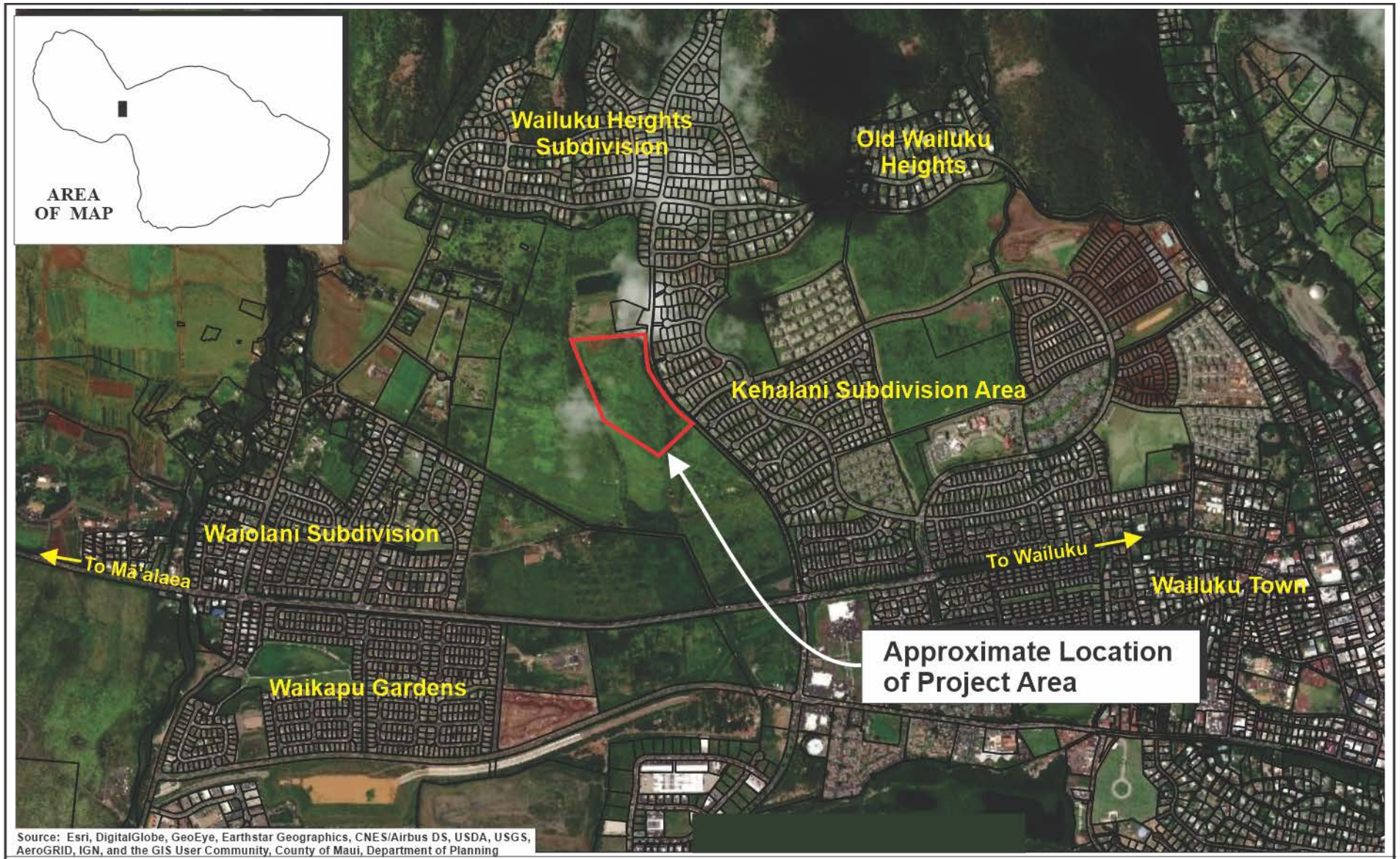
Kuikahi Properties, LLC ("Applicant") is proposing a new residential community, to include a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units on an approximately 14.9-acre portion of land identified as Tax Map Key (2)3-5-002:003 (Parcel 3) in Wailuku, Maui, Hawai'i. See **Figure 1**. The 14.9-acre portion of Parcel 3 is hereafter referred to as "project site". The proposed development also includes a minor commercial component through the live-work units, which are envisioned to be for neighborhood services or office-types of businesses. See **Figure 1** and **Figure 2**. The proposed project site is located mauka of Honoapi'ilani Highway, which borders Parcel 3 to the east, and adjacent to Ku'ikahi Drive, which borders the project site to the north. Vacant agricultural lands are located immediately to the south of the project site with existing residential areas of Waikapu located further south. The existing Wailuku Heights subdivision is located to the west.

The proposed project will be comprised of 204 residential units affordable to families between the 60 percent to 140 percent of the Area Median Income (AMI), and includes a minor commercial component. **Table 1** outlines the number of units per unit type to be provided at the project.

Table 1. Ku'ikahi Affordable Housing Project Units

Unit Type	Number of Units
Multi-Family/Condominium	120
Duplex	34
Live-Work	16
Studio	28
Single-Family	6
TOTAL	**204**

In addition to the residences, approximately 460 parking stalls will be provided onsite for residents' and visitors' use. The proposed project also includes a pavilion, playground, pedestrian and bike path, and "spot parks" for residents' use. Related improvements to be developed with the project include internal roadways and sidewalks, landscaping, drainage improvements, and utility connections. See **Figure 3**.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, County of Maui, Department of Planning

Figure 1

Kuikahi Affordable Housing Project

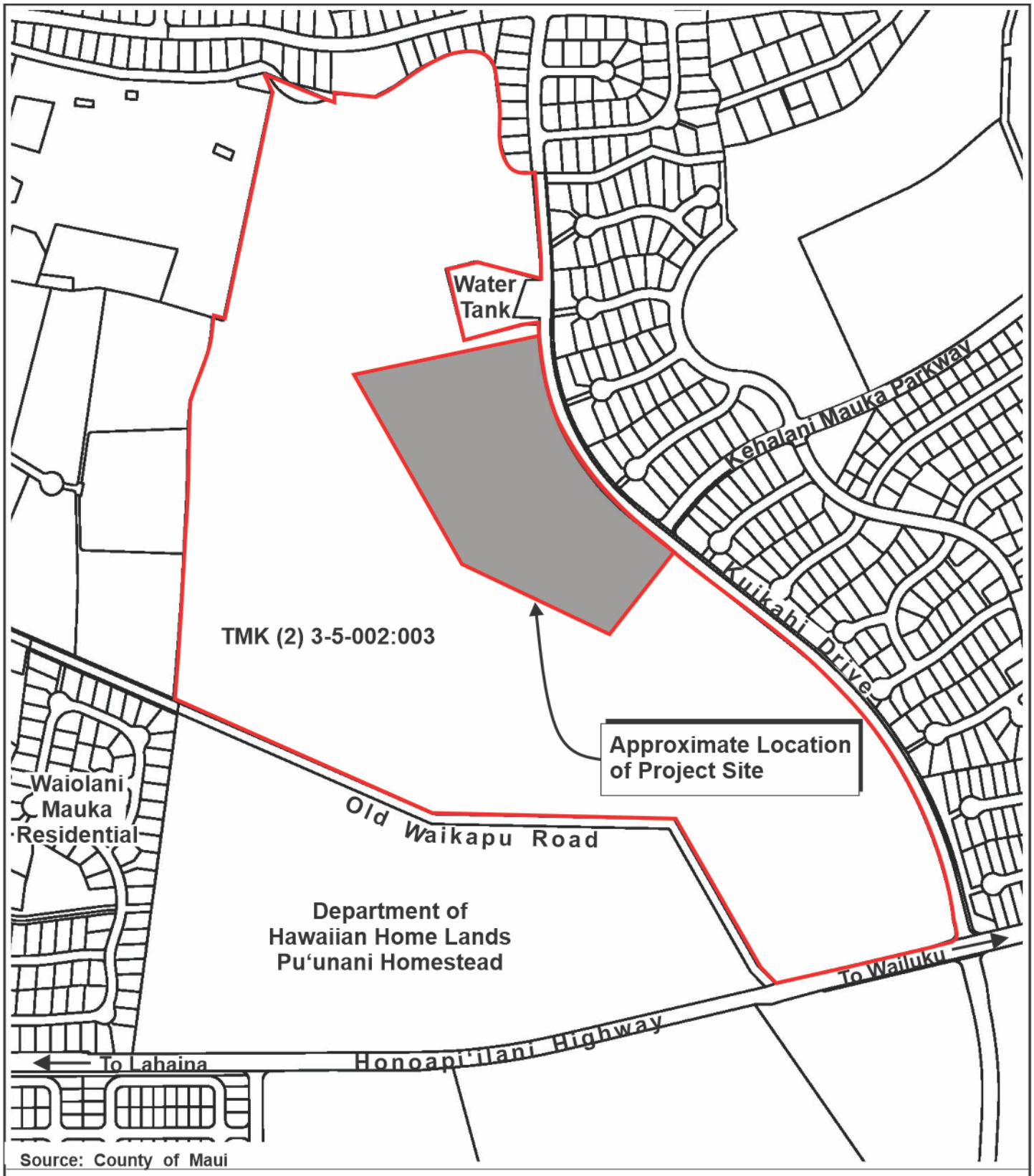
Regional Location Map

0 750 Feet
375 1,500

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\RegionalLocation(ECL) (REV)



Source: County of Maui

Figure 2 Kuikahi Affordable Housing Project
Project Location Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis/Wailuku AH/Applications/Figures/Property Location Map.DEA

Source: Ron J. Ped, Architect

Figure 3

Kuikahi Affordable Housing Project

Preliminary Site Plan

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Kuikahi Properties, LLC

WV Regenesis\Wailuku AH\Applications\Figures\Preliminary Site Plan

The following is a summary of the residential units and amenities proposed as part of the Kuikahi Affordable Housing project. See **Appendix "A"** with preliminary project plans.

Multi-Family/Condominium Units

The project is proposing 120 Multi-Family/Condominium units which will be located in 11 buildings. The multi-family units will include two (2) bedroom, two (2) bathroom units and three (3) bedroom, two (2) bathroom units. The unit sizes will range from approximately 880 square feet (s.f.) to 1,152 s.f. The multi-family buildings will be three (3) stories in height. Associated parking stalls for the units will also be provided. The multi-family units are proposed for the north side of the project site. Refer to **Figure 3**.

Duplex Units

Thirty-four (34) duplex units are proposed in 17 buildings at the project site. The duplex buildings will be one (1) story and two (2) stories in height and units will include three (3) bedroom, two (2) bathroom units. The duplex units will range in size from approximately 1,164 s.f. to 1,240 s.f. Related parking stalls will also be provided in the area of the units. The duplex units are proposed for the center portion of the project site.

Live-Work Units

Eight (8) buildings will house a total of 16 live-work type units. The live-work type units are proposed at the eastern end of the project site. The live-work units will be approximately 1,848 s.f. and include two (2) bedroom, two (2) bathroom units. The live-work units will be three (3) stories in height and include parking for the residential and limited commercial use of the buildings. The live-work units are proposed for the eastern portion of the project site.

The 16 live-work units are an attractive living option to address the "missing middle housing", as described in a Housing Technical Resource Paper (County of Maui, 2018) previously prepared for the County of Maui's Planning Department. The intention of these live-work units is to allow residents to supplement their mortgage and living expenses through a multitude of ways, including but not limited to such options like renting out a portion of their unit to long-term residents or conducting a small, home business that is secondary to the use of the home as a residence. Further, any business-related activities will be in compliance with use regulations as outlined in Chapter 19.67 of the Maui County Code (MCC).

Studio Units

A total of 28 one bedroom, one bathroom units are proposed in 14 buildings. The units will be approximately 400 s.f. in size and will be located in two (2) story buildings. Related parking for the studio units is also provided. The studio units are proposed for the southern area of the project site, located between the single-family residential and live-work units.

Single-Family Residences

Six (6) single-family residences are also proposed, with three (3) bedroom and two (2) bathroom layouts. The homes would be approximately 1,400 s.f. in size and are located on the southwest side of the project site. Property lots for the single-family residences will range in size from approximately 4,600 s.f. to 5,200 s.f.

Recreational Amenities

The project is proposing five (5) spot parks throughout the project site as well as a playground and pavilion, located in the center of the project site. Three (3) spot parks are located within the multi-family residential area, with one (1) spot park located adjacent to the live-work units and the studio and single-family residential units. The pavilion and playground is proposed within the duplex unit area. Additionally, the Applicant is proposing a pedestrian/bike path at the west end of the project site. The pedestrian/bike path will connect with Ku‘ikahi Drive. Refer to **Figure 3**.

Other Related Improvements

The proposed project will be accessible via two (2) entrances from Ku‘ikahi Drive, one at the south portion of the project area, across of Kehalani Mauka Parkway, and the other on the north portion of the project site below an existing water tank. Refer to **Figure 3**. In coordination with the County of Maui, Department of Public Works, the Applicant is proposing a roundabout at the southeast project driveway with Ku‘ikahi Drive. Further discussion of the proposed roundabout is included in Chapter II of this document.

Additionally, other related infrastructural (i.e., water, sewer, drainage, electrical, cable) improvements will be provided for the project as well as area landscaping, grading and other improvements relative to the overall development of the project. Preliminary development plans for the proposed project are included as **Appendix “A”**

B. PROJECT NEED

For many years, Maui has experienced a shortage of affordable housing for local residents. There has been very little housing available and affordable to lower income families, forcing many to either live in less than ideal, cramped conditions or relocate off-island. While there are other affordable housing projects being developed in the Wailuku

area currently, the proposed project is unique in providing a variety of unit types to accommodate families of different sizes. As previously stated, the proposed project will address this housing shortage by providing 204 residential units of varying size to families earning between 60 and 140 percent of the AMI.

The proposed project would be an infill project as it is generally surrounded by existing residential development to the north, south and west and commercial development to the east. The site is located in proximity to existing infrastructure and services and amenities that support residential housing.

C. REGULATORY CONSIDERATIONS

The project site is designated as "Agricultural" by the State Land Use Commission (SLUC) and is zoned as "Agricultural" by Maui County. Furthermore, the project site is within the Maui Island Plan's Urban and Rural Growth Boundaries and is designated "Agriculture" in the Wailuku-Kahului Community Plan. Due to the project's "Agricultural" State Land Use designation, and that the project area is less than 15 acres, the Applicant will be seeking approval of a District Boundary Amendment from the Maui County Council. As a 100 percent affordable housing development, the Applicant is applying for Chapter 2.97, MCC approval from the Maui County Council for the proposed development.

Though the proposed project will utilize private funds, County lands will be used for improvements to Ku'ikahi Drive. The use of County lands triggers compliance with the environmental review requirements of Hawai'i Revised Statutes (HRS), Chapter 343. Accordingly, this Environmental Assessment (EA) is being prepared pursuant to Chapter 343, HRS and Chapter 11-200.1, Hawai'i Administrative Rules to evaluate the technical characteristics and potential environmental impacts of the proposed project, as well as to advance findings and mitigative measures relative to the project. The County of Maui, Department of Housing and Human Concerns will serve as the approving agency for the EA as the improvements are tied to the affordable housing project.

D. CONSTRUCTION COST AND TIMELINE

The proposed Kuikahi Affordable Housing project is anticipated to take 2.5 to 3 years to obtain all necessary construction-related permitting as well as complete construction. The project construction cost is estimated at $65 million.

DESCRIPTION OF THE EXISTING CONDITIONS, POTENTIAL IMPACTS AND MITIGATION MEASURES

II

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

A. PHYSICAL SETTING

1. Surrounding Land Use

a. Existing Conditions

The project site, including infrastructural improvements, is comprised of 14.9 acres and is located in northern Wailuku. The project site is located mauka of Honoapiʻilani Highway, which borders the site to the east, and adjacent to Kuʻikahi Drive, which borders the site to the north. Directly to the west and mauka from the project site is the Wailuku Heights subdivision, while further north and northeast (across Honoapiʻilani Highway) is the Kehalani Project District area. Vacant agricultural lands are located immediately to the south of the project site. Offsite utilities, such as sewer, water, electrical, and communication underground and overhead lines, exist within Kuʻikahi Drive. Various other residential developments and a handful of small locally owned businesses comprise the general land use fabric of this area of Wailuku. Refer to **Figure 1** and **Figure 2**.

b. Potential Impacts and Mitigation Measures

The proposed project is located adjacent to existing infrastructure and in an appropriate location adjacent to urbanized areas of Wailuku. The proposed project is compatible with the surrounding existing uses of the area. In the context of surrounding land uses, the proposed project is not anticipated to have a significant adverse effect on the surrounding landscape. The proposed project offers multiple housing types for various family sizes, all of which will be affordable for Maui's families.

2. Climate

a. Existing Conditions

Maui's climate is relatively consistent throughout the year. The island's climate varies as the terrain changes. Characteristic of Maui's climate, the proposed project site experiences mild and uniform temperatures year-round, moderate humidity and consistent trade winds.

Average temperatures at the general project area (based on temperatures recorded at Kahului Airport) range from the low 60s to high 80s

(Fahrenheit). September is historically the warmest month, while February is the coolest. Annual precipitation rainfall average was approximately 13 inches (Maui County Data Book, 2019). Winds blow predominantly out of the north-northeasterly direction.

b. Potential Impacts and Mitigation Measures

The proposed action will occur in an area formerly used for agricultural cultivation which is now mostly vacant. The proposed project will be located in the midst of other similar residential developments. The proposed project is not anticipated to have an adverse effect on climate.

3. Topography and Soil Conditions

a. Existing Conditions

Elevations across the 14.9-acre proposed subdivision site range from approximately 664 feet above mean sea level (amsl) to 540 feet amsl. The existing terrain slopes steadily downward from the northwestern corner of the site to the eastern portion of the site at a slope of approximately 10.6 percent. See **Appendix "B",** Preliminary Engineering Report.

Underlying the project site and surrounding area are soils belonging to the Pulehu-Ewa-Jaucus association. According to the Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lāna'i, State of Hawai'i, prepared by the United States Department of Agriculture Soil Conservation Service, these soils are characterized as having a slight to moderate erosion hazard (Foote et al, 1972). See **Figure 4**.

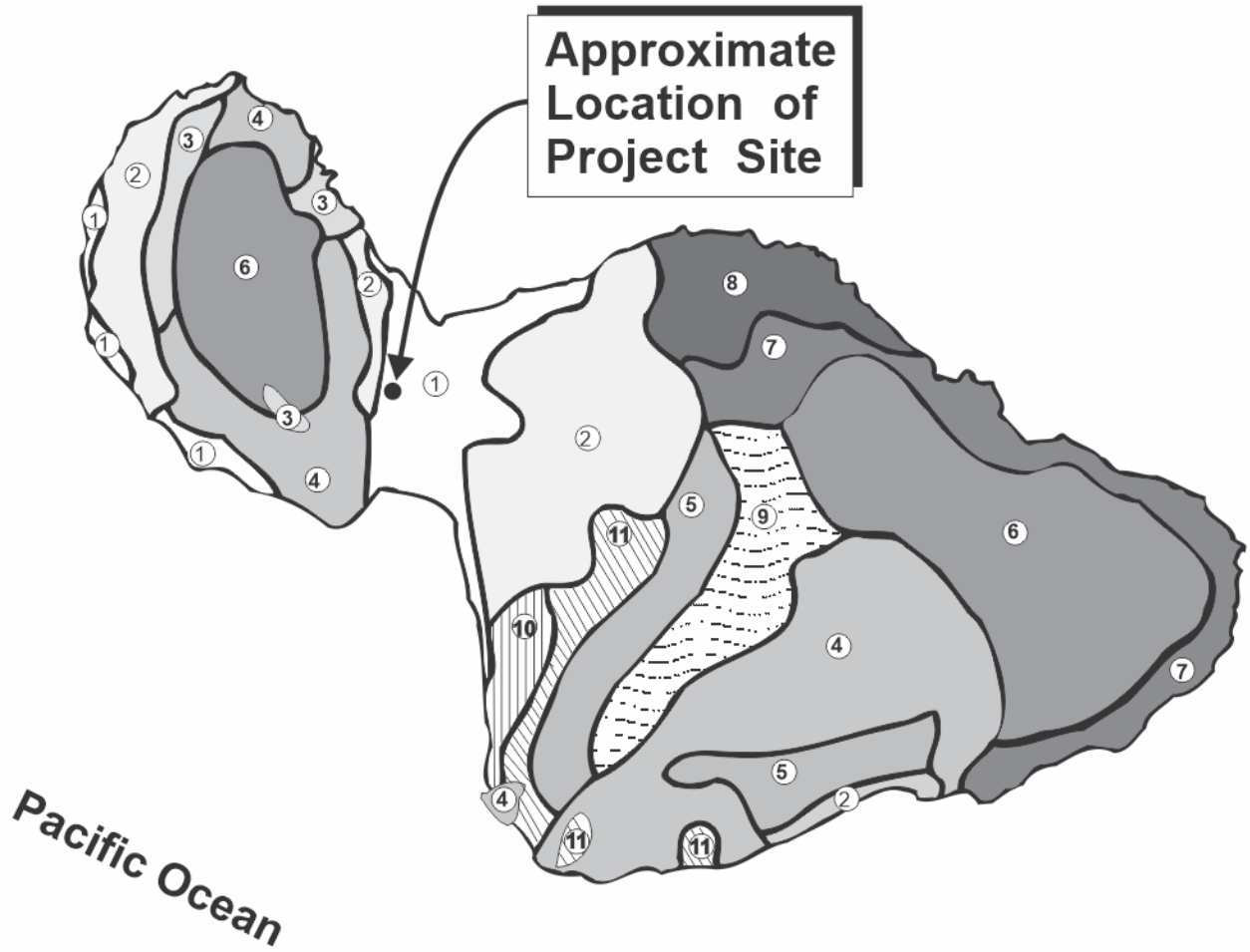
Per the "*Soil Survey Database for the Island of Maui, Hawai'i*", the project area is located on soils identified as, Iao Clay (IcB) and Iao Cobbly Silty Clay (IbB). These soils are reported to produce a low to medium amount of runoff and represent a slight to moderate erosion hazard (U.S. Department of Agriculture, 2014). See **Figure 5**.

b. Potential Impacts and Mitigation Measures

The 14.9-acre project site was previously used for agriculture, and is currently vacant and undeveloped. The project grading concept considers the balancing of cut and fill quantities to reduce the import and/or export of earthwork material and to ensure that the building height standards can be met. Best Management Practices (BMPs) will be implemented during construction to minimize impacts from soil erosion resulting from wind and water (e.g., dust and silt fencing, watering for dust

LEGEND

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



Map Source: U.S. Department of Agriculture, Soil Conservation Service, 1972

Figure 4 Kuikahi Affordable Housing Project

Soil Association Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

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WV Regenesis\Wailuku AH\Applications\Figures\Soils Assoc.DEA

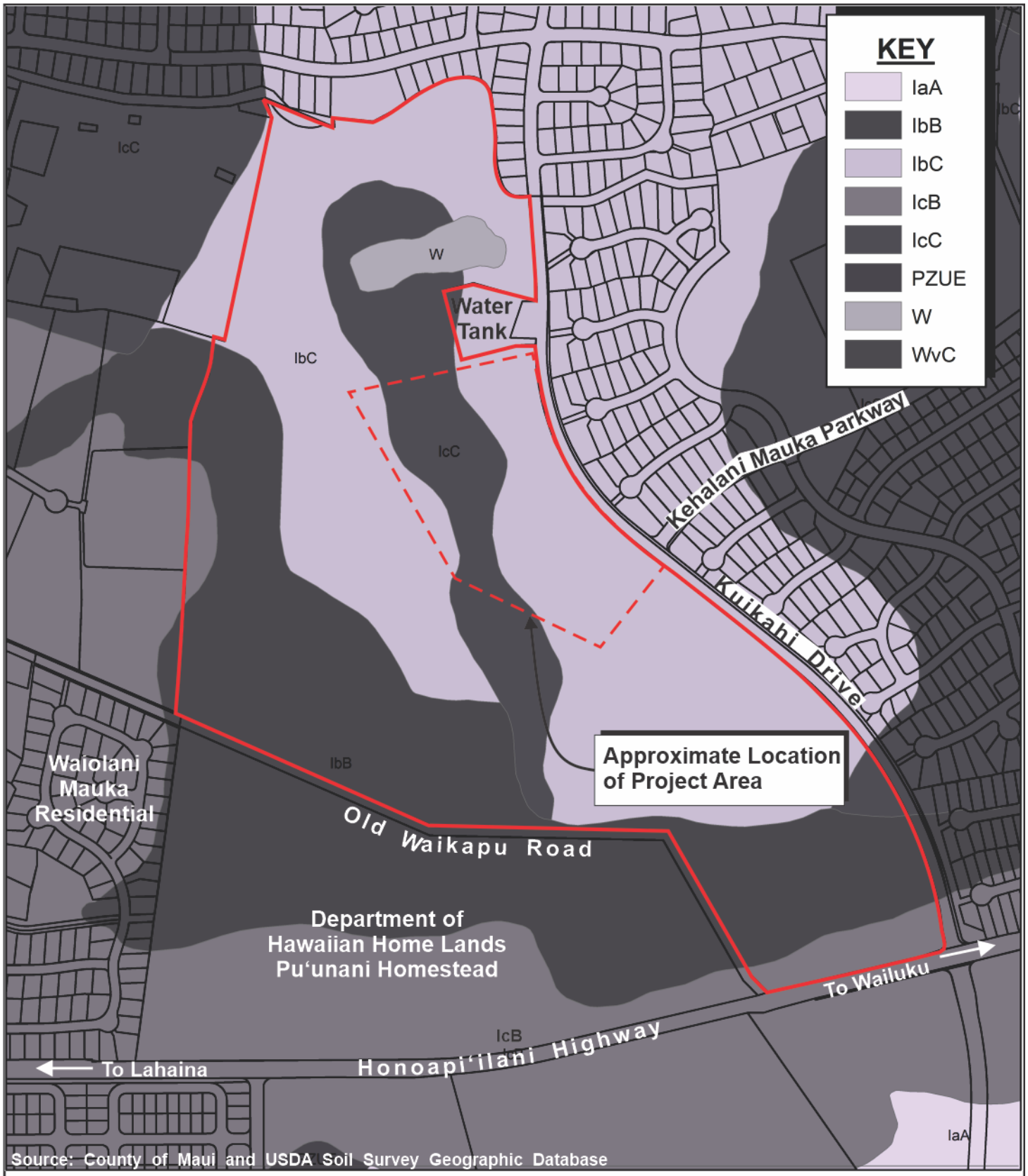

Figure 5 Kuikahi Affordable Housing Project

Soils Classification Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

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WV Regenesis/Wailuku AH/Applications/Figures/Soils Classification.DEA

control, etc.). An application for a National Pollutant Discharge Elimination System (NPDES) permit will be submitted to the State Department of Health (DOH) for review and approval prior to the start of construction of the proposed subdivision. Grading and Work on County Highway permits will also be applied for the proposed subdivision and offsite roadway and utility connections. The underlying soils do not pose limitations with respect to project constructability. The proposed project is not anticipated to have an adverse effect on topography and soils. Refer to **Appendix "B"**.

4. Agricultural Productivity Considerations

a. Existing Conditions

In 1977, the State Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawaiʻi (ALISH). The classification system is based primarily, but not exclusively, on the soil classification of the land. The three (3) categories are "Prime", "Unique" and "Other Important" agricultural lands, with all remaining lands identified as "Unclassified".

"Prime" agricultural lands have soil quality, growing season, and moisture supply needed to produce sustained high yield crops economically. "Unique" agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of specific crop. "Other" important agricultural lands are lands that have not been rated "Prime" or "Unique" agricultural lands that are also of statewide or local importance for agricultural use.

As previously stated, the project site is located in an area of Wailuku that was formerly utilized for agricultural purposes for multiple decades. As such, the project site is located within the ALISH's "Prime" land area. See **Figure 6**. However, the project site has not been cultivated for agricultural use for over 15 years and currently sits vacant and underutilized.

Separately, the University of Hawaiʻi, Land Study Bureau (LSB) developed the Overall Productivity Rating, which classified soils according to five (5) productivity levels, with "A" representing the class of highest productivity soils and "E" representing the lowest.

The soils in the eastern portion of the project site has been classified "A", while the soils in the western portion has been classified as "B", and the soil along a small strip on the northern portion of the project site classified as "E". by the LSB. See **Figure 7**.

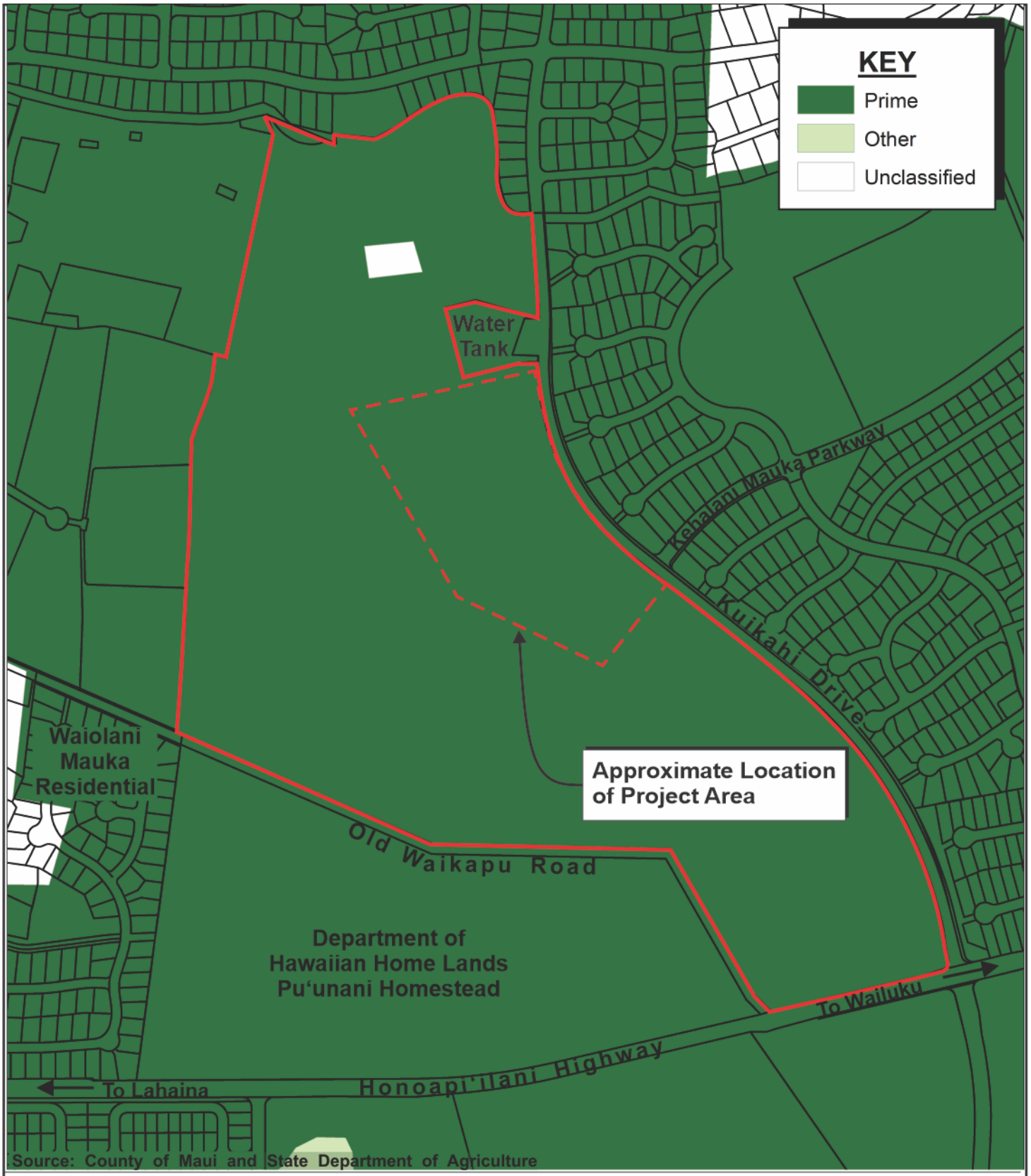

Figure 6 Kuikahi Affordable Housing Project

0 150 300 600 Feet

Agricultural Lands of Importance to the State of Hawai'i Map

Prepared for: Kuikahi Properties, LLC

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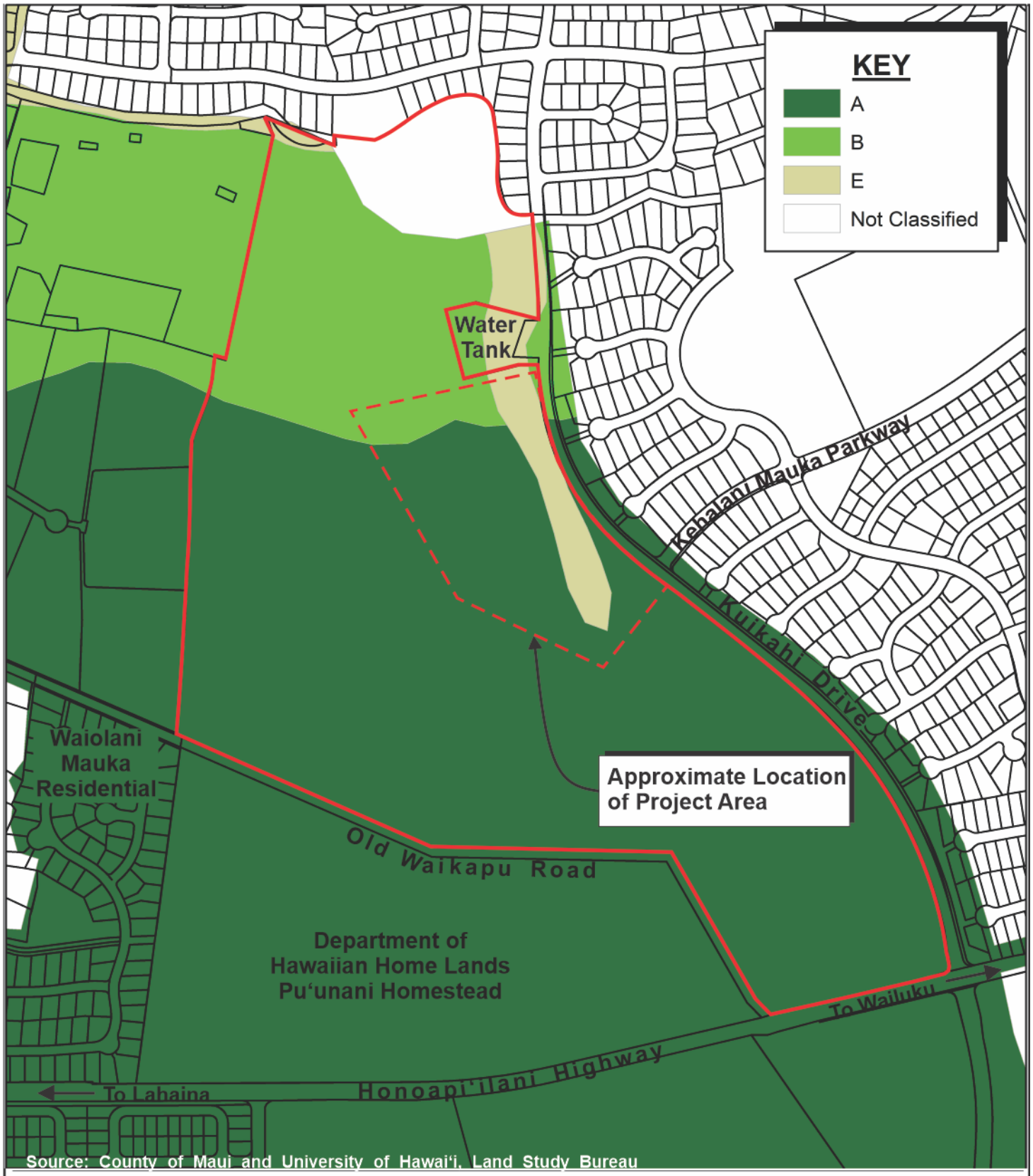

Figure 7 Kuikahi Affordable Housing Project
Land Study Bureau Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

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WV Regenesis/Wailuku AH/Applications/Figures/LSB.DEA

b. Potential Impacts and Mitigation Measures

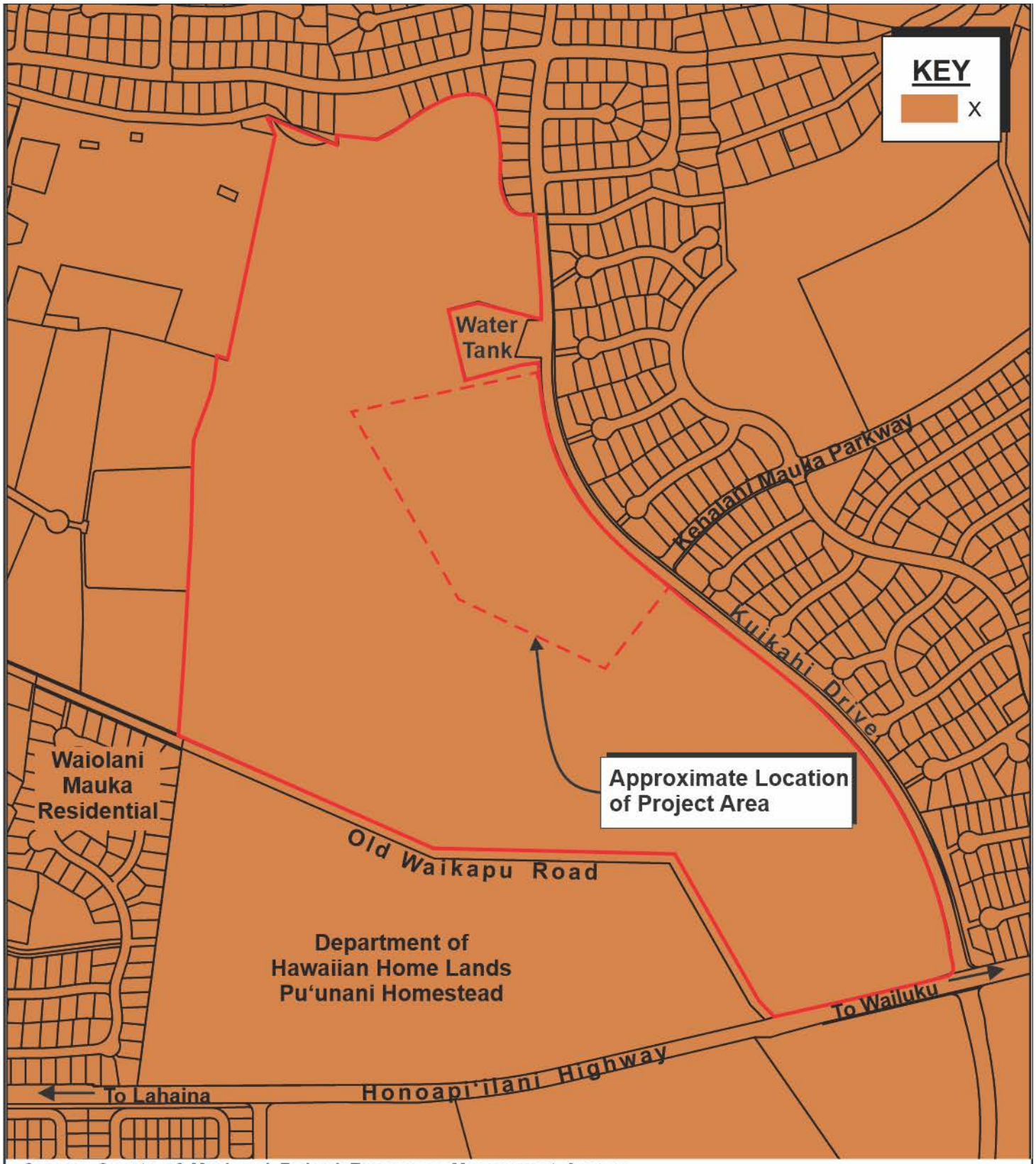
The proposed project will utilize the property for needed affordable housing for Maui families earning 140 percent or below the Area Median Income. The proposed project is considered an infill development, as the property is located adjacent to existing urbanized areas with other similar residential subdivisions. The proposed action will occur on property that has been fallow for over 15 years. Additionally, the use of the 14.9 acres for affordable housing purpose represents a relatively small area of land designated for agricultural use on the island of Maui. There are approximately 242,440 acres of land designated "Agricultural" by the SLUC on Maui island alone (Maui County Data Book, 2019). As the lands are not currently actively cultivated, there are no adverse impacts to agriculturally productive lands as a result of the proposed action.

5. Flood, Tsunami, and Sea Level Rise

a. Existing Conditions

The Flood Insurance Rate Map (FIRM), Geographic Information System (GIS) layer provided by the United States (U.S.) Federal Emergency Management Agency (FEMA) indicates the project site is situated in Flood Zone X, outside both the floodplain and tsunami zone. Flood Zone X (unshaded) represents areas outside of the 0.2 percent annual chance flood plain and there are no restrictions upon development within this zone. See **Figure 8**.

Mauka of the proposed project site, above the existing water tank lot, is the Wailuku Water Reservoir 10 which is owned by both Kuikahi Properties, LLC and Wailuku Water Company, and is regulated by the State of Hawai'i. See **Figure 9** for attributes of the reservoir. The reservoir is used for irrigation and water supply, and accommodates storm drainage from the Wailuku Heights subdivision. Reservoir dimensions were documented back in 2012 to be 52 feet in height by 880 feet in length. Originally constructed for irrigation and water supply in 1951, it was enlarged in 1967 with an additional embankment toward the north and an additional spillway with an invert approximately one (1) foot higher than the original spillway. Storage capacity of the reservoir is approximately 57 acre-feet or 19 Million Gallons (MG). By definition, the reservoir's embankment barrier from the lowest elevation on the outside limit of the barrier exceeds 25 feet in height which meets the threshold for being considered a dam by the State Department of Land and Natural Resources (DLNR).



Source: County of Maui and Federal Emergency Management Agency

Figure 8 Kuikahi Affordable Housing Project

Flood Insurance Rate Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

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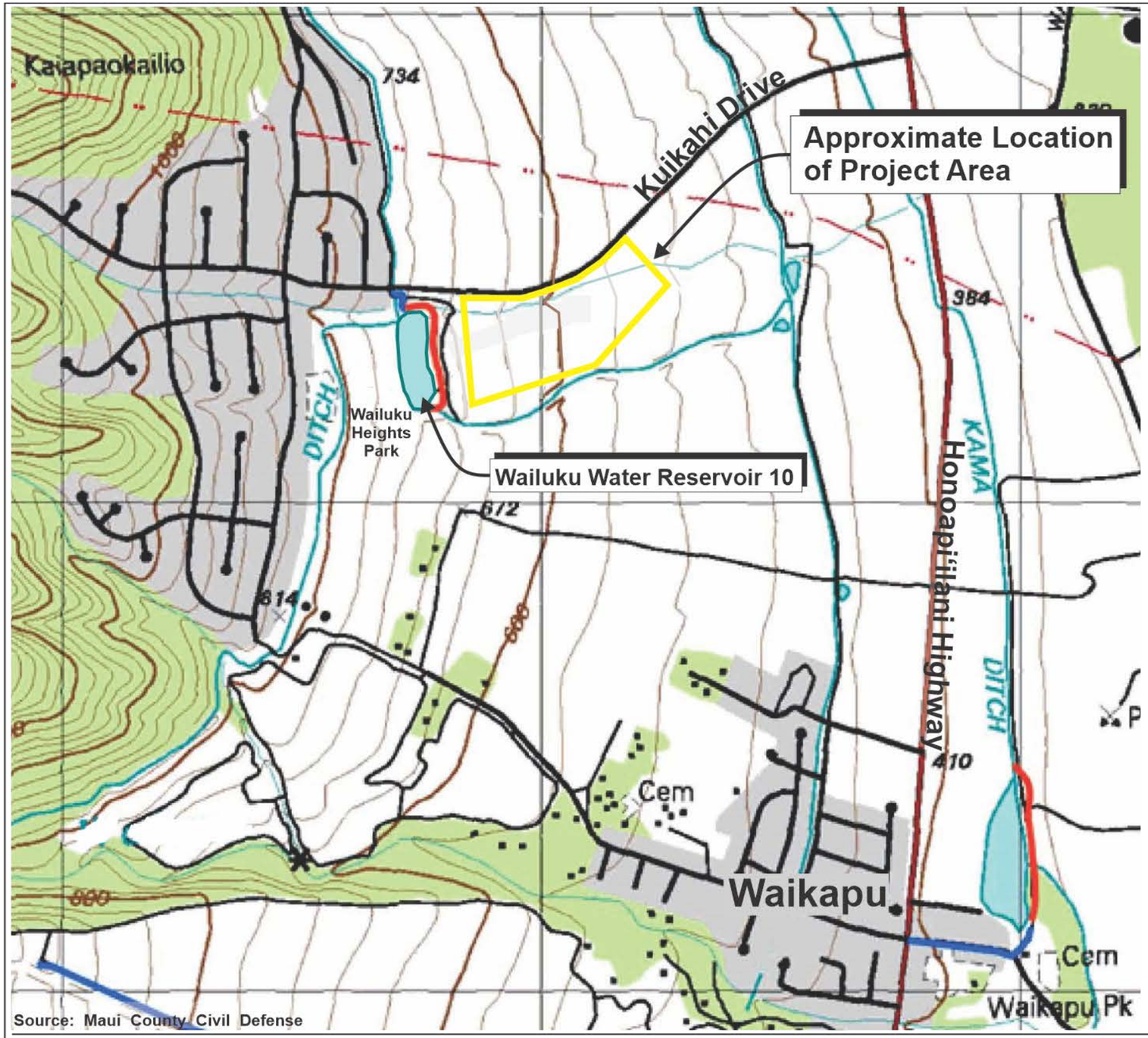
WV Regenesis/Wailuku AH/Applications/Figures/FIRM.DEA



1. General Information	
a. State Dam ID	MA-0151
b. National ID	HI00151
c. Dam Name	WAILUKU WATER RESERVOIR 10
d. Other Name(s)	
e. Longitude / Latitude	-156.5128 / 20.8658
f. County / Island	Maui / Maui
g. Type of Dam	Earthen
h. Purpose	Irrigation
i. Completed / Last Modified	/
j. Nearest City / Town	Wailuku Heights (0.1 mile)
k. Water Body Type	State Regulated Dam
l. Dam Height	52 ft
m. Dam Length	880 ft
n. Drainage Area	0.27 sq. miles / 173 acres
o. Primary Spillway Type	Culvert
p. Maximum Storage	57 ac-ft / 19 MG

2. Owner Information	
a. Name of Owner	Kuikahi Properties LLC, Wailuku Water Company
b. TMK(s)	(2) 3-5-002:003

3. Hazard Potential Classification	
a. Hazard Classification	High
b. Emergency Action Plan	Yes

KEY

Roads ——— Crests ———

Figure 9

Kuikahi Affordable Housing Project

Wailuku Water Reservoir 10 Dam Data Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

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WV Regenesis\Wailuku AH\Applications\Figures\Wailuku Water Res Dam Data Map 11x17

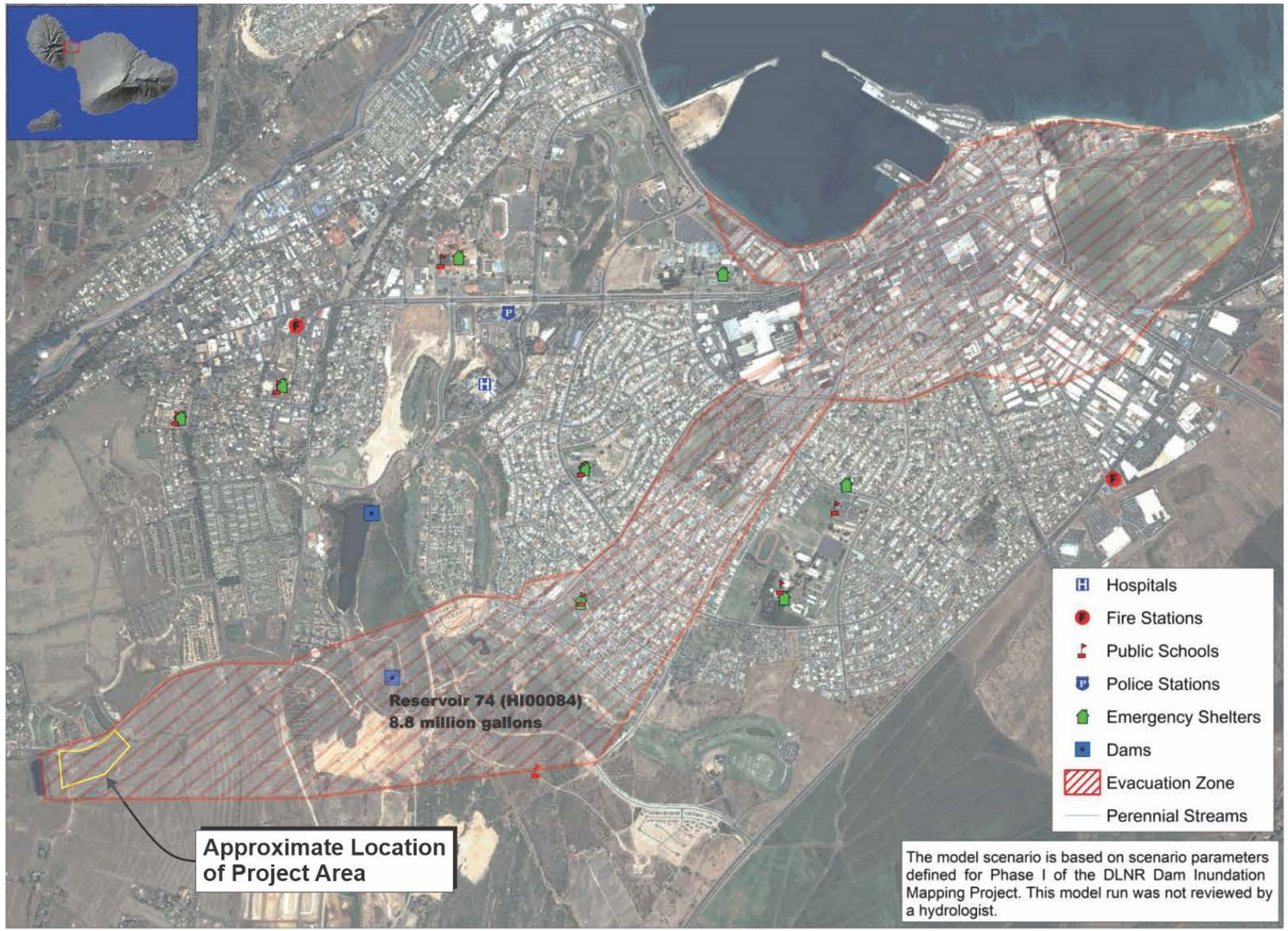
Inflow enters from 1) the Iao-Waikapu Ditch, 2) a corrugated metal pipe at least 48-inches in diameter from a storm drain system, and 3) an 18-inch ductile iron pipe from an unknown source. Inflows reported by DLNR from the Iao-Waikapu Ditch is approximately 18 MG per day, and can be controlled at the stream diversion. Inflow from the storm drain and 18-inch pipe are unmeasured and uncontrolled.

An Evacuation Zone Map generated by the Pacific Disaster Center for the DLNR, dated November 27, 2012, illustrates an area below the existing Wailuku Water Reservoir 10 that would experience inundation in the event of a dam failure. See **Figure 10**. The proposed project area is within this mapped inundation area. Otherwise, the project site does not experience any significant local flooding problems due to its location in Waikapū's and Wailuku's gently sloping mauka to makai topography.

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 Hawaiʻi Sea Level Rise Vulnerability and Adaptation Report that was prepared in 2017 by the Hawaiʻi Climate Change Mitigation and Adaptation Commission. (Hawaiʻi Climate Change Mitigation and Adaptation Commission, 2017). It is noted that the project site is located inland and outside of the projected 3.2-foot sea level rise exposure area.

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

The development of the proposed project will comply with County of Maui's drainage standards and will utilize stormwater runoff BMPs during construction. There are no significant adverse impacts to drainage conditions and flooding anticipated as a result of grading activities associated with the construction of the proposed project. The proposed project will also provide drainage improvements to mitigate any increase in runoff created by the project. See Section D.4. Drainage, of this chapter for further discussion. Although the proposed project site is within the dam failure evacuation zone map limits, it is noted that 18 MG per day of inflow from the Iao-Waikapu ditch is controllable and there is a primary spillway on the southern portion of the reservoir (right abutment) composed of a 6-inch diameter concrete encased corrugated metal pipe set approximately 5 feet below the crest elevation of the reservoir. Refer to **Figure 10**. Another secondary spillway is an uncontrolled masonry lined channel near the left abutment that flows into a grass-lined drainage swale that eventually joins into the Kaiapaokailio Stream. These spillways provide some provisions for overflows to potentially mitigate a dam failure.



Imagery: (c) Digital Globe 2004

This product depicts downstream flood potential using the DHI MIKE 21 model.

The scenario depicts a dam failure in series. The uppe dam fails by piping, while the lower dam is failed by overtopping.

November 27, 2012

Source: Maui County Civil Defense

Disclaimer: Information shown on this map is approximate and should be used as a guideline for emergency response. While the best available data has been utilized as inputs into the dam failure computer model, the final modeled product results should be interpreted as "best available estimates" of the evacuation areas. These dam failure computer models assumed that each dam fails from a defect in the embankment structure, while full at maximum capacity, under dry (no rain) conditions and no discharge through the spillways. Dam Breaches during flooding or other hazard events could differ or be larger than the area identified.

Should evacuations be initiated, listen to instructions from your local emergency management / civil defense agency, and directives from the police and fire department. Based on the anticipated dam hazard or multiple hazards facing the community, this evacuation area may be altered by the local emergency management agency. The dam evacuation area is different from FEMA flood zone maps or the Tsunami Evacuation Maps (those can be viewed at: gis.hawaiinfip.org). Although the modeled dam failure area utilized to create the evacuation zone maps were conducted by PDC for the State DLNR, the displayed evacuation map is the product and property of the local County Emergency Management or Civil Defense Agency. Any usage or alteration of this map should be cleared with that respective county agency.

For more information: contact local Emergency Management / Civil Defense Agency or visit: http://dlnreng.hawaii.gov/dam

Figure 10

Kuikahi Affordable Housing Project
Wailuku Water Reservoir 10 Evacuation Zone Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\Wailuku Water Res Evac Zone Map 11X17

However, Kuikahi Properties, LLC and Wailuku Water Company are actively coordinating with the DLNR Engineering Division, Flood Control and Dam Safety Section to determine any further mitigation measures appropriate to reduce the potential for inundation due to a dam failure. Accordingly, significant adverse impacts associated with floods, tsunamis, and sea level rise are not anticipated.

6. Streams and Wetlands

a. Existing Conditions

A natural, typically dry drainageway (gully) that originates in the West Maui Mountains traverses through the northernmost portion of Parcel 2, and also through Parcel 64. See **Figure 11**. It is noted as Kalapaokaʻīlio Stream in US Geological Survey map documents of this area; however, the drainageway is correctly known as Kalapaokaʻīlio Stream (Ulukau, Hawaiian Place Names, 2021) . The drainageway ultimately empties into a dry overflow basin in the Waiʻale Reservoir.

The Waikapū Stream is located approximately 3,000 feet to the south of the project site. Waikapū Stream is a perennial stream which originates in the upper reaches of Waikapū Valley, ultimately discharging into Keālia Pond in the Māʻalaea flats. There are no known wetlands or other water bodies on or in the vicinity of the project site.

b. Potential Impacts and Mitigation Measures

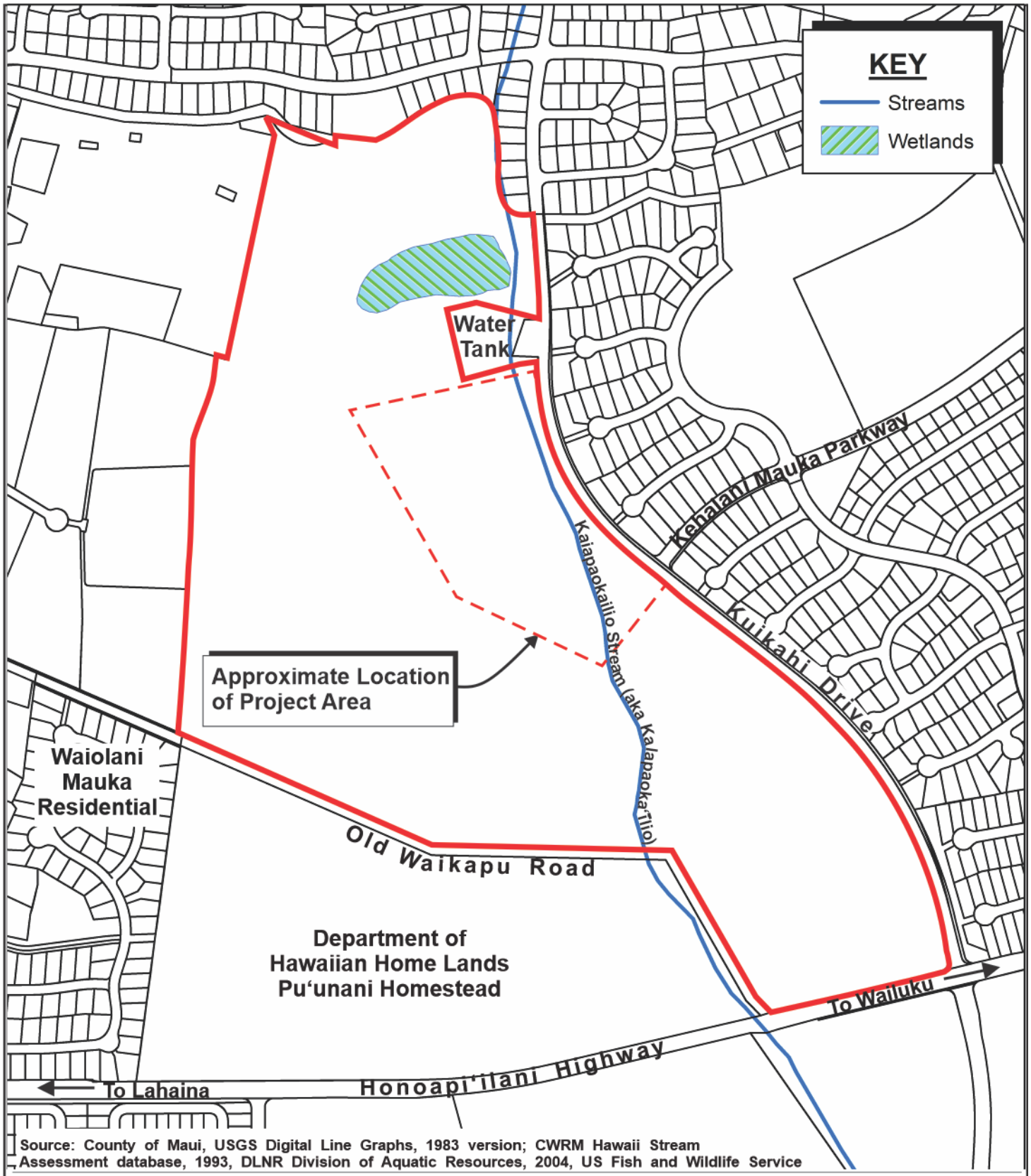
The project site is located in the midst of residential developments in Wailuku. Appropriate BMPs will be used during construction and applicable drainage detention measures provided for the long-term habitation of the site. The Applicant will make every effort to ensure that the project will not have a direct impact upon the natural drainageway, Kaiapaokailio Stream, Waikapū Stream, or any other waterbody in the region.

7. Flora and Fauna

a. Existing Conditions

A flora and fauna survey was conducted for the proposed project by Robert W. Hobdy, environmental consultant, in June 2020. See **Appendix "C"**. 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.



Source: County of Maui, USGS Digital Line Graphs, 1983 version; CWRM Hawaii Stream Assessment database, 1993, DLNR Division of Aquatic Resources, 2004, US Fish and Wildlife Service

Figure 11 Kuikahi Affordable Housing Project

Streams and Wetlands Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis/Wailuku AH/Applications/Figures/Streams and Wetlands.DEA

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.

A walk-through botanical survey was conducted to identify all plant species, distribution, and abundance at the project site. The vegetation in the project area was dominated by tall, dense grass. Plant diversity was low and many species were heavily grazed by goats and deer. A total of 30 plant species were recorded during the survey. One (1) species of Guinea grass was abundant throughout the project area, two (2) other species were common, koa haole, and glycine. The remaining 27 plant species were either uncommon or rare. There were no native plants found during the survey.

In conjunction with the botanical survey, a walk-through fauna survey was also conducted. Additionally, field observations were made with the aid of binoculars and by listening to vocalizations. An evening visit was made to the area to record crepuscular activities and vocalization and to see if there was any evidence of occurrence of the endemic and endangered Hawaiian hoary bat in the area. Signs of presence of two (2) species of non-native mammals were observed in the project area during two site visits: domestic goats and axis deer. An evening survey using a bat-detecting device was made in the project area to determine any presence of the Hawaiian hoary bat. No bat activity was detected with the use of this device. Other non-native mammals that would likely use this project area, but which were not seen, include rats, mice, and domestic cats.

Bird diversity and total numbers were low in the project area. Only six (6) widespread non-native bird species were observed during the two (2) site visits. One (1) species was uncommon, the zebra dove, while the remaining five (5) species were all of rare occurrence. A few other non-native bird species would likely utilize this habitat occasionally, but this dry, nearly monotypic grassland is not suitable for Hawai‘i’s native forest birds, sea birds, water birds or nēnē, and none were seen.

Similarly, insect species and total numbers were likewise sparse in the project area. Six (6) non-native insects were recorded during the two site visits. One (1) species was uncommon, the long-tailed blue butterfly. The

remaining five (5) insect species were of rare occurrence. No native insects were seen, and no host plans for any rare native insects were seen.

All mammal, bird and insect species recorded in this project area were non-native species. Heavy grazing and browsing by domestic and wild animals has reduced plant species to only the hardiest and least edible components. This in turn has resulted in low numbers of all other animal species at the project area.

b. Potential Impacts and Mitigation Measures

Though there were no endangered Hawaiian hoary bats recorded during the survey, the Survey noted that these mammals could occasionally pass through the area. Should they be found in the project area, the U.S. Fish and Wildlife Service has guidelines for their protection which will be followed by the Applicant. Similarly, no native bird species were found at the project area during the two (2) site visits. However, there are native seabirds, the endangered Hawaiian petrel and the threatened Newell's shearwater, that may fly over these lowlands on the way to their burrows high in the mountains. These seabirds, and especially the fledglings, are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. They are then vulnerable to injury, vehicle strikes and predators. As recommended in the Survey, the Applicant will shield all significant outdoor lighting downward to minimize disorientation of these protected seabirds. Refer to **Appendix "C"**.

8. Archaeological Resources

a. Existing Conditions

A previous Archaeological Inventory Survey (AIS) was conducted in 2005 for two (2) parcels totaling 215.8 acres (TMK Nos. (2)3-5-002:002 and 003), which included the 14.9-acre project site. The AIS was conducted by Scientific Consultant Services, Inc. (SCS) and was comprised of historic background settlement pattern research, a complete pedestrian survey of the survey area, and subsurface testing via backhoe and reporting. The State Historic Preservation Division (SHPD) accepted the AIS by letter dated November 18, 2005. See **Appendix "D"** and **Appendix "D-1"**, respectively.

The fieldwork involved the execution of a complete pedestrian survey of the subject area, as well as lands beyond for the purpose of site inventory and limited subsurface testing to evaluate the significance of any subsurface deposits. Laboratory work consisted of analysis of any

subsurface deposits found and literature research review involved a review of all previous archaeological work conducted in the surrounding area.

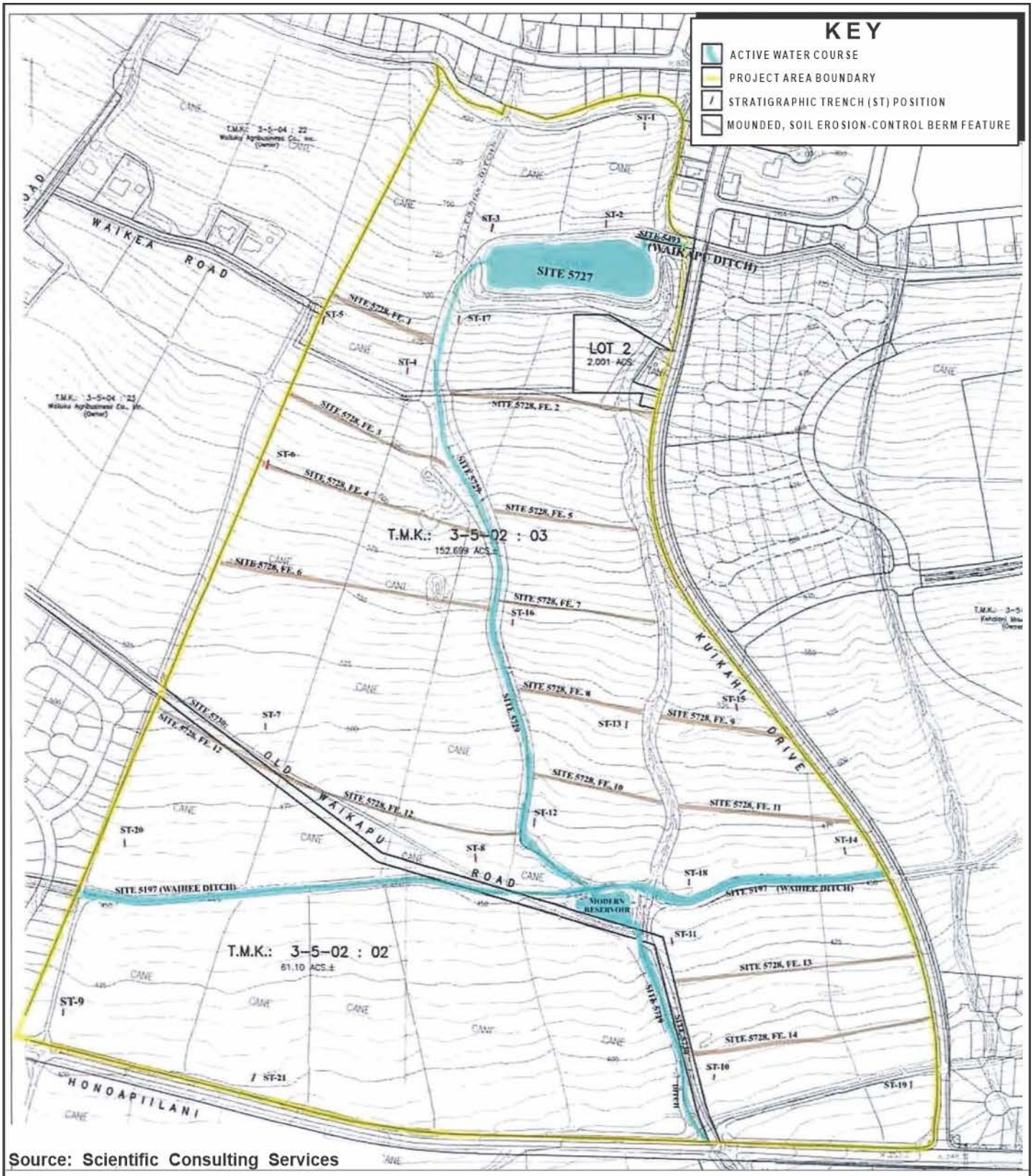
During the field inspection, seven (7) historical sites related to the former use of the area for sugar cane cultivation were identified. The sites were determined significant under Criterion "D" as having the potential to yield information important to understanding the history of the region and were determined to be adequately documented by SHPD. Refer to **Appendix "D"**. The sites included Waihee Ditch (State Site 50-50-04-5197), Waikapū Ditch (State Site 50-50-04-5493), an unnamed lesser ditch (State Site 50-50-04-5729), another unnamed lesser ditch (State Site 50-50-04-5726), a larger unnamed reservoir (State Site 50-50-04-5727), a series of 14 sugar canefield erosion-control soil berms (State Site 50-50-04-5728), and Old Waikapū Road (State Site 50-50-04-5730). Six (6) of the seven (7) sites are located outside of the project area. The series of sugar cane erosion-control soil berms (State Site -5728) is located within the project site. See **Figure 12.** These sites revealed a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road and are part of the turn-of-the century sugar industry in Hawai'i. No burial features or human remains were identified during the pedestrian surveys or subsurface testing.

For the proposed Kuikahi Village project, a HRS 6E submittal form and related documentation was prepared and submitted to the State Historic Preservation Division (SHPD) for review and determination in February 2021. See **Appendix "D-2"**.

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

The previous AIS for the 14.9-acre site involved evaluation, documentation, and recordation and when necessary, limited subsurface investigation of recorded sites. Laboratory analysis was also performed, where necessary.

As noted previously, the AIS was accepted by SHPD by letter dated November 18, 2005. In their acceptance letter, SHPD concluded that no further archaeological mitigation is necessary. Refer to **Appendix "D-1"**. The project's archaeologist, SCS, submitted a Section 6E, HRS form to SHPD in February 2021 to reconfirm SHPD's acceptance of the previous AIS and that no further action is necessary. A copy of the Section 6E, HRS form is attached as **Appendix "D-2"**.



Source: Scientific Consulting Services

Figure 12 Kuikahi Affordable Housing Project

Archaeological Site Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\Archaeological Site Map

9. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment (CIA) report was prepared March 1, 2021 by Honu Media in order to identify the possibility of ongoing cultural activities and resources within the project area or its vicinity, and then assessing the potential for impacts on these cultural resources. See **Appendix "E"**.

The land on which the proposed project sits was cultivated for sugar and pineapple for over 135 years and untouched since 2005 when agricultural activities ceased. As described in the Archaeological Resources section of this Chapter, the AIS identified historical sites related to former use of the area associated with sugar cane cultivation. No burial features or human remains were identified.

Oral interviews were conducted as part of the CIA with interviewees that responded to solicitations and were contacted for interviews on cultural and historical knowledge of the project area.

An interview was conducted with Warrick Dutro from Kula, Maui who is a member of the Cummings family, but grew up in the area and practices ka nohona Hawai'i. Mr. Dutro farms taro nearby at one of the many loʻi kahiko o Waikapu with walls built from two-man boulders. While the area was commercially farmed, youngsters played, and teenagers came in their trucks to drink beer and socialize. Warrick recalls chicken fights in the pineapple field of Puhiawaʻawa, away from Waikapu Valley. The CIA notes that cock fighting was a traditional Hawaiian pastime also, as reported by Martha Beckwith in *Hawaiian Mythology*. Refer to **Appendix "E"**. Other memories described by Mr. Dutro were the pineapple fields being used to dispose of pig bones after family luaus and people sometimes buried their pets in the fields.

Also interviewed was Avery Chumbley, Manager of the Wailuku Water Company, who had knowledge on the history of the area. He spoke of pre-Mahele times in the mid 1800's when the lands were heavily populated with native Hawaiians, particularly in the Wailuku area. During that time, it was Kingdom-land that cultivated coffee beans. Wailuku Sugar Company bought the land in 1894 and its successive entities, Wailuku Agribusiness which was part of C. Brewer & Co., who owned or controlled the property before selling it to Towne Realty. The property was in sugar cane cultivation until it was used for pineapple cultivation from about 1988 until about 2003

or 2004. He had no knowledge on cultural or historical aspects of the property except for the reservoir that is regulated by the DLNR Dam Safety Division. He stated that the regulated dam could be a high risk to life and property. A failure or breach of the dam would be a catastrophic event of severe flooding. Mr. Chumbley was aware of the SCS Archaeology report of 2005 and knew that there were no finds other than plantation irrigation ditches and the Old Waikapu Road.

Seven (7) other people who responded to the solicitation for interviewees were as follows:

- Kumu Hōkūao Pellegrino, President of Na Wai ‘Eha, former president of Maui Historical Society, and an educator at Kamehameha Schools. His response is pending.
- Kaniloa Kamaunu, committee member of ‘Aha Moku o Wailuku, asked the Applicant for a presentation to ‘Aha Moku Committee members and Po‘o o ka Moku o Wailuku, Clyde Kahalehau. The presentation is currently being scheduled.
- Kaleo‘uhane Ho‘opai, Wailuku resident and family genealogist was met during a “talk story” session at Church of God on Ho‘okele Street in Wailuku. She did not have any specific cultural or historical facts about the project area.
- Lucienne DeNaie is the Principal of Maui Tomorrow, Sierra Club, and Maui Cultural Land Trust, and a Historian and Author. Her suggestion was to interview Avery Chumbley, Wailuku Water Company, formerly with C. Brewer & Company, which owned Wailuku Sugar Company. She also kindly passed on requests for informants to committee members of the ‘Aha Moku o Wailuku.
- Penelope Randall who emailed a reply stating “*All I know is that all that area has burials*” did not respond to a follow-up email or phone calls. No further response was received by Ms. Randall.
- Amy Halas replied to the first public release, but did not have any specific ties to or information about the project area. No further response was received on a second request.
- Mavis Madieros Oliviera of the Oliviera-Ho‘opi‘i family of Hana is a Researcher for the Ke ‘Au Ali‘i land conservation group in Hana. She had no specific information about the project area.

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

The CIA report was an effort of multiple online searches of government and museum map collections, photos and aerials that revealed no structures on the property. Refer to **Appendix “E”**. The 2005 AIS of the property recorded historic irrigation ditches, watercourses and roads registered with SHPD. Recent studies of Kehalani Mauka just east and south of the project

area also found similar irrigation ditches and no burial assets. Out of the interviews conducted via solicitation, none testified to the presence of any ceremonial or cultural practices, resources, or sites, presence of house sites or burials connected to the project area. As such, the CIA report concluded that there would be no impacts to cultural resources, nor effect on historic properties. Furthermore, the report also recommended adhering to monitoring practices as prescribed by SHPD.

10. Air Quality

a. Existing Conditions

There are no point sources of airborne emissions in the immediate vicinity of the project site. Although minimal, airborne pollutants are largely attributable to vehicular traffic on the surrounding roadways. Windblown dust from surrounding fallow agricultural lands is another source of indirect emissions in the region. These sources, however, are intermittent and prevailing winds quickly disperse the particulates generated by these temporary sources. Overall, the air quality in the region is considered good.

b. Potential Impacts and Mitigation Measures

In the short term, construction-related activities for the proposed project will be the primary source of airborne pollutants affecting the surrounding area. Site work involving clearing, grubbing, and grading operations will generate fugitive dust. Appropriate BMPs, such as periodic watering of exposed surfaces, installation of dust screens, and regular maintenance of construction equipment will be utilized to minimize air quality impacts associated with project construction.

The proposed project is not an action which will generate adverse long-term air quality impacts. In the long term, the proposed project will provide 204 affordable housing units to families earning 140 percent or below the Area Median Income. The proposed residences are not anticipated to have an adverse effect upon air quality.

11. Greenhouse Gas Considerations

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, 2007). Within the State of Hawai‘i,

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 (Hawai‘i 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, the 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 Mitigating Measures</u>

The proposed action involves the construction of 204 residential units. In the context of the GHG Reporting Program (25,000 metric tons of CO_2 EQ), the relative effects of GHG emissions (CO_2 EQ) from the project are not considered significant.

The average energy use per household in Maui County[1] is 581 kilowatt hours (kWh) per month (Hawai‘i Energy, 2017). This corresponds roughly to production of 4.9 metric tons CO_2 EQ per year (U.S. EPA, 2018). As such, the GHG emissions associated with the proposed development of 204 residences is anticipated to be on the order of 980 metric tons CO_2 EQ per year.

The proposed action will involve short-term consumption of fuel for construction equipment, vehicles, and machinery during the construction period. This usage is not anticipated to be substantial or excessive within the context of the action's benefits over the lifetime of the project. After the project is completed, use of the proposed residences may result in increased motor vehicle traffic in the project area. Statewide, vehicle-related fuel consumption for commercial, industrial, and residential sectors is a less significant contributor to total GHG emissions than emissions

[1] Honolulu = 561 kWh/month; Hawai‘i = 505 kWh/month. These are county-wide averages. If the proposed residences incorporate solar photovoltaic energy generation or other sustainable elements which would reduce energy consumption below average levels, this can be addressed as a mitigating factor.

attributable to electricity consumption (Hawaiʻi Department of Health, 2019), and this contribution is anticipated to continue to decrease due to ongoing reduction in vehicle emission standards as well as increased utilization of hybrid and electric vehicles.

The proposed action will incorporate energy efficient features to the extent possible. Features may include solar hot water heaters or other energy efficient hot water devices, energy efficient light fixtures in the parking areas, and use of architectural features on the residential units. Furthermore, the State of Hawaiʻi has set a renewable energy portfolio standard of 100 percent (100%) by the year 2045 (Section 269-92, HRS) to minimize dependence on fossil fuel combustion, and has declared a policy to reduce GHG emissions to 1990 levels by the year 2020 (Act 234, Session Laws of Hawaiʻi, 2007). The State is on track to meet these goals (Hawaiʻi Department of Health, 2019; Hawaiʻi PUC, 2018), which will result in a reduction of GHG impact of the proposed action along with reductions of GHG emissions statewide.

The proposed action is not anticipated to create significant direct and indirect foreseeable GHG emissions. This action does not fall within the threshold of mandatory GHG reporting.

12. Noise Quality

a. Existing Conditions

There are no fixed noise generators in the vicinity of the project site. Noise generated in the area is primarily attributed to vehicular traffic along the surrounding roadways, including Honoapiʻilani Highway which lies directly to the east of Parcel 3, where the proposed project will be located. Overall, the noise level in the region is fairly low.

a. Potential Impacts and Mitigation Measures

Ambient noise conditions may be temporarily affected by construction activities. Heavy construction machinery, such as backhoes, dump trucks, front-end loaders, and material-transport vehicles are anticipated to be the dominant noise-generating sources during the construction period of the proposed project.

In order to mitigate noise impacts, construction activities are anticipated to be limited to daylight work hours generally, Monday through Friday. Project-related noise will be minimized through use of applicable BMPs, such as regular maintenance of construction equipment and use of properly

muffled equipment. In the long term, the proposed project is not anticipated to have adverse noise quality impacts.

13. Hazardous Materials

a. Existing Conditions

As previously mentioned, the proposed project site had been previously cultivated for sugar cane and pineapple agricultural production for several decades. During this time, agricultural pest control chemicals and fertilizers were used on the property. By the early 2000's, agricultural production of sugar cane and pineapple ceased, and the land has remained vacant and fallow since then.

A Phase 1 Environmental Site Assessment (ESA) had previously been conducted for a master planned residential project that was previously proposed on Parcel 3 (including the proposed project site), and adjacent properties to Parcel 3, called the Pu'unani project. The Phase 1 ESA identified physical, recognizable environmental conditions as defined by the American Society of Testing Materials (ASTM) standards associated with the past use of the project area. The inspection revealed no evidence of recognized adverse environmental conditions in connection with the prior Pu'unani project properties, as follows:

- **Database Listings:** The subject site is not listed. The report opined that one (1) nearby listed site and another site located within a half-a-mile do not have a reasonable potential to adversely impact the environmental condition of the subject property due to its down gradient location from the properties.
- **Current and Historic Use or Storage of Hazardous and Regulated Substance:** There is no evidence of any historic misuse or significant spills of hazardous or regulated substances on the subject properties.
- **Solid Waste Management:** A limited amount of historical dumping (construction and miscellaneous debris) was evident on the subject properties. Management of these wastes should be performed in a manner that complies with all local, state and federal regulations, as applicable to the waste type. During future site work, if large amounts of construction debris or unidentifiable substances (containers) are discovered, proper waste identification, testing, and applicable waste handling and disposal procedures are recommended.

- **Surface Waters and Area Aquifer Protection:** The developer and property owner should be aware of the potential for offsite contaminants to migrate into nearby drainageways. Products of concern relating to any future development project or land-clearing activity would be earthen material (silt), paints, oils, antifreezes, and other fluids from automobile or onsite machinery, or leaks from onsite stocked items (Vuich Environmental Consultants, Inc., 2004).

b. Potential Impacts and Proposed Mitigation Measures

Based on the results of the Phase 1 ESA prepared for the previously proposed Pu‘unani project—which encompassed Parcel 3, including the same project area as the Kuikahi Affordable Housing project—there was no evidence of hazardous materials at the project area (Vuich Environmental Consultants, Inc., 2004). Up until about the early 2000’s, the area was used for sugar cane and pineapple cultivation. During future site work, if large amounts of construction debris or unidentifiable substances (i.e., containers) are discovered, proper waste identification, testing, and applicable waste handling and disposal procedures will be implemented.

Use of fertilizers within residential lots and within common areas will be in a manner consistent with best landscape practices so as to avoid the overuse of soil amendments and nutrients. With such practices, there are no anticipated adverse effects on groundwater resources attributed to fertilizer use. No adverse impacts to surface, underground, or marine resources are anticipated.

14. Scenic and Open Space Resources

a. Existing Conditions

The West Maui Mountains to the west, Haleakalā to the east and Kahului Bay and the Pacific Ocean to the northeast define the scenic resources in Central Maui.

The project site is surrounded by fallow former agricultural lands and residential developments similar in scale to the proposed project as well as limited commercial development.

b. Potential Impacts and Mitigation Measures

The proposed dwelling designs are consistent with other similar developments in the vicinity of the proposed project and will conform to the

Maui County Zoning Code for single-family and multi-family structures. It is noted that electrical utility lines will be placed underground. In addition, the proposed project is located in the upper portion of Parcel 3, away from the Honoapiʻilani Highway, providing an open space setback from the roadway to the house lots. It is anticipated that the project will not have an adverse impact on scenic and open space resources.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Land Use and Community Character

a. Existing Conditions

From a regional perspective the project site is located immediately south of the urbanized area of Wailuku Town and north of Waikapū Town. Wailuku Town serves as the commercial and governmental center of the region. The project site is surrounded by fallow former agricultural lands, and other residential developments of the same nature as the proposed project as well as existing commercial development.

b. Potential Impacts and Proposed Mitigation Measures

The project is compatible with the adjacent residential uses and community character. As such, the proposed project is in consonance with the current land use and community character of the area.

2. Population

a. Existing Conditions

According to the 2020 U.S. Census, the population of Maui County was 164,754, an increase of 6.4 percent since 2010, when the County had a population of 154,834 (U.S. Census Bureau, 2020). It is noted, however, that population growth over the past decade has been uneven, with stronger growth in the early part of the decade. The U.S. Census Bureau's annual population estimates data indicates that Maui County population grew steadily between 2010 and 2014, when annual population growth rates ranged from 1.2 percent to 1.3 percent. The estimated population in 2014 was 163,036. The 2020 U.S. Census resident count for Maui County is actually lower than the Census Bureau's previous population estimates for 2016 to 2019 (U.S. Census Bureau, 2019).

Sub-county population data from the 2020 Census is not yet available. However, according to the U.S. Census Bureau's 2019 American

Community Survey five-year population estimates, the Wailuku Census Designated Place had a population of 17,708 residents between 2014 and 2019 (U.S. Census Bureau, 2019).

The State of Hawai‘i, Department of Business Economic Development and Tourism (DBEDT) publishes population projections through 2045. According to the latest forecast, which was published in 2018, Maui County’s population is expected to grow to 211,500 by 2045 (State of Hawai‘i, DBEDT, 2018).

b. Potential Impacts and Proposed Mitigation Measures

The proposed project involves developing needed affordable housing units for Maui families earning between 60 percent and up to 140 percent of the AMI. In the context of the County of Maui’s population projections through the year 2030, the proposed project is not anticipated to significantly alter population trends. The proposed project is not anticipated to result in adverse impacts on the region’s or island’s population parameters.

3. Economy

a. Existing Conditions

The economy of Maui is heavily dependent upon the visitor industry. Many of the hotel and resort amenities are in South Maui and West Maui, with non-resort, smaller hotels located in Central Maui.

The economy of the Wailuku region is anchored by government services, with County and State agency offices occupying the civic center portion of town, near the High Street-Main Street intersection. With access to government offices, professional services such as engineering, architectural, and accounting offices are located nearby.

Hawai‘i’s economy through 2019 was strong, with record-setting visitor arrivals and low unemployment. However, the COVID-19 pandemic has had far reaching impacts on the economy on Maui, in Hawai‘i, and across the nation and world. Stay-at-home regulations and travel quarantines aimed to curb the spread of COVID-19 virus in Hawai‘i have caused many businesses to shut down or drastically reduce operations. Unemployment claims have soared. The County’s and State’s economy is slowly recovering, but unemployment remains high. In May 2021, the unemployment rate in Maui County reached 10.4 percent, compared to 32.5 percent in May 2020 (during the pandemic) (Department of Labor and Industrial Relations, 2021).

b. Potential Impacts and Mitigation Measures

The proposed project will provide short-term construction-related employment and services. From a long-term perspective, the project will provide much-needed affordable housing in close proximity to the Wailuku Town area. The proposed housing will serve households seeking primary residence and will not be for second home or transient populations. Affordable housing reduces the portion of incomes residents must pay for rent, providing them with more disposable income. Significant adverse economic impacts are not anticipated.

4. Housing

a. Existing Conditions

The County of Maui 2030 General Plan – Countywide Policy Plan notes that *"shelter is among the most basic of human needs"*. The affordability, quality, and location of housing – including the degree of crowding within the home and within the neighborhood – play an enormous role in the quality of life of Maui County's residents.

According to the *Hawaii Housing Planning Study, 2016*, a significant number of Maui households live in overcrowded conditions or are "doubled-up" with other families. According to the report, crowding continues to be a problem in the housing market and in 2016 affected 21.4 percent of households in Maui County.

The population growth factors related to housing demand include total population, households, and household size. The study reported that between 2010 and 2015, the total population increased by 19.3 percent, number of households by 12.5 percent and average household size by 5.8 percent. The data is consistent with a housing market where demand is greater than supply.

According to the study, renters in Maui County represented 39 percent of households and paid the second highest amount ($2,106) to cover their monthly housing expenses. In 2014, affordable units were most limited in Maui County, with just 48.6 percent of the island's 50,021 units affordable to Maui's lower income households (SMS, 2016).

b. Potential Impacts and Mitigation Measures

As previously mentioned, Maui County's need for affordable homes has risen due to an increasing population over the past decade. According to the *Hawaii Housing Planning Study 2016*, the future housing demand for Maui County between 2015 and 2025 is forecasted to be 13,949 units. The total forecasted (2015-2025) single-family and multi-family units by U.S. Department of Housing and Urban Development (HUD) income classification (Percent of Area Median Income (AMI)) for Maui County for owner occupied and rental units are summarized in **Table 2**.

Table 2. Rental Housing Forecast by HUD Income Classification (Percent of AMI)

	Less than 30 Percent	30-50 Percent	50-60 Percent	60-80 Percent	80-120 Percent	120-140 Percent	140-180 Percent	180+ Percent	Total
Total Demand	2,947	2,775	1,414	2,393	1,626	1,493	500	801	13,949
Total Ownership Units	1,079	824	351	1,151	1,308	1,292	469	766	7,240
Single-Family Ownership	1,022	783	234	1,022	1,112	1,032	368	610	6,183
Multi-Family Ownership	57	41	117	129	196	260	101	156	1,057
Total Rental Units	1,868	1,951	1,063	1,242	318	201	31	35	6,709
Single Family Rental	1,295	1,226	771	1,050	239	156	17	30	4,784
Multi-Family Rental	573	725	292	192	79	45	14	6	1,926

Source: SMS Research & Marketing Service, Inc., Hawaii Housing Planning Study, 2016.

The amount of affordable, long-term housing options, in addition to transportation costs, greatly outpace living wages that families are earning.

The Applicant has reviewed the potential market for the proposed affordable units and analyzed options for the sale of the units. With 100 percent of the proposed units being for sale within the 60 percent to 140 percent AMI, the Applicant will review options to keep these units at affordable sale prices, while providing owners the option to build equity in their units which would allow for the potential to move in to larger or different types of housing units, as their family needs change over time. See **Appendix "F"**, Market Overview, prepared by Applicant.

The proposed project will provide 204 affordable housing units to families earning between 60 percent and up to 140 percent of the AMI, filling a critical need for affordable housing in Maui County. The proposed project is located in close proximity to jobs, schools, and other public and commercial services.

C. PUBLIC SERVICES

1. Solid Waste Collection and Disposal

a. Existing Conditions

Single-family residential solid waste collection service in Wailuku is provided by the County of Maui on a weekly basis. Residential solid waste collected by County crews are disposed of 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 privately operated greenwaste recycling facility, Maui Earth Compost Company, is situated at Pulehu Road and Hansen Road, while Eko Compost is operated at the Central Maui Landfill. According to the County of Maui, the Central Maui Landfill has adequate capacity to accommodate residential and commercial waste needs through the year 2026. The County's Department of Environmental Management is currently planning to implement a processing facilities project adjacent to the landfill, which would further extend the projected capacity by an estimated 16 years. The remaining capacity estimate is based on future disposal volumes that assume significant population growth.

b. Potential Impacts and Mitigation Measures

Construction-related waste will be properly disposed of in accordance with policy and practices established by the Solid Waste Division to ensure that there are no adverse impacts to the County's Central Maui Landfill.

Upon completion, it is anticipated that the residences will be served by a private refuse collection service. Refuse from the project site will be disposed of at the County's Central Maui Landfill. As such, there are no adverse impacts anticipated to the County's disposal capacities attributed to the proposed project.

2. Police, Fire, and Medical Facilities

a. Existing Conditions

Police protection for the Wailuku-Kahului region is provided by the Maui Police Department located at the Wailuku Station headquartered on Mahalani Street, approximately two (2) miles northeast of the project site. The Maui Police Department provides investigative services, uniform patrol services, technical support, and traffic services as stated in its mission to protect the residents of Maui County.

Fire prevention, protection, rescue, and emergency services for the Wailuku-Kahului region are provided by the Maui County Department of Fire and Public Safety. The department has two (2) stations to service the Wailuku-Kahului region, both in proximity to the project site. The Wailuku station is located in Wailuku town approximately 1.5 miles northeast of the project site and the Kahului station is located on Dairy Road in Kahului approximately three (3) miles southeast of the project site.

Maui Memorial Medical Center is managed by Kaiser Permanente and is the only major medical facility on the island. Acute, general, and emergency care services are provided by the 214-bed Maui Memorial Medical Center facility located on Mahalani Street, Wailuku, about two (2) miles east of the project site.

In addition, Kaiser, Maui Medical Group, and Maui Medical Clinic provide health care for the island of Maui. These facilities are located in Wailuku and Kahului. Dental and other medical offices are also located within the Wailuku-Kahului region to serve its residents and visitors.

b. Potential Impacts and Mitigation Measures

The proposed project involves the proposed development of a new residential development in Wailuku. The proposed project is located within service areas for existing police, fire, and medical facilities and is not anticipated to adversely impact these services.

3. Educational Facilities

a. Existing Conditions

The State Department of Education (DOE) operates several schools in the Wailuku-Kahului region. Public school facilities within the Wailuku-Kahului District area include: two (2) high schools, Henry Perrine Baldwin High and

Maui High (grades 9 to 12); two (2) intermediate schools, Iao Intermediate and Maui Waena Intermediate School (grades 6 to 8); and six (6) elementary schools (Grades K to 5), Wailuku Elementary, Waiheʻe Elementary, Pōmaikaʻi Elementary, Kahului Elementary, Lihikai Elementary, and Puʻu Kukui Elementary School.

The area is also served by several privately operated schools providing education for elementary, intermediate, and high school students. Privately operated schools serving the Wailuku-Kahului region include St. Anthony School (grades K to 12), Kaʻahumanu Hou Christian School (grades K to 12), Emmanuel Lutheran School (K to 6), and Maui Adventist School (grades 1 to 8).

The DOE's 2020 to 2021 school enrollment for their Central Maui schools are presented in **Table 3**.

Table 3. 2020 to 2021 DOE School Enrollment

School	Enrollment
Baldwin High School	1,299
Iao Intermediate School	889
Kahului Elementary School	901
Lihikai Elementary School	816
Maui High School	2,100
Maui Waena Intermediate School	1,100
Pōmaikai Elementary School	565
Puʻu Kukui Elementary School	735
Waiheʻe Elementary School	601
Wailuku Elementary School	626
Source: Department of Education, 2020.	

Additionally, the University of Hawaiʻi Maui College is a four-year college located on Kaʻahumanu Avenue in Kahului.

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

The proposed project entails the development of 204 affordable housing units in Wailuku. It is understood that the DOE's elementary, intermediate, and high schools servicing the project area are over capacity. The Applicant will collaborate with the DOE on redistricting strategies and assisting in advancing plans to develop new schools and expanding existing schools for previous proposed large developments in the region.

The proposed project is located in the DOE's Central Maui Impact Fee District. The State law on school impact fees, Chapter 302-A, Hawaiʻi

Revised Statutes (HRS), requires the execution of an Education Contribution Agreement (ECA) with the DOE prior to any approvals of subdivision or building permits. As such, the Applicant is prepared to pay for prescribed impact fees and plans to meet with the DOE to discuss execution of an ECA. Impacts on school facilities will be mitigated with payment of the impact fees.

4. Recreational Facilities

a. Existing Conditions

Within the Wailuku-Kahului Community Plan Region, there are many recreational activities, including shoreline and boating activities at the Kahului Harbor and adjoining beach parks, and organized recreational activities provided/offered at County Parks. Within close proximity of the project site is Waikapū Park and Community Center. In Wailuku town are Wells Park, the Wailuku Elementary School Park, the ʻĪao Valley State Park the Kehalani Mauka Park, the Velma McWayne Santos Community Center, Papohaku Park, War Memorial Athletic complex, Wailuku Little League baseball fields, the 65-acre Maui Regional Park, Maui Lani Parkway Park, Sakamoto Swimming Pool, and Keōpūolani Regional Park.

In addition, there are several golf courses in the Wailuku-Kahului region. These include the Kahili and Kamehameha Golf Courses, The Dunes at Maui Lani Golf Course, and the Maui County-owned Waiehu Golf Course.

b. Potential Impacts and Mitigation Measures

The proposed project entails the development of a new affordable housing development in Wailuku. The proposed development will not only include residences, but also a playground, pavilion and “spot parks” for residents’ use. The “spot parks” will be approximately 700 to 1,500 s.f. in size, while the pavilion will be approximately 400 s.f. and the playground will be 3,800 s.f. Additionally, a pedestrian and bike path is proposed within the development, which would connect to Kuʻikahi Drive. Refer to **Figure 3**. It is anticipated that many residents would relocate from other areas on Maui. As such, adverse impacts to recreational resources are not anticipated.

It is noted that residential subdivisions in the County of Maui are required to dedicate land for park/playground purposes, improvements to a park in the same community plan area, or payment of an in lieu fee to the County. The proposed project is intending to request that the proposed recreational improvements meet the park assessment requirements through the MCC Chapter 2.97 application process.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

A Traffic Impact Analysis Report (TIAR) was prepared by Austin, Tsutsumi & Associates, Inc. for the proposed project in January 26, 2021 to evaluate potential traffic impacts resulting from the proposed project. See **Appendix "G"**.

Roadways surrounding the project site and serving the region are:

1. Honoapiʻilani Highway, east of the project site, is a north-south State Department of Transportation (SDOT) - Highways Division roadway, two-way, two-lane undivided arterial highway with posted speeds ranging from 30 miles per hour (mph) to 45 mph. Separate right turn lanes are provided at all major intersections from Wailuku to Waikapu.

2. Kuʻikahi Drive that borders the project site, is a County east-west roadway, two-way, two-lane, undivided collector road with posted speeds ranging from 25 mph to 30 mph.

3. Maui Lani Parkway that connects to Kuʻikahi Drive, is a County east-west roadway, two-way, two-lane divided collector road which provides a connection for the Waiale area to other regional roads.

4. Waiale Road, a County north-south roadway, is a two-way, two-lane, undivided collector road with posted speeds ranging from 25 mph to 30 mph. It serves as the southern connection to Lower Main Street, extends through the Kehalani Village Center, and ends in Waikapu at East Waiko Road.

5. East Waiko Road, a County east-west roadway, is a two-way, two-lane, undivided collector road with posted speeds ranging from 20 mph to 25 mph. East Waiko Road connects to the Honoapiʻilani Highway at its west terminus at a signalized intersection.

6. Kehalani Parkway, mostly a County roadway, is a two-way, two-lane divided collector road with posted speeds ranging from 20 mph to 30 mph. The parkway starts from the lower Kehalani residential subdivisions and extends east across Honoapiʻilani Highway in the mauka direction then loops around Puʻu Kukui Elementary School

and the upper Kehalani residential subdivisions. The parkway physically continues to loop south and connect to Ku‘ikahi Drive across the proposed project access road. However, the mauka portion of the road is blocked while the Anuhea residential homes are being constructed.

7. Nokekula Loop, Ha‘awi Street and Kokololio Street, are east-west local County roads posted at 20 mph, which connect to Waiale Road and service the Waikapu Gardens, Phase I residential neighborhood.

8. Ohana Hana Loop, is an east-west local road posted at 20 mph that connects to Waiale Road and services the Waikapu Gardens Phase II residential neighborhood.

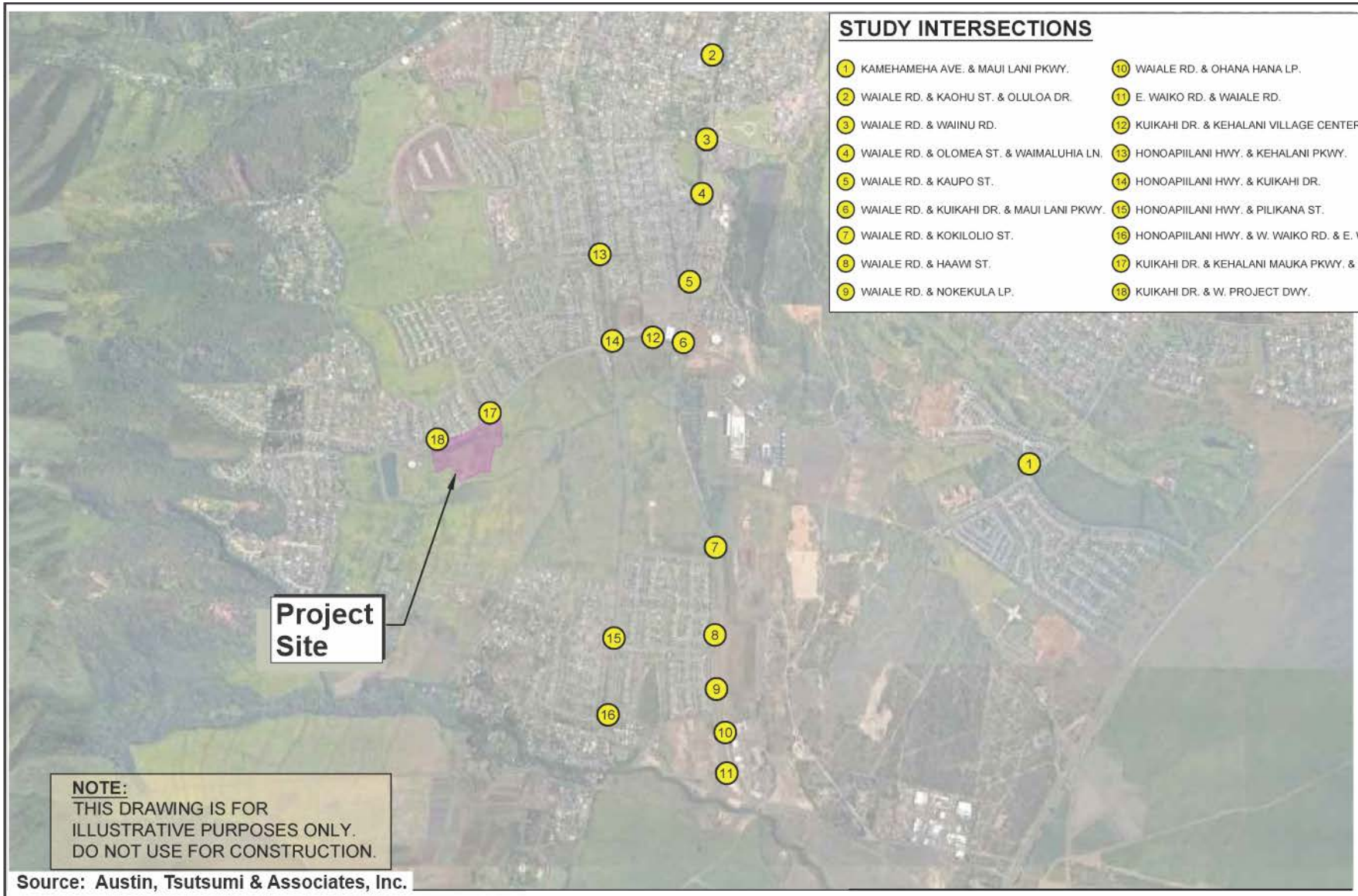
9. Kaohu Street, a County east-west local road posted at 20 mph, is a two-way, two-lane undivided local road servicing the County building, residential areas, and various businesses.

10. Olomea Street, a County east-west local road posted at 20 mph, is a two-way, two-lane undivided road servicing the Kehalani residential subdivision.

Existing traffic volumes were captured between March through May 2019 at the following roadway intersections surrounding the project area/region were analyzed on their existing operating Level of Service (LOS). See **Figure 13**.

1. Kamehameha Avenue/Maui Lani Parkway, most recently converted to a roundabout but was previously a 4-way stop controlled intersection where eastbound and southbound approaches operate at LOS F in the AM peak hour. The eastbound, westbound, and southbound through/right turn movement operates at LOS F with overcapacity conditions during the PM peak hour.

2. Waiale Road/Kaohu Street/Oluolu Drive is a four-way stop controlled intersection with shared lanes along its approaches. During the AM peak hour, the Waiale Road approaches operate at LOS F or overcapacity conditions. During the PM peak hour, the southbound approach operates at LOS F and overcapacity conditions with the northbound left turn/through movement operating at LOS E.



Source: Austin, Tsutsumi & Associates, Inc.

Figure 13

Kuikahi Affordable Housing Project

Traffic Study Intersection

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\Traffic Study Intersection

3. Waiale Road/Waiinu Road, an unsignalized T-intersection that is with stop control on the westbound Waiinu Road approach, operates at LOS F and overcapacity conditions with lengthy delays in both the AM and PM peak hours

4. Waiale Road/Olomea Street, is an unsignalized intersection with stop control on the eastbound Olomea Street approach. There is the Maui Community Correctional Center driveway slightly offset to the south of Olomea Street. During the AM and PM peak hour, the eastbound movement operates at LOS F and overcapacity conditions.

5. Waiale Road/Kaupo Street , is an unsignalized T-intersection with exclusive left turn and right turn lane along the Kaupo Street approach and no separate turn lanes on the Waiale Road approaches. Eastbound left turn movements operate at LOS F during the AM and PM peak hours with overcapacity conditions during the AM peak hour.

6. Waiale Road/Ku‘ikahi Drive/Maui Lani Parkway is a signalized intersection with exclusive left turn lanes on all approaches and an exclusive right turn lane on the westbound approach. All movements currently operate at LOS C or better during the AM and PM peak hour except with a 20 to 30 minute queue in the AM beyond the length of the left turn storage lane into the Kehalani Village Drive backing up to Honoapi‘ilani Highway.

7. Waiale Road at Kokololio Street, Ha‘awi Street, Nokekula Loop, and Ohana Hana Loop are unsignalized T-intersections servicing the Waikapu Gardens Phase I and II developments. All movements at the intersections operate at LOS B or better during the AM and PM peak hours.

8. Waiale Road/Waiko Road is an unsignalized T-intersection with shared lanes on all approaches with the southbound approach being stop controlled. All movements operate at LOS D or better during the AM and PM peak hours.

9. Ku‘ikahi Drive/Kehalani Village Center Access is an unsignalized T-intersection with exclusive left turn lanes in the eastbound and southbound directions with all movements operating at LOS D or better during the AM and PM peak hours except the southbound left turn movement that operates at LOS E during the PM peak hour.

10. Honoapiʻilani Highway/Kuʻikahi Drive is signalized intersection with exclusive left turn and right turn lanes on all approaches. All movements currently operate at LOS D or better during the AM and PM peak hours.

11. Honoapiʻilani Highway/Pilikana Street is a signalized T-intersection with an exclusive northbound left turn lane and southbound channelized exclusive right turn lane. All movements operate at LOS C or better during the AM and PM peak hours.

12. Honoapiʻilani Highway/Waiko Road is a signalized intersection with exclusive left turn lanes on the northbound and southbound approaches and exclusive right turn lanes on the eastbound and southbound approaches. All movements operate at LOS C or better during the AM and PM peak hours.

13. Honoapiʻilani Highway/Kehalani Parkway is a signalized intersection with exclusive left turn and right turn lanes on all approaches. All movements operate at LOS D or better during the AM and PM peak hours. There is a period of heavy traffic for about 30 minutes during AM peak hour between 7:15-7:45 AM from traffic generated by the Puʻu Kukui Elementary School. Queueing on Honoapiʻilani Highway at Aupuni Street fronting the Wailuku Library also results from the Wailuku Elementary School morning drop-offs. Northbound traffic on the highway queues back to Kehalani Parkway for about 5 to 10 minutes.

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

Traffic projections for the Base Year 2024, when the proposed project is anticipated to be completed, were determined based on existing traffic counts, the Maui Regional Travel Demand Model growth forecast for years of 2024 and 2035, and nearby developments in the immediate vicinity of the project. The growth rate was determined to be approximately 1.9 percent per year. Future developments accounted for expected to be built by 2024 are as follows:

- Waikapu Light Industrial (8.5-acre industrial development along Waiko Road)

- Waiale Business Park (formerly known as Waiko Light Industrial Subdivision, 102,414 square feet (s.f.) of commercial space and 215,195 s.f. of light industrial uses)

- Emmanuel Lutheran Pre-School (build out to include K-8 school with church/office buildings)
- Maui Lani Village Center (Infill anticipated of 19,700 s.f. commercial, 62,400 s.f. office, and 75,500 s.f. warehouse space)
- Kehalani Village Center (infill development of the existing retail center plus 56 multi-family dwelling units)
- Waiale Elua (70 single-family units with neighborhood park)
- Kehalani Mauka (Expansion of existing residential subdivision with 304 single-family plus 54 multi-family units)
- Waikapu Country Town (150 single-family units)
- Waikapu Ventures Affordable Housing (68 single-family plus 12 multi-family units)
- Heritage at Maui Lani (25 single-family units)
- Wailuku Apartment (324 multi-family units)
- Maui Lani Parkways Phase 3 (74 single-family units)
- Ag Subdivision Lots (5-ag lots proposed)
- Gentry (Maui Lani Ph. 8B and 8C) (291 single-family units)
- Puʻunani Homestead (161 single-family units)

Also, the Maui Lani Parkway/Kamehameha Avenue intersection was converted to a single-lane roundabout by the County in July 2020 and is included in the Base Year 2024 analysis. Some future planned roadway projects like the Waiale Road Extension and Waiko Road Improvements projects are not likely to be built by Year 2024 and were not included in the analysis.

The County's planned installation of a roundabout at the Waiale Road/Waiinu Road intersection, which will help the flow of traffic, is accounted for in the analysis.

Also, at various stages of occupancy of the Wailuku Apartments project, the signal timing at the Waiale Road/Kuʻikahi Drive intersection will be

optimized. The signalization timing was a traffic mitigation measure for the Wailuku Apartments project.

The planned Maui Lani Parkway Extension anticipated to connect the existing Maui Lani Parkway and extend northward to intersect with Waiinu Road where Maui Lani Parkway and Pu‘umele Street exist, will provide an alternate route into Kahului from Wailuku to alleviate traffic congestion along Waiale Road. Although the completion of this road is unknown, Base Year conditions were analyzed with and without the Maui Lani Parkway Extension.

For the Base Year 2024 analysis, with additional traffic generated by nearby developments plus defacto growth, LOS and turning movements at the various intersections studied throughout the network will worsen. If the Maui Lani Parkway Extension is built, a large portion of traffic is anticipated to be rerouted way from Waiale Road to mitigate much of the impacts from growth and background developments. Refer to **Appendix "G"**. The roundabout at Kamehameha Avenue/Maui Lani Parkway is anticipated to have all movements operate at LOS D or better for both peak hours except the southbound approach anticipated to operate at LOS E during the PM peak hour, below capacity.

The Waiale Road/Kaohu Street intersection movements on the Waiale Road approaches will continue to operate at LOS F and overcapacity as existing. Although signal warrants are met at this intersection, physical right-of-way and alignment constraints make it difficult to signalize.

The Waiale Road/Waiinu Road will experience similar conditions as at Waiale Road/Kaohu Street. Once implemented, the Maui Lani Parkway Extension would improve the LOS E and below capacity conditions at the Waiale Road/Waiinu Road intersection.

Signal warrants are met for existing conditions at the Waiale Road/Olomea Street intersection, although not planned at this time. Therefore, the intersection will continue to operate with over capacity conditions. Median refuge lanes may help to reduce delays for left turns out of Olomea Street. The Maui Lani Parkway Extension is again anticipated to reduce traffic along Waiale Road to generally improve operations at the Waiale Road/Olomea Street intersection.

At Waiale Road/East Waiko Road, a signal is anticipated if no provisions are made to provide separate left turn and right turn lanes on the Waiale Road approach.

With the Wailuku Apartments driveway added across the Ku‘ikahi Drive/Kehalani Village Center intersection, it is anticipated to operate at LOS F in both peak hours. However, a signal warrant was not met with projected Base Year volumes.

The Honoapi‘ilani Highway/Kehalani Parkway intersection will operate at LOS E conditions compared to its existing LOS D or better and continue to experience the 30 minutes of queueing attributed to the Pu‘u Kukui Elementary School morning traffic.

Finally, for the Honoapi‘ilani Highway/Ku‘ikahi Drive intersection, the eastbound approach and southbound left turns are anticipated to operate at LOS E and below capacity. However, overall the intersection will operate adequately at LOS D or better during both peak hours.

At Future Year 2024, the proposed project traffic generated is approximately 87 and 106 new trips during the AM and PM peak hours, respectively. All study intersections are generally forecast to operate at similar LOS to Base Year 2024 conditions. The project’s anticipated impact to Honoapi‘ilani Highway is 5 to 18 vehicles per peak direction and 3 to 12 vehicles along Waiale Road. At both of the proposed project driveways off Ku‘ikahi Drive, all movements are anticipated to operate at LOS B or better during both peak hours. The project anticipates inclusion of a mini roundabout at the main entrance to the project across Kehalani Mauka Parkway/Ku‘ikahi Drive provided all design criteria can be met during the design phase of the project.

The TIAR provided the following recommendations to address Base Year 2024 conditions without the proposed project, which includes various Waiale Road Corridor improvements such as:

- Consider various traffic control treatment option at Waiale Road/Kaohu Street intersection that may fit within the constraints of the site.

- Inclusion of median refuge lanes at unsignalized intersections with Waiale Road to ease entry of left turns onto Waiale Road.

- At Waiale Road/Ku‘ikahi Drive intersection, lengthen the southbound left turn lane by shortening the existing northbound left turn into Waimaluhia Lane. Signal timing should be continually optimized with new developments.

The TIAR provided the Future Year 2024 recommendations for mitigation with the proposed project:

- At the Waiale Road/Ku‘ikahi Drive intersection, optimize signal timing.

- At the proposed Ku‘ikahi Drive/Kehalani Mauka Parkway/Proposed Project Access intersection, consider a mini-roundabout when Kehalani Mauka Parkway fully opens to through traffic. Future design of the roundabout shall provide adequate horizontal and vertical sight distance on all approaches while maintaining an acceptable grade coupled with enforcement of speeds along the relatively steep Ku‘ikahi Drive approaches.

The TIAR concluded that with the two (2) mitigation measures noted above, the proposed project is not anticipated to have a significant impact on traffic in the area.

2. Water

a. Existing Conditions

A Preliminary Engineering Report (PER) was prepared by Otomo Engineering, Inc. for the proposed project. Refer to **Appendix "B"**.

Water for the Wailuku area is provided by the County's Department of Water Supply (DWS) Central Maui System. Water is provided from wells in the Iao and Waihe‘e aquifers. The previous landowner participated in a water infrastructure upgrade project for the DWS system, whereby a planned 300,000 gallon storage tank was expanded to 500,000 gallons to accommodate the previous project. The 500,000 gallon tank was constructed and is located at the 835 feet elevation, near the project site.

The PER noted that there is an existing 8-inch County force main that delivers water from the 3.0 MG Waiale Tank to the 1.5 MG tank at the 670 feet elevation. The 8-inch force main traverses along Ku‘ikahi Drive, to the 1.5 MG tank, which is located immediately west of the project site. The proposed development between the 560 and 725 foot elevation will be serviced by the Kehalani Mauka high level water service. Storage for the project will be provided by the existing 500,000 gallon tank.

b. Potential Impacts and Mitigation Measures

The PER noted that in accordance with the DWS' Domestic Consumption Guidelines for multi-family residential development, the average daily demand for the 120 multi-family units, six (6) single-family units, 34 duplexes, 16 live-work units and 28 studios is anticipated to be approximately 115,840 gallons per day (GPD). Fire flow for a low-rise multi-family development is 1,500 gallons per minute for a 2-hour duration. Fire hydrants will be installed within the project site with a maximum spacing of 250 feet.

Lastly, it is noted that at a 100 percent affordable housing project, the Applicant will seek an exemption through the MCC Chapter 2.97 application process for the Water Availability (Chapter 14.12) provision of the MCC. Further, in 2007 and 2012, Kehalani Mauka entered into water use agreements with the previous property owner, Towne Development of Hawaii, for 225,000 gallons of water storage in the Kehalani Mauka water storage tank. The Applicant purchased Parcel 3 from Towne Development of Hawaii, which included said water storage credits. As such, the Applicant (Kuikahi Properties LLC) intends to utilize these water storage credits for the proposed project.

3. Wastewater

a. Existing Conditions

The Wailuku area is served by the County of Maui's sewer system, which collects wastewater and conveys it to the Wailuku-Kahului Wastewater Reclamation Facility (WKWWRF) for treatment and disposal.

The PER noted that there are existing 8-inch sewerlines along Ku'ikahi Drive, in proximity to the project site. The existing sewerlines travel east along Ku'ikahi Drive which connects to a sewer manhole at the intersection of Ku'ikahi Drive and Waiale Road. From that point, the existing sewer system travels north along Waiale Road, Lower Main Street and crosses Waiehu Beach Road to discharge into the Wailuku Wastewater Pump Station (WWPS). The WWPS is located makai of the Waiehu Beach Road and Kahului Beach Road intersection. The WWPS then pumps the wastewater through a 24-inch force main to the WKWWRF for treatment.

b. Potential Impacts and Mitigation Measures

The PER noted that the proposed project, with its 120 multi-family units, six (6) single-family units, 34 duplexes, 16 live-work units and 28 studios are

anticipated to generate approximately 52,590 GPD of wastewater. The proposed project will include an onsite sewer collection system which will collect wastewater from the units and connect to the County's existing sewer system within Ku'ikahi Drive. The onsite sewer improvements will be designed to County standards. Refer to **Appendix "B"**.

4. Drainage System

a. Existing Conditions

The elevations at the project site range from approximately 664 feet above mean sea level (amsl) at the northwestern corner of the site to approximately 540 feet amsl at the eastern end of the site, with an average slope of approximately 10.6 percent. Refer to **Appendix "B"**.

As previously noted, there is an existing dam/reservoir located above the DWS' 500,000 gallon storage tank, on the north side of the project site. The dam/reservoir receives water from an irrigation ditch as well as drainage from the Wailuku Heights subdivision. See **Figure 14**.

There are two (2) existing drainageways that traverse through Parcel 3. The first drainageway is on the south side of the reservoir/dam and the DWS' 500,000 gallon tank. The PER noted that according to the as-built plans and drainage report for the Wailuku Heights Unit 1, the 100-year flow at South Alu Road is 611.7 cubic feet per second (cfs). The second drainageway is parallel to and outside of the southern boundary of the project site. The as-built plans and drainage report for the Wailuku Heights Unit 1 noted that the 100-year flow at South Alu Road in this vicinity is 619.9 cfs. Both drainageways cross South Alu Road with 11.5 foot by 7.3 foot arch pipe culverts. The two (2) existing drainageways flow in west to east direction and eventually merge makai (east) of the project site. The flows from the existing drainageways continue toward Honoapi'ilani Highway. The PER noted that the estimated existing 50-year, 1-hour storm runoff from the project site is 23.51 cfs, with a corresponding runoff volume of 32,446 cubic feet.

b. Potential Impacts and Mitigation Measures

Following the build out of the project, the PER estimated that the 50-year, 1-hour storm runoff would be 66.45 cfs, with a corresponding storage volume of 118,619 cubic feet. There will be a net increase in runoff of 42.94 cfs, due to the development of the project. The corresponding increase in runoff volume will be 86,173 cubic feet. Refer to **Appendix "B"**.

Source: Otomo Engineering, Inc.

Figure 14

Kuikahi Affordable Housing Project

Preliminary Drainage Plan

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\Drainage Plan

The existing southern drainageway will not be altered and offsite runoff will continue to sheet flow in a westerly direction as it is currently. Underground culverts will be installed along sections of the existing northern drainageway. The installation of culverts will accommodate the construction of the structures and parking areas for the proposed project.

A large onsite retention basin will be constructed at the easterly end of the project site. Onsite runoff will be collected by grated inlet catch basins within the paved parking areas and conveyed to the onsite retention basin. The retention basin and subsurface drainage system will be sized to accommodate more than the increase in the surface runoff volume from a 50-year, 1-hour storm for the project site. An overflow culvert at the retention basin will allow excess runoff to discharge to an outlet which will be located within the existing northern drainageway. At the outlet, runoff will continue downstream along its present drainage pattern, at a flow less than the pre-development rate.

The drainage design criteria will be to minimize any alterations to the natural pattern of the existing onsite surface runoff and reduce the quality of runoff sheet flowing from the project to the downstream properties. Offsite runoff from the drainage areas mauka of South Alu Road will continue to flow through the project site along its present route. The proposed project's drainage system will be designed in accordance with the County of Maui's Rules for Design of Storm Drainage Facility and Rules for the Design of Storm Water Treatment Best Management Practices.

Lastly, the Applicant is currently working with the Department of Public Works (DPW) to remove the outlet of the existing 66-inch culvert from the dam/reservoir to a new retention basin (planned by the DPW) which will be sized to accommodate the flow from the Wailuku Heights subdivision. The site of the new retention basin is being considered south of the existing dam/reservoir. The Applicant has met with the State DLNR Engineering-Dam Safety Division to discuss alternatives to reduce the height of the dam for possible declassification. This action is being pursued separately from the proposed action. Refer to **Appendix "B"**.

5. Electric, Telephone, and Cable

a. Existing Conditions

There are existing underground electrical, telephone, and cable transmission lines provided by Hawaiian Electric Company, Ltd (Maui Electric), Hawaiian Telcom, and Spectrum Cable, respectively, along Ku'ikahi Drive adjacent to the project site. Refer to **Appendix "B"**.

b. Potential Impacts and Mitigation Measures

Hawaiian Electric Company, Hawaiian Telcom, and Spectrum Cable (formerly Oceanic Time Warner) will be able to provide electrical, telephone, and cable television services, respectively, for the proposed project. The proposed electrical, telephone, and cable TV distribution systems to the project site will be serviced from the existing facilities within Ku‘ikahi Drive. Within the project, underground utility lines will provide electrical, telephone, and cable television services.

Coordination with the above-mentioned utility service providers will continue to ensure that systems planning and design can be programmed consistent with the project development schedule.

E. CUMULATIVE AND SECONDARY IMPACTS

Pursuant to the Hawai‘i Administrative Rules, Chapter 200, Section 11-200.1-2, entitled Environmental Impact Statement Rules, a cumulative impact means:

> *…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. Cumuative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

“Secondary impacts” or “indirect impacts” are defined as:

> *…effects that are caused by the action or are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects 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.*

Cumulative and secondary impacts can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects, for example, can occur because they can induce development by removing one (1) of the impediments to growth.

The project is proposed to be implemented in an area developed with residential subdivisions of a similar nature. The proposed project is not a phase of a larger action, nor does it represent a committment to such actions. Given the surrounding residential developments, significant environmental impacts are not anticipated as a result of the project. Although the proposed project requires the provision of basic infrastructure, such as water and wastewater service, these requirements are not considered significant as the project will be developed within the existing service limits for these services. As

previously noted, the TIAR concluded that the proposed project is anticipated to generate five (5) to 18 vehicles per peak hour, per direction along Honoapiʻilani Highway and three (3) to 12 vehicles along Waiale Road. Two (2) improvements were recommended by the TIAR to mitigate traffic from the proposed project as well as the anticipated increase in traffic in the area, generated by other proposed projects. One (1) of the recommended mitigation measures is the construction of a roundabout at one (1) of the project's driveways with Kuʻikahi Drive. The Applicant is proposing to include this improvement as part of the project. As such, no cumulative impacts are anticipated as a result of the project.

Secondary impacts are those which have the potential to occur late in time or farther in distance, but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of a project. The proposed project involves the development of 204 residential units in Wailuku. However, as previously discussed, the future residents will likely be from Maui and will consist of households earning between 60 to 140 percent of the AMI. As such, secondary impacts related to population increase in the region are not anticipated. Further, the proposed project will be located in the midst of other similar residential developments. Among the other residential developments in the area that were included in the TIAR analysis were the Wailuku Apartments, Puʻunani Homestead, and Waikapu Country Town as well as the build out of the Kehalani master planned project. The TIAR also included commercial and industrial projects planned within the project's vicinity in its traffic analysis. As such, given the surrounding development, significant environmental impacts are not anticipated as a result of the project. Therefore, with the proposed mitigation measures, the project is not anticipated to result in significant adverse secondary impacts.

RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

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 "Agricultural" district. See **Figure 15**. The project area is less than 15 acres and as such, the Applicant will be seeking approval from the Maui County Council for a District Boundary Amendment from the State Land Use Commission (SLUC) to re-designate the project area to "Urban".

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. Part II of the State Plan covers its administrative structure and implementation process.

The overall theme of the Hawaiʻi State Plan is governed by the following general principles.

1. Individual and family self-sufficiency

2. Social and economic mobility

3. Community or social well-being

In consonance with the foregoing principles, the Hawaiʻi State Plan identifies three (3) clarifying goals:

1. A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaiʻi'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.

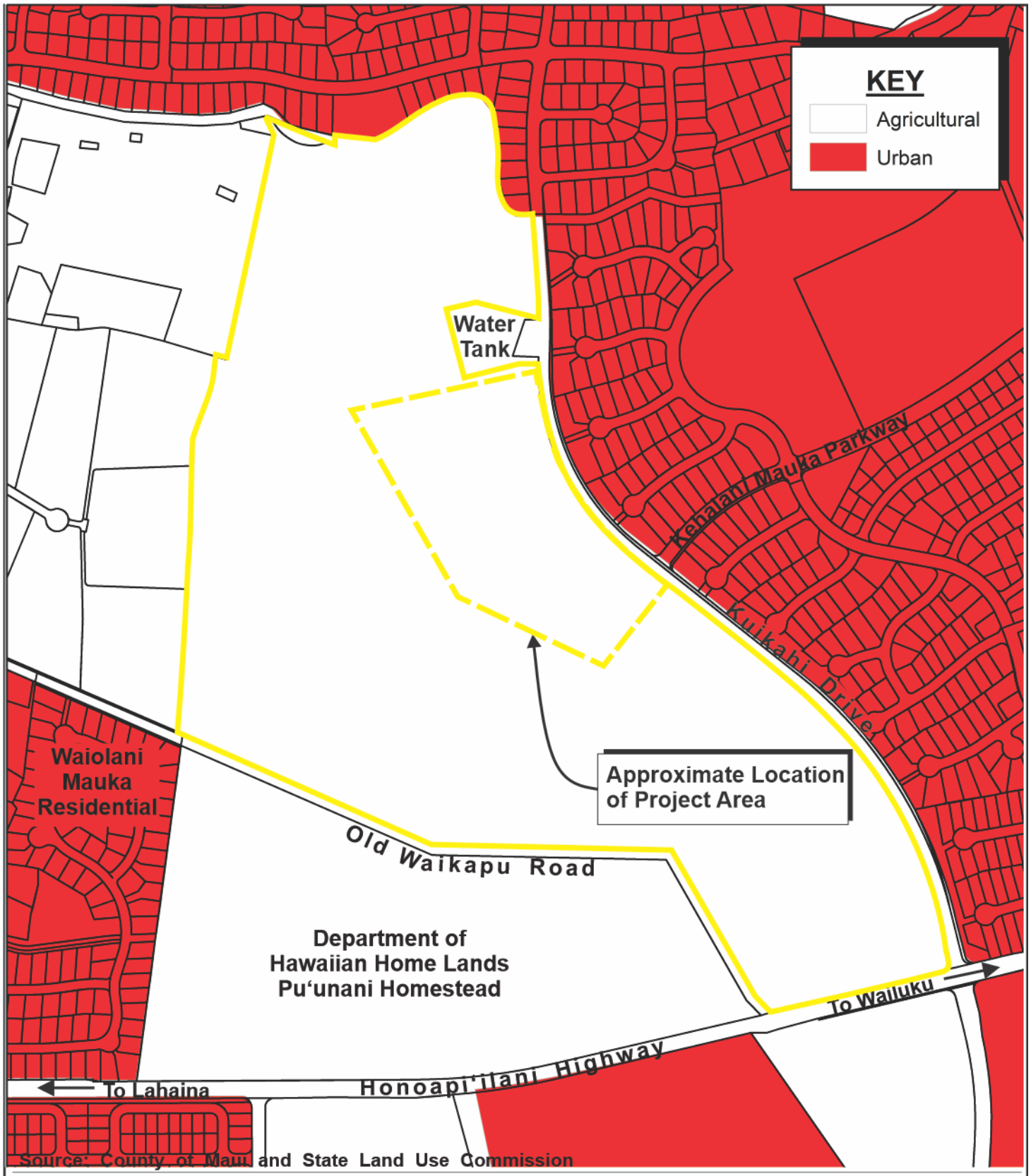


Figure 15 Kuikahi Affordable Housing Project
State Land Use Designation Map

0 150 300 600 Feet

Prepared for: Kuikahi Properties, LLC

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

This section of the environmental assessment examines the applicability of the proposed action as it relates to the objectives, policies, and priority guidelines of the Hawai‘i State Plan, as set forth in HRS Sections 226-5 through 226-27.

The table below summarizes the relationship between the proposed action and the goals of the Hawai‘i State Plan. The relationship between the action and the goals are categorized into the following groups. More detailed analysis and discussion, including the methodology used, is presented in **Appendix "H"**.

1. **Directly applicable**: the action and its potential effects directly advances or promotes the objective, policy or priority guideline.

2. **Indirectly applicable**: the action and its potential effects indirectly supports or advances the objective, policy or priority guideline.

3. **Not applicable**: the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Hawai‘i State Plan.

In general, a proposed action's applicability to the objectives, policies and priority guidelines of the Hawai`i State Plan is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions. The analysis presented in **Table 4** and summarized below focuses on key elements of the proposed action's relationship to the Hawai‘i State Plan. Detailed discussion on the applicability of the proposed action to each goal and related objectives, policies, and implementing actions of the Hawai`i State Plan is provided in **Appendix "H"**.

Table 4. Hawai‘i State Plan Analysis Summary

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			
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.		✓	
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.		✓	
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.			✓
Chapter 226-8 Objective and policies for the economy – – visitor industry.			
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.			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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.			✓
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.			✓
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.			✓
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.	✓		
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.		✓	
Chapter 226-14 Objective and policies for facility systems – – in general.			
Objective: 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.		✓	

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.		✓	
(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.		✓	
Chapter 226-16 Objective and policies for facility systems – – water.			
<u>Objective</u>: 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.	✓		
Chapter 226-17 Objectives and policies for facility systems – – transportation.			
<u>Objectives</u>: Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:			
(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.			✓
Chapter 226-18 Objectives and policies for facility systems – – energy.			
<u>Objectives</u>: 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;			✓
(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.			✓
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.			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(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.			✓
Chapter 226-19 Objectives and policies for socio-cultural advancement – – housing.			
Objectives: 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.	✓		
(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.	✓		
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.			✓
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.		✓	
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.			✓
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.			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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.		✓	
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.			✓
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
Objectives: 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.			✓

The Kuikahi Affordable Housing project directly and indirectly supports the goals and objectives of the Hawai‘i State Plan as the proposed action consists of the development of approximately 204 affordable housing units which will be affordable to families living on Maui. As part of the Chapter 343, HRS review process, this EA has been prepared to evaluate the potential impacts resulting from the project to the natural as well as the socio-economic environment of the State, County, and Maui island. The project directly supports the State's goals related to enhancement and protection of the physical environment, as various technical studies including a Biological Resources Survey, AIS, and CIA have been completed to ensure that natural, historical, cultural, and archaeological resources at the project site have been comprehensively identified and mitigated to the extent necessary by the Applicant. Furthermore, other studies have been completed for the

project such as the TIAR and PER which evaluate and provide recommendations for mitigation measures as they relate to impacts on traffic and other infrastructure, respectfully.

With respect to the State's goals for housing and public safety, the proposed project will cater to local families earning between 60 and 140 percent of the AMI, offering Maui's residents the opportunity to live comfortably in the central, developed town of Wailuku. Furthermore, the project is conveniently located in close proximity to existing businesses, State and County government facilities, schools, and social services, which will directly benefit the project residents by relieving any long commutes to and from these services and facilities. Lastly, the project is centrally-located in a developed area of Wailuku and is an in-fill action, allowing for easier connection to existing infrastructure, and thus, supports the State's goals for facility systems. As such, the Kuikahi Affordable Housing project is consistent with the goals and objectives of the Hawaiʻi State Plan.

Priority Guidelines

"Priority guidelines" means those guidelines which shall take precedence when addressing areas of statewide concern. This section addresses applicability criteria to the priority guidelines set forth in HRS 226-103.

Priority guidelines of the Hawaiʻi State Plan covers the economy, population growth and land resources, crime and criminal justice, affordable housing, quality education, sustainability, and climate change adaptation.

The table below summarizes the relationship between the proposed action and the priority guidelines of the Hawaiʻi State Plan. See **Table 5**. More detailed discussion is presented in **Appendix "H"**.

Table 5. Hawai‘i State Plan Priority Guidelines Analysis Summary

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies **Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable**	**DA**	**IA**	**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:		✓	
(b) Priority guidelines to promote the economic health and quality of the visitor industry:			✓
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:			✓
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:			✓
(e) Priority guidelines for water use and development:			✓
(f) Priority guidelines for energy use and development:		✓	
(g) Priority guidelines to promote the development of the information industry:			✓
Chapter 226-104: Population growth and land resources priority guidelines.			
(a) Priority guidelines to effect desired statewide growth and distribution:		✓	
(b) Priority guidelines for regional growth distribution and land resource utilization:		✓	
Chapter 226-105: Crime and criminal justice.			
Priority guidelines in the area of crime and criminal justice:			✓
Chapter 226-106: Affordable housing.			
Priority guidelines for the provision of affordable housing:	✓		
Chapter 226-107: Quality education.			
Priority guidelines to promote quality education:			✓
CHAPTER 226-108: Sustainability			
Priority guidelines and principles to promote sustainability shall include:		✓	
CHAPTER 226-109: Climate change adaptation			
Priority guidelines and principles to promote climate change adaptation shall include:		✓	

As an affordable housing project, the proposed action is directly supportive of the Hawai‘i State Plan's Priority Guidelines for affordable housing. The proposed project repurposes agricultural land while providing affordable housing opportunities for various family sizes in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. The project is complementary and consistent with its neighboring residential developments and is also close to service infrastructure and transportation access and

services. Further, the project will add diversity to the housing product mix in the region which itself lacks in affordable housing options.

C. STATE FUNCTIONAL PLAN

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 Hawaiʻi 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 Kuikahi Affordable Housing 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	Though the proposed project does involve lands designated as "Agricultural" these lands have been out of agricultural use for decades. Furthermore, the proposed project makes prudent use of these unused agricultural lands to provide affordable housing to Hawaiʻi residents. The proposed action does not contravene the objectives and policies of this functional plan.
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	The proposed project will not utilize any State Conservation lands. Similarly, the project is located inland, and not near the coastline. Best Management Practices (BMPs) will be implemented to prevent adverse impacts to downstream properties and the shoreline.
3	Education State Functional Plan (1989)	Department of Education	Improvements to Hawaiʻi's educational curriculum, quality of educational staff, and access to adequate facilities	The proposed project will provide for the educational assessment required by the DOE for residential projects.
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 action will result in the creation of jobs through the construction period.
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 proposed action is not anticipated to contravene the objectives and policies of this functional plan.

Table 6. Relationship Between the Proposed Kuikahi Affordable Housing Project and the State Functional Plans (continued)

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
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	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
7	Higher Education Functional Plan (1984)	University of Hawai'i	Prepare Hawai'i's citizens for the demands of an increasingly complex world through providing technical and intellectual tools	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
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	A HRS 6E submittal was completed for the project and filed with the SHPD. The Applicant will follow the determination provided by the SHPD in regards to archaeological mitigation for the project.
9	Housing State Functional Plan (2017)	Hawai'i Housing Finance and Development Corporation	Based largely on joint public/private efforts to finance, build, and maintain an adequate supply of affordable housing. It will be a working tool to guide the State, the counties, as well as the private sector in meeting the overall goal that every Hawaii resident will have the opportunity to live in a safe, decent and affordable home.	The proposed project will provide 204 housing units affordable to families earning 60 percent to 140 percent of the Area Median Income. The proposed action supports the objectives and policies of this functional plan.
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'	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.

Table 6. Relationship Between the Proposed Kuikahi Affordable Housing Project and the State Functional Plans (continued)

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
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	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
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	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.
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	The proposed action is not anticipated to contravene the objectives and policies of this functional plan.

D. GENERAL PLAN OF THE COUNTY OF MAUI

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

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

Chapter 2.80B of the Maui County Code, relating to the General Plan and Community Plans, implements the foregoing Charter provision through enabling legislation which calls for a Countywide Policy Plan and a Maui Island Plan.

1. 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 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.

Table 7 below summarizes the relationship between the proposed action and the 11 goals of the Countywide Policy Plan. The relationship between the action and the goals are categorized into the following groups. More detailed analysis and discussion, including the methodology used, is presented in **Appendix "H-1"**.

1. **Directly applicable:** the action and its potential effects directly advances, promotes or affects the relevant goal, objective, or policy.

2. **Indirectly applicable:** the action and its potential effects indirectly supports, advances or affects the objective, policy or priority guideline.

3 **Not applicable:** the action and its potential effects have no direct or indirect relationship to the objectives and policies of the Countywide Policy Plan.

In general, a proposed action's applicability to the goals, objectives, policies and implementing actions of the Countywide Policy Plan is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions. The analysis presented in **Table 7.** and summarized below focuses on key elements of the proposed action's relationship to the Countywide Policy Plan. Detailed discussion on the applicability of the proposed action to each goal and related objectives, policies, and implementing actions of the Countywide Policy Plan is provided in **Appendix "H-1"**.

Table 7. Countywide Policy Plan Analysis Summary

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
A. PROTECT THE NATURAL ENVIRONMENT			
Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.	✓		
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.		✓	
C. IMPROVE EDUCATION			
Goal: Residents will have access to lifelong formal and informal educational options enabling them to realize their ambitions.		✓	
D. STRENGTHEN SOCIAL AND HEALTHCARE SERVICES			
Goal: Health and social services in Maui County will fully and comprehensively serve all segments of the population.			✓
E. EXPAND HOUSING OPPORTUNITIES FOR RESIDENTS			
Goal: Quality, island-appropriate housing will be available to all residents.	✓		
F. STRENGTHEN THE LOCAL ECONOMY			
Goal: Maui County's economy will be diverse, sustainable, and supportive of community values.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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.		✓	
H. DIVERSIFY TRANSPORTATION OPTIONS			
Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.		✓	
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.	✓		
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.	✓		
K. STRIVE FOR GOOD GOVERNANCE			
Goal: Government services will be transparent, effective, efficient, and responsive to the needs of residents.			✓

The goals of the Countywide Policy Plan for Maui County are directly and indirectly applicable and, in most cases, supported by the Kuikahi Affordable Housing project. The proposed project makes prudent use of uncultivated agricultural land by providing approximately 204 affordable housing units available to families earning between 60 to 140 percent of the AMI, in an optimal location near other residential developments as well as the government, business, and commercial centers of Wailuku and Kahului. By being in close proximity to these areas, residents will be able to easily access social and commercial services as well as potential job opportunities in the Wailuku-Kahului area which would, hopefully, reduce commute times to and from other areas on Maui.

As previously mentioned, various technical studies and reports have been prepared for the proposed project to ensure that its impact on natural, cultural/archaeological, and historical resources as well as surrounding infrastructure are minimal, or that mitigation measures are implemented by the Applicant to address the project's impacts. Some mitigation measures include the use of BMPs throughout construction and traffic mitigation measures such as traffic signal optimization at the Waiale Road/Ku'ikahi Drive intersection and the installation of a mini-roundabout at the project's east driveway with Ku'ikahi Drive. Additionally, the proposed project has been carefully designed taking into consideration building profiles and massing so as to not adversely impact scenic views and vistas. The proposed structures will be similar in scale and size to existing residential developments nearby and will be built in accordance with

established development standards. Lastly, the Applicant has been coordinating with various County agencies to ensure the availability and capacity of existing infrastructure so that the project can easily connect to these systems.

2. 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, 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*

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 urban growth boundaries (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 Kuikahi Affordable Housing project is located in the UGB and RGB of the MIP's Wailuku-Kahului region. It is further noted that the subject property is "Outside of Protected Areas" in the MIP. The proposed project will provide 204 housing units affordable to families earning between 60 and 140 percent of the AMI. See **Figure 16**.

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.

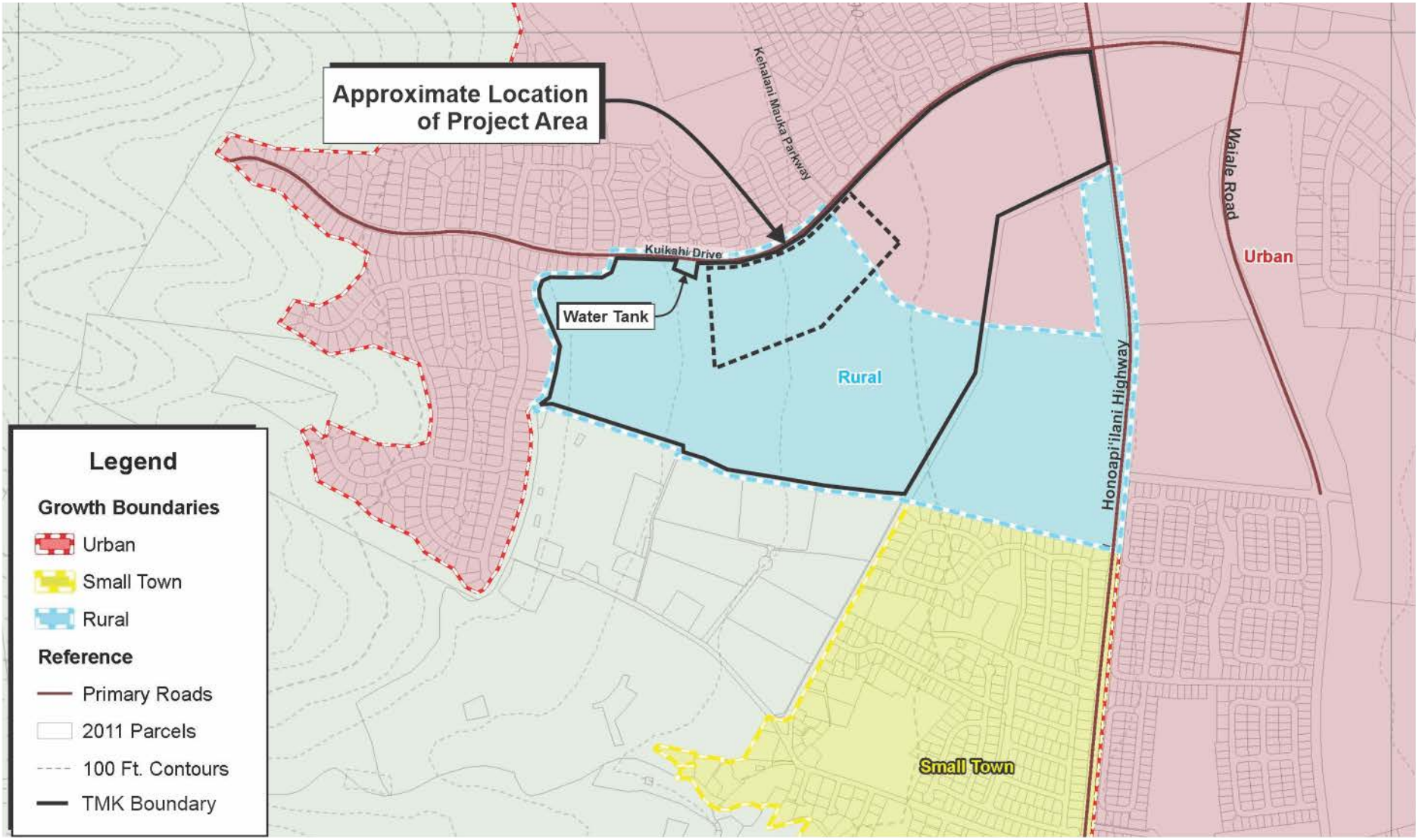
Table 8 below summarizes the relationship between the proposed action and the goals of the MIP. The relationship between the action and the goals are categorized into the following groups. More detailed analysis and discussion, including the methodology used, is presented in **Appendix "H-2"**.

1. **Directly applicable:** the action and its potential effects directly advances or promotes the objective, policy or priority guideline.

2. **Indirectly applicable:** the action's potential effects indirectly supports or advances the objective, policy or priority guideline.

3. **Not applicable:** The action and its potential effects have no direct or indirect relationship to the objectives and policies of the Maui Island Plan.

In general, a proposed action's applicability to the MIP is judged on the basis of the action's direct or indirect relationship to the respective objectives, policies and priority directions. It is recognized that the categorization of "applicability" is subject to interpretation and should be appropriately considered in the context of local and regional conditions. The analysis presented in **Table 8** and summarized below focuses on key elements of the proposed action's relationship to the MIP. Detailed discussion on the applicability of the proposed action to each goal and related objectives, policies, and implementing actions of the MIP is provided in **Appendix "H-2"**.



Source: County of Maui

Figure 16

Kuikahi Affordable Housing Project

Maui Island Plan Growth Boundary Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

WV Regenesis\Wailuku AH\Applications\Figures\Maui Island Map

Table 8. Maui Island Plan Analysis Summary

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
CHAPTER 1 – POPULATION			
1.1 Maui's people, values, and lifestyles thrive through strong, healthy, and vibrant island communities.	✓		
CHAPTER 2 – HERITAGE RESOURCES			
CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES ISSUES			
2.1 Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.		✓	
SHORELINE, REEFS, AND NEARSHORE WATERS			
2.2 An intact, ecologically functional system of reef, shoreline, and nearshore waters that are protected in perpetuity.		✓	
WATERSHEDS, STREAMS, AND WETLANDS ISSUES			
2.3 Healthy watersheds, streams, and riparian environments.	✓		
WILDLIFE AND NATURAL AREAS			
2.4 Maui's natural areas and indigenous flora and fauna will be protected.		✓	
SCENIC RESOURCES			
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.	✓		
CHAPTER 3 – NATURAL HAZARDS			
3.1 Maui will be disaster resilient.			✓
CHAPTER 4 – ECONOMIC DEVELOPMENT			
ECONOMIC DIVERSIFICATION			
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.	✓		
TOURISM			
4.2 A healthy visitor industry that provides economic well-being with stable and diverse employment opportunities.			✓
AGRICULTURE			
4.3 Maui will have a diversified agricultural industry contributing to greater economic, food, and energy security and prosperity.			✓
EMERGING SECTORS			
4.4 A diverse array of emerging economic sectors.			✓
SMALL BUSINESS DEVELOPMENT			
4.5 Small businesses will play a key role in Maui's economy.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
HEALTH CARE SECTOR			
4.6 Maui will have a health care industry and options that broaden career opportunities that are reliable, efficient, and provide social well-being.			✓
EDUCATION AND WORKFORCE DEVELOPMENT			
4.7 Maui will have effective education and workforce development programs and initiatives that are aligned with economic development goals.			✓
CHAPTER 5 – HOUSING			
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.	✓		
CHAPTER 6 – INFRASTRUCTURE AND PUBLIC FACILITES			
SOLID WASTE			
6.1 Maui will have implemented the ISWMP thereby diverting waste from its landfills, extending their capacities.		✓	
WASTEWATER			
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.		✓	
WATER			
6.3 Maui will have an environmentally sustainable, reliable, safe, and efficient water system.		✓	
TRANSPORTATION			
6.4 An interconnected, efficient, and well-maintained, multimodal transportation system.		✓	
TRANSIT			
6.5 An island-wide transit system that addresses the needs of residents and visitors and contributes to healthy and livable communities.			✓
PARKS			
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.		✓	
PUBLIC FACILITIES			
6.7 Maui will have adequate public facilities that meet the diverse needs of residents.			✓
SCHOOLS AND LIBRARIES			
6.8 Maui will have school and library facilities that meet residents' needs and goals.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
HEALTH CARE			
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.			✓
ENERGY			
6.10 Maui will meet its energy needs through local sources of clean, renewable energy, and through conservation.		✓	
HARBORS AND AIRPORT			
6.11 Maui will have harbors and airports that will efficiently, dependably, and safely facilitate the movement of passengers and cargo.			✓
CHAPTER 7 – LAND USE			
AGRICULTURAL LANDS			
7.1 Maui will have a prosperous agricultural industry and will protect agricultural lands.			✓
RURAL AREAS			
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.		✓	
URBAN AREAS			
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.	✓		
CHAPTER 8 – DIRECTED GROWTH PLAN			
URBAN AND SMALL TOWN GROWTH AREA			
8.1 Maui will have well-serviced, complete, and vibrant urban communities and traditional small towns through sound planning and clearly defined development expectations.	✓		
RURAL GROWTH AREA			
8.2 Maui will maintain opportunities for agriculture and rural communities through sound planning and clearly defined development expectations.		✓	
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.			✓

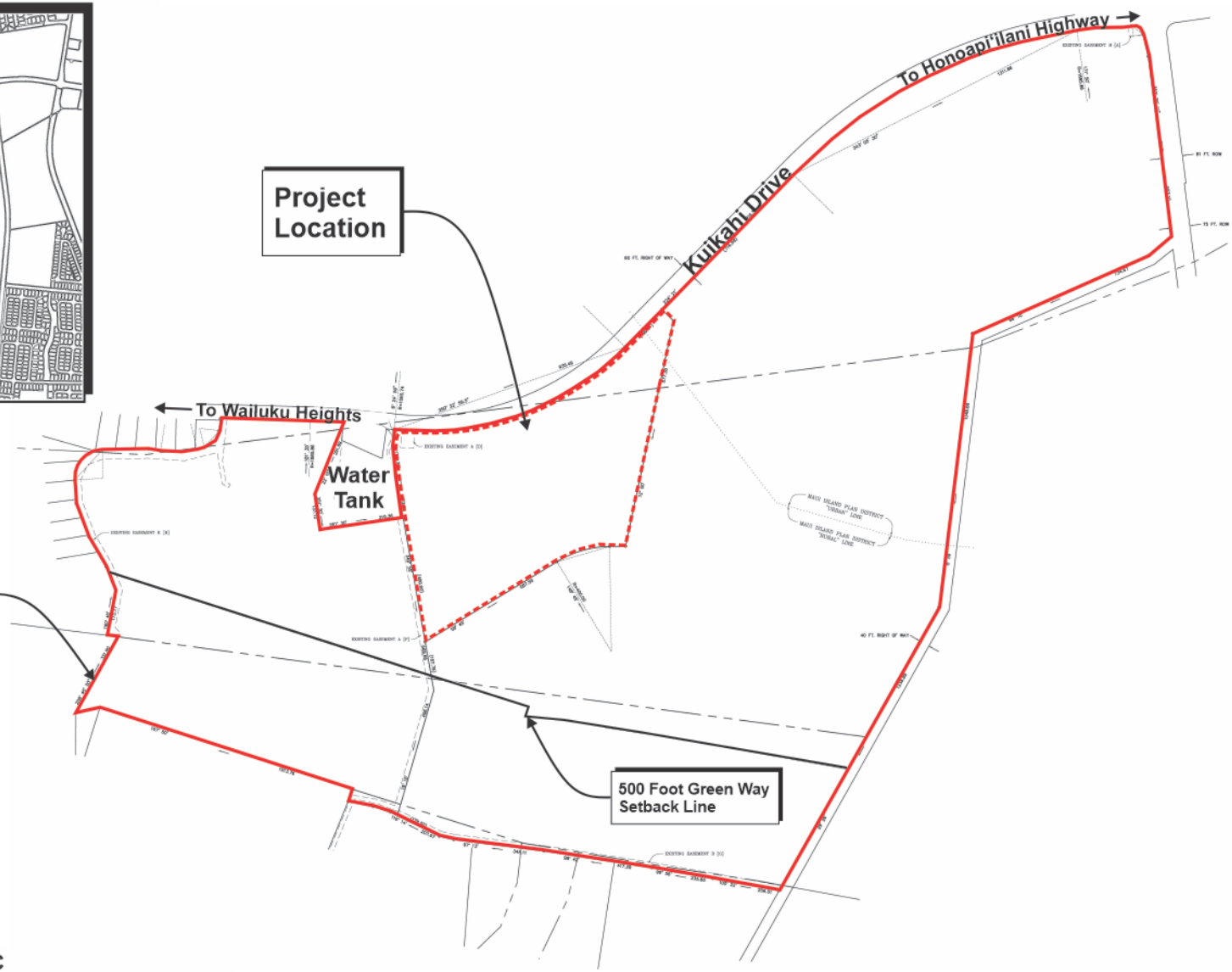
The goals, objectives, and policies of the Maui Island Plan have direct and indirect relationships with the Kuikahi Affordable Housing project. The proposed project provides additional affordable housing opportunities for Maui's residents in an area

that is close to the government, business, and commercial centers of Wailuku and Kahului. Further, the proposed project will provide for additional housing options for local families seeking to live on Maui island to be closer to their families and local employment, education, and social opportunities. The proposed project is located on fallow agricultural lands that have not been used for agricultural production in many years. As such, the proposed action is a prudent use of the land to provide much needed housing for Maui County's individuals and families.

The proposed project will generate short-term construction-related employment opportunities, as well as supporting the construction industry as a whole, including local businesses that rely on said industry. Further, the proposed action will indirectly affect the local economy, as it is anticipated that residents of the project will support small businesses nearby. The residential development also includes 16 live-work units, in which its residents are able to conduct their small-business operations through their homes. This helps these business owners save on operational costs such as storefront rent.

In addition to the various reports and studies completed for the proposed project, BMPs measures will be implemented throughout construction so as to mitigate any stormwater runoff resulting from the proposed development. Appropriate BMPs will be used during construction and applicable drainage detention measures will be provided for the long-term habitation of the site.

It is noted that the MIP identified a former planned project on Parcel 3 and a neighboring parcel, the Puʻunani project, in the Directed Growth Chapter discussion. The previously proposed project was proposed as a mixed use residential project, with Urban and Rural land uses. The MIP notes that 450 units were proposed for the Urban portions of the project site, while the dwelling unit count and proposed density in the Rural areas were to be determined. Additionally, the MIP notes that a 200-foot greenbelt from the eastern edge of the Puʻunani project's edge along Honoʻapiilani Highway was designated. Additionally, a 500-foot wide greenbelt along the Puʻunani project's southern boundary, adjacent to the Waiolani subdivision should also be provided to provide separation between Wailuku and Waikapu. The proposed Kuikahi project will comply with the 500-foot greenbelt along the southern boundary of the project site. See **Figure 17.** No development activities are proposed in this area. The project site is also located more than 200 feet away from the Honoapiʻilani Highway, and as such, the greenbelt requirement for this area will also be respected.



Source: Kuikahi Properties, LLC

Figure 17

Kuikahi Affordable Housing Project

Maui Island Plan Buffer Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

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E. WAILUKU-KAHULUI COMMUNITY PLAN

The project site is located within the Wailuku-Kahului 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 Wailuku-Kahului 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 Wailuku-Kahului Community Plan was adopted by the County of Maui through Ordinance Number 3061, and became effective on June 5, 2002. The Community Plan land use map designates the project site as "Agriculture". See **Figure 18**. Pursuant to the Chapter 2.97, MCC, certain exemptions from the Wailuku-Kahului Community Plan Land use designation will be sought to enable the project to be developed, as proposed, on lands designated "Agriculture".

Though the property is designated as "Agriculture", the land has not been in agricultural cultivation use for over 15 years. Furthermore, the proposed Kuikahi Affordable Housing project makes prudent use of the project area by providing much-needed affordable housing units. The proposed development will include multiple housing types for various family sizes and will also include a minor commercial component.

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

ENVIRONMENT

Goal:

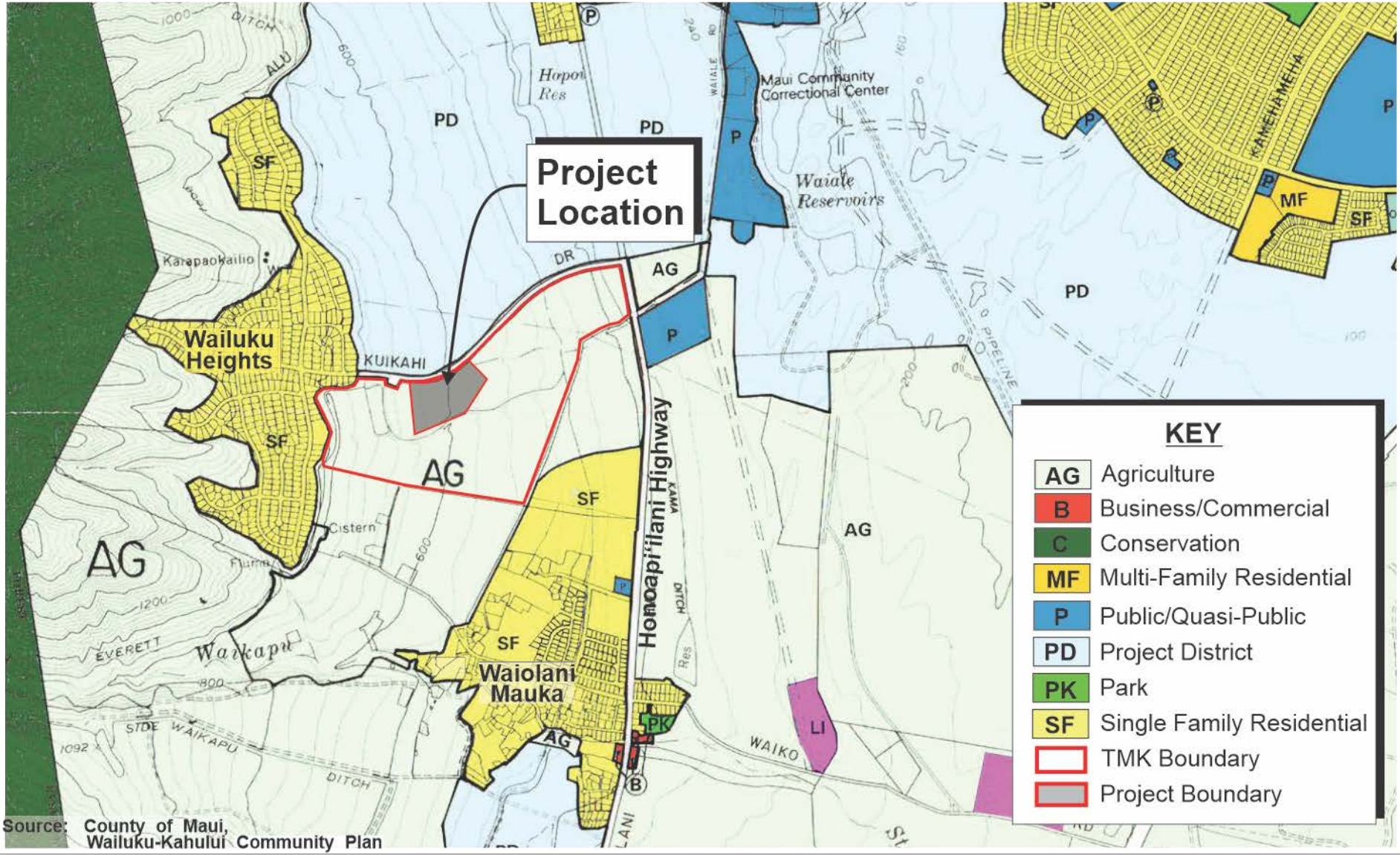
A clean and attractive physical and natural environment in which man-made developments or alterations to the natural environment relate to sound environmental and ecological practices, and important scenic and open space resources are maintained for public use and enjoyment.

Objectives and Policies:

* * *

13. Support energy conservation measures, including the use of solar heating and photovoltaic systems, in conjunction with urban uses.

14. Promote the planting and maintenance of trees and other landscape planting to enhance the streetscapes and the built-environment.



Source: County of Maui, Wailuku-Kahului Community Plan

Figure 18

Kuikahi Affordable Housing Project

Wailuku-Kahului Community Plan Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

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CULTURAL RESOURCES

Goal:

Identification, protection, preservation, enhancement, and where appropriate, use of cultural practices and sites, historic sites and structures, and cultural landscapes and view planes that:

1. *Provide a sense of history and define a sense of place for the Wailuku-Kahului region; and*
2. *Preserve and protect native Hawaiian rights and practices customarily and traditionally exercised for subsistence, cultural and religious purposes in accordance with Article XII, Section 7, of the Hawaii State Constitution, and the Hawaii Supreme Court's PASH opinion, 79 HAW. 425 (1995).*

Objectives and Policies:

* * *

5. *Require development projects to identify all cultural resources located within the project area as part of initial project studies. Further, require that all proposed activity include recommendations to mitigate potential adverse impacts on cultural resources.*

Implementing Actions:

* * *

2. *Require development projects to identify all cultural resources located within or adjacent to the project area and consult with individuals knowledgeable about such cultural resources prior to application as part of the County development review process. Further, require that all proposed activity include recommendations to mitigate potential adverse impacts on cultural resources including site avoidance, adequate buffer areas, and interpretation. Particular attention should be directed toward dune areas, known and probable precontact habitation areas, and other sites and areas listed in No. 5 below, with review by the Cultural Resources Commission, where appropriate.*

HOUSING

Goal:

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

Objectives and Policies

* * *

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

* * *

6. *Coordinate the planning, design and construction of public infrastructure improvements with major residential projects that have an affordable housing component.*

* * *

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

SOCIAL INFRASTRUCTURE

Goal:

Develop and maintain an efficient and responsive system of public services which promotes a safe, healthy and enjoyable lifestyle, accommodates the needs of young, elderly, disabled and disadvantaged persons, and offers opportunities for self-improvement and community well-being.

Recreation

Objectives and Policies

1. *Provide park and recreation areas as an integral part of project district specifications which will accommodate the needs of population growth.*

* * *

16. *Ensure that adequate regional/community park facilities are provided to service new residential developments.*

Education

Implementing Actions

1. *Where possible during the zoning process, ensure that applicants contribute to the development, funding, and/or construction of school facilities on a fair-share basis as determined by and to the satisfaction of the State Department of Education. Terms of the contribution shall be*

agreed upon by the applicant and the State Department of Education prior to the applicant applying for building permits.

LAND USE

Goal:

An attractive, well-planned community with a mixture of compatible land uses in appropriate areas to accommodate the future needs of residents and visitors in a manner that provides for the social and economic well-being of residents and the preservation and enhancement of the region's environmental resources and traditional towns and villages.

* * *

14. Maintain physical separation between traditional towns and villages in the region. Where possible, provide specific design or landscape elements, such as open space buffers or changes in streetscape, to clearly delineate the boundary between Kahului and Wailuku. Maintain open space around traditional rural areas, such as Waikapu and Waihe'e, to provide a sense of community and to prevent envelopment of these areas by urban expansion.

* * *

15. Provide a substantial greenway or greenbelt to serve as a buffer zone, line of demarcation, or definition between Wailuku and Waikapu, and between Waikapu and Ma'alaea, in order to prevent the continuation of urban sprawl. Changes in streetscapes could include landscaping and agricultural planting materials that reflect the character of each community, and are utilized to delineate a substantial boundary between Kahului and Wailuku.

INFRASTRUCTURE

Goal:

Timely and environmentally sound planning, development and maintenance of infrastructure systems which serve to protect and preserve the safety and health of the region's residents, commuters and visitors through the provision of clean water, effective waste disposal and drainage systems, and efficient transportation systems which meet the needs of the community.

LIQUID AND SOLID WASTE

Objectives and Policies:

1. Coordinate sewer system improvement plans with future growth requirements, as defined in the Community Plan.

DRAINAGE

Objective and Policies:

4. Ensure that storm water run-off and siltation from proposed development will not adversely affect the marine environment and nearshore and offshore water quality. Minimize the increase in discharge of storm water runoff to coastal waters by preserving flood storage capacity in low-lying areas, and encouraging infiltration of runoff.

ENERGY

Objectives and Policies:

6. Encourage energy efficient building design and site development practices.

TRANSPORTATION

Objectives and Policies:

2. Provide bikeway and walkway systems in the Wailuku-Kahului area which offer safe and pleasant means of access, particularly along routes accessing esidential districts, major community facilities and activity centers, school sites, and the shoreline between Kahului Harbor and Pa'ia.

Discussion and Response:

As previously mentioned, the proposed Kuikahi Affordable Housing project will provide 204 residential units varying in type (i.e., multi-family/condominium, duplex, live-work, studio, single-family) to accommodate for different family sizes. These residences will be affordable for families and individuals, with units for for sale. Parking for residents and visitors, as well as "spot parks", a playground, pavilion, and a bicycle/pedestrian trail are among the amenities to be provided at the proposed development. The project site is centrally located, near existing residential and commercial developments in both Wailuku and Waikapū. The location is ideal for an affordable housing project, given the proximity to commercial and social services, such as grocery stores, local small-businesses, schools, and government facilities. Furthermore, the project will include a minor commercial component, in which residents living in the live-work units may use the space to operate their own small-businesses at an affordable price.

F. COUNTY ZONING

The project site is identified "Agricultural" on the digital zoning maps adopted by the County of Maui through Ordinance No. 4883 effective on October 6, 2018. While the

current zoning does not allow for the proposed residential uses, an application pursuant to Chapter 2.97, MCC, has been prepared for submittal to the County of Maui. Included in the filing will be a request to exempt the proposed project from certain provisions of the MCC which will allow the proposed project to be developed as proposed and exempt from County zoning provisions and the development standards of the "Agricultural" district. See **Figure 19**. These exemptions are further described in Chapter IV of this document.

G. HAWAIʻI COASTAL ZONE MANAGEMENT PROGRAM

The Hawaiʻi 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 Hawaiʻi's coastal zone. Although the subject property is not within the County of Maui's Special Management Area (SMA), the applicability of coastal zone management considerations applies to all lands in the State of Hawaiʻi and, as such, has been reviewed and assessed as follows.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

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

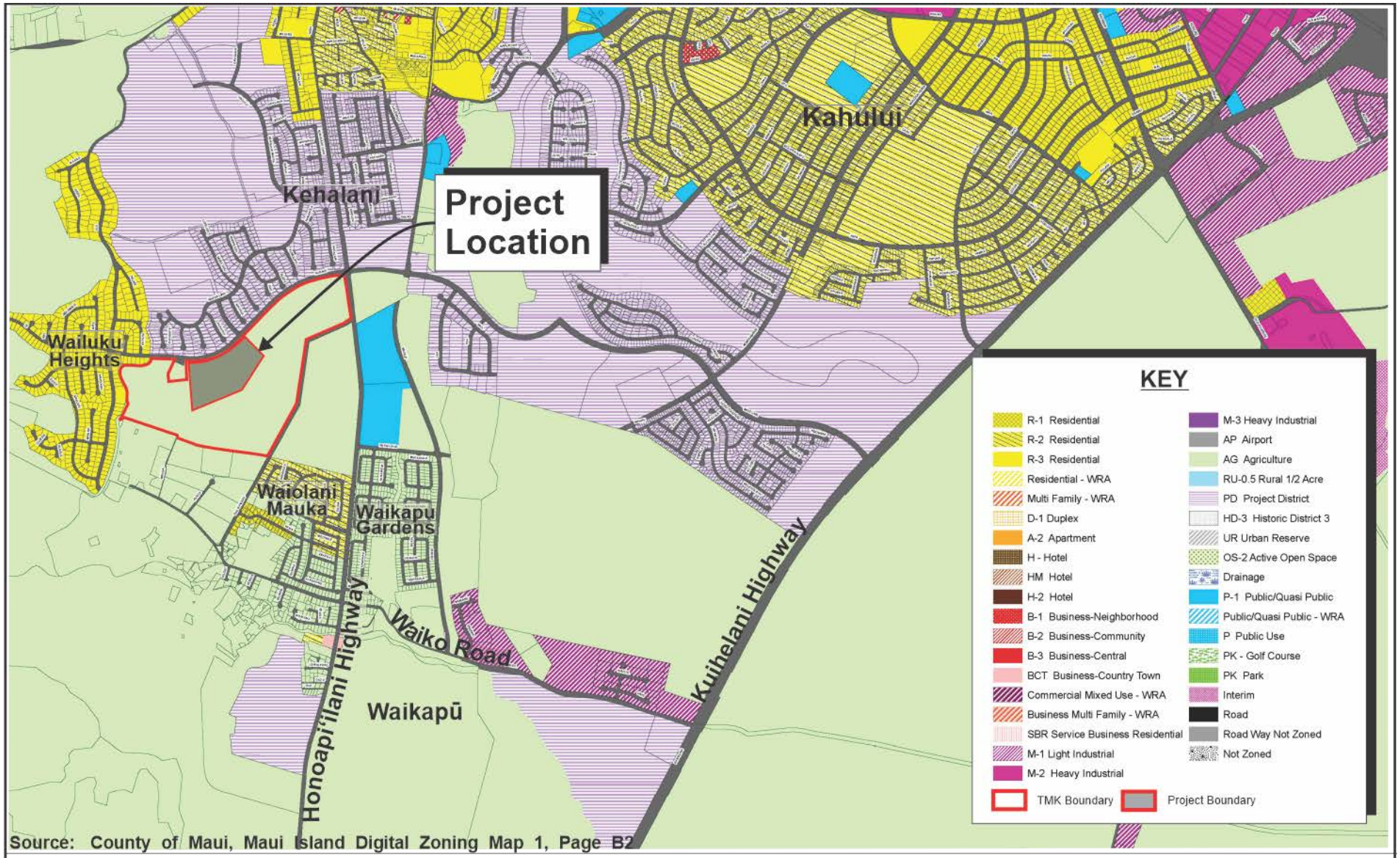
b. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

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

ii. Requiring restoration of coastal resources that have recreational and ecosystem value including, but not limited to coral reefs, surfing sites, fishponds, sand beaches, and coastal dunes when these resources will be unavoidably damaged by development; or requiring monetary compensation to the State for recreation when restoration 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;



Source: County of Maui, Maui Island Digital Zoning Map 1, Page B2

Figure 19

Kuikahi Affordable Housing Project

Maui County Zoning Map

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

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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 and away from the coastline. The proposed action is not expected to impact coastal recreational opportunities or affect existing public access to and along 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: Archaeological consultation with SHPD and a CIA were carried out for the proposed project. Refer to **Appendix "D-2"** and **Appendix "E"**, respectively. The Applicant will comply with recommendations and reqruiements by the SHPD for project implementation.

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 those 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 and represents an affordable housing project in an area surrounded by urban development. As such, the proposed project will not adversely impact coastal scenic and open space resources.

4. Coastal Ecosystems

Objective:

Protect valuable coastal ecosystems, including reefs, beaches and coastal dunes 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 of significant biological or economic importance, including reefs, beaches, and dunes;

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 coastal ecosystems and is, therefore, not anticipated to have adverse impacts on coastal/shoreline resources, including reefs and marine resources. The proposed project does not include any stream diversions or channelization. Appropriate Best Management Practices (BMPs) will be utilized to ensure that construction runoff is appropriately retained, 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 and coastal related development are located, designed, and constructed to minimize exposure to coastal hazards and adverse social, visual, and environmental impacts in the coastal zone management area; and

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

i. Use of designated locations is not feasible;

ii. Adverse environmental effects and risks from coastal hazards 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 construction jobs. The proposed project does not contravene the objective and policies for economic use.

6. Coastal Hazards

Objective:

Reduce hazard to life and property from coastal hazards.

Policies:

a. Develop and communicate adequate information about the risk of coastal hazards;

b. Control development, including planning and zoning control, in areas subject to coastal hazards;

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

d. Prevent coastal flooding from inland projects.

Response: As previously mentioned, the proposed project is located within Flood Zone X of the Federal Emergency Management Agency's Flood Insurance Rate Map and the project area does not experience any significant local flooding problems. The project will be located inland and is outside any tsunami evacuation areas and sea level rise exposure areas. As such, the proposed project does not contravene the objective and policies for coastal hazards.

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 pursuant to Chapter 343, HRS. Additionally, as previously noted, the Applicant plans to submit an application related to MCC, Chapter 2.97 for

affordable housing to the Maui County Council for review and approval. Said application will also undergo public review. The Applicant has, and will continue to engage the public through the project planning and design processes. Meetings were conducted with various stakeholders including the Waikapu Community Association, the Kehalani Community Association Board, and the Wailuku Heights Association. Consultation has also occurred through the CIA process in which native Hawaiian organizations, agencies, and community members were contacted. Refer to **Appendix "E"**.

8. Public Participation

Objective:

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

Policies:

a. Promote public involvement in coastal zone management processes;

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

c. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: Opportunities for agency and public review of the proposed action are provided through the comment processes pursuant to Chapter 343, HRS and MCC, Chapter 2.97 application process. The Applicant also held meetings with various stakeholders including the Waikapu Community Association, the Kehalani Association, and the Wailuku Heights Association. Consultation has also occurred through the CIA process. Refer to **Appendix "E"**.

9. Beach and Coastal Dune Protection

Objectives:

A. *Protect beaches and coastal dunes for:*

(i) *Public use and recreation;*

(ii) *The benefit of coastal ecosystem; and*

(iii) *Use as natural buffers against coastal hazards; and*

B. *Coordinate and fund beach management and protection.*

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 shoreline hardening structures, including seawalls and reventments, at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities;*

c. *Minimize the construction of public shoreline hardening structures, including seawalls and revetments at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities;*

d. *Minimize grading of and damage to coastal dunes;*

e. *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*

f. *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, away from the shoreline and is not anticipated to impact shoreline processes.

10. Marine and Coastal 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 and coastal processes, impacts of climate change and sea level rise, marine*

life, and other ocean resources to acquire and inventory information necessary to understand how coastal development activities relate to and impact ocean and coastal resources; and

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

Response: The project is located inland, away from the ocean and is, therefore, not anticipated to have an impact on marine resources.

REQUESTED EXEMPTIONS PURSUANT TO CHAPTER 2.97, MCC

IV

IV. REQUESTED EXEMPTIONS PURSUANT TO CHAPTER 2.97, MCC

A. INTRODUCTION

The purpose of Maui County Code (MCC) Chapter 2.97, "Residential Workforce Housing Policy Incentives and Exemptions" is to establish a process by which developers of 100 percent residential workforce housing projects may seek fast track development of their projects by applying for County exemptions from this code. This process allows developers to seek exemptions from MCC including, but not limited to Title 19, MCC relating to zoning; Title 18, MCC relating to subdivision requirements; Chapter 2.80B, MCC relating to general plan and community plans; and Chapter 19.68, MCC relating to State land use district boundary amendments for projects less than 15 acres in the "Agricultural" district, provided that the project still meets the minimum requirements for health and safety.

The Kuikahi Affordable Housing Project will be a 204-unit affordable for sale project offered to residents earning between 60 percent and 140 percent of the Area Median Income (AMI). Most of Maui County's current projects in the development pipeline are affordable or workforce for-sale homes. The proposed project intends to serve the demand for affordable housing in the Central Maui area and offers a variety of housing types for families and individuals. In response to this increasing affordable housing demand pressure and high cost of construction, Chapter 2.97, MCC exemptions are sought.

The exemption requests which follow are necessary to achieve and maintain the financial feasibility of the project and thereby reduce the per unit cost of the project. If the proposed exemptions are granted, Kuikahi Properties, LLC will be able to offer 204 residential units, affordable to qualified households earning between 60 percent and 140 percent of the AMI.

B. EXEMPTIONS TO BE REQUESTED

This Environmental Assessment (EA) has been prepared to support the Applicant's Chapter 2.97, MCC application for submittal to the County of Maui, Department of Housing and Human Services (DHHC). Included in the Chapter 2.97, MCC filing will be a request to exempt the proposed project from certain provisions of the MCC which will allow the proposed project to be developed for senior affordable rental housing. It is noted that the list of exemptions is preliminary and subject to approval by the Maui County Council. Exemptions may be further modified as part of the Chapter 2.97 review and approval process. The proposed current exemptions are summarized below in **Table 9**.

Table 9. Proposed Kuikahi Affordable Housing Project Chapter 2.97 Exemption Requests

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
1. Requirements for bond funding to ensure project construction completion.	Title 2 – Administration and Personnel Chapter 2.97 - Residential Workforce Housing Policy Incentives and Exemptions Section 160 Timing of Completion	**MCC 2.97.160 – Timing of Completion.** Clarification is requested to state that the form of bonding to ensure that construction is completed will be in the form of a material house bond.	Exemption will provide Applicant flexibility in providing the bond funding to ensure completion of construction. Applicant will provide a bond for the project.
2. Requirement for Community Plan Amendment to allow for Single-Family, Multi-Family, Business/Multi-Family and Park Uses	Title 2 – Administration and Personnel Chapter 2.97 - Residential Workforce Housing Policy Incentives and Exemptions Section 120, Exemptions Chapter 2.80B - General Plan and Community Plans	**MCC 2.97.120 - Exemptions. Chapter 2.80B, General Plan and Community Plans.** Per County Code 2.97.120, an exemption from Chapter 2.80B, MCC, General Plan and Community Plans, shall be granted to permit the project to proceed without obtaining a community plan amendment. The project site is designated as “Agricultural” in the Wailuku-Kahului Community Plan Map. The exemption will allow the project to proceed with the “Single Family”, Multi-Family”, “Business/Multi-Family”, and “Park” uses as proposed.	The project site is currently designated “Agriculture” by the Wailuku-Kahului Community Plan. The exemption from the Community Plan Amendment requirement will allow for expedited process to allow for affordable workforce housing in Central Maui.
3. Requirement for Compliance with Residential Workforce Housing Policy – Housing Credits	Title 2 – Administration and Personnel Chapter 2.96 - Residential Workforce Housing Policy Section 050 - Residential Workforce Housing Credits	**MCC 2.96.050 - Residential Workforce Housing Credits.** An exemption from MCC 2.96.050, Residential Workforce Housing Credits, is requested to allow 100% of the units to qualify for workforce housing credits.	The proposed exemption will provide the Applicant the ability to receive affordable housing credits for all units within the project. The Applicant will be able to market the housing credits to raise funds for future affordable housing projects.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
4. Requirement for receipt of required disposal permit and payment of fees related to disposal of construction waste	Title 8 – Health and Safety Chapter 8.04 – Refuse Collection and Landfills Sections: 040 – Disposal Permits-Application and Suspension. 050 – Disposal Charges.	**MCC 8.04.040 - Disposal Permits – Application and Suspension.** **MCC 8.04.050 - Disposal Charges.** An exemption from MCC 8.04.040, and 050, Refuse Collection and Landfills is requested to exempt the project from obtaining a construction waste disposal permit and paying disposal fees during construction.	An exemption from the requirements to apply for a disposal permit and pay associated charges will provide cost savings and ensure that the project is financially feasible.
5. Requirement for fees related to Driveway permits	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 150 – Fee Waiver. Title 12 – Streets, Sidewalks, and Public Places Chapter 12.08 – Driveways Section 050 – Permit-Fee.	**MCC 2.97.150 - Fee Waiver.** **MCC 12.08.050 - Permit-Fee.** Per County Code 2.97.150, an exemption from MCC 12.08.050 - Permit Fee, is requested that no fees will be required for the approval and construction of the driveways.	An exemption from the requirements to pay associated charges for driveway permits will provide cost savings and ensure that the project is financially feasible.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
6. Requirement for fees related to permits for work in the County Right-of-Way	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 120 – Exemptions. Title 12 – Streets, Sidewalks, and Public Places Chapter 12.04 – Street and Highway Excavations Section 025 – Permit fee.	**MCC 2.97.120 - Exemptions.** **MCC 12.04.025 - Permit Fee.** Per County Code 2.97.120, an exemption from MCC 12.04.025 – Permit Fee, is requested that no fees will be required for the approval of a County highways permit to construct improvements and install off-site utilities on Ku'ikahi Drive.	An exemption from the requirements to pay associated charges for work on County roadway will provide cost savings and ensure that the project is financially feasible.
7. Requirement to provide landscaping as specified by the County	Title 12 – Streets, Sidewalks, and Public Places Chapter 12.24A Landscape Planting and Beautification	**MCC 12.24A – Landscape Planting and Beautification** If necessary to provide flexibility, an exemption from MCC 12.24A, Landscape Planting and Beautification, is requested to exempt the project from standard landscaping requirements. Landscaping will be in accordance with the Conceptual Landscape Plan. See **Exhibit "1"**.	An exemption from the requirement to provide landscaping as specified by the section of the code is requested to provide the Applicant some flexibility in the landscaping provided for the project. This may also provide cost savings for the project.
8. Requirement to provide landscaping as specified by the County	Title 12 – Streets, Sidewalks, and Public Places Chapter 12.24A Landscape Planting and Beautification Section 070D – Street Trees. Subdivisions.	**MCC 12.24A.070D – Street Trees. Subdivisions.** Planting of Street Trees, shall be granted to allow flexibility in the number, species, and location of street trees in the Kuikahi Village project. The Conceptual Landscape Plan prepared by a licensed landscape architect, attached here as **Exhibit "1"**, shall be reviewed by the Department of Public Works prior to approval.	An exemption from the requirement to provide landscaping as specified by the section of the code is requested to provide the Applicant some flexibility in the landscaping provided for the project. This may also provide cost savings for the project.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
9. Requirement for payment of Water System Development fees	Title 14 – Public Services Chapter 14.07 – Water system Development Fees Section 030 – Water System Development Fee Schedule	**MCC 14.07.030 – Water System Development Fee Schedule.** An exemption from MCC Chapter 14.07.030, Water System Development Fees, is requested to exempt the project from water system development fees.	An exemption from the requirements to pay the water system development fees will advance the affordability objectives of the project.
10. Requirement for payment of Temporary Water Meter fees	Title 14 – Public Services Chapter 14.10 – Water Rates and Fees Section 040 – Temporary Meter Charges and Water Use Restrictions	**MCC 14.10.040 – Temporary Meter Charges.** An exemption from MCC Chapter 14.10.040, Temporary Meter Charges, to waive the fees for a temporary construction water meter for the project and from the restrictions on water use of temporary meter during construction of the project.	An exemption from the requirements to pay the temporary water meter fees during construction will advance the affordability objectives of the project.
11. Requirement for payment of Wastewater Assessment Fees	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 150 – Fee Waiver. Title 14 – Public Services Chapter 14.35 – Wastewater Assessment Fees For Facility Expansion For The Wailuku/Kahului Wastewater Treatment System Section 080 – Exemptions.	**MCC 2.97.150 - Fee Waiver.** **MCC 14.35.080 – Exemptions.** Per MCC 2.97.150, an exemption from MCC 14.35.080, Wastewater Assessment Fees for Facility Expansion for the Wailuku/Kahului regional Wastewater Treatment System.	An exemption from the requirements to pay the Wailuku/Kahului Assessment fees for the expansion of the Wailuku/Kahului Wastewater Treatment system will advance the affordability objectives of the project.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
12. Requirement for payment of Traffic Impact Fees for Wailuku-Kahului Fees	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 150 – Fee Waiver. Title 14 – Public Services Chapter 14.76 - Impact Fees For Traffic And Roadway Improvements In Wailuku-Kahului, Maui, Hawaii Section 120 – Exemptions and Credits.	**MCC 14.76.120 – Exemptions and Credits.** Per MCC 2.97.150, an exemption from MCC 14.76.120, Impact fees for traffic and roadway improvements in Wailuku-Kahului, Maui, Hawaiʻi.	An exemption from the requirements to pay the Wailuku-Kahului Traffic Impact assessment fees for road improvements will advance the affordability objectives of the project.
13. Requirement for payment of permit and inspection fees	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 150 – Fee Waiver. Title 16, Buildings and Construction, MCC: Sections 16.04C, Fire Code 16.18B, Electrical Code 16.20B, Plumbing Code 16.26B, Building Code	**MCC Title 16 - Building and Construction Exemptions from MCC Chapters:** **• 16.04C, Fire Code,** **• 16.18B, Electrical Code,** **• 16.20B, Plumbing Code, and** **• 16.26B, Building Code** Per Maui County Code 2.97.150, exemptions from MCC 16.04C Fire Code; 16.18B Electrical Code; 16.20B Plumbing Code; and 16.26B Building Code, is requested to exempt the project from Fire, Electrical, Plumbing, and Building Permit fees, as well as plan review and inspection fees.	These exemptions provide savings to ensure the project is financially feasible. The project intends to meet all inspection and code requirements.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
14. Requirement for payment of permit and inspection fees	Title 16 – Building and Construction Chapter 16.26B – Building Code Section 108.2.1 – Schedule of Permit Fees.	**MCC 16.26B.108.2.1 – Schedule of Permit Fees.** An exemption from MCC 16.26B.108.2.1 Plan Review Fees and Fund, is requested to request exemption for project permits from Plan Review fees and any resubmittal review fees.	These exemptions provide savings to ensure the project is financially feasible. The project intends to meet all inspection and code requirements.
15. Urban standards, relating to curb, gutter, and sidewalks	Title 16 – Building and Construction Chapter 16.26B – Building Code Section 3600 – Chapter 36 Added. Improvements to Public Streets	**MCC 16.26B.3600 – Chapter 36 Added. Improvements to Public Streets.** An exemption from MCC 16.26B.3600, Improvements to Public Streets, is requested that the project will not be required to make improvements pertaining to the undergrounding of overhead utility lines, road widening, or other improvements including, but not limited to curbs, gutters, and sidewalks along Ku‘ikahi Drive for the entire parcel.	This exemption will allow the Applicant to implement the project without providing improvements to public streets and ensuring the project is financially feasible. The Applicant will provide a shared bike/pedestrian path on their property, along the project’s frontage to Ku‘ikahi Drive.
16. Requirements for Change of Zoning, Community Plan Amendment and roadway design standards	Title 18 – Subdivisions Chapter 18.04 – General Provisions Chapter 18.16 – Design Standards Section 020 – Compliance.	**MCC 18.16.020 – Design Standards.** An exemption from MCC 18.04 General Provisions and 18.16.020 Design Standards, is requested as related to land use consistency and conformity requirements of Title 18, and any requirement to obtain a change in zoning and/or community plan amendment and also allow for flexible design standards for the proposed roundabout on Ku‘ikahi Drive at the Kehalani Mauka Parkway intersection to enable subdivision approval.	This exemption will allow the Applicant to implement the project without the Change of Zoning and Community Plan Amendment while ensuring the project is financially feasible. The exemption will also allow the Applicant flexibility in the design of the proposed roundabout at the intersection of Kehalani Mauka Parkway and Ku‘ikahi Drive, to the satisfaction of the Department of Public Works.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
17. Requirement for payment of Park Assessment fee	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 150 – Fee Waiver. Title 18 – Subdivisions Chapter 18.16 – Design Standards Section 320 – Parks and Playgrounds.	**MCC 18.16.320 – Parks and Playgrounds.** Per County Code, 2.97.150, an exemption from MCC 18.16.320 Parks and Playgrounds, is requested to exempt the project from park assessment fees.	This exemption provides savings to ensure the project is financially feasible. The project will provide a playground with covered pavilion, five (5) spot parks and a shared bike/pedestrian pathway within the project and along the project frontage with Ku‘ikahi Drive. The parks will be privately owned and maintained.
18. Requirement for minimum right-of-way widths for roadways	Title 18 – Subdivisions Chapter 18.16 – Design Standards Sections: 050 – Minimum Right-of-Way and Pavement Widths. 060 – Widening of Existing Rights-of-Way.	**MCC 18.16.050 - Minimum Right-of-Way and Pavement Widths.** **MCC 18.16.060 - Widening of Existing Rights-of-Way.** An exemption from MCC 18.16.050, minimum right-of-way and pavement widths, and 18.16.060 widening of existing rights-of-way is requested for project’s internal roadways. The Project’s internal roadways are proposed to have a 20 foot wide right of way.	This exemption will allow the Applicant to implement the project by providing narrower road widths within the project and ensuring the project is financially feasible. The Applicant does not plan to dedicate the internal project roads to the County in the future.
19. Requirement for Land Use consistency for subdivision of property	Title 18 – Subdivisions Chapter 18.04 – General Provisions Section 030 – Administration	**MCC 18.04.030 – Administration.** An exemption from Section 18.04.030, MCC, Administration, and related land use consistency and conformity requirements of Title 18, shall be granted to exempt the project from obtaining a change in zoning and/or community plan amendment to enable subdivision approval and for the project to be developed to the standards outlined in this exemption list.	This exemption would expedite the delivery of affordable workforce housing. The project area is located within the Rural and Urban Growth boundaries and respects the setbacks set in the Maui Island Plan for the previously planned project (Pu‘unani Project).

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
20. Urban standards, relating to sidewalks	Title 18 – Subdivisions Chapter 18.20 – Improvements Section 070 – Sidewalks.	**MCC 18.20.070 – Sidewalks.** An exemption from MCC 18.20.070 is requested to not require the Applicant to construct a sidewalk along Ku‘ikahi Drive. An exemption from Section 18.20.070 MCC, Sidewalks, shall be granted to allow the following sidewalk standards within the project: • Three (3) feet wide, with no curb and gutter	This exemption will allow the Applicant to implement the project without providing improvements to public streets and ensuring the project is financially feasible. The Applicant will provide a shared bike/pedestrian path on their property, along the project's frontage to Ku‘ikahi Drive.
21. Urban standards, relating to curbs and gutter	Title 18 – Subdivisions Chapter 18.20 – Improvements Section 080 – Curbs and Gutters.	**MCC 18.20.080 – Curbs and Gutters** An exemption from Section 18.20.080 MCC, Curbs and Gutters, shall be granted to allow grass swales within the Project.	This exemption will allow the Applicant to implement the project without providing improvements to interior streets and ensuring the project is financially feasible. The Applicant will provide grass swales along the interior project roads.
22. Requirement to provide improvements for subdivision	Title 14 - Public Services Title 16 - Building and Construction Title 18 – Subdivisions Title 19.30A - Agricultural Zoning	An exemption is requested from the requirements of Title 14, Title 16, Title 18 and Section 19.30A of the Maui County Code to authorize the Director of Public Works to defer various subdivision requirements, limitations or both, to approve the subdivision application for the parcel identified at TMK (2) 3-5-002:003, are approximately 148.01 acres, to create the14.950 acre for the Project (the "Project Site"). The subject subdivision will result in two (2) lots, (a) the 14.950 acre Project Site; and (b) a 133.06 acre lot. The 133.06 acre lot and the Project Site will be subject to the provisions of Title 14,Title 16, Title 18, and Section 19.30A, MCC, upon application for further subdivision or building permit, whichever occurs first, with the understanding that certain exemptions are being requested for the Project Site as part of this Chapter 2.97, MCC, application.	This exemption will allow for the proposed project to proceed, without the requirement to provide standard subdivision improvements to the entire Tax Map Key parcel. This exemption will expedite the delivery of affordable workforce housing. Any future development of additional lands within the Tax Map Key parcel would undergo separate review and compliance with requirements.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
23. Requirement of payment of building permit resubmittal fee	Title 19 – Zoning Article II. – Comprehensive Zoning Provisions Chapter 19.04 – General Provisions and Definitions Section 050 – Fees Article V. – Administration and Enforcement Chapter 19.510 – Application and Procedures Section 010.B – General Application Procedures. Fees	**MCC 19.04.050 – Fees.** **MCC 19.510.010B – General Application Procedures. Fees.** An exemption from Section 19.04.050, MCC, Fees and Section 19.510.010B., Application and Procedures is requested to exempt the project from any building permit resubmittal fees.	The proposed exemption will allow the project plans to be reviewed without the payment of resubmittal fees during building permit review. This will provide cost savings for the Applicant to support the goal of providing affordable workforce housing.
24. Requirements of Change of Zoning and all provisions related to "Agricultural" development standards to allow for the Residential and Park design standards	Title 19 – Zoning Article II. – Comprehensive Zoning Provisions Chapter 19.30A – Agricultural District	**MCC 19.30A – Agricultural District** An exemption from 19.30A.Agricultural District, MCC, Permitted Uses, shall be granted to allow the following principal uses: 1) single-family units; and 2) accessory structures such as carports and private garages; parking areas; energy systems, small-scale; fences and walls; storage sheds; and park recreational buildings and structures, including but not limited to gazebo, pavilions, courts, and playgrounds. Further, this exemption shall allow the use of the property in the conceptual plat configuration shown in **Exhibit "2"**, which may be amended by the Director of Public Works. The following zoning standards shall apply to the proposed development. **Residential Use:** **Minimum lot area:** Approximately 4,600 square feet for single-family residences	The project site is zoned "Agricultural". These exemptions would expedite the delivery of affordable workforce housing by allowing the project to be developed with the Residential and Park development standards noted which are more applicable to the project, without the need to obtain a Change of Zoning.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
		Height: No building shall exceed three-stories or 40 feet in height, measured from finished grade **Setback:** For single-story buildings: • Front yard setback: 15 feet • Side and Rear yard setback: six (6) feet For two and three-story buildings: • Front yard setback: 15 feet • Side and Rear yard setback: 10 feet **Park Use:** **Minimum lot area:** 1,260 square feet **Height:** No building shall exceed two-stories or thirty (30) feet in height, measured from finished grade **Setback:** 0 yard setback	
25. Requirements of Change of Zoning and all provisions related to "Agricultural" development standards to allow for design standards	Title 19 – Zoning Article II. – Comprehensive Zoning Provisions Chapter 19.30A – Agricultural District Section 030 – District Standards.	**MCC 19.30A.030 – District Standards.** An exemption from 19.30A.030, District Standards, shall be granted to allow for the use of walls with a maximum height of eight (8) feet for the project including retaining walls which may be needed for site utilization.	The proposed exemption would provide for expedited development of residential work force housing through the allowance of the use of retaining walls with a maximum height of eight (8) feet. This provision will ensure the project is financially feasible.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
26. Requirements of heights limits for structures	Title 19 – Zoning Article II. – Comprehensive Zoning Provisions Chapter 19.30.A – Agricultural District Section 030 – District Standards.	**MCC 19.30.050 – Development Standards.** An exemption from Section 19.30.A.030, MCC, Development Standards, to allow a maximum height of three-stories not to exceed 40 feet, as measured from finished grade.	An exemption from the height requirements will allow for the multi-family units to be constructed for the project. This will support the delivery of affordable housing units.
27. Requirement to provide landscaping as specified by the County	Title 19 – Zoning Article II. – Comprehensive Zoning Provisions Chapter 19.36B – Off-Street Parking and Loading Section 080 – Landscaping.	**MCC 19.36B.080 – Landscaping** An exemption from Section 19.36B.080, MCC, Landscaping, to allow for flexibility in the location of landscaping, which requires one (1) shade tree at minimum regular intervals for every five (5) spaces. The project shall comply with Section 19.36 B.080 in effect at the time of the filing of the MCC Chapter 2.97 application, and that the project shall not be subject to any amendments to Section 19.36 B.080 adopted prior to the issuance of building permits for the project until construction is completed. Refer to **Exhibit "1"**.	An exemption from the requirement to provide landscaping as specified by the section of the code is requested to provide the Applicant some flexibility in the landscaping provided for the project. This may also provide cost savings for the project.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
28. Requirement for State Land Use District Boundary Amendment for project	Title 2 – Administration and Personnel Chapter 2.97 Residential Workforce Housing Policy Incentives and Exemptions Section 120 – Exemptions. Title 19 – Zoning Chapter 19.68 – State Land Use District Boundaries Chapter 19.510 – Application and Procedures Article 8. – Chapter 8, Revised Charter of the County of Maui (1983), as amended.	**MCC 19.68 – State Land Use District Boundaries.** **MCC 19.510 – Application and Procedures Article 8. – Chapter 8, Revised Charter of the County of Maui (1983), as amended.** Per County Code 2.97.120, an exemption from Chapter 19.68, MCC, State Land Use District Boundaries; Chapter 19.510, MCC, Application and Procedures; Article 8, Chapter 8, Revised Charter of the County of Maui (1983), as amended. Exemptions are granted from Chapters 19.68 and 19.510, MCC, and Article 8, Chapter 8, of the Revised Charter of the County of Maui (1983), as amended, to enable the District Boundary Amendment request to proceed directly to the Maui County Council. The District Boundary Amendment request will not require the preparation of a District Boundary Amendment application and will not require processing through the Maui Planning Commission.	The project site is 14.9 acres and is located within the "Agricultural" District. This exemption will expedite the delivery of affordable workforce housing.
29. Requirement for payment of permit and inspection fees.	Title 20 – Environmental Protection Chapter 20.08 – Soil Erosion and Sedimentation Control Section 090 – Grubbing and Grading Permit Fees.	**MCC 20.08.090 - Grubbing and Grading Permit Fees.** An exemption from Section 20.08.090, MCC, Grubbing and Grading Permit Fees, shall be granted to exempt the project from payment of grading, grubbing, and excavation permit fees, as well as inspection fees.	These exemptions provide savings to ensure the project is financially feasible. The project intends to meet all inspection and code requirements.

Development Standard or Requirement	Relevant Section/ Requirement	Requested Exemption	Rationale for Request
30. Requirement for payment of permit and inspection fees	Title 20 – Environmental Protection Chapter 20.08 – Soil Erosion and Sedimentation Control Sections: 130 – Permit–Bond-Required. 140 – Permit-Bond-Conditions. 150 – Permit-Bond-Term.	**MCC 20.08.130 – Permit-Bond-Required.** **MCC 20.08.140 – Permit-Bond-Conditions.** **MCC 20.08.150 – Permit-Bond-Term.** An exemption from Sections 20.08.130, 20.08.140 and 20.08.150, MCC, Permit Bond, shall be granted to exempt the project from filing a bond and instead, allow Applicant to provide a cash equivalent to the County of Maui for grading, construction of drainage improvements and implementation of erosion control measures.	These exemptions provide flexibility to the Applicant in the type of bond funding for the grading work. This would assist in expediting the delivery of affordable workforce units. The project intends to meet all inspection and code requirements.

Fee	MCC Section	Value Per Unit	Total Value
Refuse Disposal Permit	8.04.040	$ 1.00	$ 204.00
Refuse Per Ton	8.04.050	$ 181.00	$ 36,924.00
Driveway Fee and Inspection	12.08.050	$ 150.00	$ 150.00
Water System Development Fees	14.07.030	$ 3,125.00	$ 637,500.00
Wastewater Assessment Fees	14.34.080	$ 2,790.00	$ 569,160.00
Electrical	16.18B	$ 630.00	$ 128,520.00
Plumbing	16.20B	$ 1,500.00	$ 30,600.00
Building Code	16.26B	$ 880.00	$ 179,520.00
Park Fees	18.16.320	$ 5,880.00	$ 1,199,520.00
Grading Permit	20.08.090	$ 375.00	$ 375.00
Sub Totals		$ 15,161.00	$ 2,782,473.00
Workforce Housing Guidelines	2.97.080	<$101,323.52>	<$20,670,000.00>
TOTALS			**<$17,887,527.00>**

In summary, Chapter 2.97, MCC provides certain provisions for qualified affordable and/or workforce housing projects to be exempt from MCC provisions, provided that the housing project is consistent with the purpose and intent of this chapter, and meets minimum requirements of health and safety. As such, the above noted exemptions will be filed as part of the Kuikahi Affordable Housing Project's Chapter 2.97, MCC application with the DHHC for review and action by the Maui County Council. These exemptions will expedite the delivery of affordable housing. The requested exemptions do not compromise the health and safety provisions of the proposed project.

ALTERNATIVES TO THE PROPOSED ACTION

V

V. ALTERNATIVES TO THE PROPOSED ACTION

The following is a discussion of the various development alternatives that have been considered by the Applicant as part of the planning process.

A. PREFERRED ALTERNATIVE

The preferred alternative is the proposed development of 204 residential housing units varying in type (i.e., multi-family/condominium, duplex, live-work, studio, single-family) to accommodate for different family sizes. These residences will be affordable for families and individuals earning 60 to 140 percent of the AMI, with units for sale. Parking for residents and visitors, as well as community pavilion, playground, and "spot parks" are among the amenities to be provided at the proposed development.

Furthermore, the location of the proposed project is in an area of Wailuku developed with existing residential developments of a similar nature, with existing infrastructure systems, and a handful of small businesses. Wailuku Town is the seat of State and County government offices on Maui. Wailuku also features a number of professional services, restaurants, and retail outlets.

For these reasons, the preferred alternative is considered to be the most viable alternative for providing much needed affordable housing in the Wailuku area. Furthermore, the project will be developed in an area with existing infrastructure systems.

B. SITE DESIGN ALTERNATIVES

With the proposed project site, a variety of alternative layouts could be considered as well as the types of residential units to be utilized. In designing a master plan for the site, the Applicant considered various factors in determining the size and scope of the development, including topography features, mix of housing units, market viability, ingress and egress from the site and community amenities to be provided. While there have been various iterations of site plan layouts for the project site, the proposed site plan provided in Chapter I of the document is the alternative that best met the Applicant's desire to provide a variety of housing types and price ranges, provide recreational amenities and would be a financially viable project. No public funds are anticipated to be utilized for the project development; the project is anticipated to be privately funded.

C. NO ACTION ALTERNATIVE

Under the "no action" alternative, the project site would remain "as is". The "no action" alternative is not considered to be in the best interest of the community at large as the "no action" alternative would not provide new affordable housing opportunities for Maui County

residents. In this context, the proposed project is considered the most appropriate alternative.

D. DEFERRED ACTION ALTERNATIVE

A deferral of the proposed action means that the development proposal would be pursued at a later point in time. The deferral alternative is not considered viable from a project implementation standpoint. Delays in project implementation will likely result in higher development costs and greater uncertainty with respect to infrastructure systems adequacy. With this in mind, the “deferred action alternative” is not considered appropriate.

SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

VI

VI. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Assessment of construction-related impacts, noise and air quality impacts, and potential impacts on the physical and socio-economic environment, as well as a CIA and consultation with the SHPD were carried out as part of the environmental assessment documentation process. The proposed development may result in limited, unavoidable construction-related impact on the environment, as described in Chapter II.

In the short term, construction associated with the proposed project will have a temporary impact on air quality from dust generation and discharge of exhaust from construction equipment during ground altering activities and site grading. Appropriate Best Management Practices will be incorporated to mitigate adverse construction-related impacts, including but not limited to, watering of exposed surfaces, installing dust screens, and regular maintenance of construction equipment.

Construction of the proposed project will also generate unavoidable short-term noise impacts. The use of properly maintained construction equipment will mitigate noise impacts caused by equipment. The incorporation of State Department of Health construction noise limits and curfew times are measures to mitigate noise impacts caused by construction activities.

The Applicant has consulted with the State Department of Transportation and the County Department of Public Works (DPW) to develop appropriate mitigation measures to address traffic impacts that will result from the proposed project. The project will provide access and related improvements, as outlined in the Traffic Impact Assessment Report (TIAR). Refer to **Appendix "G"**. Coordination with the DPW is continuing on the proposed roundabout at the project's east driveway intersection with Ku'ikahi Drive. Future discussions will also be initiated on the traffic signal optimization at the Waiale Road/Ku'ikahi Drive intersection, as recommended by the TIAR.

In summary, the proposed action is not anticipated to create any significant, long-term adverse environmental effects.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

VII

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed action will not entail a substantial commitment of public services or facilities. Offsite infrastructure systems will be improved by the Applicant to address additional demands generated by the proposed project. Development of the proposed project will involve a commitment of energy, labor, fiscal, and material resources. The use of these resources, when weighed against the expected benefit to be derived from the residential project benefiting Maui's families and individuals at a variety of income levels, is not considered an adverse commitment.

LIST OF PERMITS AND APPROVALS

VIII

VIII. LIST OF PERMITS AND APPROVALS

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

State of Hawai‘i

1. District Boundary Amendment (from Maui County Council)
2. Chapter 343, Hawai‘i Revised Statutes, Environmental Assessment
3. Chapter 11-46, Community Noise Control, as applicable
4. Chapter 11-60.1-33, Fugitive Dust, as applicable
5. National Pollutant Discharge Elimination System (NPDES) Permit

County of Maui

1. County of Maui, Chapter 2.97 Affordable Housing approval
2. Construction permits (i.e., building and grading permits)
3. Work on County Roadway approval

SIGNIFICANCE CRITERIA ASSESSMENT

IX

IX. SIGNIFICANCE CRITERIA ASSESSMENT

The "Significance Criteria", defined in Chapter 11-200.1-13 of the Hawai'i Administrative Rules, were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following criteria and analyses are provided.

1. Irrevocably commit a natural, cultural, or historic resources.

Though there were no endangered Hawaiian hoary bats recorded during the Flora and Fauna survey, it was noted that these mammals could occasionally pass through the area. As such, should they be observed in the project area, the U.S. Fish and Wildlife Service has guidelines for their protection which will be followed by the Applicant. No native bird species were found at the project area during the survey; however, there are native seabirds which are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. As recommended in the survey, the Applicant will shield all significant outdoor lighting downward to minimize disorientation of these protected seabirds.

An Archaeological Inventory Survey (AIS) was conducted in 2005 which included the 14.9-acre project site. The AIS was compromised of historic background settlement pattern research, a complete pedestrian survey of the survey area, and subsurface testing via backhoe and reporting. Six (6) of the seven (7) historical sites related to the former use of the area for sugar cane cultivation were identified, and determined significant under Criterion "D" as having the potential to yield potential information important to understanding the history of the region and were determined to be adequately documented by SHPD. Refer to **Appendix "D"**. Six (6) of the seven (7) sites were located outside of the project area. Consequently, the AIS was accepted by the SHPD, and it was concluded that no further archaeological mitigation was necessary. Refer to **Appendix "D"**.

A CIA was also completed for the project, which included historical and cultural research and background information, as well as interviews with long-time area residents and members of the community who were familiar with the area. The CIA concluded that there would be no impacts to cultural resources in the area.

With the mitigation measures presented herein, the proposed project will not involve an irrevocable commitment to loss or destruction of any natural, cultural, or historic resources.

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

The proposed action will be implemented adjacent to existing residential developments of a similar nature, as well as existing commercial development, and the commitment of land resources for the proposed action will not curtail the range of beneficial uses of the

environment. The project site, although designated for agricultural use, has not been in agricultural production for some time. The proposed use of the site for development of a new residential subdivision is compatible with surrounding residential uses.

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

The proposed action does not conflict with the policies and guidelines of Chapter 343, HRS. An environmental assessment is being carried out to ensure the proposed project will not have adverse impacts on the environmental resources.

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

The proposed action will have a beneficial effect on the local economy during the short and long term. As previously discussed, positive economic and social impacts are anticipated as a result of the project including construction-related jobs, real property assessment revenues, and contribution of water, wastewater, and educational assessment fees. In the long-term, residents at the proposed development will support nearby local grocery stores and businesses. Residents living in live-work units will also be able to operate their small-businesses out of their homes, saving on potential storefront rent that they would otherwise expend at other locations.

5. Have a substantial adverse effect on public health.

Based on the results of the Phase 1 ESA prepared for the originally proposed Pu‘unani project, which was located in the same project area as the Kuikahi Affordable Housing project, there was no evidence of hazardous materials at the project area. Up until the mid-1980's, the area was used for sugar cane and pineapple cultivation. During future site work, if large amounts of construction debris or unidentifiable substances (i.e., containers) are discovered, proper waste identification, testing, and applicable waste handling and disposal procedures will be implemented. Use of fertilizers within residential lots and within common areas will be in a manner consistent with best landscape practices so as to avoid the overuse of soil amendments and nutrients. With such practices, there are no anticipated adverse effects on groundwater resources attributed to fertilizer use. No adverse impacts to surface, underground, or marine resources are anticipated.

The project is not anticipated to result in long-term air or noise impacts. Additionally, the proposed action is not anticipated to create significant direct or indirect foreseeable greenhouse gas (GHG) emissions, and does not fall within the threshold of mandatory GHG reporting. As such, no adverse impact to public health or welfare is anticipated as a result of the proposed action.

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

The proposed Kuikahi Affordable Housing project will provide needed affordable housing for Maui's families at various income levels. Many of these families and individuals may work in the business districts of Kahului and Wailuku, but live further away due to lack of affordable housing in these areas. The proposed project is not expected to attract additional residents who are new to Maui, but to instead, allow for existing, local families and individuals to live in closer proximity to their work places, commercial and business developments, and public facilities. As such, the project is not anticipated to involve substantial secondary impacts due to population change. Secondary impacts on public facilities are not anticipated. The Applicant is coordinating with the DWS and DEM to determine the level of infrastructural improvements needed to provide water and wastewater services, respectively, for the proposed project.

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

No substantial degradation of environmental quality resulting from the action is anticipated. Best Management Practices (BMPs) and appropriate erosion control measures will be utilized during the construction period. Drainage system improvements will be constructed in accordance with applicable regulatory design standards to ensure that surface runoff will not have an adverse effect on adjacent or downstream properties.

Any potential short-term impacts to air and noise quality during the construction phase of the project, will be mitigated through employing BMPs. In the long term, the project will not adversely impact air quality and ambient noise.

8. **Be individually limited but cumulatively have substantial adverse effects upon the environment or involves a commitment for larger actions.**

The proposed action is a stand-alone project, and does not represent a commitment to a larger action. There are no anticipated cumulative impacts associated with the proposed action. The Applicant does own additional lands surrounding the project site, but there is no plan for development of lands outside of the project site at this time. Any future development of addtional lands would require separate regulatory reviews and approvals.

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

As previously mentioned there were no endangered Hawaiian hoary bats recorded during the Flora and Fauna survey; however, should they show up in the project area, the U.S. Fish and Wildlife Service has guidelines for their protection which will be followed by the Applicant. No native bird species were found at the project area during the survey but, as recommended in the survey, the Applicant will shield all significant outdoor lighting downward to minimize disorientation of these protected seabirds. Refer to **Appendix "C"**. The project site is located adjacent to existing residential developments of a similar nature.

The project is not anticipated to substantially affect 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 may pose a temporary short-term impact on air and noise quality; however, impacts will be mitigated through the use of BMPs. Dust control measures, such as regular watering and sprinkling, and installation of dust screens will be implemented to minimize wind-blown emissions. Noise impacts will be mitigated by limiting construction to daylight work hours. Utilizing approved BMPs, significant impacts to water quality are not anticipated.

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

11. 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.

The project site is situated inland and is not anticipated to have any adverse impact upon coastal waters or resources, beaches, estuaries, or other fresh water bodies.

According to the Federal Emergency Management Agency's Flood Insurance Rate Maps currently in effect, the project site falls within Zone X (unshaded), an area of minimal flooding. The project site is located outside of the tsunami inundation zone. In addition, the project site is located outside of the 3.2-foot projected sea level rise exposure area.

Drainage improvements will be designed to mitigate runoff in accordance with County drainage and stormwater rules and regulations. During construction, recommended BMPs will be implemented for erosion and sedimentation control to minimize potential impacts to water quality.

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

The proposed development has been designed to integrate with its surrounding environment in an effort to not block established scenic vistas, viewplanes, or corridors during the day or night. The project is located inland, away from coastal and open space areas and will not substantially affect coastal scenic or open space resources.

13. Require substantial energy consumption or emit substantial greenhouse gasses.

The proposed action will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources or substantial emission of greenhouse gasses. In the long term, the project will create an additional

demand for electricity. However, this demand will not be substantially or excessively more than the energy consumed by similar developments throughout the region.

In summary, the project site is situated adjacent to existing residential uses of a similar nature, and in close proximity to services and commercial areas in the Wailuku and Kahului region. This project will be developed in an area with existing infrastructure systems, and will not extend County service areas. The proposed project is not anticipated to have a significant adverse impact on the physical, cultural and socio-economic environments. Based on the preceding analysis in this Draft EA document, and in accordance with the significance criteria set forth in 11-200.1-13, HAR, it is anticipated that the proposed project will result in a finding of no significant impact (AFNSI).

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

X

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

The following agencies, organizations, and individuals were consulted during preparation of the Draft Environmental Assessment (EA). This Chapter addresses early consultation comments received from these agencies, organizations, and individuals.

Federal Agencies

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

2. Larry Yamamoto, State Conservationist
   Natural Resources Conservation Service
   U.S. Department of Agriculture
   P.O. Box 50004
   Honolulu, Hawai‘i 96850-0001

3. Linda Speerstra, Chief
   U.S. Department of the Army, Regulatory Branch
   U.S. Army Engineer District, Honolulu
   Regulatory Branch, Building 230
   Fort Shafter, Hawai‘i 96858-5440

4. Ryan Okahara, Field Office Director
   U.S. Department of Housing and Urban Development
   1132 Bishop Street, Suite 1400
   Honolulu, Hawai‘i 96813-4918

5. Michelle Bogardus, Island Team Leader
   U.S. Fish and Wildlife Service
   300 Ala Moana Blvd., Rm. 3-122
   Honolulu, Hawai‘i 96850

State Agencies

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

7. Denise Albano, Chair
   State of Hawai‘i
   Department of Agriculture
   1428 South King Street
   Honolulu, Hawai‘i 96814-2512

8. M. Kaleo Manuel, Deputy Director
   State of Hawai‘i
   Commission on Water Resource Management
   P.O. Box 621
   Honolulu, Hawai‘i 96809

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

10. State of Hawai‘i
    Department of Health
    1250 Punchbowl St., Room 325
    Honolulu, Hawai‘i 96813

11. Alec Wong, P.E., Chief
    State of Hawai‘i
    Department of Health
    Clean Water Branch
    Hale Ola, Room 225
    2827 Waimano Home Road
    Pearl City, Hawai‘i 96782

12. Patti Kitkowski, District Environmental Health Program Chief
    State of Hawai‘i
    Department of Health
    Maui Sanitation Branch
    54 South High Street, Room 300
    Wailuku, Hawai‘i 96793

13. Keith Kawaoka, Acting Director
State of Hawai‘i
Department of Health
Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawai‘i 96813

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

15. State of Hawai‘i
Department of Land and Natural Resources
State Historic Preservation Division, Maui
130 Mahalani Street
Wailuku, Hawai‘i 96793

16. State of Hawai‘i
Department of Public Safety
919 Ala Moana Boulevard, 4th Floor
Honolulu, Hawai‘i 96814

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

18. Denise Iseri-Matsubara, Executive Director
State of Hawai‘i
Hawai‘i Housing Finance and Development Corporation
677 Queen St # 300
Honolulu, Hawai‘i 96813

19. Major General Kenneth Hara, Adjutant General
Hawai‘i State Civil Defense
3949 Diamond Head Road
Honolulu, Hawai‘i 96816

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

21. Sylvia Hussey, Chief Executive Officer
State of Hawai‘i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, Hawai‘i 96817

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

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

Maui County Agencies

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

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

26. Karla Peters, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoa Street, Unit 2F
Wailuku, Hawai‘i 96793

27. Michele Chouteau McLean, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, Hawai‘i 96793

28. Tivoli Faaumu, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai‘i 96793

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

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

31. Jeff Pearson, Director
County of Maui
Department of Water Supply
200 South High Street, 5th Floor
Wailuku, Hawai‘i 96793

32. Herman Andaya, Emergency Management Officer
County of Maui
Emergency Management Agency
200 South High Street
Wailuku, Hawai‘i 96793

33. Honorable Alice Lee, Council Chair
Maui County Council
200 South High Street
Wailuku, Hawai‘i 96793

Maui County Organizations

34. Hawaiian Telcom
60 South Church Street
Wailuku, Hawai‘i 96793

35. Tiana Raymonds
Kehalani Community Organization
Scott Matsuura, President
P.O. Box 1530
Wailuku, Hawai‘i 96793

36. Debbie Cabebe, Chief Executive Officer
Maui Economic Opportunity
99 Mahalani Street
Wailkuku, Hawai‘i 96793

37. Michael Grider, Manager, Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawai‘i 96733

38. Spectrum
158 Ma‘a Street
Kahului, Hawai‘i 96732

39. Travis Polido, President
Waikapu Community Association
P.O. Box 3046
Wailuku, Hawai‘i 96793

40. Waikapu Gardens Homeowners Association
P.O. Box 2390
Wailuku, Hawai‘i 96793

41. Kristen Holmes
Wailuku Community Association
c/o Swan Interiors
2103 W Vineyard Street
Wailuku, Hawai‘i 96793

42. Joseph G. Blackburn II
Waiolani Mauka Community Association
P.O. Box 1067
Wailuku, Hawai‘i 96793

43. Wailuku Heights Extension Unit I
Community Association
P.O. Box 698
Wailuku, Hawai‘i 96793

44. Lester Yano
Wailuku Heights Extension Unit II
Community Association
c/o Hawaiiana Management Co
140 Hoohana Street, Suite 208
Kahului, Hawai‘i 96732

45. Hawaiiana Management Company
Wailuku Heights Extension Unit II
Homeowners Association
1305 N. Holopono Street, Unit 3A
Kihei, Hawai‘i 96753

46. Wayne Hedani, Agent
Wailuku Heights Extension Community Association
586 Ku‘ikahi Drive
Wailuku, Hawai‘i 96793

47. Joseph G. Blackburn II
Waiolani Community Association
P.O. Box 1067
Wailuku, Hawai‘i 96793

48. Joseph G. Blackburn II
Waiolani Elua Community Association
P.O. Box 1067
Wailuku, Hawai‘i 96793

United States Department of Agriculture

Natural Resources
Conservation Service

Pacific Islands Area
Kahului Field Office

77 Hookele St., # 202
Kahului, HI 96732

Voice
808-871-5500 ext. 3
Fax
855-878-2454

November 17, 2020

Ms. Charlene Shibuya
Munekiyo Hiraga
305 High St., Suite 104
Wailuku, HI 96793

Subject: Early Consultation for the Proposed Kuikahi Residential Project; TMK No. (2) 3-5-002: 003 (por.); Wailuku, Maui, HI

Dear Ms. Shibuya:

I have no comments.

Sincerely,

Gerald Gregory
District Conservationist

An Equal Opportunity Provider and Employer

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Gerald Gregory, District Conservationist
Natural Resources Conservation Service
Pacific Islands Area, Kahului Field Office
77 Hoʻokele Street, Suite 202
Kahului, Hawaiʻi 96732

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawaiʻi

Dear Mr. Gregory:

Thank you for your early consultation response letter dated November 17, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we acknowledge that the Natural Resources Conservation Service has no comments on the proposed project at this time.

We would also like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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NOV 27 2020

DAVID Y. IGE
GOVERNOR

CURT T. OTAGURO
COMPTROLLER

AUDREY HIDANO
DEPUTY COMPTROLLER

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

(P)20.193

NOV 18 2020

Ms. Charlene Shibuya
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request for
Proposed Kuikahi Residential
Wailuku, Maui, Hawaii
TMK: (2) 3-5-002:003 (por.)

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Dora Choy of the Planning Branch at 586-0488.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

DC:mo
c: Mr. Wade Shimabukuro, DAGS MDO

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Christine L. Kinimaka, Public Works Administrator
State of Hawai‘i
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawai‘i 96810

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Kinimaka:

Thank you for your early consultation response letter dated November 18, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we acknowledge that the Department has no comments at this time, as the proposed project does not impact any of the Department's projects or existing facilities.

We would also like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
K:\DATA\WV Regenesis\Wailuku AH\Applications\ECL\Response Letters\DAGS Response.docx

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SUZANNE D. CASE
CHAIRPERSON

KAMANA BEAMER, PH.D.
MICHAEL G. BUCK
ELIZABETH A. CHAR, M.D.
NEIL J. HANNAHS
WAYNE K. KATAYAMA
PAUL J. MEYER

M. KALEO MANUEL
DEPUTY DIRECTOR

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

December 1, 2020

REF: RFD.5506.6

TO: Ms. Charlene Shibuya
Munekiyo Hiraga

FROM: M. Kaleo Manuel, Deputy Director
Commission on Water Resource Management

SUBJECT: Early Consultation Request for the Proposed Kuikahi Residential Project

FILE NO.: RFD.5506.6
TMK NO.: (2) 3-5-002:003(por.)

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

Our comments related to water resources are checked off below.

[X] 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

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

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

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

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

[X] 6. We recommend the use of alternative water sources, wherever practicable.

[X] 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

[X] 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

- [ ] 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
- [ ] 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- [ ] 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.
- [ ] 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- [ ] 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- [ ] 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- [ ] 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.
- [ ] 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- [ ] 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- [ ] 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

- [X] OTHER: Planning - The proposed water source(s) and projected water demands for the project, both potable and non-potable, should be identified and the calculations used to estimate demands should be provided. A discussion of the potential impacts on water resources and other public trust uses of water should be included, and any proposed mitigation measures described. Water conservation and efficiency measures to be implemented should also be discussed.

If you have any questions, please contact Lenore Ohye of the Commission staff at 587-0216.

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

M. Kaleo Manuel, Deputy Director
State of Hawai‘i
Commission on Water Resource Management
P.O. Box 621
Honolulu, Hawai‘i 96809

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i, RFD.5506.6

Dear Mr. Manuel:

Thank you for your early consultation response letter dated December 1, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

- We acknowledge your comment to work with the County of Maui, Department of Water Supply (DWS) to have the project incorporated into the County's Water Use and Development Plan. Your comment has been forwarded to the Applicant and its project team for consideration. Additionally, we note that the DWS also received a copy of the Early Consultation letter and provided comments on the project.

- To the extent practicable, water efficient fixtures and practices will be encouraged for implementation within residences of the proposed project. Furthermore, the resource you provided regarding Leadership in Environmental Design certification will be reviewed.

- Best Management Practices (BMPs), including utilizing Low Impact Design measures for stormwater management to minimize the impact of the proposed project on the existing area's hydrology while maintaining onsite infiltration and prevention of polluted runoff will be implemented.

- We acknowledge your comment regarding the encouragement for use of alternative water sources. We note that the proposed project is anticipated to be serviced by the County's existing municipal water system.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

- We note your comment recommending participation in the Hawaii Green Business Program. Your comment has been forwarded to the Applicant for consideration.

- We acknowledge your comment regarding the use of landscape irrigation conservation BMPs endorsed by the Landscape Industry Council of Hawai‘i. The resource provided in your letter will be reviewed for applicability to the proposed project.

- We acknowledge your comment regarding identification of water source(s) and demand for the proposed project. Chapter II of the Environmental Assessment (EA) prepared for the project will include a discussion on the potential impacts to water resources and proposed mitigation measures. Water conservation and efficiency measures will be implemented at the project and will be further described in Chapter II of the EA.

Furthermore, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agricultural” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
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DAVID Y. IGE
GOVERNOR

DR. CHRISTINA M. KISHIMOTO
SUPERINTENDENT

STATE OF HAWAI`I

DEPARTMENT OF EDUCATION

P.O. BOX 2360

HONOLULU, HAWAI`I 96804

OFFICE OF FACILITIES AND OPERATIONS

November 27, 2020

Charlene Shibuya
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: Early Consultation Request for the Proposed Kuikahi Residential Project
Wailuku, Maui, Hawaii, TMK 9-1-181:042

Dear Ms. Shibuya:

The Hawaii State Department of Education (HIDOE) has the following comments in the preparation of a Draft Environmental Assessment (DEA) for the proposed Kuikahi Residential Project (Project). The Project is envisioned to develop approximately 200 fee simple residential units targeting income groups with Area Median Incomes at or below 120 percent on approximately14.9 acres of land located in Wailuku, Island of Maui, TMK 3-5-002:Por. 003.

The HIDOE schools servicing the Project are Puu Kukui Elementary, Maui Waena Intermediate, and Maui High. All three schools are over capacity. This overcapacity is expected to remain over the next five years.

The Project is located within the Central Maui School Impact District with fee amounts of $2,371 for multi-family residential units and $5,373 for single-family residential units. Kuikahi Associates, LLC is encourage to meet with the HIDOE as early as possible to discuss executing an Educational Contribution Agreement.

The DEA should discuss whether accessory dwelling units will be allowed.

Thank you for the opportunity to comment. Should you have questions, contact Robyn Loudermilk, Planner of the Faculties Development Branch, Planning Section, at (808) 784-5093 or via email at robyn.loudermilk@k12.hi.us.

Respectfully,

for Mindalourey

Kenneth G. Masden II
Public Works Manager
Planning Section

KGM:rll
c: Kathleen Dimino, Complex Area Superintendent, Baldwin/Kekaulike/Maui Complex Area

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Kenneth G. Masden II, Public Works Manager
Planning Section
State of Hawai‘i
Department of Education
P.O. Box 2360
Honolulu, Hawai‘i 96804

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Mr. Masden II:

Thank you for your early consultation response letter dated November 27, 2020 on the subject project. We would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agricultural” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

On behalf of Kuikahi Properties, LLC (“Applicant”), we offer the following responses to comments noted in your letter.

1. We acknowledge that some of the Department of Education's (DOE) elementary, intermediate, and high school servicing the area are over capacity and some have many out of district students. The Applicant will continue collaborating with the DOE on redistricting strategies. The Applicant will also continue to assist in advancing plans to develop new schools and expanding existing schools in previous proposed large developments in the region which committed to land and infrastructure contributions.

2. The Applicant understands there are school impact fees associated with the project being located in the Central Maui Impact District. As such, the Applicant is prepared to pay for prescribed impact fees and plans to meet with your department to discuss executing an Educational Contribution Agreement.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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NOV 25 2020

DAVID Y. IGE
GOVERNOR OF HAWAII

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
Maui District Health Office
54 South High St. Rm. #301
Wailuku, HI 96793

Lorrin W. Pang, M.D., M.P.H.
District Health Officer

November 20, 2020

Ms. Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request for the Proposed Kuikahi Residential Project, Wailuku, Maui, Hawaii
TMK: (2) 3-5-002:003 (por)

Thank you for the opportunity to review this project. We have the following comments to offer:

> We are unable to offer any comments for the proposed project as the wastewater system was not satisfactorily addressed for our review. Please provide wastewater disposal method for the proposed project for review. If you have any questions, please call Roland Tejano, Environmental Engineer, at 808 984-8232.

It is strongly recommended that you review the department's website at https://health.hawaii.gov/epo/files/2018/05/DOHEHA.LandUseContactList.20180502.pdf and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please contact me at 808 984-8230 or email me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
District Environmental Health Program Chief

c Sina Pruder, Acting EMD Administrator

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Patti Kitkowski
District Environmental Health Program Chief
State of Hawai‘i
Department of Health
Maui District Health Office
54 South High Street, Room #301
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Kitkowski:

Thank you for your early consultation response letter dated November 20, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

As the proposed project is in its preliminary development stage, detailed information as it relates to the wastewater system was not included in the Applicant's request for early consultation comments from the Department of Health. However, the Applicant confirms that the project will connect to the County's wastewater system, and additional wastewater disposal information will be included in the Draft Environmental Assessment (EA) which is being prepared for the proposed action. Upon the publication of the Draft EA in the Office of Environmental Quality Control's *The Environmental Notice*, a copy of the document will be provided to the Department for additional review and comment.

Furthermore, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
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DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 24, 2020

Munekiyo Hiraga
Attn: Ms. Charlene Shibuya, Sr Associate via email: planning@munekiyohiraga.com
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: Early Consultation Request for the Proposed **Kuikahi Residential Project** located at Wailuku, Island of Maui; TMK: (2) 3-5-002:003 (por.) on behalf of Kuikahi Properties LLC

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

At this time, enclosed are comments from the (a) Engineering Division, (b) Division of Forestry & Wildlife, and (c) Land Division-Maui District on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: darlene.k.nakamura@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 13, 2020

FROM:

MEMORANDUM

~~TO:~~

DLNR Agencies:
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
__Div. of State Parks
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
__Office of Conservation & Coastal Lands
X Land Division – Maui District (daniel.l.ornellas@hawaii.gov)
X Historic Preservation (DLNR.Intake.SHPD@hawaii.gov)

TO:

~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for the Proposed **Kuikahi Residential Project**
LOCATION: Wailuku, Island of Maui; TMK: (2) 3-5-002:003 (por.)
APPLICANT: Munekiyo Hiraga on behalf of Kuikahi Properties LLC

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **November 23, 2020.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

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

Signed: CSC
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Nov 19, 2020

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Early Consultation Request for the Proposed Kuikahi Residential Project
Location: Wailuku, Island of Maui
TMK(s): (2) 3-5-002:003 (por.)
Applicant: Munekiyo Hiraga on behalf of Kuikahi Properties LLC

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: Nov 19, 2020

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 13, 2020

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
__Div. of State Parks
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
__Office of Conservation & Coastal Lands
X Land Division – Maui District (daniel.l.ornellas@hawaii.gov)
X Historic Preservation (DLNR.Intake.SHPD@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for the Proposed **Kuikahi Residential Project**
LOCATION: Wailuku, Island of Maui; TMK: (2) 3-5-002:003 (por.)
APPLICANT: Munekiyo Hiraga on behalf of Kuikahi Properties LLC

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **November 23, 2020.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

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

Signed: for
Print Name: DAVID G. SMITH, Administrator
Division: Division of Forestry and Wildlife
Date: Nov 23, 2020

Attachments
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

November 23, 2020

MEMORANDUM ***Log. No. 2890***

TO: RUSSELL Y. TSUJI, Administrator
Land Division

FROM: DAVID G. SMITH, Administrator

SUBJECT: Division of Forestry and Wildlife Comments on Early Consultation Requests for the Proposed Kuikahi Residential Project

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your inquiry regarding review of the early consultation request for the proposed Kuikahi Residential Project in Wailuku, Maui, TMK: (2) 3-5-002:003 (por.). The proposed project consists of constructing a new residential community that includes multi-family, duplex, live-work, studio, and single-family units, on an approximately 14.9-acre portion of land.

The State listed Blackburn's Sphinx Moth (BSM; *Manduca blackburni*) has a historic range that encompasses the project area. Larvae of BSM feed on many nonnative hostplants that include tree tobacco (*Nicotiana glauca*) which grows in disturbed soil. We recommend contacting our Maui DOFAW office at (808) 984-8100 for further information about where BSM may be present and whether a vegetation survey should be conducted to determine the presence of plants preferred by BSM. To avoid harm to BSM, DOFAW recommends removing plants less than one meter in height or during the dry time of the year. If you remove tree tobacco over one meter in height or disturb the ground around or within several meters of these plants they must be checked thoroughly for the presence of eggs and larvae.

State listed waterbirds such as the Hawaiian Duck (*Anas wyvilliana*), Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian Coot (*Fulica alai*) and Hawaiian Goose or Nēnē (*Branta sandvicensis*) have the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass these species. If any of these species are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of its own accord. If a nest is discovered at any point, please contact the Maui DOFAW office at the aforementioned number.

DOFAW is concerned about attracting vulnerable birds to areas that may host nonnative predators such as cats, rodents, and mongoose. Additionally, constructiom and improvements to the are likely to increase the number of users and may generate more predator attractants. We recommend

taking action to minimize predator presence; remove cats, place bait stations for rodents and mongoose, and provide covered trash receptacles.

The State listed Hawaiian Hoary Bat or 'Ōpe'ape'a (*Lasiurus cinereus semotus*) has the potential to occur in the vicinity of the project area and may roost in nearby trees. If any site clearing is required this should be timed to avoid disturbance during the bat birthing and pup rearing season (June 1 through September 15). If this cannot be avoided, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed without consulting DOFAW.

DOFAW recommends minimizing the movement of plant or soil material between worksites, such as in fill. Soil and plant material may contain invasive fungal pathogens, vertebrate and invertebrate pests (e.g. Little Fire Ants), or invasive plant parts that could harm our native species and ecosystems. We recommend consulting the Maui Invasive Species Committee at (808) 573-6472 in planning, design, and construction of the project to learn of any high-risk invasive species in the area and ways to mitigate spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

DOFAW recommends using native plant species for landscaping that are appropriate for the area (i.e. climate conditions are suitable for the plants to thrive, historically occurred there, etc.). Please do not plant invasive species. DOFAW recommends consulting the Hawai'i-Pacific Weed Risk Assessment website to determine the potential invasiveness of plants proposed for use in the project (https://sites.google.com/site/weedriskassessment/home). We recommend that you refer to www.plantpono.org for guidance on selection and evaluation for landscaping plants.

We note that artificial lighting can adversely impact seabirds that may pass through the area at night by causing disorientation. This disorientation can result in collision with manmade artifacts or grounding of birds. For nighttime lighting that might be required, DOFAW recommends that all lights be fully shielded to minimize impacts. Nighttime work that requires outdoor lighting should be avoided during the seabird fledging season from September 15 through December 15. This is the period when young seabirds take their maiden voyage to the open sea. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawai'i please visit: https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf.

We appreciate your efforts to work with our office for the conservation of our native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Koa Matsuoka, Protected Species Habitat Conservation Planning Associate at (808) 587-4149 or koa.matsuoka@hawaii.gov.

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 13, 2020

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division (DLNR.ENGR@hawaii.gov)
X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
__Div. of State Parks
X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
__Office of Conservation & Coastal Lands
X Land Division – Maui District (daniel.l.ornellas@hawaii.gov)
X Historic Preservation (DLNR.Intake.SHPD@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for the Proposed **Kuikahi Residential Project**
LOCATION: Wailuku, Island of Maui; TMK: (2) 3-5-002:003 (por.)
APPLICANT: Munekiyo Hiraga on behalf of Kuikahi Properties LLC

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **November 23, 2020.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

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

Signed: [signature]
Print Name: Daniel Ornellas
Division: Land Div.
Date: 11/16/20

Attachments
cc: Central Files

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Russell Y. Tsuji, Land Administrator
State of Hawai‘i
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai‘i 96809

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Mr. Tsuji:

Thank you for your early consultation response letter dated November 24, 2020, transmitting comments from the Engineering Division in a letter dated November 19, 2020, Division of Forestry and Wildlife in a letter dated November 23, 2020, and Land Division in a transmittal dated November 16, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

ENGINEERING DIVISION

Thank you for your comment regarding the National Flood Insurance Program. The Applicant will include a discussion of the project site's Flood Hazard Zone designation in Chapter II of the Draft Environmental Assessment (EA).

DIVISION OF FORESTRY AND WILDLIFE (DOFAW)

We acknowledge the DOFAW's comments recommending consultation with the Division's Maui office regarding the Blackburn's Sphinx Moth and other potential species which may be present at the project site. The Applicant and its project consultant will conduct a Flora and Fauna Survey of the project site to identify any known plant and animal species and provide recommended mitigation measures to avoid removal or harm to any species. Furthermore, the Applicant, to the best of their ability, will follow recommended measures regarding the minimization of movement of plant or soil materials between worksites, the use of native plant species for landscaping at the project site, and fully shielded lighting to minimize impacts to seabirds.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

LAND DIVISION

We acknowledge that the Division has no comments on the proposed project.

Additionally, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Robert Hobdy
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DEC 11 2020

DAVID Y. IGE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF PUBLIC SAFETY
919 Ala Moana Boulevard, 4th Floor
Honolulu, Hawaii 96814

MAX N. OTANI
DIRECTOR

Maria C. Cook
Deputy Director
Administration

Tommy Johnson
Deputy Director
Corrections

Jordan Lowe
Deputy Director
Law Enforcement

No. 2020-4283

December 3, 2020

Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High street, Suite 104
Wailuku, Hawaii 96793

Subject: Early Consultation Request for the Proposed Kuikahi Residential Project; TMK No. (2)3-5-002:003(por); Wailuku, Maui, Hawaii

Dear Ms. Shibuya:

In response to your letter dated November 4, 2020, we reviewed the proposed new Kuikahi Residential Project development and have no comments. The project does not impact any of the Department of Public Safety projects and or existing facilities.

If you or your staff have any questions, please contact Mr. Wayne Takara, Chief Planner, at 587-3463.

Sincerely,

Maria C. Cook
Deputy Director of Administration

c: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Wayne Takara, PSD Chief Planner

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Maria C. Cook, Deputy Director of Administration
State of Hawai‘i
Department of Public Safety
919 Ala Moana Boulevard, 4th Floor
Honolulu, Hawai‘i 96814

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Cook:

Thank you for your early consultation response letter dated December 3, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we acknowledge that the Department has no comment on the proposed project, as it does not impact any of the Department's projects or existing facilities.

We would also like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
K:\DATA\WV Regenesis\Wailuku AH\Applications\ECL\Response Letters\Public Safety Response.docx

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A.S. ARAKI-REGAN
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

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

IN REPLY REFER TO:
DIR 1018
STP 8.3075

November 19, 2020

Ms. Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation
Kuikahi Residential Project
Wailuku, Maui, Hawaii
Tax Map Key: (2) 3-5-002: 003 (portion)

The State of Hawaii, Department of Transportation (HDOT) has review the subject early consultation request and understands Kuikahi Properties, LLC is proposing to develop a new residential community to include residential uses such as multi-family, duplex, live-work, studio, and single-family units on an approximately 14.9-acre portion of land adjacent to Kuikahi Drive.

Direct access to the project site is proposed to be via two driveways on Kuikahi Drive which is under the County of Maui's jurisdiction. One of the project access driveways proposed to be located at the Kuikahi Drive and Kehalani Mauka Parkway intersection is approximately 0.5 miles away from the Kuikahi Drive intersection with Honoapiilani Highway (State Route 30).

HDOT has the following comments:

Airports Division (HDOT-A)

1. The Kuikahi Residential project location is approximately 3.9 miles from Kahului Airport. All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf.

2. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

Highways Division (HDOT-HWY)

1. A Traffic Impact Assessment Report (TIAR) shall be prepared by a licensed professional engineer and submitted to HDOT with the draft Environmental Assessment (EA). The study area should include the Honoapiilani Highway (State Route 30) and Kuikahi Drive intersection.

2. There are other proposed developments in the region, including the Department of Hawaiian Home Land (DHHL) Puunani Homestead subdivision on an adjacent parcel (Tax Map Key: 3-5-002:002). The trip generation anticipated from these other projects in conjunction with the proposed project that could result in a cumulative adverse significant impact on Honoapiilani Highway traffic conditions. The draft EA and TIAR should include the potential cumulative impacts on traffic in the region.

3. We understand the traffic conditions are not typical due to COVID-19; and the analysis would need to rely, in part, on best available information, for example, the TIAR prepared for the DHHL project.

4. Describe the project development schedule, including phasing, and the landowner's future land use plans (vision) for the remainder of the parcel.

5. Describe the interconnection of the proposed internal bike and pedestrian pathways with those existing and proposed in the vicinity.

6. If a request for a reduction in the number of required parking spaces is being considered, specify the difference, the rationale for the reduction (e.g., reliance on alternative transportation), and include both trip generation scenarios in the TIAR.

7. Describe County roadway improvements included in the project, including the roundabout at the Kehalani Mauka Parkway and Kuikahi Drive intersection, and the Kehalani Mauka Parkway extension, as shown on the site plan. Clarify the jurisdiction of the proposed Kehalani Mauka Parkway extension.

8. The internal roadways appear to "stub-out" at the site development boundaries, suggesting there are future development plans for the remainder of the parcel. It is important for the Draft EA to describe the long-term master plan for the entire parcel, to provide context for the near-term project and disclose the potential cumulative environmental impacts associated with the entire master plan.

9. Describe proposed direct impacts to the State highway right-of-way, if applicable, including utility connections and use of stormwater drainage structures.

If there are any questions, please contact Mr. Blayne Nikaido of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Jade Butay, Director
State of Hawai‘i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai‘i 96813-5097

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i, DIR 1018, STP.8.3075

Dear Mr. Butay:

Thank you for your early consultation response letter dated November 19, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

AIRPORTS DIVISION (HDOT-A)

Response to Comment No. 1

We note the HDOT-A's comment regarding the proximity of the proposed project to the Kahului Airport. The Applicant confirms that its project team will review the Technical Assistance Memorandum for guidance in further developing the project.

Response to Comment No. 2

We acknowledge the HDOT-A's comment regarding the submittal of the FAA Form 7460-1 Notice of Proposed Construction or Alteration, pursuant to Code of Federal Regulations, Title 14, Part 77.9. As previously noted in your letter, the proposed project site is approximately 3.9 miles from Kahului Airport, a public use airport. The project site is beyond 20,000 feet of the airport and, as such, submittal of a FAA Form 7460-1 to the FAA is not anticipated.

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Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

HIGHWAYS DIVISION (HDOT-HWY)

Response to Comment No. 1

Thank you for your comment. The Applicant confirms that a Traffic Impact Assessment Report (TIAR) is being prepared and that the TIAR will be submitted to the HDOT with its copy of the Draft Environmental Assessment (EA). The Applicant confirms that the TIAR will analyze the Honoapiʻilani Highway and Kuikahi Drive intersection.

Response to Comment No. 2

The Applicant confirms that the Draft EA and TIAR will include a discussion on the potential cumulative impacts on traffic in the region. The report includes a review of publicly available information for projects in the area.

Response to Comment No. 3

We acknowledge the Division's comment regarding traffic conditions due to the COVID-19 global pandemic. The Applicant and its traffic engineer confirm that the TIAR will analyze best available information, including information from the Department of Hawaiian Home Lands' proposed project in the area.

Response to Comment No. 4

The Applicant confirms that there are no future plans for the use of the remainder of the project parcel.

The proposed Kuikahi Residential project is anticipated to be developed as one (1) project with project infrastructure installed first and the vertical construction developed in phases. Preliminarily, the Applicant is proposing to develop the multi-family and live work units first and the limited single-family units to follow. The Applicant is limiting project plans to the proposed 14.9 acre area due to the uncertainty of the market and the economy. Any future development of additional lands in the area would undergo a separate review and permitting.

Response to Comment No. 5

The Applicant is proposing to connect the proposed pedestrian paths and bikeways within the residential development to the existing facilities within Kuikahi Drive. To achieve the pedestrian connectivity, the Applicant is proposing a crosswalk across Kuikahi Drive as there is an existing sidewalk on the North side of the road.

Response to Comment No. 6

The Applicant is not proposing an exemption for reduction of parking stalls for the project. The project will provide the number of stalls required by the County Code for the development.

Response to Comment No. 7

The Applicant's traffic engineering consultant has held discussions with the County of Maui, Department of Public Works (DPW) regarding the proposed roundabout on County roadway Kuikahi Drive. Discussions are ongoing in terms of preliminary design and layout of the roundabout, but the DPW is generally supportive of the roundabout. Further detail on the roundabout will be provided in the Draft EA. At the roundabout, the extension of the Kehalani Mauka Parkway into the project will serve as the main entrance into the project. A secondary access off Kuikahi Drive is proposed along the west boundary of the project. Internal project roadways are intended to remain private.

Response to Comment No. 8

Though the initial site plan for the proposed project included internal roadways which seemed to connect to potential future development, the Applicant confirms that there are no plans for future development of the remainder of the parcel. The site plan will be revised to indicate that the project roads will end within the project. It is noted that there is language within the Maui Island Plan which requires buffers from the Waikapu community for larger property. As such, any future development of the remaining lands, would also need to account for these buffer areas.

Response to Comment No. 9

Direct impacts to the State highway right-of-way will be studied and described in the TIAR and Preliminary Engineering Report prepared for the project. The Draft EA will include analysis of any potential impacts to right-of-ways and proposed mitigation measures.

Lastly, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agricultural” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft EA for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Tyler Fujiwara, Austin, Tsutsumi & Associates, Inc.
Stacy Otomo, Otomo Engineering, Inc.
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DEC - 8 2020

DAVID Y. IGE
Governor

MIKE MCCARTNEY
Director

LAND USE COMMISSION
Department of Business, Economic Development & Tourism
State of Hawai`i

DANIEL E. ORODENKER
Executive Officer

December 2, 2020

Ms. Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request for the Proposed Kuikahi Residential Project
TMK No. (2) 3-5-002: 003 (por.)
Wailuku, Maui, Hawai`i

We are in receipt of your letter dated November 4, 2020, requesting our comments regarding the Kuikahi Residental Project ("Project"). We understand that the Project consists of an approximately 200-unit residential development consisting of multi-family, duplex, live-work, studio, and single-family units on an approximately 14.9-acre portion of the subject parcel. Minor commercial uses are also proposed in the live-work units. All units are anticipated to be offered for sale at affordable prices to local residents.

We further understand that the Applicant is planning to apply for Chapter 2.97, Maui County Code ("MCC"), approval from the Maui County Council for the Project. Chapter 2.97, MCC, provides a process in which developers of 100 percent residential workforce housing may seek to fast track their developments by applying for County exemptions from this code, including Chapter 19.68 relating to State land use district boundary amendments for developments less than 15 acres in the Agricultural, Rural, and Urban Districts..

With this understanding, we have the following comments:

235 SOUTH BERETANIA STREET • SUITE 406 • HONOLULU, HAWAI`I 96813 • TEL: (808) 587-3822 • FAX: (808) 587-3827
EMAIL: dbedt.luc.web@hawaii.gov
MAILING ADDRESS: P. O. Box 2359, Honolulu, Hawai`i 96804

1) Based on the representation of the Project Area on the Regional Location Map, we find that it is located within the State Land Use Agricultural District. Your letter erroneously states that "[t]he project site is designated for 'Urban' use by the State Land Use Commission...."

2) The Applicant should clarify whether it intends to seek exemptions from the district boundary amendment requirements as provided for under Chapter 2.97, MCC. If the Applicant does plan to request exemptions, the nature of such exemptions should be described in the Draft Environmental Assessment ("DEA"). We are aware of at least one instance where an applicant proposing an affordable housing development on Maui sought to exempt itself from filing an application for a district boundary amendment and the procedures associated with such an application, including the requirement that the Maui Planning Commission conduct a public hearing on the matter. Although in that case, the Maui County Council would have considered the boundary amendment, held hearings, taken evidence, acted on the boundary amendment, and imposed conditions of approval. we raised various concerns about the nature of the exemptions, including issues with proper notice and due process. We would have serious reservations if this Applicant followed a similar path.

3) In the event the Applicant pursues a district boundary amendment for the Project either with the Planning Commission or directly with the County Council, we would still have concerns about the deliberate parcelization of the Project. We believe it is highly unlikely the Project can be limited to under the 15-acre statutory threshold. We further believe that this acreage was chosen strictly to evade Land Use Commission ("LUC") consideration of the Project. As you know, developments often have impacts on areas of statewide concern, including, but not limited to, transportation infrastructure and school facilities. This Project does not appear to be any different. Once the Hawai`i Revised Statutes ("HRS") chapter 343 environmental review process concludes, there are no assurances that further consideration of these interests will occur before the County without the active participation of the State during the decision-making process. In light of the existing and ongoing residential developments of Wailuku Heights and Kehalani Mauka, respectively, there needs to be continuing analysis

of the potential cumulative and secondary impacts from the Project and these neighboring developments on State facilities and services. The LUC's quasi-judicial process would enable such interests as well as those of the County to be equally represented and considered before any decision is made on a development. Athough the provision of much needed affordable housing on Maui is laudable, we believe the misuse of HRS chapter 205 in this way compromises the statutory safeguards currently in place and, ultimately, the public's faith in the land use entitlement process. We request the Applicant reconsider its stance on the matter and be in accord with the spirit and intent of the State Land Use Law promulgated under HRS chapter 205.

If the Applicant chooses to adhere to the representation that the Project Area is under the 15-acre threshold, we request that the Applicant also agree or make clear that the surrounding areas will not be subject to the same parceling attempts. If not, we believe the Project Area should be processed as a larger parcel.

4) We request the DEA be provided to our office for review as soon as it becomes available.

We have no further comments to offer at this time. Should you have any questions or require further clarification, please feel free to call our office at 587-3822.

Sincerely,

Daniel E. Orodenker
Executive Officer

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Daniel E. Orodenker, Executive Officer
State of Hawai‘i
Department of Business, Economic Development, & Tourism
Land Use Commission
235 South Beretania Street, Suite 406
Honolulu, Hawai‘i 96813

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Mr. Orodenker:

Thank you for your early consultation response letter dated December 2, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

Response to Comment No. 1

We apologize for the error in our early consultation request noting that the project site is designated as "Urban" by the State Land Use Commission (SLUC), when in fact it is designated as "Agricultural". We will ensure that this information will be accurately represented in the Environmental Assessment document.

Response to Comment No. 2

Thank you for the comments related to the District Boundary Amendment (DBA) request. Since the project site is designated as "Agricultural" by the SLUC, the Applicant will be pursuing a DBA approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size. As the project site is less than 15 acres, we are proposing an exemption from Maui County Code (MCC) Chapter 19.68, State Land Use District Boundaries, MCC Chapter 19.510, Applications and Procedure and Article 8, Chapter 8, of the revised Charter of the County of Maui, as amended. The EA document and MCC Chapter 2.97 application will disclose the project intent to pursue these exemptions for the DBA action.

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Response to Comment No. 3

We reviewed the comments provided and note that the Applicant does own additional lands adjacent to the proposed 14.9 acre project area. It is noted that the proposed project is intended to be a 100 percent affordable housing project. Further, the Applicant is intending to privately finance the project; no government funds or tax credits will be sought for the project implementation. Given the current global pandemic and the uncertainty of future economic outlook, the Applicant determined that they would like to proceed with the limited scope of the project. The Applicant also recognizes that any future residential and/or commercial development, beyond the 14.9 acre project site, will require separate environmental reviews and land use entitlement actions. The Applicant has no plans in the forseeable future for the development of the additional lands in the area and it is anticipated that should the Kuikahi residential project receive approvals, that it will be a multi-year project.

In terms of items of Statewide importance, the Applicant is intending to abide by the State Department of Education's (DOE) assessment for the residential units, as it recognizes that the proposed project will likely include school aged children. Further, the Applicant and its consultants are in discussions with the State Department of Transportation (SDOT) as there may be anticipated improvements at the Kuikahi Drive and Honoapiilani Highway intersection as determined by a Traffic Impact Analysis Report. In addition to being reviewing agencies during the environmental review process, both the DOE and the SDOT are reviewing agencies on building permits related to residential development. As such, there is a mechanism in place through the County's Building Permit process, for follow through on commitments related to State agencies.

The Applicant believes that the project will have multiple opportunities for public review and has also instituted a community outreach program for the project. The community stakeholders that are included in the outreach program include surrounding landowners and homeowner associations, Maui County Councilmembers as well as residents with cultural and historical background. The County Council review of the Chapter 2.97 application will also be agendized and open to the public.

Response to Comment No. 4

We confirm that a copy of the Draft EA for the proposed project will be provided to the Land Use Commission's office for review as soon as it is available.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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DEC 2 1 2020

MICHAEL P. VICTORINO
Mayor

ERIC A. NAKAGAWA, P.E.
Acting Director

SHAYNE R. AGAWA, P.E.
Deputy Director

MICHAEL P. RATTE
Solid Waste Division

SCOTT R. ROLLINS, P.E.
Wastewater Reclamation Division

TAMARA L. FARNSWORTH
Environmental Protection &
Sustainability Division

COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2050 MAIN STREET, SUITE 2B
WAILUKU, MAUI, HAWAII 96793

December 7, 2020

Munekiyo Hiraga
Attn: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: KUIKAHI RESIDENTIAL PROJECT
EARLY CONSULTATION REQUEST
TMK (2) 3-5-002:003 (POR.), WAILUKU

We reviewed the subject application and have the following comments:

1. Solid Waste Division comments:

   a. None

2. Wastewater Reclamation Division (WWRD) comments:

   This letter is response to your Early Consultation Request dated 11-4-2020. It is intended to provide information describing the nature and limitation of the wastewater service that could be provided to the subject project. Our review of your request has concluded that:

   a. The subject project proposed to be developed by Kuikahi Properties, LLC consists of approximately 120 condominium units, 34 duplex units, 16 live-Work units, 28 studio units and 6 single family residences.
   b. Estimated wastewater flows for the project were not included in your request. We attempted to assess the proposed project based on your included description. We projected that the development could produce approximately 55,000 gpd of wastewater. At the current time, the WWRF has adequate capacity to accept and treat the expected flows from the project.
   c. Connection to the County wastewater system would be on Kuikahi Drive. Flows would follow Kuikahi Drive, Waiale Road and Lower Main Street to the Wailuku Wastewater Pump Station (WWPS). The Wailuku WWPS force main discharges at the Wailuku/Kahului WWRF.

d. Capacity in the collection system is not available for this project until the Lower Main Street Sewer Upgrade is completed. The project has been designed and bids opened. It is scheduled to begin construction in early 2021 with completion expected before the end of the year.
e. The Wailuku Wastewater Pump Station currently has adequate capacity to accommodate this project.
f. Wastewater treatment for the subject project would be provided by the Wailuku/Kahului Wastewater Reclamation Facility (WWRF). This facility is owned and operated by the County of Maui and currently processes approximately 5.8 million gallons per day (mgd) of wastewater. To date the County has allocated 6.9 mgd of the plants 7.9 mgd capacity.
g. The project will be required to construct a sewer service manhole on the property prior to connection to the County system.
h. Any businesses within the project will be required to install pretreatment devices (grease interceptor etc.) if applicable.
i. Note that capacity cannot be guaranteed until building permits are issued. There is always a possibility that adequate capacity may not be available if construction is delayed, a significant number of other projects are developed, or regulatory conditions change.
j. Wastewater contribution calculations are required before building permit is issued.
k. Developer is not required to pay assessment fees for this area at the current time.
l. Developer is required to fund any necessary off-site improvements to collection system and wastewater pump stations.
m. Show or list minimum slope of new sewer laterals.
n. Indicate on the plans the ownership of each easement (in favor of which party). Note: County will not accept sewer easements that traverse private property.
o. Non-contact cooling water and condensate should not drain to the wastewater system.

If you have any questions regarding this letter, please contact Shayne Agawa at 270-8230.

Sincerely,

Digitally signed by Eric Nakagawa
DN: cn=Eric Nakagawa, o=County of Maui, ou=Director of Environmental Management, email=eric.nakagawa@co.maui.hi.us, c=US
Date: 2020.12.08 16:19:45 -10'00'

ERIC A. NAKAGAWA, P.E.
Director of Environmental Management

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Mark Alexander Roy
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Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Eric Nakagawa, Director
County of Maui
Department of Environmental Management
2050 Main Street, Suite 2B
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Mr. Nakagawa:

Thank you for your early consultation response letter dated December 7, 2020 on the subject project. We would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agricultural” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

On behalf of Kuikahi Properties, LLC (“Applicant”), we offer the following information in response to comments noted in your letter.

SOLID WASTE DIVISION

We acknowledge that the Solid Waste Division has no comments on the proposed project.

WASTEWATER RECLAMATION DIVISION (WWRD)

We offer the following information in response to each of the WWRD’s comments:

a. We note the WWRD’s comment on the number of units at the proposed project.

b. Since the project is in its early planning and development phase, estimated wastewater flows for the project were not included in our early consultation request; however, this information will be included in a Preliminary Engineering and Drainage Report (PEDR) in the Environmental Assessment (EA). We note

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the WWRD's estimated projection of 55,000 gallons per day (gpd) of wastewater, and acknowledge that the Wailuku/Kahului Wastewater Reclamation Facility (WWRF) currently has adequate capacity to accept and treat the expected flows (55,000 gpd) from the project.

c. We acknowledge the WWRD's confirmation that the project would connect to the County's wastewater system through Kuikahi Drive and would connect to the Wailuku Wastewater Pump Station (WWPS), which ultimately discharges at the Wailuku/Kahului WWRF.

d. We note the WWRD's comment regarding the construction of the Lower Main Street Sewer Upgrade. The Applicant does not anticipate to start construction for the proposed project until various entitlement and construction permitting approvals are obtained. The Applicant and its civil engineering consultant will continue to coordinate with the WWRD as the project proceeds.

e. We acknowledge the WWRD's comment that the WWPS currently has adequate capacity to accommodate the proposed project.

f. We acknowledge the WWRD's comment confirming the Wailuku/Kahului Wastewater Reclamation Facility owned and operated by the County will provide service to the project. And that the facility processes approximately 5.8 million gallons per day (gpd) of wastewater with an allocation to date of 6.9 million gpd of the plant's 7.9 million gpd capacity.

g. The Applicant will construct a sewer service manhole on the property prior to connecting to the County's system.

h. We note that the WWRD will require that any businesses operating at the project site will be required to install pre-treatment devices, if applicable.

i. We note that capacity at the WWPS and Wailuku/Kahului WWRF cannot be guaranteed until building permits for the proposed project are issued.

j. Wastewater contribution calculations will be submitted prior to building permit issuance.

k. We note the WWRD's confirmation that the Applicant is not required to pay assessment fees for this area at the current time.

l. We note the WWRD's confirmation that the Applicant is required to fund necessary off-site improvements to collection system and wastewater pump stations.

m. Project plans will include information related to minimum slope of new sewer laterals.

n. The Applicant will include information related to ownership of each easement on the project plans and acknowledge that the County will not accept sewer easements that traverse private property.

o. Non-contact cooling water and condensates will not be directed into the County's wastewater system.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
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MICHAEL P. VICTORINO
Mayor

DAVID C. THYNE
Fire Chief

BRADFORD K. VENTURA
Deputy Fire Chief

DEPARTMENT OF FIRE & PUBLIC SAFETY
FIRE PREVENTION BUREAU
COUNTY OF MAUI
313 MANEA PL.
WAILUKU, HI 96793

November 12, 2020

Munekiyo Hiraga
Attn: Charlene Shibuya, Senior Associate
305 High St. Suite 104
Wailuku, HI 96793

SUBJECT: EARLY CONSULTATION REQUEST
PROPOSED KUIKAHI RESIDENTIAL PROJECT
TMK: (2) 3-5-002:003(POR) WAILUKU, MAUI, HAWAII

Dear Charlene Shibuya,

Thank you for allowing our office to provide comment on the proposed project. As per your request, comments are provided below:

- There are no objections in regards to the information provided as part of the Early Consultation Request for the Proposed Kuikahi Residential Project.

- Our office does reserve the right to comment on the proposed project during the building permit review process should detailed plans for this project be routed to our office for review. At that time, fire apparatus access, water supply for fire protection, and fire and life safety requirements associated with the subject project will be formally reviewed.

If there are any questions or comments, please feel free to contact me at (808) 876-4693 or by email at paul.haake@mauicounty.gov.

Sincerely,

Paul Haake

Paul Haake, Captain - Fire Prevention Bureau

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Mark Alexander Roy
VICE PRESIDENT
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VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Ryan Otsubo, Captain
County of Maui
Department of Fire & Public Safety
Fire Prevention Bureau
313 Manea Place
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Captain Otsubo:

Thank you for your Department's early consultation response letter dated November 30, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to comments noted in your letter.

We appreciate the Department's confirmation that there are no objections to the information provided in the Early Consultation Request for the proposed project. The Applicant acknowledges the Department's right to comment on the proposed project during the building permit review process, and confirms that detailed project plans will be provided to the Department for review and approval.

Lastly, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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MICHAEL P. VICTORINO
Mayor

KARLA H. PETERS
Director

MARY A. KIELTY
Deputy Director

DEPARTMENT OF PARKS AND RECREATION

700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawai'i 96793
Main Line (808) 270-7230 / Facsimile (808) 270-7942

November 18, 2020

Charlene Shibuya, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Shibuya:

SUBJECT: EARLY CONSULTATION REQUEST FOR THE PROPOSED KUIKAHI RESIDENTIAL PROJECT; TMK: (2) 3-5-002:003 (por.); WAILUKU, MAUI, HAWAII

Thank you for the opportunity to review the proposed Kuikahi Residential project. In review of the project, we note that the applicant is currently proposing to develop 204 affordable housing units and is planning to apply for Maui County Code 2.97 approval from the Maui County Council for the proposed development.

The Department of Parks and Recreation looks forward to reviewing the final application for compliance with Maui County Code 18.16.320. We have no further comments at this time.

Should you have any questions or concerns, please feel free to call me, or Samual Marvel, Chief of Planning and Development, at (808) 270-6173.

Sincerely,

KARLA H. PETERS
Director of Parks and Recreation

c: Samual Marvel, Chief of Planning and Development

KHP:SM:csa

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Karla H. Peters, Director
County of Maui
Department of Parks and Recreation
700 Hali‘a Nakoa Street, Unit 2
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Peters:

Thank you for your early consultation response letter dated November 18, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we acknowledge that the Department has no comment on the proposed project at this time.

Furthermore, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

MICHAEL P. VICTORINO
Mayor

MICHELE CHOUTEAU MCLEAN, AICP
Director

JORDAN E. HART
Deputy Director

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

December 31, 2020

Ms. Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: REQUEST FOR EARLY CONSULTATION REGARDING THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED KUIKAHI AFFORDABLE RESIDENTIAL PROJECT, LOCATED IN WAILUKU, MAUI, HAWAII; TMK: (2) 3-5-002:003 (POR.) (RFC 2020/0164)

The Department of Planning (Department) is in receipt of the proposed Kuikahi Affordable Residential Housing Project (Project) Request for Early Consultation in preparation of the Draft Environmental Assessment (DEA). The Department understands from your letter dated November 4, 2020, that *"as a 100 percent affordable housing development, the Applicant is planning to apply for Chapter 2.97, Maui County Code (MCC) approval from the Maui County Council for the proposed development. Though the proposed project will utilize private funds, State and County lands are anticipated to be used for improvements to Honoapiilani Highway and Kuikahi Drive, respectively. The use of State and County lands triggers compliance with the environmental review requirements of Hawaii Revised Statutes (HRS), Chapter 343. Accordingly a DEA will be prepared pursuant to Chapter 343, HRS and Chapter 11-200.1, Hawaii Administrative Rules (HAR) to evaluate the technical characteristics and potential environmental impacts of the proposed project, as well as to advance findings and mitigative measures relative to the project."* The Department of Housing and Human Concerns (DHHC) will be the Approving Authority for the Chapter 343, HRS EA.

The project will be 100 percent affordable and comprised of approximately 200 residential units, including a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units on an approximately 14.9 acre portion of TMK parcel. The 200 units are targeted to families earning at or below 120 percent of the Area Median Index (AMI). In addition to the residential units, internal roadways, sidewalks, bike paths, landscaping, spot parks, drainage improvements and utility connections are proposed as part of the project.

Adequate off-street parking stalls will be provided for the project. Access to the project is proposed via two driveways along Kuikahi Drive, a roundabout at the east portion of the project area, across from Kehalani Mauka Parkway, and the other on the west portion of the project site below the existing water tank. The Department offers the following comments:

1. The proposed project site is in the Puunani planned growth area outlined in the Maui Island Plan (MIP) on page 8-21. Located south of the Kehalani Master Development and below Wailuku Heights, the project appears to be outside of the 200-foot greenbelt buffer adjacent to the Honoapiilani Highway and outside of the 500 foot greenbelt along the Puunani planned growth area's southern extent providing a separation between the Waiolani community and Wailuku. Verify that the project is outside of these greenbelt buffers by including the buffers on a project site map.

2. **Exhibit 1** attached to this comment letter is a copy of the Puunani planned growth area narrative from the MIP. The original intent of the Puunani planned growth area as stated in the MIP was *"Pu'unani is a residential expansion of the existing southern boundary of Wailuku Town. It is intended that infrastructure development be coordinated with neighboring developments including Kehalani, Wai'ale and Waikapu Tropical Plantation Town. The urban portion of the growth area will be comprised primarily of approximately 450 multifamily units and commercial and public/quasi-public uses. The rural component will be comprised of low-density residential lots that will provide for a transitional zone from the high-density, multifamily component of the growth area as well as Wailuku to the north."* Discuss how this project comports with the MIP for the Puunani planned growth area and the distribution of urban and rural components within this growth area.

3. Under the heading ***Regulatory Considerations*** in your letter of November 4, 2020, you state that the project site is designated "Urban" by the State Land Use Commission. The Department understands that this project site is still designated "Agriculture." Verify the State Land Use Boundary designation for this project parcel. If as suspected, the project area of 14.9 acres is designated "Agriculture", the Applicant should request a District Boundary Amendment (DBA). Regarding the exemption from the application process and Maui Planning Commission review requirements of Chapter 19.68, MCC referring to State Land Use District Boundaries, the Department advises that the Applicant request a DBA from the County Council as part of their affordable housing review pursuant to Chapter 2.97 of the MCC.

4. The Department notes that any future urban development on the adjacent lands in the Puunani planned growth area will require a full DBA with State Land Use Commission review.

5. The conceptual site plan indicates related improvements such as internal roadways, sidewalks, bike paths, landscaping, spot parks, drainage improvements, utility connections, and two entrances from Kuikahi Drive. The build out of a roundabout at the intersection of Kuikahi Drive and Kehalani Mauka Parkway is an interesting concept and should be explored as part of the final project. Review the engineering of this roundabout in the DEA as the slope of Kuikahi Drive must be taken into consideration. Pedestrian/bike paths should be included in the final design and built to connect to future developments. Internal sidewalks are excellent providing connectively throughout the project. The pedestrian and bike path at the western edge of the project provides connectivity with the bike path along the southern edge of Kuikahi Drive.

6. The Department also comments on the extension of Kehalani Mauka Parkway south of Kuikahi Drive. What is your intended roadway name for this road into the project? Also, this roadway should contain similar sidewalks and a shared use path/bikeway that already exists on the northern side of Kuikahi Drive to maintain consistency with the travel experience.

7. The Department would also like the Applicant to consider having adequate storage space on-site for lawn and other equipment.

Thank you for the opportunity to comment on the preparation of the DEA for the Kuikahi Residential Project. Should you require further clarification, please contact Staff Planner Kurt Wollenhaupt at kurt.wollenhaupt@mauicounty.gov or at (808) 270-1789.

Sincerely,

For MICHELE MCLEAN, AICP
Planning Director

xc: Jordan Hart, Deputy Planning Director (PDF)
Clayton I. Yoshida, AICP, Planning Program Administrator (PDF)
John S. Rapacz, Planning Program Administrator (PDF)
Kurt F. Wollenhaupt, Staff Planner (PDF)
Kathleen Aoki, Administrative Planning Officer (PDF)
Pam Eaton, Planning Program Administrator (PDF)
Paul Critchlow, Staff Planner (PDF)
Charlene Shibuya, Munekiyo Hiraga (PDF)

Project File
MCM:KFW:lp
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Pu`unani

The Pu`unani planned growth area is intended to be a mixed-use project located at the southwest edge of Wailuku. This urban and rural expansion is located south of Kehalani below Wailuku Heights and is bounded to the east by Honoapi`ilani Highway. The growth area will be buffered by a 200-foot greenbelt along its eastern edge and adjacent to Honoapi`ilani Highway. Additionally, a 500-foot greenbelt along the area's southern extent shall provide a separation between the Waiolani community and Wailuku. The greenbelt, greenway, and rural lands are intended to provide separation between Wailuku and Waikapu, and to provide a visual relief by creating a lower-density residential pattern than surrounding communities. This planned growth area will mark the southern boundary of Wailuku.

Planned Growth Area Rationale

Pu`unani is a residential expansion of the existing southern boundary of Wailuku Town. It is intended that infrastructure development be coordinated with neighboring developments including Kehalani, Wai`ale and Waikapū Tropical Plantation Town. The urban portion of the growth area will be comprised primarily of approximately 450 multifamily units and commercial and public/quasi-public uses. The rural component will be comprised of low-density residential lots that will provide for a transitional zone from the high-density, multifamily component of the growth area as well as Wailuku to the north. The precise rural residential densities and unit count for the rural component of the project will be determined at the time of zoning.

The area is currently zoned for agricultural use, and water and wastewater infrastructure, as well as transit access are in place. The Pu`unani planned growth area is depicted on Figure 8-1. Table 8-7 provides planning guidelines for this planned growth area:

Table 8 - 7: Pu`unani Planned Growth Area

Background Information:			
Project Name:	Pu`unani	Directed Growth Map #:	C3
Type of Growth:	Urban & Rural Expansion	Gross Site Acreage:	209 Acres
Planning Guidelines			
Dwelling Unit Count:	Approximately Urban - 450 Units Rural – To be determined[8]	Residential Product Mix:	MF/VMX - 64 Acres Rural - 143 Acres
Net Residential Density:	Urban – 9-12 du/acre Rural - To be determined	Parks and Open Space%[9]:	≥ 36%
		Commercial:	Neighborhood Serving

[8] Additional units may be permitted through a transfer of development rights program or to provide affordable housing in excess of what is required by law. Unit counts may be further defined through the entitlement process in response to infrastructure and environmental constraints.

[9] The distinct boundaries of the parks and open space, specific location of the recreational uses, and the precise amenities will be further defined during the Wailuku – Kahului Community Plan Update and the project review and approval process.

EXHIBIT /

MUNEKIYO HIRAGA
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Michele Chouteau McLean, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. McLean:

Thank you for your early consultation response letter dated December 31, 2020 with the Department of Planning's consolidated comments on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in each letter:

Response to Comment No. 1

The Applicant confirms that the Draft EA will include an additional figure depicting the 500-foot greenbelt along the Maui Island Plan's planned growth area in relation to the project site to verify that the development is outside of the greenbelt buffer. The project site is located more than 200 feet away from the Honoapi‘ilani Highway.

Response to Comment No. 2

We note the Department's comments regarding the Pu‘unani planned growth area of the Maui Island Plan. The proposed Kuikahi Affordable Housing project consists of the development of 204 residential units for Maui's low-income families and will also include a minor live-work component within the project itself. A small portion of the project will include single-family residential lots (six (6) lots total). Additionally, the project is outside of the 500-foot buffer area from the Waiolani community, separating the development from Waikapū. As such, the proposed project is in alignment with the intention of the Pu‘unani planned growth area. Additional discussion as it relates to the Pu‘unani growth area will be included in the Draft EA.

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Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Response to Comment No. 3

We apologize for the error in our consultation letter noting that the project site is designated "Urban" by the State Land Use Commission (SLUC). The project site is designated "Agricultural" and, as such, the Applicant will be pursuing a District Boundary Amendment (DBA) approval from the Maui County Council in addition to its request to the Council for affordable housing review, pursuant to Chapter 2.97, Maui County Code (MCC).

Response to Comment No. 4

We acknowledge the Department's comment that any future urban development on adjacent lands in the Pu'unani planned growth area will require a full DBA with SLUC review. It is noted that there are no future plans to develop the area beyond the proposed project site.

Response to Comment No. 5

We note the Department's comments regarding the conceptual site plan, specifically the roundabout on Kuikahi Drive and inclusion of pedestrian/bike paths. The Applicant and the project's traffic engineering consultant are in discussions with the Department of Public Works regarding the possible roundabout relative to engineering and design options. The Applicant confirms that internal sidewalks and bike paths will be developed to ensure connectivity between the proposed project and existing, surrounding developments.

Response to Comment No. 6

Since the proposed action is in its conceptual design phase, the Applicant has not developed possible roadway names for the extension of Kehalani Mauka Parkway; however, as the project's design progresses, an application with the Department of Public Work's Commission on Naming Streets, Parks, and Facilities will be filed for review and approval of the proposed street name. Additionally, we note the Department's recommendation to include sidewalks and shared use paths/bikeways on this road.

Response to Comment No. 7

Thank you for your comment regarding inclusion of having adequate storage space on-site for lawn and other equipment at the proposed project. This suggestion has been shared with the Applicant and its design team for consideration.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft EA for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Tyler Fujiwara, Austin, Tsutsumi & Associates, Inc.
Stacy Otomo, Otomo Engineering, Inc.
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NOV 27 2020

POLICE DEPARTMENT

COUNTY OF MAUI

MICHAEL P. VICTORINO
MAYOR

OUR REFERENCE

YOUR REFERENCE

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

TIVOLI S. FAAUMU
CHIEF OF POLICE

DEAN M. RICKARD
DEPUTY CHIEF OF POLICE

November 13, 2020

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Shibuya:

SUBJECT: Early Consultation Request for the Proposed Kuikahi Residential Project; TMK No. (2) 3-5-002 (por.); Wailuku

We have received your letter of November 5, 2020 requesting comments on the above mentioned project. The information was assigned to our Community Policing Unit. Enclosed is a copy of their findings that we would like to document as our comments. Thank you for giving us an opportunity to provide our comments.

Very truly yours,

AC J. Jakubczak
Assistant Chief John Jakubczak
for: Tivoli S. Faaumu
Chief of Police

c: Michele Chouteau McLean, Dept. of Planning
Linda Munsell, Dept. of Housing and Human Concerns

TO	:	**TIVOLI FAAUMU, CHIEF OF POLICE, COUNTY OF MAUI**
VIA	:	**CHANNELS** John Jakubczak Assistant Chief NOTED. A RESPONSE LETTER TO BE DRAFTED AND SUBMITTED ON DEPT. LETTERHEAD TO MUNEKIYO HIRAGA. 11/13/2020
FROM	:	**SHAWN MIDA, POLICE OFFICER III, COMMUNITY POLICING**
SUBJECT	:	**RESPONSE TO A REQUEST FOR COMMENTS REGARDING THE PROPOSED KUIKAHI RESIDENTIAL PROJECT**

This communication is submitted as a response to a request for comments by Charlene SHIBUYA, Senior Associate.

PROJECT	:	RESPONSE TO A REQUEST FOR COMMENTS REGARDING PROPOSED KUIKAHI RESIDENTIAL PROJECT
TMK	:	TMK No. (2)3-5-002:003 (por.); WAILUKU, MAUI, HAWAII

RESPONSE:

In review of the submitted construction plans, concerns from the Police perspective are upon the safety of pedestrian and vehicular movement.

It is unknown at this time if any equipment will be stored on site, as it will be a decision made by the project contractor. The project will need to meet the minimal standards set forth by county codes and state laws. I suggest if the roads will be temporary closed due to one lane (alternating traffic) the project manager utilize flag men to conduct traffic control and have all proper signage posted along the routes during construction.

There are no objections to the upcoming construction project at this time.

Submitted for your perusal,

15285

Shawn MIDA, E#15285
Police Officer III / Community Policing
11/12/20 @ 1430 hrs.

NOTED:

Sgt. James E. Terry E#12125
Wailuku Patrol Division
11/12/2020 @ 1650 Hours

11.13.20 0720

MUNEKIYO HIRAGA
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Acting Chief Dean M. Rickard
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai‘i 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Chief Rickard:

Thank you for your Department's early consultation response letter dated November 13, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter.

We note the Department's concern regarding the safety of pedestrian and vehicular movement at the project site. As stated in your letter, the project's contractor will ensure that minimal standards set forth by County codes and State laws are met. The Applicant and its traffic engineer have and continue to coordinate with the State Department of Transportation and Department of Public Works to determine necessary traffic control measures during project construction (i.e., lane closures, signage, etc.) and will implement these measures accordingly. We acknowledge the Department's confirmation that there are no objections to the project's construction at this time.

Lastly, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 412 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Tyler Fujiwara, Austin Tsutsumi & Associates
Stacy Otomo, Otomo Engineering, Inc.
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JAN 12 2021

MICHAEL P. VICTORINO
Mayor

ROWENA M. DAGDAG-ANDAYA
Director

JORDAN MOLINA
Deputy Director

GLEN A. UENO, P.E., L.S.
Development Services Administration

RODRIGO "CHICO" RABARA, P.E.
Engineering Division

JOHN R. SMITH, P.E.
Highways Division

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

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM 434
WAILUKU, MAUI, HAWAII 96793

December 29, 2020

Ms. Charlene Shibuya, Senior Associate
MUNEKIYO HIRAGA
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: EARLY CONSULTATION REQUEST FOR THE PROPOSED KUIKAHI RESIDENTIAL PROJECT; TMK: (2) 3-5-002:003 (POR.)

We reviewed the early consultation request and have the following comments:

Comments from the Highways Division:

1. Highways Division requests that all roadways and drainage facilities associated with this project remain private in-perpetuity.

Comments from the Engineering Division:

2. Upon submittal of the drainage report, please ensure compliance with the following:

   - Title MC-15, Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui";
   - Title MCC-15, Chapter 111, "Rules for the Design of Storm Water Treatment Best Management Practices"; and
   - Title 20, Chapter 20.08, "Soil Erosion and Sedimentation Control".

3. The project drainage report should demonstrate that post-development discharge along the property line will not adversely affect downstream properties and conveyances. Provide analysis of pre-developed and post-

developed conditions for discharge locations along the property line and the resulting effects of post-developed conditions.

4. Identify any adjacent drainageways in both the report and project construction plans. Include information regarding the reserved flooded width, flow rates, and conveyance calculations.

5. Provide information on offsite runoff if it enters the project site. Please note that the recurrence interval is based on the drainage area and not the developed area. Review the drainage area contributing to the project site and select the criteria and design methodology accordingly.

6. Please provide the following information with the project drainage report:

   - Verification that the proposed drainage improvements are in compliance with any existing development master plans;
   - Flooded width calculations for roadways;
   - Hydraulic grade lines on drainline profiles;
   - Backwater calculations; and
   - Calculations for sizing of all drainage systems (i.e., bioretention strips, underground detention systems, and detention basin).

7. Our Department is currently evaluating options to handle storm runoff from the Wailuku Heights Extension Unit 1 Subdivision that presently discharges into the reservoir located above this proposed project. Preliminary options being considered involve constructing a new detention basin downstream of the Wailuku Heights Extension Unit 1 Subdivision. Please contact the Department of Public Works, Engineering Division to discuss in more detail.

If you have any questions regarding the above, please contact Wendy Kobashigawa at 270-7745 or wendy.kobashigawa@co.maui.hi.us.

8. Submit traffic impact analysis report (TIAR) for review and comment.

9. Consult with the Engineering Division's Engineering Services Section to discuss parameters of the TIAR, prior to commencement of a study.

10. Confirm whether any roadways proposed will remain under private ownership or if the intent is to dedicate such roadways to the County of Maui.

11. Sidewalks of six (6) feet wide will be required along roadways fronting the project.

12. Sidewalks of five (5) feet wide will be required on both sides of roadways within the project limits that are to be dedicated to the County of Maui.

13. Crosswalks and ramps at all intersections across all approaches. Ramps shall comply to the current Americans with Disabilities Act Accessibility Guidelines (ADAAG) to the maximum extent feasible.

14. A turn lane will be required to serve the proposed conventional intersection (west access to project) on Kuikahi Drive, as shown in Figure 2 attached to the early consultation letter.

15. Sight distances on Kuikahi Drive should be based on the average operating speeds. This data should be included in the project's TIAR.

16. Ensure that the proposed roundabout at the east access to the project will accommodate larger vehicles anticipated to serve the area.

17. Rectangular Rapid Flashing Beacons are required for crosswalks across Kuikahi Drive at the proposed roundabout.

Please call Jordan Molina at 270-7845 if you have any questions regarding this letter.

Sincerely,

Jordan Molina

FOR ROWENA M. DAGDAG-ANDAYA
Director of Public Works

RMDA:JM:da
xc: Highways Division
Engineering Division
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Rowena M. Dagdag-Andaya, Director
County of Maui
Department of Public Works
200 South High Street, 4th Floor
Wailuku, Hawaii 96793

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai'i

Dear Ms. Dagdag-Andaya:

Thank you for your early consultation response letter dated December 7, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

HIGHWAYS DIVISION

We acknowledge that the Highways Division requests that all roadways and drainage facilities associated with the project remain private in perpetuity. It is the project's intent to keep all internal roadway and drainage facilities privately owned and maintained.

ENGINEERING DIVISION

1. A drainage report will be included with the Draft Environmental Assessment. The civil engineering consultant will ensure the drainage report submittal complies with the Maui County Code and administrative rules concerning the Design of Storm Drainage Facilities, Design of Storm Water Treatment Best Management Practices, and Soil Erosion and Sedimentation Control.

2. As applicable, the report will contain necessary information requested concerning:

   - Post-development discharge along the property line not adversely affecting downstream properties and conveyances;

   - Analysis of discharge locations along the property line on resulting effects of the development;

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- Identifying adjacent drainageways in the report and the project construction plans including information regarding the reserved flooded width, flow rates, and conveyance calculations;

- Offsite runoff if it enters the project site. The recurrence interval will be based on the drainage area contributing to the project site and not the developed area for selecting the appropriate criteria and design methodology;

- Verifying that the proposed drainage improvements are in compliance with any existing development master plans;

- Flooded width calculations for roadways;

- Hydraulic grade lines on drainline profiles;

- Backwater calculations; and

- Calculations for sizing of all drainage systems (i.e. bioretention strips, underground detention systems, and detention basins).

3. On February 25, 2021, as requested by the Engineering Division, we met with the Deputy Director to initiate discussions on evaluating alternatives to handle storm runoff from the Wailuku Heights Extension Unit 1 Subdivision that presently discharges into the reservoir located in and above the proposed project's property. The Applicant expressed his willingness to further discuss more details on options proposed by your Department's design consultant when they become available.

4. A Traffic Impact Analysis Report (TIAR) has been prepared and will be included with the Draft Environmental Assessment for review and comment by the Department. The traffic engineering consultant met with the Engineering Division to discuss parameters of the TIAR, prior to preparing the study.

5. Roadways internal to the proposed project will remain private. For the proposed roundabout at the intersection of Ku'ikahi Drive and Kehalani Mauka Parkway, additional road widening right-of-way at the project entrance will be dedicated to the County of Maui.

6. With the 2.97 Residential Workforce Housing application, an exemption will be requested for sidewalks along the Ku'ikahi Drive frontage. Proposed in lieu of the sidewalk will be a 10-foot wide separated shared use path to connect with the project's internal pedestrian and bike path.

7. The internal roadways will remain private with sidewalks on both sides.

8. Crosswalks and ramps will be provided at the Ku‘ikahi Drive and Kehalani Mauka Parkway intersection as well as internal intersections to ensure compliance with the current Americans with Disabilities Act Accessibility Guidelines (ADAAG).

9. A turn lane will be provided at the intersection of Ku‘ikahi Drive and the west access driveway.

10. Sight distances on Ku‘ikahi Drive will be based on the average operating speeds.

11. The proposed roundabout at the east access to the project will be designed to accommodate larger vehicles anticipated to serve the area.

12. Per the Department’s requirements, Rectangular Rapid Flashing Beacons will be provided for crosswalks across Ku‘ikahi Drive at the proposed roundabout.

Furthermore, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agriculture” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
Tyler Fujiwara, Austin Tsutsumi & Associates
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DEC - 8 2020

MICHAEL P. VICTORINO
Mayor

MARC I. TAKAMORI
Director

MICHAEL B. DU PONT
Deputy Director

DEPARTMENT OF TRANSPORTATION
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793
TELEPHONE: (808) 270-7511
FAX: (808) 270-7505

November 16, 2020

Munekiyo HIraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, HI 96793

SUBJECT: Early Consultation Request for the Proposed Kuikahi Residential Project; TMK No. (2)3-5-002:003(por.); Wailuku, Maui, Hawai'i

Dear Ms. Shibuya,

We appreciate the opportunity to provide early consultation comments on the Proposed Kuikahi Residential project.

The County Department of Transportation provides public transit services within the vicinity of the proposed residential project. In order for public transit to be considered for expansion in new developments, there are certain criteria that makes transit works such as through streets whether it's major collector roads or within the subdivisions. Providing interconnecting sidewalks within and between the subdivisions and ample lighting in the evenings is also necessary for walkable communities and for the safety of potential residents and public transit riders.

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

Sincerely,

Marc Takamori, Director
Department of Transportation

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Marc Takamori, Director
County of Maui
Department of Transportation
110 Ala‘ihi Street, Suite 210
Kahului, Hawai‘i 96732

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Mr. Takamori:

Thank you for your early consultation response letter dated November 16, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we offer the following information in response to the comments noted in your letter:

We acknowledge the Department's comments regarding criteria for implementation of public transit to the project site. The proposed residential neighborhood will contain internal roadways, street lighting, and internal sidewalks which will ultimately connect to an overall sidewalk network between other residential subdivisions in the vicinity of the project area.

Lastly, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

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We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
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DEC 15 2020

Maui Economic Opportunity, Inc.

P.O. Box 2122
Kahului, HI 96733
808-249-2990
Fax: 808-249-2991
www.meoinc.org

November 30, 2020

Muneyiko Hiraga
Attn: Charlene Shibuya
305 High Street, Suite 104
Wailuku, HI 96793

Re: Early Consultation Request for the Proposed Kuikahi Residential Project

Dear Charlene Shibuya,

We do not have any objection or comment to the proposed Kuikahi Residential Project; TMK No. (2)3-5-002:003(por.); in Wailuku, Maui, Hawai'i.

Thank you for seeking community comments.

Mahalo nui loa,

for DC

Debbie Cabebe, SPHR
Chief Executive Officer

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Tessa Munekiyo Ng
VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Debbie Cabebe, SPHR, Chief Executive Officer
Maui Economic Opportunity, Inc.
P.O. Box 2122
Kahului, Hawai‘i 96733

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Cabebe:

Thank you for your early consultation response letter dated November 30, 2020 on the subject project. On behalf of Kuikahi Properties, LLC (“Applicant”), we acknowledge that the MEO has no objection or comment on the proposed project at this time.

We would also like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as “Urban” by the State Land Use Commission (SLUC). However, the project site is designated as “Agricultural” by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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From: Yonamine, Connie E <Connie.Yonamine@charter.com>
Sent: Monday, November 16, 2020 2:16 PM
To: Charlene Shibuya
Subject: Proposed Kuikahi Residential development

Hello Charlene,
We received the early consultation request for this proposed development. At this time we have no questions.
Not sure when this will start so when possible, could you email the DWG file for the electrical plans so we can look over.
Let me know if you have any questions.

Thank you,

Connie E. Yonamine | Construction Coordinator II
(O) 808.442.4831 |(M) 808.357.0068
(E) Connie.yonamine@charter.com
158 Ma'a Street
Kahului HI 96732

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VICE PRESIDENT

Michael T. Munekiyo
SENIOR ADVISOR

September 7, 2021

Connie E. Yonamine, Construction Coordinator II
Charter Spectrum
158 Ma‘a Street
Kahului, Hawai‘i 96732

SUBJECT: Proposed Kuikahi Residential Project at TMK (2)3-5-002:003 (por.), Wailuku, Maui, Hawai‘i

Dear Ms. Yonamine:

Thank you for your early consultation response email from November 16, 2020 on the subject project. On behalf of Kuikahi Properties, LLC ("Applicant"), we acknowledge that Spectrum does not have any questions on the proposed project at this time. Additionally, as requested, electrical plans for the project will be provided to Spectrum for review upon their availability.

Lastly, we would like to correct a mistake that was included in our initial letter requesting early consultation comments. Our letter stated that the project site is designated as "Urban" by the State Land Use Commission (SLUC). However, the project site is designated as "Agricultural" by the SLUC and, as such, the Applicant will also be pursuing a District Boundary Amendment (DBA) approval. The Maui County Council will be the approving body for the DBA as the project area is under 15 acres in size.

We appreciate your input and will include a copy of your comment letter and this response letter in the Draft Environmental Assessment for the project. Should you have any questions or require additional information, please feel free to contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:ab
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
Stacy Otomo, Otomo Engineering, Inc.
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REFERENCES | XI

XI. REFERENCES

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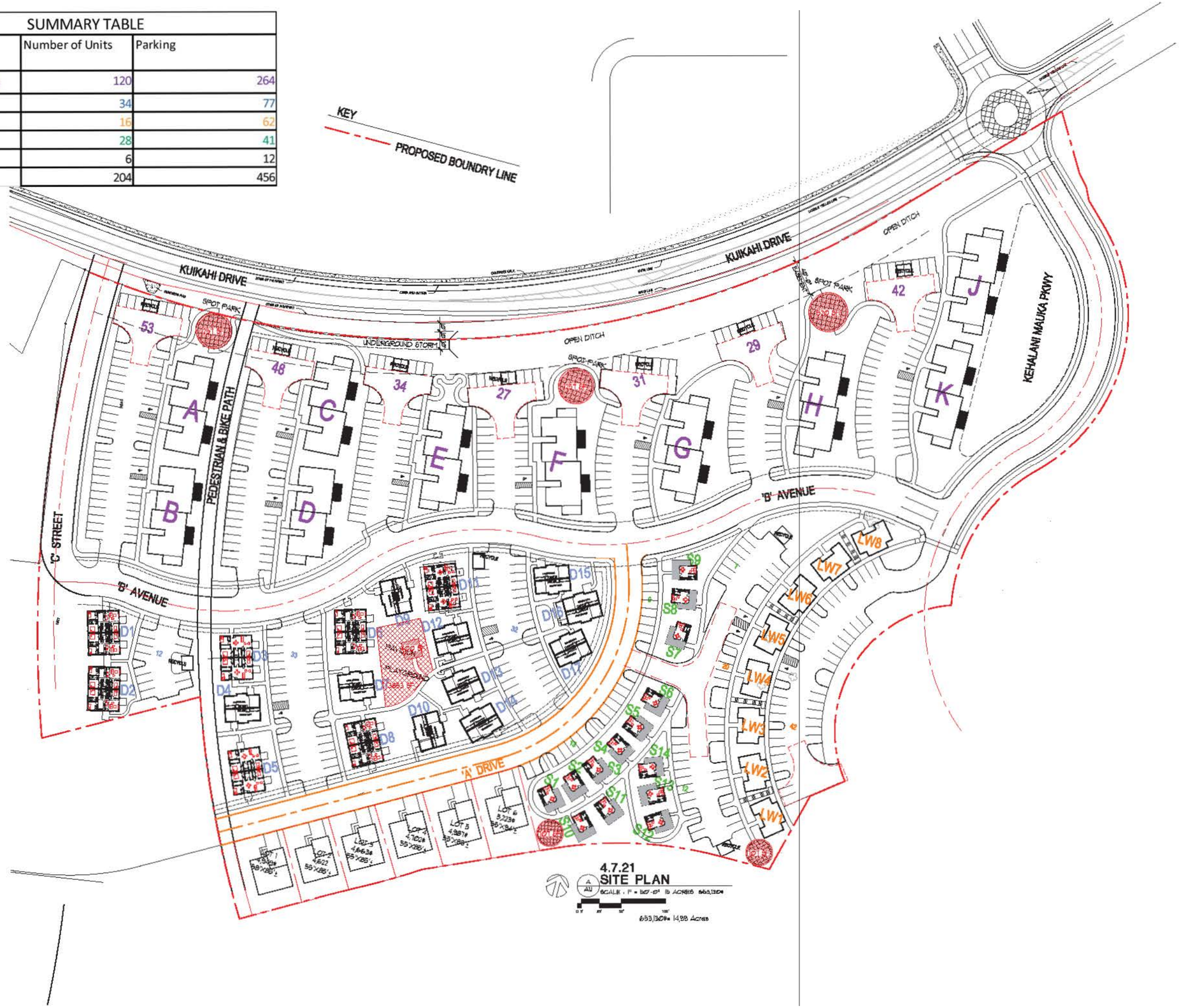
PRELIMINARY DEVELOPMENT PLANS

APPENDIX

A

SUMMARY TABLE		
Use	Number of Units	Parking
Multifamily/Condo	120	264
Duplex	34	77
Live Work	16	62
Studio	28	41
Single family	6	12
	204	456



RONALD JAMES PED ARCHITECT P.C.

RONALD J. PED
LICENSED PROFESSIONAL ARCHITECT
No. AR-16577

This work was prepared by me or under my supervision. Construction of this project will be under my Observation
EXPIRE DATE 04/30/2020

NEW APARTMENT PROJECT
BETSILL KUIKAHI VILLAGE
KUIKAHI DRIVE & KEHALANI MAUKA PKWY

DATE: 9 MAR 2020
DRAWN:
JOB NO.: 2023

A1.1

LAST SAVED: Wed, 09 Jan 2021 - 10:19 am
PRINTED: Wed, 09 Jan 2021 - 10:51 am
LOCATION: P:\2023 Betsill Kuikahi village\BIND SITE PLAN 6.9.2021_SPOT PARKS.dwg A1.1
PRINTED BY: Andy

Plant Palette

Trees:

-Milo

-Pink Tecoma

-Rainbow Shower

-Plumeria

-Avocado

-Mango

-Plumeria

-Jatropha

-Foxtail Palm

-Loulu Palm

-Yew Pine

Shrubs:

-Hau

-El Dorado

-Queen Emma Lily

-Plumbago

-Firecracker

-Areca Palm

-Ape

-Akia

-Kalo

-Croton

Ground Cover:

-Pohinahina

-Kupu Fern

-Ilima Papa

-Nehe

-Lauae Fern

-Ruellia

-Golden Glory

-El Toro Zoysia Grass

PLANTING CONCEPT PLAN

- Medium Flowering Canopy Tree
- Large Flowering Canopy Tree
- Medium Shade Tree
- Small Flowering Tree
- Palms
- Grass
- Shrubs & Ground Cover
- Native Shrubs & Ground cover
- Buffer Shrubs

KUIKAHI AFFORDABLE HOUSING

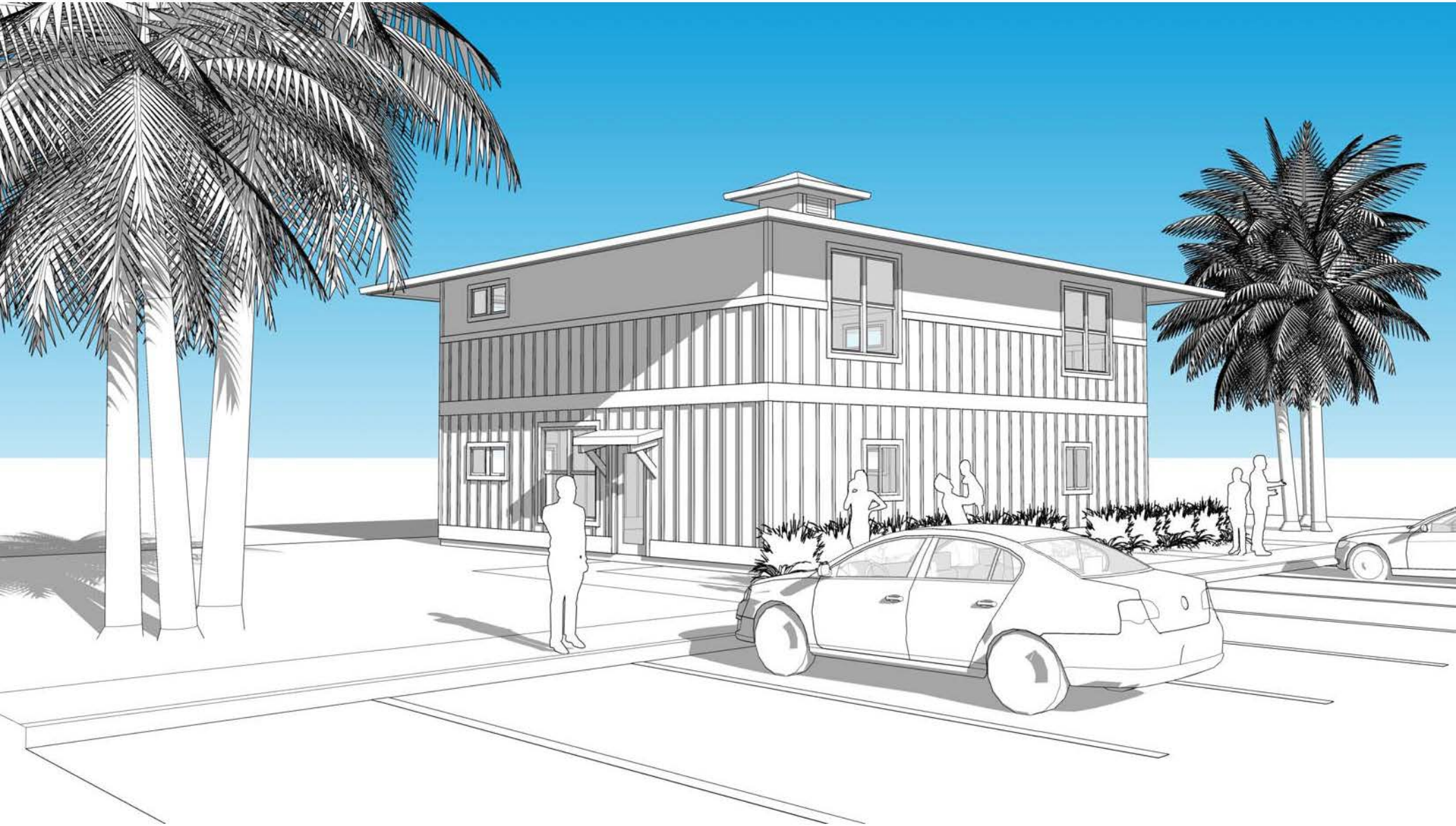
Wailuku, Maui, Hawaii

6-15-21

HAWAII LAND DESIGN

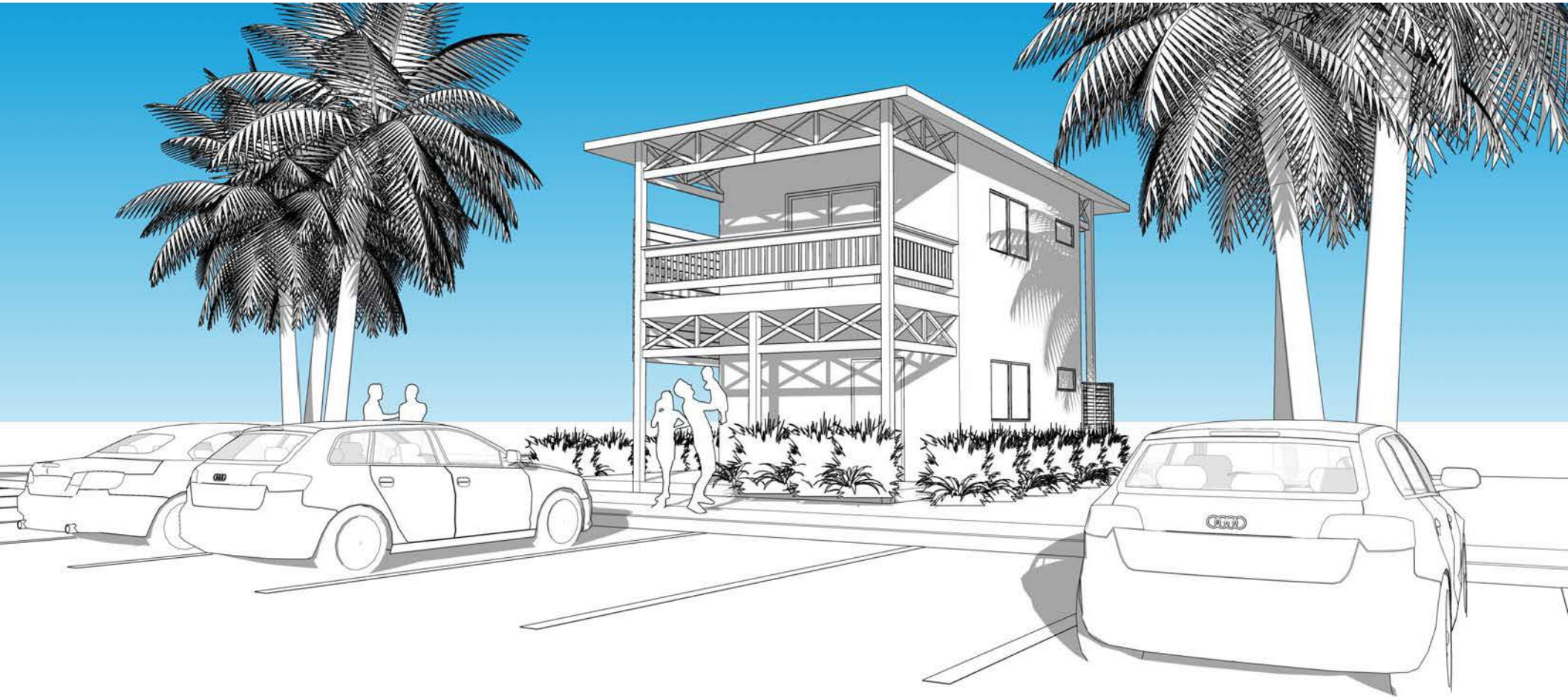
MULTI-FAMILY/CONDO UNIT BUILDING ELEVATIONS

DUPLEX BUILDING ELEVATIONS



LIVE-WORK UNIT BUILDING ELEVATION

STUDIO UNIT BUILDING ELEVATION



SINGLE-FAMILY BUILDING ELEVATIONS

PRELIMINARY ENGINEERING REPORT

APPENDIX B

PRELIMINARY ENGINEERING REPORT

FOR

KUIKAHI RESIDENTIAL PROJECT

Wailuku, Maui, Hawaii

T.M.K.: (2) 3-5-002: Por. 003

Prepared for:

Kuikahi Properties, LLC
191 Waihee Valley Road
Wailuku, Hawaii 96793

Prepared by:

OTOMO
ENGINEERING, INC.

CONSULTING CIVIL ENGINEERS
305 SOUTH HIGH STREET, SUITE 102
WAILUKU, MAUI, HAWAII 96793
PHONE: (808) 242-0032

April 2021

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PRELIMINARY ENGINEERING REPORT
FOR
KUIKAHI RESIDENTIAL PROJECT
T.M.K.: (2) 3-5-002: Por. 003

1.0 INTRODUCTION

The purpose of this report is to provide information on the existing infrastructure which will be servicing the proposed project. It will also evaluate the adequacy of the existing infrastructure and anticipated improvements which may be required for the development of the project.

The subject parcel is identified as T.M.K.: (2) 3-5-002: Portion of 003. Parcel 003 contains an area of approximately 148.0 acres and the proposed project encompasses an area of approximately 14.9 acres. The remaining 133.1 acres may be developed at a future date.

The project site is undeveloped and covered with keawe trees, weeds, and grass. It is being used for cattle and goat grazing. The subject parcel is bordered by Kuikahi Drive to the north, Honoapiilani Highway and vacant land to the east, agricultural lands to the south and the Wailuku Heights Subdivision to the west.

The development plan includes a total of 204 units. There will be 120 multi-family units, 6 single-family units, 34 duplexes, 16 live-work units, and 28 studios. The project is being processed using Maui County Code Chapter 2.97 – Residential Workforce Housing Policy Incentives and Exemptions.

Associated improvements include approximately 460 paved parking stalls, internal roadways and sidewalks, bike paths, pocket parks, drainage improvements, utility connections, and landscaping. Access to the project site will be from two (2) driveways from Kuikahi Drive.

2.0 EXISTING INFRASTRUCTURE

2.1 ROADWAYS

Access to the project site will be from two new driveways off Kuikahi Drive. The primary access will be from a new leg at the Kuikahi Drive-Kehalani Mauka Parkway intersection. The existing T-intersection will be converted into a 4-way intersection and the secondary access will be from a new driveway located approximately 0.2 miles mauka of the primary driveway.

Honoapiilani Highway is a north-south, two-way, two-lane, undivided collector roadway with posted speed limits between 30 miles per hour (mph) and 45 mph. It is a State-owned highway that begins as the continuation of South High Street near Kahookele Street and continues southward toward Waikapu, Maalaea and continues to West Maui.

Kuikahi Drive is an east-west undivided collector roadway with posted speed limits ranging between 20 mph and 30 mph. It begins approximately 1.2 miles west of Honoapiilani Highway at the Wailuku Height subdivision and extends eastward and terminates nears the Church of Jesus Christ of Latter Day Saints, where Kuikahi Drive becomes Maui Lani Parkway.

Maui Lani Parkway is an east-west, two-way, two-lane divided roadway which provides connection from the Waiale area to other regional roadways. It begins to the east at its T-intersection with Kuihelani Highway and terminates at its intersection with Waiale Road, where it transitions into Kuikahi Drive.

Waiale Road is a north-south, two-way, two-lane, undivided collector roadway. To the north, Waiale Road serves as the southern connection to Lower Main Street and terminates at a T-intersection at East Waiko Road. The posted speed limit along this roadway is 20 mph at Lower Main Street and transitions to 25 mph from Waiinu Road to the Maui Lani Parkway-Kuikahi Drive intersection and increases to 30 mph until its southern terminus at Waiko Road.

East Waiko Road is an east-west, two-way, two-lane, undivided collector roadway with a posted speed limit of 20 mph. It extends westward from Kuihelani Parkway to Honoapiilani Highway where it continues as West Waiko Road through the Waikapu residential neighborhood.

2.2 DRAINAGE

Elevations on the site range from approximately 664 feet above mean sea at the northwestern corner of the site to approximately 540 feet above mean sea level at the eastern end, with an average slope of approximately 10.6%.

There is an existing dam/reservoir above the Department of Water Supply's (DWS) 500,000-gallon water tank. It is known as the Wailuku Water Reservoir 10 (State Dam ID MA-0151). The dam/reservoir receives water from a ditch that traverses from Iao Valley, along the makai boundary of Wailuku Heights-Unit I, through a culvert along Kuikahi Drive and discharges into the dam/reservoir. A 66-inch drainline from the Wailuku Heights Subdivision also discharges into the dam/reservoir.

There are two existing drainageways that traverse through the subject parcel. The first traverses on the south side of the reservoir/dam and DWS 500,000-gallon water tank along the north side of the project site. According to the as-built plans and drainage report for Wailuku Heights-Unit 1, the 100-year flow at South Alu Road is 611.7 cfs. The second traverses parallel to and outside of the southern boundary of the project site. According to the as-built plans and drainage report for Wailuku Heights-Unit 1, the 100-year flow at South Alu Road is 619.9 cfs. Both drainageways crosses South Alu Road with 11'-5" x 7'-3" arch pipe culverts.

The two drainageways flow in a west to east direction and eventually merge makai of the project site. The flow then continues toward Honoapiilani Highway.

It is estimated that the existing 50-year, 1-hour storm runoff from the project site is 23.51 cfs, corresponding to a runoff volume of 32,446 cubic feet.

According to Panel Number 150003 0391F of the Flood Insurance Rate Map, dated November 4, 2015, prepared by the United States Federal Emergency Management Agency, the project site is situated in Flood Zone X. Flood Zone X represents areas outside the 0.2% annual chance floodplain.

According to the "Soil Survey Database for Island of Maui, Hawaii (September 2014)," prepared by the United States Department of Agriculture Natural Resources Conservation Service, the soils within the project site are classified as Iao cobbly silty clay, 7 to 15 percent slopes (IbC) and Iao clay, 7 to 15 percent slopes (IcC). Iao cobbly silty clay and Iao clay are characterized as having medium runoff and a moderate erosion hazard.

2.3 SEWER

There are existing 8-inch sewerlines along Kuikahi Drive. The 8-inch sewerlines traverse to the east along Kuikahi Drive which connects to a sewer manhole at the intersection of Waiale Road and Kuikahi Drive. The sewer system then traverses to the north along Waiale Road, Lower Main Street, across Waiehu Beach Road and discharges into the Wailuku Wastewater Pump Station, which is located makai of the Waiehu Beach Road-Kahului Beach Road intersection. This pump station pumps the wastewater through a 24-inch forcemain to the Wailuku/Kahului Wastewater Reclamation Facility for treatment.

2.4 WATER

Water to the Wailuku area is provided by the County Department of Water Supply (DWS) Central Maui System. Water is drawn from wells in the Iao and Waihee aquifers. The previous landowner participated in water infrastructure upgrades to the DWS water system, expanding a planned 300,000-gallon storage tank to 500,000 gallons to accommodate the previous project. The enlarged 500,000-gallon tank is located at the 835 feet elevation.

There is an existing 8-inch County force main that delivers water from the 3.0-million-gallon Waiale tank to the 1.5-million-gallon tank at the 670 elevation. The

8-inch force main traverses along Kuikahi Drive to the 1.5-million-gallon tank, which is located immediately to the west of the project site.

The proposed development between the 560 to 725 foot elevation will be serviced by the Kehalani Mauka high level service water service. Storage will be provided by the 500,000-gallon tank.

2.5 ELECTRIC, TELEPHONE, AND CABLE TV

There are existing underground utility distribution systems along Kuikahi Drive fronting the project site. The existing systems currently serves the residential areas of Wailuku Heights and the Kehalani development.

3.0 ANTICIPATED INFRASTRUCTURE IMPROVEMENTS

3.1 ROADWAYS

Access to the project site will be from two new driveways off Kuikahi Drive. The primary access will be from a new leg at the Kuikahi Drive-Kehalani Mauka Parkway intersection.

The Traffic Impact Analysis Report (TIAR), prepared by Austin, Tsutsumi & Associates, Inc., dated January 26, 2021, concluded that "*The project is anticipated to generate approximately 87 (106) trips during the AM and PM peak hours. Upon completion of the Project, all study intersections are generally forecast to operate with LOS similar to Base Year 2024 conditions. The project is only anticipated to generate 5-18 vehicles per peak per direction along Honoapiilani Highway and 3-12 vehicles along Waiale Road.*

At the Waiale Road intersections with Kaohu Street, Olomea Street and Kaupo Street, various movements will continue operating at LOS F and over-capacity conditions similar to the Base Year scenarios. However, the Project only adds about 3-12 vehicles per peak per direction at these intersections.

At the Waiale Road/Waiinu Road intersection, similar to base year conditions, the northbound approach will continue to operate a LOS F and overcapacity conditions due to high volumes even with proposed roundabout. With the Maui Lani Parkway Extension, the northbound approach will improve to LOS E and below capacity conditions.

At the Waiale Road/Kuikahi Drive/Maui Lani Parkway intersection, various movements are anticipated to experience an increase in delay of 1-10 seconds from Base Year conditions. The Maui Lani Parkway Extension will significantly improve operations by removing all LOS F and overcapacity conditions. A few movements will continue operating at LOS E conditions."

The TIAR made the following recommendations to mitigate the traffic expected to be generated by the project:

"The Maui Lani Parkway Extension will help mitigate congestive conditions along Waiale Road during the peak periods of traffic. As interim improvements, the following could be considered for Base Year 2024 conditions WITHOUT the Project:

Waiale Road Corridor

For future planning purposes along Waiale Road:

- *Consider various traffic control treatment options at Waiale Road/Kaohu Street intersection that may include roadway widening, traffic signal and/or roundabout, depending on resolution to various geometric constraints.*
- *Median refuge lanes along Waiale Road could be considered to help ease entry of left-turn vehicles onto Waiale Road.*
- *At the Waiale Road/Kuikahi Drive intersection, lengthen the southbound left-turn lane while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection. Signal timing should continually be optimized as new developments are constructed.*

The following Future Year 2024 recommendations should be considered WITH the Project:

- *At the Waiale Road/Kuikahi Drive intersection, signal timing should be optimized.*
- *At the proposed Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection, consider a mini roundabout when Kehalani Mauka Parkway opens to through traffic beyond its current dead end near Kehalani Villas. Future design of a roundabout shall provide adequate horizontal and vertical sight distance on all approaches and maintaining an acceptable grade and enforcement of speeds along the relatively steep Kuikahi Drive approaches."*

3.2 DRAINAGE

After the development of the proposed project, it is estimated that the 50-year, 1-hour storm runoff will be 66.45 cfs, with a corresponding storage volume of 118,619 cubic feet. There will be a net increase in runoff of 42.94 cfs (66.45 cfs – 23.51 cfs) due to the development of the project. The corresponding increase in runoff volume will be 86,173 cubic feet (118,619 cubic feet – 32,446 cubic feet).

The existing southern drainageway will not be altered and offsite runoff will continue to sheet flow in a westerly direction as it is presently doing. Underground culverts will be installed along sections of the existing northern drainageway. The installation of the culverts will accommodate the construction of the structures and parking areas.

A large onsite retention basin will be constructed at the easterly end of the project site. Onsite runoff will be collected by grated inlet catch basins within the paved parking areas and conveyed to perforated subsurface drainlines. Runoff from the main driveway areas will be collected by grated inlet catch basins and conveyed to the onsite retention basin.

The retention basin and subsurface drainage systems will be sized to accommodate more than the increase in surface runoff volume from a 50-year, 1-hour storm created by the proposed project. An overflow culvert at the retention

basin will allow excess runoff to discharge to an outlet which will be located within the existing northern drainageway. At the outlet, runoff will continue downstream along its present drainage pattern at a flow less than the pre-development rate.

The drainage design criteria will be to minimize any alterations to the natural pattern of the existing onsite surface runoff and reduce the quantity of runoff sheet flowing from the project to the downstream properties. Offsite runoff from the drainage areas mauka of South Alu Road will continue to flow through the project site along its present route. The proposed drainage system will be designed in accordance with Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui" and Chapter 111, "Rules for the Design of Storm water Treatment Best Management Practices."

The Developer is working with the Department of Public Works to remove the outlet of the existing 66-inch culvert from the dam/reservoir to a new retention basin which will be sized to accommodate the flow from the Wailuku Heights Subdivision. The site of the retention basin being considered is to the south of the existing dam/reservoir.

The Developer and Wailuku Water Company have met with the Department of Land and Natural Resources, Engineering-Dam Safety Division to inspect the dam/reservoir. They are pursuing alternatives to reduce the height of the dam for possible declassification.

3.3 SEWER

The proposed 120 multi-family units, 6 single-family units, 34 duplexes, 16 live-work units, and 28 studios will generate approximately 52,590 gallons of wastewater daily. The onsite sewer system will collect the wastewater from the units and connect to the County's wastewater system on Kuikahi Drive. Onsite sewer systems will be design to County standards.

The Wailuku/Kahului Wastewater Reclamation Facility currently has enough capacity to accommodate the project.

3.4 WATER

In accordance with the Department of Water Supply's Domestic Consumption Guidelines for multi-family residential development, the average daily demand for the 120 multi-family units, 6 single-family units, 34 duplexes, 16 live-work units, and 28 studios is approximately 115,840 gallons per day. Fire flow demand for a low-rise multi-family development is 1,500 gallons per minute for a 2-hour duration. Fire hydrants will be installed with a maximum spacing of 250 feet.

Chapter 2.97 provides an exemption for the project to Chapter 14.12-Water Availability of the Maui County Code and will be required to provide verification that it has a long-term, reliable water source.

3.5 ELECTRIC, TELEPHONE, AND CABLE TV

The installation of electrical, telephone, and cable TV systems for the project will be coordinated with Maui Electric Company, Hawaiian Telcom, and Spectrum, respectively from the existing underground facilities along Kuikahi Drive. All project lighting will be provided as approved by the Department of Planning.

APPENDIX A

HYDROLOGIC CALCULATIONS

Hydrologic Calculations

Purpose: Determine the increase in onsite surface runoff due to the development of the project site based on a 50-year, 1-hour storm.

A. Determine the Runoff Coefficient (C):

EXISTING CONDITIONS:

Infiltration (Medium)	=	0.07
Relief (Rolling)	=	0.03
Vegetal Cover (Good)	=	0.03
Development Type (Ag)	=	0.15
C	=	0.28

DEVELOPED CONDITIONS:

ROOF AREAS:

Infiltration (Negligible)	=	0.20
Relief (Hilly)	=	0.06
Vegetal Cover (None)	=	0.07
Development Type (Roof)	=	0.65
C	=	0.98

PAVED AREAS:

Infiltration (Negligible)	=	0.20
Relief (Rolling)	=	0.03
Vegetal Cover (None)	=	0.07
Development Type (Pavement)	=	0.65
C	=	0.95

LANDSCAPE AREAS:

Infiltration (Medium)	=	0.07
Relief (Rolling)	=	0.03
Vegetal Cover (High)	=	0.00
Development Type (Open)	=	0.15
C	=	0.25

EXISTING CONDITIONS:

Open Area = 14.9 acres
C = 0.28

DEVELOPED CONDITIONS:

Paved Area = 5.46 Acres
Roof Area = 2.18 Acres
Landscaped Area = 7.26 acres
WEIGHTED C = 0.61 (Use 0.70 based on Table 3 in the Rules for the Design of Storm Drainage Facilities in the County of Maui)

B. Determine the 50-year, 1-hour rainfall:

i_{50} = 3.5 inches

Adjust for time of concentration to compute Rainfall Intensity (I):

Existing Condition:
T_c = 23 minutes
I = 5.636 inches/hour

Developed Condition:
T_c = 17 minutes
I = 6.371 inches/hour

C. Drainage Area (A) = 14.9 Acres

D. Compute the 50-year storm runoff volume (Q):

Q = CIA

Existing Conditions:
Q = (0.28)(5.636)(14.9)
= 23.51 cfs

Developed Conditions:

Q = (0.70)(6.371)(14.9)

= 66.45 cfs

The increase in runoff due to the proposed development is 66.45 cfs – 23.51 cfs = 42.94 cfs. The increase in runoff volume due to the proposed development is 118,619 cubic feet – 32,446 cubic feet = 86,173 cubic feet.

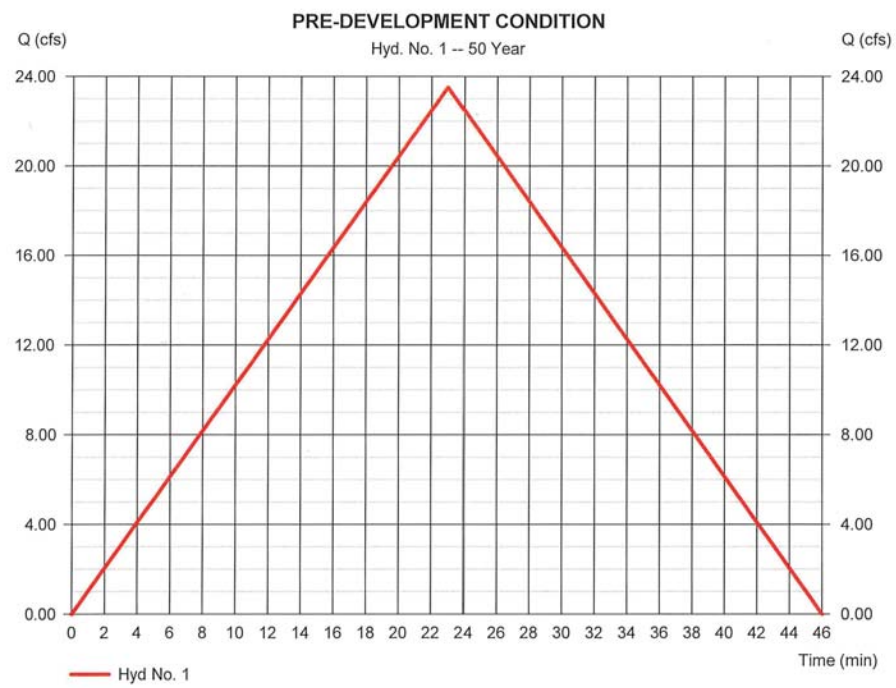
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Wednesday, 04 / 7 / 2021

Hyd. No. 1

PRE-DEVELOPMENT CONDITION

Hydrograph type	= Rational	Peak discharge	= 23.51 cfs
Storm frequency	= 50 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 32,446 cuft
Drainage area	= 14.900 ac	Runoff coeff.	= 0.28
Intensity	= 5.636 in/hr	Tc by User	= 23.00 min
IDF Curve	= 3-5.IDF	Asc/Rec limb fact	= 1/1



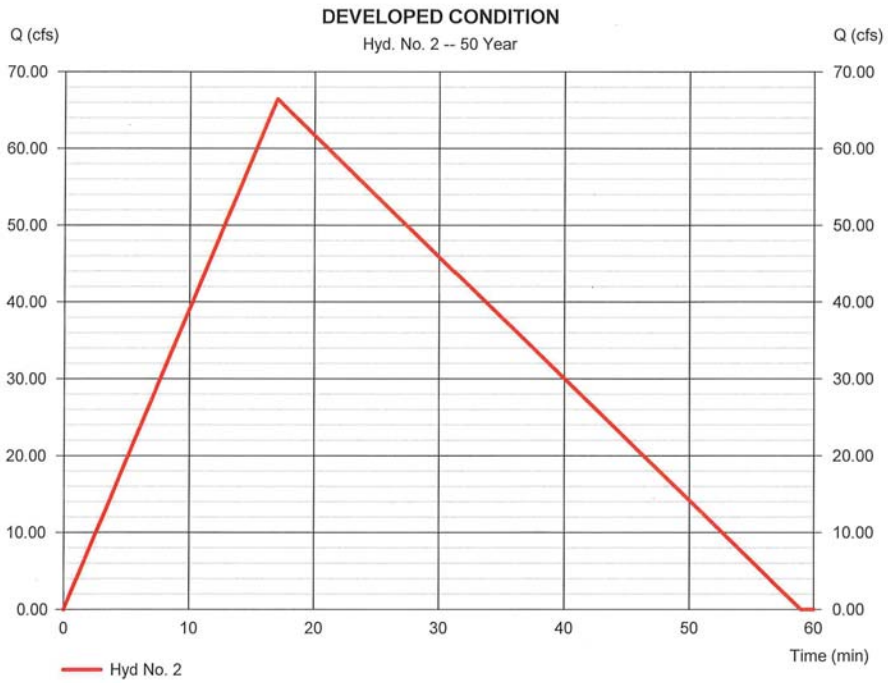
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Wednesday, 04 / 7 / 2021

Hyd. No. 2

DEVELOPED CONDITION

Hydrograph type	= Rational	Peak discharge	= 66.45 cfs
Storm frequency	= 50 yrs	Time to peak	= 17 min
Time interval	= 1 min	Hyd. volume	= 118,619 cuft
Drainage area	= 14.900 ac	Runoff coeff.	= 0.7
Intensity	= 6.371 in/hr	Tc by User	= 17.00 min
IDF Curve	= 3-5.IDF	Asc/Rec limb fact	= 1/2.5



APPENDIX B

STORM WATER QUALITY CALCULATIONS

Storm Water Quality Calculations

Purpose: Determine the storage volume required for detention-based control for storm water quality.

A. Determine the Runoff Coefficient (C):

$$C = 0.05 + (0.009 \times IMP)$$

$$IMP = \text{Impervious Area } (\%) = 51.3\%$$

$$C = 0.05 + (0.009 \times 51.3) = 0.51$$

B. Drainage Area (A) = 14.9 Acres

C. Compute the Water Quality Design Volume (WQDV):

$$WQDV = C \times 1'' \times A \times 3630 = (0.51)(1'')(14.9)(3630) = 27{,}584 \text{ cubic feet}$$

APPENDIX C

WATER DEMAND CALCULATIONS

WATER DEMAND CALCULATIONS

The development plan includes a total of 204 units. There will be 120 multi-family units, 6 single-family units, 34 duplexes, 16 live-work units, and 28 studios. For the purpose of computing the Average Daily Demand on an area basis, the area associated with each use will be based on a percentage of the total unit count.

Per Table 100-18 of the 2002 Water System Standards:

Multi-Family Low Rise:

Average Daily Demand (ADD) = 560 gallons per unit or 5,000 gallons per acre

ADD = (560 gallons/unit) x (164 units) = 91,840 gallons per day

ADD = (5,000 gallons/acre) x (11.76 acres*) = 58,800 gallons per day
*Note-84% of the project is multi-family, live-work, or studio (0.84 x 14.00 = 11.76 acres)

Average Daily Demand is 91,840 gallons (Greater of the two consumption)

Single-Family:

Average Daily Demand (ADD) = 600 gallons per unit or 3,000 gallons per acre

ADD = (600 gallons/unit) x (40 units) = 24,000 gallons per day

ADD = (3,000 gallons/acre) x (2.24 acres**) = 6,720 gallons per day
**Note-16% of the project is single-family or duplex (0.16 x 14.00 = 2.24 acres)

Average Daily Demand is 24,000 gallons (Greater of the two consumption)

TOTAL DAILY CONSUMPTION = 91,840 + 24,000 = 115,840 gallons

APPENDIX D

WASTEWATER CALCULATIONS

WASTEWATER CALCULATIONS

Per the February 2, 2006 Wastewater Flow Standards:

Apartment/Condo:

Wastewater Contribution for an Apartment Unit is 255 gallons/day/unit

Contribution = (198 units) x (255 gallons/unit/day) = 50,490 gallons per day

Single-Family:

Wastewater Contribution for a Single-Family Unit is 350 gallons/day/unit

Contribution = (6 units) x (350 gallons/unit/day) = 2,100 gallons per day

TOTAL WASTEWATER CONTRIBUTION = 50,490 + 2,100 = 52,590 gallons

EXHIBITS

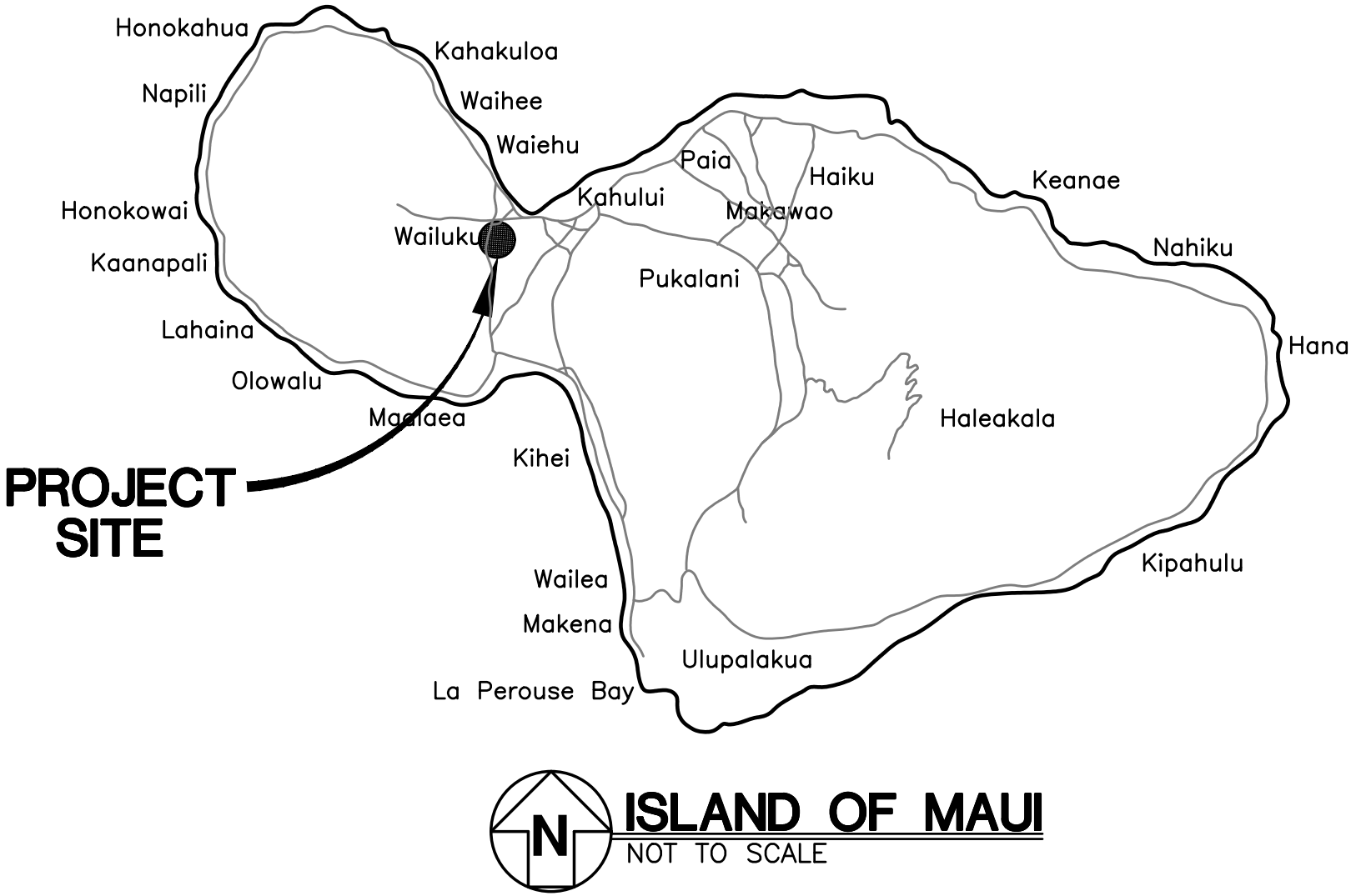
1 **Location Map**

2 **Vicinity Map**

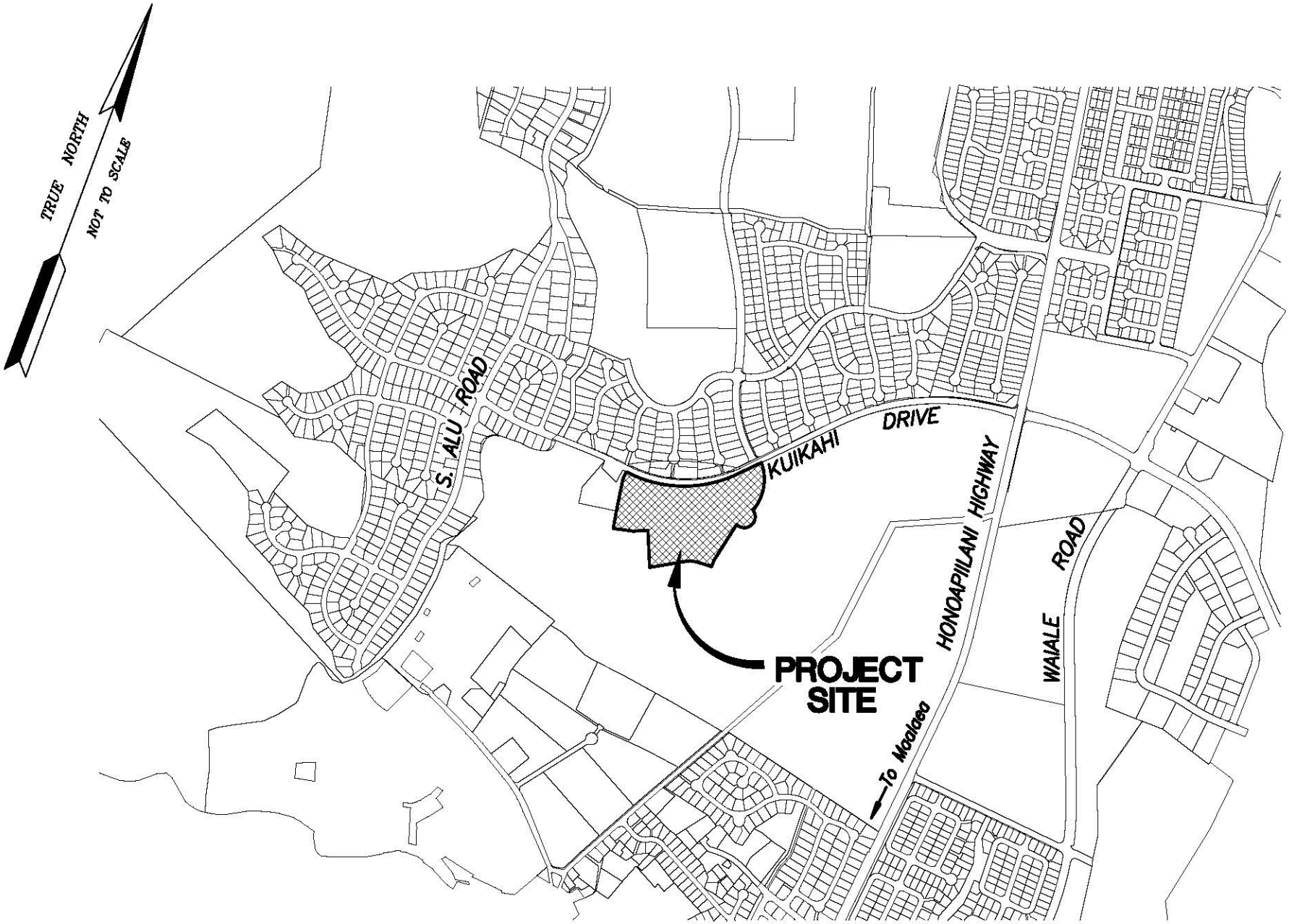
3 **Soil Survey Map**

4 **Flood Insurance Rate Map**

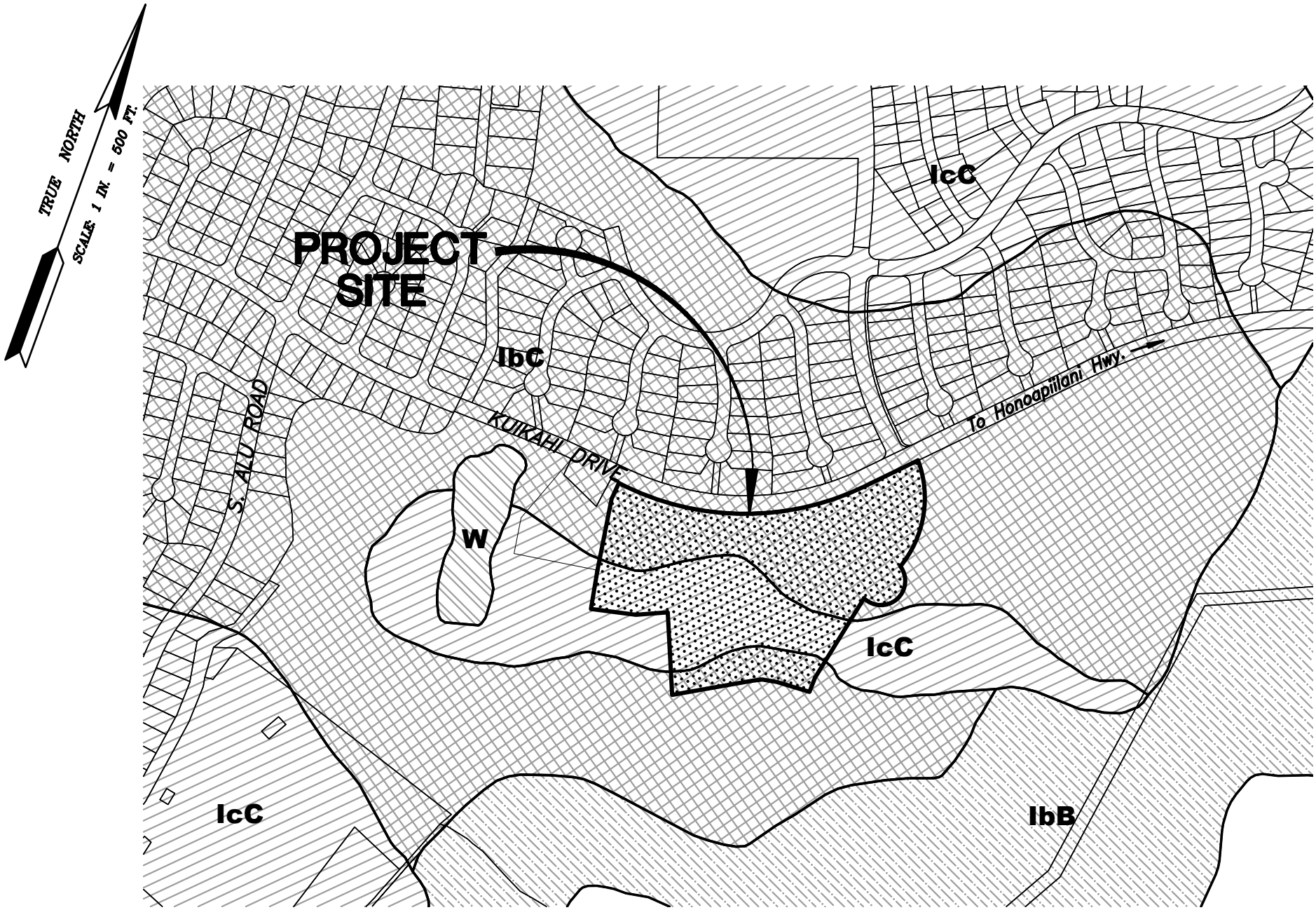
5 **Preliminary Drainage Plan**



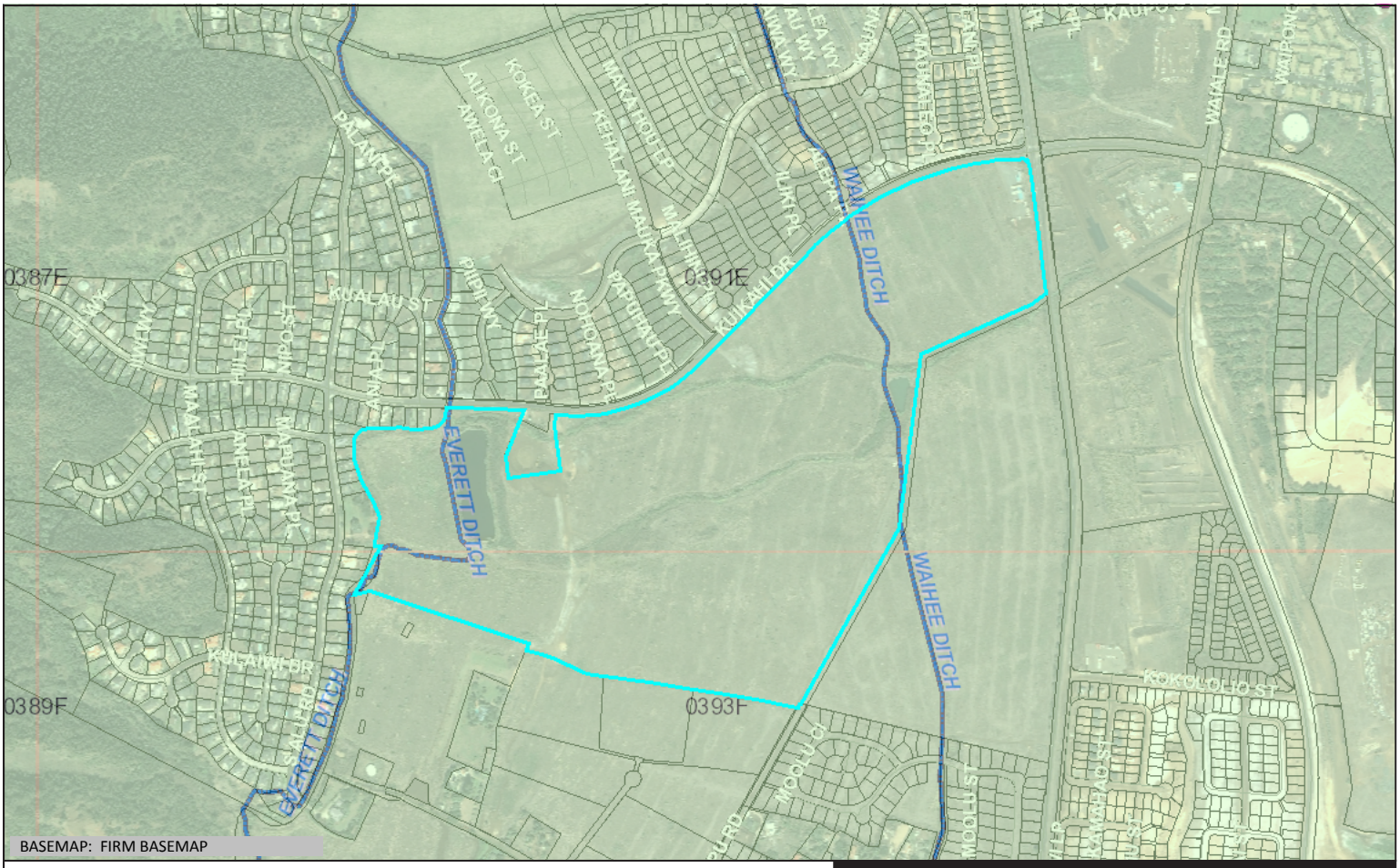
LOCATION MAP
EXHIBIT 1



VICINITY MAP
EXHIBIT 2



SOIL SURVEY MAP
EXHIBIT 3



Flood Hazard Assessment Report

www.hawaiinfip.org

Kuikahi Affordable Projec

Property Information

COUNTY:	MAUI
TMK NO:	(2) 3-5-002:003
WATERSHED:	IAO
PARCEL ADDRESS:	ADDRESS NOT DETERMINED WAILUKU, HI 96793

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL - EFFECTIVE DATE:	1500030391E - SEPTEMBER 25, 2009 1500030393F - NOVEMBER 04, 2015

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: YES (MA-0151)
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 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.

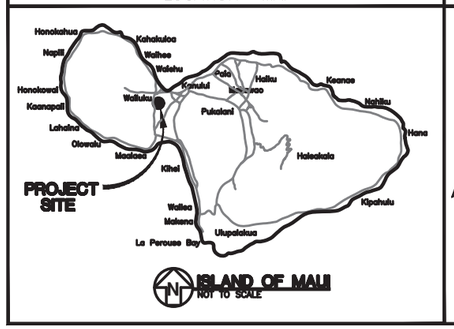
OTHER FLOOD AREAS

- **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.

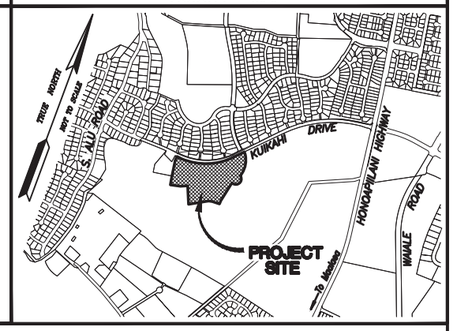
EXHIBIT 4 FLOOD INSURANCE RATE MAP

PRELIMINARY DRAINAGE PLAN
NOT TO SCALE

LOCATION MAP



VICINITY MAP



OTOMO ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS
305 S. High Street, Ste. 102
Wailuku, Maui, Hawaii 96793
Phone: (808) 242-0032

STACY A. OTOMO
LICENSED PROFESSIONAL ENGINEER
No. 5115-C
HAWAII, U.S.A.

LICENSE EXPIRES: 4-30-22

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. ("OBSERVATION OF CONSTRUCTION" AS DEFINED UNDER SECTION 16-115-2 OF THE HAWAII ADMINISTRATIVE RULES, PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS, AND LANDSCAPE ARCHITECTS.)

Stacy A. Otomo — SIGNATURE
4-9-21 — DATE

NOTE: THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AT THE JOB SITE BEFORE PROCEEDING WITH THE WORK.

KUIKAHI RESIDENTIAL PROJECT

T.M.K.: (2) 3-5-002: POR. 003

WAILUKU, MAUI, HAWAII

PRELIMINARY DRAINAGE PLAN

REVISION	DATE	NOTE
△		
△		
△		
△		
△		
△		
△		

DESIGNED BY: S.A.O.
DRAWN BY: L.C.O.
PROJECT NO.: 2020-26
DRAWING NAME: DRAINAGE
DATE: 4-9-21

SHEET NO.
EXHIBIT 5
OF SHEETS

G:\2020 PROJECTS\2020-26 (Kuikahi Village)\EXHIBITS\DRAINAGE.dwg
Apr. 12, 2021 - 11:31am

FLORA AND FAUNA SURVEY

APPENDIX

C

BIOLOGICAL RESOURCES STUDY

FOR THE

WAILUKU AFFORDABLE HOUSING PROJECT

WAILUKU, MAUI

by

Robert W. Hobdy
Environmental Consultant
Kokomo, Maui
June 2020

Prepared for:
Waihe`e Valley Regenesis, LLC

FLORA AND FAUNA STUDY
WAILUKU AFFORDABLE HOUSING PROJECT
WAILUKU, MAUI

INTRODUCTION

The Wailuku Affordable Housing Project lies on 14.57 acres of undeveloped land between Wailuku and Waikapu in central Maui, TMK (2) 3-5-02:03 portion. It is located adjacent to the south side of Kuikahi Drive and a residential community and is surrounded above, below and to the south by former sugar cane lands that are currently fallow. This biological study was initiated by the owners in compliance with environmental requirements of the planning process.

SITE DESCRIPTION

The project area is situated on moderately sloping lands on the lower eastern slopes of the West Maui mountains. The vegetation consists mainly of a dense growth of tall grasses with scattered shrubs and small trees. The soils are characterized as Iao cobbly silty clay, 7 – 15% slopes (1bC) and Iao clay, 7 – 15% slopes (1cC), which are deep, alluvial, well-drained soils (Foote et al, 1972). Rainfall averages 30 inches per year with most occurring during the winter months (Armstrong, 1983).

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Wailuku Affordable Housing Project which was conducted in June 2020. 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 was used following routes to ensure maximum coverage of the habitats in this property. Areas most likely to harbor native or rare plants such as gullies were more intensively examined. Notes were made on plant species, distribution and abundance as well on terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation in the project area was dominated by tall, dense grass. Plant diversity was low and many species were heavily grazed by goats and deer. A total of 30 plant species were recorded during the survey. One species Guinea grass (*Megathyrsus maximus*) was abundant throughout the project area, Two other species were common, koa haole (*Leucaena leucocephala*) and glycine (*Neonotonia wightii*). The remaining 27 plant species were either uncommon or rare. Not a single native plant was found during the survey.

DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project area was dominated by just a few non-native plants. All of the plants recorded during the survey were common, non-native species and are of no particular environmental concern.

No federally listed Endangered or Threatened native plant species (USFWS, 2020) were encountered during the course of the survey. Nor were any species that are candidates for such status seen. No special plant habitats or rare plant communities were seen on the property.

As a result of these above conditions there is little of botanical concern on this property and the proposed land use changes are not expected to have a significant negative impact on the botanical resources in this part of Maui.

No recommendations are deemed necessary or appropriate regarding the botanical resources on this property.

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 plants are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation.

2. Common English or Hawaiian name.

3. Bio-geographical status. The following symbols are used:

   endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.

   indigenous = native to the Hawaiian Islands and, also to one or more other geographic area(s).

   Polynesian = all those plants brought to these islands by the Polynesians during the course of their migrations.

   non-native = all those plants brought to the islands intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

   abundant = forming a major part of the vegetation within the project area.

   common = widely scattered throughout the area or locally abundant within a portion of it.

   uncommon = scattered sparsely throughout the area or occurring in a few small patches.

   rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MONOCOTS			
POACEAE (Grass Family)			
Cenchrus ciliaris L.	buffelgrass	non-native	rare
Chloris barbata (L.) Sw.	swollen fingergrass	non-native	uncommon
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	non-native	rare
Megathyrsus maximus (Jacq.) Simon & Jacobs	Guinea grass	non-native	abundant
DICOTS			
AMARANTHACEAE (Amaranth Family)			
Alternanthera pungens Kunth	khaki weed	non-native	rare
Amaranthus spinosus L.	spiny amaranth	non-native	rare
ASTERACEAE (Sunflower flower)			
Tridax procumbens L.	coat buttons	non-native	rare
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
Xanthium strumarium L.	cocklebur	non-native	rare
BORAGINACEAE (Borage Family)			
Heliotropium procumbens Mill.	fourspike heliotrope	non-native	rare
CARICACEAE (Papaya Family)			
Carica papaya L.	papaya	non-native	rare
CUCURBITACEAE (Gourd Family)			
Momordica charantia L.	bitter melon	non-native	rare
EUPHORBIACEAE (Spurge Family)			
Euphorbia hirta L.	hairy spurge	non-native	rare
Macaranga tanarius (L.) Mull. Arg.	parasol leaf tree	non-native	uncommon
Ricinus communis L.	Castor bean	non-native	rare
FABACEAE (Pea Family)			
Chamaecrista nictitans (L.) Moench	partridge pea	non-native	rare
Indigofera spicota Forssk.	creeping indigo	non-native	rare
Indigofera suffruticosa Mill.	*inikō*	non-native	uncommon
Leucaena leucocephala (Lam.) de Wit	*koa haole*	non-native	common
Macroptilium atropurpureum (D.C.) Urb.	siratro	non-native	rare
Neonotonia wightii (Wight & Arnott) Lackey	glycine	non-native	common
Pithecellobium dulce (Roxb.) Benth.	*'opiuma*	non-native	rare
Samanea saman (Jacq.) Merr.	monkeypod	non-native	rare
LAMIACEAE (Mint Family)			
Leonotis nepetifolia (L.) R. Br.	lion's ear	non-native	uncommon
Salvia occidentalis Sw.	West Indian sage	non-native	rare
MALVACEAE (Mallow Family)			
Malvastrum coromandelianum (L.) Garcke	false mallow	non-native	rare
Sida ciliaris L.	bracted fanpetals	non-native	rare
Sida spinosa L.	prickly sida	non-native	uncommon
NYCTAGINACEAE (Four-o'clock Family)			
Boerhavia coccinea Mill.	scarlet spiderling	non-native	uncommon

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
PAPAVERACEAE (Poppy Family)			
Argemone mexicana L.	mexican poppy	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 endemic and endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Signs of presence two species of non-native mammals were observed in the project area during two site visits. Taxonomy and nomenclature of the mammals follows Tomich (1986). These were domestic goats (*Capra hircus*) and axis deer (*Axis axis*).

An evening survey was made in the project area to determine any presence of the Hawaiian bat. A bat detecting device (Batbox III D) was used at three locations, set to the frequency of 27,000 Hertz that these bats are known to emit when echo-locating for nocturnal flying insect prey. No bat activity was detected with the use of this device.

Other non-native mammals that would likely use this project area, but which were not seen, include rats (*Rattus* spp.), mice (*Mus domesticus*) and domestic cats (*Felis catus*).

BIRDS

Bird diversity and total numbers were low in this habitat. Taxonomy and nomenclature follow American Ornithological Society (2020). Just six widespread non-native bird species were observed during two site visits. One species was uncommon, the zebra dove (*Geopelia striata*), while the remaining five species were all of rare occurrence. A few other non-native bird species would likely utilize this habitat occasionally, but this dry, nearly monotypic grassland is not suitable for Hawaii's native forest birds, sea birds, water birds or nēnē, and none were seen.

INSECTS

Insect species and total numbers were likewise sparse in this habitat. Taxonomy and nomenclature follow Nishida et al (1992). Just six non-native insects were recorded during two site visits. One species was uncommon, the long-tailed blue butterfly (*Lampides boeticus*). The remaining five insect species were of rare occurrence.

No native insects were seen, and no host plants for any rare native insects were seen either.

DISCUSSION AND RECOMMENDATIONS

All mammal, bird and insect species recorded in this project area were non-native species. Heavy grazing and browsing by domestic and wild ungulates has reduced plant species to only the hardiest and least edible components. This in turn has resulted in low numbers of all other animal species here.

While no Endangered Hawaiian bats were recorded during the survey, these wide-ranging, nocturnally active flying mammals could occasionally pass through the area. If they show up in the project area the U.S. Fish and Wildlife Service has guidelines for their protection.

Another Endangered species, the Blackburn's sphinx moth (*Manduca blackburni*), was looked for but not found. The lack of any of their host plants on this project area, however, makes their presence unlikely.

No native bird species were found on the property during two site visits. However, there are native seabirds, the Endangered Hawaiian petrel (*Pterodroma sanwichensis*) and the Threatened Newell's shearwater (*Puffinus newelli*) that fly over these lowlands on the way to their burrows high in the mountains. These seabirds, and especially the fledglings, are attracted to bright lights in the evenings and early dawn hours and can become disoriented and crash. They are then vulnerable to injury, vehicle strikes and predators. It is recommended that any significant outdoor lighting in any proposed development on this property be shielded to direct the light downward to minimize disorientation of these protected seabirds.

No other issues are anticipated with wildlife species.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within three groups: Mammals, Birds, and Insects. 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.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
MAMMALS			
BOVIDAE (Hollow-horned Ruminant Family)			
Capra hircus L.	domestic goat	non-native	rare
CERVIDAE (Deer Family)			
Axis axis Erxleben	axis deer	non-native	rare
BIRDS			
COLUMBIDAE (Dove Family)			
Geopelia striata L.	zebra dove	non-native	uncommon
Streptopelia chinensis Scopoli	spotted dove	non-native	rare
FRINGILLIDAE (Finch Family)			
Haemorhous mexicanus Muller	house finch	non-native	rare
PHASIANIDAE (Pheasant Family)			
Francolinus francolinus L.	black francolin	non-native	rare
Francolinus pondicerianus Gmelin	gray francolin	non-native	rare
STURNIDAE (Starling Family)			
Acridotheres tristis L.	commmon myna	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
INSECTS			
Order DIPTERA - flies			
MUSCIDAE (House Fly Family)			
Musca domestica L.	house fly	non-native	rare
SYRPHIDAE (Hoverfly Family)			
Eristalis tenax L.	drone fly	non-native	rare
TACHINIDAE (Tachinid Fly Family)			
Lespesia archippivora Riley	tachinid fly	non-native	rare
Order LEPIDOPTERA - butterflies & moths			
LYCAENIDAE (Gossamer-winged Butterfly Family)			
Lampides boeticus L.	long tail blue butterfly	non-native	uncommon
PIERIDAE (White and Sulphur Butterfly Family)			
Eurema niccipe Cramer	sleepy orange butterfly	non-native	rare
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	rare

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ARCHAEOLOGICAL INVENTORY SURVEY DATED OCTOBER 2005

APPENDIX

D

SCS Project Number 607-1

ARCHAEOLOGICAL INVENTORY SURVEY REPORT ON 215.800 ACRES LOCATED IN WAIKAPU AHUPUA`A, WAILUKU DISTRICT, MAUI ISLAND, HAWAI`I [TMK (2) 3-5-02: 02 and 03]

Prepared by:
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October 2005

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ABSTRACT

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is developing the "Pu`unani" project in conjunction with Endurance Investors, LLC and the Association of II Wai Hui, LP.

Seven historic sites were documented during this Inventory Survey, two of which were previously recorded in the State Index of Historic Places (SIHP). All seven sites relate to historic sugarcane agriculture; the project area is 100 percent covered by abandoned cane land. Sites include two major concrete irrigation ditches; two lesser, more localized ditches; a reservoir; erosion-control earthen berms; and a cane-haul dirt road.

State Site Number 50-50-04-5197 represents the previously recorded Waihee Ditch, and State Site Number 50-50-04-5493 represents the previously recorded Waikapu Ditch. Five new sites were added to the SIHP during Inventory Survey. State Site Number 50-50-04-5729 represents a lesser, un-named, rock and mortar ditch. Likewise, State Site Number 50-50-04-5726 represents a second lesser, un-named, earthen ditch/drainage. Site 50-50-04-5727 is a large, un-named reservoir—the terminus of Waikapu Ditch. State Site Number 50-50-04-5728 is a sugar field erosion-control site comprised of 14 cross-slope, earthen berms of varying length that are positioned regularly throughout the project area. Finally, State Site Number 50-50-04-5730 represents "Old Waikapu Road", a cane-haul transport, dirt road that spans the border of parcels 02 and 03.

Excavation consisted of twenty-one backhoe-dug stratigraphic trenches evenly spread across the project area. Extensive pedestrian survey and this representative subsurface testing did not yield artifacts or cultural deposits.

All seven sites (all representing historic period sugarcane agriculture activities) were assessed as significant under Criterion D of Hawai`i's State Historic Preservation criteria. Based on the results of this project and depth of documentation, all seven sites have yielded all potential information important to this historic period and no additional archaeological mitigation is recommended within this project area.

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is developing the "Pu`unani" project in conjunction with Endurance Investors, LLC and the Association of II Wai Hui, LP. The Inventory Survey included historic background research and settlement pattern analysis prior to fieldwork, a complete pedestrian survey of the project area, representative subsurface testing via backhoe, and reporting (Figures 1 and 2).

Fieldwork, primarily consisting of systematic pedestrian survey, recordation, and representative subsurface backhoe testing, was conducted between August 16, 2005 and August 25, 2005 by SCS personnel Ian Bassford, B.A.; Randolph Ogg, B.A.; and Jon Wilson, B.A. The Principle Investigator for this project was Michael Dega, Ph.D.

Archaeological Inventory Survey of the project area was conducted to determine the presence/absence of archaeological deposits in surface and subsurface contexts through complete systematic survey and representative subsurface testing. The ultimate goals were to determine if historically significant archaeological sites occurred on the parcel and to provide recommendations to the State Historic Preservation Division (SHPD) concerning site mitigation during future land use of the project area.

ENVIRONMENTAL SETTING

LOCATION

The large survey area lies between coastal flats to the east and more mountainous terrain to the west along the medial reaches of the Maui isthmus between Wailuku and Mā`alaea (Figure 3). The project area is located between Wailuku (2 km north) and Waikapu to the south. Roughly ten percent of the project area (the northeast corner) lies within Wailuku Ahupua`a; the remainder is in the *ahupua`a* to the south—Waikapu (see Figure 1). The project area is composed of two adjacent parcels: TMK parcel 02 is located in the southeast quadrant of the project area and is less than half the size of parcel 03. The eastern perimeter of the project area abuts Honoapi`ilani Highway as it traverses from Wailuku toward Waikapu across the central Maui isthmus. The western border is defined by Wailuku Heights, an existing residential neighborhood. The northern boundary of the survey area is the curving Kuikahi Drive; the southern boundary is an arbitrary TMK line through abandoned cane lands (Figure 4).

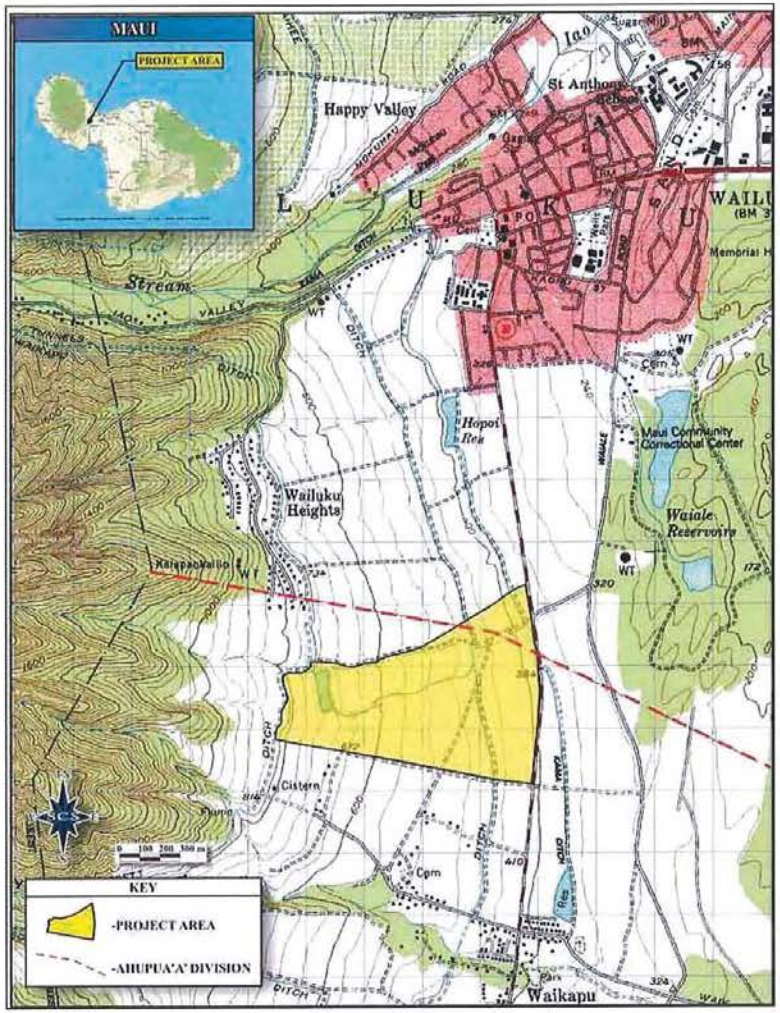

Figure 1: USGS Wailuku Quadrangle Map.

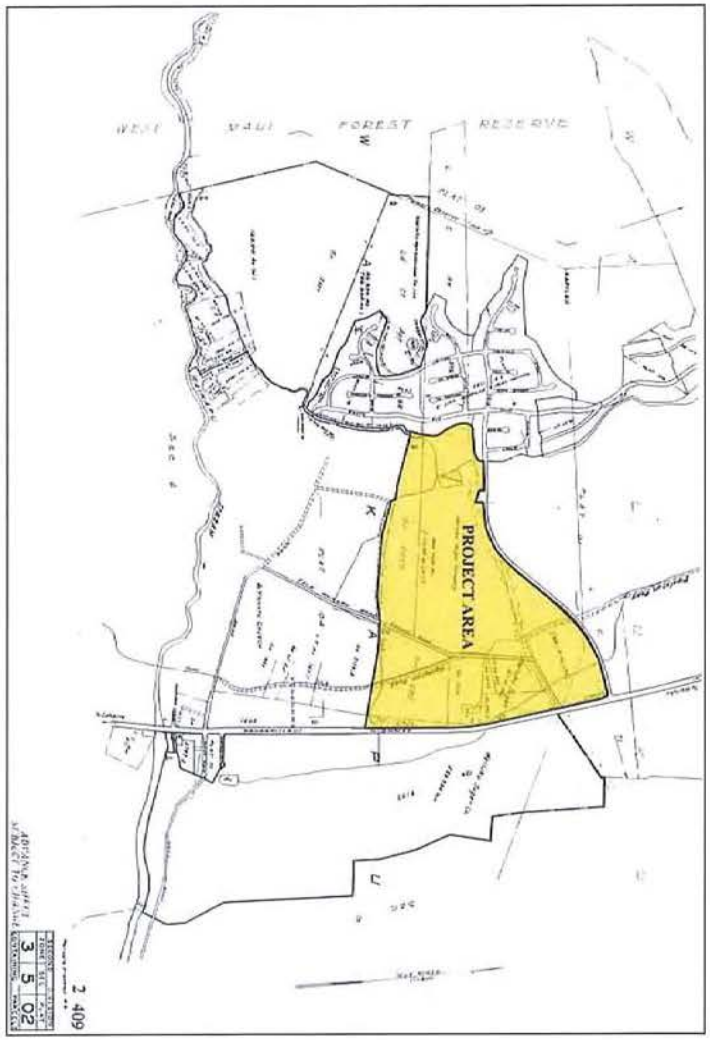

Figure 2: Tax Map Key [TMK] Showing Project Area.

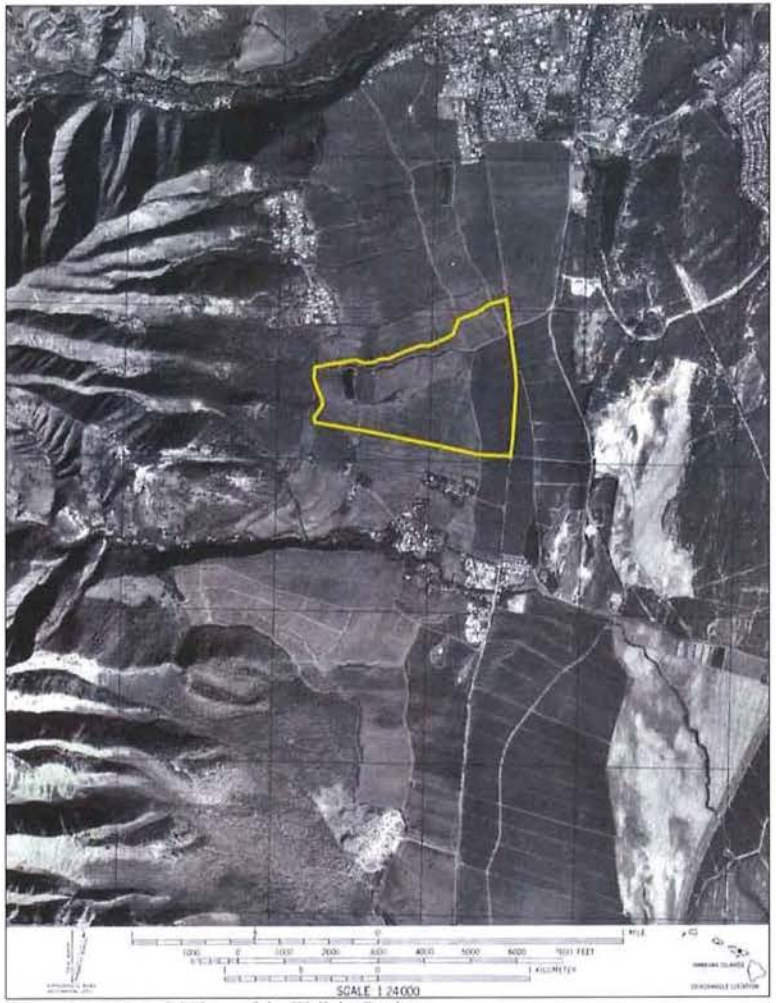

Figure 3: 1977 Aerial Photo of the Wailuku Region.

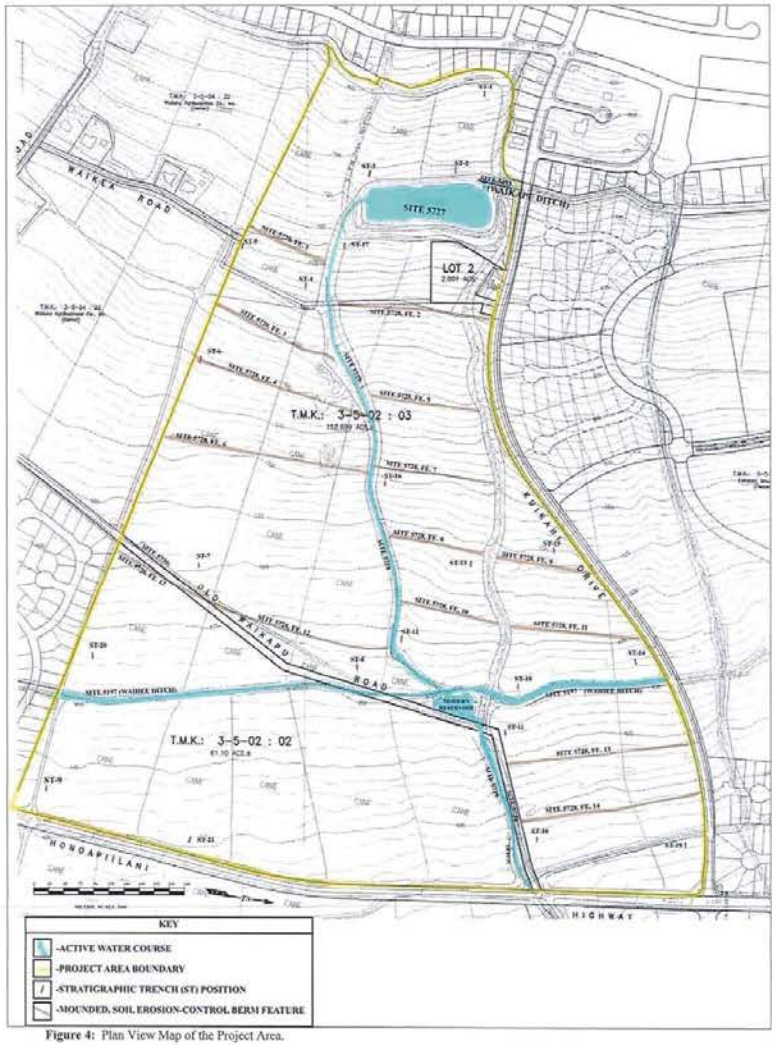

Figure 4: Plan View Map of the Project Area.

PROJECT AREA LANDFORM

Both archeological field survey and a review of geotechnical reports for the parcel reveal that the slightly sloping project area lies in locations previously utilized for the cultivation of now-abandoned sugar cane. According to Cavanaugh (1995:2), who conducted geotechnical studies on the 450-acre Kehalani Mauka Subdivision (the parcel that borders Kuikahi Drive to the north), "site topography slopes down moderately toward the east at a gradient of 10 percent." This accurately describes the slope of the current project area, which is steeper at its western (*mauka*) perimeter, and relatively flat near Honoapi'ilani Highway (Figure 5). Ground elevations range from approximately 115 meters (380 feet) above mean sea level (amsl) to 200 meters (660 feet) amsl. Various historic and modern dirt roads transect the surveyed area. As is discussed more below, project area exclusively consists of tilled zone, fill, and alluvial sediments. To the east, near the Maui Lani development, sandy matrices were identified. Sandy matrices were not identified in the current study area. Likewise, neither archaeological nor geotechnical subsurface testing detected any sandy matrices in areas immediately to the east of Honoapi'ilani Highway (Monahan 2003) or north of Kuikahi Drive during the Kehalani Mauka Subdivision (Dega 2004).

Figure 5: Distant Photograph of Project Area (lighter colored grass at center roughly defines boundaries). View to West.

Hydrology within the relatively dry project area is mostly in the form of historic irrigation modifications. Some of these modifications were the creation of a larger web of water conduits, drainages, and reservoirs, some built as early as 1905. No perennial streams run directly through the project area, and thus artificial ones had to be created for proper irrigation. By comparison, 'Īao Stream runs west-east to the north of the proposed development while Waikapu Stream runs west-east to the south of the project area. Being located near these two major streams appears to have been beneficial for cultivation on the present parcel, at least during historic times. Several still-utilized irrigation ditches (*i.e.*, Waihee Ditch, Site -5197) transect the project area, and a still-active larger reservoir is linked to one of these ditches. The remnant irrigation ditches and reservoir not only point to massive landscape modification in the area during historic times but also strongly infer the aridness of the area, which required large-scale water importation. The water table was not encountered in any of the 21 stratigraphic trenches excavated within the project area (maximum depth of 2.60 meters). Soil borings conducted during geotechnical analyses in a nearby project area failed to reveal the presence of the area's water table to at least 25 feet below the surface (Shimamoto 1995:4).

The project area has seen significant modern activity. A 25 meter high cinder/ soil pile has been consistently mined (or imported) via truck traffic into the western half of the project area from a dirt road linking Kuikahi Drive. Modern rubbish is scattered over the surface of each quadrant; nearly a dozen abandoned cars are located in the southeast quadrant. Land owners have a construction trailer and small, dirt parking lot at the northeast corner of parcel 03. Consistent, daily vehicle traffic across the parcel indicates the modern maintenance efforts related to the irrigation systems (necessary to serve locations outside of the project area).

VEGETATION AND SOILS

Vegetation in the project area is dominated by the presence abandoned cane that has been overtaken by non-native secondary growth shrubs and various introduced grasses (Figure 6). Several ironwood trees (*Casuarina glauca*) dot the landscape. *Haole koa (Leucaena leucocephala)* are fairly common especially bordering the eastern highway perimeter and near irrigation conduits. Native vegetation was not documented within the project area.

According to Foote *et al.* (1972:46–47, 100), soils in the project area fall into four sub-classifications of the 'Īao soil series. These soils consist of well-drained soils on valley fill and alluvial fans that have developed from igneous rock and are nearly level to moderately sloping. The 'Īao Series derivatives are similar to each other, yet primarily differ by the slope of the surface layer and inclusions of a higher content of cobblestones, such as in 'Īao cobbly silty clay

Figure 6: Project Area Vegetation and Topography. View to Northeast.

(classified as both IbB and IbC). The IbC soil (7 to 15 percent slopes) is distributed along the Kuikahi Drive area; whereas the IbB soil forms the central region. Also occurring within the project area (in roughly equal percentages) are 'Īao clay, on lesser slopes (IcB), and 'Īao clay on steeper slopes (IcC). Figure 7 shows the project area distribution of these derivatives.

The presence of these soil types was confirmed through geotechnical studies in bordering parcels and archaeological testing during the current project. Important to emphasize again, no sandy sediment was identified in the project area. Sandy sediment (sand dunes) and mixed coastal-terrigenous sediments occur to the east of the current parcel (*i.e.*, Maui Lani).

The fairly homogenous nature of soils in the project area does provide contrast to soil regimes occurring more to the east (coastal-terrigenous and coastal) and to the north and south (dynamic stream valleys). The current project area occurs in a medial or intermediate environmental zone, both on a north-south and east-west axis. Along a north-south axis, the property lies in a very dry, open area between two perennial streams ('Īao and Waikapu). On an east-west axis, the project parcel lies above the influence of the coastal plain and below the wetter uplands. The current parcel thus lies in a fairly non-dynamic environmental zone that is practically surrounded on all sides by contrastingly vibrant areas (see Figure 5). That this

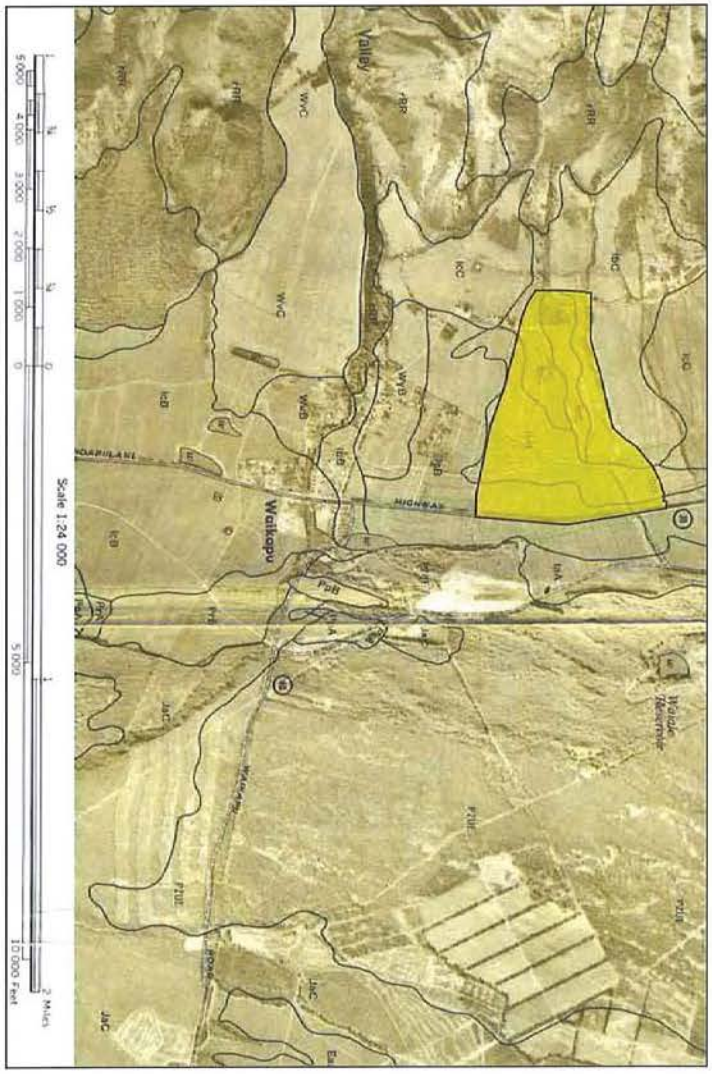

Figure 7: Project Area Soils and their Distribution [Adapted from Foote *et. al* (1972)].

intermediate area, occurring between more dynamic zones, required artificial controls is well-observed throughout the project area in the form of irrigation ditches and reservoirs.

CLIMATE

Rainfall in this intermediate environment is very modest. The project area receives an average annual rainfall of only 33 to 44 centimeters (Price 1983:63), with much of this rainfall occurring during the winter months (November–April). Seasonal variation in rainfall amount follows normal orographic patterns for leeward-type areas of Maui. The project area occurs just to the south of what may be considered the leeward-windward boundary. At higher elevations within Wailuku Ahupua`a, the amount of rainfall doubles and triples that of the project area. To the north, from `Īao Stream Valley area toward Waihee Valley, rainfall is much more intensive, with combined rainfall and geographic patterns being more conducive to traditional types of agricultural cultivation (*i.e.*, *lo`i*, sweet potato). The rainfall in this gently sloping project area drains downhill to the east and provides an additional water source for traditional Hawaiian agriculture in the lowland flats to the east of the project area (see Handy and Handy 1972).

TRADITIONAL AND HISTORIC SETTING

Wailuku District inhabits the eastern side of the West Maui Mountains (Mauna Kahalawai) and occupies the isthmus through the center of the island to coastal reaches in Kahukui and Mā`alaea. Wailuku, together with Waikapū, Waihee, and Waiehu, is one of the *Na Wai `Ehā*, or "the four waters," known for the occupancy of chiefly individuals (Kame`eleihiwa 1992; Pukui and Elbert 1992; and Creed 1993). Wailuku District and Wailuku Ahupua`a are frequently mentioned in historical texts and oral traditional accounts as being politically, ceremonially, and geographically important areas during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of `Īao Valley and lower Wailuku. The many *heiau* constructed in the Wailuku area point to its ceremonial and religious importance during pre-Contact times. During historic times, after numerous battles in the area, the large concentration of Land Commission Awards granted in Wailuku, particularly in lower `Īao Valley, also attest to a sizeable population base and the importance of the lands for cultivation through time. More recent land use in the area included sugar cane cultivation and use of the land for pasture.

THE TRADITIONAL SETTING OF WAILUKU

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations

eventually settling into drier leeward areas at later periods (Kirch 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-dates accepted ranges gleaned from palynological data. A more secure estimate for initial occupation of the islands is the A.D. 9th century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihee and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O`ahu, has yielded dates of occupation, albeit controversial, from A.D. 300 to 600 [Pearson *et al.* 1971], one of the earliest dated sites in the Hawaiian Islands. For the most part, these dates have now been diagnosed as very problematical and are no longer valid.) More recent research within Wailuku Ahupua`a indicates that the area was likely settled between *c.* A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996).

To the north of the current project area lies `Īao Valley, one of the most important locations in the area for prehistoric activity. Connolly (1974:5) states that the pre-Contact valley [`Īao] had a large population base with "most people residing in a settlement near `Īao Needle," just north of the project area. Supposedly, the subsistence base of this population consisted of fish and taro, with Kahului Harbor and the coast close by and *lo`i* systems lining `Īao Valley's stream banks. Prehistoric ditches or *`auwai* were utilized in taro cultivation (Connolly 1974:5). Sterling (1998:86) adds that two *`auwai* within the valley:

> have existed immemorially and were evidently constructed for the purpose of irrigating *kalo* on the plains which stretch away to the northward and southward of the [`Īao] river. Several minor *`auwai* have, since ancient times, tapped the river at different points lower down and spread the water through the lands in the gulch on either side of the river bed.

Handy in Sterling (1998:63) further notes that "From Waihee and Wailuku Valley, in ancient times, was the largest continuous area of wet taro cultivation in the islands." Cheever (1851:124) writes: "the whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it."

Recent archaeological research (Fredericksen and Fredericksen 1996:52) has revealed that habitation sites along what is now Lower Main Street in Wailuku, "are associated with the

rich taro producing lands in the Lower `Īao River flood plain, and the extensive cultivation systems present in `Īao Valley." These habitation sites have been dated to the A.D. 15th through 17th centuries. The `Īao Valley area was not only renowned for its agricultural base during prehistoric times but its ceremonial and political base as well (see also Cordy 1996; Donham 1996).

No discussion of Wailuku is complete without mentioning the important *heiau* complex above `Īao Valley near its seaward terminus. During the mid to late 18th century, the Halekii-Pihana *heiau* complex was supposedly designed by a Hawaiian named Kiha (Sterling 1998:89). These monuments, designated as State Site Number 50-50-04-522 and occurring along the northwest flank of the current project area, are described as very important *heiau* within Hawaiian history. Yent (1983:7) notes the life cycle of the *ali`i* was represented here. It was the place where Kamehameha I's wife was born, Kahekili lived, and Kekaulike died. Thrum (1909:46) reported that Kamehameha I evoked his war god at Pihana Heiau after his warriors defeated Kalanikupuli's forces during the Battle of `Īao in 1790. The two *heiau* are primarily associated with Kahekili, who is connected with the Halekii-Pihana complex between *c*. A.D. 1765 and 1790, and Kamehameha, during his conquering of Maui in 1792 (Yent 1983:18). Halekii and Pihana Heiau are the only remaining pre-Contact Hawaiian structures of religious and historical importance in the Wailuku-Kahului area that are easily accessible to the public (Estioko-Griffin and Yent 1986:3). As stated, the area within and adjacent to the current project is known not only for its religious and/or ceremonial significance, but for its political prominence as well.

The Fredericksens' (1996:52) report states that politically, Wailuku [village] was known as a central settlement for high ranking chiefs and their retinue. The Wailuku area was also witness to many battles, from the Battles of `Īao and Sand Hills to the Battles of Kepaniwai and Kakanilua. The most famous battle was that of Kepaniwai where Kamehameha I, in July 1790, finally wrested control of Maui Island. Kamehameha I and his warriors landed at the Kawela portion of Kahului Bay and proceeded up `Īao and other valleys to score a decisive victory. Wailuku, meaning water of destruction, succinctly describes the area in which many of these major battles occurred. Of additional note is that in the Kauahea area of `Īao Valley (southeast of `Īao Stream below Pihana Heiau-supposedly within the current project area), warriors apparently dwelt and were "trained in war skills and there was a boxing site in the time of Kahekili" (Sterling 1998:89).

TRADITIONAL SETTING OF THE PROJECT AREA

Creed (1993) has written extensively on the traditional background of the Waikapu area, much of which directly applies to the open landscape of the current project area just to the north of Waikapu. Many classes of sites are found or may have existed in the Waikapu-Wailuku area during traditional times. Creed (1993:19–21) provides an extensive list, including some site types that would not apply to the current parcel due to its distance from major drainages, the coastline, and its open land classification. Traditional sites that would apply include agricultural sites (*kula* lands, *wauke* patches, *hala* trees, pigs, and potato patches), boundary walls, burials (sometimes located in habitation terraces), feather gathering areas (particularly in the mountains to the west), habitation loci, and *pohaku* (an adze stone marks the border between Wailuku and Waikapu). While populations were predominantly centered in `Īao Valley and Waikapu Valley, there was agricultural and habitation activity in the open grasslands of the current project area above the coastal flats. Much evidence for such activities has not yet been found through archaeological means, a situation that places much culpability on historic land use that may have erased or scattered this evidence. As such, there is much more evidence for historic activities occurring in the area.

HISTORIC SETTING OF THE PROJECT AREA

Current project area lands were first assigned to the district formerly known as Kula. Taken literally, *Kula* refers to open land or plains (Pukui and Elbert 1992:70). Kula District is known for its dry, arid lands being vacant of perennial streams. Kula was always an arid region, throughout its long, low seashore, vast stony *kula* lands, and broad uplands. There are exceptions in Wailuku as one proceeds along Īao Stream Valley and further to the west/northwest past Waihee and Waiehu. However, even the vast stony *kula* lands were utilized during traditional and historic times. Most evidence for such land utilization has come in the form historic records.

THE GREAT MāHELE

In 1848, during the late historic period, commissioners of the Great Māhele instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The Māhele was based upon the principles of western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Kuykendall Vol. I 1938:145 footnote 47 *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among

other things. Case in point, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I 1938: 145 *et passim*; Kame'eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka'āinana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali'i*. However, in the case of commoners, they would only make claims only if they had first been made aware of the foreign procedures (*kuleana* lands, land commission awards). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame'eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming houselots in Honolulu, Hilo, and Lāhianā were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

Wailuku District was declared Crown Land during the Great Māhele and numerous Land Commission Awards, approximately 180, were awarded within Wailuku Ahupua'a while approximately 100 were awarded for Waikapu Ahupua'a (Creed 1993). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugarcane. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38).

During the Great Māhele of 1848, a total of three land claims were awarded in the current project area (Waihona 'Aina 2005): LCA 433, 3201, and 3525—all of which are located in parcel 02, in the central area of the eastern border near Honoapi'ilani Highway (Figure 8). Table 1 summarizes archival research of these three LCAs.

Table 1: LCA and Land Grant Data for [TMK:(2) 3-5-02: 02].[1]

LCA No.	Awardee	Land Use	Comments
00433	William Crowningburgh and wife Maile	*lo'i* – 21 *'apana* – 4	Stream also on property. Crowningburgh surrounded this land with a fence and raised animals on the property. Plot of land was referred to as *Pili Pili* at the time.
03201	Wm. A. McLane	*'apana* – 2	One ditch on piece of land. Plot of land was referred to as *Awakamanu* at the time.
03525	Keliiolelo	*lo'i* – 3 *'apana* – 3 House lot – 1	Stream on property. Plot of land was referred to as *Awakamanu* at the time.

[1] Source: Waihona Aina website (www.waihona.com), information obtained in September, 2005.

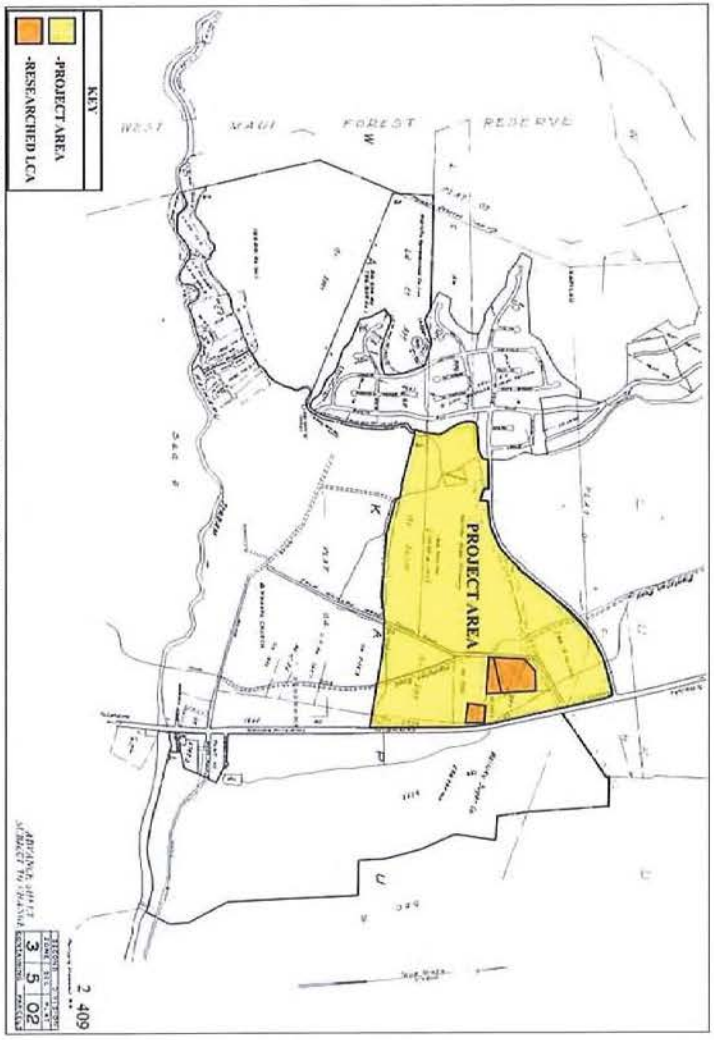

Figure 8: Adapted 1992 Tax Map Key with Researched LCAs Highlighted.

This LCA record keeps with the overall LCA pattern of the Waikapu-Wailuku area intimating taro cultivation in association with permanent residences. Such a pattern is historically documented from 1848, but likely extended deeper into the past. *Lo'i* (irrigated taro patches or planted terraces) and evidence of smaller, private land plot divisions, *'apana*, are no longer detectable within this surface or subsurface landscape.

Similarly, the Wailuku Ahupua'a parcel north of Kuikahi Drive predominantly lists among its LCA records 'property for raising cattle' and 'pasture grounds for cattle' (Dega 2004). There also is some mention of stone walls, *kalo* patches, and *lauhala* trees on the landscape. Perhaps the most significant structures on this adjacent land were built by the American Board of Commissioners for Foreign Missions (A.B.C.F.M.) which consisted of two house lots with adobe walls. The lots occurred "near pasture land," a common theme for the area (Waihona 'Aina 2005). In Waikapu, to the south, the LCAs reflect *lo'i* cultivation, *kula* lands, and house sites. However, much or all of the evidence related to such settlement of the Waikapu area has been effaced by late-historic and modern cultivation. The current project area is a prime example of this trend.

Land use in Wailuku and Waikapu Ahupua'a in the mid 19th and early 20th century was largely devoted to the sugar industry. During the 1860s, the sugar business was growing, with plantations and mills at Wailuku, Waihe'e, Waikapu, and Haiku. Many of the plantation camps associated with these mills were centered in the Pu'unene, Kahului, and Wailuku area (see Denham *et al.* 1992:16). Historic utilization of the Waikapu-Wailuku landscape within and near the project area focused on industrial-levels of cultivating sugar cane and pineapple. Water was channeled from traditional sources (*e.g.*, Waikapū Stream, western aquifers or springs) through plantation lands. Both local and imported workers operated on these plantation lands and the area maintained fair population density. Evidence for expansive landscape modifications to accommodate the industrial-level of production is very evident across the current subject parcel in the form of the north-south oriented known historic ditches. The significant amount of plastic and tubing and sheeting found within Layer I of excavations attests to even more recent utilization of the open landscape for cultivation. These former sugarcane lands are now being reclaimed through residential developments.

PREVIOUS ARCHAEOLOGY

IMMEDIATE VICINITY OF PROJECT AREA

Intensive research within the State Historic Preservation Division (SHPD) archives concluded that no previous archaeological study was conducted within the present project area. However, of primary importance for the present study are the results from three projects recently conducted within and bordering the 348-acre subdivision to the north (Figure 9). First, Archaeological Inventory Survey was conducted on approximately 100 acres of land that included five separate lots and a proposed road corridor in the Kehalani Mauka Subdivision (Dega 2003). Three historic sites were documented during this Inventory Survey. State Site Number 50-50-04-5473 has been assigned to Hopoi Reservoir. This reservoir predates Hopoi Camp and was present at least by 1922 (see Dega 2003). Occurring to the immediate east of Hopoi Reservoir and running north-south to Waikapu is Kama Ditch (State Site No. 50-50-04-5474), a water conduit carrying the precious commodity to dry southern lands. A single basalt adze (Site 50-50-04-5478) was recovered from the northern flank of Lot 21 along the eastern flank of the parcel. Extensive survey and testing in the area of the isolated find failed to produce additional artifacts or cultural deposits. Representative subsurface testing (18 trenches) on the lots only revealed highly homogenous soil matrices across the open, barren intermediate area.

A second SCS Inventory Survey Report dealing with these same Kehalani Mauka lands (Dega 2004) documented lots not surveyed in the first study. This survey recorded six additional sites, all historic. Similar to the present project area, a series of un-named, lesser ditches was found within Kehalani Mauka, represented by State Site Numbers 50-50-04-5490 and 50-50-04-5493. Waihee Ditch (Site -5197) flows from this former SCS project area into the present project area. Historic-modern roadways (50-50-04-5489), a historic surface artifact scatter (50-50-04-5491), and several plantation-era clearing mounds (50-50-04-5492).

In summary, the results of the Kehalani Mauka Subdivision Inventory Survey roughly duplicate the present project area's findings. Aside from a lone traditional artifact (an adze)—which could remain despite a century of cultivation—larger traditional sites were destroyed during the sugar-era.

An Archaeological Assessment Report was published based on a negative results survey on Kehalani lands just to the east of Honoapi'ilani Highway (Monahan 2003). This survey did not produce any structures or artifact scatters. Trench excavation demonstrated a fairly consistent subsurface stratigraphy with a thick layer of dark brown silt (Layer II) inclusive of historical

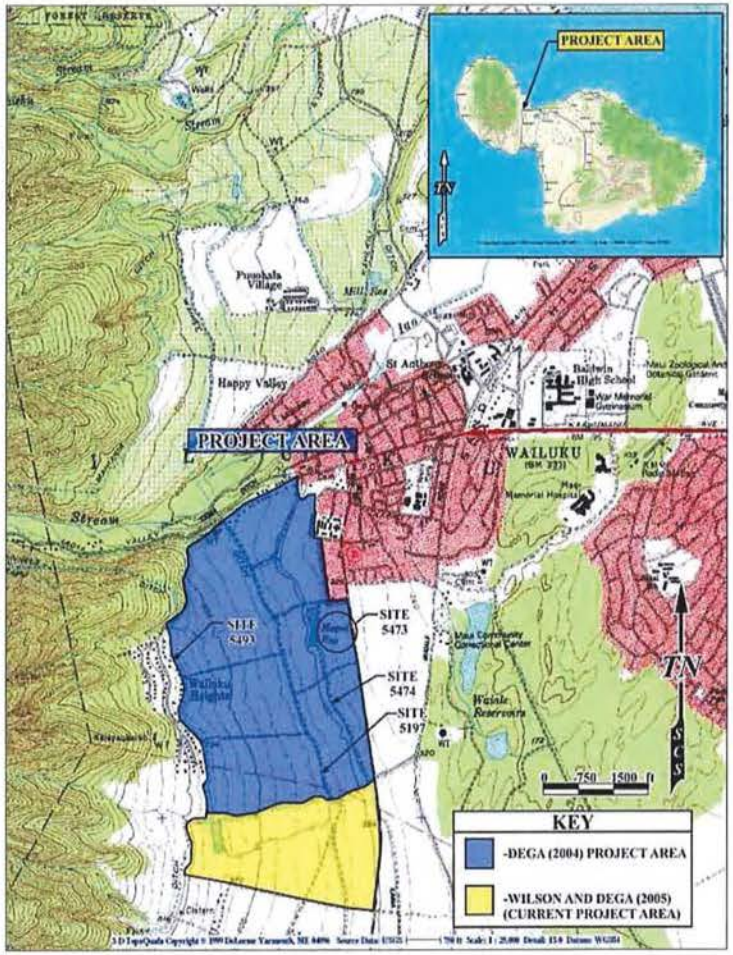

Figure 9: USGS Wailuku Quadrangle Map Showing Adjacent Areas of Archaeological Study.

garbage (*i.e.,* black plastic and rubber tubing, white plastic irrigation pipes, and black plastic sheeting) over an undisturbed very dark grayish-brown silty clay subsurface (Layer III). A dark brown, silty root mat-layer (Layer I) was present in some units. No undisturbed sandy deposits were encountered, although a few trenches close to the eastern boundary of the project area did contain thin lenses of yellowish-brown sand. These sand lenses were clearly introduced as recent fill.

GENERAL WAIKAPU AREA

In terms of general projects in the Wailuku-Waikapu environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). None of their archaeological finds directly pertain to the current project area; however, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapu area.

In an area south of the project area, within open lands similar to what is being researched herein, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikapū, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the Mā`alaea Complex) was identified by Walker (1931) to the west of Mā`alaea. Chronology for these sites has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at Mā`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

Recent archaeological work in Waikapū Ahupua`a (Kennedy 1988, 1989; Folk and Hammatt 1989; Haun 1989; Brisbin *et al.* 1991; Donham 1991; Titchenal 1996) has revealed a low density of sites ranging in function from habitation to agriculture. Radiocarbon dating results in these studies have produced dates ranging from the A.D. 1100s to modern times. Together, their collective data suggests a "general trend toward development of large, densely settled populations between A.D. 1200 and about 1800, and the expansion and intensification of dryland field systems, particularly during the latter two centuries of this period" (Creed 1993:33).

Other recent archaeological work just to the south and/ or east of the current project area has been limited to two field inspections (Donham 1991, 1995) and near the eastern boundary line of the current project location, two archaeological Inventory Survey-level investigations

(Kennedy 1988, 1989; Buffum and Dega 2001). The conclusions offered by these few projects primarily indicate that any surface and/or subsurface features of cultural value that were once present within the area have most likely since been destroyed by intensive agricultural use of the land (*i.e.*, sugar cane and/or pineapple cultivation); this pattern was also confirmed by subsurface examination. As such, a broader background for Wailuku District is offered herein (see below).

WAILUKU DISTRICT OVERVIEW

The following section provides a brief overview of archaeological research in Wailuku District itself and is presented in two arbitrary sections: Upper Wailuku and Lower Wailuku District. Upper Wailuku is considered to be the lands above Kuihelani Highway while Lower Wailuku encompasses the lands below Kuihelani Highway and extends to Mâ`alaea Bay in Waikapu Ahupua`a. The following district-specific research appears in its entirely as first published in Dega (2004).

UPPER WAILUKU DISTRICT

The majority of archaeological work is associated with the Pu`u One region in the northern most section of Wailuku District. Prior archaeological work in the Pu` One region indicates an emerging pre-Contact settlement pattern for this region. SCS (Dunn and Spear 1995) conducted research at the intersection of Naniloa and Waiale Roads where habitation features and a cultural layer interspersed with hearth and pit features were identified during a monitoring project. These features all occurred in sandy substrate. Radiocarbon dates submitted from these features yielded dates ranging from A.D. 1434 to A.D. 1807, dates suggesting pre-Contact sites and early historic land use. SCS (Burgett and Spear 1995) conducted Archaeological Inventory Survey in the sand hills along lower Main Street. One habitation site (50-50-04-4004) located in a remnant of a once larger cultural deposit was identified. Radiocarbon samples dated the site to A.D. 1420 and A.D. 1640, or to the early to mid-prehistoric time range.

SCS (Morawski and Spear 2001) conducted Archaeological Monitoring during the installation of a water pipeline and fire hydrants on Naniloa, Helenani, Leilani, Kainani, Naniluna, and Ka`ahumanu Highway roads with the town of Wailuku. During the research, a historic refuse dump was discovered, as were the remains of previously disturbed human burials. SCS (Buffum and Spear 2001; Zachman and Spear 2002) conducted Archaeological Monitoring at the Maui Medical Center. Due to extensive landscape modifications, no archaeological or traditional materials were identified during excavation.

Pantaleo and Sinoto (1996) conducted archaeological work at the Maui Lani Development to the east of the present project area. As of the 1996 publication, only one concentration of multiple burials was discovered while the remainder were isolated individual burials at the tip of the dune (at the highest elevations). A more contemporary report documenting additional burial finds at Maui Lani should aid in clarifying the overall results of that project. Research conducted by Fredericksen and Fredericksen (1997) indicated that this section of dunes was primarily used during prehistoric times as an interment area, a contention easily supported by the previous year's study. Habitation sites (several with associated burials) have been found mostly in the dune area associated with the Lower Main Street/Waiale Road Corridor. Conversely, studies east of this corridor have yielded only human burials (Fredericksen and Fredericksen 1998). Fredericksen and Fredericksen (1998) lists many of the archaeological studies conducted in the Lower Main Street/Waiale Road Corridor and Central Maui area.

LOWER WAILUKU DISTRICT

A limited number of archaeological projects have been conducted in this particular land section, much of which was disturbed during the massive sugar cane cultivation. The fair amount of archaeological work conducted along Lower Main Street is summarized elsewhere (see Morawski and Dega 2003). In comparison, Sinoto and Pantaleo (1992) conducted Archaeological Inventory Survey of a proposed location for the Kihei Gateway complex, on the *makai* side of the Piilani-Mokulele Highway junction. One historic site, the remains of concrete footings from a bridge across Waiakoa stream, was identified (Site 50-50-09-31).

SCS (Burgett and Spear 1997) conducted large-scale Archaeological Inventory Survey of the Puunene Bypass/Mokulele Highway improvements stretching across the majority of Wailuku District. Although no sites were identified, this absence may account for the lack of archaeological remains: extensive disturbance associated with prior sugar cane cultivation, highway and private construction activities, and little or no prehistoric occupation of the area. However, *lo`i* cultivation was reported to be intensively cultivated in this area (Handy and Handy 1972). The replacement of *lo`i* with sugar cane during historic times would be the most likely cause for the destruction of all traditional sites related to prehistoric cultivation in the area.

Fredericksen and Federicksen (1998) conducted archaeological research on 232 acres northeast of Puunene Avenue stretching to Haleakala Highway. No formalized traditional or prehistoric sites were discovered. Several sites consisting of volcanic-glass surface scatters were identified in the former sugar cane fields along with a historic irrigation ditch.

SETTLEMENT PATTERN

Archaeological investigations within the currently studied portion of Wailuku-Waikapū have revealed relatively little regarding traditional settlement patterns due to the dearth of supporting empirical evidence. Archival research and analyses of the generalized settlement pattern for Wailuku District have been the foremost sources for discerning an established settlement pattern for the current project area.

Archaeological evidence suggests that early settlement in the Hawaiian Islands occurred along windward shoreline areas between the A.D. 4th and 11th centuries. Pollen evidence suggests a settlement date of the A.D. 9th century (see Athens 1997). For the most part, these populations used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* zones. Greater population expansion to inland areas did not occur until the *c.* A.D. 12th century but continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c.* A.D. 1600.

Nearer the coast in intermediate lands such as the current project area (*c.* 60–85 meters amsl), taro was cultivated along stream courses, dryland taro was grown on *kula* lands such as the project area, and populations were settled. It is possible that the *kalo* patches described in the aforementioned LCA accounts originated during the "Expansion Period" of A.D. 1400 to 1600, perpetuating through historic times (Kirch 1985). However, most of the LCAs for the area describe almost no cultivation occurring in the area during the 1850s as pasture land and sugar cane cultivation were already dominating the use of the land (Creed 1993:74). Primary settlement and resource zones lay outside the current medial environmental zone in Wailuku proper, near perennial water sources (ʻĪao Valley, Waihee, Waiehu). The only substantial settlement along this medial isthmus zone between 300 and 600 feet amsl was at Waikapu, to the south of the current project area, near the base of Waikapu Stream Valley (see Creed 1993). As the current project area does not contain a perennial water source and is primarily open grassland, the area is considered to lie at the periphery of the more resource-rich zones in Wailuku.

Historic utilization of the Wailuku-Waikapu landscape was dominated by the cash cropping of sugar cane and pineapple, made possible by water channeled from traditional sources (*e.g.*, Waikapu Stream) through plantation lands. Historic features associated with this period are represented as water features in the form of reservoirs (Hopoi Reservoir) and water channels (Waikapu Ditch, Waihee Ditch). This area was also an important transportation corridor linking both the south and north flanks of the Maui isthmus, with Honoapiʻilani Highway having been demarcated as a Government Road on area maps by 1882 (Creed 1993:20).

PROJECT AREA EXPECTATIONS

Prior to commencing archaeological fieldwork, a review of archival resources and the results of previous archaeological work conducted in the area was undertaken to assess possible findings during fieldwork. Based on previous archaeological work—primarily north and east of this intermediate landscape—and on LCA information, site patterns prior to intensive historic land alteration activities show systematic use of the terrain as taro planting areas, limited habitation, and divisions of pastureland. Previous archaeological investigations within this portion of the Wailuku-Waikapū corridor have revealed very little data to confirm these patterns, this not surprising considering the impact that long and intensive agricultural exploitation has had on the surface of the area and subsurface strata. Traditional site components expected prior to these land-altering activities consist of dryland taro patches, associated agricultural components such as *ʻauwai* and/or terracing, house sites, boundary walls, and pasture walls. Expectations for identifying such data sets were low, however, due to the aforementioned historic land uses.

Traditional sites that may once have been present within the current project area were not expected to remain unaltered. Given LCA testimony and general settlement patterns for this inland, intermediate area, land use patterns for the current project area were thought to be most obviously related to historic-period settlement and cultivation—but on a very limited scale. At present, an empirically-based chronology of this area has yet to be provided, given intensive historic land modifications and the lack of datable archaeological evidence. According to Creed (1993:77):

> . . . we have no carbon dates to indicate the possible beginnings for this wetland agriculture in Waikapū Valley. Moreover, this area has been in constant use for crops and habitations at least since the time of the *Māhele*, if not long before and modern uses may have destroyed all traces of prehistoric uses. However, the LCA records and early maps document the extent of the *loʻi* agriculture in the

1850s. The stream valley in its upper reaches may have some remnants of these *Māhele* period *lo'i* or *'auwai*.

Expectations for this project area rested on several assumptions, some of which were proven valid at the end of fieldwork. First, the project area, lying in an open, intermediate zone containing hard soil composed of silty clay with cobbles was not intensively occupied during traditional times. Traditional and early historic-period populations were focused elsewhere in areas such as Waikapu, 'Īao Valley, Waihee Valley, and Waiehu Valley. Thus, there were low expectations for identifying larger, intact sites or deposits; they simply were not constructed in this area. Secondly, there was the possibility that sand sediment could be present along the eastern flank of the project area. The association of sand and traditional/historic burials and cultural deposits has been well documented (see Kirch 1985). Thus, if sandy deposits did occur along the eastern flank, cultural deposits could be present. Third, the area was heavily modified for industrial cultivation. Remnants of such modifications, such as fill strata, excavated areas, reservoirs, and earth mounds/ berms were expected throughout the project area. A cursory study of the USGS Wailuku Quadrangle Map showed that irrigation ditches crossed the current project area. Finally, based on the primarily negative results from other archaeological projects conducted along the intermediate Wailuku-Waikapu corridor, there were limited expectations for identifying intact traditional-period architectural structures or intact cultural deposits lying beneath the tilled surface. However, historic structures related to irrigation and were likely, considering they were previously documented near the parcel (see Dega 2003). In all, some of these expectations were met during the current study.

METHODOLOGY

FIELD METHODS

Fieldwork consisted of systematic pedestrian survey of the entire 215.800 acre parcel and mechanical subsurface testing across representative portions of the parcel. Written and photographic documentation occurred during each phase of research. First, 100 percent systematic pedestrian survey was conducted to assess the presence/absence of surface features and artifacts as well as to assess soil deposits amenable to testing. As visibility was moderate within fifty percent of the project area (*makai* half), and low-to-moderate in the *mauka* half, 100 percent surface survey was conducted by two to three crewmembers spaced closely together (5 meters apart), walking parallel along north-south transects. When any structures, artifacts, or intriguing topographical changes were identified, they were plotted on an overall site map and flagged. Surface artifact assemblages, surface features, or anomalies were assigned temporary

site numbers. Temporary site numbers were converted to State Site Numbers upon a cursory project review by SHPD following the completion of fieldwork.

After survey, the crew returned to each flagged location to fully investigate the area and assess excavation potential. Representative areas were demarcated for subsurface testing. All subsurface testing was done mechanically by backhoe. Following excavation each trench was thoroughly documented via stratigraphic layer profiles, soil analysis, photography, and location plotting on a project area map (see Figure 4). A vast area was tested with these intermittent trenches, however, excavation produced negative results in terms of subsurface cultural material of interest to the archaeological record.

While no cultural materials were collected from any trench, soil samples were taken from each trench and analyzed in the field. The results revealed a fairly homogenous soil matrix. None of the excavated soil was screened, but all trench walls were thoroughly inspected. Photographs were taken first of trench locations prior to excavation, secondly of at least one profile (or multiples) of each trench, and thirdly, overview shots were taken of the respective trench at the base of excavation. Representative photographs are offered in Appendix A.

LABORATORY METHODS

As the results of survey and excavation were negative in terms of collected artifact classes and samples, laboratory work was not necessary. Because none of the soils analyzed in the field were deemed to be associated with past habitation surfaces, traditional agricultural levels, or cultural deposits, no samples were submitted for specialized analysis (*e.g.*, radiocarbon, pollen, phytolith analysis). Subsurface charcoal was an extremely rare commodity, and when found it was in association with modern debris from modern agricultural activity or dumping. Drafting of stratigraphic profiles, mapping illustration, and section drawings, were the primary components to laboratory work. All field notes, maps, photographs, and artifacts pertaining to this project are being curated at the SCS laboratory in Honolulu.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

A 100-percent pedestrian survey of the project area revealed the presence of a network of historic-period surface structures that are represented as the seven sites described below. The previously documented (Dega 2004) Waikapu Ditch (State Site No. 50-50-04-5493) and Waihee Ditch (State Site No. 50-50-04-5197) were subject to additional documentation during this survey. No traditional Hawaiian cultural material was found.

DITCHES

Four ditches are present within the project area. All four ditches originate outside of the project area and/ or extend beyond the project area's limits; no ditch exists as a segment contained strictly within the project area. Two of these ditches are of a larger historic context within Maui's sugarcane era. These are named ditches and some limited information regarding their construction and use appears within the historic record. It is important to note that up to as recently as 1983 (the publication of one series of USGS maps) two more of these significant, longer range water courses flowed into the project area. The Everett Ditch and Kama Ditch, however, have since been diverted or destroyed and no longer appear within the project area. Additionally, two lesser ditches served a more localized role within the project area. Only one lesser ditch, a possibly historic drainage from upslope, did not flow consistently at the time of survey.

State Site Number 50-50-04-5197 (Waihee Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (1905–1907 construction)
DIMENSIONS:	Length: 960.00 m; Width: 2.40m; Depth: 1.70 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None

DESCRIPTION: The Waihee Ditch is a flowing, concrete water conduit. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 10). Concrete cross-braces reinforce the relatively thin (0.10 m) concrete sides. The curving ditch flows into the project area from the north and roughly keeps a north-south orientation as it transects parcels 03 then 02 (see Figure 4). A smaller ditch (Site - 5729) that serviced only the locality of the project area, flows into the Waihee ditch from the west (pictured in Figure 10).

Modern alterations and maintenance to the Waihee Ditch are evidenced within the project area in the form of fortifications, a watergate near a modern reservoir, and foot and car bridges over the ditch. Additionally, nearby surface deposits of freshwater clam shells and *kukui* nuts are evidence of modern maintenance in the form of regular cleaning of the ditch. These finds are also a testament to the Waihee Ditches length and volume (Figure 11), as neither of these species exists within the project area; they traveled here via the ditch from environments north and *mauka*. In terms of historic information regarding a single project area site, the most available for

Figure 10: Waihee Ditch (50-50-04-5197). View to South.

Figure 11: Waihee Ditch (50-50-04-5197) paralleling Old Waikapu Road (50-50-04-5730). View to South.

the area pertains to Waihee Ditch. This history is worth noting in detail as it lends to an understanding of project area utilization around the turn of the century.

According to Wilcox's *Sugar Water: Hawai`i's Plantation Ditches* (1996:124), the Waihee "Canal" was started in June 1905 and was completed in May 1907. The entire canal cost $160,000 to construct and was used by Wailuku Sugar Company (founded 1862) and HC&S. The Waihee Canal was built under the leadership of an engineer named James T. Taylor. The canal, or ditch as it is now known, represents a monumental effort to carry water to dry areas of Maui. Wilcox's research emphasizes this display of manpower for the purpose of sugar irrigation:

> this 50-mgd-capacity ditch tapped the Waihee stream at the 650 foot elevation, just below the Aliele falls. . . . Its 10.62 miles included twenty-two tunnels totaling 16,539 feet; thirty-nine flumes totaling 2764 feet; 35,549 feet of open, cement-lined ditch; and a 1253-foot-long, 3-foot-diameter siphon to cross Iao Valley. Ditch grade averaged 2/5 feet per 1000. The longest tunnel (2246 feet) was especially challenging, as much of it went through hard close-grained rock and it required compressed air and percussion drills. This tunnel took eighteen months to cut. The contract price for the labor ranged from 85 cents to $5 per foot, depending on the material cut, the location, and the length of the tunnel. (1996:124)

The Waihee Ditch represents the oldest securely dated site on the project area landscape. Three other ditches are also located within the project area: two lesser, more localized ditches run from west to east; the Waikapu Ditch parallels the Waihee Ditch as it enters the project area from the north.

State Site Number 50-50-04-5493 (Waikapu Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (in use by 1913)
DIMENSIONS:	Length: 61.00 m; Width: 1.70m; Depth: 1.00 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	The Waikapu Ditch is a flowing, concrete water conduit that taps

the Iao Stream at upper elevations within Iao Valley. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 12)

Figure 12: Waikapu Ditch (50-50-04-5493) at point where it enters Project Area. View to South.

—and is very similar in appearance to Waihee ditch. The concrete sides of the ditch measure 0.20 m thick. The curving ditch flows into the *mauka* fifth of the project area from the north and roughly keeps a north-south orientation. Unlike, the Waihee Ditch, the Waikapu Ditch does not transect the project area, rather it enters and then ceases.

The Waikapu Ditch flows into the Site -5727 reservoir where it terminates (although this may not have been the historic termination point of this ditch). The out-flow of this reservoir is a smaller, localized ditch that runs *makai* (Site -5729) and does not resemble the Waikapu ditch. Modern alterations and maintenance to the Waikapu Ditch are evidenced within the project area in the form of fortifications and a car bridge over the ditch. Wilcox (1996:124-125) notes that the ditch was in use prior to 1913 and was built by Wailuku Sugar Company.

State Site Number 50-50-04-5729 (un-named ditch)

FORM	Rock and concrete mortar water-course
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 1200.00 m; Width: 0.90m; Depth: 0.75 m (within P. Area)
CONDITION:	Fair

SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, flowing ditch was almost certainly built after Waihee and Waikapu Ditch construction. Site -5729 serves as a *mauka-makai* link between these two major sources of imported water. Site -5729 is constructed of basalt rock walls, specifically small boulders that are often welded together with concrete mortar (Figures 13 and 14). The walls of this U-shaped ditch are four to six courses high, and average 0.20 m thick. The bottom of the ditch is a concave, roughly-molded concrete basin. This construction material is an indicator of a localized irrigation effort, as the cost of labor and materials was a significantly smaller undertaking than the major ditches flowing in from the north. The origin of the Site -5729 ditch is the outflow of the Site -5727 reservoir (which gathers its water from the Waikapu Ditch terminus). Site -5929 then flows into the Waihee Ditch (Figure 15). The Site -5729 ditch is controlled by modern mechanisms in its flow into and out of the modern, smaller reservoir, and eventually downslope toward Honoapi'ilani Highway and out of the project area.

Figure 13: Site 50-50-04-5729 Ditch. View to West.

Figure 14: Site 50-50-04-5729 Ditch, Showing Rock and Mortar Construction of Side Walls. View to Northwest.

Figure 15: Site 50-50-04-5729 Ditch (at center) flowing into Waihee Ditch (50-50-04-5197). View to West.

State Site Number 50-50-04-5726 (un-named ditch)

FORM	Earthen berm ditch
FUNCTION:	Sugarcane irrigation
AGE:	Possibly historic
DIMENSIONS:	Length: 215.00 m; Width: 7.00m; Depth: 2.50 m (within P. Area)
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	This un-named, intermittently flowing ditch was possibly

constructed within the historic sugar era. It is a wider U-shape than the other ditches, and is choked with thick introduced grasses that stand over two meters tall. Like the Site -5729 ditch, this is a localized irrigation effort. The possibility exists that this is not a sugar cane agriculture feature, but a modern widening of a natural watershed drainage. However, its earthen berm sides resemble the historic, machine-created berms (Site -5728) constructed on the project area as erosion control during the sugar era. This ditch / drainage runs downslope, approximately west to east.

State Site Number 50-50-04-5727 (un-named reservoir)

FORM	Rectangular reservoir
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 229.00 m; Width: 76.00m; Depth: undetermined
CONDITION:	Excellent (currently maintained)
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	This un-named, large reservoir is currently active and maintained

by modern pumping equipment and fencing (Figure 16). It is surrounded by machine-created earthen berms of the same construction seen elsewhere on the project area in association with historic agriculture. Waikapu Ditch flows from the north and empties into Site -5727 (see Figure12). Everett Ditch, flowing downslope from the *mauka* West Maui Mountains, also once terminated at this reservoir (however, this ditch no longer exists within the project area). The out-flow for Site -5727 is the Site -5729 localized, lesser ditch. The length of this reservoir is oriented north-south.

The size, construction, elevation, position, and shape of Site -5727 resembles that of Hopoi Reservoir (State Site 50-50-04-5473), a documented sugar era irrigation site. Hopoi Reservoir is located 1 kilometer northeast of the Site -5727 reservoir and the latter is likely of the same construction period as the former. Hopoi Reservoir, although empty and abandoned during

Figure 16: Site 50-50-04-5727 Reservoir. View to North.

initial recordation (see Dega 2004), also was a collection point of a known major water course (Kama Ditch, Site 50-50-04-5474).

Note: A smaller, modern reservoir is located within the *makai* third of the project area (Figure 17). A 1977 aerial map of the Kahului isthmus (see Figure 3) clearly shows the Site -5727 reservoir, and also shows that this smaller reservoir was not yet constructed.

State Site Number 50-50-04-5728 (erosion-control berms)

FORM	Earthen berms (n = 14)
FUNCTION:	Sugarcane field erosion control
AGE:	Likely historic
DIMENSION RANGE:	Length: 132 to 456 m; Width: 5.0 to 17.0 m; Height: 1.0 to 1.8 m
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	ST-6
DESCRIPTION:	Fourteen soil berms comprise Site -5728 (Figure 18). This historic

method of machine-piled earthen mounds was used within cane fields to prevent topsoil erosion. As depicted by Figure 4, the positions of the fourteen berm segments vary slightly from a general north-south orientation. What is consistent, however, is that the position of each individual

Figure 17: Modern Reservoir at center of Project Area's Eastern Half.

Figure 18: Site 50-50-04-5728, Feature 13 (Erosion-control Berm). The contour of the berm running cross-slope can be seen as a mound in the dirt road. View to Northeast.

segment runs perpendicular to the sloping terrain within that specific locality of the project area. The mounded soil acted to block rainwater runoff, preserving both moisture and topsoil. To a lesser degree, it is possible that the berms also prevented some wind blown soil erosion, as some of the berms were mounded to a height of 1.80 m. State Site Number 50-50-04-5522 provides a documented case of such berms in the nearby former cane fields of Waiehu, Maui (Wilson and Dega 2004).

Stratigraphic Trench 6

One stratigraphic trench (ST-6) was backhoe excavated through a single soil berm segment of Site -5728. The Feature 4 berm ran north-south at the center of the project area's south perimeter (see Figure 4). ST-6 perpendicularly transected the Feature 4 berm with the intent to explore its interior construction and subsurface depth. A cross sectional profile of ST-6 (Figures 19 and 20) indicates Site -5728 berms are 100 percent made up of naturally occurring soils that have been machine mounded in the past. No imported rock or other substance was used in the construction of these berms. The soil disturbance extends into Layer II (to a maximum depth of 50 cmbs) as evidenced by the mounded subsurface contour in shown in Figure 20. This simply means that the plow mechanism that created these berms cut deeper into the natural landscape in this berm building effort than was generally used when tilling the surrounding fields. (The surrounding fields consistently display an undisturbed Layer II.) Subsurface content is explored further under the heading "Subsurface Testing."

State Site Number 50-50-04-5730 (Old Waikapu Road)

FORM	Dirt road
FUNCTION:	Probable cane-haul route
AGE:	Likely historic
DIMENSIONS:	Length: 945.00 m; Width: 3.50m
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	A dirt road that enters the project area from the eastern perimeter

(Honoapi'ilani Highway)—and then turns southwest before crossing the southern perimeter—forms the boundary between parcels 02 and 03. On a 1992 Tax Map Key the following words are printed in association with this road: "(Old Waikapu Road) County Road". At the time of survey, this road continued to see infrequent pedestrian and vehicle traffic—reserved for those transecting this undeveloped swath of land as a possible shortcut between paved roads. For this reason, this dirt road remains free of vegetation (Figure 21).

Figure 19: ST-6 (Photograph of North Wall) Profile Shows Subsurface Contour of Machine-mounded Site -5728, Feature 4 Berm. View to North.

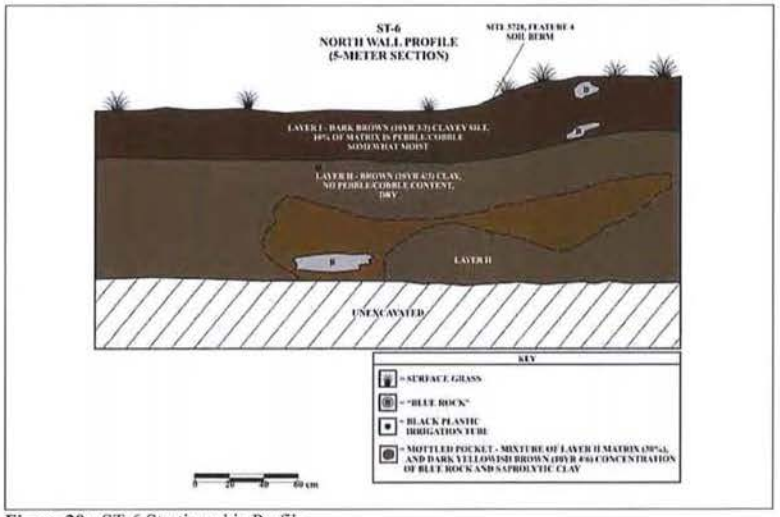

Figure 20: ST-6 Stratigraphic Profile.

Figure 21: "Old Waikapu Road" (50-50-04-5730). View to Southwest.

Exactly how old "Old" Waikapu Road is difficult to determine precisely. However it is safe to assume that this newly recorded State Site Number (50-50-04-5730) originated in the same sugar period as the other six sites within the project area. A Cultural Impact Assessment (CIA) within the same project area provides further detail backing a historic origin to the Old Waikapu Road. Author of the CIA, Kalei Tsuha, interviewed a local resident who, as a child in 1922, remembers traveling across the project area on this same road by horse (K. Tsuha, personal communication 9/25/05).

SUBSURFACE TESTING

Twenty-one stratigraphic trenches (STs) were mechanically excavated by backhoe to test for the presence/absence of subsurface cultural deposits in a variety of project area locations. Excavation took place over a three-day period, August 22–24, 2005. Of these trenches, only one (the previously described ST-6) revealed any kind of subsurface cultural material. ST-6 was placed through an existing soil berm in order to document construction technique of these historic agricultural features. ST-6 documented the subsurface extent of the Site -5728, Feature 4 soil berm (the base of which does extend into the otherwise undisturbed Layer II matrix) (see

Figure 20). None of the 21 trenches revealed any type of artifact, charcoal deposit, or midden deposit.

Testing was spread evenly across the project area with the intent of documenting soil stratigraphy trends by project area location. In total, 21 stratigraphic trenches (ST-1 through ST-21) were excavated and documented. The trenches averaged 7.86 m long, 0.70 m wide, and 1.58 m deep.

Calculating the above averages, an approximate area of 155 m^2 and volume of 183 m^3 of soil was excavated during testing. These sampling figures are primarily indicative of the limited positive results achieved for each trench; if significant cultural resources were documented during the project, it is likely that less geographic space would have been excavated as documentation and sampling of such cultural resources would have been more time consuming. In the amount of time allowed for the project, testing was geared toward obtaining the most information available to assess the presence/absence of subsurface cultural deposits (as it was fairly quickly determined that all surface sites were historic).

STRATIGRAPHIC TRENCH LAYER ANALYSIS

As expected, excavation within the former sugarcane fields resulted in a consistent stratigraphy of culturally sterile soils. Trenching revealed no more or less than two distinct layers in each ST. The variation between trenches was even less than expected, as in each, Layer I represented soil that had been disturbed by historic and modern agricultural practices, and Layer II represented undisturbed soil. The minimal variation between trenches was threefold: the thickness of Layer I varied by 41 centimeters at most; the soil color and qualities variety slightly in among some trenches; and the pebble, cobble, and or saprolytic rock content within Layer II somewhat varied. Otherwise, the project area is extremely homogenous in subsurface content. This can be credited primarily the effects of decades of agricultural use, and also the fact that the Iao Series soils existing here show only minor variation. The following two examples, ST-7 and ST-9, display the typical slight range of stratigraphic variation within the project area (Figure 22).

ST-9 is the standard project area stratigraphy. Layer I has a surface cover of thick, dried grass. Layer I is 65 cm deep and consists of a moderately moist, very dark grayish-brown (10YR 3/2) clayey silt, of which less than ten percent is pebble/ cobble. Layer I contains evidence of the modern agricultural practices in the form of plastics. Only two of the 21 STs excavated did not

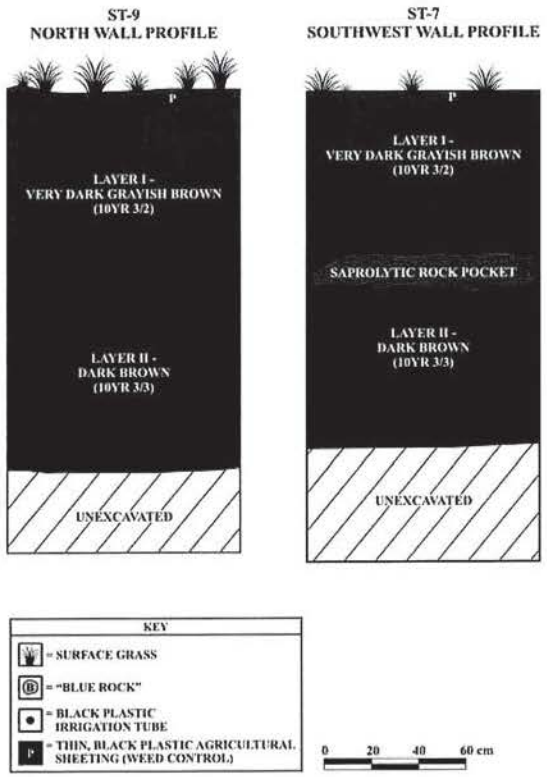

Figure 22: ST-9 and ST-7 Profiles Display Typical Subsurface Stratigraphy within Project Area.

contain either drip line irrigation tubing or black plastic weed-control sheeting in Layer I (see Appendix A). In the majority of STs, Layer I contained both of these plastics at varying depths.

Layer II, as evidenced in ST-9, was often a very compact, moderately dry, dark brown (10YR 3/3) clay, of zero pebble or cobble content. Often, however, a pocket of saprolytic (decomposing) rock or "blue" rock could be found in Layer II (as shown in the ST-7 profile). Layer II thickness remains undetermined as this layer proved too deep to find bedrock, even with the reach of a large backhoe. ST-20 was excavated to a maximum depth of 2.60 m in an unsuccessful attempt to reach bedrock. It is safe to assume that Layer II of the project area is at least 2.00 m thick, but probably much thicker.

DISCUSSION AND CONCLUSIONS

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03]. Inventory Survey included archival research, systematic pedestrian survey of the project area, and representative subsurface testing. While the landscape did not yield traditional Hawaiian archaeological sites, it did reveal a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road—forming seven sites. Five of these sites are new additions to the State's rich historic record of turn-of-the century sugar industry in Hawai'i.

WATER CIRCUITRY

In his 2004 Inventory Survey Report of the Kehalani Mauka Development lands Dr. M. Dega initiated three hypotheses regarding historic water circuitry within this Wailuku / Waikapu landscape. Aside from the small area of land covered by the pre-existing Kuikahi Drive that acts to separate the two surveys—the 348.613 acres in Dega's study and the 215.800 to the south (the present survey) may be viewed as 564.413 contiguous acres for the archaeological record. This is not an arbitrary relationship, as the *ahupua'a* division separating these fields did not individualize their historic utilization. The following text is from *An Intermediate Zone Archaeology Inventory Survey [TMK (2) 3-5-001:portion of 001]* (Dega 2004:41–42):

> Several intriguing patterns emerge as one focuses upon the empirical, historic-period evidence at hand. One of these patterns is the direction in which the historic ditches have been constructed and utilized across the parcel. Case in point: three main ditches or canals run north-south, or [*perpendicular*] to the slope, across the project area and beyond. Waihee Ditch, Kama Ditch, and the westernmost ditch of Site T-24 (Site -5493) [*Waikapu Ditch*] are the most well-constructed on the parcel. These ditches were water conduits across these dry zones. Typically they could be used to water areas along their course or would simply empty into large retention basins (reservoirs) at selected points.
>
> However, there is also a network of ditches, mostly earthen berms and small channels, that run [*parallel*] to the slope on a west (upslope)-east (downslope) axis. These ditches are commonly non-formalized like the north-south ditches and tend to be more localized. Site T-16 (Site -5490), built on an east-west axis for instance, runs a total of 1,000 meters while the north-south Waihee Ditch runs for more than 16 kilometers. The important point is that there is a functional difference between the north-south oriented ditches and the east-west coursing ditches. The more formalized [and costly] north-south ditches are actually water conduits wherein water may be carried long distances to irrigate such water-poor locales as the present project area. The less conventional ditches situated on an east-west axis are simply drainages and do not fulfill an irrigation role on these dry parcels. These smaller ditches appear to be more naturally formed by erosion and were simply modified to accommodate excess water and sediment flow so as not to interfere with the main purpose of cultivation. This pattern appears valid for the present project area but requires additional information from other locales to be proven, negated, or amended.

Thus, we propose two hypotheses that remain to be examined:

1. All north-south canals or ditches along central Maui that run [*perpendicular*] to the slope are water conduits and inherently contain an irrigation function.

2. All east-west bearing canals or ditches along Central Maui that run [*parallel*] to the slope are only drainages that do not disseminate water for irrigation purposes but function to remove overflow so as not to curtail cultivation potential.

DISCUSSION POINTS

The current study provides a second example within the archaeological record confirming Dega's first hypothesis. Both the Waihee Ditch and Waikapu Ditch (numbered, but not named in Dega 2004) were identified as running north to south. These major irrigation conduits continue this flow direction into the current project area. These are large, long, costly, historic structures that were designed to carry stream waters great distances. These ditches run cross-slope within the project area.

The current project area findings expand upon, but do not necessarily confirm Dega's second hypothesis. Two lesser, localized ditches do indeed follow the same orientation as those in the Kehalani lands. Both of these lesser ditches run with the slope contour (perpendicularly linking the major ditches, at times). However, the hypothesis of a functional difference is not soundly reinforced. The Site -5726 ditch is a subtle, earthen feature that may have filled a drainage role rather than an irrigation role. But there is no proof that the more elaborately constructed Site -5729 ditch (stacked basalt boulders that are mortared with concrete) did not in fact serve as a *mauka* to *makai* irrigation artery. This ditch may have served as an outlet to the reservoir's (Site 5727) spill-over, however, this function should not exclude a dual purpose of localized irrigation.

Finally, like in Dega's (2004) study, four points contribute to the current project's lack of traditional Hawaiian cultural material. First, and most obviously for this location, historic impacts have dramatically altered the landscape so much as to erase larger archaeological traces of traditional-period activities. Second, the lack of traditional-period evidence suggests that these open lands were probably not intensively utilized during prehistoric times. The current project area may have not been selected as a habitation zone as it is an open area without perennial water resources—and more preferable lands were readily available. Third, the types of traditional activities conducted within and near the project area may not have left archaeological signatures. Fourth, as is the case for all archaeological projects, testing may have not coincided with the existing subsurface cultural materials. This is unlikely but always a possibility as 100 percent of any parcel is rarely ever fully excavated.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

Seven archaeological sites were documented in the project area: Waihee Ditch (50-50-04-5197); Waikapu Ditch (50-50-04-5493); an un-named, lesser ditch (50-50-04-5729); a second un-named, lesser ditch (50-50-04-5726); a large, un-named reservoir (50-50-04-5727); a series of fourteen sugarcane-field erosion-control, soil berms (50-50-04-5728); and a County dirt road named "Old Waikapu Road" (50-50-04-5730).

These sites have been evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five criteria are classified below:

Criterion A: 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 distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in 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

All seven of these historic sites have been assessed as significant under Criterion D.

Based upon the results of this Inventory Survey and the results of archaeological work on adjacent parcels that have also produced primarily negative results (see Dega 2003, 2004; Monahan 2003; Buffum and Dega 2001), it appears as though additional archaeological research on the subject parcels would not contribute a significant volume of additional data to the interpretation of the area or region, or to Hawaiian prehistory/history. Archaeological Monitoring is not recommended during construction within the project area. The seven sites documented herein have yielded their information to the historical record and no additional archaeological work is recommended.

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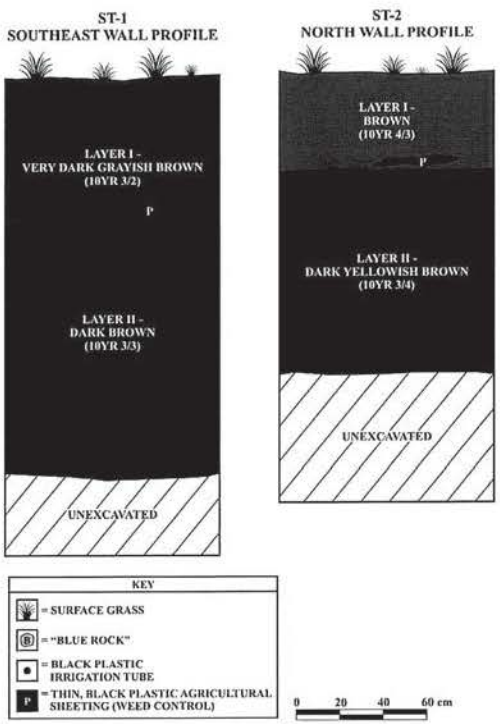
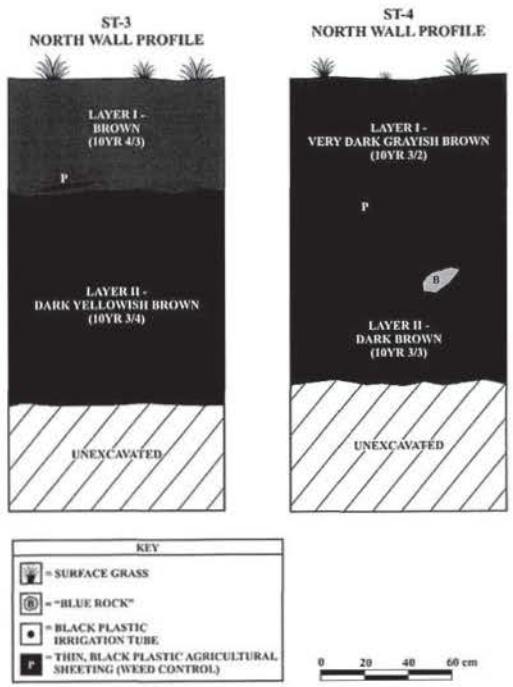
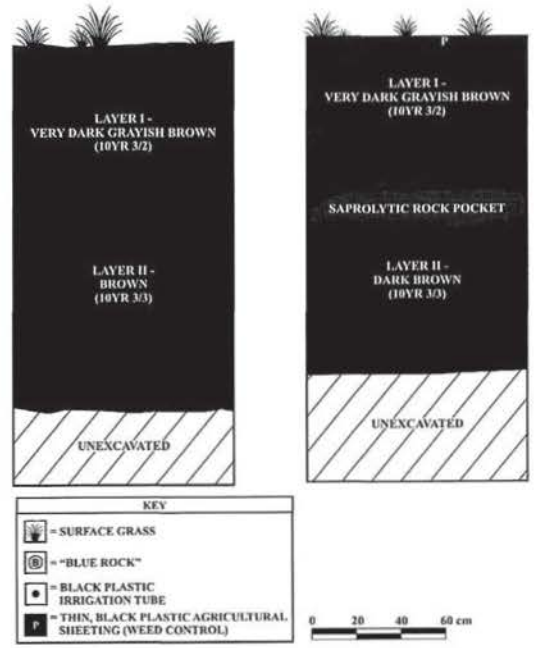
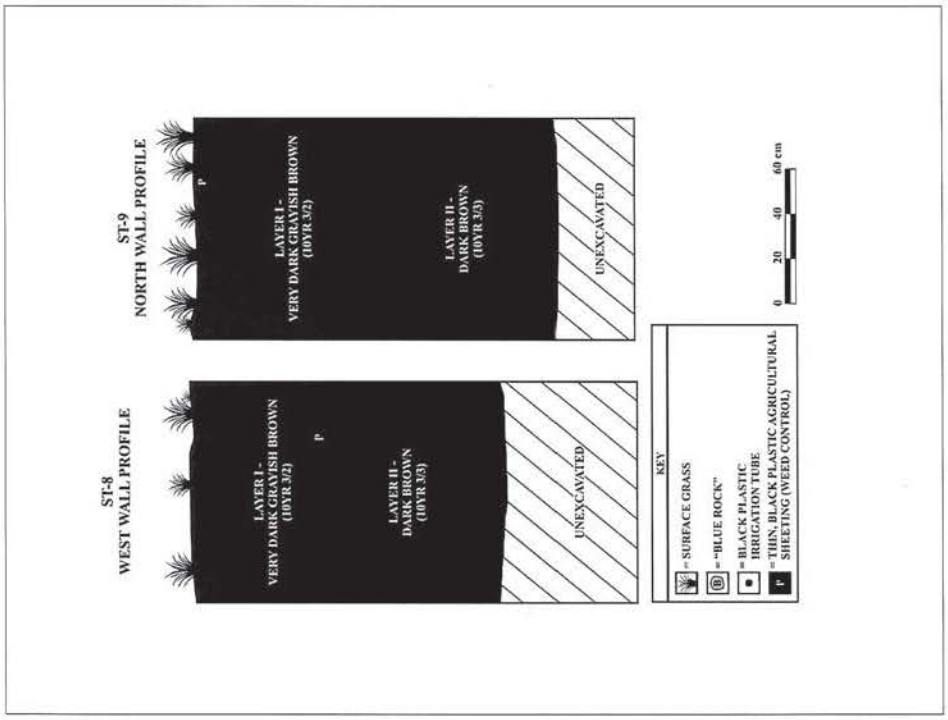
APPENDIX A: STRATIGRAPHIC PROFILES

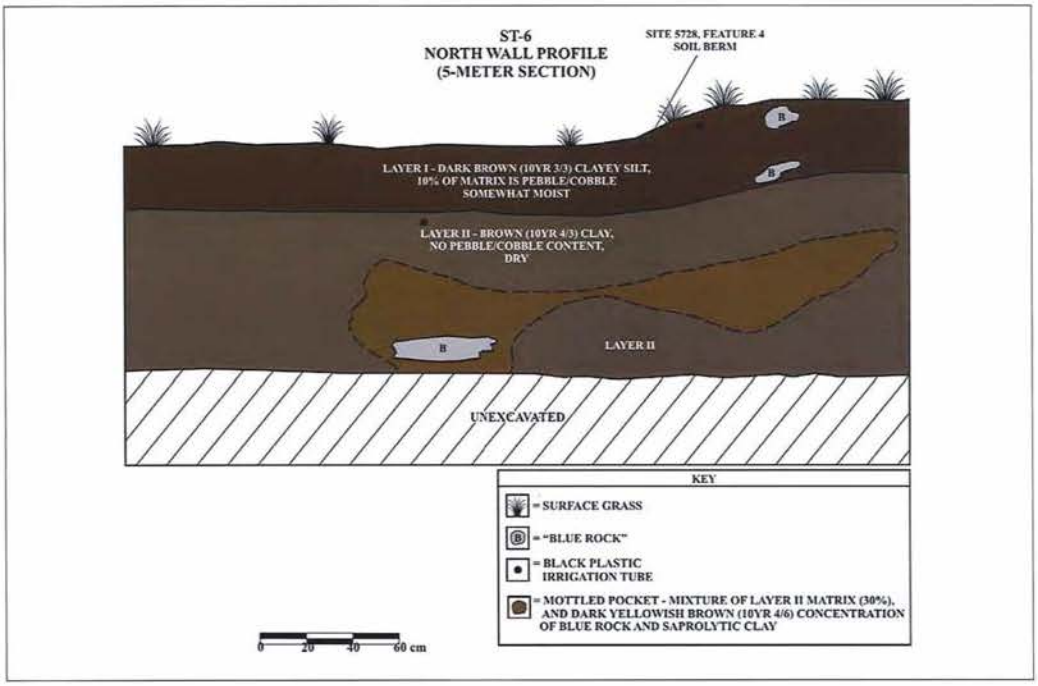



ST-3
NORTH WALL PROFILE
LAYER I -
BROWN
(10YR 4/3)
P
LAYER II -
DARK YELLOWISH BROWN
(10YR 3/4)
UNEXCAVATED
ST-4
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
B
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

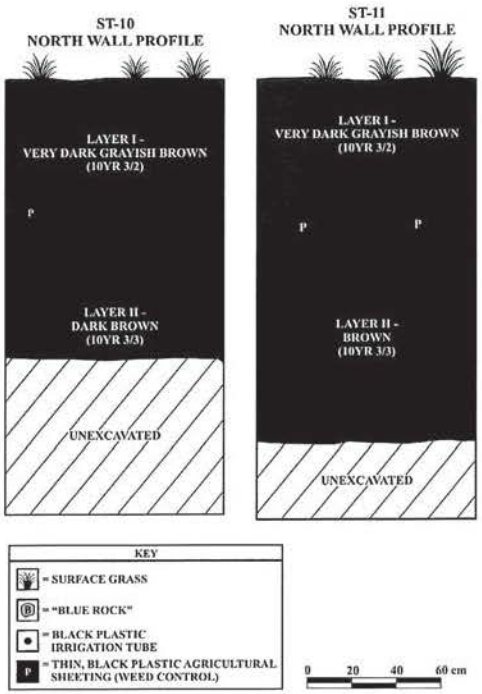

ST-5
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
ST-7
SOUTHWEST WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
SAPROLYTIC ROCK POCKET
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

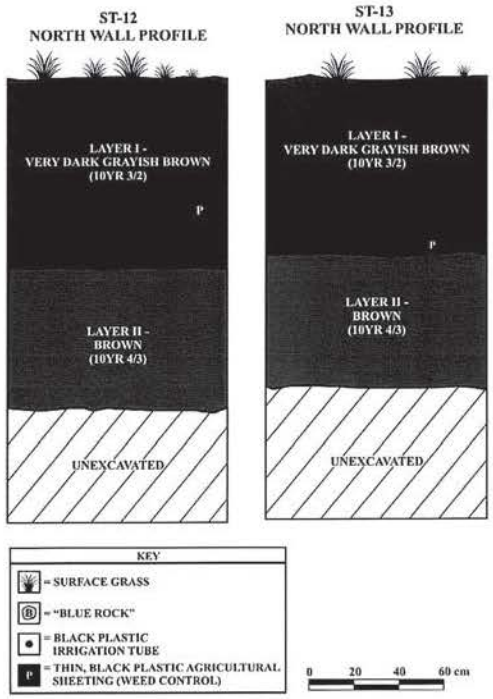

ST-8
WEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-9
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

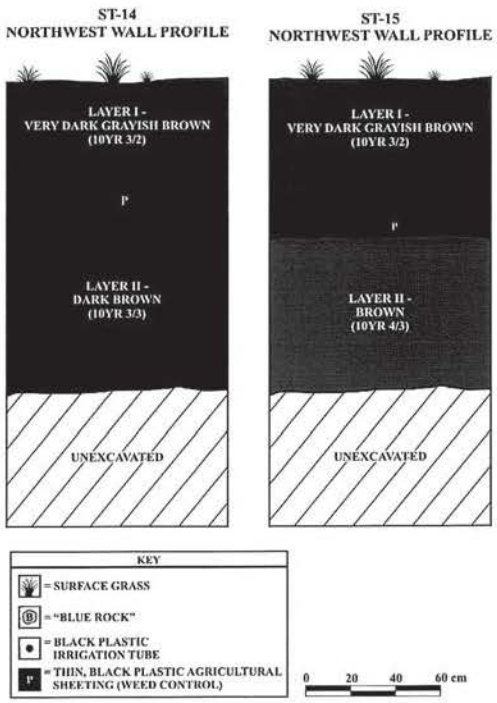
A: 5

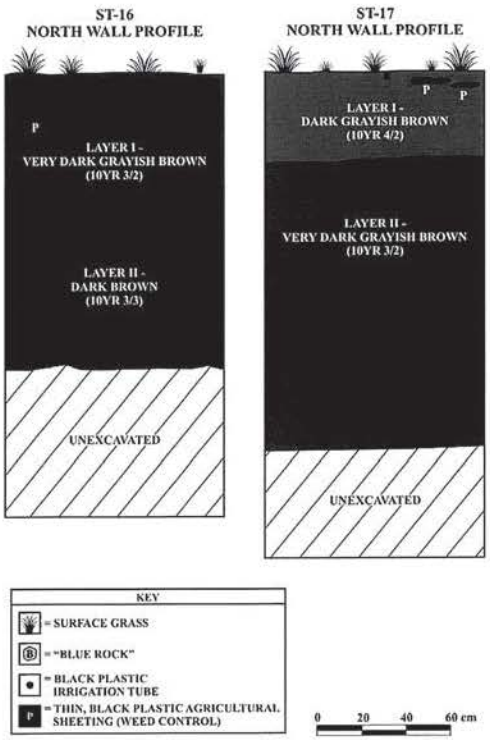

ST-6
NORTH WALL PROFILE
(5-METER SECTION)
SITE 5728, FEATURE 4
SOIL BERM
LAYER I - DARK BROWN (10YR 3/3) CLAYEY SILT,
10% OF MATRIX IS PEBBLE/COBBLE
SOMEWHAT MOIST
LAYER II - BROWN (10YR 4/3) CLAY,
NO PEBBLE/COBBLE CONTENT,
DRY
LAYER II
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= MOTTLED POCKET - MIXTURE OF LAYER II MATRIX (30%),
AND DARK YELLOWISH BROWN (10YR 4/6) CONCENTRATION
OF BLUE ROCK AND SAPROLYTIC CLAY
0 20 40 60 cm

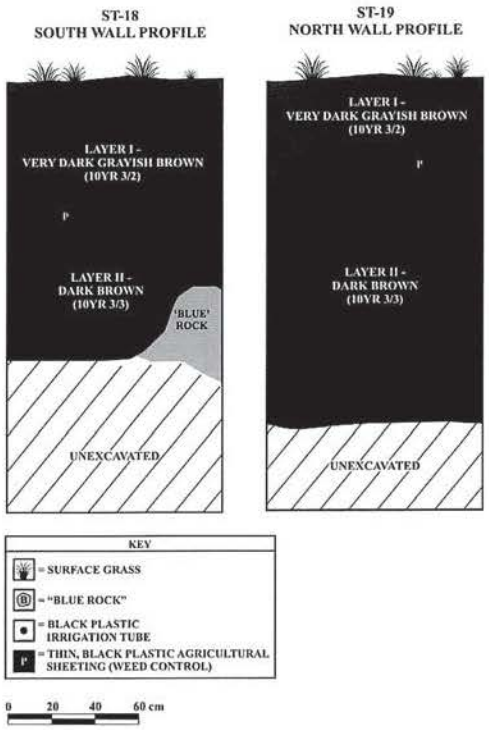
A: 4

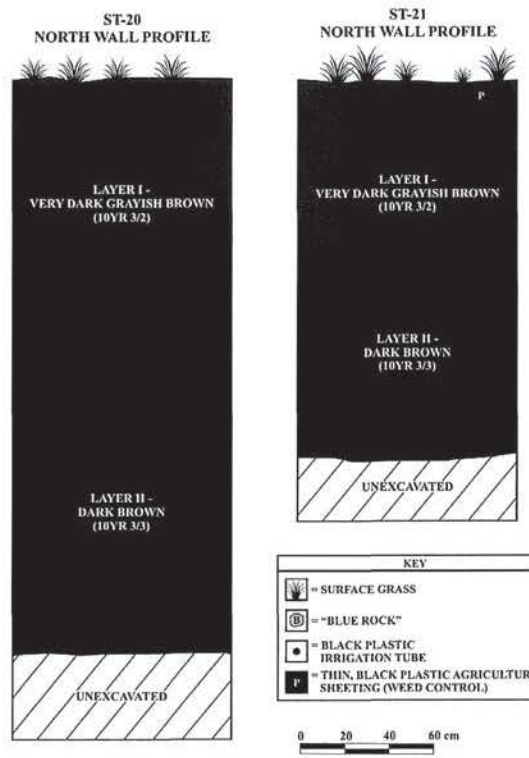

ST-10
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-11
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
P
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-12
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
ST-13
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-14
NORTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-15
NORTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-16
NORTH WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-17
NORTH WALL PROFILE
P
P
LAYER I -
DARK GRAYISH BROWN
(10YR 4/2)
LAYER II -
VERY DARK GRAYISH BROWN
(10YR 3/2)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-18
SOUTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
'BLUE'
ROCK
UNEXCAVATED
ST-19
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-20
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-21
NORTH WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

STATE HISTORIC
PRESERVATION DIVISION
LETTER DATED
NOVEMBER 18, 2005

APPENDIX

D-1

LINDA LINGLE
GOVERNOR OF HAWAII

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

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

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

(E-42)

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

November 18, 2005

Michael Dega, Ph.D.
Scientific Consultant Services
711 Kapiolani Blvd. Suite 975
Honolulu, HI 96813

LOG NO: 2005.2398
DOC NO: 0511MK22

Dear Dr. Dega:

SUBJECT: Historic Preservation Review - 6E-42 - Archaeological Inventory Survey On 215.800 Acres for Towne Development of Hawaii and Endurance Investors, LLC
Waikapu Ahupua'a, Wailuku District, Maui
TMK (2) 3-5-002:002 and 003

Thank you for the opportunity to review this report which our staff received on October 14, 2005 (Wilson and Dega 2005, *Archaeological Inventory Survey Report on 215.800 Acres Located in Waikapu Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03]*...Scientific Consultant Services, Inc., ms.

The background section acceptably establishes the ahupua'a settlement pattern and predicts the likely site pattern in the project area. The historical information provided summarizes the history of the post-contact period land uses. The summary of previous archaeological work in the area provides a baseline for the current work. The subject parcel has formerly been utilized for commercial agriculture, and consists 100% of abandoned cane land. Three small Land Commission Awards are situated within the subject parcel, in an area through which a stream and/or ditch formally ran.

The survey has adequately covered the project area documenting five new historic properties in the project area, and re-identifying two previously identified historic properties. Previously identified sites, SIHP 50-50-04-5197 and -5493, consist of the Waihe'e and Waikapu Ditches. Newly identified SIHP sites 50-50-5729 and -5726 represent an unnamed rock and mortar ditch and an unnamed earthen ditch/drainage. A large unnamed reservoir, SIHP 50-50-04-5727, is situated at the terminus of the Waikapu Ditch (-5493). SIHP 50-50-04-5728 is a sugar field erosion control site, incorporating 14 earthen berms cross slope. These are clearly identified topographically. One additional site, SIHP 50-50-04-5730, the

"Old Waikapu Road" was identified as spanning the border of Parcels 002 and 003. Subsurface testing (twenty-one backhoe trenches) were also negative for evidence of cultural deposits. These were distributed evenly across the project area.

We concur that all seven sites are significant under Criterion "D" and have the potential to yield information important to understanding the history of the region. The sites have been adequately documented.

We also agree that no further archaeological mitigation is necessary.

We find this report to be acceptable. The historic preservation review process is concluded. Development of the project areas will have "no effect" on significant historic sites. As always, if you disagree with our comments or have questions, please contact Dr. Melissa Kirkendall (Maui/Lana'i SHPD 243-5169) as soon as possible to resolve these concerns.

Aloha,

MELANIE A. CHINEN, Administrator
State Historic Preservation Division

MK: kf

c: Bert Ratte, DPWEM, County of Maui
Michael Foley, Director, Dept of Planning, 250 S. High Street, Wailuku, HI 96793
Maui Cultural Resources Commission, Dept. of Plng, 250 S. High St., Wailuku, HI 96793

HAWAI‘I REVISED STATUTES SECTION 6E FORM DATED FEBRUARY 2021

APPENDIX

D-2

AFFORDABLE HOUSING

Providing Workforce Housing for Maui's Ohana

Kuikahi Properties, llc

191 Waihee Valley Road Wailuku, HI 96793 | 808.269.0244 |
doyle@mevlanaholding.net

February 2, 2021

Alan Downer, Ph.D., Administrator
State Historic Preservation Division
Department of Land and Natural Resources
601 Kamokila Boulevard, Suite 555
Kapolei, Hawai'i 96707
(via: SHPD Portal)

SUBJECT: Request for Concurrence, HRS Chapter 6E-8 Historic Preservation Review for the Proposed Kuikahi Residential Project in Wailuku, Waikapu Ahupua'a, Wailuku District, Island of Maui, TMK: (2)3-5-002: 003 por.

Dear Dr. Downer:

This letter introduces the 6E submittal and relevant illustrations for the above-noted project in Waikapu, Maui. This communiqué provides background to the project including its location and sponsorship, as well as a review of any historic properties previously documented within or near the project area that are subject to §6E-8, HRS. An effect determination and proposed mitigation are also presented below. Multiple illustrations accompany this 6E submittal to show project area location, soils in the area, and conceptual plans for the development.

Regulatory Synopsis

The project area is designated for "Agricultural District" use by the State Land Use Commission and is zoned as "Agriculture" by Maui County. The project site is within the Maui Island Plan's (MIP) Urban Growth Boundary and is designated "Agriculture" in the Wailuku-Kahului Community Plan. The MIP provides that there be a 200-foot buffer between the project site and the Waikapu area which is further south. As such, the proposed development will be located north of and outside of this 200-foot buffer. As a 100 percent affordable housing development, the Applicant is planning to apply for Chapter 2.97, Maui County Code approval from the Maui County Council for the proposed development. Though the proposed project will utilize private funds, State and County lands are anticipated to be used for improvements to Honoapi'ilani Highway and Kuikahi Drive, respectively. The use of State and County lands triggers compliance with the environmental review requirements of Hawai'i Revised Statutes (HRS), Chapter 343. Accordingly, a Draft Environmental Assessment (EA) will be prepared pursuant to Chapter 343, HRS and Chapter 11-200.1, Hawai'i Administrative Rules (HAR) to evaluate the technical characteristics and potential environmental impacts of the proposed project, as well as to advance findings and mitigative measures relative to the project. The County of Maui, Department of Housing and Human Concerns will serve as the approving agency for the EA.

Kuikahi Properties, LLC. (Applicant) is submitting this §6E-8, HRS review inclusive of the SHPD 6E Submittal Form, Proposed Site Plan, and illustrations of the project area location. The project planner (Munekiyo Hiraga) has retained Scientific Consultant Services, Inc. (SCS) to conduct the historic property research for this project and to conduct future mitigation if recommended by the State Historic Preservation Division (SHPD).

Kuikahi Residential Project

The Applicant is proposing a new residential community, to include a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units, on an approximately 14.9-acre portion of land. The proposed development is also planning a minor commercial component through live-work units, which are envisioned to be for neighborhood services or office-types of businesses. The proposed project site is located mauka of Honoapi'ilani Highway, which borders the site to the east, and adjacent to Ku'ikahi Drive, which borders the site to the north. Beyond Ku'ikahi Drive to the north is the Kehalani Master Planned development which includes existing residential homes. Vacant agricultural lands are located immediately to the south of the project site. There

are existing residential homes to the west of the project site which are a portion of the Wailuku Heights area.

The proposed project will be comprised of approximately 200 residential units anticipated for sale at affordable levels per the Area Median Index (AMI). In addition to the residences, approximately 460 parking stalls will be provided onsite for residents' and visitors' use. Related improvements to be developed with the project include internal roadways and sidewalks, bike paths, landscaping, spot parks, drainage improvements, and utility connections.

The proposed project will be accessible via two (2) entrances from Ku'ikahi Drive, one at the east portion of the project area, across of Kehalani Mauka Parkway and the other on the west portion of the project site below an existing water tank. Also proposed is a pedestrian and bike path running north-south through the project, east of the internal road proposed below the existing water tank.

Ground Altering Activities

Grading, grubbing, and excavation work will occur both on and offsite for this project. Onsite excavations will be done for the housing development itself, as well as for utilities. The housing development work is still in the design phase but it is feasible to state that all 14.9 acres of the project area could be built upon. Three main utility projects will be required: 5,000 ft. waterline (excavation to be 2 ft. wide by 4 ft. deep); 4,700 ft. sewerline (2 ft. wide by 6 ft. deep), and a 3,900 ft. drainline (4 ft. wide by 6 ft deep). Off-site utility work will include 80 ft. of waterline (2 ft. wide by 4 ft. deep) within the County Right-of-Way along Ku'ikahi Drive, as well as 50 ft. of sewerline in the same location.

The project area was formerly used for the industrial cultivation of sugar cane, as evidenced by the many water ditches in the area (see below). Soils in the project area consist of Iao cobbly silty clay in the northern half and Iao clay in the southern half. Wilson and Dega (2005) conducted nearby excavation work and noted silty clay and clay overlying saprolitic rock and bedrock. The profile extended to 0.90 m (2.9 ft) below surface. There are no sand deposits in the project area.

Identification and Inventory of Historic Properties

While the current project area encompasses 14.9 acres of undeveloped land that was previously under intensive cultivation, this land was subject to a larger AIS in 2005. Wilson and Dega (2005; see attached illustration of previous archaeology within and near the project area). The larger project totaled 215.800 acres within TMK (2)3-5-02: 02 and

03, of which the current project area occurred. Seven historic sites were documented during the AIS, including segments of two major concrete irrigation ditches (Waihee Ditch Site 50-50-04-5197, Waikapu Ditch Site 50-50-04-5729), two lesser, more localized ditches (Sites -5726, -5729), an un-named reservoir (Site -5727), erosion-control earthen berms (Site -5728), and Old Waikapu Road, a cane-haul dirt road (Site -5730). None of these sites occurs within the current 14.9-acre project area. In addition, during the 2005 AIS project, twenty-one backhoe-dug stratigraphic trenches evenly spread across the project area. All were sterile.

Other projects have occurred bordering the project area (Dega 2004) also led to the documentation of surface Plantation-era sites (ditches, etc.), with no subsurface findings after subsurface testing. Overall, based on the available data, no sites are known to have been documented within the current project area.

Effect Determination

Kuikahi Properties, LLC. (Applicant) proposes a no effect for the above noted project area. A 2005 AIS has already been undertaken inclusive of the project area, with limited testing (sterile), and all Historic era Plantation sites have been recorded. The AIS was accepted by the SHPD on November 18, 2005 (Log No: 2005.2398, Doc No: 0511MK22), with the SHPD stating that no further work was needed for the project area.

Mitigation

Kuikahi Properties, LLC. (Applicant) proposes no further work for the project area.

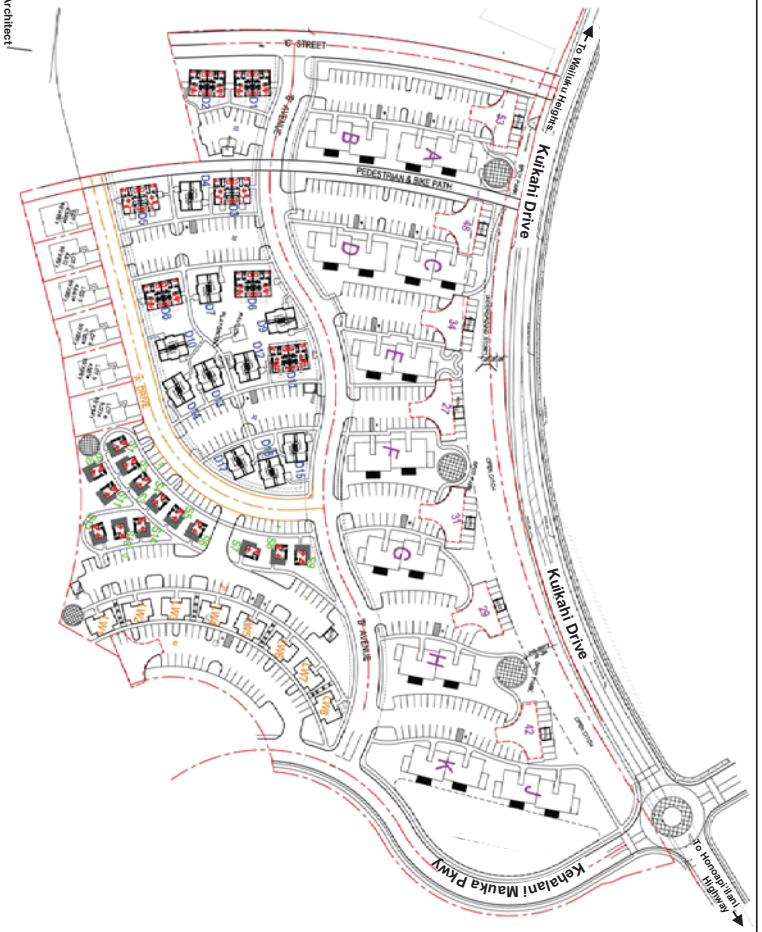
Kuikahi Properties, LLC. (Applicant) is requesting SHPD concurrence with the effect determination of **"no historic properties effected".**

Should there be any questions or comments regarding this matter, please contact Doyle Betsill at (808)269-0244.

Mahalo,

Doyle Betsill
Kuikahi Properties, LLC.

Attachments
cc: Susan Lebo, Ph.D., SHPD Archaeology Branch Chief
Andrew McCallister, SHPD Maui Lead Archaeologist
Lehua Soares, SHPD Archaeology Administrative Assistant
K:\DATA\WV Regenesis\Wailuku AH\HRS Chapter 6E\KPLLC Section 6E cover letter.docx



Source: Ron J. Ped. Architect

Figure 2

Kuikahi Affordable Housing Project
Preliminary Site Plan

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Kuikahi Properties, LLC

WV Regenesis\Wailuku AH\Applications\Figures\Site Plan\CD1 (REV)

MUNEKIYO HIRAGA
Planning, Project Management, Sustainable Solutions.

Michael T. Munekiyo
CHAIRMAN
Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

November 4, 2020

Wayne Hedani, Agent
Wailuku Heights Extension Community Association
586 Kuikahi Drive
Wailuku, Hawai'i 96793

SUBJECT: Early Consultation Request for the Proposed Kuikahi Residential Project; TMK No. (2)3-5-002:003(por.); Wailuku, Maui, Hawai'i

Dear Mr. Hedani:

On behalf of Kuikahi Properties, LLC (Applicant), we are writing to you regarding the proposed Kuikahi Residential project.

PROJECT BACKGROUND

The Applicant is proposing a new residential community, to include a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units, on an approximately 14.9-acre portion of land identified as Tax Map Key (2)3-5-002:003 in Wailuku, Maui, Hawai'i. The proposed development is also planning a minor commercial component through the live-work units, which are envisioned to be for neighborhood services or office-types of businesses. See **Figure 1**. The proposed project site is located mauka of Honoapi'ilani Highway, which borders the site to the east, and adjacent to Ku'ikahi Drive, which borders the site to the north. Beyond Ku'ikahi Drive to the north is the Kehalani Master Planned development which includes existing residential homes. Vacant agricultural lands are located immediately to the south of the project site. There are existing residential homes to the west of the project site which are a portion of the Wailuku Heights area. Refer to **Figure 1**.

The proposed project will be comprised of approximately 200 residential units anticipated for sale at affordable levels per the Area Median Index (AMI). **Table 1** outlines the proposed number of units per unit type to be provided at the project.

Maui: 305 High Street, Suite 104 · Wailuku, Hawaii 96793 · Tel: 808.244.2015 · Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 · Honolulu, Hawaii 96813 · Tel: 808.983.1233
www.munekiyohiraga.com

Table 1. Number of Affordable Units Per Unit Type

Unit Type	Number of Units
Multi-Family/Condominium	120
Duplex	34
Live-Work	16
Studio	28
Single-Family	6
TOTAL	**204**

In addition to the residences, approximately 460 parking stalls will be provided onsite for residents' and visitors' use. Related improvements to be developed with the project include internal roadways and sidewalks, bike paths, landscaping, spot parks, drainage improvements, and utility connections. See **Figure 2**, Conceptual Site Plan.

The proposed project will be accessible via two (2) entrances from Ku'ikahi Drive, one at the east portion of the project area, across of Kehalani Mauka Parkway and the other on the west portion of the project site below an existing water tank. Also proposed is a pedestrian and bike path running north-south through the project, east of the internal road proposed below the existing water tank. Refer to **Figure 2**.

PROJECT NEED

For many years, Maui has experienced a shortage of affordable housing for local residents. While there are other affordable housing projects being developed in the Wailuku area, the proposed project is unique in providing a variety of unit types to accommodate families of different sizes. As previously stated, the proposed project will address this housing shortage by providing approximately 200 residential units of varying size to families earning at or below 120 percent of the AMI.

REGULATORY CONSIDERATIONS

The project site is designated for "Urban" use by the State Land Use Commission and is zoned as "Agriculture" by Maui County. Furthermore, the project site is within the Maui Island Plan's (MIP) Urban Growth Boundary and is designated "Agriculture" in the Wailuku-Kahului Community Plan. The MIP provides that there be a 200-foot buffer between the project site and the Waikapu area which is further south. As such, the proposed development will be located north of and outside of this 200-foot buffer. Refer to **Figure 1**. As a 100 percent affordable housing development, the Applicant is

planning to apply for Chapter 2.97, Maui County Code approval from the Maui County Council for the proposed development. Though the proposed project will utilize private funds, State and County lands are anticipated to be used for improvements to Honoapi'ilani Highway and Kuikahi Drive, respectively. The use of State and County lands triggers compliance with the environmental review requirements of Hawai'i Revised Statutes (HRS), Chapter 343. Accordingly, a Draft Environmental Assessment (EA) will be prepared pursuant to Chapter 343, HRS and Chapter 11-200.1, Hawai'i Administrative Rules (HAR) to evaluate the technical characteristics and potential environmental impacts of the proposed project, as well as to advance findings and mitigative measures relative to the project. The County of Maui, Department of Housing and Human Concerns will serve as the approving agency for the EA.

On behalf of the Applicant, we are writing to you today to kindly request your early review and comment on the proposed project in accordance with the requirements of Chapter 11-200.1, HAR.

We would appreciate receiving any comments you may have at the address listed below by November 25, 2020.

Munekiyo Hiraga
Attn: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions regarding this Chapter 343, HRS early consultation request, please do not hesitate to contact me at (808) 244-2015. Thank you.

Very truly yours,

Charlene Shibuya
Senior Associate

CSS:lh
Enclosures
cc: Linda Munsell, County of Maui, Department of Housing and Human Concerns
Doyle Betsill, Kuikahi Properties, LLC
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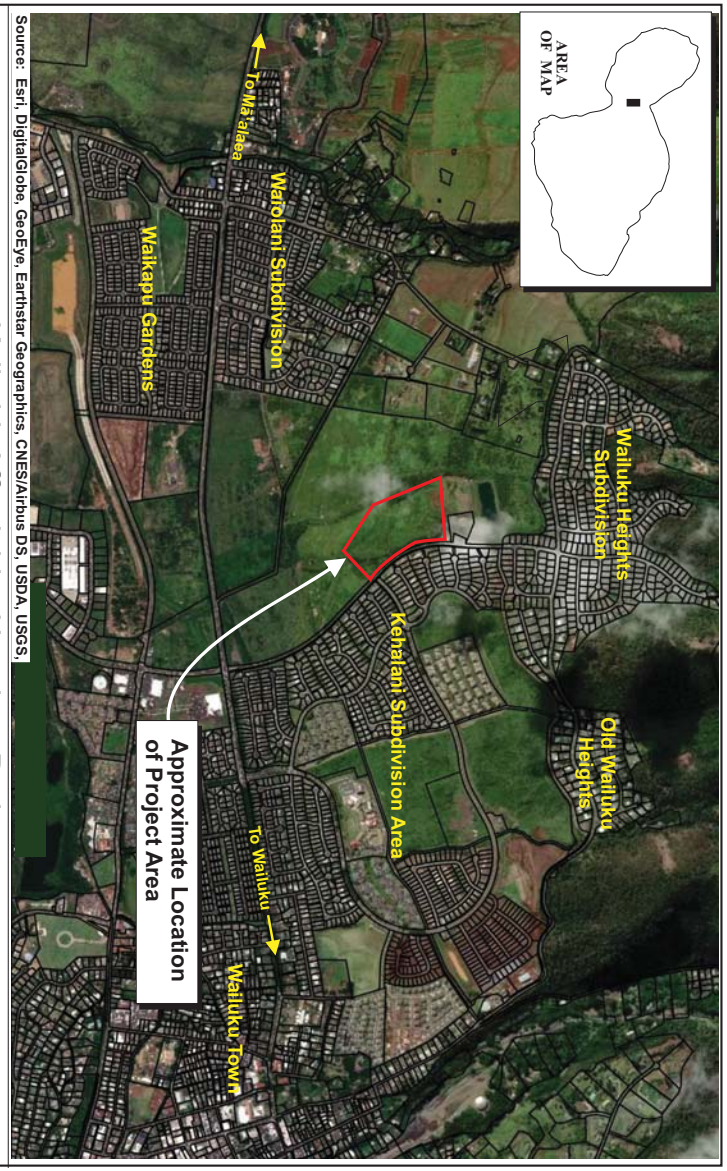

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

Figure 1 Kuikahi Affordable Housing Project
Regional Location Map

MUNEKIYO HIRAGA

Prepared for: Kuikahi Properties, LLC

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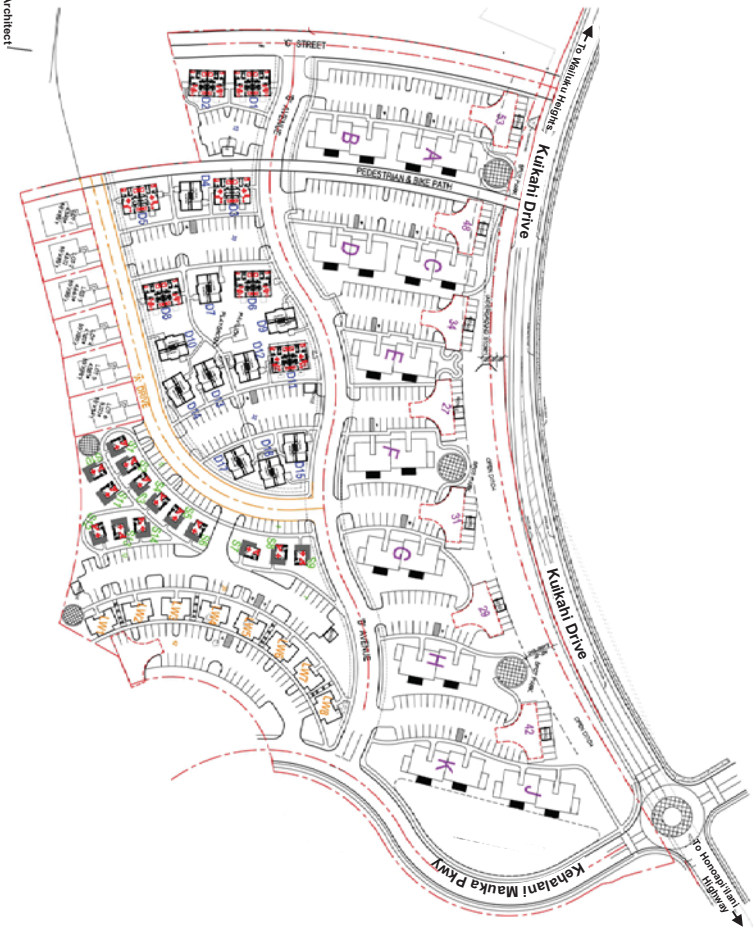


Source: Ron J. Ped, Architect

Figure 2

Kuikahi Affordable Housing Project

Preliminary Site Plan

NOT TO SCALE

Prepared for: Kuikahi Properties, LLC

MUNEKIYO HIRAGA

W:\Projects\Kuikahi\Figures\Figure 2 (Site Plan).cdr

State Historic Preservation Division

HRS 6E Submittal Form

Per §6E, Hawai'i Revised Statutes, if the Project requires review by the State Historic Preservation Division (SHPD), please review and fill out this form and submit all requested information to SHPD. Please submit this form and project documentation **electronically** to:

dlnr.intake.shpd@hawaii.gov

If you are unable to submit electronically, please contact SHPD at (808) 692-8015. Mahalo.

The submission date of this form is:

1. APPLICANT (select one)

☑ Property Owner ☐ Government Agency

2. AGENCY (select one)

☐ Planning Department ☐ Department of Public Works ☐ Other (specify):

Type of Permit Applied For:

3. APPLICANT CONTACT

3.1) Name: 3.2) Title:

3.3) Street Address:

3.4) County: 3.5) State: 3.6) Zip Code:

3.7) Phone: 3.8) Email:

4. PROJECT DATA

4.1) Permit Number (if applicable):

4.2) TMK [e.g. (3) 1-2-003:004]: (2) 3-5-002: 003 por.

4.3) Street Address:

4.4) County: Maui 4.5) State: HI 4.6) Zip Code: 96793

4.7) Total Property Acreage: 14.9 acres

4.8) Project Area (acreage, square feet): 14.9 acres

4.9) List any previous SHPD correspondence (LOG Number & DOC Number, if applicable):

LOG NO. Log No:2005.2398 DOC NO. Doc No:0511MK22

5. PROJECT INFORMATION

5.1) Does the Project involve a Historic Property? A Historic Property is any building, structure, object,

district, area, or site, including heiau and underwater site, **which is over 50 years old** (*HRS §6E-2*).

☐ Yes ☐ No

5.2) The date(s) of construction for the historic property (building, structure, object, district, area, or site, including heiau and underwater site) is n/a

5.3) Is the Property listed on the Hawai'i and or National Register of Historic Places? To check: http://dlnr.hawaii.gov/shpd/

☐ Yes ☐ No

5.4) Detailed Project Description and Scope of Work:

The Applicant is proposing a new residential community, to include a variety of residence types such as multi-family, duplex, live-work, studio, and single-family units, on an approximately 14.9-acre portion of land. The proposed development is also planning a minor commercial component through live-work units, which are envisioned to be for neighborhood services or office-types of businesses. The proposed project site is located mauka of Honoapi'ilani Highway, which borders the site to the east, and adjacent to Ku'ikahi Drive, which borders the site to the north. Beyond Ku'ikahi Drive to the north is the Kehalani Master Planned development which includes existing residential homes. Vacant agricultural lands are located immediately to the south of the project site. There are existing residential homes to the west of the project site which are a portion of the Wailuku Heights area.
The proposed project will be comprised of approximately 200 residential units anticipated for sale at affordable levels per the Area Median Index (AMI). In addition to the residences, approximately 460 parking stalls will be provided onsite for residents' and visitors' use. Related improvements to be developed with the project include internal roadways and sidewalks, bike paths, landscaping, spot parks, drainage improvements, and utility connections.

5.5) Description of **previous** ground disturbance (e.g. previous grading and grubbing):

This undeveloped 14.9 acres was previously part of a large sugar cane cultivation area in Waikapu. The entirety of the current project area was under intensive sugar cane cultivation until the past decade. Ground disturbance includes massive surface clearance, planting, and cultivation, as well as a subsurface till zone. The latter would involve upper level disturbances occurring from the surface to c. at least 30-50 cm below the surface.

5.6) Description of **proposed** ground disturbance (e.g. # of trenches, Length x Width x Depth):

Grading, grubbing, and excavation work will occur both on and off-site for this project. On site excavations will be done for the housing development itself, as well as for utilities. The housing development work is still in the design phase but it is feasible to state that all 14.9 acres of the project area could be built upon. Three main utility projects will be required: 5,000 ft. waterline (excavation to be 2 ft wide by 4 ft deep); 4,700 ft sewerline (2 ft wide by 6 feet deep), and a 3,900 ft. drainline (4 feet wide by 6 ft deep). Off-site utility work will include 80 ft of waterline (2 ft wide by 4 ft deep) within the County Right-of-Way along Kuikahi Drive, as well as 50 ft of sewerline in the same location.

5.7) The Agency shall ensure whether historic properties are present in the project area, and, if so, it shall ensure that these properties are properly identified and inventoried. Identify all known historic properties:

n/a

5.8) Once a historic property is identified, then an assessment of significance shall occur.

Integrity (check all that apply):

☐ Location ☐ Design ☐ Setting ☐ Materials ☐ Workmanship ☐ Feeling ☐ Association

Criteria (check all that apply):

☐ a – associated with events that have made an important contribution to the broad patterns of our history
☐ b – associated with the lives of persons important in our past
☐ c – embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value
☐ d – have yielded, or is likely to yield, information important for research on prehistory or history
☐ e – have an important value to the Native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out or still carried out, at the property or due to associations with traditional beliefs, events, or oral accounts - - these associations being important to the group's history and cultural identity

5.9) The effects or impacts of a project on significant historic properties shall be determined by the agency.

Effect Determination (select one):

☑ No Historic Properties Affected
☐ Effect, with Agreed Upon Mitigation Commitments (§6E-42, HRS)
☐ Effect, with Proposed Mitigation Commitments (§6E-8, HRS)

5.10) This project is (check all that apply, if applicable):

☐ an activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency;

☐ carried out with Federal financial assistance; and or

☐ requiring a Federal permit, license or approval.

If any of these boxes are checked, then the Project may also be subject to compliance with Section 106 of the National Historic Preservation Act (NHPA).

6. PROJECT SUBMITTALS

6.1) Please submit a copy of the Tax Map Key (TMK) map

6.2) Please submit a copy of the property map showing the project area and indicate if the project area is smaller than the property area.

6.3) Please submit a permit set of drawings. A permit set is a set of drawings prepared and signed by a licensed architect or engineer and is at least 65% complete.

6.4) Are you submitting a survey?

☐ Yes ☐ No

Specify Survey:

6.5) Did SHPD request the survey?

☐ Yes ☐ No

If 'Yes', then please provide the date, SHPD LOG NO, and DOC NO:

Date: LOG NO. DOC NO.

6.6) **SURVEY REVIEW FEES**. Fee for Review of Reports and Plans (§§13-275-4 and 284-4). A filing fee will be charged for all reports and plans submitted to our office for review. Please go to:

http://dlnr.hawaii.gov/shpd/about/branches/archaeology/filing-fee-schedule/

A check payable to the Hawaii Historic Preservation Special Fund should accompany all reports or plans submitted.

6.7) Please submit color photos/images of the Historic Property (any building, structure, object, district, area, or site, including heiau and underwater site) that will be affected by the Project.

The following are the minimum number and type of color photographs required:

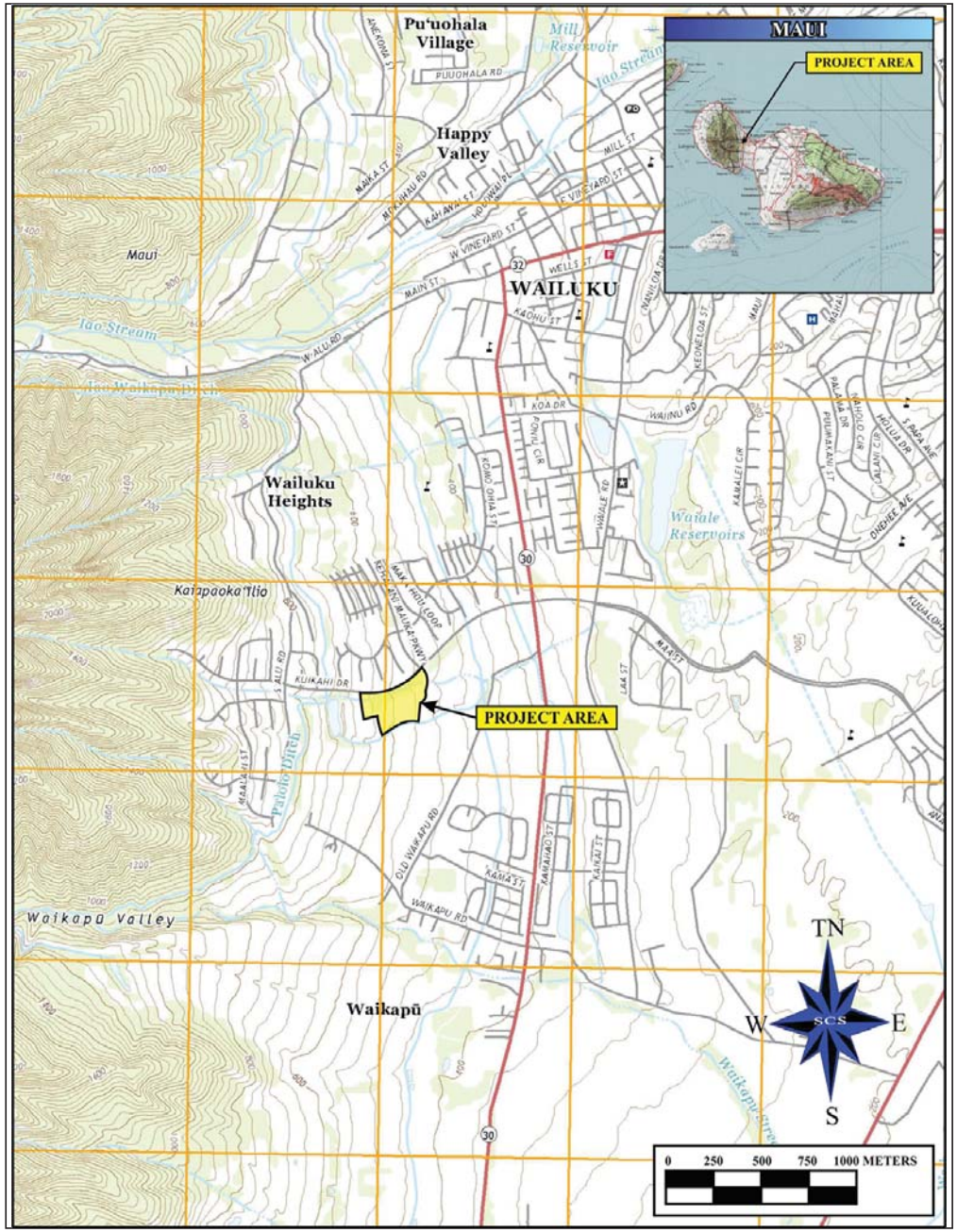
Quantity	Description
1-2	Street view(s) of the resource and surrounding area
1-2	Over view of exterior work area
1	exterior photo of the North elevation (if applicable)
1	exterior photo of the South elevation (if applicable)
1	exterior photo of the East elevation (if applicable)
1	exterior photo of the West elevation (if applicable)
1-2	interior photos(s) of areas affected (if applicable)

CHECKLIST

☑ **SHPD FORM 6E** (this form)

☑ **PROJECT SUBMITTALS** (any requested documentation for items 6.1 - 6.7 of this form)

☐ **FILING FEE FORM** (if applicable)



PROJECT AREA
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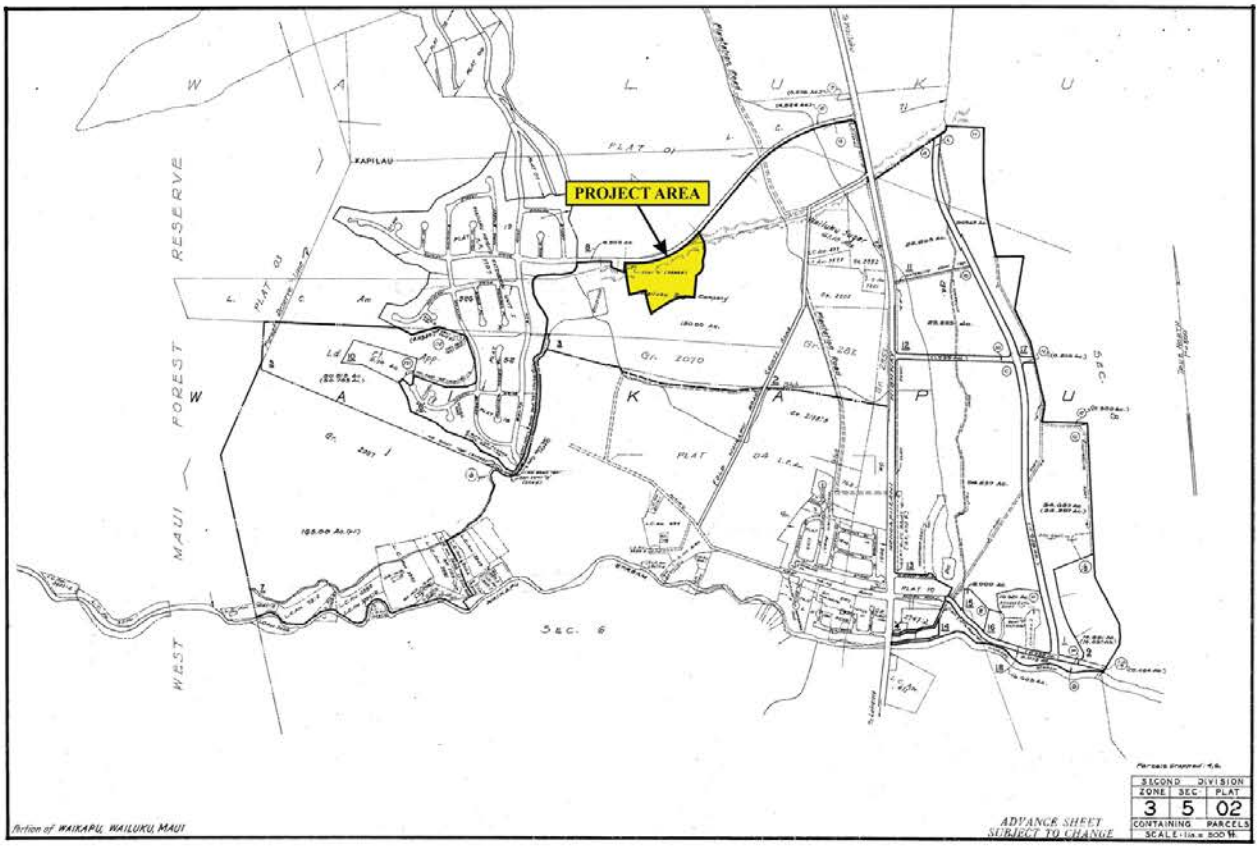
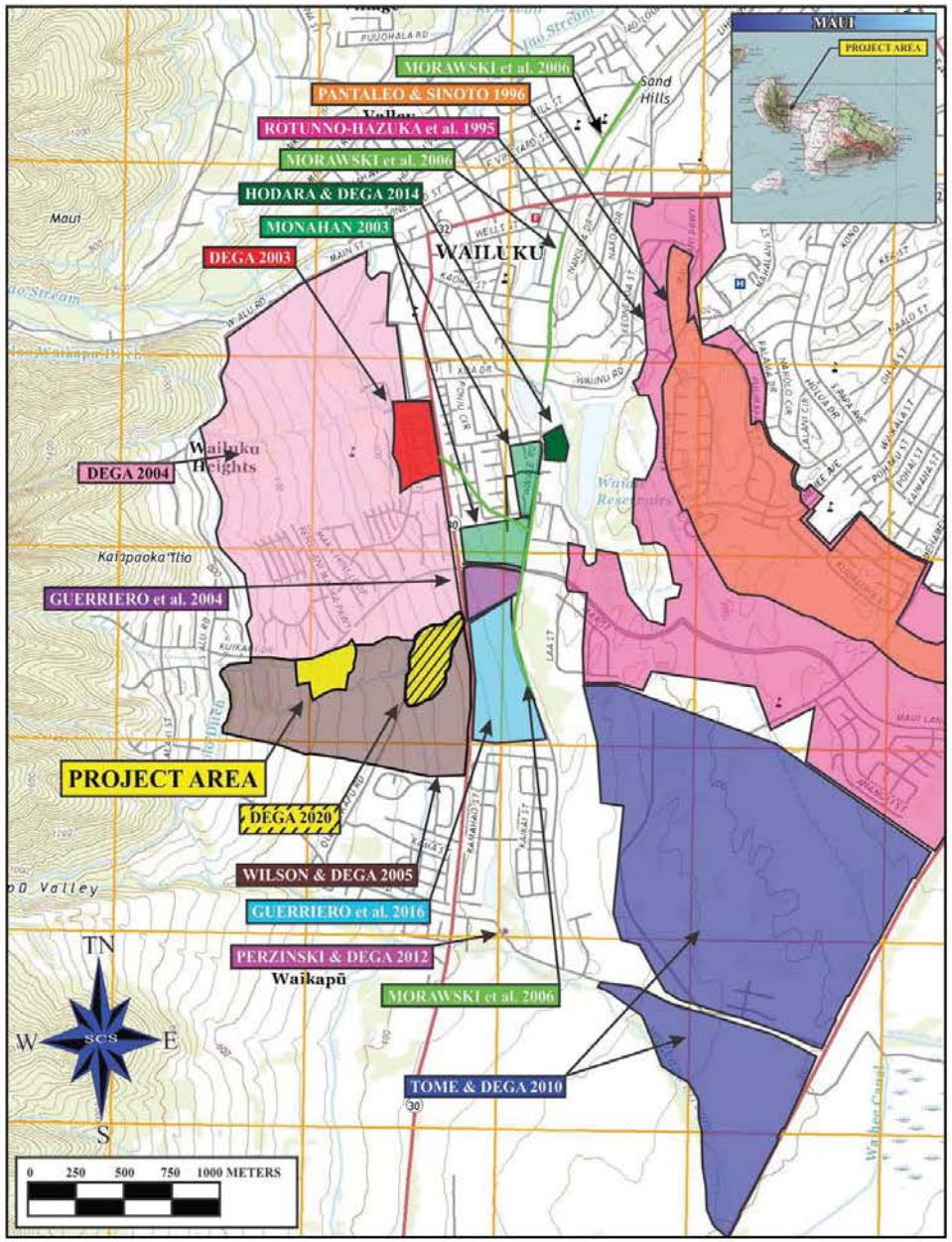

PROJECT AREA
KAPILAU
PLAT 01
PLAT 04
Gr. 2070
Gr. 2071
Gr. 2072
SEC. 6
MAUI WEST FOREST RESERVE
SECOND DIVISION
ZONE SEC. PLAT
3 5 02
CONTAINING PARCELS
ADVANCE SHEET
SUBJECT TO CHANGE
Portion of WAIKAPU, WAILUKU, MAUI


MAUI
PROJECT AREA
MORAWSKI et al. 2006
PANTALEO & SINOTO 1996
ROTUNNO-HAZUKA et al. 1995
MORAWSKI et al. 2006
HODARA & DEGA 2014
MONAHAN 2003
DEGA 2003
WAILUKU
Sand Hills
Maui
Wailuku Heights
DEGA 2004
Kalapaoka'Ilio
GUERRIERO et al. 2004
PROJECT AREA
DEGA 2020
WILSON & DEGA 2005
GUERRIERO et al. 2016
PERZINSKI & DEGA 2012
Waikapū
MORAWSKI et al. 2006
TOME & DEGA 2010
TN
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PROJECT AREA
PZUF
W
IaA
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IbB
IcC
IbC
IcC
W
IrC
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JaC
Google Earth

CULTURAL IMPACT ASSESSMENT

APPENDIX

E

Kuikahi Affordable Housing Project
Cultural Impact Assessment Study

TMK: (2) 3-5-02:30
ʻIli o Puhiawaawa, Wailuku Moku
Island of Maui

by
Katherine Kamaʻemaʻe Smith
Historical/Cultural Consultant
Honu Media, LLC

March 1, 2021

Prepared for
Alaula Development LLC
415 Dairy Road, Suite E-231
Kahului, HI 96793

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I. Orientation Maps and Images

Figure 1. Kuikahi Affordable Homes parcel, TMK (2) 3-5-02:30, in yellow. This parcel was formerly part of a larger parcel, TMK (2) 3-5-02:02 and 03, outlined in green. It lies West and mauka of Honoapiʻilani Highway, and fronts on Kuikahi Drive, south of Kehalani Mauka subdivision.

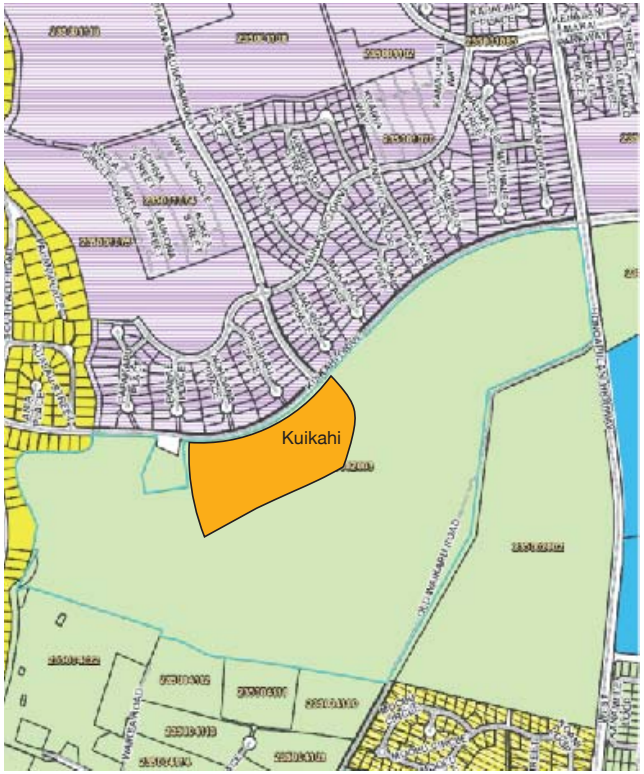


Figure 2. County of Maui Planning Department public map showing agricultural zoning on and surrounding the study parcel.The other subdivisions in purple and yellow are zones urban and residential. The Cut-out above the study parcel is reserved Wailuku Water Company Land.

Figure 3. 1979 MAGIS UH Aerial of Study Property on a high alluvial plain between Wailuku and Waikapū valleys.

Pedestrian Survey Images

A Pedestrian inspection of the study parcel was conducted in December, during a dry period, which made the surface and plantation era features easier to see than when the grasses and shrubs are lush.

1. TMK (2) 3-5-02:30, 101 Kuikahi Drive, Gate to property, South of Kehalani Mauka

2. Entry farm road. Goat farm on right, study parcel to left.

3. Large boulder and Wailuku Water Company tank mauka of property

4. Dry gully running mauka-makai, tracing Kuikahi Drive, runs along the front of the property

5. Large scarred and broken boulders beside gully and plantation push piles.

6. Looking southwest to Haleakalā rift zone, Kealia and North Kīhei Sugar Beach in distance

7. Eroded field berm, Planation irrigation debris, and distant trees lining another dry gulch

8. Eastern View of Haleakalā from property. Sun, moon and stars rise from behind Haleakala

9. View of Kahului from property northwest corner; Kokomo and Kauhikoa pu‘u in distance

10. View of Kahului, Kanahā, Papa‘ula and Kū‘au points

11. Southeast corner boundary marker; looking North along Eastern border. Kehalani Mauka homes in distance

12. Northwest view towards ʻĪao Valley and the Wailuku afternoon cloud bank

13. Puʻukukui and West Maui Mountains above Puhiawaawa

14. Distant Southwestern view to ridge on Western side of Waikapū Valley and Hanaʻula

15. Koa haole is the main biota on this property, besides alien grasses and vines.

16. Along both gulches koa haole have matured to large tree

17. The soil is covered with straw debris, vinyl weed barrier and drip irrigation debris from pineapple farming.

18. One lone Loulū palm is visible from the study property, a local landmark.

19. Property revisited during wet winter, when fast maturing drylands crops like sweet potato might be grown without irrigation. Eastern views of Haleakala.

The study parcel is fallow farming land with two dry gulches, plantation push piles of rocks and alien volunteer plants. The soil is full of rock and irrigation debris. No surface features setting or resources of cultural significance were observed.

II. Introduction:
This historical and cultural study is undertaken to discover, research and analyze potential cultural impacts of building on this parcel of land. The laws and regulations governing land development require that a thorough inventory and evaluation of possible cultural impacts be undertaken with the goal of isolating, protecting, preserving and analyzing the effects of potential mitigation on cultural assets or alterations of cultural sites, physical resources or settings. This includes local traditional and customary beliefs, practices connected to the study parcel and its environs and all rights of native Hawaiians to access and carry out their practices. See Appendix for The Environmental Council, State of Hawaiʻi Guidelines.

III. Kuikahi Affordable Community StudyAbstract

The study parcel is in the ʻili of Puhiawaawa in the Moku of Wailuku, also known as Nā Wai ʻEhā. The polygonal 14.75 acre parcel TMK (2) 3-5-02:30 was subdivided from a 215-acre parcel TMK (2)3-5-20:02 and 03, earlier planned as Puʻunani Estates, but never developed. The larger parcel is fully fenced but fallow agricultural lands, and a separate fenced area leased to a family who raise goats. The northern boundary is Kuikahi Drive from just below a water tank to a point across from the intersection with Kehalani Mauka Parkway.
The western boundary is a dirt farm road that runs due South from the gate at 101 Kuikahi Drive, just East of the Wailuku Water Company Reservoir #10, water holding tank and processing tanks.

The southern boundary is accessible by visible on an East-West farm road that runs downhill, due East and twenty yards North of a parallel push pile of boulders bordering a dry gulch. The Southeast corner corner is marked by an orange tag on a pole, and the southern boundary runs a sightly curved trace from the stake to a point opposite the intersection of Kehalani Mauka Parkway and Kuikahi Drive.

The study parcel is on an incline, with the highest elevation of 780 AMSL at the northern boundary and 620 AMSL at the southern boundary toward the northeast. Storm run-off currently slows downhill in a gulch on the northern margin of the parcel. As viewed from above, the larger parcel land appears to have been bermed intervals along the hillside contour for the purpose of cane field irrigation. The intervals between the berms look like terraces, and they were engineered to drain to the side gulch and downhill.

The property has a large push pile of rocks and boulders on the edge of the dry gulch that runs along Kuikahi Drive. A few very large boulders noted on the pedestrian survey have bulldozer scars and have been probably moved.

All of the flora on the study parcel is volunteer alien grasses, shrubs and a few trees. There is one large Loulū native palm downhill from the study parcel which people in who live in this area may use as a landmark. The water tank and reservoir are also local landmarks. Irrigation ditches that formerly irrigated the study parcel are not on this study property, but are discussed in the area history in section IV.

Downhill sight lines from this property extend Northeast to South to South-Southwest to include distant views of Kahului Harbor, the northeastern ocean, sun and moon rise over Haleakalā, the entire Central Plain: Kuʻau Point, Pukalani, Kokomo and Kauihoa Puʻu,

Haleakalā summit and kula flanks to ‘Ulupalakua. Kealia Pond and the north Kīhei beach can be seen to the Southwest. To the NorthTo the North-Northwest, West and West-Southwest are uphill views of Kapilau Ridge, Pu‘u Lio and Kalapao‘ilio ridge in the West Maui Mountains.

Other than ironwoods, Koa haole and one coconut palm the only flora is mixed alien grass and alien weed turf. No fauna, moths, snails, rodents, seabirds or seabird nests were observed. Although pueo probably forage in these fields, no birds or nests were observed.

Remnants of commercial sugar cane and pineapple farming are visible in surface soil: plastic weed barrier, vinyl drip irrigation tubing, OVC pipes, and wood stakes. Fencing is chainlink.

Other than one natural dry gulch improved with push piles, and berms, there are no other land features on the study property. Historic features on adjacent lands are registered with the Hawai‘i State Historic Preservation Division. No cultural natural resources, features, artifacts or settings were observed.

Adjacent Area Historical Assets (not on the study parcel)
Adjacent to the study property in a cut-out of the eastern boundary of the larger parcel is Reservoir No. 10, built by Wailuku Sugar Company in 1910 and enlarged to provide more irrigation water in 1966. The Reservoir at about 730 feet of elevation was once the terminus of two plantation irrigation ditches: the Everett Ditch from Waikapū Stream and the ‘Īao-Wailuku Ditch from Wailuku River. The Everett Ditch was closed down in the 1970s and the ‘Īao-Wailuku Ditch still operates. Another overflow ditch runs downhill from to connect with the Waihe‘e Ditch at about 400 feet of elevation, which was built in 1882 to grow sugar on the entire Central Maui Plain. The Reservoir and its working ditches are part of the Wailuku Water Department system; the reservoir is by the Department of Lands and Natural Resources Dam Safety Department.

IV. Cultural Historical Study Methodology

Research Scope
Phase 1 research begins with a thorough inventory of published archaeological records and historical documents with mentions of the parcel and its surrounding area, including Hawaiian Kingdom, Territory of Hawai‘i, State of Hawaii and Maui County records, and archival newspapers published in Hawaiian and English and online resources. This phase is to uncover previous land use, and significant features or events with a focus on cultural uses.

Phase 2 research will assess historical land use on this parcel by reviewing and translating all Mahele ‘Āina and Boundary Commission native testimonies for the project area that exist. I will also pull articles from Hawaiian language newspapers and missionary records that mention the area. The parcel area history is presented in a narrative, supported by an appendix of documents used to create the narrative. Some of these resources are purely cultural descriptions or mentions of practices or beliefs connected to the events and activities chronicled. Culture rests in the language and daily activities of ordinary people, and in land features, as well as the stories, chants, songs, dances, dirges and fables passed down for generations. Emphasis is placed on collecting and reporting place names and stories that may not have been previously preserved in DLNR public records.

Phase 3 research will collect cultural informant testimony for this project area from past archaeology reports, CIA reports on adjacent lands, or other publications. At this point, I will solicit present-day testimony from Maui cultural practitioners and families that lived or worked on the parcel. Informants who descend from the LCA awardees, or grantees of property conveyances for this land will also be sought. By this process, any cultural practices carried out on the property in the past or in modern times can be reported and preserved..

Finally, additional heritage information from plantation days to the present will be researched using the Maui News index and records at Alexander and Baldwin Sugar Museum and Maui Historical Society Archives. Any land uses by the military in WWII will also be researched.

The study concludes with my recommendations. I will assess the likelihood of disturbing previously unlocated subsurface burials, ceremonial sites, heritage or other historical artifacts on the study parcel—that would trigger isolation, preservation or other mitigation activities on the part of the developer. I will also recommend ways the developer may carry forward the Hawaiian place names and stories connected to this parcel for preservation and for enrichment of future generations.

Research Methods Pandemic restrictions restricted library research to online resources and my own private library of reference materials. When possible, library archivists were able to assist me online.

A. Previous Studies and Filings for the larger parcel TMK (2) 3-5-02:02 and 03 and nearby lands with similar topography were researched online. In October, 2020, a search of DLNR SHPD resources was requested from their Kapolei Library to include any previously registered Cultural Impact Assessments on file for the larger parcel and nearly projects. A report and several letters were provided.

B. Primary Historical Data
A search of online historical resources and primary source historical literature from my personal library was conducted, because access to public libraries was restricted. The search included mentions of the ‘ili names, nearby place names, and the names of the original grantee. Searches were also made on Ulukau and Papakilo Database for histories, mo‘olelo, ka‘ao, palapala and mentions of this area north of Waikapu and south of Wailuku. The search by grantee name and place names was extended to Nūpepa ‘Ōlelo Hawai‘i. No data was withheld. A few articles, announcements and ads added historical fragments.

C. Solicitation of Cultural Informants
A notice asking for cultural information ran in The Maui News Thursday July 29 and Sunday, August 1. Two Press Releases were issued; one in Nov. 2020 and Feb. 3, 2021. In addition to print and online news outlets, the notice for cultural and initial descendants containing preliminary Puhiawaawa and Humphreys information was emailed to 49 persons with access cultural information on Maui: Hawaiian churches, cultural associations, ‘Aha Moku Members, Maui Historical Society, Lahaina Restoration Foundation, Maui Native Hawaiian Chamber of Commerce, Hawaiian practitioners and educators. The Maui News and MauiNOW picked up the release and Kehaulani Cerizo wrote an article about Kuikahi Affordable Housing project plans and the need for informants. By March 1, only two interviews yielded any additional cultural or historical information specifically about the study parcel. Two members of ‘Aha

Moku subsequently responded but did not schedule interviews. Should other cultural information be offered, it will be added to this report as an addendum.

D. Search of Hawaiian Kingdom Land Records
Royal Patent and Land Commission Awards at the Great Mahele were recovered from Ka Puke Mahele and the density of Waikapū kuleana assessed using Pae ʻĀina Productions alphabetical Index of Land Commission Awards. Palapala of native testimonies and land claims were researched at Papakilo Database website and ulukau.org. Locations for Government Land Grants, homesteads and kuleana land within the study property were matched to County of Maui Tax Key Map Plat for 02.

E. Review of Settlement Patterns in Wailuku Nā Wai ʻEhā Moku
A review of habitation sites on Maui was studied in Handy & Handy to determine the probability of pre-Western contact kauhale in this area of Wailuku on the open kula. A probability of subsurface burials and ceremonial features was reasoned based on the works of local and academic historians, and on the geographical and meteorological attributes of the study land with regard to access to water, shelter and livelihood. Established works of Kirsch, Sterling, Zeigler and D.K. Waiʻaleʻale were consulted.

F. Maps of the Parcel and Ahupuaʻa
Historical survey and topography maps, historical aerial photos from UH MAGIS website and current Google Earth map satellite photos of the property were studied. All place names were collected, reviewed in *Place Names of Hawaiī*, indexes of primary source literature; if a translation was not available, the names were studied using Pukui and Elbert's Hawaiian Dictionary for possible clues about the places they mark. An 1837 hand-drawn map of Wailuku by Edward Bailey was located in the biography, Edward Bailey. Permission was solicited from the director of the State of Hawaii Judiciary Museum in Honolulu, for a commercial photographer to shoot a high resolution digital image of the Maui map.

G. Review of Periodical Literature
A search of Hawaiian and WWII era newspaper stories was undertaken for mentions of Wailuku and Waikapu that might refer to Puhiawaawa.

H. Site Visits
A site visit was conducted in December 2020 to inspect the study parcel and experience its orientation, sites, sounds and view lines. A pedestrian survey was conducted to look for surface cultural landforms, features and artifacts, winds, clouds and natural resources useful for Hawaiian cultural practices. The inspection was facilitated by a period of drought that allowed good visibility and viewing of soil surface, boulders and alteration to the natural topography. Subsequent visits were made to confirm winds, clouds, morning and evening orientation and the return of foliage after the drought.

V. History of Parcel (2) 3-7-013:026

The parcel is located in Wailuku, to the south of ʻĪao Valley, and just north of the Waikapū Ahupuaʻa boundary, on the kula about a mile mauka from Honoapiʻilani Highway. The steeply sloping alluvial soils of Wailuku and Waikapū originate from the erosion of the West Maui Mountains.

In the pre Western contact era, lava flows from Haleakalā ran into the base of Puʻukukui, and the central "valley" of Maui was formed. The proximity of the two mountains creates a ventura for Trade Winds approaching from the Northeast. The winds build up pressure as they approach both volcanos. Then they follow the path of least resistance, speeding between the peaks. Wailuku is culturally referred to as the place of "flying clouds" relating to the ventura.

The winds also blow the coral sands Wailuku, Kahului and the Hamakua coast into isthmus or central plain, which is properly called Kamaʻomaʻo (translated the "greenness," by Pukui). Samuel Kamakau described the central plain as covered in ʻilima plants, confirming the place name. Near the mouth of Wailuku Stream sand was "lithified" into permanent sand hills. To the South, closer to Māʻalaea where the winds begin to lose pressure, loose sand formed large moving dunes 30 or 40 feet high, before the days of commercial farming. At that time, Kamaʻomaʻo was also a dry place, where spirits roamed.

An 1854 description by George Washington Bates in *Sandwich Island Notes* is excerpted by Elspeth Sterling in Sites of Maui. It educates us about Kamaʻomaʻo topography right before commercial agriculture began:

> [*coming from Lahaina*] This mountain region once passed (the Pali) the traveler enters on the plain or isthmus of Kula. It is a sandy alluvial, constantly changing the configuration of its surface beneath the action of heavy winds. This neck of land has a gradual elevation from the seashore on the southwest, to nearly two hundred feet on the northeast, in the region of Wailuku. In extent it is seven miles by twelve. During three-fourths of the year it forms a fine pasture-land for hundreds of cattle that range over its surface. It is not fit for cultivation.

William Henry Cornwell and Claus Spreckles gambled that the land would support commercial agriculture if water could be supplied from the streams of Nā Wai Ehā.

The study property does not seem geographically strategic enough that it would have made a good fortified lookout, and not prominent enough for firebrand signaling. Peaks above the property may have served these needs. The gusting Kokololio wind gallops over the slight crest of Puhiawaawa, building pressure before it side slips down the northern wall of Waikapū Valley. Near noon on Trade Wind days, from Puhiawaawa one watches the cloud lei of Haleakalā forming into a great thick trail to the West. Visible also is "ka puka lani," a rather stationary hole in the cloud billows condensing and swirling up Haleakala's northeastern-facing flanks. At this distance, the sea looks a paler blue, and ʻehukai causes the shoreline to glow. Puhiawaawa has an unobstructed view of the Haleakalā's kuahiwi silhouetted against the sky. Above Kūʻau, the legendary puʻu of Kauhikoa and Kokomo are visible, as is the full summit and many puʻu above the southwest rift zone.

Before rains come, “pig-shaped” clouds “ka‘i” process single file over the central plains, and sometimes, on a calm morning a few small wispy clouds sit almost stationary above Red Hill in the ahupua‘a of Waiohuli, Kula Moku.

Although there is a lot to see from Puhiawaawa, the place was distant from the reviving streams of Kāne or any known punawai or artesian springs. Two natural gulches that appear on old maps were dry except for freshets and flash floods. Lacking a permanent water source, the land may have been cultivated in sweet potato during wet winter months. Even so, it would have been a long hike to cultivate and pu‘e ‘uala every few days. The mahi ‘uala tended the field by loosening the soil around each plant, and as the runner vines grew, winding winding them around the plant and covering them with soil. Each plant was built into a mound, where all the potatoes matured. This process facilitated harvest, because all the tubers were under the plant, and harvest could be staggered, leaving some ‘ulala in the ground for later use.

Another observation that would indicate Puhiawaawa was not choice farm land is the absence of rock walls in property descriptions at the time of the Māhele. In farmlands, one would expect to find walls, which were necessary because there were so many wandering pipi. Cattle belonged to the King and until the 1830s were kapu. The farmer’s only defense was to build walls to keep them out of his patches.

The ‘ili mauka of Puahiawaawa is named ‘Āwikiwiki for an endemic thin, climbing vine with cultivars still growing on Maui, O‘ahu and Kaua‘i. This hearty vine will grow from seed and climb fences, arbors. I can also be used as a ground cover. The small flowers are bright purple.

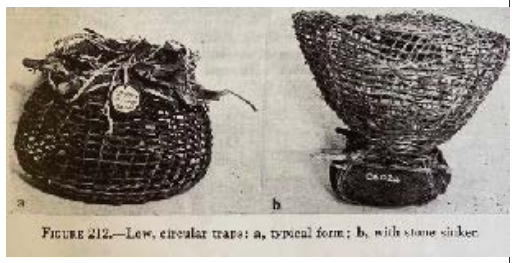


FIGURE 212.—Low, circular traps: a, typical form; b, with stone sinker.

‘Āwikiwiki was used to make small hina‘i, temporary fish traps used to catch ‘ōpae and small fish in mountain streams. I did not hike up through ‘Āwikiwiki to see if the vines still grow there. And don’t know if these traps are still used on Maui, but the baskets on the left, posted on pinterest.com are very similar to those described by Bishop Museum’s Te Rangi Hiroa in *Arts and Crafts of Hawai’i*, page 313.

Otherwise, the study land did not have desirable sites for hale, and there are no mentions of cultural resources on the study property itself.

Here, the sun rises from behind Haleakalā, as does the moon and stars. Kilo hōkū ho‘okele track star courses from horizon to horizon. In Puhiawaawa and ‘Āwikiwiki, stars, hōkū pa‘a planets and constellations would be identified by where they first appear along the (bumpy ridge line of a mountain) of Haleakalā and disappear behind Pu‘ukukui, defining time and season with accuracy. Today the lights of Pukalani and Kula are night features, but the light pollution is not enough to obscure the heavens.

The study parcel is part of Land Commission Award 326 and Royal Patent 7659 issued to William Humphreys in 1849, just one of 92 awards in the Waikapū area. Much of the Waikapū land not awarded in kuleana or grants was sold to William H. Cornwell in the early 1850s. In 1875 Wailuku Sugar Company consolidated sugar lands in the Waikapū and Wailuku areas. Wailuku Sugar Co. can document that the study land was cultivated continuously for 120 years as cane fields, until in 1988. At that time, Wailuku Agribusiness (a succeeding company of former Wailuku Sugar Co.) diversified and planted the property in pineapple for 16 years, until 2005. At that time, the property was sold to Towne Realty and it has been fallow since.

Formal Wailuku Moku Histories

The history of Wailuku area was elegantly reported in an archaeological report on this parcel by Ericksen & Ericksen in 2004.

A 2020 Kahului Draft EA for renovation of Maui High School, by Cultural Surveys Hawai‘i also records the history of Wailuku. See Appendix.

A detailed history of Waikapū was researched and chronicled by Jill Engledow of Maui Island Press for Mike Atherton in 2009.

Hōkūao Pellegrino, former Director of Maui Historical Society (Bailey House Museum), President of Nā Wai Ehā and educator at Kamehameha Schools has written a cultural history of his family's lo'i land in Waikapū and a comprehensive history of Nā Wai Ehā area that is available on the Maui Historical Society website. Copies are provided in the Appendix.

The purpose of this study is to document the history and cultural knowledge and practices connected to this small parcel and nearby areas. If possible, this study will provide additive to previously published histories and elaborate on cultural fragments that pertain to the study parcel. The larger context and specifics help encourage and promote respectful and careful stewardship of the land.

General Cultural Aspects of Hawaiian History

The Hawaiian Islands were colonized by Polynesians via Sāmoa, and the Marquesas between 800 and 1100 AD. Each brought versions of their Polynesian beliefs and ways of living. The *Kumulipo* Chant emphasizes the one-ness of creation—sky, land, sea, and people. The people descend from the taro plant and plants and animals share body forms on land and in the sea. The Kumu Lipo chant, which takes many hours to recite, documents creation and the genealogy of Hawaiian Ulu and Nanaulu lines of Ali'i. Connectedness is a cornerstone of Polynesian tradition.

The *History of Kanalu* is another chant passed down last to B.K. Nāmakaokeahi. This history of the Hawaiian people focuses on another mea nui or foundational value of Hawai'i: Kuleana, a duty and responsibility to carry on traditions and grow the lāhui or "nation." Generations of Hawaiian colonizers sustained their families, cared for the land and its resources, handed down their traditions through mentoring and preserved their heritage for coming generations.

Polynesia began with families, 'ohana, under the primogeniture authority of head men or haku. Family members gave their authority to the head man, who shared leadership with a priest. Later in the 10th century, Tahitian Ari'i and priests colonized Hawaii, importing their ahupua'a system of governance, and their kapu laws enforced by the divine ali'i, who traced their genealogies back to the gods. This blended culture controlled and conserved sky, land, sea and kānaka in Hawai'i for six centuries, through the reign of Kamehameha the Great, who died in 1819. Practice of culture is as diverse and inspired as the many storied places of Hawai'i, but the driving values are consistent, and fully resonant both the honua (earthly) and lewalani (spiritual) realms.

The constitutional monarchy of Hawai'i, adopted under the pressures of foreign trade, immigrants and the industrial revolution, threatened Hawaiian beliefs, and interfered with the practice of traditional culture. Many kūpuna who were sources of the old ways died in epidemics in Kingdom times. Social pressure by high chiefs to adopt Western ways drew Hawaiians away from farming. They sailed on Western vessels, and worked on sugar plantations. Farming and fishing families got smaller. Patches went fallow.

The practice of traditions in the public arena were restricted. Kūpuna kept traditions alive in their homes and gardens. Hawaiian churches used their native tongue in worship services and provided safe gathering places practice of culture. Kumu hula preserved mele, dress and percussion instruments. They taught hula spiritual protocol to their students. Watermen and "beach boys" kept paddling and surfing alive. But by the 1960s, so few mānaleo native

speakers were still living that the Hawaiian language and culture was within one generation of extinction.

The Hawaiian archipelago had always been connected by ka moana to all the distant lands of the earth. Loss of voyaging traditions in about 1300 had isolated Hawai'i until these skills were restored by young Hawaiian watermen, beginning in the 1970s. Four decades of cultural revival has followed, a kuleana begun by King Kalākaua and Ka Hale Nāua, Hawaiian Royal Orders and Civic Clubs and innumerable kumu, kilo and kāhuna. Now young Hawaiian speakers are building upon the Hawaiian culture they learned: language, chant, music, literature, art, engineering and science.

In 1843, on the steps of Kawaiaha'o Church in Honolulu, Kauikeaouli Kamehameha III chose the word "ea" to proclaim the sovereignty of the Hawaiian Kingdom, "Ua mau ka ea o ka 'āina i ka pono." "Ea" does not refer to laws or royal protocol. It speaks of the life, spirit and independence of ka 'āina, resident in balanced Hawaiian culture. Hawaiian ways, Ka nohona Hawai'i, require cooperation, knowledge and skill. Maui cultural norms value determination, alertness, righteousness, precision, practiced skills, intelligent decision-making, resource management, conflict resolution, crisis management and endurance. All of these seriously important goals may be attained by practicing one's skills with laughter or tears. Maui people work hard with joy.

The 'ohana of Maui interconnect many ways. Nuclear family extends to neighboring and distant family, co-workers, and community, like ripples in a pond (Personal Communication Randy Piltz). Interconnection, communication and cooperative work projects of the past are treasured, like the building the great earthworks of heiau, irrigate their patches, and voyage to other islands and nations. As Maui people feed their families, complete daily chores, share windfalls, survive disasters and keep the peace, and balance decisions to honor the past and protect the future. The kuleana to keep the lāhui and the culture growing is in good hands.

VI. Cultural Significance of Wailuku-Waikapū Area

One of five heavily settled areas of Maui outlined by Handy, Handy & Pukui was Nā Wai Ehā in Wailuku, where a large population thrived alongside the Waihe'e, Waiehu, 'Īao and Waikapū streams. The 'ili of Puhiawaawa is two miles South of 'Īao Valley, and one mile North of Waikapū Valley on the West Maui Mountain foothills, overlooking Kama'oma'o plain. The name is not interpreted in the literature, and without the mo'olelo of the place, it is not possible to interpret the name. The historical record preserves the name of one small village between Puhiawaawa and Wailuku called Hapoi that was a kauhale on the Alexander 1885 map and a plantation camp on a later Wailuku Sugar Company 1937 map.

The area of Wailuku ahupua'a adjacent to 'Īao Valley was a seat governance for many Maui ruling chiefs, and the famous Kahekilinui'ahumanu, Kahekili II, an 18th century high chief known for his military prowess and a commanding appearance, with his right side tattooed solid black. His royal hale were in Wailuku. The Waiakamakeha heiau, now the site of Ka'ahumanu Church, was near Kahekili's hale. The Pīhana-Haleki'i heiau complex further west in Paukūkalo, is one of the largest heiau in the world. It consists of a terraced luakini and Hale Ki'i, which is interpreted as a heiau papa. Both guard the mouth of 'Īao valley stronghold. Deep in 'Īao Valley, the ancient dynasties of Hawaiian kings were buried, from Kapawa in the 11th century, to Kalanikuihonoikamoku in 1736.

Because Hāna is geographically separated from the larger settlements of Wailuku, Lāhainā and Honuaʻula, control of Hāna swapped back and forth for centuries —between the high chiefs of Maui and Hawaiʻi. All the battles for Hāna, though historically important, could be described as skirmishes compared to the invasion of Maui in 1790, by Kamehameha the Great.

Unification of Maui rule by High Chief Piʻilani in the late 15th century ushered in a period prosperity and peace. Among his numerous earthworks are the rebuilding of Piʻilanihale Heiau in Hāna and construction of the Alaloa footpath circumventing the entire island by his son, Kihapiʻilani. His daughter Piʻikea was defied in the form of Kihawahine, a moʻo protectress of fresh groundwaters and feather goddess of high chiefesses, Kalola and Keōpūolani.

Expansion of farming into leeward areas came with the introduction of the sweet potato to Hawaiʻi from Peru around 1350. By the 18th century, when Maui and Oʻahu were ruled by Kamehamehanui and Kahekili II, increased wealth and population lit the fires of conquest. The result was nearly a century of wars among high chiefs of Hawaiʻi, Maui and Oʻahu.

Several battles took place on the plains of Kamaʻomaʻo and sand hills of Wailuku, to the Northeast of this study parcel. Both the "Kakanilua" conflict in 1776 and "Kepaniwai," Kamehameha's first conquest of Maui in 1790, describe troops moving across the length of Mauiʻs central plain. It is possible that remains of fallen warriors or battle artifacts may be unearthed when sub-surface sandy soils of Wailuku moku are disturbed. Information on specific battles recounted in Hawaiian literature is presented below.

VII. ʻŌlelo Noʻeau Collected by Mary Kawena Pukui that Refer to the Study Area

#11 - "Ahulau ka Piʻipiʻi i Kakanilua," *a slaughter of the Piʻipiʻi at Kakanilua.*

Any great slaughter is compared to the utter destruction of the Piʻipiʻi lau of expert warriors lost in the sand dunes of Wailuku.

#1465 - "Ka makani Kokololio o Waikapū" *The swift, gusty winds of Waikapū.*

1473 - "Ka malu ao o nā pali kapu o Kakaʻe" *The cloud shelter of the sacred cliffs of Kakaʻe.*

#1481 - "Kamaʻomaʻo, ka ʻāina huli hana" *At Kamaʻomaʻo, land activities.*

1710 - "Ke ʻinana la me he ʻōpae ʻoehaʻa" *Active like freshwater shrimp*

Said of scattered warriors who climb up rocks and hillsides to escape death.

#1711 - "Ke inu akula paha aʻu ʻĀlapa i ka wai o Wailuku," *My Ālapa warriors must now be drinking the water of Wailuku.*

A remark by Kalaniōpuʻu to his wife Kaloa and son Kiwalaʻo before his soldiers were utterly destroyed by Kahekili at Kakanilua.

#1722 - "Ke kai holu o Kahului." *The swaying seas of Kahului.*

#2300 - "Nā Wai ʻEhā," *The Four Waters.*

The four streams of windward West Maui are Waikapū, Wailuku, Waiehu, and Waiheʻe.

#2647 -"Pili ka hanu o Wailuku," *Wailuku holds its breath (from fear or cold).*

A word play on "luku" which means destruction.

#2911 - "Waikapū i ka makani Kokololio" *Waikapū in the gusty wind.*

#2912 - "Wailuku i ka malu he kuawa" *Wailuku in the shelter — a valley*.

#2923 - "Wehe i ka mākāhā i komo iʻa." *Open the sluice gate so fish may enter.*

A prophecy by Kaleopuʻupuʻu, kahuna of Kahekili, regarding the 1776 invasion by Kalaniopuʻu. This saying applies to any strategy for trapping an enemy.

VIII. Place names in the Study Area	Meanings (Pukui & Elbert or literal)
Āwākamanu ʻili	noisy bird
ʻĀwikiwiki ʻili	a vine related to *maunaloa* used to make temporary fish traps
Hopoi village (Hapoi)	moʻolelo unknown; also a Plantation Camp
Kalapaokaʻilio ridge	the ridge of the dog
Kahoʻi ʻili	the return; or Kāhoi, an interjection, "Surprise"
Kapaʻanui	unknown; possibly "Big foundation"
Kapalaʻalaea	a smudge or kapa print of ʻalaea dye
Kapilau Ridge	the stench
Lapaleihua Ridge	fruit lei ridge
Makani lawe malie wind	Wind that takes it easy — wind of Waikapū
Papakapu ʻili	forbidden flats
Papōhaku ʻili	stone field
Pōhākoʻi small village	adze rock; permanent rock cliff or obstruction
Pōhakuloa ʻili	long rock
Pualiwaʻapauʻili	moʻolelo unknown; possibly "completed war canoe"
Puhiawaawa ʻili	unknown; moʻolelo not found.
Puʻu Lio peak	horse hill
Puʻu Hele (*former Māʻalaea landmark*)	walking hill; (associated with a moʻo)
Waiehu stream and land section	spraying waters
Waiheʻe stream and land section	sliding waters
Waikapū river and land section	waters [of] the conch
Wailuku stream and land section	waters of destruction

IX. Battles For Control of Maui

High Chief Kalaniopuʻu Raids on Maui 1775-6

Samuel Kamakau chronicled many 18th century battles for the rule of Maui. Most prominent are the battles for Maui between the heirs of King Kekaulike in 1738. These conflicts all took place on the Lāhainā side of West Maui.* This war put Kamehamehanui in firm control until his younger brother Kahekili II took reign in 1767.

Rule of Hāna switched intermittently between Maui and Hawai‘i high chiefs, but Kalaniopu‘u started earnest skirmishes to take the rest of Maui starting in 1752. A later raid on Kaupō in 1775 was driven back by Kahekili’s forces and Hawai‘i retreated in their canoes from Kalaeoka‘ilio in Kaupō. In 1776, Kalaniopu‘u tried landing at Mā‘alaea, but his complete force was ambushed and destroyed by Kahekili warriors in the dunes and sand hills as they were approaching Wailuku. Battles like these caused iwi, burials and artifacts to be deposited in the sandy soils of Wailuku ahupua‘a:

> When Kahekili heard of the fighting at Honua‘ula, he got his forces together—chiefs, fighting men, and left-handed warriors whose slingshots missed not a hair of the head or a blade of grass. … Kalaniopu‘u landed his forces before noon, a great multitude filling the land from Kīheipuko‘a at Kealia to Kapa‘ahu, all eager with the thought that the ‘Ālapa were to drink of the waters of Wailuku. Across the plains of Pu‘u‘ainakō and Kama‘oma‘o shown the feather cloaks of the soldiers…
>
> Kahekili was at Kalanihale just below Kihahale and above the plateau of Ka‘ilipoe at Pōhauokahi. …Like a dark cloud hovering over the ‘Ālapa, rose the destroying host of Kahekili seaward of the Sandhills of Kahului, the “smoke head” Po‘oahi and the “red coconut” Niu‘ula divisions. They slew the ‘Alapa at the southeast of Kalua.

Mo‘olelo of eyewitness survivors of Kakanilua and Kamehameha‘s 1790 invasion of Maui were published serials in “Ka Nūpepa Kū ‘Oko‘ā’’ Hawaiian Language nūpepa. Later, that information was published in book form by Kamehameha Schools Press as *Ke Aupuni Mō‘ī.* Other primary sources were collected from kūpuna by a team of Hawaiian scholars and preserved by a Circuit Judge for the Hawaiian Kingdom, Abraham Fornander in 1872. Yet another Hawaiian language resource for Hawaiian military history was written by Reverend Stephen L. Desha and translated by Francis N. Frazier in *Kamehameha and His Warrior Kekūhaupi‘o* in 2000.

The young warriors, Kamehameha Pai‘ea and Kekūhaupi‘o fought together against Maui armies in early skirmishes. In 1790, they again invaded when Kahekili was on O‘ahu. This time, they avoided the Wailuku sand hills and attacked from the North. Also, the maka‘āinana had grown to love Kamehameha‘s younger brother, Keli‘imaika‘i, who was once exiled in Hāna. These historical events played into Kamehameha’s victory on Maui.

*Note that the Pu‘unēnē village mentioned in Kamakau’s account of this battle is not in Pu‘ali Komohana, but in Kā‘anapali Moku, Mailepai Ahupua‘a.

Ke Pani Wai Invasion of Maui by Kamehameha the Great - September, 1790

Armed with muskets from Canton and a single copper bulwark cannon from *The Fair American* sloop, Kamehameha set out with some 800 war canoes and 10,800 warriors to conquer Maui, which was under the rule of King Kahekili. At the time, Kahekili was on O‘ahu, so his sons, High Chiefs Kalanikūpule and Koalaukani with High War Chief Kamohomoho, defended Maui with a force of 12,400 warriors.

Wailuku was the prize, with it’s great heiau of Hale Ki‘i, birthplace of Maui‘s highest kapu chiefess Kalola, and the sprawling terraces of Pīhana luakini protecting the sacred ‘Īao Valley where many generations of high chiefs were laid to rest.

Kamehameha first landed at Hāna, where the people put up no defense, and suffered no pillage. Then, he dispatched a small division to march by land to Hamakualoa, flanked by his huge flotilla of canoes, cruising in the westerly currents. At Kokomo, champions Kamehameha and Kapakahili of Maui faced off for control of the sacred ‘Olopū adze, and Kamehameha was victorious. After Kokomo, he consulted his feather god, Kūka‘ilimoku and received a favorable sign. The next day, all Kamehameha’s canoes proceeded to round Kū‘au point, and fly downwind *en masse* into Kahului Bay. Landed canoes and warriors filled the beaches from Papa‘u Point at Kanahā to Hopukoa in Waihe‘e!

After ordering his troops to remove of the iako and bake the wa‘a hulls in the sun, from atop the beach end of the Wailuku Sandhills, Kamehameha delivered this famous command to his troops, “ I mua e nā pōki‘i a inu i ka wai ‘awa‘awa ‘a‘ole hope e ho‘i aku ai,” *“Forward my precious brothers, to drink the the bitter water; afterward, there is no returning.”* Kamehameha remembered the humiliating retreat from Kalaeoka‘ilio years earlier and by his actions and this proclamation, his warriors understood that victory was their only option.

The night before the first battle commenced, Kamehameha troops initiated a skirmish at Waihe‘e, and burned down that village with flaming arrows. Hawaii troops then garrisoned the escape route to Waihe‘e Valley. Early the next morning, Hawai‘i met Maui on the Wailuku plains and fought for two days until Maui retreated. Some of this fighting may have taken place in the Kahului area, but most occurred in the sand hills.

After an engagement at Waikapū, the Maui forces retreated into the stronghold of ‘Īao Valley. It is possible that some of the fighting was on or near the Study Parcel.

What Maui expected would be a stronghold became a death trap. Hawai‘i troops not only pushed the battle uphill, but the canon and muskets of Kamehameha wreaked destruction behind the front lines, scattering the Maui warriors. Hawai‘i prevailed and many lives were lost. One name for this battle describes the Maui warriors seeking to escape by clawing up the steep valley walls, “Kauwa‘upali,” the other refers to the many corpses damming the Wailuku River, causing its blood-stained water to flow uphill, “Kepaniwai.” From that time, Maui women worked the fields, cooked the food, and paid taxes to the chiefs because there were so few adult men left.

As history shows, Kamehameha’s decision to attack from the north and avoid the dunes of Kama‘oma‘o was wise. His innovation of using western muskets and a single six-pounder copper canon to penetrate Maui’s battle line allowed his kāua to succeed despite the topographical and geological advantages of the ‘Īao stronghold and his army being outnumbered. The strategy was later replayed on O‘ahu at Nu‘uanu with the same destructive results.

With so many days of fighting with spears, sling stones, arrows, tripping clubs, daggers, garrotes, clubs, lei manō, musket shot and canon balls, one might wonder why these artifacts are so rare. Unlike modern armies, Hawaiian koa crafted their own weapons. Therefore, after battle, it was common practice for the victors to gather up all weapons and ammunition for future use.

In the 1960s a former owner of Sun Motors in Wailuku found a 6-pound cannon ball in the dune behind his car lot, which is now on display at the Maui Historical society. (Personal communication Terry Wallace, 1993.)

After Kamehameha took Maui, he followed the Maui royalty fleeing to Moloka‘i with the intention to take Kalola‘s most sacred kapu granddaughter, Keopuolani as his wife. Kalola was ill, and asked that her daughter and granddaughter remain with her until her death. In a short

time, Keopuolani, her mother, Kekuiapoiwa Liliha and aunt Kalanikauiokokilo Kalanikua were with Kamehameha.

This union brought Kamehameha under the protection of the, the most revered feather god of Queen Keōpūolani, Kihawahine. Kihawahine is a Moʻo, protectress of ground water that appears as a large black spiritual lizard. Hawaiians know that underground fresh water in their islands flows from a deep source. The moʻo guard these important springs, ponds and water courses. We see moʻo in the silhouettes of our mountain ridges rolling down to the sea. They resemble the profiles of huge dark moʻo, with heads looking out to sea.

X. Heiau Sites Recorded for Wailuku

Winslow Walker visited Maui in the 1930s to inventory all the cultural sites recorded by Stokes. A copy of his hand-written notes from SHPD Archives was reviewed for this study and compared to the heiau lists reported by Thrum. Other than the Waiakamakaeha heiau, destroyed before Kaʻahumanu Church was built, and two Waikapū heiau also destroyed, the only other Wailuku heiau still visible at the time of Walker's study was the majestic Pīhana-Halekiʻi complex.

XI. Puhiawaawa and ʻĀwikiwiki - The Great Mahele of 1848, and The Kuleana Act of 1850

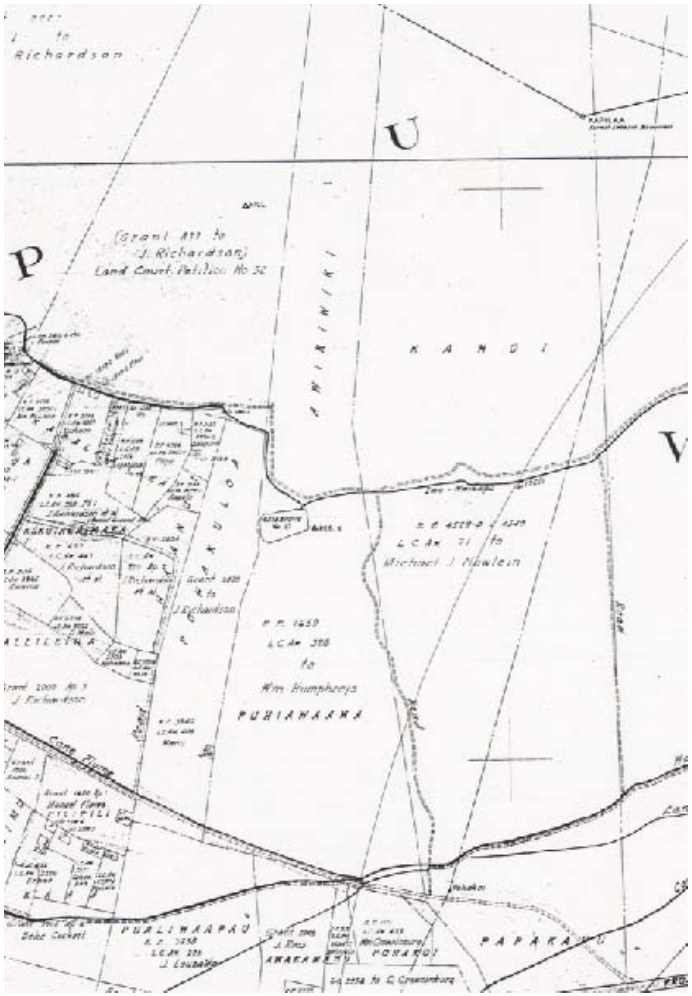
At The Mahele, Wailuku and Waikapū were assigned to King Kauikeaouli Kamehameha III. ʻIli in ʻĪao Valley went to Hazeleponi Kalama. Nā Wai ʻEhā was so heavily cultivated that over 540 kuleana land claims were awarded in Wailuku, and 92 more in Waikapū. The Kingdom of Hawaii assigned Wailuku and Waikapū as crown lands, and Waikapū was specifically set aside for the benefit of the public school system begun by the American Board of Commissions for Foreign Missions (ABCFM) missionary schools.

The boundary between Wailuku and Waikapū was not surveyed until 1851 by Edward Bailey. For this reason, early historical records sometimes place the study area Wailuku, and other times Waikapū. Early boundary accounts describe an Pōhakoʻi "Adz Boulder" that marked the boundary.

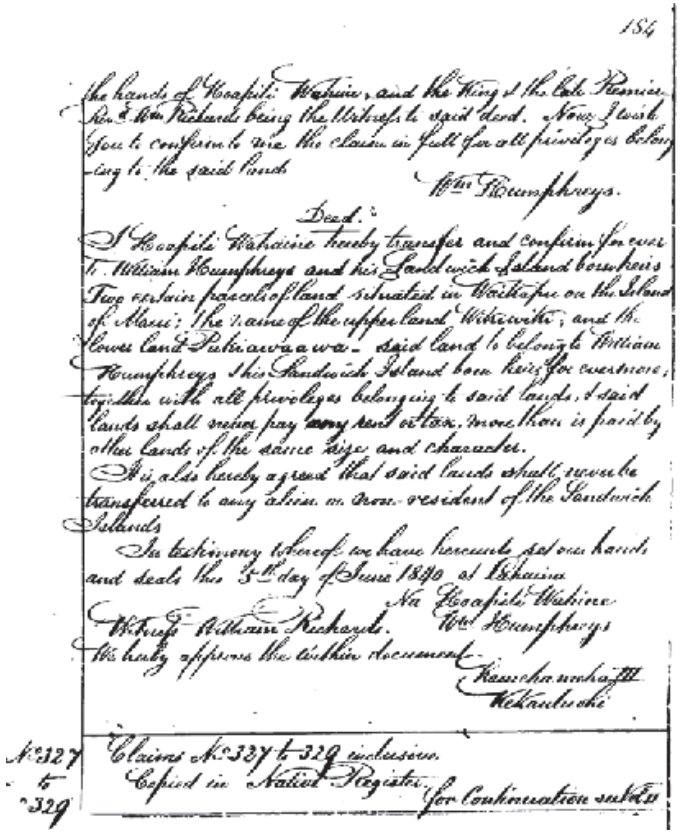
As a professional surveyor, Bailey suggested that Waikapū lands be divided into eight hui of 1,000 acres each for the people of Waikapū. He explained that remaining lands were in high country (on the steep inclines of the Weat Maui Mountains which the farmers didn't want), or the bare sands of the commons were less useful. Therefore, he suggested they could be offered at one dollar an acre.

After the boundary was formally established, Waikapū lands that were not already awarded as kuleana could be sold. William Henry Cornwell bought them all and the proceeds, a little over $15,000, funded the Department of Public Instruction of the Hawaiian Kingdom, for the support of public schools. *Edward Bailey*, p.195. Cornwell later resold them to Claus Spreckles in 1875.

The Study Parcel lands were part of LCA 326 (Royal patent 7689) awarded to William Humphreys in 1849. It included lowland ʻili of Puhiawaawa and adjacent upland ʻili ʻĀwikiwiki (also "Wikiwki"). The grant contained no separate kuleana parcels. See Appendix for Palapala.



Section of Bruce 1937 Map of Wailuku Sugar Company Plantation, showing Māhele awards, ʻili, roads, irrigation ditches, Reservoir No.10, and a cane flume next to Old Waikapū Road.



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the hands of Hoapili Wahine, and the King & the Chief Premier Rev. Wm Richards being the Witness to said deed. Now I wish you to confirm to me the claim in full for all privileges belonging to the said lands

Wm Humphreys.

Deed:

I Hoapili Wahaine hereby transfer and confirm for ever to William Humphreys and his heirs in Sandwich Islands bornheirs Two certain parcels of land situated in Waikapu on the Island of Maui: The name of the upper land Wikiwiki, and the lower land Puhiawaawa - said land to belong to William Humphreys this Sandwich Island born heirs for evermore, together with all privileges belonging to said lands, & said lands shall never pay any rent or tax, more than is paid by other lands of the same size and character.

It is also hereby agreed that said lands shall never be transferred to any alien or non-resident of the Sandwich Islands

In testimony whereof we have hereunto set our hands and seals this 5th day of June 1840 at Waikapu

Na Hoapili Wahine

Witness William Richards. Wm Humphreys

We hereby approve the within document

Kamehameha III
Kekauonohi

No 327 to 329

Claims No 327 to 329 inclusive.
Copied in Native Register. for Continuation see Vol 11

Hoapili Wahine gave stewardship of these two ‘ili to William Humphreys in 1840, well before the Mahele. In 1849 Humpheys submitted a Māhele claim to the Land Commission of the Hawaiian Kingdom. He produced a deed issued June 5th, 1840 witnessed by William Richards and certified by Kamehameha III.

The deed was hand copied into the register of land claims, according to practices of that era. Witness William Richards, was a member of the Privy Council. The notes by Kingdom surveyor T. (Theophilus) Metcalf refer to refer to a watercourse on or near the Louzada parcel on the flats below Puhiawaawa serving Io‘i in that area, but no mention of any water or cultivated patches on the Humphreys’ parcel. In addition, the only stone walls noted were on the

boundary of Pōhakuloa ‘ili, controlled by Croninburg. a Hala tree was mentioned as a boundary marker, so hala may have been grown and gathered in this area.

This is a list of LCA award properties that abutted the Humphreys land.

LCA/RP	‘Ili Name	Awardee
1. 71/4529	Kahoi	Michael J. Nowlein
2. Grant 2070	Pōhakuloa.	William Richards 5228
3. 408/3540.	Pōhakuloa	Manu
4. 225/7658.	Pualiwa‘apau	J. Louzado
5. Grant 2953	Pualiwa‘apau.	W.R. Brown
6. Grant 2005.	Āwākamanu	J. Ross
7. 3201:2/2775	Āwākamanu	William Archibald McLane
8. 3525/3121	Āwākamanu	Kelilela
9. 4433/1111	Pōhakoi	William Croninburg
10. Grant 2952	Pōhakoi	William Croninburg

These land grants and awards for fee simple ownership were at a time when sugar promised to be an economic boom for Hawai‘i. Until this time, traditional methods of food and subsistence farming (somewhat like southern share cropping) were the norm. The Hawaiian starch staples were kalo (taro), ‘uala (sweet potato), ‘ulu (breadfruit) pia (arrowroot) and mai‘a (banana). Some haole vegetables like Irish potato, onions, pumpkins and oranges were grown for provisioning Whaling ships and later for export to California during the Gold Rush, but after 1850, kō (sugar) was the big cash crop on Maui.

XII. Sugar Plantations in Wailuku

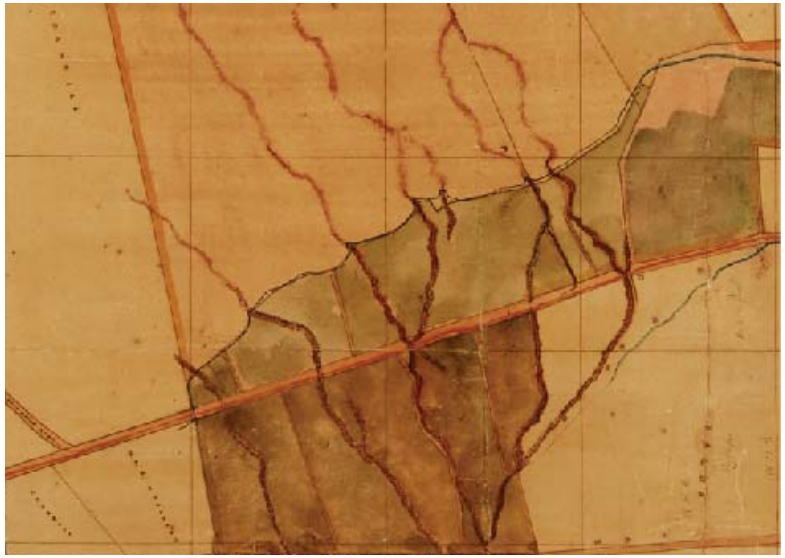
Bailey Sugar Plantation

Edward Bailey’s claim for 420 acres in Wailuku was also awarded. He expanded the small fields he had been growing near the Wailuku Seminary. He referred to “the plain being lost” to Spreckles and the people being “pīhoihoi” upset about it. Claus Spreckles cut a deal with Kamehameha III Kauikeaouli for a grant of some 10,000 acres of Wailuku Commons land, to which he added another six thousand and Hawai‘i Commercial and Sugar Company (HC&S) was born.

In 1866, E. Bailey & Sons Plantation began growing sugar cane on West Maui kula fields that stretched south to the Nowlein land in Kaho‘i. In 1870, Edward sold out to his son William H. Bailey, who later in 1879, sold the lands to Wailuku Sugar Company and succeeded Captain Wilfong as Plantation Manager.

This hand drawn map by Bailey in 1837 shows his cultivated fields in faded green. Courtesy, State of Hawai‘i Judiciary Museum 2021.

This section map section shows the extent of the Bailey Plantation fields, along the north and south sides of High Street, as far as Cornwell land. On the left is where the Old Waikapū Road forks off. The dark line along the upper edge of the fields is the extension of the Kama ʻauwai that sparked a landmark water rights dispute between Wailuku kalo farmer, Peck v. Bailey.



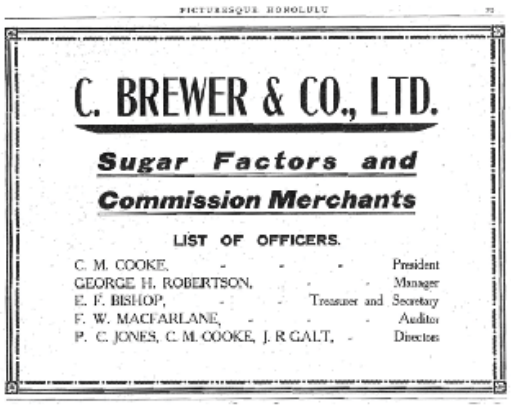
Photograph by Brian Suda Photography, Honolulu. Courtesy of The Stat of Hawaii Judicial Museum

Bailey Plantation lands were on the foothills above the government road (High Street) and below the road on the flat Kamaʻomaʻo plain.

This 1837 map shows all the structures in Wailuku Town at that time — the Bailey home and Seminary, The Alexander home, Kuihelani home and others. Kaʻahumanu Church is labeled "Native Church," distinct from the "Foreign Church" downhill and south on the government road, (High Street).ʻAuwai and water channels are drawn in blue.

C. Brewer & Company, Ltd.

In 1926, C. Brewer & Co., the oldest of Hawaiʻi's "Big Five" companies, was founded in Honolulu. Their business was "Sugar Factors and Commission Merchants," middlemen between growers, millers and retail outlets. The company was always diversified—trading, whaling, agriculture consulting, real estate, stevedoring, trucking, nutraceuticals, Hawaii's Own frozen Juices, and Kilauea Agronomics guava orchards. Eventually, they would hold 20,000 acres of sugar in Wailuku, Waikapū and Māʻalaea, in addition to Mauna Loa Chocolate Company and Hawaiian Isles Kona Coffee Company on Hawaii island.


PICTURESQUE HONOLULU

C. BREWER & CO., LTD.

Sugar Factors and Commission Merchants

LIST OF OFFICERS.

C. M. COOKE, - - - President
GEORGE H. ROBERTSON, - - Manager
E. F. BISHOP, - - Treasurer and Secretary
F. W. MACFARLANE, - - - Auditor
P. C. JONES, C. M. COOKE, J. R GALT, - Directors

Charles Brewer arrived in Hawai‘i in the 1820s and commanded commercial ships for Henry A. Pierce and James Hunnewell, trading with China and Russia. He became a partner in 1835 in the general merchandise and commission business in Honolulu. When Pierce retired in 1843, Brewer brought in his nephew, “Charles Brewer 2nd.” In 1845, the company merged with Marshall and Johnson and in 1847 Uncle Charles retired to Boston.

In 1859, young Charles Brewer 2nd and a new partner, Sherman Peck, took over the business, and changed the name to C. Brewer & Co. Their entrance into Maui sugar was by becoming an agent for the Makawao Plantation.

Sugar was just taking off in 1863, when C. Brewer acquired holdings in in the newly operational Wailuku Plantation. Then in 1871, banker Peter Cushman Jones was made a partner, and the company continued to prosper, acquiring both the Waihe‘e and Waikapū sugar companies over the next 22 years.

The Reciprocity Act of 1877, processing innovations, harbor development and the Kahului RR system created a thriving sugar industry in Hawaii. Wailuku Sugar Company incorporated in 1883, with Jones as President and Manager. By the 1920s, this mid-size wholly-owned subsidiary of C. Brewer & Co.Ltd. was was producing 20,000 tons of sugar annually. After a great run, C. Brewer & Co. refocused their business goals. In 1984. Wailuku Sugar became Wailuku Agribusiness, and in 1988, fields in the foothills of the West Maui Mountains were growing pineapple instead of sugar. This shift included the study property.

Wailuku Sugar Company

The study property was planted in sugar in 1882, when irrigation infrastructure was brought to these high kula lands by the Everett Ditch from Waikapū Stream. In 1908, the ‘Īao-Waikapu Ditch brought in more water from the Wailuku River. Both watercourses terminated at Reservoir # 10, above the study property. The Everett Ditch was shut down in 1970s, but the ‘Īao-Waikapu Ditch still flows to this reservoir. When the reservoir was expanded in 1966, an

overflow ditch was constructed from the southeast corner of the reservoir down a natural gully to the Waihe‘e Ditch, which runs north to south through the Central Plain.

The sugar cane that Wailuku Water Company and East Maui Irrigation ditch systems supplied is gone and the State of Hawaii and County of Maui are reimagining how public water will be conserved and managed as a public trust for the future. No historic ditches, wells, tanks or pumps are located on the study parcel . The only vestiges of commercial farm irrigation are pineapple drip line fragments and old pieces of PVC pipe. But one may still see the berms that kept irrigation water from running off the fields.

How Berms Aided Irrigation

In plantation days, inclined fields like those on the study property and all along the West Maui alluvial foothills were planted along contour lines. Depending on the incline, earth berms along contour lines were built to slow the downhill flow of both irrigation water and storm runoff. The clay and alluvial rubble soils of Central Maui foothills are less prone to erosion than humus soils, so the planters could employ low-labor field “flooding” methods of intermittent irrigation. The remnants of the system are described and analyzed by Jon Wilson and Michael E. Dega in their archaeological inventory of the larger parcel, TMK (2) 3-5-02:02 and 03.

Fig. 18. The border method at Eva Plantation Company. This system of applying water has resulted in phenomenal savings in the labor of irrigating. (Photograph by Covell, Honolulu.)

This image from Wadsworth, in *History Summary of Irrigation in Hawaii,* shows bermed, inclined fields being flooded from the top. Each area between the berms or “terrace” is canted to a border channel that drains water to the next lower terrace. This example photographed at Eva Plantation in O‘ahu, explains the bermed appearance of the fields on the study property and how the berms aided the flooding method of gravity irrigation.

Sugar harvested from the study property was processed at Wailuku Sugar Mill, in Wailuku on Mill Street, between the sand hills. This image shows the mill in 1865. The cane was hauled to the mill by teamsters — large wagons pulled by teams of horses.

Another historical feature nearby the Kuikahi Affordable Community project property is the Old Waikapū Road, used heavily used in plantation days. According to the 1937 Bruce map of Wailuku Sugar Plantation, a cane flume beside this road. The flume used Waikapū Stream water to push cut cane downhill like a water slide. At the lower end, cane was loaded onto horse-drawn wagons and/or railway cars and hauled to the mill. Labor-saving Flumes were constructed from wood and could be miles long. This picture of a flume from *Maui Remembers* (page 43) by Gail Bartholomew Ainsworth, shows workers harvesting cut cane with a wood plank flume.

XIII. Grantee William Humphreys

A search for William Humphreys, the first grantee of this land, yielded a picture of his 53 years on Maui. Humphreys was born in New Hampshire in 1789, came to Hawai'i in 1817 and died in Waikapū in 1865. I found no marriage or offspring, but one mention of a James Humphreys, perhaps a relative. William lived in Makawao and was active in public life, serving in jury pools for Judge Edwin Miner in Lahaina. He ran for Maui representative of the Hawai'i Kingdom's legislative assembly. Humphreys served as a secretary of the Supreme Court in Honolulu as evidenced in these legal notices in Ka Hōkū o Ka Pakipika December 5, 1861:

OLELO HOOLAHA.
Ma ka Waiwai o }
KAAWANUA (k.) }

NO KA MEA, UA NOIIA MAI KA MEA Hanohano G. M. Robertson, Lunakanawai o ka Aha Kiekie e KAHAI (k.) no ka hooiaio i na Palapala Kauoha o Kaawanua (k.) no Honolulu, Oahu, i make aku nei. Nolaila, ua hoikeia i na kanaka a pau loa, ke pili, o ka Poalua, oia ka la 11 o Aperila, i ka hora 10 o ke kakahiaka, oia ka la a me ka hora i olelola no ka hoolohe i ka oiaio o keia Palapala Kauoha, a me na mea hoole i hoikeia, aia ma ka Hale Hookolokolo ma Honolulu, Oahu. WM. HUMPHREYS.
Hope Kakauolelo o ka Aha Kiekie. Honolulu, Mar. 23, 1865. 174 2t

OLELO HOOLAHA.
Ma ka Waiwai o } HIKOULA (k.) me }
KUALUA (w.) }

NO KA MEA, UA NOIIA MAI KA MEA Hanohano G. M. Robertson, Lunakanawai o ka
Aha Kiekie e KAHALEKAPU (k.) no ka hooiaio i na Palapala Kauoha o Hikoula (k.) me Kualua (w,) no Honolulu, Oahu i make aku nei : Nolaila, ua hoikeia i na kanaka a pau loa, ke pili, o ka Poaono, oia ka la 22 o Aperila, i ka hora 10 o kakahiaka, oia ka la a me ka hora i olelola no ka hoolohe i ka oiaio o keia Palapala Kauoha, a me na mea hoole i hoikeia, aia ma ka Hale Hookolokolo ma Honolulu, Oahu.
WM. HUMPHREYS,
Hope Kakauolelo o ka Aha Kiekie. Honolulu, Mar. 23, 1865. 174-2t

Although he appears to have had no issue, the Humphreys name is carried through seven generations of the Cummings family in Kula. William Humphreys was a close friend the family patriarch, Thomas Booth Cummings, a rancher and teamster. Cummings named one of his sons Willam Humphreys Cummings. Ron Daniels of Wailuku shared that his family patriarch, Willam H, Daniels, proprietor of a dry goods and general merchandise store in Wailuku was also a friend of Willam Humphreys.

We find from Hawaiian language literature that William Humphreys was selected as Hamakuapoko-Hamakualoa-Makawao reporter for the "'Aha Nūpepa" of Ka Hōkū Pakipika in 1861, for which he wrote articles under the pen name, W.H. Uwele'ale'a. He was an advocate for Hansen's Disease patients at Kalawao, Moloka'i. This Nūpepa-Hawaii.com blog comment from Cummings family kilo kū'auhau Michael Newton describes the contributions of Willam Humphreys:

> Kalaupapa has received much of the attention , in part from Father Damien. However, there was a second smaller colony at the eastern end of the peninsula at Kalawao. Most patients there were Chinese, and this is where Humphreys concentrated his efforts until his untimely death from a prescribed medicine in the mid 1860s. He might have been one of the first to use the media of his day to educate those in the islands that were unaware of the seriousness of the conditions. At Kalawao he organized voting blocks, book clubs and taught many years at no expense. He served two terms as Sheriff and was imprisoned twice—once for for refusing to arrest patients for victimless crimes, and another for butchering beef on a nearby ranch to provide fresh beef for the starving. He, like many others, worked under the radar and was but a small footprint in Hawai'i's history. But when he passed, the patients of Kalawao lost their dearest friend.

XIV. The Central Plains During WWII

Martial Law was imposed in Hawai'i form Dec. 8, 1941 until October 1944. An invasion of this strategic archipelago was expected after Pearl Harbor, so the War Department supplied Hawaiian Islands with defensive beach fortifications, batteries, airfields and military personnel. The1940 population of 45,000 swelled to over 100,000 in 1943. Pillboxes were installed on Mā'alaea beaches and strategic lookouts. Barbed wire cut off Kīhei beaches for civilian use. Everyone had to carry a military ID card at all times, curfews and blackouts were strictly enforced. Loitering on the streets was not allowed. Children carried gas masks to school and knew how to use them. Food and gasoline were scarce and rationed.

Although up to 40 percent of Maui's population were Japanese, internment was limited to community leaders, Buddhist priests and Japanese language teachers. One facility was nearby St Anthony's High School Campus (Personal communication, Sister Rosalani Enamoto). First generation Japanese-American Nisei joined volunteer civilian brigades to help the war effort. At the earliest opportunity, many enlisted in the Army and served in regimental combat teams of the 100th Battalion, fighting valiantly and awarded many Congressional Medals of Honor. A few Nisei were selected to serve in the Military Intelligence Service, surveilling Imperial Air Force pilots' radio comms, interpreting, translating and interrogating prisoners. Embedded Nisei MIS in Army and Marine units helped open the Burma Road, translated Japanese war plans that won the Battles of the Philippine Sea and Saipan. They were instrumental after the war in administering the peaceful occupation of Japan.

The War Department built two Naval Air Command bases on the plains of Central Maui: NAS Kahului where our airport is now, and NAS Pu'unene by Maui Racetrack. Over 3,000 Navy pilots were trained in the skies over Maui during the war.

The US Army set up a Station Hospital and nurses BOQ in Waikapū Valley (personal communication with WWII veteran James Davis). At Mā'alaea, defensive beach fortifications simulated those on Japanese-controlled Pacific islands like Tarawa. From 1943-45,

amphibious landing exercises were conducted by US Marines from Mā'alaea to Big Beach in Mākena. US Navy carrier pilots practiced bombing sorties using Kaho'olawe island as a target.

The Bailey House Museum on Main Street in Wailuku was used as a Civil Defense Headquarters, and a Civil Defense bunker was built next to the Hongwanji Mission near the corner of Market and Wells. Thousands of Navy, Army and Marines personnel frequented the USO club in Wailuku, 'Īao Theater movies, the bar at Maui Grand Hotel, and Baldwin High School football games. Comedian Bob Hope staged an outdoor variety show for Maui troops at Paukūkalo in 1944.

Maui 'ohana reached out to the young soldiers, most of whom were still in their teens, and a generation of US military fell in love with Hawai'i.

XV. Oral Interviews

Informant subjects that responded to solicitations were contacted for followup conversation, talk story or formal interview at a convenient time and by appropriately distanced communication.

Warrick Dutro, Kula Maui. Member of the Cummings family

Warrick grew up in the area of the study land, which was planted in pineapple. He and his buddies rode bikes and hiked the fields. He and his family live in Kula, but he farms taro in Waikapū where he grew up and practices ka nohona Hawai'i. Nearby his patch is one of the the many lo'i kahiko o Waikapū with walls built from two-man boulders.

Mr. Dutro is working on his Cummings genealogy and is always looking for more information about Willam Humpfreys, after whom generations of his uncles were named.

Although the study land was commercially farmed, it was still a place where youngsters played and teenagers came in their trucks at night to drink beer. Warrick remembers chicken fights that Waikapu people would hold in the pineapple fields of Puhiawaawa, away from Waikapū Valley.

Lest we think cock fighting is an introduced sport, it was a traditional Hawaiian pass time too. Martha Beckwith in *Hawaiian Mythology* reports that cockfighting was a Hawaiian sport, "as it is with Tahitians." She quotes a passage of Hauikalani, a mele commemorating the first victory of Kamehameha over Kiwala'o. The translation by Fornander in Volume 6 of *Fornander's Ancient History of The Hawaiian People* describes the battle as a cockfight:

> Till one great blow of the spur
> Hits the head, he flees severely wounded.
> The chief bites like a dog, scratches like a fowl;
> The fowl scratches, the soft dust flies upward.

Warrick also remembered bringing pig bones up to the pineapple fields after family lū'au. It was a good place to dispose of them. He warned that if the Kuikahi Affordable Community builders find bones, they might be pig bones. Or dogs. He said people sometimes buried their pets by the fields too.

As youngsters, Warrick and his buddies had a wide range of territory in which to play and explore. He was thinking that he didn't know anything about the study property, but in fact, once there, pleasant memories popped up and with them, customary practices of Hawaiians who still live and work nearby.

Avery Chumbley, Manager, Wailuku Water Company.
Transcribed from telephone Interview Feb 27, 2021

Can you tell me all you know about the history and cultural significance of this property?

So, you have to go back to historic Hawaiian times, pre mahele. In the mid 1800s, those lands were heavily populated with Hawaiians, particularly in the Wailuku area. Maybe less as you came south near the Waikapu area. The lands between Wailuku and Waikapū were Kingdom lands around that time. And say about in the 1840's—1847, there was a lot of coffee bean grown in the Wailuku and Waikapū areas. So a lot of that that was Kingdom land. Then in 1848, when the Mahele started and the division of land started to take place, between native Hawaiians and commoners and royalty, those parcels were divided up. One of the original awardees of that particular property was John Richardson, and he was able to get Land Commission Awards or Grants through the mahele process. He was probably the first individual owner of those properties right after the Mahele — right through the Kingdom time.

Wailuku Sugar Company was organized under Kingdom laws in 1862. There was another company called Waikapū Plantation. There were two individuals, James Louzada, and William H. Cornwell who were the two original creators of Waikapū Plantation. And to the best of my knowledge, those lands were part of the Waikapu Plantation. The first steam mill in the Waikapu area was erected in 1862 also. That was in the Waikapu proper area — not the Kuikahi parcel that is the subject of your investigations.

Wailuku Sugar Company, which I said was incorporated in 1862, bought out from Louzada and Cornwell in 1894—Waikapū Plantation. So Wailuku Sugar Company and its successive entities, Wailuku Agribusiness, which were all part of C. Brewer & Co. has owned or controlled that particular property for about 127 years, before we sold it to Towne Realty, when we were going through dissolution, and we were shutting down C. Brewer & Co. That land had sugar on it all the way up to about 1988, when we planted it in pineapple. It was in pineapple from 1988 and I believe the last harvest there was in 2003 or perhaps 2004. So it was only in pineapple for about 16 years. From 2004 until currently, it has pretty much remained fallow.

Drip irrigation came in the late seventies, 1977 or 1978. So prior to that it was all furrow irrigation up until that time. To my knowledge there had been no cultural or historical aspects to that particular property except for the reservoir, which was built in about 1910 and expanded around 1966 or 67. That particular reservoir is the only one that was within our plantation system that is regulated by the DLNR Dams Safety Division. It's a division of the engineering department of DLNR. Now that's going to be an issue and a problem of the owners.

Why is that?

You've got a regulated, high risk dam there. If there is any kind of failure or breach of that dam, you have a catastrophic event of severe flooding that can result in loss of life or loss of property.

I had some just preliminary discussions with the Betsill about that as they were going through their due diligence to buy the property. But, every property owner that has held that property since we sold it has been aware of what could be issues in getting zoning and development on that property because of the regulation of that dam.

It's a big issue that they are going to have to address in a full-blown EIS in my opinion. I guess they are going to disclose all that. I know that Towne Realty did an EIS on the property. Were the owners given a copy of that? Do you have that?

I have the Dega Archaeology report of 2005.

That's part of it. There shouldn't be anything cultural in the archaeology report.

No finds except for the plantation irrigation ditches and the Old Waikapu Road.

That Waihe'e Ditch was built in 1903 or 1904.

There are two ditches that come together at the reservoir, the 'Īao- Waikapu and—

The 'Īao Ditch is the supply ditch that fills the reservoir, then on the far south end of the reservoir there is an overflow or "drop" ditch that allows water to flow out of reservoir 10 down to Waihe'e Ditch.

Isn't there also the Everett Ditch that connects to the same reservoir from Waikapū Stream?

That was abandoned in the 70s.

So, the Everett ditch is still there but no water flows through it to the reservoir, is that right?

Yes.There is another issue that is going to come up in an environmental impact statement and that is when the Wailuku Heights developments were done, the original development and then the expansion of the new areas, a lot of the roadway drainage was diverted into that reservoir, so we, that is Wailuku Water Company, do not have the ability to control the surface collection and drainage water from the residential road areas (hardened areas) into that reservoir.

So I assume that the reservoir water is non-potable and just being used for irrigation purposes?

Yes, that's correct. And the land owners have no right or authority or any ability to take or use any of that water.

Right. Do you know of any cultural sites, practices or resources that are on this property?

I don't think I can opine on what was there over 120 years ago.

No— no opining, just what you know (laughter). I do thank you very much for talking with me.

You're very welcome.

Other People Who Responded:

1. Kumu Hōkūao Pellegrino - President of Nā Wai 'Ehā, former president of Maui Historical Society, and an educator at Kamehameha Schools asked to comment on the Kuikahi Affordable Community project. Response pending.

2. Kaniloa Kamaunu, Committee member, 'Aha Moku o Wailuku asked for the developer to make a presentation to the 'Aha Moku Committee members and Po'o o ka Moku o Wailuku, Clyde Kahalehau. Presentation being scheduled.

3. Kaleo'uhane Ho'opai, - Wailuku resident and family genealogist met to talk story. Kaleo'uhane said he does not have any specific cultural or historical facts about the study property. We met at Church of God on Ho'okele Street in Wailuku and talked about the 'āina, the Māhele, Hawaiian rights and his family genealogy. Nothing discussed specifically pertained to the study property.

4. Lucienne DeNaie, Principle: Maui Tomorrow, Sierra Club and Maui Cultural Land Trust, Historian and Author
Lucienne suggested I interview Avery Chumbley who works for Wailuku Water Company, formerly C. Brewer & Company, which owned Wailuku Sugar Company. She kindly passed on my request for informants to committee members of the 'Ahu Moku o Wailuku, since online email and telephone reach information for people serving on 'Aha Moku o Maui was out of date.

5. Penelope Randall
Penelope sent an email reply to my PR saying "All I know is that all that area has burials." Follow up email and phone calls did not get any further response.

6. Amy Halas
Amy replied to my first wave PR, but did not have any specific ties to or information about the study property. I did send her the second, more detailed PR, but had no further response.

7. Mavis Madieros Oliviera - Oliviera-Ho'opi'i family of Hāna, Researcher for Ke 'Au Ali'i land conservation group in Hāna. Mavis does historical research in Hāna, is interested in land use issues but had no specific information about the study property.

Three people called looking to purchase affordable housing.

VII. Confidential Information Withheld/Conflicts of information
No confidential information regarding the history or cultural resources or significance of this study parcel has been withheld from this report and no conflicts of information concerning any research about this property were encountered.

VIII. Conclusion and Effects on Plan
No cultural items, artifacts, cultural sites or mentions of any pre Western contact cultural practice was observed or found in research for this study property. No natural resource valuable for the practice of Hawaiian traditions was observed, reported or mentioned for this property. No historical stories, events or artifacts significant to the history of Wailuku or Waikapu not previously recorded or registered with the State of Hawai'i or any national heritage organization were found. The State of Hawaii State Historic Preservation Division has no reports or letters noting any cultural assets or resources for this parcel other than previously registered ditches, water courses used by historic plantations and the Old Waikapū Road.

A 2004 study of this property found no cultural assets on this parcel. Historic irrigation ditches, watercourses and roads were registered with SHPD. A recent study of Kehalani Mauka just East and South of the study parcel on similar land also found similar irrigation ditches and no burials assets. No burials or other cultural assets with discovered during the development of Kehalani Mauka homes.

Multiple online searches of government and museum map collections, photos and aerials do not show any structures on the study property. My request for informants via The Maui News, Maui Now and personal press release to all sectors of the Maui community did not receive any responses from lineal descendants. Of four cultural respondents, two had no information pertaining to this specific parcel, one shared recent cultural information from forty years ago for the surrounding area, and the other shared historical information about commercial agriculture and irrigation of the study parcel land.

No informant testified to the presence of any ceremonial or cultural practices or sites, nor the presence of house sites or burials or cultural resources connected to this parcel.

Due to the fact that this land was cultivated in sugar and pineapple for over 135 years and untouched since 2005, and based on the result of my study and the results of the archaeological inventory previously conducted by Wilson and Dega, I conclude that there will be no cultural impacts and therefore no effect on plan.

I recommend that should names be selected for roadways and sections of Kuikahi Affordable Community development, that the developers consider preserving the Hawaiian place names, 'ōlelo no'eau and sugar cane farming terms that are connected to this kula between Waikapū and Wailuku. Particularly names of mountain ridges and peaks and 'ili —names that already out of use and vulnerable to being lost.

I also recommend use of native grasses and shrubs for landscaping, and in particular, adding 'Āwikiwiki vine to the plant selection because of its historical connection to this area.

IX. Groups Contacted
State Historic Preservation Department, Land and Natural Resources Division Kapolei
Archivist, Stacy K. Naipo
Aha Moku o Maui website information, email, text and phone calls to principles.
A&B Sugar Museum Archives

Press Release Requesting Cultural Information sent to 49 Maui Hawaiians groups and practitioners
Maui Native Hawaiian Chamber of Commerce
Reverend John Tomoso, Good Shepherd Church, Wailuku. Member, Royal Order of Kamehameha.
Lucienne DeNaie, Maui Tomorrow

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XI. Appendix Listing

1. LCA Palapala from OHA Papakilo Database Intro
2. LCA 326 Foreign Testimony 1
3. LCA 326 Foreign Testimony 2
4. LCA 326 Foreign Testimony 3
5. LCA 326 Foreign Testimony 4
6. LCA 326 Foreign Testimony 5
7. Bailey 1837 Map
8. Bruce 1937 Wailuku Sugar Map

9. USGA Topo Map Wailuku Section1924
10. USGA Topo Map Wailuku Section 1955
11. History of Waikapū by Jill Engledow 2006
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14. AIS Report for TMK (2) 3-5-02: 02 and 03 by Wilson and Dega, 2005
15. Phase II ESA Central Maui Regional Park by Element Environmental LLC, 2013
16. SHPD letter of acceptability of 2005 Dega Report — no further mitigation necessary 2005
17. SHPD confirmation letter 2009
18. Nūpepa 'Ōlelo Hawai'i —Wm Humphreys reporter for Makawao and Hamakua coast 1861
19. Nūpepa 'Ōlelo Hawai'i —Wm Humphreys Article on Aha Aloha with Po'okela and Waine'e Churches, Lahaina 1863
19. Nūpepa 'Ōlelo Hawai'i —Wm Humphreys Public Notice of reading of his will in 1865
20. Online comment from Nūpepa Hawai'i.com by Michael Newtson, TB Cummings descendant regarding connection of Uwele'ale'a to his family.
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PAPAKILO
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75 feet 8 inches to the point first mentioned. Thence on the opposite side of the Street towards the sea, beginning at a corner in a straight line with the South wall of the above mentioned lot and running a Northerly 65 feet. Thence running at right angles into the Sea, the south side, starting from the first mentioned corner, and running at right angles into the Sea, Together with all the privileges & appurtenances to said lands in any way appertaining or belonging, To have & to hold the above granted Premises to the said Michael J Nowlein, his heirs & assigns to his & their use & behoof forever.

And the said Charles Cocket for myself my heirs, executors and administrators, do covenant with the said Michael J Nowlein, his heirs & assigns, that I am lawfully professed of the afore granted premises, that they are free of all encumbrance that I have good right to sell & convey the same to the said Michael J Nowlein as aforesaid, – and that I will, and my heirs, executors & administrators shall warrant & defend the same to the said Michael J Nowlein his heirs and assigns for ever, against the lawful claims & demands of all Persons.

In Witness whereof I, the said Charles Cocket have hereunto set my hand & seal at Lahaina

Signed, Sealed & delivered in presence of us

Approved by me Namakeha

Hoapiliwaiu Charles Cocket.

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the hands of Hoapili Wahine, and the King & the late Premier Rev.d Wm Richards being the Witness to said deed. Now I wish you to confirm to me the claim in full for all privileges belonging to the said land.

Wm Humphreys.

Deed.

I Hoapili Wahine hereby transfer and confirm forever to William Humphreys and his Land with Island born heirs Two certain parcels of land situated in Waikapu on the Island of Maui; The name of the upper land Wikiwiki; and the lower land Puhiawaawa - said land to belong to William Humphreys this Sandwich Island born heirs for evermore; together with all privileges belonging to said lands, & said lands shall never pay any rent or tax, more than is paid by other lands of the same size and character.

It is also hereby agreed that said lands shall never be transferred to any alien or non-resident of the Sandwich Islands

In testimony whereof we have hereunto set our hands and seals this 5th day of June 1840 at Lahaina

Na Hoapili Wahine

Witness William Richards. Wm Humphreys

We hereby approve the within document

Kamehameha III

Kekauonohi

No 327 to 329 — Claims No 327 to 329 inclusive Copied in Native Register. See Continuation Vol. II

PAPAKILO DATABASE

Kūkulu ka ʻike i ka ʻōpua

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Māhele ʻĀina Index – Mahele Awards – Helu 326

Note: Record display *abridged* > show complete information

> **Metadata**

Collection

Mahele Awards (KPA)

Claimant

Humphreys, William

Island	Ili (Location)	Ahupuaa	District
Maui	Auwikiwiki & Puhiawaawa	Waikapu	Wailuku

RelatedHelu

1. Māhele ʻĀina Index – Foreign Register – Helu 326 (/main/documentdisplay.php?id=23934)
2. Māhele ʻĀina Index – Native Register – Helu 326 (/main/documentdisplay.php?id=39554)
3. Māhele ʻĀina Index – Native Testimony – Helu 326 (/main/documentdisplay.php?id=50932)

NextHelu

Māhele ʻĀina Index – Mahele Awards – Helu 326B (/main/documentdisplay.php?id=31280)

PreviousHelu

Māhele ʻĀina Index – Mahele Awards – Helu 325 (/main/documentdisplay.php?id=31278)

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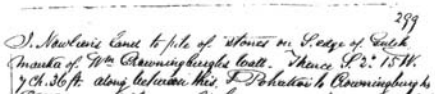

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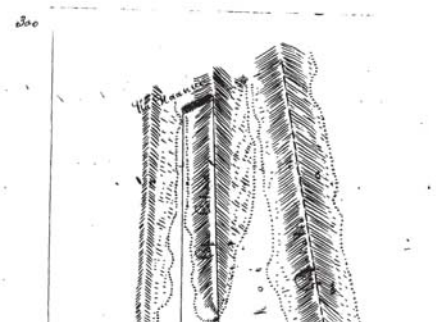

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Humphreys, William

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Maui	Auwikiwiki & Puhiawaawa	Waikapu	Wailuku

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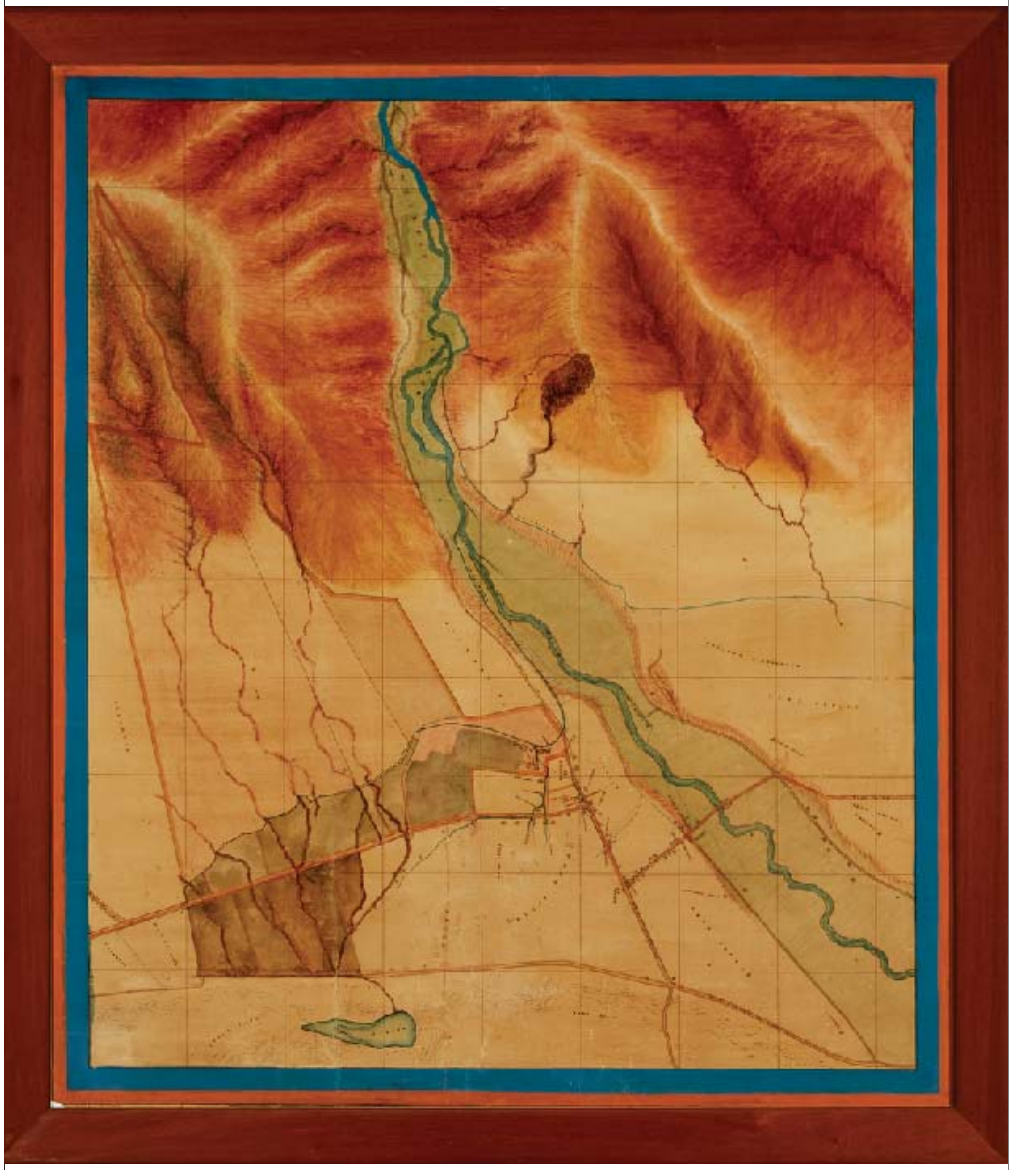

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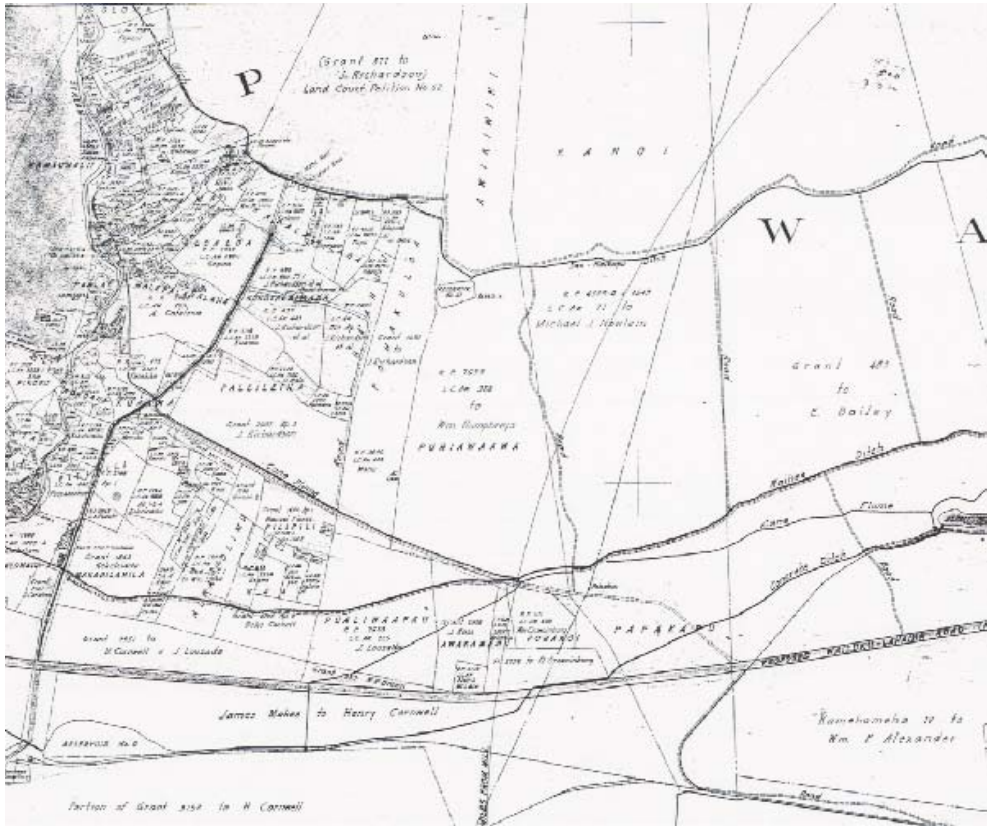
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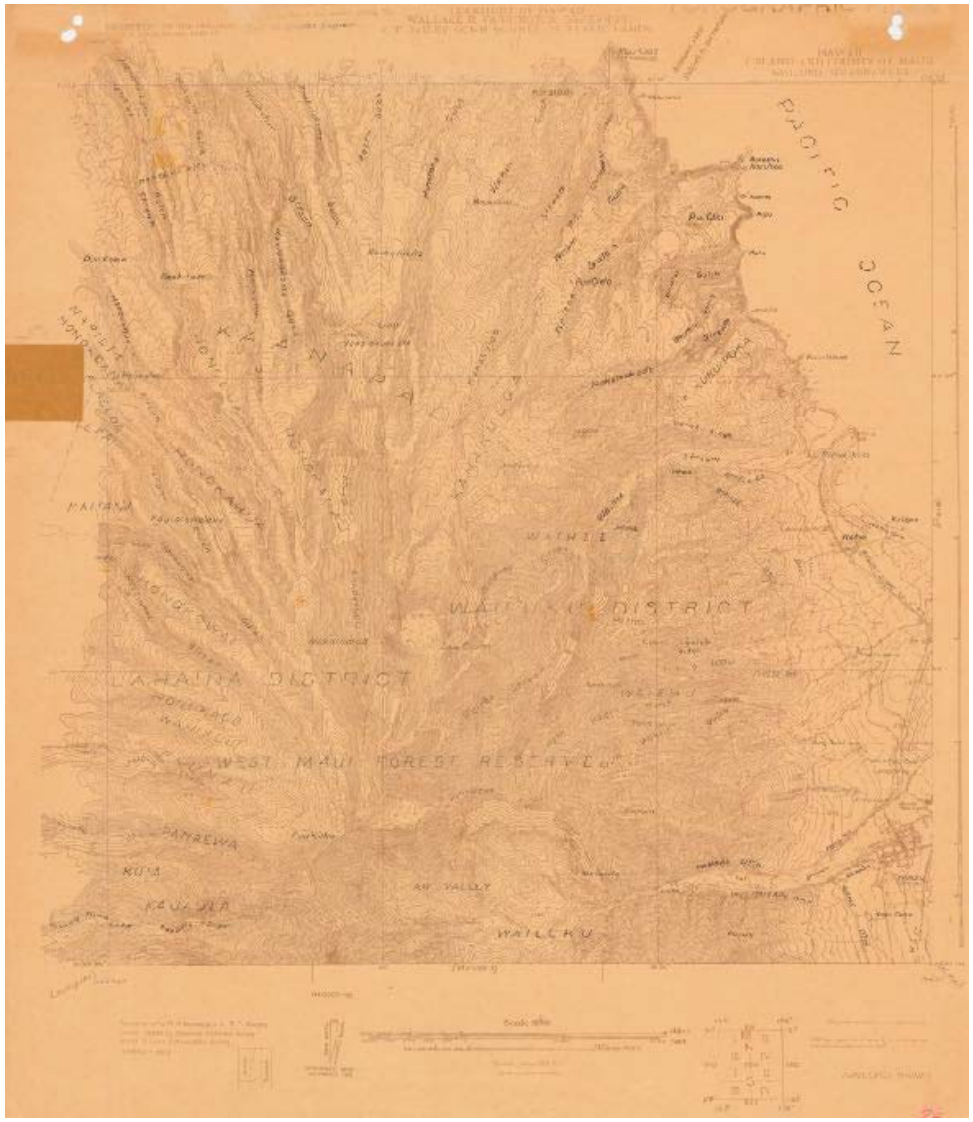
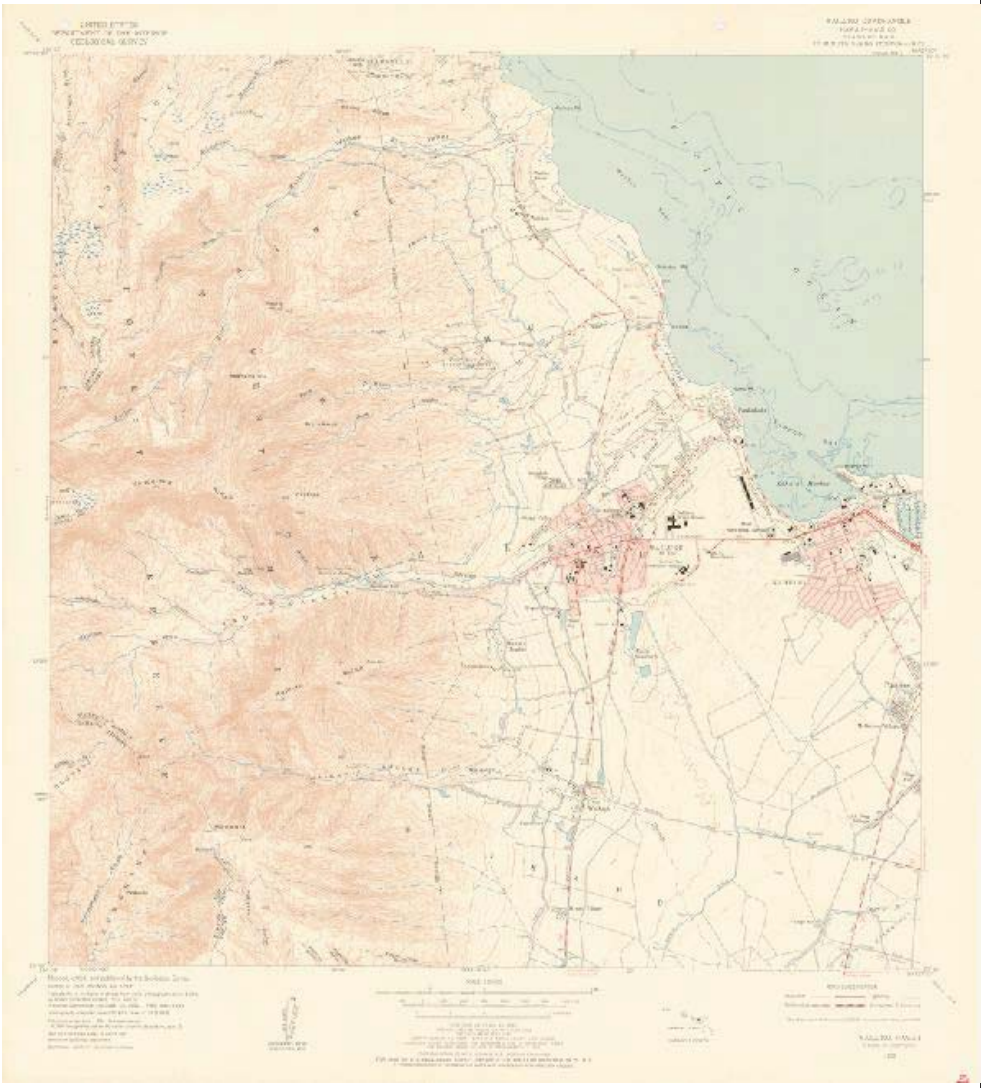
James Mahee to Henry Cornwell
Portion of Grant 3154 to H Cornwell

007


PACIFIC
OCEAN
WAIHEE
WAILUKU DISTRICT
LAHAINA DISTRICT
WEST MAUI FOREST RESERVE
WAILUKU

008



009

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

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

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

April 3, 2009

Colleen Suyama
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

LOG NO: 2009.0123
DOC NO: 0904PC10
Archaeology

SUBJECT: **Chapter 6E-42 Historic Preservation Review – Draft Environmental Impact Statement Comments Regarding the Proposed Pu'unani Subdivision**
Waikapu Ahupua'a, Wailuku District, Maui Island
TMK: (2) 3-5-002:002; (2) 3-5-002:003

Thank you for the opportunity to review this document, which our staff received in January of 2009 (Munekiyo & Hiraga, Inc. 2009): *Draft Environmental Impact Statement for the Proposed Pu'unani Subdivision*. Please accept our apologies for the delay in commenting.

Overall, we believe the proposed project will have *no effect on historic properties* because it has already undergone the historic preservation review process. An archaeological inventory survey of the proposed subdivision was completed and accepted by this office in 2005 (SHPD LOG NO: 2005.2398; DOC NO: 0511MK22). Upon acceptance we concurred that the two previously and five newly identified historic properties recorded within the project area boundaries were significant under Criterion D of the National and Hawai'i Registers of Historic Places for their potential to yield information to history or prehistory and that enough such information had been collected during the survey. We also agreed that no further work with respect to the sites themselves was warranted.

As stated in Chapter II, Subsection A, Part 8, even though precautionary archaeological monitoring was not recommended for future ground altering disturbance within the subject parcels, we expect all project personnel to be informed that should any significant cultural deposits or human skeletal remains be encountered during construction activities, all work in the vicinity of the find must be immediately halted and this office contacted for assistance.

If you have any questions or comments regarding this letter, please contact the SHPD's Lead Maui Archaeologist, Ms. Patty Conte (Patty.J.Conte@hawaii.gov).

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
State Historic Preservation Division

; ;

ULUKAU: HAWAIIAN ELECTRONIC LIBRARY
English Text
Kōkua
Kekahi...

Hoʻolaupaʻi

He ʻOhina Nūpepa ʻŌlelo Hawaiʻi

huli | inoa nūpepa | lā hoʻopuka

e koho i kekahi pihi o luna aʻe nei i loaʻa nā nūpepa

Buke 4, Helu 13
30 Malaki 1865

Nupepa Kuokoa
KE KILOHANA POOKELA NO KA LAHUI HAWAI'I

ʻaoʻao 3 *(4 ʻaoʻao)*

< 2 huli i ka ʻaoʻao 4 >

[kiʻi kumu nāmua]
[kiʻi kumu lōpū PNG]
[kiʻi kumu nui PDF]
[hoʻokaʻawale kikokikona]
[mai hōʻike i ke kahiāuli]
[kiʻi paʻi kumu TIFF]
(0 Mb)

Inā ʻike ʻia he kuʻia a i ʻole he manaʻo kou, e leka uila iā ***hoolaupai@bishopmuseum.org***

Ka Nupepa Kuokoa.

Ua hoike hou ae no na nupepa kipi i kekahi mau hunahuna ano nui o Tekaka, oia hoi ke auhee ana o kekahi puali kipi ma ka muliwai Konoka Hema [South Concha,] i ka malama iho nei o Ianuari, i na Ilikini. Ua weliweli no ka ke kaua ana, mawaena o na kipi a me na Ilikini.

Ua hai ae kekahi elele o kekahi nupepa o Wileminetona, ua nui na koa akau i lawepioia e na kipi, i hookuuia i ka manawa i pio mai nei o ua kulanakauhale la. Ua hoopaaia lakou iloko o ka Pa Hipa [Camp Lamab,] hookahi mile ka loihi mai ke kulanakauhale aku. Ua malamaia lakou e like me ka malama ia ana o na holoholona. Ekolu ia mamua o ka haalele ana o na kipi i ke kulanakauhale, aole i haawiia aku ia lakou kekahi mau wahi mea ai. Ua hoomanawanui iho na kamaaina e hanai ia lakou, aka, ua laweia'ku ka ai mai o lakou aku e na'lii koa nana e malama. He mea e ke kaumaha o ka poe e nana mai ana ia lakou. Ua lilo kekahi poe o ua poe la i lawepioia i poe hupo. Aole hiki ia lakou ke hoomaopopo i ko lakou mau inoa, ua poina loa.

Ua hai mai ka nupepa kipi o Ralei [Raleigh,] ua huna iho ka na kanaka o Wileminetona i na kukaa pulupulu he 15,000, e kali ana no ka hiki aku o na puali koa Aupuni.

KANAKA NAUPAKA.— Ua hai ae kekahi kanaka naauao no ke kanaka nau paka. He 525 galani ana e kuha ai i na makahiki he 25.

FOR IMMEDIATE RELEASE Date: Feb 3, 2021

Contact: Katherine Kamaʻemaʻe Smith
Email: katsmith75@icloud.com
Tel: 808-268-0787

Cultural/Historical Information Needed for Wailuku Affordable Housing Project

Wailuku, Wednesday, Feb 3— Honu Media LLC wishes to interview lineal and cultural descendants with knowledge about Wailuku land fronting the west side of Kuikahi Drive, from the water tank to a point opposite Kehalani Mauka Parkway. A 100% affordable housing community of multifamily and single family homes is being planned for this 14.75 acre parcel, TMK (2) 3-5-02:30. Information will be compiled in a cultural impact assessment (CIA) study, to record, preserve and protect cultural resources, sites, beliefs and traditional practices associated with this property.

If you or your kūpuna have information about former cane lands between Wailuku and Waikapū, below Reservoir No.10 where the Iao-Wailuku and Everett Ditches end, please contact Katherine Kamaʻemaʻe Smith, historical consultant at 808-268-0787, katsmith75@icloud.com

The proposed parcel was part of a larger, terraced parcel mauka of Puanani Homesteads, but not under development. Wailuku Sugar Company (Wailuku Agribusiness) grew cane here until 1988. On the study property at this time, near the water tank is a small base yard and a little herd of goats.

At the Mahele, Kamehameha III Kauikeaouli retained Wailuku and Waikapu ahupuaʻa as Crown Lands. The majority of LCA awards and Royal Patents were located adjacent to ʻĪao and Waikapū Streams. There were none in the study parcel, which is part of Land Grant No. 326 of ʻĀuwikiwiki and Puhiawaawa ʻili in Wailuku ahupuaʻa, awarded to Wm. Humphreys in 1849. In 1865, Wm. Humphreys died at age 76 in Waikapū. He was a native of New Hampshire who lived on Maui for 53 years (The Friend, Mar 1 1865). He was a friend of William Henry Daniels, and TB Cummings, Sr.

Persons with knowledge about the history or prehistory this property, especially of current or past cultural resources, sites or practices on this property, please contact Katherine Kamaʻemaʻe Smith, 808-268-0787 or katsmith75@icloud.com to schedule a telephone, electronic or in-person interview.

—pau—

500 Kapalua Drive, Lahaina HI 96761 | katsmith75@icloud.com | 808-268-0787

Na luna hou i kohoia no ka Hoku o o ka Pakipika.

I mea e holo ai ka hana. Ua hooholo hou ka "Ahahui Nupepa," e koho i mau luna hou no na Apana e like me ka hoolaha ana ma ka Helu mua o Sepatemaba o ka la 7, a e
huipu ko lakou lawelawe ana i ka Hoku Pakipika, ma ko lakou mau Apana.

NO KA MOKUPUNI O HAWAII.
No Kohala Akau. J. Wight Esq. J. W. Naihe, a me Daniela. Ua hookuuia o Bona a me Makuaole.
No Kohala Hema. Iaukea, D. Manuia, Kakaio. Ua hookuuia o George.
No Kawaihae uka. Papaua.
No Hamakua, Hawaii. Halemanu a me Kauwahi, huipu me Kinuway Esq.

NO KA MOKUPUNI O MAUI.
No Hamakuapoko, Hamakualoa, Makawao. W. H. Uwelealea, Ua hookuuia G. Miner.
No Lahaina. J. W. H. Kauwahi, a me Manaku; Hui aku me na luna mua.

NO KA MOKUPUNI O OAHU.
No Waikiki. Kumaua, a me Uilama.
No Makiki. Papa.
No Kapalama uka. Kahinalua; huipu me ka Luna mua.
No Kalihi. Kaoo; huipu me ka Luna mua.
No Ewa. Pomaikai, iwaena o na Katorika.
No Waialua. J. H. Kaakua, huipu me Luna mua.
No Koolaupoko. Makekehau, huipu me na Luna mua.
No Moanalua. Polapola.

Me give you good blow, me is invisible [? invincible] man."

Another suggestion I have is maybe:

> *"Goddam you bloody kanaka. You wanna fight? I am strong. Me give you good blow. Me Englishman."*

Also there was another comment just a few minutes ago!

> MICHAEL NEWTSON *says:*
>
> *In our Cummings Ohana I have written of many of our ancestors exploits. But these long overdue articles brings to mind an early story of our Patriarch Thomas Booth Cummings who was so inspired by a hapa Hawaiian who served alongside of him in the jury pools of Edwin Miner's court in Lahaina (1848-50) that he named his first born son after him. The young man who had such a promising will to help the needy was William Humphreys, who often went by the name Ulawalea as a pen name when writing the countless articles in Hawaiian Nupepa about the injustices of the peninsula. Kalaupapa has received much of the attention, in part from Father Damien. However, there was a second smaller colony at the eastern end of the peninsula at Kalawao. Most patients here were Chinese, and this is where Humphreys concentrated his efforts in the early until his untimely death from a prescribed medicine in the mid 1860's. He might have been one of the first to use the media of his day to educate those in the islands that were unaware of the seriousness of the conditions. At Kalawao he organized voting blocks, book clubs and taught many years for no expense. He served two terms as Sheriff and was imprisoned twice, once for refusing to arrest patients for victimless crimes and another for butchering beef on a nearby ranch to provide fresh meat for the starving. He like many others, worked under the radar and was but a small foot print in Hawaii's history, but when passed the patients of Kalawao lost their dearest friend.*

Mahalo to everyone that gave responses, they put much more meaning into this post!

017

INK:(2) 3-5-002:002,003
AIS ON 215.800 ACRESA FOR TOWNE

016

LINDA LINGLE
GOVERNOR OF HAWAII

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

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

November 18, 2005

Michael Dega, Ph.D.
Scientific Consultant Services
711 Kapiolani Blvd. Suite 975
Honolulu, HI 96813

LOG NO: 2005.2398
DOC NO: 0511MK22

Dear Dr. Dega:

SUBJECT: Historic Preservation Review - 6E-42 - Archaeological Inventory Survey On 215.800 Acres for Towne Development of Hawaii and Endurance Investors, LLC
Waikapu Ahupua'a, Wailuku District, Maui
TMK (2) 3-5-002:002 and 003

Thank you for the opportunity to review this report which our staff received on October 14, 2005 (Wilson and Dega 2005, *Archaeological Inventory Survey Report on 215.800 Acres Located in Waikapu Ahupua'a, Wailuku District, Maui Island, Hawai'i [TMK (2) 3-5-02: 02 and 03])*...Scientific Consultant Services, Inc., ms.

The background section acceptably establishes the ahupua'a settlement pattern and predicts the likely site pattern in the project area. The historical information provided summarizes the history of the post-contact period land uses. The summary of previous archaeological work in the area provides a baseline for the current work. The subject parcel has formerly been utilized for commercial agriculture, and consists 100% of abandoned cane land. Three small Land Commission Awards are situated within the subject parcel, in an area through which a stream and/or ditch formally ran.

The survey has adequately covered the project area documenting five new historic properties in the project area, and re-identifying two previously identified historic properties. Previously identified sites, SIHP 50-50-04-5197 and -5493, consist of the Waihe'e and Waikapu Ditches. Newly identified SIHP sites 50-50-5729 and -5726 represent an unnamed rock and mortar ditch and an unnamed earthen ditch/drainage. A large unnamed reservoir, SIHP 50-50-04-5727, is situated at the terminus of the Waikapu Ditch (-5493). SIHP 50-50-04-5728 is a sugar field erosion control site, incorporating 14 earthen berms cross slope. These are clearly identified topographically. One additional site, SIHP 50-50-04-5730, the

"Old Waikapu Road" was identified as spanning the border of Parcels 002 and 003. Subsurface testing (twenty-one backhoe trenches) were also negative for evidence of cultural deposits. These were distributed evenly across the project area.

We concur that all seven sites are significant under Criterion "D" and have the potential to yield information important to understanding the history of the region. The sites have been adequately documented.

We also agree that no further archaeological mitigation is necessary.

We find this report to be acceptable. The historic preservation review process is concluded. Development of the project areas will have "no effect" on significant historic sites. As always, if you disagree with our comments or have questions, please contact Dr. Melissa Kirkendall (Maui/Lana'i SHPD 243-5169) as soon as possible to resolve these concerns.

Aloha,

MELANIE A. CHINEN, Administrator
State Historic Preservation Division

MK: kf

c: Bert Ratte, DPWEM, County of Maui
Michael Foley, Director, Dept of Planning, 250 S. High Street, Wailuku, HI 96793
Maui Cultural Resources Commission, Dept. of Plng, 250 S. High St., Wailuku, HI 96793

NOV 22 2005

Facsimile Memorandum
Melissa Kirkendall, Maui Archaeologist
130 Mahalani Street
Wailuku, Hawai'i 96793

TO: Jocelyn Nazareno
FAX: 808 692-8020

FROM: Melissa Kirkendall
FAX: 808 243-5838

Subject:
Historic Preservation Review - 6E-42 - Archaeological Inventory Survey on 215.800 Acres for Tuwne Development of Hawaii and Endurance Investors, LLC
Waikapu Ahupua'a, Wailuku District, Maui
TMK (2) 3-5-002:002 and 003

Agency Comments: SCS

Web: On___ Not On___ DOC No. 0511MK22

Determination	Jurisdiction	Actions	Document/Fee
X NHPA	County 6E-8	Survey Requested	Assessment
LPM	X County 6E-42	Preliminary Monitoring	X Inventory Survey Plan Report
WC-PC	State 6E-8	Survey w/ Monitoring	Monitoring
Pending	State 6E-42	Documentation Requested	Monitoring Report
None	6E-43	Mitigation Specified	Data Recovery Plan
F NHPA	6E-42.6	Under Review	Data Recovery Report
F NAE	Federal	X Considered Adequate	Preservation Plan
F AE	Other	Revision Requested	Burial Plan
		Do Not Concur	Burial Disinterment
		Information Requested	Osteological Report
		Information Provided	Ethnographic Documentation
		Comments	MOA
		Inadvertent Notification	Other
		Council Determination	
		Council Plan Approved	
		Other	

NOTES:

Inventory: ___ Burial: ___ #Sites: 7 (2 previously identified all sugar cane related) Acres: 215.800
Staff: Anth: MK Architecture: ___ History & Culture: ___ 03/16/05

607-1

Date: 10-13-05

Submittal Sheet for Historic Preservation Review Filing Fees

RECEIVED
HISTORIC PRES. DIV.
DEPT. OF LAND & NATURAL RESOURCES
2005 OCT 13 P 1:42

State Historic Preservation Division
Department Land and Natural Resources

Agency/Firm (Requesting Review): Scientific Consultant Services

Contact: JON WILSON

Phone: 597-1182 Fax: 597-1193 E-Mail: JON@scshawaii.com

Address: 711 Kapiolani Blvd Ste 975

Title of Report/Plan: ARCHAeological Inventory Survey Report on 215.800 Acres Located in Waikapu Ahupua'a, Wailuku District, Maui Island, Hawaii

Island: Maui District: Wailuku Ahupua'a: Waikapu

TMK [(1) 1-1-001:001]: TMK (2) 3-5-02: 02 AND 03

Submitted Plan/Report Fee & Type: (All reports or plans submitted to the SHPD for review shall be accompanied by the appropriate fee in accordance with HAR §13-275-4 and §284-4).

Check if Report is a Re-Submittal (no fee charged)

$50	Archaeological Assessment
$150	Archaeological Inventory Survey Plan
$450	Archaeological, Architectural or Ethnographic Survey Report
$150	Preservation Plan
$25	Monitoring Plan
$150	Archaeological Data Recovery Plan
$250	Burial Treatment Plan
$100	Archaeological Monitoring Report, if resources reported
$450	Archaeological Data Recovery Report
$450	Ethnographic Documentation Report
$25	Burial Disinterment Report
$50	Osteological Analysis Report

Fee Total: $ (Make check payable to "Hawaii Historic Preservation Special Fund")

For Office Use Only:

Date Received: OCT 13 2005	Receipt No.: 1463 Payment Method: Cash ____ $ 450.— Check: ✓ Check No.: 3113
Log. No.: 2005.2268	Receipt Issued by: S. Zamora Treasury Deposit Receipt No:

Note: A copy of this form will be mailed or faxed back to you and will serve as your receipt.

Public Comment Due: Nov 13, 2005
Review Due: Nov 27, 2005

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

PH: 808-597-1182 FAX: 808-597-1193

FAX or TRANSMITTAL MEMORANDUM

To: Melanie Chinen Date: 10-13-05

Firm: SHPD- OAHU Phone: 692-8040

Address: 601 Kamokila Blvd Suite 555 Fax: 692-8020

The following is being sent to you: ____ By Fax ✓ Enclosed ____ Under Separate Cover

____ SCS Report(s) ____ Contract(s) ____ Billing(s) ____ Bid ____ Other

Enclosed: Item:
SCS Project Number: 607-1

ARCHAeological Inventory Survey Report on 215.800 Acres Located in Waikapu Ahupua'a Wailuku District, Maui Island, Hawaii

( ) For your files
( ) For your client
( ) For review and comment
( ) For your signature and return
( ) Submitted as a "DRAFT"
( ) Submitted as a "FINAL"
( ) For necessary action
( ) As requested
( ) As per our conversation

Comments: TMK (2) 3-5-02: 02 AND 03

Mahalo,

For SCS: ____

Spear / Chaffee / Dega / Monahan / McGerty / Morawski / Baker / Tome

HONU MEDIA, LLC

FOR IMMEDIATE RELEASE Date: Feb 3, 2021

Contact: Katherine Kamaʻemaʻe Smith
Email: katsmith75@icloud.com
Tel: 808-268-0787

Cultural/Historical Information Needed for Wailuku Affordable Housing Project

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—pau—

AFFIDAVIT OF PUBLICATION

STATE OF HAWAII, } ss.
County of Maui. }

Kara Durr being duly sworn deposes and says, that she is an Advertising Clerk of the Maui Publishing Co., Ltd., publishers of THE MAUI NEWS, a newspaper published in Wailuku, County of Maui, State of Hawaii; that the ordered publication as to Information Wanted for Cultural Impact Assessment

of which the annexed is a true and correct printed notice, was published 2 times in THE MAUI NEWS, aforesaid, commencing on the 15th day of October, 2020, and ending on the 17th day of October, 2020, (two days inclusive), to-wit: on October 15, 17, 2020

and that affiant is not a party to or in any way interested in the above entitled matter.

This 1 page Information Wanted for Cultural, dated October 15, 17, 2020, was subscribed and sworn to before me this 19th day of October, 2020, in the Second Circuit of the State of Hawaii, by Kara Durr

Notary Public, Second Judicial Circuit, State of Hawaii
BETTY E. UEHARA
My Commission expires on 09-26-2023

BETTY E. UEHARA NOTARY PUBLIC No. 83-344 STATE OF HAWAII

Information Wanted for Cultural Impact Assessment

Honu Media LLC Cultural / Historical Research seeks information about cultural resources or practices at or near TMK (2) 3-5-2-02:03. A 14.9 acre, 100% affordable development is planned on this property on the West side of Kuikahi Dr., mauka of Rt. 30. Please contact Honu Media within 30 days at: 268-0787.

(MN: October 15, 17, 2020)

APPENDIX J

A History Report of Waikapū

A History of Waikapū

Waikapū is shown here in the 1890's, some 30 yeas after sugar growers William Cornwell and Jamees Louzada formed Waikapū Plantation, which was acquired by Wailuku Sugar Company in 1894. The road shown is West Waiko Road, and the church building at right is now a private residence. Waikapu is now home to more that 1,000 Mauians and is the site of the Maui Tropical Plantation, a visitor attraction built around a tropical agricultural theme. Maui Historical Society Photo

By
Jill Engledow

For
Mike Atherton

August 2009

A History of Waikapū

by

Jill Engledow

Ka makani kokoloio o Waikapū
"The gusty wind of Waikapū"
An *'ōlelo no'eau,* or traditional saying, referred to in the song "Inikinikimālie" by James Kahale

Famed for its gusty winds and pleasant living, the land division called Waikapū originates in one of four valleys created by streams known as *Nā Wai Eha*--The Four Waters. One of those famous streams carved the steep ridges and gullies of Waikapū Valley through the West Maui volcano, transporting the mountain's core material and depositing it in an alluvial fan at the mouth of the canyon. This fan joined with those of the other three valleys -- 'Īao, Waiehu and Waihe'e -- to create an alluvial plain 13 km long. (Kyselka: 28, 36) The soil of this plain accumulated thickly near the mountain, spreading more thinly across the Isthmus formed when lava from Haleakalā pooled against West Maui. Over thousands of years, as glaciers grew in other parts of the world and sea levels dropped, broad stretches of coral reef were exposed and broken down to sand. Trade winds blew the sand onto the isthmus and formed it into ridges, which became lithified, or turned into stone, by carbonic acid released from the roots of plants growing in the sand.

By the time human beings arrived, the land of *Nā Wai Eha,* with its deep, rich alluvial soil and flowing streams, was ripe for cultivation. The new residents looked down over the sand dunes of the Isthmus, a shifting plain where inhabitants of the land believed that ghosts wandered. (Pukui: 81) Many years later, a writer would remark that "at times, the wind sweeps across this plain with great force, and clouds of sand, five hundred to one thousand feet high, move over it, presenting to the spectator on the mountains a most beautiful sight." (*Pacific Commercial Advertiser*, April 9, 1864)

Ambitious ancient farmers took advantage of the optimal growing conditions close to the streams. "Spreading north and south from the base of Waikapu to a considerable distance below the valley are the vestiges of extensive wet plantations, now almost obliterated by sugarcane cultivation," wrote E. S.C. Handy in 1934. "Far on the north side, just above the main road and at least half a mile below the entrance to the canyon, an extensive truck garden on old terrace ground showed the large area and the distance below and away from the valley that was anciently developed in terraced taro culture. On the south side there are likewise several sizable *kuleana* where, in 1934, old terraces were used for truck gardening. . . There were probably once a few small terraces on the narrow level strips of valley bottom in the lower canyon." (Handy: 497)

S.W. Nailiili, writing in 1865, offered this poetic description: "Waikapu, a district known for its majesty and splendid living, whose native songs gather flowers in the dew and weave wreaths of *ohelo* berries."

(Sterling: 91)

Though some maintain that "Waikapū" means "sacred water," others say "Waikapū" refers to a conch shell, or *pū*, once secreted in a cave "away up the stream, about a mile or more from the village," wrote W.K. Kaualililehua in 1872.

> On the left side of the stream is a cave and in the cave was the conch. It sounded all the time, unseen by the public, but a prophet on Kauai listened for it and came to seek with the idea of finding it.
>
> On the northeast side of that stream on the opposite side of the conch that sounded, on the cliff, was a dog named Puapualenalena. Because he heard it, he sought diligently to find it but he did not succeed. Those who guarded the conch were very watchful. The dog kept studying ways of obtaining it.

One day, when the owners of the conch had been "utterly careless," Puapualenalena stole the conch. "After he took it, it sounded no more to this day. It used to be heard everywhere in the islands and was annoying to some people. From this conch, the whole of the place was named Waikapū (Water of the conch). This is the legend of how it received its name. . . ." (Sterling: 93)

Others say the name refers to Kamehameha assembling his forces for battle by sounding a conch sshell at Waikapū. (Sterling: 93) It's not clear which battle this story refers to.

The great chief Kihapi'ilani and his wife passed through Waikapū on their travels around the island, finding a crowd near a huge rock above the stream of Waikapū, an adz rock said to be the boundary between Wailuku and Waikapū. "And it remains there until this day," writer Moses Manu said in 1884. (Sterling: 94)

Kiha also visited Waikapū on the advice of two old men in Ha'ikū, who told him their sister Pao could help him:

> Kihapi'ilani started for Waikapu where the prophetess by the name of Pao was living. While Kihapi'ilani was yet on the road, on his way to meet her, she predicted to those around her, saying: "There is a chief on the way here in search for some one to help him in his revenge."
>
> When Kihapiilani arrived in the presence of Pao, a rainbow appeared at the same time. Pao then said: "My lord is swift of foot." She then greeted Kihapiilani. Kihapiilani returned the greeting. After the greetings had been exchanged, Pao invited Kihapiilani to come in, and then she asked him: "What brings my lord here on this hot day?" The chief replied: "I have come in search of someone who will cause the death of my brother Piilani, for he has treated me shamefully." Pao then replied: "There in the lowlands of Kalepolepo lives the one who will assist you in killing your enemy. You go down till you reach Kalepolepo and look for a man whose face is covered over with filth. He is the one." At the close of the directions of Pao, Kihapiilani proceeded on his way to Kalepolepo, where in time he found the man described to him and he went up to meet him. (Fornander, Vol. IV)

1954 USGS map, with approximate Waikapū boundaries marked in red

Waikapū the District

Traditionally, Waikapū is more than just the fertile valley at the base of the mountain. The district covers approximately half of the Isthmus known as Kamaʻomaʻo, reaching the south shore and including the shoreline from near Maʻalaea to Kīhei Pūkoʻa. According to approximate boundary lines on a 1954 USGS map, the northern mauka boundary passes near the south end of Wailuku Heights and follows a line slanting down to a point near the bottom of modern-day Waiko Road. From there it turns sharply east, descending in a somewhat curved line to Kīhei. The eastern boundary line of the district meets the ocean at Kīhei Pūkoʻa, at the eastern end of the great wetlands known as Kealia Pond. Unlike the other three streams of Nā Wai Eha, Waikapū Stream did not reach the sea. Blocked by sand dunes, it drained instead into Kealia Pond. On this makai edge of the district is a surf spot still famous today and once there were salt pans "where they make most excellent salt," according to a voyager in 1817.

(Sterling: 95)

Between the shore and the valley was Puʻu Hele, a cinder cone formed late in the history of the West Maui Volcano. According to legend, Puʻu Hele was one of a pair of *moʻo* (lizards), the husband of nearby Puʻu-o-kali. Their child, Puʻu-o-inaina, was placed on Kahoʻolawe and later was a lover of Pele's sweetheart, Lohiau, according to *Place Names of Hawaii*. (Pukui: 203) Once 20 meters in height, Puʻu Hele was considered an essential stop on a trip around the island, according to Theodore Kelsey. "You cannot claim a circuit of Maui unless after you have been all around, you circle the hill above Puu-hele, then climb to the top and proclaim, 'Uapuni o Maui iaʻuʻ." (Sterling: 94)

Puʻu Hele now is a hole in the ground, deeper than it once was tall. Its cinders were mined to make road beds, beginning in World War II, when the Navy built Naval Air Station Puʻunēnē. (Kyselka:38 and Ashdown: 59) Today, what appears to be the remnants of the cinder cone's edges may be seen along Honoapiʻilani Highway just mauka of the South Kīhei Road intersection.

A Famous Battle

In the days when Puʻu Hele stood tall, before cultivation and sand mining had flattened the dunes of Kamaʻomaʻo, those dunes provided cover for Maui warriors in a famous battle. Around 1776, near the end of a century of warfare that frequently brought the chiefs of Maui and Hawaiʻi Island into conflict, the Big Island chief Kalaniopuʻu made what turned out to be a disastrous decision. Having successfully retaken Hana (a territory long disputed by chiefs of the two islands), he landed his fleet of war canoes along the south shore at Keoneʻōʻio, Honuaʻula and Kīhei. From here, he planned to attack Maui's ruling chief, Kahekili, who happened to be his brother-in-law. Kahekili's sister, Kalola, was with her husband, along with Kīwalaʻō, the son of Kalaniopuʻu and Kalola.

Though he had arrived with close to 3,000 men, Kalaniopuʻu at first gathered only 800, his most skilled warriors, the ʻĀlapa and the Piʻipiʻi. These young chiefs were "of equal height and were garbed in feather cloaks of various colors. They were those of whom King Kalaniopuu thought a great deal, for they were skilled in the martial arts of those days," Stephen L. Desha wrote. "I am sending you inland to Wailuku to fight the warriors of Kahekili and my word of hope to you is you will have great strength and drink the water of Iao," Kalaniopuʻu said to these warriors as he sent them into battle at dawn. The warriors' shouted response in the quiet morning betrayed their battle preparation to spies who raced back toward Wailuku to inform Kahekili that the Hawaiʻi Island army was ready to march.

Alas for those young warriors, their leader had failed to heed the advice of his own kahuna, who had warned him that he should wait until the next day at high noon, and have his nephew Kamehameha lead the army. On the other side of the isthmus, Kahekili had been given a more positive prophecy: "O heavenly one, the fish has entered the sluice-gate and is surrounded by the small-meshed net." A great strategist, Kahekili had planned carefully and also enjoyed the support of additional warriors provided by his ally and nephew, Kahahana of Oʻahu. "Kahekili's warriors were roused up, joined by the Oahu warriors under Kahahana, the young Oahu chief, and these numerous warriors were stationed at the sand dunes of Waikapu and also at a place close to those sand dunes seaward of Wailuku. Kahekili's warriors hid like sand crabs in their holes awaiting the onslaught of Kalaniopuu's relatively few warriors who would move inland to Wailuku without realizing that their death was awaiting them." (Desha: 35-43)

Historian Samuel Kamakau's description of the battle is evocative:

> Across the plains of Puʻuʻainako (Cane-trash-hill) and Kamaomao shone the feather cloaks of the soldiers, woven in ancient pattern and covered like the hues of the rainbow in red, yellow, and green, with helmets on their heads whose arcs shone like a night in summer when the crescent lies within the moon. . . . Like a dark cloud hovering over the Alapa rose the destroying host of Kahekili seaward of the sandhills of Kahulu`u. . . They slew the Alapa on the sand hills at the southeast of Kalua. There the dead lay in heaps strewn like kukui branches; the corpses lay heaped in death; they were slain like fish enclosed in a net. This great slaughter was called Ahulau ka Piipii i Kakanilua (Slaughter of the Piipii at Kakanilua). (Kamakau: 85)

Kahekili's forces, hidden in the sandhills on either side of the plain, allowed the warriors to advance across the plain of Kamaʻomaʻo until they reached the southeastern side of a place called Kalua, close to the village of Wailuku. (Sterling: 88) The Maui warriors then attacked, slaughtering all but two of the crack warriors in Kalaniopuʻu's army. These two managed to get back to Kīhei Pukoʻa, where Kalaniopuʻu was confidently boasting that his warriors had perhaps already drunk of the waters of Wailuku. Grief stricken and furious, Kalaniopuʻu and his chiefs determined to try again. In response, Kahekili's men rose at dawn once more and occupied the sand hills, and again their divided forces sent down a rain of spears, javelins and other missiles on the Hawaii warriors. "The terrified soldiers were surrounded and took to flight; they were driven by Kahekili's men like leaves before a whirlwind. The plains of Kamaomao became like a fishpond through whose sluice gate the sea flooded, Kalaniopuu's men like the mullet driven by the sound of beating into the sluice gate. . ." (Kamakau: 85-88)

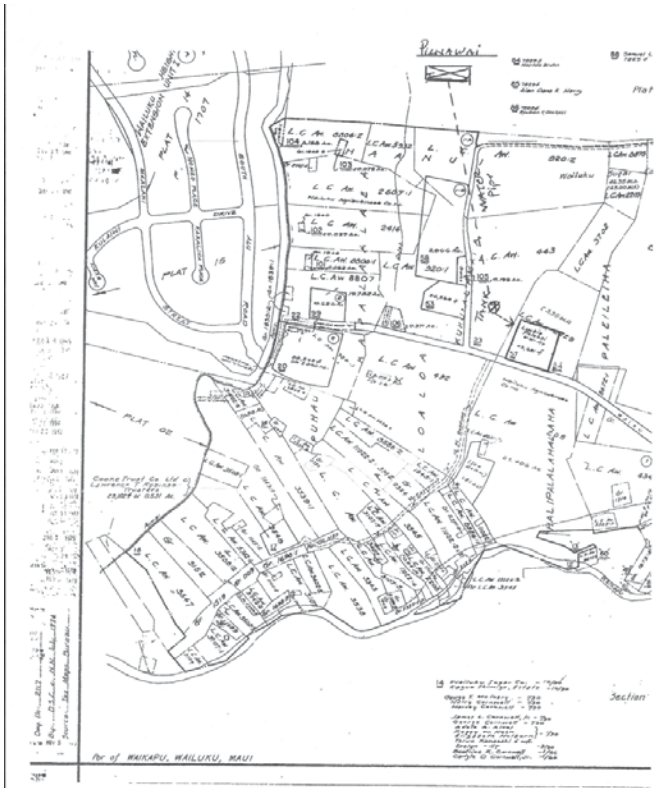
At last accepting that his men were surrounded and the battle lost, Kalaniopuʻu first asked his wife to go to her brother and sue for peace. Kalola refused, saying that she would be killed "for we came to deal death. If we had come offering love we should have been received with affection. I can do nothing." Instead, she told her husband to send her son, a chief of divine rank, along with the twin half-brothers of Kahekili. Kiwalao's rank was such that even the Maui warriors had to bow before him and allow him passage to Wailuku, where Kahekili magnanimously accepted their surrender. "Then Kahekili said to his followers, 'Take the fish of Kanaha and Mauʻoni and the vegetable food of Nawaieha down to Kiheipukoa.' So the two chiefs became reconciled, but Kalaniopuu's was a feigned friendship." (Kamakau: 88-89)

The next great battle in Na Wai Eha would be the decisive battle of Kepaniwai, in which Kalaniopuʻu's nephew and heir Kamehameha would defeat Kahekili's son in the valley above Wailuku in his campaign to conquer and rule all the islands. As part of the spoils of war, the conqueror parceled out land to his supporters. Waikapū was among the ʻāina given to Keʻeaumoku, one of the four "Kona Uncles," powerful chiefs whose support had helped Kamehameha rise. (Kameʻeleihiwa: 106)

The Outside World Arrives

By this time, Western voyagers were beginning to appear regularly in the Islands as word spread of the visit by Captain James Cook in 1778.

Foreigners arrived early in Waikapū. Kamakau, describing the chief Kuakini (also known as John Adams), who "was fond of the foreigners and entertained them at meals," says "there were foreigners



Contemporary TMK map shows density of *kuleana* in Upper Waikapu.
Map source: online application for Surface Water Use Permit

living at Hana, Waikapu, Honokowai, Waialua and on all the lands of Kahekili on Maui and Oahu; and when that chief died they came under Kuakini." (Kamakau: 389) The Kahekili referred to here it is not the chief who won the battle of Kakanilua, but Kahekili Keʻeaumoku, heir of the "Kona Uncle" Keʻeaumoku. Kahekili Keʻeaumoku, who had been *kiaʻāina* (governor) of Maui since the time of Kamehameha I, died in 1824, leaving his lands to his younger brother Kuakini. The lands then passed to Leleiohoku after the death of Kuakini in 1844. (Kameʻeleihiwa, 106)

Soon after the death of Kamehameha I in 1819, missionaries arrived to share the Gospel and the Western skills of reading and writing. Small schools and churches spring up everywhere around the islands. Though missionaries did conduct two censuses (one in 1832 and one in 1836, with 733 persons in Waikapū in 1832 and 709 in 1836), it is often school and church records that give us an idea of population levels at a time when few records were kept.

A report from 1834 counts individuals attending two schools in Waikapū, one with 170 *kane* and 155 *wahine* and another with 84 *kane* and 54 *wahine*. The report, printed in the mission-sponsored newspaper *Ka Lama*, laments that few children are represented in these numbers. In a report on the Wailuku Station from June 1, 1837 to June 1, 1838, missionary Richard Armstrong wrote: "From Waikapu to Waihee, there are now 5 good doby [adobe] schoolhouses." (Ms. in HMCS). In April 1841, school commissioner David Malo reported to the Legislative Council of the Chiefs held at Kaluaokiha in Lahaina that there were four schools and four teachers in Waikapū, with a total of 159 students. In his 1842 tour of schools, Malo found a total of 146 students in Waikapū. Teachers at this time were paid between 12.5 cents and 25 cents a day. (General Reports 1821-1842, HMCS) In 1852, the school agent's report found three schools, with a total of 84 students. Very likely these schools were scattered throughout the district, rather than clustered at the village we now call Waikapū.

Waikapū village was clearly well populated at the time of the Māhele, when land was divided between the king, chiefs and commoners. A map of Waikapū Plantation in the State Survey Office shows the area to be filled with the small landholdings known as *kuleana*. Though the map is not dated, it probably would have been drawn sometime between 1862, when Waikapū Plantation was founded, and 1894, when the plantation was purchased by Wailuku Sugar Company. One contemporary landowner, Avery Chumbley, says there are 32 *kuleana* within the 67 acres he owns in upper Waikapū. The old map shows that land use was similarly concentrated throughout the village area, with *kuleana* extending along the streambed far up the mountain.

The *Indices of Awards*, listing those who acquired land during the Mahele, shows some of the largest in plots in Waikapū going to *haole.* Michael J. Nowlien received 303.5 acres, William Humphries 131.3 acres and James Lozada 26.1 acres. Others with relatively large pieces include Haa (35 acres), Copp (16.94 acres), Catalina (13.61 acres), Manu (11.01 acres), John Richardson & Co. (two pieces, 8 and 6.10 acres), William Shaw (two pieces 13.6 and 6.3 acres), Anthony Silva (8.2 acres), Kepaa (9.69 acres), Kuihelani (9.4 acres), William McLane (5 acres). Maps of the time show Richardson with what looks like considerably more land than is indicated in the *Indices.* David Malo, the well-known scholar and author, also received a lot with a house and *kalo* and pasture land.

In addition to *kalo*, there was some early growing of sugar at Waikapū, perhaps by Anthony (Antonio) Sylva or by Antonio (or Antone) Catalina. One 1823 report says that Catalina made "an excellent syrup." (Girvin: 195) There was an early attempt at coffee growing around 1847, (Kuykendall: 316) and residents apparently raised cattle, whose "depredations" as they wandered the plain destroyed acres of young sugar cane. "Some of the natives have lost nearly all they had planted," J. S. Green wrote in 1846. (*The Polynesian,* October 3, 1846) Some indication of the area's agricultural nature comes also from this *Pacific Commercial Advertiser* report of a destructive storm in 1858, when:

> . . . A waterspout was formed and carried to the summit of the mountains between Waikapū and Ukumehame and there discharged. The torrent rolled down on each side, bearing all before it; the branch of waterspout that came down to Waikapū uprooted huge trees and strewed them out

> over the plain, dug up and removed large fields of kalo, and carried away considerable portions of arable land, leaving deep fissures and piles of stone instead. Many families, who before the catastrophe, sent food to market, were left destitute. The water came down in a body like a mighty wall fifteen or twenty feet high, with such majesty that it would not follow the windings of the brook, but rushed over whatever lay in its way, cutting its own path. Several horses and cattle were caught in its track and drowned. One dwelling house was carried off with all its contents, the inmates barely escaping with their lives. It is very remarkable that the house of Mr. Devauchelle escaped destruction. The torrent passed like a high wall on both sides of it, leaving it unhurt and strewing large boulders and trunks of trees all around it. After crossing the road in front of Mr. Antonio Sylva's house, the torrent parted and one branch rushed on to Kealia and the other hastened down to Kahului, both depositing all along their track large trunks of trees brought down from the mountain, and kalo and sugar cane from the Waikapu gardens. . . (*P.C. Advertiser,* 3/11/1858)

Waikapū Plantation

Waikapū Plantation was founded several years later. It was formed by a series of purchases that began when James Louzada acquired the estate of the late Circuit Court Judge John "Iaone" Richardson. Members of the Richardson family had lived in Waikapū for many years. Apparently the first resident of that name was George Richardson, who was born in Ireland and died in Waikapū in 1835, leaving a widow named Kaneole. Their son or grandson, John Richardson, is named in several places on the Waikapū Plantation map. His land became available for sale through tragic circumstances, when Richardson committed suicide at age 35 by hanging himself from a tree on his cattle range in Kula. "He had been laboring for some time under a mental aberration, caused, it is said, by domestic troubles," said the *Pacific Commercial Advertiser* in January 1860. Perhaps this was depression resulting from the death of his wife, Dorcas (Doreka Ilai) in 1857 and their four-year-old daughter Fanny in 1859. The newspaper said Richardson had been a member of the House of Representatives, recently promoted by the king to a seat in the House of Nobles, and was considered "one of the most promising and intelligent of his race." (*P.C. Advertiser*, 1/12/1860)

Louzada, a native of New York, had arrived in the Islands in 1834. (*The Friend,* December 1869: 104) His acquisition of Richardson's estate was not his first stake in Waikapū land. A copy of a March 15, 1844, deed from Charles Kanaina to Louzada, translated from Native Register, Volume I, page 175, reads as follows:

> I hereby give two ilis of mine at Waikapu, Aoaokamanu and Puahinakao, to James Louzada to live on under me, as the natives of Hawaii do. If he does wrong under the law, his occupation thereof shall end. Furthermore I shall have the Thursdays and the Fridays [tax days] of the land, and he shall be responsible to me. Furthermore he shall give the tribute to the tax

> collector, as formerly paid by these lands. Furthermore, *e like no me ka la me ai kahiko* [the ancient ways of the land shall be followed?] Furthermore if it comes to us that he petitions as a foreigner [does not follow Hawaiian custom] then his occupation of the land shall cease. Furthermore if the *lunas* object to this grant of land, then it shall cease and the land be returned to me.

Several years later, Louzada wrote to William Richards, president of the Board of Commissioners to Quiet Land Titles, regarding his application for Land Commission Award 225, for land at Waikapū totaling 26.10 acres:

> Enclosed I take the liberty to transmit to Your Excellency a verified copy of a deed for the land, which I cultivate at present, given me by Ch. Kanaina Esqr. with the consent of Her Highness the late Premier. The stipulations of the deed are of such a nature, that as a new order of things is impending, I cannot feel satisfied or safe, until I ensure that the land cannot be taken from me. I have the more reasons to be anxious, as I have expended all I had, to put the land in order, and it would be very distressing to me, if I had to leave it. I have always strictly adhered to the conditions of the writing, and shall certainly still in future endeavor to show, that I am not unworthy of the favor which I respectfully beg . . .

Copies of these two documents are in the possession of a contemporary Cornwell descendant, Mark R. Walker.

In a column by Mrs. D.P. Penhallow titled "Waikapu, Maui: a Sketch" in the February 3, 1926, *Maui News* is more detail.

> As with much of early Hawaiian history, so it is with Waikapu. Definite dates of events are hard to fix and the sequence of them not always clear, but as Waikapu was first in this section of Maui in war so, evidently, was it the first to produce sugar and cattle. A Spaniard named Antone Catalina made cane syrup at Waikapu in 1823, which was apparently the beginning of the sugar industry in the Wailuku District. James Louzada came over from Waimea, Hawaii, a number of years later, established a cattle business, opened a store and began cultivating cane on a large scale. The date is not definite but he erected a stone mill with oxen for motive power on the premises known as Hale-pa-laha-laha at the interest in Waikapu Valley, located on its northern slope. It is reputed that Louzada's Hawaiian wife, Kapu, lost an arm while tending the mill.
>
> Following this mill a stream driven one was erected in 1862 near the present road to Lahaina, just north of the stream crossing. . . the store referred to was the first in the district, people going from Wailuku to make purchases there. The store building was located on the lower corner of the Pia Cockett premises and remained as a landmark until a few years ago. The cattle industry flourished and also, many fine horses were produced, horseracing being a feature of Waikapu for years. . . . Aside

> from its commercial aspect, there was much of romantic interest attached to Waikapu. Kalalaua spent some of his leisure time with the Cornwells, who kept open house, and it has been featured in song and story. Its romance was of the past, which belonged to its day and age. Of this there are but slight reminders evident only to those who can picture it as it was.

Louzada's acquisition of additional land in 1862 apparently was unplanned, simply a response to a promising opportunity. According to an article in the April 9, 1864, *Pacific Commercial Advertiser*:

> Mr. James Louzada, happening to be in the vicinity, heard that there was to be an auction sale of the estate of the late John Richardson, and attracted by curiosity attended it. A good frame house and lot was put up for sale, but nobody wanted it. Seven hundred dollars only were bid, and Mr. L. thinking it a safe investment, took it at a few dollars over that sum, and for a few hundreds also purchased the taro lands belonging to the estate. Thus, without any intention of buying when he went to the sale, he found himself possessed, for the paltry sum of $1,200, of a good dwelling house and some of the finest cane land on the island. He was not long in finding out that he had located over a mine destined to be as productive as a gold mine, nor in making his plans for the future. Associating himself with his brother-in-law, Henry Cornwell, Esq. [married to Louzada's sister Adelia], formerly of this city [Honolulu], he set to work to erect a mill and commence the manufacture of sugar, the natives and foreigners in the village promising to plant cane on their own lands. Two years have passed since the lucky purchase of this property occurred, and already he has sent to market some 400,000 pounds of sugar, worth perhaps $25,000, though his mill has been in operation only about eight months.

The writer said there had been a remarkable change in the village of Waikapū since "we last rode past it" four years ago, when "there was nothing here to attract a stranger--a few thatch houses with one or two frame buildings, scattered among taro patches were all that one would notice in passing. Now a tall chimney attracts for miles the eye of the traveler and the dark smoke, growing up in clouds from its top, tells plainly of the industry, capital and enterprise that center here."

The writer told of visiting the mill to meet:

> "Mr. Cornwell and his son William, who were hard at work turning cane juice into gold. The mill consists of a large building in the form of an L, on a hill slope, which facilitates the work very much. The machine is driven by a 36 horse engine, built by Mr. Henry Hughes of this city, who also constructed all the machinery used on this plantation. Everything about the mill is of Hawaiian manufacture, which can be said of but a few sugar manufacturers on the islands. The capacity of the mill is about four thousand pounds of sugar per day, though, by working nights, which is sometimes done, five thousand pounds can be got off. To obtain this product, Messrs. Louzada and Cornwell employ about seventy field and mill laborers, of whom forty are females, who are engaged on account of

the scarcity of men. . . .The land at Waikapu consisting of a gentle slope from the base of the mountain to the road, irrigated by the Waikapu river, is admirably adapted to sugar culture, producing, when well cared for, very heavy crops. The extent of land suitable for cane is limited only by the amount of water obtainable for irrigation. The proprietors of the mill have purchased land largely since they began operations and have now some 200 acres. They purchase cane from the natives, paying generally about one hundred dollars an acre for the standing crop, taking it off at their own expense. The sugar boiling department is under the charge of Wm. Cornwell, who possesses all the activity, industry and perseverance of his father and uncle. The high reputation of the sugar made at this mill is the best recommendation that a sugar-boiler can wish.

Old map of Waikapu Plantation shows mill site near Waiko Road intersection.
Map source: DLNR State Survey Office

About a mile back from the mill, and on an elevation overlooking the whole country, stands the house of the late Mr. Richardson, the sale of which we have already referred to, now occupied by Mr. Cornwell and his family. It has been much improved, by additions, and forms one of the pleasantest residences we have ever seen. From its front verandah, a most beautiful scene is had--the village and mill buildings, the plain, Kahului Bay on the left, Kalepolepo Bay at the right, and the whole of Mt. Haleakala, with its villages on its side--are all in view. Were we to select a site for a country home, it would be this charming spot in Waikapu, and we congratulate Mr. and Mrs. C. and their family on possessing so healthy and delightful a home, where in and around the dwelling every comfort and luxury is provided. The traveler, who enjoys, as did we, the pleasure of a short sojourn here, and an acquaintance with those who show such refinement and taste, and who welcome visitors with such cordial hospitality, will leave their pleasant home with many regrets. Such residences and such homes we trust will spring up in every district.

What a change has taken place in Waikapu within two years! Where were a few taro-patches, half cultivated by lazaroni, a village has sprung up, with its sugar mill and buildings, its waving cane fields and busy laborers, scattering industry, thrift and contentment everywhere. Here where a few hundred dollars worth of taro were formerly raised, forty thousand dollars' worth of sugar may now annually be made and sent to market.

A planter's life, however, is no playspell. Messrs Louzada and Cornwell and every one else engaged on the estate work hard -- up early in the morning, and late at night, they earn every dollar they receive. Although the first outlay in commencing a plantation is heavy -- and few estates are set in operation with less than forty or fifty thousand, and from that to one hundred thousand dollars -- yet when once completed, the income promises to be large, and on most plantations will amount to at least twenty-five per cent on the investment, when well managed. This estate, thus far, has cost its proprietors nearly fifty thousand dollars and it is safe to say that it will produce annually at least forty thousand dollars, at present prices of sugar."

This account, in addition to providing a detailed glimpse of life at Waikapū in 1864, also offers insights into attitude and understanding at the time. Clearly, sugar plantations were welcomed as the economic future of the Islands. The use of the word "lazaroni" in relation to Waikapū taro farmers now seems insulting; *Webster's New World Dictionary* defines lazaroni as "any of the class of homeless beggars formerly common on the streets of Naples." The writer apparently has no understanding of the fact that "a few taro patches, half cultivated" may be the remnants of a highly productive farming community devastated by imported diseases in previous decades. Or perhaps the "few taro patches" were all that was left after the destructive 1858 waterspout described above. This 1864 writer's view is in contrast to that of Gorham D. Gilman, who wrote in 1843 of a tour of Maui: "The country around Waikapu and

approaching Wailuku is quite fertile and well cultivated, and formed a pleasing contrast to the arid plain below." Gilman reported being greeted by friendly natives who offered "a tumbler of fine cool water" and "a stick of Sugar Cane in our hands to eat on the way." (MHS ms. collection)

The new plantation established a mill at the Kīhei-mauka corner of West Waiko Road, which may be seen on the old Waikapū Plantation map. The map also shows another mill east of that site and on the other side of the stream; it seems unlikely that this is the earlier mill set up by Louzada, because a *Maui News* column from 1926 (quoted below) sites the first mill at Halepalahalaha, which is higher up the hill. The site of the Waikapū Plantation mill yard continued as stables until it was subdivided for housing starting about 1955. (Chumbley) The old smokestack "which marked the site of the original Waikapu sugar mill," toppled in a Kona gale in 1918. (Silva: 32)

Not all was rosy in the early years of the Waikapū Plantation. One problem arose from the establishment by Louzada and Cornwell of a road that is now known as Old Waikapū Road. Thomas W. Everett, a Waikapū resident who served as sheriff of Maui for many years, reported in an 1866 letter:

> I got Mr. Alexander to survey the Crownenburg Lot last week and likewise the Nowlien Lot Boundaries. He found that the disputed road was no part of it on the "Nowlien" land now owned by Cornwell but that after the road left the Crownenburg land it ran through Govt. land all the way into the main road leading from Wailuku to Lahaina. He found that Louzada and Cornwell had fenced in quite a piece of land into their pasture from the main road up to what I have marked on enclosed sketch Pohakoi. . . this stone "Pohakoi" was decided by the parties who settled the boundary question in 1847 or 8 to be the boundary between Wailuku and Waikapu. Consequently the Nowlien lot is in Wailuku. Cornwell has lately bought the Crownenburg lots, but Daniels has possesion for three years to come. . . . there is no doubt that the parties knew of this piece of land when it was fenced up but it was probably thought it would not be missed. . . (MHS files)

This road still remains, though it is little used today. According to Avery Chumbley, the road once continued more parallel with Honoapiʻilani Highway, rather than turning down toward the highway around Kuikahi Drive. Chumbley thinks it was realigned some time around the 1930s. He is not sure why this happened, but says until that time the road was the main access to the hundreds of *kuleana* properties scattered throughout the valley.

A much bigger issue was the unclear boundary between Waikapū and Pulehunui. Much of the land of Waikapū was part of the one-twentieth of all unappropriated public lands set aside to produce income for school purposes by a law established in 1850. "During the next few years considerable acreage was sold to procure money for educational purposes." (Wist: 60) "In 1875, the Board of Education sold at auction the 'Land known as the Ahupuaa of Waikapu, saving grants hitherto made within the said ahupaa, or sales by the Board of Education,' to Henry Cornwell, from the Government issuing a royal patent in the above terms without survey or statement of area. Mr. Cornwell afterward sold to Claus Spreckels and others the part known as Waikapu Commons." (Sterling: 95) This 1878 sale was of an undivided half interest in 16,000 acres of the Waikapū Commons from Henry Cornwell to Spreckels, who was in the process of acquiring land and water rights in order to begin what would become Hawaiian Commercial & Sugar Company. (Adler: 36)

This land sale was to result in problems within the next few years, as the owners of the adjacent *ahupuaʻa*. The original sale to Cornwell had been based on a map, with no survey or notes and just an estimate of the acreage. For $15,050, Cornwell received "all that tract of Kula land commonly known as the Waikapu commons, extending on both sides of the Waikapu main road and embracing all the said commons land known to belong to the Hawaiian Board of Education." Subsequent to the sale, the owner of Pulehunui went to court to claim that the boundaries were incorrect. Based on testimony by "the oldest native residents" of the area, the claim was upheld, and Cornwell was "ejected." Having already sold it, he was obliged to repurchase it from the owner of Pulehunui at a cost of $7,500. Cornwell then went to court to claim that the Board of Education was responsible for this problem, and the court agreed. (Supreme Court of the Hawaiian Islands)

Meanwhile, the ownership of Waikapū Plantation had changed in 1877, with the original proprietor retaining an interest but selling the remainder to his son William H. Cornwell and William's brother-in-law, George W. McFarlane. At this point, Waikapū Plantation could produce 1,000 tons annually, and if water could be brought in, it would produce 2,000 tons of sugar. (Apparently this need would be met by the first artesian well on the outside islands, drilled in 1881 at Waikapū Plantation by the McCandless brothers.) Ownership changed yet again, with the partnership known as the Waikapū Sugar Plantation Company dissolved by mutual consent to be continued thereafter by William Cornwell and George McFarlane under the firm name of Cornwell & Company. (Silva: 17, 19) Louzada had died in 1869, and Henry Cornwell was getting on in years and would die in 1886 at the age of 70. (familysearch.org)

In 1889, the *Pacific Commercial Advertiser* reported the sale of W.H. Cornwell's half-interest in the Waikapū Plantation to Spreckels. "The remaining half is held by G. W. MacFarlane and Company and probably will be purchased by the same party. Major Cornwell will continue to be the manager. . . the purchase of this plantation by such a shrewd, farseeing capitalist as Colonel Spreckels, indicates that he has firm faith in Hawaiian sugar property, and that the proposed changes in the American tariff will not ruin our sugar planters, croakers to the contrary notwithstanding," the paper said. (Silva: 22) The next year, MacFarlane sold the other half interest to Spreckels. In 1894, Wailuku Sugar Company purchased Waikapū Sugar Company, with 2,500 shares at $42 per share. The first crop of the combined Wailuku, Waihee and Waikapū plantations in 1895 produced 4,939 tons of sugar. The survey for a railroad line to Waikapū had just been completed--this line would be 20,800 feet in length. (Silva: 24) Over the next 20 years or so, Wailuku Sugar Company would also buy up another operation, Waikapū Agricultural Company; it is not clear at this point who or what constituted this company. (Silva: 29-32)

Colonel Cornwell

Through the late 19th century, the Cornwell residence was a center of hospitality enjoyed by none other than King Kalākaua, as William Henry Cornwell's involvement in the affairs of the kingdom grew. Cornwell, born about 1842 in Brooklyn, New York, came to the Islands with his parents about 1857, according to his 1903 obituary in *Paradise of the Pacific*. Cornwell married Blanche MacFarlane, sister of G.W. MacFarlane, and the two had three children before her death at the age of 27. The obituary said that Cornwell:

> ". . .grew up in the cane fields and was made manager at an early age. Throughout his whole life he was one of the most successful planters in the group. He became quite intimate with Claus Spreckels when the latter launched his great plantations on Maui, and through business dealings

> with the gentleman afterwards, which involved the acquisition of water rights from the King, he got well acquainted with his Majesty, who made him a member of his staff. In 1890 he was elected noble and ever after that time was prominent in politics. On March 14, 1891, he [and others were] appointed by Queen Liliuokalani as members of her personal staff with the rank of Colonel. At the time of the overthrow of the Monarchy he was Minister of Finance in the Queen's Cabinet. After annexation Colonel Cornwell allied himself with the Democratic Party, being at the time of his death member of the National Democratic Committee. No one in the islands had a keener relish for honest racing sport than he. As an importer of superior breed of horses he was instrumental in improving much island stock for racing and general purposes." (*Paradise of the Pacific,* December 1903: 69)

Family stories shared by Cornwell's great-grandson, John Cornwell Walker of Honolulu, tell of the two-story house acquired in the original purchase of the Richardson state, its location still marked by two Norfolk pines that stood on either side of the walkway, with another pine a quarter-mile away at the site of the stables. Cornwell raised horses to race in Honolulu, and once took a winning steed to a downtown hotel and poured champagne over the horse. The king would come to visit, landing at McGregor Point, where he would be joined by other riders for a parade to Waikapū. He would stay for perhaps a week of parties and poker games, then depart, accompanied once again by an escort of horsemen. (Walker)

Two Norfolk pines mark the former site of the Cornwell home. Engledow photo 7/09

Some say that the character of "Uncle Bill Calhoun" in Armine von Tempski's *Born in Paradise* is based on that of William H. Cornwell. Though much of the story beginning on page 64 is obviously

fiction, it may be that some of the descriptions apply to the real Waikapū and the real Cornwell.

> "A short distance from the sheer walls of rock which made a sort of awesome portal [to the valley], a sprawling house sat on a low hill top surrounded by Norfolk Island Pines. Purple mango trees and dark pointing fingers of Italian cypresses flanked brick walks which leaped down through terraces of gay flowers in wide steps to meet the road. A feeling of excitement poured from the house though no people were visible . . ."

Inside the house, in "a spacious room filled with pictures of racehorses and women," Uncle Bill Calhoun lay, obviously ill. But "I sensed he was a great figure. His conversation was punctuated with damns, shouts, and 'Let's hoist another!' Opened-armed, open-hearted, he seemed to embrace life as it came toward him."

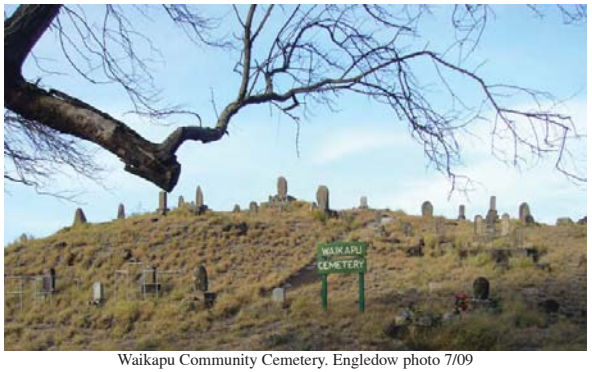
A photograph of Colonel Cornwell published in the Wailuku Sugar Company's Centennial history shows a man who might very well have been this hearty, lively character, though the real Cornwell did not die a lingering death tended by a lovely young *hapa-haole* woman, but died suddenly following an attack of angina pectoris at his home in Waikapū, having married Josephine Colvin a year earlier. William H. Cornwell was buried in Honolulu, but a Cornwell family graveyard remains on the property in upper Waikapū owned by Avery Chumbley, and Chumbley says other graves that were next to the Piltz house above Old Waikapū Road (near the site of the old Cornwell house) were exhumed. These may have included the grave of George E. Richardson, brother of Judge John Richardson, who was buried in Waikapu in the “family vault.”

Col. William H. Cornwell. Source: Wailuku Sugar Co. Centennial

Cornwells maintained their presence in Waikapū for at least a few years; William H. Cornwell Jr. opened a butcher shop called the Waiohuli Market in Waikapū in 1906. He left in 1907 to establish a business on the mainland. And at least one contemporary family, the Vidas, is of Cornwell ancestry.

Wailuku Sugar

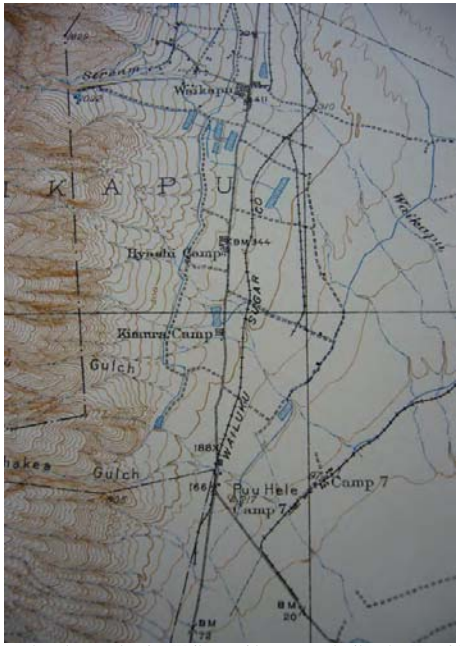
The sale of Waikapū Sugar Company to Wailuku Sugar Company brought it into a much larger operation and into the plantation lifestyle often remembered today, with workers of various ethnicities living in separate camps near their work sites. Apparently there was a camp at Waikapū village, which was enlarged in 1919 by bringing in six houses from Pu‘uhele Camp. That same year, a new dispensary was built at Waikapū. (Silva: 32) Old maps show two camps between Waikapū and Pu‘u Hele, one called Kimura Camp and one called Hayashi Camp. Graves in a small cemetery on East Waiko Road are almost all marked in Japanese, indicating that there may have been another ethnic Japanese camp nearby, but no such camp shows on maps consulted for this report. There are about 75 marked graves and more than 20 unmarked graves at this Waikapū Community Cemetery. (MHS)



Waikapu Community Cemetery. Engledow photo 7/09

The 1910 census enumerator noted specific areas as he filled in the names on each 25-line page for Census District 76, making it possible to estimate population at that time. Kimura Camp had about 60 residents; Hayashi about 100; Pu‘uhele Camp about 60; "Waikapu Plantation Camps" more than 200; "Waikapu Camp number one," 100; Waikapu Ranch Camp, 50; Waikapu Village about a dozen; "plantation camps," 50; and "Waikapu mauka camps," 50.

The 1920 count lists about 175 residents on Waikapū Road. The 1930 count lists 325 in Waikapū Village, 25 in Waikapū and an unclear number, at least 125, in Hayashi Camp.



1923 Ma‘alaea Quadrangle map showing Waikapu with camps and railroads. Hawai‘i State Archives

School and Church

Old maps show the parcel on the Wailuku side of the Waikapū Protestant church as a school. Whether this is the same location as the missionary schools reported in the mid-1800s if not clear, but a current Waikapū resident, Zelie Rogers Harders, says school continued to be in session there at least through the early 1940s. Mrs. Harders was attending Kaunoa School when Pearl Harbor was attacked, and her parents decided to keep her closer to home and enrolled her in the one-room Waikapū schoolhouse. A few records on file at the State Archives in the Department of Education “Reports on Numbers and Nationalities of Pupils” mention the school. In 1890, F.R. Woolsey was principal, with 29 boys and 14 girls (all “native”) plus two girls who were "half caste" in first through fourth grade. Most were aged six to 15; one was older than 15 years. (262-8-19) In 1911, Zelie Rogers (Mrs. Harders' grand-aunt) was a teacher. In the term ending March 31 of that year, there were 42 pupils but only 32 seats, all in first grade. The report said 16 were Hawaiian, five-part Hawaiian, 19 Japanese and one Chinese. Most were six or seven years old; two were 11 years old and beginning school for the first time. (262-9-39) Mrs. Harders says that when her grand-aunt was teacher, she was able to fool naughty boys who plotted mischief in Hawaiian, because she herself was part Hawaiian and fluent in the language. Miss Rogers later married Patrick “Pia” Cockett, who would become a member of the county Board of Supervisors.

Waikapu Church in 2009. Engledow photo 7/09

The Protestant church in Waikapū began in 1838. Its first building was erected in 1866. Records of church growth and change may be found in the Mission Houses Museum Library, which includes minutes of the Maui Presbytery and of the Hawaii Evangelical Association. Originally, this church was part of the Wailuku parish, which included Wailuku, Waikapū, Waiheʻe and Waiehu. In the minutes of the Maui Presbytery for 1869, translated by H. P. Judd, a request by members of the Waikapū congregation that it be separated as an independent church was approved. In 1870, church elder J. Kamakele reporting on the doings of the church, and the church called a new pastor, W. Kahoʻokaumaha (also spelled Hoʻokaumaha).

Archives of the Hawaiian Evangelical Association provide annual statistics as well as occasional insights into the life of the church and the village. In 1871, a report from the Rev. W. Hoʻokaumaha says "this is a small parish but rich (fertile). There are not many members of this church, for they are a small family." Religious meetings were held on Wednesdays, Saturdays and Sundays and not many attended during the week because they were working for the sugar planters, but "on Sundays the Hawaiians set apart that day, so they assemble in larger members in the church. There are some unbelievers in the parish. In the camps of the '*haole*' are the chief doubters." The pastor said these would hide in their office or lie down and pretend to be sick when church members came to visit. The church building was in poor condition, and the congregation was preparing to raise a fund of $2,000 to improve it. At this time, "there are two schools in the parish, the teachers of which are Protestant." There were a few Roman Catholics and Mormons. Apparently there was some sort of epidemic, because the pastor notes that "last March, 40 died." He was also concerned that hula teachers had come from Lahaina and unbelievers practiced the dance. "Some religious persons went to forbid that evil practice and it has ceased," and the teacher had gone back to Lahaina, he wrote.

In the Presbytery minutes of 1876, the minister reported "great activity of the church at Waikapu in rebuilding their edifice."

The statistical tables for 1870-71 shows 197 members in good standing. By 1887-88, there were only 56 members, with the Reverend S. Kaili in charge. The statistical report for 1889-90 shows that

Wailuku and Waikapū were under the leadership of the Reverend O. Nawahine, with a total of 94 on the membership rolls. Consolidation continued--in 1897-98, Wailuku, Waikapū and Honuaʻula were led by the Reverend S. Kapu, with a total of 187 congregants.

In 1909, the Maui News reported that the Reverend Lincoln Benjamin Kaumeheiwa had been invited to co-pastor with the Reverend R.B. Dodge of Kaahumanu and Waikapū churches; he had been in Hana and was "a good preacher and has a good voice for singing," the newspaper said. In 1918, he was installed as pastor of Waikapū and Puʻunene churches. Church membership continue to dwindle, and by the 1940s a supply pastor preached to 27 members. In 1957, Waikapū, still listed as a "Hawaiian church," had an average attendance of 10 and was "yoked" with Kahului Union. By 1958, the church is no longer included in the annual statistical reports.

St. Joseph Mission, on Honopiʻilani Highway, served the Catholic community of Waikapū from 1900 (*Pioneers of the Faith:* 327) until it burned down in February 1997. Today it is a well-kept shrine to St. Joseph, with some graves, only three of which are marked. They are the graves of Hanna Sylva, wife of Antone, who died October 13, 1885, and of Mary Ann and George Maxwell (died 1931 and 1930).

World War II

Like others around Hawaii, the people of Waikapū endured martial law and pitched in to prepare for possible enemy attack. There also was new construction in the village with the establishment of Waikapū Station Hospital. An article in the June 17, 1942, *Maui News* describes its formal opening at a banquet held in a hospital's mess hall.

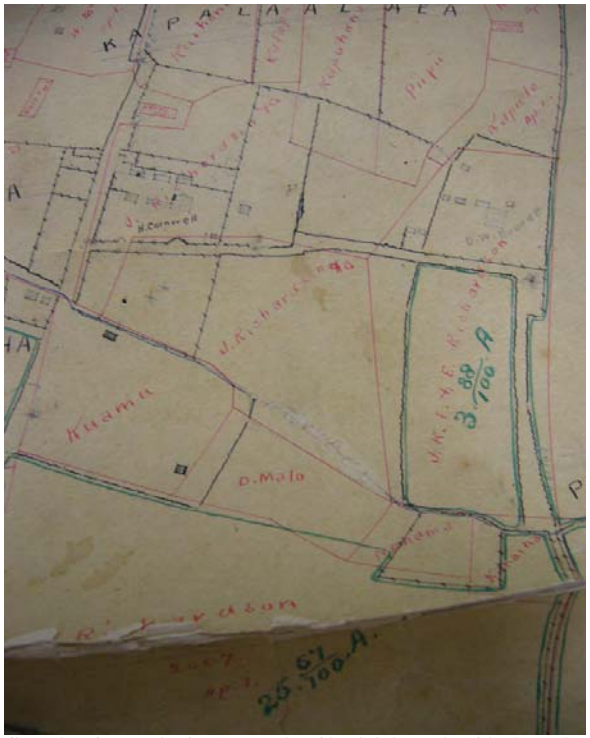
> The hospital is considered an example of the speed with which defense construction has been accomplished on the island, in as much as it was not completed until last January, and now includes almost complete facilities for operation of a general hospital. . . . Major J. Mulligan asserted that the hospital could not have been built without the combined efforts of individuals present at the banquet, and asserted that he appreciated the neighborliness and assistance that had been given on the project. Staff of the hospital consists of eight physicians, ten nurses and 21 enlisted men. Facilities installed include four wards, complete surgery, laboratory, dentistry office, X-ray machine and darkroom, beside large storerooms, mess hall and quarters for the officers, nurses and enlisted men. Wards at the new hospital are so constructed that emergency wards may be organized on the ground beneath them. The surgery is located in the old Waikapu church, from which the steeple has been removed to make it less conspicuous. Now serving as a nurses cottage is the old parsonage. {According to Avery Chumbley, this site was the triangular parcel at the junction of Waiko and Old Waiko roads.]

Steps at junction of Waiko and Old Waiko roads may have led to WWII nurses cottage.
Engledow photo 7/09

An article in the August 18, 1923, *Maui News* tells of the formation of a volunteer company made up mostly of men from Waikapū.

> Proficiency in the use of the bolo knife, with which the majority of its members are armed, and skill with small arms and in hand-to-hand combat is the pride of Co. E. 2nd Bn., Maui Volunteers.
>
> The company, sponsored by the Wailuku Sugar Company, comes largely from Waikapu, where it has its headquarters, and consists largely of men working for the Wailuku Sugar Co. Most of its members are Filipino nationals.
>
> The company is commanded by Capt. Wayne Richardson, Jr., Wailuku Sugar Co. division overseer and a graduate of Stanford University, with 1st Lt. James A. Tokunaga, former Hawaiian National Guardsman and highway maintenance foreman for the Territorial department of public works here, as executive officer and second in command.
>
> Approximately 130 men answered the call on May 10, 1942, which deemed a volunteer company necessary at Waikapu. After considerable organizing and fundamental training, the company was under way to becoming a top-notch outfit.. . . Training primarily has been with small arms. Considerable effort and time also has been spent in training on hand-to-hand combat, bayonet defense and the use of bolo knives. Most members of the company are equipped with a bolo knife made by themselves and each man owns a hunting knife. . . . Weekly drills are

> conducted from 8:30 to noon each Sunday at the Waikapu ball park. The public is invited to witness these drill periods and see the men who volunteer their time, in addition to fulfilling their civilian jobs, for the defense of Maui.



Section of Waikapu Plantation map showing Kuamu and David Malo kuleana, plus Richardson and Cornwell lands
DLNR State Survey Office

Waikapu Residents

Waikapū has over the years at home to many families whose names are familiar around Maui, including the Sylvas, Cocketts, Vidas and Maxwells, who are descendants, according to Charles K. Maxwell, of Kealiiwahinehololio, a high chiefess who once controlled all the lands from Waikapū to Ma‘alaea. (BWS 12/4/2002)

One of the oldest families in Waikapū is descended from Kuamu, whose *kuleana* was high on Waiko Road, which was bounded on one side by David Malo and on others by John Richardson. The great-great-great-great-grandson of Kuamo is Glenn McLean, who lived on the property for many years beginning in 1973. McLean is the family historian, having spent much time listening to the stories of his elders as he was growing up, and he has studied history formally in recent years, learning Hawaiian and digging into archival records. McLean's grandfather Kalā Pelekai grew up on the Kuamu kuleana. His grandmother Luʻukia Pelekai grew up on land mauka of the Maui Tropical Plantation belonging to her stepfather, Kaʻaʻa; there are several family graves on that parcel. Kalā and Luʻukia married in 1916 and moved to Hāna, where Glenn McLean now lives. McLean's mother also grew up in Waikapū, but now lives in Hāna as well.

McLean said Kuamu was awarded five *apana*--three for *kalo*, one for *wauke* and one in Keokea for sweet potatoes. The Waikapū property as it now exists has shrunk by about two-thirds from the original dimensions of about 3.5 acres shown on early maps. The property has limited access to water from the Waikapū stream, through a 1-inch pipe that waters fruit trees and the native plants grown by McLean's son Luke, who now lives on the property. McLean has applied for a Commission on Water Resource Management surface water use permit in order to a re-open old *loʻi* on the property.

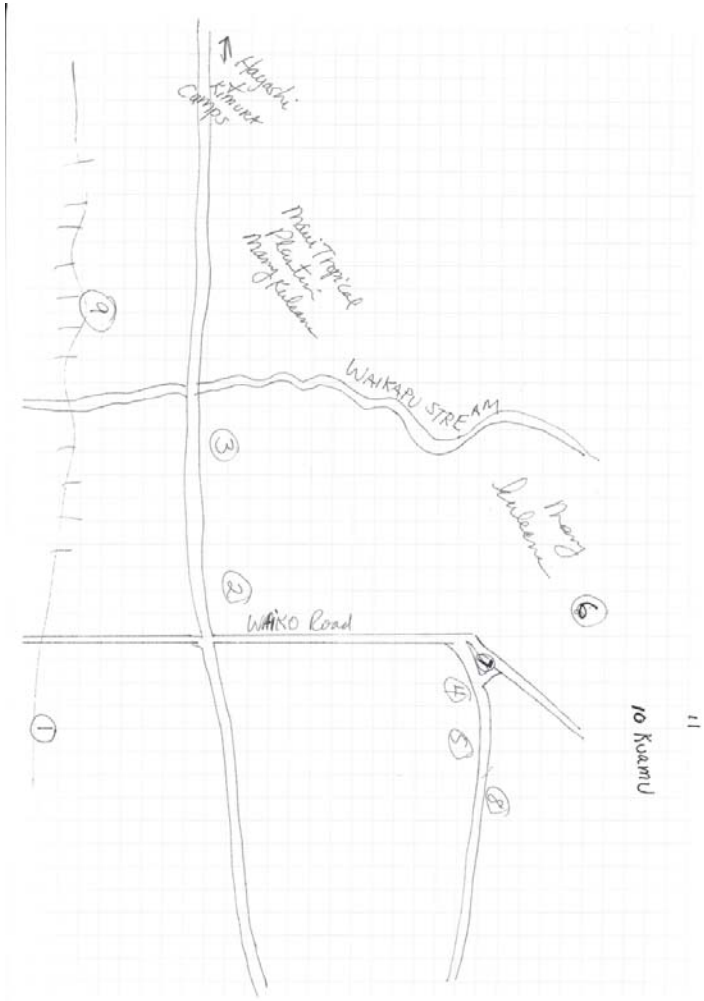
In a brief, informal conversation, McLean shared a few tidbits of Waikapū history. Some of his relatives were among many who left the village in the 1930s to move to Molokaʻi and take up homestead lands there. Eddie Rogers, whose family still lives in Waikapū, once leased 5,000 acres between Waikapū and Maʻalaea for his cattle; as a young man, McLean worked for him fixing fences. Near the junction of Waiko and Old Waiko roads was a store run by Ah Fat Soong, where Rogers and other residents loved to go for bread and coffee in the morning. Another old family is the Vidas (descendants of Kate Louzada Cornwell and Daniel Rodrigues Vida, who came from Chile and married Kate in 1868). (familysearch.org) A grave on their property belongs to a Cockett, perhaps Charles, the first person of that well-known Maui name to come to the island.

Waikapu also has spawned some famous individuals, beginning with earliest recorded history. The early Hawaiian evangelist known as Blind Bartimeus was born in Waikapū about 1875 and was a noted hula performer and drummer for Hawaiian royalty. (Bingham)

More recently, it is the hometown of the late Shin'ichi Suzuki, a world-class teacher and practitioner of aikido. Suzuki was born in 1917 in Waikapū, the first in a family of ten children whose father immigrated from Japan to work in the cane fields. (Curtis)

* * * * *

Author's note: Waikapū clearly was a vital and important community in Maui's history, and its story as presented here could be greatly expanded. Due in part to time constraints, this report is based almost entirely on documentary resources, with few interviews of contemporary Waikapū residents (who are putting together their own oral history). Stories told by residents and descendants of former residents would fill in gaps and perhaps correct errors or mis perceptions found in this report. The author hopes that this report turns out to be the first draft of a comprehensive history of Waikapū.



Engledow map 7/09

Approximate locations of various sites mentioned in A History of Waikapū

1. Waikapū Community Cemetery.
2. Site of 1862 Waikapū Mill, later Wailuku Sugar stables area. This was subdivided starting 1955.
3. Old Catholic church that burned in 1997
4. Old Congregational church. Turned into a surgery during WWII; now a private residence.
5. Old school site, closed sometime after early 1940s.
6. Many kuleana on Avery Chumbley's land, and some Cornwell graves.
7. WWII nurses cottage
8. Old Waikapu Road, created in 1860s, was much-used access route between Wailuku and *kuleana* in the area.
9. Plantation railroad in this approximate area.
10. Kuamu *kuleana*
11. Cornwell home

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Waikapū, Hawai'i 96793
(808) 430-4534

2016 FEB -5 AM 9:42

WATER USE PERMIT APPLICANT PRO SE

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I

Surface Water Use Permit Applications, Integration of Appurtenant Rights and Amendments to the Interim Instream Flow Standards, Nā Wai 'Ehā Surface Water Management Areas of Waihe'e, Waiehu, 'Īao, & Waikapū Streams, Maui	)	Case No. CCH-MA15-01
	)	TESTIMONY OF HŌKŪAO PELLEGRINO; EXHIBITS "2332-PELLEGRINO-1" - "2332-PELLEGRINO-4"

TESTIMONY OF HŌKŪAO PELLEGRINO

1. This testimony is provided in support of Surface Water Use Permit Application ("SWUPA") Nos. 2277, 2332, and 2333, filed with the Commission on Water Resource Management for parcels in Waikapū, Tax Map Key ("TMK") Nos. (2) 3-5-012:020, (2) 3-5-012:023, and (2) 3-5-012:026.

2. SWUPA No. 2277 was filed on April 23, 2009 by Warren Soong for 1.52 acres of land, then identified as TMK No. (2) 3-5-012:026. Since then, the land was subdivided, and my parents Victor and Wallette Pellegrino purchased a 0.671-acre portion, at new TMK No. (2) 3-5-012:026. (Mr. Soong still owns the remaining 0.85 acre, now identified as TMK No. (2) 3-5-012:047.)

3. SWUPA Nos. 2332 and 2333 were filed on April 30, 2009 by my parents for TMK Nos. (2) 3-5-012:020 and (2) 3-5-012:023. My parents still own and live on parcel :020.

My wife Alana and I are now the legal owners of parcel :023, where we live and operate Noho'ana Farm, LLC, cultivating lo'i kalo for educational and subsistence purposes. The purpose of Noho'ana Farm is to grow food and share Hawaiian culture. As explained below, we are expanding our farm by restoring lo'i on the former Soong property, parcel :026. My wife and I are the caretakers of all three parcels.

4. I submit this testimony on behalf of my parents, my wife, and myself, and with the agreement among us that any water use permit(s) issued by this Commission for uses on these three parcels be issued to me and my wife, Hōkūao and Alana Pellegrino.

5. We are a Native Hawaiian 'ohana who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778. Pursuant to Article XII, Section 7 of the Hawai'i Constitution and Hawai'i Revised Statutes ("HRS") section 174C-101, our uses of stream water are traditional and customary cultural practices that are protected public trust purposes.

6. Our domestic water use is also a protected public trust purpose.

7. Because TMK 3-5-012:023 is adjacent to Waikapū Stream and we had an existing use of stream water on April 30, 2008, we are existing riparian users under Hawai'i law, which is protected under Article XI, Section 7 of the Hawai'i Constitution.

8. Based on the information set forth below, I request recognition of appurtenant rights for TMK No. (2) 3-5-012:020 of 52,500 gallons per day ("gpd"), for TMK No. (2) 3-5-012:023 of 640,200 gpd, and for TMK No. (2) 3-5-012:026 of 201,300 gpd, for a total of 893,700 gpd. I request a Surface Water Use Permit for our current reasonable-beneficial use for TMK No. (2) 3-5-012:020 of 600 gpd, for TMK No. (2) 3-5-012:023 of 61,800 gpd, and for TMK No. (2) 3-5-012:026 of 187,800 gpd.

QUANTIFICATION OF APPURTENANT RIGHTS

9. I am attaching various Māhele documents that confirm water use on TMK Nos. (2) 3-5-012:020,[1] (2) 3-5-012:023, and (2) 3-5-012:026 at the time of the Māhele.

TMK No. (2) 3-5-012:020

10. TMK No. (2) 3-5-012:020 is comprised of 'āpana 3 of Land Commission Award ("LCA") No. 8808 to Kekeleiaiku, confirmed by Royal Patent ("RP") No. 2164. Attached as "2332-PELLEGRINO-1" is a true and correct copy of LCA No. 8808 to Kekeleiaiku, as well as the native testimony supporting the award (both the original and the English translation).

11. The documents in 2332-PELLEGRINO-1, referring to LCA No. 8808, establish that 'āpana 3 was cultivated in wetland kalo: the native testimony states that this 'āpana contained 6 lo'i kalo.

TMK No. (2) 3-5-012:023

12. TMK No. (2) 3-5-012:023 is comprised of two LCAs: 'āpana 1 of LCA No. 3340 to Nahau, confirmed by RP No. 3115; and 'āpana 1 of LCA No. 3110 to Kuolaia, confirmed by RP No. 3152.

13. Attached as "2332-PELLEGRINO-2" is a true and correct copy of LCA No. 3340 to Nahau, as well as the native register (both the original and the English translation) supporting the award. The documents in 2332-PELLEGRINO-2 confirm that 'āpana 1 of LCA No. 3340 was cultivated in wetland kalo: the native register describes the land as "kuleana taro patches."

14. Attached as "2332-PELLEGRINO-3" is a true and correct copy of LCA No. 3110 to Kuolaia, as well as the foreign testimony (original in English) and native register (both the

[1] The deed for parcel :020 contains a reservation of appurtenant rights. I understand that because of this reservation, the appurtenant water rights may be extinguished on this parcel. Nevertheless, as stated in SWUPA No. 2332, we reserve the right to claim appurtenant water rights on this parcel, and are therefore providing proof of water use at the time of the Māhele.

original and the English translation) supporting the award. The documents in 2332-PELLEGRINO-3 confirm that ʻāpana 1 of LCA No. 3110 was cultivated in wetland kalo: the foreign testimony describes ʻāpana 1 as a "section of loi in Nohoana" that includes a pōʻalima, and the native register describes 40 taro patches and a pōʻalima.

15. Additionally, parcel :023 has remnants of an extensive loʻi kalo complex with stone terracing. At least 12 loʻi kalo ranging in size from 300 square feet to 6,000 square feet are present. The parcel's adjacency to the Waikapū Stream is also an indicator that this land was loʻi land.

TMK No. (2) 3-5-012:026

16. TMK No. (2) 3-5-012:026 is comprised of LCA No. 2199 to Pahoa, confirmed by RP No. 3129. Attached as "2332-PELLEGRINO-4" is a true and correct copy of LCA No. 2199 to Pahoa, as well as the native testimony (both the original and English translation) supporting the award. The documents in 2332-PELLEGRINO-4 confirm that this kuleana was cultivated in wetland kalo: the native testimony states that this parcel was kalo land that included a pōʻalima.

17. Like parcel :023, parcel :026 also has remnants of an extensive loʻi kalo system, with a number of intact loʻi throughout the parcel.

Application of the Kalo Water Duty

18. Based on the Māhele documents in 2332-PELLEGRINO-1 through 2332-PELLEGRINO-4, the lands identified as TMK Nos. (2) 3-5-012:020, (2) 3-5-012:023, and (2) 3-5-012:026 were all cultivated in loʻi kalo at the time of fee simple conversion. Thus, the quantification of the appurtenant rights is the amount of water sufficient to grow kalo on these parcels—0.175 acre, 2.134 acres, and 0.671 acre, respectively—using traditional methods.

19. It is my understanding that, on average, taking into account fallow loʻi and uncultivated areas such as banks between loʻi, healthy wetland kalo requires between 100,000 and 300,000 gallons of water per acre per day ("gad"), and that areas with greater proportions of loʻi in cultivation will require an amount closer to the upper end of this range.

20. Thus, in my best estimation, the water rights appurtenant to the three parcels are as follows:

a. TMK No. (2) 3-5-012:020: 52,500 gpd (0.175 acre x 300,000 gad);

b. TMK No. (2) 3-5-012:023: 640,200 gpd (2.134 acres x 300,000 gad);

c. TMK No. (2) 3-5-012:026: 201,300 gpd (0.671 acre x 300,000 gad).

AMOUNT REQUESTED UNDER PERMIT

21. Currently, for parcel nos. :020 and :023, we divert water from the kuleana ʻauwai that runs along Waikō Road. The water flows through a traditional poʻowai near Ione Shimizu's house and continues makai in pipes and ditches through parcel :023 (Nohoʻana Farm), where we use the water on parcel :023 and pipe more water to parcel :020 (parents' houselot) for the following uses:

a. TMK No. (2) 3-5-012:020: home garden on approximately 0.09 acre, including fruit trees (maiʻa, mountain apple, fig, kukui), herbs, vegetables, tī, and numerous native plants.

b. TMK No. (2) 3-5-012:023: five organic loʻi kalo on approximately 0.2 acre, and diversified agricultural crops, including ʻulu, maiʻa, ʻuala, kō, tī, niu, mountain apple, guava, avocado, mango, kamani, papaya, vegetables, herbs, and citrus trees, on approximately 0.6 acre.

22. As for TMK No. (2) 3-5-012:026 (previously owned by Mr. Soong), water is diverted from the 'auwai to irrigate a non-commercial garden on approximately 0.05 acre, which includes mai'a, 'ulu, mango, and tī. I intend to return the land to its original state by restoring lo'i kalo on approximately 0.621 acre, and have already begun the process of opening up the lo'i.

23. I request a Surface Water Use Permit for the following amounts:

a. As for TMK No. (2) 3-5-012:020, I believe the 2002 State of Hawai'i Water System Standard for Maui County of 600 gpd per single family home is sufficient for my parents' existing domestic water uses.

b. As for TMK No. (2) 3-5-012:023, applying the kalo water duty described in the appurtenant rights quantification section above, I request 60,000 gpd (0.2 acre x 300,000 gad) to irrigate our lo'i. Applying the 2002 State of Hawai'i Water System Standard for Maui County of 3,000 gad to our diversified agriculture, I request an additional 1,800 gpd (0.6 x 3,000 gad). In total, I request 61,800 gpd for parcel :023.

c. As for TMK No. (2) 3-5-012:026, applying the 2002 State of Hawai'i Water System Standard for Maui County of 3,000 gad to our diversified agriculture, I request 1,500 gpd (0.5 x 3,000 gad). I also request an additional 186,300 gpd for irrigation of the lo'i we are in the process of restoring (0.621 acre x 300,000 gad). In total, I request 187,800 gpd for parcel :026.

Reasonable-Beneficial Analysis

24. Our uses of stream water on the three parcels are "reasonable-beneficial," defined as: "the use of water in such a quantity as is necessary for economic and efficient utilization, for

a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and public interest." HRS § 174C-3.

25. The quantity we are requesting is necessary for the economic and efficient irrigation of our farm and home gardens, which include lo'i kalo, fruits, vegetables, mixed herbs, and other native plants. Our use of the stream water is economic and efficient, as we use only the amount needed to irrigate our lo'i and other crops, and we implement measures to minimize water loss.

26. Our use of stream water on our farm and around our homes is also consistent with the state and county land use plans and the public interest. Our 'ohana's land is classified by the State as urban, and zoned by the County as agricultural. Our water use for lo'i kalo and domestic cultivation is also in the public interest and fulfills public trust purposes.

Alternatives Analysis

27. Because our land has appurtenant rights to stream water in the nature of an easement that was conveyed at the time of the Māhele, and because, by using stream water, we are exercising our traditional and customary right as Native Hawaiians to cultivate kalo on our land in the traditional manner, we are not required to provide an alternatives analysis to show that we have no practicable alternative source of water. Our appurtenant and traditional and customary rights are for stream water, not for water from any other source, and our exercise of these rights enjoys maximum protection and first priority under the law. Nonetheless, the Alternatives Analysis set forth in SWUPA 2332 remains applicable, true, and correct.

28. We have always used a reasonable amount of 'auwai water to raise our lo'i kalo and maintain other agricultural crops, along with other community members along this traditional 'auwai. Other alternatives, such as municipal water, reclaimed wastewater, water

from other ditch systems, desalinized water, and groundwater, are not practicable alternatives to the 'auwai water from Waikapū Stream. Requiring my 'ohana to pay for these alternatives instead of using stream water via the 'auwai that runs through our land would impose an unfair and impracticable cost on my 'ohana.

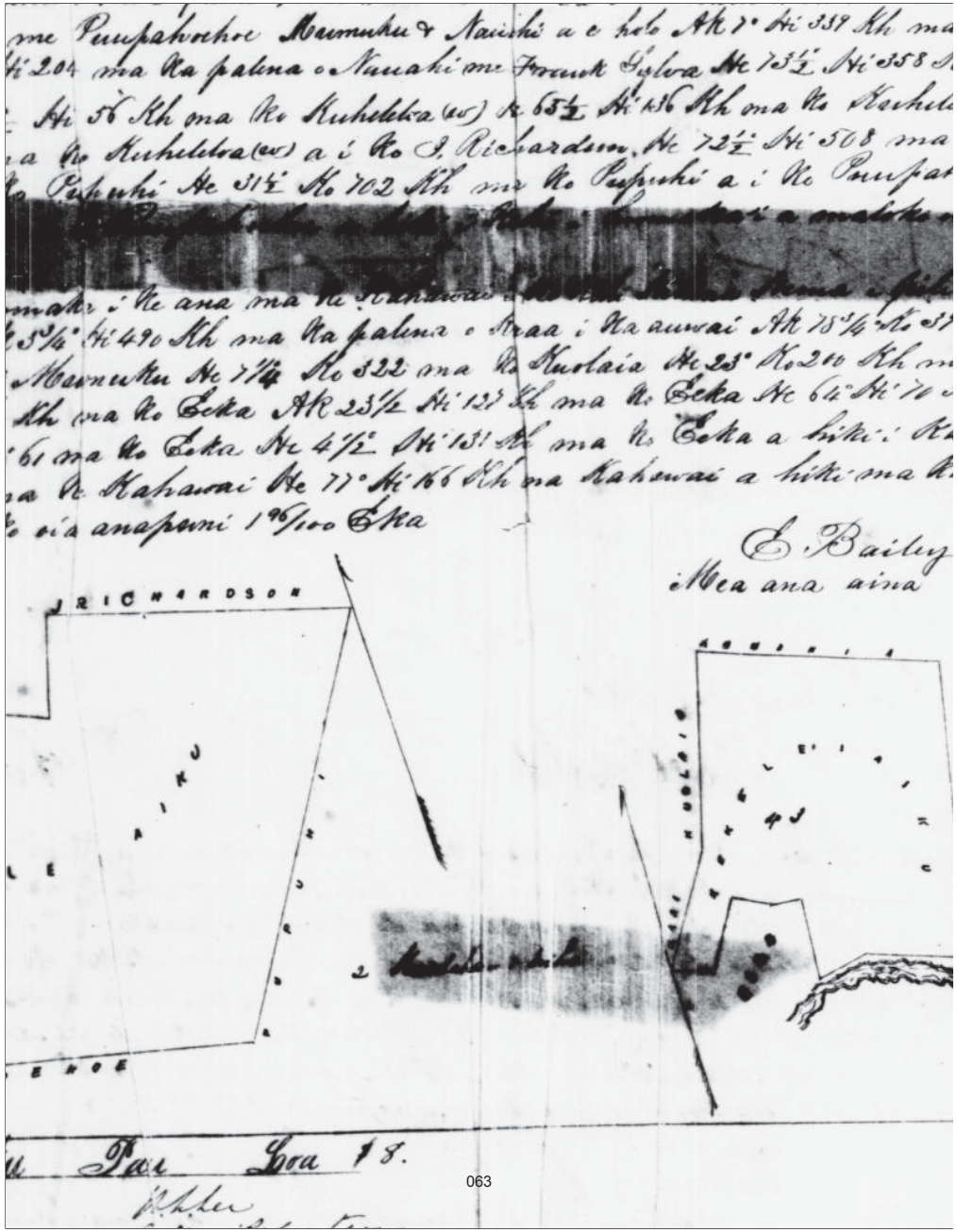
SUMMARY

29. In sum: (1) our domestic water use is a protected public trust purpose; (2) my 'ohana's traditional and customary right to grow kalo is a protected public trust purpose; (3) the exercise of our appurtenant rights is a protected public trust purpose, and we are entitled to 52,500 gpd for parcel :020, 640,200 for parcel :023, and 201,300 for parcel :026; (4) at this time, I request a permit for 600 gpd for parcel :020, 61,800 gpd for parcel :023, and 187,800 gpd for parcel :026, and these amounts will be used to irrigate our lo'i kalo, farm crops, and home gardens, which are reasonable-beneficial uses of stream water which there is no practicable alternative.

I, Hōkūao Pellegrino, do declare under penalty of law that the foregoing is true and correct.

Dated: Waikapū, Hawai'i, 2/1/16.

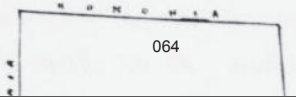
HŌKŪAO PELLEGRINO
WATER USE PERMIT APPLICANT PRO SE

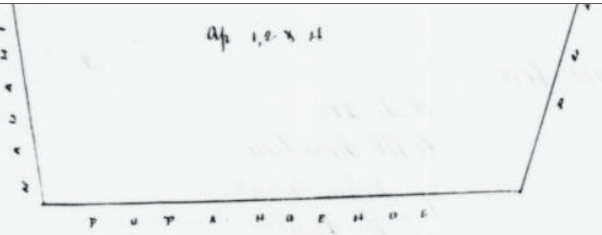


Helu 5505 Kekeleiaihu Haikapu Maui

Palapala no ke ana ana i ke Kuleana 5505 no Kekeleiaihu ma ka
Kahelahela, Haikapu, Mokupuni o Maui. E hoomaka i ke ana e no Ap
1 i huiia i hookahi ma ke kihi Komohana Hema e pili ana me Puupua
ukuku & Hauahi a e holo Ak 4° Hi 339 Kh ma ka pralena o Halualahi Ak 11½
ma ka pralena o Halualahi me Frank Sylva He 4° 3½ Hi 351 Kh ma ke Kuhua
½ Hi 56 Kh me ke Kuhelelea (xx) He 65½ Hi 136 Kh ma ke Kuhelelea (xx) Ak
Kh ma ke Kuhelelea (xx) a i ke J Richardson He 4° 9½ Hi 56 ma ke J Ri
o Pupuhi He 31½ Hi 452 Kh ma ke Pupuhi a i ke Puupahoehoe Ak 4° 2½
ma ke Puupahoehoe a hiki i kahi i hoomaka ai a maloko eia anapuni
Apanana 3. E hoomaka i ke ana ma ke Kahawai i ke kihi Kokimo He
ana me Kaaa a e holo Ak 9½ Hi 490 Kh ma ka pralena e Kaaa i ka a
0½ He 390 Kh ma ke Kenehia & Hiamuku He 7½ He 322 ma ke Kuolaia
ere Kh ma ke Kaai He 45 Hi 60 Kh ma ke Eeka, Ak 23½ Hi 107 Kh ma
Kema 61° Hi 90 Kh ma ke Eeka, He 69° Hi 61 ma ke Eeka He 15½ Hi 101
ka a hiki i Kahawai Ak 45 He 50 Kh ma ke Kahawai, He 77° He 166 Kh
wai a hiki ma kahi i hoomaka ai a malokoeia anapuni 1 42/100 Eka.

E Bailey
Maui ana





Uku pau loa

57

H. L. Lee
G. W. Robertson
J. Kekauonohi
J. H. Smith

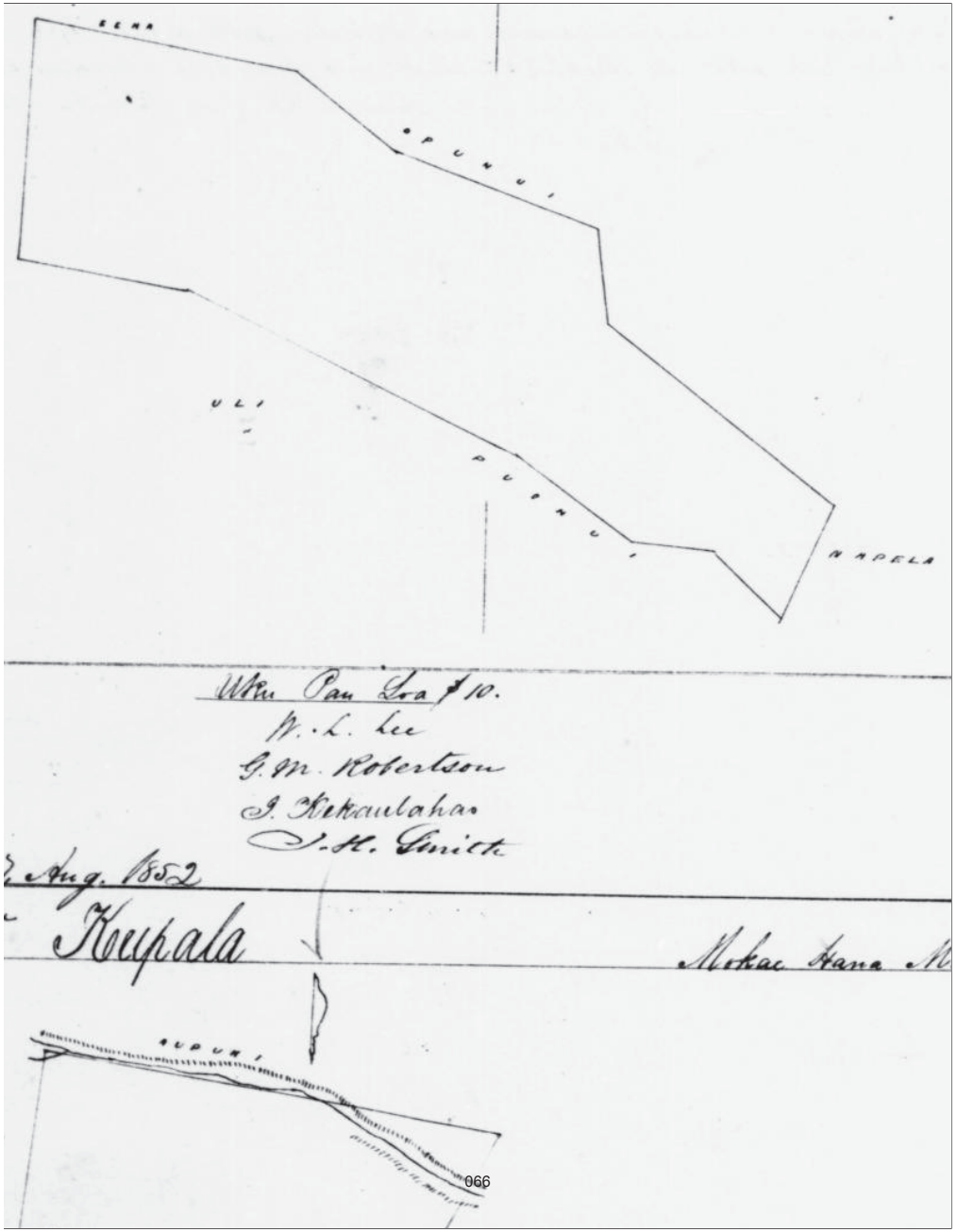
Honolulu June 25 1892.

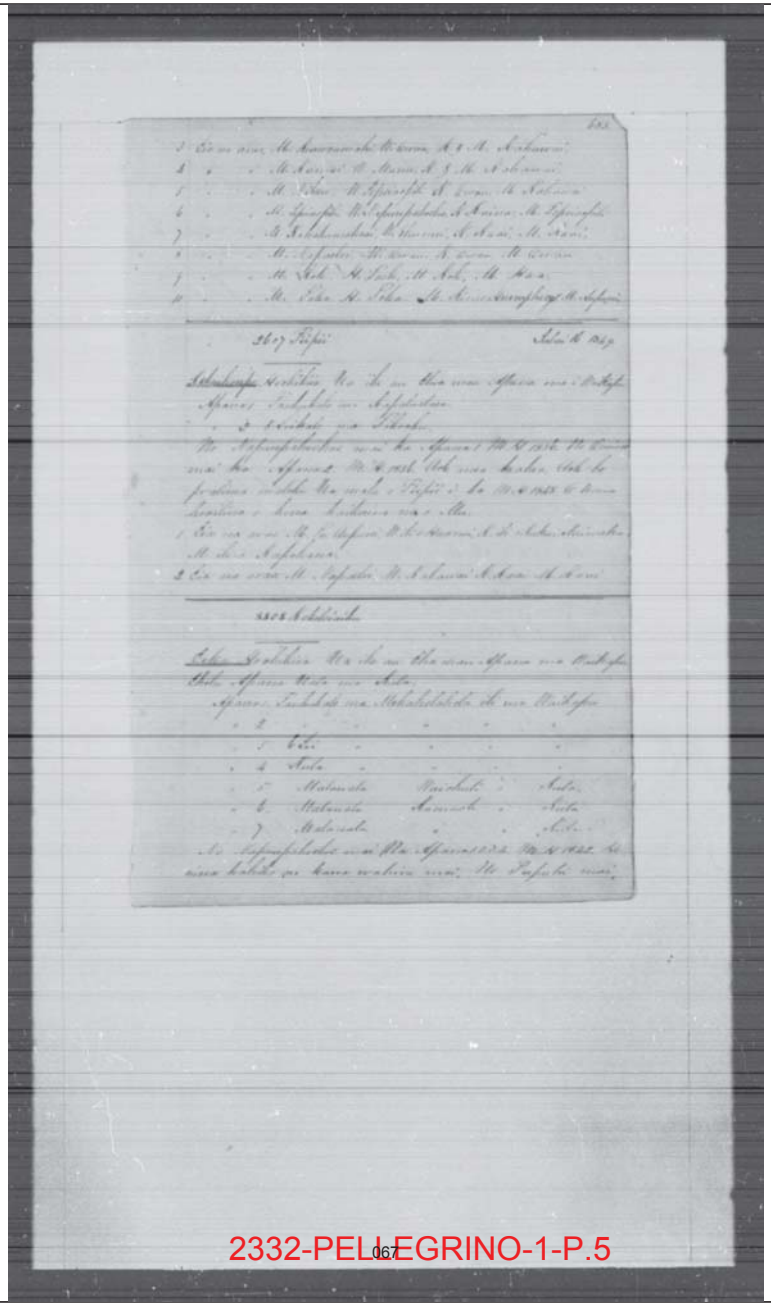
R.P. 4125

Helu 5742 Kaluahinui Haikapu Maui

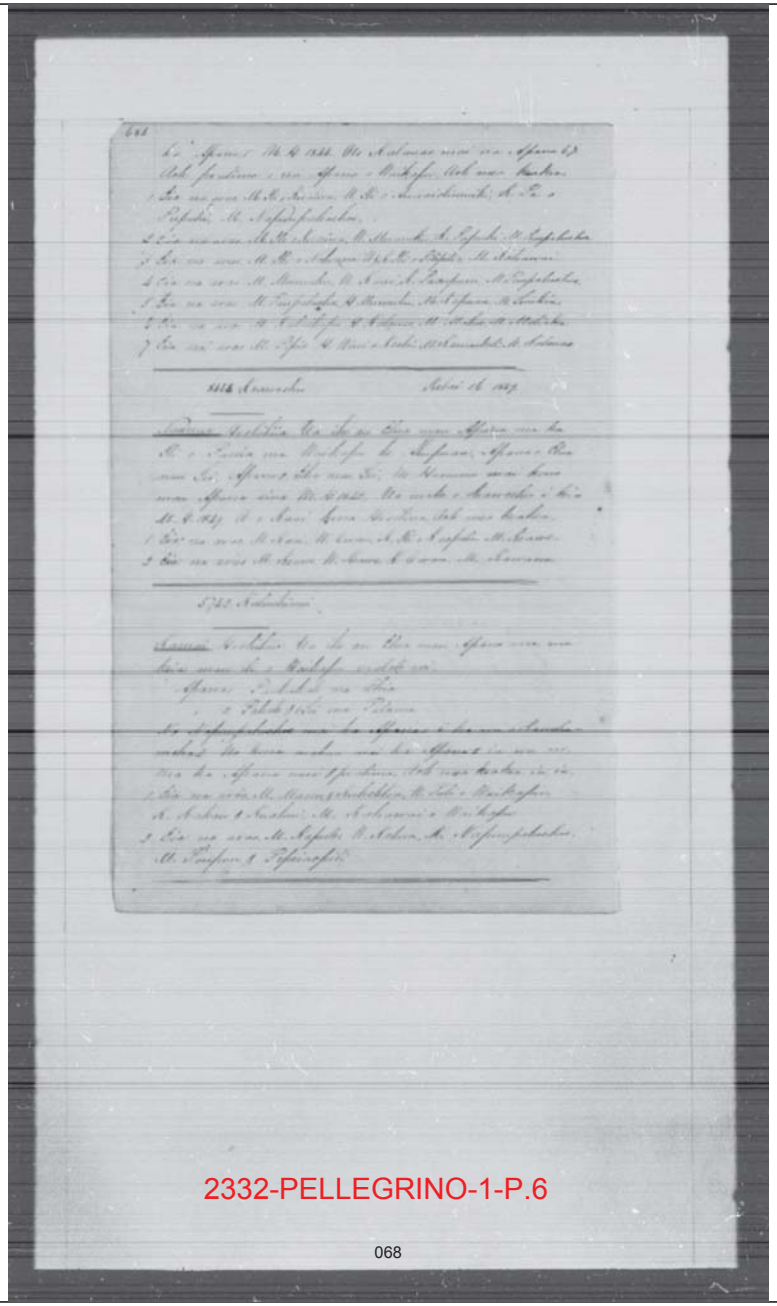
Kuleana 5742 no Kaluahinui, Haikapu, Maui.

Apana 1 Wahi 1. Ili o Ohiu. E hoomaka ma ke kihi Akau e pili a
Kaheana Kuleana a e holo He 3° 42½ Hi 200 Kh e pili ana me ke Kaheana
23 Kh ma ke Kaheana He 29½ Hi 60 e pili ana me ke Kaheana Ak 19½
ma ke Kaheana He 29½ Hi 383 Kh ma ke Kaheana He 69° He 61 Kh ma
ima He 35½ He 43 Kh ma ka Pralima He 51° He 115 Kh ma ke Pralim
He 532 Kh ma ke Kuhelelea, Ak 35° Hi 69 Kh ma ke Kuhelelea Ak 1
22 Kh ma ke Kuhelelea Ak 145½ Hi 66 Kh ma ke Kaheana a hiki ma
waka ai 42/100 Eka.





2332-PELLEGRINO-1-P.5



2332-PELLEGRINO-1-P.6

Native Testimony (Kekeleaiku – LCA 8808)

Translation

8808 – Kekeleiaiku

Eeka (‘E‘eka) Ho‘ohiki ‘ia. Ua ‘ike au ‘ehā mau ‘āpana ma Waikapū, ‘ekolu ‘āpana ‘uala ma Kula.

‘Āpana 1: Paukū kalo ma Mokahelahela ‘ili ma Waikapū.
‘Āpana 2: Paukū kalo ma Mokahelahela ‘ili ma Waikapū.
‘Āpana 3: 6 Lo‘i ma Mokahelahela ‘ili ma Waikapū.
‘Āpana 4: 4 Kula ma Mokahelahela ‘ili ma Waikapū.
‘Āpana 5: Māla ‘uala ma Waiohuli (ahupua‘a) ma Kula.
‘Āpana 6: Māla ‘uala ma Kama‘ole (ahupua‘a) ma Kula.
‘Āpana 7: Māla ‘uala ma Kama‘ole (ahupua‘a) ma Kula.

No Napuupahoehoe (Nāpu‘upāhoehoe) mai nā ‘Āpana 1, 2, 3, 4 i ka makahiki 1842. He ‘āina kahiko no kāna wahine mai. No Pupuhi mai ka ‘Āpana 5 i ka makahiki 1844. No Kalanao mai nā ‘Āpana 6, 7. ‘A‘ole Po‘alima i nā ‘āpana o Waikapū. ‘A‘ole me ke‘ake‘a.

‘Āpana 1: Eia nā ‘ao‘ao, Mauka ‘ili o Kuaiwa (Kua‘iwa), Waihee (Waihe‘e) ‘ili o Auwaiolimuiki (‘Auwaiolimuiki), Kula pā o Pupuhi, Maalaea (Mā‘alaea) Napuupahoehoe (Nāpu‘upāhoehoe).
‘Āpana 2: Eia nā ‘ao‘ao, Mauka ‘ili o Kuaiwa (Kua‘iwa), Waihee (Waihe‘e) Mumuku, Kula Pupuhi, Maalaea (Mā‘alaea) Puupahoehoe (Pu‘upāhoehoe).
‘Āpana 3: Eia nā ‘ao‘ao, Mauka ‘ili o Nohoana (Noho‘ana), Waihee (Waihe‘e) & Kula ‘ili o Pilipili, Maalaea (Mā‘alaea) kahawai.
‘Āpana 4: Eia nā ‘ao‘ao, Mauka Mumuku, Waihee (Waihe‘e) Kau‘i, Kula pā aupuni, Maalaea (Mā‘alaea) Puupahoehoe (Pu‘upāhoehoe).
‘Āpana 5: Eia nā ‘ao‘ao, Mauka Puupahoehoe (Pu‘upāhoehoe), Honuaula (Honua‘ula) Mumuku, Makai Kapuaa (Kapua‘a), Makawao Luukia (Lu‘ukia).
‘Āpana 6: Eia nā ‘ao‘ao, Mauka Kalihopu, Honuaula (Honua‘ula) Kalauai (Kalau‘ai), Makai Mahoe, Makawao Mary Crowningburgh.
‘Āpana 7: Eia nā ‘ao‘ao, Mauka Pipii (Pipi‘i), Honuaula (Honua‘ula) Wiwi (Wīwī), Makai Kamauhole, Makawao Kalauai.

8808 – Kekeleiaiku

Eeka (‘E‘eka) had sworn that he knew of the claimant’s land that consists of 7 pieces, 4 in Waikapū and 3 in Kula, Maui.

Parcel 1: Section of lo‘i’s in the subdivision of Mokahelahela, Waikapū.
Parcel 2: Section of lo‘i’s in the subdivision of Mokahelahela, Waikapū.
Parcel 3: 6 lo‘i’s in the subdivision of Mokahelahela, Waikapū.
Parcel 4: 4 kula in the subdivision of Mokahelahela, Waikapū.
Parcel 5: Potato patch at Waiohuli, Kula.

2332-PELLEGRINO-1-P.7

Parcel 6: Potato patch at Kamaʻole, Kula.
Parcel 7: Potato patch at Kamaʻole, Kula.

The claimant received his sections 1, 2, 3, 4, in Waikapū from Napuupahoehoe (Nāpuʻupāhoehoe) in 1842. These older lands were from his wife. Section 5 is from Pupuhi in 1844. Section 6 and 7 were from Kalanao. There are no Poʻalima in any of the sections of land in Waikapū. His title has never been disputed.

Section 1: Bounded, Mauka by the subdivision of Kuaiwa (Kuaʻiwa), Waihee (Waiheʻe) by the subdivision of Auwaiolimuiki (ʻAuwaiolimuiki), Kula by the land of Pupuhi, Maalaea (Māʻalaea) b the land of Napuupahoehoe (Nāpuʻupāhoehoe).

Section 2: Bounded, Mauka by the subdivision of Kuaiwa (Kuaʻiwa), Waihee (Waiheʻe) by the land of Mumuku, Kula by the land of Pupuhi, Maalaea (Māʻalaea) by the land of Puupahoehoe (Puʻupāhoehoe).

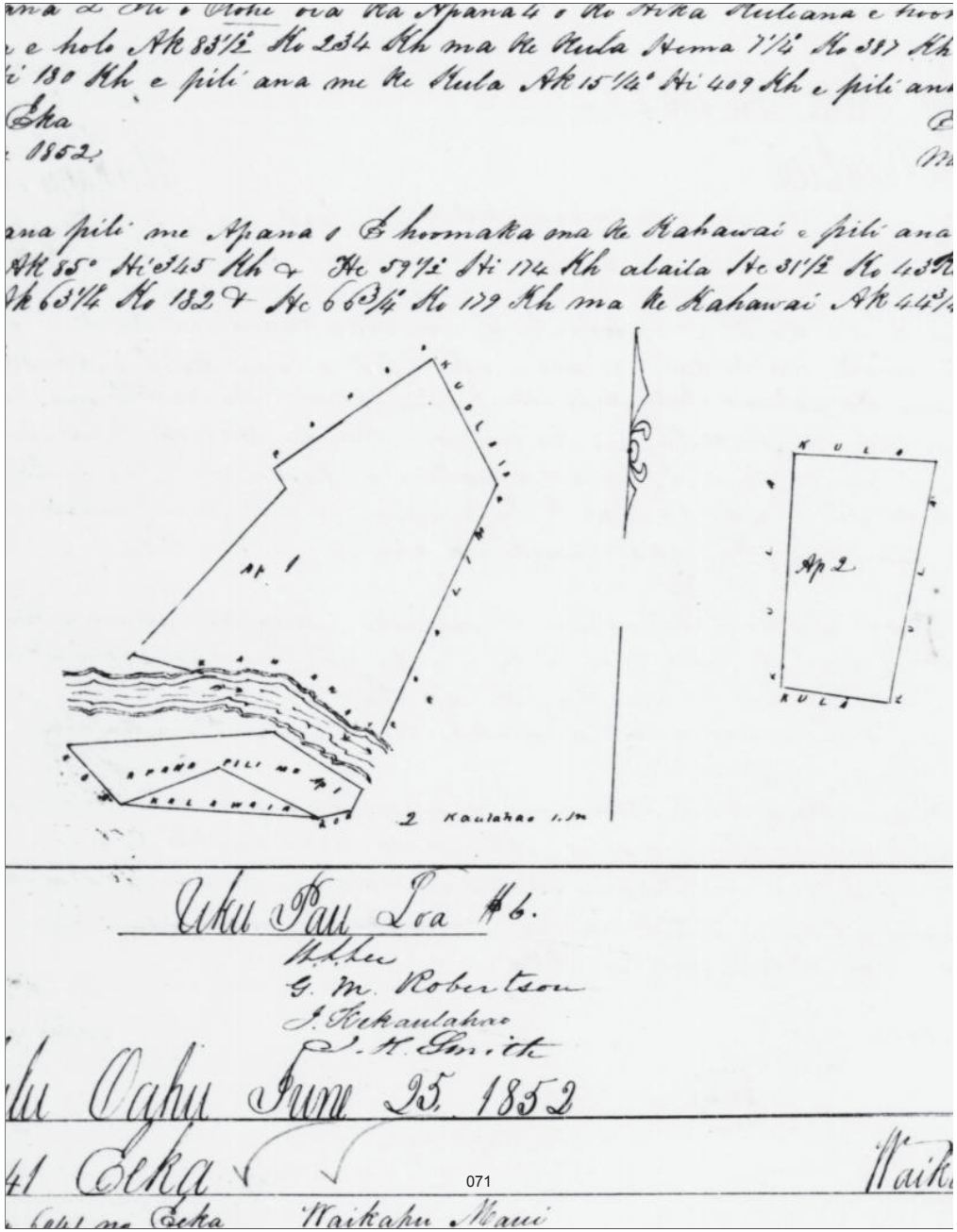
Section 3: Bounded, Mauka by the subdivision of Nohoana (Nohoʻana), Waihee (Waiheʻe) & Kula by the subdivision of Pilipili, Maalaea (Māʻalaea) by the stream (Waikapū).

Section 4: Bounded, Mauka by the land of Mumuku, Waihee (Waiheʻe) by the land of Kauʻi, Kula by the government land, Maalaea (Māʻalaea) by the land of Puupahoehoe (Puʻupāhoehoe).

Section 5: Bounded, Mauka by the land of Puupahoehoe (Puʻupāhoehoe), Honuaula (Honuaʻula) by the land of Mumuku, Makai by the land of Kapuaa (Kapuaʻa), Makawao by the land of Luukia (Luʻukia).

Section 6: Bounded, Mauka by the land of Kalihopu, Honuaula (Honuaʻula) by the land of Kalauai (Kalauʻai), Makai by the land of Mahoe, Makawao by the land of Mary Crowningburgh.

Section 7: Bounded, Mauka by the land of Pipii (Pipiʻi), Honuaula (Honuaʻula) by the land of Wiwi (Wīwī), Makai by the lad of Kamauhole, Makawao by the land of Kalauai.

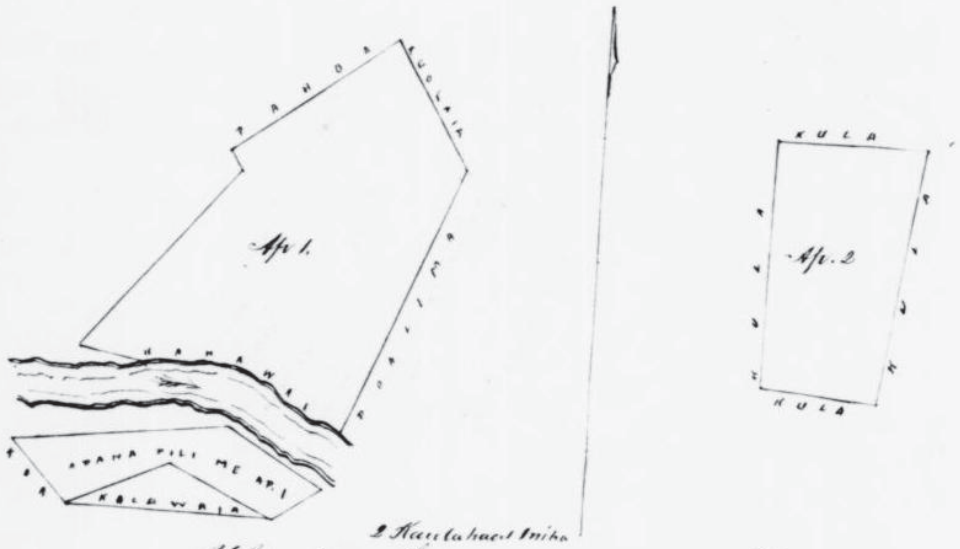


R.P. 3115

Helu 3340 **Akau** **Waikapu Maui.**

Kuleana 3340 Akau Waikapu Maui

Apana 1 Ili'ol Aloeana. O hoomaka ma ke kihi Akau e pili ana me k
o hele He 29° Hi 230 Kh ~~ma ke Kahawai~~ e pili ana me Kuaeleia,
Kom. 1554 Kh e pili ana me ka Poalima i ke Kahawai alaila hoi
Kahawai a i ke kihi Komokana Ak. 93½ Ko 1129 Kh Ak 37½
e pili ana me Poalima Ak 218½ Ko 31 Kh e pili ana me Pahoe
½ Ko 210 Kh e pili ana me Pahoe i kahu i hoomaka'i



2 Kaulahao I Iniha

Ukee pau loa

H. L. Lee
G. M. Robertson
J. Kekaulahao
J. H. Smith

Honolulu Oahu June 25. 1859.

R.P. 2813.

Helu 6141 **Ewa** **Waikapu Maui.**

Kuleana 6141 no Ewa Waikapu Maui.

Apana 1. Ili o Makahulahula. O hoomaka ma ke Kahawai k
na e pili ana me ka poalima, a e hele Ak. 21° Hi 2½ Kh e pili ana me
lima He 75° Ki 61 Kh e pili ana me Kekeleiaiku, Ak. 23½° Hi 107 Kh
ana me Kekeleiaiku, He 64° Ki 51 Kh e pili ana me Kekeleiaiku
4 Kh e pili ana me Kekeleiaiku He 14½° Hi 131 Kh e pili ana m
eleiaiku i ke Kahawai ma ke Kahawai e hele ai a hiki i ke

palena. ma ka Akau o Kalakuahaulu. a ma
ka Hikina hepa aina. Hema ke aina o
Makale Kamohana pa aina.
Waikapu Na Namaiku
17 Iunuari 1886.

3331 Napua

Aloha nihon na Luna homa. Ke
hoopii aku nei au i kou kuleana. He mau
M. loi koi kuleana ke ola, aia ma ka ili aina
o Kapaia o Kalua ma Waiehu o Maui, he
20 makahi loi koi. nohoaina mutaita. A
pono na palena. Akau na loi o Akale. Hiki
na hepa aina. Hema na loi o Makahano.
hano. Kamohana ke Auwai. Ke ka Makale
Waiehu 17 Dek 1886 Na Napua

Waikapu Maui Nov 15 1886

3340 Kalauna

Aloha nihon na Luna Homa
M. kuleana aina. Ke hoopii aku nei au ia nihon
no koi mau kuleana loi. Ea. ma ka ili aina o
Kahana. Hikina. Makahalehele. Kamohana
Kualuwai. Hikina Akau ka Auwai. Hema ke
Kalauai. Ea mai ka mui o na loi ia e a me
na Apuloulula. ia kou mau kuleana loi.
Iuni i kuleana ai au ia mau loi. mai
ka wa o da aina koi makuahine, a make
ia. nolaa ngau ma kou mau loi mai ka wa
o Kamehameha. a hiki ayui i koi manaua
Ola hehele. He mala wauke nau aia
ma ka ili aina o Kaeeee lima. Hikina o
Puuhele. Kamohana o Kamehameha. Akau
Waikapu. Hema Kamaula, mai ka

wa mai ia Pkaule mai a hiki loa mai
i ami. mai laila mai ke mana nohoa
kuleana aia. nolaila. kou hoopii aku
aku ia nihon. na pau.
Na Nakauna

3341 Kiemhee

Ia nihon na Luna Kom
M. ike aloha. Ke hoopii aku nei au i koi
kuleana ia nihon. he mau loi koi he 15
a me hale kuleana hale ma Iuwaele
nui i pili aina me kana, a o na pale
na. ma ka Akau na loi o Naai. Hikim
ke pa aina, ma ka hema ke kula Kamo
hana, ke ili aina i Kapaia o Kalua. No
K Akau i ke au ia Ke
Na Makee
Waikapu Dek 22 1887 Kiemhee

3342 Nawahi

Ia nihon na Luna homa
M. me ke aloha. Ke hoopii aku nei au i koi
kuleana ia nihon, he mau loi he 18, aia
ma Auwaelauui Waikapu Maui, a
o na palena. Ma ka Akau na loi o
George Shaw. Ma ka hema na loi o
Kiemhee, ma ka hikina na loi na o
Jeage Shaw. ma ke Kamohana.
Na loi o Naai. No George Shaw
mai koi aina. Eiaaku ke loi ma
Kuiwa Na Nawahi
Waikapu 22 Dek 1887

Native Register (Nahau a.k.a. Nahauna – LCA 3340.1)
Translation

Waikapū, Maui ʻIanuali 13, 1848

3340 Nahauna a.k.a. Nahau

ʻAuhea ʻoukou e nā Luna Hoʻonā Kuleana ʻĀina. Ke hoʻopiʻi aku nei au iā ʻoukou no kēia mau kuleana loʻi. Eia ma ka ʻili ʻāina o Nohoana (Nohoʻana). Hikina Makahelahela, komohana kuahiwi, hikina ʻakau ka ʻauwai, hema ke kahawai. Eia mai ka nui o nā loʻi oʻu 8 a me nā ahu lauhala 2. ʻO ia koʻu mau kuleana loʻi.

Penei e kuleana ai au ia mau loʻi, mai ka wā e ola ana koʻu makuahine a make ia. Noho mau ma kēia mau loʻi mai ka wā o Kamehameha II a hiki mai i kēia manawa.

Eia kekahi, he māla wauke naʻu, aia ma ka ʻili ʻāina o Aweoweo (ʻĀweoweo) luna, hikina o Puuhele (Puʻuhele), komohana o Ukumehame II (ʻUkumehame), ʻakau o Waikapū, hema o Honuaula (Honuaʻula) mai ka wā mai iā Pikanele mai a hiki loa mai i ʻaneʻi. Mai laila mai kō māua noho kuleana ʻana. No laila, kēia hoʻopiʻi ʻana aku iā ʻoukou, ua pau.

Naʻu,
Nahauna a.k.a Nahau

Waikapū, Maui January 13, 1848

3340 Nahauna a.k.a. Nahau

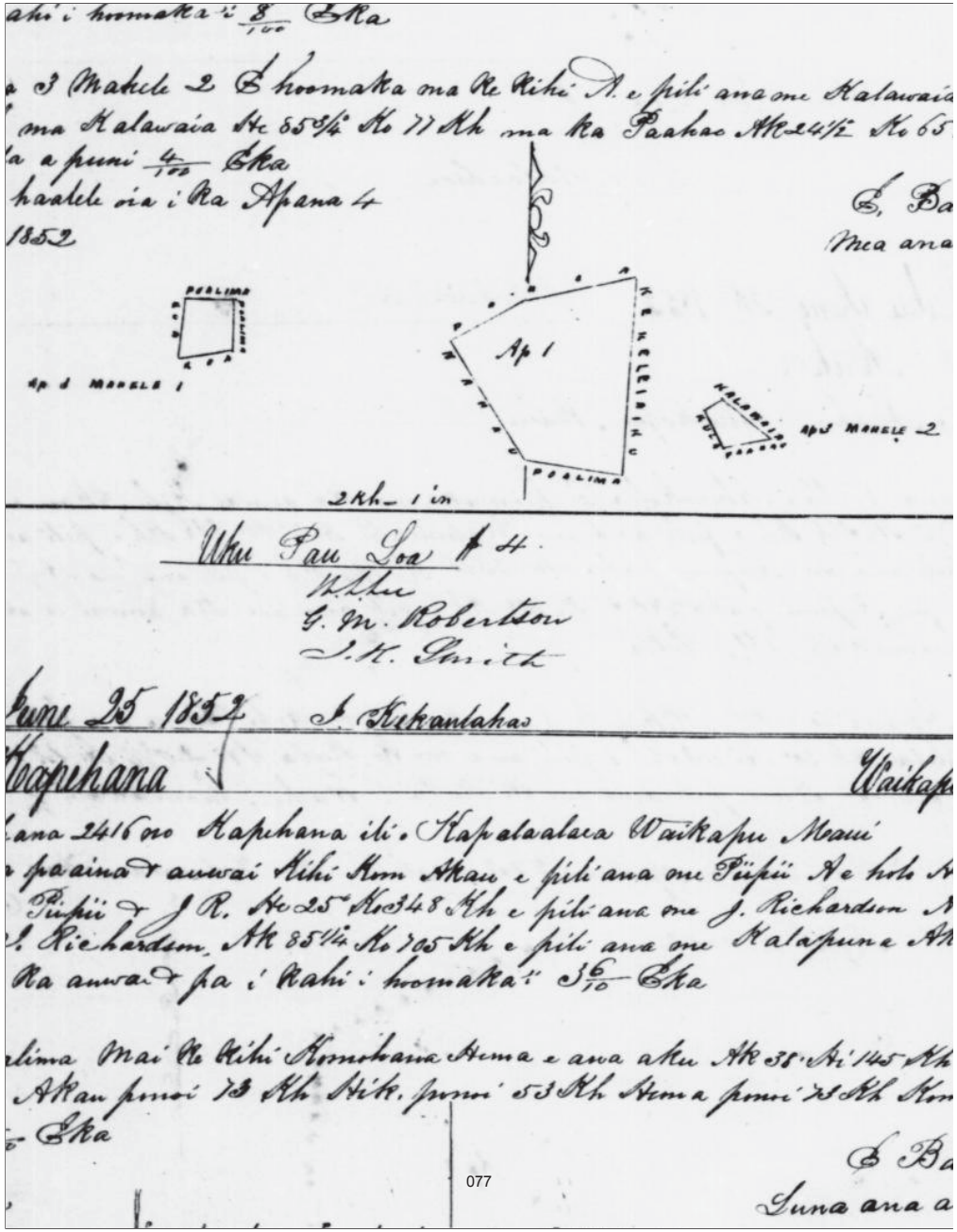
Here ye Land Commissioners of kuleana lands. I am petitioning you for these kuleana taro patches of mine. They are in the subdivision of Nohoana (Nohoʻana). It is bounded east by the subdivision of Makahelahela, west by the mountain, northeast by the ʻauwai, south by the Waikapū stream. There are a total of 8 taro patches of mine and 2 mounds of lauhala. This is the extent of my kuleana taro patch lands.

Thus, I have been responsible for these taro patches from when my mother was alive until she passed. I have continued to occupy these taro patches from the time of Kamehameha II until now.

Furthermore, I have a garden of wauke for myself and it is situated in the subdivision of Aweoweo (ʻĀweoweo) which is above and over the mountain. It is bounded east of Puuhele (Puʻuhele), west of Ukumehame II (ʻUkumehame), north of Waikapū, south of Honuaula (Honuaʻula) from the time of Pikanele all the way until now. It is there where the two of us reign over the kuleana. Therefore, this is what I petition to all of you, it is complete.

Sincerely,
Nahauna a.k.a. Nahau

2332-PELLEGRINO-2-P.6



R. P. 3152

Helu 3110 Kuolaia Waikapu Maui

Kuleana 3110 no Kuolaia Waikapu Maui.

Wahi 1. Ili o Aeheana. E hoomaha ma ka kihi Akau e pili ana me
kau a e holo He 4½° Ho 322 Kh e pili ana me Kekeleiaikuu, Ah 7½° K
ili ana me ka Poalima, Ah 29 Ho 230 Kh e pili ana me Kahau, Ah
Kh e pili ana me Pahoa, Ah 11° He 192 Kh e pili ana me Pahoa i
akai 1/100 E kea.

Wahi 2. Ua huia me ko Kaelemakule - ae ia.

Wahi 3. Mahele 1. Ili o Piikoiu. E hoomaha ma ke kihi Komohana
ana me Poalima a e holo Hikina pouci 79 Kh & Hema pouci 90 Kh ma
a, He 11½° He 55 Kh & Ake 6½° He 98 Kh ma ko Aea i kahi i hoomakaí
Wahi 3. Mahele 2. E hoomaha ma ke kihi Akau e pili ana me K

Ukuu pau lea

W. L. Lee
C. W. Richardson
J. K. Smith
J. Kekauonohi

Honolulu Oahu June 25. 1852

P. 3149

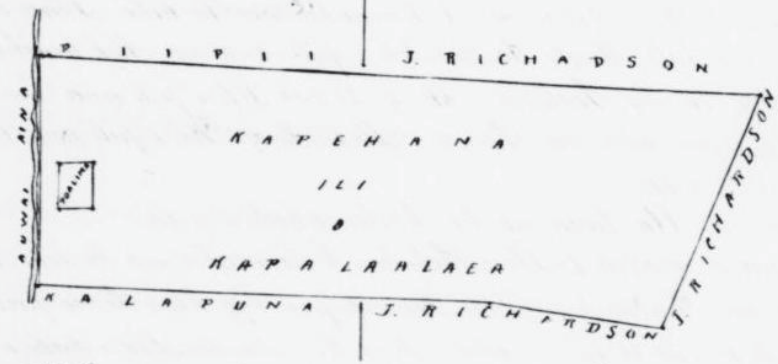
Helu 2416 Kapehana Waikapu Ma

Kuleana 2416 no Kapehana Ili o Kapalaalaea Waikapu Ma
hoomaha ma ka pacina & auwai kihi Komohana Akau e pili ana me Siipu
He 84° He 1123 Kh e pili ana me Siipii & J. Richardson, He 25° He 3418
pili ana me J. Richardson, Ah 11½° He 274 Kh e pili ana me J. Richa
15½° He 475 Kh e pili ana me Kalapuna Ah 7½° He 3444 Kh e pili ana
ui & pa i kahi i hoomakaí 3½ E kea.

Poalima mai ke kihi Komohana Hema e ana aku Ah 38° Kh 1145 K
mua alaila holo Akau pouci 73 Kh Hikina pouci 59 Kh Hema pouci 73 Kh
ehana pouci 53 Kh a puni 1/100 E kea

April 30. 1852.

C. Bailey Aea ana ai



Ukuu pau lea

[illegible] Hula land in Kekaua.

The Obt rec[d] these lands as follows: No[s] 1 & 4 from Keale in the days of Kamehamehah and No 2. f Hulumakule in 1848. His title was over disputed. There are lei fruitina in No 1.

No 1. is bounded Mauka, by Kika's land. Makai, by [illegible] of Kuaiea. Hula, by my land. Maalaea, by Kikaua's land.

No 2. is bounded Mauka, by Manu's land. Makai, Hulili's land. On other two sides, by the Crab of Waikapu.

No 3. is bounded Mauka, by Napaeli's land. Maka by the Crab. Hula, by my land. Maalaea, by Kikikua's land.

No 4. is bounded Mauka, on all sides, by Ka land.

At 3301 Makee & Kamaka.

Kekalaihi Jr. The Obts are my sons. Their land consist of one piece of fish land one Moo, in Olika, Waikapu, Maui.

They rec[d] it from me in 1846 and I had it from Keaunui in the days of Kamehameha I. and possessed it for a while until I gave it to my sons. They have possessed it ever since, and their title is not disputed.

There is another piece a kula land in Olika, to which title is the same.

The first piece is bounded Mauka, by Kakalelo's land. Makai & Hula sides, by Pipinui's land. Maalaea, by the Cr

No 2. is bounded Mauka, by K. Catalina's land. Makai, by Kuanui's land. Hula, by Kalalelo's land. Maalaea Kolui's land.

aumai, eia na palena o na lei ia ma Kapunahuhee mai kou mau lei a me ka pahale a me kalikula aia ma ka lii aina o Olika, hookahi lei, aia nae ma ka Mao aina o Maleana, a pena no i kaawi mau iaia

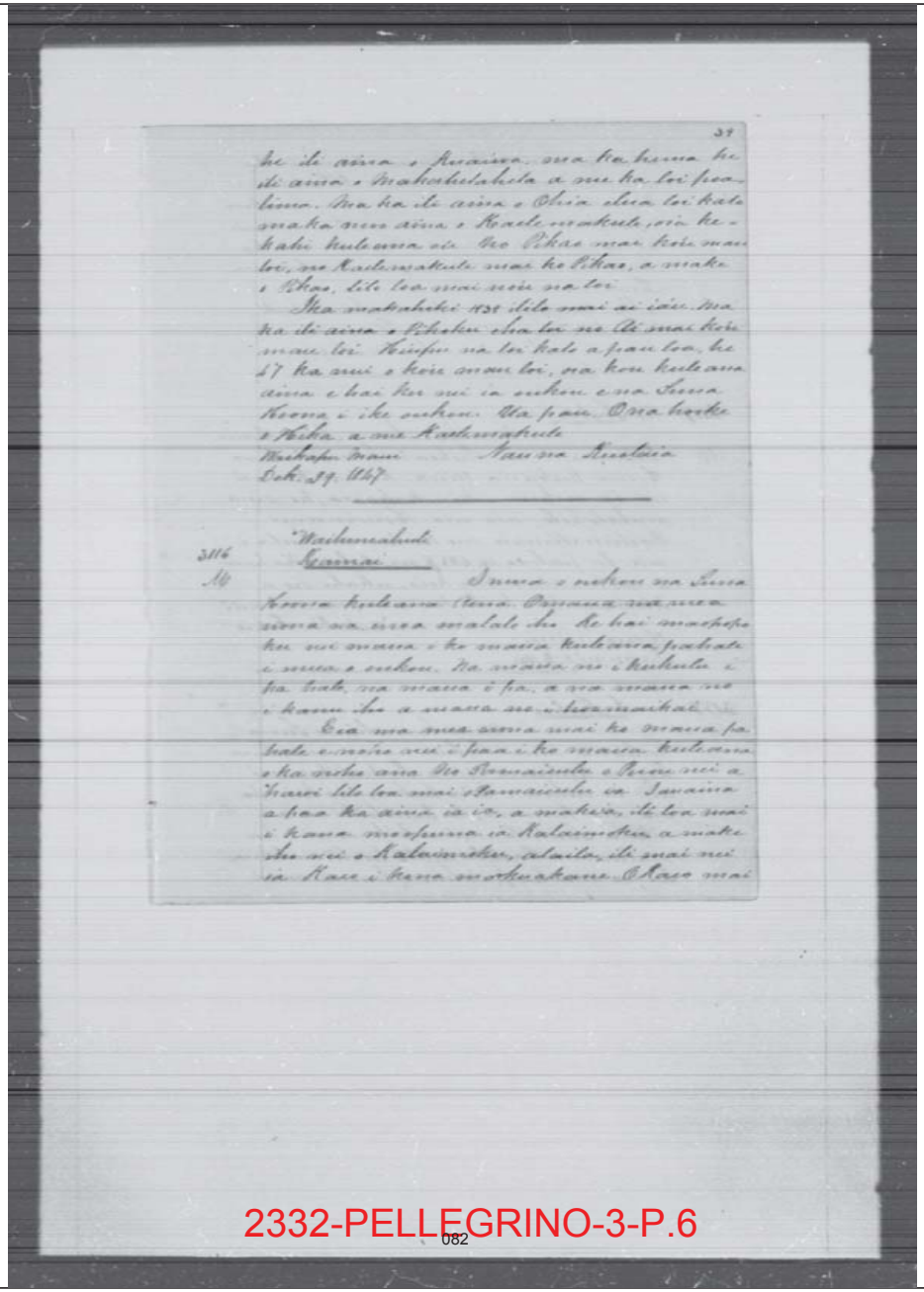
Eia kekahi kuleana ia he moo aina Paahai aia ma Kealia, Ma Kamalalea mai kou moo paahai ia no nae kou hemahama o ka mapolo ole iaia o ka makaluki i kaawi ia mai iaia. Aka, eia ka mea mapolo iaia o kou nohu ana mai, mai ka manawa mai o Kamehameha I a hiki i keia manawa e nohu no kakou. Ua pau Waikapu Maui Ain na Kuhiulo. January 4. 1888.

3110
14

Kuolaia

Ke aina o Nohoana Ke hai ku nei au ia nakou e na Luna koma kuleana Aina i kou Aina he moo aina kou kuleana no Kika mai kou moo aina i kaawi mai iaia mai ka ua kahiko mai a hiki i keia manawa kou nohu ana Ale i mapolo iaia ka makaluki i kaa mai ai kou Aina Eia ka mea mapolo iaia, na ka ua manawa o Kamehameha I eia kaia i kuika ia nakou. Ke he o na moo aina nei ia he 20 lei kalo, na ke hemahama o kou moo aina, he kahawai, na ka Mauu

2332-PELLEGRINO-3-P.5



Native Register (Kuolaia – LCA 3110.1)

Translation

3110 Kuolaia

‘Ili ‘āina ‘o Nohoana (Noho‘ana). Ke ha‘i aku nei au iā ‘oukou e nā Luna Ho‘onā Kuleana ‘Āina i ko‘u ‘āina, he mo‘o ‘āina ko‘u kuleana. No Hika mai ko‘u mo‘o ‘āina i hā‘awi mai ia‘u mai ka wā kahiko mai ā hiki i kēia manawa ko‘u noho ‘ana. ‘A‘ole i maopopo ia‘u makahiki i loa‘a mai ai ko‘u ‘āina. Eia ka mea maopopo ia‘u, ma ka manawa o Kamehameha I, ‘o ia ka‘u e hō‘ike iā ‘oukou. I loko o ua mo‘o ‘āina nei o‘u, he 40 lo‘i kalo. Ma ke komohana o ku‘u mo‘o ‘āina, he kahawai. Ma ka ‘akau he ‘ili ‘āina o Kuaiwa. Ma ka hema, he ‘ili ‘āina o Makahelahela a me ka lo‘i Po‘alima. Ma ka ‘ili ‘āina o Ohia (‘Ōhi‘a), ‘elua lo‘i kalo ma ka mo‘o ‘āina o Kaelemakule (Ka‘elemakule). ‘O ia kekahi kuleana o‘u. No Pikao mai ko‘u mau lo‘i. No Kaelemakule (Ka‘elemakule) mai kō Pikao, a make o Pikao, lilo loa mai no‘u nā lo‘i.

I ka makahiki 1838 i lilo mai ai ia‘u ma ka ‘ili ‘āina o Pikoku (Pikokū), ‘ehā lo‘i. No Ai mai ko‘u mau lo‘i. Hui pū nā lo‘i kalo a pau loa, he 47 ka nui o ko‘u mau lo‘i. ‘O ia ko‘u kuleana ‘āina e ha‘i aku nei iā ‘oukou e nā Luna Ho‘onā i ‘ike ‘oukou. Ua pau. ‘O nā hō‘ike ‘o Hika a me Kaelemakule (Ka‘elemakule).

Waikapū, Maui — Na‘u na Kuolaia
Kekemapa. 29, 1847

Subdivision of Noho‘ana. I proclaim to all Kuleana Land Commissioners regarding my land, a small piece of land which is under my responsibility. My small piece of land was from Hika which was granted to me from olden times until now at which time I am living on. I don’t know the year that I received the land. These are the things I do know regarding this piece of land from the time of Kamehameha 1, which I will present to all of you. Inside of this piece of land, there are 40 taro patches, on the western side of my piece of land, there is a stream (Waikapū). To the north, is situated the subdivision known as Kuaiwa. Towards the south, is the subdivision called Makahelahela and a Po‘alima taro patch. In the subdivision named ‘Ōhi‘a, there are two taro patches on Ka‘elemakule’s small piece of land. This falls under my title as well. All of my taro patches were from Pikao. Pikao’s came from from Ka‘elemakule until Pikao passes away, at which time those taro patches will be transferred over to mine.

In the year 1838, the subdivision known as Pikoku was in my possession and it had four taro patches. These taro patches of mine were from Ai. At most, I have 47 taro patches. These are my land titles that I proclaim to you Land Commissioners that I would like you to consider. That is all. Hika and Ka‘elemakule

Waikapū, Maui — Sincerely, Kuolaia
December 29, 1847

Uku Pau Loa #5.

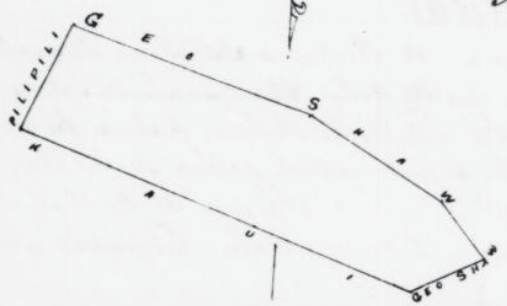
Witness
G. M. Robertson
J. H. Smith

ne 25. 1852 J. Kekaulahao

2 Kanepuahewa Waikapu

no Kanepuahewa ili o Auwaiolimu Waikapu Maui
Ke Kihi Akau e pili ana me George Shaw a e holo Ak 74 Ki 400
w Ak 60° Ki 247 Kh e pili ana me George Shaw Ak 42½ Ki 108
Shaw. Ak 64¼ Ko 133 Kh e pili ana me George Shaw. Ak 77¾ Ko
Ak 72 Ko 388 Kh e pili ana me Kaui Ak 23¼ Ki 178 Kh e pili a
ahi i hoomaka'i 1 22/100 Eka

S. Bailey
Mea ana aina



Uku Pau Loa #5.

Witness
G. M. Robertson
J. H. Smith

ne 25 1852 J. Kekaulahao

Pahoa Waikapu

Uku Pau Loa #6.

Witness
G. M. Robertson
J. H. Smith

June 25 1852 J. Kekaulahao

Mahoe

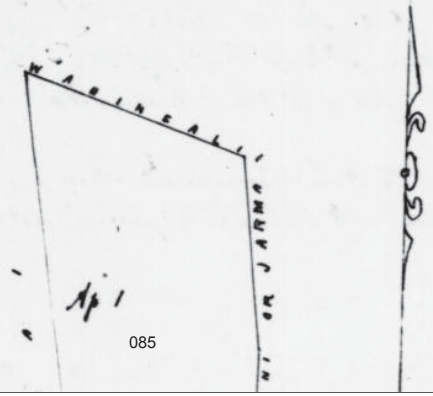
Mahoe Waikapu Maui

1 Ili o Ahuakolea E hoomaka ma Ka auwai Kihi Akau e pili
Ki 366 Kh e pili ana me Wahinealii Ak 4° Ki 296 Kh e pili ana m
ana me Aupuni paha Ak 23½ Ko 194 Kh e pili ana me Aupuni
Aupuni paha Ak 5° Ko 758 Kh e pili ana me Ka auwai a me K
maka'i 1 99/100 Eka

ana 4 Ili o Kikia E hoomaka ma Ke Kihi Hema a e holo Ak
Ak 80° Ki 113 Kh e pili ana me Ke Kula Ak 20¾ Ki 72 Kh
130 Kh e pili ana me Ke Kula i Kahi i hoomaka'i 2/10 K

Ua paa na Apana 2 + 3 ma loko o Ke Kula ana o Kaa a m
E
M

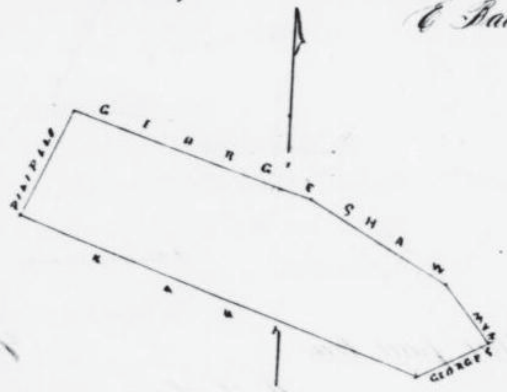
Apel 16, 1852



Helu 5252 Kanepuahuwa Waikapu Maui.

Huiloana 5252 no Kanepuahuwa, Ili o Auwaiolimu, Waikapu, Maui. O hem
o kihi Akau e pili ana me George Shaw a o hole He. 74° Ho 100 Kh e pili ana
Shaw, He 60° Ho 214 7 Kh e pili ana me George Shaw, He 110 ½° Ho 105 Kh e
me George Shaw, He 65 ½° Ho. 133 Kh e pili ana me George Shaw, Ak 74 ½
h e pili ana me Kaui, Ak. 74° Ho. 355 Kh e pili ana me Kaui, Ak 29 ½
h e pili ana me ka Ili o Kilipili i kahi i hoomakai 1 ¾ Ho 6 ka.

April 14. 1852. E. Bailey Mea ana



Ukiu pau loa

H. L. Lee
G. M. Robertson
J. H. Smith
J. Kekauonohi

Honolulu June 25. 1852.

RP 3129

Helu 2199 Pahoa Waikapu Maui

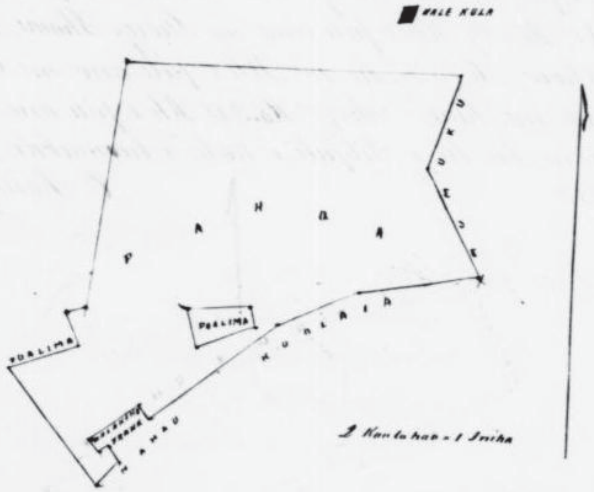
Palapala no ke ana ana i ka Huiloana 2199 no Pahoa ma ka Ili o Kaaiu
Waikapu, Mokupuni o Maui. O hoomaka ma ke kihi Hikina o kua Apana o pu
me Victoria Kekauonohi a me Moomuku a o hole Ak. 29° Ho 15 Kh ma ka pu

Komohana Akau o kuia Poalima, alaila hole Hema 15½° Hi 35 Kh Ak
Ak 25 ½° Ho 92 Kh Hi 15° Ho 98 Kh a puni ma ia anapuni Hi o ke Kaulahao.

E. Bailey Mea ana

Kumu Nomenana Akau o kela Poalima, alaila hele Hema 15½° Hi 34 K
96 Kh, Akes 7½ Ke 32 Kh He 15° Ke 94 Kh a puni ma ia anapuni ¼ o ke Kan

E. Bailey Ale



Ukeu puu lou

W. L. Lee
G M Robertson
J. H. Smith
J. Kekaulahai.

Honolulu Oahu June 25. 1852

R. P. 3125

Helu 10160 Mahoe Waikapu Maui

aole Mahoe Waikapu Maui.

Apana 1 Ili o Muwaholua. E hoomaka ma ka auwai k
puili ana me Wahinealii a e holo He 66½° Hi 366 Kh e puili ana me
E 11° Hi 296 Kh e puili ana me Aupuni paha He 5¾° Ke 181 Kh e puili
Aupuni paha, He 23¾° Ke 194 Kh e puili ana me Aupuni paha, H

088

o Pumpahuhue.

2199. Pahoa.

Ekra Hookuhiia. Ua iki au 2 apana ma ka ili o Kuaiwa, ma Waikapu
~~kekahi Apana~~. A ma ka ~~Ahupuaa~~ o Waiehuli, Hula. Kekahi Apana.

No Kapu mai kona aina ma Waikapu i ka M. H. 1837. Ua kam
ualuna mai ka Apana ma Hula i ka M. H. 1846. ke aina kahuhu loa
no mae, no kana wahine, Aole ona kuaka, 1 ~~poalima~~ ma ka aina
kalo ma Waikapu.

1 Penei na pahee o ka aina kalo ma Waikapu. M. aina o Palakalo M.
pela no. M. aina o Mumuku. M. aina o Heeka.

2 ma Waiehuli. Hula. Penei na pahee. Mauka aina o Ekum. Homuala
aina o Kapuaa. M. pela no. Makanoa aina o Emilia.

6251. Ekra.

Kamai Hookuhiia. Ua iki au 3 apana, ma ka ili o Mokuhulahula
ma Kuaiwa, i Waikapu. 1 apana ma Waiehuli o Hula.

~~Apana 1 – 14 ka ma ka ili o Mokuhulahula Waikapu~~

" 2. Pahale " " " " "
" 3. 2 kihale " " " Kuaiwa " "
" 4. Kuula uala kalo – Waiehuli – Hula

No Pumpahuhue mai kona mau apana aina ma Waikapu i ka
M. H. 1842. No Emilia mai ka apana 4. i ka M. H. 1845. No Pupuhi
mai ka Emilia aina i ka ma o Kamehameha V. Aole ona kuaka.

089

Native Testimony (Pahoa – LCA 2199)

Translation

2199 Pahoa

Eeka Hoʻohiki ʻia, ua ʻike au 2 ʻāpana ma ka ʻili o Kuaiwa, ma Waikapū kekahi ʻāpana, a ma ke ahupuaʻa o Waiohuli, Kula, kekahi ʻāpana.

No Kapu mai kona ʻāina ma Waikapū i ka makahiki 1837. No kāna wahine mai ka ʻāpana ma Kula i ka makahiki 1846. He ʻāina kahiko loa oʻu naʻe no kāna wahine. ʻAʻole mea keʻakeʻa. 1 Poʻalima ma ka ʻāina kalo ma Waikapū.

1. Penei nā palena o ka ʻāina kalo ma Waikapū. Mauka ʻāina o Palakiko, Waiheʻe pēlā nō, Kula ʻāina o Mumuku, Māʻalaea ʻāina o Hika.
2. Ma Waiohuli, Kula, penei nā palena, Mauka ʻāina o Okuu (ʻŌkuʻu), Honuaʻula ʻāina o Kapuaa (Kapuaʻa), Makai pēlā nō, Makawao ʻāina o Emilia.

2199 Pahoa

Eeka had sworn, I know of 2 pieces of land in the subdivision of Kuaiwa in Waikapū and another in the land division of Waiohuli, Kula.

His land in Waikapū was given to him by Kapu in 1837. This is an old land of mine from his wife. No one has disputed the land claim. There is 1 Poʻalima on his kalo land in Waikapū.

1. Here are the boundaries of the kalo land in Waikapū. Upland and Waiheʻe by Palakiko's land, Kula by the land of Mumuku and Māʻalaea by the land of Hika.
2. In Waiohuli, Kula, the boundaries are as follows. Upland by the land of ʻŌkuʻu, Honuaʻula and towards the ocean by the land of Kapuaʻa, Makawao by the land of Emilia.

2332-PELLEGRINO-4-P.7

HŌKŪAO PELLEGRINO
213 West Waikō Road
Waikapū, Hawaiʻi 96793
(808) 430-4534

WATER USE PERMIT APPLICANT PRO SE

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAIʻI

Surface Water Use Permit Applications, Integration of Appurtenant Rights and Amendments to the Interim Instream Flow Standards, Nā Wai ʻEhā Surface Water Management Areas of Waiheʻe, Waiehu, ʻĪao and Waikapū Streams, Maui	)	Case No. CCH-MA15-01 WITNESS LIST

WITNESS LIST

PARTY: HŌKŪAO PELLEGRINO

NAME/ ORGANIZATION/ POSITION	SUBJECT MATTER	EXHIBIT(S) TO BE INTRODUCED BY WITNESS
Hōkūao Pellegrino	Need for and use of Nā Wai ʻEhā water	2232-PELLEGRINO-1 to - 4

HŌKŪAO PELLEGRINO
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(808) 430-4534

WATER USE PERMIT APPLICANT PRO SE

COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I

Surface Water Use Permit Applications, Integration of Appurtenant Rights and Amendments to the Interim Instream Flow Standards, Nā Wai 'Ehā Surface Water Management Areas of Waihe'e, Waiehu, 'Īao and Waikapū Streams, Maui	)	Case No. CCH-MA15-01
	)	EXHIBIT LIST

EXHIBIT LIST

PARTY: HŌKŪAO PELLEGRINO

EXHIBIT NUMBER	DESCRIPTION	REFERENCES	REC'D INTO EVIDENCE
2232-PELLEGRINO-1	LCA No. 8808, Native Testimony, Native Testimony Translation	Testimony of Hōkūao Pellegrino	
2232-PELLEGRINO-2	LCA No. 3340, Native Register, Native Register Translation	Testimony of Hōkūao Pellegrino	
2232-PELLEGRINO-3	LCA No. 3110, Foreign Testimony, Native Register, Native Register Translation	Testimony of Hōkūao Pellegrino	
2232-PELLEGRINO-4	LCA No. 2199, Native Testimony, Native Testimony Translation	Testimony of Hōkūao Pellegrino	

M-01855

TMK(2) 3-5-002

SCS Project Number 607-1

ARCHAEOLOGICAL INVENTORY SURVEY REPORT ON 215.800 ACRES LOCATED IN WAIKAPU AHUPUA'A, WAILUKU DISTRICT, MAUI ISLAND, HAWAI'I [TMK (2) 3-5-02: 02 and 03]

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October 2005

Prepared for:
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ABSTRACT

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "`Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc.

Seven historic sites were documented during this Inventory Survey, two of which were previously recorded in the State Index of Historic Places (SIHP). All seven sites relate to historic sugarcane agriculture; the project area is 100 percent covered by abandoned cane land. Sites include two major concrete irrigation ditches; two lesser, more localized ditches; a reservoir; erosion-control earthen berms; and a cane-haul dirt road.

State Site Number 50-50-04-5197 represents the previously recorded Waihee Ditch, and State Site Number 50-50-04-5493 represents the previously recorded Waikapu Ditch. Five new sites were added to the SIHP during Inventory Survey. State Site Number 50-50-04-5729 represents a lesser, un-named, rock and mortar ditch. Likewise, State Site Number 50-50-04-5726 represents a second lesser, un-named, earthen ditch/drainage. Site 50-50-04-5727 is a large, un-named reservoir—the terminus of Waikapu Ditch. State Site Number 50-50-04-5728 is a sugar field erosion-control site comprised of 14 cross-slope, earthen berms of varying length that are positioned regularly throughout the project area. Finally, State Site Number 50-50-04-5730 represents "Old Waikapu Road", a cane-haul transport, dirt road that spans the border of parcels 02 and 03.

Excavation consisted of twenty-one backhoe-dug stratigraphic trenches evenly spread across the project area. Extensive pedestrian survey and this representative subsurface testing did not yield artifacts or cultural deposits.

All seven sites (all representing historic period sugarcane agriculture activities) were assessed as significant under Criterion D of Hawai`i's State Historic Preservation criteria. Based on the results of this project and depth of documentation, all seven sites have yielded all potential information important to this historic period and no additional archaeological mitigation is recommended within this project area.

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "`Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc. The Inventory Survey included historic background research and settlement pattern analysis prior to fieldwork, a complete pedestrian survey of the project area, representative subsurface testing via backhoe, and reporting (Figures 1 and 2).

Fieldwork, primarily consisting of systematic pedestrian survey, recordation, and representative subsurface backhoe testing, was conducted between August 16, 2005 and August 25, 2005 by SCS personnel Ian Bassford, B.A.; Randolph Ogg, B.A.; and Jon Wilson, B.A. The Principle Investigator for this project was Michael Dega, Ph.D.

Archaeological Inventory Survey of the project area was conducted to determine the presence/absence of archaeological deposits in surface and subsurface contexts through complete systematic survey and representative subsurface testing. The ultimate goals were to determine if historically significant archaeological sites occurred on the parcel and to provide recommendations to the State Historic Preservation Division (SHPD) concerning site mitigation during future land use of the project area.

ENVIRONMENTAL SETTING

LOCATION

The large survey area lies between coastal flats to the east and more mountainous terrain to the west along the medial reaches of the Maui isthmus between Wailuku and Mā`alaea (Figure 3). The project area is located between Wailuku (2 km north) and Waikapu to the south. Roughly ten percent of the project area (the northeast corner) lies within Wailuku Ahupua`a; the remainder is in the *ahupua`a* to the south—Waikapu (see Figure 1). The project area is composed of two adjacent parcels: TMK parcel 02 is located in the southeast quadrant of the project area and is less than half the size of parcel 03. The eastern perimeter of the project area abuts Honoapi`ilani Highway as it traverses from Wailuku toward Waikapu across the central Maui isthmus. The western border is defined by Wailuku Heights, an existing residential neighborhood. The northern boundary of the survey area is the curving Kuikahi Drive; the southern boundary is an arbitrary TMK line through abandoned cane lands (Figure 4).

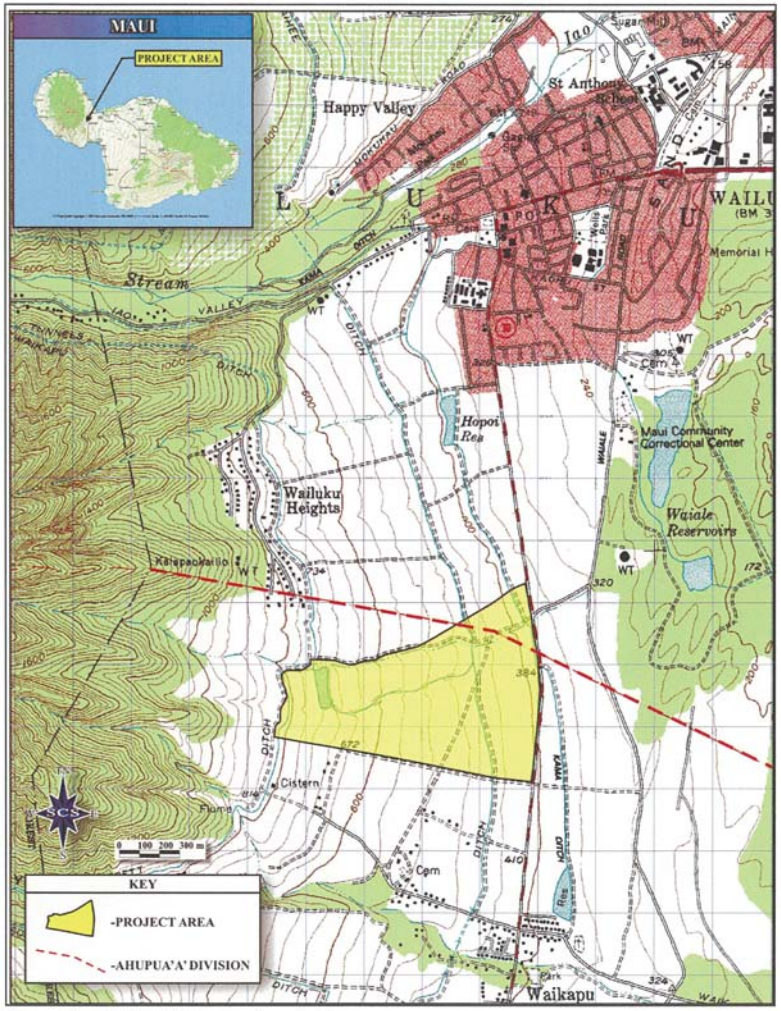

Figure 1: USGS Wailuku Quadrangle Map.

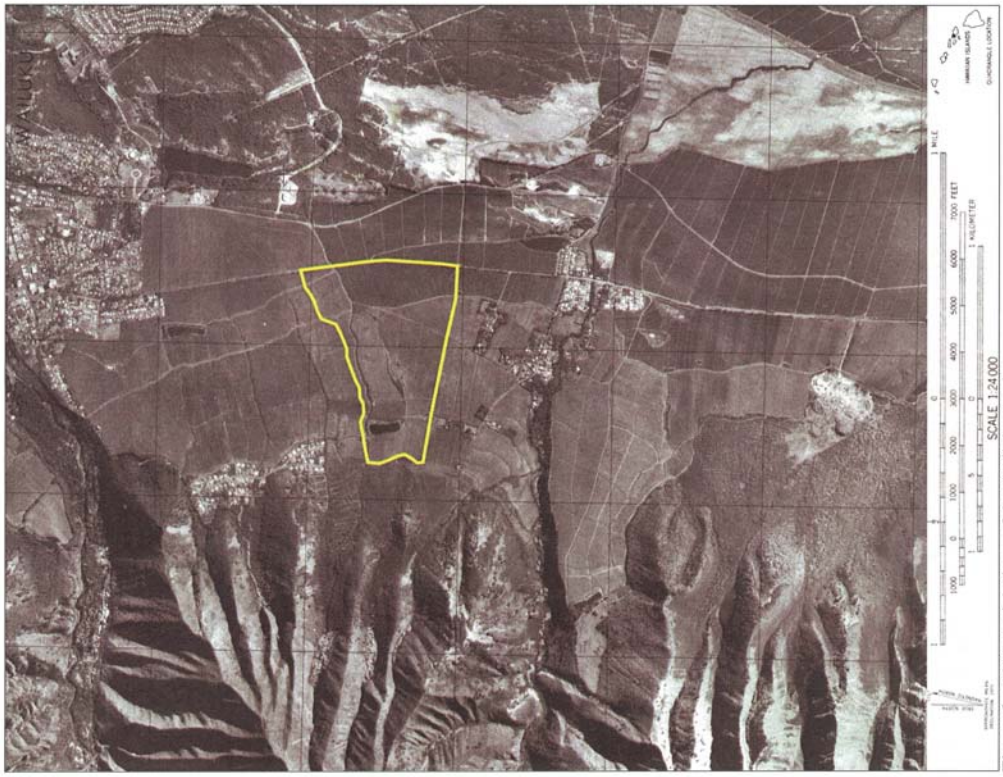

Figure 3: 1977 Aerial Photo of the Wailuku Region.

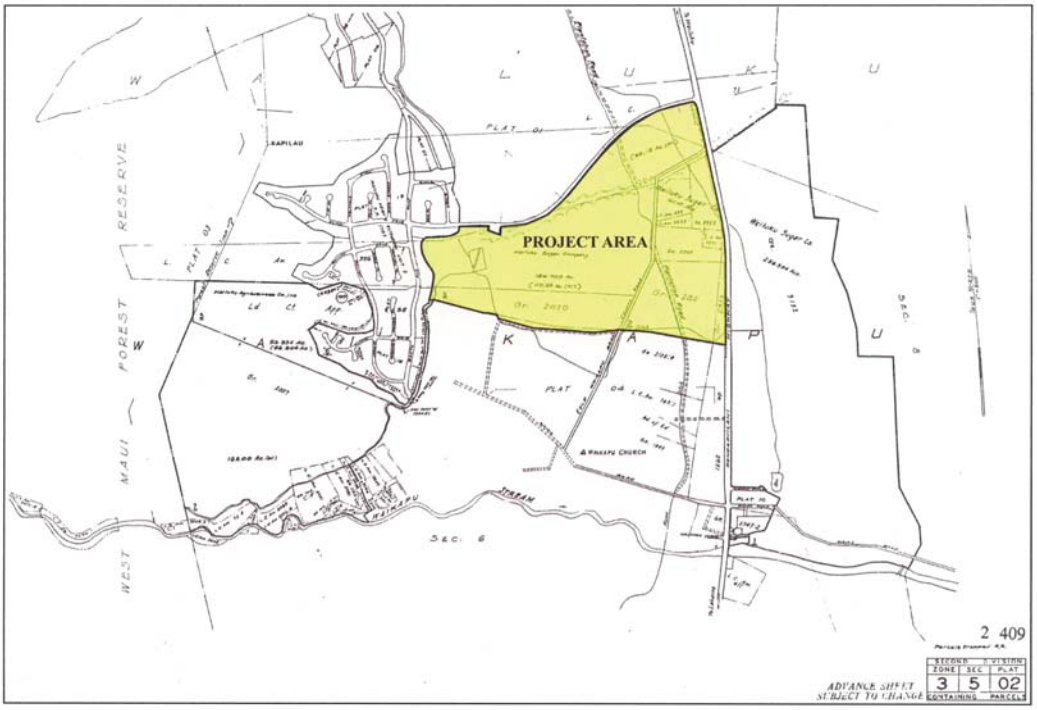

Figure 2: Tax Map Key [TMK] Showing Project Area.

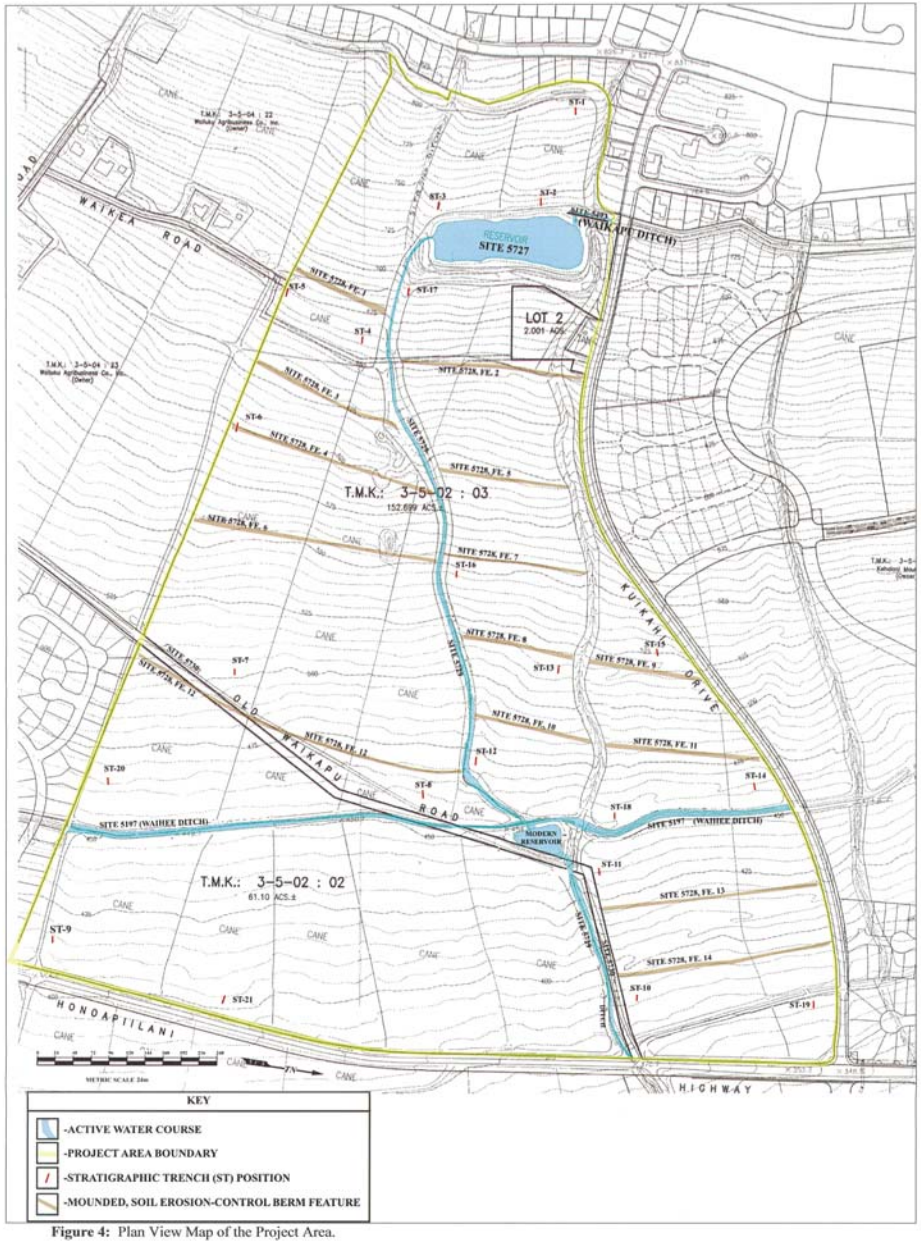

Figure 4: Plan View Map of the Project Area.

PROJECT AREA LANDFORM

Both archeological field survey and a review of geotechnical reports for the parcel reveal that the slightly sloping project area lies in locations previously utilized for the cultivation of now-abandoned sugar cane. According to Cavanaugh (1995:2), who conducted geotechnical studies on the 450-acre Kehalani Mauka Subdivision (the parcel that borders Kuikahi Drive to the north), "site topography slopes down moderately toward the east at a gradient of 10 percent." This accurately describes the slope of the current project area, which is steeper at its western (*mauka*) perimeter, and relatively flat near Honoapi`ilani Highway (Figure 5). Ground elevations range from approximately 115 meters (380 feet) above mean sea level (amsl) to 200 meters (660 feet) amsl. Various historic and modern dirt roads transect the surveyed area. As is discussed more below, project area exclusively consists of tilled zone, fill, and alluvial sediments. To the east, near the Maui Lani development, sandy matrices were identified. Sandy matrices were not identified in the current study area. Likewise, neither archaeological nor geotechnical subsurface testing detected any sandy matrices in areas immediately to the east of Honoapi`ilani Highway (Monahan 2003) or north of Kuikahi Drive during the Kehalani Mauka Subdivision (Dega 2004).

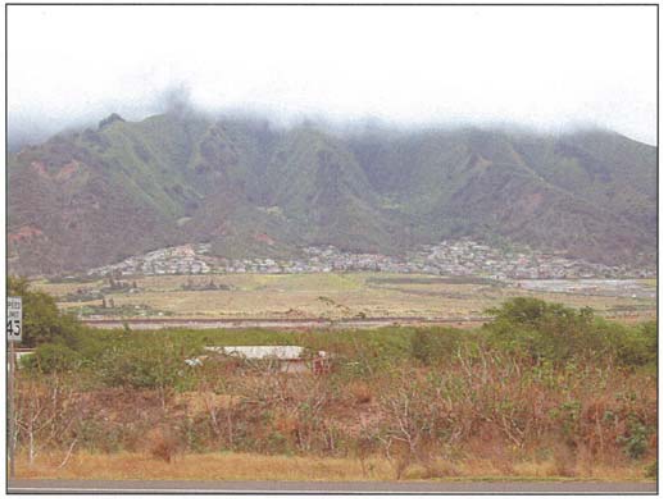

Figure 5: Distant Photograph of Project Area (lighter colored grass at center roughly defines boundaries). View to West.

Hydrology within the relatively dry project area is mostly in the form of historic irrigation modifications. Some of these modifications were the creation of a larger web of water conduits, drainages, and reservoirs, some built as early as 1905. No perennial streams run directly through the project area, and thus artificial ones had to be created for proper irrigation. By comparison, ʻĪao Stream runs west-east to the north of the proposed development while Waikapu Stream runs west-east to the south of the project area. Being located near these two major streams appears to have been beneficial for cultivation on the present parcel, at least during historic times. Several still-utilized irrigation ditches (*i.e.*, Waihee Ditch, Site -5197) transect the project area, and a still-active larger reservoir is linked to one of these ditches. The remnant irrigation ditches and reservoir not only point to massive landscape modification in the area during historic times but also strongly infer the aridness of the area, which required large-scale water importation. The water table was not encountered in any of the 21 stratigraphic trenches excavated within the project area (maximum depth of 2.60 meters). Soil borings conducted during geotechnical analyses in a nearby project area failed to reveal the presence of the area's water table to at least 25 feet below the surface (Shimamoto 1995:4).

The project area has seen significant modern activity. A 25 meter high cinder/ soil pile has been consistently mined (or imported) via truck traffic into the western half of the project area from a dirt road linking Kuikahi Drive. Modern rubbish is scattered over the surface of each quadrant; nearly a dozen abandoned cars are located in the southeast quadrant. Land owners have a construction trailer and small, dirt parking lot at the northeast corner of parcel 03. Consistent, daily vehicle traffic across the parcel indicates the modern maintenance efforts related to the irrigation systems (necessary to serve locations outside of the project area).

VEGETATION AND SOILS

Vegetation in the project area is dominated by the presence abandoned cane that has been overtaken by non-native secondary growth shrubs and various introduced grasses (Figure 6). Several ironwood trees (*Casuarina glauca*) dot the landscape. *Haole koa (Leucaena leucocephala*) are fairly common especially bordering the eastern highway perimeter and near irrigation conduits. Native vegetation was not documented within the project area.

According to Foote *et al*. (1972:46–47, 100), soils in the project area fall into four sub-classifications of the ʻĪao soil series. These soils consist of well-drained soils on valley fill and alluvial fans that have developed from igneous rock and are nearly level to moderately sloping. The ʻĪao Series derivatives are similar to each other, yet primarily differ by the slope of the surface layer and inclusions of a higher content of cobblestones, such as in ʻĪao cobbly silty clay

Figure 6: Project Area Vegetation and Topography. View to Northeast.

(classified as both IbB and IbC). The IbC soil (7 to 15 percent slopes) is distributed along the Kuikahi Drive area; whereas the IbB soil forms the central region. Also occurring within the project area (in roughly equal percentages) are ʻĪao clay, on lesser slopes (IcB), and ʻĪao clay on steeper slopes (IcC). Figure 7 shows the project area distribution of these derivatives.

The presence of these soil types was confirmed through geotechnical studies in bordering parcels and archaeological testing during the current project. Important to emphasize again, no sandy sediment was identified in the project area. Sandy sediment (sand dunes) and mixed coastal-terrigenous sediments occur to the east of the current parcel (*i.e.*, Maui Lani).

The fairly homogenous nature of soils in the project area does provide contrast to soil regimes occurring more to the east (coastal-terrigenous and coastal) and to the north and south (dynamic stream valleys). The current project area occurs in a medial or intermediate environmental zone, both on a north-south and east-west axis. Along a north-south axis, the property lies in a very dry, open area between two perennial streams (ʻĪao and Waikapu). On an east-west axis, the project parcel lies above the influence of the coastal plain and below the wetter uplands. The current parcel thus lies in a fairly non-dynamic environmental zone that is practically surrounded on all sides by contrastingly vibrant areas (see Figure 5). That this

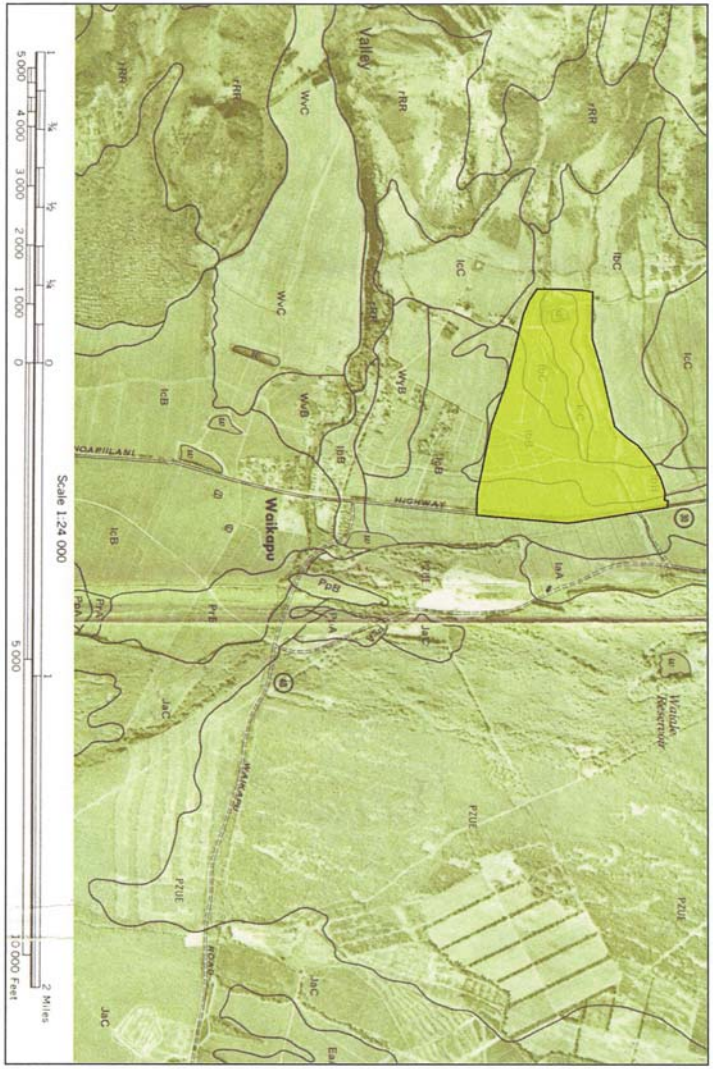

Figure 7: Project Area Soils and their Distribution [Adapted from Foote *et. al* (1972)].

intermediate area, occurring between more dynamic zones, required artificial controls is well-observed throughout the project area in the form of irrigation ditches and reservoirs.

CLIMATE

Rainfall in this intermediate environment is very modest. The project area receives an average annual rainfall of only 33 to 44 centimeters (Price 1983:63), with much of this rainfall occurring during the winter months (November–April). Seasonal variation in rainfall amount follows normal orographic patterns for leeward-type areas of Maui. The project area occurs just to the south of what may be considered the leeward-windward boundary. At higher elevations within Wailuku Ahupua`a, the amount of rainfall doubles and triples that of the project area. To the north, from `Īao Stream Valley area toward Waihee Valley, rainfall is much more intensive, with combined rainfall and geographic patterns being more conducive to traditional types of agricultural cultivation (*i.e.*, *lo`i*, sweet potato). The rainfall in this gently sloping project area drains downhill to the east and provides an additional water source for traditional Hawaiian agriculture in the lowland flats to the east of the project area (see Handy and Handy 1972).

TRADITIONAL AND HISTORIC SETTING

Wailuku District inhabits the eastern side of the West Maui Mountains (Mauna Kahalawai) and occupies the isthmus through the center of the island to coastal reaches in Kahukui and Mā`alaea. Wailuku, together with Waikapū, Waihee, and Waiehu, is one of the *Na Wai `Ehā*, or "the four waters," known for the occupancy of chiefly individuals (Kame`eleihiwa 1992; Pukui and Elbert 1992; and Creed 1993). Wailuku District and Wailuku Ahupua`a are frequently mentioned in historical texts and oral traditional accounts as being politically, ceremonially, and geographically important areas during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of `*I*ao Valley and lower Wailuku. The many *heiau* constructed in the Wailuku area point to its ceremonial and religious importance during pre-Contact times. During historic times, after numerous battles in the area, the large concentration of Land Commission Awards granted in Wailuku, particularly in lower `*I*ao Valley, also attest to a sizeable population base and the importance of the lands for cultivation through time. More recent land use in the area included sugar cane cultivation and use of the land for pasture.

THE TRADITIONAL SETTING OF WAILUKU

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations

eventually settling into drier leeward areas at later periods (Kirch 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-dates accepted ranges gleaned from palynological data. A more secure estimate for initial occupation of the islands is the A.D. 9th century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihee and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O`ahu, has yielded dates of occupation, albeit controversial, from A.D. 300 to 600 [Pearson *et al*. 1971], one of the earliest dated sites in the Hawaiian Islands. For the most part, these dates have now been diagnosed as very problematical and are no longer valid.) More recent research within Wailuku Ahupua`a indicates that the area was likely settled between *c*. A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996).

To the north of the current project area lies `Īao Valley, one of the most important locations in the area for prehistoric activity. Connolly (1974:5) states that the pre-Contact valley [`*f*ao] had a large population base with "most people residing in a settlement near `*f*ao Needle," just north of the project area. Supposedly, the subsistence base of this population consisted of fish and taro, with Kahului Harbor and the coast close by and *lo`i* systems lining `*f*ao Valley's stream banks. Prehistoric ditches or `*auwai* were utilized in taro cultivation (Connolly 1974:5). Sterling (1998:86) adds that two `*auwai* within the valley:

> have existed immemorially and were evidently constructed for the purpose of irrigating *kalo* on the plains which stretch away to the northward and southward of the [`*f*ao] river. Several minor `*auwai* have, since ancient times, tapped the river at different points lower down and spread the water through the lands in the gulch on either side of the river bed.

Handy in Sterling (1998:63) further notes that "From Waihee and Wailuku Valley, in ancient times, was the largest continuous area of wet taro cultivation in the islands." Cheever (1851:124) writes: "the whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it."

Recent archaeological research (Fredericksen and Fredericksen 1996:52) has revealed that habitation sites along what is now Lower Main Street in Wailuku, "are associated with the

rich taro producing lands in the Lower `*f*ao River flood plain, and the extensive cultivation systems present in `*f*ao Valley." These habitation sites have been dated to the A.D. 15th through 17th centuries. The `*f*ao Valley area was not only renowned for its agricultural base during prehistoric times but its ceremonial and political base as well (see also Cordy 1996; Donham 1996).

No discussion of Wailuku is complete without mentioning the important *heiau* complex above `Īao Valley near its seaward terminus. During the mid to late 18th century, the Halekii-Pihana *heiau* complex was supposedly designed by a Hawaiian named Kiha (Sterling 1998:89). These monuments, designated as State Site Number 50-50-04-522 and occurring along the northwest flank of the current project area, are described as very important *heiau* within Hawaiian history. Yent (1983:7) notes the life cycle of the *ali`i* was represented here. It was the place where Kamehameha I's wife was born, Kahekili lived, and Kekaulike died. Thrum (1909:46) reported that Kamehameha I evoked his war god at Pihana Heiau after his warriors defeated Kalanikupuli's forces during the Battle of `*f*ao in 1790. The two *heiau* are primarily associated with Kahekili, who is connected with the Halekii-Pihana complex between *c*. A.D. 1765 and 1790, and Kamehameha, during his conquering of Maui in 1792 (Yent 1983:18). Halekii and Pihana Heiau are the only remaining pre-Contact Hawaiian structures of religious and historical importance in the Wailuku-Kahului area that are easily accessible to the public (Estioko-Griffin and Yent 1986:3). As stated, the area within and adjacent to the current project is known not only for its religious and/or ceremonial significance, but for its political prominence as well.

The Fredericksens' (1996:52) report states that politically, Wailuku [village] was known as a central settlement for high ranking chiefs and their retinue. The Wailuku area was also witness to many battles, from the Battles of `*f*ao and Sand Hills to the Battles of Kepaniwai and Kakanilua. The most famous battle was that of Kepaniwai where Kamehameha I, in July 1790, finally wrested control of Maui Island. Kamehameha I and his warriors landed at the Kawela portion of Kahului Bay and proceeded up `*f*ao and other valleys to score a decisive victory. Wailuku, meaning water of destruction, succinctly describes the area in which many of these major battles occurred. Of additional note is that in the Kauahea area of `*f*ao Valley (southeast of `*f*ao Stream below Pihana Heiau-supposedly within the current project area), warriors apparently dwelt and were "trained in war skills and there was a boxing site in the time of Kahekili" (Sterling 1998:89).

TRADITIONAL SETTING OF THE PROJECT AREA

Creed (1993) has written extensively on the traditional background of the Waikapu area, much of which directly applies to the open landscape of the current project area just to the north of Waikapu. Many classes of sites are found or may have existed in the Waikapu-Wailuku area during traditional times. Creed (1993:19–21) provides an extensive list, including some site types that would not apply to the current parcel due to its distance from major drainages, the coastline, and its open land classification. Traditional sites that would apply include agricultural sites (*kula* lands, *wauke* patches, *hala* trees, pigs, and potato patches), boundary walls, burials (sometimes located in habitation terraces), feather gathering areas (particularly in the mountains to the west), habitation loci, and *pohaku* (an adze stone marks the border between Wailuku and Waikapu). While populations were predominantly centered in `Īao Valley and Waikapu Valley, there was agricultural and habitation activity in the open grasslands of the current project area above the coastal flats. Much evidence for such activities has not yet been found through archaeological means, a situation that places much culpability on historic land use that may have erased or scattered this evidence. As such, there is much more evidence for historic activities occurring in the area.

HISTORIC SETTING OF THE PROJECT AREA

Current project area lands were first assigned to the district formerly known as Kula. Taken literally, *Kula* refers to open land or plains (Pukui and Elbert 1992:70). Kula District is known for its dry, arid lands being vacant of perennial streams. Kula was always an arid region, throughout its long, low seashore, vast stony *kula* lands, and broad uplands. There are exceptions in Wailuku as one proceeds along Īao Stream Valley and further to the west/northwest past Waihee and Waiehu. However, even the vast stony *kula* lands were utilized during traditional and historic times. Most evidence for such land utilization has come in the form historic records.

THE GREAT M~HELE

In 1848, during the late historic period, commissioners of the Great M~hele instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The M~hele was based upon the principles of western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Kuykendall Vol. I 1938:145 footnote 47 *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among

other things. Case in point, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I 1938: 145 *et passim*; Kame`eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`~inana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*. However, in the case of commoners, they would only make claims only if they had first been made aware of the foreign procedures (*kuleana* lands, land commission awards). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming houselots in Honolulu, Hilo, and L~hian~ were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

Wailuku District was declared Crown Land during the Great Māhele and numerous Land Commission Awards, approximately 180, were awarded within Wailuku Ahupua`a while approximately 100 were awarded for Waikapu Ahupua`a (Creed 1993). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugarcane. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38).

During the Great M~hele of 1848, a total of three land claims were awarded in the current project area (Waihona `Aina 2005): LCA 433, 3201, and 3525—all of which are located in parcel 02, in the central area of the eastern border near Honoapi`ilani Highway (Figure 8). Table 1 summarizes archival research of these three LCAs.

Table 1: LCA and Land Grant Data for [TMK:(2) 3-5-02: 02].[1]

LCA No.	Awardee	Land Use	Comments
00433	William Crowningburgh and wife Maile	*lo`i* – 21 *`apana* – 4	Stream also on property. Crowningburgh surrounded this land with a fence and raised animals on the property. Plot of land was referred to as *Pili Pili* at the time.
03201	Wm. A. McLane	*`apana* – 2	One ditch on piece of land. Plot of land was referred to as *Awakamanu* at the time.
03525	Keliiolelo	*lo`i* – 3 *`apana* – 3 House lot –1	Stream on property. Plot of land was referred to as *Awakamanu* at the time.

[1] Source: Waihona Aina website (www.waihona.com), information obtained in September, 2005.

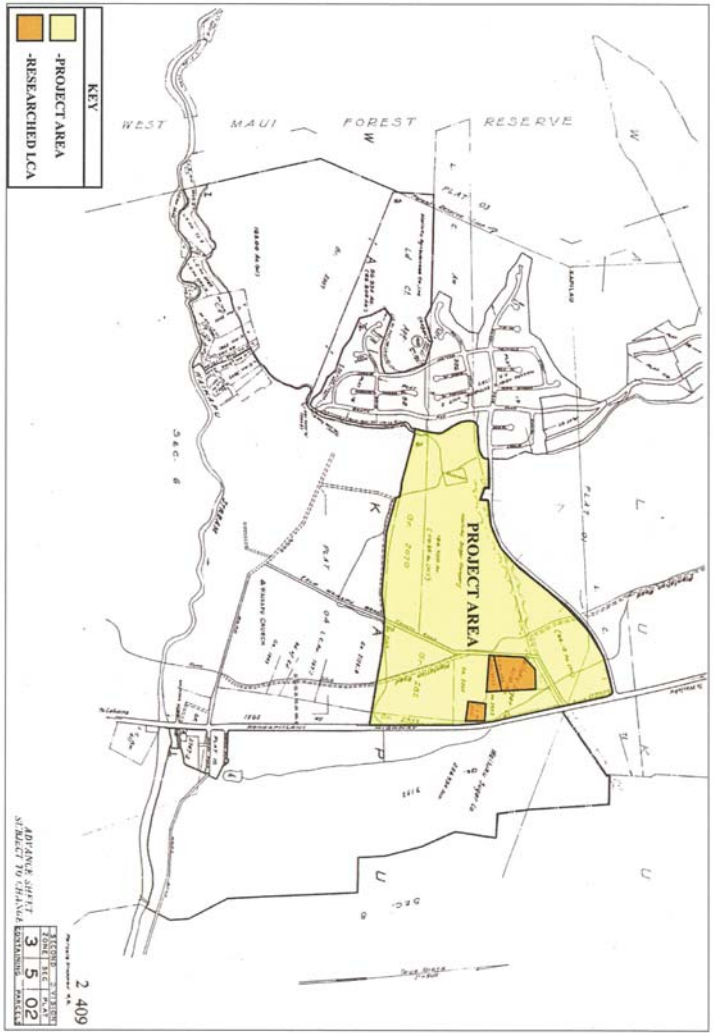

Figure 8: Adapted 1992 Tax Map Key with Researched LCAs Highlighted.

This LCA record keeps with the overall LCA pattern of the Waikapu-Wailuku area intimating taro cultivation in association with permanent residences. Such a pattern is historically documented from 1848, but likely extended deeper into the past. *Lo`i* (irrigated taro patches or planted terraces) and evidence of smaller, private land plot divisions, *`apana*, are no longer detectable within this surface or subsurface landscape.

Similarly, the Wailuku Ahupua`a parcel north of Kuikahi Drive predominantly lists among its LCA records 'property for raising cattle' and 'pasture grounds for cattle' (Dega 2004). There also is some mention of stone walls, *kalo* patches, and *lauhala* trees on the landscape. Perhaps the most significant structures on this adjacent land were built by the American Board of Commissioners for Foreign Missions (A.B.C.F.M.) which consisted of two house lots with adobe walls. The lots occurred "near pasture land," a common theme for the area (Waihona `Aina 2005). In Waikapu, to the south, the LCAs reflect *lo`i* cultivation, *kula* lands, and house sites. However, much or all of the evidence related to such settlement of the Waikapu area has been effaced by late-historic and modern cultivation. The current project area is a prime example of this trend.

Land use in Wailuku and Waikapu Ahupua`a in the mid 19th and early 20th century was largely devoted to the sugar industry. During the 1860s, the sugar business was growing, with plantations and mills at Wailuku, Waihe`e, Waikapu, and Haiku. Many of the plantation camps associated with these mills were centered in the Pu`unene, Kahului, and Wailuku area (see Denham *et al*. 1992:16). Historic utilization of the Waikapu-Wailuku landscape within and near the project area focused on industrial-levels of cultivating sugar cane and pineapple. Water was channeled from traditional sources (*e.g.*, Waikap© Stream, western aquifers or springs) through plantation lands. Both local and imported workers operated on these plantation lands and the area maintained fair population density. Evidence for expansive landscape modifications to accommodate the industrial-level of production is very evident across the current subject parcel in the form of the north-south oriented known historic ditches. The significant amount of plastic and tubing and sheeting found within Layer I of excavations attests to even more recent utilization of the open landscape for cultivation. These former sugarcane lands are now being reclaimed through residential developments.

PREVIOUS ARCHAEOLOGY

IMMEDIATE VICINITY OF PROJECT AREA

Intensive research within the State Historic Preservation Division (SHPD) archives concluded that no previous archaeological study was conducted within the present project area. However, of primary importance for the present study are the results from three projects recently conducted within and bordering the 348-acre subdivision to the north (Figure 9). First, Archaeological Inventory Survey was conducted on approximately 100 acres of land that included five separate lots and a proposed road corridor in the Kehalani Mauka Subdivision (Dega 2003). Three historic sites were documented during this Inventory Survey. State Site Number 50-50-04-5473 has been assigned to Hopoi Reservoir. This reservoir predates Hopoi Camp and was present at least by 1922 (see Dega 2003). Occurring to the immediate east of Hopoi Reservoir and running north-south to Waikapu is Kama Ditch (State Site No. 50-50-04-5474), a water conduit carrying the precious commodity to dry southern lands. A single basalt adze (Site 50-50-04-5478) was recovered from the northern flank of Lot 21 along the eastern flank of the parcel. Extensive survey and testing in the area of the isolated find failed to produce additional artifacts or cultural deposits. Representative subsurface testing (18 trenches) on the lots only revealed highly homogenous soil matrices across the open, barren intermediate area.

A second SCS Inventory Survey Report dealing with these same Kehalani Mauka lands (Dega 2004) documented lots not surveyed in the first study. This survey recorded six additional sites, all historic. Similar to the present project area, a series of un-named, lesser ditches was found within Kehalani Mauka, represented by State Site Numbers 50-50-04-5490 and 50-50-04-5493. Waihee Ditch (Site -5197) flows from this former SCS project area into the present project area. Historic-modern roadways (50-50-04-5489), a historic surface artifact scatter (50-50-04-5491), and several plantation-era clearing mounds (50-50-04-5492).

In summary, the results of the Kehalani Mauka Subdivision Inventory Survey roughly duplicate the present project area's findings. Aside from a lone traditional artifact (an adze)—which could remain despite a century of cultivation—larger traditional sites were destroyed during the sugar-era.

An Archaeological Assessment Report was published based on a negative results survey on Kehalani lands just to the east of Honoapi`ilani Highway (Monahan 2003). This survey did not produce any structures or artifact scatters. Trench excavation demonstrated a fairly consistent subsurface stratigraphy with a thick layer of dark brown silt (Layer II) inclusive of historical

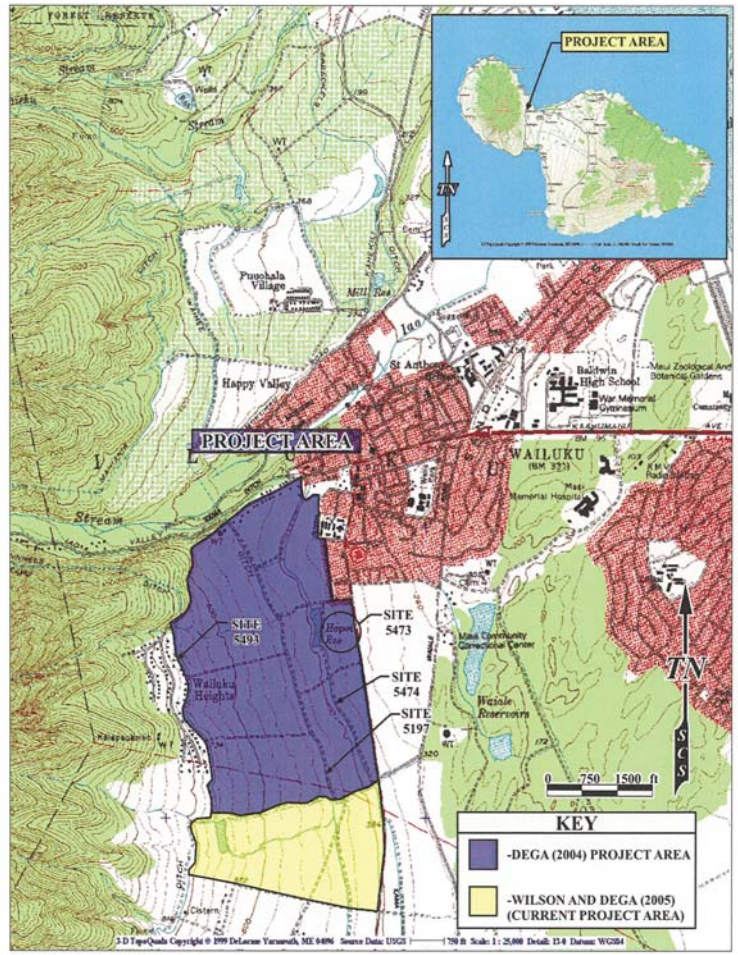

Figure 9: USGS Wailuku Quadrangle Map Showing Adjacent Areas of Archaeological Study.

garbage (*i.e.,* black plastic and rubber tubing, white plastic irrigation pipes, and black plastic sheeting) over an undisturbed very dark grayish-brown silty clay subsurface (Layer III). A dark brown, silty root mat-layer (Layer I) was present in some units. No undisturbed sandy deposits were encountered, although a few trenches close to the eastern boundary of the project area did contain thin lenses of yellowish-brown sand. These sand lenses were clearly introduced as recent fill.

GENERAL WAIKAPU AREA

In terms of general projects in the Wailuku-Waikapu environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). None of their archaeological finds directly pertain to the current project area; however, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapu area.

In an area south of the project area, within open lands similar to what is being researched herein, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikap©, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the M~`alaea Complex) was identified by Walker (1931) to the west of M~`alaea. Chronology for these sites has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at M~`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

Recent archaeological work in Waikap© Ahupua`a (Kennedy 1988, 1989; Folk and Hammatt 1989; Haun 1989; Brisbin *et al.* 1991; Donham 1991; Titchenal 1996) has revealed a low density of sites ranging in function from habitation to agriculture. Radiocarbon dating results in these studies have produced dates ranging from the A.D. 1100s to modern times. Together, their collective data suggests a "general trend toward development of large, densely settled populations between A.D. 1200 and about 1800, and the expansion and intensification of dryland field systems, particularly during the latter two centuries of this period" (Creed 1993:33).

Other recent archaeological work just to the south and/ or east of the current project area has been limited to two field inspections (Donham 1991, 1995) and near the eastern boundary line of the current project location, two archaeological Inventory Survey-level investigations

(Kennedy 1988, 1989; Buffum and Dega 2001). The conclusions offered by these few projects primarily indicate that any surface and/or subsurface features of cultural value that were once present within the area have most likely since been destroyed by intensive agricultural use of the land (*i.e.*, sugar cane and/or pineapple cultivation); this pattern was also confirmed by subsurface examination. As such, a broader background for Wailuku District is offered herein (see below).

WAILUKU DISTRICT OVERVIEW

The following section provides a brief overview of archaeological research in Wailuku District itself and is presented in two arbitrary sections: Upper Wailuku and Lower Wailuku District. Upper Wailuku is considered to be the lands above Kuihelani Highway while Lower Wailuku encompasses the lands below Kuihelani Highway and extends to Mā`alaea Bay in Waikapu Ahupua`a. The following district-specific research appears in its entirely as first published in Dega (2004).

UPPER WAILUKU DISTRICT

The majority of archaeological work is associated with the Pu`u One region in the northern most section of Wailuku District. Prior archaeological work in the Pu` One region indicates an emerging pre-Contact settlement pattern for this region. SCS (Dunn and Spear 1995) conducted research at the intersection of Naniloa and Waiale Roads where habitation features and a cultural layer interspersed with hearth and pit features were identified during a monitoring project. These features all occurred in sandy substrate. Radiocarbon dates submitted from these features yielded dates ranging from A.D. 1434 to A.D. 1807, dates suggesting pre-Contact sites and early historic land use. SCS (Burgett and Spear 1995) conducted Archaeological Inventory Survey in the sand hills along lower Main Street. One habitation site (50-50-04-4004) located in a remnant of a once larger cultural deposit was identified. Radiocarbon samples dated the site to A.D. 1420 and A.D. 1640, or to the early to mid-prehistoric time range.

SCS (Morawski and Spear 2001) conducted Archaeological Monitoring during the installation of a water pipeline and fire hydrants on Naniloa, Helenani, Leilani, Kainani, Naniluna, and Ka`ahumanu Highway roads with the town of Wailuku. During the research, a historic refuse dump was discovered, as were the remains of previously disturbed human burials. SCS (Buffum and Spear 2001; Zachman and Spear 2002) conducted Archaeological Monitoring at the Maui Medical Center. Due to extensive landscape modifications, no archaeological or traditional materials were identified during excavation.

Pantaleo and Sinoto (1996) conducted archaeological work at the Maui Lani Development to the east of the present project area. As of the 1996 publication, only one concentration of multiple burials was discovered while the remainder were isolated individual burials at the tip of the dune (at the highest elevations). A more contemporary report documenting additional burial finds at Maui Lani should aid in clarifying the overall results of that project. Research conducted by Fredericksen and Fredericksen (1997) indicated that this section of dunes was primarily used during prehistoric times as an interment area, a contention easily supported by the previous year's study. Habitation sites (several with associated burials) have been found mostly in the dune area associated with the Lower Main Street/Waiale Road Corridor. Conversely, studies east of this corridor have yielded only human burials (Fredericksen and Fredericksen 1998). Fredericksen and Fredericksen (1998) lists many of the archaeological studies conducted in the Lower Main Street/Waiale Road Corridor and Central Maui area.

LOWER WAILUKU DISTRICT

A limited number of archaeological projects have been conducted in this particular land section, much of which was disturbed during the massive sugar cane cultivation. The fair amount of archaeological work conducted along Lower Main Street is summarized elsewhere (see Morawski and Dega 2003). In comparison, Sinoto and Pantaleo (1992) conducted Archaeological Inventory Survey of a proposed location for the Kihei Gateway complex, on the *makai* side of the Piilani-Mokulele Highway junction. One historic site, the remains of concrete footings from a bridge across Waiakoa stream, was identified (Site 50-50-09-31).

SCS (Burgett and Spear 1997) conducted large-scale Archaeological Inventory Survey of the Puunene Bypass/Mokulele Highway improvements stretching across the majority of Wailuku District. Although no sites were identified, this absence may account for the lack of archaeological remains: extensive disturbance associated with prior sugar cane cultivation, highway and private construction activities, and little or no prehistoric occupation of the area. However, *lo`i* cultivation was reported to be intensively cultivated in this area (Handy and Handy 1972). The replacement of *lo`i* with sugar cane during historic times would be the most likely cause for the destruction of all traditional sites related to prehistoric cultivation in the area.

Fredericksen and Federicksen (1998) conducted archaeological research on 232 acres northeast of Puunene Avenue stretching to Haleakala Highway. No formalized traditional or prehistoric sites were discovered. Several sites consisting of volcanic-glass surface scatters were identified in the former sugar cane fields along with a historic irrigation ditch.

SETTLEMENT PATTERN

Archaeological investigations within the currently studied portion of Wailuku-Waikap© have revealed relatively little regarding traditional settlement patterns due to the dearth of supporting empirical evidence. Archival research and analyses of the generalized settlement pattern for Wailuku District have been the foremost sources for discerning an established settlement pattern for the current project area.

Archaeological evidence suggests that early settlement in the Hawaiian Islands occurred along windward shoreline areas between the A.D. 4th and 11th centuries. Pollen evidence suggests a settlement date of the A.D. 9th century (see Athens 1997). For the most part, these populations used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* zones. Greater population expansion to inland areas did not occur until the *c*. A.D. 12th century but continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c*. A.D. 1600.

Nearer the coast in intermediate lands such as the current project area (*c*. 60–85 meters amsl), taro was cultivated along stream courses, dryland taro was grown on *kula* lands such as the project area, and populations were settled. It is possible that the *kalo* patches described in the aforementioned LCA accounts originated during the "Expansion Period" of A.D. 1400 to 1600, perpetuating through historic times (Kirch 1985). However, most of the LCAs for the area describe almost no cultivation occurring in the area during the 1850s as pasture land and sugar cane cultivation were already dominating the use of the land (Creed 1993:74). Primary settlement and resource zones lay outside the current medial environmental zone in Wailuku proper, near perennial water sources (`Īao Valley, Waihee, Waiehu). The only substantial settlement along this medial isthmus zone between 300 and 600 feet amsl was at Waikapu, to the south of the current project area, near the base of Waikapu Stream Valley (see Creed 1993). As the current project area does not contain a perennial water source and is primarily open grassland, the area is considered to lie at the periphery of the more resource-rich zones in Wailuku.

Historic utilization of the Wailuku-Waikapu landscape was dominated by the cash cropping of sugar cane and pineapple, made possible by water channeled from traditional sources (*e.g.*, Waikapu Stream) through plantation lands. Historic features associated with this period are represented as water features in the form of reservoirs (Hopoi Reservoir) and water channels (Waikapu Ditch, Waihee Ditch). This area was also an important transportation corridor linking both the south and north flanks of the Maui isthmus, with Honoapi`ilani Highway having been demarcated as a Government Road on area maps by 1882 (Creed 1993:20).

PROJECT AREA EXPECTATIONS

Prior to commencing archaeological fieldwork, a review of archival resources and the results of previous archaeological work conducted in the area was undertaken to assess possible findings during fieldwork. Based on previous archaeological work—primarily north and east of this intermediate landscape—and on LCA information, site patterns prior to intensive historic land alteration activities show systematic use of the terrain as taro planting areas, limited habitation, and divisions of pastureland. Previous archaeological investigations within this portion of the Wailuku-Waikap© corridor have revealed very little data to confirm these patterns, this not surprising considering the impact that long and intensive agricultural exploitation has had on the surface of the area and subsurface strata. Traditional site components expected prior to these land-altering activities consist of dryland taro patches, associated agricultural components such as *`auwai* and/or terracing, house sites, boundary walls, and pasture walls. Expectations for identifying such data sets were low, however, due to the aforementioned historic land uses.

Traditional sites that may once have been present within the current project area were not expected to remain unaltered. Given LCA testimony and general settlement patterns for this inland, intermediate area, land use patterns for the current project area were thought to be most obviously related to historic-period settlement and cultivation—but on a very limited scale. At present, an empirically-based chronology of this area has yet to be provided, given intensive historic land modifications and the lack of datable archaeological evidence. According to Creed (1993:77):

> . . . we have no carbon dates to indicate the possible beginnings for this wetland agriculture in Waikap© Valley. Moreover, this area has been in constant use for crops and habitations at least since the time of the *M~hele*, if not long before and modern uses may have destroyed all traces of prehistoric uses. However, the LCA records and early maps document the extent of the *lo`i* agriculture in the 1850s. The stream valley in its upper reaches may have some remnants of these *M~hele* period *lo`i* or *`auwai*.

Expectations for this project area rested on several assumptions, some of which were proven valid at the end of fieldwork. First, the project area, lying in an open, intermediate zone containing hard soil composed of silty clay with cobbles was not intensively occupied during traditional times. Traditional and early historic-period populations were focused elsewhere in areas such as Waikapu, `Īao Valley, Waihee Valley, and Waiehu Valley. Thus, there were low expectations for identifying larger, intact sites or deposits; they simply were not constructed in this area. Secondly, there was the possibility that sand sediment could be present along the eastern flank of the project area. The association of sand and traditional/historic burials and cultural deposits has been well documented (see Kirch 1985). Thus, if sandy deposits did occur along the eastern flank, cultural deposits could be present. Third, the area was heavily modified for industrial cultivation. Remnants of such modifications, such as fill strata, excavated areas, reservoirs, and earth mounds/ berms were expected throughout the project area. A cursory study of the USGS Wailuku Quadrangle Map showed that irrigation ditches crossed the current project area. Finally, based on the primarily negative results from other archaeological projects conducted along the intermediate Wailuku-Waikapu corridor, there were limited expectations for identifying intact traditional-period architectural structures or intact cultural deposits lying beneath the tilled surface. However, historic structures related to irrigation and were likely, considering they were previously documented near the parcel (see Dega 2003). In all, some of these expectations were met during the current study.

METHODOLOGY

FIELD METHODS

Fieldwork consisted of systematic pedestrian survey of the entire 215.800 acre parcel and mechanical subsurface testing across representative portions of the parcel. Written and photographic documentation occurred during each phase of research. First, 100 percent systematic pedestrian survey was conducted to assess the presence/absence of surface features and artifacts as well as to assess soil deposits amenable to testing. As visibility was moderate within fifty percent of the project area (*makai* half), and low-to-moderate in the *mauka* half, 100 percent surface survey was conducted by two to three crewmembers spaced closely together (5 meters apart), walking parallel along north-south transects. When any structures, artifacts, or intriguing topographical changes were identified, they were plotted on an overall site map and flagged. Surface artifact assemblages, surface features, or anomalies were assigned temporary

site numbers. Temporary site numbers were converted to State Site Numbers upon a cursory project review by SHPD following the completion of fieldwork.

After survey, the crew returned to each flagged location to fully investigate the area and assess excavation potential. Representative areas were demarcated for subsurface testing. All subsurface testing was done mechanically by backhoe. Following excavation each trench was thoroughly documented via stratigraphic layer profiles, soil analysis, photography, and location plotting on a project area map (see Figure 4). A vast area was tested with these intermittent trenches, however, excavation produced negative results in terms of subsurface cultural material of interest to the archaeological record.

While no cultural materials were collected from any trench, soil samples were taken from each trench and analyzed in the field. The results revealed a fairly homogenous soil matrix. None of the excavated soil was screened, but all trench walls were thoroughly inspected. Photographs were taken first of trench locations prior to excavation, secondly of at least one profile (or multiples) of each trench, and thirdly, overview shots were taken of the respective trench at the base of excavation. Representative photographs are offered in Appendix A.

LABORATORY METHODS

As the results of survey and excavation were negative in terms of collected artifact classes and samples, laboratory work was not necessary. Because none of the soils analyzed in the field were deemed to be associated with past habitation surfaces, traditional agricultural levels, or cultural deposits, no samples were submitted for specialized analysis (*e.g.*, radiocarbon, pollen, phytolith analysis). Subsurface charcoal was an extremely rare commodity, and when found it was in association with modern debris from modern agricultural activity or dumping. Drafting of stratigraphic profiles, mapping illustration, and section drawings, were the primary components to laboratory work. All field notes, maps, photographs, and artifacts pertaining to this project are being curated at the SCS laboratory in Honolulu.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

A 100-percent pedestrian survey of the project area revealed the presence of a network of historic-period surface structures that are represented as the seven sites described below. The previously documented (Dega 2004) Waikapu Ditch (State Site No. 50-50-04-5493) and Waihee Ditch (State Site No. 50-50-04-5197) were subject to additional documentation during this survey. No traditional Hawaiian cultural material was found.

DITCHES

Four ditches are present within the project area. All four ditches originate outside of the project area and/ or extend beyond the project area's limits; no ditch exists as a segment contained strictly within the project area. Two of these ditches are of a larger historic context within Maui's sugarcane era. These are named ditches and some limited information regarding their construction and use appears within the historic record. It is important to note that up to as recently as 1983 (the publication of one series of USGS maps) two more of these significant, longer range water courses flowed into the project area. The Everett Ditch and Kama Ditch, however, have since been diverted or destroyed and no longer appear within the project area. Additionally, two lesser ditches served a more localized role within the project area. Only one lesser ditch, a possibly historic drainage from upslope, did not flow consistently at the time of survey.

State Site Number 50-50-04-5197 (Waihee Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (1905–1907 construction)
DIMENSIONS:	Length: 960.00 m; Width: 2.40m; Depth: 1.70 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None

DESCRIPTION: The Waihee Ditch is a flowing, concrete water conduit. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 10). Concrete cross-braces reinforce the relatively thin (0.10 m) concrete sides. The curving ditch flows into the project area from the north and roughly keeps a north-south orientation as it transects parcels 03 then 02 (see Figure 4). A smaller ditch (Site - 5729) that serviced only the locality of the project area, flows into the Waihee ditch from the west (pictured in Figure 10).

Modern alterations and maintenance to the Waihee Ditch are evidenced within the project area in the form of fortifications, a watergate near a modern reservoir, and foot and car bridges over the ditch. Additionally, nearby surface deposits of freshwater clam shells and *kukui* nuts are evidence of modern maintenance in the form of regular cleaning of the ditch. These finds are also a testament to the Waihee Ditches length and volume (Figure 11), as neither of these species exists within the project area; they traveled here via the ditch from environments north and *mauka*. In terms of historic information regarding a single project area site, the most available for

Figure 10: Waihee Ditch (50-50-04-5197). View to South.

Figure 11: Waihee Ditch (50-50-04-5197) paralleling Old Waikapu Road (50-50-04-5730). View to South.

the area pertains to Waihee Ditch. This history is worth noting in detail as it lends to an understanding of project area utilization around the turn of the century.

According to Wilcox's *Sugar Water: Hawai`i's Plantation Ditches* (1996:124), the Waihee "Canal" was started in June 1905 and was completed in May 1907. The entire canal cost $160,000 to construct and was used by Wailuku Sugar Company (founded 1862) and HC&S. The Waihee Canal was built under the leadership of an engineer named James T. Taylor. The canal, or ditch as it is now known, represents a monumental effort to carry water to dry areas of Maui. Wilcox's research emphasizes this display of manpower for the purpose of sugar irrigation:

> this 50-mgd-capacity ditch tapped the Waihee stream at the 650 foot elevation, just below the Aliele falls. . . . Its 10.62 miles included twenty-two tunnels totaling 16,539 feet; thirty-nine flumes totaling 2764 feet; 35,549 feet of open, cement-lined ditch; and a 1253-foot-long, 3-foot-diameter siphon to cross Iao Valley. Ditch grade averaged 2/5 feet per 1000. The longest tunnel (2246 feet) was especially challenging, as much of it went through hard close-grained rock and it required compressed air and percussion drills. This tunnel took eighteen months to cut. The contract price for the labor ranged from 85 cents to $5 per foot, depending on the material cut, the location, and the length of the tunnel. (1996:124)

The Waihee Ditch represents the oldest securely dated site on the project area landscape. Three other ditches are also located within the project area: two lesser, more localized ditches run from west to east; the Waikapu Ditch parallels the Waihee Ditch as it enters the project area from the north.

State Site Number 50-50-04-5493 (Waikapu Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (in use by 1913)
DIMENSIONS:	Length: 61.00 m; Width: 1.70m; Depth: 1.00 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	The Waikapu Ditch is a flowing, concrete water conduit that taps

the Iao Stream at upper elevations within Iao Valley. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 12)

Figure 12: Waikapu Ditch (50-50-04-5493) at point where it enters Project Area. View to South.

—and is very similar in appearance to Waihee ditch. The concrete sides of the ditch measure 0.20 m thick. The curving ditch flows into the *mauka* fifth of the project area from the north and roughly keeps a north-south orientation. Unlike, the Waihee Ditch, the Waikapu Ditch does not transect the project area, rather it enters and then ceases.

The Waikapu Ditch flows into the Site -5727 reservoir where it terminates (although this may not have been the historic termination point of this ditch). The out-flow of this reservoir is a smaller, localized ditch that runs *makai* (Site -5729) and does not resemble the Waikapu ditch. Modern alterations and maintenance to the Waikapu Ditch are evidenced within the project area in the form of fortifications and a car bridge over the ditch. Wilcox (1996:124-125) notes that the ditch was in use prior to 1913 and was built by Wailuku Sugar Company.

State Site Number 50-50-04-5729 (un-named ditch)

FORM	Rock and concrete mortar water-course
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 1200.00 m; Width: 0.90m; Depth: 0.75 m (within P. Area)
CONDITION:	Fair

SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, flowing ditch was almost certainly built after Waihee and Waikapu Ditch construction. Site -5729 serves as a *mauka-makai* link between these two major sources of imported water. Site -5729 is constructed of basalt rock walls, specifically small boulders that are often welded together with concrete mortar (Figures 13 and 14). The walls of this U-shaped ditch are four to six courses high, and average 0.20 m thick. The bottom of the ditch is a concave, roughly-molded concrete basin. This construction material is an indicator of a localized irrigation effort, as the cost of labor and materials was a significantly smaller undertaking than the major ditches flowing in from the north. The origin of the Site -5729 ditch is the outflow of the Site -5727 reservoir (which gathers its water from the Waikapu Ditch terminus). Site -5929 then flows into the Waihee Ditch (Figure 15). The Site -5729 ditch is controlled by modern mechanisms in its flow into and out of the modern, smaller reservoir, and eventually downslope toward Honoapi`ilani Highway and out of the project area.

Figure 13: Site 50-50-04-5729 Ditch. View to West.

Figure 14: Site 50-50-04-5729 Ditch, Showing Rock and Mortar Construction of Side Walls. View to Northwest.

Figure 15: Site 50-50-04-5729 Ditch (at center) flowing into Waihee Ditch (50-50-04-5197). View to West.

State Site Number 50-50-04-5726 (un-named ditch)

FORM	Earthen berm ditch
FUNCTION:	Sugarcane irrigation
AGE:	Possibly historic
DIMENSIONS:	Length: 215.00 m; Width: 7.00m; Depth: 2.50 m (within P. Area)
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	None

DESCRIPTION: This un-named, intermittently flowing ditch was possibly constructed within the historic sugar era. It is a wider U-shape than the other ditches, and is choked with thick introduced grasses that stand over two meters tall. Like the Site -5729 ditch, this is a localized irrigation effort. The possibility exists that this is not a sugar cane agriculture feature, but a modern widening of a natural watershed drainage. However, its earthen berm sides resemble the historic, machine-created berms (Site -5728) constructed on the project area as erosion control during the sugar era. This ditch / drainage runs downslope, approximately west to east.

State Site Number 50-50-04-5727 (un-named reservoir)

FORM	Rectangular reservoir
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 229.00 m; Width: 76.00m; Depth: undetermined
CONDITION:	Excellent (currently maintained)
SURFACE ARTIFACTS:	None
EXCAVATION:	None

DESCRIPTION: This un-named, large reservoir is currently active and maintained by modern pumping equipment and fencing (Figure 16). It is surrounded by machine-created earthen berms of the same construction seen elsewhere on the project area in association with historic agriculture. Waikapu Ditch flows from the north and empties into Site -5727 (see Figure12). Everett Ditch, flowing downslope from the *mauka* West Maui Mountains, also once terminated at this reservoir (however, this ditch no longer exists within the project area). The out-flow for Site -5727 is the Site -5729 localized, lesser ditch. The length of this reservoir is oriented north-south.

The size, construction, elevation, position, and shape of Site -5727 resembles that of Hopoi Reservoir (State Site 50-50-04-5473), a documented sugar era irrigation site. Hopoi Reservoir is located 1 kilometer northeast of the Site -5727 reservoir and the latter is likely of the same construction period as the former. Hopoi Reservoir, although empty and abandoned during

Figure 16: Site 50-50-04-5727 Reservoir. View to North.

initial recordation (see Dega 2004), also was a collection point of a known major water course (Kama Ditch, Site 50-50-04-5474).

Note: A smaller, modern reservoir is located within the *makai* third of the project area (Figure 17). A 1977 aerial map of the Kahului isthmus (see Figure 3) clearly shows the Site -5727 reservoir, and also shows that this smaller reservoir was not yet constructed.

State Site Number 50-50-04-5728 (erosion-control berms)

FORM	Earthen berms (n = 14)
FUNCTION:	Sugarcane field erosion control
AGE:	Likely historic
DIMENSION RANGE:	Length: 132 to 456 m; Width: 5.0 to 17.0 m; Height: 1.0 to 1.8 m
CONDITION:	Fair
SURFACE ARTIFACTS:	None
EXCAVATION:	ST-6
DESCRIPTION:	Fourteen soil berms comprise Site -5728 (Figure 18). This historic

method of machine-piled earthen mounds was used within cane fields to prevent topsoil erosion. As depicted by Figure 4, the positions of the fourteen berm segments vary slightly from a general north-south orientation. What is consistent, however, is that the position of each individual

Figure 17: Modern Reservoir at center of Project Area's Eastern Half.

Figure 18: Site 50-50-04-5728, Feature 13 (Erosion-control Berm). The contour of the berm running cross-slope can be seen as a mound in the dirt road. View to Northeast.

segment runs perpendicular to the sloping terrain within that specific locality of the project area. The mounded soil acted to block rainwater runoff, preserving both moisture and topsoil. To a lesser degree, it is possible that the berms also prevented some wind blown soil erosion, as some of the berms were mounded to a height of 1.80 m. State Site Number 50-50-04-5522 provides a documented case of such berms in the nearby former cane fields of Waiehu, Maui (Wilson and Dega 2004).

Stratigraphic Trench 6

One stratigraphic trench (ST-6) was backhoe excavated through a single soil berm segment of Site -5728. The Feature 4 berm ran north-south at the center of the project area's south perimeter (see Figure 4). ST-6 perpendicularly transected the Feature 4 berm with the intent to explore its interior construction and subsurface depth. A cross sectional profile of ST-6 (Figures 19 and 20) indicates Site -5728 berms are 100 percent made up of naturally occurring soils that have been machine mounded in the past. No imported rock or other substance was used in the construction of these berms. The soil disturbance extends into Layer II (to a maximum depth of 50 cmbs) as evidenced by the mounded subsurface contour in shown in Figure 20. This simply means that the plow mechanism that created these berms cut deeper into the natural landscape in this berm building effort than was generally used when tilling the surrounding fields. (The surrounding fields consistently display an undisturbed Layer II.) Subsurface content is explored further under the heading "Subsurface Testing."

State Site Number 50-50-04-5730 (Old Waikapu Road)

FORM	Dirt road
FUNCTION:	Probable cane-haul route
AGE:	Likely historic
DIMENSIONS:	Length: 945.00 m; Width: 3.50m
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	A dirt road that enters the project area from the eastern perimeter

(Honoapi`ilani Highway)—and then turns southwest before crossing the southern perimeter—forms the boundary between parcels 02 and 03. On a 1992 Tax Map Key the following words are printed in association with this road: "(Old Waikapu Road) County Road". At the time of survey, this road continued to see infrequent pedestrian and vehicle traffic—reserved for those transecting this undeveloped swath of land as a possible shortcut between paved roads. For this reason, this dirt road remains free of vegetation (Figure 21).

Figure 19: ST-6 (Photograph of North Wall) Profile Shows Subsurface Contour of Machine-mounded Site -5728, Feature 4 Berm. View to North.

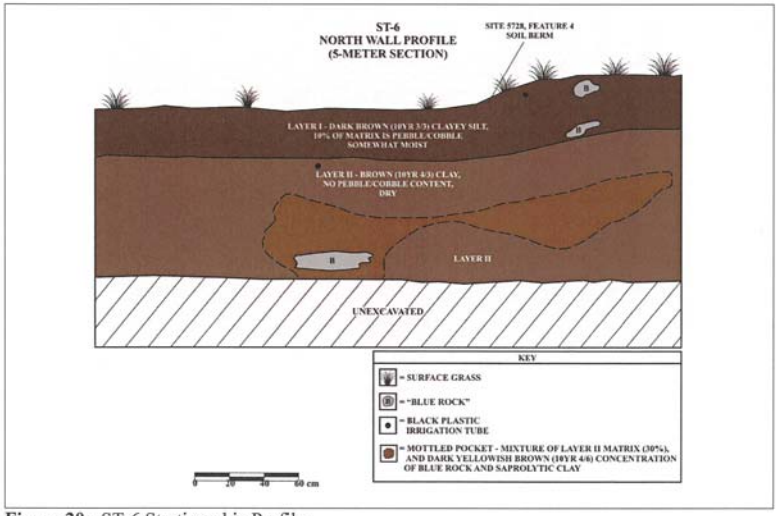

Figure 20: ST-6 Stratigraphic Profile.

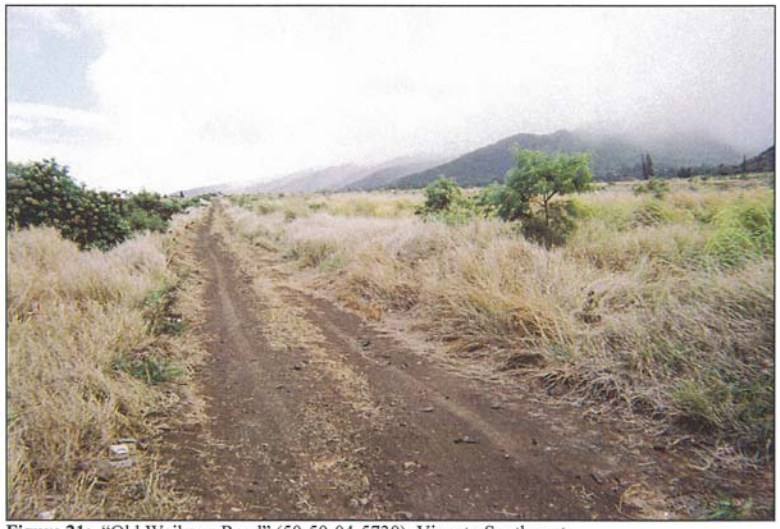

Figure 21: "Old Waikapu Road" (50-50-04-5730). View to Southwest.

Exactly how old "Old" Waikapu Road is difficult to determine precisely. However it is safe to assume that this newly recorded State Site Number (50-50-04-5730) originated in the same sugar period as the other six sites within the project area. A Cultural Impact Assessment (CIA) within the same project area provides further detail backing a historic origin to the Old Waikapu Road. Author of the CIA, Kalei Tsuha, interviewed a local resident who, as a child in 1922, remembers traveling across the project area on this same road by horse (K. Tsuha, personal communication 9/25/05).

SUBSURFACE TESTING

Twenty-one stratigraphic trenches (STs) were mechanically excavated by backhoe to test for the presence/absence of subsurface cultural deposits in a variety of project area locations. Excavation took place over a three-day period, August 22–24, 2005. Of these trenches, only one (the previously described ST-6) revealed any kind of subsurface cultural material. ST-6 was placed through an existing soil berm in order to document construction technique of these historic agricultural features. ST-6 documented the subsurface extent of the Site -5728, Feature 4 soil berm (the base of which does extend into the otherwise undisturbed Layer II matrix) (see

Figure 20). None of the 21 trenches revealed any type of artifact, charcoal deposit, or midden deposit.

Testing was spread evenly across the project area with the intent of documenting soil stratigraphy trends by project area location. In total, 21 stratigraphic trenches (ST-1 through ST-21) were excavated and documented. The trenches averaged 7.86 m long, 0.70 m wide, and 1.58 m deep.

Calculating the above averages, an approximate area of 155 m^2 and volume of 183 m^3 of soil was excavated during testing. These sampling figures are primarily indicative of the limited positive results achieved for each trench; if significant cultural resources were documented during the project, it is likely that less geographic space would have been excavated as documentation and sampling of such cultural resources would have been more time consuming. In the amount of time allowed for the project, testing was geared toward obtaining the most information available to assess the presence/absence of subsurface cultural deposits (as it was fairly quickly determined that all surface sites were historic).

STRATIGRAPHIC TRENCH LAYER ANALYSIS

As expected, excavation within the former sugarcane fields resulted in a consistent stratigraphy of culturally sterile soils. Trenching revealed no more or less than two distinct layers in each ST. The variation between trenches was even less than expected, as in each, Layer I represented soil that had been disturbed by historic and modern agricultural practices, and Layer II represented undisturbed soil. The minimal variation between trenches was threefold: the thickness of Layer I varied by 41 centimeters at most; the soil color and qualities variety slightly in among some trenches; and the pebble, cobble, and or saprolytic rock content within Layer II somewhat varied. Otherwise, the project area is extremely homogenous in subsurface content. This can be credited primarily the effects of decades of agricultural use, and also the fact that the Iao Series soils existing here show only minor variation. The following two examples, ST-7 and ST-9, display the typical slight range of stratigraphic variation within the project area (Figure 22).

ST-9 is the standard project area stratigraphy. Layer I has a surface cover of thick, dried grass. Layer I is 65 cm deep and consists of a moderately moist, very dark grayish-brown (10YR 3/2) clayey silt, of which less than ten percent is pebble/ cobble. Layer I contains evidence of the modern agricultural practices in the form of plastics. Only two of the 21 STs excavated did not

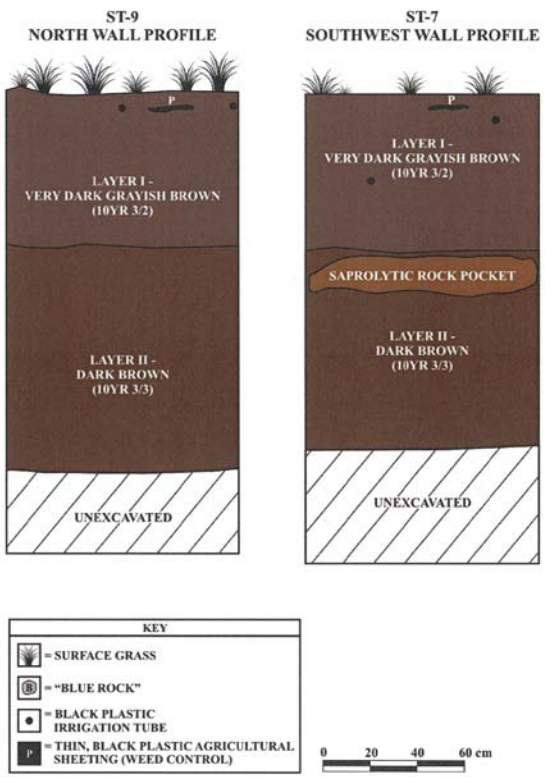

Figure 22: ST-9 and ST-7 Profiles Display Typical Subsurface Stratigraphy within Project Area.

contain either drip line irrigation tubing or black plastic weed-control sheeting in Layer I (see Appendix A). In the majority of STs, Layer I contained both of these plastics at varying depths.

Layer II, as evidenced in ST-9, was often a very compact, moderately dry, dark brown (10YR 3/3) clay, of zero pebble or cobble content. Often, however, a pocket of saprolytic (decomposing) rock or "blue" rock could be found in Layer II (as shown in the ST-7 profile). Layer II thickness remains undetermined as this layer proved too deep to find bedrock, even with the reach of a large backhoe. ST-20 was excavated to a maximum depth of 2.60 m in an unsuccessful attempt to reach bedrock. It is safe to assume that Layer II of the project area is at least 2.00 m thick, but probably much thicker.

DISCUSSION AND CONCLUSIONS

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Inventory Survey included archival research, systematic pedestrian survey of the project area, and representative subsurface testing. While the landscape did not yield traditional Hawaiian archaeological sites, it did reveal a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road—forming seven sites. Five of these sites are new additions to the State's rich historic record of turn-of-the century sugar industry in Hawai`i.

WATER CIRCUITRY

In his 2004 Inventory Survey Report of the Kehalani Mauka Development lands Dr. M. Dega initiated three hypotheses regarding historic water circuitry within this Wailuku / Waikapu landscape. Aside from the small area of land covered by the pre-existing Kuikahi Drive that acts to separate the two surveys—the 348.613 acres in Dega's study and the 215.800 to the south (the present survey) may be viewed as 564.413 contiguous acres for the archaeological record. This is not an arbitrary relationship, as the *ahupua`a* division separating these fields did not individualize their historic utilization. The following text is from *An Intermediate Zone Archaeology Inventory Survey [TMK (2) 3-5-001:portion of 001]* (Dega 2004:41–42):

> Several intriguing patterns emerge as one focuses upon the empirical, historic-period evidence at hand. One of these patterns is the direction in which the historic ditches have been constructed and utilized across the parcel. Case in

point: three main ditches or canals run north-south, or [*perpendicular*] to the slope, across the project area and beyond. Waihee Ditch, Kama Ditch, and the westernmost ditch of Site T-24 (Site -5493) [*Waikapu Ditch*] are the most well-constructed on the parcel. These ditches were water conduits across these dry zones. Typically they could be used to water areas along their course or would simply empty into large retention basins (reservoirs) at selected points.

However, there is also a network of ditches, mostly earthen berms and small channels, that run [*parallel*] to the slope on a west (upslope)-east (downslope) axis. These ditches are commonly non-formalized like the north-south ditches and tend to be more localized. Site T-16 (Site -5490), built on an east-west axis for instance, runs a total of 1,000 meters while the north-south Waihee Ditch runs for more than 16 kilometers. The important point is that there is a functional difference between the north-south oriented ditches and the east-west coursing ditches. The more formalized [and costly] north-south ditches are actually water conduits wherein water may be carried long distances to irrigate such water-poor locales as the present project area. The less conventional ditches situated on an east-west axis are simply drainages and do not fulfill an irrigation role on these dry parcels. These smaller ditches appear to be more naturally formed by erosion and were simply modified to accommodate excess water and sediment flow so as not to interfere with the main purpose of cultivation. This pattern appears valid for the present project area but requires additional information from other locales to be proven, negated, or amended.

Thus, we propose two hypotheses that remain to be examined:

1. All north-south canals or ditches along central Maui that run [*perpendicular*] to the slope are water conduits and inherently contain an irrigation function.

2. All east-west bearing canals or ditches along Central Maui that run [*parallel*] to the slope are only drainages that do not disseminate water for irrigation purposes but function to remove overflow so as not to curtail cultivation potential.

DISCUSSION POINTS

The current study provides a second example within the archaeological record confirming Dega's first hypothesis. Both the Waihee Ditch and Waikapu Ditch (numbered, but not named in Dega 2004) were identified as running north to south. These major irrigation conduits continue this flow direction into the current project area. These are large, long, costly, historic structures that were designed to carry stream waters great distances. These ditches run cross-slope within the project area.

The current project area findings expand upon, but do not necessarily confirm Dega's second hypothesis. Two lesser, localized ditches do indeed follow the same orientation as those in the Kehalani lands. Both of these lesser ditches run with the slope contour (perpendicularly linking the major ditches, at times). However, the hypothesis of a functional difference is not soundly reinforced. The Site -5726 ditch is a subtle, earthen feature that may have filled a drainage role rather than an irrigation role. But there is no proof that the more elaborately constructed Site -5729 ditch (stacked basalt boulders that are mortared with concrete) did not in fact serve as a *mauka* to *makai* irrigation artery. This ditch may have served as an outlet to the reservoir's (Site 5727) spill-over, however, this function should not exclude a dual purpose of localized irrigation.

Finally, like in Dega's (2004) study, four points contribute to the current project's lack of traditional Hawaiian cultural material. First, and most obviously for this location, historic impacts have dramatically altered the landscape so much as to erase larger archaeological traces of traditional-period activities. Second, the lack of traditional-period evidence suggests that these open lands were probably not intensively utilized during prehistoric times. The current project area may have not been selected as a habitation zone as it is an open area without perennial water resources—and more preferable lands were readily available. Third, the types of traditional activities conducted within and near the project area may not have left archaeological signatures. Fourth, as is the case for all archaeological projects, testing may have failed to coincide with the existing subsurface cultural materials. This is unlikely but always a possibility as 100 percent of any parcel is rarely ever fully excavated.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

Seven archaeological sites were documented in the project area: Waihee Ditch (50-50-04-5197); Waikapu Ditch (50-50-04-5493); an un-named, lesser ditch (50-50-04-5729); a second un-named, lesser ditch (50-50-04-5726); a large, un-named reservoir (50-50-04-5727); a series of fourteen sugarcane-field erosion-control, soil berms (50-50-04-5728); and a County dirt road named "Old Waikapu Road" (50-50-04-5730).

These sites have been evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five criteria are classified below:

Criterion A: 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 distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in 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

All seven of these historic sites have been assessed as significant under Criterion D.

Based upon the results of this Inventory Survey and the results of archaeological work on adjacent parcels that have also produced primarily negative results (see Dega 2003, 2004; Monahan 2003; Buffum and Dega 2001), it appears as though additional archaeological research on the subject parcels would not contribute a significant volume of additional data to the interpretation of the area or region, or to Hawaiian prehistory/history. Archaeological Monitoring is not recommended during construction within the project area. The seven sites documented herein have yielded their information to the historical record and no additional archaeological work is recommended.

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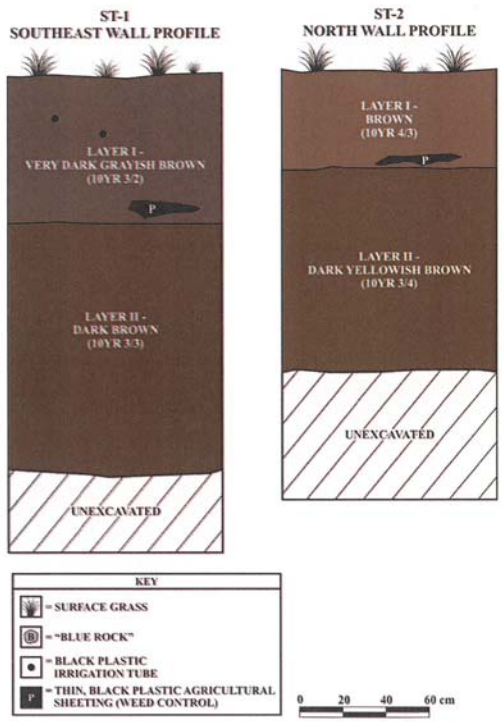
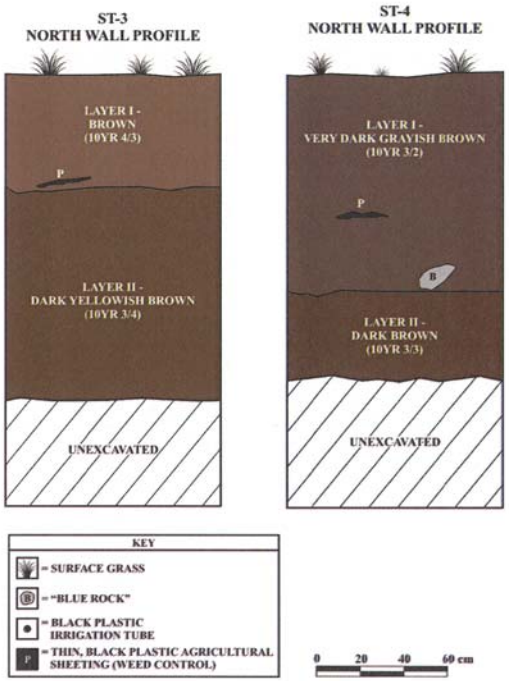
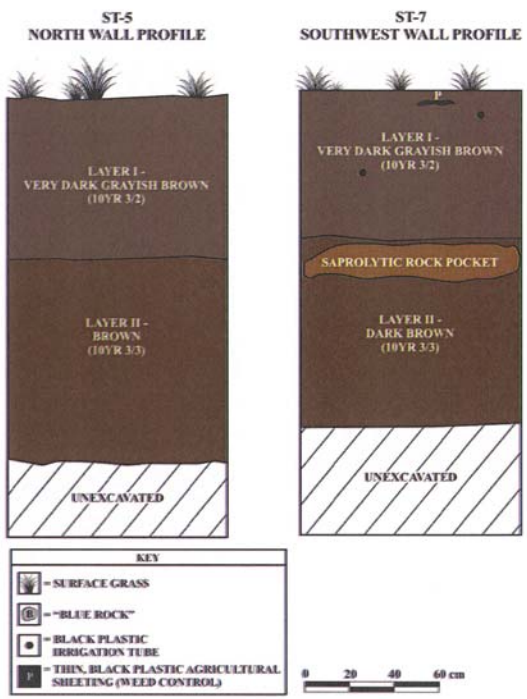
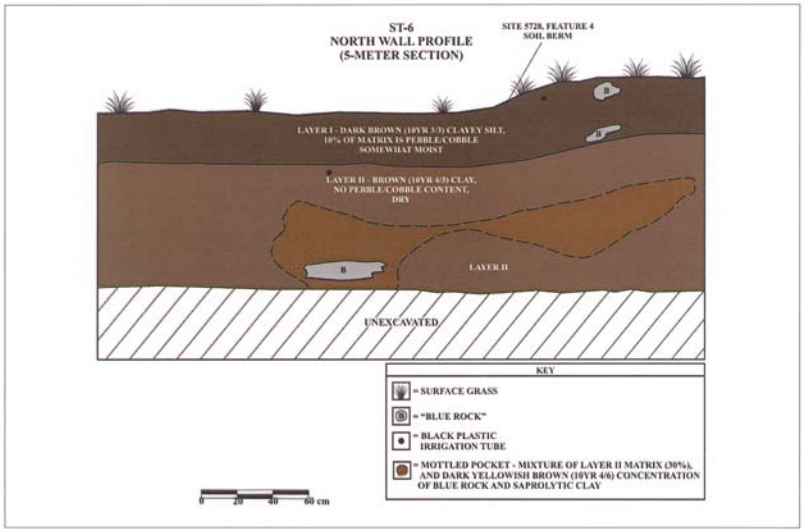
APPENDIX A: STRATIGRAPHIC PROFILES


ST-1
SOUTHEAST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-2
NORTH WALL PROFILE
LAYER I -
BROWN
(10YR 4/3)
P
LAYER II -
DARK YELLOWISH BROWN
(10YR 3/4)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
P = THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm

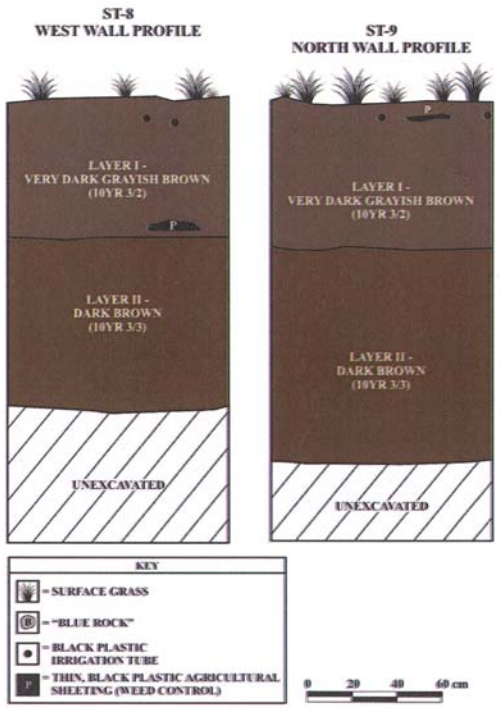

ST-3
NORTH WALL PROFILE
LAYER I -
BROWN
(10YR 4/3)
P
LAYER II -
DARK YELLOWISH BROWN
(10YR 3/4)
UNEXCAVATED
ST-4
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
B
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
P = THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm

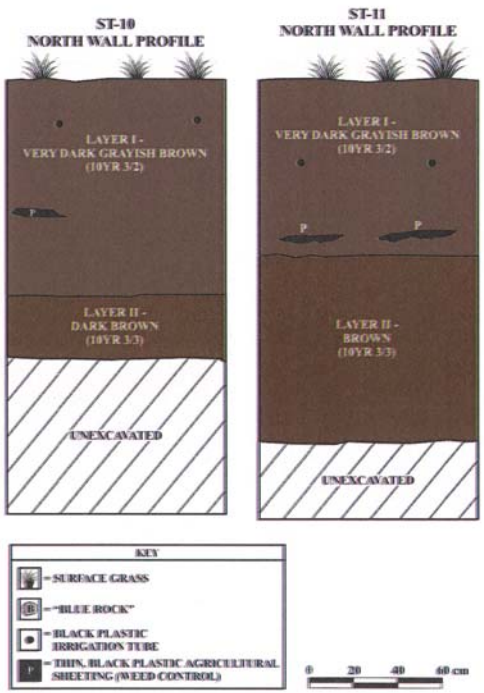

ST-5
NORTH WALL PROFILE
ST-7
SOUTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
SAPROLYTIC ROCK POCKET
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm

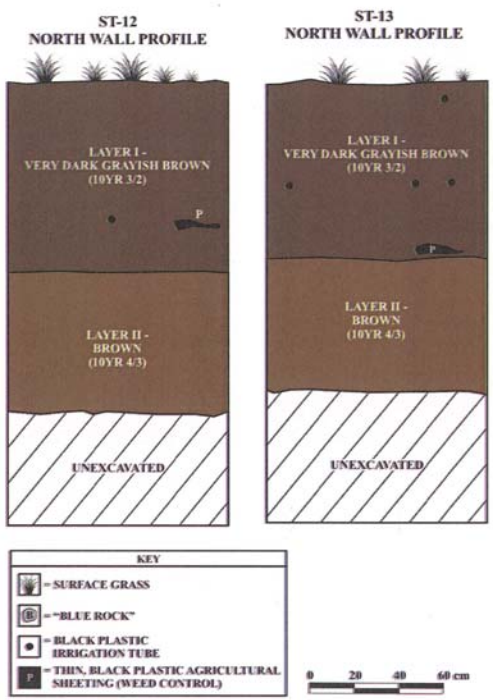
A: 3

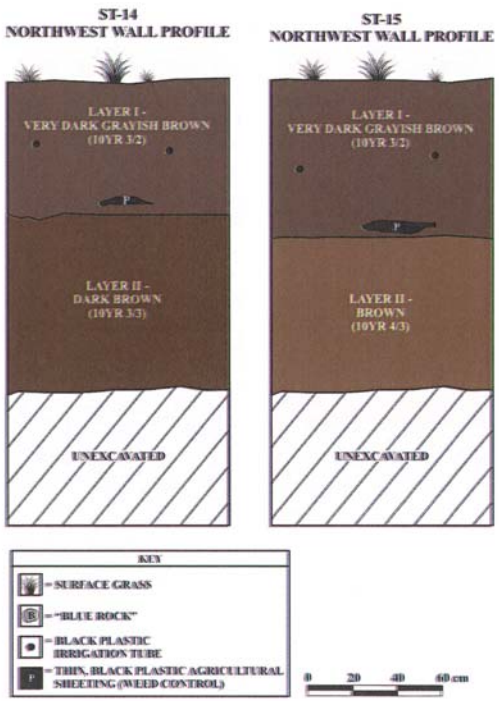

ST-6
NORTH WALL PROFILE
(5-METER SECTION)
SITE 5728, FEATURE 4
SOIL BERM
B
B
LAYER I - DARK BROWN (10YR 3/3) CLAYEY SILT,
10% OF MATRIX IS PEBBLE/COBBLE
SOMEWHAT MOIST
LAYER II - BROWN (10YR 4/3) CLAY,
NO PEBBLE/COBBLE CONTENT,
DRY
B
LAYER II
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= MOTTLED POCKET - MIXTURE OF LAYER II MATRIX (30%), AND DARK YELLOWISH BROWN (10YR 4/6) CONCENTRATION OF BLUE ROCK AND SAPROLYTIC CLAY
0 20 40 60 cm

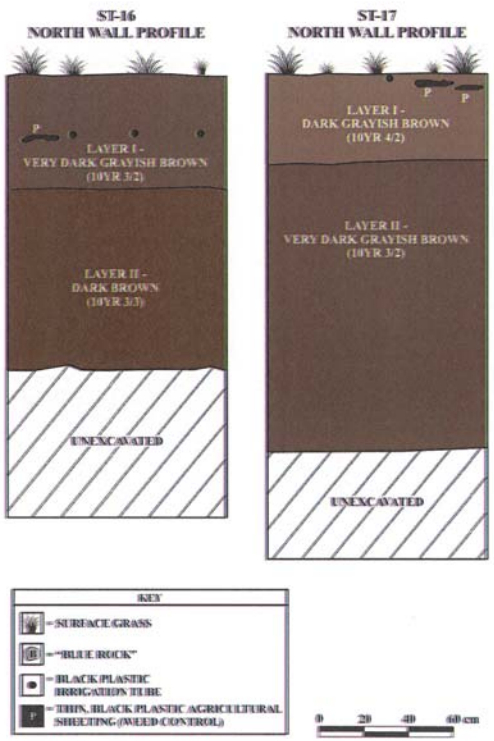
A: 4

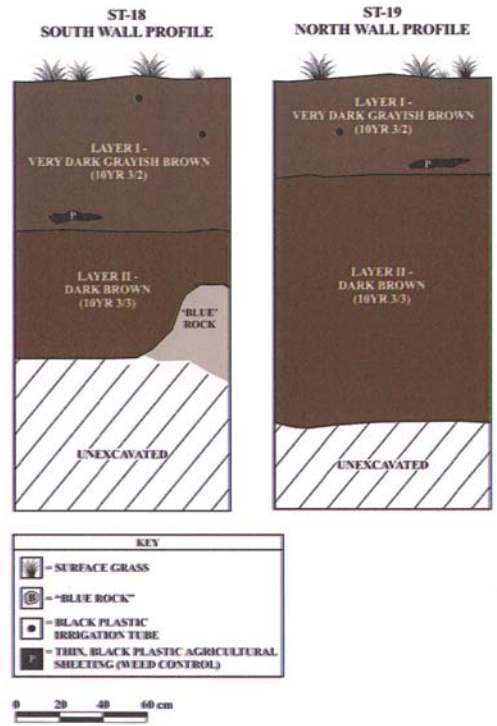

ST-8
WEST WALL PROFILE
ST-9
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-10
NORTH WALL PROFILE
ST-11
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
P
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-12
NORTH WALL PROFILE
ST-13
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-14
NORTHWEST WALL PROFILE
ST-15
NORTHWEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-16
NORTH WALL PROFILE
ST-17
NORTH WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
LAYER I -
DARK GRAYISH BROWN
(10YR 4/2)
LAYER II -
VERY DARK GRAYISH BROWN
(10YR 3/2)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-18
SOUTH WALL PROFILE
ST-19
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
"BLUE"
ROCK
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0 20 40 60 cm

Zone 3 M-Ø1576
Section 7

0502 MK15

AN ARCHAEOLOGICAL ASSESSMENT REPORT FOR THE PROPOSED CENTRAL MAUI SENIOR HOUSING PROJECT, WAILUKU *AHUPUA`A*, WAILUKU DISTRICT, MAUI ISLAND (TMK: (2) 3-7-13: Portion of Parcel 26)

Prepared on behalf of:

County of Maui
Department of Housing & Human Concerns
Wailuku, Maui

Prepared by:

Xamanek Researches
P.O. Box 880131
Pukalani, Maui

Erik Fredericksen
Demaris Fredericksen

25 October 2004

ABSTRACT

Xamanek Researches conducted an archaeological inventory/assessment survey during the summer of 2004 on a portion of land in Kahului, Wailuku *ahupua`a*, Wailuku District, Island of Maui (TMK: 3-7-13: portion of parcel 26). The inventory/assessment survey was carried out per previous discussions with Dr. Melissa Kirkendall, SHPD Maui staff archaeologist. The archaeological survey was conducted on behalf of the County of Maui Department of Housing and Human Concerns, Wailuku, Maui.

There were no significant material culture remains located during this archaeological survey of the proposed Central Maui Senior Housing project area. Landscaping soil with modern materials (Layer I) was found to cover tested portions of the study area to an average depth of about 40 cm. Layer II, which was composed of intact sand dune deposits, was located throughout the tested portions of the project area. The groundwater table was located in all test trenches between c. 90-120 cmbs.

Given the presence of sand deposits throughout the project area, precautionary monitoring is recommended. This action is recommended because isolated human burials have been located in the central Maui area in the past. It is further recommended that future construction/development plans for the Central Maui Senior Housing project be reviewed by the State Historic Preservation Division Maui office.

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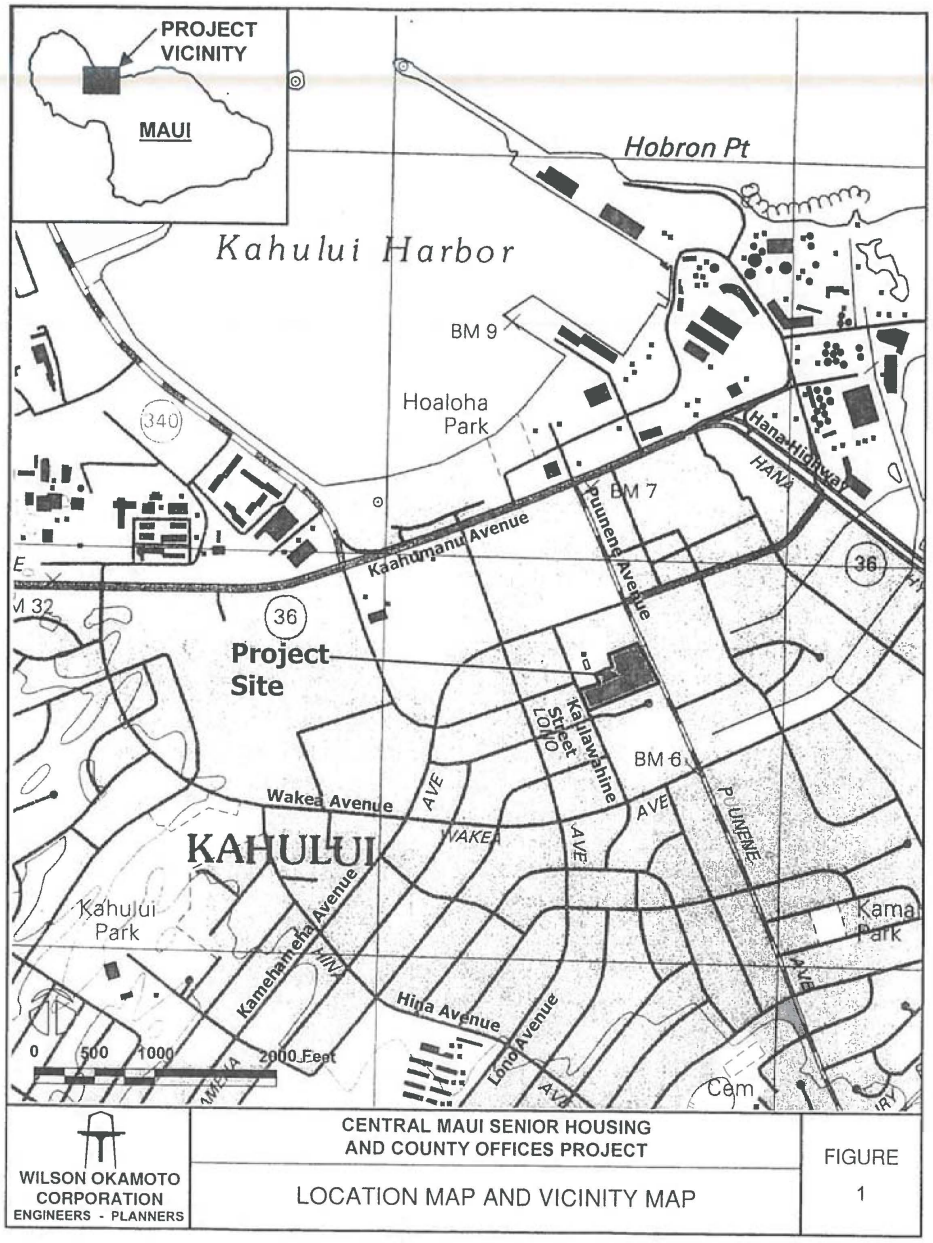
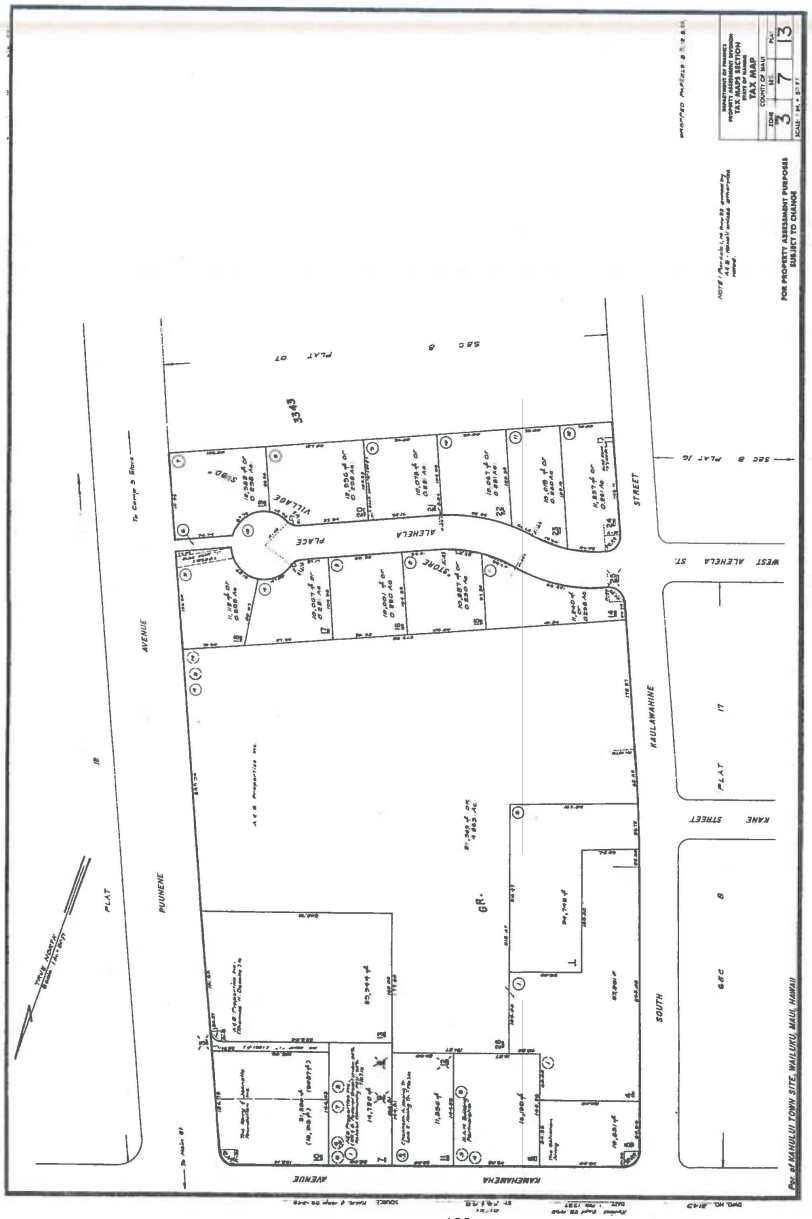
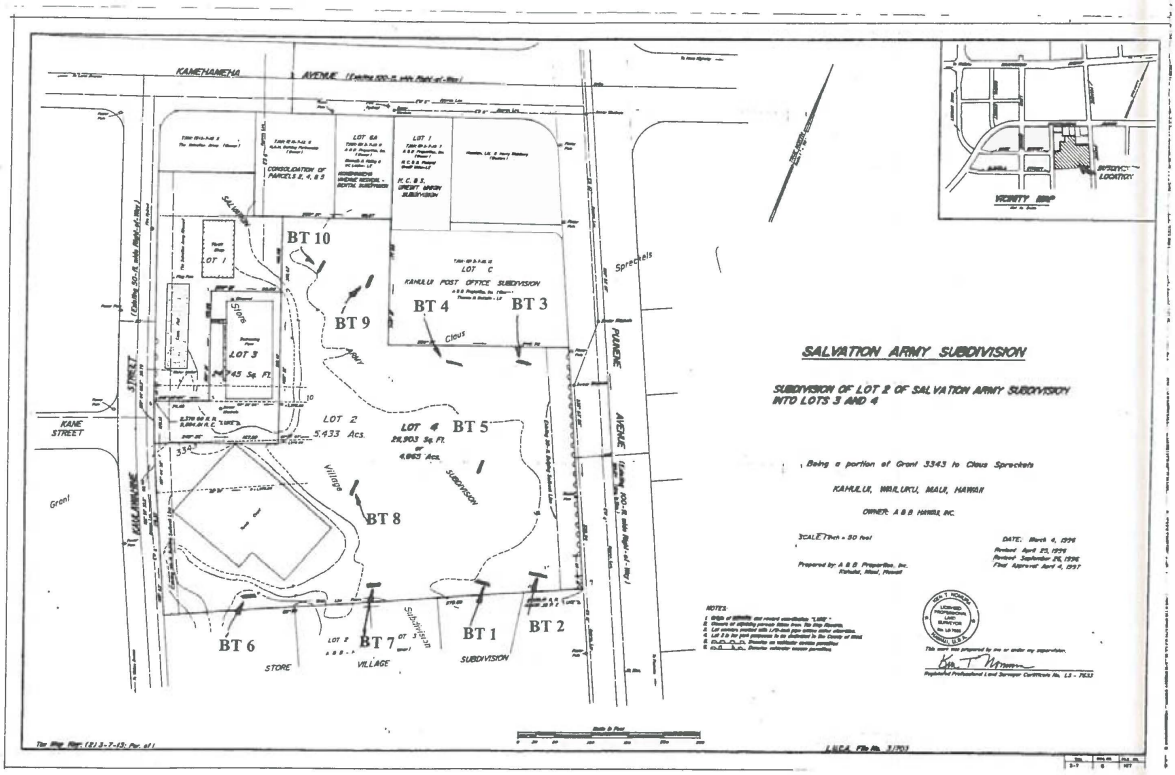


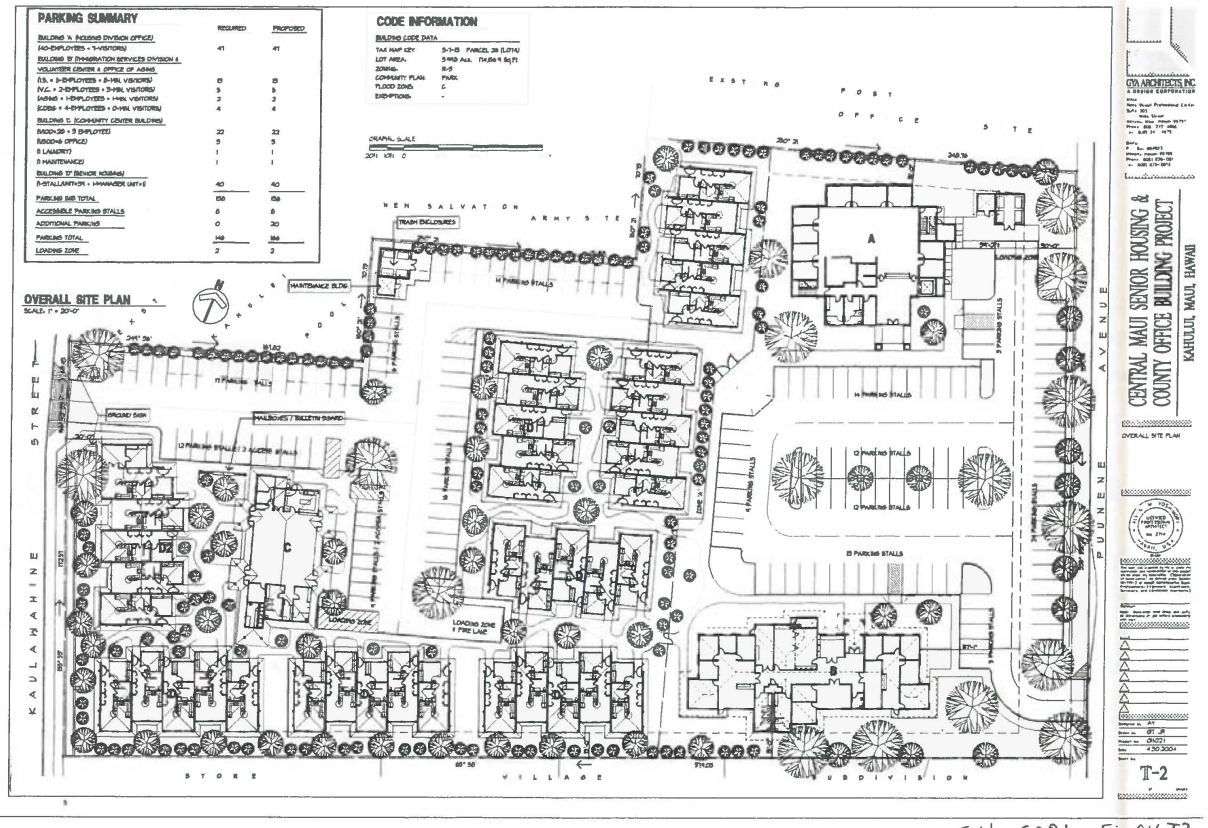
Map 1 – Topographic map



Map 2 – State Tax Map



Map 3 – Site map showing locations of Backhoe Trenches 1-10.



SH SP01 Fin04-T2

Map 4 – Schematic map of planned development.

INTRODUCTION

Mr. Michael Munekiyo of Munekiyo & Hiraga, Inc. contacted Xamanek Researches on behalf of the County of Maui Department of Housing and Human Concerns regarding the necessary archaeological work for a planned senior housing facility to be located on the grounds of the Kahului Swap Meet site in Kahului during the late fall of 2003. The 4.865 acre parcel was adjacent to and southwest of Pu`unene Avenue in Kahului, Maui (Maps 1, 2 and 3). Project plans called for the development of a housing complex along with support buildings, parking and other infrastructure. Mr. Munekiyo requested that we submit a proposal for the necessary archaeological work. Following discussions with Dr. Melissa Kirkendall, State Historic Preservation Division (SHPD) staff archaeologist for Maui, it was determined that an archaeological inventory/assessment survey was needed, because the project area lies in an area that contains sand deposits.

The SHPD had previously indicated in an 18 June 2004 review letter that an archaeological inventory/assessment survey was required for this project, because there had been no previous work undertaken on this parcel (SHPD DOC NO: 0406CD33). In addition, Jaucus Sand deposits and previously identified subsurface sites had been located in the general vicinity of the study area.

Following consultation with Dr. Melissa Kirkendall of the SHPD Maui office, we prepared a proposal for the necessary scope of work for this archaeological project. We submitted our proposal to Mr. Munekiyo and were subsequently contracted to undertake the necessary study. The following report presents the results of this archaeological survey on TMK: 3-7-13: portion of parcel 26. This report has been prepared at the direction of Mr. Daren Suzuki of Munekiyo & Hiraga, Inc. on behalf of the County of Maui Department of Housing and Human Concerns. Under the new SHPD rules and guidelines, this report will be hereafter referred to as an archaeological assessment, because there were no cultural resources located during the testing portion of the survey.

STUDY AREA

The proposed Central Maui Senior Housing project lies in Wailuku *ahupua`a*, Wailuku District, on the isthmus of Maui (TMK: (2) 3-7-13: portion of parcel 26). This c. 4-acre parcel has been impacted by previous activities, and is largely grassed over (Photographs 1-4). The study area lies adjacent to and southwest of Pu`unene Avenue, while, a portion of the study area is bounded by South Kaulawahine Street. The U. S. Post Office, various support buildings for the Salvation Army, and private residences also border portions of the project area. Much of the parcel has been utilized for the Maui Swap Meet for a number of years. The parcel is largely grassed over, and contains several gravel access roads and gravel set up areas for swap meet vendors. In addition, water and underground electrical lines were installed sometime in the past several years. The southwestern portion of the study area contains blacktop, which represents the remains of former tennis courts that were first used in the 1960s. The Kahului shoreline is located an estimated 1 km to the northwest of the project area.

Natural History

The soil types present in the vicinity of the Central Maui Senior Housing project area include Jaucus Sand deposits, as well as the reddish brown (7.5 YR 4/3) silty clay common to this part of central Maui.

The study area lies an estimated 5 feet to 7 feet AMSL. Annual rainfall on this part of Maui is about 20-30 inches, and the rains typically occur during the winter months. The average temperature ranges from the mid-seventies to the mid-eighties, and is relatively constant throughout much of the year.

Vegetation noted in the project area at the time of our survey was dominated by non-native plant species. Common vegetation noted in the study area included monkeypod (Albizia saman) trees, ironwood (Casuarina equisetifolia) trees, landscaping shrubs, alien grasses, and annual weeds.

BACKGROUND RESEARCH

Precontact Period

The *ahupua`a* of Wailuku is a large land unit stretching around Kahului Bay from Paukukalo to Kapukaulua. It includes Iao Valley and the northern half of the Kahului Isthmus. This single land division comprises nearly half of the District of Wailuku, and is noted as a place where chiefs were buried and wars were fought. The word itself can be translated as "water of destruction" (Pukui, et. al., 1974, p. 225), and this name is in reference to the battles that took place in the area.

Iao Valley and the two associated dune formations on the north and south sides of the river, constituted the core area of Wailuku. This was the religious and political center of Maui, which culminated during the time of Pi`ilani (c. 1600 AD). In the late precontact period, warfare increased as the chiefs from Maui, Oahu and Hawaii struggled for political and military dominance. High Chief Pi`ilani succeeded in unifying the districts of Maui by warfare, but after his death, his sons fought with one another--each hoping to succeed their father as high chief. Eventually Kiha-a-Pi`ilani became victorious, but each following generation of chiefs had to struggle through warfare to secure their positions of political domination (Speakman, 1978, pp. 9-13).

During the reign of the last powerful paramount chief or king, Kahekili (who ruled from 1765 to 1790), Wailuku again became the site of intense warfare. Wailuku was considered to be the capital of Maui, as Kahekili's royal residence, Kalanihale, was located in there, surrounded by his retinue.[1] In the mid-1770s, Kalanihale was marched upon by a Big Island chief named Kalani`opu`u and his *alapa*.[2] News of his coming preceded him, and Kahekili hid his warriors in the sand dunes above Haleki`i *heiau* to surprise the invading troops. A fierce battle ensued, and Kalani`opu`u's army was pushed to the sea and slaughtered (Speakman, pp. 16-17).

By 1786, Kahekili controlled Maui as well as Molokai, Lanai, and Oahu. This undisputed political control lasted for only 4 years, however. In 1790, Kamehameha the First invaded Kahekili's territory—an action that ended in the battle of Kepaniwai[3] and the defeat of the Maui ruler. The word Kahului can be translated as "the winning", and the Bay takes this name because Kamehameha gathered his warriors there prior to fighting the battle in Iao Valley (Pukui, et. al., 1974).

[1] The location is said to be located just north of the intersection of High Street and Main Street leading into Iao Valley in Wailuku town.
[2] *Alapa* is the name given to the warriors of Kalani`opu`u.
[3] Kepaniwai means literally "water dam" in reference to Iao Stream, because the stream was choked with human bodies after the slaughter there (Pukui, et. al., 1974, p. 109).

Early Post-Contact Period

The reign of Kamehameha was intertwined with the increasing presence of foreigners (*haoles*) in the islands. The arrival of Captain Cook offshore at Kahului Bay in 1778 began the steady flow of outside influences that would forever alter the indigenous population and environment. One of the first of these influences came with missionaries, whose charge it was to save "heathen" souls. The first missionaries arrived in Wailuku in 1832, and the traditional religion began to wane under their influence. Rev. Jonathan Green established a girls' seminary (Central Female Boarding School) in 1836, where young Hawaiian women were taught the language, customs, and religion of the foreigners.

Another influence to bring change to the Hawaiians was foreign commercialism, and it came initially in the form of sugar production. The first sugarcane crop grown in the *ahupua`a* were harvested and processed in 1828. Kamehameha III, with the help of two Chinese technicians, established a water-powered mill in Wailuku. This was known as the Hungtai Sugar Works, and its location was fairly close to the later location of the Wailuku Sugar Mill, which was established in 1862. Hungtai Sugar Works continued to operate until the opening of the new sugar mill.

The population of the *ahupua`a* of Wailuku was listed in the 1831-32 census as 2,256, with most of it being in the northern portion, presumably in Iao Valley (Cordy, 1978, p. 59).

In Central Maui, on the southern and eastern side of the Iao Valley dunes (Pu`uone Dunes), an early commercial activity took the form of cattle ranching. This sizable area was used for pasturage. By as early as 1845, large herds of cattle were roaming the Kahului Isthmus (cattle had been introduced on the Big Island by Vancouver in 1793). The Maui cattle were under royal *kapu,* so were not to be molested. They were so destructive to the environment that Native Hawaiian landowners protested, but to no avail (Barrere, 1975, p. 52). In addition to the commercial raising of cattle, there were also other commercial efforts, one being a brief attempt at the production of cotton in the 1830s. This endeavor met with little commercial success however[4], and further adversely impacted the landscape.

[4]The Anglican Church felt that "the Hawaiian people, freed from their service to and dependence on the chiefs should be self-supporting and thought that the encouragement of the manufacture of cloth from the superior cotton which grew luxuriantly in the islands would be a means to that end. They therefore suggested that a manufacturer be sent with sufficient machinery to get the project started. They felt that the people would continue to work with the encouragement and cooperation of the chiefs." (Lemmon et. al., 1973, p. 2.B.3). To this end they sent Miss Lydia Brown in 1835 with " 'a quantity of domestic spinning apparatus' (presumably spinning wheels and a loom)" (Ibid.), and "charged with the responsibility of teaching the Hawaiian girls the arts of carding, spinning, weaving and knitting locally grown cotton and wool." (Ibid.) As each class grew proficient enough to teach others, a new class was formed (Ibid., 2.B.4).

Post-1850s Period

After the Mahele in 1848, much of Wailuku *ahupua`a* was designated as Crown Land, to be used in support of the royal "state and dignity". In 1872, Kamehameha V died, and his sister Princess Ruth Ke`elikolani inherited this land. She was designated as the owner of the *Ka`a* lands of Wailuku, the southern portion of the *ahupua`a*. The *ili* of *Owa* comprised of 743.40 acres, (LCA 420) was granted to Kuihelani, a steward to Kamehameha I. The smaller northern section (the *ili* of *Kalua*-LCA 7713, Apana 23--391 acres) was awarded to Princess Ruth's half-sister, Victoria Kamamalu. In 1882, Princess Ruth sold one-half of the Crown Lands of Hawaii to sugar producer, Claus Spreckels, in order to settle her debts with him. Spreckels already held a lease for 16,000 acres of Wailuku *ahupua`a*, dating from 1878. Worried about what Spreckels might do with half of the Crown Lands, King Kalakaua gave him Land Grant 3343, a 24,000 acre portion of the southeastern section of Wailuku ahupua`a, in return for the surrender of his claim (Adler, 1966, pp. 262-263). The Central Maui Senior Housing Project area is part of the large Land Grant 3343.

The Reciprocity Treaty of 1876 with the United States gave a boost to the sugar industry by increasing the prices of sugar. The dry eastern part of the *ahupua`a* became attractive as potential sugar land—if only water could be brought to it. In 1880, Spreckels began construction of what was called "Spreckels' Ditch", located *makai* of the Hamakua Ditch, which had been built earlier by Alexander and Baldwin to water their Maui Agricultural Company's fields in and around Pa`ia. The "Spreckels' Ditch" brought Haleakala water farther west onto the arid Kahului isthmus. The ditch was 30 miles long, delivered about 60 million gallons of water a day, and cost $500,000 to construct.

Spreckels also built another ditch, the Waihe`e ditch in 1882, which tapped the water resources from the West Maui Mountains, thus bringing water to both sides of the Wailuku Commons isthmus area (Adler, 1966, pp. 48-49). These endeavors enabled him, in 1882, to found Hawaiian Commercial and Sugar Company. He continued involvement in that company until 1898, when control was wrested from his hands. The parent company still bears the name of Alexander and Baldwin, the principal participants in the transfer of corporate control. The production of sugar cane continues to be an activity in the isthmus area to this day, although some portions operated by C. Brewer and Company have shifted to pineapple production.

The environmental conditions in the lower Iao Valley, which in precontact times were ideal for agricultural necessary to support a large population, were a wide valley floor, rich alluvial soils, and a constant water supply from Iao Stream. These combined with the access to Kahului Harbor, rich in marine resources, made this area the prime precontact location on West Maui for a political and religious center. The lower portion of Iao Valley contained some of the most productive taro land on the island, and the abundance of Land Commission Awards in the lower valley attest to this. There are 66 LCA's, primarily taro patch *kuleana*, and 39 *po`alima* located between the old Wailuku Mill site and Paukukalo, on the southern side of Iao stream. In addition, 13 awards were

made directly to individual chiefs by Kamehameha IV.[5] The study area lies to the southeast of this rich and productive area in the more arid portion of Wailuku *ahupua`a*.

Lower Main Street was built along the route of an old government road, which very likely followed the course of existing transportation routes from the ocean to the inland portions of Iao Valley. Many of the LCAs in this area have borders aligned with the road, indicating it was an important transportation corridor at the time the *kuleana* were granted. This corridor follows the natural boundary between the sand dune and the alluvial deposits of the valley. The Kahului Railroad paralleled Lower Main Street, and was one of the earliest known commercial projects that impacted the dunes along Lower Main Street and Kahului Beach Road (Photograph 5).

The route of the railroad ran from Kahului Harbor to Wailuku Sugar Mill. The remnants of this old railroad bed can still be noted in a few places along Lower Main Street, and along Kahului Beach Road. The most striking architectural remnants of the railway system located along Kahului Beach Road are the five concrete pillars and arches, the most visible *makai* one impressed with the date "1921". In the past, a large wooden frame building rested on these pillars, serving as the housing for the Makaweli Rock Crusher apparatus. It was constructed so the train carrying rock from the quarry could off-load from the track-bed into the crusher. The concrete pilings elevated the crusher adequately above ground so trucks could be driven in and filled with crushed rock (Photograph 6). This series of pillars (that was the footings for the Makaweli Rock Crusher Mill) still stands near the intersection of Kanaloa Avenue and Kahului Beach Road.

Railroad construction was begun in the late 1870s (Photo 1)[6] and continued for nearly 2 decades, as routes were added and service expanded. The Maui News contains articles dealing with activities in the general vicinity of the project area. One dated February 8, 1902, describes a problem and potential solution resulting from the railroad:

"Superintendent R.W. Fuller of the Kahului Railroad Company is preparing to make some important changes in the line of railroad track between Kahului and Wailuku. At present the sharp turn and the railroad crossing at the beach is extremely dangerous on account of the sand dunes that shut out the approaching trains from the view of those approaching the crossing with teams, especially the wind is blowing a gale.

The track will be moved some hundreds of feet south of its present location, so that the point where it crosses the road as well as the approaching trains themselves can be seen for quite a distance. On crossing the road, the track will skirt the pasture at greater distance from the public road."

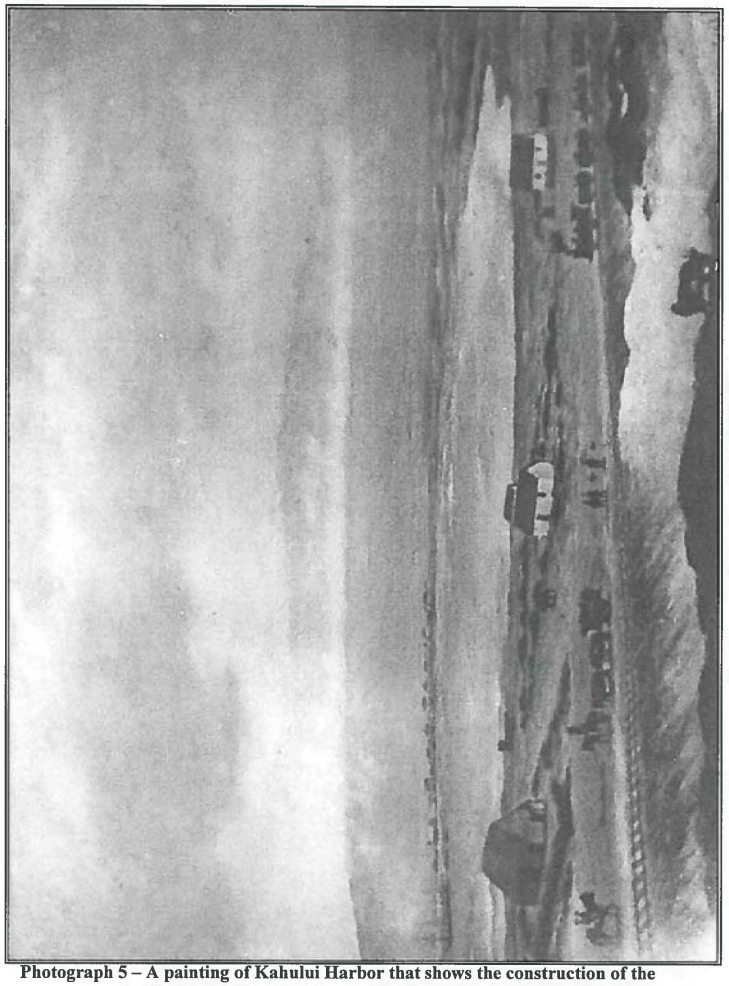
[5] This is in contrast to the area south and east of Lower Iao Valley. Here there were two LCAs awarded—one to Victoria Kamamalu (7713), and one to Kuihelani (420). The largest land partition of Central Maui is Grant 3343 to Claus Spreckels.

[6] This painting by Rev. Bailey shows several structures, which may be houses that were associated with LCAs.

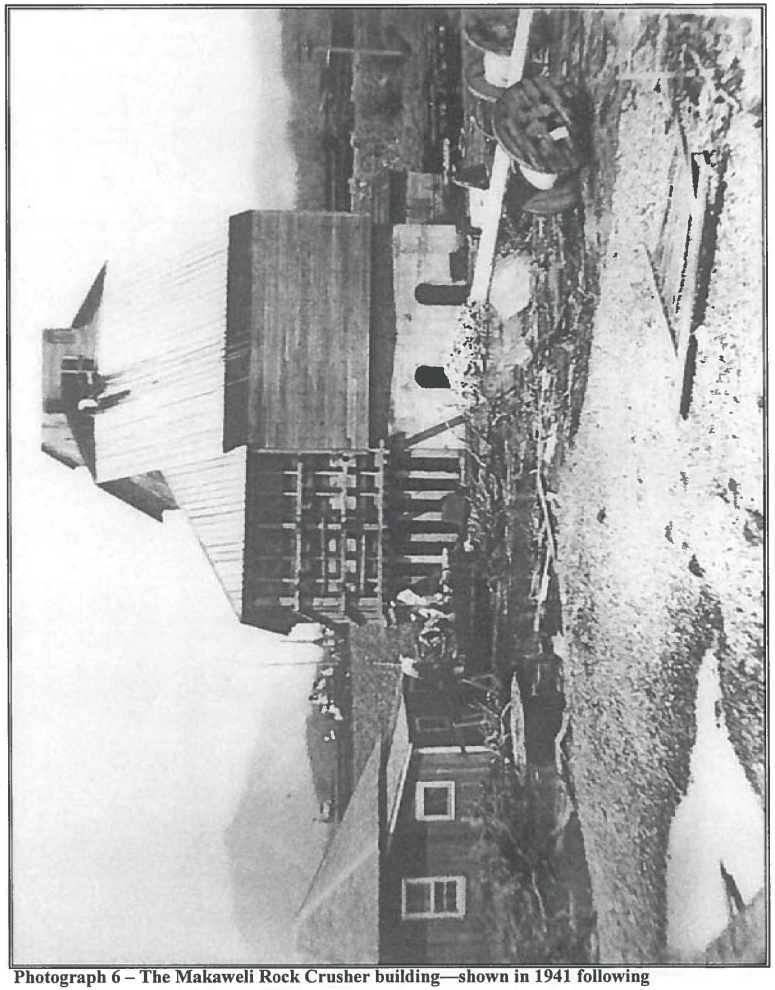
On June 8, 1907, another reference describes plans improving the land for further residential use in the future:

"The Kahului Railroad Company is filling in the lowlands, in and about Kahului and will in time raise the level of the entire town site, when the work is completed and proper drains provided, the town should be free of mosquitos and the place a most desirable locality in which to live."

The railroad continued operations until after World War II. Then slowly, demands began to change, and segments of the system were phased out. An article in **The Maui News** of October 15, 1957 bore the headline "Iron Horses Bow Out As Wailuku Sugar Company Discontinues Use of Railroad". The railroad continued to serve other areas until 1966, when it ceased operation.



Photograph 5 – A painting of Kahului Harbor that shows the construction of the Kahului Railroad with houses that may be associated with Land Commission Awards.



Photograph 6 – The Makaweli Rock Crusher building—shown in 1941 following the April 1 tsunami.

PREVIOUS ARCHAEOLOGICAL WORK

Iao Valley/Pu`uone Dunes Area

The earliest archaeological work in the Wailuku area was part of the island-wide survey done by Winslow Walker in 1931. He reported that there were a number of *heiau* in the general area of Wailuku. Two lie on the northern side of Iao Stream atop the large dune formation there--Pihana and Haleki'i. Both have been restored and are designated as the Halekii-Pihana Heiau State Monument, under the supervision of the Division of State Parks (DLNR). Walker also reported that there were a number of other *heiau* in this area of Wailuku, which were said to have been consecrated by Liholiho during his visit to Maui for that purpose in 1801 (Walker, 1931, pp. 146-147). At the time of his survey, none of these reported *heiau* (named Keahuku, Olokua, Olopio, Malena, Pohakuokahi, Lelemako, Kawelowelo, Kaulupala, Palamaihiki, and Oloolokalani) could be found (Ibid., p. 148).

A personal communication (1992) from Mr. Charles Keau, a well-respected authority on history and prehistory of Maui, provided more information about some of these *heiau*, which Walker could not find. By Mr. Keau's account, there were 3 *heiau* located in the Lower Main Street corridor from Kahului Harbor to the intersection of Lower Main and Mill Streets. One was situated across the street from the Maui Soda Company. Another was located on parcel 83 (TMK: 3-4-39) between the Maui Electric Power Station and the County of Maui Wailuku Government cemetery. A third may have been located near the Home Maid Bakery. During the construction of the parking lot next to the bakery, Mr. Keau reported that Wesley Wong, a well-known local antiquity collector, found 5 adzes of "Tahitian" style. He did not specify when this was, but thought there might still be portions of the *heiau* there as well as some burials. Recent archaeological work has corroborated at least the latter part of this prediction.

Nisei Veterans Memorial Center

This extensive sand dune habitation area is located near the corner of Lower Main Street and Wai`ehu Beach road—the site of the future Nisei Veterans Memorial Center. The Nisei Memorial project has been underway for more than 12 years, as the site has proven to be one of the more significant sites studied on the northern Maui coastline.

In February of 1992, the present authors began with an inventory survey on the 2-acre parcel of land at the intersection of Lower Main and Wai`ehu Beach Road (Fredericksen and Fredericksen, December 1992). The most notable feature surface feature was the railroad bed that ran the length of the property (Site 3112). Another

historic site (Site 3119A) was a refuse disposal area about 20 cm. below the surface. The predominant historic items were bottles and ceramics dating from the late 1800s, about the time the railroad was built and in use. A subsurface excavation that cut through the historic site, located a subsurface precontact site designated as Site 3119B. Later data recovery work at this site caused a revision in the site numbering system. All precontact components of the site are designated as Site 3120, while the historic components bear the Site 3119 designation.

Site 3120 became extremely interesting when a very early radiocarbon date of AD 233-410 was obtained. However, later data recovery work did not produce material of a comparable date. The deposits from which it came, turned out to have been previously disturbed by excavations done during the construction of the railroad bed, and the original source was not located.

In another area of Site 3120, test excavations produced a number of artifacts, including coral files, bone picks, an unfinished fishhook, and worked bone, along with large quantities of food midden. Data recovery research has shown Site 3120 to be a large habitation site, which contains a cluster of burials. The latter remain *in situ* and will be preserved as a permanent burial/grave site. Several fire pit features were recovered and a series of 12 radiocarbon dates were obtained. They range from the very early date mentioned above (AD 233-410) to AD 1200-1740, with the majority of the precontact dates falling in a range between AD 1400 to 1700 (Fredericksen, et al., 1998).

Archaeological monitoring followed the completion of data recovery, and a total of 38 additional burials (Site 4668) were located in the southwestern corner of the 2-acre parcel near the crest of the dune. A radiocarbon date from carbon recovered in a large double posthole beneath one of the burials returned a conventional radiocarbon age of 620 +/- 50, and a calibrated date range of AD 1285-1420. The monitoring program is still in process.

The adjacent property to the south (TMK: 3-8-07: 38) was surveyed by Xamanek Researches in November of 1992. Fourteen backhoe test trenches were excavated, along with 3 manual test units, in the dune areas, and relatively undisturbed portions of the parcel. The *makai* portion of the property has been impacted by a sewer line, and the mid-portion by the railroad bed (Site 3112) and rock crusher mill construction (Site 3145) [see Photograph 6]. The only cultural materials recovered were historic items, most likely associated with the railroad construction (Fredericksen and Fredericksen, November 1992).

Kanaloa Avenue

Xamanek Researches carried out an inventory survey and archaeological monitoring for the Kanaloa Avenue improvement project between 2002 and the early spring of 2004 (report in preparation). Initially, a previously unidentified habitation area site remnant was located within the road corridor (Site 4899). While it was not possible to recover a radiometric date for this site, it was interpreted as a possible precontact site,

based on the lack of any recognizable trade goods within the recovered cultural materials. During the course of construction monitoring, a total of four burials and two finds of previously disturbed human remains were located—Sites 5171, 5172 and 5495. Finally, an extensive precontact habitation area (Site 5496) was located during work within Keopuolani Park. Two charcoal samples from excavations at this habitation site returned radiometric age ranges from the AD 1300s to the 1600s.

Central Maui Area

The central area of Maui, south of Ka`ahumanu Avenue, is noted for many burials in the Pu`uone Sand Dune formation, which stretches across the isthmus. There have been a number of studies documenting these finds (Fredericksen et al., 1997; 1998; Panteleo and Sinoto, 1996; Rotonno-Hadzuka, 1994).

However, in the central area to the north of Ka`ahumanu Avenue, very few sites other than scattered human burials have been found. The authors have conducted studies at Maui Community College, Maui Central Parkway (Fredericksen and Fredericksen, December 1992; Fredericksen, et. al., 1994), and at the Keiki Zoo Maui (Fredericksen and Fredericksen, September 1995)—all with negative results. Archaeological Consultants of Hawaii conducted a survey for the Maui Arts and Cultural Center, again without significant findings (Kennedy, 1990). An inventory survey for the 110-acre Maui Central Park area, in which a large intact dune is present, was conducted by Cultural Surveys of Hawaii. Here again, no indigenous cultural sites were found. However, scattered human remains (Site 50-50-04-4211) were located on the surface near the Maui Arts and Cultural Center, during a botanical survey conducted by Xamanek Researches. Subsequent archaeological work at the inventory level indicated that no additional human remains were present, and Site 4211 was evaluated as no longer significant (Heidel, Pyle and Hammatt, January 1997, p. 97). Other historic sites noted in the Maui Central Park inventory survey include Site 4232, a former WW II military facility, and Site 3112, the Kahului Railroad Berm. Both sites will be partially preserved by being incorporated into the landscaping of the Park (Ibid., p. 96).

The paucity of archaeological findings in this area suggests that the extensive military activity associated with World War II has altered the Central Maui landscape, thereby potentially obliterating possible archaeological sites.

Settlement Patterns and Expected Findings

The lower Iao Valley portion of Wailuku *ahupua'a* was a central political and religious area of West Maui, because of its fertile taro lands and close proximity to the sea. Given these conditions, a large population could be supported, and wherever large population clusters are found, the social framework of chiefly importance and religious expression is also present. This is attested to by the existence of the 2 *heiau* (Haleki'i and Pihana) atop the northern dune system, and others reported by Walker (1931) and Keau (1992, oral communication) within the Iao Stream corridor. The middle and upper reaches of Iao Valley were also rich in *lo'i* and *'auwai* which produced additional

foodstuffs to support political and religious activities. The Upper Iao Valley had been traditionally known as a very significant sacred place in the history of Maui (Donham, MCCRC minutes, June 1, 1995). Coastal sites, such as Site 3120, have been occupied since the 1200s (and possibly much earlier), and no doubt provided the complex with marine resources. There seems to be a pattern in Iao Valley, whereby sites closer to the ocean have earlier dates than the ones farther inland, suggesting that settlement occurred first along the sea shore and gradually moved inland as the population numbers increased.

An intensification of usage appears to have occurred during the 16th century, and seems to have peaked around the time of Pi`ilani, ca. 1600 AD (Ibid.). All radiocarbon dates, which have been recovered from the sites along this corridor fall into this temporal framework.

The study area, in which the present survey and monitoring took place, lies behind the Pu`uone Dune Foundation, and is a part of the island that has been adversely affected by the presence of the military during World War II. A large Maine base existed in the area that is now Keopuolani Park. Before the construction of the base, a sizable plantation community—Raw Fish Camp—occupied the area. Prior to that, it was used as pasturage. As a consequence of the considerable amount of land alteration associated with these events, most traces of precontact activity, if it existed, has been most likely destroyed. At the northeast section (*makai*) of the Kanaloa Avenue corridor, remnants of habitation sites with associated burials have been found, and there is a possibility that similar subsurface features are present on the remaining remnants of the sand dune formation.

TABLE 1

List of Archaeological Studies carried out in Lower Iao Valley, and Central Maui Area.

AUTHORS	LOCATION	FINDINGS
Burgett and Spear, 1995	TMK: 3-8-37: 48, Lower Main St., Home Maid Bakery. Sites 3924 and 3925	Habitation sites; human burials. Dated c. AD 1430 to 1671.
Connolly, 1973	TMK: 3-8-36: 94, Lower Main St., Site 1171	Habitation site; burials discovered 1994 eroding from dune face.
Donham, 1994	TMK: 3-8-37: 49, Lower Main St., , Home Maid Bakery, Site 3556	Inadvertent burial discovery, both historic and precontact burials
Fredericksen, W. and Fredericksen, D, December 1992a	TMK:3-8-07: 40 and 43; Maui Community College Parking Lot Extension.	Historic sites from WWII. No precontact cultural materials.

Table 1 continued

Ibid., September 1995	TMK: 3-8-07: por. 1; Keiki Zoo Maui.	No findings of significance.
Ibid., February 1996	TMK: 3-8-07: 104; Maui Scrap Metal Company, Waikapu. Borrow Site, Site 3525.	Remains of at least 22 individuals recovered from mined sand.
Fredericksen D. and Fredericksen, W. December 1992b Fredericksen, et. al., November 1998	Inventory Survey - TMK: 3-8-07: 123, at Lower Main and Waiehu Road, Nisei Veterans Memorial Center. Data Recovery Report	Historic site, Kahului Railroad (Site 3112); large precontact habitation site, with continuous occupation from c. 1200 AD to c. 1740 (Site 3120); numerous burials to be preserved *in situ.*
Fredericksen, et. al., July 1995; Fredericksen, E. and Fredericksen, D. September 1996	Inventory Survey and Data Recovery: TMK: 3-4-39: por. 81, 82, 83 at Lower Main and Mill Streets, Site 4127	Habitation site; dated c. AD 1450 to 1675.
Fredericksen, E., W., and D., September 1994	TMK: 3-8-07: por. 125; Maui Central Park, 10 acres along Kahului Beach Road	No significant findings.
Ibid., January 1997	TMK: 3-4-07: por. 121, Maui Lani Parkway corridor	No precontact finds in corridor—human remains (Site 4368) on Golf Course Hole #10—monitoring recommended.
Ibid., May 1997	TMK: 3-8-47: por. 1, 2, 3, 4, 17, 18, 30, and 32; 3-9-07: por 121 Mahalani Street Extension	No significant findings—limited monitoring recommended.
Fredericksen, E., February 1997 (post-field summary)	TMK: 3-4-07: por. 121, Lot 11-A, Maui Lani Project—20.7 acres	One indigenous *in situ* burial (Site50-50-04-4401)-Monitoring recommended.
Heidel, Pyle and Hammatt, 1997	TMK: 3-8-07: 1 and 3-7-01: 2; Maui Central Park	Historic sites: 4232-WW II military camp; 3112-Kahului Rail-road Berm; 4211-scattered human remains.
Kennedy, 1992	TMK: 3-8-07; Maui Arts and Cultural Center.	No findings.
Pantaleo, J. and A. Sinoto, January 1996	TMK: 3-8-07: 2, 110; Phase 1 and Phase 1A, Maui Lani Partners Development, Wailuku.	No habitation sites. Human burials in several locations. Monitoring recommended. Additional burials during monitoring.
Rotunno and Cleghorn, 1990 Rotunno-Hazuka, et. al. May 1994a	TMK: 3-8-07: 2, 110: Maui Lani Development Property.	No precontact sites other than burials (Site 2797).
Spear, 1995	TMK: 3-8-37: 48; Lower Main St., Site 4066.	Human burials and habitation layers.

Expected Findings

With the introduction of sugarcane cultivation in the 1850s, and the importation of foreign labor to work in the plantation, the character of much of the island of Maui changed. The sugar plantations acquired either by purchase or lease, large amounts of

land, further displacing the native Hawaiian people. The acquisition of stream water for sugarcane cultivation dried much of the remaining *kalo* fields by the end of the 19th century. Afterwards a pattern of dispersed villages and camps for plantation workers emerged. *Kuleana* land grants changed ownership as plantation workers became affluent enough to purchase land from Hawaiians who were willing to sell. Commercial development became a driving force that would continue and intensify through the 20th century.

Based on our background research, the location of the parcel, the expected findings were thought to include possible human burials, precontact subsurface habitation site remnants, possibly containing associated human burials, and post-contact site remnants possibly associated with the plantation era. Given that the proposed Central Maui Senior Housing project has already been disturbed, we did not anticipate any above ground pre- or post-contact features such as walls, roads, irrigation ditches, and building foundations associated with former plantation-era activities.

ARCHAEOLOGICAL METHODS

The fieldwork for testing phase of this archaeological survey was conducted during late July of 2004. The field team was made up of Jennifer Frey and Timothy Stewart. Erik Fredericksen and Hugh Coflin had previously conducted a surface inspection of the subject parcel and located underground water and electric lines. Erik Fredericksen was also the project director. Walter and Demaris Fredericksen were the senior advisors, and Demaris Fredericksen compiled a portion of this report.

The assessment survey of the study area was carried out in two phases—a pedestrian inspection was first conducted, followed by subsurface investigation. This latter phase consisted of ten backhoe trenches that were placed in accessible portions of the study area (Map 2). The walkover portion of the survey was undertaken using transect lines spaced c. 5 meters apart, and oriented roughly northwest/southeast. While it was not possible to test in the tennis court area, the grounds around it were inspected in order to assess the possible presence of significant material culture remains elsewhere on the parcel. In addition, the margins of the adjacent properties to the southwest were visually inspected from the border of the planned County facility.

As previously noted, a total of ten backhoe trenches were utilized to sample the study area. These subsurface tests were excavated in various locales, allowing for avoidance of underground utilities, tree roots, access roads, etc. Backhoe trench profiles were visually inspected, and recorded using metric survey tapes and hand-bearing compasses. In addition soil samples from each trench profile were spot checked with

1/8th inch screen, and the back dirt was raked over. Written notes were kept in the field, and photographs were taken in a digital format. No material culture remains were transported off-island and standard laboratory procedures and methods were utilized.

ARCHAEOLOGICAL RESULTS

A total of ten backhoe trenches were utilized to assess subsurface conditions in study area during the course of this small archaeological inventory survey. There were no subsurface cultural layers encountered during the course of our subsurface testing. The backhoe trenches were c. 5.5 meters in length by 0.7 meter in width by a maximum of 1.4 meters in depth. All trenches were excavated into the water table, which was located between 90 and 120 cmbs. Table 2 at the end of this section provides a summary of backhoe trench results for the project. Backhoe test results are briefly discussed below. Refer to Appendix A for photographs.

Backhoe Trenches 1, 2, 6 and 7 (Figures 1-4, Photographs 7, 8, 12 and 13)

These four backhoe trenches were located near the southwestern boundary of the proposed Central Maui Senior Housing project area. Trench orientations were roughly 70 degrees magnetic and the trenches were c. 5.5 meters in length by up to 1.3 meters in depth. The groundwater table was encountered between 90 and 120 cmbs.

Layer I was up to 40 cm in thickness, and was composed of pale brown (10 YR 6/3) to light yellowish brown (10 YR 6/4), silty sand and/or top soil (7.5 YR 4/4). In addition, gravel was present on the parking area that BTs 1 and 2 sampled. This relatively loose layer contained some sand banding, along with scattered modern materials such as aluminum foil, plastic and bottle glass. In addition, small pieces of cinder were also noted. This material is interpreted as landscaping fill.[7]

Layer II extended to the bottoms of all trenches. This semi-compact stratum was composed of moist, light gray (10 YR 7/1) medium-grained sand. There were no significant material culture remains noted in this layer.

The groundwater table was encountered between 90 and 120 cmbs in all four trenches of these trenches.

[7] An abandoned PVC irrigation line was noted c. 15 cmbs.

M-01855

TMK(2) 3-5-002

SCS Project Number 607-1

ARCHAEOLOGICAL INVENTORY SURVEY REPORT ON 215.800 ACRES LOCATED IN WAIKAPU AHUPUA`A, WAILUKU DISTRICT, MAUI ISLAND, HAWAI`I [TMK (2) 3-5-02: 02 and 03]

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ABSTRACT

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "`Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc.

Seven historic sites were documented during this Inventory Survey, two of which were previously recorded in the State Index of Historic Places (SIHP). All seven sites relate to historic sugarcane agriculture; the project area is 100 percent covered by abandoned cane land. Sites include two major concrete irrigation ditches; two lesser, more localized ditches; a reservoir; erosion-control earthen berms; and a cane-haul dirt road.

State Site Number 50-50-04-5197 represents the previously recorded Waihee Ditch, and State Site Number 50-50-04-5493 represents the previously recorded Waikapu Ditch. Five new sites were added to the SIHP during Inventory Survey. State Site Number 50-50-04-5729 represents a lesser, un-named, rock and mortar ditch. Likewise, State Site Number 50-50-04-5726 represents a second lesser, un-named, earthen ditch/drainage. Site 50-50-04-5727 is a large, un-named reservoir—the terminus of Waikapu Ditch. State Site Number 50-50-04-5728 is a sugar field erosion-control site comprised of 14 cross-slope, earthen berms of varying length that are positioned regularly throughout the project area. Finally, State Site Number 50-50-04-5730 represents "Old Waikapu Road", a cane-haul transport, dirt road that spans the border of parcels 02 and 03.

Excavation consisted of twenty-one backhoe-dug stratigraphic trenches evenly spread across the project area. Extensive pedestrian survey and this representative subsurface testing did not yield artifacts or cultural deposits.

All seven sites (all representing historic period sugarcane agriculture activities) were assessed as significant under Criterion D of Hawai`i's State Historic Preservation criteria. Based on the results of this project and depth of documentation, all seven sites have yielded all potential information important to this historic period and no additional archaeological mitigation is recommended within this project area.

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Towne Development of Hawaii is conducting the "`Alaneo" development project in conjunction with Endurance Investors, LLC and planner Munekiyo and Hiraga, Inc. The Inventory Survey included historic background research and settlement pattern analysis prior to fieldwork, a complete pedestrian survey of the project area, representative subsurface testing via backhoe, and reporting (Figures 1 and 2).

Fieldwork, primarily consisting of systematic pedestrian survey, recordation, and representative subsurface backhoe testing, was conducted between August 16, 2005 and August 25, 2005 by SCS personnel Ian Bassford, B.A.; Randolph Ogg, B.A.; and Jon Wilson, B.A. The Principle Investigator for this project was Michael Dega, Ph.D.

Archaeological Inventory Survey of the project area was conducted to determine the presence/absence of archaeological deposits in surface and subsurface contexts through complete systematic survey and representative subsurface testing. The ultimate goals were to determine if historically significant archaeological sites occurred on the parcel and to provide recommendations to the State Historic Preservation Division (SHPD) concerning site mitigation during future land use of the project area.

ENVIRONMENTAL SETTING

LOCATION

The large survey area lies between coastal flats to the east and more mountainous terrain to the west along the medial reaches of the Maui isthmus between Wailuku and Mā`alaea (Figure 3). The project area is located between Wailuku (2 km north) and Waikapu to the south. Roughly ten percent of the project area (the northeast corner) lies within Wailuku Ahupua`a; the remainder is in the *ahupua`a* to the south—Waikapu (see Figure 1). The project area is composed of two adjacent parcels: TMK parcel 02 is located in the southeast quadrant of the project area and is less than half the size of parcel 03. The eastern perimeter of the project area abuts Honoapi`ilani Highway as it traverses from Wailuku toward Waikapu across the central Maui isthmus. The western border is defined by Wailuku Heights, an existing residential neighborhood. The northern boundary of the survey area is the curving Kuikahi Drive; the southern boundary is an arbitrary TMK line through abandoned cane lands (Figure 4).

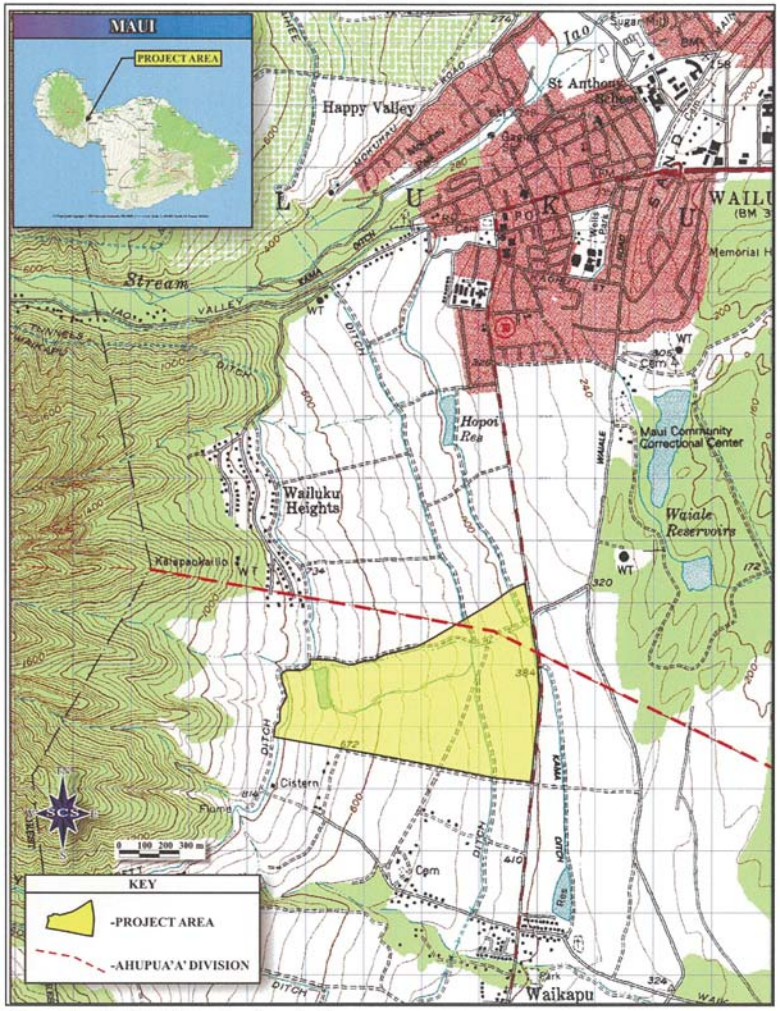

Figure 1: USGS Wailuku Quadrangle Map.

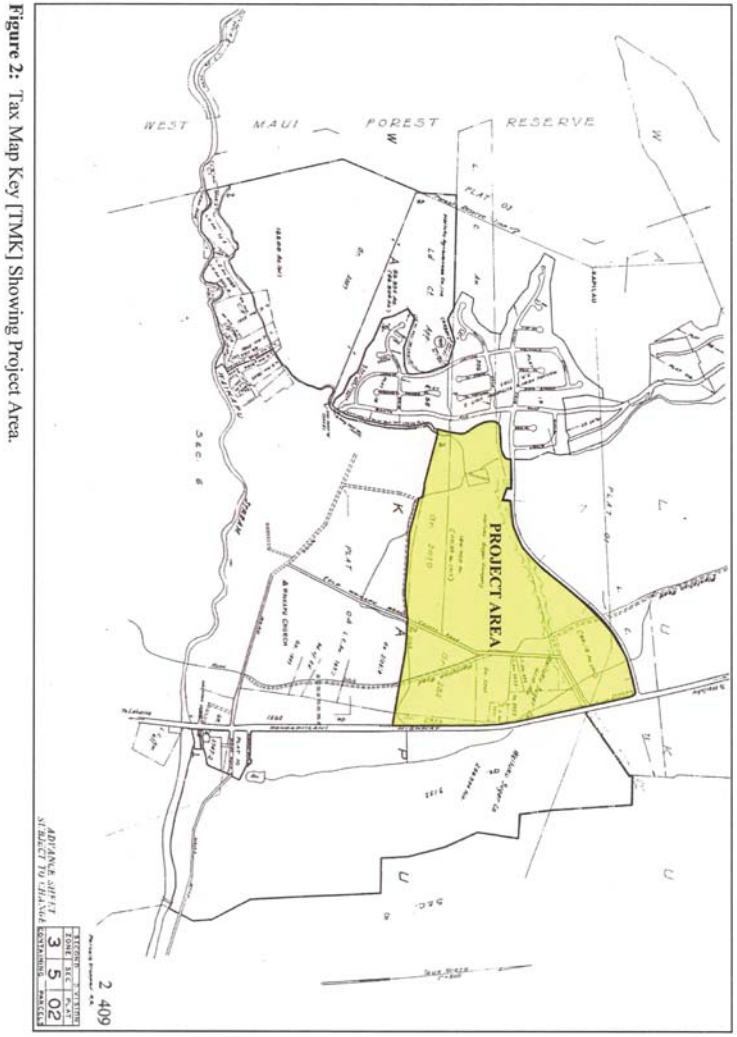

Figure 2: Tax Map Key [TMK] Showing Project Area.

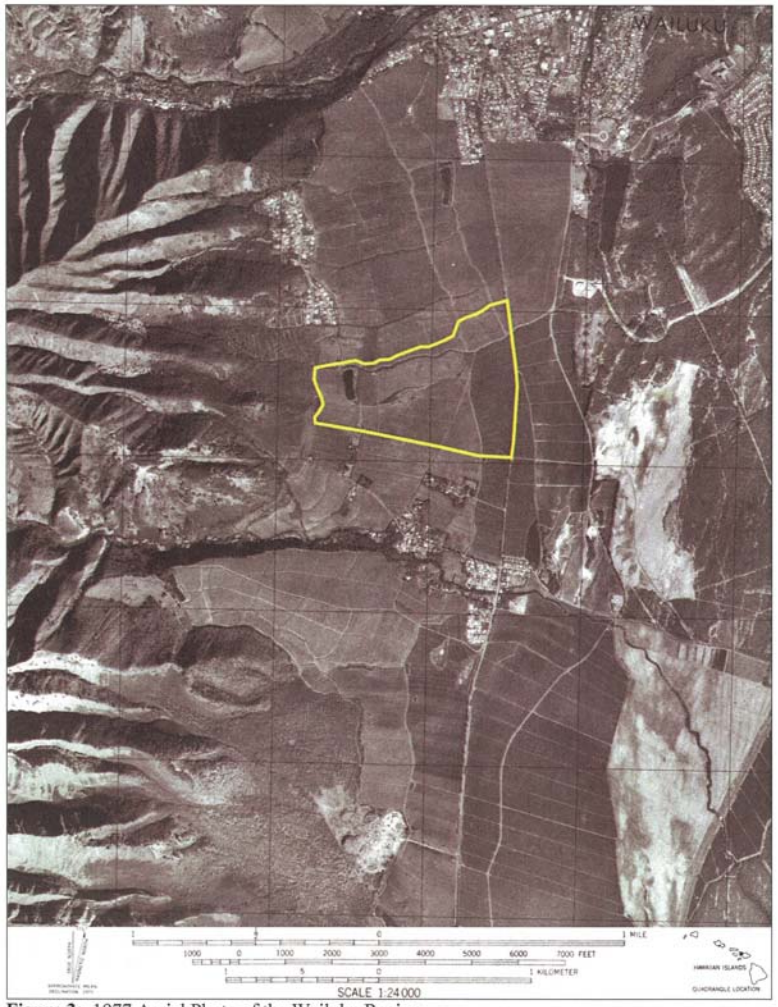

Figure 3: 1977 Aerial Photo of the Wailuku Region.

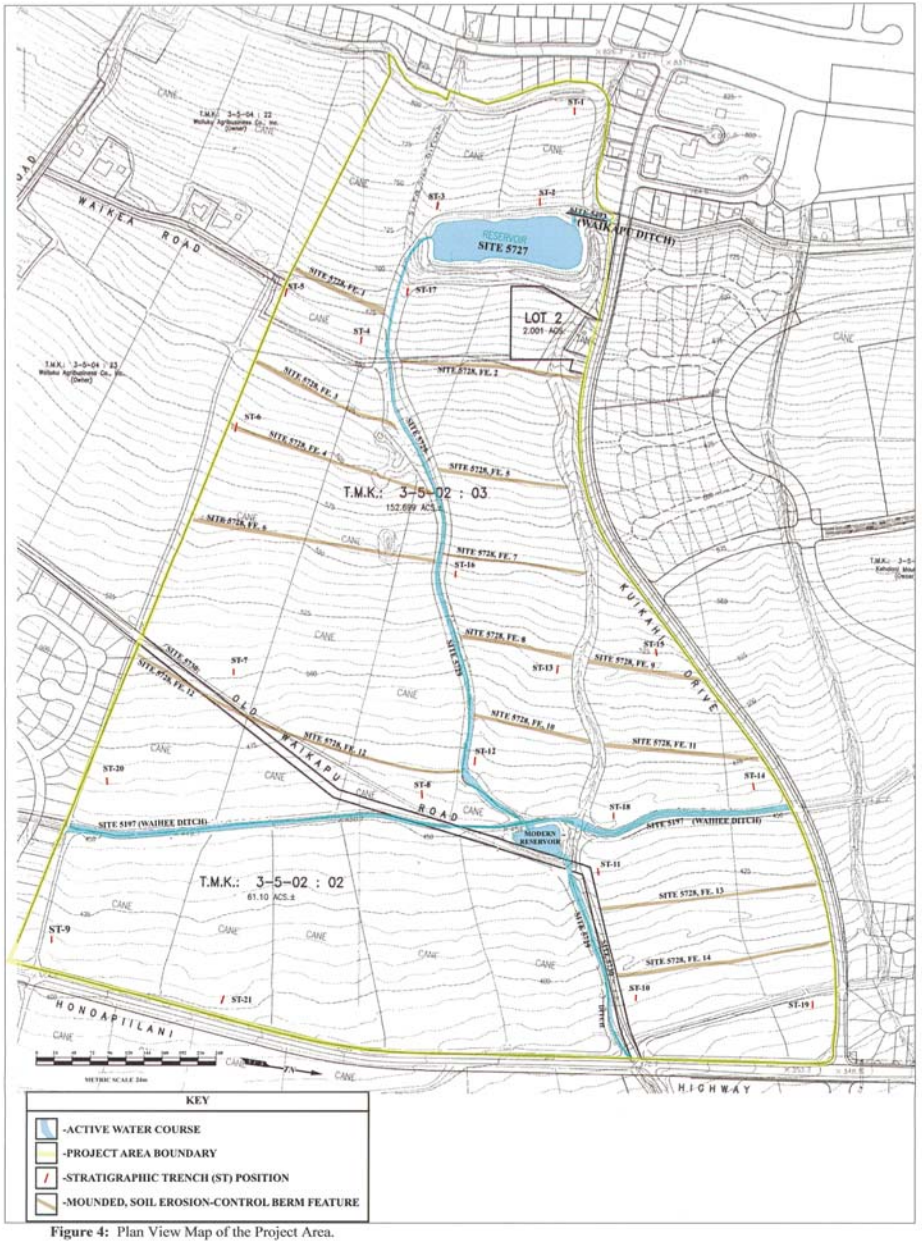

Figure 4: Plan View Map of the Project Area.

PROJECT AREA LANDFORM

Both archeological field survey and a review of geotechnical reports for the parcel reveal that the slightly sloping project area lies in locations previously utilized for the cultivation of now-abandoned sugar cane. According to Cavanaugh (1995:2), who conducted geotechnical studies on the 450-acre Kehalani Mauka Subdivision (the parcel that borders Kuikahi Drive to the north), "site topography slopes down moderately toward the east at a gradient of 10 percent." This accurately describes the slope of the current project area, which is steeper at its western (*mauka*) perimeter, and relatively flat near Honoapi'ilani Highway (Figure 5). Ground elevations range from approximately 115 meters (380 feet) above mean sea level (amsl) to 200 meters (660 feet) amsl. Various historic and modern dirt roads transect the surveyed area. As is discussed more below, project area exclusively consists of tilled zone, fill, and alluvial sediments. To the east, near the Maui Lani development, sandy matrices were identified. Sandy matrices were not identified in the current study area. Likewise, neither archaeological nor geotechnical subsurface testing detected any sandy matrices in areas immediately to the east of Honoapi'ilani Highway (Monahan 2003) or north of Kuikahi Drive during the Kehalani Mauka Subdivision (Dega 2004).

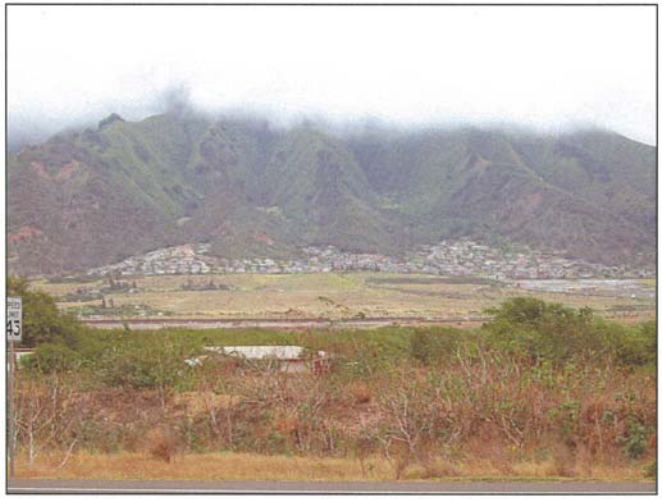

Figure 5: Distant Photograph of Project Area (lighter colored grass at center roughly defines boundaries). View to West.

Hydrology within the relatively dry project area is mostly in the form of historic irrigation modifications. Some of these modifications were the creation of a larger web of water conduits, drainages, and reservoirs, some built as early as 1905. No perennial streams run directly through the project area, and thus artificial ones had to be created for proper irrigation. By comparison, 'Īao Stream runs west-east to the north of the proposed development while Waikapu Stream runs west-east to the south of the project area. Being located near these two major streams appears to have been beneficial for cultivation on the present parcel, at least during historic times. Several still-utilized irrigation ditches (*i.e.*, Waihee Ditch, Site -5197) transect the project area, and a still-active larger reservoir is linked to one of these ditches. The remnant irrigation ditches and reservoir not only point to massive landscape modification in the area during historic times but also strongly infer the aridness of the area, which required large-scale water importation. The water table was not encountered in any of the 21 stratigraphic trenches excavated within the project area (maximum depth of 2.60 meters). Soil borings conducted during geotechnical analyses in a nearby project area failed to reveal the presence of the area's water table to at least 25 feet below the surface (Shimamoto 1995:4).

The project area has seen significant modern activity. A 25 meter high cinder/ soil pile has been consistently mined (or imported) via truck traffic into the western half of the project area from a dirt road linking Kuikahi Drive. Modern rubbish is scattered over the surface of each quadrant; nearly a dozen abandoned cars are located in the southeast quadrant. Land owners have a construction trailer and small, dirt parking lot at the northeast corner of parcel 03. Consistent, daily vehicle traffic across the parcel indicates the modern maintenance efforts related to the irrigation systems (necessary to serve locations outside of the project area).

VEGETATION AND SOILS

Vegetation in the project area is dominated by the presence abandoned cane that has been overtaken by non-native secondary growth shrubs and various introduced grasses (Figure 6). Several ironwood trees (*Casuarina glauca*) dot the landscape. *Haole koa (Leucaena leucocephala*) are fairly common especially bordering the eastern highway perimeter and near irrigation conduits. Native vegetation was not documented within the project area.

According to Foote *et al*. (1972:46–47, 100), soils in the project area fall into four sub-classifications of the 'Īao soil series. These soils consist of well-drained soils on valley fill and alluvial fans that have developed from igneous rock and are nearly level to moderately sloping. The 'Īao Series derivatives are similar to each other, yet primarily differ by the slope of the surface layer and inclusions of a higher content of cobblestones, such as in 'Īao cobbly silty clay

Figure 6: Project Area Vegetation and Topography. View to Northeast.

(classified as both IbB and IbC). The IbC soil (7 to 15 percent slopes) is distributed along the Kuikahi Drive area; whereas the IbB soil forms the central region. Also occurring within the project area (in roughly equal percentages) are `Īao clay, on lesser slopes (IcB), and `Īao clay on steeper slopes (IcC). Figure 7 shows the project area distribution of these derivatives.

The presence of these soil types was confirmed through geotechnical studies in bordering parcels and archaeological testing during the current project. Important to emphasize again, no sandy sediment was identified in the project area. Sandy sediment (sand dunes) and mixed coastal-terrigenous sediments occur to the east of the current parcel (*i.e.*, Maui Lani).

The fairly homogenous nature of soils in the project area does provide contrast to soil regimes occurring more to the east (coastal-terrigenous and coastal) and to the north and south (dynamic stream valleys). The current project area occurs in a medial or intermediate environmental zone, both on a north-south and east-west axis. Along a north-south axis, the property lies in a very dry, open area between two perennial streams (`Īao and Waikapu). On an east-west axis, the project parcel lies above the influence of the coastal plain and below the wetter uplands. The current parcel thus lies in a fairly non-dynamic environmental zone that is practically surrounded on all sides by contrastingly vibrant areas (see Figure 5). That this

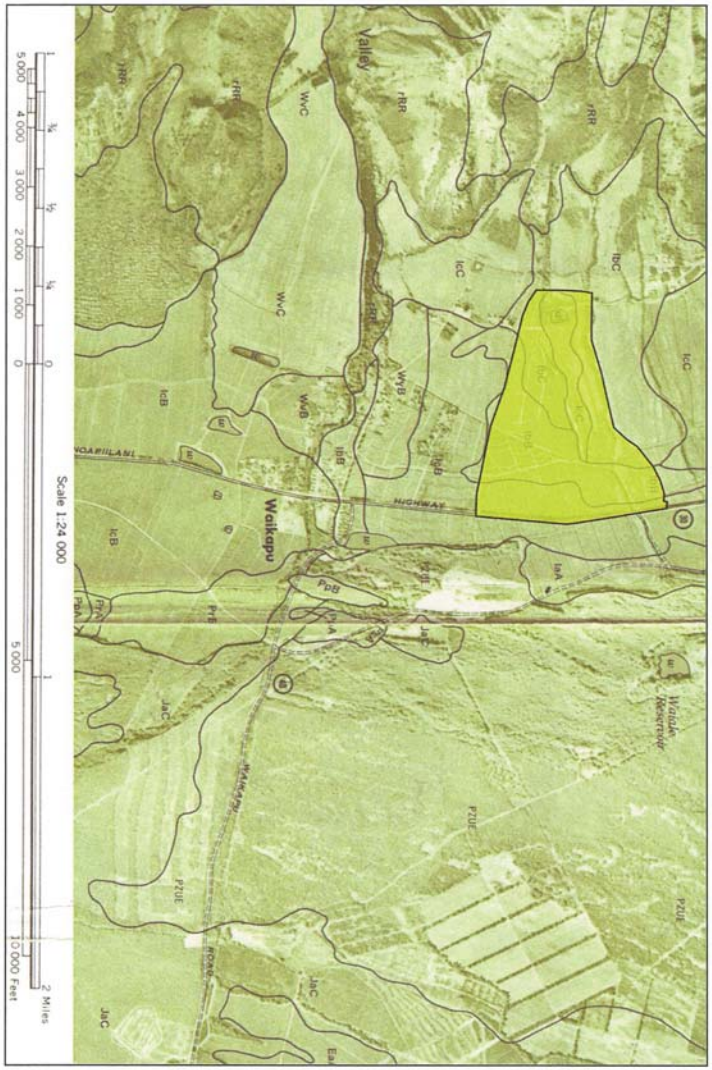

Figure 7: Project Area Soils and their Distribution [Adapted from Foote *et. al* (1972)].

intermediate area, occurring between more dynamic zones, required artificial controls is well-observed throughout the project area in the form of irrigation ditches and reservoirs.

CLIMATE

Rainfall in this intermediate environment is very modest. The project area receives an average annual rainfall of only 33 to 44 centimeters (Price 1983:63), with much of this rainfall occurring during the winter months (November–April). Seasonal variation in rainfall amount follows normal orographic patterns for leeward-type areas of Maui. The project area occurs just to the south of what may be considered the leeward-windward boundary. At higher elevations within Wailuku Ahupua`a, the amount of rainfall doubles and triples that of the project area. To the north, from `Īao Stream Valley area toward Waihee Valley, rainfall is much more intensive, with combined rainfall and geographic patterns being more conducive to traditional types of agricultural cultivation (*i.e.*, *lo`i*, sweet potato). The rainfall in this gently sloping project area drains downhill to the east and provides an additional water source for traditional Hawaiian agriculture in the lowland flats to the east of the project area (see Handy and Handy 1972).

TRADITIONAL AND HISTORIC SETTING

Wailuku District inhabits the eastern side of the West Maui Mountains (Mauna Kahalawai) and occupies the isthmus through the center of the island to coastal reaches in Kahukui and Mā`alaea. Wailuku, together with Waikapū, Waihee, and Waiehu, is one of the *Na Wai `Eh~*, or "the four waters," known for the occupancy of chiefly individuals (Kame`eleihiwa 1992; Pukui and Elbert 1992; and Creed 1993). Wailuku District and Wailuku Ahupua`a are frequently mentioned in historical texts and oral traditional accounts as being politically, ceremonially, and geographically important areas during traditional times (Cordy 1981, 1996; Kirch 1985). Wailuku was considered a "chiefly center" (Sterling 1998:90) with many of the chiefs and much of the area's population residing near or within portions of `*f*ao Valley and lower Wailuku. The many *heiau* constructed in the Wailuku area point to its ceremonial and religious importance during pre-Contact times. During historic times, after numerous battles in the area, the large concentration of Land Commission Awards granted in Wailuku, particularly in lower `*f*ao Valley, also attest to a sizeable population base and the importance of the lands for cultivation through time. More recent land use in the area included sugar cane cultivation and use of the land for pasture.

THE TRADITIONAL SETTING OF WAILUKU

Archaeological settlement data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward sides of the main islands, with populations

eventually settling into drier leeward areas at later periods (Kirch 1985). Archaeological dates for initial occupation of the Hawaiian Islands far pre-dates accepted ranges gleaned from palynological data. A more secure estimate for initial occupation of the islands is the A.D. 9th century (Athens 1997), if one is to lay more credibility with the pollen record than the archaeological record. In the Waihee and Waiehu areas of Wailuku, Kirch (1985:87) notes that "a number of coastal dune midden sites have been reported, and at least one of these contained pearl-shell fishhooks similar to those from the Bellows Site, eroding from the wave-cut midden." (The Bellows site, located on the windward coast of O`ahu, has yielded dates of occupation, albeit controversial, from A.D. 300 to 600 [Pearson *et al.* 1971], one of the earliest dated sites in the Hawaiian Islands. For the most part, these dates have now been diagnosed as very problematical and are no longer valid.) More recent research within Wailuku Ahupua`a indicates that the area was likely settled between *c.* A.D. 1100 (Kirch 1985:142) and A.D. 1200 (Fredericksen and Fredericksen 1996).

To the north of the current project area lies `Īao Valley, one of the most important locations in the area for prehistoric activity. Connolly (1974:5) states that the pre-Contact valley [`*f*ao] had a large population base with "most people residing in a settlement near `*f*ao Needle," just north of the project area. Supposedly, the subsistence base of this population consisted of fish and taro, with Kahului Harbor and the coast close by and *lo`i* systems lining `*f*ao Valley's stream banks. Prehistoric ditches or `*auwai* were utilized in taro cultivation (Connolly 1974:5). Sterling (1998:86) adds that two `*auwai* within the valley:

> have existed immemorially and were evidently constructed for the purpose of irrigating *kalo* on the plains which stretch away to the northward and southward of the [`*f*ao] river. Several minor `*auwai* have, since ancient times, tapped the river at different points lower down and spread the water through the lands in the gulch on either side of the river bed.

Handy in Sterling (1998:63) further notes that "From Waihee and Wailuku Valley, in ancient times, was the largest continuous area of wet taro cultivation in the islands." Cheever (1851:124) writes: "the whole valley of Wailuku, cultivated terrace after terrace, gleaming with running waters and standing pools, is a spectacle of uncommon beauty to one that has a position a little above it."

Recent archaeological research (Fredericksen and Fredericksen 1996:52) has revealed that habitation sites along what is now Lower Main Street in Wailuku, "are associated with the

rich taro producing lands in the Lower `fao River flood plain, and the extensive cultivation systems present in `fao Valley." These habitation sites have been dated to the A.D. 15th through 17th centuries. The `fao Valley area was not only renowned for its agricultural base during prehistoric times but its ceremonial and political base as well (see also Cordy 1996; Donham 1996).

No discussion of Wailuku is complete without mentioning the important *heiau* complex above `Īao Valley near its seaward terminus. During the mid to late 18th century, the Halekii-Pihana *heiau* complex was supposedly designed by a Hawaiian named Kiha (Sterling 1998:89). These monuments, designated as State Site Number 50-50-04-522 and occurring along the northwest flank of the current project area, are described as very important *heiau* within Hawaiian history. Yent (1983:7) notes the life cycle of the *ali`i* was represented here. It was the place where Kamehameha I's wife was born, Kahekili lived, and Kekaulike died. Thrum (1909:46) reported that Kamehameha I evoked his war god at Pihana Heiau after his warriors defeated Kalanikupuli's forces during the Battle of `fao in 1790. The two *heiau* are primarily associated with Kahekili, who is connected with the Halekii-Pihana complex between *c*. A.D. 1765 and 1790, and Kamehameha, during his conquering of Maui in 1792 (Yent 1983:18). Halekii and Pihana Heiau are the only remaining pre-Contact Hawaiian structures of religious and historical importance in the Wailuku-Kahului area that are easily accessible to the public (Estioko-Griffin and Yent 1986:3). As stated, the area within and adjacent to the current project is known not only for its religious and/or ceremonial significance, but for its political prominence as well.

The Fredericksens' (1996:52) report states that politically, Wailuku [village] was known as a central settlement for high ranking chiefs and their retinue. The Wailuku area was also witness to many battles, from the Battles of `fao and Sand Hills to the Battles of Kepaniwai and Kakanilua. The most famous battle was that of Kepaniwai where Kamehameha I, in July 1790, finally wrested control of Maui Island. Kamehameha I and his warriors landed at the Kawela portion of Kahului Bay and proceeded up `fao and other valleys to score a decisive victory. Wailuku, meaning water of destruction, succinctly describes the area in which many of these major battles occurred. Of additional note is that in the Kauahea area of `fao Valley (southeast of `fao Stream below Pihana Heiau-supposedly within the current project area), warriors apparently dwelt and were "trained in war skills and there was a boxing site in the time of Kahekili" (Sterling 1998:89).

TRADITIONAL SETTING OF THE PROJECT AREA

Creed (1993) has written extensively on the traditional background of the Waikapu area, much of which directly applies to the open landscape of the current project area just to the north of Waikapu. Many classes of sites are found or may have existed in the Waikapu-Wailuku area during traditional times. Creed (1993:19–21) provides an extensive list, including some site types that would not apply to the current parcel due to its distance from major drainages, the coastline, and its open land classification. Traditional sites that would apply include agricultural sites (*kula* lands, *wauke* patches, *hala* trees, pigs, and potato patches), boundary walls, burials (sometimes located in habitation terraces), feather gathering areas (particularly in the mountains to the west), habitation loci, and *pohaku* (an adze stone marks the border between Wailuku and Waikapu). While populations were predominantly centered in `Īao Valley and Waikapu Valley, there was agricultural and habitation activity in the open grasslands of the current project area above the coastal flats. Much evidence for such activities has not yet been found through archaeological means, a situation that places much culpability on historic land use that may have erased or scattered this evidence. As such, there is much more evidence for historic activities occurring in the area.

HISTORIC SETTING OF THE PROJECT AREA

Current project area lands were first assigned to the district formerly known as Kula. Taken literally, *Kula* refers to open land or plains (Pukui and Elbert 1992:70). Kula District is known for its dry, arid lands being vacant of perennial streams. Kula was always an arid region, throughout its long, low seashore, vast stony *kula* lands, and broad uplands. There are exceptions in Wailuku as one proceeds along Īao Stream Valley and further to the west/northwest past Waihee and Waiehu. However, even the vast stony *kula* lands were utilized during traditional and historic times. Most evidence for such land utilization has come in the form historic records.

THE GREAT M~HELE

In 1848, during the late historic period, commissioners of the Great M~hele instigated an extreme modification to traditional land tenure on all islands that resulted in a division of lands and a system of private ownership. The M~hele was based upon the principles of western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Kuykendall Vol. I 1938:145 footnote 47 *et passim*; Daws 1968:111; Kame`eleihiwa 1992:169–170, 176). The dramatic shift from a redistributive economy to a market economy resulted in drastic changes to land tenure, among

other things. Case in point, foreigners demanded private ownership of land to ensure their investments (Kuykendall Vol. I 1938: 145 *et passim*; Kame`eleihiwa 1992:178; Kelly 1998:4).

Once lands were made available and private ownership was instituted, native Hawaiians, including the *maka`~inana* (commoners), were able to claim land plots upon which they had been cultivating and living. Oftentimes, foreigners were simply just given lands by the *ali`i*. However, in the case of commoners, they would only make claims only if they had first been made aware of the foreign procedures (*kuleana* lands, land commission awards). These claims could not include any previously cultivated or currently fallow land, *okipu*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). Awarded parcels were labeled as Land Commission Awards (LCAs). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming houselots in Honolulu, Hilo, and L~hian~ were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16).

Wailuku District was declared Crown Land during the Great Māhele and numerous Land Commission Awards, approximately 180, were awarded within Wailuku Ahupua`a while approximately 100 were awarded for Waikapu Ahupua`a (Creed 1993). A handful of foreigners (*i.e.*, Anthony Catalena, James Louzada, E. Bailey) gained control of large parcels of lands that would later be used for mass cultivation of sugarcane. Significantly, the majority of LCAs were awarded to Hawaiians, a gauge that can be used to measure pre-Contact settlement, since there was little overall change in traditional land use among Hawaiians prior to 1853 (Creed 1993:38).

During the Great M~hele of 1848, a total of three land claims were awarded in the current project area (Waihona `Aina 2005): LCA 433, 3201, and 3525—all of which are located in parcel 02, in the central area of the eastern border near Honoapi`ilani Highway (Figure 8). Table 1 summarizes archival research of these three LCAs.

Table 1: LCA and Land Grant Data for [TMK:(2) 3-5-02: 02].[1]

LCA No.	Awardee	Land Use	Comments
00433	William Crowningburgh and wife Maile	*lo`i* – 21 *`apana* – 4	Stream also on property. Crowningburgh surrounded this land with a fence and raised animals on the property. Plot of land was referred to as *Pili Pili* at the time.
03201	Wm. A. McLane	*`apana* – 2	One ditch on piece of land. Plot of land was referred to as *Awakamanu* at the time.
03525	Keliiolelo	*lo`i* – 3 *`apana* – 3 House lot –1	Stream on property. Plot of land was referred to as *Awakamanu* at the time.

[1] Source: Waihona Aina website (www.waihona.com), information obtained in September, 2005.

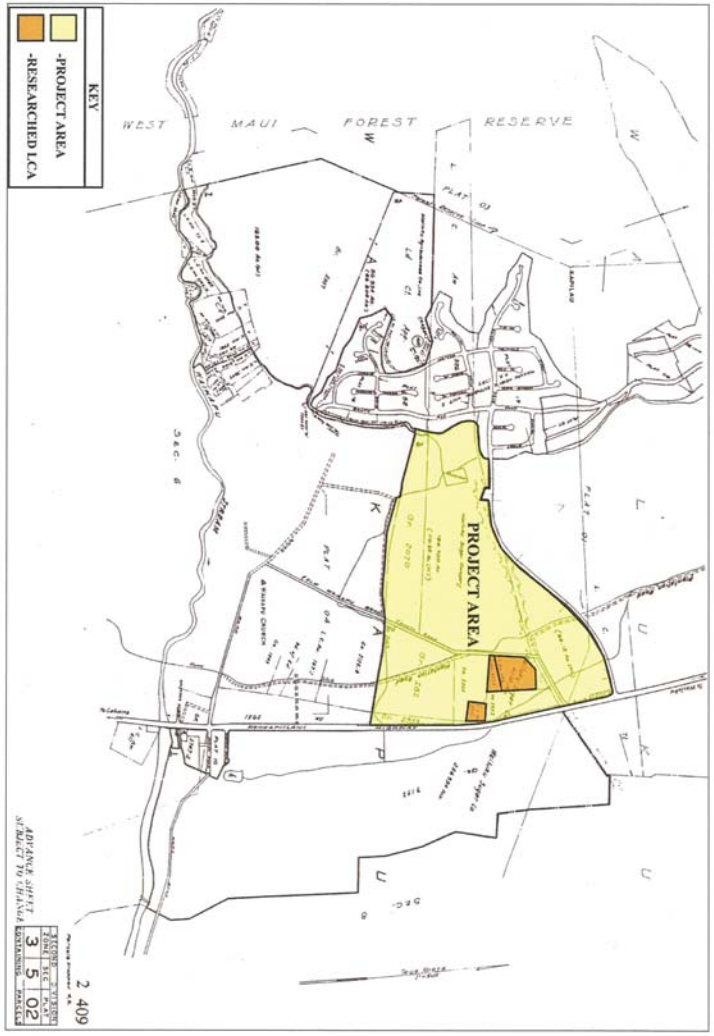

Figure 8: Adapted 1992 Tax Map Key with Researched LCAs Highlighted.

This LCA record keeps with the overall LCA pattern of the Waikapu-Wailuku area intimating taro cultivation in association with permanent residences. Such a pattern is historically documented from 1848, but likely extended deeper into the past. *Lo`i* (irrigated taro patches or planted terraces) and evidence of smaller, private land plot divisions, *`apana*, are no longer detectable within this surface or subsurface landscape.

Similarly, the Wailuku Ahupua`a parcel north of Kuikahi Drive predominantly lists among its LCA records 'property for raising cattle' and 'pasture grounds for cattle' (Dega 2004). There also is some mention of stone walls, *kalo* patches, and *lauhala* trees on the landscape. Perhaps the most significant structures on this adjacent land were built by the American Board of Commissioners for Foreign Missions (A.B.C.F.M.) which consisted of two house lots with adobe walls. The lots occurred "near pasture land," a common theme for the area (Waihona `Aina 2005). In Waikapu, to the south, the LCAs reflect *lo`i* cultivation, *kula* lands, and house sites. However, much or all of the evidence related to such settlement of the Waikapu area has been effaced by late-historic and modern cultivation. The current project area is a prime example of this trend.

Land use in Wailuku and Waikapu Ahupua`a in the mid 19th and early 20th century was largely devoted to the sugar industry. During the 1860s, the sugar business was growing, with plantations and mills at Wailuku, Waihe`e, Waikapu, and Haiku. Many of the plantation camps associated with these mills were centered in the Pu`unene, Kahului, and Wailuku area (see Denham *et al*. 1992:16). Historic utilization of the Waikapu-Wailuku landscape within and near the project area focused on industrial-levels of cultivating sugar cane and pineapple. Water was channeled from traditional sources (*e.g.*, Waikap© Stream, western aquifers or springs) through plantation lands. Both local and imported workers operated on these plantation lands and the area maintained fair population density. Evidence for expansive landscape modifications to accommodate the industrial-level of production is very evident across the current subject parcel in the form of the north-south oriented known historic ditches. The significant amount of plastic and tubing and sheeting found within Layer I of excavations attests to even more recent utilization of the open landscape for cultivation. These former sugarcane lands are now being reclaimed through residential developments.

PREVIOUS ARCHAEOLOGY

IMMEDIATE VICINITY OF PROJECT AREA

Intensive research within the State Historic Preservation Division (SHPD) archives concluded that no previous archaeological study was conducted within the present project area. However, of primary importance for the present study are the results from three projects recently conducted within and bordering the 348-acre subdivision to the north (Figure 9). First, Archaeological Inventory Survey was conducted on approximately 100 acres of land that included five separate lots and a proposed road corridor in the Kehalani Mauka Subdivision (Dega 2003). Three historic sites were documented during this Inventory Survey. State Site Number 50-50-04-5473 has been assigned to Hopoi Reservoir. This reservoir predates Hopoi Camp and was present at least by 1922 (see Dega 2003). Occurring to the immediate east of Hopoi Reservoir and running north-south to Waikapu is Kama Ditch (State Site No. 50-50-04-5474), a water conduit carrying the precious commodity to dry southern lands. A single basalt adze (Site 50-50-04-5478) was recovered from the northern flank of Lot 21 along the eastern flank of the parcel. Extensive survey and testing in the area of the isolated find failed to produce additional artifacts or cultural deposits. Representative subsurface testing (18 trenches) on the lots only revealed highly homogenous soil matrices across the open, barren intermediate area.

A second SCS Inventory Survey Report dealing with these same Kehalani Mauka lands (Dega 2004) documented lots not surveyed in the first study. This survey recorded six additional sites, all historic. Similar to the present project area, a series of un-named, lesser ditches was found within Kehalani Mauka, represented by State Site Numbers 50-50-04-5490 and 50-50-04-5493. Waihee Ditch (Site -5197) flows from this former SCS project area into the present project area. Historic-modern roadways (50-50-04-5489), a historic surface artifact scatter (50-50-04-5491), and several plantation-era clearing mounds (50-50-04-5492).

In summary, the results of the Kehalani Mauka Subdivision Inventory Survey roughly duplicate the present project area's findings. Aside from a lone traditional artifact (an adze)—which could remain despite a century of cultivation—larger traditional sites were destroyed during the sugar-era.

An Archaeological Assessment Report was published based on a negative results survey on Kehalani lands just to the east of Honoapi`ilani Highway (Monahan 2003). This survey did not produce any structures or artifact scatters. Trench excavation demonstrated a fairly consistent subsurface stratigraphy with a thick layer of dark brown silt (Layer II) inclusive of historical

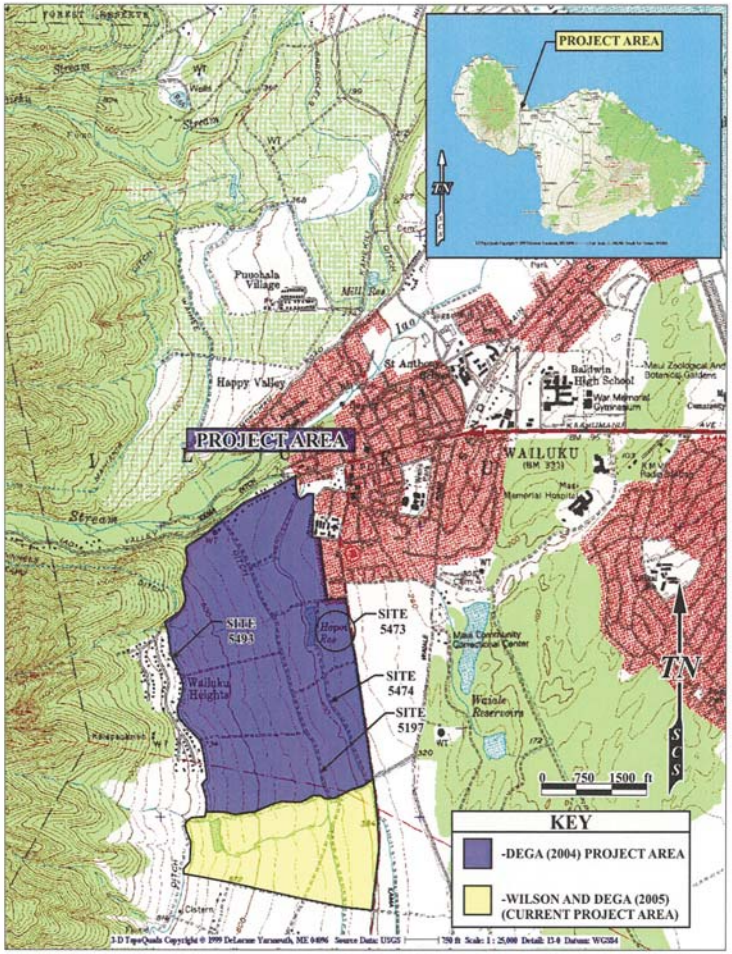

Figure 9: USGS Wailuku Quadrangle Map Showing Adjacent Areas of Archaeological Study.

garbage (*i.e.,* black plastic and rubber tubing, white plastic irrigation pipes, and black plastic sheeting) over an undisturbed very dark grayish-brown silty clay subsurface (Layer III). A dark brown, silty root mat-layer (Layer I) was present in some units. No undisturbed sandy deposits were encountered, although a few trenches close to the eastern boundary of the project area did contain thin lenses of yellowish-brown sand. These sand lenses were clearly introduced as recent fill.

GENERAL WAIKAPU AREA

In terms of general projects in the Wailuku-Waikapu environs, the earliest archaeological endeavors on Maui were undertaken by Thrum (1909), Stokes (1918), Emory (1921), and Walker (1931). None of their archaeological finds directly pertain to the current project area; however, their data allows for a deeper understanding of the traditional use of the Wailuku-Waikapu area.

In an area south of the project area, within open lands similar to what is being researched herein, Thrum mentions that two *heiau* may have possibly existed within the *ahupua`a* of Waikap©, but evidence of the two sites no longer remains (1909–1918:59). A group of approximately 45 house and shelter sites (State Sites 50-50-09-1441, the McGregor Point C-shaped structures, and 50-50-09-1287, the M~`alaea Complex) was identified by Walker (1931) to the west of M~`alaea. Chronology for these sites has yet to be determined (Creed 1993). Walker (1931:58) also described a *koa*, or fishing shrine, and two petroglyph fields with an associated *heiau* (State Site numbers 50-50-09-1169 and -1199) at M~`alaea. The *koa* was not assigned a State Site number, nor has it been relocated.

Recent archaeological work in Waikap© Ahupua`a (Kennedy 1988, 1989; Folk and Hammatt 1989; Haun 1989; Brisbin *et al.* 1991; Donham 1991; Titchenal 1996) has revealed a low density of sites ranging in function from habitation to agriculture. Radiocarbon dating results in these studies have produced dates ranging from the A.D. 1100s to modern times. Together, their collective data suggests a "general trend toward development of large, densely settled populations between A.D. 1200 and about 1800, and the expansion and intensification of dryland field systems, particularly during the latter two centuries of this period" (Creed 1993:33).

Other recent archaeological work just to the south and/ or east of the current project area has been limited to two field inspections (Donham 1991, 1995) and near the eastern boundary line of the current project location, two archaeological Inventory Survey-level investigations

(Kennedy 1988, 1989; Buffum and Dega 2001). The conclusions offered by these few projects primarily indicate that any surface and/or subsurface features of cultural value that were once present within the area have most likely since been destroyed by intensive agricultural use of the land (*i.e.*, sugar cane and/or pineapple cultivation); this pattern was also confirmed by subsurface examination. As such, a broader background for Wailuku District is offered herein (see below).

WAILUKU DISTRICT OVERVIEW

The following section provides a brief overview of archaeological research in Wailuku District itself and is presented in two arbitrary sections: Upper Wailuku and Lower Wailuku District. Upper Wailuku is considered to be the lands above Kuihelani Highway while Lower Wailuku encompasses the lands below Kuihelani Highway and extends to Mā`alaea Bay in Waikapu Ahupua`a. The following district-specific research appears in its entirely as first published in Dega (2004).

UPPER WAILUKU DISTRICT

The majority of archaeological work is associated with the Pu`u One region in the northern most section of Wailuku District. Prior archaeological work in the Pu` One region indicates an emerging pre-Contact settlement pattern for this region. SCS (Dunn and Spear 1995) conducted research at the intersection of Naniloa and Waiale Roads where habitation features and a cultural layer interspersed with hearth and pit features were identified during a monitoring project. These features all occurred in sandy substrate. Radiocarbon dates submitted from these features yielded dates ranging from A.D. 1434 to A.D. 1807, dates suggesting pre-Contact sites and early historic land use. SCS (Burgett and Spear 1995) conducted Archaeological Inventory Survey in the sand hills along lower Main Street. One habitation site (50-50-04-4004) located in a remnant of a once larger cultural deposit was identified. Radiocarbon samples dated the site to A.D. 1420 and A.D. 1640, or to the early to mid-prehistoric time range.

SCS (Morawski and Spear 2001) conducted Archaeological Monitoring during the installation of a water pipeline and fire hydrants on Naniloa, Helenani, Leilani, Kainani, Naniluna, and Ka`ahumanu Highway roads with the town of Wailuku. During the research, a historic refuse dump was discovered, as were the remains of previously disturbed human burials. SCS (Buffum and Spear 2001; Zachman and Spear 2002) conducted Archaeological Monitoring at the Maui Medical Center. Due to extensive landscape modifications, no archaeological or traditional materials were identified during excavation.

Pantaleo and Sinoto (1996) conducted archaeological work at the Maui Lani Development to the east of the present project area. As of the 1996 publication, only one concentration of multiple burials was discovered while the remainder were isolated individual burials at the tip of the dune (at the highest elevations). A more contemporary report documenting additional burial finds at Maui Lani should aid in clarifying the overall results of that project. Research conducted by Fredericksen and Fredericksen (1997) indicated that this section of dunes was primarily used during prehistoric times as an interment area, a contention easily supported by the previous year's study. Habitation sites (several with associated burials) have been found mostly in the dune area associated with the Lower Main Street/Waiale Road Corridor. Conversely, studies east of this corridor have yielded only human burials (Fredericksen and Fredericksen 1998). Fredericksen and Fredericksen (1998) lists many of the archaeological studies conducted in the Lower Main Street/Waiale Road Corridor and Central Maui area.

LOWER WAILUKU DISTRICT

A limited number of archaeological projects have been conducted in this particular land section, much of which was disturbed during the massive sugar cane cultivation. The fair amount of archaeological work conducted along Lower Main Street is summarized elsewhere (see Morawski and Dega 2003). In comparison, Sinoto and Pantaleo (1992) conducted Archaeological Inventory Survey of a proposed location for the Kihei Gateway complex, on the *makai* side of the Piilani-Mokulele Highway junction. One historic site, the remains of concrete footings from a bridge across Waiakoa stream, was identified (Site 50-50-09-31).

SCS (Burgett and Spear 1997) conducted large-scale Archaeological Inventory Survey of the Puunene Bypass/Mokulele Highway improvements stretching across the majority of Wailuku District. Although no sites were identified, this absence may account for the lack of archaeological remains: extensive disturbance associated with prior sugar cane cultivation, highway and private construction activities, and little or no prehistoric occupation of the area. However, *lo`i* cultivation was reported to be intensively cultivated in this area (Handy and Handy 1972). The replacement of *lo`i* with sugar cane during historic times would be the most likely cause for the destruction of all traditional sites related to prehistoric cultivation in the area.

Fredericksen and Federicksen (1998) conducted archaeological research on 232 acres northeast of Puunene Avenue stretching to Haleakala Highway. No formalized traditional or prehistoric sites were discovered. Several sites consisting of volcanic-glass surface scatters were identified in the former sugar cane fields along with a historic irrigation ditch.

SETTLEMENT PATTERN

Archaeological investigations within the currently studied portion of Wailuku-Waikap© have revealed relatively little regarding traditional settlement patterns due to the dearth of supporting empirical evidence. Archival research and analyses of the generalized settlement pattern for Wailuku District have been the foremost sources for discerning an established settlement pattern for the current project area.

Archaeological evidence suggests that early settlement in the Hawaiian Islands occurred along windward shoreline areas between the A.D. 4th and 11th centuries. Pollen evidence suggests a settlement date of the A.D. 9th century (see Athens 1997). For the most part, these populations used local resources and seldom ventured into upland valleys. Cordy (in Creed 1993) suggests, however, that upper valley areas on windward coasts were likely populated before the A.D. 1100s. Coastal settlement was still dominant, but populations began exploiting and living in more upland *kula* zones. Greater population expansion to inland areas did not occur until the *c*. A.D. 12th century but continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands. Upland areas of Maui such as the Waiohuli-Kula area contained large garden enclosures, ceremonial structures, and permanent habitation sites by *c*. A.D. 1600.

Nearer the coast in intermediate lands such as the current project area (*c*. 60–85 meters amsl), taro was cultivated along stream courses, dryland taro was grown on *kula* lands such as the project area, and populations were settled. It is possible that the *kalo* patches described in the aforementioned LCA accounts originated during the "Expansion Period" of A.D. 1400 to 1600, perpetuating through historic times (Kirch 1985). However, most of the LCAs for the area describe almost no cultivation occurring in the area during the 1850s as pasture land and sugar cane cultivation were already dominating the use of the land (Creed 1993:74). Primary settlement and resource zones lay outside the current medial environmental zone in Wailuku proper, near perennial water sources (`Īao Valley, Waihee, Waiehu). The only substantial settlement along this medial isthmus zone between 300 and 600 feet amsl was at Waikapu, to the south of the current project area, near the base of Waikapu Stream Valley (see Creed 1993). As the current project area does not contain a perennial water source and is primarily open grassland, the area is considered to lie at the periphery of the more resource-rich zones in Wailuku.

Historic utilization of the Wailuku-Waikapu landscape was dominated by the cash cropping of sugar cane and pineapple, made possible by water channeled from traditional sources (*e.g.*, Waikapu Stream) through plantation lands. Historic features associated with this period are represented as water features in the form of reservoirs (Hopoi Reservoir) and water channels (Waikapu Ditch, Waihee Ditch). This area was also an important transportation corridor linking both the south and north flanks of the Maui isthmus, with Honoapi`ilani Highway having been demarcated as a Government Road on area maps by 1882 (Creed 1993:20).

PROJECT AREA EXPECTATIONS

Prior to commencing archaeological fieldwork, a review of archival resources and the results of previous archaeological work conducted in the area was undertaken to assess possible findings during fieldwork. Based on previous archaeological work—primarily north and east of this intermediate landscape—and on LCA information, site patterns prior to intensive historic land alteration activities show systematic use of the terrain as taro planting areas, limited habitation, and divisions of pastureland. Previous archaeological investigations within this portion of the Wailuku-Waikap© corridor have revealed very little data to confirm these patterns, this not surprising considering the impact that long and intensive agricultural exploitation has had on the surface of the area and subsurface strata. Traditional site components expected prior to these land-altering activities consist of dryland taro patches, associated agricultural components such as *`auwai* and/or terracing, house sites, boundary walls, and pasture walls. Expectations for identifying such data sets were low, however, due to the aforementioned historic land uses.

Traditional sites that may once have been present within the current project area were not expected to remain unaltered. Given LCA testimony and general settlement patterns for this inland, intermediate area, land use patterns for the current project area were thought to be most obviously related to historic-period settlement and cultivation—but on a very limited scale. At present, an empirically-based chronology of this area has yet to be provided, given intensive historic land modifications and the lack of datable archaeological evidence. According to Creed (1993:77):

> . . . we have no carbon dates to indicate the possible beginnings for this wetland agriculture in Waikap© Valley. Moreover, this area has been in constant use for crops and habitations at least since the time of the *M~hele*, if not long before and modern uses may have destroyed all traces of prehistoric uses. However, the LCA records and early maps document the extent of the *lo`i* agriculture in the

1850s. The stream valley in its upper reaches may have some remnants of these *M~hele* period *lo`i* or *`auwai*.

Expectations for this project area rested on several assumptions, some of which were proven valid at the end of fieldwork. First, the project area, lying in an open, intermediate zone containing hard soil composed of silty clay with cobbles was not intensively occupied during traditional times. Traditional and early historic-period populations were focused elsewhere in areas such as Waikapu, `Īao Valley, Waihee Valley, and Waiehu Valley. Thus, there were low expectations for identifying larger, intact sites or deposits; they simply were not constructed in this area. Secondly, there was the possibility that sand sediment could be present along the eastern flank of the project area. The association of sand and traditional/historic burials and cultural deposits has been well documented (see Kirch 1985). Thus, if sandy deposits did occur along the eastern flank, cultural deposits could be present. Third, the area was heavily modified for industrial cultivation. Remnants of such modifications, such as fill strata, excavated areas, reservoirs, and earth mounds/ berms were expected throughout the project area. A cursory study of the USGS Wailuku Quadrangle Map showed that irrigation ditches crossed the current project area. Finally, based on the primarily negative results from other archaeological projects conducted along the intermediate Wailuku-Waikapu corridor, there were limited expectations for identifying intact traditional-period architectural structures or intact cultural deposits lying beneath the tilled surface. However, historic structures related to irrigation and were likely, considering they were previously documented near the parcel (see Dega 2003). In all, some of these expectations were met during the current study.

METHODOLOGY

FIELD METHODS

Fieldwork consisted of systematic pedestrian survey of the entire 215.800 acre parcel and mechanical subsurface testing across representative portions of the parcel. Written and photographic documentation occurred during each phase of research. First, 100 percent systematic pedestrian survey was conducted to assess the presence/absence of surface features and artifacts as well as to assess soil deposits amenable to testing. As visibility was moderate within fifty percent of the project area (*makai* half), and low-to-moderate in the *mauka* half, 100 percent surface survey was conducted by two to three crewmembers spaced closely together (5 meters apart), walking parallel along north-south transects. When any structures, artifacts, or intriguing topographical changes were identified, they were plotted on an overall site map and flagged. Surface artifact assemblages, surface features, or anomalies were assigned temporary

site numbers. Temporary site numbers were converted to State Site Numbers upon a cursory project review by SHPD following the completion of fieldwork.

After survey, the crew returned to each flagged location to fully investigate the area and assess excavation potential. Representative areas were demarcated for subsurface testing. All subsurface testing was done mechanically by backhoe. Following excavation each trench was thoroughly documented via stratigraphic layer profiles, soil analysis, photography, and location plotting on a project area map (see Figure 4). A vast area was tested with these intermittent trenches, however, excavation produced negative results in terms of subsurface cultural material of interest to the archaeological record.

While no cultural materials were collected from any trench, soil samples were taken from each trench and analyzed in the field. The results revealed a fairly homogenous soil matrix. None of the excavated soil was screened, but all trench walls were thoroughly inspected. Photographs were taken first of trench locations prior to excavation, secondly of at least one profile (or multiples) of each trench, and thirdly, overview shots were taken of the respective trench at the base of excavation. Representative photographs are offered in Appendix A.

LABORATORY METHODS

As the results of survey and excavation were negative in terms of collected artifact classes and samples, laboratory work was not necessary. Because none of the soils analyzed in the field were deemed to be associated with past habitation surfaces, traditional agricultural levels, or cultural deposits, no samples were submitted for specialized analysis (*e.g.*, radiocarbon, pollen, phytolith analysis). Subsurface charcoal was an extremely rare commodity, and when found it was in association with modern debris from modern agricultural activity or dumping. Drafting of stratigraphic profiles, mapping illustration, and section drawings, were the primary components to laboratory work. All field notes, maps, photographs, and artifacts pertaining to this project are being curated at the SCS laboratory in Honolulu.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

A 100-percent pedestrian survey of the project area revealed the presence of a network of historic-period surface structures that are represented as the seven sites described below. The previously documented (Dega 2004) Waikapu Ditch (State Site No. 50-50-04-5493) and Waihee Ditch (State Site No. 50-50-04-5197) were subject to additional documentation during this survey. No traditional Hawaiian cultural material was found.

DITCHES

Four ditches are present within the project area. All four ditches originate outside of the project area and/ or extend beyond the project area's limits; no ditch exists as a segment contained strictly within the project area. Two of these ditches are of a larger historic context within Maui's sugarcane era. These are named ditches and some limited information regarding their construction and use appears within the historic record. It is important to note that up to as recently as 1983 (the publication of one series of USGS maps) two more of these significant, longer range water courses flowed into the project area. The Everett Ditch and Kama Ditch, however, have since been diverted or destroyed and no longer appear within the project area. Additionally, two lesser ditches served a more localized role within the project area. Only one lesser ditch, a possibly historic drainage from upslope, did not flow consistently at the time of survey.

State Site Number 50-50-04-5197 (Waihee Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (1905–1907 construction)
DIMENSIONS:	Length: 960.00 m; Width: 2.40m; Depth: 1.70 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None

DESCRIPTION: The Waihee Ditch is a flowing, concrete water conduit. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 10). Concrete cross-braces reinforce the relatively thin (0.10 m) concrete sides. The curving ditch flows into the project area from the north and roughly keeps a north-south orientation as it transects parcels 03 then 02 (see Figure 4). A smaller ditch (Site - 5729) that serviced only the locality of the project area, flows into the Waihee ditch from the west (pictured in Figure 10).

Modern alterations and maintenance to the Waihee Ditch are evidenced within the project area in the form of fortifications, a watergate near a modern reservoir, and foot and car bridges over the ditch. Additionally, nearby surface deposits of freshwater clam shells and *kukui* nuts are evidence of modern maintenance in the form of regular cleaning of the ditch. These finds are also a testament to the Waihee Ditches length and volume (Figure 11), as neither of these species exists within the project area; they traveled here via the ditch from environments north and *mauka*. In terms of historic information regarding a single project area site, the most available for

Figure 10: Waihee Ditch (50-50-04-5197). View to South.

Figure 11: Waihee Ditch (50-50-04-5197) paralleling Old Waikapu Road (50-50-04-5730). View to South.

the area pertains to Waihee Ditch. This history is worth noting in detail as it lends to an understanding of project area utilization around the turn of the century.

According to Wilcox's *Sugar Water: Hawai`i's Plantation Ditches* (1996:124), the Waihee "Canal" was started in June 1905 and was completed in May 1907. The entire canal cost $160,000 to construct and was used by Wailuku Sugar Company (founded 1862) and HC&S. The Waihee Canal was built under the leadership of an engineer named James T. Taylor. The canal, or ditch as it is now known, represents a monumental effort to carry water to dry areas of Maui. Wilcox's research emphasizes this display of manpower for the purpose of sugar irrigation:

> this 50-mgd-capacity ditch tapped the Waihee stream at the 650 foot elevation, just below the Aliele falls. . . . Its 10.62 miles included twenty-two tunnels totaling 16,539 feet; thirty-nine flumes totaling 2764 feet; 35,549 feet of open, cement-lined ditch; and a 1253-foot-long, 3-foot-diameter siphon to cross Iao Valley. Ditch grade averaged 2/5 feet per 1000. The longest tunnel (2246 feet) was especially challenging, as much of it went through hard close-grained rock and it required compressed air and percussion drills. This tunnel took eighteen months to cut. The contract price for the labor ranged from 85 cents to $5 per foot, depending on the material cut, the location, and the length of the tunnel. (1996:124)

The Waihee Ditch represents the oldest securely dated site on the project area landscape. Three other ditches are also located within the project area: two lesser, more localized ditches run from west to east; the Waikapu Ditch parallels the Waihee Ditch as it enters the project area from the north.

State Site Number 50-50-04-5493 (Waikapu Ditch)

FORM	Concrete water-course
FUNCTION:	Sugarcane irrigation
AGE:	Historic (in use by 1913)
DIMENSIONS:	Length: 61.00 m; Width: 1.70m; Depth: 1.00 m (within P. Area)
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	The Waikapu Ditch is a flowing, concrete water conduit that taps

the Iao Stream at upper elevations within Iao Valley. Within the project area, the ditch is U-shaped, having two vertical concrete sides, an open top, and a flat concrete bottom (Figure 12)

Figure 12: Waikapu Ditch (50-50-04-5493) at point where it enters Project Area. View to South.

—and is very similar in appearance to Waihee ditch. The concrete sides of the ditch measure 0.20 m thick. The curving ditch flows into the *mauka* fifth of the project area from the north and roughly keeps a north-south orientation. Unlike, the Waihee Ditch, the Waikapu Ditch does not transect the project area, rather it enters and then ceases.

The Waikapu Ditch flows into the Site -5727 reservoir where it terminates (although this may not have been the historic termination point of this ditch). The out-flow of this reservoir is a smaller, localized ditch that runs *makai* (Site -5729) and does not resemble the Waikapu ditch. Modern alterations and maintenance to the Waikapu Ditch are evidenced within the project area in the form of fortifications and a car bridge over the ditch. Wilcox (1996:124-125) notes that the ditch was in use prior to 1913 and was built by Wailuku Sugar Company.

State Site Number 50-50-04-5729 (un-named ditch)

FORM	Rock and concrete mortar water-course
FUNCTION:	Sugarcane irrigation
AGE:	Likely historic
DIMENSIONS:	Length: 1200.00 m; Width: 0.90m; Depth: 0.75 m (within P. Area)
CONDITION:	Fair

SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, flowing ditch was almost certainly built after Waihee and Waikapu Ditch construction. Site -5729 serves as a *mauka-makai* link between these two major sources of imported water. Site -5729 is constructed of basalt rock walls, specifically small boulders that are often welded together with concrete mortar (Figures 13 and 14). The walls of this U-shaped ditch are four to six courses high, and average 0.20 m thick. The bottom of the ditch is a concave, roughly-molded concrete basin. This construction material is an indicator of a localized irrigation effort, as the cost of labor and materials was a significantly smaller undertaking than the major ditches flowing in from the north. The origin of the Site -5729 ditch is the outflow of the Site -5727 reservoir (which gathers its water from the Waikapu Ditch terminus). Site -5929 then flows into the Waihee Ditch (Figure 15). The Site -5729 ditch is controlled by modern mechanisms in its flow into and out of the modern, smaller reservoir, and eventually downslope toward Honoapi`ilani Highway and out of the project area.

Figure 13: Site 50-50-04-5729 Ditch. View to West.

Figure 14: Site 50-50-04-5729 Ditch, Showing Rock and Mortar Construction of Side Walls. View to Northwest.

Figure 15: Site 50-50-04-5729 Ditch (at center) flowing into Waihee Ditch (50-50-04-5197). View to West.

State Site Number 50-50-04-5726 (un-named ditch)

FORM Earthen berm ditch
FUNCTION: Sugarcane irrigation
AGE: Possibly historic
DIMENSIONS: Length: 215.00 m; Width: 7.00m; Depth: 2.50 m (within P. Area)
CONDITION: Fair
SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, intermittently flowing ditch was possibly constructed within the historic sugar era. It is a wider U-shape than the other ditches, and is choked with thick introduced grasses that stand over two meters tall. Like the Site -5729 ditch, this is a localized irrigation effort. The possibility exists that this is not a sugar cane agriculture feature, but a modern widening of a natural watershed drainage. However, its earthen berm sides resemble the historic, machine-created berms (Site -5728) constructed on the project area as erosion control during the sugar era. This ditch / drainage runs downslope, approximately west to east.

State Site Number 50-50-04-5727 (un-named reservoir)

FORM Rectangular reservoir
FUNCTION: Sugarcane irrigation
AGE: Likely historic
DIMENSIONS: Length: 229.00 m; Width: 76.00m; Depth: undetermined
CONDITION: Excellent (currently maintained)
SURFACE ARTIFACTS: None
EXCAVATION: None
DESCRIPTION: This un-named, large reservoir is currently active and maintained by modern pumping equipment and fencing (Figure 16). It is surrounded by machine-created earthen berms of the same construction seen elsewhere on the project area in association with historic agriculture. Waikapu Ditch flows from the north and empties into Site -5727 (see Figure12). Everett Ditch, flowing downslope from the *mauka* West Maui Mountains, also once terminated at this reservoir (however, this ditch no longer exists within the project area). The out-flow for Site -5727 is the Site -5729 localized, lesser ditch. The length of this reservoir is oriented north-south.

The size, construction, elevation, position, and shape of Site -5727 resembles that of Hopoi Reservoir (State Site 50-50-04-5473), a documented sugar era irrigation site. Hopoi Reservoir is located 1 kilometer northeast of the Site -5727 reservoir and the latter is likely of the same construction period as the former. Hopoi Reservoir, although empty and abandoned during

Figure 16: Site 50-50-04-5727 Reservoir. View to North.

initial recordation (see Dega 2004), also was a collection point of a known major water course (Kama Ditch, Site 50-50-04-5474).

Note: A smaller, modern reservoir is located within the *makai* third of the project area (Figure 17). A 1977 aerial map of the Kahului isthmus (see Figure 3) clearly shows the Site -5727 reservoir, and also shows that this smaller reservoir was not yet constructed.

State Site Number 50-50-04-5728 (erosion-control berms)

FORM Earthen berms (n = 14)
FUNCTION: Sugarcane field erosion control
AGE: Likely historic
DIMENSION RANGE: Length: 132 to 456 m; Width: 5.0 to 17.0 m; Height: 1.0 to 1.8 m
CONDITION: Fair
SURFACE ARTIFACTS: None
EXCAVATION: ST-6
DESCRIPTION: Fourteen soil berms comprise Site -5728 (Figure 18). This historic method of machine-piled earthen mounds was used within cane fields to prevent topsoil erosion. As depicted by Figure 4, the positions of the fourteen berm segments vary slightly from a general north-south orientation. What is consistent, however, is that the position of each individual

Figure 17: Modern Reservoir at center of Project Area's Eastern Half.

Figure 18: Site 50-50-04-5728, Feature 13 (Erosion-control Berm). The contour of the berm running cross-slope can be seen as a mound in the dirt road. View to Northeast.

segment runs perpendicular to the sloping terrain within that specific locality of the project area. The mounded soil acted to block rainwater runoff, preserving both moisture and topsoil. To a lesser degree, it is possible that the berms also prevented some wind blown soil erosion, as some of the berms were mounded to a height of 1.80 m. State Site Number 50-50-04-5522 provides a documented case of such berms in the nearby former cane fields of Waiehu, Maui (Wilson and Dega 2004).

Stratigraphic Trench 6

One stratigraphic trench (ST-6) was backhoe excavated through a single soil berm segment of Site -5728. The Feature 4 berm ran north-south at the center of the project area's south perimeter (see Figure 4). ST-6 perpendicularly transected the Feature 4 berm with the intent to explore its interior construction and subsurface depth. A cross sectional profile of ST-6 (Figures 19 and 20) indicates Site -5728 berms are 100 percent made up of naturally occurring soils that have been machine mounded in the past. No imported rock or other substance was used in the construction of these berms. The soil disturbance extends into Layer II (to a maximum depth of 50 cmbs) as evidenced by the mounded subsurface contour in shown in Figure 20. This simply means that the plow mechanism that created these berms cut deeper into the natural landscape in this berm building effort than was generally used when tilling the surrounding fields. (The surrounding fields consistently display an undisturbed Layer II.) Subsurface content is explored further under the heading "Subsurface Testing."

State Site Number 50-50-04-5730 (Old Waikapu Road)

FORM	Dirt road
FUNCTION:	Probable cane-haul route
AGE:	Likely historic
DIMENSIONS:	Length: 945.00 m; Width: 3.50m
CONDITION:	Good
SURFACE ARTIFACTS:	None
EXCAVATION:	None
DESCRIPTION:	A dirt road that enters the project area from the eastern perimeter

(Honoapi`ilani Highway)—and then turns southwest before crossing the southern perimeter—forms the boundary between parcels 02 and 03. On a 1992 Tax Map Key the following words are printed in association with this road: "(Old Waikapu Road) County Road". At the time of survey, this road continued to see infrequent pedestrian and vehicle traffic—reserved for those transecting this undeveloped swath of land as a possible shortcut between paved roads. For this reason, this dirt road remains free of vegetation (Figure 21).

Figure 19: ST-6 (Photograph of North Wall) Profile Shows Subsurface Contour of Machine-mounded Site -5728, Feature 4 Berm. View to North.

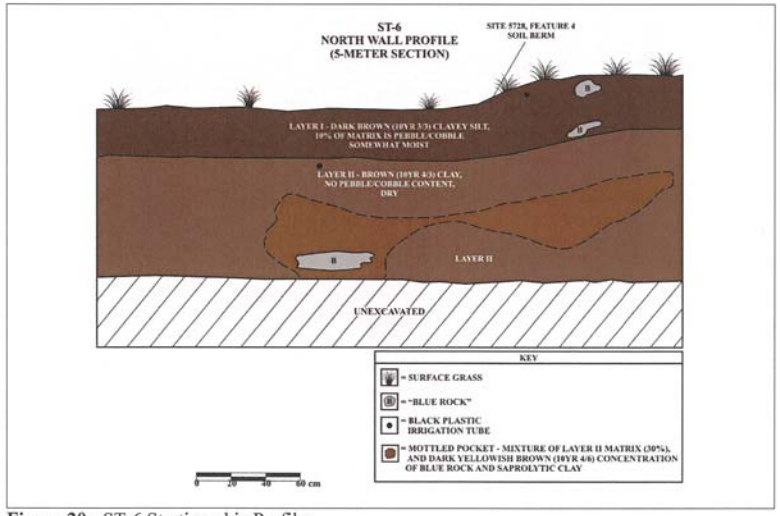

Figure 20: ST-6 Stratigraphic Profile.

Figure 21: "Old Waikapu Road" (50-50-04-5730). View to Southwest.

Exactly how old "Old" Waikapu Road is difficult to determine precisely. However it is safe to assume that this newly recorded State Site Number (50-50-04-5730) originated in the same sugar period as the other six sites within the project area. A Cultural Impact Assessment (CIA) within the same project area provides further detail backing a historic origin to the Old Waikapu Road. Author of the CIA, Kalei Tsuha, interviewed a local resident who, as a child in 1922, remembers traveling across the project area on this same road by horse (K. Tsuha, personal communication 9/25/05).

SUBSURFACE TESTING

Twenty-one stratigraphic trenches (STs) were mechanically excavated by backhoe to test for the presence/absence of subsurface cultural deposits in a variety of project area locations. Excavation took place over a three-day period, August 22–24, 2005. Of these trenches, only one (the previously described ST-6) revealed any kind of subsurface cultural material. ST-6 was placed through an existing soil berm in order to document construction technique of these historic agricultural features. ST-6 documented the subsurface extent of the Site -5728, Feature 4 soil berm (the base of which does extend into the otherwise undisturbed Layer II matrix) (see

Figure 20). None of the 21 trenches revealed any type of artifact, charcoal deposit, or midden deposit.

Testing was spread evenly across the project area with the intent of documenting soil stratigraphy trends by project area location. In total, 21 stratigraphic trenches (ST-1 through ST-21) were excavated and documented. The trenches averaged 7.86 m long, 0.70 m wide, and 1.58 m deep.

Calculating the above averages, an approximate area of 155 m^2 and volume of 183 m^3 of soil was excavated during testing. These sampling figures are primarily indicative of the limited positive results achieved for each trench; if significant cultural resources were documented during the project, it is likely that less geographic space would have been excavated as documentation and sampling of such cultural resources would have been more time consuming. In the amount of time allowed for the project, testing was geared toward obtaining the most information available to assess the presence/absence of subsurface cultural deposits (as it was fairly quickly determined that all surface sites were historic).

STRATIGRAPHIC TRENCH LAYER ANALYSIS

As expected, excavation within the former sugarcane fields resulted in a consistent stratigraphy of culturally sterile soils. Trenching revealed no more or less than two distinct layers in each ST. The variation between trenches was even less than expected, as in each, Layer I represented soil that had been disturbed by historic and modern agricultural practices, and Layer II represented undisturbed soil. The minimal variation between trenches was threefold: the thickness of Layer I varied by 41 centimeters at most; the soil color and qualities variety slightly in among some trenches; and the pebble, cobble, and or saprolytic rock content within Layer II somewhat varied. Otherwise, the project area is extremely homogenous in subsurface content. This can be credited primarily the effects of decades of agricultural use, and also the fact that the Iao Series soils existing here show only minor variation. The following two examples, ST-7 and ST-9, display the typical slight range of stratigraphic variation within the project area (Figure 22).

ST-9 is the standard project area stratigraphy. Layer I has a surface cover of thick, dried grass. Layer I is 65 cm deep and consists of a moderately moist, very dark grayish-brown (10YR 3/2) clayey silt, of which less than ten percent is pebble/ cobble. Layer I contains evidence of the modern agricultural practices in the form of plastics. Only two of the 21 STs excavated did not

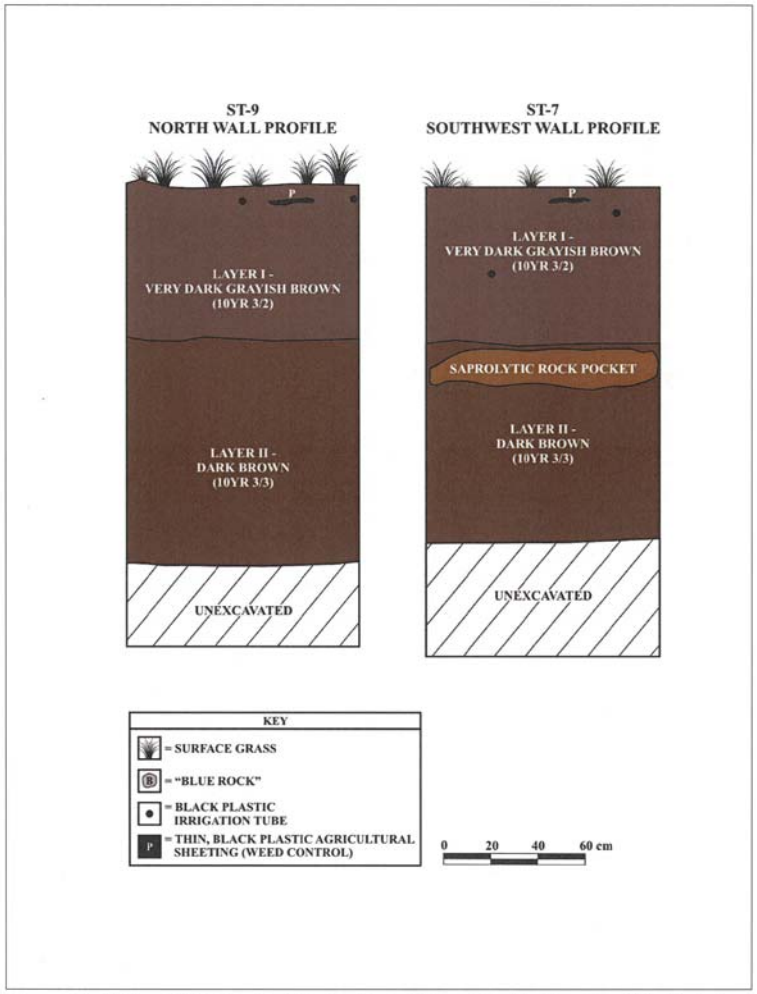

Figure 22: ST-9 and ST-7 Profiles Display Typical Subsurface Stratigraphy within Project Area.

contain either drip line irrigation tubing or black plastic weed-control sheeting in Layer I (see Appendix A). In the majority of STs, Layer I contained both of these plastics at varying depths.

Layer II, as evidenced in ST-9, was often a very compact, moderately dry, dark brown (10YR 3/3) clay, of zero pebble or cobble content. Often, however, a pocket of saprolytic (decomposing) rock or "blue" rock could be found in Layer II (as shown in the ST-7 profile). Layer II thickness remains undetermined as this layer proved too deep to find bedrock, even with the reach of a large backhoe. ST-20 was excavated to a maximum depth of 2.60 m in an unsuccessful attempt to reach bedrock. It is safe to assume that Layer II of the project area is at least 2.00 m thick, but probably much thicker.

DISCUSSION AND CONCLUSIONS

Scientific Consultant Services, Inc. (SCS) conducted Archaeological Inventory Survey on two parcels totaling 215.800 acres, which form one large land tract within Waikapu (and partially Wailuku) Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK (2) 3-5-02: 02 and 03]. Inventory Survey included archival research, systematic pedestrian survey of the project area, and representative subsurface testing. While the landscape did not yield traditional Hawaiian archaeological sites, it did reveal a network of irrigation systems in the form of ditches and a reservoir, erosion-control berms, and a historic dirt road—forming seven sites. Five of these sites are new additions to the State's rich historic record of turn-of-the century sugar industry in Hawai`i.

WATER CIRCUITRY

In his 2004 Inventory Survey Report of the Kehalani Mauka Development lands Dr. M. Dega initiated three hypotheses regarding historic water circuitry within this Wailuku / Waikapu landscape. Aside from the small area of land covered by the pre-existing Kuikahi Drive that acts to separate the two surveys—the 348.613 acres in Dega's study and the 215.800 to the south (the present survey) may be viewed as 564.413 contiguous acres for the archaeological record. This is not an arbitrary relationship, as the *ahupua`a* division separating these fields did not individualize their historic utilization. The following text is from *An Intermediate Zone Archaeology Inventory Survey [TMK (2) 3-5-001:portion of 001]* (Dega 2004:41–42):

> Several intriguing patterns emerge as one focuses upon the empirical, historic-period evidence at hand. One of these patterns is the direction in which the historic ditches have been constructed and utilized across the parcel. Case in point: three main ditches or canals run north-south, or [*perpendicular*] to the slope, across the project area and beyond. Waihee Ditch, Kama Ditch, and the westernmost ditch of Site T-24 (Site -5493) [*Waikapu Ditch*] are the most well-constructed on the parcel. These ditches were water conduits across these dry zones. Typically they could be used to water areas along their course or would simply empty into large retention basins (reservoirs) at selected points.
>
> However, there is also a network of ditches, mostly earthen berms and small channels, that run [*parallel*] to the slope on a west (upslope)-east (downslope) axis. These ditches are commonly non-formalized like the north-south ditches and tend to be more localized. Site T-16 (Site -5490), built on an east-west axis for instance, runs a total of 1,000 meters while the north-south Waihee Ditch runs for more than 16 kilometers. The important point is that there is a functional difference between the north-south oriented ditches and the east-west coursing ditches. The more formalized [and costly] north-south ditches are actually water conduits wherein water may be carried long distances to irrigate such water-poor locales as the present project area. The less conventional ditches situated on an east-west axis are simply drainages and do not fulfill an irrigation role on these dry parcels. These smaller ditches appear to be more naturally formed by erosion and were simply modified to accommodate excess water and sediment flow so as not to interfere with the main purpose of cultivation. This pattern appears valid for the present project area but requires additional information from other locales to be proven, negated, or amended.

Thus, we propose two hypotheses that remain to be examined:

1. All north-south canals or ditches along central Maui that run [*perpendicular*] to the slope are water conduits and inherently contain an irrigation function.

2. All east-west bearing canals or ditches along Central Maui that run [*parallel*] to the slope are only drainages that do not disseminate water for irrigation purposes but function to remove overflow so as not to curtail cultivation potential.

DISCUSSION POINTS

The current study provides a second example within the archaeological record confirming Dega's first hypothesis. Both the Waihee Ditch and Waikapu Ditch (numbered, but not named in Dega 2004) were identified as running north to south. These major irrigation conduits continue this flow direction into the current project area. These are large, long, costly, historic structures that were designed to carry stream waters great distances. These ditches run cross-slope within the project area.

The current project area findings expand upon, but do not necessarily confirm Dega's second hypothesis. Two lesser, localized ditches do indeed follow the same orientation as those in the Kehalani lands. Both of these lesser ditches run with the slope contour (perpendicularly linking the major ditches, at times). However, the hypothesis of a functional difference is not soundly reinforced. The Site -5726 ditch is a subtle, earthen feature that may have filled a drainage role rather than an irrigation role. But there is no proof that the more elaborately constructed Site -5729 ditch (stacked basalt boulders that are mortared with concrete) did not in fact serve as a *mauka* to *makai* irrigation artery. This ditch may have served as an outlet to the reservoir's (Site 5727) spill-over, however, this function should not exclude a dual purpose of localized irrigation.

Finally, like in Dega's (2004) study, four points contribute to the current project's lack of traditional Hawaiian cultural material. First, and most obviously for this location, historic impacts have dramatically altered the landscape so much as to erase larger archaeological traces of traditional-period activities. Second, the lack of traditional-period evidence suggests that these open lands were probably not intensively utilized during prehistoric times. The current project area may have not been selected as a habitation zone as it is an open area without perennial water resources—and more preferable lands were readily available. Third, the types of traditional activities conducted within and near the project area may not have left archaeological signatures. Fourth, as is the case for all archaeological projects, testing may have failed to coincide with the existing subsurface cultural materials. This is unlikely but always a possibility as 100 percent of any parcel is rarely ever fully excavated.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

Seven archaeological sites were documented in the project area: Waihee Ditch (50-50-04-5197); Waikapu Ditch (50-50-04-5493); an un-named, lesser ditch (50-50-04-5729); a second un-named, lesser ditch (50-50-04-5726); a large, un-named reservoir (50-50-04-5727); a series of fourteen sugarcane-field erosion-control, soil berms (50-50-04-5728); and a County dirt road named "Old Waikapu Road" (50-50-04-5730).

These sites have been evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five criteria are classified below:

Criterion A: 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 distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in 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

All seven of these historic sites have been assessed as significant under Criterion D.

Based upon the results of this Inventory Survey and the results of archaeological work on adjacent parcels that have also produced primarily negative results (see Dega 2003, 2004; Monahan 2003; Buffum and Dega 2001), it appears as though additional archaeological research on the subject parcels would not contribute a significant volume of additional data to the interpretation of the area or region, or to Hawaiian prehistory/history. Archaeological Monitoring is not recommended during construction within the project area. The seven sites documented herein have yielded their information to the historical record and no additional archaeological work is recommended.

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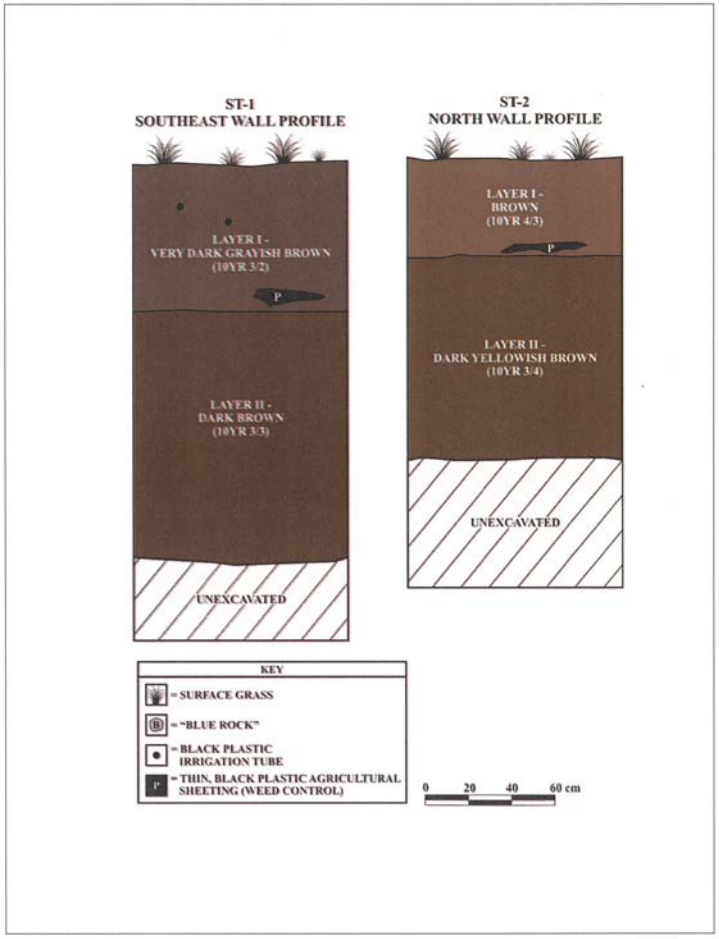
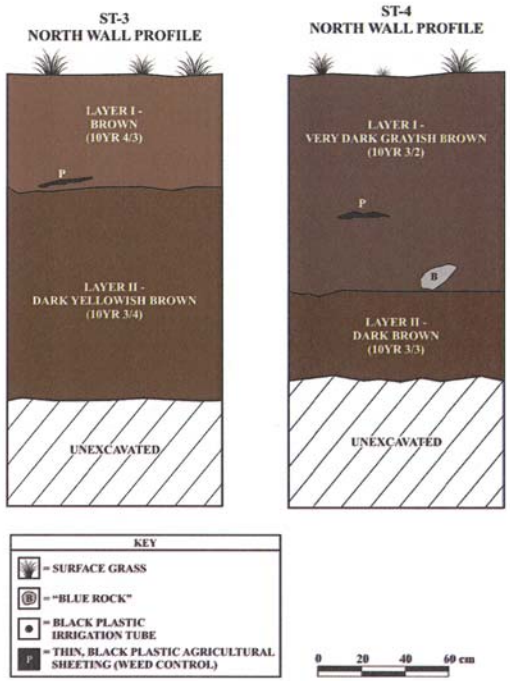
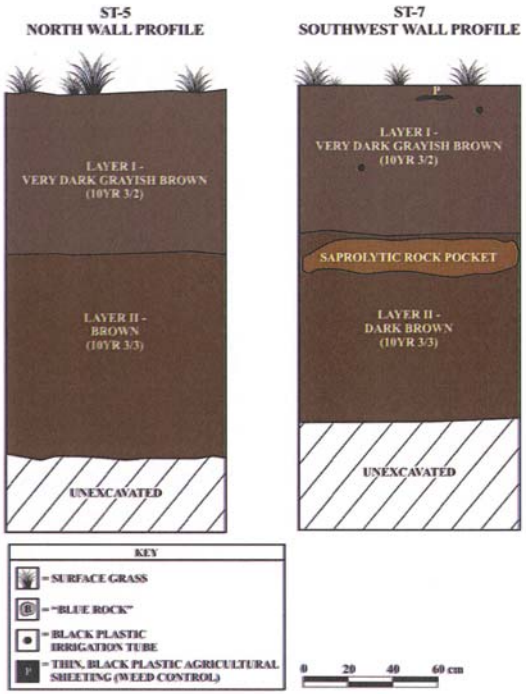
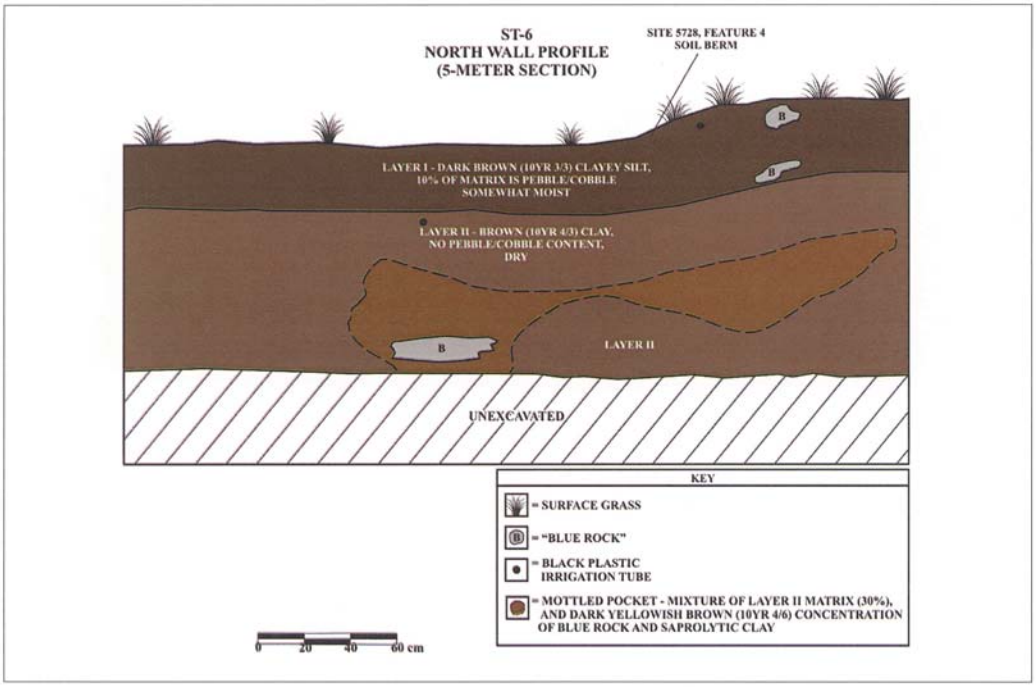
APPENDIX A: STRATIGRAPHIC PROFILES

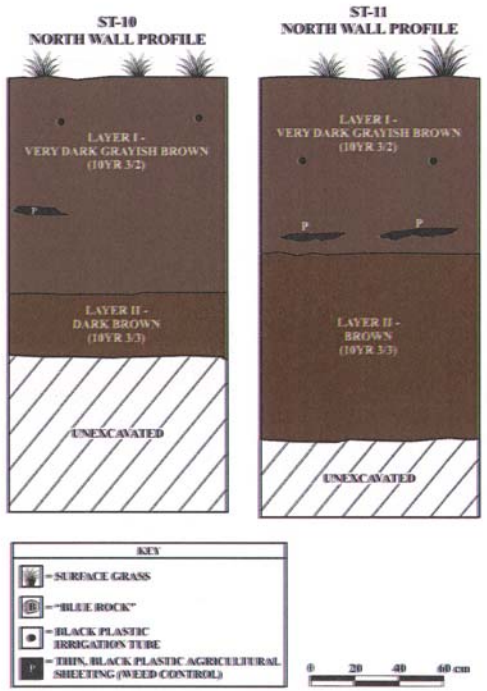



ST-3
NORTH WALL PROFILE
LAYER I -
BROWN
(10YR 4/3)
P
LAYER II -
DARK YELLOWISH BROWN
(10YR 3/4)
UNEXCAVATED
ST-4
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
B
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm


ST-5
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
ST-7
SOUTHWEST WALL PROFILE
P
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
SAPROLYTIC ROCK POCKET
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm

ST-8
WEST WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-9
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
0
20
40
60 cm


ST-6
NORTH WALL PROFILE
(5-METER SECTION)
SITE 5728, FEATURE 4
SOIL BERM
B
B
LAYER I - DARK BROWN (10YR 3/3) CLAYEY SILT,
10% OF MATRIX IS PEBBLE/COBBLE
SOMEWHAT MOIST
LAYER II - BROWN (10YR 4/3) CLAY,
NO PEBBLE/COBBLE CONTENT,
DRY
B
LAYER II
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC
IRRIGATION TUBE
= MOTTLED POCKET - MIXTURE OF LAYER II MATRIX (30%),
AND DARK YELLOWISH BROWN (10YR 4/6) CONCENTRATION
OF BLUE ROCK AND SAPROLYTIC CLAY
0
20
40
60 cm


ST-10
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-11
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
P
LAYER II -
BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
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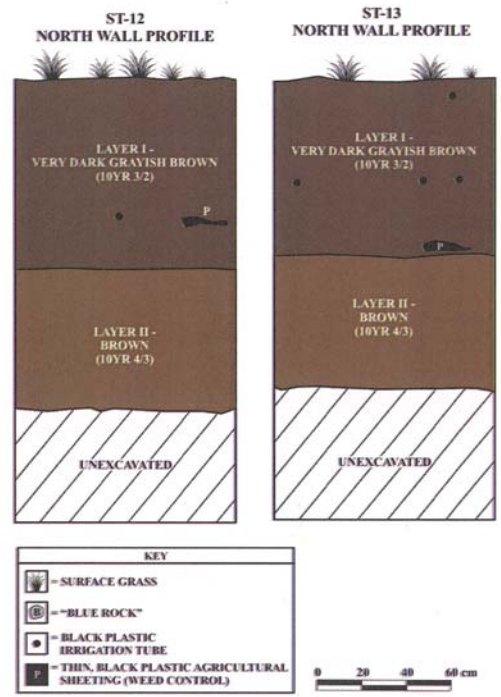
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(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
ST-13
NORTH WALL PROFILE
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
UNEXCAVATED
KEY
= SURFACE GRASS
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= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
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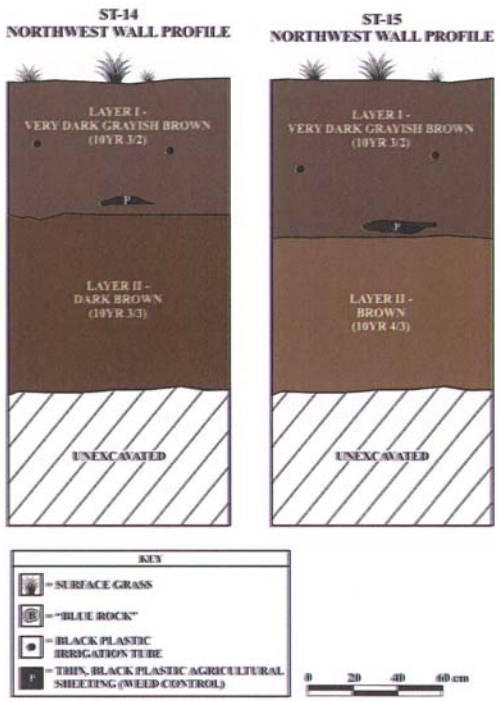
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(10YR 3/2)
P
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-15
NORTHWEST WALL PROFILE
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(10YR 3/2)
P
LAYER II -
BROWN
(10YR 4/3)
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KEY
= SURFACE GRASS
= "BLUE ROCK"
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IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
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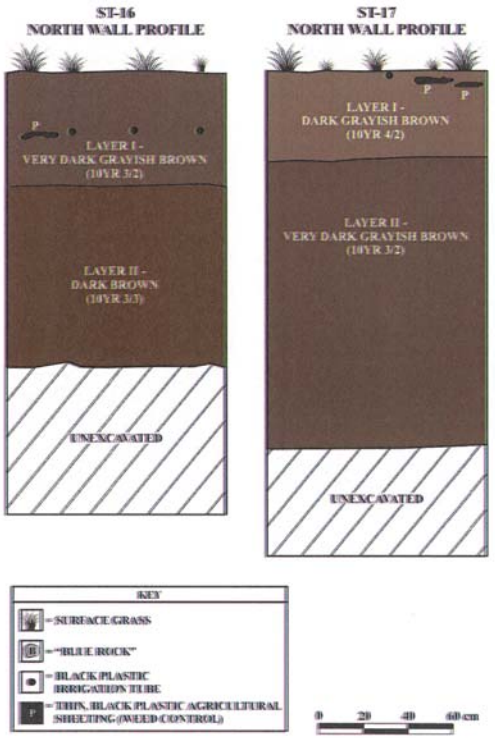
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(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
ST-17
NORTH WALL PROFILE
P
P
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DARK GRAYISH BROWN
(10YR 4/2)
LAYER II -
VERY DARK GRAYISH BROWN
(10YR 3/2)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
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IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL
SHEETING (WEED CONTROL)
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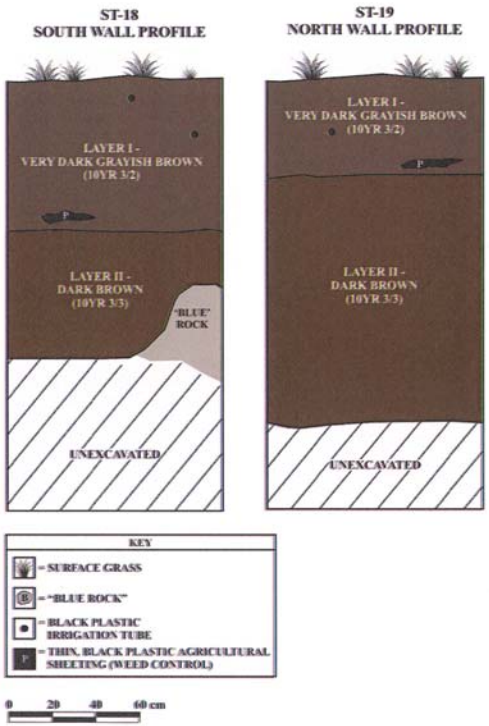
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SOUTH WALL PROFILE
ST-19
NORTH WALL PROFILE
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(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
"BLUE" ROCK
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
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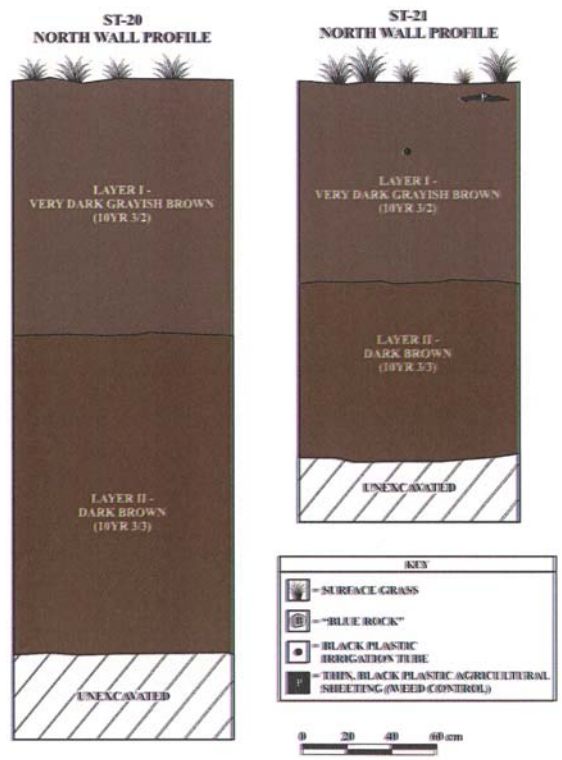
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NORTH WALL PROFILE
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NORTH WALL PROFILE
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(10YR 3/3)
UNEXCAVATED
LAYER I -
VERY DARK GRAYISH BROWN
(10YR 3/2)
LAYER II -
DARK BROWN
(10YR 3/3)
UNEXCAVATED
KEY
= SURFACE GRASS
= "BLUE ROCK"
= BLACK PLASTIC IRRIGATION TUBE
= THIN, BLACK PLASTIC AGRICULTURAL SHEETING (WEED CONTROL)
0 20 40 60 cm

Final Report

Phase II Environmental Site Assessment
Central Maui Regional Park
Kahului, Maui, Hawaii
TMK: (2) 3-8-007:101 (portion)

Prepared for:

State of Hawaii
Department of Land and Natural Resources
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Prepared by:

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December 2013

Executive Summary

Element Environmental, LLC (E2) completed a Phase II Environmental Site Assessment (ESA) of the proposed Central Maui Regional Park site located on Tax Map Key (TMK) parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA determined if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

Per the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009), the screening was completed on various sized decision units (DUs) utilizing a multi-increment (MI) sampling approach. The 65-acre site was divided into seven (7) DUs ranging in size from approximately 16,300 square feet to 8.1 acres. Two (2) MI soil samples were collected from each DU, one (1) at 0 – 6 inches below ground surface (bgs), and the other at 1 – 2 feet bgs. One of the DUs identified as the Stressed Vegetation DU was sampled in triplicate for quality assurance/quality control (QA/QC) purposes. Each multi-increment sample was analyzed for some or all of the following COPCs: total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), diesel range organics (DRO) and residual range organics (RRO), halogenated volatile organic compounds (HVOCs), polynuclear aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), Organochlorine Pesticides, Resource Conservation and Recovery Act (RCRA) 8 Metals, polychlorinated biphenyls (PCBs) and Dioxins/Furans.

The results of the multi-increment sampling analyses indicate that residual levels of COPCs are not present at significant levels in surface and subsurface soils at the site. HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected. Dioxins/Furans, the organochlorine pesticide 4,4'-DDE, PAHs, RCRA 8 metals, TPH-DRO and TPH-RRO were all detected above laboratory reporting limits in various MI samples, however none exceeded their associated Tier 1 environmental action levels (EALs) for unrestricted land use. Therefore the project site does not require any further action or restrictions on land use prior to its development into a public park.

No MEC were encountered in any of the DUs during MI soil sampling or site reconnaissance activities. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified at the project site. A total of 16 solid waste soil piles located throughout the project site were identified during the site reconnaissance. Physical descriptions were recorded in the field notebook and the footprint of each soil pile was surveyed using a differential global positioning system (GPS) unit. No MEC were observed on the surface of any of the soil piles. It is recommended that the solid waste in the soil piles be removed and properly disposed during the future re-development of the site as a public park. It is also recommended that a qualified environmental scientist be present during the solid waste removal to visually observe if any releases from the solid wastes have occurred that warrant further investigation and sampling. Although MEC was not observed during the site reconnaissance, MEC was found during excavations on adjacent properties. It is recommended that all future grading operations be completed with MEC construction support.

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Appendix D Precision, Accuracy, Representativeness, Comparability, Completeness Summary Report
Appendix E Soil Pile Photographs
Appendix F Senior Unexploded Ordnance Supervisor Final Report

List of Acronyms

%RSD	percent relative standard deviation
APPL	Agriculture and Priority Pollutant Laboratories, Inc.
AR	applicable requirements
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
°C	degrees Celsius
CD-ROM	Compact Disc Read Only Memory
COC	Chain-of-Custody
COPC	Contaminants of Potential Concern
DLNR	Department of Land and Natural Resources
DQO	data quality objectives
E2	Element Environmental, LLC
EAL	Environmental Action Level
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
°F	degrees Fahrenheit
GPS	global positioning system
HDOH	State of Hawaii Department of Health
HDPE	High Density Polyethylene
HEER	Office of Hazard Evaluation and Emergency Response
HVOC	halogenated volatile organic compound
LCS	laboratory control sample
LDC	Laboratory Data Consultants
MDL	method detection limit
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mph	miles per hour
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
msl	mean sea level

PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, completeness
PCB	polychlorinated biphenyl
pg/g	picogram per gram
PPE	personal protective equipment
PQL	practical quantitation limit
PZUE	Pu'uone sand
QA	quality assurance
QA/QC	quality assurance/quality control
RPD	relative percent difference
RSD	relative standard deviation
SOW	scope of work
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semi-volatile organic compound
TMK	Tax Map Key
TPH-DRO	total petroleum hydrocarbons-diesel range organics
TPH-GRO	total petroleum hydrocarbons-gasoline range organics
TPR-RRO	total petroleum hydrocarbons-residual range organics
USDA-SCS	U.S. Department of Agriculture Soil Conservation Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance
VOC	volatile organic compound

Section 1 Introduction

This Phase II Environmental Site Assessment (ESA) Report presents the work procedures, methods, and results from the Phase II ESA conducted by Element Environmental, LLC (E2) for the proposed Central Maui Regional Park site located on Tax Map Key (TMK) parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA was conducted to determine if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document and survey piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

This Phase II ESA Report has been prepared for the State of Hawaii Department of Land and Natural Resources (DLNR) Division of State Parks in accordance with E2's sampling and analysis plan (SAP) dated March 2013.

1.1 Purpose and Objectives

The purpose of the Phase II ESA was to determine if historical uses at the property as identified in the Phase I ESA have impacted soils at the site with COPCs. In addition, due to the potential presence of MEC at the site, a site reconnaissance of the property was conducted in order to identify features that may suggest previous use of the site for a training range or bombing target. The results of this screening will be used to determine if additional characterization and/or remediation with regard to the planned future development is necessary to protect human health and the environment.

1.2 Report Organization

Details of the investigation are presented in the following sections of this Phase II ESA Report. The report is organized as follows:

Section 1:	Introduction
Section 2:	Site Background
Section 3:	Field Investigation and Sample Collection
Section 4:	Soil Sampling Results
Section 5:	Summary of Findings
Section 6:	References
Appendix A:	Project Photographs
Appendix B:	Laboratory Analytical Data Reports
Appendix C:	Data Validation Report
Appendix D:	Precision, Accuracy, Representativeness, Comparability, Completeness Summary Report
Appendix E:	Soil Pile Photographs
Appendix F:	Senior Unexploded Ordnance Supervisor Final Report

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Section 2 Site Background

2.1 Site Location and Description

The project site consists of one contiguous parcel of relatively undeveloped land located two (2) miles inland from Kahului, Maui along the northwestern side of Kuihelani Highway (Figure 2-1). The property consists of approximately 65 acres of land designated as TMK parcel (2) 3-8-007:101 (portion).

Kuihelani Highway runs along the southeastern boundary of the site. A dirt road off of Kuihelani Highway leads up to the southwestern perimeter of the site, which is approximately one quarter mile inland from the highway. The dirt road forks halfway to the site perimeter and the right hand segment transects the parcel and leads to the northeastern boundary. A lined irrigation basin is located adjacent to the southwestern perimeter of the project site along the dirt access road. Various concrete pads and infrastructure are located throughout the southern portion of the property. These are believed to be the remnants of a sod farm which previously occupied this portion of the property. The northern portion of the property is grassy, semi-cleared land which is believed to have been used for past agricultural practices.

The project site is currently unoccupied. The Maui Lani housing development is being constructed along the northeastern boundary of the site, and horse pastures occupy the area west of the site. The horses are contained by wire fences which run along the western edge and through the northern portion of the property. An additional entrance to the project site is located on the northern edge of the property where South Kamehameha Avenue temporarily terminates in the adjacent Maui Lani housing development. The state land use designation for the property is Agricultural (State of Hawaii, 2012).

2.2 Physiography

2.2.1 Climate

The annual average temperature at the property is 75.6 degrees Fahrenheit (ºF). The property experiences an average winter temperature of approximately 72.2ºF and an average summer temperature of approximately 78.5ºF. Annual average wind speed at the property is approximately 12.8 miles per hour (mph). Total precipitation at the property averages approximately 18.5 inches annually. Precipitation occurs mostly during winter and relatively infrequently during the summer. Precipitation averages approximately 9.1 inches during the winter, approximately 4.6 inches during the spring, approximately 3.7 inches during the fall, and less than one (1) inch during the summer (PBR, 2011).

2.2.2 Geology

The island of Maui is part of a huge volcanic massif built by at least six major and one minor volcano (Macdonald, et al., 1983). The lower saddles between the volcanoes are flooded by sea water, dividing the volcanic massif into four separate islands – Maui, Kahoolawe, Lanai, and Molokai (Macdonald, et al., 1983). The development of the island above sea level is believed to have occurred between late Pliocene and Pleistocene time (approximately one to 12 million years ago) (Macdonald, et al., 1983).

Maui as it is today consists of two major volcanoes; the older West Maui Volcanics and the younger Haleakala or East Maui Volcanics (Macdonald, et al., 1983). The volcanic rocks of West Maui are divided into three series named the Wailuku Volcanic Series (the oldest), the Honolua Volcanic Series, and the Lahaina Volcanic Series (the youngest) (Macdonald, et al., 1983). The Wailuku Volcanic Series built the major shield of the volcano and was followed by a period of weathering and erosion. The Honolua Volcanic Series consists of thin layers of flows, domes, and pyroclastic deposits. After a long period of erosion, came the eruptions that produced the flows and cones of the rejuvenated volcanism known as the Lahaina Volcanic Series. The volcanic rocks of East Maui or Haleakala are divided into two series; the Honomanu Volcanic Series (oldest), the Kula Volcanic Series, and the Hana Volcanic Series (youngest) (Macdonald, et al., 1983). The Honomanu Volcanic Series, the main mass of Haleakala, has been almost wholly buried by later lavas and is now exposed only in sea cliffs along part of the north shore. The Kula Volcanic Series forms the surface over most of the northwestern and southeastern segments of the mountain including the subject property. In some localities the Kula lavas are separated from the underlying Honomanu lavas by a layer of red soil, but at many places there is no obvious break between the two series. The Hana Volcanic series were formed after a long period of erosion and are considered the post erosional lavas. Hana lavas are absent on the entire northwestern sector of the volcano.

The subject property is located within the isthmus on the saddle between the West and East Maui Volcanics. The isthmus consists of dunes, chiefly lithified and is underlain by East Maui lavas that banked against those of West Maui (Macdonald and Abott, 1970).

2.2.3 Soils

According to the U.S. Department of Agriculture Soil Conservation Service (USDA-SCS), the soil in the area of the site is classified as Pu'uone sand (PZUE).

- The Pu'uone sand (PZUE) series (7 to 30 percent slopes) consists of somewhat excessively drained soils in uplands. These soils developed in material weathered from coral seashells. In a typical profile, the surface layer is sand about 20 inches thick and the subsoil is approximately 20 to 40 inches of cemented material. Capacity of the most limiting layer to transmit water is moderately high to high, available water capacity is very low, and the depth to water table is more than 80 inches (USDA-SCS, 2013).

2.2.4 Hydrogeology

The subject property is located within the Kahului Aquifer System of the Central Aquifer Sector (Mink and Lau, 1990). Two aquifers underlie the site. The upper aquifer has the aquifer code 60301116 (12211). This aquifer is basal, unconfined, located in sedimentary (nonvolcanic) lithology and is currently used as an ecologically important water source. The aquifer has a low salinity with a chloride content of 250 milligrams per liter (mg/l) to 1,000 mg/l. This aquifer is considered irreplaceable and is highly vulnerable to contamination (Mink and Lau, 1990).

The lower aquifer has the aquifer code 60301111 (12212). This aquifer is basal, confined, located in flank formations and is currently used as an ecologically important water source. The aquifer has a fresh salinity with a chloride content of less than 250 mg/l. This aquifer is considered irreplaceable and is moderately vulnerable to contamination (Mink and Lau, 1990).

The subject property is *makai* (below) of the underground injection control line, indicating that the underlying aquifer is not considered a drinking water source (HDOH, 1999). The average elevation of the property is approximately 171 feet above mean sea level (msl).

Groundwater is assumed to flow down gradient in an east northeast direction. The depth to and direction of groundwater flow beneath the property are not definitively known. Characterization would require subsurface exploration, installation of groundwater monitoring wells, and surveys of groundwater elevations. No municipal drinking water supply wells are located on the subject property. An irrigation water supply system consisting of two wells, an aboveground storage tank and a pumphouse is located approximately 700 feet southwest of the property. Fourteen (14) private wells are located within one (1) mile of the subject property.

2.2.5 Surface Water

The closest surface water body to the site is a water reservoir located approximately 300 feet to the west that is part of the Waihe'e Ditch system. A pipeline connects the reservoir to the larger Wai'ale Reservoir located approximately 1.7 miles east northeast of the subject property. The nearest ocean water body is Kahului Harbor, which is located approximately two (2) miles northeast of the site and is contiguous with the Pacific Ocean. The location of Kahului Harbor in relation to the project site is shown on Figure 2-1.

Storm water runoff is expected to surface flow to the east northeast of the subject property.

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2.3 Site History

A Phase I ESA was completed for the proposed Central Maui Regional Park parcel by Pacific Consulting Services Inc. in July 2012. Based on aerial photographs, the Phase I ESA identified the following historic site uses:

- A substantial portion of the Subject Property was actively farmed between 1951 and 2000, but is currently unused. The photographs do not indicate any development of the northwestern-most portion of the Subject Property. Various dirt roads are evident on the property in the aerial photographs.
- Between 1951 and 2000, the Subject Property appears to have been cultivated for a variety of plants, although it does not appear that sugar cane or pineapple were grown on the Subject Property.
- The 2000 aerial photograph shows indications of structures or vehicles in the eastern part of the Subject Property, near Kuihelani Highway. A possible structure or debris pile is evident in the same general area in the 2012 aerial photograph.

Based on the activities observed in the aerial photographs, as well as other sources of information gathered during the Phase I ESA, the following recognized environmental concerns were identified:

1. Historical use of the site for various agricultural uses;
2. Unexploded ordnance (UXO) removal from adjacent properties to the northeast and southwest that suggest the potential presence for UXO on the property;
3. Stressed vegetation in the area where 6,000 pounds of abandoned hazardous materials were discovered and removed by the property owner; and
4. Accumulation of solid waste in several areas of the parcel that include automobiles, automobile parts, construction debris and building debris. Some of the solid wastes appear to have been pushed into dirt-covered piles using heavy equipment.

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Section 3 Field Investigation and Sample Collection

3.1 Sampling Approach

The primary objective of this project was to resolve the following project Decision Statements:

- Determine whether COPC concentrations in soil exceed risk-based screening criteria.
- Determine whether COPCs in soil, if present in excess of screening criteria, pose unacceptable risk to human health and/or the environment.
- Determine whether a training range or bombing target is present at the site.

These decision statements were developed based on the principal study questions (PSQs) and alternative actions outlined in the project sampling and analysis plan (SAP) [E2, 2013].

3.1.1 Multi-Increment Sampling

In order to resolve the Decision Statements listed above, E2 determined that an appropriate amount of data would be required. Therefore, a multi-increment (MI) sampling strategy was designed to screen the entire 65 acre site. MI sampling is a method employed to obtain representative samples that exhibit average concentrations of COPCs in the material being sampled and that account for the variability of COPC concentrations within that particular material. Such a method was developed to provide accurate (closeness of the sample value to its actual value) and precise (closeness of repeated sample values, or repeatability) data.

The MI sampling approach was employed in accordance with the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009) to determine the concentrations of COPCs in soils within the areas identified as having recognized environmental concerns. Decision units (DUs) for the MI sampling are depicted in Figure 3-1 and were established as follows:

- The area historically used for agriculture was divided into four (4) regional DUs approximately 6.8 to 8.1 acres in size. Two (2) MI soil samples were collected from each DU: one (1) at the surface (0-6 inches below ground surface [bgs]) and one (1) from the subsurface (1 to 2 feet bgs). The MI samples were analyzed for pesticides, heavy metals, PCBs, and dioxins.
- One (1) DU approximately 16,300 square feet in size was established in the stressed vegetation area where the removal of 6,000 pounds of abandoned hazardous materials occurred. The extents of the DU were modified in the field in order to include an adjacent soil berm that contained suspect solid waste. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.
- One (1) DU approximately 4.4 acres in size was established within the area that is adjacent to the former Maui Sod Occupant. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the

subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.

- One (1) DU approximately 5.1 acres in size was established within the area where former structures were observed to be present onsite in an aerial photograph from 2000. This area also contains several dirt covered solid waste piles that were identified in the Phase I ESA. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.

For quality assurance/quality control (QA/QC) purposes, the Stressed Vegetation DU was sampled in triplicate at both sampling depths. The field sampling methodology is described in Section 3.2.

3.1.2 Multi-Increment Sample Analyses

Based on the recognized environmental concerns identified in the Phase I ESA, MI samples from the different DUs were analyzed for some or all of the following constituents:

- Total Petroleum Hydrocarbons (TPH) - Gasoline Range Organics (GRO) (Method: EPA 8260B);
- Halogenated Volatile Organic Compounds (HVOCs) (Method: EPA 8260B);
- TPH – Diesel Range Organics (DRO) and Residual Range Organics (RRO) (Method: EPA 8015M);
- Polynuclear Aromatic Hydrocarbons (PAHs) (Method: EPA 8270C);
- Semi-volatile Organic Compounds (SVOCs) (Method: EPA 8270C);
- Organochlorine Pesticides (Method: EPA 8081A);
- Resource Conservation and Recovery Act (RCRA) 8 Metals (Method: EPA 6010B and 7471);
- Polychlorinated Biphenyls (PCBs) (Method: EPA 8082); and
- Dioxins/Furans (Method: EPA 8290).

All sample preparation and analyses were conducted according to the guidance outlined in *Test Methods for Evaluating Solid Waste,* EPA SW-846 (EPA 1996), *Guidance for Obtaining Representative Laboratory Subsamples from Particulate Laboratory Samples* (EPA 2003), and the *Department of Defense, Quality Systems Manual for Environmental Laboratories* (Department of Defense, 2010).

3.2 MEC Site Reconnaissance and Solid Waste Pile Survey

A visual survey for MEC was conducted on the property in conjunction with the MI soil sampling. The soil sample locations described above were cleared of UXO by a trained UXO technician prior to sampling. In addition, because the UXO found on the adjacent properties seemed to be randomly located, a site walkthrough was conducted to try to identify shooting positions, grenade pits, small arms berms and/or other target areas.

Solid waste soil piles located throughout the project site were scanned with a metal detector and visually inspected for MEC. The soil pile extents were then surveyed using a differential global positioning system (GPS) unit. The approximate size and volume of each pile was recorded in the field notebook, as well as a physical description of the pile noting any type of debris that was visible. In the event that any UXO was discovered, plans were made for it to be promptly turned over to the Maui Police and the U.S. Army Explosive Ordnance Disposal (EOD) for removal.

3.3 Archeological Survey

A survey for artifacts of archeological significance was conducted on the property in conjunction with the MI soil sampling. The survey was performed by an archeologist from the State of Hawaii Department of Land and Natural Resources (DLNR) who was present on site during all fieldwork activities. The soil generated during excavation at each increment sample location was screened for artifacts prior to sample collection. Plans were made to alert the DLNR archeologist if any artifacts were observed during subsurface exploration. Detailed notes of the soil composition and any findings made at each increment sample location were maintained by the archeologist. No artifacts of cultural or historical significance were discovered during the project.

3.4 Sample Collection

3.4.1 Decision Unit and Sample Increment Establishment

The boundaries and increment sample locations of the seven (7) DUs were established at the site utilizing a differential GPS unit equipped with a rover pole antenna. Northing and Easting coordinates of the DU corners and increment sample locations were input into the GPS for field stakeout prior to the commencement of fieldwork. The Stressed Vegetation DU boundaries and sample increment locations were decided upon in the field in order to encompass the entire hazardous waste removal area as well as an adjacent soil pile containing solid waste. Once the respective DU corners and sample increments were located in the field, survey flags were used to mark their locations. The seven (7) DUs were labeled according to their historic site usage as well as findings from the Phase I ESA: Ag DU-1, Ag DU-2, Ag DU-3, Ag DU-4, Stressed Vegetation DU, Structure DU and Sod DU. The increment sample locations within each DU were positioned using a stratified random design per the HDOH *Technical Guidance Manual* and are depicted on Figures 3-2 and 3-3. The replicate sample locations in the Stressed Vegetation DU were also laid out using a stratified random design, but from different starting locations and different sampling directions. The locations of the 90 individual sampling increments as well as the extents of the modified Stressed Vegetation DU were surveyed with the GPS unit following MI sample collection and are shown on Figure 3-3.

3.4.2 Multi-Increment Sample Collection

Two (2) MI soil samples were collected from each DU, with the Stressed Vegetation DU sampled in triplicate at each sampling depth for QA/QC purposes. Sample increments were collected from the surface (0 - 6 inches bgs) and subsurface (1 - 2 feet bgs) at 30 individual locations within each DU (90 individual locations for the triplicate samples within the Stressed Vegetation DU).

The MI soil samples were collected from different depth ranges by digging a two (2) foot deep hole with a posthole digger, then collecting fixed mass aliquots of soil from the sidewalls of each hole at each depth range using Terra-Core soil plungers and soil caps. For each sample increment, a 5-gram aliquot of soil was collected first using a Terra Core soil plunger, and placed into a methanol preserved volatile organic analysis (VOA) vial provided by the laboratory (i.e., for those DUs that required volatile analysis). A 30-gram soil aliquot was then collected by scraping the sidewalls with a fixed volume soil cap and placing it into a Ziploc bag for the remaining analyses. Each MI sample that required volatile analysis consisted of 10 methanol preserved VOA vials containing three (3) 5-gram soil aliquots each, and approximately one (1) kilogram of soil in a Ziploc bag. The MI samples that did not require volatile analysis consisted of approximately one (1) kilogram of soil in a Ziploc bag.

The subsurface MI sample increment was collected first in each hole in order to avoid sloughing of surface soils into the hole. Following sample collection at the subsurface depth range, the surface MI sample increment was collected using the same sampling techniques described above.

Each sampling location was cleared for MEC by a trained UXO technician prior to and during digging operations. A summary of the MI samples collected during the project is presented in Table 3-1.

600' 0 600' 1200'
SCALE: 1"=600'

REFERENCE: GOOGLE EARTH IMAGE, 2012

DATE: DEC 2013

PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII

FIGURE TITLE: MULTI-INCREMENT SOIL SAMPLE DECISION UNITS ESTABLISHED WITHIN PROJECT SITE

FIGURE NO.: 3-1

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Table 3-1: Multi-Increment Soil Sample Summary

Sample Identification	Decision Unit	Sample Depth Range (inches bgs)	Number of Increments
AGDU1-A	Ag DU 1	0 – 6	30
AGDU1-B	Ag DU 1	12 – 24	30
AGDU2-A	Ag DU 2	0 – 6	30
AGDU2-B	Ag DU 2	12 – 24	30
AGDU3-A	Ag DU 3	0 – 6	30
AGDU3-B	Ag DU 3	12 – 24	30
AGDU4-A	Ag DU 4	0 – 6	30
AGDU4-B	Ag DU 4	12 – 24	30
SVDU1-A	Stressed Vegetation DU	0 – 6	30
SVDU1-B	Stressed Vegetation DU	12 – 24	30
SVDU2-A	Stressed Vegetation DU	0 – 6	30
SVDU2-B	Stressed Vegetation DU	12 – 24	30
SVDU3-A	Stressed Vegetation DU	0 – 6	30
SVDU3-B	Stressed Vegetation DU	12 – 24	30
STRUCTDU-A	Structure DU	0 – 6	30
STRUCTDU-B	Structure DU	12 – 24	30
SODDU-A	Sod DU	0 – 6	30
SODDU-B	Sod DU	12 – 24	30

3.4.3 Sample Shipment

All soil samples were labeled with a unique sample identification designation and placed into insulated coolers filled with ice for preservation immediately upon sample collection. The samples were chilled and maintained at a temperature of 4 degrees Celsius (ºC) ± 2 ºC and managed under chain of custody protocol and documentation during transport to the analytical laboratory. The samples were shipped overnight via FedEx to the analytical laboratory, APPL, Inc. (APPL), in Clovis, California. APPL processed the samples and completed all of the analyses. Level IV data packages of the analytical results were then sent to Laboratory Data Consultants (LDC) in Carlsbad, California for complete data validation.

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Section 4 Soil Sampling Results

4.1 Data Evaluation Criteria

The primary objective of this Phase II ESA is to determine if residual levels of COPCs related to the recognized environmental concerns identified in the Phase I ESA are present in site soils, and if present, whether the levels warrant further characterization and/or remediation when considering the planned future development of the site into a community park. Therefore, the soil sample analytical results for this Phase II ESA are compared to the current HDOH Tier 1 Environmental Action Levels (EALs) for sites with unrestricted land use, groundwater is a current or potential source of drinking water and a surface water body is located greater than 150 meters from the site (HDOH, 2012). In addition, dioxin levels are compared to the soil action levels presented in the HDOH HEER technical memorandum entitled "Update to Soil Action Levels for TEQ Dioxins and Recommended Soil Management Practices" dated June 2010 (HDOH, 2010).

4.2 Sample Results

4.2.1 Multi-increment Sample Results

A total of 18 MI samples (14 primary and four (4) replicate) were collected during this investigation: two (2) from each of the seven (7) DUs (surface and subsurface), with the Stressed Vegetation DU sampled in triplicate at each depth for QA/QC purposes. The laboratory analytical results are presented in Table 4-1. Some analytical results within the table are reported as "ND", which indicates that a specific analyte was "not detected" at or above the method detection limit as shown on the laboratory reports. Concentrations above the detection limit but below the quantitation limit are shown in the table but are marked with a "J" qualifier indicating that it is an estimated value. Detected concentrations that are above the quantitation limit, but below the respective HDOH Tier 1 EAL are shown on the table as normal values. Detected concentrations that exceed the corresponding HDOH Tier 1 EAL are bolded and highlighted in orange. Several analytes do not have established EALs and are identified on the table by "NS", which indicates that "no standard" has been established. If a MI sample was not analyzed for a certain contaminant, it is shown in the table with "NA" indicating that it was "not analyzed" for that respective analyte. The complete laboratory analytical data reports are provided in Appendix B.

The analytical results indicate that HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected from the site. Dioxins/Furans were only analyzed for in the MI samples collected from the four (4) Ag DUs. Subsequently, they were detected in all eight (8) Ag DU MI samples at toxicity equivalent (TEQ) concentrations ranging from 0.43 picograms per gram (pg/g) to 11 pg/g. These results are all well below the TEQ dioxin soil action level of 240 pg/g for unrestricted land use.

The organochlorine pesticide 4,4'-DDE was detected in three (3) of the 18 MI samples at estimated concentrations ranging from 0.0023 milligrams per kilogram (mg/kg) to 0.0032 mg/kg. These concentrations are all well below the corresponding HDOH Tier 1 EAL of 1.4 mg/kg.

PAHs were analyzed for in the MI soil samples collected from the Structure DU, Sod DU and Stressed Vegetation DU (sampled in triplicate). Of the ten (10) MI samples collected from these DU's (including the QA/QC triplicate MI samples), all ten (10) contained detected concentrations or estimated concentrations of various PAH compounds. However, none of the PAH detections in any of the MI samples exceeded its respective HDOH Tier 1 EAL.

The eight (8) RCRA metals were analyzed for in all 18 MI samples collected from the site. All 18 MI samples contained detected or estimated concentrations of various metals (with the exception of selenium and silver which were non-detect in all samples), however none exceeded their respective HDOH Tier 1 EALs. Arsenic was detected at concentrations ranging from an estimated 0.35 mg/kg to 5.7 mg/kg, which are below the Tier 1 EAL of 24 mg/kg. Barium was detected at concentrations ranging from 4.5 mg/kg to 65.5 mg/kg, which are below the Tier 1 EAL of 1,000 mg/kg. Cadmium was detected at concentrations ranging from an estimated 0.072 mg/kg to 1.2 mg/kg, which are below the Tier 1 EAL of 14 mg/kg. Chromium was detected at concentrations ranging from 10.1 mg/kg to 24.5 mg/kg, which are below the Tier 1 EAL of 1,100 mg/kg. Lead was detected at concentrations ranging from an estimated 0.19 mg/kg to 4.3 mg/kg, which are below the Tier 1 EAL of 200 mg/kg. Mercury was detected at concentrations ranging from an estimated 0.01 mg/kg to an estimated 0.031 mg/kg, which are well below the Tier 1 EAL of 4.7 mg/kg.

TPH-DRO and RRO were analyzed for in the MI soil samples collected from the Structure DU, Sod DU and Stressed Vegetation DU (sampled in triplicate). Of the ten (10) MI samples collected from these DU's (including the QA/QC triplicate MI samples), only the six (6) MI samples from the stressed vegetation DU contained detected or estimated concentrations of these TPH compounds. None of the TPH-DRO or RRO detections in any of the MI samples exceeded its respective HDOH Tier 1 EAL. TPH-DRO was detected at concentrations ranging from an estimated 1.6 mg/kg to an estimated 2.8 mg/kg, which are below the Tier 1 EAL of 100 mg/kg. TPH-RRO was detected at concentrations ranging from an estimated 8.1 mg/kg to 18 mg/kg, which are below the Tier 1 EAL of 500 mg/kg.

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	AGDU1-A		AGDU1-B		AGDU2-A		AGDU2-B	
			Laboratory ID	AY79373		AY79374		AY79386		AY79387	
			Sample Location	Ag DU1 0-6" bgs		Ag DU1 12-24" bgs		Ag DU2 0-6" bgs		Ag DU2 12-24" bgs	
Method	Analyte	Units	PAL[1]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	ND		ND		ND		0.14	J
	1,2,3,7,8-PECDD	pg/g	NS	ND		0.1	J	ND		1.4	J
	1,2,3,4,7,8-HXCDD	pg/g	NS	ND		ND		ND		1.9	J
	1,2,3,6,7,8-HXCDD	pg/g	NS	0.79	J	0.56	J	3.4	J	6.5	J
	1,2,3,7,8,9-HXCDD	pg/g	NS	ND		ND		2.4	J	4.1	J
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	15		9.4	J	64		130	
	OCDD	pg/g	NS	130		82		580		1200	
	2,3,7,8-TCDF	pg/g	NS	ND		ND		0.14	J	0.21	J
	1,2,3,7,8-PECDF	pg/g	NS	ND		ND		0.43	J	ND	
	2,3,4,7,8-PECDF	pg/g	NS	ND		ND		0.55	J	0.88	J
	1,2,3,4,7,8-HXCDF	pg/g	NS	ND		0.27	J	ND		ND	
	1,2,3,6,7,8-HXCDF	pg/g	NS	ND		ND		0.83	J	ND	
	2,3,4,6,7,8-HXCDF	pg/g	NS	ND		ND		0.97	J	1.9	J
	1,2,3,7,8,9-HXCDF	pg/g	NS	ND		ND		ND		0.63	J
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	ND		ND		ND		17	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	ND		ND		1.1	J	2	J
	OCDF	pg/g	NS	6.8	J	2.1	J	10	J	26	
	TEQ[2]	pg/g	240	0.64		0.43		2.9		5.9	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	NA		NA		NA		NA	
	2-Methyl-naphthalene	mg/kg	4.1	NA		NA		NA		NA	
	Benzo(a) Anthracene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(a)Pyrene	mg/kg	0.15	NA		NA		NA		NA	
	Benzo(b) Fluoranthene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(g,h,i) Perylene	mg/kg	35	NA		NA		NA		NA	
	Benzo(k) Fluoranthene	mg/kg	15	NA		NA		NA		NA	
	Chrysene	mg/kg	30	NA		NA		NA		NA	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	NA		NA		NA		NA	
	Fluoranthene	mg/kg	460	NA		NA		NA		NA	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	NA		NA		NA		NA	
	Naphthalene	mg/kg	4.4	NA		NA		NA		NA	
	Phenanthrene	mg/kg	440	NA		NA		NA		NA	
	Pyrene	mg/kg	44	NA		NA		NA		NA	
Metals (6010B/ 7471B)	**Arsenic (As)**	**mg/kg**	24	3.2	J	2.6	J	5.7	J	2.4	J
	Barium (Ba)	mg/kg	1000	8.8	J	4.5	J	8.1	J	5.5	J
	Cadmium (Cd)	mg/kg	14	0.29	J	0.12	J	0.28	J	0.11	J
	Chromium (Cr)	mg/kg	1100	13.7	J	11.1	J	14.8	J	10.5	J
	Lead (Pb)	mg/kg	200	ND		ND		ND		ND	
	Mercury (Hg)	mg/kg	4.7	ND		ND		ND		ND	
TPH (8015C)	TPH-GRO	mg/kg	100	NA		NA		NA		NA	
	TPH-DRO	mg/kg	100	NA		NA		NA		NA	
	TPH-RRO	mg/kg	500	NA		NA		NA		NA	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	AGDU3-A		AGDU3-B		AGDU4-A		AGDU4-B	
			Laboratory ID	AY79476		AY79477		AY79474		AY79475	
			Sample Location	Ag DU3 0-6" bgs		Ag DU3 12-24" bgs		Ag DU4 0-6" bgs		Ag DU4 12-24" bgs	
Method	Analyte	Units	PAL[1]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	ND		ND		0.25	J	ND	
	1,2,3,7,8-PECDD	pg/g	NS	ND		ND		2.5	J	ND	
	1,2,3,4,7,8-HXCDD	pg/g	NS	1.6	J	ND		3.2	J	ND	
	1,2,3,6,7,8-HXCDD	pg/g	NS	5.3	J	1.2	J	12	J	ND	
	1,2,3,7,8,9-HXCDD	pg/g	NS	3.5	J	1.1	J	8.7	J	ND	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	100		23		270		15	
	OCDD	pg/g	NS	890		200		2900		110	
	2,3,7,8-TCDF	pg/g	NS	ND		ND		ND		ND	
	1,2,3,7,8-PECDF	pg/g	NS	0.49	J	ND		0.95	J	ND	
	2,3,4,7,8-PECDF	pg/g	NS	ND		ND		1.9	J	ND	
	1,2,3,4,7,8-HXCDF	pg/g	NS	2.4	J	ND		6.3	J	ND	
	1,2,3,6,7,8-HXCDF	pg/g	NS	ND		ND		ND		ND	
	2,3,4,6,7,8-HXCDF	pg/g	NS	1.5	J	ND		3.8	J	ND	
	1,2,3,7,8,9-HXCDF	pg/g	NS	ND		ND		1.5	J	ND	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	10	J	ND		43		ND	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	1.7	J	0.46	J	4.1	J	0.25	J
	OCDF	pg/g	NS	19	J	4	J	76		3.3	J
	TEQ[2]	pg/g	240	4.4		1.5		11		0.79	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	NA		NA		NA		NA	
	2-Methyl-naphthalene	mg/kg	4.1	NA		NA		NA		NA	
	Benzo(a) Anthracene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(a)Pyrene	mg/kg	0.15	NA		NA		NA		NA	
	Benzo(b) Fluoranthene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(g,h,i) Perylene	mg/kg	35	NA		NA		NA		NA	
	Benzo(k) Fluoranthene	mg/kg	15	NA		NA		NA		NA	
	Chrysene	mg/kg	30	NA		NA		NA		NA	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	NA		NA		NA		NA	
	Fluoranthene	mg/kg	460	NA		NA		NA		NA	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	NA		NA		NA		NA	
	Naphthalene	mg/kg	4.4	NA		NA		NA		NA	
	Phenanthrene	mg/kg	440	NA		NA		NA		NA	
	Pyrene	mg/kg	44	NA		NA		NA		NA	
Metals (6010B/ 7471B)	**Arsenic (As)**	**mg/kg**	24	3.6	J	2.9	J	2.4	J	0.68	J
	Barium (Ba)	mg/kg	1000	4.7	J	5.1	J	8.8	J	10.3	J
	Cadmium (Cd)	mg/kg	14	0.095	J	0.072	J	0.19	J	0.24	J
	Chromium (Cr)	mg/kg	1100	10.2	J	10.1	J	12.3	J	16.6	J
	Lead (Pb)	mg/kg	200	ND		ND		0.19	J	ND	
	Mercury (Hg)	mg/kg	4.7	ND		ND		ND		ND	
TPH (8015C)	TPH-GRO	mg/kg	100	NA		NA		NA		NA	
	TPH-DRO	mg/kg	100	NA		NA		NA		NA	
	TPH-RRO	mg/kg	500	NA		NA		NA		NA	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	SVDU1-A		SVDU1-B		SVDU2-A		SVDU2-B	
			Laboratory ID	AY79375		AY79376		AY79377		AY79378	
			Sample Location	Stress Veg. DU1 0-6" bgs		Stress Veg. DU1 12-24" bgs		Stress Veg. DU2 0-6" bgs (Surface Replicate 1)		Stress Veg. DU2 12-24" bgs (Sub-surface Replicate 1)	
Method	Analyte	Units	PAL[1]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	0.0026	J	ND		ND		0.0032	J
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	0.0012	J	ND		ND		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.0018	J	0.0012	J	0.00097	J	ND	
	Benzo(a) Anthracene	mg/kg	1.5	0.0045	J	0.0018	J	0.0042	J	ND	
	Benzo(a)Pyrene	mg/kg	0.15	0.0058		0.0016	J	0.0043	J	ND	
	Benzo(b) Fluoranthene	mg/kg	1.5	0.014	J	0.0038	J	0.008		0.0017	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.009		0.0024	J	0.0054		0.0014	J
	Benzo(k) Fluoranthene	mg/kg	15	0.013	J	0.0036	J	0.0026	J	0.0016	J
	Chrysene	mg/kg	30	0.0051		0.0021	J	0.0041	J	0.00089	J
	Dibenzo(a,h) Anthracene	mg/kg	0.15	0.0029	J	ND		0.0018	J	ND	
	Fluoranthene	mg/kg	460	0.0052		0.003	J	0.0041	J	ND	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0065		0.0018	J	0.0043	J	ND	
	Naphthalene	mg/kg	4.4	0.002	J	0.0013	J	0.0021	J	ND	
	Phenanthrene	mg/kg	440	0.0023	J	0.0023	J	0.002	J	ND	
	Pyrene	mg/kg	44	0.0043	J	0.0025	J	0.0036	J	ND	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		0.35	J	ND		ND	
	Barium (Ba)	mg/kg	1000	44.3	J	11.6	J	40.5	J	10.7	J
	Cadmium (Cd)	mg/kg	14	0.74	J	0.18	J	0.67	J	0.2	J
	Chromium (Cr)	mg/kg	1100	19.4	J	13.3	J	19.4	J	14.4	J
	Lead (Pb)	mg/kg	200	3.6	J	0.19	J	2.8	J	1.6	J
	Mercury (Hg)	mg/kg	4.7	0.031	J	ND		0.03	J	ND	
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND		ND	
	TPH-DRO	mg/kg	100	2.5	J	2.2	J	2.3	J	2.8	J
	TPH-RRO	mg/kg	500	18		12		13		8.1	J

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	SVDU3-A		SVDU3-B		TRIP BLANK		STRUCTDU-A	
			Laboratory ID	AY79379		AY79380		AY79381/AY79388		AY79384	
			Sample Location	Stress Veg. DU3 0-6" bgs (Surface Replicate 2)		Stress Veg. DU3 12-24" bgs (Sub-surface Replicate 2)		NONE		Structure DU 0-6" bgs	
Method	Analyte	Units	PAL[1]	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		NA		0.0023	J
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	ND		ND		NA		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.0024	J	0.0018	J	NA		0.0015	J
	Benzo(a) Anthracene	mg/kg	1.5	0.0048	J	0.0012	J	NA		0.0065	
	Benzo(a)Pyrene	mg/kg	0.15	0.0052		0.0012	J	NA		0.03	J
	Benzo(b) Fluoranthene	mg/kg	1.5	0.012	J	0.0028	J	NA		0.069	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.0061		0.0021	J	NA		0.09	J
	Benzo(k) Fluoranthene	mg/kg	15	0.011	J	0.0026	J	NA		0.064	J
	Chrysene	mg/kg	30	0.0048	J	0.0013	J	NA		0.0094	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	ND		ND		NA		0.019	
	Fluoranthene	mg/kg	460	0.0045	J	0.0018	J	NA		0.0066	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0044	J	0.0014	J	NA		0.058	J
	Naphthalene	mg/kg	4.4	0.0024	J	0.0013	J	NA		0.0014	J
	Phenanthrene	mg/kg	440	0.002	J	ND		NA		0.0018	J
	Pyrene	mg/kg	44	0.0041	J	0.0016	J	NA		0.0054	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		ND		NA		ND	
	Barium (Ba)	mg/kg	1000	41.8	J	14.5	J	NA		65.5	J
	Cadmium (Cd)	mg/kg	14	0.66	J	0.28	J	NA		1.2	J
	Chromium (Cr)	mg/kg	1100	18.9	J	15.5	J	NA		24.5	J
	Lead (Pb)	mg/kg	200	1.5	J	0.19	J	NA		2	J
	Mercury (Hg)	mg/kg	4.7	0.031	J	ND		NA		0.03	J
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND		ND	
	TPH-DRO	mg/kg	100	2.2	J	1.6	J	NA		ND	
	TPH-RRO	mg/kg	500	13		9	J	NA		ND	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	STRUCTDU-B		SODDU--A		SODDU-B	
			Laboratory ID	AY79385		AY79382		AY79383	
			Sample Location	Structure DU 12-24" bgs		Sod Farm DU 0-6" bgs		Sod Farm DU 12-24" bgs	
Method	Analyte	Units	PAL[1]	Result	Qualifier	Result	Qualifier	Result	Qualifier
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	ND		ND		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.00097	J	0.0014	J	ND	
	Benzo(a) Anthracene	mg/kg	1.5	0.0012	J	0.015		0.0015	J
	Benzo(a)Pyrene	mg/kg	0.15	0.0014	J	0.023		0.0032	J
	Benzo(b) Fluoranthene	mg/kg	1.5	0.0034	J	0.066	J	0.01	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.0026	J	0.05		0.0072	
	Benzo(k) Fluoranthene	mg/kg	15	0.0032	J	0.061	J	0.0094	J
	Chrysene	mg/kg	30	0.0019	J	0.016		0.0024	J
	Dibenzo(a,h) Anthracene	mg/kg	0.15	ND		0.013		0.002	J
	Fluoranthene	mg/kg	460	0.0018	J	0.013		0.002	J
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0019	J	0.036		0.0052	
	Naphthalene	mg/kg	4.4	0.0011	J	0.0012	J	0.00094	J
	Phenanthrene	mg/kg	440	ND		0.0025	J	0.0011	J
	Pyrene	mg/kg	44	0.0013	J	0.011		0.0016	J
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		ND		ND	
	Barium (Ba)	mg/kg	1000	29	J	40	J	15.8	J
	Cadmium (Cd)	mg/kg	14	0.62	J	0.81	J	0.39	J
	Chromium (Cr)	mg/kg	1100	20.6	J	22.2	J	19.6	J
	Lead (Pb)	mg/kg	200	0.46	J	4.3	J	ND	
	Mercury (Hg)	mg/kg	4.7	ND		0.024	J	ND	
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND	
	TPH-DRO	mg/kg	100	ND		ND		ND	
	TPH-RRO	mg/kg	500	ND		ND		ND	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

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4.2.2 Quality Control Samples

The Stressed Vegetation DU was sampled in triplicate at both depth ranges for quality assurance/quality control (QA/QC) purposes. PAHs, the pesticide 4,4'-DDE, RCRA 8 Metals, TPH-DRO and TPH-RRO were the only analytes detected in these six (6) MI samples. None of the detections exceeded their respective Tier 1 EAL. The percent relative standard deviation (%RSD) was calculated for the results of each analytical detection within each group of triplicate MI soil samples. If one (1) of the MI samples within a triplicate group contained a result below the laboratory detection limit, the relative percent difference (RPD) was calculated for the analytical results of the remaining two (2) MI samples. If only one (1) MI sample within a triplicate group contained a detection of a certain analyte, the %RSD and RPD were both not calculable.

The %RSD and RPD of the analytical results for the surface triplicate MI samples exceeded their respective limits three (3) times [two (2) PAH compounds and one (1) RCRA 8 metal]. The %RSD and RPD limits were exceeded four (4) times in the subsurface triplicate MI samples [three (3) PAH compounds and one (1) RCRA 8 metal]. The detected concentrations of all the triplicate sample results that exceeded their %RSD and RPD limits are well below their associated Tier 1 EALs. These limit exceedances likely reflect the heterogeneity of the surface and subsurface soil in the Stressed Vegetation DU, rather than the precision in the field sampling methodology and laboratory analyses. Detected concentrations well below the associated Tier 1 EALs were reproduced in each triplicate sample regardless of the %RSD and RPD limit exceedances; therefore, the analytical results are confirmed and the objective of screening for COPCs at the project site has been met.

Laboratory QA/QC procedures employed for this project were standard laboratory QA/QC procedures which included using standard EPA test methods and analyzing one or more of the following: method blanks, laboratory control spikes, matrix spikes, matrix spike duplicates, laboratory control samples and sample duplicates. QA/QC results and QA/QC case narratives are provided in the attached laboratory analytical data reports from APPL (Appendix B). According to APPL, the laboratory QA/QC analysis met quality assurance objectives with the exceptions noted in the case narratives.

All laboratory analytical results were validated by a third party validator (LDC) under EPA Level IV data validation guidelines in order to evaluate the data according to precision, accuracy, representativeness, comparability and completeness (PARCC) relative to the project data quality objectives (DQOs). A total of 18 MI soil samples were analyzed for COPCs during the project. All data was assessed to be valid with the exception of 18 of the 144 total RCRA 8 metals results, which were rejected based on matrix spike/matrix spike duplicate percent recoveries. With respect to the completeness of the overall project data, 18 sample results of the 1,594 total analytes reported were rejected; for a completeness percentage of 98.8. This completeness percentage based on rejected data meets the DQO goal of 90 percent. The complete LDC data validation report is provided in Appendix C, and the PARCC summary report is included in Appendix D.

4.3 MEC Site Reconnaissance and Solid Waste Pile Findings

A visual survey for MEC was conducted on the property in conjunction with the MI soil sampling. No MEC were encountered in any of the DUs during MI soil sampling activities at the site. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified during fieldwork activities. The Senior UXO Supervisor (SUXOS) Final Report detailing the MEC reconnaissance activities performed during the project is provided in Appendix F.

A total of 16 solid waste soil piles were identified, measured and surveyed throughout the project site following MI soil sampling. The dimensions and volume of each pile were measured and recorded in the field notebook, as well as a physical description of the pile and any debris that was visible. The footprint of each soil pile was surveyed using a differential GPS unit. No MEC were observed on the surface of any of the soil piles. Photographic documentation of each solid waste soil pile is included in Appendix E on the attached CD-ROM. Approximate dimensions, volumes, and physical descriptions of the 16 soil piles are summarized in Table 4-2. The surveyed locations and footprints of each soil pile within the project site are depicted in Figure 4-1.

Table 4-2: Summary of Solid Waste Soil Piles Observed within Project Site

Soil Pile Identification	Soil Pile Dimensions [L x W x H] (ft)	Soil Pile Volume (yd^3)	Description of Soil Pile and its Visible Contents
Pile 1	375 x 45 x 4.5	2,813	Pile height ranges from 6 ft at the NE end to 3 ft at the SW end. Pile consists mostly of clayey fine sand with silt; no significant metallic debris or rubbish (300 lbs.); aluminum cans, foil and window frames observed.
Pile 2	510 x 8 x 3	453	Pile height ranges from 2 ft to 4 ft. Small pile (1 yd^3) of Monier tile observed within pile; pile is mostly soil with some metallic debris (700 lbs.); fence posts and car rims observed. Car parts and cans observed between Piles 1 and 2.
Pile 3	68 x 9 x 3	68	Pile is mostly soil with minor amounts of metallic debris; one block of concrete and several fence posts observed.
Pile 4	426 x 25 x 7	2,761	Pile height ranges from 6 ft to 8 ft. Pile is mostly soil with some boulders; contains one large piece of rusted metal (possibly an old water heater), two 2'x2' pieces of ¼" steel plating, and other minor metallic debris such as rebar.
Pile 5	520 x 30 x 8	4,622	Pile is mostly soil; no significant metallic debris detected; only one aluminum can observed.
Pile 6	40 x 12 x 4	71	Pile contains soil with a pile of concrete (1 – 1.5 tons); no other metallic debris.
Pile 7	54 x 15 x 5	150	Pile is mostly fine sand with some clay and silt; small amount of trash, wire (250 lbs.), and a metal rack observed in pile.
Pile 8	190 x 18 x 5	633	Some carpet observed along sides of pile; truck axle observed (500 lbs.); southern 2/3 length of pile contains: another truck axle and bumper; lot of metal debris in one area of the pile; one computer monitor and one pile of rocks.
Pile 9	180 x 36 x 4	960	Pile height ranges from 3 ft to 5 ft. Scrap metal, car parts, wire, steel and PVC pipe, car hood and car seats observed in pile.
Pile 10	50 x 36 x 3	200	Pile contains car tires and rims, PVC pipe, corrugated metal and wire.
Pile 11	370 x 30 x 3.5	1,439	Pile height ranges from 3 ft to 4 ft. Pile contains concrete debris, scrap metal, vegetative waste, car tires, wood debris, an appliance (stove?), and steel fence posts.
Pile 12	Pile stretches along entire eastern boundary of the site	~9,000	The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development. Pile contains scrap metal, PVC pipe, irrigation lines, wood debris, car tires and rims. The most concentrated debris areas are adjacent to the housing area.
Pile 13	100 ft diameter x 6	1,745	The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development.
Pile 14	600 x 50 x 8	8,889	Pile height ranges from 4 ft to 11 ft. The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development, located on the NE property boundary. Pile contains plastic and construction debris (lumber, nails, bands, etc.)
Pile 15	60 x 20 x 6	267	Pile contains wooden fence posts and wooden debris.
Pile 16	12 ft diameter x 3	13	Pile contains concrete rubble, CMU blocks, rebar, piping and traffic bollards.

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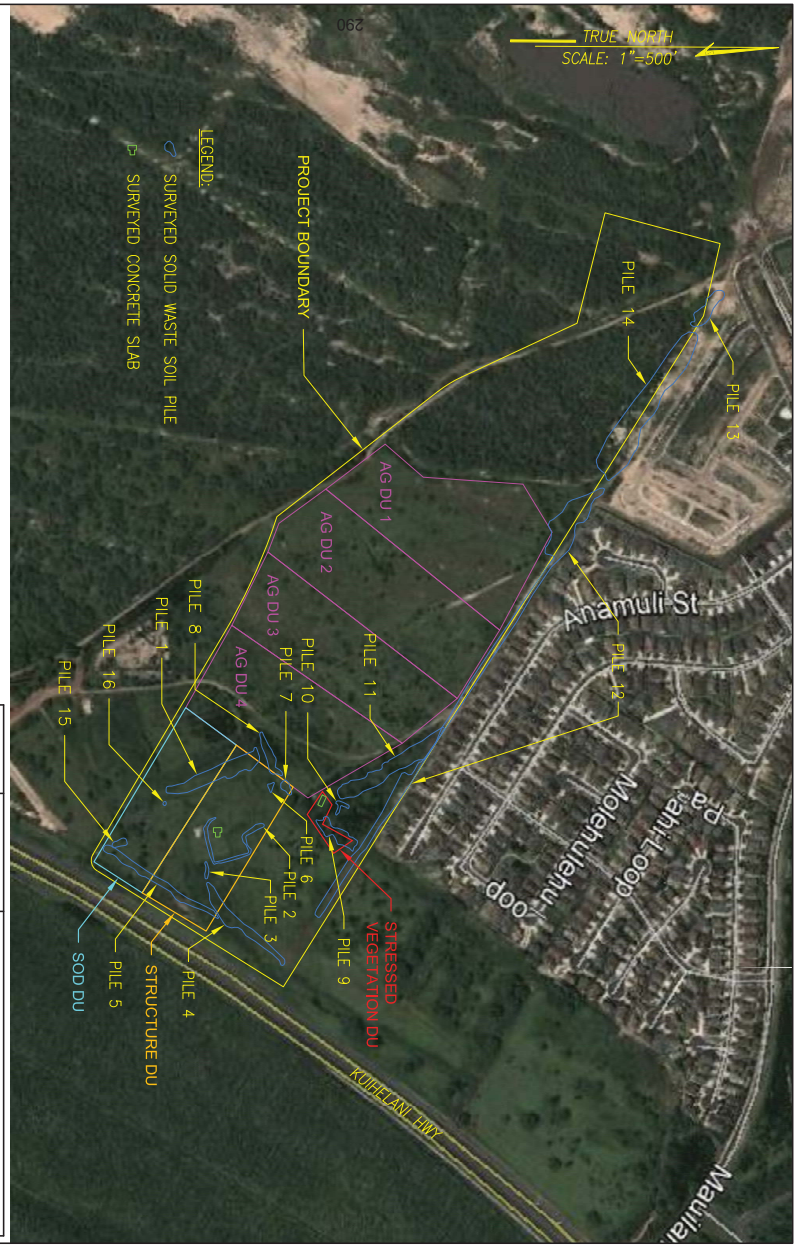

Section 5 Summary of Findings

E2 completed a Phase II ESA of the proposed Central Maui Regional Park site located on TMK parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA determined if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

Per the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009), the screening was completed on various sized decision units utilizing a multi-increment sampling approach. The 65-acre site was divided into seven (7) decision units ranging in size from approximately 16,300 square feet to 8.1 acres. Two (2) multi-increment soil samples were collected from each decision unit, one (1) at 0 – 6 inches bgs, and the other at 1 – 2 feet bgs. The Stressed Vegetation DU was sampled in triplicate for QA/QC purposes. Each multi-increment sample was analyzed for some or all of the following COPCs: TPH-GRO, DRO and RRO, HVOCs, PAHs, SVOCs, Organochlorine Pesticides, RCRA 8 Metals, PCBs, and Dioxins/Furans.

The results of the multi-increment sampling analyses indicate that residual levels of COPCs are not present at significant levels in surface and subsurface soils at the site. HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected. Dioxins/Furans, the organochlorine pesticide 4,4'-DDE, PAHs, RCRA 8 metals, TPH-DRO and TPH-RRO were all detected above laboratory reporting limits in various MI samples, however none exceeded their associated Tier 1 EALs for unrestricted land use. Therefore the project site does not require any further action or restrictions on land use prior to its development into a public park.

No MEC were encountered in any of the DUs during MI soil sampling or site reconnaissance activities. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified at the project site. A total of 16 solid waste soil piles located throughout the project site were identified during the site reconnaissance. Physical descriptions were recorded in the field notebook and the footprint of each soil pile was surveyed using a differential GPS unit. No MEC were observed on the surface of any of the soil piles. It is recommended that the solid waste in the soil piles be removed and properly disposed during the future re-development of the site as a public park. It is also recommended that a qualified environmental scientist be present during the solid waste removal to visually observe if any releases from the solid wastes have occurred that warrant further investigation and sampling. Although MEC was not observed during the site reconnaissance, MEC was found during excavations on adjacent properties. It is recommended that all future grading operations be completed with MEC construction support.

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Appendix A

Project Photographs

Photo 1: Entrance to proposed Central Maui Regional Park project site off of Kuihelani Highway

Photo 2: Typical landscape and vegetative growth within project site

Photo 3: Concrete pad and solid waste debris within Stressed Vegetation decision unit

Photo 4: Orange flags marking increment soil sample locations within decision unit

Photo 5: Excavating to 24" bgs using posthole digger in order to collect subsurface soil sample increment; UXO technician performing MEC clearance at various depths of excavation

Photo 6: Collecting soil sample increment using dedicated fixed-volume soil scoop

Photo 7: Completed multi-increment soil samples ready for shipment to the analytical laboratory

Photo 8: State of Hawaii Department of Land and Natural Resources archeologist performing archeological monitoring at increment sample location

Photo 9: Documenting and surveying solid waste soil pile; concrete debris present in foreground

Photo 10: UXO technician screening the surface of solid waste soil pile for MEC using metal detector

Photo 11: Automobile parts observed in solid waste soil pile

Photo 12: Various solid waste debris observed in soil pile adjacent to new Maui Lani housing development

Appendix A

Photo 13: Example of large metal debris observed in solid waste soil pile

Photo 14: Large soil pile extending along northern boundary of project site created during clearing/grading of parcels for adjacent Maui Lani housing development

Housing Project

February 9, 2021, 3:17 PM HST

Recommend104 Share

AAA

A 100% affordable housing community of multifamily and single family homes is being planned for this 14.75 acre parcel, TMK (2) 3-5-02:30. PC: courtesy

Honu Media LLC is seeking interviews from lineal and cultural descendants with knowledge about land in Wailuku identified for use in a proposed affordable housing development.

The parcel is located on land fronting the west side of Kuikahi Drive, from the water tank to a point opposite Kehalani Mauka Parkway.
The proposed 100% affordable housing community includes plans for multifamily and single family homes on a 14.75 acre parcel, TMK (2) 3-5-02:30.
Information will be compiled in a cultural impact assessment (CIA) study, “to record, preserve and protect cultural resources, sites, beliefs and traditional practices associated with this property.”
Individuals with information about former cane lands between Wailuku and Waikapū, below Reservoir No. 10 where the ‘Īao-Wailuku and Everett Ditches end, are invited to contribute by contacting Katherine Kama‘ema‘e Smith, historical consultant at (808) 268-0787, katsmith75@icloud.com
The proposed parcel was part of a larger terraced parcel mauka of Puanani Homesteads, but not under development. Wailuku Sugar Company (Wailuku Agribusiness) grew cane there until 1988. On the study property at this time, near the water tank is a small base yard and a small herd of goats.

ARTICLE CONTINUES BELOW AD

According to Smith, at the Mahele, “Kamehameha III Kauikeaouli retained Wailuku and Waikapū ahupua‘a as Crown Lands. The majority of LCA awards and Royal Patents were located adjacent to ‘Īao and Waikapū Streams.” Smith states that “there were none in the study parcel, which is part of Land Grant No. 326 of Auwikiwiki and Puhiawawa ‘ili in Wailuku ahupua‘a, awarded to Wm. Humphreys in 1849.”
“In 1865, Wm. Humphreys died at age 76 in Waikapū. He was a native of New Hampshire who lived on Maui for 53 years (The Friend, Mar 1 1865). He was a friend of William Henry Daniels,” according to information provided by Smith.

Persons with knowledge about the history or prehistory this property, especially of current or past cultural resources, sites or practices on this property, are invited to contact Katherine Kama‘ema‘e Smith, (808) 268-0787 or katsmith75@icloud.com to schedule a telephone, electronic or in-person interview.

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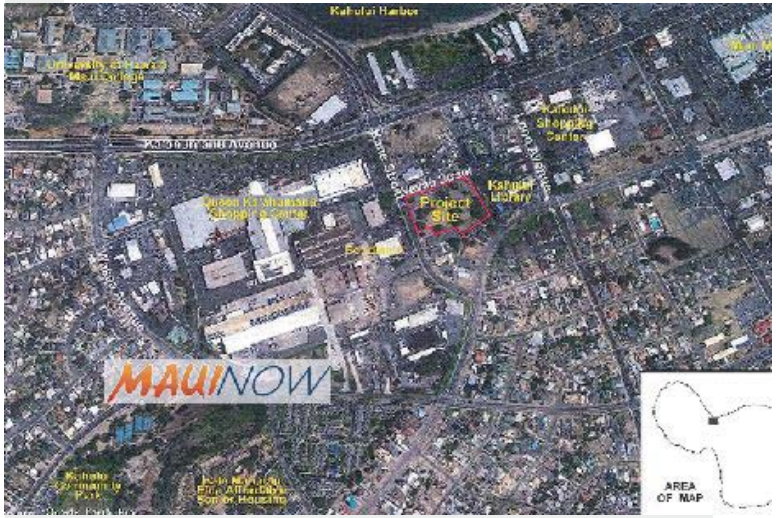
- 

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e koho i kekahi pihi o luna aʻe nei i loaʻa nā nūpepa

29 ʻAukake 1863

ʻaoʻao 3 (4 ʻaoʻao)

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Ka Nupepa Kuokoa.

Na Palapala
La Hoihoi Ea o ka Aina.

ALOHA KE KUOKOA. â€" Ua malama pinepine no kekahi mau Aupuni nui o ka honua, i na ???? e like me keia a kakou o malama nei. ke me ke Aupuni o Amerika Huipuia e ?? ???? ne i ka la 4 o Iulai. Pela no i hoo-??? ino ai ka Ahahui Aloha o ka malu Ulu Lahui keia hana maikai, iloko o na maka-???????? i hala aku nei. A na keia Ahahui no i kauo ae i kekahi ??? Ahahui o ae. oia o Ahahui Anuenue, a ?? Ahahui o Kauapo. ma ke kulanakauhale o Lahaina, ua lana mai ko'u manao e hai ??? i na hana i hanaia e ka Ahahui Aloha o ka malu Ulu o Lele. Mamua ae o ka hiki ana mai o ka la 31 o Iulai. ua nui na la o ka halawai ana, e noonoo no na mea pili i na aahu, na mea ai, a ??? ke ano o ka huakai. A i ka halawai hope loa ana, ua hooholoia, e hololio ka Ahahui Aloha, i ka manawa e kani ai ka bele o Wai-????? ka Luakini, i ke aumoe, no ko makou manao e weheia mai ana ke ana kau ???? o ka honua. e ka lua o na malamalama ??? a ke Akua i hanu iho ai, oia hoi ka Ma-????. me ko makou hoike mua aku i ko makou aloha no ka la 31 o Iulai, ma ke kani ??a o ia bele. Mai ka

napoo ana o ka la o ka Poaha, oia ka la 30 o Iulai, aole i hoopio ?? ka pana maikai ana o nu puuwai olioli o na lala pa kahi a pau o ia Hui, a hiki i ka wa io kani mai ai ka bele i ka hona 12 o ke
aumoe.
KE ANO O KA HOLOLIO ANA A ME NA AAHU. Ma ia manawa i kani ai o ka bele, ua hoonaueueia ke aua kau malie o ka honua, e na kapuai o na lio, a me ka leo o na pahu, a me na oho, me he poe lio la e makaukau ana no ke kaua. A hiki mai na mea a pau ma kalii o ka Luna Nui, Mrs. S. Treadway. Ia wa a makou e ku aua maluna o na lio, aia hoi, elua lio e holo mai ana me na kapa ano e, i kahikoia me he ano Generala la imua o na koa, me ko makou manao he muu lala no ku Ahahui Anuenue, i ae la kekahi i kekahi, ua lanakila ka Ahahui Anuenue, Auwe! Nani ka lanakila ! ! i nana hou aku ka hana o makou, o na Luna no ka o makou, alaila, hoihoiia mai ia manao uua pela.
KA NAUE ANA O KA HUAKAI LIO.
Ua hoomaka ka hele ana ma ke kihi Akau o ke kulanakauhale, me ka Hae Aupuni e welo ana mamua, a me ku Hae no hoi o ko makou Ahahui, a mahope iho na pahu, a me ka mea puhi ohe. a o ka huakai no hoi mahope iho. Pela ka hele ana o ka huakai a hiki ma ke alanui e pii anu ma kahi o Mr. Kenui, malaila pii ma ia Akau Hikina, a kupono i ke Alanui Hoapili, hele Hikina hou, oia ka helu 2 o na Alanui, mailaila aku a Kupono i kahi o ka Luna Nui. iho hou i kai. a hiki ma kona Hale, ia wa. haawi Ua Ahahui ekolu huro aua no ka Luna Makai Nui o Maui. oia o Peter M. Treadway Eqs., a ma ia manawa, akahi no a komo mai ku Luna Nui o makou i Ua huakai. A pela ka hele malie ana me ka haunaele ole, a hiki ma kahi o ka Mea Hanohano Gov. P. Nahaolelua, mahlaila haawi hou ka Ahahui ekolu huro ana. mailaila aku a hiki makahi o Miss. J. Young Moemalie, haawi no ka Ahahui ekolu huro ana. A kupono malaila, pii hou iuka, a loaa ke Alanui Hoapili, alaila, huli hou i ka Akau. a hiki ma kahi o F. W. Hutchinson, Esq.. haawi no ka Ahahui ekolu huro ana, mailaila aku a hiki ma kahi o Ua Luna Nui o ka Ahahui Anuenue, oia o Miss Emma Malo, haawi no ka Ahahui ekolu huro ana, a mailaila aku a hiki i kalii o A. Oudinot Pela no ka hana ana ma ke Alanui Papu, pii hou mauka a hiki i ka hehi 3 o na alanui. hele hou aku a kupono i ke Alanui Lahainaluna, pii hou iuka ma ia Alanui a hiki i kahi o Henry Turton & Co., haawi no ka Ahahui ekolu huro ana, e like mo ka mea mau, e haawi ana i ke aloha no ua malihini. a me na kamaaina. Mailaila'ku makou a hiki ma kahi o Mr. Spencer. haawi no ka Ahahui ekolu huro, a pau ia, pii hou a hiki i ke alanui e pii ana i Maunahoomaha, hele hou ma ka Akau, a hiki i kahi o Mr. D. D. Baldwin, hawi no ka Ahahui ekolu huro ana, a pau ia, huli hope hou a hiki ma ke Alanui Lahainaluna, pii na hua o ka Ahahui e haawi i ke aloha no ka wahine a ke Kakauolelo o ka Ahahui, oia o Mrs. Kiaiaina, no ka mea, ua loohiaia oia i ka nawaliwali, a he mea kaumaha in no keia Ahahui, e hoope una i na kulu waimaka ma nu na pola hainaka keokeo, a hoopuka'e la i keia mau huaolelo, "Auwe! Aloha no makou!!" A pau ka ike ana ia lai o ke kaona, huli ka ihu o na lio i kai; ia wa, ua hala aku na eheu o ka po, a ua puka mai ka eheu o ke kakahiaka, o ke ono paha ia o ka hora iu wa, kau aku la ka manao u ka ihu o ku moku Kilauea, no ka mea, aia malaila na keiki (boys) puukani o Honolulu i ke puhi ohe, uu hoolimalimaia e ko makou Ahahui. O ka iho hou no ia o na lio a hiki ma kahi o ke Kanikela Amerika, haawi no ka Ahahui ekolu huro ana. Alaila hoi hou i ka

Hale Hookolokolo, ma ka pili kahakai, ia hele ana aku ma ko alo o ka Hale Hookolokolo huli ke alo o na lio i kui, e nana ana i ka moku Kilauea, e kokolo mai ana maloko mai o Lanai ; a no ka lohi loa o ka holo ana mai.
naue hou lio ka Ahahui i ka hoolai lio ma ke kaona. a kaapuni hou i ke kulanakauhale, oia ka lua o ka puni ana. Oiai ka moku Kilauea e naue holo ae ana makai. e naue holo ana no hoi ka Ahahui Aloha mauka. I ko'u nana iho. ua lai no. a uki hou ka Ahahui ma ka Hale Hookolokoo. a malaila kahi i ku iho ai na lio. Ia wa, holo aku ka Luna i kohoia i Komite no na mea e pili ana no na mea kani. a me ka Hope Luna Nui iluna o ka moku Kilauea, a hoi mai la laua me na mea puhi ohe. a i ka hiki ana ma kahi o ka huakai, o ka hoomaka ho la no ia o ia poe ma ka lakou hana. a o ke kai hele aku la no ia o " ka huakai a hiki i kahi e ahaaina ai ka Ahahui Aloha. Noho iki iho la makou, a hoi kela mea keia mea i kona wahi. no ka maliuliu i na mea e pili ana i ka hana ia la no ka ahaaina ana. O ke kumu o ko makou hana ana pela, i kaawale makou i ka huikau o na lepo o ke ahiahi; no ka mea. ekolu ahaaina ma ia ia, nolaila, ua kaawale aku ka nui o ka lepo ia makou. KUPA HAWAII. Lahaina, Maui, Aug. 10, 1833.
Ka La Hoihoi Ea ma Lahaina,
I KE KILOHANA POOKELA O KA LAHUI HAWAII. â€” Ua ike lea no wau, he olioli nui ko'u i ka hoopiiia ana i kou mau Kolamu i na . manao pili i ka pomaikai a me ka hauoli o ka lehulehu, nolaila, ke hoike aku nei au ia ne me ke kaniuhu ole i ke ano o ka malama ia ana o ua la la, e kaÂ» Ahahui Aloha o ka malu Ulu o Lele. Ua malamaia iho nei ka la 31 o Iulai, e Ua Ahahui Aloha o ka malu Ulu o Lele, ma ke kukulu ana iho nei he Ahaaina nui hanohano, ma ke Capitala o keia Mokupuni, ma kahi i kapaia o "Maunakui." Mamua ae o ia la, ua akoakoa pu mui na lala a pau o keia Aha, mai kela Apana keia Apana mai o keia Mokupuni, me na puuwai i piha i ka olioli, i holookoa hoi i ka manao lokahi. [ka la 30 o Iulai a po iho, i ka hora 12 o ua po la, a oiai e konale maikai ana ka mahina, he leo o ka bele nui o Wainee, i hoomakaukau mua ia, e wawalo ana i ke ku1e-nakauhale a puni. no ka hoomakaukau ana o ka Ahahui Aloha. a mahope iho. loheia'ku ia ka leo o na pahu, e holoholo ana iloko o na lau laau. Me he hekili la iloko o na ao panopano, ia wa koko no, ua oiliili koke mai na hoa a pau o ka Hui, maluna o na lio, ma kela wahi keia wahi, me ka hikiwawe hakalia ole. a i Ua mauawa pokole, ua akoakoa mai na hoa a pau me ka eleu nui, ma kahi o Mrs. S. Treadway, ka Luna Nui o ka Ahahui, i kahikoia i na aahu like. a puka mai ka Luua Nui me konu hanohano a pau, a alakai aku la i ka Ahahui holookoa iu po. Penei ke alakai ana, ka Hae Hawaii mamua loa. e paa ia ana e J. Kaluna. a o ka Luna Nui aku, Mrs. Sally Treadway, me kona hae, a hae hoi o ka Ahahui Aloha, e paaia ana e Wm. Kaluna. na puhi ohe aku. Peter Kalaikini aku. ka hope luna nui, u Kakauolelo hoi o ka Aha, o ka Hui aku, i maheleia i na laina elua, e hoomaluia ana e Wm. Hanaike a me John Hoopii, na luna hoomalu, a o Moses Kahula hoi a me Davida Kamaiopili. na ahai olelo, e holoholo ana laua imua a i hope o na laina, no na huaolelo mui ka Luna Nui mai a i na luna hoomalu, a pela no ka hele huakai ana mahina o na lio. a puni ke kulanakauhale. 1 ka moku anu o ka pawa o ka wanaao, i ka wa hoi e wehe mai ana o Ue alaula o ke kakahiaka, ikea lea ia mui la na kaha onionio o ka Hae Hawaii e na kanaka a pau, e welo hele ana ma na kapa kahakai o Panaewa, me he anuenue la iloko o ka ua lani pili, alaila, he leo o ka lehulehu i loheia'ku e haawi mai ana i na leo

huro kupinai pau ole i ka helu, no ku piha i na uila olioli, no ka hoihoiia ana mai o ke ea o ko lakou Aupuni, a me ke kau hou ana hoi o ka hanohano

Alii. I ka hora 8 o ke kakahiaka o ka la 31. a oiai e hoohehee ana na kukuna wela o ka la I na kehau o ka po. a e lai malie ana hoi ke kai i ka pohu maiino o Hauola, kuolo ae la ka Ahahui Aloha me ka hanohano nui. ma ke alo o ka Hale Aupuni, a mailaila i ku like ai na laina elua, e huli ana ke alo i ke kai, e ani maikaiia ana e ka welau Ma-a, o na puuwai palupalu mamua, a o na lima lauahi o ke aloha mahope, e kali ana no ka lele mai o na puhiohe o Honolulu mai. ua ku mai lakou ia kakahiaka, mu ka moku Kilauea, a i ko lakou pae ana mai, hoonohoia'e la lakou mamua o ka Aha, a puhi ae la i ke mele. a kai malie aku la ka Aha holookoa, a komo ma ka pa i kapaia o "Maunakui," a hookuuia ae la ka Aha ia kakahiaka. I ka aina awakea, i ka hora 3, a i ka wa hoi i akaku'u mai ai o ka ikiiki o na kukuna wela o ka la. a oiai ua akoakoa lakou a pau ma kahi o ka Luna Nui, puka hou mai la lakou e kai wawae ana, ua kuikui palua ia, he kane a he wahine, e hele ana i na lai-
na pololei elua e hele ana i kahi i hoomakaukau mua ia no ka ahaaina olioli. A welo ae la ka Hae Hawaii mamua loa, a o ka poe mea kani aku, e mele ana i na mele hoohauoli, e hoolele!e ana i ka hauli o ka poe makaikai, i hiki ole ke uumi iho, a o Mr. M. Kenui aku ke kahunapule o ua Ahahui nei, a o Mr. John Booth aku ka Ilamuku o ua Aha nei, me kona kahiko ano koa maoli no ka lanakila, ka Luna Nui aku me kona mau hoa luna. e lai malie ana malalo o ke aka o
kona hae ponoi, o ka ano o ia hae, he hae ulaula ki8hi eleele, i kaula i na hua nui akaaka. "Ahahui Aloha." O ke ano nae o ke kapi o ka Luna Nui ia U. he kapa eleele silika, i kauia i ka lipine silika opulepule hinuhinu. Ua lupea opea kona e ka la, Ua hinua e ke kai o Ehu, Ua kaia e ka hau, Ua hanini mauka o Alanapo-e, Po i ka uahi na ulu i Weli e."
Ka ua mea he nani o ka aahu o ka Luna Nui. a o na huakai aku i kahikoia na wahine i na papale eleele bihopa. ame na aahu pu-ahau o Maleka, "Me he pua akuli la i ke kaha o Kealia â€" e ! alia." Ko na kane noi, he paa keokeo puapua koae, mai ka papale a ka wawae, " Me he ku la na ka ahu pea maikai i ke kai o Kea wa iki." E hoomalu ponoia ana e na Lunahoomalu, e "Kalakalaihi ka la kau ma Lehua." A o na na ahai olelo hoi, ua kahikoia i na paa eleele i hoopiliia i na ribine silika olenalena, me na hulu nui eleele e pulelo ana ma na papale, i keokeo no la paha, o "Murata no la kahi mea e like ai." O ka hanohano i lona ia poe ma ia la, he mea hiki ole i ka waha hookahi ke huai pau ae ; a i ka hiki ana ma kahi i hoahuia'i na momona a pau o kela ano keia ano, uu akoakoa mai ilaila na hooai hanohano a pau i kauohaia'i, na Luna Aupuni o keia kulanakauhale, na Kahunapule a pau o kela hoomana keia hoomana, ke Kanikela o Amerika Huipuia, ame na hoa hanohano e ne he nui wale; a pau keia poe a pau i ka noho ma ku papaaina, uhi mai la ka naulu mamalu o ke aka o ka poe makaikai e ku mai ana, a aneane pouli mai la ko loko o ka hale, a ku ae la ko ka hale a pau iluna, a mele mai la ka poe haku mele ma na waha, a kani pu mai la hoi na mea kani, i ka leo mele Aupuni, "E ola ka Moi i ke Akua." A pau ia, pule ke Kahunapule o ka aha. a paina iho la me ka olioli nui ame ka hauoli. A oiai no e ai una. hoopuka pinepine mai la ka luna mele, o D. Kahaulelio. a me na hoa mele pu hoi, i na mele hoohauoli he nui wale, a hoohialaai iho la nu hoa a pau, a ku mai la o James Humphreys ka mea i kohoia i haiolelo no iu la, a haiolelo mai la ia nona mea e pili

ana ia la, ma ka olelo kupa o ke one hanau, a nui ka hope no o kana haiolelo, ua hakuia he mau pauku himeni, e hoonani ana ia Iehova, (Ue koa lanakila) a ilaila, ku

hou na hoaai a pau iluna, a ani like ae la i na lima no ka hoomaikai ana, a uu hoopiha pinepine ia no na kiha wai huihui, me ka hooho ana i na huro he nui wale no ko kakou mau Moi, a no ko laua hanohano alii. a pela no a pau wale ka paina ana. I ka po iho, he wahi hoolele haole a hiki i ka hora 12 o ka po. A no ke eweewe loa no paha o ka manao hauoli o ka aha ia la. hoomau hou ae la lakou i kekahi la ae, he ahaaina hou no, a i ka po iho, hoolele hou no, ilaila ikeia iho ai kekahi poe hou ae. "He aha la ia i ka Ahahui Aloha, Opala ia." A oia ka hookuuia ana'ku o ka Ahahui o ka malu ulu o Lele, me ka maluhia. W. H. UWELEALEA. Lahaina, Maui, Aug. 3, I863.
Hoopunipuni nui launa ole mai.
E ka Nupepa Kuokoa e; Aloha kaua:
E ahonui oe i ka hookomo iho ma kou wahi kaawale i keia manao, i ike mai ka lehulehu i ka hoopunipuni o keia kanaka, o Kalua kona inoa. aole nae hoi o'u manao e hai ma ke akea ina akahi wale no ana hana ana ia'u, a no ko'u manao o puni hou auanei kekahi poe e ae e like me ko'u mau puni ana iho nei, nolaila au e kamailio nei me ka hookamani ole. I ka la 10 o Aukake nei, hoomakaukau au no ka hoi i Hawaii i ko'u home; iho aku la au me ka'u wahine a kau i ka moku "Kilauea." o ka hele mai no ia o ua Kaimi nei, a onou malu mai ana, me ka olelo mai "Eia mai ko hapalua kini he $10.00," o ko'u ho-o no ia i ko'u eke, me ka hoomaopopo ole no. no ka mea, he pohihihi no au ma ka nana dala ana, no ka mea, he wahi elemakule no au i maa ma ka nana ma ke dala keokeo, iloko nae o'u ka manao iini nui he hapalua kini io ka mea i loaa mai ia'u mai a Kalua mai, (oia ke kane a kuu moopuna.) O ko makou holo mai no ia a Kalepolepo ohi ia mai ana ke dala o ka moku, ia wa, heie au me ua hapalua kini nei a ua Kalua nei i haawi mai ai ia'u. me ka manao e laweia elua dala $2.00, koe $8.00. i ka wa a'u i haawi ai i ua hapalua kini nei, o ka pane mai no ia o ke Kupakako "Aole keia he hapalua kini, he keleawe keia," (he keneta.) eia ka mea i loaa ia'u o ka nele i ka mea i manao lana'i. O ka lua keia o ka hoopunipuni ana a ua kane nei a ua moopuna nei ia'u. aka, aole no au e wehewehe loa ana ma ia mea, ma keia hoopunipuni no au e kamailio ai, oia ka hoopunipuni i laha i waena o ka lehulehu. Alua o'u holo ana i ona la me ka makaukau no na mea kino, aole no au i haawi aku iaia me ka hoopunipuni, e hana ai la hoi ia ia'u pela, pololei, i kuu manao, ina i i mai ua Kalua la "Aole wahi dala," ma pela ua oi ka maikai oia mamua o ka hoopunipuni. O keia Kalua oia ka mea e noho la ma ka pa o Kauka Ruka. nolaila, e makaala ka poe e ae o puni. E. KINI. Honopueo, Kohala, Hawaii, Aukake 15, 1863.
Ke akamai o ko Akua i kona hana ana i ka Mahina.
Ua hana ma ke Akua i na mea a pau, he pono i kona manao. Ua hana mai oia i ka la, na hoku paa. na helu lewa. na hoku welowelo, a kau aku ia ma waena o ke aouli, ma ka lani a o ka mahina hoi. oia kekahi mea nui ana i hana ai. a o ko ka Honua nei hoa hele no ia, a mai ka Honua nei a ka mahina, he 240.000 mile, a ua like kona loa me ko ka Honua, a o kona unawaena, he 2,180, a o kona kaa hookahi ana. 29 la 17 hora, 24 minute. a ua poai hookahi oia i ka Honua. i na la he 27 1/2 aole like loa ka ike ia o ka mahina i na manawa a pau. i kekahi manawa. ua like me ka poepoe i ka wa e hiki ai ka mahina, ma waena o ka la. a me ka Honua, a i huli mai ka aoao pouli ia kakou nei. ua kapaia oia he mahinahou, aka. i ka wa e hiki ai ka Honua ma waena

o ka la. a me ka mahina, a huli mai ia kakou ka aoao olinolino, ua kapaia oia he mahina poepoe, no ia mea na inoa ona i kapaia'i o ka mahina hapalua mua. mahina poepoe, mahina hipilua hope, a me ka mahina hou. ina i nana ia ka mahina me ka ohinana maikai. alaila. e ike ia na nauna, a me na puu, na awawa, na pohaku nui, a me na aina papu, a ua oleloia ua ike ia kekahi mau Bele, ma ka mahina e a ana i ka manao o Helekela e 4 mile ko kiekie o kekahi mauna, a 3 mile ka hohonu o kekahi awawa. Nolaila ua akaka loa ko ke Akua akamai i kona hana ana i ka mahina, oia ua li Ue pu no me kakou, na puu na awawa. na mauna, a me na kahawai a he pono ia kakou e mahalo aku. Me ke aloha. J. W. MALUNA. Waianae, Oahu, Aukake 18, 1862.
Nu Hou.

E ka Nupepa Kuokoa e; Aloha oe: Ma ka Poalima, oia ka la 7 o keia malama, ku kekahi wahine i ka pu. o Painaliilii kona inoa, eia ihu kona moolelo. Ma ia la. he ahaaina ma ka hale o Kapai, ma Makawao. ua akoakoa mai ka lehulehu malaila; aia nae. e ki mau ana o Kaaea i ka pu i ka hoomaka ana e ahaaina, o ke kumu o kona ki ana. he hoailona iu no uu ahaaina nei. i mea e akaka ai i ka lehulehu he ahaaina malaila, i ka pu hope loa o Uanii ki ana. puka mai la ua Kanea nei mailoko mai o ka hale me kana pu. u ku oia mawaho o ka lanai o ka hale. kau aku la oia i kanu pu i kana wahine e makemake ai e ki aku, aia nae, ike mai la kekahi kanaka e kau pololei aku ana ka waha o ka pu i ona la, kahea mai la oia me ka leo nui, "Ea ! e ku mai auanei au i kuu pu ? E ki aku oe i Uau pu ma kahi e!" Lohe mai la ka wahine a ua Kaaea nei, pane mui la oia i kana kane, "E hele oe ma Uahi kaawale e ki ai i kau pu." Ia manuwa koke no. huli ae la ua Kaaea nei a ki aku la i kana pu, a i Ue kani ana o kana pu. pane mai la ua Painaliilii nei i kana kane. "Auwe! ku au i ka pu." No ka mea. e noho kokoke ana ua wahine nei mamua ona, pane mai la ua Kaaea nei. "Aole oe ku i ka pu, ua pili aku la ko hanu no ke kani o ka pu." Pane hou mai la ua wahine nei, "Ua ku nu i ka pu ma kuu opu." Ia manawa, holo aku la ke kane a ua wahine nei, haha aku la ma kona opu ; aia hoi, ua hu kona naau iwaho. Ia manawa, maule iho la ua wahine nei. uwe ne la no hoi ka lehulehu o ua wahine nei. o ke kanaka hoi nona ke ki ana i ka pu, hopu iho la oia i ke ahuawa, aole nae i make ua wahine nei ia manawa. Ua kiiia o Mr. Wiltong. e hele mai o nana i keia pilikia, a ua manao oia noio e make, aka. ua haalele koke mai oia i ka la i ka mea mehana, ma ka hora 12 o ka la 8, a o ua Kaaea nei hoi, ua hopu ia oia. . Me ke aloha. Na'u na S. KAHAAWIPU. Halehaka. Hamakualoa, Maui, Aug. 11, 1863. [Ua ninaninauia e ka Lunakanawai apana o Kaaea, a ua hookuuia no. pela ko makou lohe mai â€" LUNA HOOPONOPONO.]

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ʻEnehana | Hōʻike hou

MARKET OVERVIEW FOR KUIKAHI AFFORDABLE PROJECT

APPENDIX

F

KUIKAHI 100% WORKFORCE HOUSING MARKET OVERVIEW

In developing the marketing plan for the Kuikahi 100% Workforce Housing Neighborhood, Alaula Builders desires to identify the target market and the overall market conditions for workforce housing homes for local Maui families.

In Alaula's market study and research there was interviews, analysis and research with Realtors, new homeowners, potential buyers, various government agencies and several other developers. The focus was to look into historical challenges to previous multi-family projects.

This investigation revealed one main point. The biggest obstacle to selling workforce housing units was the deed restriction. The figures exposed that buyers were reluctant to enter into the purchase of a home with restricted ability to participate in full appreciation and equity. Poignantly there was little to no objection to the location, floor plan, project or price. Should the home have been offered without the restricted resale deed restriction the homes were nearly 100% acceptable to potential buyers.

There are several key factors that make the Kuikahi neighborhood unique to previous multi-family projects that may have had challenges selling their units.

Most importantly Alaula is addressing the largest buyer objection with a proactive unique approach to the deed restrictions. Alauala is proposing a deed restriction that allows new homeowners to participate 100% in market appreciation while allowing the home to remain in affordability in perpetuity. Alaula's research has found that this approach is very palatable to first time homebuyers that are most likely moving into a 'trade up home' and not their 'forever home'.

The biggest difference with Kuikahi and these previous projects that moved out of affordability and into market rate was their ability to actually move out of affordability. Kuikahi will be processed via MCC 2.97 and will not have that component. The stories reveal that if this option is available, buyers become a bit confused and are more agreeable to opt for a higher price without deed restrictions. As proposed, Kuikahi is 100% affordable and will remain that way in perpetuity. With less confusion there is less objection to this component of affordable homes.

A broad range of market information about Maui's residential workforce housing historical trends for the surrounding neighborhoods and the real estate market in general is considered favorable to buyer's looking for workforce housing. The current housing market is unprecedentedly active.

Housing will continue to be scarce as inventory of housing is at record lows and prices are at record highs according to data collected from the Realtors Association of Maui. Additionally, the current mortgage rates are at historical lows and now is a time for home buyers to get into the market as soon as they can.

Alaula will make its best efforts to advertise and market Kuikahi to Maui's workforce families and individuals. Avenues such as the Maui News, Mauinow.com, Realtor outreach, word of mouth, social media, website, mailings and blogs will also be used to inform buyers of the Residential Workforce Housing Program.

Lastly, Aluala will not use nor promote 'mortgage steering' that has plagued past failures.

TRAFFIC IMPACT ANALYSIS REPORT

APPENDIX

G

TRAFFIC IMPACT ANALYSIS REPORT
KUIKAHI RESIDENTIAL
WAILUKU, MAUI, HAWAII

DRAFT FINAL

May 25, 2021

Prepared for:

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TRAFFIC IMPACT ANALYSIS REPORT
KUIKAHI RESIDENTIAL
Wailuku, Maui, Hawaii

DRAFT FINAL

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May 25, 2021

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

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KUIKAHI RESIDENTIAL
TRAFFIC IMPACT ANALYSIS REPORT

Wailuku, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the proposed Kuikahi Residential project (hereinafter referred to as the "Project") located in Wailuku, Maui, Hawaii.

1.1 Location

The Project is located in Wailuku on the island of Maui on approximately 15 acres of land more specifically identified as TMK: (2) 3-5-002:003 (por.). The Project will be bounded by Honoapiilani Highway to the east and the Kuikahi Drive to the north. See Figure 1.1 for Project location.

1.2 Project Description

The Project proposes the development of 204 residential units, including 120 multi-family residential units, 34 duplex units, 16 live work units, 28 studio units, and 6 single family lots. Access to the site will occur via two (2) new driveways off of Kuikahi Drive, with primary access from a new leg at the Kuikahi Drive/Kehalani Mauka Parkway intersection which will convert the existing T-intersection into a 4-way intersection. Secondary access will be provided via a new driveway from Kuikahi Drive located approximately 0.20 miles west of the primary driveway. See Figure 1.2 for Site Plan.

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KUIKAHI RESIDENTIAL

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

STUDY INTERSECTIONS

1. KAMEHAMEHA AVE. & MAUI LANI PKWY.
2. WAIALE RD. & KAOHU ST. & OLULOA DR.
3. WAIALE RD. & WAIINU RD.
4. WAIALE RD. & OLOMEA ST. & WAIMALUHIA LN.
5. WAIALE RD. & KAUPO ST.
6. WAIALE RD. & KUIKAHI DR. & MAUI LANI PKWY.
7. WAIALE RD. & KOKILOLIO ST.
8. WAIALE RD. & HAAWI ST.
9. WAIALE RD. & NOKEKULA LP.
10. WAIALE RD. & OHANA HANA LP.
11. E. WAIKO RD. & WAIALE RD.
12. KUIKAHI DR. & KEHALANI VILLAGE CENTER DR.
13. HONOAPIILANI HWY. & KEHALANI PKWY.
14. HONOAPIILANI HWY. & KUIKAHI DR.
15. HONOAPIILANI HWY. & PILIKANA ST.
16. HONOAPIILANI HWY. & W. WAIKO RD. & E. WAIKO RD.
17. KUIKAHI DR. & KEHALANI MAUKA PKWY. & E. PROJECT DWY.
18. KUIKAHI DR. & W. PROJECT DWY.

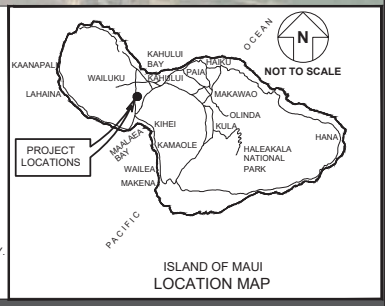


FIGURE 1.1 LOCATION MAP

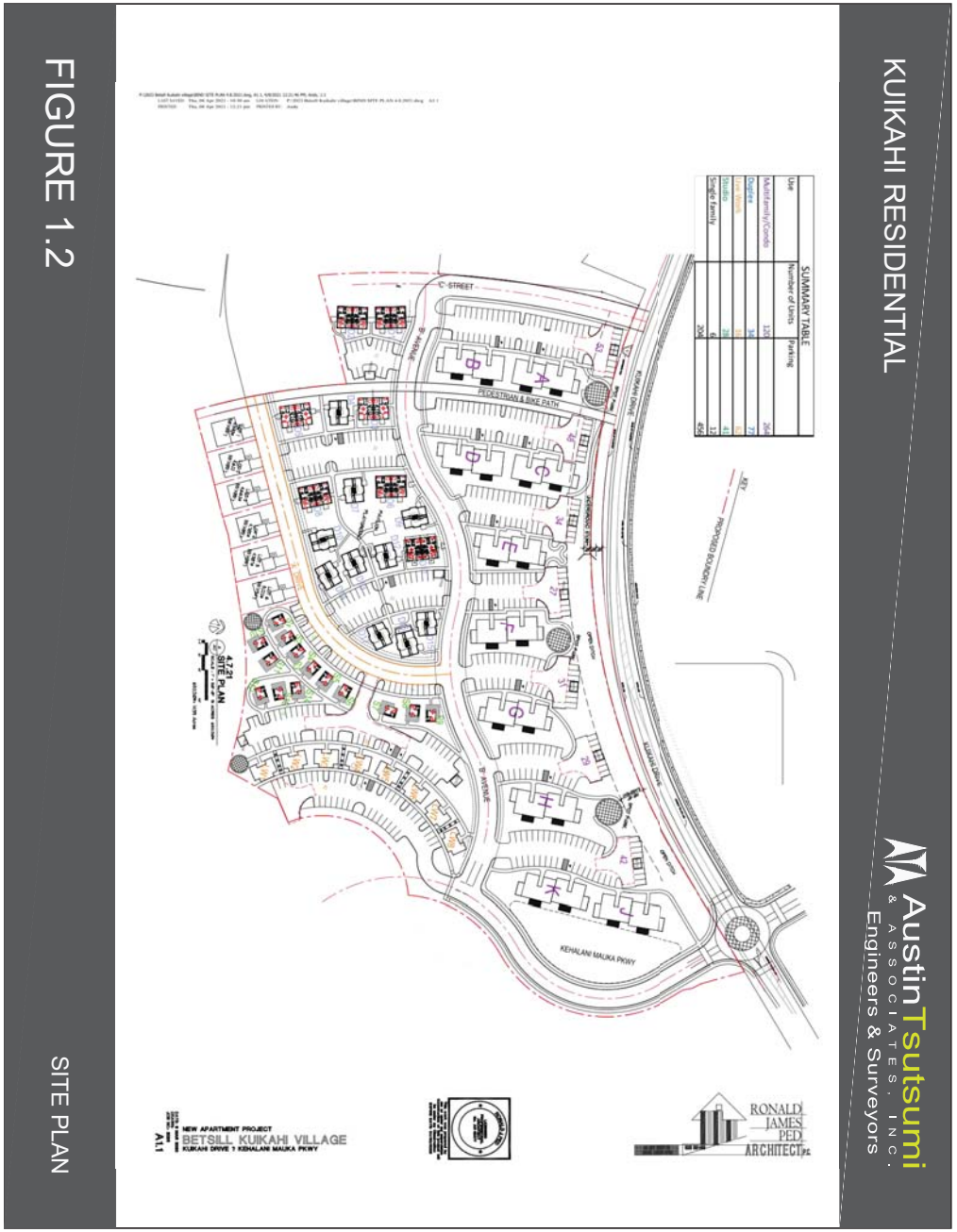


FIGURE 1.2

SITE PLAN

2. METHODOLOGY

This study will address the following:

- Assess existing traffic operating conditions during the weekday AM and PM peak hours of traffic within the study area.
- Traffic Projections for Base Year 2024 (without the Project).
- Estimate the vehicular trips that will be generated by the Project.
- Traffic projections for the Project for Future Year 2024 (with Project).
- Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by the Project.

2.1 Intersection Methodology

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. See Appendix B for Level of Service Criteria.

Analyses for the signalized and stop-controlled study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. Roundabout analysis was performed using SIDRA Intersection, which is also able to prepare reports based on SIDRA methodologies. 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.

3. EXISTING TRAFFIC CONDITIONS

3.1 Roadway Network

The following are brief descriptions of the existing roadways studied within the vicinity of the Project:

Honoapiilani Highway is a north-south, two-way, two-lane, undivided arterial highway with posted speed limits ranging between 30 miles per hour (mph) and 45 mph. Honoapiilani Highway begins as the continuation of South High Street near Kahookele Street and continues southward through Waikapu, Maalaea, and wraps around the "Pali" to West Maui. Right turn channelization is provided at all of its major intersections within the study area.

Kuikahi Drive is an east-west, two-way, two-lane, undivided collector roadway with posted speed limits ranging between 25 mph and 30 mph. Kuikahi Drive begins approximately 1.2 miles west of Honoapiilani Highway within the Wailuku Heights development and extends eastward past Honoapiilani Highway, terminating near The Church of Jesus Christ of Latter Day Saints, where Kuikahi Drive becomes Maui Lani Parkway.

Maui Lani Parkway is an east-west, two-way, two-lane, divided roadway with a posted speed limit of 30 mph that provides connection for the Waiale area to regional roadways. Maui Lani Parkway begins to the east at it's T-intersection with Kuihelani Highway and terminates to the west at its intersection with Waiale Road, where it transitions into Kuikahi Drive.

Waiale Road is a north-south, two-way, two-lane, undivided collector roadway. To the north, Waiale Road serves as the southern connection to Lower Main Street and extends past the Maui Community Correctional Center, Kehalani Village Center and various residential subdivisions, eventually terminating at a T-intersection with East Waiko Road. Waiale Road has a posted speed limit of 20 mph from Lower Main Street and transitions to 25 mph from Waiinu Road to Maui Lani Parkway/Kuikahi Drive and increased again to 30 mph from Maui Lani Parkway/Kuikahi Drive to its southern terminus at Waiko Road.

East Waiko Road is an east-west, two-way, two-lane, undivided collector roadway with a posted speed limit of 20 mph in the Project study area. East Waiko Road extends westward from Kuihelani Highway to Honoapiilani Highway where it continues as West Waiko Road within the Waikapu residential neighborhood.

Kehalani Parkway is an east-west, two-way, four-lane, divided collector roadway with posted speed limits ranging between 20 mph and 30 mph on either side of Honoapiilani Highway. Kehalani Parkway extends east of Honoapiilani Highway from the lower Kehalani residential subdivision at Kamole Street and continues in the mauka direction, curving north past Puu Kukui Elementary School in the upper Kehalani residential subdivisions.

Nokekula Loop, Haawi Street & Kokololio Street are east-west, two-way, two-lane, undivided local roadway to the west of Waiale Road with a posted speed limit of 20 mph. These three roads service the Waikapu Gardens Phase I residential neighborhood

Ohana Hana Loop is an east-west, two-way, two-lane, undivided local roadway to the west of Waiale Road with a posted speed limit of 20 mph. Ohana Hana Loop extends from Waiale Road and services the Waikapu Gardens Phase II residential neighborhood.

Kaohu Street is an east-west, two-way, two-lane, undivided local roadway on the northern side of the Project Site that extends from High Street to the west and ends at Waiale Road to the east, before turning into Oluloa Drive, to serve a residential subdivision. Kaohu Street provides access to various residential homes, various businesses and the Maui County Building. The posted speed limit is 20 mph with a posted school zone speed limit of 20 mph enforced between the hours of 7:00 AM and 6:00 PM.

Olomea Street is an east-west, two-way, two-lane, undivided local roadway that services the Kehalani residential subdivision consisting of various single family and multi-family dwellings. The posted speed limit on Olomea Street is 30 mph.

Kaupo Street is an east-west, two-way, two-lane, undivided local roadway that services the Kehalani residential subdivision consisting of various single family and multi-family dwellings. Kaupo Street also provides northerly access to the Kehalani Village Center. The posted speed limit on Kaupo Street is 20 mph.

Kamehameha Avenue is generally a north-south, two-way, two lane undivided roadway which provides connectivity between the Wailuku and Kahului areas. Kamehameha Ave begins to the north with its intersection with Hana Highway near the Kanaha Pond, extends westward and then curves southward where it currently terminates near the Pomaikai Elementary School. Kamehameha Avenue has a speed limit of 20 mph and a posted school zone speed limit of 20 mph near the Pomaikai Elementary School.

3.2 Existing Traffic Volumes

Intersection analysis within the study area was performed on the following intersections due to their proximity to the Project. Turning movement volumes were collected at each of the following Study Intersections on the dates noted:

- Kamehameha Avenue/Maui Lani Parkway (Unsignalized) - *March 13, 2019*
- Waiale Road/Kaohu Street & Oluloa Drive (Unsignalized) - *April 9, 2019*
- Waiale Road/Waiinu Road (Unsignalized) - *March 14, 2019*
- Waiale Road/Olomea Street (Unsignalized) - *March 14, 2019*
- Waiale Road/Kaupo Street (Unsignalized) - *April 9, 2019*
- Waiale Road/Kuikahi Drive & Maui Lani Parkway (Signalized) - *March 13, 2019*
- Waiale Road/Kokololio Street (Unsignalized) - *April 4, 2019*
- Waiale Road/Haawi Street (Unsignalized) - *April 4, 2019*
- Waiale Road/Nokekula Loop (Unsignalized) - *April 4, 2019*
- Waiale Road/Ohana Hana Loop (Unsignalized) - *April 4, 2019*
- Waiko Road/Waiale Road (Unsignalized) - *April 4, 2019*
- Kuikahi Drive/Kehalani Village Center Driveway (Unsignalized) - *April 9, 2019*
- Honoapiilani Highway/Kehalani Parkway (Signalized) - *May 10, 2018*
- Honoapiilani Highway/Kuikahi Drive (Signalized) - *March 13, 2019*

- Honoapiilani Highway/Pilikana Street (Signalized) - *May 10, 2018*
- Honoapiilani Highway/Waiko Road (Signalized) - *May 10, 2018*

Based on the traffic count data, the weekday AM peak hour of traffic was determined to occur between 7:00 AM and 8:00 AM, while the weekday PM peak hour of traffic was determined to occur between 4:00 PM and 5:00 PM. The traffic count data is provided in Appendix A for the existing intersections studied.

3.3 Existing Traffic Conditions Analysis and Observations

As of the writing of this report, Kamehameha Avenue/Maui Lani Parkway is a roundabout. However, at the time that counts and observations were performed, the intersection was a 4-way stop. The intersection will be analyzed as a 4-way stop for Existing Conditions, and as a roundabout for Base Year and Future Year conditions.

Kamehameha Avenue/Maui Lani Parkway was a four-way stop controlled intersection with exclusive left-turn lanes on both approaches on Kamehameha Avenue and is located 700 feet northeast of Pomaikai Elementary School. Each approach includes flashing beacons with stop signs, and marked crosswalks are provided on the southwest leg of Kamehameha Avenue and the northwest leg of Maui Lani Parkway.

The eastbound approach and the southbound through/right-turn movement operates at LOS F during the AM peak hour, and the eastbound approach, westbound approach, and the southbound through/right-turn movement operates at LOS F with overcapacity conditions during the PM peak hour of traffic. This is primarily due to relatively high volumes of regional traffic between the Waikapu-Wailuku-Kahului regions. Queues were inconsistent and varied in length throughout the peak hours, with a short period of extensive southbound queuing during the AM peak hour and periodic eastbound queuing during the AM and PM peak hours of traffic.

Waiale Road/Kaohu Street/Oluloa Drive is a four-way stop intersection with shared left-turn/through/right-turn lanes along Waiale Road and the westbound approach along Oluloa Drive. An exclusive left-turn lane and shared through/right-turn lane is provided along the eastbound approach on Kaohu Street.

Traffic was generally observed to progress unimpeded along Waiale Road during the AM peak hour, except between 7:30-7:50 AM, where southbound traffic on Waiale Road could queue back near to Wells Street. More critically, northbound traffic on Waiale Road was observed to slowly progress through the intersection. For a brief 5-10 minute period starting from 7:30 AM, northbound traffic spilled back at varying lengths from this four-way stop to the Waiale Road/Waiinu Road intersection, causing congestion that stretched back towards Kuikahi Drive. Operationally, the northbound and southbound approaches along Waiale Road operate at or over-capacity conditions with LOS F during the AM peak hour. Congestion and queuing along Waiale Road generally dissipated around 7:50-7:55 AM. During the PM peak hour, the southbound approach also operates at LOS F and overcapacity conditions and the northbound left-turn/through movement operates at LOS E during the PM peak hour.

Various constraints limit options to implement mitigative measures to curb congestive conditions at this intersection and along Waiale Road. Based on the Four-Hour signal warrant in the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition, a signal is warranted based on existing traffic volumes. However, installation of a traffic

signal system will be challenging given the existing alignment of the roadway, right-of-way constraints and skewed approach for Oluloa Drive. The lane striping along Waiale Road is currently adjacent to the westernmost limits of the County's right-of-way. Some undeveloped right-of-way is available on the easternmost limits of the County's right-of-way, so Waiale Road may need to be realigned to fit a traffic signal system at this intersection. Waiale Road may also require widening to provide exclusive left-turn lanes, given the relatively high volume of through traffic to reduce blocking of through vehicles by queued left-turn vehicles. A mini roundabout is likely infeasible due to the existing right-of-way constraints as well as the skewed approach from Oluloa Drive that inhibits perpendicular intersection approaches necessary for roundabouts. A mini roundabout may be able to fit if Waiale Road is realigned and the Oluloa Road leg is removed at this intersection. Mitigation to remove stop control along the Waiale Road approach (creating a two-way stop-controlled intersection) will also be negatively impacted by the skewed approach from Oluloa Drive, making it difficult for vehicles along Oluloa Drive to detect approaching free flowing northbound vehicles along Waiale Road. Right-of-way acquisition may be needed to provide more space for the options of a traffic signal, roundabout, widening improvements and/or the realignments of Waiale Road and Oluloa Drive to provide perpendicular intersection approach angles.

Waiale Road/Waiinu Road is an unsignalized T-intersection that is stop-controlled on the westbound Waiinu Road approach. In both the AM and PM peak hours the westbound shared left-turn/through lane operates at LOS F and overcapacity conditions with lengthy delays.

As noted above, northbound congestion can spill back into this intersection from the Waiale Road/Kaohu Street/Oluloa Drive four-way stop intersection during portions of the AM peak hour, causing congestion that stretches back towards Kuikahi Drive. Northbound congestion is further impacted at this intersection due to a heavy northbound right-turn movement as turning vehicles slow in anticipation of the turn, also slowing all vehicles in the single-lane northbound approach.

Some northbound vehicles along Waiale Road also stopped within the through travel lane to allow southbound left-turn and westbound left-turn vehicles (ranging from 1-6 vehicles at a time) to turn onto or off of Waiale Road, which contributed to the lengthy platoons along Waiale Road. During the PM peak hour, traffic along Waiale Road operated smoothly, but queues continued to be observed along the westbound leg of Waiinu Road. Queues along the westbound approach was variable throughout the peak period, and depended on gaps in traffic and the occurrence of northbound and southbound Waiale Road vehicles stopping within the through lane to allow westbound vehicles from Waiinu Road to turn onto Waiale Road.

The County plans to construct a roundabout at this intersection. Although the design and timeline for completion of this roundabout is unknown, it was included for analysis purposes in the Base and Future Year scenarios.

Waiale Road/Olomea Street is an unsignalized intersection which is stop-controlled on the eastbound Olomea Street approach. The driveway for the Maui Community Correctional center (MCCC) is slightly offset to the south of the Olomea Street intersection. This driveway was considered to be the westbound approach. During the AM and PM peak hours of traffic, the eastbound left-turn/through movement operates at LOS F and overcapacity conditions. During the AM peak hour, due to northbound congestion along Waiale Road, some northbound vehicles along Waiale Road were observed to stop within the through travel lane to allow eastbound left-turn vehicles to turn onto Waiale Road, which contributed to the northbound congestion. Based on a signal warrant, a signal is warranted with existing conditions. However, as a temporary

mitigative measure, a median refuge lane may help reduce eastbound left-turn vehicle delays by allowing vehicles to turn onto Waiale Road with a two-stage approach; turning left into the refuge lane after finding gaps in southbound traffic, then merging into the Waiale Road through lane after finding gaps in northbound traffic.

This 4-legged intersection is unconventional in that the east-leg of the intersection consists of two (2) full movement driveways separated by a utility pole. The northernmost east-leg driveway appears to be within the Maui Memorial Park property, providing access at its southwest corner of the site. The southernmost east-leg driveway services MCCC as it's sole access to Waiale Road. Existing vehicles currently utilize both driveways, with traffic primarily generated by the MCCC. Ideally, it would be best to remove the southernmost east-leg driveway to MCCC and have MCCC work with Maui Memorial Park to allow a shared easement access to the northernmost east-leg driveway that services Maui Memorial Park. This consolidates multiple turning movements at two closely spaced driveways, better lines up with the Olomea Street leg of the intersection and would remove the southbound left-turners that can queue up in the northbound left-turn lane to access MCCC using the southernmost east-leg. Left-turn restrictions could have negative effects since this is the sole access to MCCC and southbound left-turners would need to continue further south ¼ mile to Waimaluhia Lane and circulate back up to turn right into the MCCC. Illegal u-turn movements will likely be made to avoid the detour to Waimaluhia Lane. If agreements cannot be made for a shared easement, the southernmost east-leg driveway should be restricted to right-in, right-out only to remove southbound left-turner from encroaching into the existing northbound left-turn lane.

Waiale Road/Kaupo Street is an unsignalized T-intersection with exclusive left-turn and right-turn lanes along the Kaupo Street approach and shared northbound through/left-turn and shared southbound through/right-turn lanes along Waiale Road. Eastbound left-turn movements operate at LOS F with overcapacity conditions during the AM peak hour and LOS F during the PM peak hour. Similar to the Waiale Road/Olomea Street intersection, observations indicated that some northbound vehicles along Waiale Road stopped within the through travel lane to allow eastbound left-turn vehicles to turn onto Waiale Road, which contributed to the northbound congestion spilling back to Kuikahi Drive during the AM peak hour. An exclusive northbound left-turn lane and/or a median refuge lane may be considered to improve operations at this intersection and reduce vehicle spill back into Kuikahi Drive. A signal is not warranted with existing conditions.

Waiale Road/Kuikahi Drive/Maui Lani Parkway is a signalized intersection with exclusive left-turn lanes on all approaches and an exclusive right-turn lane on the westbound approach. All movements at this intersection currently operate at LOS C or better during the AM and PM peak hours of traffic. However, for about 20-30 minutes during the AM peak hour, vehicles were observed to queue beyond the length of the eastbound left-turn storage lane to the Kehalani Village Drive or as far as Honoapiilani Highway. These queues occur at variable lengths and are dependent on existing northbound queues that spill back from Waiale Road into the Waiale Road/Kuikahi Drive intersection, which limits full progression for eastbound left-turning vehicles. During the PM peak hour, some southbound congestion occurs, primarily due to the short existing southbound left-turn lane. While the existing right-of-way along Waiale Road does not allow for widening of additional lanes, the southbound left-turn lane could be lengthened, while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection.

Waiale Road @ Kokololio Street, Haawi Street, Nokekula Loop, and Ohana Hana Loop are unsignalized T-intersections servicing the Waikapu Gardens Phase I and II developments. All

movements at these intersections currently operate at LOS B or better with no significant delays during the AM and PM peak hours of traffic.

Waiale Road/Waiko Road is an unsignalized T-intersection with shared lanes on all approaches and the southbound approach stop-controlled. All movements at this intersection currently operate at LOS D or better with no significant delays or queues during the peak hours of traffic.

Kuikahi Drive/Kehalani Village Center Access is an unsignalized T-intersection with exclusive left-turns in the eastbound and southbound directions. All movements at this intersection currently operate at LOS D or better during the AM and PM peak hours of traffic with the exception of the southbound left-turn movement which operates at LOS E during the PM peak hour of traffic.

Honoapiilani Highway/Kuikahi Drive is a signalized intersection with exclusive left-turn and right-turn lanes on all approaches. The channelized northbound right-turn movement also includes an exclusive eastbound acceleration lane. All movements at this intersection currently operate at LOS D or better during both AM and PM peak hours.

Honoapiilani Highway/Pilikana Street is a signalized intersection with an exclusive left-turn lane on the northbound approach and a channelized right-turn lane on the southbound approach. All movements at this intersection operate at LOS D or higher for both peak hours.

Honoapiilani Highway/Waiko Road is a signalized intersection with exclusive left-turn lanes on the northbound and southbound approaches, and exclusive right-turn lanes on the eastbound and southbound approaches. All movements at this intersection currently operate at LOS C or better with no significant delays or queuing during the AM and PM peak hours of traffic.

Honoapiilani Highway/Kehalani Parkway is a signalized intersection with exclusive left-turn and right-turn lanes on all approaches. The channelized northbound and southbound right-turn movements also include exclusive eastbound and westbound receiving lanes, respectively. All movements at this intersection currently operate at LOS D or better during the AM and PM peak hours of traffic. For a portion of the AM peak hour, the eastbound left-turn movement operates with queues that extend to or beyond the existing left-turn storage lane and some vehicles may require two cycle lengths to clear the intersection. Heavy traffic during a short period of time is reflective of typical school traffic conditions, as these queuing conditions were observed to last about 30 minutes during the AM peak hour, generally between 7:15-7:45 AM and primarily stem from traffic generated by the Puu Kukui Elementary School.

In addition, northbound traffic queues along Honoapiilani Highway were observed to primarily stem from Wailuku Elementary School. At Aupuni Street, northbound traffic queued back to Kehalani Parkway for about 5-10 minutes during the AM peak hour.

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. Signal warrants are provided in Appendix D.

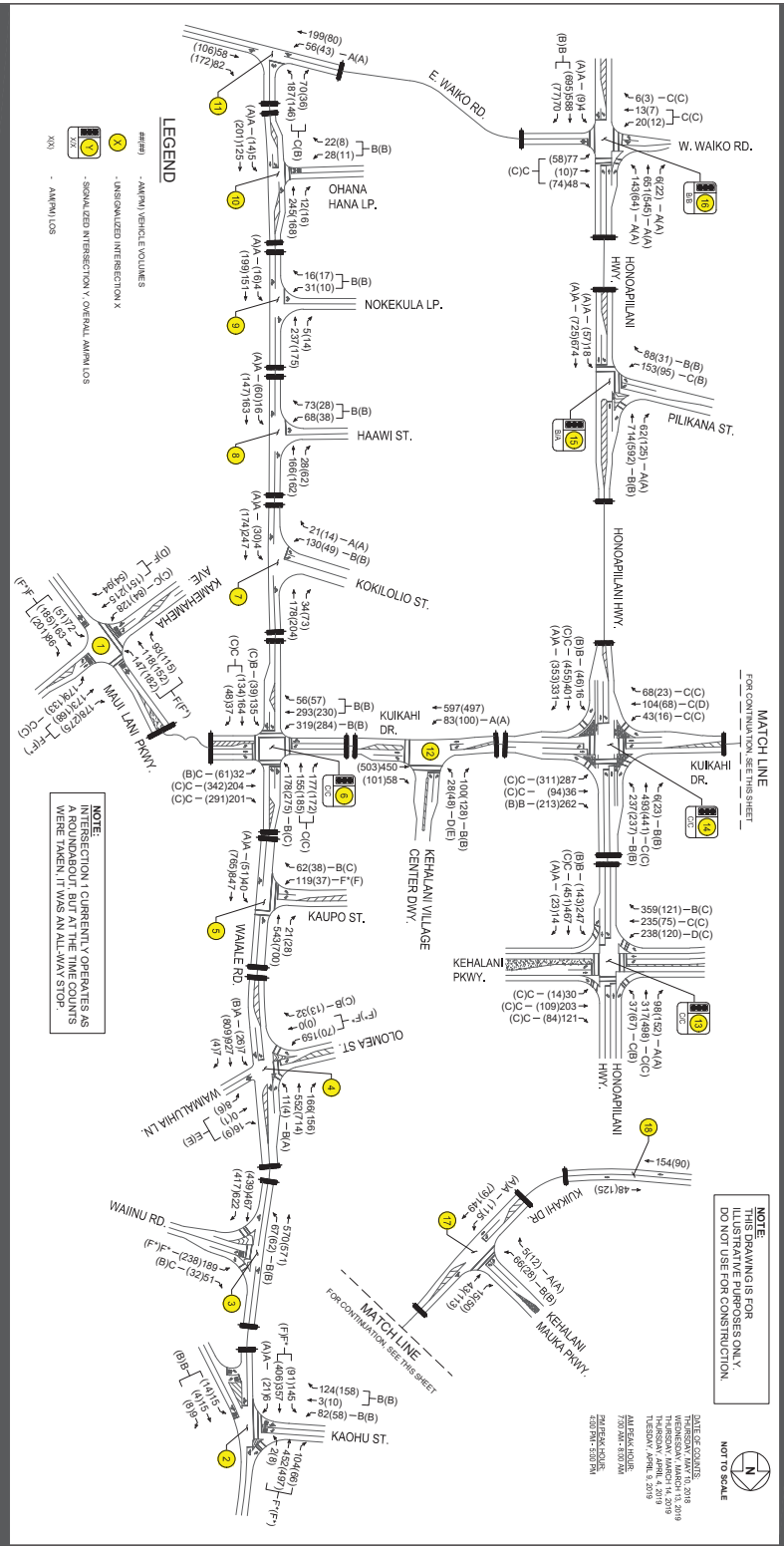


FIGURE 3.1

EXISTING CONDITIONS, LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 3.1 : Existing Conditions Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kamehameha Ave & Maui Lani Pkwy						
NB LT	19.6	0.40	C	18.1	0.29	C
NB TH/RT	53.1	0.88	F	27.7	0.66	D
EB LT/TH/RT	76.6	0.99	F	137.4	1.26	F*
WB LT/TH/RT	58.2	0.91	F	117.7	1.22	F*
SB LT	24.5	0.55	C	19.5	0.42	C
SB TH/RT	70.4	0.97	F	126.4	1.25	F*
Overall	57.2	-	F	102.2	-	F
2: Waiale Rd & Kaohu St/Oluloa Dr						
NB LT/TH	60.1	1.00	F*	55.9	0.98	F
NB RT	8.6	0.01	A	8.8	0.04	A
EB LT	13.5	0.21	B	12.7	0.15	B
EB TH/RT	12.8	0.28	B	14.1	0.37	B
WB LT/TH/RT	13.0	0.11	B	12.7	0.07	B
SB LT/TH/RT	88.1	1.08	F*	97.8	1.10	F*
Overall	62.9	-	F	65.1	-	F
3: Waiale Rd & Olomea St/Maui Community Correctional Facility Driveway						
WB LT	662.6	2.23	F*	589.5	2.12	F*
WB RT	16.8	0.15	C	14.0	0.08	B
SB LT	12.0	0.12	B	10.4	0.09	B
Overall	64.6	-	-	80.4	-	-
4: Waiale Rd & Olomea St/Waimaluhia Ln						
NB LT	9.4	0.01	A	10.2	0.04	B
EB LT/TH	994.8	2.88	F*	389.0	1.41	F*
EB RT	13.8	0.08	B	15.6	0.04	C
WB LT/TH/RT	41.6	0.21	E	46.4	0.17	E
SB LT	10.4	0.02	B	9.8	0.01	A
Overall	84.8	-	-	15.7	-	-
5: Waiale Rd & Kaupo St						
NB LT	8.9	0.05	A	9.7	0.07	A
EB LT/TH	244.1	1.24	F*	80.7	0.47	F
EB RT	13.4	0.14	B	15.2	0.11	C
Overall	18.5	-	-	2.5	-	-
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy						
NB LT	19.9	0.45	B	25.3	0.18	C
NB TH/RT	25.1	0.56	C	33.0	0.73	C
EB LT	17.7	0.72	B	18.1	0.75	B
EB TH/RT	18.4	0.58	B	16.8	0.44	B
WB LT	22.2	0.11	C	19.0	0.15	B
WB TH	29.4	0.72	C	31.4	0.82	C
WB RT	23.8	0.11	C	21.2	0.15	C
SB LT	18.5	0.45	B	24.9	0.69	C
SB TH/RT	30.2	0.81	C	28.9	0.77	C
Overall	22.5	-	C	24.8	-	C
7: Waiale Rd & Kokololio St						
NB LT	7.7	0.00	A	7.9	0.03	A
EB LT	14.1	0.26	B	13.0	0.11	B
EB RT	9.5	0.03	A	9.7	0.02	A
Overall	3.4	-	-	1.9	-	-
8: Waiale Rd & Haawi St						
NB LT	7.7	0.01	A	7.9	0.05	A
EB LT/RT	11.6	0.22	B	11.8	0.12	B
Overall	3.4	-	-	2.5	-	-

* Denotes overcapacity condition, v/c ≥ 1.

Table 3.1: Existing Conditions Level of Service Summary Cont'd

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
9: Waiale Rd & Nokekula Lp						
NB LT	7.8	0.00	A	7.7	0.01	A
EB LT/RT	11.2	0.08	B	10.3	0.04	B
Overall	1.3	-	-	0.9	-	-
10: Waiale Rd & Ohana Hana Loop						
NB LT	7.8	0.00	A	7.7	0.01	A
EB LT/RT	10.7	0.08	B	10.3	0.03	B
Overall	1.3	-	-	0.7	-	-
11: E Waiko Rd & Waiale Rd						
EB LT	7.6	0.04	A	8.0	0.04	A
SB LT/RT	15.7	0.46	C	13.4	0.32	B
Overall	6.9	-	-	4.8	-	-
12: Kuikahi Dr & Kehalani Village Center Dr						
EB LT	8.9	0.09	A	9.4	0.12	A
SB LT	33.4	0.19	D	39.6	0.34	E
SB RT	12.7	0.19	B	14.1	0.26	B
Overall	2.2	-	-	3.4	-	-
13: Honoapiilani Hwy & Kehalani Pkwy						
NB LT	17.9	0.63	B	15.5	0.46	B
NB TH	26.1	0.77	C	20.2	0.65	C
NB RT	0.0	0.00	A	0.0	0.00	A
EB LT	35.2	0.84	D	21.8	0.47	C
EB TH	21.8	0.45	C	22.2	0.18	C
EB RT	19.9	0.20	B	21.5	0.07	C
WB LT	25.9	0.10	C	26.1	0.05	C
WB TH	32.9	0.78	C	29.2	0.42	C
WB RT	27.8	0.07	C	27.2	0.03	C
SB LT	20.4	0.15	C	14.3	0.20	B
SB TH	30.2	0.72	C	24.4	0.77	C
SB RT	0.0	0.00	A	0.0	0.00	A
Overall	27.0	-	C	21.9	-	C
14: Honoapiilani Highway & Kuikahi Drive						
NB LT	18.5	0.06	B	17.8	0.14	B
NB TH	28.4	0.75	C	29.8	0.78	C
NB RT	0.0	0.00	A	0.0	0.00	A
EB LT	28.1	0.13	C	32.6	0.06	C
EB TH	32.1	0.43	C	35.2	0.31	D
EB RT	28.8	0.04	C	30.7	0.01	C
WB LT	23.2	0.62	C	26.5	0.65	C
WB TH	22.0	0.08	C	23.6	0.19	C
WB RT	15.9	0.13	B	16.5	0.11	B
SB LT	17.2	0.64	B	18.6	0.68	B
SB TH	21.5	0.70	C	21.6	0.62	C
SB RT	11.8	0.01	B	13.9	0.02	B
Overall	23.4	-	C	24.6	-	C
15: Honoapiilani Hwy & Pilikana St						
NB LT	8.4	0.06	A	7.4	0.16	A
NB TH	5.7	0.59	A	6.1	0.67	A
EB LT	23.5	0.65	C	19.4	0.45	B
EB RT	19.0	0.05	B	17.0	0.00	B
SB TH	11.6	0.80	B	11.6	0.76	B
SB RT	6.1	0.05	A	7.1	0.11	A
Overall	10.2	-	B	9.1	-	A

* Denotes overcapacity condition, v/c ≥ 1.

Table 3.1: Existing Conditions Level of Service Summary Cont'd

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd						
NB LT	7.0	0.01	A	5.4	0.02	A
NB TH/RT	12.4	0.71	B	11.7	0.75	B
EB LT/TH	24.1	0.12	C	27.5	0.08	C
EB RT	23.6	0.01	C	27.2	0.01	C
WB LT/TH/RT	26.0	0.46	C	30.0	0.49	C
SB LT	8.1	0.35	A	8.1	0.18	A
SB TH	8.4	0.62	A	6.7	0.49	A
SB RT	4.5	0.00	A	4.2	0.01	A
Overall	11.6	-	B	11.2	-	B
17: Kuikahi Dr & Kehalani Mauka Pkwy						
EB LT	7.3	0.00	A	7.6	0.01	A
SB LT	10.2	0.10	B	10.2	0.04	B
SB RT	8.6	0.01	A	9.1	0.02	A
Overall	2.6	-	-	1.6	-	-

* Denotes overcapacity condition, v/c ≥ 1.

4. BASE YEAR 2024 TRAFFIC CONDITIONS

4.1 Defacto Growth Rate

Projections for Base Year 2024 traffic were based upon existing traffic counts performed by ATA, the Maui Regional Travel Demand Model (MRTDM) growth for forecast years of 2024 and 2035, and nearby developments in the immediate vicinity of the Project. The resulting growth rate along study roadways was approximately 1.9 percent per year.

4.2 Traffic Forecasts for Known Developments

By Year 2024, the following developments shown in Figure 4.1 and Table 4.1 may be constructed. The Kehalani Village Center and Maui Lani Village Center are currently constructed. The associated growth in occupancy for these two centers is described below.

- **Waikapu Light Industrial Project** - Proposed 8.5-acre industrial development along Waiko Road. Forecast traffic growth generated by this development was obtained from the Project's TIAR dated April 2013 and was added to the roadway network.

- **Waiale Business Park** – Formerly known as "Waiko Light Industrial Subdivision", this industrial park along Waiko Road will include approximately 102,414 SF of commercial space and 215,195 SF of light industrial uses. Forecast traffic growth was based on the latest land use breakdown and was added to the roadway network.

- **Emmanuel Lutheran Pre-School** – Proposed relocation of Emmanuel Lutheran Church Maui church and school facilities to a currently unoccupied lot bound by the proposed Wailuku Apartments to the north, proposed Waikapu Ventures Affordable Housing to the south, Waiale Road to the east, and Honoapiilani Highway to the west. At full build-out this development envisions a new preschool, K-8 school and buildings for church/office related functions, dependent on funding. In December 2018, State Land Use Commission (LUC) approved a 10-year time extension for developers with a condition to obtain funding and build a multi-purpose building for the preschool/church activities within six (6) years. This TIAR assumes the preschool, with the 30-student enrollment, will be completed by Year 2024. All remaining components of the development are anticipated to occur beyond Year 2024.

- **Maui Lani Village Center** – Expansion of the existing retail center in the Maui Lani subdivision currently occupied by Walgreen and a mix of various commercial, office, residential and warehouse uses. Based on the historic growth of this site, approximately 83,000 SF of commercial, 33,000 SF of office and 231,000 SF of warehouse/self-storage space may be completed by year 2024. The forecast AM and PM peak hour trips were generated based on the cumulative ITE Trip generation and added to the roadway network.

- **Kehalani Village Center** – Infill development of the existing retail center in the Kehalani subdivision currently occupied by Longs Drugs, Foodland, Foodland Gas, American Savings Bank, Coffee Bean Tea & Leaf, McDonalds and Fabmac Homes. It is anticipated that the Kehalani Village Center will be expanded with infill commercial space and 56 multi-family dwelling units. The forecast AM and PM peak hour trips for the remaining

network.

- **Waiale Elua** – Proposed 70-unit single-family residential subdivision and a neighborhood park, currently being constructed. It will be located adjacent to the Valley Isle Fellowship Church along Waiale Road. One access will be provided along Waiale Road. The forecast AM and PM peak hour trips were obtained from the Project's TIAR dated 2015 and was added to the roadway network.

- **Kehalani Mauka** – Expansion of the existing residential subdivision located north of Kuikahi Drive, west of Honoapiilani Highway and east of Wailuku Heights. Kehalani Mauka is partially developed with residential homes and the Puu Kukui Elementary School. Based on the latest projections, approximately 368 single-family homes and 54 multi-family units may be completed by year 2024. The Kehalani Mauka Parkway Loop is also anticipated to be completed by year 2024.

- **Waikapu Country Town** – This future development is currently going through the entitlement process to obtain permits for construction. For purposes of this TIAR, it is assumed that permit approval and infrastructure construction will be complete by Year 2024 and the initial phase that includes 150 single-family residential units (identified in the project EIS) will be constructed and occupied.

- **Waikapu Ventures Affordable Housing** – Proposed residential subdivision with 68 single-family units and 12 multi-family units on land bound by Emmanuel Lutheran Pre-School to the north, Waiale Elua to the south, Waiale Road to the east, and Honoapiilani Highway to the west. The forecast AM and PM peak hour trips were obtained from the Project's TIAR dated 2018 and added to the roadway network.

- **Heritage at Maui Lani** – Proposed residential subdivision with 25 single-family homes, currently being constructed on lands adjacent and to the north of Pomaikai Elementary School. Access will be provided along Kamehameha Avenue.

- **Wailuku Apartments** – Proposed 324 multi-family dwelling units upon 14.4 acres of undeveloped land bound by Kuikahi Drive to the north, the proposed Emmanuel Lutheran Pre-School to the south, Waiale Road to the east, and Honoapiilani Highway to the west. Vehicular access is anticipated to be provided by two new project accesses; one along Kuikahi Drive directly across the Kehalani Village Center driveway and one along Waiale Road.

- **Maui Lani Parkways Phase 3** – Proposed additional 74 single-family units to the existing Maui Lani Parkways Phase 1 and 2 residential subdivision bound by Maui Lani Parkway to the south and The Dunes at Maui Lani Golf Course to the north.

- **Ag Subdivision Lots** – Proposed five (5) Ag lots, adjacent and to the west of the Project site. Build-out and occupancy is unknown, but for purposes of this TIAR, was assumed to be occupied by Year 2024. Ohana units will be permitted and access to the site will occur temporarily by the existing dirt road easement just north of the Waiolani Subdivision. Permanent access will occur via the future Project South Access.

- **Gentry (Maui Lani Ph 8B & 8C)** – Proposed 291 single-family dwelling units. It is assumed that the first home will be built occupied in early 2022, with additional units being built & occupied at a rate of 1 home per week thereafter until all homes are completed. Therefore, by Year 2024, it assumed that approximately 128 units will be built and occupied, or about 44% of the total development.

- **Puunani Homesteads** – Proposed 137 turn-key homes and 24 vacant residential lots, for a total of 161 single-family dwelling units, bounded by Honoapiilani Highway to the east and the Waiolani residential subdivision to the south. Access to the site will occur via two (2) new driveways off of Honoapiilani Highway. The forecast AM and PM peak hour trips were obtained from the Project's TIAR dated August 31, 2020 and was added to the roadway network.

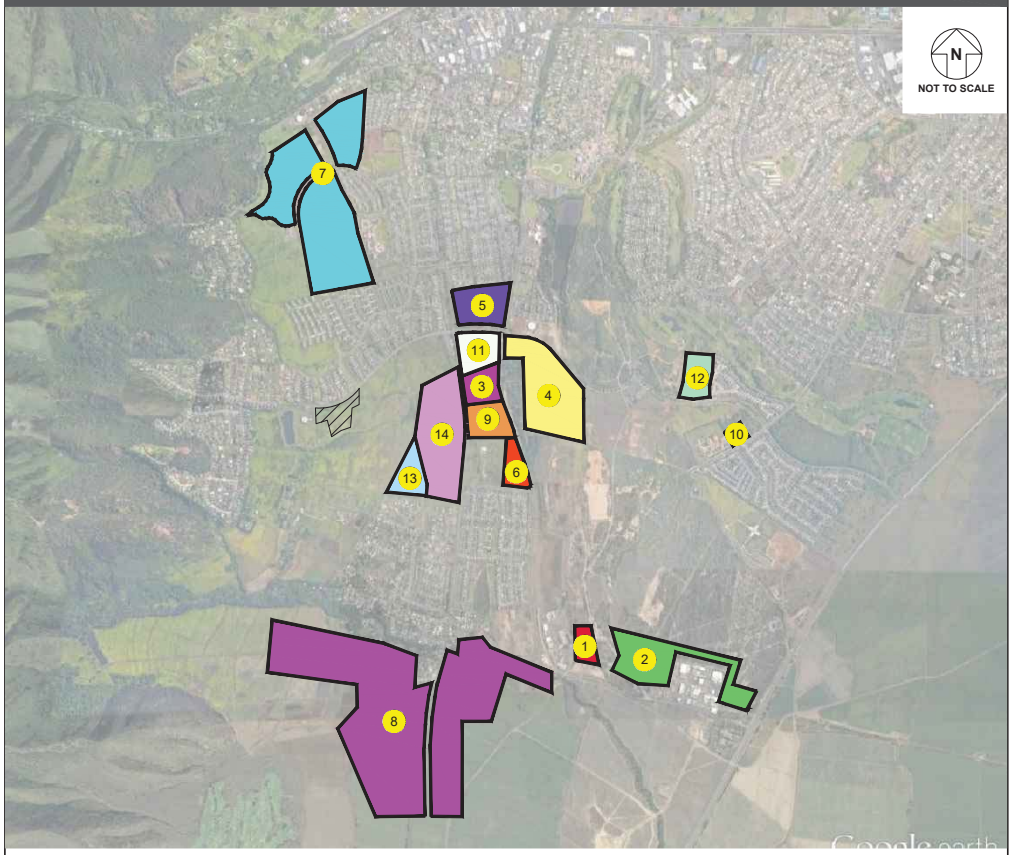
Table 4.1: Total Trips Generated by Known Developments in Project Vicinity [1]

Known Development	Land Use	Units	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
Waikapu Light Industrial Project	Industrial Park	8.5 Acres	74	15	89	21	79	100
Waiale Business Park	Retail/Light Industrial	102,414 SF retail 215,195 SF light ind.	187	79	266	183	253	436
Emmanuel Lutheran Pre-School	Daycare	30 Students	15	14	29	12	14	26
Maui Lani Village Center (formerly VMX) [1]	Commercial, Office, Warehouse	83,000 SF commercial, 33,000 SF office, 231,000 SF warehouse	89	27	116	117	234	411
Kehalani Village Center [2]	Commercial, Residential	100,000 SF 56 MF units	37	41	78	133	138	271
Waiale Elua	Single-Family Residential	70 SF units	15	44	59	49	28	77
Kehalani Mauka [3]	Single-Family, Multi-Family Residential	304 SF units 54 MF units	72	223	295	208	123	331
Waikapu Country Town [4]	Single-Family Residential	150 SF units	28	84	112	95	56	150
Waikapu Ventures Affordable Housing	Single-Family, Multi-Family Residential	68 SF units 12 MF units	17	51	68	54	32	86
Heritage at Maui Lani	Single-Family	25 SF units	6	17	23	17	10	27
Wailuku Apartments	Multi-Family Residential	324 MF units	36	103	139	90	51	141
Maui Lani Parkways Phase 3	Single-Family	74 SF units	14	43	57	48	28	76
Ag Subdivision Lots	Single-Family Residential	10 SF units	3	9	12	8	4	12
Gentry (Maui Lani Ph 8B & 8C)	Single-Family Residential	291 SF units	53	158	211	178	105	283
Puunani Homesteads	Single-Family	161 SF units	30	89	119	101	60	161

Note:
1. Maui Lani Village Center projections are based on historic growth rate. Majority of expansion attributed to lower trip generating office and warehouse land uses.
2. **Kehalani Village Center is already partially completed with Longs Drugs, Foodland, Foodland Gas and McDonalds. Trips shown accounts for the additional 100,000 SF of commercial space and multi-family low-rise units anticipated to be completed by Year 2024. ITE recommended 34% pass-by reduction applied to new retail.**
3. Kehalani Mauka projections based on latest assumptions for growth.
4. Initial residential phase as identified in the Waikapu Country Town Final EIS dated December 2016, assumed to be completed by Year 2024.

KUIKAHI RESIDENTIAL

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors



LEGEND

- PROJECT AREA
- 1 WAIKAPU LIGHT INDUSTRIAL
- 2 WAIALE BUSINESS PARK
- 3 EMMANUEL LUTHERAN SCHOOL
- 4 MAUI LANI VILLAGE CENTER
- 5 KEHALANI VILLAGE CENTER
- 6 WAIALE ELUA
- 7 KEHALANI MAUKA
- 8 WAIKAPU COUNTRY TOWN
- 9 WAIKAPU VENTURES AFFORDABLE HOUSING
- 10 HERITAGE AT MAUI LANI
- 11 WAILUKU APARTMENTS
- 12 MAUI LANI PARKWAYS PH. 3
- 13 AG SUBDIVISION LOTS
- 14 PUUNANI HOMESTEADS

FIGURE 4.1

BACKGROUND DEVELOPMENTS IN PROJECT VICINITY

4.3 Planned Roadway Projects

At the Maui Lani Parkway/Kamehameha Avenue intersection, a single-lane roundabout was constructed by the County in July 2020 and was included in Base Year 2024 analysis.

The Waiale Road Extension and Waiko Road Improvements are planned roadway improvements to be constructed in the future. However, since they are unlikely to be built by Year 2024 given their current status, these roadway improvements were not included in this TIAR.

Traffic along Waiale Road will continue to be congested during the AM peak hour of traffic from existing commuter and school traffic. As noted in the latest Statewide Transportation Improvement Program (STIP), the County is planning to install a roundabout at the Waiale Road/Waiinu Road intersection which will help the flow of traffic through the corridor. Although the design and timeline for completion of this roundabout is unknown, it was included for analysis purposes in the Base and Future Year scenarios

At various stages of occupancy of the Wailuku Apartments project, the signal timing at the Waiale Road/Kuikahi Drive intersection will be optimized to accommodate traffic increases on the southern end.

The planned Maui Lani Parkway Extension is anticipated to stretch from the existing Maui Lani Parkway and extend northward and intersect with Waiinu Road at its existing north intersection with Maui Lani Parkway and Puumele Street. This roadway is anticipated to provide an alternate route to and from Kahului and Wailuku and alleviate congestion along Waiale Road. It is not known exactly when the roadway will be completed; therefore, two Base Year conditions have been developed, one of which analyzes conditions without Maui Lani Parkway Extension completed and another with Maui Lani Parkway Extension completed. Figure 4.2 shows the anticipated reroutes as a result of the completion of Maui Lani Parkway.

4.4 Base Year 2024 Analysis

4.4.1 Base Year 2024 Analysis without and with Maui Lani Parkway Extension

With additional traffic generated by nearby developments and defacto growth in the study area, delay and LOS of turning movements at various intersections throughout the network are anticipated to worsen from existing conditions. When constructed, the proposed Maui Lani Parkway Extension is anticipated to reroute a large portion of traffic away from Waiale Road, onto Maui Lani Parkway Extension, thereby mitigating much of the impacts along Waiale Road, generated by growth and additional traffic generated by background developments. Figure 4.2 shows the anticipated reroutes as a result of the completion of Maui Lani Parkway.

With the roundabout at the Kamehameha Avenue/Maui Lani Parkway intersection, all movements are anticipated to operate at LOS A.

At the Waiale Road/Kaohu Street intersection, the northbound left-turn/through movement and the southbound approach will continue to operate at LOS F and overcapacity conditions as in Existing conditions. As previously discussed in Section 3.3, signal warrant was met at this intersection for existing conditions, but due to right-of-way and alignment constraints, a signal may be difficult to implement.

At the Waiale Road/Waiinu Road intersection, the northbound approach will continue to operate at LOS F and overcapacity conditions due to high volumes even with proposed roundabout. With the Maui Lani Parkway Extension, the northbound approach will improve to LOS A and below capacity conditions.

Signal warrants were met for existing conditions at the Waiale Road/Olomea Street intersection, however no improvements are planned for this intersection. As a result, the intersection will continue to operate with overcapacity conditions on the eastbound left-turn/through movement with Base Year conditions. As stated in Section 3.3, a median refuge lane may help reduce eastbound left-turn vehicle delays by allowing vehicles to turn onto Waiale Road with a two-stage approach; turning left into the refuge lane after finding gaps in southbound traffic, then merging into the Waiale Road through lane after finding gaps in northbound traffic. In lieu of any intersection improvements, the Maui Lani Parkway Extension is anticipated to reduce through traffic along Waiale Road to generally improve operations and reduce delays from existing conditions during both AM and PM peaks.

At the Waiale Road/Kaupo Street intersection, the eastbound left-turn movement is anticipated to continue operating at LOS F and overcapacity conditions during the AM peak hour, and the PM peak hour will worsen from existing conditions to become overcapacity during the PM peak hour as well. A signal would not be warranted based on projected Base Year volumes. In lieu of any intersection improvements, the Maui Lani Parkway Extension is anticipated to reduce through traffic along Waiale Road to generally improve operations and reduce delays from existing conditions during the AM peak hour.

At the Waiale Road/Kuikahi Drive/Maui Lani Parkway intersection, all movements during the AM peak hour will continue to operate adequately at LOS D or better. During the PM peak hour, various movements will operate at LOS E/F conditions with some movements operating at over-capacity conditions. The Maui Lani Parkway Extension will alleviate the majority of problematic movements, with all movements operating at LOS D or better with the exception of the southbound through/right-turn movement operating at LOS E. However, the overall LOS will continue operating adequately at LOS D or better with all movements below capacity. To help mitigation PM peak hour southbound congestion, the southbound left-turn lane could be lengthened, while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection. Signal timing at this critical intersection should continually be optimized as new developments are constructed.

At the Waiale Road/E Waiko Road intersection, the southbound shared left-turn/right-turn movement is anticipated to operate at LOS F(D) during the AM(PM) peak hours. A signal is anticipated to be warranted with projected Base Year volumes. However, if the southbound Waiale Road approach is provided with separate left-turn and right-turn lanes, the four-hour warrant would fall short by 1 hour, making a signal not warranted.

With build-out of the Wailuku Apartments project, the Kuikahi Drive/Kehalani Village Center Driveway intersection will add a fourth leg to service Wailuku Apartments. The minor street northbound and southbound shared left-turn/through movements are anticipated to operate at LOS F during both peak hours, with the northbound shared left-turn/through movement and the southbound left-turn/through movement operating with overcapacity conditions during the PM peak hour. A signal warrant was not met with the projected Base Year volumes.

At the Honoapiilani Highway/Kehalani Parkway intersection, the westbound through movement will operate at LOS E conditions during the AM peak hour. As noted in Section 3.3, heavy traffic during a short period of time is reflective of typical school traffic conditions, as these queuing conditions were observed to last about 30 minutes during the AM peak hour and primarily stem from traffic generated by the Puu Kukui Elementary School. The eastbound left-turn, westbound through, and southbound through movements are also anticipated to operate at LOS E during the AM peak hour. There are currently no identified or planned roadway improvements likely to occur at this intersection.

At the Honoapiilani Highway/Kuikahi Drive intersection, all movements are anticipated to operate at LOS D or better during the AM peak hour. During the PM peak hour, the eastbound approach and southbound left-turn movement are anticipated to operate at LOS E however, all movements will operate below capacity and overall at an adequate LOS D or better during both peak hours.

Figures 4.3 and 4.4 illustrate the Base Year 2024 forecast traffic volumes and LOS for the “without Maui Lani Parkway” scenario, and “with Maui Lani Parkway” scenario, respectively. Table 4.2 summarizes the Base Year 2024 LOS at the study intersections compared to existing conditions. LOS worksheets are provided in Appendix C.

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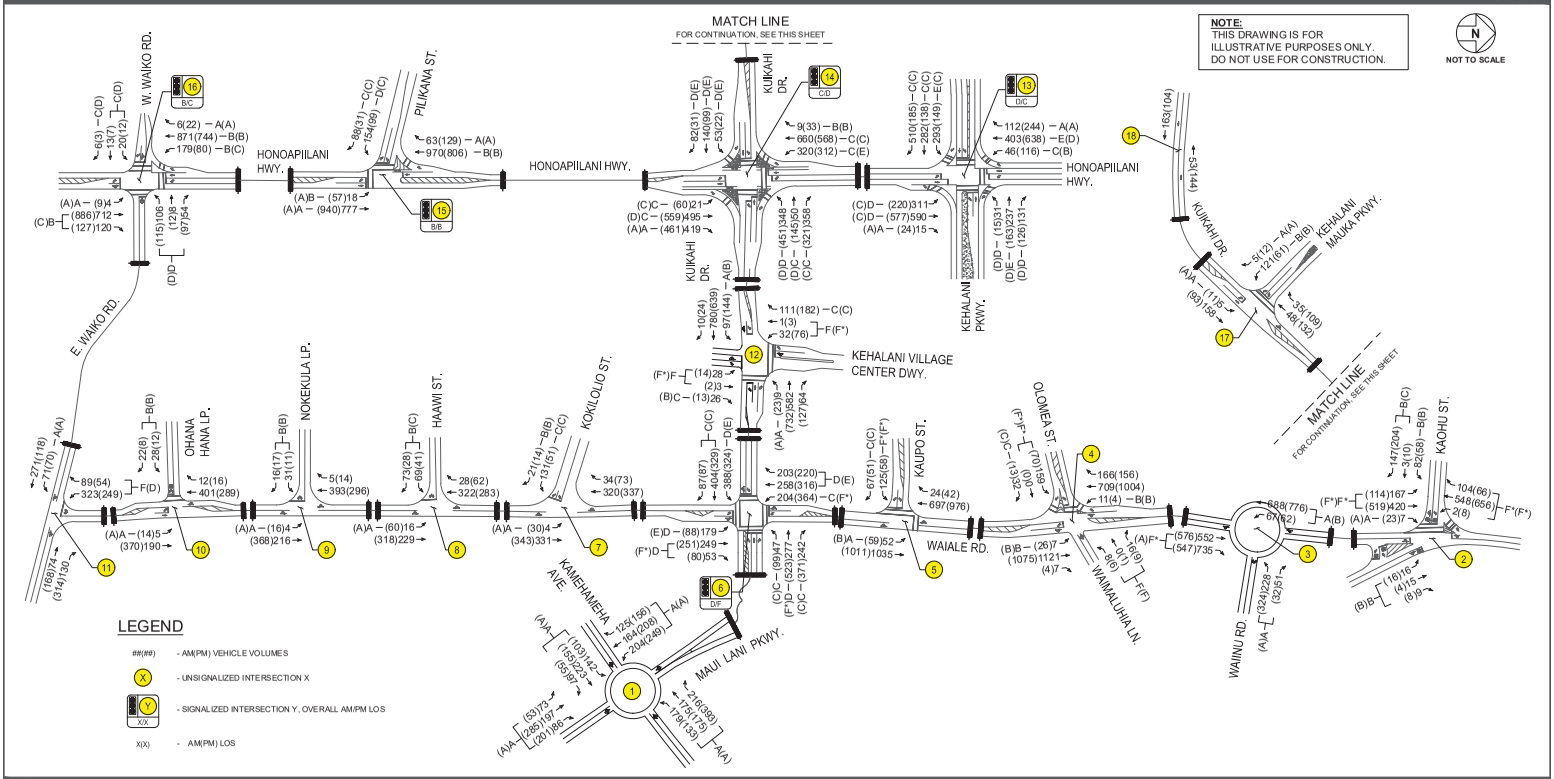

FIGURE 4.3

BASE YEAR 2024 WITHOUT MAUI LANI PARKWAY EXT.
LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS

WAILUKU AFFORDABLE HOUSING

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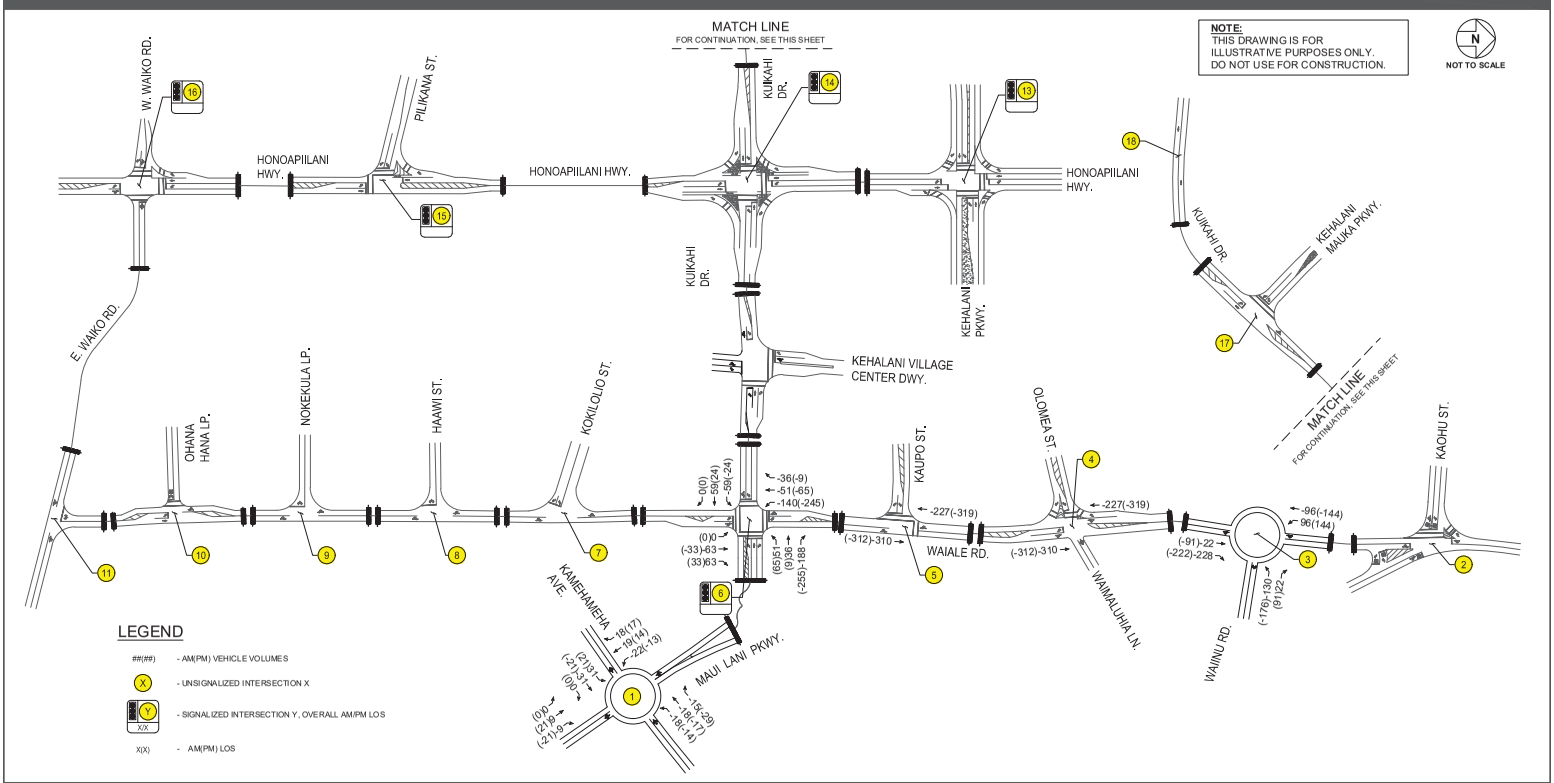

FIGURE 4.2

MAUI LANI PARKWAY EXTENSION REROUTES

Table 4.2: Existing and Base Year 2024 Level of Service Summary

Intersection	Existing Conditions						Base Year 2024 Conditions WITHOUT MLP Ext.						Base Year 2024 Conditions WITH MLP Ext.					
	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: Kamehameha Ave & Maui Lani Pkwy																		
NB LT	19.6	0.40	C	18.1	0.29	C	-	-	-	-	-	-	-	-	-	-	-	-
NB TH/RT	53.1	0.88	F	27.7	0.66	D	-	-	-	-	-	-	-	-	-	-	-	-
NB LT/TH/RT	-	-	-	-	-	-	6.5	0.57	A	5.8	0.44	A	6.3	0.56	A	5.0	0.41	A
EB LT/TH/RT	76.6	0.99	F	137.4	1.26	F*	5.1	0.55	A	6.6	0.80	A	4.5	0.55	A	5.1	0.66	A
WB LT/TH/RT	58.2	0.91	F	117.7	1.22	F*	4.8	0.45	A	7.8	0.66	A	4.5	0.44	A	6.1	0.62	A
SB LT	24.5	0.55	C	19.5	0.42	C	-	-	-	-	-	-	-	-	-	-	-	-
SB TH/RT	70.4	0.97	F	126.4	1.25	F*	-	-	-	-	-	-	-	-	-	-	-	-
SB LT/TH/RT	-	-	-	-	-	-	5.5	0.62	A	9.9	0.80	A	5.5	0.58	A	9.2	0.76	A
Overall	57.2	-	F	102.2	-	F	5.5	0.62	A	7.8	0.80	A	5.2	0.58	A	6.6	0.76	A
2: Waiale Rd & Kaohu St/Oluloa Dr																		
NB LT/TH	60.1	1.00	F*	55.9	0.98	F	122.0	1.22	F*	163.7	1.37	F*	122.0	1.22	F*	163.7	1.37	F*
NB RT	8.6	0.01	A	8.8	0.04	A	8.9	0.01	A	9.4	0.05	A	8.9	0.01	A	9.4	0.05	A
EB LT	13.5	0.21	B	12.7	0.15	B	14.2	0.23	B	13.7	0.16	B	14.2	0.23	B	13.7	0.16	B
EB TH/RT	12.8	0.28	B	14.1	0.37	B	14.3	0.36	B	17.6	0.53	C	14.3	0.36	B	17.6	0.53	C
WB LT/TH/RT	13.0	0.11	B	12.7	0.07	B	14.1	0.12	B	14.6	0.09	B	14.1	0.12	B	14.6	0.09	B
SB LT/TH/RT	88.1	1.08	F*	97.8	1.10	F*	167.5	1.33	F*	244.5	1.54	F*	167.5	1.33	F*	244.5	1.54	F*
Overall	62.9	-	F	65.1	-	F	121.8	-	F	170.4	-	F	121.8	-	F	170.4	-	F
3: Waiale Rd & Waiinu Rd																		
NB TH/RT	-	-	-	-	-	-	26.6	1.04	F*	1.7	0.91	A	7.4	0.91	A	3.4	0.75	A
WB LT	662.6	2.23	F*	589.5	2.12	F*	-	-	-	-	-	-	-	-	-	-	-	-
WB LT/RT	-	-	-	-	-	-	5.6	0.37	A	7.4	0.50	A	4.6	0.23	A	4.4	0.33	A
WB RT	16.8	0.15	C	14.0	0.08	B	-	-	-	-	-	-	-	-	-	-	-	-
SB LT	12.0	0.12	B	10.4	0.09	B	-	-	-	-	-	-	-	-	-	-	-	-
SB LT/TH	-	-	-	-	-	-	3.5	0.71	A	10.4	0.87	B	1.6	0.63	A	2.4	0.73	A
Overall	64.6	-	-	80.4	-	-	16.5	1.04	F*	5.7	0.91	A	4.9	0.91	A	3.1	0.75	A
4: Waiale Rd & Olomea St/Waimaluhia Ln																		
NB LT	9.4	0.01	A	10.2	0.04	B	10.1	0.01	B	11.9	0.05	B	9.1	0.01	A	10.1	0.04	B
EB LT/TH	994.8	2.88	F*	389.0	1.41	F*	2312.8	5.58	F*	1883.8	4.23	F*	596.1	2.06	F*	300.4	1.23	F*
EB RT	13.8	0.08	B	15.6	0.04	C	16.3	0.10	C	21.6	0.06	C	12.9	0.07	B	15.2	0.04	C
WB LT/TH/RT	41.6	0.21	E	46.4	0.17	E	82.6	0.37	F	157.2	0.45	F	30.9	0.16	D	40.7	0.15	E
SB LT	10.4	0.02	B	9.8	0.01	A	11.5	0.02	B	11.1	0.01	B	9.8	0.02	A	9.5	0.01	A
Overall	84.8	-	-	15.7	-	-	165.7	-	-	57.0	-	-	56.6	-	-	12.7	-	-
5: Waiale Rd & Kaupo St																		
NB LT	8.9	0.05	A	9.7	0.07	A	9.7	0.07	A	11.4	0.10	B	8.7	0.06	A	9.6	0.08	A
EB LT	244.1	1.24	F*	80.7	0.47	F	874.3	2.56	F*	754.2	2.03	F*	145.8	1.01	F*	94.0	0.65	F
EB RT	13.4	0.14	B	15.2	0.11	C	16.1	0.18	C	22.4	0.21	C	12.6	0.13	B	15.0	0.13	C
Overall	18.5	-	-	2.5	-	-	55.5	-	-	20.7	-	-	13.4	-	-	4.3	-	-

* Denotes overcapacity condition, v/c ≥ 1.

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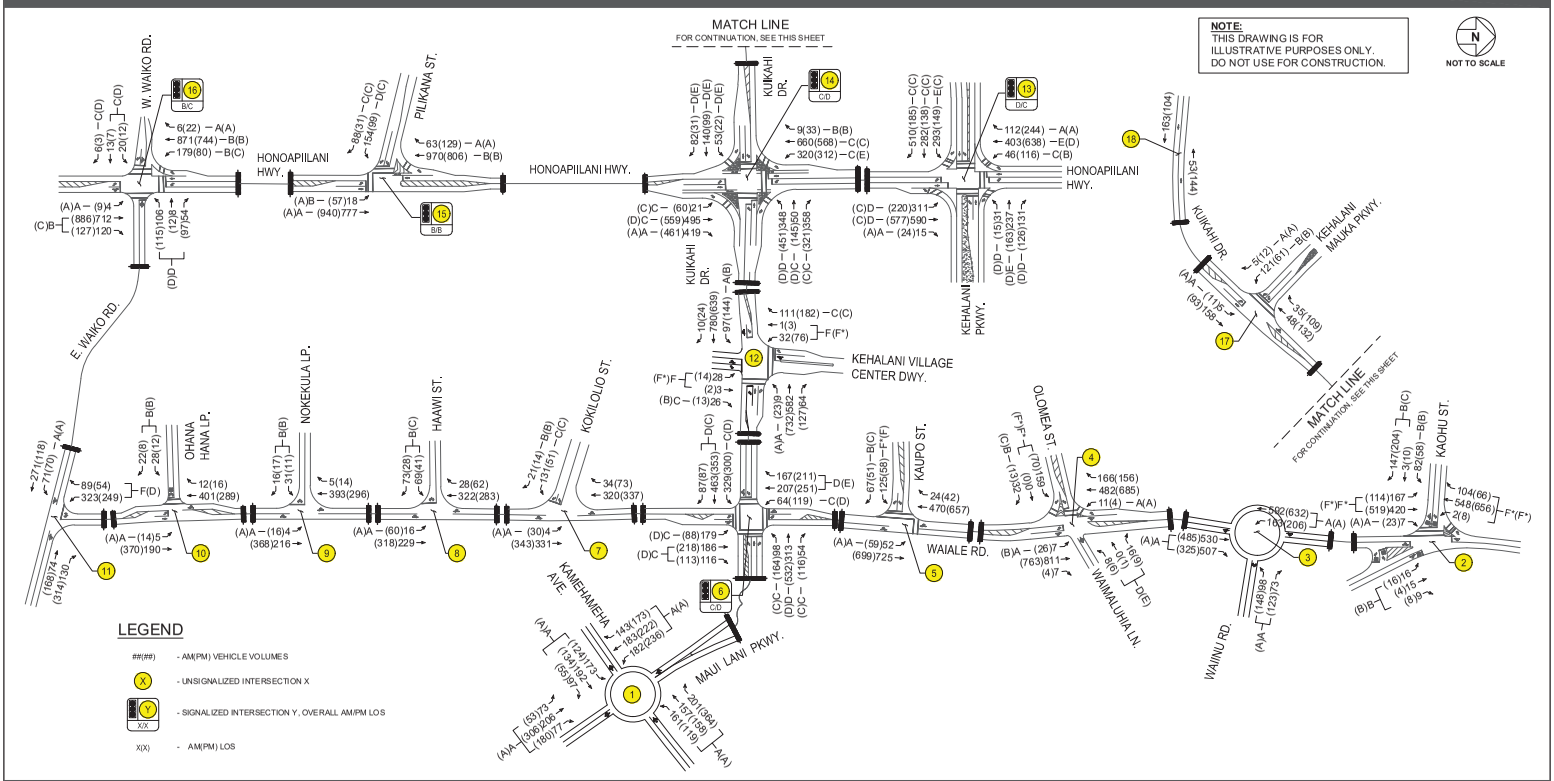

FIGURE 4.4

BASE YEAR 2024 WITH MAUI LANI PARKWAY EXT.
LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS

Table 4.2: Existing and Base Year 2024 Level of Service Summary

Intersection	Existing Conditions						Base Year 2024 Conditions WITHOUT MLP Ext.						Base Year 2024 Conditions WITH MLP Ext.					
	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
13: Honoapiilani Hwy & Kehalani Pkwy																		
NB LT	17.9	0.63	B	15.5	0.46	B	43.1	0.91	D	22.4	0.77	C	43.1	0.91	D	22.4	0.77	C
NB TH	26.1	0.77	C	20.2	0.65	C	47.8	0.90	D	25.0	0.72	C	47.8	0.90	D	25.0	0.72	C
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	35.2	0.84	D	21.8	0.47	C	56.4	0.94	E	34.5	0.67	C	56.4	0.94	E	34.5	0.67	C
EB TH	21.8	0.45	C	22.2	0.18	C	27.4	0.44	C	30.6	0.32	C	27.4	0.44	C	30.6	0.32	C
EB RT	19.9	0.20	B	21.5	0.07	C	25.8	0.31	C	28.8	0.11	C	25.8	0.31	C	28.8	0.11	C
WB LT	25.9	0.10	C	26.1	0.05	C	39.0	0.12	D	36.5	0.06	D	39.0	0.12	D	36.5	0.06	D
WB TH	32.9	0.78	C	29.2	0.42	C	68.4	0.88	E	43.3	0.73	D	68.4	0.88	E	43.3	0.73	D
WB RT	27.8	0.07	C	27.2	0.03	C	41.3	0.06	D	38.0	0.06	D	41.3	0.06	D	38.0	0.06	D
SB LT	20.4	0.15	C	14.3	0.20	B	31.9	0.29	C	17.7	0.38	B	31.9	0.29	C	17.7	0.38	B
SB TH	30.2	0.72	C	24.4	0.77	C	55.9	0.88	E	35.5	0.87	D	55.9	0.88	E	35.5	0.87	D
SB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
Overall	27.0	-	C	21.9	-	C	47.6	-	D	30.4	-	C	47.6	-	D	30.4	-	C
14: Honoapiilani Highway & Kuikahi Drive																		
NB LT	18.5	0.06	B	17.8	0.14	B	21.7	0.10	C	28.0	0.22	C	21.7	0.10	C	28.0	0.22	C
NB TH	28.4	0.75	C	29.8	0.78	C	34.0	0.81	C	55.0	0.89	D	34.0	0.81	C	55.0	0.89	D
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	28.1	0.13	C	32.6	0.06	C	38.0	0.19	D	58.6	0.13	E	38.0	0.19	D	58.6	0.13	E
EB TH	32.1	0.43	C	35.2	0.31	D	45.1	0.73	D	75.4	0.73	E	45.1	0.73	D	75.4	0.73	E
EB RT	28.8	0.04	C	30.7	0.01	C	38.3	0.06	D	56.1	0.01	E	38.3	0.06	D	56.1	0.01	E
WB LT	23.2	0.62	C	26.5	0.65	C	43.6	0.84	D	54.9	0.89	D	43.6	0.84	D	54.9	0.89	D
WB TH	22.0	0.08	C	23.6	0.19	C	28.6	0.11	C	35.9	0.27	D	28.6	0.11	C	35.9	0.27	D
WB RT	15.9	0.13	B	16.5	0.11	B	21.3	0.34	C	23.9	0.34	C	21.3	0.34	C	23.9	0.34	C
SB LT	17.2	0.64	B	18.6	0.68	B	30.8	0.86	C	60.4	0.94	E	30.8	0.86	C	60.4	0.94	E
SB TH	21.5	0.70	C	21.6	0.62	C	27.4	0.81	C	31.2	0.69	C	27.4	0.81	C	31.2	0.69	C
SB RT	11.8	0.01	B	13.9	0.02	B	11.8	0.01	B	17.8	0.02	B	11.8	0.01	B	17.8	0.02	B
Overall	23.4	-	C	24.6	-	C	32.5	-	C	46.1	-	D	32.5	-	C	46.1	-	D
15: Honoapiilani Hwy & Piilkana St																		
NB LT	8.4	0.06	A	7.4	0.16	A	13.0	0.09	B	9.7	0.19	A	13.0	0.09	B	9.7	0.19	A
NB TH	5.7	0.59	A	6.1	0.67	A	5.3	0.62	A	6.8	0.78	A	5.3	0.62	A	6.8	0.78	A
EB LT	23.5	0.65	C	19.4	0.45	B	38.1	0.78	D	27.4	0.54	C	38.1	0.78	D	27.4	0.54	C
EB RT	19.0	0.05	B	17.0	0.00	B	29.3	0.04	C	23.7	0.01	C	29.3	0.04	C	23.7	0.01	C
SB TH	11.6	0.80	B	11.6	0.76	B	14.5	0.87	B	12.3	0.83	B	14.5	0.87	B	12.3	0.83	B
SB RT	6.1	0.05	A	7.1	0.11	A	5.0	0.05	A	6.0	0.11	A	5.0	0.05	A	6.0	0.11	A
Overall	10.2	-	B	9.1	-	A	12.5	-	B	10.1	-	B	12.5	-	B	10.1	-	B
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd																		
NB LT	7.0	0.01	A	5.4	0.02	A	9.8	0.01	A	9.0	0.03	A	9.8	0.01	A	9.0	0.03	A
NB TH/RT	12.4	0.71	B	11.7	0.75	B	16.6	0.81	B	31.0	0.94	C	16.6	0.81	B	31.0	0.94	C
EB LT/TH	24.1	0.12	C	27.5	0.08	C	31.9	0.12	C	37.4	0.07	D	31.9	0.12	C	37.4	0.07	D
EB RT	23.6	0.01	C	27.2	0.01	C	31.2	0.01	C	37.0	0.00	D	31.2	0.01	C	37.0	0.00	D
WB LT/TH/RT	26.0	0.46	C	30.0	0.49	C	35.7	0.60	D	45.5	0.72	D	35.7	0.60	D	45.5	0.72	D
SB LT	8.1	0.35	A	8.1	0.18	A	15.1	0.58	B	24.8	0.44	C	15.1	0.58	B	24.8	0.44	C
SB TH	8.4	0.62	A	6.7	0.49	A	12.2	0.76	B	11.6	0.64	B	12.2	0.76	B	11.6	0.64	B
SB RT	4.5	0.00	A	4.2	0.01	A	4.7	0.00	A	5.8	0.01	A	4.7	0.00	A	5.8	0.01	A
Overall	11.6	-	B	11.2	-	B	16.2	-	B	25.0	-	C	16.2	-	B	25.0	-	C
17: Kuikahi Dr & Kehalani Mauka Pkwy																		
EB LT	7.3	0.00	A	7.6	0.01	A	7.4	0.00	A	7.8	0.01	A	7.4	0.00	A	7.8	0.01	A
SB LT	10.2	0.10	B	10.2	0.04	B	11.0	0.18	B	11.1	0.10	B	11.0	0.18	B	11.1	0.10	B
SB RT	8.6	0.01	A	9.1	0.02	A	8.7	0.01	A	9.4	0.02	A	8.7	0.01	A	9.4	0.02	A
Overall	2.6	-	-	1.6	-	-	3.8	-	-	2.1	-	-	3.8	-	-	2.1	-	-

* Denotes overcapacity condition, v/c ≥ 1.

Table 4.2: Existing and Base Year 2024 Level of Service Summary

Intersection	Existing Conditions						Base Year 2024 Conditions WITHOUT MLP Ext.						Base Year 2024 Conditions WITH MLP Ext.					
	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
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy																		
NB LT	19.9	0.45	B	25.3	0.18	C	50.1	0.83	D	63.2	0.74	E	27.5	0.65	C	53.6	0.68	D
NB TH/RT	25.1	0.56	C	33.0	0.73	C	35.8	0.68	D	96.7	1.00	F*	27.1	0.57	C	51.4	0.74	D
EB LT	17.7	0.72	B	18.1	0.75	B	40.9	0.92	D	60.9	0.94	E	27.2	0.84	C	51.0	0.92	D
EB TH/RT	18.4	0.58	B	16.8	0.44	B	29.4	0.74	C	28.9	0.60	C	38.4	0.90	D	30.0	0.60	C
WB LT	22.2	0.11	C	19.0	0.15	B	30.6	0.20	C	29.7	0.29	C	26.7	0.45	C	26.7	0.43	C
WB TH	29.4	0.72	C	31.4	0.82	C	53.2	0.86	D	138.2	1.16	F*	40.4	0.80	D	50.3	0.90	D
WB RT	23.8	0.11	C	21.2	0.15	C	32.6	0.12	C	34.6	0.21	C	26.9	0.03	C	30.3	0.08	C
SB LT	18.5	0.45	B	24.9	0.69	C	24.3	0.59	C	111.9	1.10	F*	23.8	0.21	C	35.5	0.49	D
SB TH/RT	30.2	0.81	C	28.9	0.77	C	52.2	0.92	D	71.0	0.98	E	41.8	0.87	D	69.8	0.94	E
Overall	22.5	-	C	24.8	-	C	40.4	-	D	81.7	-	F	34.0	-	C	48.0	-	D
7: Waiale Rd & Kokololio St																		
NB LT	7.7	0.00	A	7.9	0.03	A	8.1	0.00	A	8.3	0.03	A	8.1	0.00	A	8.3	0.03	A
EB LT	14.1	0.26	B	13.0	0.11	B	19.7	0.37	C	18.5	0.17	C	19.7	0.37	C	18.5	0.17	C
EB RT	9.5	0.03	A	9.7	0.02	A	10.5	0.03	B	10.7	0.02	B	10.5	0.03	B	10.7	0.02	B
Overall	3.4	-	-	1.9	-	-	3.4	-	-	1.6	-	-	3.4	-	-	1.6	-	-
8: Waiale Rd & Haawi St																		
NB LT	7.7	0.01	A	7.9	0.05	A	8.1	0.02	A	8.2	0.06	A	8.1	0.02	A	8.2	0.06	A
EB LT/RT	11.6	0.22	B	11.8	0.12	B	14.6	0.29	B	15.6	0.18	C	14.6	0.29	B	15.6	0.18	C
Overall	3.4	-	-	2.5	-	-	3.0	-	-	2.0	-	-	3.0	-	-	2.0	-	-
9: Waiale Rd & Nokekula Lp																		
NB LT	7.8	0.00	A	7.7	0.01	A	8.2	0.00	A	8.0	0.01	A	8.2	0.00	A	8.0	0.01	A
EB LT/RT	11.2	0.08	B	10.3	0.04	B	13.6	0.11	B	12.4	0.06	B	13.6	0.11	B	12.4	0.06	B
Overall	1.3	-	-	0.9	-	-	1.0	-	-	0.6	-	-	1.0	-	-	0.6	-	-
10: Waiale Rd & Ohana Hana Loop																		
NB LT	7.8	0.00	A	7.7	0.01	A	8.3	0.01	A	8.0	0.01	A	8.3	0.01	A	8.0	0.01	A
EB LT/RT	10.7	0.08	B	10.3	0.03	B	12.2	0.10	B	11.8	0.04	B	12.2	0.10	B	11.8	0.04	B
Overall	1.3	-	-	0.7	-	-	1.0	-	-	0.5	-	-	1.0	-	-	0.5	-	-
11: E Waiko Rd & Waiale Rd																		
EB LT	7.6	0.04	A	8.0	0.04	A	7.8	0.06	A	8.7	0.07	A	7.8	0.06	A	8.7	0.07	A
SB LT/RT	15.7	0.46	C	13.4	0.32	B	52.9	0.92	F	33.8	0.75	D	52.9	0.92	F	33.8	0.75	D
Overall	6.9	-	-	4.8	-	-	23.3	-	-	11.1	-	-	23.3	-	-	11.1	-	-
12: Kuikahi Dr & Kehalani Village Center Dr																		
NB LT/TH	-	-	-	-	-	-	218.6	0.78	F	534.2	1.02	F*	218.6	0.78	F	534.2	1.02	F*
NB RT	-	-	-	-	-	-	15.9	0.08	C	13.6	0.03	B	15.9	0.08	C	13.6	0.03	B
EB LT	8.9	0.09	A	9.4	0.12	A	9.6	0.12	A	11.3	0.21	B	9.6	0.12	A	11.3	0.21	B
WB LT	-	-	-	-	-	-	9.7	0.01	A	9.2	0.03	A	9.7	0.01	A	9.2	0.03	A
SB LT	33.4	0.19	D	39.6	0.34	E	-	-	-	-	-	-	-	-	-	-	-	-
SB LT/TH	-	-	-	-	-	-	151.4	0.65	F	691.9	2.05	F*	151.4	0.65	F	691.9	2.05	F*
SB RT	12.7	0.19	B	14.1	0.26	B	15.0	0.25	C	23.6	0.51	C	15.0	0.25	C	23.6	0.51	C
Overall	2.2	-	-	3.4	-	-	8.5	-	-	35.1	-	-	8.5	-	-	35.1	-	-

* Denotes overcapacity condition, v/c ≥ 1.

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 of the Project.

5.1 Background

The Project proposes the development of 204 residential units, including 120 multi-family residential units, 34 duplex units, 16 live/work units, 28 studio units, and 6 single family lots. Access to the site will occur via two (2) new driveways off of Kuikahi Drive. The eastern access will be located at the existing intersection of Kuikahi Drive/Kehalani Mauka Parkway and will convert the T-intersection into a four-way intersection. Analysis for the East Driveway was performed with the intersection as (1) a roundabout and (2) two-way stop controlled. The West Project Driveway will provide secondary access.

5.1.1 Trip Generation

The Institute of Transportation Engineers (ITE) 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 variable can range from Dwelling Units (DU) for single-family attached homes to Gross Floor Area (GFA) for commercial and office 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 Type	Independent Variable	AM Peak Hour		PM Peak Hour	
		Rate	% Enter	Rate	% Enter
Single Family Detached Housing (ITE 210)	Dwelling Units (DU)	[a]	25%	[b]	63%
Multifamily Housing Low-Rise (ITE 220)	DU	[c]	23%	[d]	63%

Notes:
[a] T = 0.71 * (X) + 4.8
[b] T = EXP(0.96 * Ln(X) + 0.2)
[c] T = EXP(0.95 * Ln(X) – 0.51)
[d] T = EXP(0.89 * Ln(X) – 0.02)

Table 5.2: New Project-Generated Trips

Land Use Type	Quantity	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Single Family Detached Housing (ITE 210)	6 DU	3	7	10	4	3	7
Multifamily Housing Low-Rise (ITE 220)	198 DU	21	71	92	69	40	109
Total	**204 DU**	**24**	**78**	**102**	**73**	**43**	**116**

5.1.2 Trip Distribution

At the two (2) Project intersections, trips were distributed based on percentages derived from existing turning movement volumes at the Kuikahi Drive/Kehalani Mauka Parkway intersection since the intersection serves the similar residential uses to the Project.

Beyond the Project intersections, trips were assigned based upon existing travel patterns in the remaining study area and likely interaction between land uses. A portion of trips were distributed to the nearby Puu Kukui Elementary School via Kehalani Mauka Parkway. 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 volumes.

5.2 Future Year 2024 Analysis

5.2.1 Future Year 2024 Analysis without and with Maui Lani Parkway Extension

Upon completion of the Project, all study intersections are generally forecast to operate with LOS similar to Base Year 2024 conditions. The Project is only anticipated to generate 2-22 vehicles per peak per direction along Honoapiilani Highway and 2-15 vehicles along Waiale Road.

At the Waiale Road intersections with Kaohu Street, Olomea Street and Kaupo Street, various movements will continue operating at LOS F and over-capacity conditions similar to the Base Year scenarios. However, the Project only adds about 2-15 vehicles per peak per direction at these intersections. Base Year mitigation considerations were described in Section 4.

At the Waiale Road/Waiinu Road intersection, similar to Base Year conditions, the northbound approach will continue to operate at LOS F and overcapacity conditions due to high volumes even with proposed roundabout. With the Maui Lani Parkway Extension, the northbound approach will improve to LOS A.

At the Waiale Road/Kuikahi Drive/Maui Lani Parkway intersection, various movements are anticipated to experience an increase in delay of 1-20 seconds from Base Year conditions.

Without the Maui Lani Parkway Extension, various movements will operate at LOS E/F and various PM peak movements will operate with overcapacity conditions. The Maui Lani Parkway Extension will significantly improve operations by removing all LOS F and overcapacity conditions. A few movements will continue operating at LOS E conditions. As discussed in Section 4, to help mitigation PM peak hour southbound congestion, the southbound left-turn lane could be lengthened, while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection. Signal timing at this critical intersection should continually be optimized as new developments are constructed.

The southbound approach at the Waiko Road/Waiale Road intersection will continue to operate at LOS F(D) during the AM and PM peak hours, respectively. The Project is not anticipated to add any trips to the critical southbound approach. As stated in Section 4.4, a signal is anticipated to be warranted with projected Base Year volumes. However, if the southbound Waiale Road approach is provided with separate left-turn and right-turn lanes, the four-hour warrant would fall short by one hour, making a signal not warranted.

At the Kuikahi Drive/Kehalani Village Center Driveway intersection, various movements will continue to operate at LOS F and overcapacity conditions as it did with Base Year conditions. A signal warrant was not met with the projected Future Year volumes.

At the Honoapiilani Highway/Kuikahi Drive intersection, levels-of-service are anticipated to be similar to Base Year conditions, with LOS E on various Kuikahi Drive movements and the northbound through and southbound left-turn movement. All movements are anticipated to operate below capacity.

At both Project Driveways, all movements are anticipated to operate at LOS B or better across both peak hours. A signal is not warranted based on forecast volumes and were therefore analyzed as unsignalized two-way stop-controlled intersections. Kehalani Mauka Parkway, which services the Kehalani Master Planned Community, currently terminates at the Villas of Kehalani subdivision. As new subdivisions are constructed, the dead-end will be removed and Kehalani Mauka Parkway will serve as a continuous loop through the mauka Kehalani Community. While the forecast volumes do not warrant a signal at the Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection, it may be warranted in the future when Kehalani is fully developed and when the dead end is removed. Therefore, for purposes of future planning, a roundabout was analyzed at the Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection. A mini roundabout may be feasible given the relatively large space of currently vacant lands south of the intersection, but various concerns will need to be addressed during design including grading, horizontal and vertical sight distance on all approaches, and enforcement of speeds along the relatively steep Kuikahi Drive approaches. The design of the roundabout itself may assist in lowering the speeds along Kuikahi Drive as drivers slow down to maneuver through the roundabout entries and yield to circulating vehicles.

The Department of Education (DOE) has noted the nearby Puu Kukui Elementary School to service the Project, likely resulting in increased pedestrian crossings – including small schoolchildren – across Kuikahi Drive. The previously mentioned reduction in speeds from roundabout design at the Kehalani Mauka Parkway/East Project Driveway intersection may facilitate pedestrian crossings across Kuikahi Drive, where the students are then able to continue walking on paved sidewalks to Puu Kukui Elementary School, less than a 1-mile walk away.

Figures 5.2 and 5.3 illustrates the Future Year 2024 forecast traffic volumes and LOS for the study intersection movements for the “without Maui Lani Parkway” and “with Maui Lani Parkway” scenarios, respectively. Table 5.3 summarizes the Future Year 2024 LOS at the study intersections compared to Base Year 2024 conditions. Table 5.4 shows a LOS comparison for TWSC (two-way stop control) at the West Driveway vs. Roundabout at the West Driveway. LOS worksheets are provided in Appendix C.

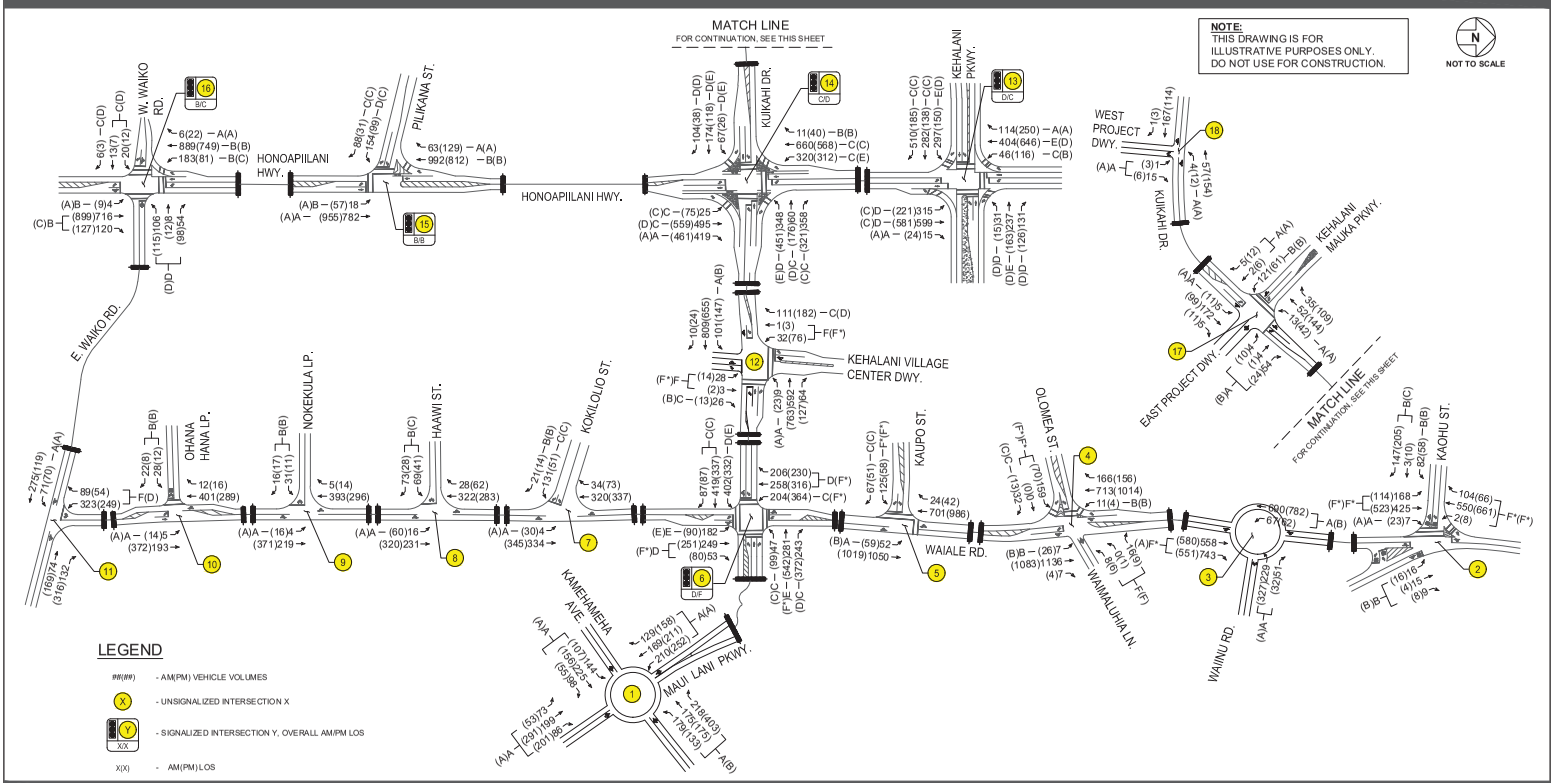

FIGURE 5.2

FUTURE YEAR 2024 WITHOUT MAUI LANI PARKWAY EXT.
LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS

KUIKAHI RESIDENTIAL

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

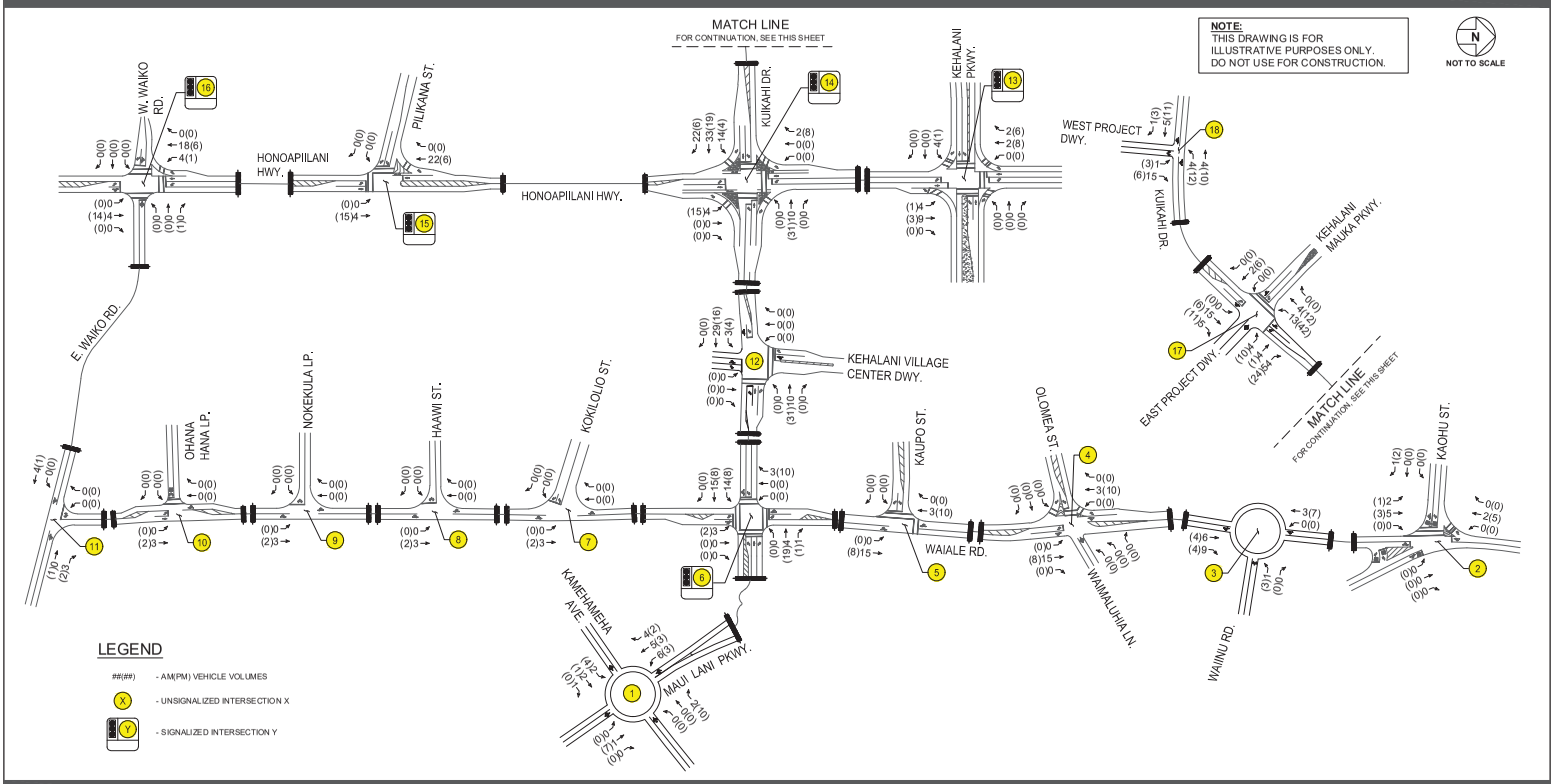

FIGURE 5.1

PROJECT-GENERATED TRAFFIC

Table 5.3: Base Year 2024 and Future Year 2024 Conditions Level of Service Summary

Intersection	Base Year 2024 Conditions WITHOUT MLP Ext.						Future Year 2024 Conditions WITHOUT MLP Ext.						Base Year 2024 Conditions WITH MLP Ext.						Future Year 2024 Conditions WITH MLP Ext.					
	AM			PM			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	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
12: Kuikahi Dr & Kehalani Village Center Dr																								
NB LT/TH	218.6	0.78	F	534.2	1.02	F*	258.6	0.86	F	636.5	1.16	F*	218.6	0.78	F	534.2	1.02	F*	258.6	0.86	F	636.5	1.16	F*
NB RT	15.9	0.08	C	13.6	0.03	B	16.4	0.08	C	13.8	0.03	B	15.9	0.08	C	13.6	0.03	B	16.4	0.08	C	13.8	0.03	B
EB LT	9.6	0.12	A	11.3	0.21	B	9.6	0.12	A	11.5	0.23	B	9.6	0.12	A	11.3	0.21	B	9.6	0.12	A	11.5	0.23	B
WB LT	9.7	0.01	A	9.2	0.03	A	9.8	0.01	A	9.3	0.03	A	9.7	0.01	A	9.2	0.03	A	9.8	0.01	A	9.3	0.03	A
SB LT/TH	151.4	0.65	F	691.9	2.05	F*	178.6	0.72	F	803.5	2.26	F*	151.4	0.65	F	691.9	2.05	F*	178.6	0.72	F	803.5	2.26	F*
SB RT	15.0	0.25	C	23.6	0.51	C	15.2	0.26	C	25.4	0.54	D	15.0	0.25	C	23.6	0.51	C	15.2	0.26	C	25.4	0.54	D
Overall	8.5	-	-	35.1	-	-	9.6	-	-	39.6	-	-	8.5	-	-	35.1	-	-	9.6	-	-	39.6	-	-
13: Honoapiilani Hwy & Kehalani Pkwy																								
NB LT	43.1	0.91	D	22.4	0.77	C	44.3	0.91	D	22.9	0.79	C	43.1	0.91	D	22.4	0.77	C	44.3	0.91	D	22.9	0.79	C
NB TH	47.8	0.90	D	25.0	0.72	C	49.1	0.90	D	25.2	0.73	C	47.8	0.90	D	25.0	0.72	C	49.1	0.90	D	25.2	0.73	C
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	56.4	0.94	E	34.5	0.67	C	60.1	0.95	E	35.2	0.68	D	56.4	0.94	E	34.5	0.67	C	60.1	0.95	E	35.2	0.68	D
EB TH	27.4	0.44	C	30.6	0.32	C	27.6	0.44	C	30.9	0.32	C	27.4	0.44	C	30.6	0.32	C	27.6	0.44	C	30.9	0.32	C
EB RT	25.8	0.31	C	28.8	0.11	C	26.0	0.31	C	29.1	0.11	C	25.8	0.31	C	28.8	0.11	C	26.0	0.31	C	29.1	0.11	C
WB LT	39.0	0.12	D	36.5	0.06	D	39.2	0.12	D	37.0	0.06	D	39.0	0.12	D	36.5	0.06	D	39.2	0.12	D	37.0	0.06	D
WB TH	68.4	0.88	E	43.3	0.73	D	68.8	0.89	E	43.8	0.74	D	68.4	0.88	E	43.3	0.73	D	68.8	0.89	E	43.8	0.74	D
WB RT	41.3	0.06	D	38.0	0.06	D	41.5	0.05	D	38.5	0.06	D	41.3	0.06	D	38.0	0.06	D	41.5	0.05	D	38.5	0.06	D
SB LT	31.9	0.29	C	17.7	0.38	B	32.1	0.30	C	17.8	0.38	B	31.9	0.29	C	17.7	0.38	B	32.1	0.30	C	17.8	0.38	B
SB TH	55.9	0.88	E	35.5	0.87	D	56.3	0.88	E	36.3	0.88	D	55.9	0.88	E	35.5	0.87	D	56.3	0.88	E	36.3	0.88	D
SB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
Overall	47.6	-	D	30.4	-	C	48.8	-	D	30.9	-	C	47.6	-	D	30.4	-	C	48.8	-	D	30.9	-	C
14: Honoapiilani Highway & Kuikahi Drive																								
NB LT	21.7	0.10	C	28.0	0.22	C	22.6	0.12	C	28.2	0.28	C	21.7	0.10	C	28.0	0.22	C	22.6	0.12	C	28.2	0.28	C
NB TH	34.0	0.81	C	55.0	0.89	D	35.3	0.82	D	55.6	0.90	E	34.0	0.81	C	55.0	0.89	D	35.3	0.82	D	55.6	0.90	E
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	38.0	0.19	D	58.6	0.13	E	37.7	0.22	D	58.3	0.14	E	38.0	0.19	D	58.6	0.13	E	37.7	0.22	D	58.3	0.14	E
EB TH	45.1	0.73	D	75.4	0.73	E	46.3	0.79	D	77.5	0.81	E	45.1	0.73	D	75.4	0.73	E	46.3	0.79	D	77.5	0.81	E
EB RT	38.3	0.06	D	56.1	0.01	E	38.4	0.12	D	55.0	0.02	E	38.3	0.06	D	56.1	0.01	E	38.4	0.12	D	55.0	0.02	E
WB LT	43.6	0.84	D	54.9	0.89	D	48.3	0.87	D	59.7	0.91	E	43.6	0.84	D	54.9	0.89	D	48.3	0.87	D	59.7	0.91	E
WB TH	28.6	0.11	C	35.9	0.27	D	29.4	0.14	C	36.9	0.32	D	28.6	0.11	C	35.9	0.27	D	29.4	0.14	C	36.9	0.32	D
WB RT	21.3	0.34	C	23.9	0.34	C	21.8	0.35	C	24.1	0.34	C	21.3	0.34	C	23.9	0.34	C	21.8	0.35	C	24.1	0.34	C
SB LT	30.8	0.86	C	60.4	0.94	E	33.4	0.87	C	61.3	0.94	E	30.8	0.86	C	60.4	0.94	E	33.4	0.87	C	61.3	0.94	E
SB TH	27.4	0.81	C	31.2	0.69	C	29.1	0.82	C	32.4	0.70	C	27.4	0.81	C	31.2	0.69	C	29.1	0.82	C	32.4	0.70	C
SB RT	11.8	0.01	B	17.8	0.02	B	12.2	0.01	B	18.3	0.03	B	11.8	0.01	B	17.8	0.02	B	12.2	0.01	B	18.3	0.03	B
Overall	32.5	-	C	46.1	-	D	34.6	-	C	47.6	-	D	32.5	-	C	46.1	-	D	34.6	-	C	47.6	-	D
15: Honoapiilani Hwy & Pilikana St																								
NB LT	13.0	0.09	B	9.7	0.19	A	13.8	0.09	B	9.8	0.19	A	13.0	0.09	B	9.7	0.19	A	13.8	0.09	B	9.8	0.19	A
NB TH	5.3	0.62	A	6.8	0.78	A	5.3	0.61	A	6.9	0.79	A	5.3	0.62	A	6.8	0.78	A	5.3	0.61	A	6.9	0.79	A
EB LT	38.1	0.78	D	27.4	0.54	C	39.6	0.78	D	27.7	0.54	C	38.1	0.78	D	27.4	0.54	C	39.6	0.78	D	27.7	0.54	C
EB RT	29.3	0.04	C	23.7	0.01	C	30.5	0.04	C	23.9	0.01	C	29.3	0.04	C	23.7	0.01	C	30.5	0.04	C	23.9	0.01	C
SB TH	14.5	0.87	B	12.3	0.83	B	15.5	0.88	B	12.3	0.83	B	14.5	0.87	B	12.3	0.83	B	15.5	0.88	B	12.3	0.83	B
SB RT	5.0	0.05	A	6.0	0.11	A	4.9	0.05	A	6.0	0.11	A	5.0	0.05	A	6.0	0.11	A	4.9	0.05	A	6.0	0.11	A
Overall	12.5	-	B	10.1	-	B	13.1	-	B	10.2	-	B	12.5	-	B	10.1	-	B	13.1	-	B	10.2	-	B
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd																								
NB LT	9.8	0.01	A	9.0	0.03	A	10.1	0.01	B	9.1	0.03	A	9.8	0.01	A	9.0	0.03	A	10.1	0.01	B	9.1	0.03	A
NB TH/RT	16.6	0.81	B	31.0	0.94	C	16.8	0.81	B	32.9	0.95	C	16.6	0.81	B	31.0	0.94	C	16.8	0.81	B	32.9	0.95	C
EB LT/TH	31.9	0.12	C	37.4	0.07	D	32.1	0.13	C	37.7	0.07	D	31.9	0.12	C	37.4	0.07	D	32.1	0.13	C	37.7	0.07	D
EB RT	31.2	0.01	C	37.0	0.00	D	31.5	0.01	C	37.3	0.00	D	31.2	0.01	C	37.0	0.00	D	31.5	0.01	C	37.3	0.00	D
WB LT/TH/RT	35.7	0.60	D	45.5	0.72	D	36.0	0.60	D	46.0	0.73	D	35.7	0.60	D	45.5	0.72	D	36.0	0.60	D	46.0	0.73	D
SB LT	15.1	0.58	B	24.8	0.44	C	15.5	0.59	B	26.1	0.47	C	15.1	0.58	B	24.8	0.44	C	15.5	0.59	B	26.1	0.47	C
SB TH	12.2	0.76	B	11.6	0.64	B	12.6	0.77	B	11.7	0.65	B	12.2	0.76	B	11.6	0.64	B	12.6	0.77	B	11.7	0.65	B
SB RT	4.7	0.00	A	5.8	0.01	A	4.7	0.00	A	5.8	0.01	A	4.7	0.00	A	5.8	0.01	A	4.7	0.00	A	5.8	0.01	A
Overall	16.2	-	B	25.0	-	C	16.5	-	B	26.1	-	C	16.2	-	B	25.0	-	C	16.5	-	B	26.1	-	C
17: Kehalani Mauka Pkwy/East Project Driveway & Kuikahi Drive																								
NB LT/TH/RT	-	-	-	-	-	-	9.8	0.08	A	10.3	0.05	B	-	-	-	-	-	-	9.8	0.08	A	10.3	0.05	B
EB LT	7.4	0.00	A	7.8	0.01	A	7.4	0.00	A	7.8	0.01	A	7.4	0.00	A	7.8	0.01	A	7.4	0.00	A	7.8	0.01	A
WB LT	-	-	-	-	-	-	7.6	0.01	A	7.5	0.03	A	-	-	-	-	-	-	7.6	0.01	A	7.5	0.03	A
SB LT	11.0	0.18	B	11.1	0.10	B	13.3	0.24	B	13.9	0.15	B	11.0	0.18	B	11.1	0.10	B	13.3	0.24	B	13.9	0.15	B
SB RT	8.7	0.01	A	9.4	0.02	A	8.7	0.01	A	9.4	0.02	A	8.7	0.01	A	9.4	0.02	A	8.7	0.01	A	9.4	0.02	A
Overall	3.8	-	-	2.1	-	-	5.1	-	-	3.4	-	-	3.8	-	-	2.1	-	-	5.1	-	-	3.4	-	-
18: Kuikahi Drive & West Project Driveway																								
NB LT/RT	-	-	-	-	-	-	9.3	0.02	A	9.4	0.01	A	-	-	-	-	-	-	9.3	0.02	A	9.4	0.01	A
WB LT	-	-	-	-	-	-	7.6	0.00	A	7.5	0.01	A	-	-	-	-	-	-	7.6	0.00	A	7.5	0.01	A
Overall	-	-	-	-	-	-	0.7	-	-	0.6	-	-	-	-	-	-	-	-	0.7	-	-	0.6	-	-

* Denotes overcapacity condition, v/c ≥ 1.

Table 5.3: Base Year 2024 and Future Year 2024 Conditions Level of Service Summary

Intersection	Base Year 2024 Conditions WITHOUT MLP Ext.						Future Year 2024 Conditions WITHOUT MLP Ext.						Base Year 2024 Conditions WITH MLP Ext.						Future Year 2024 Conditions WITH MLP Ext.					
	AM			PM			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	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Kamehameha Ave & Maui Lani Pkwy																								
NB LT/TH/RT	6.5	0.57	A	5.8	0.44	A	6.9	0.58	A	5.2	0.42	A	6.3	0.56	A	5.0	0.41	A	6.6	0.57	A	5.1	0.42	A
EB LT/TH/RT	5.1	0.55	A	6.6	0.80	A	5.3	0.57	A	6.8	0.84	A	4.5	0.55	A	5.1	0.66	A	4.7	0.57	A	5.2	0.67	A
WB LT/TH/RT	4.8	0.45	A	7.8	0.66	A	5.0	0.46	A	5.8	0.67	A	4.5	0.44	A	6.1	0.62	A	4.7	0.45	A	6.5	0.63	A
SB LT/TH/RT	5.5	0.62	A	9.9	0.80	A	6.9	0.58	A	10.8	0.82	B	5.5	0.58	A	9.2	0.76	A	5.6	0.59	A	10.0	0.78	B
Overall	5.5	0.62	A	7.8	0.80	A	5.7	0.62	A	7.6	0.82	A	5.2	0.58	A	6.6	0.76	A	5.4	0.59	A	7.0	0.78	A
2: Waiale Rd & Kaohu St/Olulloa Dr																								
NB LT/TH	122.0	1.22	F*	163.7	1.37	F*	126.5	1.24	F*	167.8	1.37	F*	122.0	1.22	F*	163.7	1.37	F*	126.5	1.24	F*	167.8	1.37	F*
NB RT	8.9	0.01	A	9.4	0.05	A	8.9	0.01	A	9.5	0.05	A	8.9	0.01	A	9.4	0.05	A	8.9	0.01	A	9.5	0.05	A
EB LT	14.2	0.23	B	13.7	0.16	B	14.2	0.23	B	13.7	0.16	B	14.2	0.23	B	13.7	0.16	B	14.2	0.23	B	13.7	0.16	B
EB TH/RT	14.3	0.36	B	17.6	0.53	C	14.4	0.36	B	17.7	0.53	C	14.3	0.36	B	17.6	0.53	C	14.4	0.36	B	17.7	0.53	C
WB LT/TH/RT	14.1	0.12	B	14.6	0.09	B	14.1	0.12	B	14.6	0.09	B	14.1	0.12	B	14.6	0.09	B	14.1	0.12	B	14.6	0.09	B
SB LT/TH/RT	167.5	1.33	F*	244.5	1.54	F*	169.1	1.33	F*	249.7	1.54	F*	167.5	1.33	F*	244.5	1.54	F*	169.1	1.33	F*	249.7	1.54	F*
Overall	121.8	-	F	170.4	-	F	124.3	-	F	174.3	-	F	121.8	-	F	170.4	-	F	124.3	-	F	174.3	-	F
3: Waiale Rd & Wainu Rd																								
NB TH/RT	26.6	1.04	F*	1.7	0.91	A	31.4	1.06	F*	1.8	0.92	A	7.4	0.91	A	3.4	0.75	A	8.4	0.93	A	3.6	0.76	A
WB LT/RT	5.6	0.37	A	7.4	0.50	A	5.6	0.37	A	7.5	0.51	A	4.6	0.23	A	4.4	0.33	A	4.6	0.23	A	4.5	0.34	A
SB LT/TH	3.5	0.71	A	10.4	0.87	B	3.6	0.72	A	11.1	.83	B	1.6	0.63	A	2.4	0.73	A	5.5	0.93	A	2.6	0.74	A
Overall	16.5	1.04	F*	5.7	0.91	A	19.3	1.06	F*	6.0	0.92	A	4.9	0.91	A	3.1	0.75	A	5.5	0.93	A	3.3	0.76	A
4: Waiale Rd & Olomea St/Waimaluhia Ln																								
NB LT	10.1	0.01	B	11.9	0.05	B	10.1	0.01	B	12.0	0.05	B	9.1	0.01	A	10.1	0.04	B	9.1	0.01	A	10.1	0.04	B
EB LT/TH	2312.8	5.58	F*	1883.8	4.23	F*	2403.9	5.76	F*	1883.8	4.23	F*	596.1	2.06	F*	300.4	1.23	F*	632.7	2.13	F*	320.0	1.27	F*
EB RT	16.3	0.10	C	21.6	0.06	C	16.4	0.10	C	21.8	0.06	C	12.9	0.07	B	15.2	0.04	C	13.0	0.07	B	15.3	0.04	C
WB LT/TH/RT	82.6	0.37	F	157.2	0.45	F	87.7	0.38	F	163.2	0.46	F	30.9	0.16	D	40.7	0.15	E	31.6	0.16	D	41.8	0.15	E
SB LT	11.5	0.02	B	11.1	0.01	B	11.6	0.02	B	11.2	0.01	B	9.8	0.02	A	9.5	0.01	A	9.9	0.02	A	9.6	0.01	A
Overall	165.7	-	-	57.0	-	-	170.8	-	-	56.6	-	-	56.6	-	-	12.7	-	-	59.4	-	-	13.4	-	-
5: Waiale Rd & Kaupo St																								
NB LT	9.7	0.07	A	11.4	0.10	B	9.7	0.07	A	11.5	0.10	B	8.7	0.06	A	9.6	0.08	A	8.7	0.06	A	9.6	0.08	A
EB LT	874.3	2.56	F*	754.2	2.03	F*	924.2	2.66	F*	830.5	2.17	F*	145.8	1.01	F*	94.0	0.65	F	160.5	1.05	F*	99.8	0.67	F
EB RT	16.1	0.18	C	22.4	0.21	C	16.2	0.18	C	22.7	0.22	C	12.6	0.13	B	15.0	0.13	C	12.6	0.13	B	15.1	0.14	C
Overall	55.5	-	-	20.7	-	-	58.0	-	-	22.6	-	-	13.4	-	-	4.3	-	-	14.4	-	-	4.5	-	-
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy																								
NB LT	50.1	0.83	D	63.2	0.74	E	58.3	0.87	E	78.6	0.82	E	27.5	0.65	C	53.6	0.68	D	29.0	0.67	C	62.0	0.71	E
NB TH/RT	35.8	0.68	D	96.7	1.00	F*	37.0	0.69	D	98.9	1.01	F*	27.1	0.57	C	51.4	0.74	D	27.8	0.57	C	55.6	0.70	E
EB LT	40.9	0.92	D	60.9	0.94	E	45.4	0.94	D	62.6	0.94	E	27.2	0.84	C	51.0	0.92	D	32.9	0.87	C	79.6	0.96	E
EB TH/RT	29.4	0.74	C	28.9	0.60	C	29.9	0.75	C	28.9	0.61	C	38.4	0.90	D	30.0	0.60	C	35.5	0.89	D	33.1	0.59	C
WB LT	30.6	0.20	C	29.7	0.29	C	31.2	0.20	C	30.0	0.29	C	26.7	0.45	C	26.7	0.43	C	27.9	0.47	C	30.7	0.43	C
WB TH	53.2	0.86	D	138.2	1.16	F*	55.7	0.87	E	158.6	1.21	F*	40.4	0.80	D	50.3	0.90	D	39.5	0.81	D	63.1	0.92	E
WB RT	32.6	0.12	C	34.6	0.21	C	33.3	0.12	C	35.0	0.22	D	26.9	0.03	C	30.3	0.08	C	27.4	0.03	C	34.7	0.08	C
SB LT	24.3	0.59	C	111.9	1.10	F*	25.1	0.60	C	114.7	1.11	F*	23.8	0.21	C	35.5	0.49	D	24.4	0.21	C	40.0	0.49	D
SB TH/RT	52.2	0.92	D	71.0	0.98	E	54.7	0.93	D	78.0	1.00	F*	41.8	0.87	D	69.8	0.94	E	43.5	0.87	D	74.5	0.94	E
Overall	40.4	-	D	81.7	-	F	42.9	-	D	88.3	-	F	34.0	-	C	48.0	-	D	34.7	-	C	57.6	-	E
7: Waiale Rd & Kokololio St																								
NB LT	8.1	0.00	A	8.3	0.03	A	8.1	0.00	A	8.3	0.03	A	8.1	0.00	A	8.3	0.03	A	8.1	0.00	A	8.3	0.03	A
EB LT	19.7	0.37	C	18.5	0.17	C	19.9	0.37	C	18.6	0.17	C	19.7	0.37	C	18.5	0.17	C	19.9	0.37	C	18.6	0.17	C
EB RT	10.5	0.03	B	10.7	0.02	B	10.5	0.03	B	10.7	0.02	B	10.5	0.03	B	10.7	0.02	B	10.5	0.03	B	10.7	0.02	B
Overall	3.4	-	-	1.6	-	-	3.4	-	-	1.6	-	-	3.4	-	-	1.6	-	-	3.4	-	-	1.6	-	-
8: Waiale Rd & Haawi St																								
NB LT	8.1	0.02	A	8.2	0.06	A	8.1	0.02	A	8.2	0.06	A	8.1	0.02	A	8.2	0.06	A	8.1	0.02	A	8.2	0.06	A
EB LT/RT	14.6	0.29	B	15.6	0.18	C	14.6	0.29	B	15.6	0.18	C	14.6	0.29	B	15.6	0.18	C	14.6	0.29	B	15.6	0.18	C
Overall	3.0	-	-	2.0	-	-	3.0	-	-	2.0	-	-	3.0	-	-	2.0	-	-	3.0	-	-	2.0	-	-
9: Waiale Rd & Nokekula Lp																								
NB LT	8.2	0.00	A	8.0	0.01	A	8.2	0.00	A	8.0	0.01	A	8.2	0.00	A	8.0	0.01	A	8.2	0.00	A	8.0	0.01	A
EB LT/RT	13.6	0.11	B	12.4	0.06	B	13.6	0.11	B	12.4	0.06	B	13.6	0.11	B	12.4	0.06	B	13.6	0.11	B	12.4	0.06	B
Overall	1.0	-	-	0.6	-	-	1.0	-	-	0.6	-	-	1.0	-	-	0.6	-	-	1.0	-	-	0.6	-	-
10: Waiale Rd & Ohana Hana Loop																								
NB LT	8.3	0.01	A	8.0	0.01	A	8.3	0.01	A	8.0	0.01	A	8.3	0.01	A	8.0	0.01	A	8.3	0.01	A	8.0	0.01	A
EB LT/RT	12.2	0.10	B	11.8	0.04	B	12.2	0.10	B	11.8	0.04	B	12.2	0.10	B	11.8	0.04	B	12.2	0.10	B	11.8	0.04	B
Overall	1.0	-	-	0.5	-	-	1.0	-	-	0.5	-	-	1.0	-	-	0.5	-	-	1.0	-	-	0.5	-	-
11: E Waiko Rd & Waiale Rd																								
EB LT	7.8	0.06	A	8.7	0.07	A	7.8	0.06	A	8.7	0.07	A	7.8	0.06	A	8.7	0.07	A	7.8	0.06	A	8.7	0.07	A
SB LT/RT	52.9	0.92	F	33.8	0.75	D	54.2	0.93	F	34.2	0.75	D	52.9	0.92	F	33.8	0.75	D	54.2	0.93	F	34.2	0.75	D
Overall	23.3	-	-	11.1	-	-	23.7	-	-	11.2	-	-	23.3	-	-	11.1	-	-	23.7	-	-	11.2	-	-

* Denotes overcapacity condition, v/c ≥ 1.

Table 5.4: Base Year 2024 and Future Year 2024 Conditions Level of Service Summary

Intersection	Future Year 2024 Conditions With TWSC at West Driveway						Future Year 2024 Conditions With RAB at West Driveway					
	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
17: Kehalani Mauka Pkwy/East Project Driveway & Kuikahi Drive												
NB LT/TH/RT	9.8	0.08	A	10.3	0.05	B	1.5	0.06	A	1.5	0.03	A
EB LT	7.4	0.00	A	7.8	0.01	A	-	-	-	-	-	-
EB LT/TH/RT	-	-	-	-	-	-	0.7	0.15	A	0.7	0.10	A
WB LT	7.6	0.01	A	7.5	0.03	A	-	-	-	-	-	-
WB LT/TH/RT	-	-	-	-	-	-	0.4	0.08	A	0.5	0.23	A
SB LT	13.3	0.24	B	13.9	0.15	B	-	-	-	-	-	-
SB LT/TH/RT	-	-	-	-	-	-	2.9	0.10	A	3.0	0.07	A
SB RT	8.7	0.01	A	9.4	0.02	A	-	-	-	-	-	-
Overall	5.1	-	-	3.4	-	-	1.4	0.15	A	1.0	0.2	A

KUIKAHI RESIDENTIAL

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

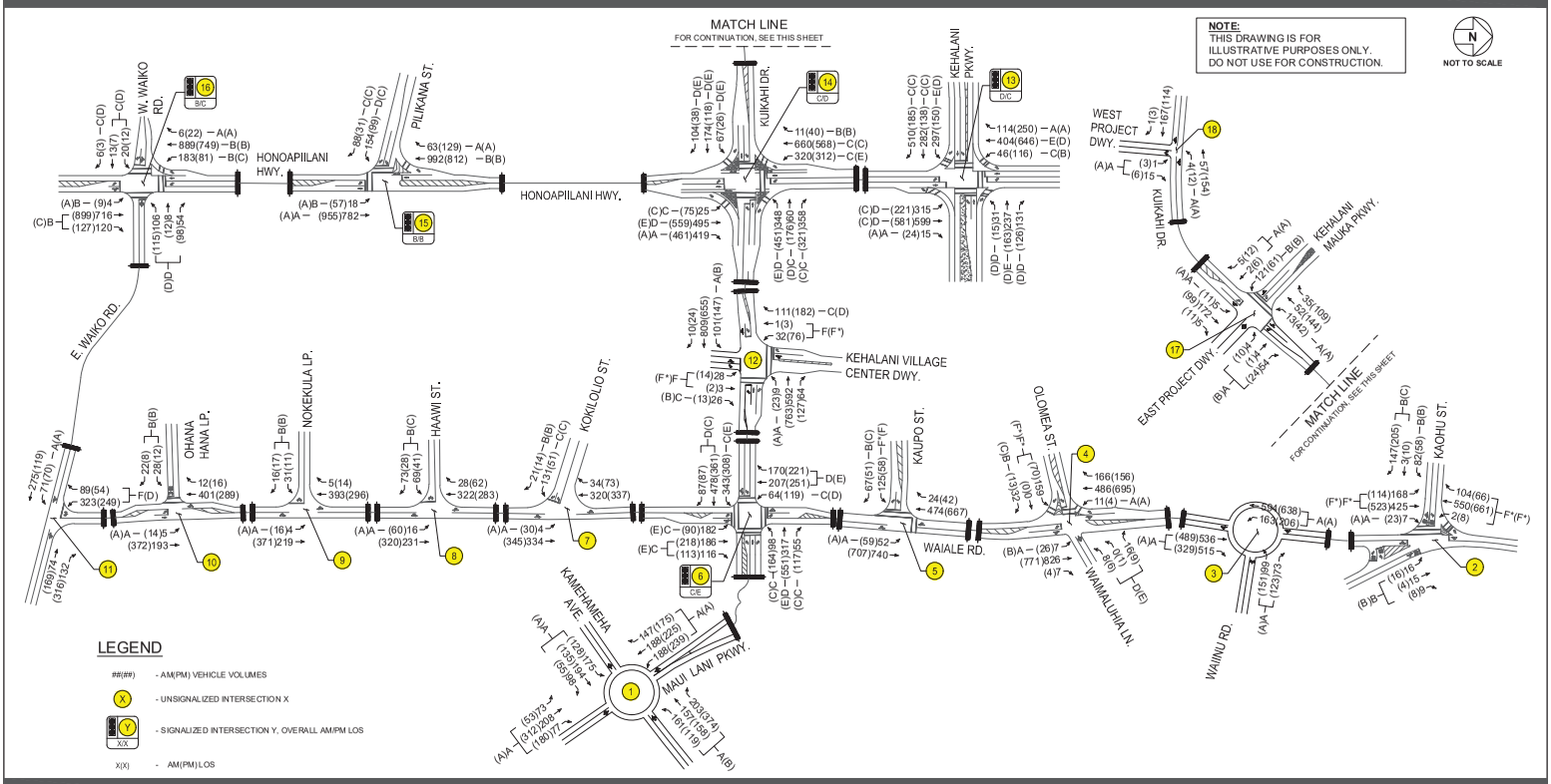

FIGURE 5.3

FUTURE YEAR 2024 WITH MAUI LANI PARKWAY EXT. LANE CONFIGURATION, TRAFFIC VOLUMES AND LOS

6. CONCLUSIONS

The Project proposes the development of 204 residential units, including 120 multi-family residential units, 34 duplex units, 16 live work units, 28 studio units, and 6 single family lots, subject to change. Access to the site will occur via two (2) new driveways off of Kuikahi Drive with primary access from a new leg at the Kuikahi Drive/Kehalani Mauka Parkway intersection which will convert the existing T-intersection into a 4-way intersection. Secondary access will be provided via a new driveway from Kuikahi Drive located approximately 0.20 miles west of the primary driveway.

6.1 Existing Conditions

During the AM peak hour, between 7:30-7:50 AM, northbound traffic congestion is observed to occur from the Waiale Road/Kaohu Street/Oluloa Drive intersection and can spill back beyond the Waiale Road/Kuikahi Drive intersection. During the PM peak hour, the southbound approach also operates at LOS F and overcapacity conditions and the northbound left-turn/through movement operates at LOS E during the PM peak hour. As a result, many side street movements and approaches that intersect Waiale Road between Kaohu Street and Kaupo Street, experience lengthy delays and some over-capacity conditions during both peak hours of traffic. Based on existing volumes, a signal is warranted at the Waiale Road/Olomea intersection and the Waiale Road/Kaohu Street intersection. The Waiale Road/Kaohu Street intersection has existing geometric constraints that may make installation of a signal or roundabout difficult.

At the time counts were taken, Kamehameha Avenue/Maui Lani Parkway four-way stop-controlled intersection, various movements operated at LOS F conditions during the peak hours. Queues were inconsistent and varied in length throughout the peak hours, with a short period of extensive southbound queuing during the AM peak hour and periodic eastbound queuing during the AM and PM peak hours of traffic. A roundabout was installed at this intersection on July 2020.

The Honoapiilani Highway/Kehalani Parkway intersection provides access to the Puu Kukui Elementary School. As a result, the eastbound left-turn movement queues beyond the existing left-turn storage lane and some vehicles may require two cycle lengths to clear the intersection during the AM peak hour. Heavy traffic during a short period of time is reflective of typical school traffic conditions, as these queuing conditions were observed to last about 30 minutes during the AM peak hour, generally between 7:15-7:45 AM.

Northbound traffic queues along Honoapiilani Highway were observed to primarily stem from Wailuku Elementary School. At Aupuni Street, northbound traffic queued back to Kehalani Parkway for about 5-10 minutes during the AM peak hour.

6.2 Base Year 2024 Conditions

Various nearby developments are anticipated to be completed by Year 2024 and were included as part of this study. These developments are discussed in greater detail in Section 4.2.

The planned Maui Lani Parkway Extension will ultimately stretch from the existing Maui Lani Parkway and extend northward and intersect with Waiinu Road at its existing north intersection with Maui Lani Parkway and Puumele Street. This roadway is anticipated to reroute a large portion of traffic away from Waiale Road, onto Maui Lani Parkway Extension, thereby mitigating much of the impacts along Waiale Road. It is not known exactly when the roadway will be completed, but

for purposes of this TIAR, analysis with and without the Maui Lani Parkway Extension was included.

6.2.1 Base Year 2024 Analysis

With the roundabout at the Kamehameha Avenue/Maui Lani Parkway intersection, all movements are anticipated to operate at LOS A across both peak hours.

At the Waiale Road/Waiinu Road intersection, the northbound approach will continue to operate at LOS F and overcapacity conditions due to high volumes even with proposed roundabout. With the Maui Lani Parkway Extension, the northbound approach will improve to LOS A.

Signal warrants were met for existing conditions at the Waiale Road/Olomea Street intersection, however no improvements are planned for this intersection. In lieu of any intersection improvements, the Maui Lani Parkway Extension is anticipated to reduce through traffic along Waiale Road to generally improve operations and reduce delays from existing conditions during both AM and PM peaks.

At the Waiale Road/Kaupo Street intersection, the eastbound left-turn movement is anticipated to continue operating at LOS F and overcapacity conditions during the AM peak hour, and the PM peak hour will worsen from existing conditions to become overcapacity during the PM peak hour as well. A signal would not be warranted based on projected Base Year volumes. In lieu of any intersection improvements, the Maui Lani Parkway Extension is anticipated to reduce through traffic along Waiale Road to generally improve operations and reduce delays from existing conditions during the AM peak hour.

At the Waiale Road/Kuikahi Drive/Maui Lani Parkway intersection, the Maui Lani Parkway Extension will alleviate the majority of problematic movements by improving LOS E/F and overcapacity conditions to LOS D or better conditions. To help mitigation PM peak hour southbound congestion, the southbound left-turn lane could be lengthened, while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection. Signal timing at this critical intersection should continually be optimized as new developments are constructed.

At the Honoapiilani Highway/Kehalani Parkway intersection, the westbound through, eastbound left-turn, and southbound through movements will operate at LOS E conditions during the AM peak hour. As noted in Section 3.3, heavy traffic during a short period of time is reflective of typical school traffic conditions, as these queuing conditions were observed to last about 30 minutes during the AM peak hour and primarily stem from traffic generated by the Puu Kukui Elementary School. There are currently no identified or planned roadway improvements likely to occur at this intersection.

At the Honoapiilani Highway/Kuikahi Drive intersection, the eastbound approach and southbound left-turn movements are anticipated to operate at LOS E during the peak hour. However, all movements will operate below capacity and overall at an adequate LOS D or better during both peak hours.

6.3 Future Year 2024 Conditions

The Project is anticipated to generate approximately 102(116) new trips during the AM and PM peak hours. Upon completion of the Project, all study intersections are generally forecast to operate with LOS similar to Base Year 2024 conditions. The Project is only anticipated to generate

2-22 vehicles per peak per direction along Honoapiilani Highway and 2-15 vehicles along Waiale Road

At the Waiale Road intersections with Kaohu Street, Olomea Street and Kaupo Street, various movements will continue operating at LOS F and over-capacity conditions similar to the Base Year scenarios. However, the Project only adds about 2-15 vehicles per peak per direction at these intersections. Base Year mitigation considerations were described in Section 4.

At the Waiale Road/Waiinu Road intersection, similar to Base Year conditions, the northbound approach will continue to operate at LOS F and overcapacity conditions due to high volumes even with proposed roundabout. With the Maui Lani Parkway Extension, the northbound approach will improve to LOS A.

At the Waiale Road/Kuikahi Drive/Maui Lani Parkway intersection, various movements are anticipated to experience an increase in delay of 1-20 seconds from Base Year conditions. The Maui Lani Parkway Extension will significantly improve operations by removing all LOS F and overcapacity conditions. A few movements will continue operating at LOS E conditions.

At the Honoapiilani Highway/Kuikahi Drive intersection, levels-of-service are anticipated to be similar to Base Year conditions, with LOS E on various Kuikahi Drive movements and the northbound through and southbound left-turn movement. All movements are anticipated to operate below capacity.

At both Project Driveways, all movements are anticipated to operate at LOS B or better across both peak hours. A signal is not warranted based on forecast volumes and were therefore analyzed as unsignalized two-way stop-controlled intersections. Kehalani Mauka Parkway, which services the Kehalani Master Planned Community, currently terminates at the Villas of Kehalani subdivision. As new subdivisions are constructed, the dead-end will be removed and Kehalani Mauka Parkway will serve as a continuous loop through the mauka Kehalani Community. While the forecast volumes do not warrant a signal at the Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection, it could be warranted in the future when Kehalani is fully developed and when the dead end is removed. Therefore, for purposes of future planning, a roundabout was analyzed at the Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection. A mini roundabout may be feasible given the relatively large space of currently vacant lands south of the intersection, but various concerns will need to be addressed during design including grading, horizontal and vertical sight distance on all approaches, and enforcement of speeds along the relatively steep Kuikahi Drive approaches. The design of the roundabout itself may assist in lowering the speeds along Kuikahi Drive as drivers slow down to maneuver through the roundabout entries and yield to circulating vehicles.

The Department of Education (DOE) has noted the nearby Puu Kukui Elementary School to service the Project, likely resulting in increased pedestrian crossings – including small schoolchildren – across Kuikahi Drive. The previously mentioned reduction in speeds from roundabout design at the Kehalani Mauka Parkway/East Project Driveway intersection may facilitate pedestrian crossings across Kuikahi Drive, where the students are then able to continue walking on paved sidewalks to Puu Kukui Elementary School, less than a 1-mile walk away.

7. RECOMMENDATIONS

The Maui Lani Parkway Extension will help mitigate congestive conditions along Waiale Road during the peak periods of traffic. As interim improvements, the following could be considered for Base Year 2024 conditions WITHOUT the Project:

Waiale Road Corridor

- For future planning purposes along Waiale Road:
  - Consider various traffic control treatment options at Waiale Road/Kaohu Street intersection that may include roadway widening, traffic signal and/or roundabout, depending on resolution to various geometric constraints.
  - Median refuge lanes along Waiale Road could be considered to help ease entry of left-turn vehicles onto Waiale Road.
  - At the Waiale Road/Kuikahi Drive intersection, lengthen the southbound left-turn lane while shortening the existing northbound left-turn lane at the Waiale Road/Waimaluhia Lane intersection. Signal timing at this critical intersection should continually be optimized as new developments are constructed.

The following Future Year 2024 recommendations should be considered WITH the Project:

- At the Waiale Road/Kuikahi Drive intersection, signal timing should be optimized.
- At the proposed Kuikahi Drive/Kehalani Mauka Parkway/Project Access intersection, consider a mini roundabout when Kehalani Mauka Parkway opens to through traffic beyond its current dead end near Kehalani Villas. Future design of a roundabout shall provide adequate horizontal and vertical sight distance on all approaches and maintaining an acceptable grade and enforcement of speeds along the relatively steep Kuikahi Drive approaches.

8. REFERENCES

- Austin, Tsutsumi & Associates, Central Maui Regional Sports Complex TIAR, 2014.
- Austin, Tsutsumi & Associates, Puunani Homesteads TIAR, 2020.
- Austin, Tsutsumi & Associates, Waiale Affordable Housing TIAR, 2016.
- Austin, Tsutsumi & Associates, Waikapu Light Industrial Project TIAR, 2013.
- Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009.
- Fehr & Peers, Waikapu Country Town TIAR, December 2016.
- Institute of Transportation Engineers, Trip Generation, 10th Edition, 2017.
- Phillip Rowell & Associates, Waiko Road Light Industrial Park TIAR, 2014.
- Transportation Research Board, Highway Capacity Manual, 6th Edition.

APPENDICES

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

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 : Maui Lani Pkwy - Kamehameha Ave
Site Code :
Start Date : 3/13/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	MAUI LANI PKWY SOUTHBOUND				KAMEHAMEHA AVE WESTBOUND				MAUI LANI PKWY NORTHBOUND				KAMEHAMEHA AVE EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	29	44	6	0	61	6	39	0	3	36	12	0	17	16	15	3	287
06:45	42	44	4	2	55	15	52	0	13	40	23	0	13	27	13	0	343
Total	71	88	10	2	116	21	91	0	16	76	35	0	30	43	28	3	630
07:00	30	33	14	4	67	40	50	0	18	38	9	0	26	34	21	1	385
07:15	31	26	25	12	30	58	36	0	26	34	20	0	31	61	23	3	416
07:30	32	22	32	11	40	60	21	0	16	35	30	0	33	63	24	0	419
07:45	46	31	17	4	42	15	63	0	12	48	27	0	38	57	26	0	426
Total	139	112	88	31	179	173	170	0	72	155	86	0	128	215	94	4	1646
08:00	46	37	6	3	43	15	63	0	5	46	20	0	22	22	17	0	345
08:15	40	44	6	0	42	8	51	0	2	56	25	0	9	14	6	0	303
Grand Total	296	281	110	36	380	217	375	0	95	333	166	0	189	294	145	7	2924
Apprch %	40.9	38.9	15.2	5	39.1	22.3	38.6	0	16	56.1	27.9	0	29.8	46.3	22.8	1.1	
Total %	10.1	9.6	3.8	1.2	13	7.4	12.8	0	3.2	11.4	5.7	0	6.5	10.1	5	0.2	
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0
Cars & Light Goods	286	267	109	0	375	217	368	0	95	315	164	0	188	291	145	0	2820
% Cars & Light Goods	96.6	95	99.1	0	98.7	100	98.1	0	100	94.6	98.8	0	99.5	99	100	0	96.4
Buses	2	0	1	0	1	0	2	0	0	6	1	0	1	2	0	0	16
% Buses	0.7	0	0.9	0	0.3	0	0.5	0	0	1.8	0.6	0	0.5	0.7	0	0	0.5
Single-Unit Trucks	8	12	0	0	4	0	5	0	0	12	1	0	0	0	0	0	42
% Single-Unit Trucks	2.7	4.3	0	0	1.1	0	1.3	0	0	3.6	0.6	0	0	0	0	0	1.4
Articulated Trucks	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	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	21	0	0	0	0	0	0	0	0	0	0	0	2	23
% Bicycles on Crosswalk	0	0	0	58.3	0	0	0	0	0	0	0	0	0	0	0	28.6	0.8
Pedestrians	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	5	20
% Pedestrians	0	0	0	41.7	0	0	0	0	0	0	0	0	0	0	0	71.4	0.7

Austin Tsutsumi & Associates

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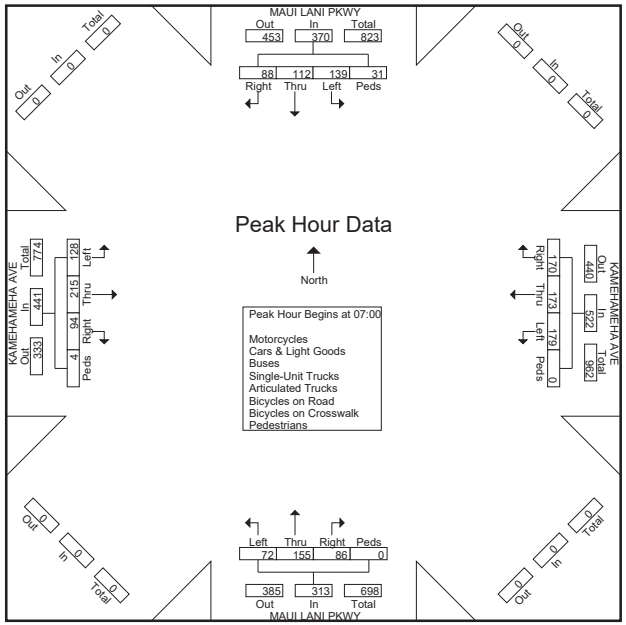
File Name : Maui Lani Pkwy - Kamehameha Ave
Site Code :
Start Date : 3/13/2019
Page No : 2

	MAUI LANI PKWY SOUTHBOUND					KAMEHAMEHA AVE WESTBOUND					MAUI LANI PKWY NORTHBOUND					KAMEHAMEHA AVE 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 07:00																					
07:00	30	**33**	14	4	81	**67**	40	50	0	**157**	18	38	9	0	65	26	34	21	1	82	385
07:15	31	26	25	**12**	94	30	58	36	0	124	**26**	34	20	0	80	31	61	23	**3**	118	416
07:30	32	22	**32**	11	97	40	**60**	21	0	121	16	35	**30**	0	81	33	**63**	24	0	120	419
07:45	**46**	31	17	4	**98**	42	15	**63**	0	120	12	**48**	27	0	**87**	**38**	57	**26**	0	**121**	**426**
Total Volume	139	112	88	31	370	179	173	170	0	522	72	155	86	0	313	128	215	94	4	441	1646
% App. Total	37.6	30.3	23.8	8.4		34.3	33.1	32.6	0		23	49.5	27.5	0		29	48.8	21.3	0.9		
PHF	.755	.848	.688	.646	.944	.668	.721	.675	.000	.831	.692	.807	.717	.000	.899	.842	.853	.904	.333	.911	.966



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File Name : Maui Lani Pkwy - Kamehameha Ave
Site Code :
Start Date : 3/13/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	MAUI LANI PKWY SOUTHBOUND				KAMEHAMEHA AVE WESTBOUND				MAUI LANI PKWY NORTHBOUND				KAMEHAMEHA AVE EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	46	43	23	0	35	39	49	0	12	50	43	0	18	25	12	0	395
15:45	37	32	37	2	39	52	59	0	14	42	51	0	30	41	19	0	455
Total	83	75	60	2	74	91	108	0	26	92	94	0	48	66	31	0	850
16:00	43	27	32	1	42	46	55	0	11	46	45	0	20	41	19	0	428
16:15	39	32	35	3	26	40	63	0	10	48	42	0	31	48	14	0	431
16:30	48	32	26	1	27	42	63	0	15	42	54	0	24	36	12	0	422
16:45	44	54	17	2	38	40	79	0	15	39	60	0	9	26	9	0	432
Total	174	145	110	7	133	168	260	0	51	175	201	0	84	151	54	0	1713
17:00	41	62	13	2	31	36	66	0	8	66	44	0	8	15	9	0	401
17:15	53	41	21	0	30	32	69	0	10	30	63	0	20	16	4	0	389
Grand Total	351	323	204	11	268	327	503	0	95	363	402	0	160	248	98	0	3353
Apprch %	39.5	36.3	22.9	1.2	24.4	29.8	45.8	0	11	42.2	46.7	0	31.6	49	19.4	0	
Total %	10.5	9.6	6.1	0.3	8	9.8	15	0	2.8	10.8	12	0	4.8	7.4	2.9	0	
Motorcycles	1	0	0	0	0	0	2	0	0	0	1	0	1	0	0	0	5
% Motorcycles	0.3	0	0	0	0	0	0.4	0	0	0	0.2	0	0.6	0	0	0	0.1
Cars & Light Goods	348	322	202	0	264	327	499	0	95	362	395	0	158	245	98	0	3315
% Cars & Light Goods	99.1	99.7	99	0	98.5	100	99.2	0	100	99.7	98.3	0	98.8	98.8	100	0	98.9
Buses	1	0	1	0	1	0	0	0	0	0	3	0	1	0	0	0	7
% Buses	0.3	0	0.5	0	0.4	0	0	0	0	0	0.7	0	0.6	0	0	0	0.2
Single-Unit Trucks	1	1	1	0	3	0	2	0	0	1	3	0	0	3	0	0	15
% Single-Unit Trucks	0.3	0.3	0.5	0	1.1	0	0.4	0	0	0.3	0.7	0	0	1.2	0	0	0.4
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	3	0	0	0	0	0	0	0	0	0	0	0	0	3
% Bicycles on Crosswalk	0	0	0	27.3	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
% Pedestrians	0	0	0	72.7	0	0	0	0	0	0	0	0	0	0	0	0	0.2

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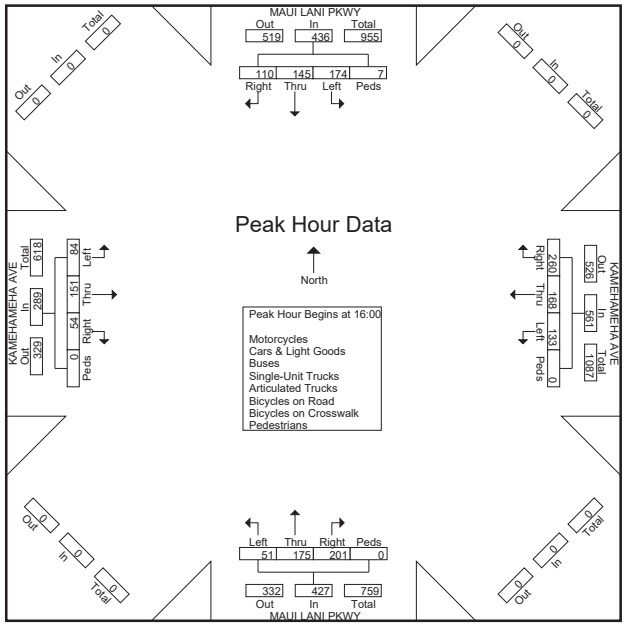
File Name : Maui Lani Pkwy - Kamehameha Ave
Site Code :
Start Date : 3/13/2019
Page No : 2

	MAUI LANI PKWY SOUTHBOUND					KAMEHAMEHA AVE WESTBOUND					MAUI LANI PKWY NORTHBOUND					KAMEHAMEHA AVE 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 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	43	27	32	1	103	**42**	**46**	55	0	143	11	46	45	0	102	20	41	**19**	0	80	428
16:15	39	32	**35**	**3**	109	26	40	63	0	129	10	**48**	42	0	100	**31**	**48**	14	0	**93**	431
16:30	**48**	32	26	1	107	27	42	63	0	132	**15**	42	54	0	111	24	36	12	0	72	422
16:45	44	**54**	17	2	**117**	38	40	**79**	0	**157**	15	39	**60**	0	**114**	9	26	9	0	44	**432**
Total Volume	174	145	110	7	436	133	168	260	0	561	51	175	201	0	427	84	151	54	0	289	1713
% App. Total	39.9	33.3	25.2	1.6		23.7	29.9	46.3	0		11.9	41	47.1	0		29.1	52.2	18.7	0		
PHF	.906	.671	.786	.583	.932	.792	.913	.823	.000	.893	.850	.911	.838	.000	.936	.677	.786	.711	.000	.777	.991



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File Name : Waiale Rd - Kaohu St
Site Code :
Start Date : 2/1/2018
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				KAOHU ST Westbound				WAIALE RD Northbound				OLULOA DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
12:00 AM	0	9	1	0	0	0	0	0	0	3	0	0	0	0	3	0	16
12:15 AM	1	5	0	0	0	0	0	0	3	5	0	0	0	0	0	0	14
12:30 AM	1	4	0	0	0	0	0	0	1	4	1	0	0	0	0	0	11
12:45 AM	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	5
Total	2	21	1	0	0	0	0	0	4	13	2	0	0	0	3	0	46
01:00 AM	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
01:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
01:30 AM	0	3	0	0	1	0	0	0	1	1	0	0	0	0	0	0	6
01:45 AM	0	6	0	0	0	0	0	0	1	6	0	0	0	0	0	0	13
Total	0	12	0	0	1	0	0	0	2	11	0	0	0	0	0	0	26
02:00 AM	0	2	1	0	0	0	0	0	1	3	0	0	0	0	0	0	7
02:15 AM	0	6	1	0	0	0	0	0	0	1	0	0	0	0	0	0	8
02:30 AM	0	5	0	0	0	0	0	0	1	3	1	0	0	0	0	0	10
02:45 AM	0	2	1	0	0	0	0	0	1	5	0	0	0	0	0	0	9
Total	0	15	3	0	0	0	0	0	3	12	1	0	0	0	0	0	34
03:00 AM	0	5	0	0	0	0	0	0	1	3	0	0	0	0	0	0	9
03:15 AM	0	1	0	0	0	0	0	0	1	2	0	0	1	0	1	0	6
03:30 AM	0	6	1	0	0	0	0	0	1	2	0	0	1	0	0	0	11
03:45 AM	0	7	1	0	0	0	0	0	1	4	0	0	0	0	2	0	15
Total	0	19	2	0	0	0	0	0	4	11	0	0	2	0	3	0	41
04:00 AM	0	2	0	0	0	0	0	0	1	4	0	0	0	0	1	0	8
04:15 AM	1	8	0	0	2	0	0	0	0	1	0	0	1	0	0	0	13
04:30 AM	0	11	1	0	2	0	0	0	4	11	0	0	2	0	0	0	31
04:45 AM	1	12	2	0	0	0	1	0	3	12	0	0	0	0	1	0	32
Total	2	33	3	0	4	0	1	0	8	28	0	0	3	0	2	0	84
05:00 AM	0	21	1	0	2	0	0	0	2	10	0	0	5	0	3	0	44
05:15 AM	1	21	1	0	2	0	0	0	5	10	1	0	0	0	0	0	41
05:30 AM	0	27	0	0	0	0	0	0	3	16	0	0	1	0	2	0	49
05:45 AM	0	34	2	0	2	0	0	0	5	17	0	0	1	0	1	0	62
Total	1	103	4	0	6	0	0	0	15	53	1	0	7	0	6	0	196
06:00 AM	0	40	4	0	3	0	1	0	4	25	0	0	2	0	2	0	81
06:15 AM	1	56	2	0	4	1	0	0	7	39	1	0	2	0	1	0	114
06:30 AM	0	66	18	0	2	5	1	0	14	37	0	0	3	0	8	0	154
06:45 AM	1	74	29	0	2	2	1	0	22	55	3	0	5	0	7	0	201
Total	2	236	53	0	11	8	3	0	47	156	4	0	12	0	18	0	550
07:00 AM	1	79	26	0	6	2	1	2	35	71	1	0	18	1	28	0	271
07:15 AM	0	107	40	0	8	3	1	0	43	80	0	0	21	2	48	0	353
07:30 AM	3	114	37	0	5	5	3	0	47	84	1	0	21	5	46	0	371
07:45 AM	1	120	15	0	7	1	2	0	21	118	4	0	23	1	22	0	335
Total	5	420	118	0	26	11	7	2	146	353	6	0	83	9	144	0	1330
08:00 AM	0	85	11	0	0	1	2	0	16	83	1	0	15	0	16	0	230
08:15 AM	2	67	10	0	1	4	1	0	16	85	1	0	3	2	17	0	209
08:30 AM	0	79	10	0	2	0	2	0	20	70	2	0	3	1	8	0	197
08:45 AM	1	70	7	0	4	1	0	2	15	98	4	0	1	0	23	0	226
Total	3	301	38	0	7	6	5	2	67	336	8	0	22	3	64	0	862
09:00 AM	0	79	9	0	5	0	1	0	5	70	0	0	7	0	15	1	192
09:15 AM	3	71	10	0	3	0	0	1	12	59	0	0	6	0	7	0	172
09:30 AM	0	78	7	0	1	2	2	0	12	53	4	0	2	1	18	0	180

Austin Tsutsumi & Associates

501 Sumner Street #521
Honolulu, HI 96817
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File Name : Waiale Rd - Kaohu St
Site Code :
Start Date : 2/1/2018
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Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				KAOHU ST Westbound				WAIALE RD Northbound				OLULOA DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
09:45 AM	5	78	7	0	3	0	1	0	12	77	2	0	12	1	16	0	214
Total	8	306	33	0	12	2	4	1	41	259	6	0	27	2	56	1	758
10:00 AM	1	79	13	0	0	0	0	0	24	67	1	0	12	1	15	0	213
10:15 AM	2	80	11	0	2	0	0	0	11	84	1	0	10	1	6	0	208
10:30 AM	1	90	8	0	3	1	1	1	18	65	1	0	9	1	14	0	213
10:45 AM	1	83	17	0	3	1	0	1	19	81	1	0	13	2	20	0	242
Total	5	332	49	0	8	2	1	2	72	297	4	0	44	5	55	0	876
11:00 AM	4	63	13	0	5	0	0	0	20	65	2	0	15	0	27	0	214
11:15 AM	0	79	16	0	6	0	0	1	18	78	2	0	13	0	20	0	233
11:30 AM	2	73	10	0	3	0	0	0	22	57	0	0	11	0	14	0	192
11:45 AM	1	103	9	0	0	0	2	0	11	62	4	0	13	1	25	0	231
Total	7	318	48	0	14	0	2	1	71	262	8	0	52	1	86	0	870
12:00 PM	0	102	15	0	1	1	0	1	23	65	2	0	16	0	26	0	252
12:15 PM	1	88	8	0	1	0	2	0	23	70	5	0	6	0	18	0	222
12:30 PM	4	87	21	0	3	0	0	0	23	69	3	0	12	0	17	0	239
12:45 PM	5	86	7	0	0	0	1	1	9	96	4	2	5	0	16	0	232
Total	10	363	51	0	5	1	3	2	78	300	14	2	39	0	77	0	945
01:00 PM	1	120	6	0	2	1	0	0	21	70	2	0	5	2	16	0	246
01:15 PM	2	89	10	0	2	1	0	0	27	80	4	0	9	1	12	0	237
01:30 PM	0	100	14	0	3	0	0	0	25	71	1	0	7	0	28	0	249
01:45 PM	0	100	18	0	2	1	0	0	24	77	3	0	11	2	15	0	253
Total	3	409	48	0	9	3	0	0	97	298	10	0	32	5	71	0	985
02:00 PM	0	104	23	0	5	2	0	0	31	82	0	0	16	8	41	0	312
02:15 PM	0	117	15	0	5	1	2	0	25	77	3	0	29	5	61	0	340
02:30 PM	0	100	13	0	1	0	0	0	26	83	3	0	19	1	30	0	276
02:45 PM	0	111	14	0	1	0	0	0	16	93	2	0	5	2	16	0	260
Total	0	432	65	0	12	3	2	0	98	335	8	0	69	16	148	0	1188
03:00 PM	2	115	5	0	5	1	2	2	17	79	1	0	11	2	12	0	254
03:15 PM	0	117	3	0	1	0	3	0	19	75	3	0	8	0	12	0	241
03:30 PM	2	109	5	0	4	0	1	1	20	107	2	0	20	3	37	0	311
03:45 PM	3	116	9	0	0	0	1	0	23	96	3	0	15	3	17	0	286
Total	7	457	22	0	10	1	7	3	79	357	9	0	54	8	78	0	1092
04:00 PM	1	102	10	1	2	2	3	0	18	103	0	1	11	3	24	1	282
04:15 PM	0	120	11	0	1	0	1	0	17	112	1	0	6	4	38	0	311
04:30 PM	2	126	9	0	3	0	0	0	22	98	3	0	7	2	61	0	333
04:45 PM	3	119	10	0	2	0	0	0	7	83	5	0	6	1	30	0	266
Total	6	467	40	1	8	2	4	0	64	396	9	1	30	10	153	1	1192
05:00 PM	3	112	3	0	3	0	1	0	25	68	7	0	6	2	24	0	254
05:15 PM	3	113	5	0	4	0	0	0	11	77	1	0	9	1	21	0	245
05:30 PM	5	97	10	0	0	0	0	0	6	70	5	0	3	1	9	0	206
05:45 PM	2	78	4	0	1	3	0	0	17	78	1	0	1	0	9	0	194
Total	13	400	22	0	8	3	1	0	59	293	14	0	19	4	63	0	899
06:00 PM	1	86	7	0	0	0	0	0	22	63	2	0	8	3	18	0	210
06:15 PM	1	78	5	0	5	1	0	0	15	68	4	0	6	3	14	0	200
06:30 PM	3	75	3	0	1	2	0	0	12	55	4	0	4	0	10	0	169
06:45 PM	1	53	12	0	1	1	0	0	16	66	5	0	5	1	10	0	171
Total	6	292	27	0	7	4	0	0	65	252	15	0	23	7	52	0	750
07:00 PM	4	63	6	0	1	0	0	0	14	43	2	0	0	0	9	1	143
07:15 PM	1	45	2	0	2	0	0	0	10	42	2	0	2	1	6	0	113
07:30 PM	0	35	6	0	0	1	0	0	7	36	5	0	4	0	12	0	106

Austin Tsutsumi & Associates

501 Sumner Street #521
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File Name : Waiale Rd - Kaohu St
Site Code :
Start Date : 2/1/2018
Page No : 3

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				KAOHU ST Westbound				WAIALE RD Northbound				OLULOA DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:45 PM	1	35	5	0	1	0	0	0	3	16	2	0	4	1	10	0	78
Total	6	178	19	0	4	1	0	0	34	137	11	0	10	2	37	1	440
08:00 PM	1	43	3	0	2	2	1	0	1	31	1	0	5	1	11	0	102
08:15 PM	0	46	5	0	2	0	0	0	9	30	2	0	2	0	6	0	102
08:30 PM	1	49	2	0	1	0	0	0	4	41	3	0	1	0	9	0	111
08:45 PM	0	41	1	0	1	0	0	0	6	27	0	0	0	0	5	0	81
Total	2	179	11	0	6	2	1	0	20	129	6	0	8	1	31	0	396
09:00 PM	1	28	1	0	0	0	2	0	8	23	2	0	1	0	3	0	69
09:15 PM	1	33	4	0	1	0	0	0	8	25	1	0	3	2	4	0	82
09:30 PM	0	22	1	0	1	1	0	0	4	20	2	0	2	0	7	0	60
09:45 PM	0	20	1	0	1	1	0	0	2	27	0	0	1	0	3	0	56
Total	2	103	7	0	3	2	2	0	22	95	5	0	7	2	17	0	267
10:00 PM	0	12	2	0	1	0	0	0	2	13	2	0	0	1	1	0	34
10:15 PM	1	25	0	0	0	0	0	0	1	8	1	0	0	0	3	0	39
10:30 PM	0	26	2	0	1	0	0	2	3	9	0	0	0	0	4	0	47
10:45 PM	0	14	1	0	0	0	0	0	1	10	0	0	0	0	1	0	27
Total	1	77	5	0	2	0	0	2	7	40	3	0	0	1	9	0	147
11:00 PM	2	17	1	0	0	0	0	0	1	11	2	0	1	0	0	0	35
11:15 PM	0	12	2	0	0	0	0	0	2	15	2	0	0	0	2	0	35
11:30 PM	0	8	2	0	0	1	0	0	0	10	1	0	0	0	0	0	22
11:45 PM	0	12	0	0	1	0	0	0	1	8	0	0	0	0	0	0	22
Total	2	49	5	0	1	1	0	0	4	44	5	0	1	0	2	0	114
Grand Total	93	5522	674	1	164	52	43	15	1107	4467	149	3	544	76	1175	3	14088
Apprch %	1.5	87.8	10.7	0	59.9	19	15.7	5.5	19.3	78	2.6	0.1	30.3	4.2	65.4	0.2	
Total %	0.7	39.2	4.8	0	1.2	0.4	0.3	0.1	7.9	31.7	1.1	0	3.9	0.5	8.3	0	
Motorcycles	0	27	0	0	0	0	0	0	4	26	2	0	0	0	5	0	64
% Motorcycles	0	0.5	0	0	0	0	0	0	0.4	0.6	1.3	0	0	0	0.4	0	0.5
Cars	72	4088	494	0	133	42	32	0	792	3161	114	0	380	54	852	0	10214
% Cars	77.4	74	73.3	0	81.1	80.8	74.4	0	71.5	70.8	76.5	0	69.9	71.1	72.5	0	72.5
Light Goods Vehicles	21	1282	158	0	28	8	11	0	271	1154	32	0	147	21	299	0	3432
% Light Goods Vehicles	22.6	23.2	23.4	0	17.1	15.4	25.6	0	24.5	25.8	21.5	0	27	27.6	25.4	0	24.4
Buses	0	10	12	0	0	0	0	0	13	21	0	0	0	0	1	0	57
% Buses	0	0.2	1.8	0	0	0	0	0	1.2	0.5	0	0	0	0	0.1	0	0.4
Single-Unit Trucks	0	108	9	0	3	2	0	0	23	98	0	0	17	1	13	0	274
% Single-Unit Trucks	0	2	1.3	0	1.8	3.8	0	0	2.1	2.2	0	0	3.1	1.3	1.1	0	1.9
Articulated Trucks	0	5	0	0	0	0	0	0	2	4	0	0	0	0	4	0	15
% Articulated Trucks	0	0.1	0	0	0	0	0	0	0.2	0.1	0	0	0	0	0.3	0	0.1
Bicycles on Road	0	2	1	0	0	0	0	0	2	3	1	0	0	0	1	0	10
% Bicycles on Road	0	0	0.1	0	0	0	0	0	0.2	0.1	0.7	0	0	0	0.1	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	15	0	0	0	3	0	0	0	3	22
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	100	0.2

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501 Sumner Street #521
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File Name : Waiale Rd - Kaohu St
Site Code :
Start Date : 2/1/2018
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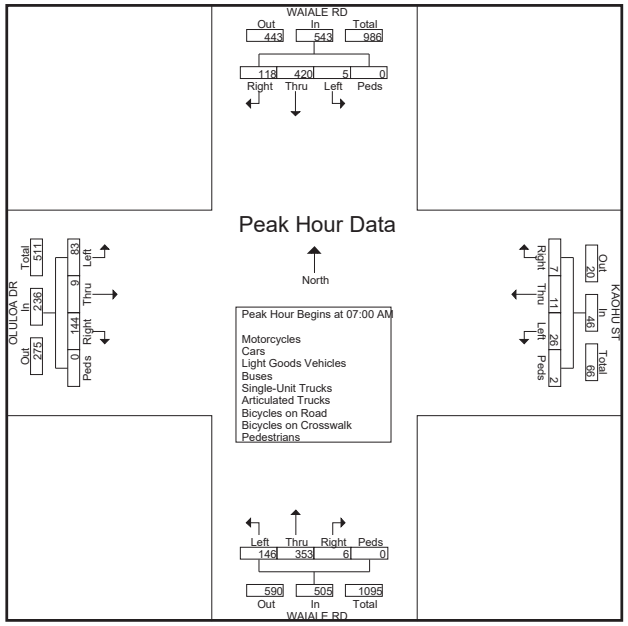
	WAIALE RD Southbound					KAOHU ST Westbound					WAIALE RD Northbound					OLULOA DR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	79	26	0	106	6	2	1	**2**	11	35	71	1	0	107	18	1	28	0	47	271
07:15 AM	0	107	**40**	0	147	**8**	3	1	0	12	43	80	0	0	123	21	2	**48**	0	71	353
07:30 AM	**3**	114	37	0	**154**	5	**5**	**3**	0	**13**	**47**	84	1	0	132	21	**5**	46	0	**72**	**371**
07:45 AM	1	**120**	15	0	136	7	1	2	0	10	21	**118**	**4**	0	**143**	**23**	1	22	0	46	335
Total Volume	5	420	118	0	543	26	11	7	2	46	146	353	6	0	505	83	9	144	0	236	1330
% App. Total	0.9	77.3	21.7	0		56.5	23.9	15.2	4.3		28.9	69.9	1.2	0		35.2	3.8	61	0		
PHF	.417	.875	.738	.000	.881	.813	.550	.583	.250	.885	.777	.748	.375	.000	.883	.902	.450	.750	.000	.819	.896



Austin Tsutsumi & Associates

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File Name : Waiale Rd - Oluloa Dr
Site Code :
Start Date : 4/9/2019
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				OLULOA DR WESTBOUND				WAIALE RD NORTHBOUND				KAOHU ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	56	12	0	1	2	1	1	17	46	0	0	6	0	11	0	153
06:45	1	71	30	0	6	2	0	0	24	51	0	0	3	0	14	0	202
Total	1	127	42	0	7	4	1	1	41	97	0	0	9	0	25	0	355
07:00	1	77	24	0	1	1	1	1	30	80	2	0	14	0	22	0	254
07:15	0	113	40	0	5	3	2	0	40	79	2	0	25	0	29	0	338
07:30	1	112	28	0	4	6	2	2	45	76	1	0	23	3	43	0	346
07:45	0	135	12	0	5	5	4	1	30	111	1	0	20	0	30	0	354
Total	2	437	104	0	15	15	9	4	145	346	6	0	82	3	124	0	1292
08:00	2	111	12	0	2	1	2	0	20	110	3	0	12	2	16	0	293
08:15	1	88	9	0	5	0	0	0	13	66	3	0	13	0	21	0	219
Grand Total	6	763	167	0	29	20	12	5	219	619	12	0	116	5	186	0	2159
Apprch %	0.6	81.5	17.8	0	43.9	30.3	18.2	7.6	25.8	72.8	1.4	0	37.8	1.6	60.6	0	
Total %	0.3	35.3	7.7	0	1.3	0.9	0.6	0.2	10.1	28.7	0.6	0	5.4	0.2	8.6	0	
Motorcycles	0	4	2	0	0	0	0	0	1	1	0	0	0	0	0	0	8
% Motorcycles	0	0.5	1.2	0	0	0	0	0	0.5	0.2	0	0	0	0	0	0	0.4
Cars & Light Goods	6	741	154	0	27	20	10	0	216	604	12	0	114	5	177	0	2086
% Cars & Light Goods	100	97.1	92.2	0	93.1	100	83.3	0	98.6	97.6	100	0	98.3	100	95.2	0	96.6
Buses	0	4	7	0	0	0	1	0	2	4	0	0	0	0	0	0	18
% Buses	0	0.5	4.2	0	0	0	8.3	0	0.9	0.6	0	0	0	0	0	0	0.8
Single-Unit Trucks	0	13	4	0	1	0	0	0	0	10	0	0	2	0	7	0	37
% Single-Unit Trucks	0	1.7	2.4	0	3.4	0	0	0	0	1.6	0	0	1.7	0	3.8	0	1.7
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	1.1	0	0.1
Bicycles on Road	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3
% Bicycles on Road	0	0.1	0	0	3.4	0	8.3	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
% Pedestrians	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0.1

Austin Tsutsumi & Associates

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File Name : Waiale Rd - Oluloa Dr
Site Code :
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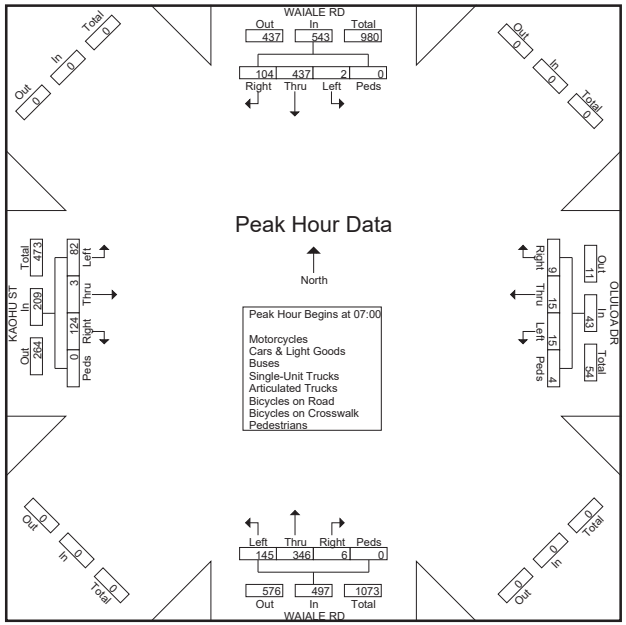
	WAIALE RD SOUTHBOUND					OLULOA DR WESTBOUND					WAIALE RD NORTHBOUND					KAOHU ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	**1**	77	24	0	102	1	1	1	1	4	30	80	**2**	0	112	14	0	22	0	36	254
07:15	0	113	**40**	0	**153**	**5**	3	2	0	10	40	79	2	0	121	**25**	0	29	0	54	338
07:30	1	112	28	0	141	4	**6**	2	**2**	14	**45**	76	1	0	122	23	**3**	**43**	0	**69**	346
07:45	0	**135**	12	0	147	5	5	**4**	1	**15**	30	**111**	1	0	**142**	20	0	30	0	50	**354**
Total Volume	2	437	104	0	543	15	15	9	4	43	145	346	6	0	497	82	3	124	0	209	1292
% App. Total	0.4	80.5	19.2	0		34.9	34.9	20.9	9.3		29.2	69.6	1.2	0		39.2	1.4	59.3	0		
PHF	.500	.809	.650	.000	.887	.750	.625	.563	.500	.717	.806	.779	.750	.000	.875	.820	.250	.721	.000	.757	.912



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File Name : Waiale Rd - Oluloa Dr
Site Code :
Start Date : 4/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				OLULOA DR WESTBOUND				WAIALE RD NORTHBOUND				KAOHU ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	3	107	11	0	2	2	1	5	17	98	4	0	27	5	42	0	324
15:45	1	108	14	0	5	1	1	0	26	95	6	0	16	2	16	0	291
Total	4	215	25	0	7	3	2	5	43	193	10	0	43	7	58	0	615
16:00	2	114	9	0	3	0	2	0	30	97	6	0	13	2	17	0	295
16:15	0	120	20	0	3	2	3	0	27	110	7	0	14	1	28	0	335
16:30	0	119	15	0	5	1	0	0	25	94	1	0	16	3	51	0	330
16:45	6	127	22	4	3	1	3	0	9	91	7	0	15	4	62	0	354
Total	8	480	66	4	14	4	8	0	91	392	21	0	58	10	158	0	1314
17:00	5	129	8	5	3	0	2	1	20	79	2	0	18	1	30	2	305
17:15	0	118	7	3	0	0	1	0	18	69	1	0	5	1	16	1	240
Grand Total	17	942	106	12	24	7	13	6	172	733	34	0	124	19	262	3	2474
Apprch %	1.6	87.5	9.8	1.1	48	14	26	12	18.3	78.1	3.6	0	30.4	4.7	64.2	0.7	
Total %	0.7	38.1	4.3	0.5	1	0.3	0.5	0.2	7	29.6	1.4	0	5	0.8	10.6	0.1	
Motorcycles	0	4	0	0	0	0	0	0	0	6	0	0	1	0	2	0	13
% Motorcycles	0	0.4	0	0	0	0	0	0	0	0.8	0	0	0.8	0	0.8	0	0.5
Cars & Light Goods	17	923	103	0	24	7	12	0	172	714	32	0	122	19	259	0	2404
% Cars & Light Goods	100	98	97.2	0	100	100	92.3	0	100	97.4	94.1	0	98.4	100	98.9	0	97.2
Buses	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
% Buses	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0.1
Single-Unit Trucks	0	10	2	0	0	0	1	0	0	13	1	0	0	0	0	0	27
% Single-Unit Trucks	0	1.1	1.9	0	0	0	7.7	0	0	1.8	2.9	0	0	0	0	0	1.1
Articulated Trucks	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
% Articulated Trucks	0	0.2	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Road	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3
% Bicycles on Road	0	0.1	0	0	0	0	0	0	0	0	2.9	0	0.8	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	16.7	0	0	0	0	0	0	0	33.3	0.1
Pedestrians	0	0	0	12	0	0	0	5	0	0	0	0	0	0	0	2	19
% Pedestrians	0	0	0	100	0	0	0	83.3	0	0	0	0	0	0	0	66.7	0.8

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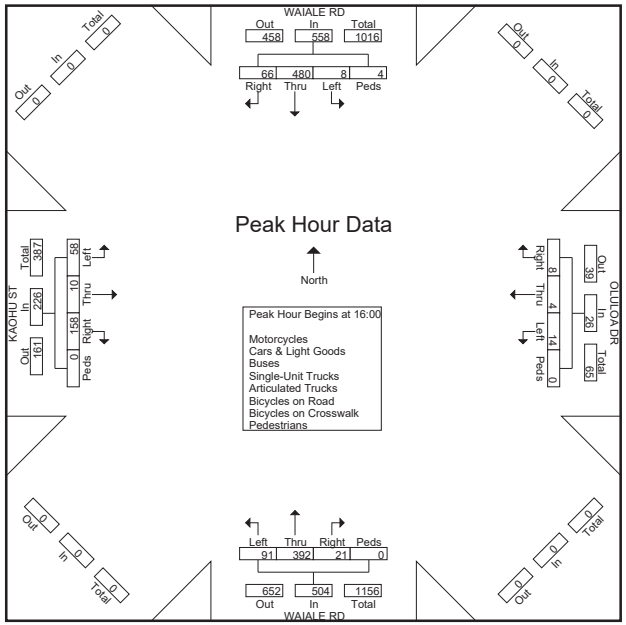
File Name : Waiale Rd - Oluloa Dr
Site Code :
Start Date : 4/9/2019
Page No : 2

	WAIALE RD SOUTHBOUND					OLULOA DR WESTBOUND					WAIALE RD NORTHBOUND					KAOHU ST 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 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	2	114	9	0	125	3	0	2	0	5	**30**	97	6	0	133	13	2	17	0	32	295
16:15	0	120	20	0	140	3	**2**	**3**	0	**8**	27	**110**	**7**	0	**144**	14	1	28	0	43	335
16:30	0	119	15	0	134	**5**	1	0	0	6	25	94	1	0	120	**16**	3	51	0	70	330
16:45	**6**	**127**	**22**	**4**	**159**	3	1	3	0	7	9	91	7	0	107	15	**4**	**62**	0	**81**	**354**
Total Volume	8	480	66	4	558	14	4	8	0	26	91	392	21	0	504	58	10	158	0	226	1314
% App. Total	1.4	86	11.8	0.7		53.8	15.4	30.8	0		18.1	77.8	4.2	0		25.7	4.4	69.9	0		
PHF	.333	.945	.750	.250	.877	.700	.500	.667	.000	.813	.758	.891	.750	.000	.875	.906	.625	.637	.000	.698	.928



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File Name : Waiale Rd - Waiinu Rd
Site Code :
Start Date : 3/13/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIINU RD WESTBOUND				WAIALE 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	10	72	0	0	36	0	2	0	0	67	98	0	0	0	0	0	285
06:45	9	89	0	0	39	0	9	0	0	83	134	0	0	0	0	0	363
Total	19	161	0	0	75	0	11	0	0	150	232	0	0	0	0	0	648
07:00	14	120	0	0	44	0	9	1	0	101	109	0	0	0	0	0	398
07:15	16	138	0	0	39	0	14	0	0	126	138	0	0	0	0	0	471
07:30	20	153	0	0	52	0	19	1	0	114	174	0	0	0	0	0	533
07:45	17	144	0	0	49	0	9	0	0	115	186	0	0	0	0	0	520
Total	67	555	0	0	184	0	51	2	0	456	607	0	0	0	0	0	1922
08:00	12	99	0	0	36	0	4	1	0	87	84	0	0	0	0	0	323
08:15	15	80	0	0	29	0	15	0	0	85	83	0	0	0	0	0	307
Grand Total	113	895	0	0	324	0	81	3	0	778	1006	0	0	0	0	0	3200
Apprch %	11.2	88.8	0	0	79.4	0	19.9	0.7	0	43.6	56.4	0	0	0	0	0	
Total %	3.5	28	0	0	10.1	0	2.5	0.1	0	24.3	31.4	0	0	0	0	0	
Motorcycles	0	3	0	0	1	0	1	0	0	1	2	0	0	0	0	0	8
% Motorcycles	0	0.3	0	0	0.3	0	1.2	0	0	0.1	0.2	0	0	0	0	0	0.2
Cars & Light Goods	109	854	0	0	298	0	78	0	0	761	993	0	0	0	0	0	3093
% Cars & Light Goods	96.5	95.4	0	0	92	0	96.3	0	0	97.8	98.7	0	0	0	0	0	96.7
Buses	0	6	0	0	1	0	0	0	0	8	7	0	0	0	0	0	22
% Buses	0	0.7	0	0	0.3	0	0	0	0	1	0.7	0	0	0	0	0	0.7
Single-Unit Trucks	3	29	0	0	18	0	2	0	0	8	3	0	0	0	0	0	63
% Single-Unit Trucks	2.7	3.2	0	0	5.6	0	2.5	0	0	1	0.3	0	0	0	0	0	2
Articulated Trucks	0	1	0	0	6	0	0	0	0	0	1	0	0	0	0	0	8
% Articulated Trucks	0	0.1	0	0	1.9	0	0	0	0	0	0.1	0	0	0	0	0	0.2
Bicycles on Road	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
% Bicycles on Road	0.9	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
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	33.3	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	66.7	0	0	0	0	0	0	0	0	0.1

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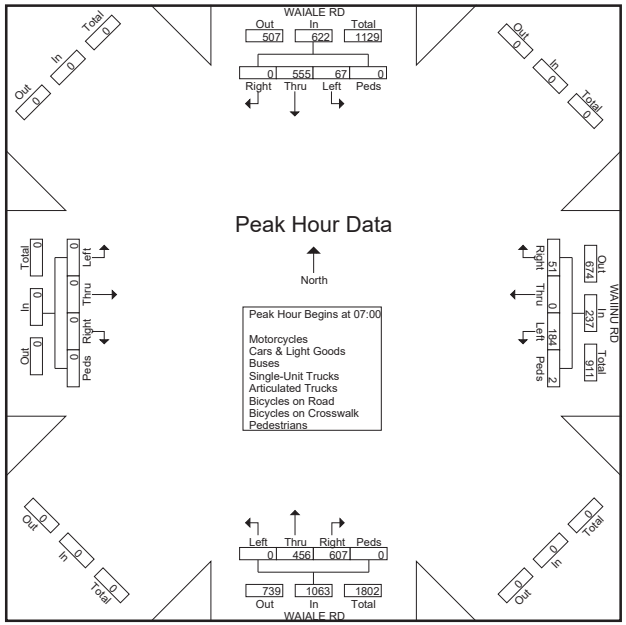
File Name : Waiale Rd - Waiinu Rd
Site Code :
Start Date : 3/13/2019
Page No : 2

	WAIALE RD SOUTHBOUND					WAIINU RD WESTBOUND					WAIALE 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 07:00																					
07:00	14	120	0	0	134	44	0	9	**1**	54	0	101	109	0	210	0	0	0	0	0	398
07:15	16	138	0	0	154	39	0	14	0	53	0	**126**	138	0	264	0	0	0	0	0	471
07:30	**20**	**153**	0	0	**173**	**52**	0	**19**	1	**72**	0	114	174	0	288	0	0	0	0	0	**533**
07:45	17	144	0	0	161	49	0	9	0	58	0	115	**186**	0	**301**	0	0	0	0	0	520
Total Volume	67	555	0	0	622	184	0	51	2	237	0	456	607	0	1063	0	0	0	0	0	1922
% App. Total	10.8	89.2	0	0		77.6	0	21.5	0.8		0	42.9	57.1	0		0	0	0	0		
PHF	.838	.907	.000	.000	.899	.885	.000	.671	.500	.823	.000	.905	.816	.000	.883	.000	.000	.000	.000	.000	.902



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File Name : Waiale Rd - Waiinu Rd
Site Code :
Start Date : 3/12/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIINU RD WESTBOUND				WAIALE RD NORTHBOUND				EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	13	170	0	0	55	0	13	0	0	114	91	0	0	0	0	0	456
15:45	14	131	0	0	43	0	7	0	0	107	89	1	0	0	0	0	392
Total	27	301	0	0	98	0	20	0	0	221	180	1	0	0	0	0	848
16:00	9	141	0	0	55	0	3	0	0	110	101	0	0	0	0	0	419
16:15	14	124	0	0	54	0	7	0	0	114	108	0	0	0	0	0	421
16:30	21	156	0	0	50	0	7	0	0	91	99	0	0	0	0	0	424
16:45	18	133	0	0	72	0	15	0	0	110	96	0	0	0	0	0	444
Total	62	554	0	0	231	0	32	0	0	425	404	0	0	0	0	0	1708
17:00	7	141	0	0	71	0	12	0	0	97	82	0	0	0	0	0	410
17:15	7	103	0	0	48	0	10	1	0	84	81	0	0	0	0	0	334
Grand Total	103	1099	0	0	448	0	74	1	0	827	747	1	0	0	0	0	3300
Apprch %	8.6	91.4	0	0	85.7	0	14.1	0.2	0	52.5	47.4	0.1	0	0	0	0	
Total %	3.1	33.3	0	0	13.6	0	2.2	0	0	25.1	22.6	0	0	0	0	0	
Motorcycles	0	4	0	0	1	0	0	0	0	4	3	0	0	0	0	0	12
% Motorcycles	0	0.4	0	0	0.2	0	0	0	0	0.5	0.4	0	0	0	0	0	0.4
Cars & Light Goods	101	1088	0	0	440	0	74	0	0	815	726	0	0	0	0	0	3244
% Cars & Light Goods	98.1	99	0	0	98.2	0	100	0	0	98.5	97.2	0	0	0	0	0	98.3
Buses	0	1	0	0	3	0	0	0	0	1	8	0	0	0	0	0	13
% Buses	0	0.1	0	0	0.7	0	0	0	0	0.1	1.1	0	0	0	0	0	0.4
Single-Unit Trucks	2	3	0	0	1	0	0	0	0	6	7	0	0	0	0	0	19
% Single-Unit Trucks	1.9	0.3	0	0	0.2	0	0	0	0	0.7	0.9	0	0	0	0	0	0.6
Articulated Trucks	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	5
% Articulated Trucks	0	0	0	0	0.4	0	0	0	0	0	0.4	0	0	0	0	0	0.2
Bicycles on Road	0	3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	5
% Bicycles on Road	0	0.3	0	0	0.2	0	0	0	0	0.1	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	0	0	0	0	1	0	0	0	1	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0.1

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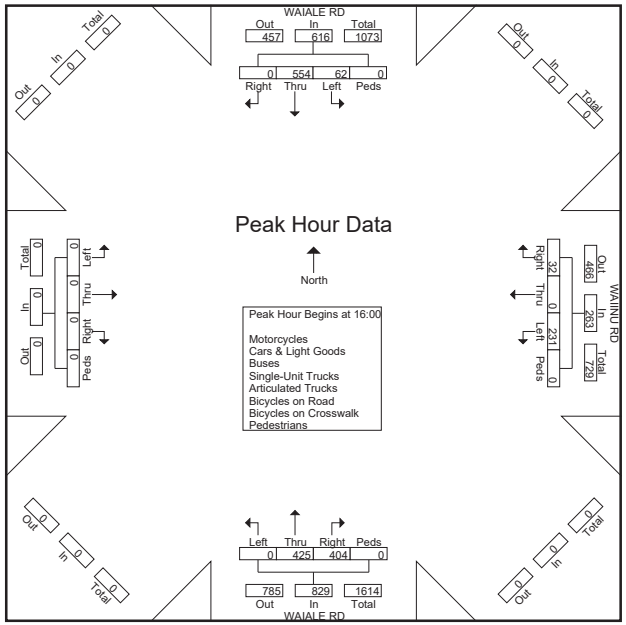
File Name : Waiale Rd - Waiinu Rd
Site Code :
Start Date : 3/12/2019
Page No : 2

	WAIALE RD SOUTHBOUND					WAIINU RD WESTBOUND					WAIALE 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 15:30 to 17:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	9	141	0	0	150	55	0	3	0	58	0	110	101	0	211	0	0	0	0	0	419
16:15	14	124	0	0	138	54	0	7	0	61	0	**114**	**108**	0	**222**	0	0	0	0	0	421
16:30	**21**	**156**	0	0	**177**	50	0	7	0	57	0	91	99	0	190	0	0	0	0	0	424
16:45	18	133	0	0	151	**72**	0	**15**	0	**87**	0	110	96	0	206	0	0	0	0	0	**444**
Total Volume	62	554	0	0	616	231	0	32	0	263	0	425	404	0	829	0	0	0	0	0	1708
% App. Total	10.1	89.9	0	0		87.8	0	12.2	0		0	51.3	48.7	0		0	0	0	0		
PHF	.738	.888	.000	.000	.870	.802	.000	.533	.000	.756	.000	.932	.935	.000	.934	.000	.000	.000	.000	.000	.962



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File Name : Waiale Rd - Olomea St
Site Code :
Start Date : 2/1/2018
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				OLOMEA ST Westbound				WAIALE RD Northbound				OLOMEA ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
12:00 AM	0	13	3	0	0	0	0	0	0	5	0	0	1	0	0	0	22
12:15 AM	0	9	1	0	0	0	0	0	2	7	0	0	2	0	1	1	23
12:30 AM	0	7	2	0	0	0	1	0	1	4	0	0	0	0	1	0	16
12:45 AM	0	6	1	0	0	0	0	0	1	3	0	0	0	0	0	0	11
Total	0	35	7	0	0	0	1	0	4	19	0	0	3	0	2	1	72
01:00 AM	0	3	2	0	0	0	0	0	0	5	0	0	0	0	0	0	10
01:15 AM	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	5
01:30 AM	0	2	0	0	0	0	0	0	0	6	0	0	1	0	0	0	9
01:45 AM	0	3	3	0	0	0	0	0	0	6	0	0	1	0	0	0	13
Total	0	8	5	0	0	0	0	0	0	21	0	0	3	0	0	0	37
02:00 AM	0	6	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8
02:15 AM	0	6	2	0	0	0	0	0	0	3	0	0	0	0	0	0	11
02:30 AM	0	6	2	0	0	0	0	0	0	7	0	0	0	0	1	0	16
02:45 AM	0	3	0	0	0	0	0	0	0	8	0	0	0	0	0	0	11
Total	0	21	4	0	0	0	0	0	0	20	0	0	0	0	1	0	46
03:00 AM	0	7	2	0	0	0	0	0	0	4	0	0	1	0	0	0	14
03:15 AM	0	3	0	0	0	0	0	0	0	4	0	0	1	0	1	3	12
03:30 AM	0	6	0	0	0	0	0	0	0	2	0	0	3	0	0	0	11
03:45 AM	1	13	1	0	0	0	0	0	0	10	0	0	1	0	1	0	27
Total	1	29	3	0	0	0	0	0	0	20	0	0	6	0	2	3	64
04:00 AM	0	3	0	0	0	0	0	0	0	8	0	0	0	0	1	0	12
04:15 AM	0	13	3	0	0	0	0	0	0	5	0	0	1	0	0	0	22
04:30 AM	0	16	1	0	0	0	0	0	0	21	0	0	11	0	0	0	49
04:45 AM	0	17	1	0	0	0	1	0	0	20	0	1	4	0	2	2	48
Total	0	49	5	0	0	0	1	0	0	54	0	1	16	0	3	2	131
05:00 AM	0	30	1	0	0	0	0	0	2	19	0	0	7	0	1	2	62
05:15 AM	1	30	2	0	0	0	0	0	0	20	0	0	6	0	2	0	61
05:30 AM	2	31	3	0	0	0	1	0	0	38	0	0	11	0	2	0	88
05:45 AM	0	40	5	0	0	0	0	0	0	65	0	0	14	0	1	1	126
Total	3	131	11	0	0	0	1	0	2	142	0	0	38	0	6	3	337
06:00 AM	1	56	3	0	0	0	1	0	0	70	0	0	17	0	1	2	151
06:15 AM	1	75	4	0	0	0	1	0	1	79	0	0	21	0	2	2	186
06:30 AM	1	88	8	0	1	0	2	0	2	116	0	0	24	0	5	0	247
06:45 AM	2	100	12	0	1	0	0	1	4	199	0	0	30	0	14	3	366
Total	5	319	27	0	2	0	4	1	7	464	0	0	92	0	22	7	950
07:00 AM	3	120	33	0	1	0	9	0	7	182	0	0	29	0	11	0	395
07:15 AM	1	129	45	0	0	0	4	0	6	254	0	0	31	0	5	2	477
07:30 AM	1	158	52	0	0	0	3	1	7	232	0	0	42	0	9	4	509
07:45 AM	3	158	37	0	0	0	2	1	8	253	0	0	42	0	7	0	511
Total	8	565	167	0	1	0	18	2	28	921	0	0	144	0	32	6	1892
08:00 AM	2	115	8	0	0	0	4	1	3	138	0	0	17	0	4	1	293
08:15 AM	3	86	13	0	0	0	1	0	7	141	0	0	31	0	7	1	290
08:30 AM	1	104	8	3	1	0	1	2	1	140	0	1	24	0	5	14	305
08:45 AM	3	106	8	0	1	0	3	1	2	189	0	0	31	0	1	4	349
Total	9	411	37	3	2	0	9	4	13	608	0	1	103	0	17	20	1237
09:00 AM	4	112	8	0	0	0	1	0	3	114	0	2	15	0	3	7	269
09:15 AM	1	95	9	0	0	0	3	0	0	91	0	8	20	0	5	3	235
09:30 AM	1	112	9	0	0	0	0	0	3	125	0	4	16	0	6	12	288

Austin Tsutsumi & Associates

501 Sumner Street #521
Honolulu, HI 96817
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File Name : Waiale Rd - Olomea St
Site Code :
Start Date : 2/1/2018
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Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				OLOMEA ST Westbound				WAIALE RD Northbound				OLOMEA ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
09:45 AM	1	114	19	4	0	0	0	1	2	121	0	0	11	0	6	2	281
Total	7	433	45	4	0	0	4	1	8	451	0	14	62	0	20	24	1073
10:00 AM	0	107	5	0	0	0	4	0	1	121	0	0	10	0	1	0	249
10:15 AM	1	104	15	0	0	1	2	0	0	138	0	0	14	0	1	1	277
10:30 AM	1	101	18	0	0	0	2	0	4	108	0	0	15	0	0	1	250
10:45 AM	2	112	14	0	0	0	2	1	5	118	0	0	19	0	4	3	280
Total	4	424	52	0	0	1	10	1	10	485	0	0	58	0	6	5	1056
11:00 AM	0	101	25	0	0	0	3	0	2	119	0	0	16	0	2	0	268
11:15 AM	2	121	13	0	0	0	0	0	0	132	0	0	10	0	0	0	278
11:30 AM	2	106	18	0	0	0	1	0	6	113	0	0	10	0	1	0	257
11:45 AM	1	134	21	0	0	0	1	0	2	100	0	0	20	0	8	0	287
Total	5	462	77	0	0	0	5	0	10	464	0	0	56	0	11	0	1090
12:00 PM	1	128	30	0	0	1	5	0	4	123	0	0	15	0	3	1	311
12:15 PM	0	112	24	0	1	0	0	0	2	143	0	0	10	0	0	2	294
12:30 PM	2	123	21	0	0	0	0	0	4	126	0	0	10	0	2	0	288
12:45 PM	5	109	17	0	1	0	1	0	7	136	0	0	20	1	2	1	300
Total	8	472	92	0	2	1	6	0	17	528	0	0	55	1	7	4	1193
01:00 PM	2	129	21	0	0	1	1	0	2	131	0	0	13	0	6	0	306
01:15 PM	0	122	22	0	0	0	2	0	2	152	0	0	16	0	3	0	319
01:30 PM	0	134	29	0	2	0	0	0	4	149	0	0	13	0	3	1	335
01:45 PM	3	119	38	0	0	0	4	1	1	150	0	0	17	0	6	1	340
Total	5	504	110	0	2	1	7	1	9	582	0	0	59	0	18	2	1300
02:00 PM	2	138	39	0	0	0	4	0	7	157	0	0	30	0	2	1	380
02:15 PM	0	165	29	0	0	0	2	0	7	135	0	0	24	1	4	11	378
02:30 PM	4	147	28	0	0	0	2	0	5	144	0	0	19	0	6	9	364
02:45 PM	0	135	23	0	0	1	3	0	6	138	0	0	16	0	2	3	327
Total	6	585	119	0	0	1	11	0	25	574	0	0	89	1	14	24	1449
03:00 PM	0	118	34	0	0	2	8	9	5	166	0	0	15	0	4	4	365
03:15 PM	0	139	29	0	0	0	4	1	6	158	1	0	21	0	0	3	362
03:30 PM	1	160	42	0	0	0	2	0	5	162	0	0	20	0	0	2	394
03:45 PM	0	146	33	0	1	0	0	2	6	152	0	0	25	0	4	0	369
Total	1	563	138	0	1	2	14	12	22	638	1	0	81	0	8	9	1490
04:00 PM	2	153	31	0	0	0	4	1	5	172	0	0	23	0	6	1	398
04:15 PM	0	166	35	0	0	0	4	0	9	204	0	0	24	0	3	3	448
04:30 PM	0	170	39	0	0	0	2	2	6	178	0	0	28	0	6	2	433
04:45 PM	1	166	35	0	0	0	0	0	7	176	0	0	17	0	6	0	408
Total	3	655	140	0	0	0	10	3	27	730	0	0	92	0	21	6	1687
05:00 PM	0	159	42	0	0	0	1	1	5	158	0	0	35	0	3	0	404
05:15 PM	0	153	35	0	0	0	2	0	3	164	1	0	12	0	1	1	372
05:30 PM	1	104	35	0	0	0	1	0	9	157	0	0	15	0	7	1	330
05:45 PM	2	104	28	0	0	0	1	0	8	129	0	0	20	0	10	0	302
Total	3	520	140	0	0	0	5	1	25	608	1	0	82	0	21	2	1408
06:00 PM	1	125	35	0	0	0	0	0	8	114	0	0	17	0	0	0	300
06:15 PM	1	97	34	0	0	0	0	0	3	127	0	0	29	0	5	0	296
06:30 PM	0	103	35	0	2	0	0	0	4	130	0	0	16	0	5	0	295
06:45 PM	0	83	23	0	0	0	0	0	8	131	0	1	19	0	2	0	267
Total	2	408	127	0	2	0	0	0	23	502	0	1	81	0	12	0	1158
07:00 PM	1	86	31	0	1	0	0	0	6	71	0	0	12	0	2	1	211
07:15 PM	0	82	18	0	0	0	1	0	7	73	0	0	16	0	1	1	199
07:30 PM	0	60	10	0	0	0	0	0	2	54	0	0	11	0	1	0	138

Austin Tsutsumi & Associates

501 Sumner Street #521
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File Name : Waiale Rd - Olomea St
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Start Date : 2/1/2018
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Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD Southbound				OLOMEA ST Westbound				WAIALE RD Northbound				OLOMEA ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:45 PM	0	61	18	0	0	0	3	0	9	50	0	0	6	0	4	2	153
Total	1	289	77	0	1	0	4	0	24	248	0	0	45	0	8	4	701
08:00 PM	0	74	14	0	0	0	2	0	9	52	0	0	12	0	1	0	164
08:15 PM	0	63	15	0	0	0	0	0	3	57	0	0	6	0	3	0	147
08:30 PM	0	79	13	0	0	0	0	0	1	53	0	0	4	0	1	0	151
08:45 PM	0	60	15	0	0	0	0	0	4	32	0	0	8	0	2	0	121
Total	0	276	57	0	0	0	2	0	17	194	0	0	30	0	7	0	583
09:00 PM	0	47	13	0	1	0	2	0	4	41	0	0	6	0	0	0	114
09:15 PM	0	48	21	0	0	0	0	0	3	50	0	0	7	0	1	0	130
09:30 PM	0	47	12	0	0	0	0	0	2	36	0	0	6	0	0	0	103
09:45 PM	0	29	12	0	0	0	1	0	3	37	0	0	6	0	0	0	88
Total	0	171	58	0	1	0	3	0	12	164	0	0	25	0	1	0	435
10:00 PM	0	26	9	0	0	0	0	0	1	25	0	0	3	0	0	0	64
10:15 PM	0	32	6	0	0	0	0	0	1	18	0	0	1	0	2	0	60
10:30 PM	0	38	6	0	0	0	0	0	0	24	0	0	6	0	1	0	75
10:45 PM	2	16	11	0	0	1	3	0	0	22	0	0	7	0	3	0	65
Total	2	112	32	0	0	1	3	0	2	89	0	0	17	0	6	0	264
11:00 PM	0	18	5	0	4	0	14	0	0	18	0	0	1	0	0	0	60
11:15 PM	0	16	4	0	0	0	1	0	0	22	0	0	2	0	0	0	45
11:30 PM	0	20	7	0	0	0	0	0	0	11	0	0	2	0	1	0	41
11:45 PM	0	21	5	0	0	0	0	0	0	11	0	0	2	0	1	0	40
Total	0	75	21	0	4	0	15	0	0	62	0	0	7	0	2	0	186
Grand Total	73	7517	1551	7	18	7	133	26	285	8588	2	17	1244	2	247	122	19839
Apprch %	0.8	82.2	17	0.1	9.8	3.8	72.3	14.1	3.2	96.6	0	0.2	77	0.1	15.3	7.6	
Total %	0.4	37.9	7.8	0	0.1	0	0.7	0.1	1.4	43.3	0	0.1	6.3	0	1.2	0.6	
Motorcycles	0	32	9	0	0	0	0	0	0	32	0	0	8	0	0	0	81
% Motorcycles	0	0.4	0.6	0	0	0	0	0	0	0.4	0	0	0.6	0	0	0	0.4
Cars	44	5405	1185	0	13	3	75	0	183	6041	1	0	898	1	196	0	14045
% Cars	60.3	71.9	76.4	0	72.2	42.9	56.4	0	64.2	70.3	50	0	72.2	50	79.4	0	70.8
Light Goods Vehicles	24	1888	341	0	5	4	51	0	64	2287	1	0	326	1	50	0	5042
% Light Goods Vehicles	32.9	25.1	22	0	27.8	57.1	38.3	0	22.5	26.6	50	0	26.2	50	20.2	0	25.4
Buses	0	23	7	0	0	0	0	0	36	56	0	0	6	0	1	0	129
% Buses	0	0.3	0.5	0	0	0	0	0	12.6	0.7	0	0	0.5	0	0.4	0	0.7
Single-Unit Trucks	4	150	5	0	0	0	5	0	2	142	0	0	6	0	0	0	314
% Single-Unit Trucks	5.5	2	0.3	0	0	0	3.8	0	0.7	1.7	0	0	0.5	0	0	0	1.6
Articulated Trucks	1	14	2	0	0	0	1	0	0	24	0	0	0	0	0	0	42
% Articulated Trucks	1.4	0.2	0.1	0	0	0	0.8	0	0	0.3	0	0	0	0	0	0	0.2
Bicycles on Road	0	5	2	0	0	0	1	0	0	6	0	0	0	0	0	0	14
% Bicycles on Road	0	0.1	0.1	0	0	0	0.8	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	9	10
% Bicycles on Crosswalk	0	0	0	0	0	0	0	3.8	0	0	0	0	0	0	0	7.4	0.1
Pedestrians	0	0	0	7	0	0	0	25	0	0	0	17	0	0	0	113	162
% Pedestrians	0	0	0	100	0	0	0	96.2	0	0	0	100	0	0	0	92.6	0.8

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501 Sumner Street #521
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File Name : Waiale Rd - Olomea St
Site Code :
Start Date : 2/1/2018
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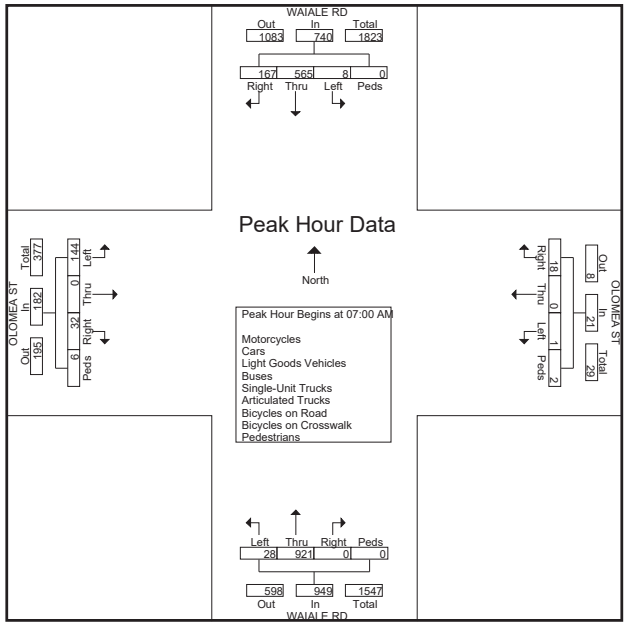
	WAIALE RD Southbound					OLOMEA ST Westbound					WAIALE RD Northbound					OLOMEA ST Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 11:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**3**	120	33	0	156	**1**	0	**9**	0	**10**	7	182	0	0	189	29	0	**11**	0	40	395
07:15 AM	1	129	45	0	175	0	0	4	0	4	6	**254**	0	0	260	31	0	5	2	38	477
07:30 AM	1	**158**	**52**	0	**211**	0	0	3	**1**	4	7	232	0	0	239	**42**	0	9	**4**	**55**	509
07:45 AM	3	158	37	0	198	0	0	2	1	3	**8**	253	0	0	**261**	42	0	7	0	49	**511**
Total Volume	8	565	167	0	740	1	0	18	2	21	28	921	0	0	949	144	0	32	6	182	1892
% App. Total	1.1	76.4	22.6	0		4.8	0	85.7	9.5		3	97	0	0		79.1	0	17.6	3.3		
PHF	.667	.894	.803	.000	.877	.250	.000	.500	.500	.525	.875	.906	.000	.000	.909	.857	.000	.727	.375	.827	.926



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File Name : Waiale Rd - Olomea St
Site Code :
Start Date : 3/14/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIMALUHIA LN WESTBOUND				WAIALE RD NORTHBOUND				OLOMEA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	6	102	8	0	1	0	0	0	1	164	6	0	19	0	11	0	318
06:45	3	105	15	0	3	0	2	1	2	166	9	0	18	0	9	0	333
Total	9	207	23	0	4	0	2	1	3	330	15	0	37	0	20	0	651
07:00	3	125	27	0	3	0	7	2	1	201	1	0	30	0	7	0	407
07:15	3	137	52	0	3	0	6	1	1	248	4	0	32	0	10	2	499
07:30	4	128	56	0	2	0	2	0	1	223	2	0	58	0	8	1	485
07:45	1	142	31	0	0	0	1	0	4	228	0	0	39	0	7	0	453
Total	11	532	166	0	8	0	16	3	7	900	7	0	159	0	32	3	1844
08:00	2	107	15	0	1	0	3	0	3	193	3	0	23	0	8	0	358
08:15	1	103	19	0	0	0	2	0	3	143	1	0	21	0	3	0	296
Grand Total	23	949	223	0	13	0	23	4	16	1566	26	0	240	0	63	3	3149
Apprch %	1.9	79.4	18.7	0	32.5	0	57.5	10	1	97.4	1.6	0	78.4	0	20.6	1	
Total %	0.7	30.1	7.1	0	0.4	0	0.7	0.1	0.5	49.7	0.8	0	7.6	0	2	0.1	
Motorcycles	0	2	0	0	0	0	0	0	0	2	0	0	3	0	0	0	7
% Motorcycles	0	0.2	0	0	0	0	0	0	0	0.1	0	0	1.2	0	0	0	0.2
Cars & Light Goods	23	909	219	0	13	0	22	0	11	1536	26	0	234	0	63	0	3056
% Cars & Light Goods	100	95.8	98.2	0	100	0	95.7	0	68.8	98.1	100	0	97.5	0	100	0	97
Buses	0	4	2	0	0	0	0	0	5	6	0	0	2	0	0	0	19
% Buses	0	0.4	0.9	0	0	0	0	0	31.2	0.4	0	0	0.8	0	0	0	0.6
Single-Unit Trucks	0	29	0	0	0	0	1	0	0	19	0	0	1	0	0	0	50
% Single-Unit Trucks	0	3.1	0	0	0	0	4.3	0	0	1.2	0	0	0.4	0	0	0	1.6
Articulated Trucks	0	4	2	0	0	0	0	0	0	3	0	0	0	0	0	0	9
% Articulated Trucks	0	0.4	0.9	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0.3
Bicycles on Road	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0.1	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	4	0	0	0	0	0	0	0	3	7
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	100	0.2

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File Name : Waiale Rd - Olomea St
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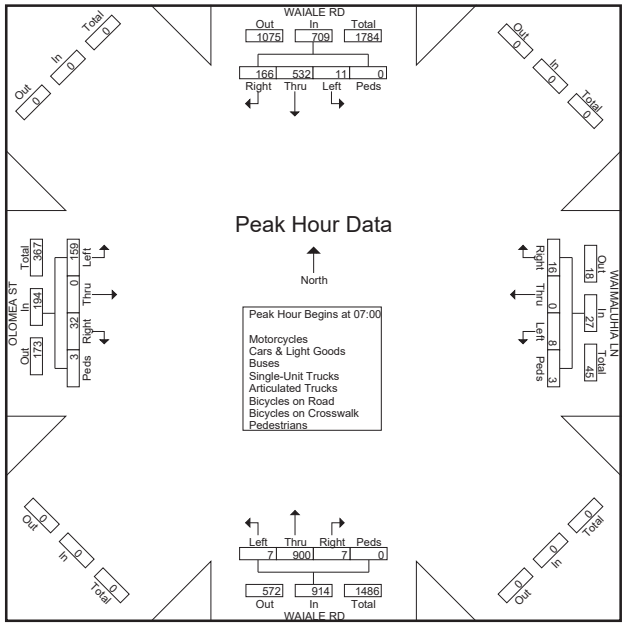
	WAIALE RD SOUTHBOUND					WAIMALUHIA LN WESTBOUND					WAIALE RD NORTHBOUND					OLOMEA ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	3	125	27	0	155	**3**	0	**7**	**2**	**12**	1	201	1	0	203	30	0	7	0	37	407
07:15	3	137	52	0	**192**	3	0	6	1	10	1	**248**	**4**	0	**253**	32	0	**10**	**2**	44	**499**
07:30	**4**	128	**56**	0	188	2	0	2	0	4	1	223	2	0	226	**58**	0	8	1	**67**	485
07:45	1	**142**	31	0	174	0	0	1	0	1	**4**	228	0	0	232	39	0	7	0	46	453
Total Volume	11	532	166	0	709	8	0	16	3	27	7	900	7	0	914	159	0	32	3	194	1844
% App. Total	1.6	75	23.4	0		29.6	0	59.3	11.1		0.8	98.5	0.8	0		82	0	16.5	1.5		
PHF	.688	.937	.741	.000	.923	.667	.000	.571	.375	.563	.438	.907	.438	.000	.903	.685	.000	.800	.375	.724	.924



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File Name : Waiale Rd - Olomea St
Site Code :
Start Date : 3/14/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIMALUHIA LN WESTBOUND				WAIALE RD NORTHBOUND				OLOMEA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	164	43	0	4	0	5	1	7	161	0	0	23	0	7	0	415
15:45	2	148	42	0	2	0	4	0	8	209	0	0	19	0	3	1	438
Total	2	312	85	0	6	0	9	1	15	370	0	0	42	0	10	1	853
16:00	2	173	38	0	2	1	5	2	7	214	0	0	21	0	5	4	474
16:15	1	157	37	0	2	0	1	0	4	205	1	0	22	0	0	0	430
16:30	0	185	41	0	2	0	3	2	6	187	1	0	16	0	4	1	448
16:45	1	174	40	0	0	0	0	0	9	175	2	0	11	0	4	0	416
Total	4	689	156	0	6	1	9	4	26	781	4	0	70	0	13	5	1768
17:00	0	174	40	0	1	0	1	0	5	162	2	0	17	0	3	1	406
17:15	0	117	29	0	0	0	1	3	6	138	0	0	15	0	4	2	315
Grand Total	6	1292	310	0	13	1	20	8	52	1451	6	0	144	0	30	9	3342
Apprch %	0.4	80.3	19.3	0	31	2.4	47.6	19	3.4	96.2	0.4	0	78.7	0	16.4	4.9	
Total %	0.2	38.7	9.3	0	0.4	0	0.6	0.2	1.6	43.4	0.2	0	4.3	0	0.9	0.3	
Motorcycles	0	3	1	0	0	0	0	0	0	13	0	0	0	0	0	0	17
% Motorcycles	0	0.2	0.3	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.5
Cars & Light Goods	5	1280	309	0	13	1	20	0	46	1401	6	0	142	0	30	0	3253
% Cars & Light Goods	83.3	99.1	99.7	0	100	100	100	0	88.5	96.6	100	0	98.6	0	100	0	97.3
Buses	0	1	0	0	0	0	0	0	4	5	0	0	0	0	0	0	10
% Buses	0	0.1	0	0	0	0	0	0	7.7	0.3	0	0	0	0	0	0	0.3
Single-Unit Trucks	0	5	0	0	0	0	0	0	2	26	0	0	2	0	0	0	35
% Single-Unit Trucks	0	0.4	0	0	0	0	0	0	3.8	1.8	0	0	1.4	0	0	0	1
Articulated Trucks	0	3	0	0	0	0	0	0	0	5	0	0	0	0	0	0	8
% Articulated Trucks	0	0.2	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.2
Bicycles on Road	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Bicycles on Road	16.7	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
% Bicycles on Crosswalk	0	0	0	0	0	0	0	37.5	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	9	14
% Pedestrians	0	0	0	0	0	0	0	62.5	0	0	0	0	0	0	0	100	0.4

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File Name : Waiale Rd - Olomea St
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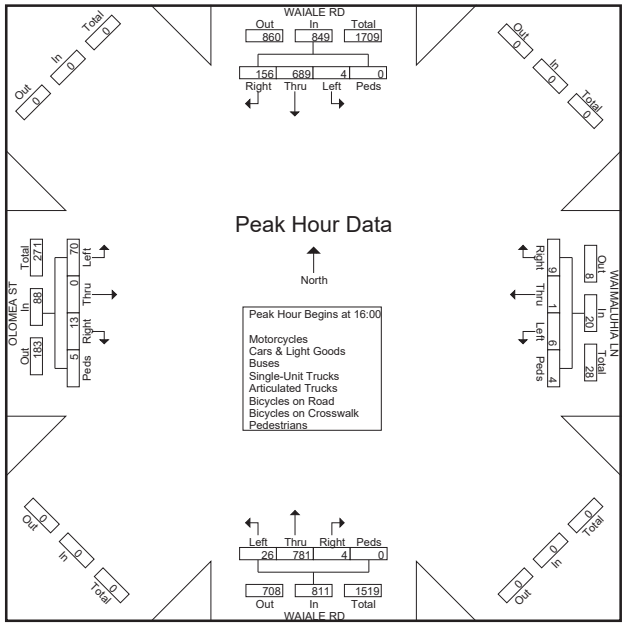
	WAIALE RD SOUTHBOUND					WAIMALUHIA LN WESTBOUND					WAIALE RD NORTHBOUND					OLOMEA ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	**2**	173	38	0	213	**2**	**1**	**5**	**2**	**10**	7	**214**	0	0	**221**	21	0	**5**	**4**	**30**	**474**
16:15	1	157	37	0	195	2	0	1	0	3	4	205	1	0	210	**22**	0	0	0	22	430
16:30	0	**185**	**41**	0	**226**	2	0	3	2	7	6	187	1	0	194	16	0	4	1	21	448
16:45	1	174	40	0	215	0	0	0	0	0	**9**	175	**2**	0	186	11	0	4	0	15	416
Total Volume	4	689	156	0	849	6	1	9	4	20	26	781	4	0	811	70	0	13	5	88	1768
% App. Total	0.5	81.2	18.4	0		30	5	45	20		3.2	96.3	0.5	0		79.5	0	14.8	5.7		
PHF	.500	.931	.951	.000	.939	.750	.250	.450	.500	.500	.722	.912	.500	.000	.917	.795	.000	.650	.313	.733	.932



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File Name : Waiale Rd - Kaupo St
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KAUPO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00	0	73	2	0	0	0	0	0	2	55	0	0	5	0	11	1	149
06:15	0	77	1	4	0	0	0	0	4	78	0	0	6	0	6	0	176
06:30	0	81	2	0	0	0	0	0	6	137	0	0	11	0	10	2	249
06:45	0	110	4	0	0	0	0	0	5	181	0	0	17	0	6	1	324
Total	0	341	9	4	0	0	0	0	17	451	0	0	39	0	33	4	898
07:00	0	118	4	0	0	0	0	0	13	183	0	0	19	0	18	1	356
07:15	0	129	5	0	0	0	0	0	13	235	0	0	26	0	13	0	421
07:30	0	131	6	0	0	0	0	0	8	180	0	0	46	0	17	0	388
07:45	0	145	6	0	0	0	0	0	6	222	0	0	28	0	14	2	423
Total	0	523	21	0	0	0	0	0	40	820	0	0	119	0	62	3	1588
08:00	0	147	2	0	0	0	0	0	10	173	0	0	6	0	7	2	347
08:15	0	118	2	1	0	0	0	0	9	150	0	0	6	0	13	0	299
08:30	0	101	6	0	0	0	0	0	10	122	0	0	0	0	8	3	250
08:45	0	112	1	1	0	0	0	0	8	162	0	0	8	0	17	0	309
Total	0	478	11	2	0	0	0	0	37	607	0	0	20	0	45	5	1205
09:00	0	88	4	0	0	0	0	0	9	132	0	0	5	0	10	0	248
09:15	0	109	5	0	0	0	0	0	5	138	0	0	8	0	7	0	272
09:30	0	97	3	0	0	0	0	0	4	116	0	0	9	0	3	0	232
09:45	0	81	3	0	0	0	0	0	8	155	0	0	6	0	9	1	263
Total	0	375	15	0	0	0	0	0	26	541	0	0	28	0	29	1	1015
10:00	0	91	3	0	0	0	0	0	7	112	0	0	6	0	5	0	224
10:15	0	97	3	0	0	0	0	0	6	129	0	0	4	0	6	0	245
10:30	0	96	2	0	0	0	0	0	3	119	0	0	4	0	9	0	233
10:45	0	113	6	0	0	0	0	0	8	133	0	0	5	0	9	1	275
Total	0	397	14	0	0	0	0	0	24	493	0	0	19	0	29	1	977
11:00	0	116	3	0	0	0	0	0	4	107	0	0	6	0	4	0	240
11:15	0	110	4	0	0	0	0	0	5	120	0	0	5	0	6	0	250
11:30	0	111	3	0	0	0	0	0	6	114	0	0	5	0	7	1	247
11:45	0	118	5	0	0	0	0	0	5	123	0	0	4	0	9	1	265
Total	0	455	15	0	0	0	0	0	20	464	0	0	20	0	26	2	1002
12:00	0	141	5	0	0	0	0	0	9	126	0	0	6	0	11	1	299
12:15	0	147	4	0	0	0	0	0	10	118	0	0	7	0	7	0	293
12:30	0	114	3	0	0	0	0	0	7	147	0	0	4	0	5	1	281
12:45	0	84	4	1	0	0	0	0	7	136	0	0	8	0	6	1	247
Total	0	486	16	1	0	0	0	0	33	527	0	0	25	0	29	3	1120
13:00	0	127	5	0	0	0	0	0	7	130	0	0	6	0	6	0	281
13:15	0	105	4	0	0	0	0	0	7	150	0	0	6	0	8	1	281
13:30	0	129	3	0	0	0	0	0	7	191	0	0	2	0	12	0	344
13:45	0	109	3	0	0	0	0	0	9	173	0	0	4	0	7	0	305
Total	0	470	15	0	0	0	0	0	30	644	0	0	18	0	33	1	1211
14:00	0	100	4	0	0	0	0	0	14	178	0	0	10	0	13	0	319
14:15	0	124	2	0	0	0	0	0	11	163	0	0	19	0	15	0	334
14:30	0	152	3	0	0	0	0	0	9	172	0	0	9	0	16	1	362
14:45	0	155	5	0	0	0	0	0	16	165	0	0	4	0	10	2	357
Total	0	531	14	0	0	0	0	0	50	678	0	0	42	0	54	3	1372
15:00	0	167	12	0	0	0	0	0	13	155	0	0	8	0	9	1	365
15:15	0	136	5	0	0	0	0	0	15	177	0	0	6	0	8	2	349

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File Name : Waiale Rd - Kaupo St
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KAUPO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	163	5	0	0	0	0	0	8	188	0	0	3	0	16	0	383
15:45	0	132	10	0	0	0	0	0	8	177	0	0	10	0	15	4	356
Total	0	598	32	0	0	0	0	0	44	697	0	0	27	0	48	7	1453
16:00	0	173	8	0	0	0	0	0	11	201	0	0	6	0	8	2	409
16:15	0	155	5	0	0	0	0	0	11	191	0	0	15	0	9	0	386
16:30	0	168	2	0	0	0	0	0	9	174	0	0	8	0	10	7	378
16:45	0	179	13	0	0	0	0	0	20	171	0	0	8	0	11	3	405
Total	0	675	28	0	0	0	0	0	51	737	0	0	37	0	38	12	1578
17:00	0	171	14	0	0	0	0	0	7	143	0	0	12	0	8	8	363
17:15	0	173	5	0	0	0	0	0	17	121	0	0	10	0	6	10	342
17:30	0	137	3	0	0	0	0	0	10	142	0	0	12	0	15	0	319
17:45	0	121	2	0	0	0	0	0	6	145	0	0	6	0	6	0	286
Total	0	602	24	0	0	0	0	0	40	551	0	0	40	0	35	18	1310
Grand Total	0	5931	214	7	0	0	0	0	412	7210	0	0	434	0	461	60	14729
Apprch %	0	96.4	3.5	0.1	0	0	0	0	5.4	94.6	0	0	45.4	0	48.3	6.3	
Total %	0	40.3	1.5	0	0	0	0	0	2.8	49	0	0	2.9	0	3.1	0.4	
Motorcycles	0	21	0	0	0	0	0	0	2	24	0	0	3	0	2	0	52
% Motorcycles	0	0.4	0	0	0	0	0	0	0.5	0.3	0	0	0.7	0	0.4	0	0.4
Cars & Light Goods	0	5759	200	0	0	0	0	0	402	6970	0	0	418	0	446	0	14195
% Cars & Light Goods	0	97.1	93.5	0	0	0	0	0	97.6	96.7	0	0	96.3	0	96.7	0	96.4
Buses	0	22	5	0	0	0	0	0	5	58	0	0	5	0	6	0	101
% Buses	0	0.4	2.3	0	0	0	0	0	1.2	0.8	0	0	1.2	0	1.3	0	0.7
Single-Unit Trucks	0	95	8	0	0	0	0	0	1	125	0	0	6	0	2	0	237
% Single-Unit Trucks	0	1.6	3.7	0	0	0	0	0	0.2	1.7	0	0	1.4	0	0.4	0	1.6
Articulated Trucks	0	29	1	0	0	0	0	0	2	26	0	0	2	0	2	0	62
% Articulated Trucks	0	0.5	0.5	0	0	0	0	0	0.5	0.4	0	0	0.5	0	0.4	0	0.4
Bicycles on Road	0	5	0	0	0	0	0	0	0	7	0	0	0	0	3	0	15
% Bicycles on Road	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0.7	0	0.1
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	3.3	0
Pedestrians	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	58	65
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	96.7	0.4

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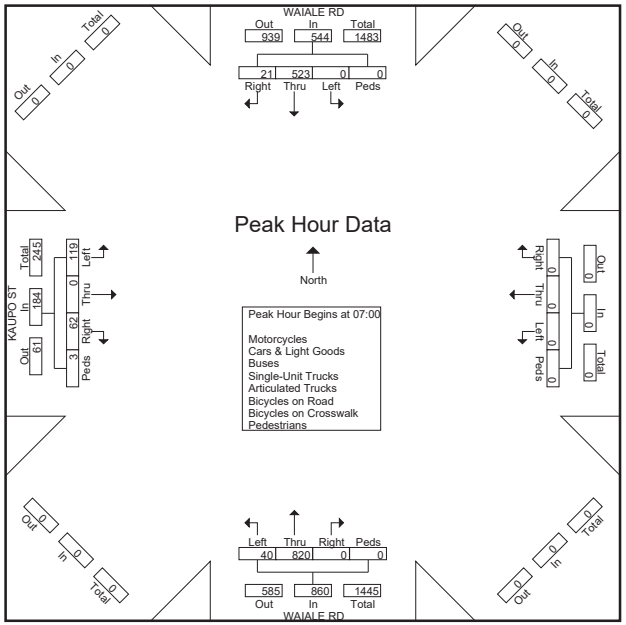
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					KAUPO ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	118	4	0	122	0	0	0	0	0	**13**	183	0	0	196	19	0	**18**	1	38	356
07:15	0	129	5	0	134	0	0	0	0	0	13	**235**	0	0	**248**	26	0	13	0	39	421
07:30	0	131	**6**	0	137	0	0	0	0	0	8	180	0	0	188	**46**	0	17	0	**63**	388
07:45	0	**145**	6	0	**151**	0	0	0	0	0	6	222	0	0	228	28	0	14	**2**	44	**423**
Total Volume	0	523	21	0	544	0	0	0	0	0	40	820	0	0	860	119	0	62	3	184	1588
% App. Total	0	96.1	3.9	0		0	0	0	0		4.7	95.3	0	0		64.7	0	33.7	1.6		
PHF	.000	.902	.875	.000	.901	.000	.000	.000	.000	.000	.769	.872	.000	.000	.867	.647	.000	.861	.375	.730	.939



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KAUPO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	81	2	0	0	0	0	0	6	137	0	0	11	0	10	2	249
06:45	0	110	4	0	0	0	0	0	5	181	0	0	17	0	6	1	324
Total	0	191	6	0	0	0	0	0	11	318	0	0	28	0	16	3	573
07:00	0	118	4	0	0	0	0	0	13	183	0	0	19	0	18	1	356
07:15	0	129	5	0	0	0	0	0	13	235	0	0	26	0	13	0	421
07:30	0	131	6	0	0	0	0	0	8	180	0	0	46	0	17	0	388
07:45	0	145	6	0	0	0	0	0	6	222	0	0	28	0	14	2	423
Total	0	523	21	0	0	0	0	0	40	820	0	0	119	0	62	3	1588
08:00	0	147	2	0	0	0	0	0	10	173	0	0	6	0	7	2	347
08:15	0	118	2	1	0	0	0	0	9	150	0	0	6	0	13	0	299
Grand Total	0	979	31	1	0	0	0	0	70	1461	0	0	159	0	98	8	2807
Apprch %	0	96.8	3.1	0.1	0	0	0	0	4.6	95.4	0	0	60	0	37	3	
Total %	0	34.9	1.1	0	0	0	0	0	2.5	52	0	0	5.7	0	3.5	0.3	
Motorcycles	0	4	0	0	0	0	0	0	0	5	0	0	2	0	0	0	11
% Motorcycles	0	0.4	0	0	0	0	0	0	0	0.3	0	0	1.3	0	0	0	0.4
Cars & Light Goods	0	933	30	0	0	0	0	0	66	1427	0	0	153	0	97	0	2706
% Cars & Light Goods	0	95.3	96.8	0	0	0	0	0	94.3	97.7	0	0	96.2	0	99	0	96.4
Buses	0	5	1	0	0	0	0	0	4	10	0	0	3	0	1	0	24
% Buses	0	0.5	3.2	0	0	0	0	0	5.7	0.7	0	0	1.9	0	1	0	0.9
Single-Unit Trucks	0	23	0	0	0	0	0	0	0	14	0	0	1	0	0	0	38
% Single-Unit Trucks	0	2.3	0	0	0	0	0	0	0	1	0	0	0.6	0	0	0	1.4
Articulated Trucks	0	12	0	0	0	0	0	0	0	2	0	0	0	0	0	0	14
% Articulated Trucks	0	1.2	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.5
Bicycles on Road	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5
% Bicycles on Road	0	0.2	0	0	0	0	0	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	1	0	0	0	0	0	0	0	0	0	0	0	8	9
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	100	0.3

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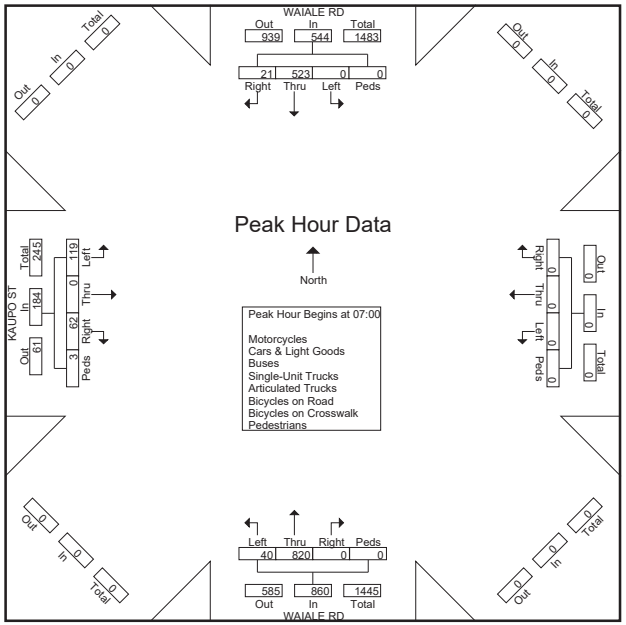
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					KAUPO ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	118	4	0	122	0	0	0	0	0	**13**	183	0	0	196	19	0	**18**	1	38	356
07:15	0	129	5	0	134	0	0	0	0	0	13	**235**	0	0	**248**	26	0	13	0	39	421
07:30	0	131	**6**	0	137	0	0	0	0	0	8	180	0	0	188	**46**	0	17	0	**63**	388
07:45	0	**145**	6	0	**151**	0	0	0	0	0	6	222	0	0	228	28	0	14	**2**	44	**423**
Total Volume	0	523	21	0	544	0	0	0	0	0	40	820	0	0	860	119	0	62	3	184	1588
% App. Total	0	96.1	3.9	0		0	0	0	0		4.7	95.3	0	0		64.7	0	33.7	1.6		
PHF	.000	.902	.875	.000	.901	.000	.000	.000	.000	.000	.769	.872	.000	.000	.867	.647	.000	.861	.375	.730	.939



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File Name : Waiale Rd - Kaupo St
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KAUPO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	163	5	0	0	0	0	0	8	188	0	0	3	0	16	0	383
15:45	0	132	10	0	0	0	0	0	8	177	0	0	10	0	15	4	356
Total	0	295	15	0	0	0	0	0	16	365	0	0	13	0	31	4	739
16:00	0	173	8	0	0	0	0	0	11	201	0	0	6	0	8	2	409
16:15	0	155	5	0	0	0	0	0	11	191	0	0	15	0	9	0	386
16:30	0	168	2	0	0	0	0	0	9	174	0	0	8	0	10	7	378
16:45	0	179	13	0	0	0	0	0	20	171	0	0	8	0	11	3	405
Total	0	675	28	0	0	0	0	0	51	737	0	0	37	0	38	12	1578
17:00	0	171	14	0	0	0	0	0	7	143	0	0	12	0	8	8	363
17:15	0	173	5	0	0	0	0	0	17	121	0	0	10	0	6	10	342
Grand Total	0	1314	62	0	0	0	0	0	91	1366	0	0	72	0	83	34	3022
Apprch %	0	95.5	4.5	0	0	0	0	0	6.2	93.8	0	0	38.1	0	43.9	18	
Total %	0	43.5	2.1	0	0	0	0	0	3	45.2	0	0	2.4	0	2.7	1.1	
Motorcycles	0	2	0	0	0	0	0	0	0	5	0	0	1	0	0	0	8
% Motorcycles	0	0.2	0	0	0	0	0	0	0	0.4	0	0	1.4	0	0	0	0.3
Cars & Light Goods	0	1299	61	0	0	0	0	0	90	1335	0	0	70	0	81	0	2936
% Cars & Light Goods	0	98.9	98.4	0	0	0	0	0	98.9	97.7	0	0	97.2	0	97.6	0	97.2
Buses	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	11
% Buses	0	0.2	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0	0.4
Single-Unit Trucks	0	8	1	0	0	0	0	0	0	11	0	0	0	0	1	0	21
% Single-Unit Trucks	0	0.6	1.6	0	0	0	0	0	0	0.8	0	0	0	0	1.2	0	0.7
Articulated Trucks	0	2	0	0	0	0	0	0	1	5	0	0	1	0	1	0	10
% Articulated Trucks	0	0.2	0	0	0	0	0	0	1.1	0.4	0	0	1.4	0	1.2	0	0.3
Bicycles on Road	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Bicycles on Road	0	0.1	0	0	0	0	0	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	2	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.9	0.1
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94.1	1.1

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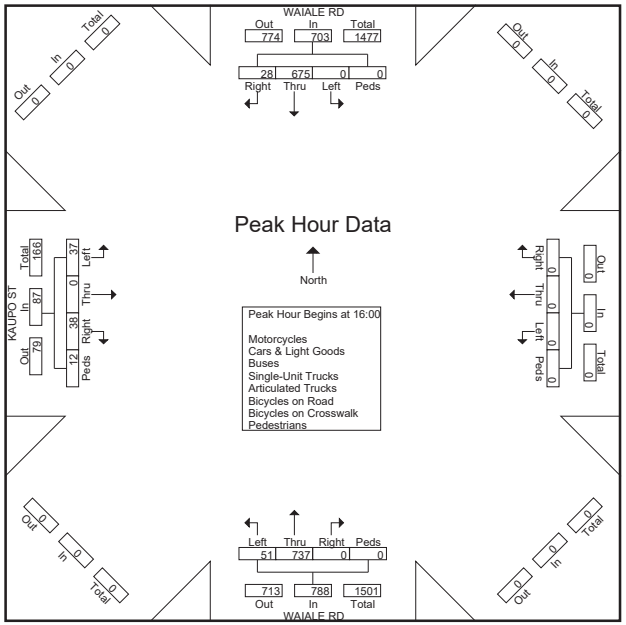
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					KAUPO ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:30 to 17:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	0	173	8	0	181	0	0	0	0	0	11	**201**	0	0	**212**	6	0	8	2	16	**409**
16:15	0	155	5	0	160	0	0	0	0	0	11	191	0	0	202	**15**	0	9	0	24	386
16:30	0	168	2	0	170	0	0	0	0	0	9	174	0	0	183	8	0	10	**7**	**25**	378
16:45	0	**179**	**13**	0	**192**	0	0	0	0	0	**20**	171	0	0	191	8	0	**11**	3	22	405
Total Volume	0	675	28	0	703	0	0	0	0	0	51	737	0	0	788	37	0	38	12	87	1578
% App. Total	0	96	4	0		0	0	0	0		6.5	93.5	0	0		42.5	0	43.7	13.8		
PHF	.000	.943	.538	.000	.915	.000	.000	.000	.000	.000	.638	.917	.000	.000	.929	.617	.000	.864	.429	.870	.965



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File Name : Waiale Rd - Kuikahi Dr
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				MAUI LANI PKWY WESTBOUND				WAIALE RD NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	30	18	37	0	6	31	39	1	4	23	12	0	54	48	4	0	307
06:45	49	26	35	2	5	45	52	0	11	45	11	0	86	50	8	1	426
Total	79	44	72	2	11	76	91	1	15	68	23	0	140	98	12	1	733
07:00	40	48	36	0	8	46	52	2	28	27	13	0	95	61	8	0	464
07:15	45	22	50	0	5	61	52	0	41	49	20	0	79	66	10	0	500
07:30	42	42	25	0	10	57	30	0	48	42	3	2	57	83	16	2	459
07:45	44	37	59	1	9	32	59	2	18	40	1	0	76	72	22	4	476
Total	171	149	170	1	32	196	193	4	135	158	37	2	307	282	56	6	1899
08:00	48	32	51	2	7	58	58	0	7	25	4	0	67	49	10	0	418
08:15	51	18	33	0	11	71	62	0	4	10	3	0	65	51	8	0	387
Grand Total	349	243	326	5	61	401	404	5	161	261	67	2	579	480	86	7	3437
Apprch %	37.8	26.3	35.3	0.5	7	46	46.4	0.6	32.8	53.2	13.6	0.4	50.3	41.7	7.5	0.6	
Total %	10.2	7.1	9.5	0.1	1.8	11.7	11.8	0.1	4.7	7.6	1.9	0.1	16.8	14	2.5	0.2	
Motorcycles	0	0	4	0	0	0	0	0	0	0	0	0	0	1	1	0	6
% Motorcycles	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0.2	1.2	0	0.2
Cars & Light Goods	340	225	300	0	60	383	397	0	157	254	67	0	570	475	82	0	3310
% Cars & Light Goods	97.4	92.6	92	0	98.4	95.5	98.3	0	97.5	97.3	100	0	98.4	99	95.3	0	96.3
Buses	1	3	1	0	0	3	3	0	1	2	0	0	8	2	1	0	25
% Buses	0.3	1.2	0.3	0	0	0.7	0.7	0	0.6	0.8	0	0	1.4	0.4	1.2	0	0.7
Single-Unit Trucks	5	12	19	0	1	15	4	0	3	4	0	0	0	2	2	0	67
% Single-Unit Trucks	1.4	4.9	5.8	0	1.6	3.7	1	0	1.9	1.5	0	0	0	0.4	2.3	0	1.9
Articulated Trucks	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	8
% Articulated Trucks	0.9	0.8	0.6	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0.2
Bicycles on Road	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Bicycles on Road	0	0.4	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3
% Bicycles on Crosswalk	0	0	0	40	0	0	0	20	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	3	0	0	0	4	0	0	0	2	0	0	0	7	16
% Pedestrians	0	0	0	60	0	0	0	80	0	0	0	100	0	0	0	100	0.5

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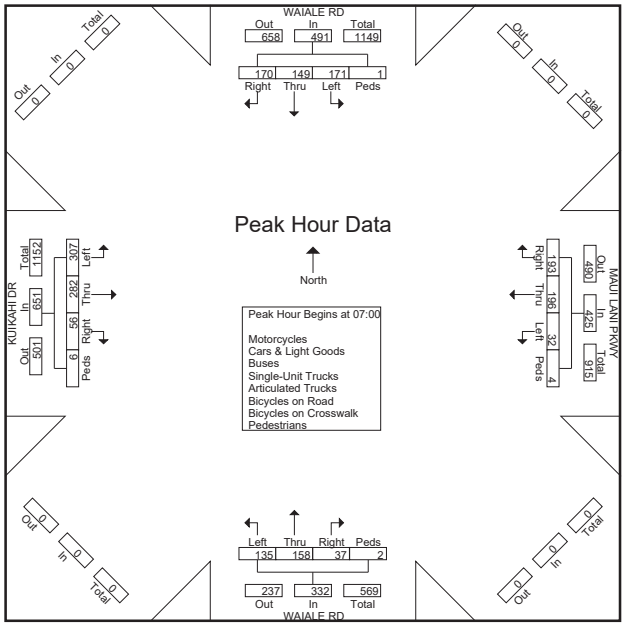
	WAIALE RD SOUTHBOUND					MAUI LANI PKWY WESTBOUND					WAIALE RD NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	40	**48**	36	0	124	8	46	52	**2**	108	28	27	13	0	68	**95**	61	8	0	164	464
07:15	**45**	22	50	0	117	5	**61**	52	0	**118**	41	**49**	**20**	0	**110**	79	66	10	0	155	**500**
07:30	42	42	25	0	109	**10**	57	30	0	97	**48**	42	3	**2**	95	57	**83**	16	2	158	459
07:45	44	37	**59**	**1**	**141**	9	32	**59**	2	102	18	40	1	0	59	76	72	**22**	**4**	**174**	476
Total Volume	171	149	170	1	491	32	196	193	4	425	135	158	37	2	332	307	282	56	6	651	1899
% App. Total	34.8	30.3	34.6	0.2		7.5	46.1	45.4	0.9		40.7	47.6	11.1	0.6		47.2	43.3	8.6	0.9		
PHF	.950	.776	.720	.250	.871	.800	.803	.818	.500	.900	.703	.806	.463	.250	.755	.808	.849	.636	.375	.935	.950



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File Name : Waiale Rd - Kuikahi Dr
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				MAUI LANI PKWY WESTBOUND				WAIALE RD NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	74	32	29	1	9	67	64	0	17	36	19	0	73	47	16	0	484
15:45	77	34	36	0	12	68	53	0	14	47	10	0	68	65	18	0	502
Total	151	66	65	1	21	135	117	0	31	83	29	0	141	112	34	0	986
16:00	63	29	41	0	11	72	77	1	10	38	9	1	60	65	14	0	491
16:15	69	43	41	0	20	66	74	0	12	36	17	0	68	50	10	0	506
16:30	65	54	45	0	14	78	55	0	5	25	15	0	66	62	12	0	496
16:45	67	52	38	0	16	61	74	0	12	30	7	0	79	44	21	0	501
Total	264	178	165	0	61	277	280	1	39	129	48	1	273	221	57	0	1994
17:00	75	45	47	0	21	78	68	0	4	24	5	0	63	52	8	0	490
17:15	71	35	50	0	22	60	67	0	9	26	3	0	54	59	16	0	472
Grand Total	561	324	327	1	125	550	532	1	83	262	85	1	531	444	115	0	3942
Apprch %	46.2	26.7	27	0.1	10.3	45.5	44	0.1	19.3	60.8	19.7	0.2	48.7	40.7	10.6	0	
Total %	14.2	8.2	8.3	0	3.2	14	13.5	0	2.1	6.6	2.2	0	13.5	11.3	2.9	0	
Motorcycles	0	0	1	0	0	1	1	0	0	2	1	0	1	2	0	0	9
% Motorcycles	0	0	0.3	0	0	0.2	0.2	0	0	0.8	1.2	0	0.2	0.5	0	0	0.2
Cars & Light Goods	558	322	324	0	123	547	529	0	83	257	84	0	513	439	114	0	3893
% Cars & Light Goods	99.5	99.4	99.1	0	98.4	99.5	99.4	0	100	98.1	98.8	0	96.6	98.9	99.1	0	98.8
Buses	2	0	0	0	0	2	0	0	0	0	0	0	6	0	0	0	10
% Buses	0.4	0	0	0	0	0.4	0	0	0	0	0	0	1.1	0	0	0	0.3
Single-Unit Trucks	1	1	2	0	1	0	2	0	0	3	0	0	11	3	1	0	25
% Single-Unit Trucks	0.2	0.3	0.6	0	0.8	0	0.4	0	0	1.1	0	0	2.1	0.7	0.9	0	0.6
Articulated Trucks	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
% Articulated Trucks	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0.3	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	1	0	0	0	1	0	0	0	1	0	0	0	0	3
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	0.1

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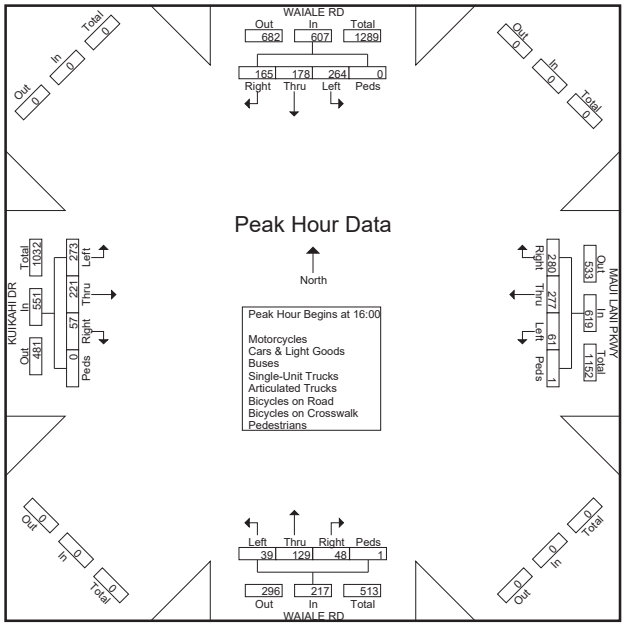
	WAIALE RD SOUTHBOUND					MAUI LANI PKWY WESTBOUND					WAIALE RD NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	63	29	41	0	133	11	72	**77**	**1**	**161**	10	**38**	9	**1**	58	60	**65**	14	0	139	491
16:15	**69**	43	41	0	153	**20**	66	74	0	160	**12**	36	**17**	0	**65**	68	50	10	0	128	**506**
16:30	65	**54**	**45**	0	**164**	14	**78**	55	0	147	5	25	15	0	45	66	62	12	0	140	496
16:45	67	52	38	0	157	16	61	74	0	151	12	30	7	0	49	**79**	44	**21**	0	**144**	501
Total Volume	264	178	165	0	607	61	277	280	1	619	39	129	48	1	217	273	221	57	0	551	1994
% App. Total	43.5	29.3	27.2	0		9.9	44.7	45.2	0.2		18	59.4	22.1	0.5		49.5	40.1	10.3	0		
PHF	.957	.824	.917	.000	.925	.763	.888	.909	.250	.961	.813	.849	.706	.250	.835	.864	.850	.679	.000	.957	.985



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File Name : Waiale Rd - Kolokolo St
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KOKOLOLIO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00	0	41	5	0	0	0	0	0	1	60	0	0	29	0	1	0	137
07:15	0	43	9	0	0	0	0	0	1	71	0	0	53	0	9	0	186
07:30	0	48	6	0	0	0	0	0	0	65	0	0	33	0	3	0	155
07:45	0	40	14	0	0	0	0	0	2	45	0	0	15	0	8	0	124
Total	0	172	34	0	0	0	0	0	4	241	0	0	130	0	21	0	602
08:00	0	50	14	0	0	0	0	0	3	25	0	0	5	0	1	0	98
08:15	0	29	5	0	0	0	0	0	1	27	0	0	5	0	2	0	69
08:30	0	24	5	0	0	0	0	0	1	33	0	0	8	0	0	0	71
08:45	0	19	5	0	0	0	0	0	1	22	0	0	9	0	2	0	58
Total	0	122	29	0	0	0	0	0	6	107	0	0	27	0	5	0	296
Grand Total	0	294	63	0	0	0	0	0	10	348	0	0	157	0	26	0	898
Apprch %	0	82.4	17.6	0	0	0	0	0	2.8	97.2	0	0	85.8	0	14.2	0	
Total %	0	32.7	7	0	0	0	0	0	1.1	38.8	0	0	17.5	0	2.9	0	
Motorcycles	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
% Motorcycles	0	0.7	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0	0.3
Cars & Light Goods	0	282	63	0	0	0	0	0	10	332	0	0	155	0	25	0	867
% Cars & Light Goods	0	95.9	100	0	0	0	0	0	100	95.4	0	0	98.7	0	96.2	0	96.5
Buses	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Buses	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Single-Unit Trucks	0	5	0	0	0	0	0	0	0	10	0	0	1	0	1	0	17
% Single-Unit Trucks	0	1.7	0	0	0	0	0	0	0	2.9	0	0	0.6	0	3.8	0	1.9
Articulated Trucks	0	3	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7
% Articulated Trucks	0	1	0	0	0	0	0	0	0	1.1	0	0	0	0	0	0	0.8
Bicycles on Road	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.6	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	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	0	0	0	0	0	0

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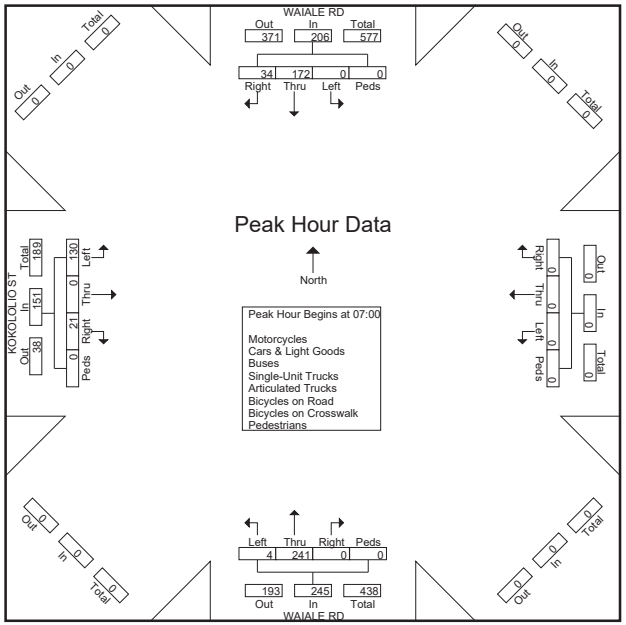
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					KOKOLOLIO ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	41	5	0	46	0	0	0	0	0	1	60	0	0	61	29	0	1	0	30	137
07:15	0	43	9	0	52	0	0	0	0	0	1	**71**	0	0	**72**	**53**	0	**9**	0	**62**	**186**
07:30	0	**48**	6	0	**54**	0	0	0	0	0	0	65	0	0	65	33	0	3	0	36	155
07:45	0	40	**14**	0	54	0	0	0	0	0	**2**	45	0	0	47	15	0	8	0	23	124
Total Volume	0	172	34	0	206	0	0	0	0	0	4	241	0	0	245	130	0	21	0	151	602
% App. Total	0	83.5	16.5	0		0	0	0	0		1.6	98.4	0	0		86.1	0	13.9	0		
PHF	.000	.896	.607	.000	.954	.000	.000	.000	.000	.000	.500	.849	.000	.000	.851	.613	.000	.583	.000	.609	.809



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				KOKOLOLIO ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
16:00	0	52	13	0	0	0	0	0	9	39	0	0	17	0	1	0	131
16:15	0	50	20	0	0	0	0	0	8	55	0	0	15	0	5	0	153
16:30	0	46	19	0	0	0	0	0	7	43	0	0	11	0	7	0	133
16:45	0	49	21	0	0	0	0	0	6	32	0	0	6	0	1	0	115
Total	0	197	73	0	0	0	0	0	30	169	0	0	49	0	14	0	532
17:00	0	48	19	0	0	0	0	0	5	27	0	0	9	0	4	0	112
17:15	0	54	14	0	0	0	0	0	4	33	0	1	18	0	3	0	127
17:30	0	37	14	0	0	0	0	0	8	29	0	0	7	0	0	0	95
17:45	0	33	13	0	0	0	0	0	7	15	0	0	0	0	2	0	70
Total	0	172	60	0	0	0	0	0	24	104	0	1	34	0	9	0	404
Grand Total	0	369	133	0	0	0	0	0	54	273	0	1	83	0	23	0	936
Apprch %	0	73.5	26.5	0	0	0	0	0	16.5	83.2	0	0.3	78.3	0	21.7	0	
Total %	0	39.4	14.2	0	0	0	0	0	5.8	29.2	0	0.1	8.9	0	2.5	0	
Motorcycles	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Motorcycles	0	0.3	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.2
Cars & Light Goods	0	360	133	0	0	0	0	0	53	270	0	0	82	0	23	0	921
% Cars & Light Goods	0	97.6	100	0	0	0	0	0	98.1	98.9	0	0	98.8	0	100	0	98.4
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	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
% Single-Unit Trucks	0	0.5	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.3
Articulated Trucks	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
% Articulated Trucks	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Bicycles on Road	0	2	0	0	0	0	0	0	1	1	0	0	1	0	0	0	5
% Bicycles on Road	0	0.5	0	0	0	0	0	0	1.9	0.4	0	0	1.2	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	0	0	0	0	0	0	0	0	1	0	0	0	0	1
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0.1

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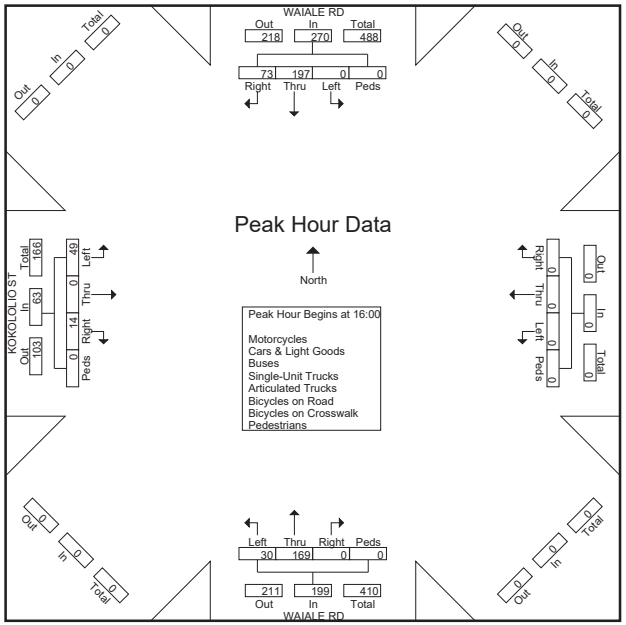
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					KOKOLOLIO ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	0	**52**	13	0	65	0	0	0	0	0	**9**	39	0	0	48	**17**	0	1	0	18	131
16:15	0	50	20	0	**70**	0	0	0	0	0	8	**55**	0	0	**63**	15	0	5	0	**20**	**153**
16:30	0	46	19	0	65	0	0	0	0	0	7	43	0	0	50	11	0	**7**	0	18	133
16:45	0	49	**21**	0	70	0	0	0	0	0	6	32	0	0	38	6	0	1	0	7	115
Total Volume	0	197	73	0	270	0	0	0	0	0	30	169	0	0	199	49	0	14	0	63	532
% App. Total	0	73	27	0		0	0	0	0		15.1	84.9	0	0		77.8	0	22.2	0		
PHF	.000	.947	.869	.000	.964	.000	.000	.000	.000	.000	.833	.768	.000	.000	.790	.721	.000	.500	.000	.788	.869



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				HAAWI ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	36	4	0	0	0	0	0	3	21	0	0	18	0	17	0	99
06:45	0	42	12	0	0	0	0	0	2	28	0	0	24	0	19	0	127
Total	0	78	16	0	0	0	0	0	5	49	0	0	42	0	36	0	226
07:00	0	46	7	0	0	0	0	0	4	48	0	0	26	0	29	0	160
07:15	0	46	7	0	0	0	0	0	4	46	0	0	21	0	20	0	144
07:30	0	35	6	0	0	0	0	0	6	38	0	0	14	0	10	0	109
07:45	0	33	8	0	0	0	0	0	2	25	0	0	7	0	14	0	89
Total	0	160	28	0	0	0	0	0	16	157	0	0	68	0	73	0	502
08:00	0	22	6	0	0	0	0	0	5	11	0	0	15	0	8	0	67
08:15	0	19	6	0	0	0	0	0	1	16	0	0	11	0	8	0	61
Grand Total	0	279	56	0	0	0	0	0	27	233	0	0	136	0	125	0	856
Apprch %	0	83.3	16.7	0	0	0	0	0	10.4	89.6	0	0	52.1	0	47.9	0	
Total %	0	32.6	6.5	0	0	0	0	0	3.2	27.2	0	0	15.9	0	14.6	0	
Motorcycles	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Motorcycles	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Cars & Light Goods	0	265	56	0	0	0	0	0	25	222	0	0	136	0	125	0	829
% Cars & Light Goods	0	95	100	0	0	0	0	0	92.6	95.3	0	0	100	0	100	0	96.8
Buses	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	4
% Buses	0	0.7	0	0	0	0	0	0	7.4	0	0	0	0	0	0	0	0.5
Single-Unit Trucks	0	6	0	0	0	0	0	0	0	9	0	0	0	0	0	0	15
% Single-Unit Trucks	0	2.2	0	0	0	0	0	0	0	3.9	0	0	0	0	0	0	1.8
Articulated Trucks	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5
% Articulated Trucks	0	1.4	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.6
Bicycles on Road	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.4	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	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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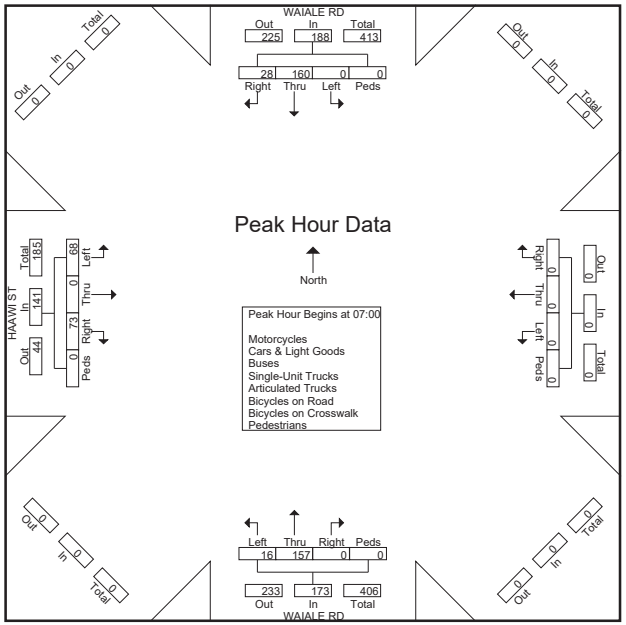
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					HAAWI ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	**46**	7	0	**53**	0	0	0	0	0	4	**48**	0	0	**52**	**26**	0	**29**	0	**55**	**160**
07:15	0	46	7	0	53	0	0	0	0	0	4	46	0	0	50	21	0	20	0	41	144
07:30	0	35	6	0	41	0	0	0	0	0	**6**	38	0	0	44	14	0	10	0	24	109
07:45	0	33	**8**	0	41	0	0	0	0	0	2	25	0	0	27	7	0	14	0	21	89
Total Volume	0	160	28	0	188	0	0	0	0	0	16	157	0	0	173	68	0	73	0	141	502
% App. Total	0	85.1	14.9	0		0	0	0	0		9.2	90.8	0	0		48.2	0	51.8	0		
PHF	.000	.870	.875	.000	.887	.000	.000	.000	.000	.000	.667	.818	.000	.000	.832	.654	.000	.629	.000	.641	.784



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				HAAWI ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	37	7	0	0	0	0	0	18	41	0	0	9	0	8	0	120
15:45	0	33	14	0	0	0	0	0	15	38	0	0	13	0	5	1	119
Total	0	70	21	0	0	0	0	0	33	79	0	0	22	0	13	1	239
16:00	0	42	17	0	0	0	0	0	14	41	0	0	11	0	8	0	133
16:15	0	43	10	0	0	0	0	0	14	42	0	0	13	0	6	0	128
16:30	0	35	18	0	0	0	0	0	16	31	0	0	8	0	6	0	114
16:45	0	35	17	0	0	0	0	0	16	28	0	0	6	0	8	0	110
Total	0	155	62	0	0	0	0	0	60	142	0	0	38	0	28	0	485
17:00	0	47	11	0	0	0	0	0	16	34	0	0	5	0	6	0	119
17:15	0	20	13	0	0	0	0	0	10	29	0	0	10	0	6	0	88
Grand Total	0	292	107	0	0	0	0	0	119	284	0	0	75	0	53	1	931
Apprch %	0	73.2	26.8	0	0	0	0	0	29.5	70.5	0	0	58.1	0	41.1	0.8	
Total %	0	31.4	11.5	0	0	0	0	0	12.8	30.5	0	0	8.1	0	5.7	0.1	
Motorcycles	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	3
% Motorcycles	0	0	0.9	0	0	0	0	0	0	0	0	0	2.7	0	0	0	0.3
Cars & Light Goods	0	286	106	0	0	0	0	0	119	282	0	0	73	0	52	0	918
% Cars & Light Goods	0	97.9	99.1	0	0	0	0	0	100	99.3	0	0	97.3	0	98.1	0	98.6
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	0	3	0	0	0	0	0	0	0	1	0	0	0	0	1	0	5
% Single-Unit Trucks	0	1	0	0	0	0	0	0	0	0.4	0	0	0	0	1.9	0	0.5
Articulated Trucks	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Bicycles on Road	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Bicycles on Road	0	0.3	0	0	0	0	0	0	0	0.4	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	0	0	0	0	0	0	0	0	0	0	0	0	1	1
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0.1

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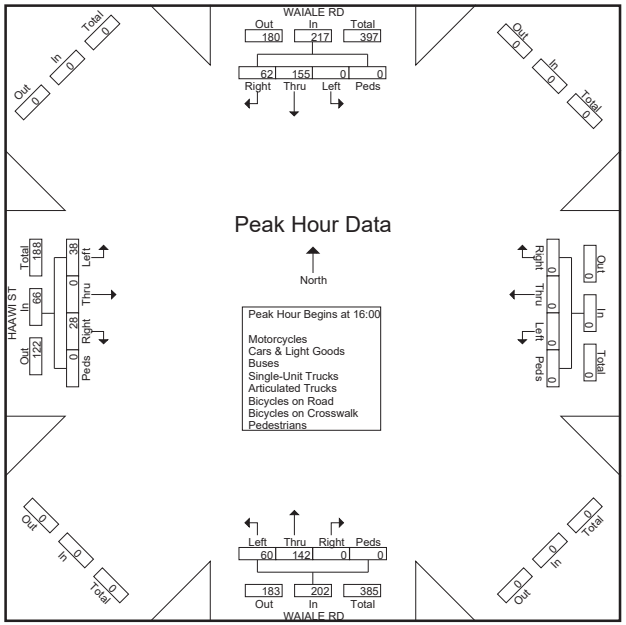
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					HAAWI ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	0	42	17	0	**59**	0	0	0	0	0	14	41	0	0	55	11	0	**8**	0	**19**	**133**
16:15	0	**43**	10	0	53	0	0	0	0	0	14	**42**	0	0	**56**	**13**	0	6	0	19	128
16:30	0	35	**18**	0	53	0	0	0	0	0	**16**	31	0	0	47	8	0	6	0	14	114
16:45	0	35	17	0	52	0	0	0	0	0	16	28	0	0	44	6	0	8	0	14	110
Total Volume	0	155	62	0	217	0	0	0	0	0	60	142	0	0	202	38	0	28	0	66	485
% App. Total	0	71.4	28.6	0		0	0	0	0		29.7	70.3	0	0		57.6	0	42.4	0		
PHF	.000	.901	.861	.000	.919	.000	.000	.000	.000	.000	.938	.845	.000	.000	.902	.731	.000	.875	.000	.868	.912



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				NOKEKULA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	31	0	0	0	0	0	0	0	17	0	0	3	0	5	0	56
06:45	0	73	3	0	0	0	0	0	0	24	0	0	4	0	9	0	113
Total	0	104	3	0	0	0	0	0	0	41	0	0	7	0	14	0	169
07:00	0	49	1	0	0	0	0	0	1	30	0	0	10	0	6	0	97
07:15	0	72	0	0	0	0	0	0	2	32	0	0	13	0	5	0	124
07:30	0	60	2	0	0	0	0	0	1	42	0	0	7	0	3	0	115
07:45	0	50	2	0	0	0	0	0	0	41	0	0	1	0	2	0	96
Total	0	231	5	0	0	0	0	0	4	145	0	0	31	0	16	0	432
08:00	0	38	1	0	0	0	0	0	2	22	0	0	1	0	4	0	68
08:15	0	27	5	0	0	0	0	0	1	17	0	0	3	0	6	0	59
Grand Total	0	400	14	0	0	0	0	0	7	225	0	0	42	0	40	0	728
Apprch %	0	96.6	3.4	0	0	0	0	0	3	97	0	0	51.2	0	48.8	0	
Total %	0	54.9	1.9	0	0	0	0	0	1	30.9	0	0	5.8	0	5.5	0	
Motorcycles	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
% Motorcycles	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Cars & Light Goods	0	385	12	0	0	0	0	0	6	209	0	0	41	0	40	0	693
% Cars & Light Goods	0	96.2	85.7	0	0	0	0	0	85.7	92.9	0	0	97.6	0	100	0	95.2
Buses	0	2	2	0	0	0	0	0	1	2	0	0	0	0	0	0	7
% Buses	0	0.5	14.3	0	0	0	0	0	14.3	0.9	0	0	0	0	0	0	1
Single-Unit Trucks	0	7	0	0	0	0	0	0	0	10	0	0	1	0	0	0	18
% Single-Unit Trucks	0	1.8	0	0	0	0	0	0	0	4.4	0	0	2.4	0	0	0	2.5
Articulated Trucks	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5
% Articulated Trucks	0	0.8	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.7
Bicycles on Road	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.3
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	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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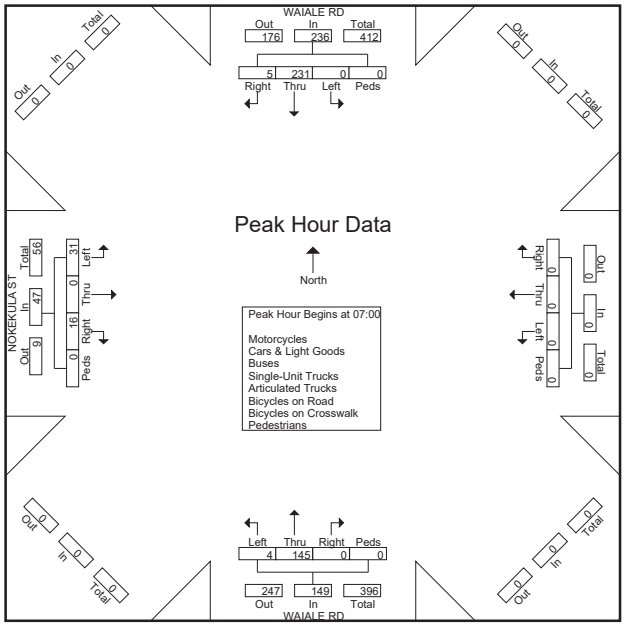
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					NOKEKULA ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	49	1	0	50	0	0	0	0	0	1	30	0	0	31	10	0	**6**	0	16	97
07:15	0	**72**	0	0	**72**	0	0	0	0	0	**2**	32	0	0	34	**13**	0	5	0	**18**	**124**
07:30	0	60	**2**	0	62	0	0	0	0	0	1	**42**	0	0	**43**	7	0	3	0	10	115
07:45	0	50	2	0	52	0	0	0	0	0	0	41	0	0	41	1	0	2	0	3	96
Total Volume	0	231	5	0	236	0	0	0	0	0	4	145	0	0	149	31	0	16	0	47	432
% App. Total	0	97.9	2.1	0		0	0	0	0		2.7	97.3	0	0		66	0	34	0		
PHF	.000	.802	.625	.000	.819	.000	.000	.000	.000	.000	.500	.863	.000	.000	.866	.596	.000	.667	.000	.653	.871



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				NOKEKULA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	45	6	0	0	0	0	0	4	47	0	0	2	0	4	0	108
15:45	0	33	7	0	0	0	0	0	4	56	0	0	1	0	1	0	102
Total	0	78	13	0	0	0	0	0	8	103	0	0	3	0	5	0	210
16:00	0	36	4	0	0	0	0	0	5	52	0	0	1	0	3	2	103
16:15	0	52	2	0	0	0	0	0	4	51	0	0	6	0	7	0	122
16:30	0	41	6	0	0	0	0	0	2	44	0	0	2	0	4	0	99
16:45	0	39	2	0	0	0	0	0	5	47	0	0	1	0	3	0	97
Total	0	168	14	0	0	0	0	0	16	194	0	0	10	0	17	2	421
17:00	0	40	6	0	0	0	0	0	3	41	0	0	1	0	2	0	93
17:15	0	40	5	0	0	0	0	0	7	47	0	0	3	0	2	0	104
Grand Total	0	326	38	0	0	0	0	0	34	385	0	0	17	0	26	2	828
Apprch %	0	89.6	10.4	0	0	0	0	0	8.1	91.9	0	0	37.8	0	57.8	4.4	
Total %	0	39.4	4.6	0	0	0	0	0	4.1	46.5	0	0	2.1	0	3.1	0.2	
Motorcycles	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Motorcycles	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.1
Cars & Light Goods	0	318	38	0	0	0	0	0	34	379	0	0	17	0	26	0	812
% Cars & Light Goods	0	97.5	100	0	0	0	0	0	100	98.4	0	0	100	0	100	0	98.1
Buses	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Buses	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.1
Single-Unit Trucks	0	4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	7
% Single-Unit Trucks	0	1.2	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0.8
Articulated Trucks	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% 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	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
% Bicycles on Road	0	0.6	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.4
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	0	0	0	0	2	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0.2

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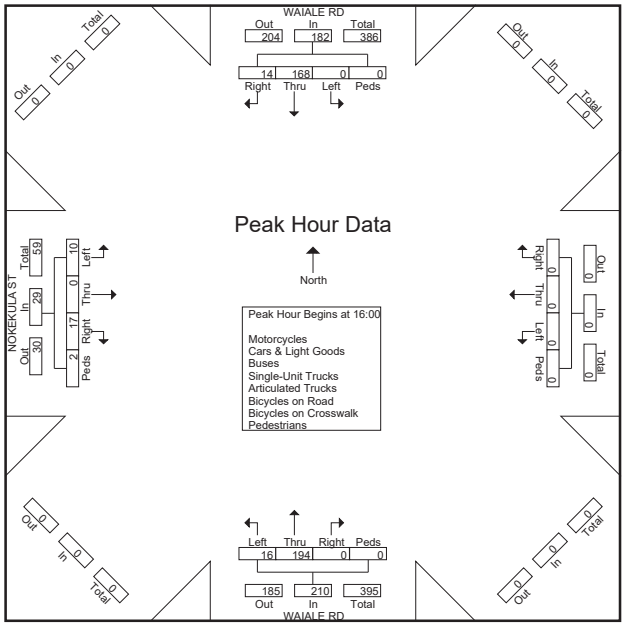
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					NOKEKULA ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	0	36	4	0	40	0	0	0	0	0	**5**	**52**	0	0	**57**	1	0	3	**2**	6	103
16:15	0	**52**	2	0	**54**	0	0	0	0	0	4	51	0	0	55	**6**	0	**7**	0	**13**	**122**
16:30	0	41	**6**	0	47	0	0	0	0	0	2	44	0	0	46	2	0	4	0	6	99
16:45	0	39	2	0	41	0	0	0	0	0	5	47	0	0	52	1	0	3	0	4	97
Total Volume	0	168	14	0	182	0	0	0	0	0	16	194	0	0	210	10	0	17	2	29	421
% App. Total	0	92.3	7.7	0		0	0	0	0		7.6	92.4	0	0		34.5	0	58.6	6.9		
PHF	.000	.808	.583	.000	.843	.000	.000	.000	.000	.000	.800	.933	.000	.000	.921	.417	.000	.607	.250	.558	.863



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				OHANA HANA LOOP EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	31	0	0	0	0	0	0	1	14	0	0	1	0	3	0	50
06:45	0	74	0	0	0	0	0	0	1	19	0	0	4	0	4	0	102
Total	0	105	0	0	0	0	0	0	2	33	0	0	5	0	7	0	152
07:00	0	58	4	0	0	0	0	0	1	18	0	0	11	0	4	0	96
07:15	0	74	2	0	0	0	0	0	0	29	0	0	6	0	8	0	119
07:30	0	62	3	0	0	0	0	0	0	33	0	0	8	0	5	0	111
07:45	0	45	3	0	0	0	0	0	4	39	0	0	3	0	5	0	99
Total	0	239	12	0	0	0	0	0	5	119	0	0	28	0	22	0	425
08:00	0	44	1	0	0	0	0	0	0	19	0	0	4	0	2	0	70
08:15	0	30	2	0	0	0	0	0	0	17	0	0	1	0	5	0	55
Grand Total	0	418	15	0	0	0	0	0	7	188	0	0	38	0	36	0	702
Apprch %	0	96.5	3.5	0	0	0	0	0	3.6	96.4	0	0	51.4	0	48.6	0	
Total %	0	59.5	2.1	0	0	0	0	0	1	26.8	0	0	5.4	0	5.1	0	
Motorcycles	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Motorcycles	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Cars & Light Goods	0	405	15	0	0	0	0	0	7	176	0	0	38	0	36	0	677
% Cars & Light Goods	0	96.9	100	0	0	0	0	0	100	93.6	0	0	100	0	100	0	96.4
Buses	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
% Buses	0	0.2	0	0	0	0	0	0	0	1.1	0	0	0	0	0	0	0.4
Single-Unit Trucks	0	6	0	0	0	0	0	0	0	9	0	0	0	0	0	0	15
% Single-Unit Trucks	0	1.4	0	0	0	0	0	0	0	4.8	0	0	0	0	0	0	2.1
Articulated Trucks	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
% Articulated Trucks	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7
Bicycles on Road	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.5	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	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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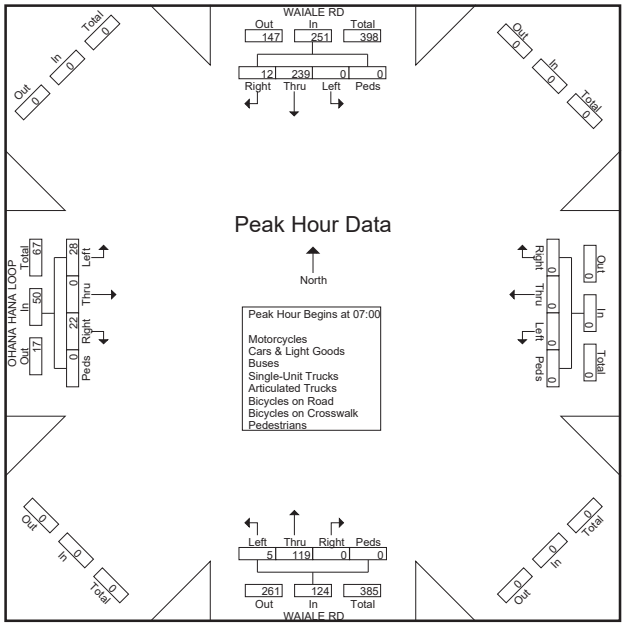
	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					OHANA HANA LOOP EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	58	**4**	0	62	0	0	0	0	0	1	18	0	0	19	**11**	0	4	0	**15**	96
07:15	0	**74**	2	0	**76**	0	0	0	0	0	0	29	0	0	29	6	0	**8**	0	14	**119**
07:30	0	62	3	0	65	0	0	0	0	0	0	33	0	0	33	8	0	5	0	13	111
07:45	0	45	3	0	48	0	0	0	0	0	**4**	**39**	0	0	**43**	3	0	5	0	8	99
Total Volume	0	239	12	0	251	0	0	0	0	0	5	119	0	0	124	28	0	22	0	50	425
% App. Total	0	95.2	4.8	0		0	0	0	0		4	96	0	0		56	0	44	0		
PHF	.000	.807	.750	.000	.826	.000	.000	.000	.000	.000	.313	.763	.000	.000	.721	.636	.000	.688	.000	.833	.893



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WESTBOUND				WAIALE RD NORTHBOUND				OHANA HANA LOOP EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	0	40	3	0	0	0	0	0	2	51	0	0	3	0	0	1	100
15:45	0	32	2	0	0	0	0	0	4	58	0	0	3	0	1	0	100
Total	0	72	5	0	0	0	0	0	6	109	0	0	6	0	1	1	200
16:00	0	39	2	0	0	0	0	0	6	55	0	0	1	0	2	0	105
16:15	0	49	5	0	0	0	0	0	5	53	0	0	4	0	4	0	120
16:30	0	35	5	0	0	0	0	0	2	46	0	0	3	0	1	0	92
16:45	0	38	4	0	0	0	0	0	1	42	0	0	3	0	1	0	89
Total	0	161	16	0	0	0	0	0	14	196	0	0	11	0	8	0	406
17:00	0	41	3	0	0	0	0	0	2	49	0	0	0	0	1	0	96
17:15	0	39	3	0	0	0	0	0	2	44	0	0	6	0	0	0	94
Grand Total	0	313	27	0	0	0	0	0	24	398	0	0	23	0	10	1	796
Apprch %	0	92.1	7.9	0	0	0	0	0	5.7	94.3	0	0	67.6	0	29.4	2.9	
Total %	0	39.3	3.4	0	0	0	0	0	3	50	0	0	2.9	0	1.3	0.1	
Motorcycles	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Motorcycles	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0.1
Cars & Light Goods	0	306	26	0	0	0	0	0	24	394	0	0	23	0	10	0	783
% Cars & Light Goods	0	97.8	96.3	0	0	0	0	0	100	99	0	0	100	0	100	0	98.4
Buses	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Single-Unit Trucks	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
% Single-Unit Trucks	0	1	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0.8
Articulated Trucks	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Bicycles on Road	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	0	0.3	3.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3
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	0	0	0	0	1	1
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0.1

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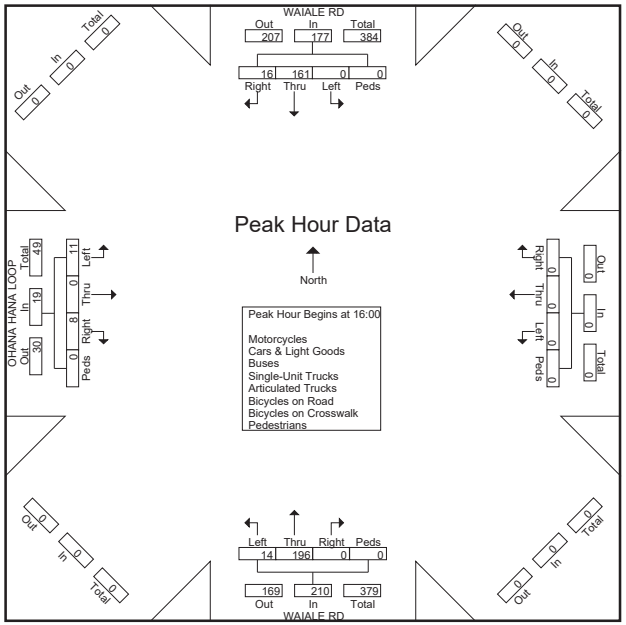
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:00

	WAIALE RD SOUTHBOUND					WESTBOUND					WAIALE RD NORTHBOUND					OHANA HANA LOOP 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
16:00	0	39	2	0	41	0	0	0	0	0	**6**	**55**	0	0	**61**	1	0	2	0	3	105
16:15	0	**49**	**5**	0	**54**	0	0	0	0	0	5	53	0	0	58	**4**	0	**4**	0	**8**	**120**
16:30	0	35	5	0	40	0	0	0	0	0	2	46	0	0	48	3	0	1	0	4	92
16:45	0	38	4	0	42	0	0	0	0	0	1	42	0	0	43	3	0	1	0	4	89
Total Volume	0	161	16	0	177	0	0	0	0	0	14	196	0	0	210	11	0	8	0	19	406
% App. Total	0	91	9	0		0	0	0	0		6.7	93.3	0	0		57.9	0	42.1	0		
PHF	.000	.821	.800	.000	.819	.000	.000	.000	.000	.000	.583	.891	.000	.000	.861	.688	.000	.500	.000	.594	.846



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File Name : Waiale Rd - Waiko Rd
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIKO RD WESTBOUND				NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00	17	0	4	0	0	2	6	0	0	0	0	0	3	15	0	0	47
06:15	24	0	9	0	0	8	12	0	0	0	0	0	6	12	0	0	71
06:30	28	0	9	0	0	12	10	0	0	0	0	0	5	22	0	0	86
06:45	66	0	22	0	0	10	7	0	0	0	0	0	11	24	0	0	140
Total	135	0	44	0	0	32	35	0	0	0	0	0	25	73	0	0	344
07:00	37	0	15	0	0	11	14	0	0	0	0	0	9	45	0	0	131
07:15	56	0	26	0	0	12	20	0	0	0	0	0	11	55	0	0	180
07:30	51	0	13	0	0	17	20	0	0	0	0	0	18	56	0	0	175
07:45	39	0	14	0	0	18	24	0	0	0	0	0	15	43	0	0	153
Total	183	0	68	0	0	58	78	0	0	0	0	0	53	199	0	0	639
08:00	20	0	23	0	0	11	13	0	0	0	0	0	4	17	0	0	88
08:15	22	0	14	0	0	18	14	0	0	0	0	0	6	15	0	0	89
08:30	21	0	10	0	0	11	15	0	0	0	0	0	2	17	0	0	76
08:45	6	0	10	0	0	12	15	0	0	0	0	0	2	22	0	0	67
Total	69	0	57	0	0	52	57	0	0	0	0	0	14	71	0	0	320
09:00	19	0	12	0	0	13	5	0	0	0	0	0	4	12	0	0	65
09:15	20	0	12	0	0	6	15	0	0	0	0	0	5	11	0	0	69
09:30	23	0	8	0	0	20	12	0	0	0	0	0	5	13	0	0	81
09:45	5	0	7	0	0	13	12	0	0	0	0	0	4	18	0	0	59
Total	67	0	39	0	0	52	44	0	0	0	0	0	18	54	0	0	274
10:00	13	0	6	0	0	5	10	0	0	0	0	0	4	5	0	0	43
10:15	9	0	5	0	0	13	10	0	0	0	0	0	9	13	0	0	59
10:30	14	0	5	0	0	5	9	0	0	0	0	0	7	15	0	0	55
10:45	13	0	6	0	0	11	18	0	0	0	0	0	5	13	0	0	66
Total	49	0	22	0	0	34	47	0	0	0	0	0	25	46	0	0	223
11:00	12	0	6	0	0	12	16	0	0	0	0	0	6	18	0	0	70
11:15	19	0	6	0	0	11	15	0	0	0	0	0	7	15	0	0	73
11:30	12	0	5	0	0	16	11	0	0	0	0	0	5	11	0	0	60
11:45	8	0	13	0	0	19	17	0	0	0	0	0	10	10	0	0	77
Total	51	0	30	0	0	58	59	0	0	0	0	0	28	54	0	0	280
12:00	21	0	3	0	0	21	18	0	0	0	0	0	10	10	0	0	83
12:15	14	0	6	0	0	8	22	0	0	0	0	0	3	17	0	0	70
12:30	16	0	9	0	0	16	19	0	0	0	0	0	4	20	0	0	84
12:45	10	0	6	0	0	12	15	0	0	0	0	0	5	11	0	0	59
Total	61	0	24	0	0	57	74	0	0	0	0	0	22	58	0	0	296
13:00	11	0	6	0	0	7	18	0	0	0	0	0	6	19	0	0	67
13:15	23	0	5	0	0	17	16	0	0	0	0	0	4	15	0	0	80
13:30	16	0	6	0	0	13	18	0	0	0	0	0	4	15	0	0	72
13:45	9	0	10	0	0	17	24	0	0	0	0	0	7	6	0	0	73
Total	59	0	27	0	0	54	76	0	0	0	0	0	21	55	0	0	292
14:00	20	0	8	0	0	15	21	0	0	0	0	0	5	17	0	0	86
14:15	23	0	16	0	0	30	15	0	0	0	0	0	7	22	0	0	113
14:30	21	0	12	0	0	14	23	0	0	0	0	0	6	17	0	0	93
14:45	15	0	8	0	0	14	30	0	0	0	0	0	8	19	0	0	94
Total	79	0	44	0	0	73	89	0	0	0	0	0	26	75	0	0	386
15:00	21	0	9	0	0	12	22	0	0	0	0	0	10	22	0	0	96
15:15	28	0	9	0	0	13	29	0	0	0	0	0	13	12	0	0	104

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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIKO RD WESTBOUND				NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	34	0	12	0	0	24	40	0	0	0	0	0	14	19	0	0	143
15:45	24	0	7	0	0	24	47	0	0	0	0	0	15	21	0	0	138
Total	107	0	37	0	0	73	138	0	0	0	0	0	52	74	0	0	481
16:00	34	0	8	0	0	35	50	0	0	0	0	0	13	15	0	0	155
16:15	45	0	12	0	0	25	40	0	0	0	0	0	15	21	0	0	158
16:30	31	0	6	0	0	25	39	0	0	0	0	0	7	22	0	0	130
16:45	30	0	9	0	0	21	39	0	0	0	0	0	7	22	0	0	128
Total	140	0	35	0	0	106	168	0	0	0	0	0	42	80	0	0	571
17:00	30	0	13	0	0	25	32	0	0	0	0	0	15	17	0	0	132
17:15	25	0	12	0	0	19	30	0	0	0	0	0	16	21	0	0	123
17:30	21	0	6	0	0	23	33	0	0	0	0	0	12	17	0	0	112
17:45	19	0	9	0	0	18	20	0	0	0	0	0	9	7	0	0	82
Total	95	0	40	0	0	85	115	0	0	0	0	0	52	62	0	0	449
Grand Total	1095	0	467	0	0	734	980	0	0	0	0	0	378	901	0	0	4555
Apprch %	70.1	0	29.9	0	0	42.8	57.2	0	0	0	0	0	29.6	70.4	0	0	
Total %	24	0	10.3	0	0	16.1	21.5	0	0	0	0	0	8.3	19.8	0	0	
Motorcycles	3	0	3	0	0	3	5	0	0	0	0	0	1	0	0	0	15
% Motorcycles	0.3	0	0.6	0	0	0.4	0.5	0	0	0	0	0	0.3	0	0	0	0.3
Cars & Light Goods	1038	0	458	0	0	719	920	0	0	0	0	0	365	885	0	0	4385
% Cars & Light Goods	94.8	0	98.1	0	0	98	93.9	0	0	0	0	0	96.6	98.2	0	0	96.3
Buses	3	0	3	0	0	3	2	0	0	0	0	0	4	5	0	0	20
% Buses	0.3	0	0.6	0	0	0.4	0.2	0	0	0	0	0	1.1	0.6	0	0	0.4
Single-Unit Trucks	31	0	3	0	0	9	40	0	0	0	0	0	6	11	0	0	100
% Single-Unit Trucks	2.8	0	0.6	0	0	1.2	4.1	0	0	0	0	0	1.6	1.2	0	0	2.2
Articulated Trucks	18	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	30
% Articulated Trucks	1.6	0	0	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0.7
Bicycles on Road	2	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	5
% Bicycles on Road	0.2	0	0	0	0	0	0.1	0	0	0	0	0	0.5	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	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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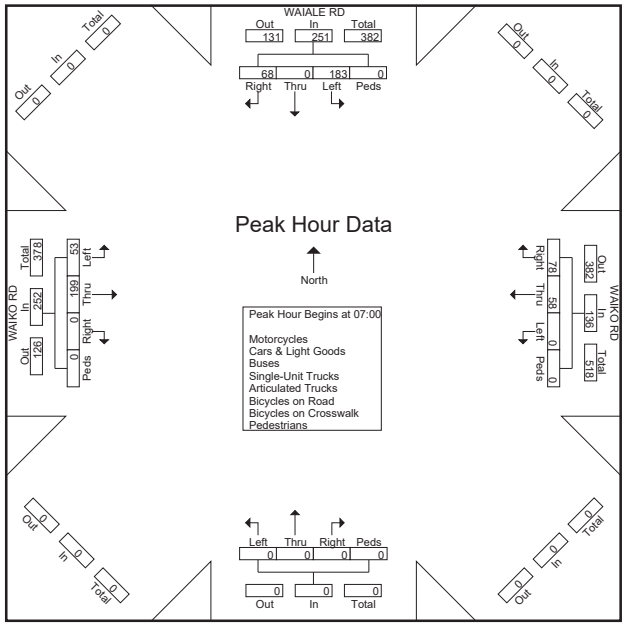
	WAIALE RD SOUTHBOUND					WAIKO RD WESTBOUND					NORTHBOUND					WAIKO RD EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 to 17:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	37	0	15	0	52	0	11	14	0	25	0	0	0	0	0	9	45	0	0	54	131
07:15	**56**	0	**26**	0	**82**	0	12	20	0	32	0	0	0	0	0	11	55	0	0	66	**180**
07:30	51	0	13	0	64	0	17	20	0	37	0	0	0	0	0	**18**	**56**	0	0	**74**	175
07:45	39	0	14	0	53	0	**18**	**24**	0	**42**	0	0	0	0	0	15	43	0	0	58	153
Total Volume	183	0	68	0	251	0	58	78	0	136	0	0	0	0	0	53	199	0	0	252	639
% App. Total	72.9	0	27.1	0		0	42.6	57.4	0		0	0	0	0		21	79	0	0		
PHF	.817	.000	.654	.000	.765	.000	.806	.813	.000	.810	.000	.000	.000	.000	.000	.736	.888	.000	.000	.851	.888



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File Name : Waiale Rd - Waiko Rd
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIKO RD WESTBOUND				NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	28	0	9	0	0	12	10	0	0	0	0	0	5	22	0	0	86
06:45	66	0	22	0	0	10	7	0	0	0	0	0	11	24	0	0	140
Total	94	0	31	0	0	22	17	0	0	0	0	0	16	46	0	0	226
07:00	37	0	15	0	0	11	14	0	0	0	0	0	9	45	0	0	131
07:15	56	0	26	0	0	12	20	0	0	0	0	0	11	55	0	0	180
07:30	51	0	13	0	0	17	20	0	0	0	0	0	18	56	0	0	175
07:45	39	0	14	0	0	18	24	0	0	0	0	0	15	43	0	0	153
Total	183	0	68	0	0	58	78	0	0	0	0	0	53	199	0	0	639
08:00	20	0	23	0	0	11	13	0	0	0	0	0	4	17	0	0	88
08:15	22	0	14	0	0	18	14	0	0	0	0	0	6	15	0	0	89
Grand Total	319	0	136	0	0	109	122	0	0	0	0	0	79	277	0	0	1042
Apprch %	70.1	0	29.9	0	0	47.2	52.8	0	0	0	0	0	22.2	77.8	0	0	
Total %	30.6	0	13.1	0	0	10.5	11.7	0	0	0	0	0	7.6	26.6	0	0	
Motorcycles	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
% Motorcycles	0.6	0	0.7	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0.4
Cars & Light Goods	304	0	134	0	0	106	109	0	0	0	0	0	76	273	0	0	1002
% Cars & Light Goods	95.3	0	98.5	0	0	97.2	89.3	0	0	0	0	0	96.2	98.6	0	0	96.2
Buses	2	0	0	0	0	1	0	0	0	0	0	0	2	2	0	0	7
% Buses	0.6	0	0	0	0	0.9	0	0	0	0	0	0	2.5	0.7	0	0	0.7
Single-Unit Trucks	7	0	1	0	0	1	12	0	0	0	0	0	0	2	0	0	23
% Single-Unit Trucks	2.2	0	0.7	0	0	0.9	9.8	0	0	0	0	0	0	0.7	0	0	2.2
Articulated Trucks	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5
% Articulated Trucks	1.3	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0.5
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	1.3	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	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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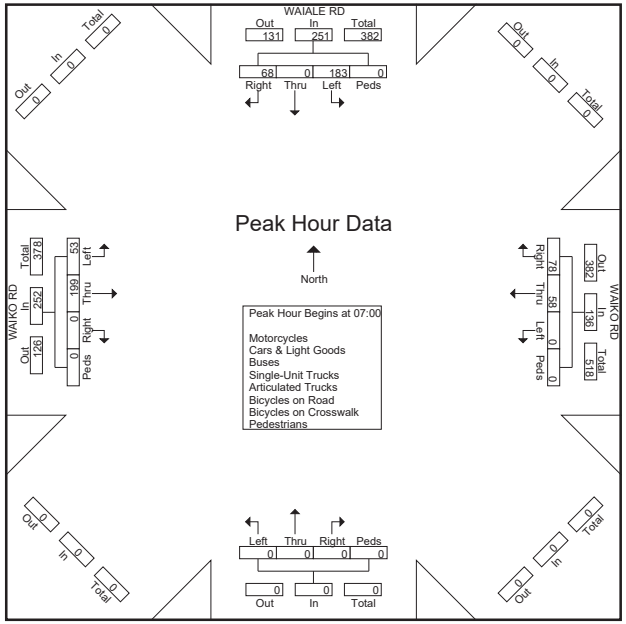
	WAIALE RD SOUTHBOUND					WAIKO RD WESTBOUND					NORTHBOUND					WAIKO RD EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	37	0	15	0	52	0	11	14	0	25	0	0	0	0	0	9	45	0	0	54	131
07:15	**56**	0	**26**	0	**82**	0	12	20	0	32	0	0	0	0	0	11	55	0	0	66	**180**
07:30	51	0	13	0	64	0	17	20	0	37	0	0	0	0	0	**18**	**56**	0	0	**74**	175
07:45	39	0	14	0	53	0	**18**	**24**	0	**42**	0	0	0	0	0	15	43	0	0	58	153
Total Volume	183	0	68	0	251	0	58	78	0	136	0	0	0	0	0	53	199	0	0	252	639
% App. Total	72.9	0	27.1	0		0	42.6	57.4	0		0	0	0	0		21	79	0	0		
PHF	.817	.000	.654	.000	.765	.000	.806	.813	.000	.810	.000	.000	.000	.000	.000	.736	.888	.000	.000	.851	.888



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	WAIALE RD SOUTHBOUND				WAIKO RD WESTBOUND				NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	34	0	12	0	0	24	40	0	0	0	0	0	14	19	0	0	143
15:45	24	0	7	0	0	24	47	0	0	0	0	0	15	21	0	0	138
Total	58	0	19	0	0	48	87	0	0	0	0	0	29	40	0	0	281
16:00	34	0	8	0	0	35	50	0	0	0	0	0	13	15	0	0	155
16:15	45	0	12	0	0	25	40	0	0	0	0	0	15	21	0	0	158
16:30	31	0	6	0	0	25	39	0	0	0	0	0	7	22	0	0	130
16:45	30	0	9	0	0	21	39	0	0	0	0	0	7	22	0	0	128
Total	140	0	35	0	0	106	168	0	0	0	0	0	42	80	0	0	571
17:00	30	0	13	0	0	25	32	0	0	0	0	0	15	17	0	0	132
17:15	25	0	12	0	0	19	30	0	0	0	0	0	16	21	0	0	123
Grand Total	253	0	79	0	0	198	317	0	0	0	0	0	102	158	0	0	1107
Apprch %	76.2	0	23.8	0	0	38.4	61.6	0	0	0	0	0	39.2	60.8	0	0	
Total %	22.9	0	7.1	0	0	17.9	28.6	0	0	0	0	0	9.2	14.3	0	0	
Motorcycles	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
% Motorcycles	0	0	0	0	0	0.5	0.3	0	0	0	0	0	0	0	0	0	0.2
Cars & Light Goods	247	0	79	0	0	196	315	0	0	0	0	0	101	157	0	0	1095
% Cars & Light Goods	97.6	0	100	0	0	99	99.4	0	0	0	0	0	99	99.4	0	0	98.9
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	4	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	8
% Single-Unit Trucks	1.6	0	0	0	0	0.5	0.3	0	0	0	0	0	1	0.6	0	0	0.7
Articulated Trucks	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
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	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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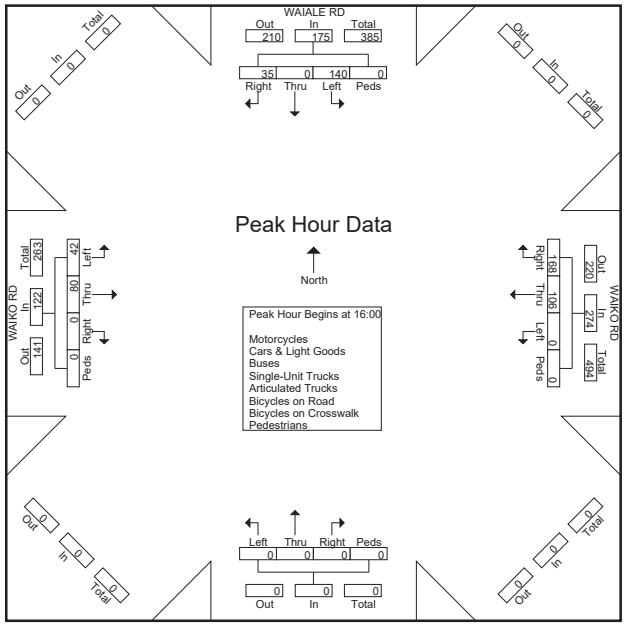
File Name : Waiale Rd - Waiko Rd
Site Code :
Start Date : 4/4/2019
Page No : 2

	WAIALE RD SOUTHBOUND					WAIKO RD WESTBOUND					NORTHBOUND					WAIKO RD EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	34	0	8	0	42	0	**35**	**50**	0	**85**	0	0	0	0	0	13	15	0	0	28	155
16:15	**45**	0	**12**	0	**57**	0	25	40	0	65	0	0	0	0	0	**15**	21	0	0	**36**	**158**
16:30	31	0	6	0	37	0	25	39	0	64	0	0	0	0	0	7	**22**	0	0	29	130
16:45	30	0	9	0	39	0	21	39	0	60	0	0	0	0	0	7	22	0	0	29	128
Total Volume	140	0	35	0	175	0	106	168	0	274	0	0	0	0	0	42	80	0	0	122	571
% App. Total	80	0	20	0		0	38.7	61.3	0		0	0	0	0		34.4	65.6	0	0		
PHF	.778	.000	.729	.000	.768	.000	.757	.840	.000	.806	.000	.000	.000	.000	.000	.700	.909	.000	.000	.847	.903



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File Name : Kehalani VC Dwy - Kuikahi Dr
Site Code :
Start Date : 5/3/2018
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI VC DWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	6	0	25	2	0	68	15	0	0	0	0	0	18	119	0	0	253
06:45	3	0	14	0	0	100	9	0	0	0	0	0	17	144	0	0	287
Total	9	0	39	2	0	168	24	0	0	0	0	0	35	263	0	0	540
07:00	8	0	22	0	0	123	18	0	0	0	0	0	12	163	0	0	346
07:15	5	0	20	0	0	124	21	0	0	0	0	0	15	198	0	0	383
07:30	2	0	28	0	0	138	17	0	0	0	0	0	24	141	0	0	350
07:45	5	0	21	1	0	107	13	0	0	0	0	0	23	151	0	0	321
Total	20	0	91	1	0	492	69	0	0	0	0	0	74	653	0	0	1400
08:00	8	0	22	0	0	76	17	0	0	0	0	0	15	116	0	0	254
08:15	3	0	33	0	0	76	14	0	0	0	0	0	15	114	0	0	255
08:30	2	0	19	1	0	58	14	0	0	0	0	0	11	115	0	0	220
08:45	8	0	23	1	0	76	12	0	0	0	0	0	11	103	0	0	234
Total	21	0	97	2	0	286	57	0	0	0	0	0	52	448	0	0	963
09:00	6	0	15	0	0	58	15	0	0	0	0	0	16	90	0	0	200
09:15	6	0	20	0	0	61	13	2	0	0	0	0	9	91	0	0	202
09:30	11	0	13	0	0	67	19	0	0	0	0	0	16	99	0	0	225
09:45	3	0	17	1	0	69	12	0	0	0	0	0	10	104	0	0	216
Total	26	0	65	1	0	255	59	2	0	0	0	0	51	384	0	0	843
10:00	6	0	19	4	0	69	15	0	0	0	0	0	16	95	0	0	224
10:15	6	0	17	0	0	74	18	0	0	0	0	0	12	79	0	0	206
10:30	5	0	17	0	0	67	11	0	0	0	0	0	14	100	0	0	214
10:45	3	0	18	2	0	75	17	0	0	0	0	0	12	91	0	0	218
Total	20	0	71	6	0	285	61	0	0	0	0	0	54	365	0	0	862
11:00	4	0	14	0	0	67	12	0	0	0	0	0	11	90	0	0	198
11:15	4	0	23	0	0	79	22	0	0	0	0	0	10	84	0	0	222
11:30	12	0	22	1	0	84	34	0	0	0	0	0	13	86	0	0	252
11:45	8	0	13	0	0	66	10	0	0	0	0	0	13	97	0	0	207
Total	28	0	72	1	0	296	78	0	0	0	0	0	47	357	0	0	879
12:00	7	0	19	0	0	99	8	0	0	0	0	0	10	105	0	0	248
12:15	3	0	11	0	0	92	14	0	0	0	0	0	15	65	0	0	200
12:30	6	0	25	0	0	80	14	0	0	0	0	0	16	76	0	0	217
12:45	6	0	14	1	0	90	13	0	0	0	0	0	11	70	0	0	205
Total	22	0	69	1	0	361	49	0	0	0	0	0	52	316	0	0	870
13:00	1	0	22	0	0	103	19	0	0	0	0	0	14	91	0	0	250
13:15	5	0	20	1	0	74	18	0	0	0	0	0	10	109	0	0	237
13:30	7	0	17	0	0	90	17	0	0	0	0	0	15	90	0	0	236
13:45	9	0	18	0	0	109	8	0	0	0	0	0	19	130	0	0	293
Total	22	0	77	1	0	376	62	0	0	0	0	0	58	420	0	0	1016
14:00	8	0	23	1	0	107	17	0	0	0	0	0	7	122	0	0	285
14:15	16	0	20	0	0	92	17	0	0	0	0	0	13	111	0	0	269
14:30	12	0	29	0	0	91	13	0	0	0	0	0	24	103	0	0	272
14:45	9	0	25	0	0	89	23	0	0	0	0	0	14	112	0	0	272
Total	45	0	97	1	0	379	70	0	0	0	0	0	58	448	0	0	1098

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File Name : Kehalani VC Dwy - Kuikahi Dr
Site Code :
Start Date : 5/3/2018
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI VC DWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	12	0	20	0	0	112	23	0	0	0	0	0	22	116	0	0	305
15:15	9	0	21	1	0	101	23	0	0	0	0	0	26	102	0	0	283
15:30	10	0	18	0	0	108	19	0	0	0	0	0	31	124	0	0	310
15:45	11	0	30	0	0	108	28	0	0	0	0	0	20	115	0	0	312
Total	42	0	89	1	0	429	93	0	0	0	0	0	99	457	0	0	1210
16:00	13	0	35	0	0	119	21	0	0	0	0	0	25	119	0	0	332
16:15	5	0	27	1	0	125	25	0	0	0	0	0	18	131	0	0	332
16:30	13	0	29	0	0	137	24	0	0	0	0	0	31	112	0	0	346
16:45	16	0	30	1	0	118	30	0	0	0	0	0	32	112	0	0	339
Total	47	0	121	2	0	499	100	0	0	0	0	0	106	474	0	0	1349
17:00	14	0	27	0	0	103	29	0	0	0	0	0	19	121	0	0	313
17:15	10	0	33	0	0	103	29	0	0	0	0	0	20	110	0	0	305
Grand Total	326	0	948	19	0	4032	780	2	0	0	0	0	725	4816	0	0	11648
Apprch %	25.2	0	73.3	1.5	0	83.8	16.2	0	0	0	0	0	13.1	86.9	0	0	
Total %	2.8	0	8.1	0.2	0	34.6	6.7	0	0	0	0	0	6.2	41.3	0	0	
Motorcycles	1	0	3	0	0	15	4	0	0	0	0	0	3	15	0	0	41
% Motorcycles	0.3	0	0.3	0	0	0.4	0.5	0	0	0	0	0	0.4	0.3	0	0	0.4
Cars	223	0	674	0	0	2803	548	0	0	0	0	0	538	3365	0	0	8151
% Cars	68.4	0	71.1	0	0	69.5	70.3	0	0	0	0	0	74.2	69.9	0	0	70
Light Goods Vehicles	95	0	258	0	0	1085	214	0	0	0	0	0	179	1236	0	0	3067
% Light Goods Vehicles	29.1	0	27.2	0	0	26.9	27.4	0	0	0	0	0	24.7	25.7	0	0	26.3
Buses	0	0	2	0	0	17	2	0	0	0	0	0	0	56	0	0	77
% Buses	0	0	0.2	0	0	0.4	0.3	0	0	0	0	0	0	1.2	0	0	0.7
Single-Unit Trucks	7	0	9	0	0	90	10	0	0	0	0	0	3	114	0	0	233
% Single-Unit Trucks	2.1	0	0.9	0	0	2.2	1.3	0	0	0	0	0	0.4	2.4	0	0	2
Articulated Trucks	0	0	0	0	0	18	2	0	0	0	0	0	1	22	0	0	43
% Articulated Trucks	0	0	0	0	0	0.4	0.3	0	0	0	0	0	0.1	0.5	0	0	0.4
Bicycles on Road	0	0	2	0	0	4	0	0	0	0	0	0	1	8	0	0	15
% Bicycles on Road	0	0	0.2	0	0	0.1	0	0	0	0	0	0	0.1	0.2	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	19	0	0	0	2	0	0	0	0	0	0	0	0	21
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	0.2

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File Name : Kehalani VC Dwy - Kuikahi Dr
Site Code :
Start Date : 5/3/2018
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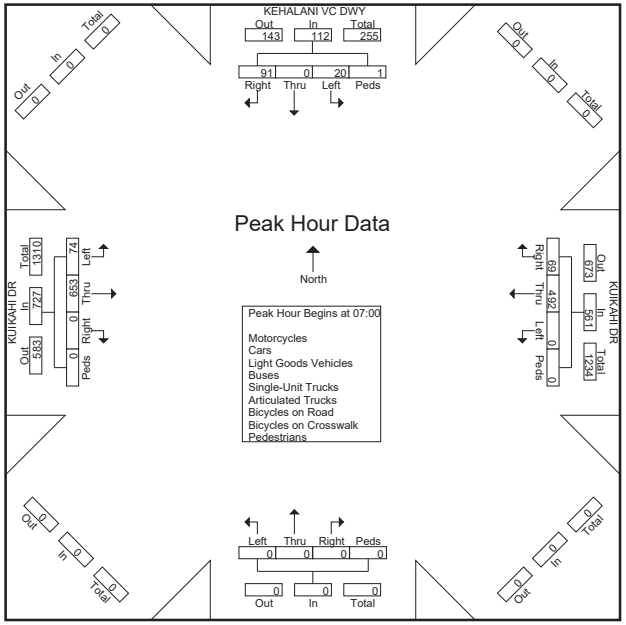
	KEHALANI VC DWY SOUTHBOUND					KUIKAHI DR WESTBOUND					NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 17:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	**8**	0	22	0	**30**	0	123	18	0	141	0	0	0	0	0	12	163	0	0	175	346
07:15	5	0	20	0	25	0	124	**21**	0	145	0	0	0	0	0	15	**198**	0	0	**213**	**383**
07:30	2	0	**28**	0	30	0	**138**	17	0	**155**	0	0	0	0	0	**24**	141	0	0	165	350
07:45	5	0	21	**1**	27	0	107	13	0	120	0	0	0	0	0	23	151	0	0	174	321
Total Volume	20	0	91	1	112	0	492	69	0	561	0	0	0	0	0	74	653	0	0	727	1400
% App. Total	17.9	0	81.2	0.9		0	87.7	12.3	0		0	0	0	0		10.2	89.8	0	0		
PHF	.625	.000	.813	.250	.933	.000	.891	.821	.000	.905	.000	.000	.000	.000	.000	.771	.824	.000	.000	.853	.914



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File Name : Kehalani Village Center Dwy - Kukahi Dr
Site Code :
Start Date : 4/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI VILLAGE CENTER DWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	7	0	26	0	0	120	14	0	0	0	0	0	23	161	0	0	351
06:45	11	0	30	0	0	137	14	0	0	0	0	0	14	181	0	0	387
Total	18	0	56	0	0	257	28	0	0	0	0	0	37	342	0	0	738
07:00	4	0	28	0	0	116	16	0	0	0	0	0	27	154	0	0	345
07:15	3	0	21	0	0	107	18	0	0	0	0	0	23	176	0	0	348
07:30	10	0	26	1	0	118	14	0	0	0	0	0	15	114	0	0	298
07:45	11	0	25	0	0	94	10	0	0	0	0	0	18	129	0	0	287
Total	28	0	100	1	0	435	58	0	0	0	0	0	83	573	0	0	1278
08:00	3	0	11	0	0	74	17	0	0	0	0	0	10	124	0	0	239
08:15	7	0	14	0	0	76	15	0	0	0	0	0	14	135	0	0	261
Grand Total	56	0	181	1	0	842	118	0	0	0	0	0	144	1174	0	0	2516
Apprch %	23.5	0	76.1	0.4	0	87.7	12.3	0	0	0	0	0	10.9	89.1	0	0	
Total %	2.2	0	7.2	0	0	33.5	4.7	0	0	0	0	0	5.7	46.7	0	0	
Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	1	3	0	0	6
% Motorcycles	0	0	0	0	0	0.2	0	0	0	0	0	0	0.7	0.3	0	0	0.2
Cars & Light Goods	54	0	181	0	0	807	114	0	0	0	0	0	143	1147	0	0	2446
% Cars & Light Goods	96.4	0	100	0	0	95.8	96.6	0	0	0	0	0	99.3	97.7	0	0	97.2
Buses	0	0	0	0	0	2	0	0	0	0	0	0	0	12	0	0	14
% Buses	0	0	0	0	0	0.2	0	0	0	0	0	0	0	1	0	0	0.6
Single-Unit Trucks	1	0	0	0	0	27	2	0	0	0	0	0	0	8	0	0	38
% Single-Unit Trucks	1.8	0	0	0	0	3.2	1.7	0	0	0	0	0	0	0.7	0	0	1.5
Articulated Trucks	1	0	0	0	0	3	2	0	0	0	0	0	0	2	0	0	8
% Articulated Trucks	1.8	0	0	0	0	0.4	1.7	0	0	0	0	0	0	0.2	0	0	0.3
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
% Bicycles on Road	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.2	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

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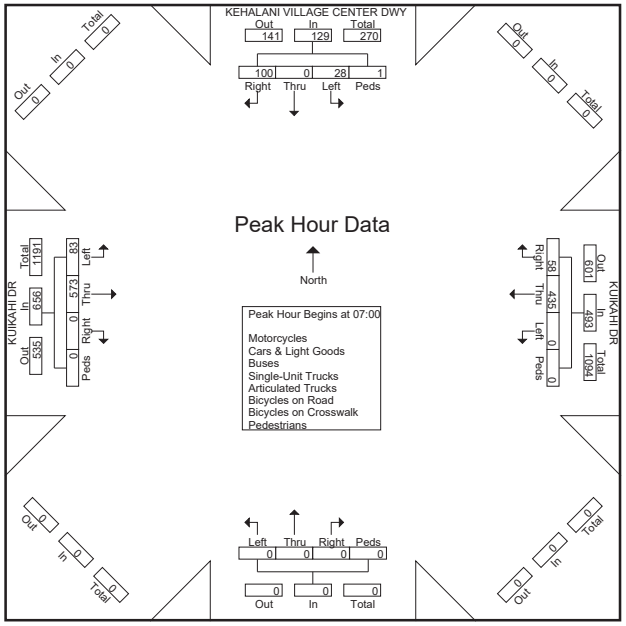
File Name : Kehalani Village Center Dwy - Kukahi Dr
Site Code :
Start Date : 4/9/2019
Page No : 2

	KEHALANI VILLAGE CENTER DWY SOUTHBOUND					KUIKAHI DR WESTBOUND					NORTHBOUND					KUIKAHI 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 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	4	0	**28**	0	32	0	116	16	0	**132**	0	0	0	0	0	**27**	154	0	0	181	345
07:15	3	0	21	0	24	0	107	**18**	0	125	0	0	0	0	0	23	**176**	0	0	**199**	**348**
07:30	10	0	26	**1**	**37**	0	**118**	14	0	132	0	0	0	0	0	15	114	0	0	129	298
07:45	**11**	0	25	0	36	0	94	10	0	104	0	0	0	0	0	18	129	0	0	147	287
Total Volume	28	0	100	1	129	0	435	58	0	493	0	0	0	0	0	83	573	0	0	656	1278
% App. Total	21.7	0	77.5	0.8		0	88.2	11.8	0		0	0	0	0		12.7	87.3	0	0		
PHF	.636	.000	.893	.250	.872	.000	.922	.806	.000	.934	.000	.000	.000	.000	.000	.769	.814	.000	.000	.824	.918



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File Name : Kehalani Village Center Dwy - Kukahi Dr
Site Code :
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI VILLAGE CENTER DWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	20	0	32	0	0	121	27	0	0	0	0	0	17	155	0	0	372
15:45	11	0	25	1	0	123	16	0	0	0	0	0	23	136	0	0	335
Total	31	0	57	1	0	244	43	0	0	0	0	0	40	291	0	0	707
16:00	9	0	37	0	0	113	23	0	0	0	0	0	32	130	0	0	344
16:15	11	0	27	2	0	119	24	0	0	0	0	0	15	103	0	0	301
16:30	16	0	30	0	0	135	21	0	0	0	0	0	23	101	0	0	326
16:45	12	0	34	2	0	116	33	0	0	0	0	0	30	112	0	0	339
Total	48	0	128	4	0	483	101	0	0	0	0	0	100	446	0	0	1310
17:00	9	0	32	1	0	102	31	1	0	0	0	0	31	109	0	0	316
17:15	11	0	26	0	0	93	19	0	0	0	0	0	26	93	0	0	268
Grand Total	99	0	243	6	0	922	194	1	0	0	0	0	197	939	0	0	2601
Apprch %	28.4	0	69.8	1.7	0	82.5	17.4	0.1	0	0	0	0	17.3	82.7	0	0	
Total %	3.8	0	9.3	0.2	0	35.4	7.5	0	0	0	0	0	7.6	36.1	0	0	
Motorcycles	0	0	2	0	0	3	0	0	0	0	0	0	2	2	0	0	9
% Motorcycles	0	0	0.8	0	0	0.3	0	0	0	0	0	0	1	0.2	0	0	0.3
Cars & Light Goods	98	0	241	0	0	912	193	0	0	0	0	0	193	912	0	0	2549
% Cars & Light Goods	99	0	99.2	0	0	98.9	99.5	0	0	0	0	0	98	97.1	0	0	98
Buses	1	0	0	0	0	1	1	0	0	0	0	0	2	9	0	0	14
% Buses	1	0	0	0	0	0.1	0.5	0	0	0	0	0	1	1	0	0	0.5
Single-Unit Trucks	0	0	0	0	0	6	0	0	0	0	0	0	0	11	0	0	17
% Single-Unit Trucks	0	0	0	0	0	0.7	0	0	0	0	0	0	0	1.2	0	0	0.7
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	0.3	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	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	6	0	0	0	1	0	0	0	0	0	0	0	0	7
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	0.3

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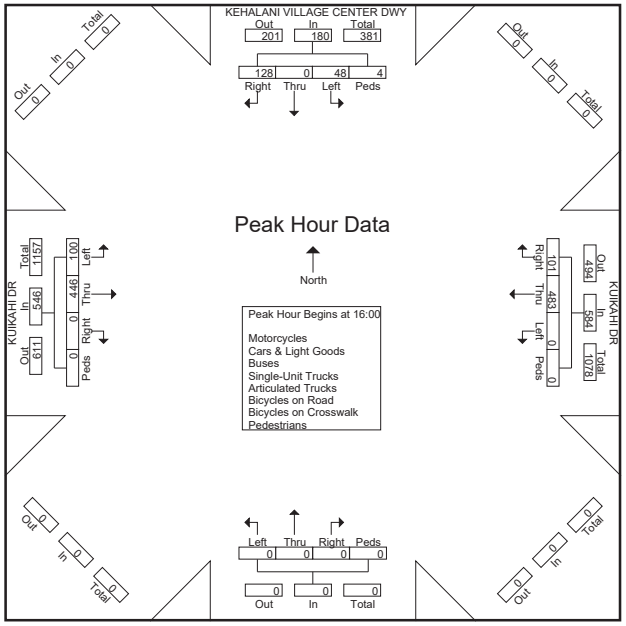
File Name : Kehalani Village Center Dwy - Kukahi Dr
Site Code :
Start Date : 4/9/2019
Page No : 2

	KEHALANI VILLAGE CENTER DWY SOUTHBOUND					KUIKAHI DR WESTBOUND					NORTHBOUND					KUIKAHI 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 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	9	0	**37**	0	46	0	113	23	0	136	0	0	0	0	0	**32**	**130**	0	0	**162**	**344**
16:15	11	0	27	**2**	40	0	119	24	0	143	0	0	0	0	0	15	103	0	0	118	301
16:30	**16**	0	30	0	46	0	**135**	21	0	**156**	0	0	0	0	0	23	101	0	0	124	326
16:45	12	0	34	2	**48**	0	116	**33**	0	149	0	0	0	0	0	30	112	0	0	142	339
Total Volume	48	0	128	4	180	0	483	101	0	584	0	0	0	0	0	100	446	0	0	546	1310
% App. Total	26.7	0	71.1	2.2		0	82.7	17.3	0		0	0	0	0		18.3	81.7	0	0		
PHF	.750	.000	.865	.500	.938	.000	.894	.765	.000	.936	.000	.000	.000	.000	.000	.781	.858	.000	.000	.843	.952



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501 Sumner Street, Suite 521
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File Name : Honoapiilani Hwy - Kehalani Pkwy
Site Code :
Start Date : 5/10/2018
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				KEHALANI PKWY WESTBOUND				HONOAPIILANI HWY NORTHBOUND				KEHALANI PKWY EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	7	109	16	0	10	21	11	1	18	59	1	0	32	17	43	0	345
06:45	15	82	29	0	4	35	17	1	41	85	2	1	54	24	57	0	447
Total	22	191	45	0	14	56	28	2	59	144	3	1	86	41	100	0	792
07:00	9	77	26	1	4	56	31	1	69	89	3	0	84	54	77	0	581
07:15	4	85	28	0	8	67	47	4	90	136	3	0	74	57	98	0	701
07:30	9	44	25	1	11	57	30	0	67	126	5	0	55	86	133	0	649
07:45	15	99	19	0	7	15	13	0	21	98	3	0	25	29	51	0	395
Total	37	305	98	2	30	195	121	5	247	449	14	0	238	226	359	0	2326
08:00	10	93	18	0	8	13	16	0	17	96	4	0	34	19	22	0	350
08:15	11	84	17	2	5	16	17	0	16	92	1	0	20	16	19	0	316
Grand Total	80	673	178	4	57	280	182	7	339	781	22	1	378	302	500	0	3784
Apprch %	8.6	72	19	0.4	10.8	53.2	34.6	1.3	29.7	68.3	1.9	0.1	32	25.6	42.4	0	
Total %	2.1	17.8	4.7	0.1	1.5	7.4	4.8	0.2	9	20.6	0.6	0	10	8	13.2	0	
Motorcycles	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	5
% Motorcycles	0	0.1	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.1
Cars & Light Goods	75	650	175	0	56	278	176	0	331	763	20	0	376	300	497	0	3697
% Cars & Light Goods	93.8	96.6	98.3	0	98.2	99.3	96.7	0	97.6	97.7	90.9	0	99.5	99.3	99.4	0	97.7
Buses	2	16	1	0	1	2	3	0	5	8	2	0	2	2	1	0	45
% Buses	2.5	2.4	0.6	0	1.8	0.7	1.6	0	1.5	1	9.1	0	0.5	0.7	0.2	0	1.2
Single-Unit Trucks	3	6	2	0	0	0	3	0	3	6	0	0	0	0	2	0	25
% Single-Unit Trucks	3.8	0.9	1.1	0	0	0	1.6	0	0.9	0.8	0	0	0	0	0.4	0	0.7
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	1	0	0	0	3	0	0	0	0	0	0	0	0	4
% Bicycles on Crosswalk	0	0	0	25	0	0	0	42.9	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	3	0	0	0	4	0	0	0	1	0	0	0	0	8
% Pedestrians	0	0	0	75	0	0	0	57.1	0	0	0	100	0	0	0	0	0.2

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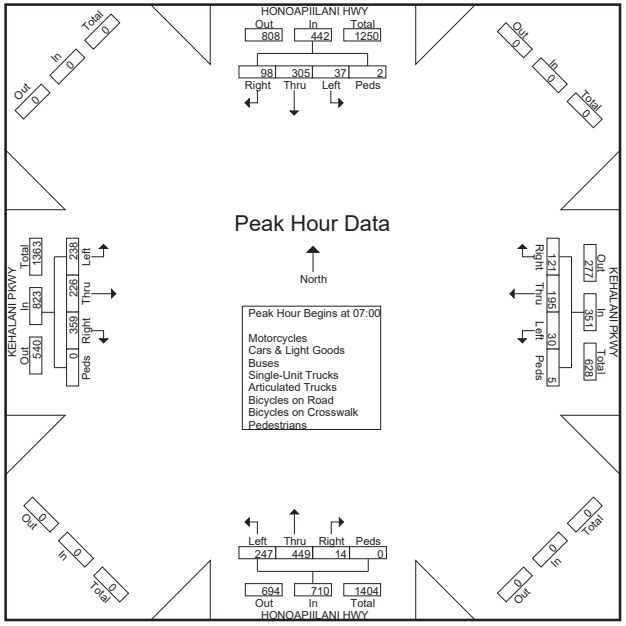
File Name : Honoapiilani Hwy - Kehalani Pkwy
Site Code :
Start Date : 5/10/2018
Page No : 2

	HONOAPIILANI HWY SOUTHBOUND					KEHALANI PKWY WESTBOUND					HONOAPIILANI HWY NORTHBOUND					KEHALANI PKWY 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 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	9	77	26	**1**	113	4	56	31	1	92	69	89	3	0	161	**84**	54	77	0	215	581
07:15	4	85	**28**	0	117	8	**67**	**47**	**4**	**126**	**90**	**136**	3	0	**229**	74	57	98	0	229	**701**
07:30	9	44	25	1	79	**11**	57	30	0	98	67	126	**5**	0	198	55	**86**	**133**	0	**274**	649
07:45	**15**	**99**	19	0	**133**	7	15	13	0	35	21	98	3	0	122	25	29	51	0	105	395
Total Volume	37	305	98	2	442	30	195	121	5	351	247	449	14	0	710	238	226	359	0	823	2326
% App. Total	8.4	69	22.2	0.5		8.5	55.6	34.5	1.4		34.8	63.2	2	0		28.9	27.5	43.6	0		
PHF	.617	.770	.875	.500	.831	.682	.728	.644	.313	.696	.686	.825	.700	.000	.775	.708	.657	.675	.000	.751	.830



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File Name : Honoapiilani Hwy - Kehalani Pkwy
Site Code :
Start Date : 5/10/2018
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				KEHALANI PKWY WESTBOUND				HONOAPIILANI HWY NORTHBOUND				KEHALANI PKWY EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:15	19	98	21	0	4	32	19	2	23	101	6	0	31	27	37	0	420
15:30	10	106	31	3	7	33	15	0	33	118	7	0	24	28	35	0	450
15:45	10	77	35	4	1	23	19	0	33	136	4	0	33	21	27	2	425
Total	39	281	87	7	12	88	53	2	89	355	17	0	88	76	99	2	1295
16:00	20	121	37	2	2	25	17	0	23	122	6	0	33	21	32	2	463
16:15	14	104	27	0	5	18	22	0	39	110	4	0	30	17	26	0	416
16:30	12	141	40	2	2	32	20	0	43	108	5	0	28	13	28	0	474
16:45	21	113	48	2	5	30	25	0	38	93	8	0	29	21	35	0	468
Total	67	479	152	6	14	105	84	0	143	433	23	0	120	72	121	2	1821
17:00	25	127	48	0	5	34	14	0	36	102	5	0	19	17	24	1	457
Grand Total	131	887	287	13	31	227	151	2	268	890	45	0	227	165	244	5	3573
Apprch %	9.9	67.3	21.8	1	7.5	55.2	36.7	0.5	22.3	74	3.7	0	35.4	25.7	38.1	0.8	
Total %	3.7	24.8	8	0.4	0.9	6.4	4.2	0.1	7.5	24.9	1.3	0	6.4	4.6	6.8	0.1	
Motorcycles	2	1	0	0	0	2	0	0	0	2	0	0	1	0	0	0	8
% Motorcycles	1.5	0.1	0	0	0	0.9	0	0	0	0.2	0	0	0.4	0	0	0	0.2
Cars & Light Goods	129	871	287	0	29	224	148	0	267	878	44	0	226	165	243	0	3511
% Cars & Light Goods	98.5	98.2	100	0	93.5	98.7	98	0	99.6	98.7	97.8	0	99.6	100	99.6	0	98.3
Buses	0	11	0	0	0	1	3	0	0	4	0	0	0	0	0	1	20
% Buses	0	1.2	0	0	0	0.4	2	0	0	0.4	0	0	0	0	0	20	0.6
Single-Unit Trucks	0	4	0	0	1	0	0	0	1	6	1	0	0	0	1	0	14
% Single-Unit Trucks	0	0.5	0	0	3.2	0	0	0	0.4	0.7	2.2	0	0	0	0.4	0	0.4
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	1	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	3.2	0	0	0	0	0	0	0	0	0	0	0	0
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	50	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	13	0	0	0	1	0	0	0	0	0	0	0	4	18
% Pedestrians	0	0	0	100	0	0	0	50	0	0	0	0	0	0	0	80	0.5

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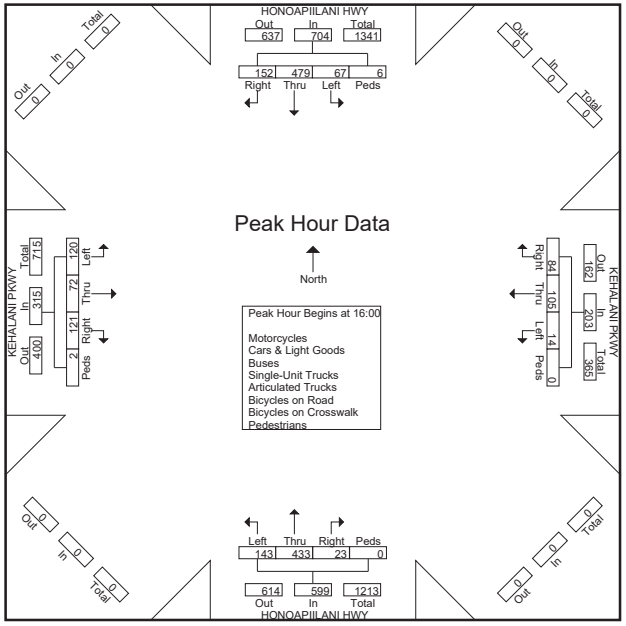
File Name : Honoapiilani Hwy - Kehalani Pkwy
Site Code :
Start Date : 5/10/2018
Page No : 2

	HONOAPIILANI HWY SOUTHBOUND					KEHALANI PKWY WESTBOUND					HONOAPIILANI HWY NORTHBOUND					KEHALANI PKWY 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 17:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	20	121	37	**2**	180	2	25	17	0	44	23	**122**	6	0	151	**33**	**21**	32	**2**	**88**	463
16:15	14	104	27	0	145	**5**	18	22	0	45	39	110	4	0	153	30	17	26	0	73	416
16:30	12	**141**	40	2	**195**	2	**32**	20	0	54	**43**	108	5	0	**156**	28	13	28	0	69	**474**
16:45	**21**	113	**48**	2	184	5	30	**25**	0	**60**	38	93	**8**	0	139	29	21	**35**	0	85	468
Total Volume	67	479	152	6	704	14	105	84	0	203	143	433	23	0	599	120	72	121	2	315	1821
% App. Total	9.5	68	21.6	0.9		6.9	51.7	41.4	0		23.9	72.3	3.8	0		38.1	22.9	38.4	0.6		
PHF	.798	.849	.792	.750	.903	.700	.820	.840	.000	.846	.831	.887	.719	.000	.960	.909	.857	.864	.250	.895	.960



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File Name : Honoapiilani Hwy - Kuikahi Dr
Site Code :
Start Date : 3/13/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				KUIKAHI DR WESTBOUND				HONOAPIILANI HWY NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	31	96	0	0	53	2	22	0	2	33	54	0	2	25	12	0	332
06:45	49	95	0	1	48	2	32	0	1	43	69	0	3	29	9	0	381
Total	80	191	0	1	101	4	54	0	3	76	123	0	5	54	21	0	713
07:00	68	118	0	2	60	4	54	0	3	67	77	0	9	27	24	0	513
07:15	69	100	0	0	70	8	72	1	4	110	81	0	17	29	8	0	569
07:30	70	139	3	0	70	12	78	0	5	130	77	0	10	26	20	0	640
07:45	70	117	3	0	79	12	51	0	4	78	82	0	7	22	16	0	541
Total	277	474	6	2	279	36	255	1	16	385	317	0	43	104	68	0	2263
08:00	34	94	1	0	86	18	38	0	3	63	62	0	3	20	13	0	435
08:15	31	84	1	0	61	13	36	0	2	71	65	0	0	25	9	1	399
Grand Total	422	843	8	3	527	71	383	1	24	595	567	0	51	203	111	1	3810
Apprch %	33.1	66.1	0.6	0.2	53.7	7.2	39	0.1	2	50.2	47.8	0	13.9	55.5	30.3	0.3	
Total %	11.1	22.1	0.2	0.1	13.8	1.9	10.1	0	0.6	15.6	14.9	0	1.3	5.3	2.9	0	
Motorcycles	0	1	0	0	2	0	1	0	0	6	2	0	0	1	0	0	13
% Motorcycles	0	0.1	0	0	0.4	0	0.3	0	0	1	0.4	0	0	0.5	0	0	0.3
Cars & Light Goods	416	822	7	0	493	69	369	0	24	584	560	0	51	199	110	0	3704
% Cars & Light Goods	98.6	97.5	87.5	0	93.5	97.2	96.3	0	100	98.2	98.8	0	100	98	99.1	0	97.2
Buses	5	15	1	0	1	0	4	0	0	3	2	0	0	2	1	0	34
% Buses	1.2	1.8	12.5	0	0.2	0	1	0	0	0.5	0.4	0	0	1	0.9	0	0.9
Single-Unit Trucks	0	5	0	0	27	2	9	0	0	2	3	0	0	1	0	0	49
% Single-Unit Trucks	0	0.6	0	0	5.1	2.8	2.3	0	0	0.3	0.5	0	0	0.5	0	0	1.3
Articulated Trucks	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	4
% Articulated Trucks	0.2	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Road	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0.2	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	1	0	0	0	0	0	0	0	1	5
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0.1

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File Name : Honoapiilani Hwy - Kuikahi Dr
Site Code :
Start Date : 3/13/2019
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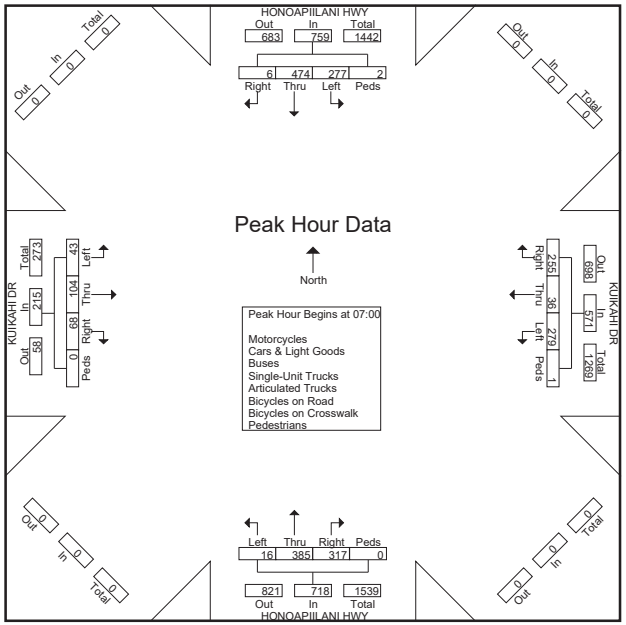
	HONOAPIILANI HWY SOUTHBOUND					KUIKAHI DR WESTBOUND					HONOAPIILANI HWY NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	68	118	0	**2**	188	60	4	54	0	118	3	67	77	0	147	9	27	**24**	0	**60**	513
07:15	69	100	0	0	169	70	8	72	**1**	151	4	110	81	0	195	**17**	**29**	8	0	54	569
07:30	**70**	**139**	**3**	0	**212**	70	**12**	**78**	0	**160**	**5**	**130**	77	0	**212**	10	26	20	0	56	**640**
07:45	70	117	3	0	190	**79**	12	51	0	142	4	78	**82**	0	164	7	22	16	0	45	541
Total Volume	277	474	6	2	759	279	36	255	1	571	16	385	317	0	718	43	104	68	0	215	2263
% App. Total	36.5	62.5	0.8	0.3		48.9	6.3	44.7	0.2		2.2	53.6	44.2	0		20	48.4	31.6	0		
PHF	.989	.853	.500	.250	.895	.883	.750	.817	.250	.892	.800	.740	.966	.000	.847	.632	.897	.708	.000	.896	.884



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File Name : Honoapiilani Hwy - Kuikahi Dr
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				KUIKAHI DR WESTBOUND				HONOAPIILANI HWY NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:30	41	82	4	1	48	16	38	0	8	101	101	0	3	14	6	0	463
15:45	59	70	3	0	64	25	40	0	4	125	82	0	1	15	9	0	497
Total	100	152	7	1	112	41	78	0	12	226	183	0	4	29	15	0	960
16:00	59	103	2	0	56	19	44	2	7	141	73	0	2	17	7	0	532
16:15	57	77	4	0	81	28	37	0	14	90	85	0	5	19	4	0	501
16:30	47	113	7	0	63	25	27	0	14	110	101	0	4	9	8	0	528
16:45	66	131	10	0	66	22	20	0	11	96	82	0	5	23	4	0	536
Total	229	424	23	0	266	94	128	2	46	437	341	0	16	68	23	0	2097
17:00	44	83	8	0	63	19	35	0	5	97	74	0	4	16	5	0	453
17:15	49	86	9	0	77	25	32	0	13	91	67	0	0	20	4	0	473
Grand Total	422	745	47	1	518	179	273	2	76	851	665	0	24	133	47	0	3983
Apprch %	34.7	61.3	3.9	0.1	53.3	18.4	28.1	0.2	4.8	53.5	41.8	0	11.8	65.2	23	0	
Total %	10.6	18.7	1.2	0	13	4.5	6.9	0.1	1.9	21.4	16.7	0	0.6	3.3	1.2	0	
Motorcycles	0	9	0	0	0	0	0	0	0	2	3	0	0	0	0	0	14
% Motorcycles	0	1.2	0	0	0	0	0	0	0	0.2	0.5	0	0	0	0	0	0.4
Cars & Light Goods	415	730	46	0	515	179	271	0	76	842	647	0	24	133	46	0	3924
% Cars & Light Goods	98.3	98	97.9	0	99.4	100	99.3	0	100	98.9	97.3	0	100	100	97.9	0	98.5
Buses	4	5	0	0	1	0	0	0	0	1	2	0	0	0	0	0	13
% Buses	0.9	0.7	0	0	0.2	0	0	0	0	0.1	0.3	0	0	0	0	0	0.3
Single-Unit Trucks	3	0	0	0	2	0	1	0	0	6	12	0	0	0	1	0	25
% Single-Unit Trucks	0.7	0	0	0	0.4	0	0.4	0	0	0.7	1.8	0	0	0	2.1	0	0.6
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	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	4
% Bicycles on Road	0	0.1	2.1	0	0	0	0.4	0	0	0	0.2	0	0	0	0	0	0.1
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	50	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
% Pedestrians	0	0	0	100	0	0	0	50	0	0	0	0	0	0	0	0	0.1

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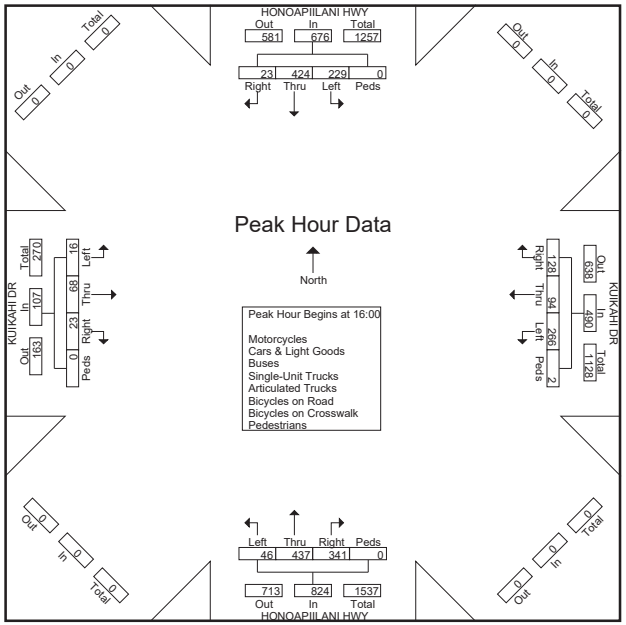
	HONOAPIILANI HWY SOUTHBOUND					KUIKAHI DR WESTBOUND					HONOAPIILANI HWY NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:30 to 17:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	59	103	2	0	164	56	19	**44**	**2**	121	7	**141**	73	0	221	2	17	7	0	26	532
16:15	57	77	4	0	138	**81**	**28**	37	0	**146**	**14**	90	85	0	189	**5**	19	4	0	28	501
16:30	47	113	7	0	167	63	25	27	0	115	14	110	**101**	0	**225**	4	9	**8**	0	21	528
16:45	**66**	**131**	**10**	0	**207**	66	22	20	0	108	11	96	82	0	189	5	**23**	4	0	**32**	**536**
Total Volume	229	424	23	0	676	266	94	128	2	490	46	437	341	0	824	16	68	23	0	107	2097
% App. Total	33.9	62.7	3.4	0		54.3	19.2	26.1	0.4		5.6	53	41.4	0		15	63.6	21.5	0		
PHF	.867	.809	.575	.000	.816	.821	.839	.727	.250	.839	.821	.775	.844	.000	.916	.800	.739	.719	.000	.836	.978



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File Name : Honoapiilani Hwy - Pilikana St
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Start Date : 5/10/2018
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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WESTBOUND				HONOAPIILANI HWY NORTHBOUND				PILIKANA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
05:30	0	96	4	0	0	0	0	0	2	24	0	0	5	0	6	0	137
05:45	0	80	4	0	0	0	0	0	1	34	0	0	8	0	7	0	134
Total	0	176	8	0	0	0	0	0	3	58	0	0	13	0	13	0	271
06:00	0	110	4	0	0	0	0	0	2	49	0	0	13	0	12	0	190
06:15	0	152	6	0	0	0	0	0	3	64	0	0	17	0	14	0	256
06:30	0	145	10	0	0	0	0	0	3	101	0	0	25	0	22	0	306
06:45	0	186	11	0	0	0	0	0	1	110	0	0	28	0	19	0	355
Total	0	593	31	0	0	0	0	0	9	324	0	0	83	0	67	0	1107
07:00	0	165	15	0	0	0	0	0	3	125	0	0	49	0	28	0	385
07:15	0	163	17	0	0	0	0	0	3	164	0	0	57	0	32	0	436
07:30	0	181	15	0	0	0	0	0	7	189	0	0	32	0	19	0	443
07:45	0	180	15	0	0	0	0	0	5	139	0	0	14	0	9	0	362
Total	0	689	62	0	0	0	0	0	18	617	0	0	152	0	88	0	1626
08:00	0	173	16	0	0	0	0	0	5	127	0	0	10	0	12	0	343
08:15	0	139	3	0	0	0	0	0	3	128	0	0	9	0	4	0	286
08:30	0	127	4	0	0	0	0	0	2	119	0	0	11	0	10	0	273
08:45	0	125	10	0	0	0	0	0	9	134	0	0	9	0	6	0	293
Total	0	564	33	0	0	0	0	0	19	508	0	0	39	0	32	0	1195
09:00	0	98	9	0	0	0	0	0	4	105	0	0	12	0	10	0	238
09:15	0	101	5	0	0	0	0	0	0	127	0	0	11	0	4	0	248
09:30	0	103	5	0	0	0	0	0	3	124	0	0	17	0	4	0	256
09:45	0	89	9	0	0	0	0	0	3	118	0	0	11	0	4	0	234
Total	0	391	28	0	0	0	0	0	10	474	0	0	51	0	22	0	976
10:00	0	105	9	0	0	0	0	0	4	117	0	0	19	0	4	0	258
10:15	0	117	10	0	0	0	0	0	1	84	0	0	11	0	3	0	226
10:30	0	106	13	0	0	0	0	0	4	160	0	0	7	0	1	0	291
10:45	0	107	8	0	0	0	0	0	2	108	0	0	7	0	1	0	233
Total	0	435	40	0	0	0	0	0	11	469	0	0	44	0	9	0	1008
11:00	0	92	13	0	0	0	0	0	2	120	0	0	8	0	4	0	239
11:15	0	105	16	0	0	0	0	0	8	127	0	0	11	0	7	0	274
11:30	0	112	13	0	0	0	0	0	1	100	0	0	11	0	2	0	239
11:45	0	98	8	0	0	0	0	0	4	114	0	0	11	0	11	0	246
Total	0	407	50	0	0	0	0	0	15	461	0	0	41	0	24	0	998
12:00	0	99	10	0	0	0	0	0	1	129	0	0	14	0	3	0	256
12:15	0	120	17	0	0	0	0	0	3	131	0	0	9	0	7	0	287
12:30	0	139	9	0	0	0	0	0	9	116	0	0	12	0	7	0	292
12:45	0	131	19	0	0	0	0	0	6	132	0	0	10	0	5	0	303
Total	0	489	55	0	0	0	0	0	19	508	0	0	45	0	22	0	1138
13:00	0	129	19	0	0	0	0	0	6	126	0	0	10	0	5	0	295
13:15	0	106	13	0	0	0	0	0	6	125	0	0	11	0	7	0	268
13:30	0	131	15	0	0	0	0	0	0	143	0	0	11	0	6	0	306
13:45	0	116	12	0	0	0	0	0	3	150	0	0	9	0	5	0	295
Total	0	482	59	0	0	0	0	0	15	544	0	0	41	0	23	0	1164
14:00	0	127	10	0	0	0	0	0	8	119	0	0	17	0	7	0	288

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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WESTBOUND				HONOAPIILANI HWY NORTHBOUND				PILIKANA ST EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
14:15	0	123	19	0	0	0	0	0	12	142	0	0	11	0	5	0	312
14:30	0	131	20	0	0	0	0	0	13	166	0	0	12	0	6	0	348
14:45	0	123	19	0	0	0	0	0	10	180	0	0	17	0	3	0	352
Total	0	504	68	0	0	0	0	0	43	607	0	0	57	0	21	0	1300
15:00	0	147	20	0	0	0	0	0	7	150	0	0	23	0	6	0	353
15:15	0	140	16	0	0	0	0	0	7	172	0	0	16	0	1	0	352
15:30	0	153	27	0	0	0	0	0	14	169	0	0	15	0	3	0	381
15:45	0	130	25	0	0	0	0	0	9	183	0	0	25	0	5	1	378
Total	0	570	88	0	0	0	0	0	37	674	0	0	79	0	15	1	1464
16:00	0	128	26	0	0	0	0	0	12	177	0	0	24	0	11	0	378
16:15	0	131	34	0	0	0	0	0	14	179	0	0	21	0	12	0	391
16:30	0	136	31	0	0	0	0	0	21	178	0	0	29	0	2	1	398
16:45	0	170	34	0	0	0	0	0	12	163	0	0	21	0	5	0	405
Total	0	565	125	0	0	0	0	0	59	697	0	0	95	0	30	1	1572
17:00	0	150	28	0	0	0	0	0	15	171	0	0	13	0	11	0	388
Grand Total	0	6015	675	0	0	0	0	0	273	6112	0	0	753	0	377	2	14207
Apprch %	0	89.9	10.1	0	0	0	0	0	4.3	95.7	0	0	66.5	0	33.3	0.2	
Total %	0	42.3	4.8	0	0	0	0	0	1.9	43	0	0	5.3	0	2.7	0	
Motorcycles	0	17	0	0	0	0	0	0	2	22	0	0	0	0	1	0	42
% Motorcycles	0	0.3	0	0	0	0	0	0	0.7	0.4	0	0	0	0	0.3	0	0.3
Cars & Light Goods	0	5823	668	0	0	0	0	0	265	5932	0	0	747	0	371	0	13806
% Cars & Light Goods	0	96.8	99	0	0	0	0	0	97.1	97.1	0	0	99.2	0	98.4	0	97.2
Buses	0	54	1	0	0	0	0	0	2	42	0	0	1	0	2	0	102
% Buses	0	0.9	0.1	0	0	0	0	0	0.7	0.7	0	0	0.1	0	0.5	0	0.7
Single-Unit Trucks	0	93	6	0	0	0	0	0	2	93	0	0	5	0	3	0	202
% Single-Unit Trucks	0	1.5	0.9	0	0	0	0	0	0.7	1.5	0	0	0.7	0	0.8	0	1.4
Articulated Trucks	0	10	0	0	0	0	0	0	0	8	0	0	0	0	0	0	18
% Articulated Trucks	0	0.2	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Road	0	18	0	0	0	0	0	0	2	15	0	0	0	0	0	0	35
% Bicycles on Road	0	0.3	0	0	0	0	0	0	0.7	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	0	0	0	0	0	0	0	0	0	0	0	0	2	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0

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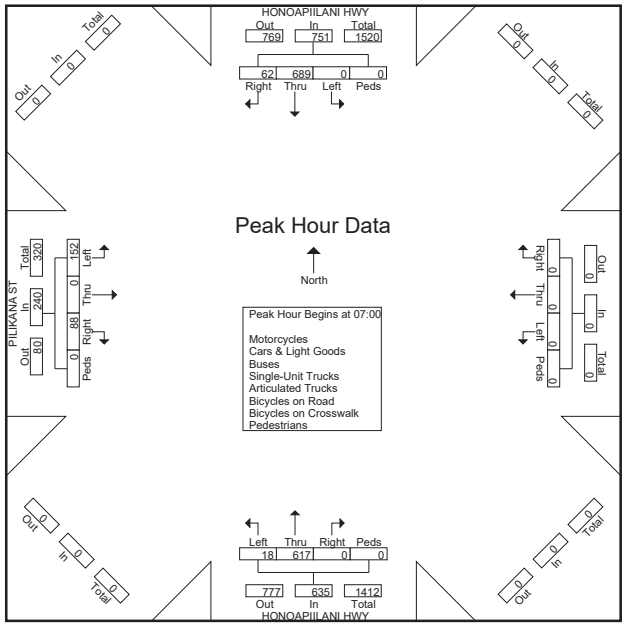
	HONOAPIILANI HWY SOUTHBOUND					WESTBOUND					HONOAPIILANI HWY NORTHBOUND					PILIKANA ST EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 05:30 to 17:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	165	15	0	180	0	0	0	0	0	3	125	0	0	128	49	0	28	0	77	385
07:15	0	163	**17**	0	180	0	0	0	0	0	3	164	0	0	167	**57**	0	**32**	0	**89**	436
07:30	0	**181**	15	0	**196**	0	0	0	0	0	**7**	**189**	0	0	**196**	32	0	19	0	51	**443**
07:45	0	180	15	0	195	0	0	0	0	0	5	139	0	0	144	14	0	9	0	23	362
Total Volume	0	689	62	0	751	0	0	0	0	0	18	617	0	0	635	152	0	88	0	240	1626
% App. Total	0	91.7	8.3	0		0	0	0	0		2.8	97.2	0	0		63.3	0	36.7	0		
PHF	.000	.952	.912	.000	.958	.000	.000	.000	.000	.000	.643	.816	.000	.000	.810	.667	.000	.688	.000	.674	.918



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WESTBOUND				PILIKANA ST NORTHBOUND				HONOAPIILANI HWY EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	144	10	0	0	0	0	0	3	101	0	0	25	0	22	0	305
06:45	0	184	11	0	0	0	0	0	1	109	0	0	28	0	19	0	352
Total	0	328	21	0	0	0	0	0	4	210	0	0	53	0	41	0	657
07:00	0	163	15	0	0	0	0	0	3	126	0	0	49	0	28	0	384
07:15	0	163	17	0	0	0	0	0	3	164	0	0	58	0	32	0	437
07:30	0	181	15	0	0	0	0	0	7	189	0	0	32	0	19	0	443
07:45	0	180	15	0	0	0	0	0	5	138	0	0	14	0	9	0	361
Total	0	687	62	0	0	0	0	0	18	617	0	0	153	0	88	0	1625
08:00	0	173	16	0	0	0	0	0	5	125	0	0	10	0	12	0	341
08:15	0	138	3	0	0	0	0	0	3	128	0	0	9	0	4	0	285
Grand Total	0	1326	102	0	0	0	0	0	30	1080	0	0	225	0	145	0	2908
Apprch %	0	92.9	7.1	0	0	0	0	0	2.7	97.3	0	0	60.8	0	39.2	0	
Total %	0	45.6	3.5	0	0	0	0	0	1	37.1	0	0	7.7	0	5	0	
Motorcycles	0	7	0	0	0	0	0	0	0	5	0	0	0	0	0	0	12
% Motorcycles	0	0.5	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.4
Cars & Light Goods	0	1273	101	0	0	0	0	0	29	1056	0	0	223	0	145	0	2827
% Cars & Light Goods	0	96	99	0	0	0	0	0	96.7	97.8	0	0	99.1	0	100	0	97.2
Buses	0	12	1	0	0	0	0	0	1	10	0	0	0	0	0	0	24
% Buses	0	0.9	1	0	0	0	0	0	3.3	0.9	0	0	0	0	0	0	0.8
Single-Unit Trucks	0	26	0	0	0	0	0	0	0	7	0	0	1	0	0	0	34
% Single-Unit Trucks	0	2	0	0	0	0	0	0	0	0.6	0	0	0.4	0	0	0	1.2
Articulated Trucks	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
% Articulated Trucks	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Bicycles on Road	0	1	0	0	0	0	0	0	0	2	0	0	1	0	0	0	4
% Bicycles on Road	0	0.1	0	0	0	0	0	0	0	0.2	0	0	0.4	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	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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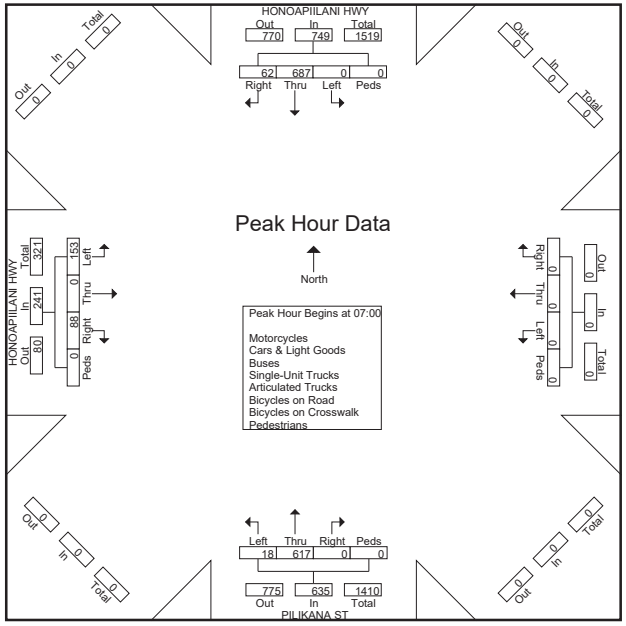
	HONOAPIILANI HWY SOUTHBOUND					WESTBOUND					PILIKANA ST NORTHBOUND					HONOAPIILANI HWY EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	163	15	0	178	0	0	0	0	0	3	126	0	0	129	49	0	28	0	77	384
07:15	0	163	**17**	0	180	0	0	0	0	0	3	164	0	0	167	**58**	0	**32**	0	**90**	437
07:30	0	**181**	15	0	**196**	0	0	0	0	0	**7**	**189**	0	0	**196**	32	0	19	0	51	**443**
07:45	0	180	15	0	195	0	0	0	0	0	5	138	0	0	143	14	0	9	0	23	361
Total Volume	0	687	62	0	749	0	0	0	0	0	18	617	0	0	635	153	0	88	0	241	1625
% App. Total	0	91.7	8.3	0		0	0	0	0		2.8	97.2	0	0		63.5	0	36.5	0		
PHF	.000	.949	.912	.000	.955	.000	.000	.000	.000	.000	.643	.816	.000	.000	.810	.659	.000	.688	.000	.669	.917



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WESTBOUND				PILIKANA ST NORTHBOUND				HONOAPIILANI HWY EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:15	0	140	16	0	0	0	0	0	7	170	0	0	16	0	1	0	350
15:30	0	153	27	0	0	0	0	0	14	169	0	0	15	0	4	0	382
15:45	0	130	25	0	0	0	0	0	9	183	0	0	25	0	5	1	378
Total	0	423	68	0	0	0	0	0	30	522	0	0	56	0	10	1	1110
16:00	0	128	26	0	0	0	0	0	12	176	0	0	24	0	11	0	377
16:15	0	130	34	0	0	0	0	0	14	180	0	0	21	0	12	0	391
16:30	0	135	31	0	0	0	0	0	19	177	0	0	29	0	2	1	394
16:45	0	170	34	0	0	0	0	0	12	162	0	0	21	0	6	0	405
Total	0	563	125	0	0	0	0	0	57	695	0	0	95	0	31	1	1567
17:00	0	150	28	0	0	0	0	0	15	171	0	0	13	0	11	0	388
Grand Total	0	1136	221	0	0	0	0	0	102	1388	0	0	164	0	52	2	3065
Apprch %	0	83.7	16.3	0	0	0	0	0	6.8	93.2	0	0	75.2	0	23.9	0.9	
Total %	0	37.1	7.2	0	0	0	0	0	3.3	45.3	0	0	5.4	0	1.7	0.1	
Motorcycles	0	2	0	0	0	0	0	0	2	5	0	0	0	0	0	0	9
% Motorcycles	0	0.2	0	0	0	0	0	0	2	0.4	0	0	0	0	0	0	0.3
Cars & Light Goods	0	1122	217	0	0	0	0	0	100	1359	0	0	163	0	49	0	3010
% Cars & Light Goods	0	98.8	98.2	0	0	0	0	0	98	97.9	0	0	99.4	0	94.2	0	98.2
Buses	0	10	0	0	0	0	0	0	0	9	0	0	0	0	0	0	19
% Buses	0	0.9	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0.6
Single-Unit Trucks	0	2	4	0	0	0	0	0	0	12	0	0	1	0	1	0	20
% Single-Unit Trucks	0	0.2	1.8	0	0	0	0	0	0	0.9	0	0	0.6	0	1.9	0	0.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	3
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	3.8	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	0	0	0	0	0	0	0	0	2	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0.1

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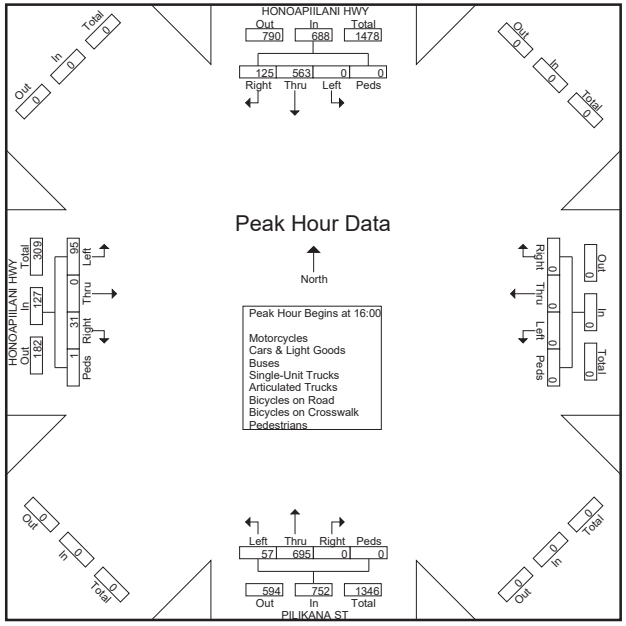
	HONOAPIILANI HWY SOUTHBOUND					WESTBOUND					PILIKANA ST NORTHBOUND					HONOAPIILANI HWY EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	0	128	26	0	154	0	0	0	0	0	12	176	0	0	188	24	0	11	0	**35**	377
16:15	0	130	**34**	0	164	0	0	0	0	0	14	**180**	0	0	194	21	0	**12**	0	33	391
16:30	0	135	31	0	166	0	0	0	0	0	**19**	177	0	0	**196**	**29**	0	2	**1**	32	394
16:45	0	**170**	34	0	**204**	0	0	0	0	0	12	162	0	0	174	21	0	6	0	27	**405**
Total Volume	0	563	125	0	688	0	0	0	0	0	57	695	0	0	752	95	0	31	1	127	1567
% App. Total	0	81.8	18.2	0		0	0	0	0		7.6	92.4	0	0		74.8	0	24.4	0.8		
PHF	.000	.828	.919	.000	.843	.000	.000	.000	.000	.000	.750	.965	.000	.000	.959	.819	.000	.646	.250	.907	.967



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WAIKO RD WESTBOUND				HONOAPIILANI HWY NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	16	130	2	0	10	0	3	0	0	89	4	0	3	7	2	1	267
06:45	15	206	1	0	19	1	5	0	1	97	12	0	7	5	7	0	376
Total	31	336	3	0	29	1	8	0	1	186	16	0	10	12	9	1	643
07:00	28	161	0	0	16	2	9	0	0	112	13	1	3	4	1	0	350
07:15	29	154	0	0	18	1	14	0	1	141	17	0	6	5	1	0	387
07:30	46	148	1	0	19	4	15	0	3	167	17	0	8	0	2	0	430
07:45	40	161	5	0	22	0	10	0	0	138	20	0	3	4	2	0	405
Total	143	624	6	0	75	7	48	0	4	558	67	1	20	13	6	0	1572
08:00	16	160	1	1	16	4	8	0	0	111	11	1	4	2	2	1	338
08:15	5	147	2	0	18	3	3	0	2	123	10	0	8	1	1	1	324
Grand Total	195	1267	12	1	138	15	67	0	7	978	104	2	42	28	18	3	2877
Apprch %	13.2	85.9	0.8	0.1	62.7	6.8	30.5	0	0.6	89.6	9.5	0.2	46.2	30.8	19.8	3.3	
Total %	6.8	44	0.4	0	4.8	0.5	2.3	0	0.2	34	3.6	0.1	1.5	1	0.6	0.1	
Motorcycles	0	6	0	0	0	0	0	0	0	4	1	0	0	0	0	0	11
% Motorcycles	0	0.5	0	0	0	0	0	0	0	0.4	1	0	0	0	0	0	0.4
Cars & Light Goods	191	1220	12	0	137	15	65	0	6	958	101	0	41	27	16	0	2789
% Cars & Light Goods	97.9	96.3	100	0	99.3	100	97	0	85.7	98	97.1	0	97.6	96.4	88.9	0	96.9
Buses	2	10	0	0	1	0	1	0	0	11	1	0	0	1	1	0	28
% Buses	1	0.8	0	0	0.7	0	1.5	0	0	1.1	1	0	0	3.6	5.6	0	1
Single-Unit Trucks	2	23	0	0	0	0	1	0	1	4	0	0	1	0	1	0	33
% Single-Unit Trucks	1	1.8	0	0	0	0	1.5	0	14.3	0.4	0	0	2.4	0	5.6	0	1.1
Articulated Trucks	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	7
% Articulated Trucks	0	0.5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2
Bicycles on Road	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
% Bicycles on Road	0	0.2	0	0	0	0	0	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	1	0	0	0	0	0	0	0	2	0	0	0	3	6
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	100	0.2

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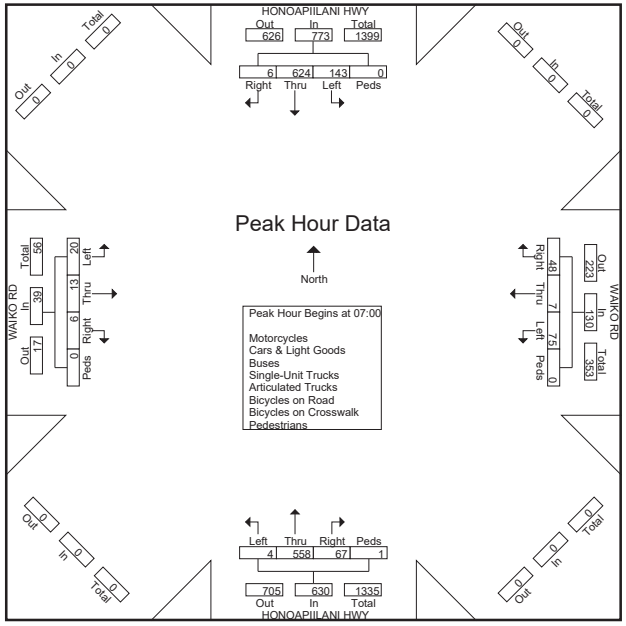
	HONOAPIILANI HWY SOUTHBOUND					WAIKO RD WESTBOUND					HONOAPIILANI HWY NORTHBOUND					WAIKO RD EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	28	**161**	0	0	189	16	2	9	0	27	0	112	13	**1**	126	3	4	1	0	8	350
07:15	29	154	0	0	183	18	1	14	0	33	1	141	17	0	159	6	**5**	1	0	**12**	387
07:30	**46**	148	1	0	195	19	**4**	**15**	0	**38**	**3**	**167**	17	0	**187**	**8**	0	**2**	0	10	**430**
07:45	40	161	**5**	0	**206**	**22**	0	10	0	32	0	138	**20**	0	158	3	4	2	0	9	405
Total Volume	143	624	6	0	773	75	7	48	0	130	4	558	67	1	630	20	13	6	0	39	1572
% App. Total	18.5	80.7	0.8	0		57.7	5.4	36.9	0		0.6	88.6	10.6	0.2		51.3	33.3	15.4	0		
PHF	.777	.969	.300	.000	.938	.852	.438	.800	.000	.855	.333	.835	.838	.250	.842	.625	.650	.750	.000	.813	.914



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	HONOAPIILANI HWY SOUTHBOUND				WAIKO RD WESTBOUND				HONOAPIILANI HWY NORTHBOUND				WAIKO RD EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:15	5	114	3	0	12	2	17	0	2	150	10	0	1	4	3	0	323
15:30	16	144	4	0	17	5	6	1	3	178	21	0	3	2	0	0	400
15:45	11	108	5	0	13	3	18	1	2	183	16	0	2	5	2	0	369
Total	32	366	12	0	42	10	41	2	7	511	47	0	6	11	5	0	1092
16:00	14	125	3	0	14	4	13	1	4	165	19	0	2	1	3	0	368
16:15	21	113	4	0	7	2	21	0	1	171	19	0	6	2	0	1	368
16:30	17	114	3	0	20	3	24	0	2	183	16	0	0	3	0	0	385
16:45	12	164	12	0	16	1	16	0	2	146	22	0	4	1	0	0	396
Total	64	516	22	0	57	10	74	1	9	665	76	0	12	7	3	1	1517
17:00	15	136	6	0	12	4	21	0	1	154	26	0	2	1	1	1	380
Grand Total	111	1018	40	0	111	24	136	3	17	1330	149	0	20	19	9	2	2989
Apprch %	9.5	87.1	3.4	0	40.5	8.8	49.6	1.1	1.1	88.9	10	0	40	38	18	4	
Total %	3.7	34.1	1.3	0	3.7	0.8	4.6	0.1	0.6	44.5	5	0	0.7	0.6	0.3	0.1	
Motorcycles	1	5	0	0	0	0	0	0	0	8	0	0	0	0	0	0	14
% Motorcycles	0.9	0.5	0	0	0	0	0	0	0	0.6	0	0	0	0	0	0	0.5
Cars & Light Goods	109	998	40	0	110	24	135	0	16	1294	147	0	20	19	7	0	2919
% Cars & Light Goods	98.2	98	100	0	99.1	100	99.3	0	94.1	97.3	98.7	0	100	100	77.8	0	97.7
Buses	0	9	0	0	0	0	0	0	0	9	0	0	0	0	0	0	18
% Buses	0	0.9	0	0	0	0	0	0	0	0.7	0	0	0	0	0	0	0.6
Single-Unit Trucks	0	4	0	0	0	0	0	0	0	14	1	0	0	0	0	0	19
% Single-Unit Trucks	0	0.4	0	0	0	0	0	0	0	1.1	0.7	0	0	0	0	0	0.6
Articulated Trucks	1	1	0	0	1	0	0	0	0	4	0	0	0	0	0	0	7
% Articulated Trucks	0.9	0.1	0	0	0.9	0	0	0	0	0.3	0	0	0	0	0	0	0.2
Bicycles on Road	0	1	0	0	0	0	1	0	1	1	1	0	0	0	2	0	7
% Bicycles on Road	0	0.1	0	0	0	0	0.7	0	5.9	0.1	0.7	0	0	0	22.2	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	33.3	0	0	0	0	0	0	0	50	0.1
Pedestrians	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	3
% Pedestrians	0	0	0	0	0	0	0	66.7	0	0	0	0	0	0	0	50	0.1

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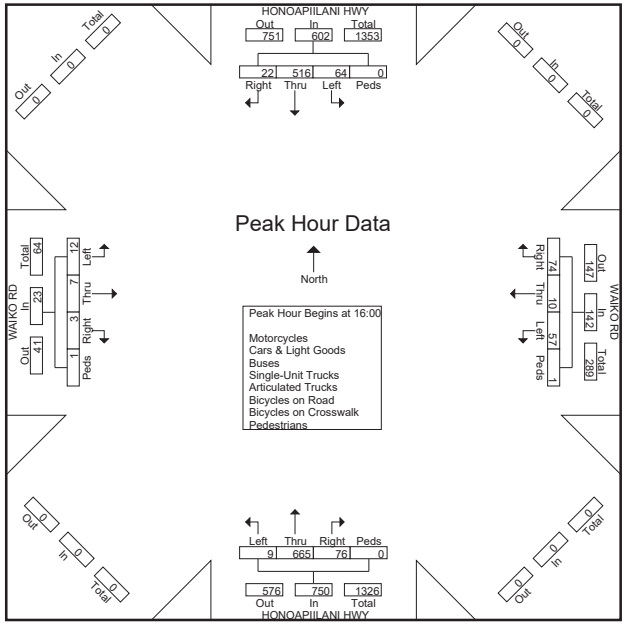
	HONOAPIILANI HWY SOUTHBOUND					WAIKO RD WESTBOUND					HONOAPIILANI HWY NORTHBOUND					WAIKO RD EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	14	125	3	0	142	14	**4**	13	**1**	32	**4**	165	19	0	188	2	1	**3**	0	6	368
16:15	**21**	113	4	0	138	7	2	21	0	30	1	171	19	0	191	**6**	2	0	**1**	**9**	368
16:30	17	114	3	0	134	**20**	3	**24**	0	**47**	2	**183**	16	0	**201**	0	**3**	0	0	3	385
16:45	12	**164**	**12**	0	**188**	16	1	16	0	33	2	146	**22**	0	170	4	1	0	0	5	**396**
Total Volume	64	516	22	0	602	57	10	74	1	142	9	665	76	0	750	12	7	3	1	23	1517
% App. Total	10.6	85.7	3.7	0		40.1	7	52.1	0.7		1.2	88.7	10.1	0		52.2	30.4	13	4.3		
PHF	.762	.787	.458	.000	.801	.713	.625	.771	.250	.755	.563	.908	.864	.000	.933	.500	.583	.250	.250	.639	.958



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI MAUKA PKWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30 AM	3	0	1	0	0	5	1	1	0	0	0	0	2	24	0	0	37
06:45 AM	5	0	0	2	0	6	2	0	0	0	0	0	2	24	0	0	41
Total	8	0	1	2	0	11	3	1	0	0	0	0	4	48	0	0	78
07:00 AM	6	0	1	0	0	6	5	0	0	0	0	0	0	23	0	0	41
07:15 AM	7	0	2	1	0	7	1	0	0	0	0	0	3	28	0	0	49
07:30 AM	12	0	0	2	0	9	3	0	0	0	0	0	1	23	0	0	50
07:45 AM	15	0	2	0	0	17	5	0	0	0	0	0	1	16	0	0	56
Total	40	0	5	3	0	39	14	0	0	0	0	0	5	90	0	0	196
08:00 AM	8	0	3	0	0	8	3	0	0	0	0	0	1	19	0	0	42
08:15 AM	6	0	0	0	0	13	6	0	0	0	0	0	2	21	0	0	48
Grand Total	62	0	9	5	0	71	26	1	0	0	0	0	12	178	0	0	364
Apprch %	81.6	0	11.8	6.6	0	72.4	26.5	1	0	0	0	0	6.3	93.7	0	0	
Total %	17	0	2.5	1.4	0	19.5	7.1	0.3	0	0	0	0	3.3	48.9	0	0	
Motorcycles	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3
% Motorcycles	1.6	0	0	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0.8
Cars & Light Goods	59	0	9	0	0	68	25	0	0	0	0	0	11	176	0	0	348
% Cars & Light Goods	95.2	0	100	0	0	95.8	96.2	0	0	0	0	0	91.7	98.9	0	0	95.6
Buses	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
% Buses	0	0	0	0	0	2.8	0	0	0	0	0	0	0	0	0	0	0.5
Single-Unit Trucks	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	3
% Single-Unit Trucks	1.6	0	0	0	0	0	3.8	0	0	0	0	0	8.3	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	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	1.6	0	0	0	0	1.4	0	0	0	0	0	0	0	0	0	0	0.5
Bicycles on Crosswalk	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0.3
Pedestrians	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	5
% Pedestrians	0	0	0	80	0	0	0	100	0	0	0	0	0	0	0	0	1.4

Austin Tsutsumi & Associates

1871 Wili Pa Loop STE.A
Wailuku, HI 96793
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File Name : Kuikahi_Dr-Kehalani_Mauka_Pkwy
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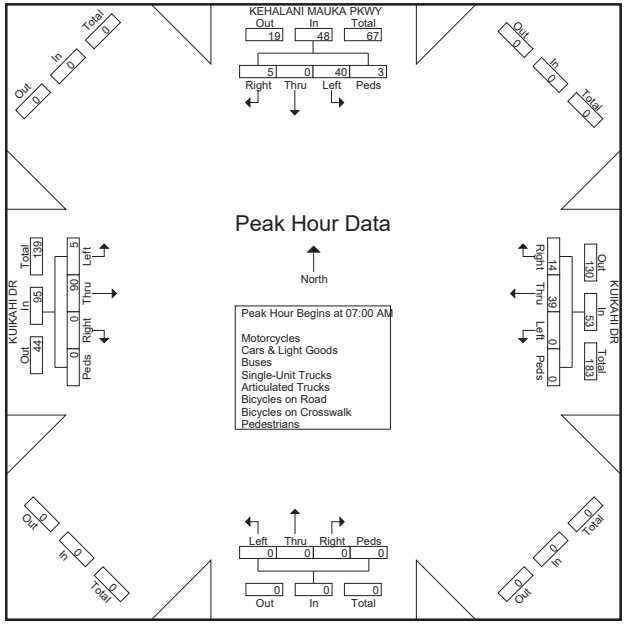
	KEHALANI MAUKA PKWY SOUTHBOUND					KUIKAHI DR WESTBOUND					NORTHBOUND					KUIKAHI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	6	0	1	0	7	0	6	**5**	0	11	0	0	0	0	0	0	23	0	0	23	41
07:15 AM	7	0	**2**	1	10	0	7	1	0	8	0	0	0	0	0	**3**	**28**	0	0	**31**	49
07:30 AM	12	0	0	**2**	14	0	9	3	0	12	0	0	0	0	0	1	23	0	0	24	50
07:45 AM	**15**	0	2	0	**17**	0	**17**	5	0	**22**	0	0	0	0	0	1	16	0	0	17	**56**
Total Volume	40	0	5	3	48	0	39	14	0	53	0	0	0	0	0	5	90	0	0	95	196
% App. Total	83.3	0	10.4	6.2		0	73.6	26.4	0		0	0	0	0		5.3	94.7	0	0		
PHF	.667	.000	.625	.375	.706	.000	.574	.700	.000	.602	.000	.000	.000	.000	.000	.417	.804	.000	.000	.766	.875



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Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEHALANI MAUKA PKWY SOUTHBOUND				KUIKAHI DR WESTBOUND				NORTHBOUND				KUIKAHI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:30 PM	11	0	4	0	0	33	6	0	0	0	0	0	2	17	0	0	73
03:45 PM	6	0	2	0	0	27	14	0	0	0	0	0	1	17	0	0	67
Total	17	0	6	0	0	60	20	0	0	0	0	0	3	34	0	0	140
04:00 PM	7	0	2	0	0	28	9	0	0	0	0	0	5	19	0	0	70
04:15 PM	4	0	2	1	0	22	7	0	0	0	0	0	3	13	0	0	52
04:30 PM	6	0	5	2	0	22	12	0	0	0	0	0	2	15	0	0	64
04:45 PM	6	0	3	1	0	23	14	0	0	0	0	0	1	19	0	0	67
Total	23	0	12	4	0	95	42	0	0	0	0	0	11	66	0	0	253
05:00 PM	6	0	6	2	0	25	6	0	0	0	0	0	3	18	0	0	66
05:15 PM	3	0	4	1	0	31	7	0	0	0	0	0	3	20	0	0	69
Grand Total	49	0	28	7	0	211	75	0	0	0	0	0	20	138	0	0	528
Apprch %	58.3	0	33.3	8.3	0	73.8	26.2	0	0	0	0	0	12.7	87.3	0	0	
Total %	9.3	0	5.3	1.3	0	40	14.2	0	0	0	0	0	3.8	26.1	0	0	
Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	4
% Motorcycles	0	0	0	0	0	0.9	0	0	0	0	0	0	0	1.4	0	0	0.8
Cars & Light Goods	47	0	28	0	0	207	75	0	0	0	0	0	20	135	0	0	512
% Cars & Light Goods	95.9	0	100	0	0	98.1	100	0	0	0	0	0	100	97.8	0	0	97
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	2	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	5
% Single-Unit Trucks	4.1	0	0	0	0	0.9	0	0	0	0	0	0	0	0.7	0	0	0.9
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	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	14.3	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Pedestrians	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
% Pedestrians	0	0	0	85.7	0	0	0	0	0	0	0	0	0	0	0	0	1.1

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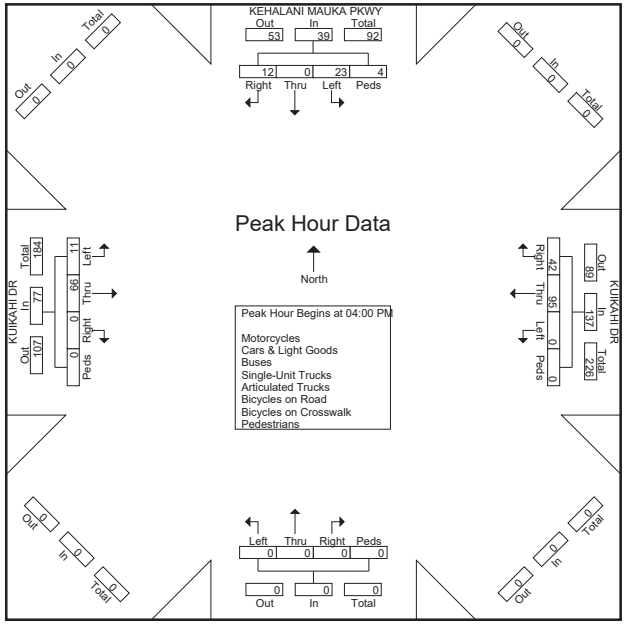
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**7**	0	2	0	9	0	**28**	9	0	**37**	0	0	0	0	0	**5**	**19**	0	0	**24**	**70**
04:15 PM	4	0	2	1	7	0	22	7	0	29	0	0	0	0	0	3	13	0	0	16	52
04:30 PM	6	0	**5**	**2**	**13**	0	22	12	0	34	0	0	0	0	0	2	15	0	0	17	64
04:45 PM	6	0	3	1	10	0	23	**14**	0	37	0	0	0	0	0	1	19	0	0	20	67
Total Volume	23	0	12	4	39	0	95	42	0	137	0	0	0	0	0	11	66	0	0	77	253
% App. Total	59	0	30.8	10.3		0	69.3	30.7	0		0	0	0	0		14.3	85.7	0	0		
PHF	.821	.000	.600	.500	.750	.000	.848	.750	.000	.926	.000	.000	.000	.000	.000	.550	.868	.000	.000	.802	.904



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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

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Existing AM

Intersection	
Intersection Delay, s/veh	57.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	147	118	93	72	163	86	128	215	94	179	173	178
Future Vol, veh/h	147	118	93	72	163	86	128	215	94	179	173	178
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	160	128	101	78	177	93	139	234	102	195	188	193
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	76.6	58.2	43.3	54.9
HCM LOS	F	F	E	F

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	41%	22%	100%	0%
Vol Thru, %	0%	70%	33%	51%	0%	49%
Vol Right, %	0%	30%	26%	27%	0%	51%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	128	309	358	321	179	351
LT Vol	128	0	147	72	179	0
Through Vol	0	215	118	163	0	173
RT Vol	0	94	93	86	0	178
Lane Flow Rate	139	336	389	349	195	382
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.395	0.884	0.998	0.912	0.546	0.975
Departure Headway (Hd)	10.227	9.476	9.232	9.406	10.096	9.196
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	351	383	393	384	356	393
Service Time	8.014	7.262	7.319	7.497	7.885	6.986
HCM Lane V/C Ratio	0.396	0.877	0.99	0.909	0.548	0.972
HCM Control Delay	19.6	53.1	76.6	58.2	24.5	70.4
HCM Lane LOS	C	F	F	F	C	F
HCM 95th-tile Q	1.8	8.8	12	9.5	3.1	11.3

HCM 6th AWSC
2: Waiale Rd & Kaohu St/Oluloa Dr

04/22/2021

Intersection	
Intersection Delay, s/veh	62.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	3	124	15	15	9	145	357	6	2	452	104
Future Vol, veh/h	82	3	124	15	15	9	145	357	6	2	452	104
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	89	3	135	16	16	10	158	388	7	2	491	113
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	13.1	13	59.5	88.1
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	29%	0%	100%	0%	38%	0%
Vol Thru, %	71%	0%	0%	2%	38%	81%
Vol Right, %	0%	100%	0%	98%	23%	19%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	502	6	82	127	39	558
LT Vol	145	0	82	0	15	2
Through Vol	357	0	0	3	15	452
RT Vol	0	6	0	124	9	104
Lane Flow Rate	546	7	89	138	42	607
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.983	0.01	0.205	0.272	0.101	1.085
Departure Headway (Hd)	6.7	5.837	8.618	7.392	8.996	6.44
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	546	617	419	489	401	564
Service Time	4.4	3.537	6.318	5.092	6.996	4.506
HCM Lane V/C Ratio	1	0.011	0.212	0.282	0.105	1.076
HCM Control Delay	60.1	8.6	13.5	12.8	13	88.1
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	13.5	0	0.8	1.1	0.3	18.2

HCM 6th TWSC
3: Waiale Rd & Waiinu Rd

04/22/2021

Intersection	
Int Delay, s/veh	64.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	189	51	467	622	67	570
Future Vol, veh/h	189	51	467	622	67	570
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	145	-	-	-	-
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	205	55	508	676	73	620

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1614	848	0	0	1186	0
Stage 1	848	-	-	-	-	-
Stage 2	766	-	-	-	-	-
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	~ 114	361	-	-	589	-
Stage 1	420	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 92	360	-	-	588	-
Mov Cap-2 Maneuver	~ 92	-	-	-	-	-
Stage 1	419	-	-	-	-	-
Stage 2	372	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 525.4	0	1.3
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	92	360	588	-
HCM Lane V/C Ratio	-	-	2.233	0.154	0.124	-
HCM Control Delay (s)	-	-	$ 662.6	16.8	12	0
HCM Lane LOS	-	-	F	C	B	A
HCM 95th %tile Q(veh)	-	-	18.4	0.5	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	84.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	0	32	8	0	16	7	927	7	11	552	166
Future Vol, veh/h	159	0	32	8	0	16	7	927	7	11	552	166
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	173	0	35	9	0	17	8	1008	8	12	600	180

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1754	1752	693	1763	1838	1015	783	0	0	1019	0	0
Stage 1	717	717	-	1031	1031	-	-	-	-	-	-	-
Stage 2	1037	1035	-	732	807	-	-	-	-	-	-	-
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	~ 67	85	443	66	76	289	835	-	-	681	-	-
Stage 1	421	434	-	281	310	-	-	-	-	-	-	-
Stage 2	279	309	-	413	394	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 60	80	442	58	72	288	833	-	-	679	-	-
Mov Cap-2 Maneuver	~ 60	80	-	58	72	-	-	-	-	-	-	-
Stage 1	410	419	-	274	302	-	-	-	-	-	-	-
Stage 2	256	301	-	368	380	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 830.4	41.6	0.1	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	833	-	-	60	442	124	679	-	-
HCM Lane V/C Ratio	0.009	-	-	2.88	0.079	0.21	0.018	-	-
HCM Control Delay (s)	9.4	0	-	$ 994.8	13.8	41.6	10.4	-	-
HCM Lane LOS	A	A	-	F	B	E	B	-	-
HCM 95th %tile Q(veh)	0	-	-	17.8	0.3	0.8	0.1	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	18.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	119	62	40	847	543	21
Future Vol, veh/h	119	62	40	847	543	21
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	129	67	43	921	590	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1612	605	616	0	-	0
Stage 1	605	-	-	-	-	-
Stage 2	1007	-	-	-	-	-
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	~ 115	498	964	-	-	-
Stage 1	545	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 104	497	961	-	-	-
Mov Cap-2 Maneuver	~ 104	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	352	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	165.1	0.4	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	961	-	104	497	-	-
HCM Lane V/C Ratio	0.045	-	1.244	0.136	-	-
HCM Control Delay (s)	8.9	0	244.1	13.4	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	8.7	0.5	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	319	293	56	32	204	201	135	164	37	178	155	177
Future Volume (veh/h)	319	293	56	32	204	201	135	164	37	178	155	177
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		0.99	0.99		0.99	0.99		0.99
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	399	318	54	35	222	28	147	178	31	193	168	150
Peak Hour Factor	0.80	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	553	549	93	326	310	261	324	317	55	428	207	184
Arrive On Green	0.22	0.35	0.35	0.03	0.17	0.17	0.09	0.21	0.21	0.11	0.23	0.23
Sat Flow, veh/h	1781	1557	264	1781	1870	1575	1781	1548	270	1781	905	808
Grp Volume(v), veh/h	399	0	372	35	222	28	147	0	209	193	0	318
Grp Sat Flow(s),veh/h/ln	1781	0	1822	1781	1870	1575	1781	0	1817	1781	0	1712
Q Serve(g_s), s	11.3	0.0	11.1	1.1	7.5	1.0	4.2	0.0	6.9	5.5	0.0	11.7
Cycle Q Clear(g_c), s	11.3	0.0	11.1	1.1	7.5	1.0	4.2	0.0	6.9	5.5	0.0	11.7
Prop In Lane	1.00		0.15	1.00		1.00	1.00		0.15	1.00		0.47
Lane Grp Cap(c), veh/h	553	0	643	326	310	261	324	0	373	428	0	391
V/C Ratio(X)	0.72	0.00	0.58	0.11	0.72	0.11	0.45	0.00	0.56	0.45	0.00	0.81
Avail Cap(c_a), veh/h	863	0	1067	569	674	568	511	0	600	574	0	566
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.9	0.0	17.5	22.1	26.3	23.6	18.9	0.0	23.8	17.8	0.0	24.4
Incr Delay (d2), s/veh	1.8	0.0	0.8	0.1	3.1	0.2	1.0	0.0	1.3	0.7	0.0	5.9
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	4.5	0.0	4.5	0.4	3.5	0.4	1.7	0.0	3.0	2.2	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.7	0.0	18.4	22.2	29.4	23.8	19.9	0.0	25.1	18.5	0.0	30.2
LnGrp LOS	B	A	B	C	C	C	B	A	C	B	A	C
Approach Vol, veh/h		771			285			356			511	
Approach Delay, s/veh		18.0			28.0			23.0			25.8	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	19.7	5.9	29.5	10.0	21.2	18.4	17.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	13.0	22.0	11.0	39.0	13.0	22.0	26.0	24.0
Max Q Clear Time (g_c+I1), s	7.5	8.9	3.1	13.1	6.2	13.7	13.3	9.5
Green Ext Time (p_c), s	0.2	0.9	0.0	2.5	0.2	1.3	1.1	1.2

Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	130	21	4	247	178	34
Future Vol, veh/h	130	21	4	247	178	34
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	50	-	-	-	-
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	141	23	4	268	193	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	488	212	230	0	-	0
Stage 1	212	-	-	-	-	-
Stage 2	276	-	-	-	-	-
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	539	828	1338	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	537	828	1338	-	-	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	820	-	-	-	-	-
Stage 2	771	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.5	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1338	-	537	828	-	-
HCM Lane V/C Ratio	0.003	-	0.263	0.028	-	-
HCM Control Delay (s)	7.7	0	14.1	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	1	0.1	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	73	16	163	166	28
Future Vol, veh/h	68	73	16	163	166	28
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	74	79	17	177	180	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	406	195	210	0	-	0
Stage 1	195	-	-	-	-	-
Stage 2	211	-	-	-	-	-
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	601	846	1361	-	-	-
Stage 1	838	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	593	846	1361	-	-	-
Mov Cap-2 Maneuver	593	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	824	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1361	-	702	-	-
HCM Lane V/C Ratio	0.013	-	0.218	-	-
HCM Control Delay (s)	7.7	0	11.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	16	4	151	237	5
Future Vol, veh/h	31	16	4	151	237	5
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	34	17	4	164	258	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	433	261	263	0	-	0
Stage 1	261	-	-	-	-	-
Stage 2	172	-	-	-	-	-
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	580	778	1301	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	858	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	578	778	1301	-	-	-
Mov Cap-2 Maneuver	578	-	-	-	-	-
Stage 1	781	-	-	-	-	-
Stage 2	858	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1301	-	633	-	-
HCM Lane V/C Ratio	0.003	-	0.081	-	-
HCM Control Delay (s)	7.8	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	22	5	125	245	12
Future Vol, veh/h	28	22	5	125	245	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	30	24	5	136	266	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	419	273	279	0	-	0
Stage 1	273	-	-	-	-	-
Stage 2	146	-	-	-	-	-
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	591	766	1284	-	-	-
Stage 1	773	-	-	-	-	-
Stage 2	881	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	589	766	1284	-	-	-
Mov Cap-2 Maneuver	640	-	-	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	881	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1284	-	690	-	-
HCM Lane V/C Ratio	0.004	-	0.079	-	-
HCM Control Delay (s)	7.8	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	199	58	82	187	70
Future Vol, veh/h	56	199	58	82	187	70
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	61	216	63	89	203	76

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	446	108
Stage 1	-	-	-	-	108	-
Stage 2	-	-	-	-	338	-
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	1429	-	-	-	570	946
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	722	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	542	946
Mov Cap-2 Maneuver	-	-	-	-	542	-
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	722	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1429	-	-	-	613
HCM Lane V/C Ratio	0.043	-	-	-	0.456
HCM Control Delay (s)	7.6	0	-	-	15.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	2.4

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	83	597	450	58	28	100
Future Vol, veh/h	83	597	450	58	28	100
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	145	-	-	50	0	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	90	649	489	63	30	109

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	553	0	-	0	1319	490
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	829	-
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	1017	-	-	-	173	578
Stage 1	-	-	-	-	616	-
Stage 2	-	-	-	-	429	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1016	-	-	-	157	577
Mov Cap-2 Maneuver	-	-	-	-	157	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	429	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	17.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1016	-	-	-	157	577
HCM Lane V/C Ratio	0.089	-	-	-	0.194	0.188
HCM Control Delay (s)	8.9	-	-	-	33.4	12.7
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7	0.7

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	238	235	359	30	203	121	247	467	14	37	317	98
Future Volume (veh/h)	238	235	359	30	203	121	247	467	14	37	317	98
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		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	340	255	94	33	221	16	268	508	0	40	345	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	405	566	478	323	285	240	423	659		260	480	
Arrive On Green	0.18	0.30	0.30	0.03	0.15	0.15	0.13	0.35	0.00	0.04	0.26	0.00
Sat Flow, veh/h	1493	1870	1580	1781	1870	1575	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	340	255	94	33	221	16	268	508	0	40	345	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1580	1781	1870	1575	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	14.0	8.4	3.4	1.2	8.7	0.7	7.9	18.5	0.0	1.2	12.9	0.0
Cycle Q Clear(g_c), s	14.0	8.4	3.4	1.2	8.7	0.7	7.9	18.5	0.0	1.2	12.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	405	566	478	323	285	240	423	659		260	480	
V/C Ratio(X)	0.84	0.45	0.20	0.10	0.78	0.07	0.63	0.77		0.15	0.72	
Avail Cap(c_a), veh/h	405	566	478	591	489	412	745	1223		752	1223	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.5	21.5	19.8	25.9	31.2	27.8	17.3	22.0	0.0	20.3	25.9	0.0
Incr Delay (d2), s/veh	13.8	0.2	0.1	0.1	1.7	0.0	0.6	4.1	0.0	0.1	4.3	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	6.3	3.6	1.2	0.5	4.0	0.3	2.9	8.0	0.0	0.5	5.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.2	21.8	19.9	25.9	32.9	27.8	17.9	26.1	0.0	20.4	30.2	0.0
LnGrp LOS	D	C	B	C	C	C	B	C		C	C	
Approach Vol, veh/h		689			270			776	A		385	A
Approach Delay, s/veh		28.2			31.7			23.2			29.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	33.0	7.5	28.1	15.2	25.6	19.0	16.6
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	3.2	20.5	3.2	10.4	9.9	14.9	16.0	10.7
Green Ext Time (p_c), s	0.0	6.5	0.0	0.8	0.3	4.2	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	104	68	287	36	262	16	401	331	237	493	6
Future Volume (veh/h)	43	104	68	287	36	262	16	401	331	237	493	6
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	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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	47	113	9	312	39	78	17	436	0	258	536	4
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	362	262	255	500	487	602	279	582		403	770	717
Arrive On Green	0.04	0.13	0.13	0.17	0.26	0.26	0.02	0.31	0.00	0.12	0.41	0.41
Sat Flow, veh/h	1968	2067	1738	1781	1870	1579	1781	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	47	113	9	312	39	78	17	436	0	258	536	4
Grp Sat Flow(s),veh/h/ln	1968	2067	1738	1781	1870	1579	1781	1870	1585	1781	1870	1583
Q Serve(g_s), s	1.6	4.0	0.3	11.2	1.2	2.5	0.5	16.5	0.0	7.2	18.6	0.1
Cycle Q Clear(g_c), s	1.6	4.0	0.3	11.2	1.2	2.5	0.5	16.5	0.0	7.2	18.6	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	362	262	255	500	487	602	279	582		403	770	717
V/C Ratio(X)	0.13	0.43	0.04	0.62	0.08	0.13	0.06	0.75		0.64	0.70	0.01
Avail Cap(c_a), veh/h	507	788	697	619	951	994	674	1427		619	1427	1273
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	31.7	28.8	21.9	22.0	15.9	18.5	24.3	0.0	16.5	19.1	11.8
Incr Delay (d2), s/veh	0.2	0.4	0.0	1.3	0.0	0.0	0.0	4.1	0.0	0.6	2.4	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	0.8	2.0	0.1	4.7	0.5	0.9	0.2	7.4	0.0	2.7	7.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.1	32.1	28.8	23.2	22.0	15.9	18.5	28.4	0.0	17.2	21.5	11.8
LnGrp LOS	C	C	C	C	C	B	B	C		B	C	B
Approach Vol, veh/h		169			429			453	A		798	
Approach Delay, s/veh		30.8			21.8			28.1			20.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	30.5	18.7	15.0	6.6	38.4	8.2	25.5
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.6	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	3.6	18.5	13.2	6.0	2.5	20.6	3.6	4.5
Green Ext Time (p_c), s	0.3	6.0	0.5	0.4	0.0	7.8	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	23.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	153	88	18	647	714	62
Future Volume (veh/h)	153	88	18	647	714	62
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	166	12	20	703	776	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	256	228	309	1201	973	825
Arrive On Green	0.14	0.14	0.02	0.64	0.52	0.52
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	166	12	20	703	776	42
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	4.5	0.3	0.2	11.1	17.4	0.7
Cycle Q Clear(g_c), s	4.5	0.3	0.2	11.1	17.4	0.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	256	228	309	1201	973	825
V/C Ratio(X)	0.65	0.05	0.06	0.59	0.80	0.05
Avail Cap(c_a), veh/h	1042	927	752	3282	2589	2194
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	18.9	8.3	5.3	10.1	6.1
Incr Delay (d2), s/veh	2.8	0.1	0.1	0.5	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.1	0.1	2.7	5.7	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.5	19.0	8.4	5.7	11.6	6.1
LnGrp LOS	C	B	A	A	B	A
Approach Vol, veh/h	178			723	818	
Approach Delay, s/veh	23.2			5.8	11.4	
Approach LOS	C			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	6.2	32.7		12.4		38.9
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	14.6	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.5	19.4		6.5		13.1
Green Ext Time (p_c), s	0.0	7.2		0.5		6.1

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	13	6	77	7	48	4	588	70	143	651	6
Future Volume (veh/h)	20	13	6	77	7	48	4	588	70	143	651	6
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	22	14	2	84	8	34	4	639	72	155	708	4
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	196	101	183	209	19	47	408	894	101	442	1146	972
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.01	0.54	0.54	0.08	0.61	0.61
Sat Flow, veh/h	856	873	1578	940	166	408	1781	1651	186	1781	1870	1585
Grp Volume(v), veh/h	36	0	2	126	0	0	4	0	711	155	708	4
Grp Sat Flow(s),veh/h/ln	1730	0	1578	1514	0	0	1781	0	1837	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.1	3.7	0.0	0.0	0.1	0.0	17.4	2.1	14.2	0.1
Cycle Q Clear(g_c), s	1.0	0.0	0.1	4.8	0.0	0.0	0.1	0.0	17.4	2.1	14.2	0.1
Prop In Lane	0.61		1.00	0.67		0.27	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	297	0	183	275	0	0	408	0	995	442	1146	972
V/C Ratio(X)	0.12	0.00	0.01	0.46	0.00	0.00	0.01	0.00	0.71	0.35	0.62	0.00
Avail Cap(c_a), veh/h	752	0	655	713	0	0	813	0	2135	720	2174	1842
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	24.0	0.0	23.6	25.5	0.0	0.0	7.0	0.0	10.3	8.0	7.3	4.5
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.4	0.0	0.0	0.0	0.0	2.1	0.2	1.2	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	0.5	0.0	0.0	1.7	0.0	0.0	0.0	0.0	6.1	0.5	4.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.1	0.0	23.6	26.0	0.0	0.0	7.0	0.0	12.4	8.1	8.4	4.5
LnGrp LOS	C	A	C	C	A	A	A	A	B	A	A	A
Approach Vol, veh/h		38			126			715			867	
Approach Delay, s/veh		24.0			26.0			12.4			8.4	
Approach LOS		C			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.6	38.6		12.0	5.3	42.9		12.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	3.1	19.4		3.0	2.1	16.2		6.8
Green Ext Time (p_c), s	0.1	13.2		0.1	0.0	13.2		0.4

Intersection Summary	
HCM 6th Ctrl Delay	11.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	149	43	15	66	5
Future Vol, veh/h	5	149	43	15	66	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	5	162	47	16	72	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	63	0	-	0	227	55
Stage 1	-	-	-	-	55	-
Stage 2	-	-	-	-	172	-
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	1540	-	-	-	761	1012
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	858	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1540	-	-	-	759	1012
Mov Cap-2 Maneuver	-	-	-	-	759	-
Stage 1	-	-	-	-	965	-
Stage 2	-	-	-	-	858	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1540	-	-	-	759	1012
HCM Lane V/C Ratio	0.004	-	-	-	0.095	0.005
HCM Control Delay (s)	7.3	-	-	-	10.2	8.6
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0

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

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Existing PM

Intersection	
Intersection Delay, s/veh	102.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	182	152	115	51	185	201	84	151	54	133	168	275
Future Vol, veh/h	182	152	115	51	185	201	84	151	54	133	168	275
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	198	165	125	55	201	218	91	164	59	145	183	299
Number of Lanes	0	1	0	0	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	1	1
HCM Control Delay	137.4	117.7	24.9	101.7
HCM LOS	F	F	C	F

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	41%	12%	100%	0%
Vol Thru, %	0%	74%	34%	42%	0%	38%
Vol Right, %	0%	26%	26%	46%	0%	62%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	205	449	437	133	443
LT Vol	84	0	182	51	133	0
Through Vol	0	151	152	185	0	168
RT Vol	0	54	115	201	0	275
Lane Flow Rate	91	223	488	475	145	482
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.259	0.59	1.187	1.132	0.385	1.158
Departure Headway (Hd)	11.439	10.712	9.515	9.457	10.45	9.464
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	316	339	386	390	347	385
Service Time	9.139	8.412	7.515	7.457	8.15	7.164
HCM Lane V/C Ratio	0.288	0.658	1.264	1.218	0.418	1.252
HCM Control Delay	18.1	27.7	137.4	117.7	19.5	126.4
HCM Lane LOS	C	D	F	F	C	F
HCM 95th-tile Q	1	3.6	18.1	16.2	1.8	17.1

Intersection	
Intersection Delay, s/veh	65.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	10	158	14	4	8	91	406	21	8	497	66
Future Vol, veh/h	58	10	158	14	4	8	91	406	21	8	497	66
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	63	11	172	15	4	9	99	441	23	9	540	72
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	13.7	12.7	54	97.8
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	0%	100%	0%	54%	1%
Vol Thru, %	82%	0%	0%	6%	15%	87%
Vol Right, %	0%	100%	0%	94%	31%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	497	21	58	168	26	571
LT Vol	91	0	58	0	14	8
Through Vol	406	0	0	10	4	497
RT Vol	0	21	0	158	8	66
Lane Flow Rate	540	23	63	183	28	621
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	0.965	0.036	0.144	0.357	0.067	1.114
Departure Headway (Hd)	6.663	5.854	8.562	7.363	9.083	6.463
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	551	615	421	491	397	565
Service Time	4.363	3.554	6.262	5.063	7.083	4.516
HCM Lane V/C Ratio	0.98	0.037	0.15	0.373	0.071	1.099
HCM Control Delay	55.9	8.8	12.7	14.1	12.7	97.8
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	12.9	0.1	0.5	1.6	0.2	19.6

Intersection	
Int Delay, s/veh	80.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	238	32	439	417	62	571
Future Vol, veh/h	238	32	439	417	62	571
Conflicting Peds, #/hr	0	0	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	145	-	-	-	-
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	259	35	477	453	67	621

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1461	706	0	0	932	0
Stage 1	706	-	-	-	-	-
Stage 2	755	-	-	-	-	-
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	~ 142	436	-	-	734	-
Stage 1	489	-	-	-	-	-
Stage 2	464	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 122	435	-	-	733	-
Mov Cap-2 Maneuver	~ 122	-	-	-	-	-
Stage 1	488	-	-	-	-	-
Stage 2	399	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 521.3	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	122	435	733	-
HCM Lane V/C Ratio	-	-	2.12	0.08	0.092	-
HCM Control Delay (s)	-	-	$ 589.5	14	10.4	0
HCM Lane LOS	-	-	F	B	B	A
HCM 95th %tile Q(veh)	-	-	21.6	0.3	0.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	15.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	13	6	1	9	26	809	4	4	714	156
Future Vol, veh/h	70	0	13	6	1	9	26	809	4	4	714	156
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	76	0	14	7	1	10	28	879	4	4	776	170

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1815	1814	864	1816	1897	884	949	0	0	886	0	0
Stage 1	872	872	-	940	940	-	-	-	-	-	-	-
Stage 2	943	942	-	876	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	~ 60	78	354	60	69	344	724	-	-	764	-	-
Stage 1	345	368	-	316	342	-	-	-	-	-	-	-
Stage 2	315	342	-	344	336	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 54	71	353	54	63	343	722	-	-	762	-	-
Mov Cap-2 Maneuver	~ 54	71	-	54	63	-	-	-	-	-	-	-
Stage 1	318	362	-	291	315	-	-	-	-	-	-	-
Stage 2	282	315	-	326	331	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 330.5	46.4	0.3	0
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	722	-	-	54	353	104	762	-	-
HCM Lane V/C Ratio	0.039	-	-	1.409	0.04	0.167	0.006	-	-
HCM Control Delay (s)	10.2	0	-	$ 389	15.6	46.4	9.8	-	-
HCM Lane LOS	B	A	-	F	C	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	6.9	0.1	0.6	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	38	51	765	700	28
Future Vol, veh/h	37	38	51	765	700	28
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	40	41	55	832	761	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1721	779	794	0	-	0
Stage 1	779	-	-	-	-	-
Stage 2	942	-	-	-	-	-
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	98	396	827	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	85	395	825	-	-	-
Mov Cap-2 Maneuver	85	-	-	-	-	-
Stage 1	395	-	-	-	-	-
Stage 2	378	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.5	0.6	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	825	-	85	395	-	-
HCM Lane V/C Ratio	0.067	-	0.473	0.105	-	-
HCM Control Delay (s)	9.7	0	80.7	15.2	-	-
HCM Lane LOS	A	A	F	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2	0.3	-	-

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	284	230	57	61	342	291	39	134	48	275	185	172
Future Volume (veh/h)	284	230	57	61	342	291	39	134	48	275	185	172
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	355	250	53	66	372	56	42	146	38	299	201	154
Peak Hour Factor	0.80	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	472	567	120	435	452	382	235	201	52	431	260	199
Arrive On Green	0.18	0.38	0.38	0.04	0.24	0.24	0.03	0.14	0.14	0.16	0.26	0.26
Sat Flow, veh/h	1781	1496	317	1781	1870	1582	1781	1430	372	1781	981	752
Grp Volume(v), veh/h	355	0	303	66	372	56	42	0	184	299	0	355
Grp Sat Flow(s),veh/h/ln	1781	0	1813	1781	1870	1582	1781	0	1802	1781	0	1733
Q Serve(g_s), s	9.7	0.0	8.8	1.9	13.3	2.0	1.4	0.0	6.9	9.6	0.0	13.4
Cycle Q Clear(g_c), s	9.7	0.0	8.8	1.9	13.3	2.0	1.4	0.0	6.9	9.6	0.0	13.4
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.21	1.00		0.43
Lane Grp Cap(c), veh/h	472	0	687	435	452	382	235	0	253	431	0	458
V/C Ratio(X)	0.75	0.00	0.44	0.15	0.82	0.15	0.18	0.00	0.73	0.69	0.00	0.77
Avail Cap(c_a), veh/h	809	0	1001	639	636	538	456	0	612	431	0	589
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	0.0	16.3	18.9	25.4	21.1	24.9	0.0	29.0	20.1	0.0	24.0
Incr Delay (d2), s/veh	2.5	0.0	0.4	0.2	6.1	0.2	0.4	0.0	4.0	4.8	0.0	4.8
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	3.9	0.0	3.5	0.8	6.4	0.7	0.6	0.0	3.2	4.4	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	0.0	16.8	19.0	31.4	21.2	25.3	0.0	33.0	24.9	0.0	28.9
LnGrp LOS	B	A	B	B	C	C	C	A	C	C	A	C
Approach Vol, veh/h		658			494			226			654	
Approach Delay, s/veh		17.5			28.6			31.6			27.0	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	15.9	6.9	32.8	6.2	24.7	16.6	23.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	11.0	24.0	11.0	39.0	11.0	24.0	26.0	24.0
Max Q Clear Time (g_c+I1), s	11.6	8.9	3.9	10.8	3.4	15.4	11.7	15.3
Green Ext Time (p_c), s	0.0	0.9	0.1	2.0	0.0	1.5	1.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	49	14	30	174	204	73
Future Vol, veh/h	49	14	30	174	204	73
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	50	-	-	-	-
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	53	15	33	189	222	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	517	262	301	0	-	0
Stage 1	262	-	-	-	-	-
Stage 2	255	-	-	-	-	-
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	518	777	1260	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	503	777	1260	-	-	-
Mov Cap-2 Maneuver	503	-	-	-	-	-
Stage 1	759	-	-	-	-	-
Stage 2	788	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.3	1.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1260	-	503	777	-	-
HCM Lane V/C Ratio	0.026	-	0.106	0.02	-	-
HCM Control Delay (s)	7.9	0	13	9.7	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	0.1	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	28	60	147	162	62
Future Vol, veh/h	38	28	60	147	162	62
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	41	30	65	160	176	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	500	210	243	0	-	0
Stage 1	210	-	-	-	-	-
Stage 2	290	-	-	-	-	-
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	530	830	1323	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	759	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	501	830	1323	-	-	-
Mov Cap-2 Maneuver	501	-	-	-	-	-
Stage 1	780	-	-	-	-	-
Stage 2	759	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1323	-	602	-	-
HCM Lane V/C Ratio	0.049	-	0.119	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	17	16	199	175	14
Future Vol, veh/h	10	17	16	199	175	14
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	18	17	216	190	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	448	198	205	0	-	0
Stage 1	198	-	-	-	-	-
Stage 2	250	-	-	-	-	-
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	568	843	1366	-	-	-
Stage 1	835	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	560	843	1366	-	-	-
Mov Cap-2 Maneuver	560	-	-	-	-	-
Stage 1	823	-	-	-	-	-
Stage 2	792	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1366	-	710	-	-
HCM Lane V/C Ratio	0.013	-	0.041	-	-
HCM Control Delay (s)	7.7	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	8	14	201	168	16
Future Vol, veh/h	11	8	14	201	168	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	12	9	15	218	183	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	440	192	200	0	-	0
Stage 1	192	-	-	-	-	-
Stage 2	248	-	-	-	-	-
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	574	850	1372	-	-	-
Stage 1	841	-	-	-	-	-
Stage 2	793	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	568	850	1372	-	-	-
Mov Cap-2 Maneuver	629	-	-	-	-	-
Stage 1	832	-	-	-	-	-
Stage 2	793	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1372	-	706	-	-
HCM Lane V/C Ratio	0.011	-	0.029	-	-
HCM Control Delay (s)	7.7	-	10.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	80	106	172	146	36
Future Vol, veh/h	43	80	106	172	146	36
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	47	87	115	187	159	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	390	209
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	181	-
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	1259	-	-	-	614	831
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	850	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1259	-	-	-	590	831
Mov Cap-2 Maneuver	-	-	-	-	590	-
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	850	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1259	-	-	-	626
HCM Lane V/C Ratio	0.037	-	-	-	0.316
HCM Control Delay (s)	8	0	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	100	497	503	101	48	128
Future Vol, veh/h	100	497	503	101	48	128
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	145	-	-	50	0	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	109	540	547	110	52	139

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	658	0	-	0	1306	548
Stage 1	-	-	-	-	548	-
Stage 2	-	-	-	-	758	-
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	930	-	-	-	176	536
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	463	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	929	-	-	-	155	535
Mov Cap-2 Maneuver	-	-	-	-	155	-
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	463	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	21.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	929	-	-	-	155	535
HCM Lane V/C Ratio	0.117	-	-	-	0.337	0.26
HCM Control Delay (s)	9.4	-	-	-	39.6	14.1
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0.4	-	-	-	1.4	1

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	75	121	14	109	84	143	451	23	67	498	152
Future Volume (veh/h)	120	75	121	14	109	84	143	451	23	67	498	152
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	0.98		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	82	29	15	118	8	155	490	0	73	541	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	367	463	388	321	279	232	340	750		360	701	
Arrive On Green	0.12	0.25	0.25	0.02	0.15	0.15	0.08	0.40	0.00	0.05	0.38	0.00
Sat Flow, veh/h	1493	1870	1566	1781	1870	1553	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	171	82	29	15	118	8	155	490	0	73	541	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1566	1781	1870	1553	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	6.8	2.6	1.1	0.5	4.3	0.3	3.9	15.9	0.0	1.8	19.0	0.0
Cycle Q Clear(g_c), s	6.8	2.6	1.1	0.5	4.3	0.3	3.9	15.9	0.0	1.8	19.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	367	463	388	321	279	232	340	750		360	701	
V/C Ratio(X)	0.47	0.18	0.07	0.05	0.42	0.03	0.46	0.65		0.20	0.77	
Avail Cap(c_a), veh/h	474	501	420	624	501	416	774	1253		840	1253	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.4	22.1	21.5	26.1	28.8	27.1	15.2	18.2	0.0	14.2	20.5	0.0
Incr Delay (d2), s/veh	0.3	0.1	0.0	0.0	0.4	0.0	0.4	2.1	0.0	0.1	3.9	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	2.3	1.1	0.4	0.2	1.9	0.1	1.4	6.5	0.0	0.7	8.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	22.2	21.5	26.1	29.2	27.2	15.5	20.2	0.0	14.3	24.4	0.0
LnGrp LOS	C	C	C	C	C	C	B	C		B	C	
Approach Vol, veh/h		282			141			645	A		614	A
Approach Delay, s/veh		21.9			28.8			19.1			23.2	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	35.9	6.3	23.5	10.8	34.0	13.7	16.1
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	3.8	17.9	2.5	4.6	5.9	21.0	8.8	6.3
Green Ext Time (p_c), s	0.1	6.4	0.0	0.2	0.2	7.0	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	21.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	68	23	311	94	213	46	455	353	237	441	23
Future Volume (veh/h)	16	68	23	311	94	213	46	455	353	237	441	23
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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	17	74	2	338	102	72	50	495	0	258	479	11
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	239	274	524	527	628	351	638		381	776	686
Arrive On Green	0.02	0.12	0.12	0.19	0.28	0.28	0.04	0.34	0.00	0.11	0.41	0.41
Sat Flow, veh/h	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1581
Grp Volume(v), veh/h	17	74	2	338	102	72	50	495	0	258	479	11
Grp Sat Flow(s),veh/h/ln	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1581
Q Serve(g_s), s	0.6	2.8	0.1	13.6	3.6	2.5	1.5	20.5	0.0	7.6	17.4	0.3
Cycle Q Clear(g_c), s	0.6	2.8	0.1	13.6	3.6	2.5	1.5	20.5	0.0	7.6	17.4	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	287	239	274	524	527	628	351	638		381	776	686
V/C Ratio(X)	0.06	0.31	0.01	0.65	0.19	0.11	0.14	0.78		0.68	0.62	0.02
Avail Cap(c_a), veh/h	454	719	680	586	867	916	671	1301		569	1301	1131
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	35.0	30.7	24.5	23.5	16.5	17.7	25.5	0.0	17.8	19.9	13.9
Incr Delay (d2), s/veh	0.1	0.3	0.0	2.1	0.1	0.0	0.1	4.3	0.0	0.8	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	0.3	1.4	0.0	5.9	1.6	0.9	0.6	9.3	0.0	2.9	7.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.6	35.2	30.7	26.5	23.6	16.5	17.8	29.8	0.0	18.6	21.6	13.9
LnGrp LOS	C	D	C	C	C	B	B	C		B	C	B
Approach Vol, veh/h		93			512			545	A		748	
Approach Delay, s/veh		34.7			24.5			28.7			20.4	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.9	35.4	21.0	15.0	8.5	41.8	6.7	29.3
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.6	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	19.6	22.5	15.6	4.8	3.5	19.4	2.6	5.6
Green Ext Time (p_c), s	0.3	6.9	0.4	0.2	0.0	6.9	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	24.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	95	31	57	725	592	125
Future Volume (veh/h)	95	31	57	725	592	125
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	1	62	788	643	77
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	231	205	399	1170	849	719
Arrive On Green	0.13	0.13	0.06	0.63	0.45	0.45
Sat Flow, veh/h	1781	1585	1781	1870	1870	1583
Grp Volume(v), veh/h	103	1	62	788	643	77
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1583
Q Serve(g_s), s	2.4	0.0	0.7	12.2	12.8	1.3
Cycle Q Clear(g_c), s	2.4	0.0	0.7	12.2	12.8	1.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	231	205	399	1170	849	719
V/C Ratio(X)	0.45	0.00	0.16	0.67	0.76	0.11
Avail Cap(c_a), veh/h	1191	1059	848	3750	2959	2504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.1	17.0	7.2	5.4	10.2	7.0
Incr Delay (d2), s/veh	1.4	0.0	0.2	0.7	1.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.2	2.7	4.2	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.4	17.0	7.4	6.1	11.6	7.1
LnGrp LOS	B	B	A	A	B	A
Approach Vol, veh/h	104			850	720	
Approach Delay, s/veh	19.4			6.2	11.1	
Approach LOS	B			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	7.7	26.4		10.8		34.1
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	2.6	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.7	14.8		4.4		14.2
Green Ext Time (p_c), s	0.1	5.5		0.3		7.4

Intersection Summary	
HCM 6th Ctrl Delay	9.1
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	7	3	58	10	74	9	695	77	64	545	22
Future Volume (veh/h)	12	7	3	58	10	74	9	695	77	64	545	22
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	13	8	1	63	11	43	10	755	81	70	592	15
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	175	87	160	157	23	57	530	1008	108	387	1213	1027
Arrive On Green	0.10	0.10	0.10	0.10	0.10	0.10	0.01	0.61	0.61	0.05	0.65	0.65
Sat Flow, veh/h	877	866	1585	738	230	562	1781	1660	178	1781	1870	1584
Grp Volume(v), veh/h	21	0	1	117	0	0	10	0	836	70	592	15
Grp Sat Flow(s),veh/h/ln	1743	0	1585	1530	0	0	1781	0	1838	1781	1870	1584
Q Serve(g_s), s	0.0	0.0	0.0	4.3	0.0	0.0	0.1	0.0	22.1	0.9	10.9	0.2
Cycle Q Clear(g_c), s	0.7	0.0	0.0	5.0	0.0	0.0	0.1	0.0	22.1	0.9	10.9	0.2
Prop In Lane	0.62		1.00	0.54		0.37	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	263	0	160	237	0	0	530	0	1116	387	1213	1027
V/C Ratio(X)	0.08	0.00	0.01	0.49	0.00	0.00	0.02	0.00	0.75	0.18	0.49	0.01
Avail Cap(c_a), veh/h	671	0	589	644	0	0	878	0	1913	661	1946	1648
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	27.5	0.0	27.2	29.4	0.0	0.0	5.4	0.0	9.5	8.1	6.1	4.2
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	2.2	0.1	0.7	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	0.3	0.0	0.0	1.8	0.0	0.0	0.0	0.0	7.5	0.3	3.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.5	0.0	27.2	30.0	0.0	0.0	5.4	0.0	11.7	8.1	6.7	4.2
LnGrp LOS	C	A	C	C	A	A	A	A	B	A	A	A
Approach Vol, veh/h		22			117			846			677	
Approach Delay, s/veh		27.5			30.0			11.6			6.8	
Approach LOS		C			C			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.6	46.8		11.8	5.9	49.6		11.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	2.7	24.1		2.7	2.1	12.9		7.0
Green Ext Time (p_c), s	0.0	16.8		0.0	0.0	10.2		0.4

Intersection Summary	
HCM 6th Ctrl Delay	11.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	79	113	50	28	12
Future Vol, veh/h	11	79	113	50	28	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	12	86	123	54	30	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	177	0	-	0	260	150
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	110	-
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	1399	-	-	-	729	896
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	915	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1399	-	-	-	722	896
Mov Cap-2 Maneuver	-	-	-	-	722	-
Stage 1	-	-	-	-	870	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1399	-	-	-	722	896
HCM Lane V/C Ratio	0.009	-	-	-	0.042	0.015
HCM Control Delay (s)	7.6	-	-	-	10.2	9.1
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Base Year 2024 AM Without Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	142	2.0	149	2.0	0.569	8.4	LOS A	5.2	131.7	0.84	0.91	1.00	20.3
7	T1	223	2.0	235	2.0	0.569	5.7	LOS A	5.2	131.7	0.84	0.91	1.00	18.9
25	R2	97	2.0	102	2.0	0.569	5.7	LOS A	5.2	131.7	0.84	0.91	1.00	18.9
Approach		462	2.0	486	2.0	0.569	6.5	LOS A	5.2	131.7	0.84	0.91	1.00	19.3
East: WB Maui Lani Parkway														
19	L2	73	2.0	77	2.0	0.449	7.0	LOS A	3.3	84.7	0.79	0.77	0.83	20.6
336	T1	197	2.0	207	2.0	0.449	4.3	LOS A	3.3	84.7	0.79	0.77	0.83	19.2
24	R2	86	2.0	91	2.0	0.449	4.3	LOS A	3.3	84.7	0.79	0.77	0.83	19.2
Approach		356	2.0	375	2.0	0.449	4.8	LOS A	3.3	84.7	0.79	0.77	0.83	19.4
North: SB Kamehameha Ave														
15	L2	179	2.0	188	2.0	0.619	7.4	LOS A	6.0	153.3	0.80	0.83	0.93	20.5
2	T1	175	2.0	184	2.0	0.619	4.7	LOS A	6.0	153.3	0.80	0.83	0.93	19.1
40	R2	216	2.0	227	2.0	0.619	4.7	LOS A	6.0	153.3	0.80	0.83	0.93	19.1
Approach		570	2.0	600	2.0	0.619	5.5	LOS A	6.0	153.3	0.80	0.83	0.93	19.5
West: EB Maui Lani Parkway														
30	L2	204	2.0	215	2.0	0.552	6.7	LOS A	4.8	122.2	0.79	0.77	0.86	20.5
464	T1	164	2.0	173	2.0	0.552	3.9	LOS A	4.8	122.2	0.79	0.77	0.86	19.1
78	R2	125	2.0	132	2.0	0.552	3.9	LOS A	4.8	122.2	0.79	0.77	0.86	19.1
Approach		493	2.0	519	2.0	0.552	5.1	LOS A	4.8	122.2	0.79	0.77	0.86	19.7
All Vehicles		1881	2.0	1980	2.0	0.619	5.5	LOS A	6.0	153.3	0.81	0.82	0.91	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	121.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	3	147	16	15	9	167	420	7	2	548	104
Future Vol, veh/h	82	3	147	16	15	9	167	420	7	2	548	104
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	89	3	160	17	16	10	182	457	8	2	596	113
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	14.3	14.1	120.7	167.5
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	28%	0%	100%	0%	40%	0%
Vol Thru, %	72%	0%	0%	2%	38%	84%
Vol Right, %	0%	100%	0%	98%	23%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	587	7	82	150	40	654
LT Vol	167	0	82	0	16	2
Through Vol	420	0	0	3	15	548
RT Vol	0	7	0	147	9	104
Lane Flow Rate	638	8	89	163	43	711
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.176	0.012	0.206	0.322	0.106	1.294
Departure Headway (Hd)	7.02	6.155	9.159	7.92	9.883	6.851
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	523	585	394	457	365	533
Service Time	4.72	3.855	6.859	5.62	7.883	4.851
HCM Lane V/C Ratio	1.22	0.014	0.226	0.357	0.118	1.334
HCM Control Delay	122	8.9	14.2	14.3	14.1	167.5
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	21.7	0	0.8	1.4	0.4	28.3

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	552	2.0	581	2.0	1.044	26.6	LOS F	79.0	2007.3	1.00	0.90	1.39	16.2
25	R2	735	2.0	774	2.0	1.044	26.6	LOS F	79.0	2007.3	1.00	0.90	1.39	16.2
Approach		1287	2.0	1355	2.0	1.044	26.6	LOS D	79.0	2007.3	1.00	0.90	1.39	16.2
East: WB Waiinu Rd														
19	L2	228	2.0	240	2.0	0.368	6.1	LOS A	2.7	68.7	0.80	0.76	0.80	20.4
24	R2	51	2.0	54	2.0	0.368	3.3	LOS A	2.7	68.7	0.80	0.76	0.80	19.0
Approach		279	2.0	294	2.0	0.368	5.6	LOS A	2.7	68.7	0.80	0.76	0.80	20.2
North: SB Waiale Rd														
15	L2	67	2.0	71	2.0	0.714	6.0	LOS A	8.6	218.8	0.80	0.64	0.87	20.6
2	T1	688	2.0	724	2.0	0.714	3.3	LOS A	8.6	218.8	0.80	0.64	0.87	19.2
Approach		755	2.0	795	2.0	0.714	3.5	LOS A	8.6	218.8	0.80	0.64	0.87	19.3
All Vehicles		2321	2.0	2443	2.0	1.044	16.5	LOS C	79.0	2007.3	0.91	0.80	1.15	17.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	165.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	0	32	8	0	16	7	1121	7	11	709	166
Future Vol, veh/h	159	0	32	8	0	16	7	1121	7	11	709	166
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	173	0	35	9	0	17	8	1218	8	12	771	180

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2135	2133	864	2144	2219	1225	954	0	0	1229	0	0
Stage 1	888	888	-	1241	1241	-	-	-	-	-	-	-
Stage 2	1247	1245	-	903	978	-	-	-	-	-	-	-
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	~ 36	49	354	35	44	218	720	-	-	567	-	-
Stage 1	338	362	-	214	247	-	-	-	-	-	-	-
Stage 2	213	246	-	332	329	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 31	45	353	30	40	217	718	-	-	565	-	-
Mov Cap-2 Maneuver	~ 31	45	-	30	40	-	-	-	-	-	-	-
Stage 1	325	344	-	206	238	-	-	-	-	-	-	-
Stage 2	189	237	-	285	313	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1928	82.6	0.1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	718	-	-	31	353	71	565	-	-
HCM Lane V/C Ratio	0.011	-	-	5.575	0.099	0.367	0.021	-	-
HCM Control Delay (s)	10.1	0	$	2312.8	16.3	82.6	11.5	-	-
HCM Lane LOS	B	A	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	20.8	0.3	1.4	0.1	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	55.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	67	52	1035	697	24
Future Vol, veh/h	125	67	52	1035	697	24
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	136	73	57	1125	758	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2013	774	787	0	-	0
Stage 1	774	-	-	-	-	-
Stage 2	1239	-	-	-	-	-
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	~ 65	398	832	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	273	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 53	397	830	-	-	-
Mov Cap-2 Maneuver	~ 53	-	-	-	-	-
Stage 1	371	-	-	-	-	-
Stage 2	272	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 574.8	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	830	-	53	397	-	-
HCM Lane V/C Ratio	0.068	-	2.564	0.183	-	-
HCM Control Delay (s)	9.7	0	$ 874.3	16.1	-	-
HCM Lane LOS	A	A	F	C	-	-
HCM 95th %tile Q(veh)	0.2	-	14	0.7	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	388	404	87	47	277	242	179	249	53	204	258	203
Future Volume (veh/h)	388	404	87	47	277	242	179	249	53	204	258	203
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		0.99	1.00		0.99	1.00		0.99
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	485	439	87	51	301	34	195	271	49	222	280	192
Peak Hour Factor	0.80	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	528	590	117	257	348	294	235	398	72	377	304	209
Arrive On Green	0.24	0.39	0.39	0.03	0.19	0.19	0.07	0.26	0.26	0.11	0.30	0.30
Sat Flow, veh/h	1781	1515	300	1781	1870	1577	1781	1538	278	1781	1029	706
Grp Volume(v), veh/h	485	0	526	51	301	34	195	0	320	222	0	472
Grp Sat Flow(s),veh/h/ln	1781	0	1815	1781	1870	1577	1781	0	1816	1781	0	1735
Q Serve(g_s), s	20.0	0.0	23.9	2.2	15.0	1.7	7.0	0.0	15.2	8.4	0.0	25.2
Cycle Q Clear(g_c), s	20.0	0.0	23.9	2.2	15.0	1.7	7.0	0.0	15.2	8.4	0.0	25.2
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.15	1.00		0.41
Lane Grp Cap(c), veh/h	528	0	707	257	348	294	235	0	470	377	0	513
V/C Ratio(X)	0.92	0.00	0.74	0.20	0.86	0.12	0.83	0.00	0.68	0.59	0.00	0.92
Avail Cap(c_a), veh/h	590	0	707	477	410	345	235	0	474	423	0	561
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.4	0.0	25.2	30.2	37.8	32.4	28.8	0.0	32.0	22.6	0.0	32.7
Incr Delay (d2), s/veh	18.6	0.0	4.3	0.4	15.4	0.2	21.3	0.0	3.9	1.7	0.0	19.6
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	10.8	0.0	10.9	1.0	8.3	0.7	4.7	0.0	7.1	3.7	0.0	13.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.9	0.0	29.4	30.6	53.2	32.6	50.1	0.0	35.8	24.3	0.0	52.2
LnGrp LOS	D	A	C	C	D	C	D	A	D	C	A	D
Approach Vol, veh/h		1011			386			515			694	
Approach Delay, s/veh		34.9			48.4			41.2			43.3	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.5	30.8	7.2	43.3	11.0	34.4	26.7	23.8
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	13.0	25.0	15.0	32.0	7.0	31.0	26.0	21.0
Max Q Clear Time (g_c+I1), s	10.4	17.2	4.2	25.9	9.0	27.2	22.0	17.0
Green Ext Time (p_c), s	0.2	1.2	0.1	1.8	0.0	1.1	0.7	0.7

Intersection Summary	
HCM 6th Ctrl Delay	40.4
HCM 6th LOS	D

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	131	21	4	331	320	34
Future Vol, veh/h	131	21	4	331	320	34
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	50	-	-	-	-
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	142	23	4	360	348	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	735	367	385	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	368	-	-	-	-	-
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	387	678	1173	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	385	678	1173	-	-	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1173	-	385	678	-	-
HCM Lane V/C Ratio	0.004	-	0.37	0.034	-	-
HCM Control Delay (s)	8.1	0	19.7	10.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.7	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	73	16	229	322	28
Future Vol, veh/h	69	73	16	229	322	28
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	75	79	17	249	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	648	365	380	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	283	-	-	-	-	-
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	435	680	1178	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	765	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	428	680	1178	-	-	-
Mov Cap-2 Maneuver	428	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	765	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1178	-	529	-	-
HCM Lane V/C Ratio	0.015	-	0.292	-	-
HCM Control Delay (s)	8.1	0	14.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	16	4	216	393	5
Future Vol, veh/h	31	16	4	216	393	5
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	34	17	4	235	427	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	673	430	432	0	-	0
Stage 1	430	-	-	-	-	-
Stage 2	243	-	-	-	-	-
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	421	625	1128	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	419	625	1128	-	-	-
Mov Cap-2 Maneuver	419	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	797	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	472	-	-
HCM Lane V/C Ratio	0.004	-	0.108	-	-
HCM Control Delay (s)	8.2	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	22	5	190	401	12
Future Vol, veh/h	28	22	5	190	401	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	30	24	5	207	436	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	660	443	449	0	-	0
Stage 1	443	-	-	-	-	-
Stage 2	217	-	-	-	-	-
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	428	615	1111	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	819	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	426	615	1111	-	-	-
Mov Cap-2 Maneuver	517	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	819	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1111	-	556	-	-
HCM Lane V/C Ratio	0.005	-	0.098	-	-
HCM Control Delay (s)	8.3	-	12.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	23.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	71	271	74	130	323	89
Future Vol, veh/h	71	271	74	130	323	89
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	77	295	80	141	351	97

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	221	0	-	0	600	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	449	-
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	1348	-	-	-	464	895
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1348	-	-	-	432	895
Mov Cap-2 Maneuver	-	-	-	-	432	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	643	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	52.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1348	-	-	-	486
HCM Lane V/C Ratio	0.057	-	-	-	0.921
HCM Control Delay (s)	7.8	0	-	-	52.9
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	10.8

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	97	780	10	9	582	64	28	3	26	32	1	111
Future Vol, veh/h	97	780	10	9	582	64	28	3	26	32	1	111
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	105	848	11	10	633	70	30	3	28	35	1	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	704	0	0	859	0	0	1813	1788	854	1733	1723	634
Stage 1	-	-	-	-	-	-	1064	1064	-	654	654	-
Stage 2	-	-	-	-	-	-	749	724	-	1079	1069	-
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	894	-	-	782	-	-	61	81	358	69	89	479
Stage 1	-	-	-	-	-	-	270	300	-	456	463	-
Stage 2	-	-	-	-	-	-	404	430	-	264	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	893	-	-	782	-	-	41	70	358	55	77	479
Mov Cap-2 Maneuver	-	-	-	-	-	-	41	70	-	55	77	-
Stage 1	-	-	-	-	-	-	238	265	-	402	457	-
Stage 2	-	-	-	-	-	-	298	424	-	212	263	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.1	126.1	46.3
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	43	358	893	-	-	782	-	-	55	479
HCM Lane V/C Ratio	0.784	0.079	0.118	-	-	0.013	-	-	0.652	0.252
HCM Control Delay (s)	218.6	15.9	9.6	-	-	9.7	-	-	151.4	15
HCM Lane LOS	F	C	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	3	0.3	0.4	-	-	0	-	-	2.7	1

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	293	282	510	31	237	131	311	590	15	46	403	112
Future Volume (veh/h)	293	282	510	31	237	131	311	590	15	46	403	112
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		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	419	307	183	34	258	14	338	641	0	50	438	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	446	694	586	281	292	246	373	716		173	496	
Arrive On Green	0.24	0.37	0.37	0.03	0.16	0.16	0.15	0.38	0.00	0.03	0.27	0.00
Sat Flow, veh/h	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	419	307	183	34	258	14	338	641	0	50	438	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	26.1	14.2	9.5	1.8	15.5	0.9	15.2	37.0	0.0	2.3	25.8	0.0
Cycle Q Clear(g_c), s	26.1	14.2	9.5	1.8	15.5	0.9	15.2	37.0	0.0	2.3	25.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	446	694	586	281	292	246	373	716		173	496	
V/C Ratio(X)	0.94	0.44	0.31	0.12	0.88	0.06	0.91	0.90		0.29	0.88	
Avail Cap(c_a), veh/h	446	694	586	663	326	274	473	716		483	586	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.8	27.2	25.7	38.9	47.5	41.3	27.0	33.3	0.0	31.5	40.5	0.0
Incr Delay (d2), s/veh	27.6	0.2	0.1	0.1	20.9	0.0	16.1	14.5	0.0	0.3	15.4	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	12.7	6.4	3.6	0.8	9.0	0.3	7.8	18.9	0.0	1.0	13.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.4	27.4	25.8	39.0	68.4	41.3	43.1	47.8	0.0	31.9	55.9	0.0
LnGrp LOS	E	C	C	D	E	D	D	D		C	E	
Approach Vol, veh/h		909			306			979	A		488	A
Approach Delay, s/veh		40.5			63.9			46.2			53.5	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	50.0	8.3	47.6	22.5	36.5	33.0	22.9
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	36.0	28.0	20.0	24.0	36.0	28.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	39.0	3.8	16.2	17.2	27.8	28.1	17.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7	0.3	2.7	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	47.6
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	140	82	348	50	358	21	495	419	320	660	9
Future Volume (veh/h)	53	140	82	348	50	358	21	495	419	320	660	9
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	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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	152	12	378	54	214	23	538	0	348	717	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	301	208	216	450	472	621	221	665		405	883	811
Arrive On Green	0.04	0.10	0.10	0.19	0.25	0.25	0.02	0.36	0.00	0.14	0.47	0.47
Sat Flow, veh/h	1968	2067	1734	1781	1870	1579	1781	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	58	152	12	378	54	214	23	538	0	348	717	5
Grp Sat Flow(s),veh/h/ln	1968	2067	1734	1781	1870	1579	1781	1870	1585	1781	1870	1583
Q Serve(g_s), s	2.6	7.1	0.6	18.4	2.2	9.4	0.8	25.8	0.0	11.7	32.5	0.2
Cycle Q Clear(g_c), s	2.6	7.1	0.6	18.4	2.2	9.4	0.8	25.8	0.0	11.7	32.5	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	301	208	216	450	472	621	221	665		405	883	811
V/C Ratio(X)	0.19	0.73	0.06	0.84	0.11	0.34	0.10	0.81		0.86	0.81	0.01
Avail Cap(c_a), veh/h	400	625	566	450	754	859	520	1132		496	1132	1022
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	43.3	38.3	30.3	28.6	21.2	21.7	28.9	0.0	20.3	22.4	11.8
Incr Delay (d2), s/veh	0.3	1.8	0.0	13.3	0.0	0.1	0.1	5.0	0.0	10.4	5.0	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	1.3	3.7	0.3	9.4	1.0	3.5	0.3	12.0	0.0	5.6	14.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	45.1	38.3	43.6	28.6	21.3	21.7	34.0	0.0	30.8	27.4	11.8
LnGrp LOS	D	D	D	D	C	C	C	C		C	C	B
Approach Vol, veh/h		222			646			561	A		1070	
Approach Delay, s/veh		42.9			35.0			33.5			28.4	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	41.2	24.0	15.0	7.3	52.8	9.0	30.0
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.0	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	13.7	27.8	20.4	9.1	2.8	34.5	4.6	11.4
Green Ext Time (p_c), s	0.3	7.4	0.0	0.5	0.0	10.0	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	32.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	154	88	18	777	970	63
Future Volume (veh/h)	154	88	18	777	970	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	7	20	845	1054	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	214	191	235	1372	1205	1021
Arrive On Green	0.12	0.12	0.02	0.73	0.64	0.64
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	167	7	20	845	1054	55
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	6.8	0.3	0.3	16.5	34.5	1.0
Cycle Q Clear(g_c), s	6.8	0.3	0.3	16.5	34.5	1.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	214	191	235	1372	1205	1021
V/C Ratio(X)	0.78	0.04	0.09	0.62	0.87	0.05
Avail Cap(c_a), veh/h	711	633	526	2239	1767	1497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.1	29.2	12.8	4.9	10.9	4.9
Incr Delay (d2), s/veh	6.0	0.1	0.2	0.5	3.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.1	0.2	4.3	12.2	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.1	29.3	13.0	5.3	14.5	5.0
LnGrp LOS	D	C	B	A	B	A
Approach Vol, veh/h	174			865	1109	
Approach Delay, s/veh	37.8			5.5	14.0	
Approach LOS	D			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	6.7	54.4		14.0		61.1
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	21.6	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.3	36.5		8.8		18.5
Green Ext Time (p_c), s	0.0	11.9		0.4		8.3

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	13	6	106	8	54	4	712	120	179	871	6
Future Volume (veh/h)	20	13	6	106	8	54	4	712	120	179	871	6
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	22	14	2	115	9	44	4	774	126	195	947	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	103	220	210	17	55	286	953	155	337	1244	1055
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.01	0.61	0.61	0.06	0.67	0.67
Sat Flow, veh/h	838	735	1579	990	119	393	1781	1569	255	1781	1870	1585
Grp Volume(v), veh/h	36	0	2	168	0	0	4	0	900	195	947	5
Grp Sat Flow(s),veh/h/ln	1573	0	1579	1502	0	0	1781	0	1824	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.1	7.6	0.0	0.0	0.1	0.0	32.2	3.2	28.9	0.1
Cycle Q Clear(g_c), s	1.5	0.0	0.1	9.0	0.0	0.0	0.1	0.0	32.2	3.2	28.9	0.1
Prop In Lane	0.61		1.00	0.68		0.26	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	220	282	0	0	286	0	1109	337	1244	1055
V/C Ratio(X)	0.12	0.00	0.01	0.60	0.00	0.00	0.01	0.00	0.81	0.58	0.76	0.00
Avail Cap(c_a), veh/h	526	0	468	511	0	0	572	0	1515	521	1553	1316
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	31.8	0.0	31.2	35.0	0.0	0.0	9.8	0.0	12.8	14.5	9.6	4.7
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.8	0.6	2.6	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	0.6	0.0	0.0	3.4	0.0	0.0	0.0	0.0	12.4	1.9	10.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.9	0.0	31.2	35.7	0.0	0.0	9.8	0.0	16.6	15.1	12.2	4.7
LnGrp LOS	C	A	C	D	A	A	A	A	B	B	B	A
Approach Vol, veh/h		38			168			904			1147	
Approach Delay, s/veh		31.8			35.7			16.6			12.6	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.3	57.2		16.8	5.4	62.1		16.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	5.2	34.2		3.5	2.1	30.9		11.0
Green Ext Time (p_c), s	0.2	17.0		0.1	0.0	19.1		0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	158	48	35	121	5
Future Vol, veh/h	5	158	48	35	121	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	5	172	52	38	132	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	90	0	-	0	253	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	182	-
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	1505	-	-	-	736	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1505	-	-	-	734	991
Mov Cap-2 Maneuver	-	-	-	-	734	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	849	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1505	-	-	-	734	991
HCM Lane V/C Ratio	0.004	-	-	-	0.179	0.005
HCM Control Delay (s)	7.4	-	-	-	11	8.7
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Base Year 2024 PM Without Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	103	2.0	108	2.0	0.441	7.6	LOS A	3.4	85.9	0.85	0.84	0.89	20.4
7	T1	155	2.0	163	2.0	0.441	4.9	LOS A	3.4	85.9	0.85	0.84	0.89	19.0
25	R2	55	2.0	58	2.0	0.441	4.9	LOS A	3.4	85.9	0.85	0.84	0.89	19.0
Approach		313	2.0	329	2.0	0.441	5.8	LOS A	3.4	85.9	0.85	0.84	0.89	19.5
East: WB Maui Lani Parkway														
19	L2	53	2.0	56	2.0	0.662	10.2	LOS B	7.1	181.4	0.89	1.04	1.17	20.1
336	T1	285	2.0	300	2.0	0.662	7.5	LOS A	7.1	181.4	0.89	1.04	1.17	18.7
24	R2	201	2.0	212	2.0	0.662	7.5	LOS A	7.1	181.4	0.89	1.04	1.17	18.7
Approach		539	2.0	567	2.0	0.662	7.8	LOS A	7.1	181.4	0.89	1.04	1.17	18.8
North: SB Kamehameha Ave														
15	L2	133	2.0	140	2.0	0.800	12.1	LOS B	12.0	305.3	0.99	1.21	1.40	19.7
2	T1	175	2.0	184	2.0	0.800	9.4	LOS A	12.0	305.3	0.99	1.21	1.40	18.4
40	R2	393	2.0	414	2.0	0.800	9.4	LOS A	12.0	305.3	0.99	1.21	1.40	18.4
Approach		701	2.0	738	2.0	0.800	9.9	LOS A	12.0	305.3	0.99	1.21	1.40	18.6
West: EB Maui Lani Parkway														
30	L2	294	2.0	309	2.0	0.708	8.1	LOS A	8.6	217.2	0.89	0.92	1.06	20.3
464	T1	208	2.0	219	2.0	0.708	5.4	LOS A	8.6	217.2	0.89	0.92	1.06	18.9
78	R2	156	2.0	164	2.0	0.708	5.4	LOS A	8.6	217.2	0.89	0.92	1.06	18.9
Approach		658	2.0	693	2.0	0.708	6.6	LOS A	8.6	217.2	0.89	0.92	1.06	19.5
All Vehicles		2211	2.0	2327	2.0	0.800	7.8	LOS A	12.0	305.3	0.92	1.03	1.17	19.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	170.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	10	204	16	4	8	114	519	23	8	656	66
Future Vol, veh/h	58	10	204	16	4	8	114	519	23	8	656	66
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	63	11	222	17	4	9	124	564	25	9	713	72
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	16.8	14.6	158.3	244.5
HCM LOS	C	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	0%	100%	0%	57%	1%
Vol Thru, %	82%	0%	0%	5%	14%	90%
Vol Right, %	0%	100%	0%	95%	29%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	633	23	58	214	28	730
LT Vol	114	0	58	0	16	8
Through Vol	519	0	0	10	4	656
RT Vol	0	23	0	204	8	66
Lane Flow Rate	688	25	63	233	30	793
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.281	0.041	0.145	0.458	0.076	1.476
Departure Headway (Hd)	7.28	6.466	9.412	8.186	10.696	7.114
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	502	557	383	444	337	516
Service Time	4.98	4.166	7.112	5.886	8.696	5.114
HCM Lane V/C Ratio	1.371	0.045	0.164	0.525	0.089	1.537
HCM Control Delay	163.7	9.4	13.7	17.6	14.6	244.5
HCM Lane LOS	F	A	B	C	B	F
HCM 95th-tile Q	26.4	0.1	0.5	2.3	0.2	37.6

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	576	2.0	606	2.0	0.911	1.7	LOS A	25.6	649.6	1.00	0.33	1.00	19.1
25	R2	547	2.0	576	2.0	0.911	1.7	LOS A	25.6	649.6	1.00	0.33	1.00	19.1
Approach		1123	2.0	1182	2.0	0.911	1.7	LOS A	25.6	649.6	1.00	0.33	1.00	19.1
East: WB Waiinu Rd														
19	L2	324	2.0	341	2.0	0.499	7.6	LOS A	4.3	109.2	0.89	0.91	0.97	20.2
24	R2	32	2.0	34	2.0	0.499	4.9	LOS A	4.3	109.2	0.89	0.91	0.97	18.8
Approach		356	2.0	375	2.0	0.499	7.4	LOS A	4.3	109.2	0.89	0.91	0.97	20.0
North: SB Waiale Rd														
15	L2	62	2.0	65	2.0	0.874	12.9	LOS B	17.2	436.7	1.00	1.21	1.44	19.6
2	T1	776	2.0	817	2.0	0.874	10.2	LOS B	17.2	436.7	1.00	1.21	1.44	18.3
Approach		838	2.0	882	2.0	0.874	10.4	LOS B	17.2	436.7	1.00	1.21	1.44	18.4
All Vehicles		2317	2.0	2439	2.0	0.911	5.7	LOS A	25.6	649.6	0.98	0.74	1.15	19.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	57

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	13	6	1	9	26	1075	4	4	1004	156
Future Vol, veh/h	70	0	13	6	1	9	26	1075	4	4	1004	156
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	76	0	14	7	1	10	28	1168	4	4	1091	170

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2419	2418	1179	2420	2501	1173	1264	0	0	1175	0	0
Stage 1	1187	1187	-	1229	1229	-	-	-	-	-	-	-
Stage 2	1232	1231	-	1191	1272	-	-	-	-	-	-	-
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	~ 22	32	232	22	29	234	550	-	-	594	-	-
Stage 1	230	262	-	218	250	-	-	-	-	-	-	-
Stage 2	217	250	-	229	239	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 18	26	231	18	24	233	548	-	-	592	-	-
Mov Cap-2 Maneuver	~ 18	26	-	18	24	-	-	-	-	-	-	-
Stage 1	196	255	-	186	213	-	-	-	-	-	-	-
Stage 2	176	213	-	210	233	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	1592.1	157.2	0.3	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	548	-	-	18	231	39	592	-	-
HCM Lane V/C Ratio	0.052	-	-	4.227	0.061	0.446	0.007	-	-
HCM Control Delay (s)	11.9	0	$	1883.8	21.6	157.2	11.1	-	-
HCM Lane LOS	B	A	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	10.1	0.2	1.5	0	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	20.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	51	59	1011	976	42
Future Vol, veh/h	58	51	59	1011	976	42
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	63	55	64	1099	1061	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2314	1087	1110	0	-	0
Stage 1	1087	-	-	-	-	-
Stage 2	1227	-	-	-	-	-
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	~ 42	263	629	-	-	-
Stage 1	323	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 31	262	627	-	-	-
Mov Cap-2 Maneuver	~ 31	-	-	-	-	-
Stage 1	238	-	-	-	-	-
Stage 2	276	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 411.8	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	627	-	31	262	-	-
HCM Lane V/C Ratio	0.102	-	2.034	0.212	-	-
HCM Control Delay (s)	11.4	0	$ 754.2	22.4	-	-
HCM Lane LOS	B	A	F	C	-	-
HCM 95th %tile Q(veh)	0.3	-	7.3	0.8	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	324	329	87	99	523	371	88	251	80	364	316	220
Future Volume (veh/h)	324	329	87	99	523	371	88	251	80	364	316	220
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	405	358	87	108	568	86	96	273	76	396	343	217
Peak Hour Factor	0.80	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	433	595	145	372	488	413	130	272	76	360	351	222
Arrive On Green	0.21	0.41	0.41	0.06	0.26	0.26	0.03	0.19	0.19	0.17	0.33	0.33
Sat Flow, veh/h	1781	1453	353	1781	1870	1582	1781	1407	392	1781	1070	677
Grp Volume(v), veh/h	405	0	445	108	568	86	96	0	349	396	0	560
Grp Sat Flow(s),veh/h/ln	1781	0	1806	1781	1870	1582	1781	0	1799	1781	0	1747
Q Serve(g_s), s	22.4	0.0	22.9	5.2	31.0	5.0	4.0	0.0	23.0	20.0	0.0	37.6
Cycle Q Clear(g_c), s	22.4	0.0	22.9	5.2	31.0	5.0	4.0	0.0	23.0	20.0	0.0	37.6
Prop In Lane	1.00		0.20	1.00		1.00	1.00		0.22	1.00		0.39
Lane Grp Cap(c), veh/h	433	0	740	372	488	413	130	0	348	360	0	574
V/C Ratio(X)	0.94	0.00	0.60	0.29	1.16	0.21	0.74	0.00	1.00	1.10	0.00	0.98
Avail Cap(c_a), veh/h	465	0	740	520	488	413	130	0	348	360	0	574
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.3	0.0	27.5	29.3	43.9	34.3	43.7	0.0	47.9	35.3	0.0	39.4
Incr Delay (d2), s/veh	25.7	0.0	1.4	0.4	94.3	0.2	19.5	0.0	48.8	76.6	0.0	31.5
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	10.5	0.0	10.2	2.3	27.1	2.0	1.6	0.0	15.1	16.4	0.0	21.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.9	0.0	28.9	29.7	138.2	34.6	63.2	0.0	96.7	111.9	0.0	71.0
LnGrp LOS	E	A	C	C	F	C	E	A	F	F	A	E
Approach Vol, veh/h		850			762			445			956	
Approach Delay, s/veh		44.1			111.1			89.5			87.9	
Approach LOS		D			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	29.0	11.2	54.6	8.0	45.0	28.8	37.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	20.0	22.0	17.0	41.0	4.0	39.0	27.0	31.0
Max Q Clear Time (g_c+I1), s	22.0	25.0	7.2	24.9	6.0	39.6	24.4	33.0
Green Ext Time (p_c), s	0.0	0.0	0.2	2.7	0.0	0.0	0.4	0.0

Intersection Summary	
HCM 6th Ctrl Delay	81.7
HCM 6th LOS	F

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	14	30	343	337	73
Future Vol, veh/h	51	14	30	343	337	73
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	50	-	-	-	-
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	55	15	33	373	366	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	845	406	445	0	-	0
Stage 1	406	-	-	-	-	-
Stage 2	439	-	-	-	-	-
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	333	645	1115	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	650	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	645	1115	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	650	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1115	-	321	645	-	-
HCM Lane V/C Ratio	0.029	-	0.173	0.024	-	-
HCM Control Delay (s)	8.3	0	18.5	10.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	28	60	318	283	62
Future Vol, veh/h	41	28	60	318	283	62
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	45	30	65	346	308	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	818	342	375	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	476	-	-	-	-	-
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	346	701	1183	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	625	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	322	701	1183	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	625	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1183	-	413	-	-
HCM Lane V/C Ratio	0.055	-	0.182	-	-
HCM Control Delay (s)	8.2	0	15.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	17	16	368	296	14
Future Vol, veh/h	11	17	16	368	296	14
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	12	18	17	400	322	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	764	330	337	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	434	-	-	-	-	-
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	372	712	1222	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	365	712	1222	-	-	-
Mov Cap-2 Maneuver	365	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1222	-	518	-	-
HCM Lane V/C Ratio	0.014	-	0.059	-	-
HCM Control Delay (s)	8	0	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	8	14	370	289	16
Future Vol, veh/h	12	8	14	370	289	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	13	9	15	402	314	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	755	323	331	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	432	-	-	-	-	-
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	376	718	1228	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	655	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	371	718	1228	-	-	-
Mov Cap-2 Maneuver	482	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	655	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1228	-	555	-	-
HCM Lane V/C Ratio	0.012	-	0.039	-	-
HCM Control Delay (s)	8	-	11.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	118	168	314	249	54
Future Vol, veh/h	70	118	168	314	249	54
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	76	128	183	341	271	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	524	0	-	0	634	354
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	280	-
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	1043	-	-	-	443	690
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1043	-	-	-	408	690
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	33.8
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1043	-	-	-	440
HCM Lane V/C Ratio	0.073	-	-	-	0.749
HCM Control Delay (s)	8.7	0	-	-	33.8
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	6.2

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	35.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	144	639	24	23	732	127	14	2	13	76	3	182
Future Vol, veh/h	144	639	24	23	732	127	14	2	13	76	3	182
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	157	695	26	25	796	138	15	2	14	83	3	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	935	0	0	721	0	0	2038	2007	708	1877	1882	797
Stage 1	-	-	-	-	-	-	1022	1022	-	847	847	-
Stage 2	-	-	-	-	-	-	1016	985	-	1030	1035	-
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	732	-	-	881	-	-	42	59	435	~ 55	71	387
Stage 1	-	-	-	-	-	-	285	313	-	357	378	-
Stage 2	-	-	-	-	-	-	287	326	-	282	309	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	731	-	-	881	-	-	16	45	435	~ 42	54	387
Mov Cap-2 Maneuver	-	-	-	-	-	-	16	45	-	~ 42	54	-
Stage 1	-	-	-	-	-	-	224	246	-	280	367	-
Stage 2	-	-	-	-	-	-	135	317	-	212	243	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0.2	$ 300.8	225.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	17	435	731	-	-	881	-	-	42	387
HCM Lane V/C Ratio	1.023	0.032	0.214	-	-	0.028	-	-	2.045	0.511
HCM Control Delay (s)	$ 534.2	13.6	11.3	-	-	9.2	-	-	$ 691.9	23.6
HCM Lane LOS	F	B	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	2.6	0.1	0.8	-	-	0.1	-	-	9	2.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	138	185	15	163	126	220	577	24	116	638	244
Future Volume (veh/h)	149	138	185	15	163	126	220	577	24	116	638	244
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	0.98		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	213	150	43	16	177	11	239	627	0	126	693	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	466	390	261	241	199	309	865		330	796	
Arrive On Green	0.14	0.25	0.25	0.02	0.13	0.13	0.10	0.46	0.00	0.06	0.43	0.00
Sat Flow, veh/h	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	213	150	43	16	177	11	239	627	0	126	693	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	11.8	6.5	2.1	0.8	9.0	0.6	7.3	26.9	0.0	3.9	33.6	0.0
Cycle Q Clear(g_c), s	11.8	6.5	2.1	0.8	9.0	0.6	7.3	26.9	0.0	3.9	33.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	317	466	390	261	241	199	309	865		330	796	
V/C Ratio(X)	0.67	0.32	0.11	0.06	0.73	0.06	0.77	0.72		0.38	0.87	
Avail Cap(c_a), veh/h	321	466	390	480	377	312	569	942		656	942	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.2	30.4	28.8	36.5	41.6	38.0	20.9	21.6	0.0	17.4	26.0	0.0
Incr Delay (d2), s/veh	4.3	0.1	0.0	0.0	1.6	0.0	1.6	3.4	0.0	0.3	9.4	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	4.6	3.0	0.8	0.3	4.3	0.2	2.8	11.7	0.0	1.5	15.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.5	30.6	28.8	36.5	43.3	38.0	22.4	25.0	0.0	17.7	35.5	0.0
LnGrp LOS	C	C	C	D	D	D	C	C		B	D	
Approach Vol, veh/h		406			204			866	A		819	A
Approach Delay, s/veh		32.5			42.5			24.3			32.7	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	51.9	6.8	29.7	14.5	48.2	18.7	17.8
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	5.9	28.9	2.8	8.5	9.3	35.6	13.8	11.0
Green Ext Time (p_c), s	0.1	7.4	0.0	0.5	0.3	6.7	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	99	31	451	145	321	60	559	461	312	568	33
Future Volume (veh/h)	22	99	31	451	145	321	60	559	461	312	568	33
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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	24	108	2	490	158	248	65	608	0	339	617	18
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	191	148	185	552	591	737	291	680		362	894	790
Arrive On Green	0.02	0.07	0.07	0.27	0.32	0.32	0.03	0.36	0.00	0.15	0.48	0.48
Sat Flow, veh/h	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Grp Volume(v), veh/h	24	108	2	490	158	248	65	608	0	339	617	18
Grp Sat Flow(s),veh/h/ln	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Q Serve(g_s), s	1.6	7.2	0.1	34.4	8.8	13.9	3.2	42.9	0.0	18.5	36.0	0.8
Cycle Q Clear(g_c), s	1.6	7.2	0.1	34.4	8.8	13.9	3.2	42.9	0.0	18.5	36.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	191	148	185	552	591	737	291	680		362	894	790
V/C Ratio(X)	0.13	0.73	0.01	0.89	0.27	0.34	0.22	0.89		0.94	0.69	0.02
Avail Cap(c_a), veh/h	219	162	198	611	641	779	407	801		429	961	847
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.3	63.7	56.1	41.0	35.8	23.8	27.9	42.0	0.0	36.3	28.5	17.7
Incr Delay (d2), s/veh	0.3	11.7	0.0	13.9	0.1	0.1	0.1	13.0	0.0	24.2	2.7	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	0.8	4.3	0.1	17.4	4.1	5.4	1.4	22.0	0.0	14.1	16.5	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.6	75.4	56.1	54.9	35.9	23.9	28.0	55.0	0.0	60.4	31.2	17.8
LnGrp LOS	E	E	E	D	D	C	C	D		E	C	B
Approach Vol, veh/h		134			896			673	A		974	
Approach Delay, s/veh		72.1			43.0			52.4			41.1	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.8	56.9	42.3	15.0	9.8	72.9	8.0	49.3
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	26.0	60.0	42.0	11.0	14.0	72.0	5.0	48.0
Max Q Clear Time (g_c+I1), s	20.5	44.9	36.4	9.2	5.2	38.0	3.6	15.9
Green Ext Time (p_c), s	0.3	6.0	0.9	0.1	0.0	9.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	31	57	940	806	129
Future Volume (veh/h)	99	31	57	940	806	129
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	2	62	1022	876	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	200	178	333	1317	1061	898
Arrive On Green	0.11	0.11	0.05	0.70	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	1870	1870	1584
Grp Volume(v), veh/h	108	2	62	1022	876	100
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1584
Q Serve(g_s), s	3.4	0.1	0.7	21.3	22.8	1.7
Cycle Q Clear(g_c), s	3.4	0.1	0.7	21.3	22.8	1.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	200	178	333	1317	1061	898
V/C Ratio(X)	0.54	0.01	0.19	0.78	0.83	0.11
Avail Cap(c_a), veh/h	892	794	654	2810	2217	1877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	23.6	9.4	5.8	10.6	6.0
Incr Delay (d2), s/veh	2.3	0.0	0.3	1.0	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.3	5.0	7.6	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.4	23.7	9.7	6.8	12.3	6.0
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	110			1084	976	
Approach Delay, s/veh	27.3			7.0	11.6	
Approach LOS	C			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.2	40.0		11.7		48.2
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	3.0	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.7	24.8		5.4		23.3
Green Ext Time (p_c), s	0.1	9.1		0.3		12.4

Intersection Summary	
HCM 6th Ctrl Delay	10.1
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	7	3	115	12	97	9	886	127	80	744	22
Future Volume (veh/h)	12	7	3	115	12	97	9	886	127	80	744	22
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	13	8	1	125	13	81	10	963	135	87	809	15
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	182	100	262	191	19	92	374	1028	144	197	1257	1064
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.01	0.64	0.64	0.04	0.67	0.67
Sat Flow, veh/h	771	605	1585	833	117	558	1781	1605	225	1781	1870	1584
Grp Volume(v), veh/h	21	0	1	219	0	0	10	0	1098	87	809	15
Grp Sat Flow(s),veh/h/ln	1376	0	1585	1508	0	0	1781	0	1830	1781	1870	1584
Q Serve(g_s), s	0.0	0.0	0.1	14.0	0.0	0.0	0.2	0.0	57.2	1.7	26.5	0.3
Cycle Q Clear(g_c), s	1.0	0.0	0.1	15.0	0.0	0.0	0.2	0.0	57.2	1.7	26.5	0.3
Prop In Lane	0.62		1.00	0.57		0.37	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	282	0	262	302	0	0	374	0	1172	197	1257	1064
V/C Ratio(X)	0.07	0.00	0.00	0.72	0.00	0.00	0.03	0.00	0.94	0.44	0.64	0.01
Avail Cap(c_a), veh/h	386	0	373	407	0	0	587	0	1207	355	1257	1064
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	37.4	0.0	37.0	43.2	0.0	0.0	9.0	0.0	17.1	24.2	10.1	5.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	13.8	0.6	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	0.5	0.0	0.0	5.8	0.0	0.0	0.1	0.0	25.7	1.4	10.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.4	0.0	37.0	45.5	0.0	0.0	9.0	0.0	31.0	24.8	11.6	5.8
LnGrp LOS	D	A	D	D	A	A	A	A	C	C	B	A
Approach Vol, veh/h		22			219			1108			911	
Approach Delay, s/veh		37.4			45.5			30.8			12.8	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.6	74.0		22.5	6.3	77.3		22.5
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	4.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	3.7	59.2		3.0	2.2	28.5		17.0
Green Ext Time (p_c), s	0.1	8.7		0.0	0.0	15.3		0.5

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	93	132	109	61	12
Future Vol, veh/h	11	93	132	109	61	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	12	101	143	118	66	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	261	0	-	0	327	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	125	-
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	1303	-	-	-	667	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	901	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1303	-	-	-	661	839
Mov Cap-2 Maneuver	-	-	-	-	661	-
Stage 1	-	-	-	-	825	-
Stage 2	-	-	-	-	901	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1303	-	-	-	661	839
HCM Lane V/C Ratio	0.009	-	-	-	0.1	0.016
HCM Control Delay (s)	7.8	-	-	-	11.1	9.4
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0

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

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Base Year 2024 AM With Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	173	2.0	182	2.0	0.557	8.0	LOS A	4.9	125.6	0.83	0.88	0.96	20.4
7	T1	192	2.0	202	2.0	0.557	5.2	LOS A	4.9	125.6	0.83	0.88	0.96	19.0
25	R2	97	2.0	102	2.0	0.557	5.2	LOS A	4.9	125.6	0.83	0.88	0.96	19.0
Approach		462	2.0	486	2.0	0.557	6.3	LOS A	4.9	125.6	0.83	0.88	0.96	19.5
East: WB Maui Lani Parkway														
19	L2	73	2.0	77	2.0	0.440	6.7	LOS A	3.2	81.1	0.78	0.72	0.80	20.6
336	T1	206	2.0	217	2.0	0.440	3.9	LOS A	3.2	81.1	0.78	0.72	0.80	19.2
24	R2	77	2.0	81	2.0	0.440	3.9	LOS A	3.2	81.1	0.78	0.72	0.80	19.2
Approach		356	2.0	375	2.0	0.440	4.5	LOS A	3.2	81.1	0.78	0.72	0.80	19.5
North: SB Kamehameha Ave														
15	L2	161	2.0	169	2.0	0.581	7.4	LOS A	5.3	133.8	0.79	0.82	0.91	20.5
2	T1	157	2.0	165	2.0	0.581	4.7	LOS A	5.3	133.8	0.79	0.82	0.91	19.1
40	R2	201	2.0	212	2.0	0.581	4.7	LOS A	5.3	133.8	0.79	0.82	0.91	19.1
Approach		519	2.0	546	2.0	0.581	5.5	LOS A	5.3	133.8	0.79	0.82	0.91	19.5
West: EB Maui Lani Parkway														
30	L2	182	2.0	192	2.0	0.549	6.2	LOS A	4.7	119.0	0.76	0.71	0.82	20.6
464	T1	183	2.0	193	2.0	0.549	3.5	LOS A	4.7	119.0	0.76	0.71	0.82	19.2
78	R2	143	2.0	151	2.0	0.549	3.5	LOS A	4.7	119.0	0.76	0.71	0.82	19.2
Approach		508	2.0	535	2.0	0.549	4.5	LOS A	4.7	119.0	0.76	0.71	0.82	19.7
All Vehicles		1845	2.0	1942	2.0	0.581	5.2	LOS A	5.3	133.8	0.79	0.78	0.87	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	121.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	3	147	16	15	9	167	420	7	2	548	104
Future Vol, veh/h	82	3	147	16	15	9	167	420	7	2	548	104
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	89	3	160	17	16	10	182	457	8	2	596	113
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	14.3	14.1	120.7	167.5
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	28%	0%	100%	0%	40%	0%
Vol Thru, %	72%	0%	0%	2%	38%	84%
Vol Right, %	0%	100%	0%	98%	23%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	587	7	82	150	40	654
LT Vol	167	0	82	0	16	2
Through Vol	420	0	0	3	15	548
RT Vol	0	7	0	147	9	104
Lane Flow Rate	638	8	89	163	43	711
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.176	0.012	0.206	0.322	0.106	1.294
Departure Headway (Hd)	7.02	6.155	9.159	7.92	9.883	6.851
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	523	585	394	457	365	533
Service Time	4.72	3.855	6.859	5.62	7.883	4.851
HCM Lane V/C Ratio	1.22	0.014	0.226	0.357	0.118	1.334
HCM Control Delay	122	8.9	14.2	14.3	14.1	167.5
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	21.7	0	0.8	1.4	0.4	28.3

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	530	2.0	558	2.0	0.914	7.4	LOS A	22.2	565.1	1.00	0.89	1.20	18.8
25	R2	507	2.0	534	2.0	0.914	7.4	LOS A	22.2	565.1	1.00	0.89	1.20	18.8
Approach		1037	2.0	1092	2.0	0.914	7.4	LOS A	22.2	565.1	1.00	0.89	1.20	18.8
East: WB Waiinu Rd														
19	L2	98	2.0	103	2.0	0.226	5.7	LOS A	1.5	39.0	0.74	0.68	0.74	20.6
24	R2	73	2.0	77	2.0	0.226	3.0	LOS A	1.5	39.0	0.74	0.68	0.74	19.2
Approach		171	2.0	180	2.0	0.226	4.6	LOS A	1.5	39.0	0.74	0.68	0.74	20.0
North: SB Waiale Rd														
15	L2	163	2.0	172	2.0	0.631	3.7	LOS A	6.6	168.6	0.53	0.24	0.53	20.9
2	T1	592	2.0	623	2.0	0.631	1.0	LOS A	6.6	168.6	0.53	0.24	0.53	19.4
Approach		755	2.0	795	2.0	0.631	1.6	LOS A	6.6	168.6	0.53	0.24	0.53	19.7
All Vehicles		1963	2.0	2066	2.0	0.914	4.9	LOS A	22.2	565.1	0.80	0.62	0.90	19.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	56.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	0	32	8	0	16	7	811	7	11	482	166
Future Vol, veh/h	159	0	32	8	0	16	7	811	7	11	482	166
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	173	0	35	9	0	17	8	882	8	12	524	180

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1552	1550	617	1561	1636	889	707	0	0	893	0	0
Stage 1	641	641	-	905	905	-	-	-	-	-	-	-
Stage 2	911	909	-	656	731	-	-	-	-	-	-	-
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	~ 92	114	490	91	101	342	891	-	-	759	-	-
Stage 1	463	469	-	331	355	-	-	-	-	-	-	-
Stage 2	328	354	-	454	427	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 84	108	489	81	96	341	888	-	-	757	-	-
Mov Cap-2 Maneuver	~ 84	108	-	81	96	-	-	-	-	-	-	-
Stage 1	453	455	-	324	348	-	-	-	-	-	-	-
Stage 2	306	347	-	410	414	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 498.4	30.9	0.1	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	888	-	-	84	489	165	757	-	-
HCM Lane V/C Ratio	0.009	-	-	2.057	0.071	0.158	0.016	-	-
HCM Control Delay (s)	9.1	0	-	$ 596.1	12.9	30.9	9.8	-	-
HCM Lane LOS	A	A	-	F	B	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	15.3	0.2	0.5	0	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	67	52	725	470	24
Future Vol, veh/h	125	67	52	725	470	24
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	136	73	57	788	511	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1429	527	540	0	-	0
Stage 1	527	-	-	-	-	-
Stage 2	902	-	-	-	-	-
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	149	551	1028	-	-	-
Stage 1	592	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 134	549	1025	-	-	-
Mov Cap-2 Maneuver	~ 134	-	-	-	-	-
Stage 1	532	-	-	-	-	-
Stage 2	395	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	99.3	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1025	-	134	549	-	-
HCM Lane V/C Ratio	0.055	-	1.014	0.133	-	-
HCM Control Delay (s)	8.7	0	145.8	12.6	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	7.3	0.5	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	329	463	87	98	313	54	179	186	116	64	207	167
Future Volume (veh/h)	329	463	87	98	313	54	179	186	116	64	207	167
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		0.99	1.00		0.99
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	411	503	88	107	340	10	195	202	104	70	225	154
Peak Hour Factor	0.80	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	492	560	98	240	424	358	299	357	184	330	259	177
Arrive On Green	0.20	0.36	0.36	0.06	0.23	0.23	0.10	0.31	0.31	0.04	0.25	0.25
Sat Flow, veh/h	1781	1550	271	1781	1870	1578	1781	1159	597	1781	1029	704
Grp Volume(v), veh/h	411	0	591	107	340	10	195	0	306	70	0	379
Grp Sat Flow(s),veh/h/ln	1781	0	1821	1781	1870	1578	1781	0	1756	1781	0	1734
Q Serve(g_s), s	14.8	0.0	27.4	4.0	15.3	0.4	6.9	0.0	13.1	2.6	0.0	18.7
Cycle Q Clear(g_c), s	14.8	0.0	27.4	4.0	15.3	0.4	6.9	0.0	13.1	2.6	0.0	18.7
Prop In Lane	1.00		0.15	1.00		1.00	1.00		0.34	1.00		0.41
Lane Grp Cap(c), veh/h	492	0	658	240	424	358	299	0	541	330	0	437
V/C Ratio(X)	0.84	0.00	0.90	0.45	0.80	0.03	0.65	0.00	0.57	0.21	0.00	0.87
Avail Cap(c_a), veh/h	656	0	795	345	502	424	303	0	570	473	0	601
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.1	0.0	27.0	25.4	32.6	26.9	22.7	0.0	25.9	23.5	0.0	32.0
Incr Delay (d2), s/veh	7.0	0.0	11.5	1.3	7.8	0.0	4.8	0.0	1.2	0.3	0.0	9.8
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	6.9	0.0	13.6	1.8	7.8	0.2	3.2	0.0	5.6	1.1	0.0	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.2	0.0	38.4	26.7	40.4	26.9	27.5	0.0	27.1	23.8	0.0	41.8
LnGrp LOS	C	A	D	C	D	C	C	A	C	C	A	D
Approach Vol, veh/h		1002			457			501			449	
Approach Delay, s/veh		33.8			36.9			27.3			39.0	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	33.5	9.7	38.3	12.8	28.5	21.8	26.3
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	11.0	29.0	11.0	39.0	9.0	31.0	26.0	24.0
Max Q Clear Time (g_c+I1), s	4.6	15.1	6.0	29.4	8.9	20.7	16.8	17.3
Green Ext Time (p_c), s	0.1	1.6	0.1	2.9	0.0	1.8	1.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	34.0
HCM 6th LOS	C

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	131	21	4	331	320	34
Future Vol, veh/h	131	21	4	331	320	34
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	50	-	-	-	-
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	142	23	4	360	348	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	735	367	385	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	368	-	-	-	-	-
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	387	678	1173	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	385	678	1173	-	-	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1173	-	385	678	-	-
HCM Lane V/C Ratio	0.004	-	0.37	0.034	-	-
HCM Control Delay (s)	8.1	0	19.7	10.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.7	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	73	16	229	322	28
Future Vol, veh/h	69	73	16	229	322	28
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	75	79	17	249	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	648	365	380	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	283	-	-	-	-	-
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	435	680	1178	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	765	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	428	680	1178	-	-	-
Mov Cap-2 Maneuver	428	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	765	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1178	-	529	-	-
HCM Lane V/C Ratio	0.015	-	0.292	-	-
HCM Control Delay (s)	8.1	0	14.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	16	4	216	393	5
Future Vol, veh/h	31	16	4	216	393	5
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	34	17	4	235	427	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	673	430	432	0	-	0
Stage 1	430	-	-	-	-	-
Stage 2	243	-	-	-	-	-
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	421	625	1128	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	797	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	419	625	1128	-	-	-
Mov Cap-2 Maneuver	419	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	797	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	472	-	-
HCM Lane V/C Ratio	0.004	-	0.108	-	-
HCM Control Delay (s)	8.2	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	22	5	190	401	12
Future Vol, veh/h	28	22	5	190	401	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	30	24	5	207	436	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	660	443	449	0	-	0
Stage 1	443	-	-	-	-	-
Stage 2	217	-	-	-	-	-
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	428	615	1111	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	819	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	426	615	1111	-	-	-
Mov Cap-2 Maneuver	517	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	819	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1111	-	556	-	-
HCM Lane V/C Ratio	0.005	-	0.098	-	-
HCM Control Delay (s)	8.3	-	12.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	23.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	71	271	74	130	323	89
Future Vol, veh/h	71	271	74	130	323	89
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	77	295	80	141	351	97

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	221	0	-	0	600	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	449	-
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	1348	-	-	-	464	895
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1348	-	-	-	432	895
Mov Cap-2 Maneuver	-	-	-	-	432	-
Stage 1	-	-	-	-	817	-
Stage 2	-	-	-	-	643	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	52.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1348	-	-	-	486
HCM Lane V/C Ratio	0.057	-	-	-	0.921
HCM Control Delay (s)	7.8	0	-	-	52.9
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	10.8

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	97	780	10	9	582	64	28	3	26	32	1	111
Future Vol, veh/h	97	780	10	9	582	64	28	3	26	32	1	111
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	105	848	11	10	633	70	30	3	28	35	1	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	704	0	0	859	0	0	1813	1788	854	1733	1723	634
Stage 1	-	-	-	-	-	-	1064	1064	-	654	654	-
Stage 2	-	-	-	-	-	-	749	724	-	1079	1069	-
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	894	-	-	782	-	-	61	81	358	69	89	479
Stage 1	-	-	-	-	-	-	270	300	-	456	463	-
Stage 2	-	-	-	-	-	-	404	430	-	264	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	893	-	-	782	-	-	41	70	358	55	77	479
Mov Cap-2 Maneuver	-	-	-	-	-	-	41	70	-	55	77	-
Stage 1	-	-	-	-	-	-	238	265	-	402	457	-
Stage 2	-	-	-	-	-	-	298	424	-	212	263	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.1	126.1	46.3
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	43	358	893	-	-	782	-	-	55	479
HCM Lane V/C Ratio	0.784	0.079	0.118	-	-	0.013	-	-	0.652	0.252
HCM Control Delay (s)	218.6	15.9	9.6	-	-	9.7	-	-	151.4	15
HCM Lane LOS	F	C	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	3	0.3	0.4	-	-	0	-	-	2.7	1

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	293	282	510	31	237	131	311	590	15	46	403	112
Future Volume (veh/h)	293	282	510	31	237	131	311	590	15	46	403	112
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		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	419	307	183	34	258	14	338	641	0	50	438	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	446	694	586	281	292	246	373	716		173	496	
Arrive On Green	0.24	0.37	0.37	0.03	0.16	0.16	0.15	0.38	0.00	0.03	0.27	0.00
Sat Flow, veh/h	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	419	307	183	34	258	14	338	641	0	50	438	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	26.1	14.2	9.5	1.8	15.5	0.9	15.2	37.0	0.0	2.3	25.8	0.0
Cycle Q Clear(g_c), s	26.1	14.2	9.5	1.8	15.5	0.9	15.2	37.0	0.0	2.3	25.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	446	694	586	281	292	246	373	716		173	496	
V/C Ratio(X)	0.94	0.44	0.31	0.12	0.88	0.06	0.91	0.90		0.29	0.88	
Avail Cap(c_a), veh/h	446	694	586	663	326	274	473	716		483	586	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	28.8	27.2	25.7	38.9	47.5	41.3	27.0	33.3	0.0	31.5	40.5	0.0
Incr Delay (d2), s/veh	27.6	0.2	0.1	0.1	20.9	0.0	16.1	14.5	0.0	0.3	15.4	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	12.7	6.4	3.6	0.8	9.0	0.3	7.8	18.9	0.0	1.0	13.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.4	27.4	25.8	39.0	68.4	41.3	43.1	47.8	0.0	31.9	55.9	0.0
LnGrp LOS	E	C	C	D	E	D	D	D		C	E	
Approach Vol, veh/h		909			306			979	A		488	A
Approach Delay, s/veh		40.5			63.9			46.2			53.5	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	50.0	8.3	47.6	22.5	36.5	33.0	22.9
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	36.0	28.0	20.0	24.0	36.0	28.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	39.0	3.8	16.2	17.2	27.8	28.1	17.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7	0.3	2.7	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	47.6
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	140	82	348	50	358	21	495	419	320	660	9
Future Volume (veh/h)	53	140	82	348	50	358	21	495	419	320	660	9
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	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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	58	152	12	378	54	214	23	538	0	348	717	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	301	208	216	450	472	621	221	665		405	883	811
Arrive On Green	0.04	0.10	0.10	0.19	0.25	0.25	0.02	0.36	0.00	0.14	0.47	0.47
Sat Flow, veh/h	1968	2067	1734	1781	1870	1579	1781	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	58	152	12	378	54	214	23	538	0	348	717	5
Grp Sat Flow(s),veh/h/ln	1968	2067	1734	1781	1870	1579	1781	1870	1585	1781	1870	1583
Q Serve(g_s), s	2.6	7.1	0.6	18.4	2.2	9.4	0.8	25.8	0.0	11.7	32.5	0.2
Cycle Q Clear(g_c), s	2.6	7.1	0.6	18.4	2.2	9.4	0.8	25.8	0.0	11.7	32.5	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	301	208	216	450	472	621	221	665		405	883	811
V/C Ratio(X)	0.19	0.73	0.06	0.84	0.11	0.34	0.10	0.81		0.86	0.81	0.01
Avail Cap(c_a), veh/h	400	625	566	450	754	859	520	1132		496	1132	1022
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.7	43.3	38.3	30.3	28.6	21.2	21.7	28.9	0.0	20.3	22.4	11.8
Incr Delay (d2), s/veh	0.3	1.8	0.0	13.3	0.0	0.1	0.1	5.0	0.0	10.4	5.0	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	1.3	3.7	0.3	9.4	1.0	3.5	0.3	12.0	0.0	5.6	14.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.0	45.1	38.3	43.6	28.6	21.3	21.7	34.0	0.0	30.8	27.4	11.8
LnGrp LOS	D	D	D	D	C	C	C	C		C	C	B
Approach Vol, veh/h		222			646			561	A		1070	
Approach Delay, s/veh		42.9			35.0			33.5			28.4	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	41.2	24.0	15.0	7.3	52.8	9.0	30.0
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.0	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	13.7	27.8	20.4	9.1	2.8	34.5	4.6	11.4
Green Ext Time (p_c), s	0.3	7.4	0.0	0.5	0.0	10.0	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	32.5
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	154	88	18	777	970	63
Future Volume (veh/h)	154	88	18	777	970	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	7	20	845	1054	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	214	191	235	1372	1205	1021
Arrive On Green	0.12	0.12	0.02	0.73	0.64	0.64
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	167	7	20	845	1054	55
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	6.8	0.3	0.3	16.5	34.5	1.0
Cycle Q Clear(g_c), s	6.8	0.3	0.3	16.5	34.5	1.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	214	191	235	1372	1205	1021
V/C Ratio(X)	0.78	0.04	0.09	0.62	0.87	0.05
Avail Cap(c_a), veh/h	711	633	526	2239	1767	1497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.1	29.2	12.8	4.9	10.9	4.9
Incr Delay (d2), s/veh	6.0	0.1	0.2	0.5	3.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.1	0.2	4.3	12.2	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.1	29.3	13.0	5.3	14.5	5.0
LnGrp LOS	D	C	B	A	B	A
Approach Vol, veh/h	174			865	1109	
Approach Delay, s/veh	37.8			5.5	14.0	
Approach LOS	D			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	6.7	54.4		14.0		61.1
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	1.0	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.3	36.5		8.8		18.5
Green Ext Time (p_c), s	0.0	11.9		0.4		8.3

Intersection Summary	
HCM 6th Ctrl Delay	12.5
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	13	6	106	8	54	4	712	120	179	871	6
Future Volume (veh/h)	20	13	6	106	8	54	4	712	120	179	871	6
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	22	14	2	115	9	44	4	774	126	195	947	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	103	220	210	17	55	286	953	155	337	1244	1055
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.01	0.61	0.61	0.06	0.67	0.67
Sat Flow, veh/h	838	735	1579	990	119	393	1781	1569	255	1781	1870	1585
Grp Volume(v), veh/h	36	0	2	168	0	0	4	0	900	195	947	5
Grp Sat Flow(s),veh/h/ln	1573	0	1579	1502	0	0	1781	0	1824	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.1	7.6	0.0	0.0	0.1	0.0	32.2	3.2	28.9	0.1
Cycle Q Clear(g_c), s	1.5	0.0	0.1	9.0	0.0	0.0	0.1	0.0	32.2	3.2	28.9	0.1
Prop In Lane	0.61		1.00	0.68		0.26	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	288	0	220	282	0	0	286	0	1109	337	1244	1055
V/C Ratio(X)	0.12	0.00	0.01	0.60	0.00	0.00	0.01	0.00	0.81	0.58	0.76	0.00
Avail Cap(c_a), veh/h	526	0	468	511	0	0	572	0	1515	521	1553	1316
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	31.8	0.0	31.2	35.0	0.0	0.0	9.8	0.0	12.8	14.5	9.6	4.7
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.8	0.6	2.6	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	0.6	0.0	0.0	3.4	0.0	0.0	0.0	0.0	12.4	1.9	10.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.9	0.0	31.2	35.7	0.0	0.0	9.8	0.0	16.6	15.1	12.2	4.7
LnGrp LOS	C	A	C	D	A	A	A	A	B	B	B	A
Approach Vol, veh/h		38			168			904			1147	
Approach Delay, s/veh		31.8			35.7			16.6			12.6	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.3	57.2		16.8	5.4	62.1		16.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	5.2	34.2		3.5	2.1	30.9		11.0
Green Ext Time (p_c), s	0.2	17.0		0.1	0.0	19.1		0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	158	48	35	121	5
Future Vol, veh/h	5	158	48	35	121	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	5	172	52	38	132	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	90	0	-	0	253	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	182	-
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	1505	-	-	-	736	991
Stage 1	-	-	-	-	952	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1505	-	-	-	734	991
Mov Cap-2 Maneuver	-	-	-	-	734	-
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	849	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1505	-	-	-	734	991
HCM Lane V/C Ratio	0.004	-	-	-	0.179	0.005
HCM Control Delay (s)	7.4	-	-	-	11	8.7
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.6	0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Base Year 2024 PM With Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	124	2.0	131	2.0	0.408	6.6	LOS A	2.9	73.5	0.80	0.73	0.80	20.5
7	T1	134	2.0	141	2.0	0.408	3.9	LOS A	2.9	73.5	0.80	0.73	0.80	19.1
25	R2	55	2.0	58	2.0	0.408	3.9	LOS A	2.9	73.5	0.80	0.73	0.80	19.1
Approach		313	2.0	329	2.0	0.408	5.0	LOS A	2.9	73.5	0.80	0.73	0.80	19.7
East: WB Maui Lani Parkway														
19	L2	53	2.0	56	2.0	0.622	8.6	LOS A	6.1	155.2	0.83	0.90	1.02	20.4
336	T1	306	2.0	322	2.0	0.622	5.9	LOS A	6.1	155.2	0.83	0.90	1.02	19.0
24	R2	180	2.0	189	2.0	0.622	5.9	LOS A	6.1	155.2	0.83	0.90	1.02	19.0
Approach		539	2.0	567	2.0	0.622	6.1	LOS A	6.1	155.2	0.83	0.90	1.02	19.1
North: SB Kamehameha Ave														
15	L2	119	2.0	125	2.0	0.755	11.4	LOS B	10.0	254.8	0.95	1.15	1.31	19.8
2	T1	158	2.0	166	2.0	0.755	8.7	LOS A	10.0	254.8	0.95	1.15	1.31	18.5
40	R2	364	2.0	383	2.0	0.755	8.7	LOS A	10.0	254.8	0.95	1.15	1.31	18.5
Approach		641	2.0	675	2.0	0.755	9.2	LOS A	10.0	254.8	0.95	1.15	1.31	18.7
West: EB Maui Lani Parkway														
30	L2	236	2.0	248	2.0	0.657	6.8	LOS A	7.0	178.2	0.82	0.79	0.92	20.5
464	T1	222	2.0	234	2.0	0.657	4.1	LOS A	7.0	178.2	0.82	0.79	0.92	19.1
78	R2	173	2.0	182	2.0	0.657	4.1	LOS A	7.0	178.2	0.82	0.79	0.92	19.1
Approach		631	2.0	664	2.0	0.657	5.1	LOS A	7.0	178.2	0.82	0.79	0.92	19.6
All Vehicles		2124	2.0	2236	2.0	0.755	6.6	LOS A	10.0	254.8	0.86	0.92	1.05	19.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	170.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	10	204	16	4	8	114	519	23	8	656	66
Future Vol, veh/h	58	10	204	16	4	8	114	519	23	8	656	66
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	63	11	222	17	4	9	124	564	25	9	713	72
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	16.8	14.6	158.3	244.5
HCM LOS	C	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	0%	100%	0%	57%	1%
Vol Thru, %	82%	0%	0%	5%	14%	90%
Vol Right, %	0%	100%	0%	95%	29%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	633	23	58	214	28	730
LT Vol	114	0	58	0	16	8
Through Vol	519	0	0	10	4	656
RT Vol	0	23	0	204	8	66
Lane Flow Rate	688	25	63	233	30	793
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.281	0.041	0.145	0.458	0.076	1.476
Departure Headway (Hd)	7.28	6.466	9.412	8.186	10.696	7.114
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	502	557	383	444	337	516
Service Time	4.98	4.166	7.112	5.886	8.696	5.114
HCM Lane V/C Ratio	1.371	0.045	0.164	0.525	0.089	1.537
HCM Control Delay	163.7	9.4	13.7	17.6	14.6	244.5
HCM Lane LOS	F	A	B	C	B	F
HCM 95th-tile Q	26.4	0.1	0.5	2.3	0.2	37.6

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	485	2.0	511	2.0	0.748	3.4	LOS A	9.8	248.1	0.81	0.66	0.88	19.3
25	R2	325	2.0	342	2.0	0.748	3.4	LOS A	9.8	248.1	0.81	0.66	0.88	19.3
Approach		810	2.0	853	2.0	0.748	3.4	LOS A	9.8	248.1	0.81	0.66	0.88	19.3
East: WB Waiinu Rd														
19	L2	148	2.0	156	2.0	0.328	5.7	LOS A	2.3	57.4	0.73	0.68	0.73	20.7
24	R2	123	2.0	129	2.0	0.328	3.0	LOS A	2.3	57.4	0.73	0.68	0.73	19.2
Approach		271	2.0	285	2.0	0.328	4.4	LOS A	2.3	57.4	0.73	0.68	0.73	20.0
North: SB Waiale Rd														
15	L2	206	2.0	217	2.0	0.734	4.5	LOS A	8.6	219.6	0.73	0.37	0.73	20.7
2	T1	632	2.0	665	2.0	0.734	1.7	LOS A	8.6	219.6	0.73	0.37	0.73	19.2
Approach		838	2.0	882	2.0	0.734	2.4	LOS A	8.6	219.6	0.73	0.37	0.73	19.6
All Vehicles		1919	2.0	2020	2.0	0.748	3.1	LOS A	9.8	248.1	0.76	0.53	0.79	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	12.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	13	6	1	9	26	763	4	4	685	156
Future Vol, veh/h	70	0	13	6	1	9	26	763	4	4	685	156
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	76	0	14	7	1	10	28	829	4	4	745	170

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1734	1733	833	1735	1816	834	918	0	0	836	0	0
Stage 1	841	841	-	890	890	-	-	-	-	-	-	-
Stage 2	893	892	-	845	926	-	-	-	-	-	-	-
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	~ 69	88	369	69	78	368	743	-	-	798	-	-
Stage 1	359	380	-	337	361	-	-	-	-	-	-	-
Stage 2	336	360	-	357	347	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 62	80	368	62	71	367	741	-	-	796	-	-
Mov Cap-2 Maneuver	~ 62	80	-	62	71	-	-	-	-	-	-	-
Stage 1	333	375	-	312	335	-	-	-	-	-	-	-
Stage 2	303	334	-	340	342	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	255.7	40.7	0.3	0
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	741	-	-	62	368	118	796	-	-
HCM Lane V/C Ratio	0.038	-	-	1.227	0.038	0.147	0.005	-	-
HCM Control Delay (s)	10.1	0	-	$ 300.4	15.2	40.7	9.5	-	-
HCM Lane LOS	B	A	-	F	C	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	6.3	0.1	0.5	0	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	51	59	699	657	42
Future Vol, veh/h	58	51	59	699	657	42
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	63	55	64	760	714	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1628	740	763	0	-	0
Stage 1	740	-	-	-	-	-
Stage 2	888	-	-	-	-	-
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	112	417	850	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	97	416	848	-	-	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	409	-	-	-	-	-
Stage 2	401	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	57	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	848	-	97	416	-	-
HCM Lane V/C Ratio	0.076	-	0.65	0.133	-	-
HCM Control Delay (s)	9.6	0	94	15	-	-
HCM Lane LOS	A	A	F	C	-	-
HCM 95th %tile Q(veh)	0.2	-	3.2	0.5	-	-

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	300	353	87	164	532	116	88	218	113	119	251	211
Future Volume (veh/h)	300	353	87	164	532	116	88	218	113	119	251	211
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	375	384	90	178	578	43	96	237	112	129	273	212
Peak Hour Factor	0.80	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	407	640	150	416	641	542	141	322	152	262	291	226
Arrive On Green	0.18	0.44	0.44	0.08	0.34	0.34	0.04	0.27	0.27	0.07	0.30	0.30
Sat Flow, veh/h	1781	1465	343	1781	1870	1583	1781	1200	567	1781	975	757
Grp Volume(v), veh/h	375	0	474	178	578	43	96	0	349	129	0	485
Grp Sat Flow(s),veh/h/ln	1781	0	1808	1781	1870	1583	1781	0	1767	1781	0	1733
Q Serve(g_s), s	20.9	0.0	27.3	8.7	40.1	2.5	5.0	0.0	24.5	6.9	0.0	37.2
Cycle Q Clear(g_c), s	20.9	0.0	27.3	8.7	40.1	2.5	5.0	0.0	24.5	6.9	0.0	37.2
Prop In Lane	1.00		0.19	1.00		1.00	1.00		0.32	1.00		0.44
Lane Grp Cap(c), veh/h	407	0	790	416	641	542	141	0	474	262	0	516
V/C Ratio(X)	0.92	0.00	0.60	0.43	0.90	0.08	0.68	0.00	0.74	0.49	0.00	0.94
Avail Cap(c_a), veh/h	603	0	1101	637	988	836	141	0	474	366	0	559
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	29.3	26.0	42.6	30.3	41.1	0.0	45.5	34.1	0.0	46.6
Incr Delay (d2), s/veh	14.9	0.0	0.7	0.7	7.7	0.1	12.5	0.0	5.9	1.4	0.0	23.1
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	14.3	0.0	12.1	3.9	19.9	1.0	2.9	0.0	11.7	3.2	0.0	19.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.0	0.0	30.0	26.7	50.3	30.3	53.6	0.0	51.4	35.5	0.0	69.8
LnGrp LOS	D	A	C	C	D	C	D	A	D	D	A	E
Approach Vol, veh/h		849			799			445			614	
Approach Delay, s/veh		39.3			43.9			51.8			62.6	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	42.6	15.1	65.5	9.0	46.6	28.0	52.7
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	17.0	32.0	28.0	83.0	5.0	44.0	39.0	72.0
Max Q Clear Time (g_c+I1), s	8.9	26.5	10.7	29.3	7.0	39.2	22.9	42.1
Green Ext Time (p_c), s	0.2	1.0	0.4	3.8	0.0	1.4	1.1	4.7

Intersection Summary	
HCM 6th Ctrl Delay	48.0
HCM 6th LOS	D

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	14	30	343	337	73
Future Vol, veh/h	51	14	30	343	337	73
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	50	-	-	-	-
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	55	15	33	373	366	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	845	406	445	0	-	0
Stage 1	406	-	-	-	-	-
Stage 2	439	-	-	-	-	-
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	333	645	1115	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	650	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	645	1115	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	650	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1115	-	321	645	-	-
HCM Lane V/C Ratio	0.029	-	0.173	0.024	-	-
HCM Control Delay (s)	8.3	0	18.5	10.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	28	60	318	283	62
Future Vol, veh/h	41	28	60	318	283	62
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	45	30	65	346	308	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	818	342	375	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	476	-	-	-	-	-
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	346	701	1183	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	625	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	322	701	1183	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	625	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1183	-	413	-	-
HCM Lane V/C Ratio	0.055	-	0.182	-	-
HCM Control Delay (s)	8.2	0	15.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	17	16	368	296	14
Future Vol, veh/h	11	17	16	368	296	14
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	12	18	17	400	322	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	764	330	337	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	434	-	-	-	-	-
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	372	712	1222	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	365	712	1222	-	-	-
Mov Cap-2 Maneuver	365	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1222	-	518	-	-
HCM Lane V/C Ratio	0.014	-	0.059	-	-
HCM Control Delay (s)	8	0	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	8	14	370	289	16
Future Vol, veh/h	12	8	14	370	289	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	13	9	15	402	314	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	755	323	331	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	432	-	-	-	-	-
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	376	718	1228	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	655	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	371	718	1228	-	-	-
Mov Cap-2 Maneuver	482	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	655	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1228	-	555	-	-
HCM Lane V/C Ratio	0.012	-	0.039	-	-
HCM Control Delay (s)	8	-	11.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	118	168	314	249	54
Future Vol, veh/h	70	118	168	314	249	54
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	76	128	183	341	271	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	524	0	-	0	634	354
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	280	-
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	1043	-	-	-	443	690
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1043	-	-	-	408	690
Mov Cap-2 Maneuver	-	-	-	-	408	-
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	33.8
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1043	-	-	-	440
HCM Lane V/C Ratio	0.073	-	-	-	0.749
HCM Control Delay (s)	8.7	0	-	-	33.8
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	6.2

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	35.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	144	639	24	23	732	127	14	2	13	76	3	182
Future Vol, veh/h	144	639	24	23	732	127	14	2	13	76	3	182
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	157	695	26	25	796	138	15	2	14	83	3	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	935	0	0	721	0	0	2038	2007	708	1877	1882	797
Stage 1	-	-	-	-	-	-	1022	1022	-	847	847	-
Stage 2	-	-	-	-	-	-	1016	985	-	1030	1035	-
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	732	-	-	881	-	-	42	59	435	~ 55	71	387
Stage 1	-	-	-	-	-	-	285	313	-	357	378	-
Stage 2	-	-	-	-	-	-	287	326	-	282	309	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	731	-	-	881	-	-	16	45	435	~ 42	54	387
Mov Cap-2 Maneuver	-	-	-	-	-	-	16	45	-	~ 42	54	-
Stage 1	-	-	-	-	-	-	224	246	-	280	367	-
Stage 2	-	-	-	-	-	-	135	317	-	212	243	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0.2	$ 300.8	225.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	17	435	731	-	-	881	-	-	42	387
HCM Lane V/C Ratio	1.023	0.032	0.214	-	-	0.028	-	-	2.045	0.511
HCM Control Delay (s)	$ 534.2	13.6	11.3	-	-	9.2	-	-	$ 691.9	23.6
HCM Lane LOS	F	B	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	2.6	0.1	0.8	-	-	0.1	-	-	9	2.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	138	185	15	163	126	220	577	24	116	638	244
Future Volume (veh/h)	149	138	185	15	163	126	220	577	24	116	638	244
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	0.98		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	213	150	43	16	177	11	239	627	0	126	693	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	466	390	261	241	199	309	865		330	796	
Arrive On Green	0.14	0.25	0.25	0.02	0.13	0.13	0.10	0.46	0.00	0.06	0.43	0.00
Sat Flow, veh/h	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	213	150	43	16	177	11	239	627	0	126	693	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	11.8	6.5	2.1	0.8	9.0	0.6	7.3	26.9	0.0	3.9	33.6	0.0
Cycle Q Clear(g_c), s	11.8	6.5	2.1	0.8	9.0	0.6	7.3	26.9	0.0	3.9	33.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	317	466	390	261	241	199	309	865		330	796	
V/C Ratio(X)	0.67	0.32	0.11	0.06	0.73	0.06	0.77	0.72		0.38	0.87	
Avail Cap(c_a), veh/h	321	466	390	480	377	312	569	942		656	942	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.2	30.4	28.8	36.5	41.6	38.0	20.9	21.6	0.0	17.4	26.0	0.0
Incr Delay (d2), s/veh	4.3	0.1	0.0	0.0	1.6	0.0	1.6	3.4	0.0	0.3	9.4	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	4.6	3.0	0.8	0.3	4.3	0.2	2.8	11.7	0.0	1.5	15.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.5	30.6	28.8	36.5	43.3	38.0	22.4	25.0	0.0	17.7	35.5	0.0
LnGrp LOS	C	C	C	D	D	D	C	C		B	D	
Approach Vol, veh/h		406			204			866	A		819	A
Approach Delay, s/veh		32.5			42.5			24.3			32.7	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	51.9	6.8	29.7	14.5	48.2	18.7	17.8
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	5.9	28.9	2.8	8.5	9.3	35.6	13.8	11.0
Green Ext Time (p_c), s	0.1	7.4	0.0	0.5	0.3	6.7	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	99	31	451	145	321	60	559	461	312	568	33
Future Volume (veh/h)	22	99	31	451	145	321	60	559	461	312	568	33
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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	24	108	2	490	158	248	65	608	0	339	617	18
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	191	148	185	552	591	737	291	680		362	894	790
Arrive On Green	0.02	0.07	0.07	0.27	0.32	0.32	0.03	0.36	0.00	0.15	0.48	0.48
Sat Flow, veh/h	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Grp Volume(v), veh/h	24	108	2	490	158	248	65	608	0	339	617	18
Grp Sat Flow(s),veh/h/ln	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Q Serve(g_s), s	1.6	7.2	0.1	34.4	8.8	13.9	3.2	42.9	0.0	18.5	36.0	0.8
Cycle Q Clear(g_c), s	1.6	7.2	0.1	34.4	8.8	13.9	3.2	42.9	0.0	18.5	36.0	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	191	148	185	552	591	737	291	680		362	894	790
V/C Ratio(X)	0.13	0.73	0.01	0.89	0.27	0.34	0.22	0.89		0.94	0.69	0.02
Avail Cap(c_a), veh/h	219	162	198	611	641	779	407	801		429	961	847
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.3	63.7	56.1	41.0	35.8	23.8	27.9	42.0	0.0	36.3	28.5	17.7
Incr Delay (d2), s/veh	0.3	11.7	0.0	13.9	0.1	0.1	0.1	13.0	0.0	24.2	2.7	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	0.8	4.3	0.1	17.4	4.1	5.4	1.4	22.0	0.0	14.1	16.5	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.6	75.4	56.1	54.9	35.9	23.9	28.0	55.0	0.0	60.4	31.2	17.8
LnGrp LOS	E	E	E	D	D	C	C	D		E	C	B
Approach Vol, veh/h		134			896			673	A		974	
Approach Delay, s/veh		72.1			43.0			52.4			41.1	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.5	58.8	56.9	42.3	15.0	9.8	72.9	8.0	49.3
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	60.0	42.0	11.0	14.0	72.0	5.0	48.0
Max Q Clear Time (g_c+I1), s	20.5	44.9	36.4	9.2	5.2	38.0	3.6	15.9
Green Ext Time (p_c), s	0.3	6.0	0.9	0.1	0.0	9.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	31	57	940	806	129
Future Volume (veh/h)	99	31	57	940	806	129
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	2	62	1022	876	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	200	178	333	1317	1061	898
Arrive On Green	0.11	0.11	0.05	0.70	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	1870	1870	1584
Grp Volume(v), veh/h	108	2	62	1022	876	100
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1584
Q Serve(g_s), s	3.4	0.1	0.7	21.3	22.8	1.7
Cycle Q Clear(g_c), s	3.4	0.1	0.7	21.3	22.8	1.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	200	178	333	1317	1061	898
V/C Ratio(X)	0.54	0.01	0.19	0.78	0.83	0.11
Avail Cap(c_a), veh/h	892	794	654	2810	2217	1877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	23.6	9.4	5.8	10.6	6.0
Incr Delay (d2), s/veh	2.3	0.0	0.3	1.0	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.3	5.0	7.6	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.4	23.7	9.7	6.8	12.3	6.0
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	110			1084	976	
Approach Delay, s/veh	27.3			7.0	11.6	
Approach LOS	C			A	B	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	8.2	40.0	11.7	48.2
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	3.0	71.0	30.0	90.0
Max Q Clear Time (g_c+I1), s	2.7	24.8	5.4	23.3
Green Ext Time (p_c), s	0.1	9.1	0.3	12.4

Intersection Summary	
HCM 6th Ctrl Delay	10.1
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	7	3	115	12	97	9	886	127	80	744	22
Future Volume (veh/h)	12	7	3	115	12	97	9	886	127	80	744	22
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	13	8	1	125	13	81	10	963	135	87	809	15
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	182	100	262	191	19	92	374	1028	144	197	1257	1064
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.01	0.64	0.64	0.04	0.67	0.67
Sat Flow, veh/h	771	605	1585	833	117	558	1781	1605	225	1781	1870	1584
Grp Volume(v), veh/h	21	0	1	219	0	0	10	0	1098	87	809	15
Grp Sat Flow(s),veh/h/ln	1376	0	1585	1508	0	0	1781	0	1830	1781	1870	1584
Q Serve(g_s), s	0.0	0.0	0.1	14.0	0.0	0.0	0.2	0.0	57.2	1.7	26.5	0.3
Cycle Q Clear(g_c), s	1.0	0.0	0.1	15.0	0.0	0.0	0.2	0.0	57.2	1.7	26.5	0.3
Prop In Lane	0.62		1.00	0.57		0.37	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	282	0	262	302	0	0	374	0	1172	197	1257	1064
V/C Ratio(X)	0.07	0.00	0.00	0.72	0.00	0.00	0.03	0.00	0.94	0.44	0.64	0.01
Avail Cap(c_a), veh/h	386	0	373	407	0	0	587	0	1207	355	1257	1064
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	37.4	0.0	37.0	43.2	0.0	0.0	9.0	0.0	17.1	24.2	10.1	5.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	13.8	0.6	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	0.5	0.0	0.0	5.8	0.0	0.0	0.1	0.0	25.7	1.4	10.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.4	0.0	37.0	45.5	0.0	0.0	9.0	0.0	31.0	24.8	11.6	5.8
LnGrp LOS	D	A	D	D	A	A	A	A	C	C	B	A
Approach Vol, veh/h		22			219			1108			911	
Approach Delay, s/veh		37.4			45.5			30.8			12.8	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.6	74.0		22.5	6.3	77.3		22.5
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	4.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	3.7	59.2		3.0	2.2	28.5		17.0
Green Ext Time (p_c), s	0.1	8.7		0.0	0.0	15.3		0.5

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kuikahi Dr & Kehalani Mauka Pkwy

04/22/2021

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	93	132	109	61	12
Future Vol, veh/h	11	93	132	109	61	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	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	12	101	143	118	66	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	261	0	-	0	327	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	125	-
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	1303	-	-	-	667	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	901	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1303	-	-	-	661	839
Mov Cap-2 Maneuver	-	-	-	-	661	-
Stage 1	-	-	-	-	825	-
Stage 2	-	-	-	-	901	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1303	-	-	-	661	839
HCM Lane V/C Ratio	0.009	-	-	-	0.1	0.016
HCM Control Delay (s)	7.8	-	-	-	11.1	9.4
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Future Year 2024 AM Without Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	144	2.0	152	2.0	0.582	8.8	LOS A	5.5	138.8	0.86	0.94	1.03	20.2
7	T1	225	2.0	237	2.0	0.582	6.1	LOS A	5.5	138.8	0.86	0.94	1.03	18.9
25	R2	98	2.0	103	2.0	0.582	6.1	LOS A	5.5	138.8	0.86	0.94	1.03	18.9
Approach		467	2.0	492	2.0	0.582	6.9	LOS A	5.5	138.8	0.86	0.94	1.03	19.3
East: WB Maui Lani Parkway														
19	L2	73	2.0	77	2.0	0.456	7.2	LOS A	3.5	87.7	0.80	0.79	0.85	20.6
336	T1	199	2.0	209	2.0	0.456	4.5	LOS A	3.5	87.7	0.80	0.79	0.85	19.1
24	R2	86	2.0	91	2.0	0.456	4.5	LOS A	3.5	87.7	0.80	0.79	0.85	19.1
Approach		358	2.0	377	2.0	0.456	5.0	LOS A	3.5	87.7	0.80	0.79	0.85	19.4
North: SB Kamehameha Ave														
15	L2	179	2.0	188	2.0	0.624	7.5	LOS A	6.2	156.2	0.81	0.84	0.95	20.5
2	T1	175	2.0	184	2.0	0.624	4.8	LOS A	6.2	156.2	0.81	0.84	0.95	19.1
40	R2	218	2.0	229	2.0	0.624	4.8	LOS A	6.2	156.2	0.81	0.84	0.95	19.1
Approach		572	2.0	602	2.0	0.624	5.7	LOS A	6.2	156.2	0.81	0.84	0.95	19.5
West: EB Maui Lani Parkway														
30	L2	210	2.0	221	2.0	0.569	6.9	LOS A	5.1	130.3	0.80	0.80	0.89	20.5
464	T1	169	2.0	178	2.0	0.569	4.1	LOS A	5.1	130.3	0.80	0.80	0.89	19.1
78	R2	129	2.0	136	2.0	0.569	4.1	LOS A	5.1	130.3	0.80	0.80	0.89	19.1
Approach		508	2.0	535	2.0	0.569	5.3	LOS A	5.1	130.3	0.80	0.80	0.89	19.7
All Vehicles		1905	2.0	2005	2.0	0.624	5.7	LOS A	6.2	156.2	0.82	0.84	0.93	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	124.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	3	147	16	15	9	168	425	7	2	550	104
Future Vol, veh/h	82	3	147	16	15	9	168	425	7	2	550	104
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	89	3	160	17	16	10	183	462	8	2	598	113
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	14.3	14.1	125.1	169.1
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	28%	0%	100%	0%	40%	0%
Vol Thru, %	72%	0%	0%	2%	38%	84%
Vol Right, %	0%	100%	0%	98%	23%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	593	7	82	150	40	656
LT Vol	168	0	82	0	16	2
Through Vol	425	0	0	3	15	550
RT Vol	0	7	0	147	9	104
Lane Flow Rate	645	8	89	163	43	713
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.188	0.012	0.206	0.323	0.106	1.298
Departure Headway (Hd)	7.025	6.161	9.179	7.94	9.916	6.867
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	522	584	394	457	364	535
Service Time	4.725	3.861	6.879	5.64	7.916	4.867
HCM Lane V/C Ratio	1.236	0.014	0.226	0.357	0.118	1.333
HCM Control Delay	126.5	8.9	14.2	14.4	14.1	169.1
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	22.3	0	0.8	1.4	0.4	28.5

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	558	2.0	587	2.0	1.056	31.4	LOS F	83.9	2131.1	1.00	0.97	1.46	15.6
25	R2	743	2.0	782	2.0	1.056	31.4	LOS F	83.9	2131.1	1.00	0.97	1.46	15.6
Approach		1301	2.0	1369	2.0	1.056	31.4	LOS D	83.9	2131.1	1.00	0.97	1.46	15.6
East: WB Waiinu Rd														
19	L2	229	2.0	241	2.0	0.369	6.1	LOS A	2.7	69.0	0.80	0.76	0.80	20.4
24	R2	51	2.0	54	2.0	0.369	3.3	LOS A	2.7	69.0	0.80	0.76	0.80	19.0
Approach		280	2.0	295	2.0	0.369	5.6	LOS A	2.7	69.0	0.80	0.76	0.80	20.2
North: SB Waiale Rd														
15	L2	67	2.0	71	2.0	0.717	6.1	LOS A	8.7	221.3	0.80	0.65	0.87	20.6
2	T1	690	2.0	726	2.0	0.717	3.4	LOS A	8.7	221.3	0.80	0.65	0.87	19.2
Approach		757	2.0	797	2.0	0.717	3.6	LOS A	8.7	221.3	0.80	0.65	0.87	19.3
All Vehicles		2338	2.0	2461	2.0	1.056	19.3	LOS C	83.9	2131.1	0.91	0.84	1.19	17.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	170.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	0	32	8	0	16	7	1136	7	11	713	166
Future Vol, veh/h	159	0	32	8	0	16	7	1136	7	11	713	166
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	173	0	35	9	0	17	8	1235	8	12	775	180

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2156	2154	868	2165	2240	1242	958	0	0	1246	0	0
Stage 1	892	892	-	1258	1258	-	-	-	-	-	-	-
Stage 2	1264	1262	-	907	982	-	-	-	-	-	-	-
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	~ 35	48	352	34	42	213	718	-	-	559	-	-
Stage 1	337	360	-	209	242	-	-	-	-	-	-	-
Stage 2	208	241	-	330	327	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 30	44	351	29	38	212	716	-	-	557	-	-
Mov Cap-2 Maneuver	~ 30	44	-	29	38	-	-	-	-	-	-	-
Stage 1	324	342	-	201	233	-	-	-	-	-	-	-
Stage 2	184	232	-	283	310	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	2003.9	87.7	0.1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	716	-	-	30	351	68	557	-	-
HCM Lane V/C Ratio	0.011	-	-	5.761	0.099	0.384	0.021	-	-
HCM Control Delay (s)	10.1	0	$	2403.9	16.4	87.7	11.6	-	-
HCM Lane LOS	B	A	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	20.9	0.3	1.5	0.1	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	58

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	67	52	1050	701	24
Future Vol, veh/h	125	67	52	1050	701	24
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	136	73	57	1141	762	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2033	778	791	0	-	0
Stage 1	778	-	-	-	-	-
Stage 2	1255	-	-	-	-	-
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	~ 63	396	829	-	-	-
Stage 1	453	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 51	395	827	-	-	-
Mov Cap-2 Maneuver	~ 51	-	-	-	-	-
Stage 1	367	-	-	-	-	-
Stage 2	267	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s$	607.3	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	827	-	51	395	-	-
HCM Lane V/C Ratio	0.068	-	2.664	0.184	-	-
HCM Control Delay (s)	9.7	0	$ 924.2	16.2	-	-
HCM Lane LOS	A	A	F	C	-	-
HCM 95th %tile Q(veh)	0.2	-	14.2	0.7	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	402	419	87	47	281	243	182	249	53	204	258	206
Future Volume (veh/h)	402	419	87	47	281	243	182	249	53	204	258	206
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		0.99	1.00		0.99	1.00		0.99
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	502	455	87	51	305	34	198	271	49	222	280	194
Peak Hour Factor	0.80	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	535	605	116	253	350	295	228	395	72	372	302	209
Arrive On Green	0.24	0.40	0.40	0.03	0.19	0.19	0.07	0.26	0.26	0.11	0.30	0.30
Sat Flow, veh/h	1781	1525	292	1781	1870	1577	1781	1538	278	1781	1024	710
Grp Volume(v), veh/h	502	0	542	51	305	34	198	0	320	222	0	474
Grp Sat Flow(s),veh/h/ln	1781	0	1817	1781	1870	1577	1781	0	1816	1781	0	1734
Q Serve(g_s), s	21.2	0.0	25.1	2.3	15.5	1.8	7.0	0.0	15.6	8.6	0.0	26.0
Cycle Q Clear(g_c), s	21.2	0.0	25.1	2.3	15.5	1.8	7.0	0.0	15.6	8.6	0.0	26.0
Prop In Lane	1.00		0.16	1.00		1.00	1.00		0.15	1.00		0.41
Lane Grp Cap(c), veh/h	535	0	720	253	350	295	228	0	467	372	0	512
V/C Ratio(X)	0.94	0.00	0.75	0.20	0.87	0.12	0.87	0.00	0.69	0.60	0.00	0.93
Avail Cap(c_a), veh/h	576	0	720	467	401	338	228	0	467	414	0	548
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	25.4	30.8	38.7	33.1	30.4	0.0	32.8	23.2	0.0	33.5
Incr Delay (d2), s/veh	22.5	0.0	4.5	0.4	17.0	0.2	27.9	0.0	4.1	1.9	0.0	21.2
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	12.0	0.0	11.5	1.0	8.8	0.7	3.2	0.0	7.4	3.8	0.0	13.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.4	0.0	29.9	31.2	55.7	33.3	58.3	0.0	37.0	25.1	0.0	54.7
LnGrp LOS	D	A	C	C	E	C	E	A	D	C	A	D
Approach Vol, veh/h		1044			390			518			696	
Approach Delay, s/veh		37.3			50.6			45.1			45.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	31.2	7.2	44.9	11.0	34.9	27.8	24.3
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	13.0	25.0	15.0	32.0	7.0	31.0	26.0	21.0
Max Q Clear Time (g_c+I1), s	10.6	17.6	4.3	27.1	9.0	28.0	23.2	17.5
Green Ext Time (p_c), s	0.2	1.1	0.1	1.6	0.0	0.9	0.5	0.6

Intersection Summary	
HCM 6th Ctrl Delay	42.9
HCM 6th LOS	D

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	131	21	4	334	320	34
Future Vol, veh/h	131	21	4	334	320	34
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	50	-	-	-	-
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	142	23	4	363	348	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	738	367	385	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	371	-	-	-	-	-
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	385	678	1173	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	698	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	383	678	1173	-	-	-
Mov Cap-2 Maneuver	383	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1173	-	383	678	-	-
HCM Lane V/C Ratio	0.004	-	0.372	0.034	-	-
HCM Control Delay (s)	8.1	0	19.9	10.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.7	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	73	16	231	322	28
Future Vol, veh/h	69	73	16	231	322	28
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	75	79	17	251	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	650	365	380	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	285	-	-	-	-	-
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	434	680	1178	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	680	1178	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1178	-	528	-	-
HCM Lane V/C Ratio	0.015	-	0.292	-	-
HCM Control Delay (s)	8.1	0	14.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	16	4	219	393	5
Future Vol, veh/h	31	16	4	219	393	5
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	34	17	4	238	427	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	676	430	432	0	-	0
Stage 1	430	-	-	-	-	-
Stage 2	246	-	-	-	-	-
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	419	625	1128	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	417	625	1128	-	-	-
Mov Cap-2 Maneuver	417	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	795	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	470	-	-
HCM Lane V/C Ratio	0.004	-	0.109	-	-
HCM Control Delay (s)	8.2	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	22	5	193	401	12
Future Vol, veh/h	28	22	5	193	401	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	30	24	5	210	436	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	663	443	449	0	-	0
Stage 1	443	-	-	-	-	-
Stage 2	220	-	-	-	-	-
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	426	615	1111	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	424	615	1111	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	817	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1111	-	555	-	-
HCM Lane V/C Ratio	0.005	-	0.098	-	-
HCM Control Delay (s)	8.3	-	12.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	23.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	71	275	74	132	323	89
Future Vol, veh/h	71	275	74	132	323	89
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	77	299	80	143	351	97

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	223	0	-	0	605	152
Stage 1	-	-	-	-	152	-
Stage 2	-	-	-	-	453	-
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	1346	-	-	-	461	894
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1346	-	-	-	429	894
Mov Cap-2 Maneuver	-	-	-	-	429	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	640	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	54.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1346	-	-	-	483
HCM Lane V/C Ratio	0.057	-	-	-	0.927
HCM Control Delay (s)	7.8	0	-	-	54.2
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	10.9

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	101	809	10	9	592	64	28	3	26	32	1	111
Future Vol, veh/h	101	809	10	9	592	64	28	3	26	32	1	111
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	110	879	11	10	643	70	30	3	28	35	1	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	714	0	0	890	0	0	1864	1839	885	1784	1774	644
Stage 1	-	-	-	-	-	-	1105	1105	-	664	664	-
Stage 2	-	-	-	-	-	-	759	734	-	1120	1110	-
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	886	-	-	761	-	-	56	75	344	63	83	473
Stage 1	-	-	-	-	-	-	256	286	-	450	458	-
Stage 2	-	-	-	-	-	-	399	426	-	251	285	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	885	-	-	761	-	-	37	65	344	50	72	473
Mov Cap-2 Maneuver	-	-	-	-	-	-	37	65	-	50	72	-
Stage 1	-	-	-	-	-	-	224	251	-	394	452	-
Stage 2	-	-	-	-	-	-	293	420	-	199	250	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	148.1	52.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	39	344	885	-	-	761	-	-	50	473
HCM Lane V/C Ratio	0.864	0.082	0.124	-	-	0.013	-	-	0.717	0.255
HCM Control Delay (s)	258.6	16.4	9.6	-	-	9.8	-	-	178.6	15.2
HCM Lane LOS	F	C	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	3.2	0.3	0.4	-	-	0	-	-	2.9	1

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	297	282	510	31	237	131	315	599	15	46	404	114
Future Volume (veh/h)	297	282	510	31	237	131	315	599	15	46	404	114
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		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	424	307	182	34	258	13	342	651	0	50	439	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	444	692	585	280	291	245	375	719		168	496	
Arrive On Green	0.24	0.37	0.37	0.03	0.16	0.16	0.15	0.38	0.00	0.03	0.27	0.00
Sat Flow, veh/h	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	424	307	182	34	258	13	342	651	0	50	439	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	26.7	14.3	9.5	1.8	15.6	0.8	15.4	37.9	0.0	2.3	26.0	0.0
Cycle Q Clear(g_c), s	26.7	14.3	9.5	1.8	15.6	0.8	15.4	37.9	0.0	2.3	26.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	444	692	585	280	291	245	375	719		168	496	
V/C Ratio(X)	0.95	0.44	0.31	0.12	0.89	0.05	0.91	0.90		0.30	0.88	
Avail Cap(c_a), veh/h	444	692	585	661	324	273	471	719		477	584	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.1	27.4	25.9	39.1	47.7	41.4	27.0	33.5	0.0	31.8	40.7	0.0
Incr Delay (d2), s/veh	30.9	0.2	0.1	0.1	21.1	0.0	17.3	15.6	0.0	0.4	15.6	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	13.3	6.5	3.6	0.8	9.0	0.3	8.0	19.5	0.0	1.0	13.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	27.6	26.0	39.2	68.8	41.5	44.3	49.1	0.0	32.1	56.3	0.0
LnGrp LOS	E	C	C	D	E	D	D	D		C	E	
Approach Vol, veh/h		913			305			993	A		489	A
Approach Delay, s/veh		42.3			64.3			47.5			53.8	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	50.4	8.3	47.6	22.7	36.6	33.0	23.0
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	36.0	28.0	20.0	24.0	36.0	28.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	39.9	3.8	16.3	17.4	28.0	28.7	17.6
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6	0.3	2.6	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	48.8
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	174	104	348	60	358	25	495	419	320	660	11
Future Volume (veh/h)	67	174	104	348	60	358	25	495	419	320	660	11
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	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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	189	29	378	65	221	27	538	0	348	717	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	330	239	246	433	478	626	217	660		400	874	812
Arrive On Green	0.05	0.12	0.12	0.19	0.26	0.26	0.03	0.35	0.00	0.14	0.47	0.47
Sat Flow, veh/h	1968	2067	1736	1781	1870	1579	1781	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	73	189	29	378	65	221	27	538	0	348	717	5
Grp Sat Flow(s),veh/h/ln	1968	2067	1736	1781	1870	1579	1781	1870	1585	1781	1870	1583
Q Serve(g_s), s	3.3	9.1	1.5	18.7	2.7	10.0	1.0	26.7	0.0	12.1	33.9	0.2
Cycle Q Clear(g_c), s	3.3	9.1	1.5	18.7	2.7	10.0	1.0	26.7	0.0	12.1	33.9	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	330	239	246	433	478	626	217	660		400	874	812
V/C Ratio(X)	0.22	0.79	0.12	0.87	0.14	0.35	0.12	0.82		0.87	0.82	0.01
Avail Cap(c_a), veh/h	413	606	555	433	732	840	501	1098		481	1098	1002
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.4	44.0	38.3	30.7	29.3	21.7	22.5	30.1	0.0	21.1	23.5	12.2
Incr Delay (d2), s/veh	0.3	2.3	0.1	17.5	0.0	0.1	0.1	5.2	0.0	12.3	5.5	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	1.6	4.8	0.6	10.1	1.3	3.7	0.4	12.5	0.0	6.0	15.3	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.7	46.3	38.4	48.3	29.4	21.8	22.6	35.3	0.0	33.4	29.1	12.2
LnGrp LOS	D	D	D	D	C	C	C	D		C	C	B
Approach Vol, veh/h		291			664			565	A		1070	
Approach Delay, s/veh		43.3			37.6			34.7			30.4	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.4	42.1	24.0	16.8	7.7	53.8	9.7	31.1
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.6	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	14.1	28.7	20.7	11.1	3.0	35.9	5.3	12.0
Green Ext Time (p_c), s	0.3	7.4	0.0	0.7	0.0	9.7	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	154	88	18	782	992	63
Future Volume (veh/h)	154	88	18	782	992	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	7	20	850	1078	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	213	190	227	1383	1221	1035
Arrive On Green	0.12	0.12	0.02	0.74	0.65	0.65
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	167	7	20	850	1078	55
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	7.1	0.3	0.3	16.9	36.9	1.0
Cycle Q Clear(g_c), s	7.1	0.3	0.3	16.9	36.9	1.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	213	190	227	1383	1221	1035
V/C Ratio(X)	0.78	0.04	0.09	0.61	0.88	0.05
Avail Cap(c_a), veh/h	685	609	506	2156	1701	1442
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	30.4	13.6	4.9	11.1	4.9
Incr Delay (d2), s/veh	6.2	0.1	0.2	0.4	4.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.1	0.2	4.5	13.3	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.6	30.5	13.8	5.3	15.5	4.9
LnGrp LOS	D	C	B	A	B	A
Approach Vol, veh/h	174			870	1133	
Approach Delay, s/veh	39.2			5.5	15.0	
Approach LOS	D			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	6.8	57.0		14.3		63.7
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	14.6	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.3	38.9		9.1		18.9
Green Ext Time (p_c), s	0.0	12.1		0.4		8.4

Intersection Summary	
HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	13	6	106	8	54	4	716	120	183	889	6
Future Volume (veh/h)	20	13	6	106	8	54	4	716	120	183	889	6
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	22	14	2	115	9	44	4	778	126	199	966	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	102	220	210	16	55	275	956	155	336	1247	1057
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.01	0.61	0.61	0.06	0.67	0.67
Sat Flow, veh/h	838	734	1579	990	118	393	1781	1570	254	1781	1870	1585
Grp Volume(v), veh/h	36	0	2	168	0	0	4	0	904	199	966	5
Grp Sat Flow(s),veh/h/ln	1572	0	1579	1502	0	0	1781	0	1825	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.1	7.6	0.0	0.0	0.1	0.0	32.6	3.3	30.2	0.1
Cycle Q Clear(g_c), s	1.5	0.0	0.1	9.1	0.0	0.0	0.1	0.0	32.6	3.3	30.2	0.1
Prop In Lane	0.61		1.00	0.68		0.26	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	287	0	220	281	0	0	275	0	1110	336	1247	1057
V/C Ratio(X)	0.13	0.00	0.01	0.60	0.00	0.00	0.01	0.00	0.81	0.59	0.77	0.00
Avail Cap(c_a), veh/h	522	0	465	507	0	0	560	0	1505	517	1543	1307
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	32.0	0.0	31.5	35.2	0.0	0.0	10.1	0.0	12.9	14.8	9.7	4.7
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9	0.6	2.9	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	0.7	0.0	0.0	3.4	0.0	0.0	0.0	0.0	12.6	2.0	10.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.1	0.0	31.5	36.0	0.0	0.0	10.1	0.0	16.8	15.5	12.6	4.7
LnGrp LOS	C	A	C	D	A	A	B	A	B	B	B	A
Approach Vol, veh/h		38			168			908			1170	
Approach Delay, s/veh		32.1			36.0			16.7			13.1	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	57.6		16.8	5.4	62.6		16.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	5.3	34.6		3.5	2.1	32.2		11.1
Green Ext Time (p_c), s	0.2	17.0		0.1	0.0	19.4		0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kehalani Mauka Pkwy & Kuikahi Dr

04/22/2021

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	172	5	13	52	35	4	4	54	121	2	5
Future Vol, veh/h	5	172	5	13	52	35	4	4	54	121	2	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	275	-	-	-	-	-	-	-	-	-	-	0
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	187	5	14	57	38	4	4	59	132	2	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	95	0	0	192	0	0	308	323	190	335	306	76
Stage 1	-	-	-	-	-	-	200	200	-	104	104	-
Stage 2	-	-	-	-	-	-	108	123	-	231	202	-
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	1499	-	-	1381	-	-	644	595	852	619	608	985
Stage 1	-	-	-	-	-	-	802	736	-	902	809	-
Stage 2	-	-	-	-	-	-	897	794	-	772	734	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1499	-	-	1381	-	-	632	587	852	567	599	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	632	587	-	567	599	-
Stage 1	-	-	-	-	-	-	800	734	-	899	800	-
Stage 2	-	-	-	-	-	-	880	785	-	712	732	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	9.8	13.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	810	1499	-	-	1381	-	-	567	985
HCM Lane V/C Ratio	0.083	0.004	-	-	0.01	-	-	0.236	0.006
HCM Control Delay (s)	9.8	7.4	-	-	7.6	0	-	13.3	8.7
HCM Lane LOS	A	A	-	-	A	A	-	B	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.9	0

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	167	1	4	57	1	15
Future Vol, veh/h	167	1	4	57	1	15
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	182	1	4	62	1	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	183	0	253	183
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	70	-
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	-	736	859
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	953	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1392	-	734	859
Mov Cap-2 Maneuver	-	-	-	-	734	-
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	950	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	850	-	-	1392	-
HCM Lane V/C Ratio	0.02	-	-	0.003	-
HCM Control Delay (s)	9.3	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Future Year 2024 PM Without Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	107	2.0	113	2.0	0.424	7.0	LOS A	3.1	78.9	0.82	0.77	0.83	20.5
7	T1	156	2.0	164	2.0	0.424	4.2	LOS A	3.1	78.9	0.82	0.77	0.83	19.1
25	R2	55	2.0	58	2.0	0.424	4.2	LOS A	3.1	78.9	0.82	0.77	0.83	19.1
Approach		318	2.0	335	2.0	0.424	5.2	LOS A	3.1	78.9	0.82	0.77	0.83	19.5
East: WB Maui Lani Parkway														
19	L2	53	2.0	56	2.0	0.641	9.2	LOS A	6.6	166.8	0.86	0.96	1.08	20.3
336	T1	291	2.0	306	2.0	0.641	6.5	LOS A	6.6	166.8	0.86	0.96	1.08	18.9
24	R2	201	2.0	212	2.0	0.641	6.5	LOS A	6.6	166.8	0.86	0.96	1.08	18.9
Approach		545	2.0	574	2.0	0.641	6.8	LOS A	6.6	166.8	0.86	0.96	1.08	19.0
North: SB Kamehameha Ave														
15	L2	133	2.0	140	2.0	0.816	13.0	LOS B	12.8	325.2	1.00	1.26	1.46	19.6
2	T1	175	2.0	184	2.0	0.816	10.3	LOS B	12.8	325.2	1.00	1.26	1.46	18.3
40	R2	403	2.0	424	2.0	0.816	10.3	LOS B	12.8	325.2	1.00	1.26	1.46	18.3
Approach		711	2.0	748	2.0	0.816	10.8	LOS B	12.8	325.2	1.00	1.26	1.46	18.5
West: EB Maui Lani Parkway														
30	L2	252	2.0	265	2.0	0.669	7.4	LOS A	7.4	188.2	0.85	0.86	0.99	20.4
464	T1	211	2.0	222	2.0	0.669	4.7	LOS A	7.4	188.2	0.85	0.86	0.99	19.0
78	R2	158	2.0	166	2.0	0.669	4.7	LOS A	7.4	188.2	0.85	0.86	0.99	19.0
Approach		621	2.0	654	2.0	0.669	5.8	LOS A	7.4	188.2	0.85	0.86	0.99	19.6
All Vehicles		2195	2.0	2311	2.0	0.816	7.6	LOS A	12.8	325.2	0.90	1.00	1.14	19.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	174.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	10	205	16	4	8	114	523	23	8	661	66
Future Vol, veh/h	58	10	205	16	4	8	114	523	23	8	661	66
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	63	11	223	17	4	9	124	568	25	9	718	72
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	16.9	14.6	162.3	249.7
HCM LOS	C	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	0%	100%	0%	57%	1%
Vol Thru, %	82%	0%	0%	5%	14%	90%
Vol Right, %	0%	100%	0%	95%	29%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	637	23	58	215	28	735
LT Vol	114	0	58	0	16	8
Through Vol	523	0	0	10	4	661
RT Vol	0	23	0	205	8	66
Lane Flow Rate	692	25	63	234	30	799
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.291	0.041	0.145	0.461	0.076	1.488
Departure Headway (Hd)	7.299	6.485	9.436	8.21	10.75	7.132
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	505	556	383	442	335	519
Service Time	4.999	4.185	7.136	5.91	8.75	5.132
HCM Lane V/C Ratio	1.37	0.045	0.164	0.529	0.09	1.539
HCM Control Delay	167.8	9.5	13.7	17.7	14.6	249.7
HCM Lane LOS	F	A	B	C	B	F
HCM 95th-tile Q	26.8	0.1	0.5	2.4	0.2	38.2

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	580	2.0	611	2.0	0.917	1.8	LOS A	26.7	679.1	1.00	0.35	1.00	19.1
25	R2	551	2.0	580	2.0	0.917	1.8	LOS A	26.7	679.1	1.00	0.35	1.00	19.1
Approach		1131	2.0	1191	2.0	0.917	1.8	LOS A	26.7	679.1	1.00	0.35	1.00	19.1
East: WB Waiinu Rd														
19	L2	327	2.0	344	2.0	0.506	7.8	LOS A	4.4	112.0	0.89	0.92	0.98	20.1
24	R2	32	2.0	34	2.0	0.506	5.1	LOS A	4.4	112.0	0.89	0.92	0.98	18.8
Approach		359	2.0	378	2.0	0.506	7.5	LOS A	4.4	112.0	0.89	0.92	0.98	20.0
North: SB Waiale Rd														
15	L2	62	2.0	65	2.0	0.883	13.6	LOS B	18.0	456.7	1.00	1.24	1.47	19.5
2	T1	782	2.0	823	2.0	0.883	10.9	LOS B	18.0	456.7	1.00	1.24	1.47	18.2
Approach		844	2.0	888	2.0	0.883	11.1	LOS B	18.0	456.7	1.00	1.24	1.47	18.3
All Vehicles		2334	2.0	2457	2.0	0.917	6.0	LOS A	26.7	679.1	0.98	0.76	1.17	19.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	56.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	13	6	1	9	26	1083	4	4	1014	156
Future Vol, veh/h	70	0	13	6	1	9	26	1083	4	4	1014	156
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	76	0	14	7	1	10	28	1177	4	4	1102	170

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2439	2438	1190	2440	2521	1182	1275	0	0	1184	0	0
Stage 1	1198	1198	-	1238	1238	-	-	-	-	-	-	-
Stage 2	1241	1240	-	1202	1283	-	-	-	-	-	-	-
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	~ 22	32	229	22	28	231	545	-	-	590	-	-
Stage 1	227	259	-	215	248	-	-	-	-	-	-	-
Stage 2	214	247	-	225	236	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 18	26	228	18	23	230	543	-	-	588	-	-
Mov Cap-2 Maneuver	~ 18	26	-	18	23	-	-	-	-	-	-	-
Stage 1	192	252	-	182	210	-	-	-	-	-	-	-
Stage 2	173	209	-	206	229	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	1592.2	163.2	0.3	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	543	-	-	18	228	38	588	-	-
HCM Lane V/C Ratio	0.052	-	-	4.227	0.062	0.458	0.007	-	-
HCM Control Delay (s)	12	0	$	1883.8	21.8	163.2	11.2	-	-
HCM Lane LOS	B	A	-	F	C	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	10.1	0.2	1.6	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	22.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	51	59	1019	986	42
Future Vol, veh/h	58	51	59	1019	986	42
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	63	55	64	1108	1072	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2334	1098	1121	0	-	0
Stage 1	1098	-	-	-	-	-
Stage 2	1236	-	-	-	-	-
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	~ 40	259	623	-	-	-
Stage 1	319	-	-	-	-	-
Stage 2	274	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 29	258	621	-	-	-
Mov Cap-2 Maneuver	~ 29	-	-	-	-	-
Stage 1	233	-	-	-	-	-
Stage 2	273	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 452.5	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	621	-	29	258	-	-
HCM Lane V/C Ratio	0.103	-	2.174	0.215	-	-
HCM Control Delay (s)	11.5	0	$ 830.5	22.7	-	-
HCM Lane LOS	B	A	F	C	-	-
HCM 95th %tile Q(veh)	0.3	-	7.4	0.8	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	332	337	87	99	542	372	90	251	80	364	316	230
Future Volume (veh/h)	332	337	87	99	542	372	90	251	80	364	316	230
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	415	366	87	108	589	89	98	273	76	396	343	226
Peak Hour Factor	0.80	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	441	603	143	370	485	410	120	271	75	358	343	226
Arrive On Green	0.21	0.41	0.41	0.06	0.26	0.26	0.03	0.19	0.19	0.17	0.33	0.33
Sat Flow, veh/h	1781	1460	347	1781	1870	1582	1781	1407	392	1781	1052	693
Grp Volume(v), veh/h	415	0	453	108	589	89	98	0	349	396	0	569
Grp Sat Flow(s),veh/h/ln	1781	0	1807	1781	1870	1582	1781	0	1799	1781	0	1744
Q Serve(g_s), s	23.3	0.0	23.5	5.3	31.0	5.3	4.0	0.0	23.0	20.0	0.0	39.0
Cycle Q Clear(g_c), s	23.3	0.0	23.5	5.3	31.0	5.3	4.0	0.0	23.0	20.0	0.0	39.0
Prop In Lane	1.00		0.19	1.00		1.00	1.00		0.22	1.00		0.40
Lane Grp Cap(c), veh/h	441	0	746	370	485	410	120	0	346	358	0	569
V/C Ratio(X)	0.94	0.00	0.61	0.29	1.21	0.22	0.82	0.00	1.01	1.11	0.00	1.00
Avail Cap(c_a), veh/h	462	0	746	516	485	410	120	0	346	358	0	569
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.6	0.0	27.5	29.6	44.3	34.8	44.6	0.0	48.3	35.6	0.0	40.3
Incr Delay (d2), s/veh	27.1	0.0	1.4	0.4	114.3	0.3	34.0	0.0	50.6	79.1	0.0	37.7
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	11.0	0.0	10.5	2.3	29.8	2.1	2.1	0.0	15.2	16.6	0.0	22.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.6	0.0	28.9	30.0	158.6	35.0	78.6	0.0	98.9	114.7	0.0	78.0
LnGrp LOS	E	A	C	C	F	D	E	A	F	F	A	E
Approach Vol, veh/h		868			786			447			965	
Approach Delay, s/veh		45.0			126.9			94.4			93.0	
Approach LOS		D			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	29.0	11.2	55.4	8.0	45.0	29.6	37.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	20.0	22.0	17.0	41.0	4.0	39.0	27.0	31.0
Max Q Clear Time (g_c+I1), s	22.0	25.0	7.3	25.5	6.0	41.0	25.3	33.0
Green Ext Time (p_c), s	0.0	0.0	0.2	2.7	0.0	0.0	0.3	0.0

Intersection Summary	
HCM 6th Ctrl Delay	88.3
HCM 6th LOS	F

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	14	30	345	337	73
Future Vol, veh/h	51	14	30	345	337	73
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	50	-	-	-	-
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	55	15	33	375	366	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	847	406	445	0	-	0
Stage 1	406	-	-	-	-	-
Stage 2	441	-	-	-	-	-
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	332	645	1115	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	320	645	1115	-	-	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	648	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1115	-	320	645	-	-
HCM Lane V/C Ratio	0.029	-	0.173	0.024	-	-
HCM Control Delay (s)	8.3	0	18.6	10.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	28	60	320	283	62
Future Vol, veh/h	41	28	60	320	283	62
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	45	30	65	348	308	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	820	342	375	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	478	-	-	-	-	-
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	345	701	1183	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	322	701	1183	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1183	-	413	-	-
HCM Lane V/C Ratio	0.055	-	0.182	-	-
HCM Control Delay (s)	8.2	0	15.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	17	16	371	296	14
Future Vol, veh/h	11	17	16	371	296	14
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	12	18	17	403	322	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	767	330	337	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	437	-	-	-	-	-
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	370	712	1222	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	363	712	1222	-	-	-
Mov Cap-2 Maneuver	363	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1222	-	517	-	-
HCM Lane V/C Ratio	0.014	-	0.059	-	-
HCM Control Delay (s)	8	0	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	8	14	372	289	16
Future Vol, veh/h	12	8	14	372	289	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	13	9	15	404	314	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	757	323	331	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	434	-	-	-	-	-
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	375	718	1228	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	371	718	1228	-	-	-
Mov Cap-2 Maneuver	482	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1228	-	555	-	-
HCM Lane V/C Ratio	0.012	-	0.039	-	-
HCM Control Delay (s)	8	-	11.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	11.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	119	169	316	249	54
Future Vol, veh/h	70	119	169	316	249	54
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	76	129	184	343	271	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	527	0	-	0	637	356
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	281	-
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	1040	-	-	-	441	688
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1040	-	-	-	406	688
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	34.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1040	-	-	-	438
HCM Lane V/C Ratio	0.073	-	-	-	0.752
HCM Control Delay (s)	8.7	0	-	-	34.2
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	6.2

Intersection	
Int Delay, s/veh	39.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	147	655	24	23	763	127	14	2	13	76	3	182
Future Vol, veh/h	147	655	24	23	763	127	14	2	13	76	3	182
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	160	712	26	25	829	138	15	2	14	83	3	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	968	0	0	738	0	0	2094	2063	725	1933	1938	830
Stage 1	-	-	-	-	-	-	1045	1045	-	880	880	-
Stage 2	-	-	-	-	-	-	1049	1018	-	1053	1058	-
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	712	-	-	868	-	-	38	55	425	~ 50	65	370
Stage 1	-	-	-	-	-	-	276	306	-	342	365	-
Stage 2	-	-	-	-	-	-	275	315	-	274	301	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	711	-	-	868	-	-	~ 14	41	425	~ 38	49	370
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 14	41	-	~ 38	49	-
Stage 1	-	-	-	-	-	-	214	237	-	265	354	-
Stage 2	-	-	-	-	-	-	123	306	-	203	233	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.2	$ 357.4	260.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	15	425	711	-	-	868	-	-	38	370
HCM Lane V/C Ratio	1.159	0.033	0.225	-	-	0.029	-	-	2.26	0.535
HCM Control Delay (s)	$ 636.5	13.8	11.5	-	-	9.3	-	-	$ 803.5	25.4
HCM Lane LOS	F	B	B	-	-	A	-	-	F	D
HCM 95th %tile Q(veh)	2.7	0.1	0.9	-	-	0.1	-	-	9.4	3

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	138	185	15	163	126	221	581	24	116	646	250
Future Volume (veh/h)	150	138	185	15	163	126	221	581	24	116	646	250
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	0.98		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	214	150	42	16	177	11	240	632	0	126	702	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	316	466	390	259	240	199	305	870		329	800	
Arrive On Green	0.14	0.25	0.25	0.02	0.13	0.13	0.10	0.47	0.00	0.06	0.43	0.00
Sat Flow, veh/h	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	214	150	42	16	177	11	240	632	0	126	702	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	12.0	6.6	2.1	0.8	9.1	0.6	7.3	27.4	0.0	3.9	34.5	0.0
Cycle Q Clear(g_c), s	12.0	6.6	2.1	0.8	9.1	0.6	7.3	27.4	0.0	3.9	34.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	316	466	390	259	240	199	305	870		329	800	
V/C Ratio(X)	0.68	0.32	0.11	0.06	0.74	0.06	0.79	0.73		0.38	0.88	
Avail Cap(c_a), veh/h	317	466	390	476	373	308	560	932		650	932	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.6	30.8	29.1	36.9	42.1	38.4	21.2	21.7	0.0	17.6	26.3	0.0
Incr Delay (d2), s/veh	4.6	0.1	0.0	0.0	1.7	0.0	1.7	3.5	0.0	0.3	10.0	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	4.7	3.0	0.8	0.3	4.3	0.2	2.8	11.9	0.0	1.5	16.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.2	30.9	29.1	37.0	43.8	38.5	22.9	25.2	0.0	17.8	36.3	0.0
LnGrp LOS	D	C	C	D	D	D	C	C		B	D	
Approach Vol, veh/h		406			204			872	A		828	A
Approach Delay, s/veh		33.0			43.0			24.6			33.5	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	52.7	6.8	30.0	14.6	49.0	18.9	17.9
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	5.9	29.4	2.8	8.6	9.3	36.5	14.0	11.1
Green Ext Time (p_c), s	0.1	7.4	0.0	0.4	0.3	6.5	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	30.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	118	38	451	176	321	75	559	461	312	568	40
Future Volume (veh/h)	26	118	38	451	176	321	75	559	461	312	568	40
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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	128	4	490	191	251	82	608	0	339	617	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	157	206	538	590	736	294	679		362	880	782
Arrive On Green	0.02	0.08	0.08	0.26	0.32	0.32	0.04	0.36	0.00	0.15	0.47	0.47
Sat Flow, veh/h	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Grp Volume(v), veh/h	28	128	4	490	191	251	82	608	0	339	617	20
Grp Sat Flow(s),veh/h/ln	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Q Serve(g_s), s	1.8	8.6	0.3	34.6	11.0	14.2	4.1	43.2	0.0	18.7	36.7	0.9
Cycle Q Clear(g_c), s	1.8	8.6	0.3	34.6	11.0	14.2	4.1	43.2	0.0	18.7	36.7	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	198	157	206	538	590	736	294	679		362	880	782
V/C Ratio(X)	0.14	0.81	0.02	0.91	0.32	0.34	0.28	0.90		0.94	0.70	0.03
Avail Cap(c_a), veh/h	221	205	247	563	637	776	397	796		425	955	845
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.0	64.2	55.0	41.2	36.8	24.0	28.0	42.4	0.0	36.7	29.5	18.3
Incr Delay (d2), s/veh	0.3	13.3	0.0	18.5	0.1	0.1	0.2	13.2	0.0	24.6	2.9	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	0.9	5.2	0.1	18.1	5.2	5.5	1.8	22.2	0.0	14.2	16.9	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.3	77.5	55.0	59.7	36.9	24.1	28.2	55.6	0.0	61.3	32.4	18.3
LnGrp LOS	E	E	E	E	D	C	C	E		E	C	B
Approach Vol, veh/h		160			932			690	A		976	
Approach Delay, s/veh		73.6			45.5			52.3			42.1	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	57.2	42.1	15.7	10.9	72.3	8.3	49.5
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	60.0	39.0	14.0	14.0	72.0	5.0	48.0
Max Q Clear Time (g_c+I1), s	20.7	45.2	36.6	10.6	6.1	38.7	3.8	16.2
Green Ext Time (p_c), s	0.3	5.9	0.5	0.1	0.0	9.2	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	47.6
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	31	57	955	812	129
Future Volume (veh/h)	99	31	57	955	812	129
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	2	62	1038	883	101
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	199	177	331	1322	1067	903
Arrive On Green	0.11	0.11	0.05	0.71	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	1870	1870	1584
Grp Volume(v), veh/h	108	2	62	1038	883	101
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1584
Q Serve(g_s), s	3.5	0.1	0.7	22.1	23.2	1.8
Cycle Q Clear(g_c), s	3.5	0.1	0.7	22.1	23.2	1.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	199	177	331	1322	1067	903
V/C Ratio(X)	0.54	0.01	0.19	0.79	0.83	0.11
Avail Cap(c_a), veh/h	884	787	649	2785	2197	1860
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	23.9	9.5	5.8	10.6	6.0
Incr Delay (d2), s/veh	2.3	0.0	0.3	1.1	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.3	5.2	7.7	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.7	23.9	9.8	6.9	12.3	6.0
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	110			1100	984	
Approach Delay, s/veh	27.6			7.1	11.6	
Approach LOS	C			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.2	40.5		11.7		48.7
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	14.0	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.7	25.2		5.5		24.1
Green Ext Time (p_c), s	0.1	9.2		0.3		12.8

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	7	3	115	12	98	9	899	127	81	749	22
Future Volume (veh/h)	12	7	3	115	12	98	9	899	127	81	749	22
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	13	8	1	125	13	82	10	977	135	88	814	15
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	182	100	262	190	19	93	371	1031	143	188	1258	1066
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.01	0.64	0.64	0.04	0.67	0.67
Sat Flow, veh/h	768	603	1585	830	117	562	1781	1608	222	1781	1870	1584
Grp Volume(v), veh/h	21	0	1	220	0	0	10	0	1112	88	814	15
Grp Sat Flow(s),veh/h/ln	1371	0	1585	1508	0	0	1781	0	1830	1781	1870	1584
Q Serve(g_s), s	0.0	0.0	0.1	14.2	0.0	0.0	0.2	0.0	59.4	1.7	27.0	0.3
Cycle Q Clear(g_c), s	1.0	0.0	0.1	15.2	0.0	0.0	0.2	0.0	59.4	1.7	27.0	0.3
Prop In Lane	0.62		1.00	0.57		0.37	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	282	0	262	303	0	0	371	0	1174	188	1258	1066
V/C Ratio(X)	0.07	0.00	0.00	0.73	0.00	0.00	0.03	0.00	0.95	0.47	0.65	0.01
Avail Cap(c_a), veh/h	382	0	371	404	0	0	583	0	1198	344	1258	1066
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	37.7	0.0	37.3	43.5	0.0	0.0	9.1	0.0	17.5	25.4	10.1	5.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	15.4	0.7	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	0.5	0.0	0.0	5.9	0.0	0.0	0.1	0.0	27.0	1.5	10.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.7	0.0	37.3	46.0	0.0	0.0	9.1	0.0	32.9	26.1	11.7	5.8
LnGrp LOS	D	A	D	D	A	A	A	A	C	C	B	A
Approach Vol, veh/h		22			220			1122			917	
Approach Delay, s/veh		37.7			46.0			32.7			13.0	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.6	74.6		22.7	6.3	77.9		22.7
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	14.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	3.0	61.4		3.0	2.2	29.0		17.2
Green Ext Time (p_c), s	0.1	7.2		0.0	0.0	15.4		0.5

Intersection Summary	
HCM 6th Ctrl Delay	26.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	99	11	42	144	109	10	1	24	61	6	12
Future Vol, veh/h	11	99	11	42	144	109	10	1	24	61	6	12
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	275	-	-	-	-	-	-	-	-	-	-	0
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	12	108	12	46	157	118	11	1	26	66	7	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	275	0	0	120	0	0	456	505	114	460	452	216
Stage 1	-	-	-	-	-	-	138	138	-	308	308	-
Stage 2	-	-	-	-	-	-	318	367	-	152	144	-
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	1288	-	-	1468	-	-	515	470	939	512	503	824
Stage 1	-	-	-	-	-	-	865	782	-	702	660	-
Stage 2	-	-	-	-	-	-	693	622	-	850	778	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1288	-	-	1468	-	-	484	448	939	479	479	824
Mov Cap-2 Maneuver	-	-	-	-	-	-	484	448	-	479	479	-
Stage 1	-	-	-	-	-	-	857	775	-	696	635	-
Stage 2	-	-	-	-	-	-	649	598	-	818	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.1	10.3	13.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	722	1288	-	-	1468	-	-	479	824
HCM Lane V/C Ratio	0.053	0.009	-	-	0.031	-	-	0.152	0.016
HCM Control Delay (s)	10.3	7.8	-	-	7.5	0	-	13.9	9.4
HCM Lane LOS	B	A	-	-	A	A	-	B	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.5	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	3	12	154	3	6
Future Vol, veh/h	114	3	12	154	3	6
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	124	3	13	167	3	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	0	0	127	0	319	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	193	-
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	-	-	1459	-	674	924
Stage 1	-	-	-	-	900	-
Stage 2	-	-	-	-	840	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1459	-	667	924
Mov Cap-2 Maneuver	-	-	-	-	667	-
Stage 1	-	-	-	-	900	-
Stage 2	-	-	-	-	832	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	819	-	-	1459	-
HCM Lane V/C Ratio	0.012	-	-	0.009	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

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

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Future Year 2024 AM With Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	175	2.0	184	2.0	0.570	8.3	LOS A	5.2	132.3	0.84	0.91	0.99	20.3
7	T1	194	2.0	204	2.0	0.570	5.6	LOS A	5.2	132.3	0.84	0.91	0.99	18.9
25	R2	98	2.0	103	2.0	0.570	5.6	LOS A	5.2	132.3	0.84	0.91	0.99	18.9
Approach		467	2.0	492	2.0	0.570	6.6	LOS A	5.2	132.3	0.84	0.91	0.99	19.4
East: WB Maui Lani Parkway														
19	L2	73	2.0	77	2.0	0.447	6.9	LOS A	3.3	84.0	0.79	0.75	0.82	20.6
336	T1	208	2.0	219	2.0	0.447	4.1	LOS A	3.3	84.0	0.79	0.75	0.82	19.2
24	R2	77	2.0	81	2.0	0.447	4.1	LOS A	3.3	84.0	0.79	0.75	0.82	19.2
Approach		358	2.0	377	2.0	0.447	4.7	LOS A	3.3	84.0	0.79	0.75	0.82	19.4
North: SB Kamehameha Ave														
15	L2	161	2.0	169	2.0	0.586	7.5	LOS A	5.4	136.3	0.80	0.83	0.92	20.5
2	T1	157	2.0	165	2.0	0.586	4.8	LOS A	5.4	136.3	0.80	0.83	0.92	19.1
40	R2	203	2.0	214	2.0	0.586	4.8	LOS A	5.4	136.3	0.80	0.83	0.92	19.1
Approach		521	2.0	548	2.0	0.586	5.6	LOS A	5.4	136.3	0.80	0.83	0.92	19.5
West: EB Maui Lani Parkway														
30	L2	188	2.0	198	2.0	0.566	6.4	LOS A	5.0	126.8	0.77	0.73	0.84	20.6
464	T1	188	2.0	198	2.0	0.566	3.7	LOS A	5.0	126.8	0.77	0.73	0.84	19.2
78	R2	147	2.0	155	2.0	0.566	3.7	LOS A	5.0	126.8	0.77	0.73	0.84	19.2
Approach		523	2.0	551	2.0	0.566	4.7	LOS A	5.0	126.8	0.77	0.73	0.84	19.7
All Vehicles		1869	2.0	1967	2.0	0.586	5.4	LOS A	5.4	136.3	0.80	0.81	0.90	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	124.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	3	147	16	15	9	168	425	7	2	550	104
Future Vol, veh/h	82	3	147	16	15	9	168	425	7	2	550	104
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	89	3	160	17	16	10	183	462	8	2	598	113
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	14.3	14.1	125.1	169.1
HCM LOS	B	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	28%	0%	100%	0%	40%	0%
Vol Thru, %	72%	0%	0%	2%	38%	84%
Vol Right, %	0%	100%	0%	98%	23%	16%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	593	7	82	150	40	656
LT Vol	168	0	82	0	16	2
Through Vol	425	0	0	3	15	550
RT Vol	0	7	0	147	9	104
Lane Flow Rate	645	8	89	163	43	713
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.188	0.012	0.206	0.323	0.106	1.298
Departure Headway (Hd)	7.025	6.161	9.179	7.94	9.916	6.867
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	522	584	394	457	364	535
Service Time	4.725	3.861	6.879	5.64	7.916	4.867
HCM Lane V/C Ratio	1.236	0.014	0.226	0.357	0.118	1.333
HCM Control Delay	126.5	8.9	14.2	14.4	14.1	169.1
HCM Lane LOS	F	A	B	B	B	F
HCM 95th-tile Q	22.3	0	0.8	1.4	0.4	28.5

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	536	2.0	564	2.0	0.926	8.4	LOS A	24.2	615.1	1.00	0.93	1.24	18.6
25	R2	515	2.0	542	2.0	0.926	8.4	LOS A	24.2	615.1	1.00	0.93	1.24	18.6
Approach		1051	2.0	1106	2.0	0.926	8.4	LOS A	24.2	615.1	1.00	0.93	1.24	18.6
East: WB Waiinu Rd														
19	L2	99	2.0	104	2.0	0.229	5.8	LOS A	1.6	39.7	0.75	0.68	0.75	20.6
24	R2	73	2.0	77	2.0	0.229	3.1	LOS A	1.6	39.7	0.75	0.68	0.75	19.2
Approach		172	2.0	181	2.0	0.229	4.6	LOS A	1.6	39.7	0.75	0.68	0.75	20.0
North: SB Waiale Rd														
15	L2	163	2.0	172	2.0	0.634	3.7	LOS A	6.7	169.9	0.53	0.24	0.53	20.9
2	T1	594	2.0	625	2.0	0.634	1.0	LOS A	6.7	169.9	0.53	0.24	0.53	19.4
Approach		757	2.0	797	2.0	0.634	1.6	LOS A	6.7	169.9	0.53	0.24	0.53	19.7
All Vehicles		1980	2.0	2084	2.0	0.926	5.5	LOS A	24.2	615.1	0.80	0.64	0.93	19.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	59.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	159	0	32	8	0	16	7	826	7	11	486	166
Future Vol, veh/h	159	0	32	8	0	16	7	826	7	11	486	166
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	173	0	35	9	0	17	8	898	8	12	528	180

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1572	1570	621	1581	1656	905	711	0	0	909	0	0
Stage 1	645	645	-	921	921	-	-	-	-	-	-	-
Stage 2	927	925	-	660	735	-	-	-	-	-	-	-
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	~ 89	111	487	88	98	335	888	-	-	749	-	-
Stage 1	461	467	-	324	349	-	-	-	-	-	-	-
Stage 2	322	348	-	452	425	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 81	105	486	79	93	334	885	-	-	747	-	-
Mov Cap-2 Maneuver	~ 81	105	-	79	93	-	-	-	-	-	-	-
Stage 1	451	453	-	317	342	-	-	-	-	-	-	-
Stage 2	300	341	-	408	412	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 528.9	31.6	0.1	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	885	-	-	81	486	161	747	-	-
HCM Lane V/C Ratio	0.009	-	-	2.134	0.072	0.162	0.016	-	-
HCM Control Delay (s)	9.1	0	-	$ 632.7	13	31.6	9.9	-	-
HCM Lane LOS	A	A	-	F	B	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	15.6	0.2	0.6	0	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	14.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	125	67	52	740	474	24
Future Vol, veh/h	125	67	52	740	474	24
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	136	73	57	804	515	26

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1449	531	544	0	-	0
Stage 1	531	-	-	-	-	-
Stage 2	918	-	-	-	-	-
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	144	548	1025	-	-	-
Stage 1	590	-	-	-	-	-
Stage 2	389	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 129	546	1022	-	-	-
Mov Cap-2 Maneuver	~ 129	-	-	-	-	-
Stage 1	529	-	-	-	-	-
Stage 2	388	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	108.9	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1022	-	129	546	-	-
HCM Lane V/C Ratio	0.055	-	1.053	0.133	-	-
HCM Control Delay (s)	8.7	0	160.5	12.6	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0.2	-	7.6	0.5	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	343	478	87	98	317	55	182	186	116	64	207	170
Future Volume (veh/h)	343	478	87	98	317	55	182	186	116	64	207	170
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		0.99	1.00		0.99
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	429	520	88	107	345	10	198	202	104	70	225	156
Peak Hour Factor	0.80	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	495	586	99	228	427	361	295	357	184	328	258	179
Arrive On Green	0.20	0.38	0.38	0.05	0.23	0.23	0.10	0.31	0.31	0.04	0.25	0.25
Sat Flow, veh/h	1781	1558	264	1781	1870	1578	1781	1159	597	1781	1023	709
Grp Volume(v), veh/h	429	0	608	107	345	10	198	0	306	70	0	381
Grp Sat Flow(s),veh/h/ln	1781	0	1822	1781	1870	1578	1781	0	1756	1781	0	1733
Q Serve(g_s), s	15.9	0.0	28.6	4.2	15.9	0.4	7.2	0.0	13.3	2.6	0.0	19.3
Cycle Q Clear(g_c), s	15.9	0.0	28.6	4.2	15.9	0.4	7.2	0.0	13.3	2.6	0.0	19.3
Prop In Lane	1.00		0.14	1.00		1.00	1.00		0.34	1.00		0.41
Lane Grp Cap(c), veh/h	495	0	685	228	427	361	295	0	540	328	0	437
V/C Ratio(X)	0.87	0.00	0.89	0.47	0.81	0.03	0.67	0.00	0.57	0.21	0.00	0.87
Avail Cap(c_a), veh/h	564	0	897	228	573	484	295	0	557	466	0	588
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	26.7	26.4	33.3	27.4	23.3	0.0	26.5	24.1	0.0	32.8
Incr Delay (d2), s/veh	12.3	0.0	8.7	1.5	6.2	0.0	5.8	0.0	1.3	0.3	0.0	10.7
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	8.0	0.0	13.7	1.9	7.9	0.2	3.4	0.0	5.7	1.1	0.0	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.9	0.0	35.5	27.9	39.5	27.4	29.0	0.0	27.8	24.4	0.0	43.5
LnGrp LOS	C	A	D	C	D	C	C	A	C	C	A	D
Approach Vol, veh/h		1037			462			504			451	
Approach Delay, s/veh		34.4			36.6			28.3			40.5	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	34.1	9.0	40.3	13.0	29.0	22.5	26.9
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	11.0	29.0	5.0	45.0	9.0	31.0	22.0	28.0
Max Q Clear Time (g_c+I1), s	4.6	15.3	6.2	30.6	9.2	21.3	17.9	17.9
Green Ext Time (p_c), s	0.1	1.6	0.0	3.8	0.0	1.8	0.6	1.5

Intersection Summary	
HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

HCM 6th TWSC
7: Waiale Rd & Kokololio St

04/22/2021

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	131	21	4	334	320	34
Future Vol, veh/h	131	21	4	334	320	34
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	50	-	-	-	-
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	142	23	4	363	348	37

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	738	367	385	0	-	0
Stage 1	367	-	-	-	-	-
Stage 2	371	-	-	-	-	-
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	385	678	1173	-	-	-
Stage 1	701	-	-	-	-	-
Stage 2	698	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	383	678	1173	-	-	-
Mov Cap-2 Maneuver	383	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1173	-	383	678	-	-
HCM Lane V/C Ratio	0.004	-	0.372	0.034	-	-
HCM Control Delay (s)	8.1	0	19.9	10.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.7	0.1	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	73	16	231	322	28
Future Vol, veh/h	69	73	16	231	322	28
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	75	79	17	251	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	650	365	380	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	285	-	-	-	-	-
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	434	680	1178	-	-	-
Stage 1	702	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	680	1178	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1178	-	528	-	-
HCM Lane V/C Ratio	0.015	-	0.292	-	-
HCM Control Delay (s)	8.1	0	14.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	31	16	4	219	393	5
Future Vol, veh/h	31	16	4	219	393	5
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	34	17	4	238	427	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	676	430	432	0	-	0
Stage 1	430	-	-	-	-	-
Stage 2	246	-	-	-	-	-
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	419	625	1128	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	795	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	417	625	1128	-	-	-
Mov Cap-2 Maneuver	417	-	-	-	-	-
Stage 1	653	-	-	-	-	-
Stage 2	795	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1128	-	470	-	-
HCM Lane V/C Ratio	0.004	-	0.109	-	-
HCM Control Delay (s)	8.2	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.4	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	22	5	193	401	12
Future Vol, veh/h	28	22	5	193	401	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	30	24	5	210	436	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	663	443	449	0	-	0
Stage 1	443	-	-	-	-	-
Stage 2	220	-	-	-	-	-
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	426	615	1111	-	-	-
Stage 1	647	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	424	615	1111	-	-	-
Mov Cap-2 Maneuver	516	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	817	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1111	-	555	-	-
HCM Lane V/C Ratio	0.005	-	0.098	-	-
HCM Control Delay (s)	8.3	-	12.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	23.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	71	275	74	132	323	89
Future Vol, veh/h	71	275	74	132	323	89
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	77	299	80	143	351	97

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	223	0	-	0	605	152
Stage 1	-	-	-	-	152	-
Stage 2	-	-	-	-	453	-
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	1346	-	-	-	461	894
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1346	-	-	-	429	894
Mov Cap-2 Maneuver	-	-	-	-	429	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	640	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	54.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1346	-	-	-	483
HCM Lane V/C Ratio	0.057	-	-	-	0.927
HCM Control Delay (s)	7.8	0	-	-	54.2
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	10.9

HCM 6th TWSC
12: Kuikahi Dr & Kehalani Village Center Dr

04/22/2021

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	101	809	10	9	592	64	28	3	26	32	1	111
Future Vol, veh/h	101	809	10	9	592	64	28	3	26	32	1	111
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	110	879	11	10	643	70	30	3	28	35	1	121

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	714	0	0	890	0	0	1864	1839	885	1784	1774	644
Stage 1	-	-	-	-	-	-	1105	1105	-	664	664	-
Stage 2	-	-	-	-	-	-	759	734	-	1120	1110	-
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	886	-	-	761	-	-	56	75	344	63	83	473
Stage 1	-	-	-	-	-	-	256	286	-	450	458	-
Stage 2	-	-	-	-	-	-	399	426	-	251	285	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	885	-	-	761	-	-	37	65	344	50	72	473
Mov Cap-2 Maneuver	-	-	-	-	-	-	37	65	-	50	72	-
Stage 1	-	-	-	-	-	-	224	251	-	394	452	-
Stage 2	-	-	-	-	-	-	293	420	-	199	250	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	148.1	52.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	39	344	885	-	-	761	-	-	50	473
HCM Lane V/C Ratio	0.864	0.082	0.124	-	-	0.013	-	-	0.717	0.255
HCM Control Delay (s)	258.6	16.4	9.6	-	-	9.8	-	-	178.6	15.2
HCM Lane LOS	F	C	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	3.2	0.3	0.4	-	-	0	-	-	2.9	1

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	297	282	510	31	237	131	315	599	15	46	404	114
Future Volume (veh/h)	297	282	510	31	237	131	315	599	15	46	404	114
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		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	424	307	182	34	258	13	342	651	0	50	439	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	444	692	585	280	291	245	375	719		168	496	
Arrive On Green	0.24	0.37	0.37	0.03	0.16	0.16	0.15	0.38	0.00	0.03	0.27	0.00
Sat Flow, veh/h	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	424	307	182	34	258	13	342	651	0	50	439	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1581	1781	1870	1575	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	26.7	14.3	9.5	1.8	15.6	0.8	15.4	37.9	0.0	2.3	26.0	0.0
Cycle Q Clear(g_c), s	26.7	14.3	9.5	1.8	15.6	0.8	15.4	37.9	0.0	2.3	26.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	444	692	585	280	291	245	375	719		168	496	
V/C Ratio(X)	0.95	0.44	0.31	0.12	0.89	0.05	0.91	0.90		0.30	0.88	
Avail Cap(c_a), veh/h	444	692	585	661	324	273	471	719		477	584	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.1	27.4	25.9	39.1	47.7	41.4	27.0	33.5	0.0	31.8	40.7	0.0
Incr Delay (d2), s/veh	30.9	0.2	0.1	0.1	21.1	0.0	17.3	15.6	0.0	0.4	15.6	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	13.3	6.5	3.6	0.8	9.0	0.3	8.0	19.5	0.0	1.0	13.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	27.6	26.0	39.2	68.8	41.5	44.3	49.1	0.0	32.1	56.3	0.0
LnGrp LOS	E	C	C	D	E	D	D	D		C	E	
Approach Vol, veh/h		913			305			993	A		489	A
Approach Delay, s/veh		42.3			64.3			47.5			53.8	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	50.4	8.3	47.6	22.7	36.6	33.0	23.0
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	36.0	28.0	20.0	24.0	36.0	28.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	39.9	3.8	16.3	17.4	28.0	28.7	17.6
Green Ext Time (p_c), s	0.0	0.0	0.0	0.6	0.3	2.6	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	48.8
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	174	104	348	60	358	25	495	419	320	660	11
Future Volume (veh/h)	67	174	104	348	60	358	25	495	419	320	660	11
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	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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	189	29	378	65	221	27	538	0	348	717	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	330	239	246	433	478	626	217	660		400	874	812
Arrive On Green	0.05	0.12	0.12	0.19	0.26	0.26	0.03	0.35	0.00	0.14	0.47	0.47
Sat Flow, veh/h	1968	2067	1736	1781	1870	1579	1781	1870	1585	1781	1870	1583
Grp Volume(v), veh/h	73	189	29	378	65	221	27	538	0	348	717	5
Grp Sat Flow(s),veh/h/ln	1968	2067	1736	1781	1870	1579	1781	1870	1585	1781	1870	1583
Q Serve(g_s), s	3.3	9.1	1.5	18.7	2.7	10.0	1.0	26.7	0.0	12.1	33.9	0.2
Cycle Q Clear(g_c), s	3.3	9.1	1.5	18.7	2.7	10.0	1.0	26.7	0.0	12.1	33.9	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	330	239	246	433	478	626	217	660		400	874	812
V/C Ratio(X)	0.22	0.79	0.12	0.87	0.14	0.35	0.12	0.82		0.87	0.82	0.01
Avail Cap(c_a), veh/h	413	606	555	433	732	840	501	1098		481	1098	1002
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.4	44.0	38.3	30.7	29.3	21.7	22.5	30.1	0.0	21.1	23.5	12.2
Incr Delay (d2), s/veh	0.3	2.3	0.1	17.5	0.0	0.1	0.1	5.2	0.0	12.3	5.5	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	1.6	4.8	0.6	10.1	1.3	3.7	0.4	12.5	0.0	6.0	15.3	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.7	46.3	38.4	48.3	29.4	21.8	22.6	35.3	0.0	33.4	29.1	12.2
LnGrp LOS	D	D	D	D	C	C	C	D		C	C	B
Approach Vol, veh/h		291			664			565	A		1070	
Approach Delay, s/veh		43.3			37.6			34.7			30.4	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.4	42.1	24.0	16.8	7.7	53.8	9.7	31.1
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	19.6	60.0	19.0	30.0	19.0	60.0	9.0	40.0
Max Q Clear Time (g_c+I1), s	14.1	28.7	20.7	11.1	3.0	35.9	5.3	12.0
Green Ext Time (p_c), s	0.3	7.4	0.0	0.7	0.0	9.7	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	154	88	18	782	992	63
Future Volume (veh/h)	154	88	18	782	992	63
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	167	7	20	850	1078	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	213	190	227	1383	1221	1035
Arrive On Green	0.12	0.12	0.02	0.74	0.65	0.65
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	167	7	20	850	1078	55
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	7.1	0.3	0.3	16.9	36.9	1.0
Cycle Q Clear(g_c), s	7.1	0.3	0.3	16.9	36.9	1.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	213	190	227	1383	1221	1035
V/C Ratio(X)	0.78	0.04	0.09	0.61	0.88	0.05
Avail Cap(c_a), veh/h	685	609	506	2156	1701	1442
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	30.4	13.6	4.9	11.1	4.9
Incr Delay (d2), s/veh	6.2	0.1	0.2	0.4	4.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.1	0.2	4.5	13.3	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.6	30.5	13.8	5.3	15.5	4.9
LnGrp LOS	D	C	B	A	B	A
Approach Vol, veh/h	174			870	1133	
Approach Delay, s/veh	39.2			5.5	15.0	
Approach LOS	D			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	6.8	57.0		14.3		63.7
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	14.6	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.3	38.9		9.1		18.9
Green Ext Time (p_c), s	0.0	12.1		0.4		8.4

Intersection Summary	
HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	13	6	106	8	54	4	716	120	183	889	6
Future Volume (veh/h)	20	13	6	106	8	54	4	716	120	183	889	6
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	22	14	2	115	9	44	4	778	126	199	966	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	102	220	210	16	55	275	956	155	336	1247	1057
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.01	0.61	0.61	0.06	0.67	0.67
Sat Flow, veh/h	838	734	1579	990	118	393	1781	1570	254	1781	1870	1585
Grp Volume(v), veh/h	36	0	2	168	0	0	4	0	904	199	966	5
Grp Sat Flow(s),veh/h/ln	1572	0	1579	1502	0	0	1781	0	1825	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.1	7.6	0.0	0.0	0.1	0.0	32.6	3.3	30.2	0.1
Cycle Q Clear(g_c), s	1.5	0.0	0.1	9.1	0.0	0.0	0.1	0.0	32.6	3.3	30.2	0.1
Prop In Lane	0.61		1.00	0.68		0.26	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	287	0	220	281	0	0	275	0	1110	336	1247	1057
V/C Ratio(X)	0.13	0.00	0.01	0.60	0.00	0.00	0.01	0.00	0.81	0.59	0.77	0.00
Avail Cap(c_a), veh/h	522	0	465	507	0	0	560	0	1505	517	1543	1307
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	32.0	0.0	31.5	35.2	0.0	0.0	10.1	0.0	12.9	14.8	9.7	4.7
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9	0.6	2.9	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	0.7	0.0	0.0	3.4	0.0	0.0	0.0	0.0	12.6	2.0	10.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.1	0.0	31.5	36.0	0.0	0.0	10.1	0.0	16.8	15.5	12.6	4.7
LnGrp LOS	C	A	C	D	A	A	B	A	B	B	B	A
Approach Vol, veh/h		38			168			908			1170	
Approach Delay, s/veh		32.1			36.0			16.7			13.1	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	57.6		16.8	5.4	62.6		16.8
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	11.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	5.3	34.6		3.5	2.1	32.2		11.1
Green Ext Time (p_c), s	0.2	17.0		0.1	0.0	19.4		0.5

Intersection Summary	
HCM 6th Ctrl Delay	16.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
17: Kehalani Mauka Pkwy & Kuikahi Dr

04/22/2021

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	172	5	13	52	35	4	4	54	121	2	5
Future Vol, veh/h	5	172	5	13	52	35	4	4	54	121	2	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	275	-	-	-	-	-	-	-	-	-	-	0
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	187	5	14	57	38	4	4	59	132	2	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	95	0	0	192	0	0	308	323	190	335	306	76
Stage 1	-	-	-	-	-	-	200	200	-	104	104	-
Stage 2	-	-	-	-	-	-	108	123	-	231	202	-
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	1499	-	-	1381	-	-	644	595	852	619	608	985
Stage 1	-	-	-	-	-	-	802	736	-	902	809	-
Stage 2	-	-	-	-	-	-	897	794	-	772	734	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1499	-	-	1381	-	-	632	587	852	567	599	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	632	587	-	567	599	-
Stage 1	-	-	-	-	-	-	800	734	-	899	800	-
Stage 2	-	-	-	-	-	-	880	785	-	712	732	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	9.8	13.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	810	1499	-	-	1381	-	-	567	985
HCM Lane V/C Ratio	0.083	0.004	-	-	0.01	-	-	0.236	0.006
HCM Control Delay (s)	9.8	7.4	-	-	7.6	0	-	13.3	8.7
HCM Lane LOS	A	A	-	-	A	A	-	B	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.9	0

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	167	1	4	57	1	15
Future Vol, veh/h	167	1	4	57	1	15
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	182	1	4	62	1	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	183	0	253	183
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	70	-
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	-	736	859
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	953	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1392	-	734	859
Mov Cap-2 Maneuver	-	-	-	-	734	-
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	950	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	850	-	-	1392	-
HCM Lane V/C Ratio	0.02	-	-	0.003	-
HCM Control Delay (s)	9.3	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

Future Year 2024 PM With Maui Lani Parkway Extension

MOVEMENT SUMMARY

Site: 101 [Maui Lani Parkway/Kamehameha Avenue (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Kamehameha Ave														
102	L2	128	2.0	135	2.0	0.418	6.7	LOS A	3.0	76.4	0.80	0.74	0.81	20.5
7	T1	135	2.0	142	2.0	0.418	4.0	LOS A	3.0	76.4	0.80	0.74	0.81	19.1
25	R2	55	2.0	58	2.0	0.418	4.0	LOS A	3.0	76.4	0.80	0.74	0.81	19.1
Approach		318	2.0	335	2.0	0.418	5.1	LOS A	3.0	76.4	0.80	0.74	0.81	19.6
East: WB Maui Lani Parkway														
19	L2	53	2.0	56	2.0	0.634	8.9	LOS A	6.4	162.4	0.85	0.93	1.05	20.3
336	T1	312	2.0	328	2.0	0.634	6.2	LOS A	6.4	162.4	0.85	0.93	1.05	18.9
24	R2	180	2.0	189	2.0	0.634	6.2	LOS A	6.4	162.4	0.85	0.93	1.05	18.9
Approach		545	2.0	574	2.0	0.634	6.5	LOS A	6.4	162.4	0.85	0.93	1.05	19.1
North: SB Kamehameha Ave														
15	L2	119	2.0	125	2.0	0.775	12.3	LOS B	10.8	275.0	0.98	1.21	1.39	19.7
2	T1	158	2.0	166	2.0	0.775	9.5	LOS A	10.8	275.0	0.98	1.21	1.39	18.4
40	R2	374	2.0	394	2.0	0.775	9.5	LOS A	10.8	275.0	0.98	1.21	1.39	18.4
Approach		651	2.0	685	2.0	0.775	10.0	LOS B	10.8	275.0	0.98	1.21	1.39	18.6
West: EB Maui Lani Parkway														
30	L2	239	2.0	252	2.0	0.666	6.9	LOS A	7.3	185.0	0.83	0.80	0.94	20.5
464	T1	225	2.0	237	2.0	0.666	4.2	LOS A	7.3	185.0	0.83	0.80	0.94	19.1
78	R2	175	2.0	184	2.0	0.666	4.2	LOS A	7.3	185.0	0.83	0.80	0.94	19.1
Approach		639	2.0	673	2.0	0.666	5.2	LOS A	7.3	185.0	0.83	0.80	0.94	19.6
All Vehicles		2153	2.0	2266	2.0	0.775	7.0	LOS A	10.8	275.0	0.87	0.95	1.08	19.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Intersection Delay, s/veh	174.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	10	205	16	4	8	114	523	23	8	661	66
Future Vol, veh/h	58	10	205	16	4	8	114	523	23	8	661	66
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	63	11	223	17	4	9	124	568	25	9	718	72
Number of Lanes	1	1	0	0	1	0	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	1	2
HCM Control Delay	16.9	14.6	162.3	249.7
HCM LOS	C	B	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	0%	100%	0%	57%	1%
Vol Thru, %	82%	0%	0%	5%	14%	90%
Vol Right, %	0%	100%	0%	95%	29%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	637	23	58	215	28	735
LT Vol	114	0	58	0	16	8
Through Vol	523	0	0	10	4	661
RT Vol	0	23	0	205	8	66
Lane Flow Rate	692	25	63	234	30	799
Geometry Grp	7	7	7	7	6	6
Degree of Util (X)	1.291	0.041	0.145	0.461	0.076	1.488
Departure Headway (Hd)	7.299	6.485	9.436	8.21	10.75	7.132
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	505	556	383	442	335	519
Service Time	4.999	4.185	7.136	5.91	8.75	5.132
HCM Lane V/C Ratio	1.37	0.045	0.164	0.529	0.09	1.539
HCM Control Delay	167.8	9.5	13.7	17.7	14.6	249.7
HCM Lane LOS	F	A	B	C	B	F
HCM 95th-tile Q	26.8	0.1	0.5	2.4	0.2	38.2

MOVEMENT SUMMARY

Site: 101 [Waiale Rd/Waiinu Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Waiale Rd														
7	T1	489	2.0	515	2.0	0.757	3.6	LOS A	10.2	258.0	0.83	0.68	0.90	19.3
25	R2	329	2.0	346	2.0	0.757	3.6	LOS A	10.2	258.0	0.83	0.68	0.90	19.3
Approach		818	2.0	861	2.0	0.757	3.6	LOS A	10.2	258.0	0.83	0.68	0.90	19.3
East: WB Waiinu Rd														
19	L2	151	2.0	159	2.0	0.335	5.7	LOS A	2.3	58.8	0.73	0.68	0.73	20.6
24	R2	123	2.0	129	2.0	0.335	3.0	LOS A	2.3	58.8	0.73	0.68	0.73	19.2
Approach		274	2.0	288	2.0	0.335	4.5	LOS A	2.3	58.8	0.73	0.68	0.73	20.0
North: SB Waiale Rd														
15	L2	206	2.0	217	2.0	0.742	4.6	LOS A	9.0	228.6	0.74	0.40	0.75	20.7
2	T1	638	2.0	672	2.0	0.742	1.9	LOS A	9.0	228.6	0.74	0.40	0.75	19.2
Approach		844	2.0	888	2.0	0.742	2.6	LOS A	9.0	228.6	0.74	0.40	0.75	19.6
All Vehicles		1936	2.0	2038	2.0	0.757	3.3	LOS A	10.2	258.0	0.78	0.55	0.81	19.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	0	13	6	1	9	26	771	4	4	695	156
Future Vol, veh/h	70	0	13	6	1	9	26	771	4	4	695	156
Conflicting Peds, #/hr	0	0	0	0	0	0	3	0	3	3	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
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	76	0	14	7	1	10	28	838	4	4	755	170

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1753	1752	843	1754	1835	843	928	0	0	845	0	0
Stage 1	851	851	-	899	899	-	-	-	-	-	-	-
Stage 2	902	901	-	855	936	-	-	-	-	-	-	-
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	~ 67	85	364	67	76	364	737	-	-	792	-	-
Stage 1	355	376	-	334	358	-	-	-	-	-	-	-
Stage 2	332	357	-	353	344	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 60	78	363	60	69	363	735	-	-	790	-	-
Mov Cap-2 Maneuver	~ 60	78	-	60	69	-	-	-	-	-	-	-
Stage 1	328	371	-	309	331	-	-	-	-	-	-	-
Stage 2	299	330	-	336	339	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	272.3	41.8	0.3	0
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	735	-	-	60	363	115	790	-	-
HCM Lane V/C Ratio	0.038	-	-	1.268	0.039	0.151	0.006	-	-
HCM Control Delay (s)	10.1	0	-	$ 320	15.3	41.8	9.6	-	-
HCM Lane LOS	B	A	-	F	C	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	6.4	0.1	0.5	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC
5: Waiale Rd & Kaupo St

04/22/2021

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	51	59	707	667	42
Future Vol, veh/h	58	51	59	707	667	42
Conflicting Peds, #/hr	0	0	3	0	0	3
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	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	63	55	64	768	725	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1647	751	774	0	-	0
Stage 1	751	-	-	-	-	-
Stage 2	896	-	-	-	-	-
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	109	411	842	-	-	-
Stage 1	466	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	94	410	840	-	-	-
Mov Cap-2 Maneuver	94	-	-	-	-	-
Stage 1	403	-	-	-	-	-
Stage 2	398	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	60.2	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	840	-	94	410	-	-
HCM Lane V/C Ratio	0.076	-	0.671	0.135	-	-
HCM Control Delay (s)	9.6	0	99.8	15.1	-	-
HCM Lane LOS	A	A	F	C	-	-
HCM 95th %tile Q(veh)	0.2	-	3.3	0.5	-	-

HCM 6th Signalized Intersection Summary
6: Waiale Rd & Kuikahi Dr/Maui Lani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	308	361	87	164	551	117	90	218	113	119	251	221
Future Volume (veh/h)	308	361	87	164	551	117	90	218	113	119	251	221
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	385	392	90	178	599	44	98	237	112	129	273	223
Peak Hour Factor	0.80	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	403	665	153	415	650	550	137	336	159	265	291	238
Arrive On Green	0.18	0.45	0.45	0.08	0.35	0.35	0.04	0.28	0.28	0.06	0.31	0.31
Sat Flow, veh/h	1781	1471	338	1781	1870	1583	1781	1200	567	1781	952	777
Grp Volume(v), veh/h	385	0	482	178	599	44	98	0	349	129	0	496
Grp Sat Flow(s),veh/h/ln	1781	0	1809	1781	1870	1583	1781	0	1767	1781	0	1729
Q Serve(g_s), s	26.8	0.0	31.5	10.1	48.7	3.0	6.0	0.0	28.0	8.0	0.0	44.2
Cycle Q Clear(g_c), s	26.8	0.0	31.5	10.1	48.7	3.0	6.0	0.0	28.0	8.0	0.0	44.2
Prop In Lane	1.00		0.19	1.00		1.00	1.00		0.32	1.00		0.45
Lane Grp Cap(c), veh/h	403	0	818	415	650	550	137	0	495	265	0	529
V/C Ratio(X)	0.96	0.00	0.59	0.43	0.92	0.08	0.71	0.00	0.70	0.49	0.00	0.94
Avail Cap(c_a), veh/h	404	0	948	457	827	700	137	0	495	343	0	601
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	46.2	0.0	32.4	30.0	49.6	34.7	46.0	0.0	51.1	38.6	0.0	53.4
Incr Delay (d2), s/veh	33.3	0.0	0.7	0.7	13.5	0.1	16.0	0.0	4.5	1.4	0.0	21.1
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	19.1	0.0	14.2	4.6	25.4	1.2	3.4	0.0	13.2	3.7	0.0	22.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.6	0.0	33.1	30.7	63.1	34.7	62.0	0.0	55.6	40.0	0.0	74.5
LnGrp LOS	E	A	C	C	E	C	E	A	E	D	A	E
Approach Vol, veh/h		867			821			447			625	
Approach Delay, s/veh		53.7			54.5			57.0			67.4	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.1	50.4	16.3	77.6	10.0	54.5	32.9	61.0
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Max Green Setting (Gmax), s	17.0	44.0	16.0	83.0	6.0	55.0	29.0	70.0
Max Q Clear Time (g_c+I1), s	10.0	30.0	12.1	33.5	8.0	46.2	28.8	50.7
Green Ext Time (p_c), s	0.2	1.9	0.2	3.8	0.0	2.3	0.0	4.3

Intersection Summary	
HCM 6th Ctrl Delay	57.6
HCM 6th LOS	E

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	14	30	345	337	73
Future Vol, veh/h	51	14	30	345	337	73
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	50	-	-	-	-
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	55	15	33	375	366	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	847	406	445	0	-	0
Stage 1	406	-	-	-	-	-
Stage 2	441	-	-	-	-	-
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	332	645	1115	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	320	645	1115	-	-	-
Mov Cap-2 Maneuver	320	-	-	-	-	-
Stage 1	648	-	-	-	-	-
Stage 2	648	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1115	-	320	645	-	-
HCM Lane V/C Ratio	0.029	-	0.173	0.024	-	-
HCM Control Delay (s)	8.3	0	18.6	10.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	28	60	320	283	62
Future Vol, veh/h	41	28	60	320	283	62
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	45	30	65	348	308	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	820	342	375	0	-	0
Stage 1	342	-	-	-	-	-
Stage 2	478	-	-	-	-	-
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	345	701	1183	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	322	701	1183	-	-	-
Mov Cap-2 Maneuver	322	-	-	-	-	-
Stage 1	670	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.6	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1183	-	413	-	-
HCM Lane V/C Ratio	0.055	-	0.182	-	-
HCM Control Delay (s)	8.2	0	15.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.7	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	17	16	371	296	14
Future Vol, veh/h	11	17	16	371	296	14
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	12	18	17	403	322	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	767	330	337	0	-	0
Stage 1	330	-	-	-	-	-
Stage 2	437	-	-	-	-	-
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	370	712	1222	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	651	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	363	712	1222	-	-	-
Mov Cap-2 Maneuver	363	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.4	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1222	-	517	-	-
HCM Lane V/C Ratio	0.014	-	0.059	-	-
HCM Control Delay (s)	8	0	12.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	8	14	372	289	16
Future Vol, veh/h	12	8	14	372	289	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	13	9	15	404	314	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	757	323	331	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	434	-	-	-	-	-
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	375	718	1228	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	371	718	1228	-	-	-
Mov Cap-2 Maneuver	482	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1228	-	555	-	-
HCM Lane V/C Ratio	0.012	-	0.039	-	-
HCM Control Delay (s)	8	-	11.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	11.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	119	169	316	249	54
Future Vol, veh/h	70	119	169	316	249	54
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	76	129	184	343	271	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	527	0	-	0	637	356
Stage 1	-	-	-	-	356	-
Stage 2	-	-	-	-	281	-
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	1040	-	-	-	441	688
Stage 1	-	-	-	-	709	-
Stage 2	-	-	-	-	767	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1040	-	-	-	406	688
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	767	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	34.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1040	-	-	-	438
HCM Lane V/C Ratio	0.073	-	-	-	0.752
HCM Control Delay (s)	8.7	0	-	-	34.2
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	6.2

Intersection	
Int Delay, s/veh	39.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	147	655	24	23	763	127	14	2	13	76	3	182
Future Vol, veh/h	147	655	24	23	763	127	14	2	13	76	3	182
Conflicting Peds, #/hr	1	0	0	0	0	1	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	145	-	-	50	-	50	-	-	0	-	-	0
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	160	712	26	25	829	138	15	2	14	83	3	198

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	968	0	0	738	0	0	2094	2063	725	1933	1938	830
Stage 1	-	-	-	-	-	-	1045	1045	-	880	880	-
Stage 2	-	-	-	-	-	-	1049	1018	-	1053	1058	-
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	712	-	-	868	-	-	38	55	425	~ 50	65	370
Stage 1	-	-	-	-	-	-	276	306	-	342	365	-
Stage 2	-	-	-	-	-	-	275	315	-	274	301	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	711	-	-	868	-	-	~ 14	41	425	~ 38	49	370
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 14	41	-	~ 38	49	-
Stage 1	-	-	-	-	-	-	214	237	-	265	354	-
Stage 2	-	-	-	-	-	-	123	306	-	203	233	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.2	$ 357.4	260.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	15	425	711	-	-	868	-	-	38	370
HCM Lane V/C Ratio	1.159	0.033	0.225	-	-	0.029	-	-	2.26	0.535
HCM Control Delay (s)	$ 636.5	13.8	11.5	-	-	9.3	-	-	$ 803.5	25.4
HCM Lane LOS	F	B	B	-	-	A	-	-	F	D
HCM 95th %tile Q(veh)	2.7	0.1	0.9	-	-	0.1	-	-	9.4	3

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
13: Honoapiilani Hwy & Kehalani Pkwy

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	138	185	15	163	126	221	581	24	116	646	250
Future Volume (veh/h)	150	138	185	15	163	126	221	581	24	116	646	250
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	0.98		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	1567	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	214	150	42	16	177	11	240	632	0	126	702	0
Peak Hour Factor	0.70	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, %	10	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	316	466	390	259	240	199	305	870		329	800	
Arrive On Green	0.14	0.25	0.25	0.02	0.13	0.13	0.10	0.47	0.00	0.06	0.43	0.00
Sat Flow, veh/h	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	214	150	42	16	177	11	240	632	0	126	702	0
Grp Sat Flow(s),veh/h/ln	1493	1870	1566	1781	1870	1548	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	12.0	6.6	2.1	0.8	9.1	0.6	7.3	27.4	0.0	3.9	34.5	0.0
Cycle Q Clear(g_c), s	12.0	6.6	2.1	0.8	9.1	0.6	7.3	27.4	0.0	3.9	34.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	316	466	390	259	240	199	305	870		329	800	
V/C Ratio(X)	0.68	0.32	0.11	0.06	0.74	0.06	0.79	0.73		0.38	0.88	
Avail Cap(c_a), veh/h	317	466	390	476	373	308	560	932		650	932	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.6	30.8	29.1	36.9	42.1	38.4	21.2	21.7	0.0	17.6	26.3	0.0
Incr Delay (d2), s/veh	4.6	0.1	0.0	0.0	1.7	0.0	1.7	3.5	0.0	0.3	10.0	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	4.7	3.0	0.8	0.3	4.3	0.2	2.8	11.9	0.0	1.5	16.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.2	30.9	29.1	37.0	43.8	38.5	22.9	25.2	0.0	17.8	36.3	0.0
LnGrp LOS	D	C	C	D	D	D	C	C		B	D	
Approach Vol, veh/h		406			204			872	A		828	A
Approach Delay, s/veh		33.0			43.0			24.6			33.5	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	52.7	6.8	30.0	14.6	49.0	18.9	17.9
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	24.0	50.0	14.0	20.0	24.0	50.0	14.0	20.0
Max Q Clear Time (g_c+I1), s	5.9	29.4	2.8	8.6	9.3	36.5	14.0	11.1
Green Ext Time (p_c), s	0.1	7.4	0.0	0.4	0.3	6.5	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	30.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
14: Honoapiilani Highway & Kuikahi Drive

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	118	38	451	176	321	75	559	461	312	568	40
Future Volume (veh/h)	26	118	38	451	176	321	75	559	461	312	568	40
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	2067	2067	2067	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	128	4	490	191	251	82	608	0	339	617	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	157	206	538	590	736	294	679		362	880	782
Arrive On Green	0.02	0.08	0.08	0.26	0.32	0.32	0.04	0.36	0.00	0.15	0.47	0.47
Sat Flow, veh/h	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Grp Volume(v), veh/h	28	128	4	490	191	251	82	608	0	339	617	20
Grp Sat Flow(s),veh/h/ln	1968	2067	1751	1781	1870	1585	1781	1870	1585	1781	1870	1582
Q Serve(g_s), s	1.8	8.6	0.3	34.6	11.0	14.2	4.1	43.2	0.0	18.7	36.7	0.9
Cycle Q Clear(g_c), s	1.8	8.6	0.3	34.6	11.0	14.2	4.1	43.2	0.0	18.7	36.7	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	198	157	206	538	590	736	294	679		362	880	782
V/C Ratio(X)	0.14	0.81	0.02	0.91	0.32	0.34	0.28	0.90		0.94	0.70	0.03
Avail Cap(c_a), veh/h	221	205	247	563	637	776	397	796		425	955	845
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.0	64.2	55.0	41.2	36.8	24.0	28.0	42.4	0.0	36.7	29.5	18.3
Incr Delay (d2), s/veh	0.3	13.3	0.0	18.5	0.1	0.1	0.2	13.2	0.0	24.6	2.9	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	0.9	5.2	0.1	18.1	5.2	5.5	1.8	22.2	0.0	14.2	16.9	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.3	77.5	55.0	59.7	36.9	24.1	28.2	55.6	0.0	61.3	32.4	18.3
LnGrp LOS	E	E	E	E	D	C	C	E		E	C	B
Approach Vol, veh/h		160			932			690	A		976	
Approach Delay, s/veh		73.6			45.5			52.3			42.1	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.0	57.2	42.1	15.7	10.9	72.3	8.3	49.5
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	60.0	39.0	14.0	14.0	72.0	5.0	48.0
Max Q Clear Time (g_c+I1), s	20.7	45.2	36.6	10.6	6.1	38.7	3.8	16.2
Green Ext Time (p_c), s	0.3	5.9	0.5	0.1	0.0	9.2	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	47.6
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
15: Honoapiilani Hwy & Pilikana St

04/22/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	99	31	57	955	812	129
Future Volume (veh/h)	99	31	57	955	812	129
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	108	2	62	1038	883	101
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	199	177	331	1322	1067	903
Arrive On Green	0.11	0.11	0.05	0.71	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	1870	1870	1584
Grp Volume(v), veh/h	108	2	62	1038	883	101
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1584
Q Serve(g_s), s	3.5	0.1	0.7	22.1	23.2	1.8
Cycle Q Clear(g_c), s	3.5	0.1	0.7	22.1	23.2	1.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	199	177	331	1322	1067	903
V/C Ratio(X)	0.54	0.01	0.19	0.79	0.83	0.11
Avail Cap(c_a), veh/h	884	787	649	2785	2197	1860
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	23.9	9.5	5.8	10.6	6.0
Incr Delay (d2), s/veh	2.3	0.0	0.3	1.1	1.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.3	5.2	7.7	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.7	23.9	9.8	6.9	12.3	6.0
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	110			1100	984	
Approach Delay, s/veh	27.6			7.1	11.6	
Approach LOS	C			A	B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.2	40.5		11.7		48.7
Change Period (Y+Rc), s	5.0	6.0		5.0		6.0
Max Green Setting (Gmax), s	14.0	71.0		30.0		90.0
Max Q Clear Time (g_c+I1), s	2.7	25.2		5.5		24.1
Green Ext Time (p_c), s	0.1	9.2		0.3		12.8

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
16: Honoapiilani Hwy & W Waiko Rd/E Waiko Rd

04/22/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	7	3	115	12	98	9	899	127	81	749	22
Future Volume (veh/h)	12	7	3	115	12	98	9	899	127	81	749	22
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	13	8	1	125	13	82	10	977	135	88	814	15
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	182	100	262	190	19	93	371	1031	143	188	1258	1066
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.01	0.64	0.64	0.04	0.67	0.67
Sat Flow, veh/h	768	603	1585	830	117	562	1781	1608	222	1781	1870	1584
Grp Volume(v), veh/h	21	0	1	220	0	0	10	0	1112	88	814	15
Grp Sat Flow(s),veh/h/ln	1371	0	1585	1508	0	0	1781	0	1830	1781	1870	1584
Q Serve(g_s), s	0.0	0.0	0.1	14.2	0.0	0.0	0.2	0.0	59.4	1.7	27.0	0.3
Cycle Q Clear(g_c), s	1.0	0.0	0.1	15.2	0.0	0.0	0.2	0.0	59.4	1.7	27.0	0.3
Prop In Lane	0.62		1.00	0.57		0.37	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	282	0	262	303	0	0	371	0	1174	188	1258	1066
V/C Ratio(X)	0.07	0.00	0.00	0.73	0.00	0.00	0.03	0.00	0.95	0.47	0.65	0.01
Avail Cap(c_a), veh/h	382	0	371	404	0	0	583	0	1198	344	1258	1066
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	37.7	0.0	37.3	43.5	0.0	0.0	9.1	0.0	17.5	25.4	10.1	5.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	15.4	0.7	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	0.5	0.0	0.0	5.9	0.0	0.0	0.1	0.0	27.0	1.5	10.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.7	0.0	37.3	46.0	0.0	0.0	9.1	0.0	32.9	26.1	11.7	5.8
LnGrp LOS	D	A	D	D	A	A	A	A	C	C	B	A
Approach Vol, veh/h		22			220			1122			917	
Approach Delay, s/veh		37.7			46.0			32.7			13.0	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.6	74.6		22.7	6.3	77.9		22.7
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	14.0	70.0		25.0	14.0	70.0		25.0
Max Q Clear Time (g_c+I1), s	3.0	61.4		3.0	2.2	29.0		17.2
Green Ext Time (p_c), s	0.1	7.2		0.0	0.0	15.4		0.5

Intersection Summary	
HCM 6th Ctrl Delay	26.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	99	11	42	144	109	10	1	24	61	6	12
Future Vol, veh/h	11	99	11	42	144	109	10	1	24	61	6	12
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	275	-	-	-	-	-	-	-	-	-	-	0
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	12	108	12	46	157	118	11	1	26	66	7	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	275	0	0	120	0	0	456	505	114	460	452	216
Stage 1	-	-	-	-	-	-	138	138	-	308	308	-
Stage 2	-	-	-	-	-	-	318	367	-	152	144	-
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	1288	-	-	1468	-	-	515	470	939	512	503	824
Stage 1	-	-	-	-	-	-	865	782	-	702	660	-
Stage 2	-	-	-	-	-	-	693	622	-	850	778	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1288	-	-	1468	-	-	484	448	939	479	479	824
Mov Cap-2 Maneuver	-	-	-	-	-	-	484	448	-	479	479	-
Stage 1	-	-	-	-	-	-	857	775	-	696	635	-
Stage 2	-	-	-	-	-	-	649	598	-	818	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.1	10.3	13.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	722	1288	-	-	1468	-	-	479	824
HCM Lane V/C Ratio	0.053	0.009	-	-	0.031	-	-	0.152	0.016
HCM Control Delay (s)	10.3	7.8	-	-	7.5	0	-	13.9	9.4
HCM Lane LOS	B	A	-	-	A	A	-	B	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.5	0

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	3	12	154	3	6
Future Vol, veh/h	114	3	12	154	3	6
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	124	3	13	167	3	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	0	0	127	0	319	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	193	-
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	-	-	1459	-	674	924
Stage 1	-	-	-	-	900	-
Stage 2	-	-	-	-	840	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1459	-	667	924
Mov Cap-2 Maneuver	-	-	-	-	667	-
Stage 1	-	-	-	-	900	-
Stage 2	-	-	-	-	832	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	819	-	-	1459	-
HCM Lane V/C Ratio	0.012	-	-	0.009	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Kaohu Street
Existing Conditions

Weekday Waiale Rd/Kaohu Street 8-Hour Signal Warrant

Monday, July 29, 2019

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

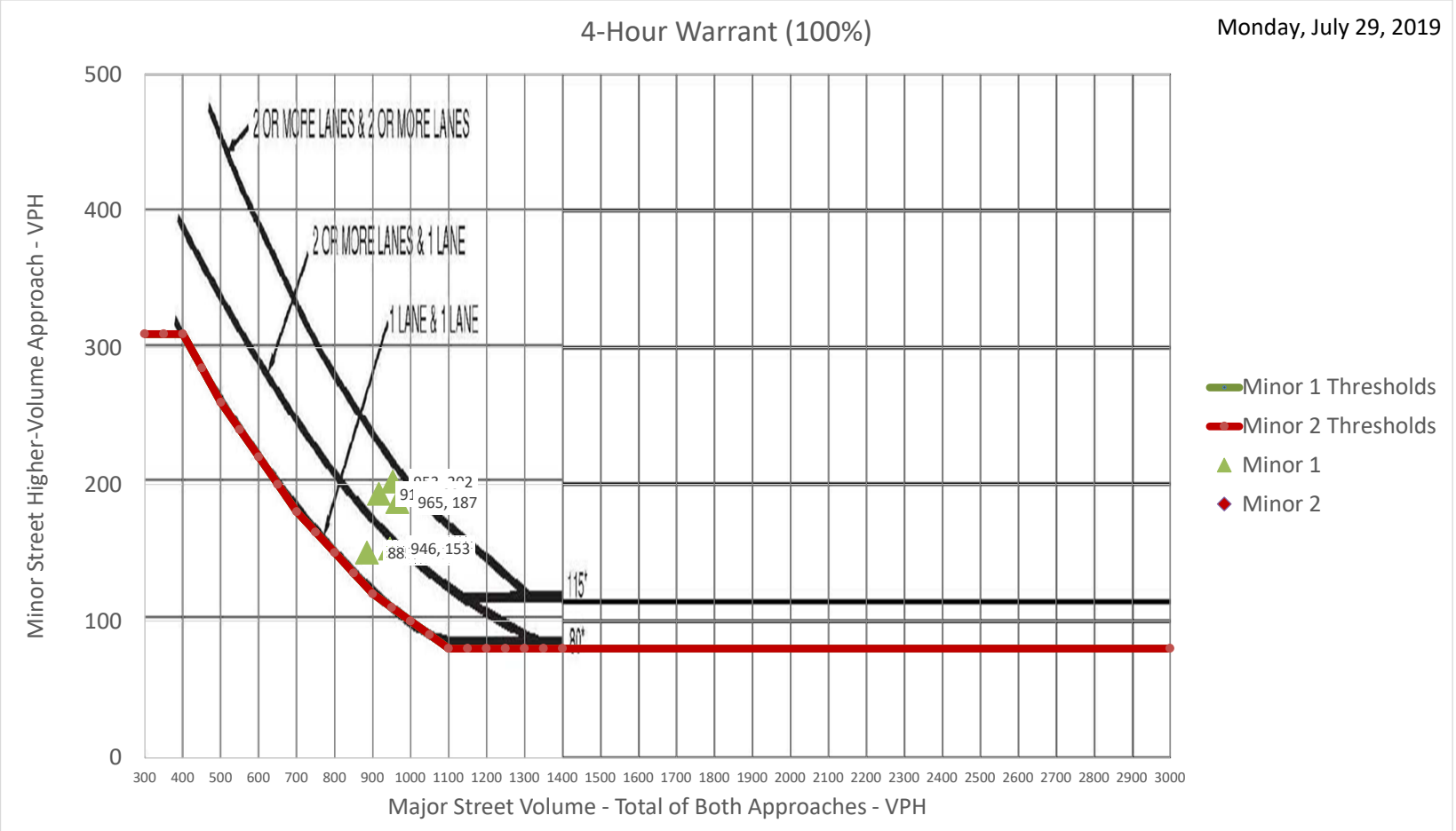
	Waiale Rd						Kaohu Street			Oluloa Street			100 % Warrant			Minor 1 (EB)			Minor 1 (WB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes														
	1						1			1			Major Threshold			500	750	600	500	750	600			
													Minor Threshold			150	75	120	150	75	120			
							RT Reduction: 0%			RT Reduction: 0%														
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	73	4	4	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	178	7	9	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	313	18	17	-	-	-	-	-	-	0	0	0
6:00	4	25	0	0	40	4	2	0	2	3	0	1	497	30	22	-	-	-	-	-	-	0	0	0
6:15	7	39	1	0	56	2	2	0	1	4	1	0	637	73	27	-	-	-	-	-	-	0	0	0
6:30	14	37	0	0	66	18	3	0	8	2	5	1	802	141	34	-	1	1	-	-	-	0	1	1
6:45	22	55	3	1	74	29	5	0	7	2	2	1	953	202	39	1	1	1	-	-	-	1	2	2
7:00	35	71	1	1	79	26	18	1	28	6	2	1	1048	236	44	1	1	1	-	-	-	2	3	3
7:15	43	80	0	0	107	40	21	2	48	8	3	1	1031	220	38	1	1	1	-	-	-	3	4	4
7:30	47	84	1	3	114	37	21	5	46	5	5	3	942	171	32	1	1	1	-	-	-	4	1	1
7:45	21	118	4	1	120	15	23	1	22	7	1	2	837	111	23	-	1	-	-	-	-	0	2	2
8:00	16	83	1	0	85	11	15	0	16	0	1	2	753	89	18	-	1	-	-	-	-	0	3	3
8:15	16	85	1	2	67	10	3	2	17	1	4	1	720	80	21	-	-	-	-	-	-	0	4	4
8:30	20	70	2	0	79	10	3	1	8	2	0	2	*694*	71	18	-	-	-	-	-	-	0	0	0
8:45	15	98	4	1	70	7	1	0	23	4	1	0	667	80	19	-	-	-	-	-	-	0	0	0
9:00	5	70	0	0	79	9	7	0	15	5	0	1	653	85	18	-	-	-	-	-	-	0	0	0
9:15	12	59	0	3	71	10	6	0	7	3	0	0	675	91	12	-	-	-	-	-	-	0	0	0
9:30	12	53	4	0	78	7	2	1	18	1	2	2	709	95	11	-	-	-	-	-	-	0	0	0
9:45	12	77	2	5	78	7	12	1	16	3	0	1	738	98	11	-	-	-	-	-	-	0	0	0
10:00	24	67	1	1	79	13	12	1	15	0	0	0	759	104	11	-	1	-	-	-	-	0	1	0
10:15	11	84	1	2	80	11	10	1	6	2	0	0	741	118	16	-	-	-	-	-	-	0	2	0
10:30	18	65	1	1	90	8	9	1	14	3	1	1	745	134	20	-	-	1	-	-	-	0	3	1
10:45	19	81	1	1	83	17	13	2	20	3	1	0	726	135	18	-	-	1	-	-	-	0	4	2
11:00	20	65	2	4	63	13	15	0	27	5	0	0	714	139	16	-	-	1	-	-	-	0	0	3
11:15	18	78	2	0	79	16	13	0	20	6	0	0	754	139	13	-	1	1	-	-	-	0	1	4
11:30	22	57	0	2	73	10	11	0	14	3	0	0	756	130	10	-	1	1	-	-	-	0	2	1
11:45	11	62	4	1	103	9	13	1	25	0	0	2	799	134	10	-	1	1	-	-	-	0	3	2
12:00	23	65	2	0	102	15	16	0	26	1	1	0	816	116	9	-	1	-	-	-	-	0	4	3
12:15	23	70	5	1	88	8	6	0	18	1	0	2	829	97	10	-	1	-	-	-	-	0	1	4
12:30	23	69	3	4	87	21	12	0	17	3	0	0	846	95	10	-	1	-	-	-	-	0	2	0
12:45	9	96	4	5	86	7	5	0	16	0	0	1	850	101	10	-	1	-	-	-	-	0	3	0
13:00	21	70	2	1	120	6	5	2	16	2	1	0	865	108	12	-	1	-	-	-	-	0	4	0
13:15	27	80	4	2	89	10	9	1	12	2	1	0	885	150	16	1	1	1	-	-	-	1	1	1
13:30	25	71	1	0	100	14	7	0	28	3	0	0	910	223	21	1	1	1	-	-	-	2	2	2
13:45	24	77	3	0	100	18	11	2	15	2	1	0	924	238	19	1	1	1	-	-	-	3	3	3
14:00	31	82	0	0	104	23	16	8	41	5	2	0	938	233	17	1	1	1	-	-	-	4	4	4
14:15	25	77	3	0	117	15	29	5	61	5	1	2	917	193	18	1	1	1	-	-	-	1	1	1
14:30	26	83	3	0	100	13	19	1	30	1	0	0	897	118	14	-	1	-	-	-	-	2	2	2
14:45	16	93	2	0	111	14	5	2	16	1	0	0	917	128	18	-	1	1	-	-	-	3	3	3
15:00	17	79	1	2	115	5	11	2	12	5	1	2	931	140	18	-	1	1	-	-	-	4	4	4
15:15	19	75	3	0	117	3	8	0	12	1	0	3	946	153	17	1	1	1	-	-	-	1	1	1
15:30	20	107	2	2	109	5	20	3	37	4	0	1	989	181	15	1	1	1	-	-	-	2	2	2
15:45	23	96	3	3	116	9	15	3	17	0	0	1	1004	191	13	1	1	1	-	-	-	3	3	3
16:00	18	103	0	1	102	10	11	3	24	2	2	3	981	193	14	1	1	1	-	-	-	4	4	4
16:15	16	112	1	0	120	11	6	4	38	1	0	1	965	187	11	1	1	1	-	-	-	1	1	1
16:30	22	98	3	2	126	9	7	2	61	3	0	0	915	170	13	1	1	1	-	-	-	2	2	2
16:45	7	83	5	3	119	10	6	1	30	2	0	0	847	113	10	-	1	-	-	-	-	3	3	3
17:00	25	68	7	3	112	3	6	2	24	3	0	1	800	86	12	-	1	-	-	-	-	4	4	4
17:15	11	77	1	3	113	5	9	1	21	4	0	0	763	83	8	-	1	-	-	-	-	0	1	0
17:30	6	70	5	4	97	10	3	1	9	0	0	0	724	75	10	-	-	-	-	-	-	0	2	0
17:45	17	78	1	2	78	4	1	0	9	1	3	0	684	76	13	-	-	-	-	-	-	0	3	0
18:00	22	63	2	1	86	7	8	3	18	0	0	0	657	82	11	-	-	-	-	-	-	0	4	0
18:15	15	68	4	1	78	5	6	3	14	5	1	0	476	53	11	-	-	-	-	-	-	0	0	0
18:30	12	55	4	3	75	3	4	0	10	1	2	0	305	30	5	-	-	-	-	-	-	0	0	0
18:45	16	66	5	1	53	12	5	1	10	1	1	0	153	16	2	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
															Hours where condition met:							5	10	8
															Signal Warranted?							Yes		
															Notes									

Weekday Waiale Rd/Kaohu Street 4-Hour Signal Warrant

Monday, July 29, 2019

	Waiale Rd						Kaohu Street			Oluloa Street			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 0%			RT Reduction: 0%											
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	73	4	4			0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	178	7	9			0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	313	18	17			0	0	0	0
6:00	4	25	0	0	40	4	2	0	2	3	0	1	497	30	22			0	0	0	0
6:15	7	39	1	0	56	2	2	0	1	4	1	0	637	73	27			0	0	0	0
6:30	14	37	0	0	66	18	3	0	8	2	5	1	802	141	34			0	0	0	0
6:45	22	55	3	1	74	29	5	0	7	2	2	1	953	202	39	1		1	0	1	1
7:00	35	71	1	1	79	26	18	1	28	6	2	1	1048	236	44	1		2	0	1	2
7:15	43	80	0	0	107	40	21	2	48	8	3	1	1031	220	38	1		3	0	1	3
7:30	47	84	1	3	114	37	21	5	46	5	5	3	942	171	32	1		4	0	1	4
7:45	21	118	4	1	120	15	23	1	22	7	1	2	837	111	23			0	0	0	0
8:00	16	83	1	0	85	11	15	0	16	0	1	2	753	89	18			0	0	0	0
8:15	16	85	1	2	67	10	3	2	17	1	4	1	720	80	21			0	0	0	0
8:30	20	70	2	0	79	10	3	1	8	2	0	2	694	71	18			0	0	0	0
8:45	15	98	4	1	70	7	1	0	23	4	1	0	667	80	19			0	0	0	0
9:00	5	70	0	0	79	9	7	0	15	5	0	1	653	85	18			0	0	0	0
9:15	12	59	0	3	71	10	6	0	7	3	0	0	675	91	12			0	0	0	0
9:30	12	53	4	0	78	7	2	1	18	1	2	2	709	95	11			0	0	0	0
9:45	12	77	2	5	78	7	12	1	16	3	0	1	738	98	11			0	0	0	0
10:00	24	67	1	1	79	13	12	1	15	0	0	0	759	104	11			0	0	0	0
10:15	11	84	1	2	80	11	10	1	6	2	0	0	741	118	16			0	0	0	0
10:30	18	65	1	1	90	8	9	1	14	3	1	1	745	134	20			0	0	0	0
10:45	19	81	1	1	83	17	13	2	20	3	1	0	726	135	18			0	0	0	0
11:00	20	65	2	4	63	13	15	0	27	5	0	0	714	139	16			0	0	0	0
11:15	18	78	2	0	79	16	13	0	20	6	0	0	754	139	13			0	0	0	0
11:30	22	57	0	2	73	10	11	0	14	3	0	0	756	130	10			0	0	0	0
11:45	11	62	4	1	103	9	13	1	25	0	0	2	799	134	10			0	0	0	0
12:00	23	65	2	0	102	15	16	0	26	1	1	0	816	116	9			0	0	0	0
12:15	23	70	5	1	88	8	6	0	18	1	0	2	829	97	10			0	0	0	0
12:30	23	69	3	4	87	21	12	0	17	3	0	0	846	95	10			0	0	0	0
12:45	9	96	4	5	86	7	5	0	16	0	0	1	850	101	10			0	0	0	0
13:00	21	70	2	1	120	6	5	2	16	2	1	0	865	108	12			0	0	0	0
13:15	27	80	4	2	89	10	9	1	12	2	1	0	885	150	16	1		1	0	1	1
13:30	25	71	1	0	100	14	7	0	28	3	0	0	910	223	21	1		2	0	1	2
13:45	24	77	3	0	100	18	11	2	15	2	1	0	924	238	19	1		3	0	1	3
14:00	31	82	0	0	104	23	16	8	41	5	2	0	938	233	17	1		4	0	1	4
14:15	25	77	3	0	117	15	29	5	61	5	1	2	917	193	18	1		1	0	1	1
14:30	26	83	3	0	100	13	19	1	30	1	0	0	897	118	14			2	0	0	2
14:45	16	93	2	0	111	14	5	2	16	1	0	0	917	128	18	1		3	0	1	3
15:00	17	79	1	2	115	5	11	2	12	5	1	2	931	140	18	1		4	0	1	4
15:15	19	75	3	0	117	3	8	0	12	1	0	3	946	153	17	1		1	0	1	1
15:30	20	107	2	2	109	5	20	3	37	4	0	1	989	181	15	1		2	0	1	2
15:45	23	96	3	3	116	9	15	3	17	0	0	1	1004	191	13	1		3	0	1	3
16:00	18	103	0	1	102	10	11	3	24	2	2	3	981	193	14	1		4	0	1	4
16:15	16	112	1	0	120	11	6	4	38	1	0	1	965	187	11	1		1	0	1	1
16:30	22	98	3	2	126	9	7	2	61	3	0	0	915	170	13	1		2	0	1	2
16:45	7	83	5	3	119	10	6	1	30	2	0	0	847	113	10			3	0	0	3
17:00	25	68	7	3	112	3	6	2	24	3	0	1	800	86	12			4	0	0	4
17:15	11	77	1	3	113	5	9	1	21	4	0	0	763	83	8			0	0	0	0
17:30	6	70	5	4	97	10	3	1	9	0	0	0	724	75	10			0	0	0	0
17:45	17	78	1	2	78	4	1	0	9	1	3	0	684	76	13			0	0	0	0
18:00	22	63	2	1	86	7	8	3	18	0	0	0	657	82	11			0	0	0	0
18:15	15	68	4	1	78	5	6	3	14	5	1	0	476	53	11			0	0	0	0
18:30	12	55	4	3	75	3	4	0	10	1	2	0	305	30	5			0	0	0	0
18:45	16	66	5	1	53	12	5	1	10	1	1	0	153	16	2			0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	5
Signal Warranted?	Yes


4-Hour Warrant (100%)
Monday, July 29, 2019
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
965, 187
946, 153
115'
80'
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

4-Hour Warrant (70%)
Monday, July 29, 2019
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
965, 187
946, 153
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Kaupo Street
Future Year Conditions

Weekday Waiale Road/Kaupo Street 8-Hour Signal Warrant

Tuesday, April 9, 2019

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

	Waiale Road						Kaupo Street			-			100 % Warrant			Minor 1 (EB)			Minor 1 (WB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes														
	1						1			1					Major Threshold	500	750	600	500	750	600			
															Minor Threshold	150	75	120	150	75	120			
							RT Reduction: 100%			RT Reduction: 0%														
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	187.9925757	7.83784	0	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	414.4423826	17.2432	0	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	732.1241832	34.4865	0	-	-	-	-	-	-	0	0	0
6:00	2.3137	76.045	0	0	106.63	3	7.8378	0	0	0	0	0	1154.846423	61.1351	0	-	-	-	-	-	-	0	0	0
6:15	4.6275	107.85	0	0	112.48	1.5	9.4054	0	0	0	0	0	1380.815156	73.2553	0	-	-	-	-	-	-	0	0	0
6:30	6.9412	189.42	0	0	118.32	3	17.243	0	0	0	0	0	1650.798667	91.1608	0	-	1	-	-	-	-	0	1	0
6:45	5.7843	250.26	0	0	160.68	6	26.649	0	0	0	0	0	1756.4469	122.237	0	-	1	1	-	-	-	0	2	1
7:00	16.9	234.33	0	0	158.16	4.5714	19.958	0	0	0	0	0	1827	125	0	-	1	1	-	-	-	0	3	2
7:15	16.9	300.91	0	0	172.9	5.7143	27.311	0	0	0	0	0	1881.531594	114.447	0	-	1	-	-	-	-	0	4	3
7:30	10.4	230.49	0	0	175.59	6.8571	48.319	0	0	0	0	0	1778.272293	96.5419	0	-	1	-	-	-	-	0	1	4
7:45	7.8	284.27	0	0	194.35	6.8571	29.412	0	0	0	0	0	1691.726841	49.7901	0	-	-	-	-	-	-	0	2	0
8:00	11.569	239.2	0	0	214.73	3	9.4054	0	0	0	0	0	1596.795798	32.9189	0	-	-	-	-	-	-	0	3	0
8:15	10.412	207.39	0	0	172.37	3	9.4054	0	0	0	0	0	1455.767307	31.3514	0	-	-	-	-	-	-	0	4	0
8:30	11.569	168.68	0	0	147.53	9	1.5676	0	0	0	0	0	*1425.901602*	34.4865	0	-	-	-	-	-	-	0	0	0
8:45	9.2549	223.99	0	0	163.6	1.5	12.541	0	0	0	0	0	1400.321669	47.027	0	-	-	-	-	-	-	0	0	0
9:00	10.412	182.51	0	0	128.55	6	7.8378	0	0	0	0	0	1348.36028	43.8919	0	-	-	-	-	-	-	0	0	0
9:15	5.7843	190.8	0	0	159.22	7.5	12.541	0	0	0	0	0	1321.276131	45.4595	0	-	-	-	-	-	-	0	0	0
9:30	4.6275	160.39	0	0	141.69	4.5	14.108	0	0	0	0	0	1289.460414	39.1892	0	-	-	-	-	-	-	0	0	0
9:45	9.2549	214.31	0	0	118.32	4.5	9.4054	0	0	0	0	0	1289.490707	31.3514	0	-	-	-	-	-	-	0	0	0
10:00	8.098	154.85	0	0	132.93	4.5	9.4054	0	0	0	0	0	1310.3165	29.7838	0	-	-	-	-	-	-	0	0	0
10:15	6.9412	178.36	0	0	141.69	4.5	6.2703	0	0	0	0	0	1336.451269	29.7838	0	-	-	-	-	-	-	0	0	0
10:30	3.4706	164.53	0	0	140.23	3	6.2703	0	0	0	0	0	1343.340346	31.3514	0	-	-	-	-	-	-	0	0	0
10:45	9.2549	183.89	0	0	165.06	9	7.8378	0	0	0	0	0	1363.308883	32.9189	0	-	-	-	-	-	-	0	0	0
11:00	4.6275	147.94	0	0	169.45	4.5	9.4054	0	0	0	0	0	1351.815676	31.3514	0	-	-	-	-	-	-	0	0	0
11:15	5.7843	165.92	0	0	160.68	6	7.8378	0	0	0	0	0	1423.388522	31.3514	0	-	-	-	-	-	-	0	0	0
11:30	6.9412	157.62	0	0	162.14	4.5	7.8378	0	0	0	0	0	1480.454978	34.4865	0	-	-	-	-	-	-	0	0	0
11:45	5.7843	170.06	0	0	172.37	7.5	6.2703	0	0	0	0	0	1531.620929	32.9189	0	-	-	-	-	-	-	0	0	0
12:00	10.412	174.21	0	0	205.96	7.5	9.4054	0	0	0	0	0	1500.743689	39.1892	0	-	-	-	-	-	-	0	0	0
12:15	11.569	163.15	0	0	214.73	6	10.973	0	0	0	0	0	1483.510122	39.1892	0	-	-	-	-	-	-	0	0	0
12:30	8.098	203.25	0	0	166.52	4.5	6.2703	0	0	0	0	0	1462.932656	37.6216	0	-	-	-	-	-	-	0	0	0
12:45	8.098	188.04	0	0	122.7	6	12.541	0	0	0	0	0	1545.679588	34.4865	0	-	-	-	-	-	-	0	0	0
13:00	8.098	179.74	0	0	185.51	7.5	9.4054	0	0	0	0	0	1634.169227	28.2162	0	-	-	-	-	-	-	0	0	0
13:15	8.098	207.39	0	0	153.38	6	9.4054	0	0	0	0	0	1667.693617	34.4865	0	-	-	-	-	-	-	0	0	0
13:30	8.098	264.08	0	0	188.44	4.5	3.1351	0	0	0	0	0	1715.049361	54.8649	0	-	-	-	-	-	-	0	0	0
13:45	10.412	239.2	0	0	159.22	4.5	6.2703	0	0	0	0	0	1724.69011	65.8378	0	-	-	-	-	-	-	0	0	0
14:00	16.196	246.11	0	0	146.07	6	15.676	0	0	0	0	0	1791.921165	65.8378	0	-	-	-	-	-	-	0	0	0
14:15	12.725	225.37	0	0	181.13	3	29.784	0	0	0	0	0	1868.833389	62.7027	0	-	-	-	-	-	-	0	0	0
14:30	10.412	237.81	0	0	222.03	4.5	14.108	0	0	0	0	0	1914.846581	42.3243	0	-	-	-	-	-	-	0	0	0
14:45	18.51	228.13	0	0	226.41	7.5	6.2703	0	0	0	0	0	1954.879984	32.9189	0	-	-	-	-	-	-	0	0	0
15:00	15.039	214.31	0	0	243.94	18	12.541	0	0	0	0	0	1936.119632	42.3243	0	-	-	-	-	-	-	0	0	0
15:15	17.353	244.73	0	0	198.66	7.5	9.4054	0	0	0	0	0	2000.171436	39.1892	0	-	-	-	-	-	-	0	0	0
15:30	9.2549	259.93	0	0	238.1	7.5	4.7027	0	0	0	0	0	2042.654912	53.2973	0	-	-	-	-	-	-	0	0	0
15:45	9.2549	244.73	0	0	192.82	15	15.676	0	0	0	0	0	2027.258626	61.1351	0	-	-	-	-	-	-	0	0	0
16:00	12.725	277.91	0	0	252.71	12	9.4054	0	0	0	0	0	2106	58	0	-	-	-	-	-	-	0	0	0
16:15	12.725	264.08	0	0	226.41	7.5	23.514	0	0	0	0	0	2027.258395	67.4054	0	-	-	-	-	-	-	0	0	0
16:30	10.412	240.58	0	0	245.4	3	12.541	0	0	0	0	0	1963.708644	59.5676	0	-	-	-	-	-	-	0	0	0
16:45	23.137	236.43	0	0	261.47	19.5	12.541	0	0	0	0	0	1876.83831	65.8378	0	-	-	-	-	-	-	0	0	0
17:00	8.098	197.72	0	0	249.79	21	18.811	0	0	0	0	0	1723.470829	62.7027	0	-	-	-	-	-	-	0	0	0
17:15	19.667	167.3	0	0	252.71	7.5	15.676	0	0	0	0	0	1246.869705	43.8919	0	-	-	-	-	-	-	0	0	0
17:30	11.569	196.33	0	0	200.12	4.5	18.811	0	0	0	0	0	799.6963831	28.2162	0	-	-	-	-	-	-	0	0	0
17:45	6.9412	200.48	0	0	176.75	3	9.4054	0	0	0	0	0	387.1724886	9.40541	0	-	-	-	-	-	-	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
																					Hours where condition met:	0	2	1
																					Signal Warranted?	No		
																					Notes			

Weekday Waiale Road/Kaupo Street 4-Hour Signal Warrant

Tuesday, April 9, 2019

	Waiale Road						Kaupo Street			-			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 100%			RT Reduction: 0%											
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	187.9925757	7.83784	0			0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	414.4423826	17.2432	0			0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	732.1241832	34.4865	0			0	0	0	0
6:00	2.3137	76.045	0	0	106.63	3	7.8378	0	0	0	0	0	1154.846423	61.1351	0			0	0	0	0
6:15	4.6275	107.85	0	0	112.48	1.5	9.4054	0	0	0	0	0	1380.815156	73.2553	0			0	0	0	0
6:30	6.9412	189.42	0	0	118.32	3	17.243	0	0	0	0	0	1650.798667	91.1608	0	1		1	0	1	1
6:45	5.7843	250.26	0	0	160.68	6	26.649	0	0	0	0	0	1756.4469	122.237	0	1		2	0	1	2
7:00	16.9	234.33	0	0	158.16	4.5714	19.958	0	0	0	0	0	1827	125	0	1		3	0	1	3
7:15	16.9	300.91	0	0	172.9	5.7143	27.311	0	0	0	0	0	1881.531594	114.447	0	1		4	0	1	4
7:30	10.4	230.49	0	0	175.59	6.8571	48.319	0	0	0	0	0	1778.272293	96.5419	0	1		1	0	1	1
7:45	7.8	284.27	0	0	194.35	6.8571	29.412	0	0	0	0	0	1691.726841	49.7901	0			2	0	0	2
8:00	11.569	239.2	0	0	214.73	3	9.4054	0	0	0	0	0	1596.795798	32.9189	0			3	0	0	3
8:15	10.412	207.39	0	0	172.37	3	9.4054	0	0	0	0	0	1455.767307	31.3514	0			4	0	0	4
8:30	11.569	168.68	0	0	147.53	9	1.5676	0	0	0	0	0	*1425.901602*	34.4865	0			0	0	0	0
8:45	9.2549	223.99	0	0	163.6	1.5	12.541	0	0	0	0	0	1400.321669	47.027	0			0	0	0	0
9:00	10.412	182.51	0	0	128.55	6	7.8378	0	0	0	0	0	1348.36028	43.8919	0			0	0	0	0
9:15	5.7843	190.8	0	0	159.22	7.5	12.541	0	0	0	0	0	1321.276131	45.4595	0			0	0	0	0
9:30	4.6275	160.39	0	0	141.69	4.5	14.108	0	0	0	0	0	1289.460414	39.1892	0			0	0	0	0
9:45	9.2549	214.31	0	0	118.32	4.5	9.4054	0	0	0	0	0	1289.490707	31.3514	0			0	0	0	0
10:00	8.098	154.85	0	0	132.93	4.5	9.4054	0	0	0	0	0	1310.3165	29.7838	0			0	0	0	0
10:15	6.9412	178.36	0	0	141.69	4.5	6.2703	0	0	0	0	0	1336.451269	29.7838	0			0	0	0	0
10:30	3.4706	164.53	0	0	140.23	3	6.2703	0	0	0	0	0	1343.340346	31.3514	0			0	0	0	0
10:45	9.2549	183.89	0	0	165.06	9	7.8378	0	0	0	0	0	1363.308883	32.9189	0			0	0	0	0
11:00	4.6275	147.94	0	0	169.45	4.5	9.4054	0	0	0	0	0	1351.815676	31.3514	0			0	0	0	0
11:15	5.7843	165.92	0	0	160.68	6	7.8378	0	0	0	0	0	1423.388522	31.3514	0			0	0	0	0
11:30	6.9412	157.62	0	0	162.14	4.5	7.8378	0	0	0	0	0	1480.454978	34.4865	0			0	0	0	0
11:45	5.7843	170.06	0	0	172.37	7.5	6.2703	0	0	0	0	0	1531.620929	32.9189	0			0	0	0	0
12:00	10.412	174.21	0	0	205.96	7.5	9.4054	0	0	0	0	0	1500.743689	39.1892	0			0	0	0	0
12:15	11.569	163.15	0	0	214.73	6	10.973	0	0	0	0	0	1483.510122	39.1892	0			0	0	0	0
12:30	8.098	203.25	0	0	166.52	4.5	6.2703	0	0	0	0	0	1462.932656	37.6216	0			0	0	0	0
12:45	8.098	188.04	0	0	122.7	6	12.541	0	0	0	0	0	1545.679588	34.4865	0			0	0	0	0
13:00	8.098	179.74	0	0	185.51	7.5	9.4054	0	0	0	0	0	1634.169227	28.2162	0			0	0	0	0
13:15	8.098	207.39	0	0	153.38	6	9.4054	0	0	0	0	0	1667.693617	34.4865	0			0	0	0	0
13:30	8.098	264.08	0	0	188.44	4.5	3.1351	0	0	0	0	0	1715.049361	54.8649	0			0	0	0	0
13:45	10.412	239.2	0	0	159.22	4.5	6.2703	0	0	0	0	0	1724.69011	65.8378	0			0	0	0	0
14:00	16.196	246.11	0	0	146.07	6	15.676	0	0	0	0	0	1791.921165	65.8378	0			0	0	0	0
14:15	12.725	225.37	0	0	181.13	3	29.784	0	0	0	0	0	1868.833389	62.7027	0			0	0	0	0
14:30	10.412	237.81	0	0	222.03	4.5	14.108	0	0	0	0	0	1914.846581	42.3243	0			0	0	0	0
14:45	18.51	228.13	0	0	226.41	7.5	6.2703	0	0	0	0	0	1954.879984	32.9189	0			0	0	0	0
15:00	15.039	214.31	0	0	243.94	18	12.541	0	0	0	0	0	1936.119632	42.3243	0			0	0	0	0
15:15	17.353	244.73	0	0	198.66	7.5	9.4054	0	0	0	0	0	2000.171436	39.1892	0			0	0	0	0
15:30	9.2549	259.93	0	0	238.1	7.5	4.7027	0	0	0	0	0	2042.654912	53.2973	0			0	0	0	0
15:45	9.2549	244.73	0	0	192.82	15	15.676	0	0	0	0	0	2027.258626	61.1351	0			0	0	0	0
16:00	12.725	277.91	0	0	252.71	12	9.4054	0	0	0	0	0	2106	58	0			0	0	0	0
16:15	12.725	264.08	0	0	226.41	7.5	23.514	0	0	0	0	0	2027.258395	67.4054	0			0	0	0	0
16:30	10.412	240.58	0	0	245.4	3	12.541	0	0	0	0	0	1963.708644	59.5676	0			0	0	0	0
16:45	23.137	236.43	0	0	261.47	19.5	12.541	0	0	0	0	0	1876.83831	65.8378	0			0	0	0	0
17:00	8.098	197.72	0	0	249.79	21	18.811	0	0	0	0	0	1723.470829	62.7027	0			0	0	0	0
17:15	19.667	167.3	0	0	252.71	7.5	15.676	0	0	0	0	0	1246.869705	43.8919	0			0	0	0	0
17:30	11.569	196.33	0	0	200.12	4.5	18.811	0	0	0	0	0	799.6963831	28.2162	0			0	0	0	0
17:45	6.9412	200.48	0	0	176.75	3	9.4054	0	0	0	0	0	387.1724886	9.40541	0			0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	2
Signal Warranted?	No

4-Hour Warrant (100%)
Tuesday, April 9, 2019
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
115'
80'
1650.798667, 91.16079945
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

4-Hour Warrant (70%)
Tuesday, April 9, 2019
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Olomea Street
Existing Conditions

Weekday Waiale Road/Olomea Street 8-Hour Signal Warrant

Thursday, February 1, 2018

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

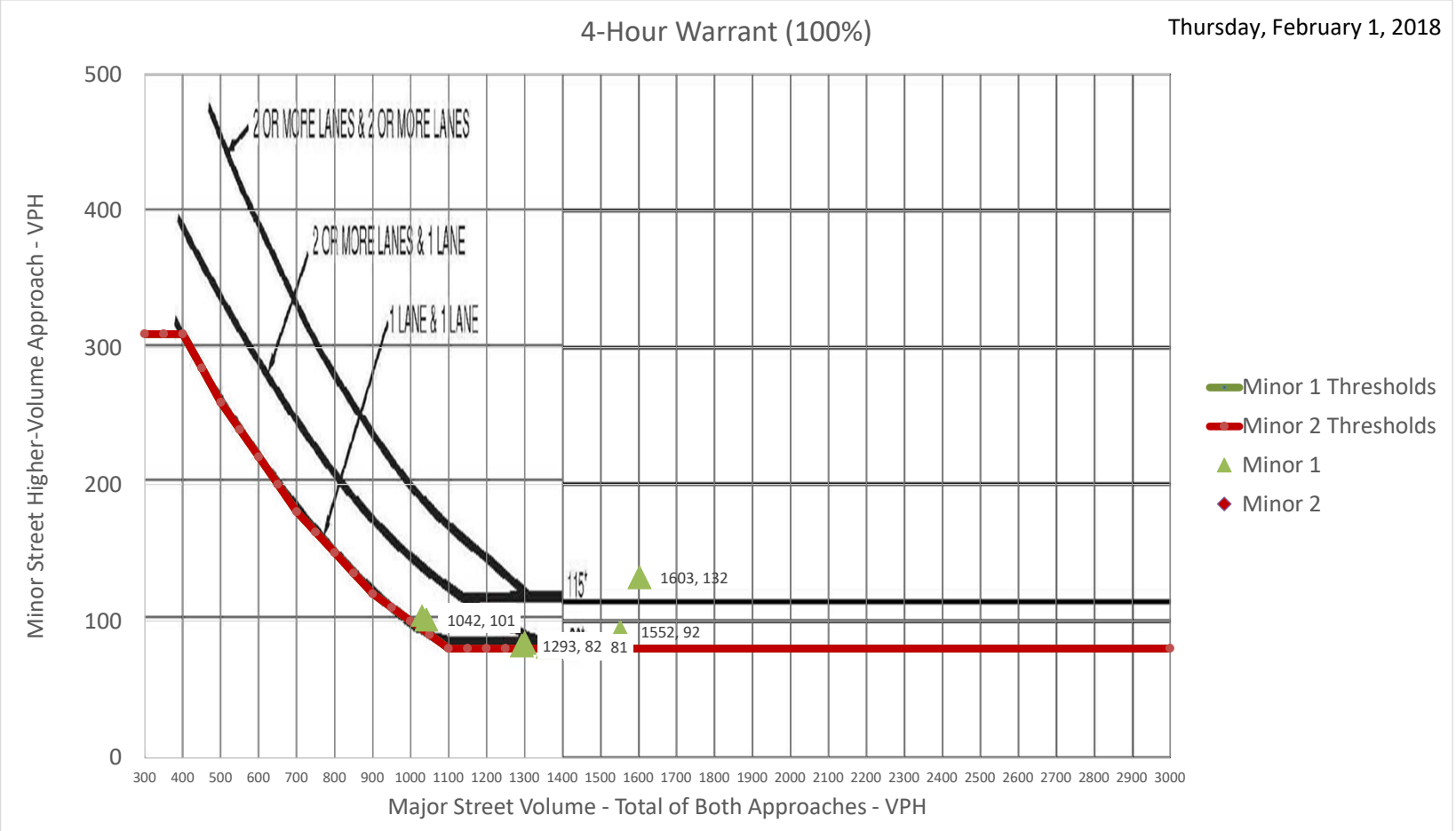
	Waiale Road						Olomea Street			-			100 % Warrant			Minor 1 (EB)			Minor 1 (WB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes					Major Threshold	500	750	600	500	750	600			
	1						1			1					Minor Threshold	150	75	120	150	75	120			
							RT Reduction: 100%			RT Reduction: 0%														
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	129	17	0	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	288	38	0	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	502	62	0	-	-	-	-	-	-	0	0	0
6:00	0	70	0	0	56	3	17	0	0	0	0	0	817	92	0	-	1	-	-	-	-	0	1	0
6:15	1	79	0	0	75	4	21	0	0	0	0	0	1030	104	0	-	1	-	-	-	-	0	2	0
6:30	2	116	0	0	88	8	24	0	0	0	0	0	1305	114	0	-	1	-	-	-	-	0	3	0
6:45	4	199	0	0	100	12	30	0	0	0	0	0	1540	132	0	-	1	1	-	-	-	0	4	1
7:00	7	182	0	0	120	33	29	0	0	0	0	0	1681	144	0	-	1	1	-	-	-	0	1	2
7:15	6	254	0	0	129	45	31	0	0	0	0	0	1603	132	0	-	1	1	-	-	-	0	2	3
7:30	7	232	0	0	158	52	42	0	0	0	0	0	1416	132	0	-	1	1	-	-	-	0	3	4
7:45	8	253	0	0	158	37	42	0	0	0	0	0	1220	114	0	-	1	-	-	-	-	0	4	0
8:00	3	138	0	0	115	8	17	0	0	0	0	0	1069	103	0	-	1	-	-	-	-	0	1	0
8:15	7	141	0	0	86	13	31	0	0	0	0	0	1042	101	0	-	1	-	-	-	-	0	2	0
8:30	1	140	0	0	104	8	24	0	0	0	0	0	*990*	90	0	-	1	-	-	-	-	0	3	0
8:45	2	189	0	0	106	8	31	0	0	0	0	0	986	82	0	-	1	-	-	-	-	0	4	0
9:00	3	114	0	0	112	8	15	0	0	0	0	0	937	62	0	-	-	-	-	-	-	0	0	0
9:15	0	91	0	0	95	9	20	0	0	0	0	0	934	57	0	-	-	-	-	-	-	0	0	0
9:30	3	125	0	0	112	9	16	0	0	0	0	0	996	51	0	-	-	-	-	-	-	0	0	0
9:45	2	121	0	0	114	19	11	0	0	0	0	0	978	50	0	-	-	-	-	-	-	0	0	0
10:00	1	121	0	0	107	5	10	0	0	0	0	0	971	58	0	-	-	-	-	-	-	0	0	0
10:15	0	138	0	0	104	15	14	0	0	0	0	0	984	64	0	-	-	-	-	-	-	0	0	0
10:30	4	108	0	0	101	18	15	0	0	0	0	0	993	60	0	-	-	-	-	-	-	0	0	0
10:45	5	118	0	0	112	14	19	0	0	0	0	0	1005	55	0	-	-	-	-	-	-	0	0	0
11:00	2	119	0	0	101	25	16	0	0	0	0	0	1013	56	0	-	-	-	-	-	-	0	0	0
11:15	0	132	0	0	121	13	10	0	0	0	0	0	1051	55	0	-	-	-	-	-	-	0	0	0
11:30	6	113	0	0	106	18	10	0	0	0	0	0	1066	55	0	-	-	-	-	-	-	0	0	0
11:45	2	100	0	0	134	21	20	0	0	0	0	0	1097	55	0	-	-	-	-	-	-	0	0	0
12:00	4	123	0	0	128	30	15	0	0	0	0	0	1109	55	0	-	-	-	-	-	-	0	0	0
12:15	2	143	0	0	112	24	10	0	0	0	0	0	1107	53	0	-	-	-	-	-	-	0	0	0
12:30	4	126	0	0	123	21	10	0	0	0	0	0	1124	59	0	-	-	-	-	-	-	0	0	0
12:45	7	136	0	0	109	17	20	0	0	0	0	0	1166	62	0	-	-	-	-	-	-	0	0	0
13:00	2	131	0	0	129	21	13	0	0	0	0	0	1205	59	0	-	-	-	-	-	-	0	0	0
13:15	2	152	0	0	122	22	16	0	0	0	0	0	1263	76	0	-	1	-	-	-	-	0	1	0
13:30	4	149	0	0	134	29	13	0	0	0	0	0	1301	84	0	-	1	-	-	-	-	0	2	0
13:45	1	150	0	0	119	38	17	0	0	0	0	0	1309	90	0	-	1	-	-	-	-	0	3	0
14:00	7	157	0	0	138	39	30	0	0	0	0	0	1303	89	0	-	1	-	-	-	-	0	4	0
14:15	7	135	0	0	165	29	24	0	0	0	0	0	1285	74	0	-	-	-	-	-	-	0	0	0
14:30	5	144	0	0	147	28	19	0	0	0	0	0	1281	71	0	-	-	-	-	-	-	0	0	0
14:45	6	138	0	0	135	23	16	0	0	0	0	0	1326	72	0	-	-	-	-	-	-	0	0	0
15:00	5	166	0	0	118	34	15	0	0	0	0	0	1361	81	0	-	1	-	-	-	-	0	1	0
15:15	6	158	0	0	139	29	21	0	0	0	0	0	1399	89	0	-	1	-	-	-	-	0	2	0
15:30	5	162	0	0	160	42	20	0	0	0	0	0	1481	92	0	-	1	-	-	-	-	0	3	0
15:45	6	152	0	0	146	33	25	0	0	0	0	0	1505	100	0	-	1	-	-	-	-	0	4	0
16:00	5	172	0	0	153	31	23	0	0	0	0	0	1552	92	0	-	1	-	-	-	-	0	1	0
16:15	9	204	0	0	166	35	24	0	0	0	0	0	1555	104	0	-	1	-	-	-	-	0	2	0
16:30	6	178	0	0	170	39	28	0	0	0	0	0	1496	92	0	-	1	-	-	-	-	0	3	0
16:45	7	176	0	0	166	35	17	0	0	0	0	0	1408	79	0	-	1	-	-	-	-	0	4	0
17:00	5	158	0	0	159	42	35	0	0	0	0	0	1293	82	0	-	1	-	-	-	-	0	1	0
17:15	3	164	0	0	153	35	12	0	0	0	0	0	929	47	0	-	-	-	-	-	-	0	2	0
17:30	9	157	0	0	104	35	15	0	0	0	0	0	574	35	0	-	-	-	-	-	-	0	3	0
17:45	8	129	0	0	104	28	20	0	0	0	0	0	269	20	0	-	-	-	-	-	-	0	4	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
																					Hours where condition met:	0	7	1
																					Signal Warranted?	No		
																					Notes			

Weekday Waiale Road/Olomea Street 4-Hour Signal Warrant

Thursday, February 1, 2018

	Waiale Road						Olomea Street			-			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 100%			RT Reduction: 0%											
Time	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	129	17	0			0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	288	38	0			0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	502	62	0			0	0	0	0
6:00	0	70	0	0	56	3	17	0	0	0	0	0	817	92	0			0	0	0	0
6:15	1	79	0	0	75	4	21	0	0	0	0	0	1030	104	0	1		1	0	1	1
6:30	2	116	0	0	88	8	24	0	0	0	0	0	1305	114	0	1		2	0	1	2
6:45	4	199	0	0	100	12	30	0	0	0	0	0	1540	132	0	1		3	0	1	3
7:00	7	182	0	0	120	33	29	0	0	0	0	0	1681	144	0	1		4	0	1	4
7:15	6	254	0	0	129	45	31	0	0	0	0	0	1603	132	0	1		1	0	1	1
7:30	7	232	0	0	158	52	42	0	0	0	0	0	1416	132	0	1		2	0	1	2
7:45	8	253	0	0	158	37	42	0	0	0	0	0	1220	114	0	1		3	0	1	3
8:00	3	138	0	0	115	8	17	0	0	0	0	0	1069	103	0	1		4	0	1	4
8:15	7	141	0	0	86	13	31	0	0	0	0	0	1042	101	0	1		1	0	1	1
8:30	1	140	0	0	104	8	24	0	0	0	0	0	*990*	90	0			2	0	0	2
8:45	2	189	0	0	106	8	31	0	0	0	0	0	986	82	0			3	0	0	3
9:00	3	114	0	0	112	8	15	0	0	0	0	0	937	62	0			4	0	0	4
9:15	0	91	0	0	95	9	20	0	0	0	0	0	934	57	0			0	0	0	0
9:30	3	125	0	0	112	9	16	0	0	0	0	0	996	51	0			0	0	0	0
9:45	2	121	0	0	114	19	11	0	0	0	0	0	978	50	0			0	0	0	0
10:00	1	121	0	0	107	5	10	0	0	0	0	0	971	58	0			0	0	0	0
10:15	0	138	0	0	104	15	14	0	0	0	0	0	984	64	0			0	0	0	0
10:30	4	108	0	0	101	18	15	0	0	0	0	0	993	60	0			0	0	0	0
10:45	5	118	0	0	112	14	19	0	0	0	0	0	1005	55	0			0	0	0	0
11:00	2	119	0	0	101	25	16	0	0	0	0	0	1013	56	0			0	0	0	0
11:15	0	132	0	0	121	13	10	0	0	0	0	0	1051	55	0			0	0	0	0
11:30	6	113	0	0	106	18	10	0	0	0	0	0	1066	55	0			0	0	0	0
11:45	2	100	0	0	134	21	20	0	0	0	0	0	1097	55	0			0	0	0	0
12:00	4	123	0	0	128	30	15	0	0	0	0	0	1109	55	0			0	0	0	0
12:15	2	143	0	0	112	24	10	0	0	0	0	0	1107	53	0			0	0	0	0
12:30	4	126	0	0	123	21	10	0	0	0	0	0	1124	59	0			0	0	0	0
12:45	7	136	0	0	109	17	20	0	0	0	0	0	1166	62	0			0	0	0	0
13:00	2	131	0	0	129	21	13	0	0	0	0	0	1205	59	0			0	0	0	0
13:15	2	152	0	0	122	22	16	0	0	0	0	0	1263	76	0			0	0	0	0
13:30	4	149	0	0	134	29	13	0	0	0	0	0	1301	84	0	1		1	0	1	1
13:45	1	150	0	0	119	38	17	0	0	0	0	0	1309	90	0	1		2	0	1	2
14:00	7	157	0	0	138	39	30	0	0	0	0	0	1303	89	0	1		3	0	1	3
14:15	7	135	0	0	165	29	24	0	0	0	0	0	1285	74	0			4	0	0	4
14:30	5	144	0	0	147	28	19	0	0	0	0	0	1281	71	0			0	0	0	0
14:45	6	138	0	0	135	23	16	0	0	0	0	0	1326	72	0			0	0	0	0
15:00	5	166	0	0	118	34	15	0	0	0	0	0	1361	81	0	1		1	0	1	1
15:15	6	158	0	0	139	29	21	0	0	0	0	0	1399	89	0	1		2	0	1	2
15:30	5	162	0	0	160	42	20	0	0	0	0	0	1481	92	0	1		3	0	1	3
15:45	6	152	0	0	146	33	25	0	0	0	0	0	1505	100	0	1		4	0	1	4
16:00	5	172	0	0	153	31	23	0	0	0	0	0	1552	92	0	1		1	0	1	1
16:15	9	204	0	0	166	35	24	0	0	0	0	0	1555	104	0	1		2	0	1	2
16:30	6	178	0	0	170	39	28	0	0	0	0	0	1496	92	0	1		3	0	1	3
16:45	7	176	0	0	166	35	17	0	0	0	0	0	1408	79	0			4	0	0	4
17:00	5	158	0	0	159	42	35	0	0	0	0	0	1293	82	0	1		1	0	1	1
17:15	3	164	0	0	153	35	12	0	0	0	0	0	929	47	0			2	0	0	2
17:30	9	157	0	0	104	35	15	0	0	0	0	0	574	35	0			3	0	0	3
17:45	8	129	0	0	104	28	20	0	0	0	0	0	269	20	0			4	0	0	4
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	7
Signal Warranted?	Yes


4-Hour Warrant (100%)
Thursday, February 1, 2018
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
115'
1603, 132
1042, 101
1293, 82
81
1552, 92
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH

4-Hour Warrant (70%)
Thursday, February 1, 2018
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Waiko Road
Base Year Conditions

Weekday Waiko Road/- 8-Hour Signal Warrant

Thursday, February 1, 2018

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

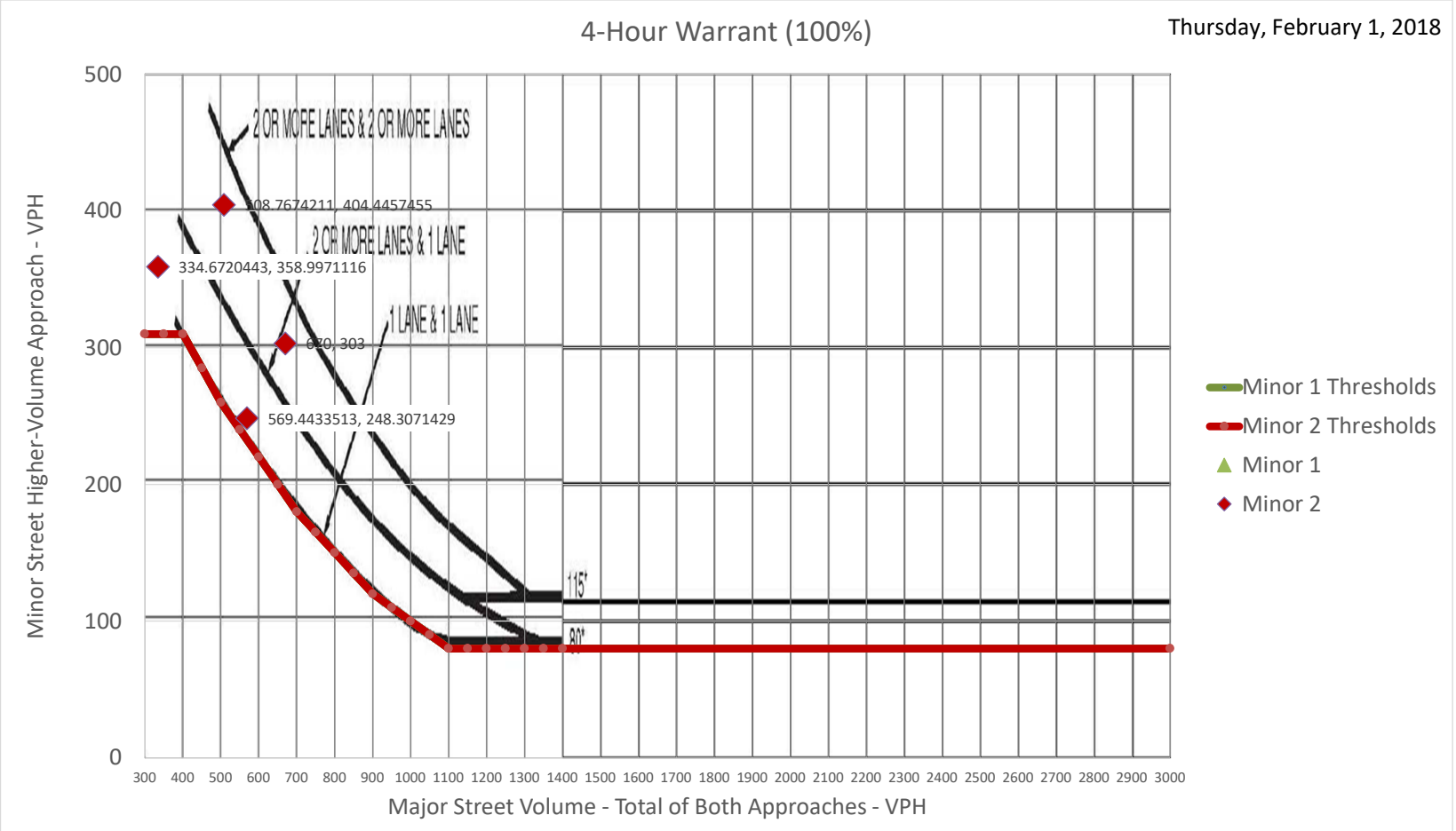
	Waiko Road						-			Waiale Road			100 % Warrant			Minor 1 (NB)			Minor 1 (SB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold			500	750	600	500	750	600			
	1						1			1			Minor Threshold			150	75	120	150	75	120			
							RT Reduction: 0%			RT Reduction: 0%														
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	41.50909704	0	36.2357	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	104.3169137	0	92.9214	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	182.8095912	0	156.721	-	-	-	-	-	-	0	0	0
6:00	5	22.125	0	0	3.1698	11.214	0	0	0	30.236	0	6	265.4753145	0	308.107	-	-	-	-	-	-	0	0	0
6:15	10	17.7	0	0	12.679	22.429	0	0	0	42.686	0	14	334.6720443	0	358.997	-	-	-	-	-	-	0	0	0
6:30	8.3333	32.45	0	0	19.019	18.69	0	0	0	49.8	0	14	410.1432523	0	437.907	-	-	-	-	-	-	0	0	0
6:45	18.333	35.4	0	0	15.849	13.083	0	0	0	117.39	0	34	487.0480775	0	483.632	-	-	-	-	-	-	0	0	0
7:00	12.057	61.281	0	0	14.034	23.333	0	0	0	67.126	0	20	546	0	421	-	-	-	1	-	-	1	0	0
7:15	14.736	74.899	0	0	15.31	33.333	0	0	0	101.6	0	34	508.7674211	0	404.446	-	-	-	1	-	-	2	0	0
7:30	24.113	76.261	0	0	21.69	33.333	0	0	0	92.525	0	17	457.3083649	0	329.979	-	-	-	-	-	-	3	0	0
7:45	20.094	58.558	0	0	22.966	40	0	0	0	70.754	0	18	375.7888722	0	272.804	-	-	-	-	-	-	4	0	0
8:00	6.6667	25.075	0	0	17.434	24.298	0	0	0	35.571	0	35	317.009142	0	209.721	-	-	-	-	-	-	0	0	0
8:15	10	22.125	0	0	28.528	26.167	0	0	0	39.129	0	22	297.8515723	0	191.943	-	-	-	-	-	-	0	0	0
8:30	3.3333	25.075	0	0	17.434	28.036	0	0	0	37.35	0	15	*273.1350854*	0	185.386	-	-	-	-	-	-	0	0	0
8:45	3.3333	32.45	0	0	19.019	28.036	0	0	0	10.671	0	15	280.8920934	0	185.943	-	-	-	-	-	-	0	0	0
9:00	6.6667	17.7	0	0	20.604	9.3452	0	0	0	33.793	0	19	274.3031896	0	180.164	-	-	-	-	-	-	0	0	0
9:15	8.3333	16.225	0	0	9.5094	28.036	0	0	0	35.571	0	19	260.6441824	0	159.493	-	-	-	-	-	-	0	0	0
9:30	8.3333	19.175	0	0	31.698	22.429	0	0	0	40.907	0	12	272.0099506	0	128.929	-	-	-	-	-	-	0	0	0
9:45	6.6667	26.55	0	0	20.604	22.429	0	0	0	8.8929	0	11	248.9125562	0	108.921	-	-	-	-	-	-	0	0	0
10:00	6.6667	7.375	0	0	7.9245	18.69	0	0	0	23.121	0	9	251.2486972	0	121.15	-	-	-	-	-	-	0	0	0
10:15	15	19.175	0	0	20.604	18.69	0	0	0	16.007	0	8	296.0656559	0	119.371	-	-	-	-	-	-	0	0	0
10:30	11.667	22.125	0	0	7.9245	16.821	0	0	0	24.9	0	8	301.8577493	0	138.157	-	-	-	-	-	-	0	0	0
10:45	8.3333	19.175	0	0	17.434	33.643	0	0	0	23.121	0	9	313.7964735	0	134.6	-	-	-	-	-	-	0	0	0
11:00	10	26.55	0	0	19.019	29.905	0	0	0	21.343	0	9	328.5150045	0	136.707	-	-	-	-	-	-	0	0	0
11:15	11.667	22.125	0	0	17.434	28.036	0	0	0	33.793	0	9	341.3839173	0	148.714	-	-	-	-	-	-	0	0	0
11:30	8.3333	16.225	0	0	25.358	20.56	0	0	0	21.343	0	8	345.995867	0	139.821	-	-	-	-	-	-	0	0	0
11:45	16.667	14.75	0	0	30.113	31.774	0	0	0	14.229	0	20	372.5565813	0	152.936	-	-	-	-	-	-	0	0	0
12:00	16.667	14.75	0	0	33.283	33.643	0	0	0	37.35	0	5	350.8658131	0	145.493	-	-	-	-	-	-	0	0	0
12:15	5	25.075	0	0	12.679	41.119	0	0	0	24.9	0	9	335.2854672	0	131.707	-	-	-	-	-	-	0	0	0
12:30	6.6667	29.5	0	0	25.358	35.512	0	0	0	28.457	0	14	337.0519991	0	146.714	-	-	-	-	-	-	0	0	0
12:45	8.3333	16.225	0	0	19.019	28.036	0	0	0	17.786	0	9	323.0532345	0	141.714	-	-	-	-	-	-	0	0	0
13:00	10	28.025	0	0	11.094	33.643	0	0	0	19.564	0	9	343.7575247	0	145.936	-	-	-	-	-	-	0	0	0
13:15	6.6667	22.125	0	0	26.943	29.905	0	0	0	40.907	0	8	357.4272462	0	164.943	-	-	-	-	-	-	0	0	0
13:30	6.6667	22.125	0	0	20.604	33.643	0	0	0	28.457	0	9	391.4869721	0	181.943	-	-	-	-	-	-	0	0	0
13:45	11.667	8.85	0	0	26.943	44.857	0	0	0	16.007	0	15	408.7004492	0	200.836	-	-	-	-	-	-	0	0	0
14:00	8.3333	25.075	0	0	23.774	39.25	0	0	0	35.571	0	12	436.0016846	0	208.507	-	-	-	-	-	-	0	0	0
14:15	11.667	32.45	0	0	47.547	28.036	0	0	0	40.907	0	25	448.8243486	0	212.286	-	-	-	-	-	-	0	0	0
14:30	10	25.075	0	0	22.189	42.988	0	0	0	37.35	0	19	443.297619	0	210.179	-	-	-	-	-	-	0	0	0
14:45	13.333	28.025	0	0	22.189	56.071	0	0	0	26.679	0	12	507.2038185	0	233.3	-	-	-	1	-	-	1	0	0
15:00	16.667	32.45	0	0	19.019	41.119	0	0	0	37.35	0	14	569.4433513	0	248.307	-	-	-	1	-	-	2	0	0
15:15	21.667	17.7	0	0	20.604	54.202	0	0	0	49.8	0	14	652.9045148	0	269.429	-	-	-	1	-	1	3	0	1
15:30	23.333	28.025	0	0	38.038	74.762	0	0	0	60.471	0	19	709.0912399	0	304.664	-	-	-	1	-	1	4	0	2
15:45	25	30.975	0	0	38.038	87.845	0	0	0	42.686	0	11	701.5654313	0	289.329	-	-	-	1	-	1	1	0	3
16:00	21.667	22.125	0	0	55.472	93.452	0	0	0	60.471	0	12	670	0	303	-	-	-	1	-	1	2	0	4
16:15	25	30.975	0	0	39.623	74.762	0	0	0	80.036	0	19	626.7914196	0	303.886	-	-	-	1	-	1	3	0	1
16:30	11.667	32.45	0	0	39.623	72.893	0	0	0	55.136	0	9	600.2581761	0	268.314	-	-	-	1	-	1	4	0	2
16:45	11.667	32.45	0	0	33.283	72.893	0	0	0	53.357	0	14	586.8324124	0	250.529	-	-	-	1	-	-	1	0	3
17:00	25	25.075	0	0	39.623	59.81	0	0	0	53.357	0	20	527.774124	0	230.964	-	-	-	1	-	-	2	0	4
17:15	26.667	30.975	0	0	30.113	56.071	0	0	0	44.464	0	19	378.2669587	0	157.607	-	-	-	-	-	-	3	0	0
17:30	20	25.075	0	0	36.453	61.679	0	0	0	37.35	0	9	234.4406559	0	94.1429	-	-	-	-	-	-	4	0	0
17:45	15	10.325	0	0	28.528	37.381	0	0	0	33.793	0	14	91.23425427	0	47.7929	-	-	-	-	-	-	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
																					Hours where condition met:	4	0	2
																					Signal Warranted?	No		
																					Notes			

Weekday Waiko Road/- 4-Hour Signal Warrant

Thursday, February 1, 2018

	Waiko Road						-			Waiale Road			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 0%			RT Reduction: 0%											
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	41.50909704	0	36.2357			0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	104.3169137	0	92.9214			0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	182.8095912	0	156.721			0	0	0	0
6:00	5	22.125	0	0	3.1698	11.214	0	0	0	30.236	0	6	265.4753145	0	308.107			0	0	0	0
6:15	10	17.7	0	0	12.679	22.429	0	0	0	42.686	0	14	334.6720443	0	358.997		1	0	1	1	1
6:30	8.3333	32.45	0	0	19.019	18.69	0	0	0	49.8	0	14	410.1432523	0	437.907		1	0	2	1	2
6:45	18.333	35.4	0	0	15.849	13.083	0	0	0	117.39	0	34	487.0480775	0	483.632		1	0	3	1	3
7:00	12.057	61.281	0	0	14.034	23.333	0	0	0	67.126	0	20	546	0	421		1	0	4	1	4
7:15	14.736	74.899	0	0	15.31	33.333	0	0	0	101.6	0	34	508.7674211	0	404.446		1	0	1	1	1
7:30	24.113	76.261	0	0	21.69	33.333	0	0	0	92.525	0	17	457.3083649	0	329.979		1	0	2	1	2
7:45	20.094	58.558	0	0	22.966	40	0	0	0	70.754	0	18	375.7888722	0	272.804			0	3	0	3
8:00	6.6667	25.075	0	0	17.434	24.298	0	0	0	35.571	0	35	317.009142	0	209.721			0	4	0	4
8:15	10	22.125	0	0	28.528	26.167	0	0	0	39.129	0	22	297.8515723	0	191.943			0	0	0	0
8:30	3.3333	25.075	0	0	17.434	28.036	0	0	0	37.35	0	15	*273.1350854*	0	185.386			0	0	0	0
8:45	3.3333	32.45	0	0	19.019	28.036	0	0	0	10.671	0	15	280.8920934	0	185.943			0	0	0	0
9:00	6.6667	17.7	0	0	20.604	9.3452	0	0	0	33.793	0	19	274.3031896	0	180.164			0	0	0	0
9:15	8.3333	16.225	0	0	9.5094	28.036	0	0	0	35.571	0	19	260.6441824	0	159.493			0	0	0	0
9:30	8.3333	19.175	0	0	31.698	22.429	0	0	0	40.907	0	12	272.0099506	0	128.929			0	0	0	0
9:45	6.6667	26.55	0	0	20.604	22.429	0	0	0	8.8929	0	11	248.9125562	0	108.921			0	0	0	0
10:00	6.6667	7.375	0	0	7.9245	18.69	0	0	0	23.121	0	9	251.2486972	0	121.15			0	0	0	0
10:15	15	19.175	0	0	20.604	18.69	0	0	0	16.007	0	8	296.0656559	0	119.371			0	0	0	0
10:30	11.667	22.125	0	0	7.9245	16.821	0	0	0	24.9	0	8	301.8577493	0	138.157			0	0	0	0
10:45	8.3333	19.175	0	0	17.434	33.643	0	0	0	23.121	0	9	313.7964735	0	134.6			0	0	0	0
11:00	10	26.55	0	0	19.019	29.905	0	0	0	21.343	0	9	328.5150045	0	136.707			0	0	0	0
11:15	11.667	22.125	0	0	17.434	28.036	0	0	0	33.793	0	9	341.3839173	0	148.714			0	0	0	0
11:30	8.3333	16.225	0	0	25.358	20.56	0	0	0	21.343	0	8	345.995867	0	139.821			0	0	0	0
11:45	16.667	14.75	0	0	30.113	31.774	0	0	0	14.229	0	20	372.5565813	0	152.936			0	0	0	0
12:00	16.667	14.75	0	0	33.283	33.643	0	0	0	37.35	0	5	350.8658131	0	145.493			0	0	0	0
12:15	5	25.075	0	0	12.679	41.119	0	0	0	24.9	0	9	335.2854672	0	131.707			0	0	0	0
12:30	6.6667	29.5	0	0	25.358	35.512	0	0	0	28.457	0	14	337.0519991	0	146.714			0	0	0	0
12:45	8.3333	16.225	0	0	19.019	28.036	0	0	0	17.786	0	9	323.0532345	0	141.714			0	0	0	0
13:00	10	28.025	0	0	11.094	33.643	0	0	0	19.564	0	9	343.7575247	0	145.936			0	0	0	0
13:15	6.6667	22.125	0	0	26.943	29.905	0	0	0	40.907	0	8	357.4272462	0	164.943			0	0	0	0
13:30	6.6667	22.125	0	0	20.604	33.643	0	0	0	28.457	0	9	391.4869721	0	181.943			0	0	0	0
13:45	11.667	8.85	0	0	26.943	44.857	0	0	0	16.007	0	15	408.7004492	0	200.836			0	0	0	0
14:00	8.3333	25.075	0	0	23.774	39.25	0	0	0	35.571	0	12	436.0016846	0	208.507			0	0	0	0
14:15	11.667	32.45	0	0	47.547	28.036	0	0	0	40.907	0	25	448.8243486	0	212.286			0	0	0	0
14:30	10	25.075	0	0	22.189	42.988	0	0	0	37.35	0	19	443.297619	0	210.179			0	0	0	0
14:45	13.333	28.025	0	0	22.189	56.071	0	0	0	26.679	0	12	507.2038185	0	233.3			0	0	0	0
15:00	16.667	32.45	0	0	19.019	41.119	0	0	0	37.35	0	14	569.4433513	0	248.307		1	0	1	1	1
15:15	21.667	17.7	0	0	20.604	54.202	0	0	0	49.8	0	14	652.9045148	0	269.429		1	0	2	1	2
15:30	23.333	28.025	0	0	38.038	74.762	0	0	0	60.471	0	19	709.0912399	0	304.664		1	0	3	1	3
15:45	25	30.975	0	0	38.038	87.845	0	0	0	42.686	0	11	701.5654313	0	289.329		1	0	4	1	4
16:00	21.667	22.125	0	0	55.472	93.452	0	0	0	60.471	0	12	670	0	303		1	0	1	1	1
16:15	25	30.975	0	0	39.623	74.762	0	0	0	80.036	0	19	626.7914196	0	303.886		1	0	2	1	2
16:30	11.667	32.45	0	0	39.623	72.893	0	0	0	55.136	0	9	600.2581761	0	268.314		1	0	3	1	3
16:45	11.667	32.45	0	0	33.283	72.893	0	0	0	53.357	0	14	586.8324124	0	250.529		1	0	4	1	4
17:00	25	25.075	0	0	39.623	59.81	0	0	0	53.357	0	20	527.774124	0	230.964			0	0	0	0
17:15	26.667	30.975	0	0	30.113	56.071	0	0	0	44.464	0	19	378.2669587	0	157.607			0	0	0	0
17:30	20	25.075	0	0	36.453	61.679	0	0	0	37.35	0	9	234.4406559	0	94.1429			0	0	0	0
17:45	15	10.325	0	0	28.528	37.381	0	0	0	33.793	0	14	91.23425427	0	47.7929			0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	4
Signal Warranted?	Yes


4-Hour Warrant (100%)
Thursday, February 1, 2018
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
334.6720443, 358.9971116
670, 303
569.4433513, 248.3071429
115'
80'
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

4-Hour Warrant (70%)
Thursday, February 1, 2018
334.6720443, 358.9971116
2 OR MORE LANES & 2 OR MORE LANES
670, 303
2 OR MORE LANES & 1 LANE
569.4433513, 248.3071429
1 LANE & 1 LANE
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Waiko Road
Future Year Conditions

Weekday Waiko Road/- 4-Hour Signal Warrant

Thursday, February 1, 2018

	Waiko Road						-			Waiale Road			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 0%			RT Reduction: 0%											
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	41.78689353	0	36.2357			0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	104.9630391	0	92.9214			0	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	183.9629717	0	156.721			0	0	0	0
6:00	5	22.313	0	0	3.1887	11.286	0	0	0	30.236	0	6	267.1063679	0	308.107			0	0	0	0
6:15	10	17.85	0	0	12.755	22.571	0	0	0	42.686	0	14	337.2887983	0	357.177		1	0	1	1	1
6:30	8.3333	32.725	0	0	19.132	18.81	0	0	0	49.8	0	14	414.0100256	0	433.333		1	0	2	1	2
6:45	18.333	35.7	0	0	15.943	13.167	0	0	0	117.39	0	34	492.0460442	0	476.55		1	0	3	1	3
7:00	12.057	62.186	0	0	14.034	23.692	0	0	0	65.306	0	20	552	0	412		1	0	4	1	4
7:15	14.736	76.005	0	0	15.31	33.846	0	0	0	98.842	0	34	513.9749596	0	397.265		1	0	1	1	1
7:30	24.113	77.387	0	0	21.69	33.846	0	0	0	90.016	0	17	461.4215333	0	325.552		1	0	2	1	2
7:45	20.094	59.422	0	0	22.966	40.615	0	0	0	68.836	0	18	378.7584369	0	270.886			0	3	0	3
8:00	6.6667	25.288	0	0	17.538	24.452	0	0	0	35.571	0	35	319.0657794	0	209.721			0	4	0	4
8:15	10	22.313	0	0	28.698	26.333	0	0	0	39.129	0	22	299.7693396	0	191.943			0	0	0	0
8:30	3.3333	25.288	0	0	17.538	28.214	0	0	0	37.35	0	15	*274.9015499*	0	185.386			0	0	0	0
8:45	3.3333	32.725	0	0	19.132	28.214	0	0	0	10.671	0	15	282.6577493	0	185.943			0	0	0	0
9:00	6.6667	17.85	0	0	20.726	9.4048	0	0	0	33.793	0	19	275.9925651	0	180.164			0	0	0	0
9:15	8.3333	16.363	0	0	9.566	28.214	0	0	0	35.571	0	19	262.2301101	0	159.493			0	0	0	0
9:30	8.3333	19.338	0	0	31.887	22.571	0	0	0	40.907	0	12	273.6273922	0	128.929			0	0	0	0
9:45	6.6667	26.775	0	0	20.726	22.571	0	0	0	8.8929	0	11	250.377774	0	108.921			0	0	0	0
10:00	6.6667	7.4375	0	0	7.9717	18.81	0	0	0	23.121	0	9	252.7039757	0	121.15			0	0	0	0
10:15	15	19.338	0	0	20.726	18.81	0	0	0	16.007	0	8	297.8209007	0	119.371			0	0	0	0
10:30	11.667	22.313	0	0	7.9717	16.929	0	0	0	24.9	0	8	303.67865	0	138.157			0	0	0	0
10:45	8.3333	19.338	0	0	17.538	33.857	0	0	0	23.121	0	9	315.6949573	0	134.6			0	0	0	0
11:00	10	26.775	0	0	19.132	30.095	0	0	0	21.343	0	9	330.4395553	0	136.707			0	0	0	0
11:15	11.667	22.313	0	0	17.538	28.214	0	0	0	33.793	0	9	343.3171833	0	148.714			0	0	0	0
11:30	8.3333	16.363	0	0	25.509	20.69	0	0	0	21.343	0	8	348.0091644	0	139.821			0	0	0	0
11:45	16.667	14.875	0	0	30.292	31.976	0	0	0	14.229	0	20	374.7776168	0	152.936			0	0	0	0
12:00	16.667	14.875	0	0	33.481	33.857	0	0	0	37.35	0	5	353.0095013	0	145.493			0	0	0	0
12:15	5	25.288	0	0	12.755	41.381	0	0	0	24.9	0	9	337.40958	0	131.707			0	0	0	0
12:30	6.6667	29.75	0	0	25.509	35.738	0	0	0	28.457	0	14	339.1645889	0	146.714			0	0	0	0
12:45	8.3333	16.363	0	0	19.132	28.214	0	0	0	17.786	0	9	325.0631177	0	141.714			0	0	0	0
13:00	10	28.263	0	0	11.16	33.857	0	0	0	19.564	0	9	345.8592206	0	145.936			0	0	0	0
13:15	6.6667	22.313	0	0	27.104	30.095	0	0	0	40.907	0	8	359.615128	0	164.943			0	0	0	0
13:30	6.6667	22.313	0	0	20.726	33.857	0	0	0	28.457	0	9	393.8730907	0	181.943			0	0	0	0
13:45	11.667	8.925	0	0	27.104	45.143	0	0	0	16.007	0	15	411.1805256	0	200.836			0	0	0	0
14:00	8.3333	25.288	0	0	23.915	39.5	0	0	0	35.571	0	12	438.6873877	0	208.507			0	0	0	0
14:15	11.667	32.725	0	0	47.83	28.214	0	0	0	40.907	0	25	451.5561545	0	212.286			0	0	0	0
14:30	10	25.288	0	0	22.321	43.262	0	0	0	37.35	0	19	445.9107143	0	210.179			0	0	0	0
14:45	13.333	28.263	0	0	22.321	56.429	0	0	0	26.679	0	12	510.1386343	0	233.3			0	0	0	0
15:00	16.667	32.725	0	0	19.132	41.381	0	0	0	37.35	0	14	572.6998877	0	248.307		1	0	1	1	1
15:15	21.667	17.85	0	0	20.726	54.548	0	0	0	49.8	0	14	656.6238657	0	269.429		1	0	2	1	2
15:30	23.333	28.263	0	0	38.264	75.238	0	0	0	60.471	0	19	713.1672507	0	304.664		1	0	3	1	3
15:45	25	31.238	0	0	38.264	88.405	0	0	0	42.686	0	11	705.6764712	0	289.329		1	0	4	1	4
16:00	21.667	22.313	0	0	55.802	94.048	0	0	0	60.471	0	12	674	0	303		1	0	1	1	1
16:15	25	31.238	0	0	39.858	75.238	0	0	0	80.036	0	19	630.5077942	0	303.886		1	0	2	1	2
16:30	11.667	32.725	0	0	39.858	73.357	0	0	0	55.136	0	9	603.7988994	0	268.314		1	0	3	1	3
16:45	11.667	32.725	0	0	33.481	73.357	0	0	0	53.357	0	14	590.2203392	0	250.529		1	0	4	1	4
17:00	25	25.288	0	0	39.858	60.19	0	0	0	53.357	0	20	530.7200584	0	230.964			0	0	0	0
17:15	26.667	31.238	0	0	30.292	56.429	0	0	0	44.464	0	19	380.3835916	0	157.607			0	0	0	0
17:30	20	25.288	0	0	36.67	62.071	0	0	0	37.35	0	9	235.7584007	0	94.1429			0	0	0	0
17:45	15	10.413	0	0	28.698	37.619	0	0	0	33.793	0	14	91.72966083	0	47.7929			0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	4
Signal Warranted?	Yes

4-Hour Warrant (100%)
Thursday, February 1, 2018
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
2 OR MORE LANES & 2 OR MORE LANES
2 OR MORE LANES & 1 LANE
1 LANE & 1 LANE
513.9749596, 397.2654176
337.2887983, 357.1774395
674, 303
572.6998877, 248.3071429
115'
80'
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

4-Hour Warrant (70%)
Thursday, February 1, 2018
Minor Street Higher-Volume Approach - VPH
Major Street Volume - Total of Both Approaches - VPH
513.9749596, 397.2654176
337.2887983, 357.1774395
2 OR MORE LANES & 2 OR MORE LANES
674, 303
2 OR MORE LANES & 1 LANE
572.6998877, 248.3071429
1 LANE & 1 LANE
Minor 1 Thresholds
Minor 2 Thresholds
Minor 1
Minor 2

Weekday Waiko Road/- 8-Hour Signal Warrant

Thursday, February 1, 2018

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

	Waiko Road						-			Waiale Road			100 % Warrant			Minor 1 (NB)			Minor 1 (SB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold			500	750	600	500	750	600			
	1						1			1			Minor Threshold			150	75	120	150	75	120			
							RT Reduction: 0%			RT Reduction: 0%														
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	41.78689353	0	36.2357	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	104.9630391	0	92.9214	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	183.9629717	0	156.721	-	-	-	-	-	-	0	0	0
6:00	5	22.313	0	0	3.1887	11.286	0	0	0	30.236	0	6	267.1063679	0	308.107	-	-	-	-	-	-	0	0	0
6:15	10	17.85	0	0	12.755	22.571	0	0	0	42.686	0	14	337.2887983	0	357.177	-	-	-	-	-	-	0	0	0
6:30	8.3333	32.725	0	0	19.132	18.81	0	0	0	49.8	0	14	414.0100256	0	433.333	-	-	-	-	-	-	0	0	0
6:45	18.333	35.7	0	0	15.943	13.167	0	0	0	117.39	0	34	492.0460442	0	476.55	-	-	-	-	-	-	0	0	0
7:00	12.057	62.186	0	0	14.034	23.692	0	0	0	65.306	0	20	552	0	412	-	-	-	1	-	-	1	0	0
7:15	14.736	76.005	0	0	15.31	33.846	0	0	0	98.842	0	34	513.9749596	0	397.265	-	-	-	1	-	-	2	0	0
7:30	24.113	77.387	0	0	21.69	33.846	0	0	0	90.016	0	17	461.4215333	0	325.552	-	-	-	-	-	-	3	0	0
7:45	20.094	59.422	0	0	22.966	40.615	0	0	0	68.836	0	18	378.7584369	0	270.886	-	-	-	-	-	-	4	0	0
8:00	6.6667	25.288	0	0	17.538	24.452	0	0	0	35.571	0	35	319.0657794	0	209.721	-	-	-	-	-	-	0	0	0
8:15	10	22.313	0	0	28.698	26.333	0	0	0	39.129	0	22	299.7693396	0	191.943	-	-	-	-	-	-	0	0	0
8:30	3.3333	25.288	0	0	17.538	28.214	0	0	0	37.35	0	15	*274.9015499*	0	185.386	-	-	-	-	-	-	0	0	0
8:45	3.3333	32.725	0	0	19.132	28.214	0	0	0	10.671	0	15	282.6577493	0	185.943	-	-	-	-	-	-	0	0	0
9:00	6.6667	17.85	0	0	20.726	9.4048	0	0	0	33.793	0	19	275.9925651	0	180.164	-	-	-	-	-	-	0	0	0
9:15	8.3333	16.363	0	0	9.566	28.214	0	0	0	35.571	0	19	262.2301101	0	159.493	-	-	-	-	-	-	0	0	0
9:30	8.3333	19.338	0	0	31.887	22.571	0	0	0	40.907	0	12	273.6273922	0	128.929	-	-	-	-	-	-	0	0	0
9:45	6.6667	26.775	0	0	20.726	22.571	0	0	0	8.8929	0	11	250.377774	0	108.921	-	-	-	-	-	-	0	0	0
10:00	6.6667	7.4375	0	0	7.9717	18.81	0	0	0	23.121	0	9	252.7039757	0	121.15	-	-	-	-	-	-	0	0	0
10:15	15	19.338	0	0	20.726	18.81	0	0	0	16.007	0	8	297.8209007	0	119.371	-	-	-	-	-	-	0	0	0
10:30	11.667	22.313	0	0	7.9717	16.929	0	0	0	24.9	0	8	303.67865	0	138.157	-	-	-	-	-	-	0	0	0
10:45	8.3333	19.338	0	0	17.538	33.857	0	0	0	23.121	0	9	315.6949573	0	134.6	-	-	-	-	-	-	0	0	0
11:00	10	26.775	0	0	19.132	30.095	0	0	0	21.343	0	9	330.4395553	0	136.707	-	-	-	-	-	-	0	0	0
11:15	11.667	22.313	0	0	17.538	28.214	0	0	0	33.793	0	9	343.3171833	0	148.714	-	-	-	-	-	-	0	0	0
11:30	8.3333	16.363	0	0	25.509	20.69	0	0	0	21.343	0	8	348.0091644	0	139.821	-	-	-	-	-	-	0	0	0
11:45	16.667	14.875	0	0	30.292	31.976	0	0	0	14.229	0	20	374.7776168	0	152.936	-	-	-	-	-	-	0	0	0
12:00	16.667	14.875	0	0	33.481	33.857	0	0	0	37.35	0	5	353.0095013	0	145.493	-	-	-	-	-	-	0	0	0
12:15	5	25.288	0	0	12.755	41.381	0	0	0	24.9	0	9	337.40958	0	131.707	-	-	-	-	-	-	0	0	0
12:30	6.6667	29.75	0	0	25.509	35.738	0	0	0	28.457	0	14	339.1645889	0	146.714	-	-	-	-	-	-	0	0	0
12:45	8.3333	16.363	0	0	19.132	28.214	0	0	0	17.786	0	9	325.0631177	0	141.714	-	-	-	-	-	-	0	0	0
13:00	10	28.263	0	0	11.16	33.857	0	0	0	19.564	0	9	345.8592206	0	145.936	-	-	-	-	-	-	0	0	0
13:15	6.6667	22.313	0	0	27.104	30.095	0	0	0	40.907	0	8	359.615128	0	164.943	-	-	-	-	-	-	0	0	0
13:30	6.6667	22.313	0	0	20.726	33.857	0	0	0	28.457	0	9	393.8730907	0	181.943	-	-	-	-	-	-	0	0	0
13:45	11.667	8.925	0	0	27.104	45.143	0	0	0	16.007	0	15	411.1805256	0	200.836	-	-	-	-	-	-	0	0	0
14:00	8.3333	25.288	0	0	23.915	39.5	0	0	0	35.571	0	12	438.6873877	0	208.507	-	-	-	-	-	-	0	0	0
14:15	11.667	32.725	0	0	47.83	28.214	0	0	0	40.907	0	25	451.5561545	0	212.286	-	-	-	-	-	-	0	0	0
14:30	10	25.288	0	0	22.321	43.262	0	0	0	37.35	0	19	445.9107143	0	210.179	-	-	-	-	-	-	0	0	0
14:45	13.333	28.263	0	0	22.321	56.429	0	0	0	26.679	0	12	510.1386343	0	233.3	-	-	-	1	-	-	1	0	0
15:00	16.667	32.725	0	0	19.132	41.381	0	0	0	37.35	0	14	572.6998877	0	248.307	-	-	-	1	-	-	2	0	0
15:15	21.667	17.85	0	0	20.726	54.548	0	0	0	49.8	0	14	656.6238657	0	269.429	-	-	-	1	-	1	3	0	1
15:30	23.333	28.263	0	0	38.264	75.238	0	0	0	60.471	0	19	713.1672507	0	304.664	-	-	-	1	-	1	4	0	2
15:45	25	31.238	0	0	38.264	88.405	0	0	0	42.686	0	11	705.6764712	0	289.329	-	-	-	1	-	1	1	0	3
16:00	21.667	22.313	0	0	55.802	94.048	0	0	0	60.471	0	12	674	0	303	-	-	-	1	-	1	2	0	4
16:15	25	31.238	0	0	39.858	75.238	0	0	0	80.036	0	19	630.5077942	0	303.886	-	-	-	1	-	1	3	0	1
16:30	11.667	32.725	0	0	39.858	73.357	0	0	0	55.136	0	9	603.7988994	0	268.314	-	-	-	1	-	1	4	0	2
16:45	11.667	32.725	0	0	33.481	73.357	0	0	0	53.357	0	14	590.2203392	0	250.529	-	-	-	1	-	-	1	0	3
17:00	25	25.288	0	0	39.858	60.19	0	0	0	53.357	0	20	530.7200584	0	230.964	-	-	-	1	-	-	2	0	4
17:15	26.667	31.238	0	0	30.292	56.429	0	0	0	44.464	0	19	380.3835916	0	157.607	-	-	-	-	-	-	3	0	0
17:30	20	25.288	0	0	36.67	62.071	0	0	0	37.35	0	9	235.7584007	0	94.1429	-	-	-	-	-	-	4	0	0
17:45	15	10.413	0	0	28.698	37.619	0	0	0	33.793	0	14	91.72966083	0	47.7929	-	-	-	-	-	-	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
																					Hours where condition met:	4	0	2
																					Signal Warranted?	No		
																					Notes			

APPENDIX D

SIGNAL WARRANT ANALYSIS

Waiale Road/Waiko Road
Future Year Conditions (Separate SBLT and RT lanes)

Weekday Waiko Road/- 8-Hour Signal Warrant

Thursday, February 1, 2018

Condition A - Minimum volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	500	400	350	280	150	120	105	84
2+	1	600	480	420	336	150	120	105	84
2+	2+	600	480	420	336	200	160	140	112
1	2+	500	400	350	280	200	160	140	112

Condition B - Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vechicles per hour on higher-volume minor-street approach (one direction only)			
Major	Minor	100% *	80%	70% **	56%	100% *	80%	70% **	56%
1	1	750	600	525	420	75	60	53	42
2+	1	900	720	630	504	75	60	53	42
2+	2+	900	720	630	504	100	80	70	56
1	2+	750	600	525	420	100	80	70	56

	Waiko Road						-			Waiale Road			100 % Warrant			Minor 1 (NB)			Minor 1 (SB)			Combination		
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold			500	750	600	500	750	600			
	1						1			1			Minor Threshold			150	75	120	150	75	120			
							RT Reduction: 0%			RT Reduction: 100%														
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	A	B	A+B	A	B	A+B	A	B	A+B
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
5:15	0	0	0	0	0	0	0	0	0	0	0	0	41.78689353	0	30.2357	-	-	-	-	-	-	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	104.9630391	0	72.9214	-	-	-	-	-	-	0	0	0
5:45	0	0	0	0	0	0	0	0	0	0	0	0	183.9629717	0	122.721	-	-	-	-	-	-	0	0	0
6:00	5	22.313	0	0	3.1887	11.286	0	0	0	30.236	0	0	267.1063679	0	240.107	-	-	-	-	-	-	0	0	0
6:15	10	17.85	0	0	12.755	22.571	0	0	0	42.686	0	0	337.2887983	0	275.177	-	-	-	-	-	-	0	0	0
6:30	8.3333	32.725	0	0	19.132	18.81	0	0	0	49.8	0	0	414.0100256	0	331.333	-	-	-	-	-	-	0	0	0
6:45	18.333	35.7	0	0	15.943	13.167	0	0	0	117.39	0	0	492.0460442	0	371.55	-	-	-	-	-	-	0	0	0
7:00	12.057	62.186	0	0	14.034	23.692	0	0	0	65.306	0	0	552	0	323	-	-	-	1	-	-	1	0	0
7:15	14.736	76.005	0	0	15.31	33.846	0	0	0	98.842	0	0	513.9749596	0	293.265	-	-	-	1	-	-	2	0	0
7:30	24.113	77.387	0	0	21.69	33.846	0	0	0	90.016	0	0	461.4215333	0	233.552	-	-	-	-	-	-	3	0	0
7:45	20.094	59.422	0	0	22.966	40.615	0	0	0	68.836	0	0	378.7584369	0	180.886	-	-	-	-	-	-	4	0	0
8:00	6.6667	25.288	0	0	17.538	24.452	0	0	0	35.571	0	0	319.0657794	0	122.721	-	-	-	-	-	-	0	0	0
8:15	10	22.313	0	0	28.698	26.333	0	0	0	39.129	0	0	299.7693396	0	120.943	-	-	-	-	-	-	0	0	0
8:30	3.3333	25.288	0	0	17.538	28.214	0	0	0	37.35	0	0	*274.9015499*	0	117.386	-	-	-	-	-	-	0	0	0
8:45	3.3333	32.725	0	0	19.132	28.214	0	0	0	10.671	0	0	282.6577493	0	120.943	-	-	-	-	-	-	0	0	0
9:00	6.6667	17.85	0	0	20.726	9.4048	0	0	0	33.793	0	0	275.9925651	0	119.164	-	-	-	-	-	-	0	0	0
9:15	8.3333	16.363	0	0	9.566	28.214	0	0	0	35.571	0	0	262.2301101	0	108.493	-	-	-	-	-	-	0	0	0
9:30	8.3333	19.338	0	0	31.887	22.571	0	0	0	40.907	0	0	273.6273922	0	88.9286	-	-	-	-	-	-	0	0	0
9:45	6.6667	26.775	0	0	20.726	22.571	0	0	0	8.8929	0	0	250.377774	0	72.9214	-	-	-	-	-	-	0	0	0
10:00	6.6667	7.4375	0	0	7.9717	18.81	0	0	0	23.121	0	0	252.7039757	0	87.15	-	-	-	-	-	-	0	0	0
10:15	15	19.338	0	0	20.726	18.81	0	0	0	16.007	0	0	297.8209007	0	85.3714	-	-	-	-	-	-	0	0	0
10:30	11.667	22.313	0	0	7.9717	16.929	0	0	0	24.9	0	0	303.67865	0	103.157	-	-	-	-	-	-	0	0	0
10:45	8.3333	19.338	0	0	17.538	33.857	0	0	0	23.121	0	0	315.6949573	0	99.6	-	-	-	-	-	-	0	0	0
11:00	10	26.775	0	0	19.132	30.095	0	0	0	21.343	0	0	330.4395553	0	90.7071	-	-	-	-	-	-	0	0	0
11:15	11.667	22.313	0	0	17.538	28.214	0	0	0	33.793	0	0	343.3171833	0	106.714	-	-	-	-	-	-	0	0	0
11:30	8.3333	16.363	0	0	25.509	20.69	0	0	0	21.343	0	0	348.0091644	0	97.8214	-	-	-	-	-	-	0	0	0
11:45	16.667	14.875	0	0	30.292	31.976	0	0	0	14.229	0	0	374.7776168	0	104.936	-	-	-	-	-	-	0	0	0
12:00	16.667	14.875	0	0	33.481	33.857	0	0	0	37.35	0	0	353.0095013	0	108.493	-	-	-	-	-	-	0	0	0
12:15	5	25.288	0	0	12.755	41.381	0	0	0	24.9	0	0	337.40958	0	90.7071	-	-	-	-	-	-	0	0	0
12:30	6.6667	29.75	0	0	25.509	35.738	0	0	0	28.457	0	0	339.1645889	0	106.714	-	-	-	-	-	-	0	0	0
12:45	8.3333	16.363	0	0	19.132	28.214	0	0	0	17.786	0	0	325.0631177	0	106.714	-	-	-	-	-	-	0	0	0
13:00	10	28.263	0	0	11.16	33.857	0	0	0	19.564	0	0	345.8592206	0	104.936	-	-	-	-	-	-	0	0	0
13:15	6.6667	22.313	0	0	27.104	30.095	0	0	0	40.907	0	0	359.615128	0	120.943	-	-	-	-	-	-	0	0	0
13:30	6.6667	22.313	0	0	20.726	33.857	0	0	0	28.457	0	0	393.8730907	0	120.943	-	-	-	-	-	-	0	0	0
13:45	11.667	8.925	0	0	27.104	45.143	0	0	0	16.007	0	0	411.1805256	0	129.836	-	-	-	-	-	-	0	0	0
14:00	8.3333	25.288	0	0	23.915	39.5	0	0	0	35.571	0	0	438.6873877	0	140.507	-	-	-	-	-	-	0	0	0
14:15	11.667	32.725	0	0	47.83	28.214	0	0	0	40.907	0	0	451.5561545	0	142.286	-	-	-	-	-	-	0	0	0
14:30	10	25.288	0	0	22.321	43.262	0	0	0	37.35	0	0	445.9107143	0	151.179	-	-	-	-	-	-	0	0	0
14:45	13.333	28.263	0	0	22.321	56.429	0	0	0	26.679	0	0	510.1386343	0	174.3	-	-	-	1	-	-	1	0	0
15:00	16.667	32.725	0	0	19.132	41.381	0	0	0	37.35	0	0	572.6998877	0	190.307	-	-	-	1	-	-	2	0	0
15:15	21.667	17.85	0	0	20.726	54.548	0	0	0	49.8	0	0	656.6238657	0	213.429	-	-	-	1	-	1	3	0	1
15:30	23.333	28.263	0	0	38.264	75.238	0	0	0	60.471	0	0	713.1672507	0	243.664	-	-	-	1	-	1	4	0	2
15:45	25	31.238	0	0	38.264	88.405	0	0	0	42.686	0	0	705.6764712	0	238.329	-	-	-	1	-	1	1	0	3
16:00	21.667	22.313	0	0	55.802	94.048	0	0	0	60.471	0	0	674	0	249	-	-	-	1	-	1	2	0	4
16:15	25	31.238	0	0	39.858	75.238	0	0	0	80.036	0	0	630.5077942	0	241.886	-	-	-	1	-	1	3	0	1
16:30	11.667	32.725	0	0	39.858	73.357	0	0	0	55.136	0	0	603.7988994	0	206.314	-	-	-	1	-	1	4	0	2
16:45	11.667	32.725	0	0	33.481	73.357	0	0	0	53.357	0	0	590.2203392	0	188.529	-	-	-	1	-	-	1	0	3
17:00	25	25.288	0	0	39.858	60.19	0	0	0	53.357	0	0	530.7200584	0	168.964	-	-	-	1	-	-	2	0	4
17:15	26.667	31.238	0	0	30.292	56.429	0	0	0	44.464	0	0	380.3835916	0	115.607	-	-	-	-	-	-	3	0	0
17:30	20	25.288	0	0	36.67	62.071	0	0	0	37.35	0	0	235.7584007	0	71.1429	-	-	-	-	-	-	4	0	0
17:45	15	10.413	0	0	28.698	37.619	0	0	0	33.793	0	0	91.72966083	0	33.7929	-	-	-	-	-	-	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0
																					Hours where condition met:	4	0	2
																					Signal Warranted?	No		
																					Notes			

Weekday Waiko Road/- 4-Hour Signal Warrant

Thursday, February 1, 2018

	Waiko Road						-			Waiale Road			100 % Warrant								
	Major Lanes						Minor 1 Lanes			Minor 2 Lanes			Major Threshold								
	1						1			1											
							RT Reduction: 0%			RT Reduction: 100%											
Time	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Major Combined Hourly	Minor 1 Hourly	Minor 2 Hourly	Minor 1 Warrant Met	Minor 2 Warrant Met	Minor 1 Warrant Hour	Minor 2 Warrant Hour	Combo Warrant met	Combo Hour
0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
0:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
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5:45	0	0	0	0	0	0	0	0	0	0	0	0	183.9629717	0	122.721			0	0	0	0
6:00	5	22.313	0	0	3.1887	11.286	0	0	0	30.236	0	0	267.1063679	0	240.107			0	0	0	0
6:15	10	17.85	0	0	12.755	22.571	0	0	0	42.686	0	0	337.2887983	0	275.177			0	0	0	0
6:30	8.3333	32.725	0	0	19.132	18.81	0	0	0	49.8	0	0	414.0100256	0	331.333	1		0	1	1	1
6:45	18.333	35.7	0	0	15.943	13.167	0	0	0	117.39	0	0	492.0460442	0	371.55	1		0	2	1	2
7:00	12.057	62.186	0	0	14.034	23.692	0	0	0	65.306	0	0	552	0	323	1		0	3	1	3
7:15	14.736	76.005	0	0	15.31	33.846	0	0	0	98.842	0	0	513.9749596	0	293.265	1		0	4	1	4
7:30	24.113	77.387	0	0	21.69	33.846	0	0	0	90.016	0	0	461.4215333	0	233.552			0	0	0	0
7:45	20.094	59.422	0	0	22.966	40.615	0	0	0	68.836	0	0	378.7584369	0	180.886			0	0	0	0
8:00	6.6667	25.288	0	0	17.538	24.452	0	0	0	35.571	0	0	319.0657794	0	122.721			0	0	0	0
8:15	10	22.313	0	0	28.698	26.333	0	0	0	39.129	0	0	299.7693396	0	120.943			0	0	0	0
8:30	3.3333	25.288	0	0	17.538	28.214	0	0	0	37.35	0	0	*274.9015499*	0	117.386			0	0	0	0
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9:00	6.6667	17.85	0	0	20.726	9.4048	0	0	0	33.793	0	0	275.9925651	0	119.164			0	0	0	0
9:15	8.3333	16.363	0	0	9.566	28.214	0	0	0	35.571	0	0	262.2301101	0	108.493			0	0	0	0
9:30	8.3333	19.338	0	0	31.887	22.571	0	0	0	40.907	0	0	273.6273922	0	88.9286			0	0	0	0
9:45	6.6667	26.775	0	0	20.726	22.571	0	0	0	8.8929	0	0	250.377774	0	72.9214			0	0	0	0
10:00	6.6667	7.4375	0	0	7.9717	18.81	0	0	0	23.121	0	0	252.7039757	0	87.15			0	0	0	0
10:15	15	19.338	0	0	20.726	18.81	0	0	0	16.007	0	0	297.8209007	0	85.3714			0	0	0	0
10:30	11.667	22.313	0	0	7.9717	16.929	0	0	0	24.9	0	0	303.67865	0	103.157			0	0	0	0
10:45	8.3333	19.338	0	0	17.538	33.857	0	0	0	23.121	0	0	315.6949573	0	99.6			0	0	0	0
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11:30	8.3333	16.363	0	0	25.509	20.69	0	0	0	21.343	0	0	348.0091644	0	97.8214			0	0	0	0
11:45	16.667	14.875	0	0	30.292	31.976	0	0	0	14.229	0	0	374.7776168	0	104.936			0	0	0	0
12:00	16.667	14.875	0	0	33.481	33.857	0	0	0	37.35	0	0	353.0095013	0	108.493			0	0	0	0
12:15	5	25.288	0	0	12.755	41.381	0	0	0	24.9	0	0	337.40958	0	90.7071			0	0	0	0
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12:45	8.3333	16.363	0	0	19.132	28.214	0	0	0	17.786	0	0	325.0631177	0	106.714			0	0	0	0
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13:15	6.6667	22.313	0	0	27.104	30.095	0	0	0	40.907	0	0	359.615128	0	120.943			0	0	0	0
13:30	6.6667	22.313	0	0	20.726	33.857	0	0	0	28.457	0	0	393.8730907	0	120.943			0	0	0	0
13:45	11.667	8.925	0	0	27.104	45.143	0	0	0	16.007	0	0	411.1805256	0	129.836			0	0	0	0
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14:15	11.667	32.725	0	0	47.83	28.214	0	0	0	40.907	0	0	451.5561545	0	142.286			0	0	0	0
14:30	10	25.288	0	0	22.321	43.262	0	0	0	37.35	0	0	445.9107143	0	151.179			0	0	0	0
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16:00	21.667	22.313	0	0	55.802	94.048	0	0	0	60.471	0	0	674	0	249	1		0	4	1	4
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16:45	11.667	32.725	0	0	33.481	73.357	0	0	0	53.357	0	0	590.2203392	0	188.529			0	3	0	3
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17:15	26.667	31.238	0	0	30.292	56.429	0	0	0	44.464	0	0	380.3835916	0	115.607			0	0	0	0
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17:45	15	10.413	0	0	28.698	37.619	0	0	0	33.793	0	0	91.72966083	0	33.7929			0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
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19:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
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21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
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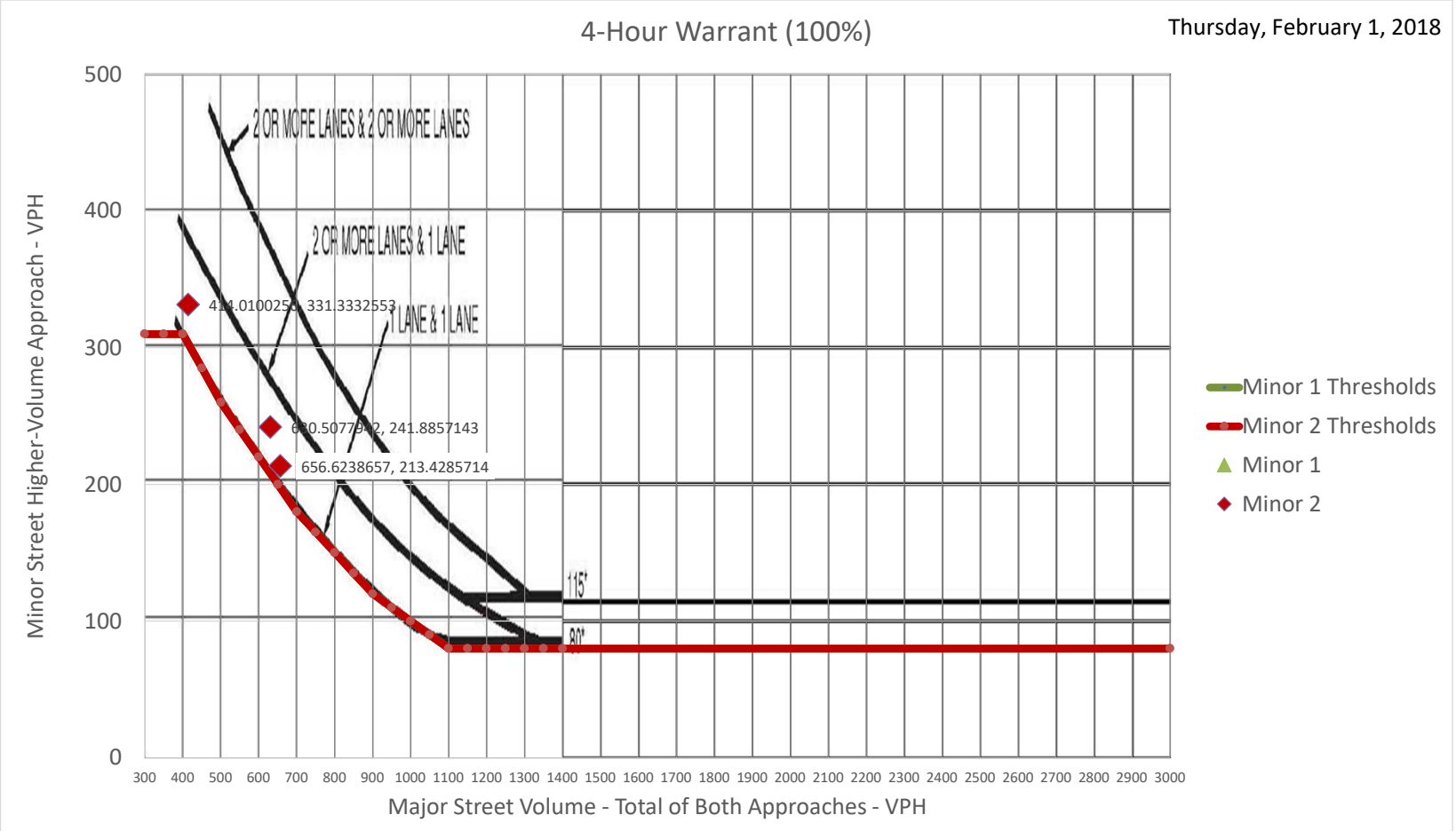
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0

Hours Where Condition Met:	3
Signal Warranted?	No

4-hr (SBLT only)



HAWAI‘I STATE PLAN ANALYSIS TABLE

APPENDIX

H

APPENDIX "H"

HAWAI'I STATE PLAN
ASSESSMENT OF PROJECT APPLICABILITY
TO GOALS, OBJECTIVES, AND POLICIES

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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 Kuikahi Affordable Housing project provides a well-designed, much needed residential housing that will be 100 percent affordable for families. The proposed project is intended to meet the housing needs of Maui's families to create a livable neighborhood. Nearby amenities include a grocery store, local restaurants, and small business operations.**			
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: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Analysis: **The proposed project indirectly supports the objectives and policies for population as it will be implemented in a developed area in Central Maui, in close proximity to existing government, business, and commercial destinations at Wailuku and Kahului, thus providing employment opportunities for residents of the project.**			
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.			✓
(12) Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawaii.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(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 action indirectly supports the general objectives and policies for the economy by supporting construction activity which contributes to increased employment opportunities, job choices, and living standards. Businesses positively affected by the project are those which support construction such as material suppliers, equipment rental companies, and landscape companies. Additionally, the project proposes to offer live/work units which would allow for small neighborhood business in the area.**			
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.			✓
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(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: **The proposed action does not directly or indirectly affect the objectives for agriculture. While the project site has consistent "Agriculture" designations by the State Land Use Commission, Wailuku-Kahului Community Plan, and Maui County Zoning, it is within the Urban Growth Boundary (UGB) of the Maui Island Plan. The lands have not been in cultivation for over a decade, aside from intermittent cattle grazing. In the context of the amount of viable agriculture lands on the island of Maui, implementation of the proposed action is not considered to adversely affect agricultural productivity on Maui. In addition, it is noted that**			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
the proposed action will be located adjacent to existing, similarly scaled residential subdivisions.			
Chapter 226-8 Objective and policies for the economy – – visitor industry.			
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: **The proposed action is not directly or indirectly applicable to the objective and policies for the State's visitor industry. The proposed action has no implications for enhancement or growth of the visitor industry.**			
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;			✓

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(5) Promote federal use of local commodities, services, and facilities available in Hawaii;			✓
(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: **The proposed action is not reliant on federal funding, and does not directly or indirectly advance the objective and policies for strengthening or increasing federal expenditures for the betterment of Hawai'i's economy.**			
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;			✓

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(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: **The Kuikahi Affordable Housing project provides affordable housing for low to moderate and above moderate income families and is not directly applicable to the State economic goals and objectives related to economic growth and innovative activities. However, with the large infusion of capital investment for the construction of the proposed project, it is anticipated to provide direct and indirect economic benefits. It is anticipated that construction jobs will be created during the development of the site and construction of the project.**			
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;			✓

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(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;			✓
(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: **The proposed action does not directly or indirectly affect Hawai'i's capacity to be a leader in the broadband and wireless communications industries, nor does it affect these innovative industries in advancing Hawai'i's economic position in the Pacific.**			
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.			✓

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(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.			✓
Analysis: **The Kuikahi Affordable Housing project makes prudent use of Maui's land-based resources by locating the development in close proximity to existing residential developments and commercial areas. An Environmental Assessment (EA) is being carried out to ensure that the proposed project does not adversely impact Hawai'i's unique and fragile environmental resources. Further, the proposed project will utilize Best Management Practices (BMPs) to ensure that natural resources such as the coastal environment are not impacted by construction activities. The use of BMPs also ensures compatibility between land-based and water-based functions, resources, and ecological systems. The biological resources study conducted as part of the environmental review process represents an effort to protect any rare and endangered plant and animal species, and their habitats native to Hawai'i that may be present in the vicinity of the proposed action. See Appendix "B".**			
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: The project has been designed to work with the natural grade of the site so as to not adversely impact scenic views and vistas. In addition to previously prepared Archaeological Inventory Survey (AIS) reports associated with the proposed project area, the Applicant's archaeology consultant submitted a request for HRS 6E review to the State Historic Preservation Division (SHPD) in February 2021. See Appendix "C" and Appendix "C-2", respectively. The project will comply with the SHPD recommendations for mitigation. Landscaping proposed in connection with the project is intended to enhance the project's visual relationship with its immediate surrounding environs.			
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.		✓	

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(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.			✓
(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 Kuikahi Affordable Housing project has been designed to be compatible with the Wailuku residential community and incorporated drainage improvements which will protect groundwater quality and reduce stormwater runoff on adjacent and downstream properties. The proposed project will be implemented in a developed area in Central Maui, in proximity to existing infrastructure and services. Improved land, air, and water quality are directly and indirectly advanced by the proposed action. Construction BMPs will be used to manage and control erosion control during grading operations to minimize downstream water quality impacts. Work on the project is not anticipated to be affected by natural hazards, and the highest standards of design and construction practices has been and will be employed for the project.**			
Chapter 226-14 Objective and policies for facility systems – – in general.			
Objective: 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.		✓	
Policies:			
(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.		✓	

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(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.			✓
Analysis: **The general objective and policies for facility systems is indirectly applicable to the proposed action. The project will secure and construct the needed infrastructure improvements to support the residences. By addressing automobile flow patterns that are anticipated to result from implementation of the proposed project, the proposed action reflects a coordinated effort to implement capital improvement priorities for the island's residents.**			
Chapter 226-15 Objectives and policies for facility systems – – solid and liquid waste.			
Objectives: 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.		✓	
(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 indirectly supports the objectives and goals for solid and liquid waste facility systems as it will connect to the County wastewater system. Coordination will be undertaken with the County Department of Environmental Management (DEM) to determine if improvements to the County's wastewater system will be required to service the project. Furthermore, construction waste will be disposed at the County's Central Maui Landfill or appropriate construction recycling centers. In addition, once built and occupied, the project is anticipated to be served by a private refuse collection service.**			
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.			✓

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(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 directly supports the objective and policies for water facility systems enhancement as it is located in an area that is serviced by existing County water infrastructure. Coordination will be undertaken with the County Department of Water Supply (DWS) to determine if improvements to the County's water system will be required to service the project.**			
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:			
(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			✓

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(13) Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.		✓	
Analysis: **The objectives and policies related to transportation facility systems are indirectly applicable to the proposed project, as it will include installation of internal sidewalks within the project area. A Traffic Impact Analysis Report (TIAR) has been prepared for the project which analyzes roadway conditions through 2024. The TIAR evaluates the number of vehicular trips that will be generated by the proposed project and provides recommendations for roadway improvements or other mitigative measures to reduce or eliminate any adverse impacts resulting from traffic generated by the project. See Appendix "G".**			
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;			✓
(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		✓	

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(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;			✓
(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 objectives and policies related to energy efficiency in facility systems are indirectly and directly applicable to the proposed action. The proposed project will incorporate energy efficient features to the extent possible. Features may include solar hot water heaters or other energy efficient hot water devices, energy efficient light fixtures in the parking areas, and use of architectural features on the residential units.**			
Chapter 226-18.5 Objectives and policies for facility systems – – telecommunications.			
Objectives:			
(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.			✓
Policies:			
(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.			✓

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Analysis: **The proposed action does not directly or indirectly affect telecommunications systems dependability, efficiency, and cost parameters. In particular, the project does not promote research and development of telecommunications systems and resources and does not advance efficient management and use of existing telecommunications systems and services.**			
Chapter 226-19 Objectives and policies for socio-cultural advancement – – housing.			
Objectives: 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.	✓		
(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 proposed project is directly supportive of the objectives and policies related to housing. The Kuikahi Affordable Housing project effectively provides rental housing for Hawai'i's residents in proximity to commercial and social services in Wailuku. The proposed project will increase affordable housing opportunities for low-income, moderate and above-moderate families. The proposed project is located within the Wailuku-Kahului Community Plan region and is conveniently accessible to public facilities, schools, transportation, and medical services, making it a prime location for affordable housing.**			

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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.			✓
(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: **The objectives and policy related to the State's socio-cultural advancement with regard to health are neither directly or indirectly applicable to the proposed project.**			
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.			✓

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(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.			✓
Analysis: **Through the payment of DOE impact fees, the proposed project indirectly supports the objectives and policies for education by supporting the provision of adequate and accessible educational services and facilities in Central Maui.**			
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: The objective and policies for improving public and private social services are neither directly or indirectly supported by the proposed action, as the project provides affordable residential housing.			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
(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: **As a residential project, the proposed action does not directly or indirectly advance the objective and policies for leisure.**			
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.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
(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: **The objective and policy for individual rights and personal well-being are neither directly nor indirectly supported by the proposed action as it provides increased opportunities for housing.**			
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.		✓	
(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 (CIA) was prepared for the proposed project as part of the environmental review process. The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area. Refer to Appendix "E". In this context, the proposed action indirectly advances the objective and policies related to culture.**			
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.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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: **The Kuikahi Affordable Housing project will be developed by Kuikahi Properties LLC. The proposed project will be designed in compliance with public safety regulations. The objective and policies relating to public safety are neither directly or indirectly supported by the proposed project.**			
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
Objectives: 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.			✓
Policies:			
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Analysis: **The proposed action is neither directly or indirect applicable to the objectives and policies for government. The proposed project will provide affordable housing for residents and will follow the regulations of MCC Chapter 2.97 regarding affordable housing projects.**			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
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:			
(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.			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
(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.			✓
(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.			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
(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:			
(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.			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
(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 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 proposed action indirectly supports the economic priority guidelines by supporting construction activity which contributes to increased employment opportunities, job choices, and living standards. The proposed project intends to contract out services during operation to third party businesses on Maui that will perform maintenance assistance, such as landscaping of public areas and other administrative services in the future which will benefit the Maui economy in the long-run. Additionally, the proposed project will incorporate energy efficient features to the extent possible. Features may include solar hot water heaters or other energy efficient hot water devices, energy efficient light fixtures in the parking areas, and use of architectural features on the residential units.**			
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.		✓	

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
(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:			
(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.		✓	

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
Analysis: **The proposed project is in keeping with HRS 226-104 Priority Guidelines on Population, Growth, and Land Resources. The project is located within the UGB, where adequate public facilities and services will be available, such as water and wastewater services for the proposed project. In addition, the project is in very close proximity to parks, schools, medical facilities, fire, and police services and other public facilities that serve the Wailuku-Kahului Community Plan region. The proposed project will help meet the existing and projected housing needs for low-income, moderate and above-moderate families of varying sizes. The project location is inland and will not have adverse impacts on the shoreline or conservation lands, as BMPs will be implemented to protect these resources and the site is located several miles from the nearest shoreline.**			
Chapter 226-105: Crime and criminal justice.			
Priority guidelines in the area of crime and criminal justice:			
(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: **The proposed action does not directly or indirectly affect the priority guidelines for crime and criminal justice.**			
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: **The proposed project directly supports the priority guidelines for affordable housing as it repurposes agricultural land while providing affordable housing opportunities for various family sizes in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. The proposed project is complementary and consistent with**			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
its neighboring residential developments and is also close to service infrastructure and transportation access and services. The project will add diversity to the housing product mix in the region which itself lacks in affordable housing options.			
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;			✓
(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: **The proposed action does not directly or indirectly affect the priority guidelines for education.**			
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 project will provide affordable housing in a manner that meets the current housing needs without compromising the needs of future generations. The project site is currently undeveloped, but is within the MIP RGB and UGB.**			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES (Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable)	DA	IA	NA
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;			✓
(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 proposed project indirectly supports the climate change priority guidelines as it will be implemented in an area that is outside of natural landscape features such as flood zones, the tsunami evacuation zone, as well as the projected sea level rise hazard area in order to avoid impacts related to climate change.**			

COUNTYWIDE POLICY PLAN ANALYSIS TABLE

APPENDIX

H-1

APPENDIX "H-1"

COUNTYWIDE POLICY PLAN
ASSESSMENT OF PROJECT APPLICABILITY
TO GOALS, OBJECTIVES, AND POLICIES

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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.			✓
Implementing Actions:			
(a) Develop island-wide networks of greenways, watercourses, and habitat corridors.			✓
Analysis: **This project indirectly improves the opportunity for existing and future residents to experience, live, and thrive in the natural beauty of Maui. This land will be cared for in years to come while also providing much needed housing opportunities. The project has been carefully designed taking into consideration building profiles and massing so as to not adversely impact scenic views and vistas. The proposed structures will be similar in scale and size to existing residential developments nearby and will be built in accordance with established subdivision standards.**			
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.			✓

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(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: Though the project site is located approximately three (3) miles from the nearest shoreline or coastal area, the proposed project will utilize BMPs to ensure that natural resources such as the coastal environment is not impacted by construction activities. Refer to Appendix "B". The use of BMPs also ensures compatibility between land-based and water-based functions, resources, and ecological systems. The biological resources study conducted as part of the environmental review process represents an effort to protect any rare and endangered plant and animal species, and their habitats that may be present in the vicinity of the proposed action. Refer to Appendix "C".			
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.			✓
(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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **The proposed project directly and indirectly meets the objective of improving the stewardship of the natural environment. The project will employ BMPs to prevent impacts from construction, including temporary erosion control, stormwater management and dust control. Refer to Appendix "B". In addition, the EA thoroughly evaluates the proposed action's potential impacts on the environment, and where applicable, advances mitigative measures aimed at reducing impacts.**			
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 does not have direct or indirect relationships to the objective of educating residents and visitors about responsible stewardship practices and the interconnectedness of the natural environment and people.**			
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:			
(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.			✓

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Analysis: **The proposed project indirectly supports the policy and objectives related to preserving local cultures and traditions. A CIA was prepared for the proposed project as part of the environmental review process. The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area. In this context, the proposed action advances the objective and policies related to preserving local cultures and traditions. Refer to Appendix "E".**			
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 project supports this objective and policy as the CIA acknowledges the relationship between the natural environment and cultural resources found in the project vicinity.**			
Objective:			
(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.			✓

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Analysis: **The proposed project does not have direct or indirect relationships to the objective of preserving the arts, culture, and history of Maui County for present and future generations. This is an affordable residential project that will help meet the housing need in Maui.**			
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.			✓
(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 action is indirectly applicable to the objective and related policies and implementing actions. Archaeological investigations and coordination for the proposed action are aimed at ensuring the preservation of historic resources which may be impacted by the project. Previous archaeological study of the project area determined that there were "*no historic properties affected.*" A HRS 6E submittal was prepared and filed with the SHPD for review and concurrence in December 2020. Refer to Appendix "D" and Appendix "D-1".**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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: **Indirectly, this project meets the goal of giving residents access to lifelong formal and informal educational options. This is an affordable housing development project which will provide homes for a number of families, putting them and their children closer to schools, allowing for easier access to education. Furthermore, the Applicant will coordinate with the Department of Education (DOE) to determine the appropriate impact fee, which the Applicant is prepared to pay under an Educational Contribution Agreement with the DOE.**			
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.			✓
(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: **Through the payment of impact fees to the Department of Education, the proposed project indirectly ensures the provision of adequate and accessible educational facilities in Central Maui.**			

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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.			✓
(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: **The proposed project is not applicable to the objective, policies and implementing action related to educational programs and institutions as the project involves development of affordable housing with limited commercial development.**			
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: **The project does not directly or indirectly maximize community-based educational opportunities. While these objectives and policies are valuable, this project concentrates on fulfilling the County's housing needs.**			

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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.			✓
(f) Encourage equal access to social and healthcare services through both technological and traditional means.			✓
Analysis: **The proposed project is not applicable to the goal, objective and policies related to social and healthcare services. The project will provide affordable housing options for the community. However, by providing affordable housing to families in a centrally located area, they will have easier access to utilize social and healthcare services, if needed.**			
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.			✓

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(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: **The objective, policies, and implementing actions relative to health care services are not directly or indirectly applicable to the project. The proposed project will provide affordable housing opportunities for residents.**			
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.			✓
Analysis: **The objective and policies related to strengthening public-awareness programs related to healthy lifestyles and social and medical services are not directly or indirectly applicable to this affordable housing project.**			
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.		✓	

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(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.			✓
Analysis: **The proposed project is directly and indirectly applicable to this goal, objective and related policies, and implementing actions as it provides additional affordable residential opportunities in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. In addition, the project will be implemented in a developed area in Central Maui, in proximity to existing infrastructure and services.**			
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 objective and policies related to increasing the mix of housing types in Maui's town and neighborhoods is directly and indirectly applicable to the proposed project. The project's location is ideal, given its surrounding residential uses. Infrastructure is also located nearby, which keeps cost of construction to connect to these facilities economical. The proposed project will cater to local families. In an area surrounded by mostly residential and some light industrial and commercial uses, homes that cater to a variety of families will provide diversity and strengthen the housing infrastructure in the Central Maui region.**			
Objective:			
(3) Increase and maintain the affordable housing inventory.	✓		

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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.			✓
(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: **Although the proposed project repurposes land designated for agricultural use for housing, the land has not been in active agricultural production for some time. The project presents an opportunity to provide affordable housing opportunities for Maui County's residents in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. Further, the proposed project is within the Maui Island Plan's RGB and UGB, and the project will be designed to be consistent and complimentary with the existing character and land uses in the surrounding area.**			
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: **The proposed project is neither directly or indirectly applicable to the objective and policies related to educational opportunities for housing options, financing, and residential construction. It is possible that the project will help to educate the development's residents' about home ownership and financing.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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.			✓
(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 generate short-term construction-related employment opportunities, directly and indirectly supporting Maui's economy. In the long-term, the proposed project will house residents who will work at and/or support nearby, local businesses in the Central Maui area. Furthermore, the proposed development includes approximately 16 live-work units, in which its residents will be able to conduct their small-business operations through their residential unit. This will help these small-business owners by lowering operational costs associated with storefront rent.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(k) Support cooperatives and other types of nontraditional communal farming l 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.			✓
(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: **The objective and policies as it relates to diversification and expansion of sustainable forms of agriculture and aquaculture are not directly or indirectly applicable to the proposed project.**			
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: **The proposed project is an affordable housing project for Maui County's low-income families. The objectives and policies around supporting a visitor industry is not applicable to the project.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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.			✓
Analysis: **The objective of expanding economic sectors that increase living-wage job choices compatible with community values are not directly or indirectly applicable to the proposed residential project.**			
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 residential project will indirectly support the goal, objective, policies, and implementing action of expanding access to recreational opportunities and community facilities to meet the needs of residents. The proposed development will include spot park areas as well as a pavilion and playground which will serve as recreational, green spaces for the project residents' use.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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.			✓
(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: **The objective and policies to improve the quality and adequacy of community facilities do not apply to this housing project.**			
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: **The proposed project does not meet the objective of enhancing funding, management, and planning of public facilities and park lands. The policies outlined to meet this objective does not apply to the proposed project.**			
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.		✓	
(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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **As previously mentioned, a TIAR has been prepared for the proposed project which evaluates potential impacts to traffic in the project area as a result of the proposed action. The TIAR provides recommendations for mitigation measures to address adverse impacts to traffic in the surrounding area. Refer to Appendix "G". The recommendations will ensure adequate capacity of roadways in the project area and that necessary improvements are completed by the Applicant in coordination with the DPW.**			
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.			✓
(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: **The proposed affordable housing project is centrally located between the small towns of Waikapū and Wailuku. From to its central location, residents will be able to easily walk or bike to nearby commercial establishments, as well as other residential developments.**			
Objective:			
(3) Improve opportunities for affordable, efficient, safe, and reliable air transportation.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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: **This residential project does not meet the objective and policies of improving opportunities for affordable, efficient, safe, and reliable air transportation.**			
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.			✓
(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: **Improving opportunities for affordable, efficient, safe, and reliable ocean transportation is not applicable to the proposed project which will be providing affordable housing.**			
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.		✓	

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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 directly support the improvement of transportation systems. The proposed action will include the installation of a roundabout at the intersection of the project driveway at Kuikahi Drive to mitigate traffic congestion and improve safety within the residential development. The project team is coordinating with the County's Department of Public Works on the roundabout installation. Refer to Appendix "G". The project is centrally located which will allow families to be closer to work, school, activities, and services, thereby limiting long distance road trips.**			
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:			
(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 project directly supports this objective and related policies and implementing action as it is located in an area that is serviced by existing County water infrastructure. Coordination will be undertaken with the DWS to determine if improvements to the County's water system will be required to service the project.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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.			✓
(d) Implement and regularly update the Integrated Solid Waste Management Plan.			✓
(e) Phase out the use of injection wells.			✓
Analysis: **The objectives, policies and actions are indirectly applicable to the proposed project. The project proposes connection to the County wastewater system and improvements that would be needed to connect to the system. Coordination will be undertaken with the DEM to determine if improvements to the County's wastewater system will be required to service the project. Construction waste will be disposed at the County's Central Maui Landfill or appropriate construction recycling centers. In addition, once built and occupied, the project is anticipated to be served by a private refuse collection service.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **The objective and policies related to increasing the use of renewable and green technologies are indirectly applicable to the proposed project, as it will incorporate energy efficient features to the extent possible. Features may include solar hot water heaters or other energy efficient hot water devices, energy efficient light fixtures in the parking areas, and use of architectural features on the residential units.**			
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: **The proposed project will be implemented in a developed area in Central Maui, in proximity to existing infrastructure and services. The residents of the proposed project will be centrally located near jobs, schools, recreation, and other services. Moreover, the project will provide improvements needed to connect to surrounding infrastructure services. Refer to Appendix "B".**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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.			✓
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: **The proposed project will be implemented in a developed area in Central Maui, in proximity to existing infrastructure and services. It is important to note that this project will support the County's population to provide equitable access to housing. The project will also be implementing infrastructure improvements to service the proposed homes.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(m) Protect summits, slopes, and ridgelines from inappropriate development.			✓
Implementing Actions:			
(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: **Although the proposed project repurposes lands designated for agricultural uses for homes, the project area is located within the Urban and Rural Growth Boundaries as designated by the County of Maui's Maui Island Plan and within an area planned for growth. The proposed project will be implemented in a developed area in Central Maui, in proximity to existing infrastructure and services and in an area outside of flood, tsunami, and sea level rise hazard areas. Additionally, the project will abide by the buffers from neighboring development as provided for in the Maui Island Plan.**			
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: **As previously discussed, the proposed project will be developed on lands designated for agriculture use. Although designated for agriculture, the lands have not been in cultivation for over a decade, aside from intermittent cattle grazing. In the context of the amount of viable agriculture lands on the island of Maui, implementation of the proposed action is not considered to adversely affect agricultural productivity on Maui. As such, the objective of improving planning for and managing agriculture lands and rural areas are not applicable to this project.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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.		✓	
(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 objective and policies are indirectly applicable to the proposed project. The proposed project will include landscaped areas and various park areas to ensure adequate green space for the development's residents.**			
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: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **The proposed project entails the development of affordable housing for Maui County's residents. The design and environmental review processes involved detailed analysis of the proposed project's potential impacts on the environment, infrastructure, and socio-economic conditions. In addition, opportunities for public input were afforded through the environmental review process and community outreach meetings with neighboring property owners.**			
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: **The objective of strengthening governmental planning, coordination, consensus building, and decision making along with the policies that support this objective is not directly applicable to the proposed project. However, it is important to note that continuing coordination between government entities is critical to the success of the project.**			
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: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **As mentioned previously, the design and environmental review processes involved opportunities for the public to provide input throughout the Chapter 343, HRS environmental review and Chapter 2.97 (MCC) application process. Public meetings and requests for comments were included which provided the space for engagement and feedback opportunities.**			
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 Lanaʻi and Molokaʻi 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: **The objective and policies as it relates to improving the efficiency, reliability, and transparency of County government's internal processes and decision making is not applicable to the proposed project.**			
Objective:			
(4) Adequately fund in order to effectively administer, implement, and enforce the General Plan.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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 objective and policies regarding the funding of the General Plan do not apply to the proposed action. The project acknowledges the importance of this objective and the importance of the General Plan.**			
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: **The objective and policies regarding the County of Maui implementing cultural and environmental practices does not apply to the proposed project.**			

MAUI ISLAND PLAN ANALYSIS TABLE

APPENDIX

H-2

APPENDIX "H-2"

MAUI ISLAND PLAN
ASSESSMENT OF PROJECT APPLICABILITY
TO GOALS, OBJECTIVES, AND POLICIES

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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 provides additional affordable housing opportunities for Maui's residents in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. Further, the proposed project will provide for additional housing options for local families seeking to live on Maui island to be closer to their families and local employment, education, and social opportunities.**			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
***Analysis*: The objective and policies related to maintaining an island cultural and lifestyle that is healthy and vibrant are not directly or indirectly applicable to the proposed project.**			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.	✓		
***Analysis*: The objectives and policies relating to ensuring an effective and efficient planning and review process incorporating best available cultural resources inventory, protection techniques, and preservation strategies and enhancement of the island's historic, archaeological, and cultural resources are directly and indirectly applicable to the proposed project. A CIA was prepared for the proposed project as part of the environmental review process. Refer to Appendix "E". The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area. In this context, the proposed action advances the objective policies related to preserving local cultures and traditions. A HRS 6E submittal for the project was uploaded to SHPD's HICRIS system in December 2020. It is noted that the project site was included in prior archaeological reviews where SHPD determined that "no historic properties" would be affected. Refer to Appendix "D", Appendix "D-1", and Appendix "D-2". Landscaping proposed in connection with the project is intended to enhance the project's visual relationship with its immediate surrounding environs.**			
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 'Ahihi-Kina'u Natural Area Reserve, Honolua-Mokulē'ia 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.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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 restoration; 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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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 objectives and policies related to shoreline, reefs, and nearshore waters are indirectly applicable to the proposed project. The proposed project is located approximately three (3) miles inland, and not in close proximity to the shoreline. With the spatial separation, there are no direct project considerations as it relates to shoreline management programming, reef health, coastal water quality, marine life or shoreline lands and access rights. However, inasmuch as the proposed action does involve grading and earth moving activities, the project may be considered to have indirect applicability to objectives and policies relating to coastal water quality. As such, appropriate BMPs will be implemented during construction to ensure that soil erosion and runoff do not adversely affect coastal waters.**			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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 Hawaiʻi 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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
Policies:			
2.3.5.a Discourage development and subdivision of land within critical watersheds and in areas susceptible to high erosion and sediment loss.			✓
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 objectives and policies related to protecting healthy watersheds, streams, and riparian environments are indirectly applicable to the proposed project. The proposed project will implement LID measures throughout construction so as to mitigate any stormwater runoff resulting from the proposed development. Furthermore, appropriate BMPs will be used during construction and applicable drainage detention measures will be provided for the long-term habitation of the site.**			
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: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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 transfer tax; revenues from the Transient Accommodations Tax; development mitigation fees; and other appropriate funding sources.			✓

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***Analysis*: The environmental review process for the proposed action included a flora and fauna survey addressing biological resources in the project area. This assessment addresses the objective of identification and protection (as applicable) restoration of wildlife habitats. No species of concern were found in the project area. Refer to Appendix "C". As such, the objectives and policies related to wildlife and natural areas on Maui are indirectly supported by the proposed project.**			
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.			✓

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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*: The objectives and policies relating to protecting and maintaining scenic resources are indirectly applicable to the proposed project. The proposed project will be implemented above and away from Honoapiʻilani Highway, which provides views of Haleakalā and the West Maui Mountains. The project has been carefully designed taking into consideration building profiles and massing so as to not adversely impact scenic views and vistas. The proposed dwellings will be similar in scale and size to existing residential developments nearby and will be built in accordance with established subdivision standards.**			
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.			✓

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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*: The objectives and policies related to making Maui disaster-resilient are not directly or indirectly applicable to the proposed project. The proposed action is limited to the development of a new residential subdivision which will benefit Maui's low-income families and individuals.**			
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.		✓	

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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.			✓
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 objectives and policies related to economic diversification are directly and indirectly applicable to the proposed project. The proposed project will generate short-term construction-related employment opportunities, as well as supporting the construction industry as a whole, including local businesses that rely on said industry. Further, the proposed action will indirectly affect the local economy, as it is anticipated that residents of**			

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the project will support small businesses nearby. The residential development also includes 16 live-work units, in which its residents are able to conduct their small-business operations through their homes. This helps these business owners save on operational costs such as storefront rent. Lastly, the proposed project will provide affordable housing options for individuals and families living on Maui.			
TOURISM			
Goal:			
4.2 A healthy visitor industry that provides economic well-being with stable and diverse employment opportunities.			✓
Objective:			
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.			✓

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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.			✓
***Analysis*: The proposed project does not have direct or indirect relationships to the goal for tourism and its accompanying objectives for increasing the visitor industry's contributions to our island's quality of life, managing future visitor unit expansion, and maximizing residents' benefits from the visitor industry.**			
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.			✓

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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.			✓
4.3.3.c Work with educational institutions and appropriate agencies to provide education and training for farm owners and entrepreneurs.			✓
***Analysis*: The proposed project does not have direct or indirect relationships to the goal for agriculture and its related objectives for consumption for locally produced fruits and vegetables, maintaining or increasing agriculture's share in the local economy, and expanding diversified agricultural production. The proposed project is located on fallow agricultural lands that have not been used for agricultural production in many years. As such, the proposed action is a prudent use of the land to provide much needed housing for Maui County's individuals and families.**			
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 Kihei, as a center for research and development, education, and diversified economic development, as provided by the Maui County Code.			✓

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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*: The proposed project does not have direct or indirect relationships to the goal for emerging sectors. The accompanying objectives for increased investment in and expansion of emerging industries, and increased development of renewable energy technologies are not affected by the proposed action.**			
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*: The proposed project consists of the development of a new residential subdivision in the Wailuku community which will benefit families and individuals. Though the goal of making small businesses play a key role in Maui's economy is not directly applicable to the proposed project, it is anticipated that residents of the project will support small, locally-owned businesses that are in the vicinity. The residential development also includes 16 live-work units, in which its residents are able to conduct their small-business operations through**			

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their homes. This helps these business owners save on operational costs such as storefront rent. As such, the objective and policies related to small-business development are indirectly applicable to the proposed action.			
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:			
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.			✓

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***Analysis*: The proposed project does not have direct or indirect relationships to the goal for the health care and its related objectives for expanding the economic benefits of the health care sector, increasing efficiency of the health care delivery system, minimizing the costs of health care, and expanding Maui's alternative health care system.**			
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 Hawai'i 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.			✓
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.			✓

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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*: The goal for education and workforce development is not directly or indirectly applicable to the proposed action. As well, the related objectives of improving preschool and K-12 education, increasing higher education certificates and degrees, and developing more jobs in the STEM-related sectors are not affected by the proposed project.**			
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.	✓		
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.			✓

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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			✓
(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.			✓

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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:			
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 provides additional affordable housing opportunities for families and individuals in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. The proposed development will be located near other urban areas, making prudent use of existing infrastructure and resources. Furthermore, the proposed project will consist of various housing types, such as multi-family/condominium,**			

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duplex, studio, single-family, and live-work units. As such, the goal, objectives, and policies related to housing are indirectly and directly applicable to the proposed project.			
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 objective and policy related to solid waste facilities is indirectly applicable to the proposed project. Solid waste generated by the project during construction will be recycled to the extent practicable and disposed at appropriately permitted construction waste disposal sites.**			
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.		✓	

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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.			✓
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*: The proposed project will connect to the County wastewater system. Coordination will be undertaken with the DEM to determine if certain improvements to the County's wastewater system will be required to service the project aside from the new sewerline that is proposed as part of the overall project.**			

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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.			✓
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.			✓

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***Analysis*: The objective and policies related to water service, systems and quality are indirectly applicable to the project. The project is located in an area that is serviced by existing County water infrastructure. Coordination will be undertaken with the DWS to determine if certain improvements to the County's water system will be required to service the project. Refer to Appendix "B".**			
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.			✓
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.		✓	

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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 provide improvements to safely integrate the project generated traffic to local roadways. Bike and pedestrian paths will be developed as part of the proposed project to further promote utilization of multimodal transportation methods. Refer to Appendix "G".**			
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.			✓
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.			✓

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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*: The proposed project does not directly or indirectly affect the goal and objectives for transit, specifically those relating to the advancement of an integrated island wide transit system, and funding to support transit improvements and operations.**			
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*.			✓
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.		✓	

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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.			✓
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*: Though the proposed project mainly consists of the development of a new residential subdivision, the proposed action will include various roadway improvements within the development. Additionally, the proposed action includes the development of small,**			

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"pocket" park areas to provide green spaces for residents for recreational use and add aesthetic value to the overall project. Additionally, the proposed improvements include a playground and pavilion within the project.			
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.			✓
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*: The proposed action does not have direct or indirect relationships to the goal for public facilities. In this context, the project does not advance or promote the objective or more effective planning for public facilities which meet community needs.**			
SCHOOLS AND LIBRARIES			
Goal:			
6.8 Maui will have school and library facilities that meet residents' needs and goals.		✓	

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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.		✓	
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*: Through the payment of impact fees to the DOE, the proposed project indirectly ensures the provision of adequate and accessible educational services and facilities in Central Maui. Further, the objective and policy related to providing a more expansive network of safe and convenient pedestrian-friendly streets, trails, pathways, and bikeways between neighborhoods and schools is indirectly supported by the proposed action, as there will be sidewalks installed within the project site.**			

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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.			✓
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.			✓

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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*: The proposed action does not have direct or indirect relationships to the goal for healthcare. In this context, the project does not advance or promote the objectives for greater healthcare system autonomy, increase long-term care capacity and alternatives, support home care and community based programs, and improve preventative medicine and primary health care.**			
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.		✓	
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.		✓	

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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:			
6.10.4 More efficient distribution of power throughout the island while preserving island beauty.			✓
***Analysis*: The objective and policies related to meeting Maui's energy needs through local sources of clean, renewable energy, and through conservation are indirectly applicable to the proposed project, as it will incorporate energy efficient features to the extent possible. Features may include solar hot water heaters or other energy efficient hot water devices, energy efficient light fixtures in the parking areas, and use of architectural features on the residential units.**			

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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:			✓
(1) Accommodate increasing volumes of cargo;			✓
(2) Provide deeper pier depths and greater fuel-receiving and storing capacities; and			✓
(3) 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:			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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*: The goal for harbors and airports are not applicable to the proposed project. In particular, the project does not advance or promote the upgrading of harbor and airport facilities, and establishing appropriately planned and functional small boat harbors.**			
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
7.1.3.b Discourage land use and urban design that impedes interconnectivity between adjacent communities.			✓
***Analysis*: The proposed action does not have direct or indirect relationships to the goal for agriculture. As previously discussed, the proposed project will be developed on lands designated for agriculture use. Although designated for agriculture, the lands have not been in cultivation for over a decade, aside from intermittent cattle grazing. In the context of the amount of viable agriculture lands on the island of Maui, implementation of the proposed action is not considered to adversely affect agricultural productivity on Maui. In addition, it is noted that the proposed action will be located adjacent to existing, similarly scaled residential subdivisions.**			
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.			✓
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.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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 is located within the Urban and Rural Growth Boundaries as designated by the County of Maui MIP and within an area planned for growth. Furthermore, the proposed project will be outside of the 200-foot buffer from other residential developments. As such, the proposed project is directly and indirectly applicable with this goal, objective, and policies.**			
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.			✓
7.3.1.i Discourage land use and urban design that impedes inter-connectivity between adjacent communities.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
7.3.3.d Strongly encourage the preservation of buildings, structures, and sites of historic significance.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	NA
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.			✓
***Analysis*: The proposed project provides affordable housing opportunities for families and individuals in an area that is close to the government, business, and commercial centers of Wailuku and Kahului. The proposed project will be located in Wailuku, in proximity to the small businesses and public facilities that are offered to the community. Furthermore, the proposed**			

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project consists of various housing types, such as multi-family/condominium, duplex, live-work, studio, and single-family units. The proposed action includes installation of small, "pocket" park areas as well as sidewalks and bike paths within the development for residents' recreational use. Further, the proposed project has and continues to seek community involvement and input in the land use planning process. Ongoing coordination with various State and County agencies ensures that the proposed action accounts for and mitigates, to the extent possible, long-term cumulative impacts resulting from the development.				
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.			✓
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.			✓

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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*: The proposed project is located within the Urban and Rural Growth Boundaries of the County of Maui's MIP. The project is in consonance with the objective and policies of the MIP and within an area planned for growth.**				
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.			✓
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.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable		DA	IA	NA
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*: The proposed project is located within the Urban and Rural Growth Boundaries of the County of Maui's MIP. The development will be located in Wailuku, near community facilities and local businesses. The project is indirectly applicable to the objective and policies of the Rural Growth Boundaries.**				
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*: Protected areas, as defined in Table 8-2 of the MIP are those lands categorized as preservation, park, greenbelt, greenway, and sensitive land. The proposed action does not occur on protected areas as delineated on Diagram WC-1.**				

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