VOLUME II OF II

(Including Appendices K to O-4)

Final Environmental Assessment

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPUʻILANI ROAD TO VICINITY OF KAʻONOʻULU STREET)

Prepared for:

County of Maui
Department of Public Works

In Cooperation with:
U.S. Department of Transportation
Federal Highway Administration

August 2025

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Prepared by:

Munekiyo Hiraga

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PRELIMINARY ENGINEERING SYNOPSIS

Established 1969

Preliminary Engineering Synopsis

Liloa Drive Extension
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

County Project No. 16-23
Federal Aid Project No. STP - 3115(001) &
STP - 3115(004)

Kihei, Maui, Hawaii
TMK: (2)3-9-01: 156 & (2)3-9-57: 028 and
Portions of TMK: (2)2-2-24: 024; (2)2-2-25: 111;
(2)2-2-26: 117; (2)3-9-01: 007, 149, 164;
(2)3-9-57: 029; and (2)3-9-62: 020

Prepared For:

Engineering Division
Department of Public Works

CLIFFORD N. MUKAI
LICENSED PROFESSIONAL ENGINEER
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HAWAII, U.S.A.

License Expires April 30, 2026

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Date: November 3, 2023
Revised: December 19, 2024

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Preliminary Engineering Synopsis for Liloa Drive Extension (Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

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J. Tsunami Evacuation Map (Kihei Map 2)
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B. Preliminary Geotechnical Engineering Exploration Report
C. Preliminary Traffic Impact Analysis Report
D. Preliminary Landscape Irrigation Demand (from Landscape Architect)

Preliminary Engineering Synopsis for Liloa Drive Extension (Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

I. INTRODUCTION

A. OBJECTIVE:

This treatise has been prepared as a summary and preliminary engineering evaluation of the proposed Liloa Drive Extension (LDE) project, from the vicinity of East Waipuilani Road to the vicinity of Kaonoulu Street, including existing infrastructure in the vicinity of the project and anticipated project improvements.

Additional relevant engineering documents include the following:

- A Preliminary Drainage Report has been prepared ["Draft – Preliminary Drainage Report for Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road) (dated May 2023)] and is contained in APPENDIX "A".
- A Preliminary Geotechnical (Soils) Engineering Exploration Report has been prepared ["Final Draft Submittal, Pavement Justification Report, Liloa Drive Extension, Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street, Kihei, Maui, Hawaii" (dated July 30, 2021, prepared by Geolabs, Inc.)] and is contained in APPENDIX "B".
- A Traffic Impact and Analysis Report has been prepared ["Traffic Impact Analysis Report, Liloa Drive Extension – East Waipuilani Road to Kaonoulu Street, Kihei, Maui, Hawaii, Final Draft" (dated March 27, 2023, prepared by Austin, Tsutsumi & Associates, Inc.)] and is contained in APPENDIX "C".
  - This report has been updated to reflect the recently completed State of Hawaii Department of Transportation's (HDOT) Double-Lane Roundabout at the intersection of Pi'ilani Highway and Kulanihakoi Street.

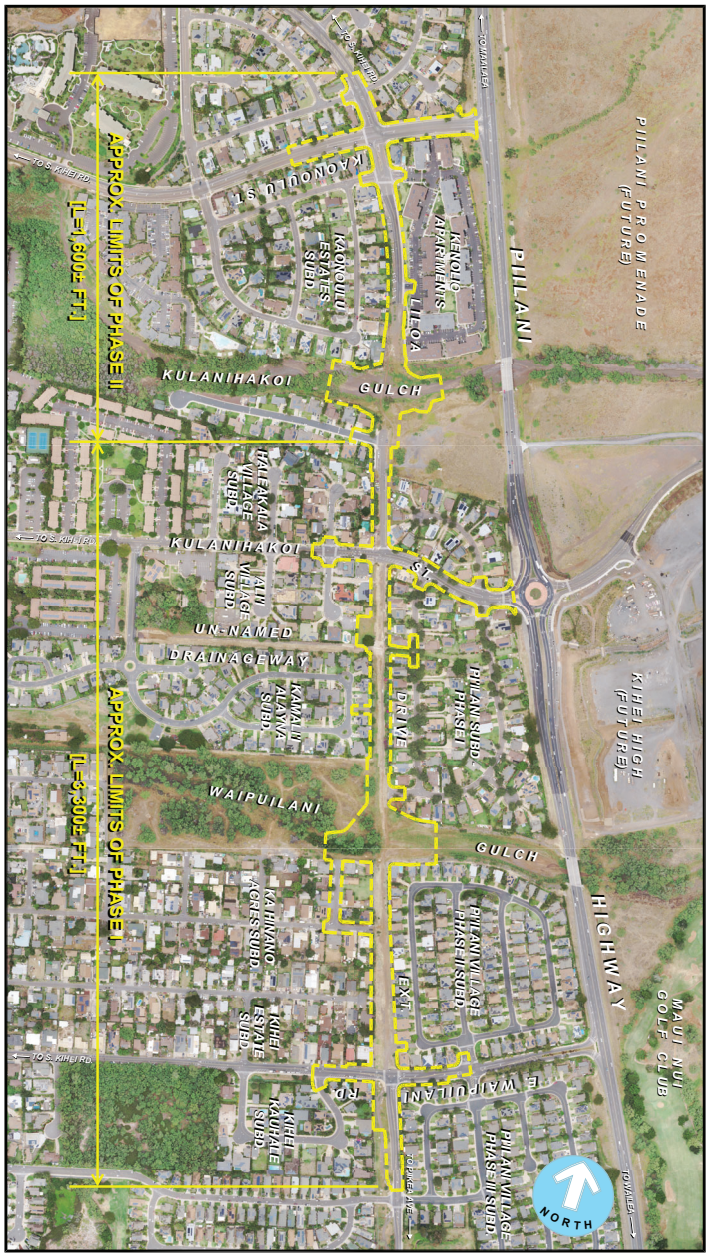
A more comprehensive, detailed evaluation of existing conditions, potential impacts and mitigative measures are addressed through an Environmental Assessment (prepared by others as a separate, compiled document).

B. SITE LOCATION:

1. GENERAL

Kihei, on the island of Maui, is located on the southern slope, along the leeward side of Haleakala, a dormant shield volcano rising up to approximately 10,000 ft. above mean sea level (M.S.L.).

The LDE project site (see Exhibit "A" – Project Location Map) is located in Kihei, and is proposed to consist of an approximately 4,900± ft. long segment of a new



LEGEND:
Project Limits

Date of Photo: April 18, 2023

FIGURE 1 - Aerial Photo of Project Site & Immediate Vicinity

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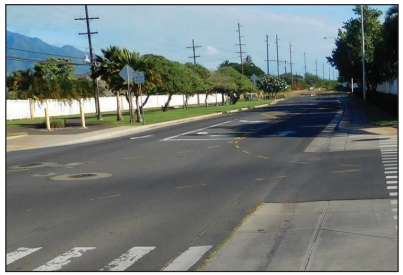


Figure 2 – North Terminus of Existing Liloa Drive [looking in a northerly direction from intersection of Liloa Drive and Kauha'a Street, with the existing Kihei Bikeway shown along the left (makai) side of the roadway]



Figure 3 – Proposed Liloa Drive Ext. at East Waipuilani Road [looking in a northerly direction from intersection of Liloa Drive and East Waipuilani Road]

two-lane roadway integrating a landscaped, shared use path, aligned generally in a north-south direction, parallel to and between Pi'ilani Highway and South Kihei Road. (See Figure 1 for a recent aerial photo of the project site and immediate vicinity).
The project site is situated approximately (see Exhibit "B" – General Plan):

- 400± to 800± ft. west (makai) of Pi'ilani Highway;
- 2000± ft. east (mauka) of South Kihei Road; and,
- 3000± feet inland (easterly) from the Pacific Ocean.

The LDE project is the continuation of the existing Liloa Drive (formerly known as North-South Collector), including the existing, pedestrian-friendly, landscaped Kihei Greenway – Shared Use Path hereinafter referred to as "Kihei Bikeway" (see Figure 2); and, generally follows the master planned roadway reserve corridor between the following:

- Its northerly terminus in the vicinity of the existing intersection of Kaonoulu Street and Kenolio Road, located approximately 500 ft. west (makai) of Pi'ilani Highway and,
- Its southerly terminus in the vicinity of the existing intersection of East Waipuilani Road and Liloa Drive, located approximately 1,000 ft. west (makai) of Pi'ilani Highway (see Figures 2 & 3); and includes realigning and integrating the north end of the County's previously constructed Kihei Bikeway.

Since the 1980s, wherever feasible, the County's Department of Public Works (DPW) has attempted to work closely with adjoining developers to proactively master plan and set aside additional right-of-way and/or linear bikeway reserves (outside of the vehicular roadway right-of-way), to accommodate the future pedestrian-friendly, landscaped bikeway (see Exhibit "M" – Proactive, Master-Planned Roadway Corridor; and, Reserves and Easements Established by County Department of Public Works for Future Pedestrian-Friendly, Landscaped Bikeway).

Heading in a northly direction from its southernly terminus in the vicinity of East Waipuilani Road (see Exhibit "B" – General Plan and Exhibit "C" – Conceptual Site Plan):

- LDE is located generally within the existing, undeveloped roadway corridor reserve between Pi'ilani Village Phase II Subdivision to the west (mauka) side; and, Kihei Estates Subdivision and Ka Hinano Acres Subdivision along the east (makai) side;
- LDE then continues northward and crosses Waipuilani Gulch (see Figure 4);
- LDE then continues northward along the existing, undeveloped roadway corridor (including areas within existing bike path easements to be dedicated to the County) between Pi'ilani Subdivision – Phase I on the west (mauka) side; and, undeveloped parcel TMK (2) 3-9-01:007, Kamali'i Alayna Subdivision and Ali'i Village Subdivision along the west (makai) side;
  - There is an existing 6-ft. asphalt concrete paved bike and jogging path (beginning at Kulanihakoi Street, extending just north of the Mahealani Street intersection and terminating at a turnaround), which was constructed in conjunction with Pi'ilani Subdivision – Phase I.
- LDE continues northward and crosses the Un-Named Drainageway that runs from Pi'ilani Highway, within Pi'ilani Subdivision – Phase I, and along Kamali'i Alayna



Figure 4 – Location of Proposed Waipuilani Gulch Bridge crossing between the Pi'ilani Subdivision – Phase I and Pi'ilani Village Phase II Subdivision



Figure 5 – Proposed Liloa Drive Ext. at Box Culvert Crossing for the Un-Named Drainageway [looking in a southeasterly direction towards the abutting Pi'ilani Subdivision – Phase I]

Subdivision's northern property line (see Figure 5).

- LDE then crosses Kulanihakoi Street and continues northerly along the existing, partially improved roadway corridor between Pi'ilani Subdivision – Phase I and undeveloped parcel TMK (2) 3-9-01:149 on the east (mauka) side; and, Haleakala Village Subdivision and Kaonoulu Estates – Phase V on the west (makai) side;
  - Beginning on the north side of Kulanihakoi Street, the name of the existing paved street segments along LDE corridor have been referred to as "Kenolio Street" (see Figure 6) and continues with this nomenclature through the end of the project.
- LDE then crosses Kulanihakoi Gulch (see Figure 7);
- LDE then continues within the existing, partially improved roadway corridor between Kenolio Apartments on the east (mauka) side; and, Kaonoulu Estates – Phase IV on the west (makai) side, to its existing intersections with Hoopili Akau Street and Kaonoulu Street, in the vicinity of its northerly terminus.



Figure 6 – Proposed Liloa Drive Ext. at Kulanihakoi Street [looking in a northerly direction from the vicinity the future intersection of proposed Liloa Drive Ext. and Kulanihakoi Street]



Figure 7 – Proposed Liloa Drive Ext. at Kulanihakoi Gulch Crossing [looking in a northerly direction from the vicinity of the future intersection of proposed Liloa Drive Ext. and Heona Place]

2. COUNTY OF MAUI SPECIAL MANAGEMENT AREA (SMA)

The entire project site is located within the County of Maui Special Management Area (SMA; see Exhibit "L" – Special Management Areas).

C. GENERAL PROJECT BACKGROUND AND DESCRIPTION

Originally envisioned as an alternate route parallel to Pi'ilani Highway and South Kihei Road, along an existing master planned north-south roadway corridor, the LDE was formerly known as the N-S Collector roadway (see Exhibit "M").

- Wherever feasible, DPW has attempted to work closely with adjoining developers to proactively master plan and set aside additional right-of-way and/or linear bikeway reserves (outside of the vehicular roadway right-of-way), to accommodate the future pedestrian-friendly, landscaped bikeway.
  - Portions of the first segment of a paved bike and jogging path were also constructed along this corridor, between Kulanihakoi Street and Waipuilani Gulch (in conjunction with the construction of Pi'ilani Subdivision – Phase I) as early as 1991, with a temporary turnaround terminus just north of Waipuilani Gulch.
  - The proposed LDE will improve traffic circulation and help to alleviate existing traffic congestion with an additional route through Kihei west (makai) of, and roughly parallel to, the existing Pi'ilani Highway.
  - The proposed LDE will also serve as an alternate route in the event of flooding, emergencies or during unexpected closures of Pi'ilani Highway and/or South Kihei Road.
  - The entire proposed LDE project corridor is located well above and inland (mauka) of any designated 3.2-foot Sea Level Rise Exposure Areas (see Exhibit "I" – Sea Level Rise Map).

In addition to enhancing local vehicular circulation throughout the Kihei area, Liloa Drive Extension will also incorporate a landscaped shared use path (i.e, Kihei Bikeway), providing opportunities for a pedestrian-friendly linear pathway along LDE as well as attractive pedestrian-friendly connectivity and continuity to the adjacent residential subdivisions in the area and the previous phases of the County's Kihei Bikeway projects that currently extend southerly to its terminus fronting the South Maui Community Park. Accordingly, LDE is expected to enhance access for residential communities in this area to destinations such as schools, medical offices, park and recreation facilities, etc. The construction of the LDE roadway, improved shoulders, fire hydrants, and bikeway will also serve to greatly reduce the potential for uncontrolled brush fires, which have damaged and/or destroyed adjoining residential structures in the past.

The proposed alignment, scope, and connections between LDE and the adjacent roadways, as well as its relation to the existing and proposed regional projects in the vicinity (e.g., Pi'ilani Subdivision – Phase I, Kenolio Apartments, Kaonoulu Estates, etc.) are shown on Exhibit "B" - General Plan.

The typical roadway sections along the proposed LDE and its connections are depicted on Exhibit "D" - Typical Sections.

Wherever practicable, to minimize the disruption to the community and traffic, underground utilities for basic services (e.g., drainage, wastewater, non-potable and potable water) are expected to be installed in conjunction with the construction of LDE.

Typical anticipated infrastructure improvements are expected to generally consist of:

- Clearing, grubbing, and grading the existing and proposed roadway corridor.
- Implementation of single-lane roundabouts at the three (3) major intersections along Liloa Drive Ext. (See Figures 15.1-15.3):
  - East Waipuilani Road;
  - Kulanihakoi Street; and,
  - Kaonoulu Street.
- Implementation of modern bridges at the two (2) major drainageway crossings of Waipuilani Gulch and Kulanihakoi Gulch;
- Roadway improvement consisting of: asphalt concrete pavement, concrete curb and gutters, concrete sidewalks and ADA-accessible curb ramps, signage and striping;
- Asphalt concrete paved multi-use pathway (i.e., Kihei Bikeway);
- Retaining walls, railing, fencing and sound walls (where required);
- Streetlights along the roadways, pole mounted lighting, and appurtenances;
- Overhead and underground electrical, telephone, cable and internet systems (including streetlights, pathway lights, underground ducts, transformers, handholes, manholes, ground mounted cabinets, and appurtenances; where required). Existing overhead electrical power transmission lines are expected to remain overhead;
- Relocations and/or replacements of existing wood 69kV utility poles to new, hurricane-resistant metal poles;
- Stormwater culvert crossings (with inlet and outlet structures), drain inlets, manholes, underground drainage system (including drainlines, box culverts, etc.), at-grade detention basins, dry wells subsurface drainage (detention) systems, and appurtenances;
- Underground water transmission and distribution mains (for potable water and fire protection) and appurtenances, where applicable;
- Fire hydrants along entire length of corridor to enhance fire protection for adjoining properties;
- Underground recycled (R1) water transmission mains and appurtenances; and,
- Landscaping and irrigation [expected to be supplied from the new reclaimed (R1) waterline, where available].

Temporary construction-phase measures are expected to be implemented from the inception of any ground disturbing activities, and maintained as required for erosion and sedimentation mitigation (e.g., dust fences, silt fences, filtration berms, temporary sedimentation basins, etc.), pursuant to applicable provisions of:

- Storm Water Permanent Best Management Practices Manual (State of Hawaii Department of Transportation (dated April 2015);
- Chapter 20.08 of the Maui County Code, “Soil Erosion and Sedimentation Control”;
- Construction Best Management Practices (BMPs) for the County of Maui (dated May 2001);

- Title MC-15, Subtitle 01, Chapter 111, “Rules for the Design of Storm Water Treatment Best Management Practices” (adopted November 9, 2012); and,
- Any applicable conditions and requirements of the project-specific National Pollutant Discharge Elimination System (NPDES) Permit, including Hawaii Administrative Rules (HAR) Chapter 11-55, Appendix K.

All sitework construction is expected to conform to the requirements and recommendations of the Project Geotechnical (Soils) Engineer of Record, who shall be a professional engineer licensed to practice in the State of Hawaii; and, the applicable requirements of the Maui County Code. The Owner is expected to retain the Project Geotechnical Engineer of Record, to provide all construction phase monitoring and testing in accordance with the recommendations of the Soils Report and requirements of the County of Maui.

Based on information provided by DPW, the LDE project is currently anticipated to be funded and constructed in two (2) phases (see Figure 1):

- Phase I generally spans approximately 3,300± ft. along the LDE corridor, from the southern terminus in the vicinity of East Waipuilani Road, to its northerly terminus in the vicinity of Kulanihakoi Street.
  - Phase I will include roadway (and associated) improvements for:
    - East Waipuilani Road for transitioning from the existing roadway section to the new intersection configuration;
    - Waipuilani Gulch; and,
    - Kulanihakoi Street for transitions to the State of Hawaii, Department of Transportation’s (HDOT) recently constructed two-lane roundabout; and, for transitioning from the existing roadway sections to the ultimate configurations of this intersection.
- Phase II generally spans the remaining approximately 1,600± ft., from its Phase I terminus in the vicinity of Kulanihakoi Street to the northern terminus in the vicinity of Kaonoulu Street.
  - Phase II will include roadway (and associated) improvements for:
    - Kulanihakoi Gulch; and,
    - Kaonoulu Street for transitioning from the existing roadway sections to the new intersection configuration.

D. EXISTING SITE CONDITIONS

1. GENERAL:

The majority of the LDE corridor is currently undeveloped, and traverses through an unpaved corridor that is currently used by pedestrians and bicyclists traveling to and from the adjacent subdivisions and streets. There have been periodic brush fires along segments of this corridor which may not be readily accessible by fire protection services, and several residential structures have been damaged and/or destroyed in the past.

There are segments of existing paved roadway (with sidewalk on the developer's side), to the north of the Kulanihakoi Street intersection, that have been constructed in conjunction with Pi'ilani Subdivision – Phase I, Kaonoulu Estates – Phase V, and Kenolio Apartments. Natural vegetation in the undeveloped areas includes, but is not limited to, buffelgrass and kiawe trees (see Figure 8). The existing Kihei Bikeway extends southerly along the corridor between East Waipuilani Road and East Lipoa Street, where the LDE will provide the continuation of the Kihei Bikeway northerly from East Waipuilani Road to Kaonoulu Street.



Figure 8 – Proposed Liloa Drive Ext. Along Abutting or Flanking Residential Developments [looking in a southerly direction along the undeveloped roadway reserve corridor in the vicinity of Pi'ilani Subdivision – Phase I]

According to the Soil Survey of the Island of Maui, prepared by the United States Department of Agriculture, Natural Resource Conservation Service (NRCS), the predominant soil classifications underlying the proposed LDE project (see Exhibit "G" – Soils Classification Report) consist of:

- Alae sandy loam (AaB);
  - The predominant Alae sandy loam is characterized as being an excessively drained soil, with low runoff and an erosion hazard which is not more than slight.
  - Slopes: 3 to 7 percent slopes.
- Waiakoa extremely silty clay loam (WID2); and,
  - The Waiakoa extremely silty clay loam is characterized as being eroded, well-drained soil, with medium runoff and a severe erosion hazard.
  - Slopes: 3 to 25 percent slopes.
- Pulehu clay loam (PsA).
  - The Pulehu clay loam, which only occurs at the southernmost portion of the already developed corridor, is characterized as being a well-drained soil, with low runoff.
  - Slopes: 0 to 3 percent.

2. TOPOGRAPHY

The existing ground (see Exhibit "F" – Topographic Survey Map of Existing Grades) is characterized by a gently sloping topography with longitudinal slopes generally ranging from 0% to 5%, and cross slopes of approximately 1% to 4%, generally in an easterly (mauka) to westerly (makai) direction. An earthen berm was created along the west (makai) side of the LDE corridor in the vicinity of Pi'ilani Subdivision – Phase I, Ali'i Village, and Kamali'i Alayna Subdivision. The

LDE corridor existing grade varies in elevation from approximately 11 feet to approximately 33 feet M.S.L.

3. FLOOD AND TSUNAMI ZONES:

According to Panel Number 150003 0586G of the Flood Insurance Rate Map, dated November 4, 2015, prepared by the United States Federal Emergency Management Agency (see Exhibit "H" – Flood Insurance Rate Map):

- The majority of the project site is situated within Zone "X", which is designated as an area outside the 0.2% chance flood plain and of minimal flood hazard.
- At the crossing with Waipuilani Gulch, a portion of the makai side of the project site is in Zone "AO" (Depth 3'), which indicates it is in special flood hazard area subject to inundation by the 1% (i.e., 100-year) annual chance flood where depths are between one (1) and three (3) feet (usually sheet flow on sloping terrain), with the average depth determined to be three (3) feet.
- At the crossing with Kulanihakoi Gulch, a portion of the project site is within Zone "AE" (18'-25') and Zone "XS". Zone "AE" (18'-25') indicates it is within a special flood hazard area subject to inundation by the 1% (i.e, 100-year) annual chance flood where the base flood elevation is determined. Zone "XS" is an area in a low-to-moderate risk flood zone (areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than one (1) foot or with drainage areas less than one (1) square mile; and areas protected by levees from 1% annual chance flood).

Based on the National Oceanic and Atmospheric Administration (NOAA) delineation:

- The majority of the project site corridor is located within the Maui County Extreme Tsunami Evacuation Zone [see Exhibit "J" – Tsunami Evacuation Map (Kihei Map 2)].
- Both the Maui County Tsunami Evacuation and Extreme Tsunami Evacuation Zones extend considerably inland along Kulanihakoi Gulch; with the Tsunami Evacuation Zone extending easterly (mauka) up and across the LDE corridor; and, the Extreme Tsunami Evacuation Zone extending easterly (mauka) of both the LDE corridor and Pi'ilani Highway.

4. WETLANDS

According to the National Wetlands Inventory, U.S. Fish and Wildlife Service, the following general categories of wetlands exist at least approximately 1,400 ft. (or more) downstream, to the west (makai) of the LDE project site corridor (see Exhibit "K" – Existing Wetlands):

- Freshwater Emergent Wetland; and,
- Freshwater Pond

Although a narrow, curvilinear delineation of the general categories Riverine (R4SBA) and Freshwaster Forested / Shrub Wetland (PFO3A) are depicted (see Insets, on Exhibit "K" – Existing Wetlands) to extend upstream in an easterly (mauka) direction along both Waipuilani and Kulanihakoi Gulches; across the LDE corridor; and, continuing further upstream across Pi'ilani Highway, it is our understanding that a detailed, on-ground biological survey and jurisdictional waters delineation (conducted by AECOS, Inc. in 2021) confirmed that:

- Streams were not flowing in the gulches and drainageway at the time of survey; and,
- No vegetation or hydrology indicators suggestive of the presence of wetlands were observed in the lands adjacent to both Waipuilani and Kulanihakoi Gulches.

E. DETAILED PROJECT DESCRIPTION:

As mentioned previously, the existing overall LDE project corridor extends in a southerly to northerly direction, from its southerly terminus in the vicinity of East Waipuilani Road to the vicinity of Kaonoulu Street (see Exhibit "C").

The proposed improvements generally retain the scope of improvements for the existing segments of the recently completed segments of Liloa Drive and Kihei Bikeway, including (where applicable):

- Ten- to twelve-foot-wide vehicular lanes, with turning lanes at roadway intersections;
- Curbs, gutters, and sidewalks;
- Where existing right-of-way widths allow, a 10 to 12 ft. wide asphalt concrete paved shared use path surface with adjoining landscaping and irrigation, appurtenances, and ornamental light poles and fixtures consistent with that already implemented for the Kihei Bikeway, and roundabout at Pi'ikea Avenue / Liloa Drive, projects; and,
- ADA-compliant curb cut ramps at intersections.

The proposed corridor is typically encumbered by the following existing utilities:

- 36" Central Maui High Pressure Water Transmission Main;
- 18" DWS Water Distribution Main;
- Existing or Proposed Segments of WWRD's 12" Reclaimed (R1) Water Transmission Main; and,
- MECO 69kV Overhead Transmission Line.

The following is a more detailed description of the existing conditions and constraints along the progression of the corridor segments:

- Beginning at its southerly terminus in the vicinity of East Waipuilani Road, LDE;
  - Integrates and extends northward approximately 450± ft. of existing improvements located immediately south of the intersection of

East Waipuilani Road and existing Liloa Drive, between Pi'ilani Village Phase III Subdivision and Kihei Kauhale Subdivision, towards Kauha'a Street. Anticipated improvements will include the reconfiguration of the existing Liloa Drive roadway and pedestrian-friendly, landscaped shared use path (the County's previously constructed Kihei Bikeway).

- Incorporates a single-lane roundabout at its intersection of East Waipuilani Road (see Figure 15.1).
- Improvements will extend easterly (mauka) and westerly (makai) along the existing segments of East Waipuilani Road, to transition the existing roadway (e.g., vehicles lanes, sidewalk, curb and gutters, utilities, etc.) to accommodate the roundabout.
- LDE continues northward, along the master planned roadway reserve corridor between Pi'ilani Village Phase II Subdivision and the Ka Hinano Acres Subdivision, towards its intersection with the temporary terminus (dead end) of Namau'u Place at the easterly region of the Ka Hinano Acres Subdivision (see Figures 9 & 10);
  - A 3-way intersection will be implemented at this location with a designated left-turn lane on LDE, for vehicles turning westerly onto Namau'u Place.
    - This will provide an alternate point of access/egress for users at Namau'u Place.
  - The proposed sidewalk along the east (mauka) side of LDE will terminate at this intersection and begin again at the intersection of Mahealani Street, noted below to allow the proposed bridge to be contained within the existing right-of-way.
  - Traveling northerly from Namau'u Place, LDE continues along the roadway reserve corridor between Pi'ilani Village Phase II Subdivision and Ka Hinano Acres Subdivision towards Waipuilani Gulch.



Figure 9 – Existing Temporary Terminus of Namau'u Place [looking in an easterly direction from the existing easterly (mauka) terminus (dead end) of Namau'u Place towards proposed Liloa Drive Ext.]



Figure 10 – Existing Temporary Terminus of Namau'u Place [looking in a northwesterly direction from proposed Liloa Drive Ext. towards the existing easterly (mauka) terminus (dead end) of Namau'u Place]

- The elevation of the LDE roadway will begin to rise to account for the proposed bridge crossing at Waipuilani Gulch.
  - Accordingly, the existing adjoining corners of both the Pi'ilani Subdivision – Phase I and Pi'ilani Village Phase II Subdivision were master planned, designed and graded to the future, anticipated higher finish grade elevations to facilitate the future Liloa Drive Extension bridge crossing at Waipuilani Gulch.
  - The SW and NW corners of Pi'ilani Subdivision – Phase I and Pi'ilani Village Phase II Subdivision, respectively, have incorporated retaining walls to accommodate the anticipated LDE bridge crossing.
  - Thus, retaining walls are anticipated along the western (makai) side of the LDE corridor to account for the existing 6-ft.(±) elevation difference between Ka Hinano Acres properties and proposed LDE roadway in this transitional area.
- At Waipuilani Gulch, a concrete bridge (constructed with precast prestressed planks and concrete topping) crossing will be implemented to traverse the gulch (which spans approximately 260 ft. in width), approximately 800 ft. west of the existing Waipuilani Bridge along Pi'ilani Highway.
  - The invert lining and side slopes of the gulch will be stabilized upstream and downstream using various materials (e.g., concrete, grouted rubble paving, turf reinforcement matting, etc.) to ensure that the natural, original flow pattern of the gulch is generally maintained.
  - The bridge will be designed to accommodate the 100-year flow, providing 2-feet (minimum) of freeboard between the water surface elevation and bridge soffit, as required by HDOT.
- Continuing northerly, a new intersection between LDE and Mahealani Street, near the SW corner of Pi'ilani Subdivision – Phase I, will be created.
  - The existing temporary terminus of Mahealani Street was master planned, designed and built-up [utilizing a Cement Rubble Masonry (CRM)



Figure 11 – Existing Terminus of Mahealani Street [looking in a westerly direction at SW corner of Pi'ilani Subdivision – Phase I, Master Planned for Future Proposed Connection with Liloa Drive Ext.]



Figure 12 – Existing Terminus of Mahealani Street [looking in a southerly direction along Liloa Drive Ext.]

retaining wall which extends from Waipuilani Gulch to north of this intersection along the east (mauka) side of LDE] to connect (at these required higher finish grade elevations) resulting from the bridge crossing (see Figures 11 & 12).
  - Based on design collaboration and ultimate direction from DPW Engineering Division, this proposed intersection will be limited to right turns in/out only to accommodate constraints in the width of the adjacent, proposed Waipuilani Gulch bridge crossing.
  - Retaining walls are anticipated along the western (makai) side of the LDE corridor to account for the existing 7-ft.(±) elevation difference between Mahealani Street and the adjacent existing ground elevations of the undeveloped property.
- LDE continues northerly approximately 600 ft. along the roadway reserve corridor between Pi'ilani Subdivision – Phase I and Kamali'i Alayna Subdivision; and, reaches the Un-Named Drainageway (see Figure 5).
  - An existing 10'-0" wide bike path easement (designated for bike path and landscaping purposes), located along the eastern (mauka) boundary of Kamali'i Alayna Subdivision, will be utilized for the Kihei Bikeway and associated improvements.
  - The existing concrete box culvert (at the Un-Named Drainageway) will be extended at its crossing with LDE and allow the runoff to continue its present course down the Un-Named Drainageway.
  - Retaining walls are anticipated along both east (mauka) and west (makai) sides of LDE to limit the overall retaining heights for each given wall. The retaining walls are required to account for the existing 6-ft.(±) elevation difference between the higher existing ground elevations of Pi'ilani Subdivision – Phase I and the lower Kamali'i Alayna Subdivision elevations.
- LDE continues northerly approximately 400 ft. along the roadway reserve corridor between Pi'ilani Subdivision – Phase I and Ka Hinano Subdivision towards existing intersection of LDE and Kulanihakoi Street; and, incorporates a single-lane roundabout at its intersection of Kulanihakoi Street (see Figure 15.2) approximately 500 ft. west of the existing recently constructed double-lane roundabout at Pi'ilani Highway.
  - Improvements will extend easterly (mauka) and westerly (makai) to transition the existing roadway (e.g., vehicles lanes, sidewalk, curb and gutters, utilities, etc.) to accommodate the configuration of the roundabout at LDE, as well as the Double-Lane Roundabout at Pi'ilani Highway.
- LDE continues along the master planned roadway reserve corridor between Pi'ilani Subdivision – Phase I on the east (mauka) side and Haleakala Village Subdivision and Kaonoulu Estates – Phase V on the west (makai) side, towards its intersection with Heona Place.
  - The existing 3-way intersection will be reconfigured at Heona Place with a designated left-turn lane on LDE, for vehicles turning westerly (makai) onto Heona Place. Provisions for a future commercial driveway

connection in the easterly (mauka) direction to serve the existing, undeveloped TMK (2) 3-9-01:149 will be implemented.
  - Retaining walls are anticipated along the western (makai) side of the LDE corridor to ensure positive drainage occurs within the LDE corridor.
- LDE continues northerly towards Kulanihakoi Gulch where the existing roadway terminates at the southerly bank of Kulanihakoi Gulch.
- At Kulanihakoi Gulch, a concrete bridge (with precast prestressed planks and concrete topping) crossing will be implemented to traverse the gulch (which spans approximately 200 ft. in width), approximately 500 ft. west (makai) of the existing Kulanihakoi Bridge along Pi'ilani Highway.
  - The invert lining and side slopes of the gulch will be strengthened and stabilized upstream and downstream using various materials (e.g., concrete, grouted rubble paving, turf reinforcement matting, etc.) to ensure the natural, original flow pattern of the gulch is maintained.
  - The bridge will be designed to accommodate the 100-year runoff flow, providing 2-feet (minimum) of freeboard between the water surface elevation and bridge soffit, as required by HDOT.
- LDE will then continue northerly along the master planned roadway reserve, between Kenolio Apartments (recently completed) on the east (mauka) side and Kaonoulu Estates – Phase IV on the west (makai) side.
  - Existing Kaonoulu Estates – Phase IV has been master planned, designed and built up to account for this future bridge crossing at Kulanihakoi Gulch.
  - Kenolio Apartments have installed frontage improvements along their development (including a two-lane asphalt concrete pavement roadway, concrete sidewalk, landscaping, etc.), which terminates just south of its southernmost driveway (see Figure 13).
  - Pursuant to direction from DPW, the southernmost driveway will be reconstructed from the existing driveway apron to a curbed driveway access to promote better traffic circulation on LDE.
  - To account for the existing paved road elevations, grade adjustment walls will be installed to accommodate the Kihei Bikeway, and its associated landscaping.
  - LDE will continue northerly, towards its intersection with Ho'opili Akau Street. The existing 4-way intersection will be reconfigured to provide designated left-turn lanes on LDE in both directions.
- LDE then continues northerly to its north terminus in the vicinity of Kaonoulu Street (see Figure 14).



Figure 13 – Existing Roadway Terminus of Kenolio Road (just south of the southernmost driveway at Kenolio Apartments) [looking in a southerly direction along proposed Liloa Drive. Ext.]

  - At its intersection of Kaonoulu Street, a new single-lane roundabout will be incorporated (see Figure 15.3).
    - Improvements will extend easterly (mauka) to the west (makai) side of Pi'ilani Highway and westerly (makai) to transition the existing roadway (e.g., vehicles lanes, sidewalk, curb and gutters, utilities, etc.) to accommodate the configuration of the roundabout.
  - Traveling northerly, LDE will transition from the roundabout to the existing roadway section where the project will end.



Figure 14 – Existing Intersection of Kaonoulu Street and Kenolio Street in vicinity of Northerly Terminus of Liloa Drive Ext. Project [looking in a northerly direction along Liloa Drive Ext. corridor]

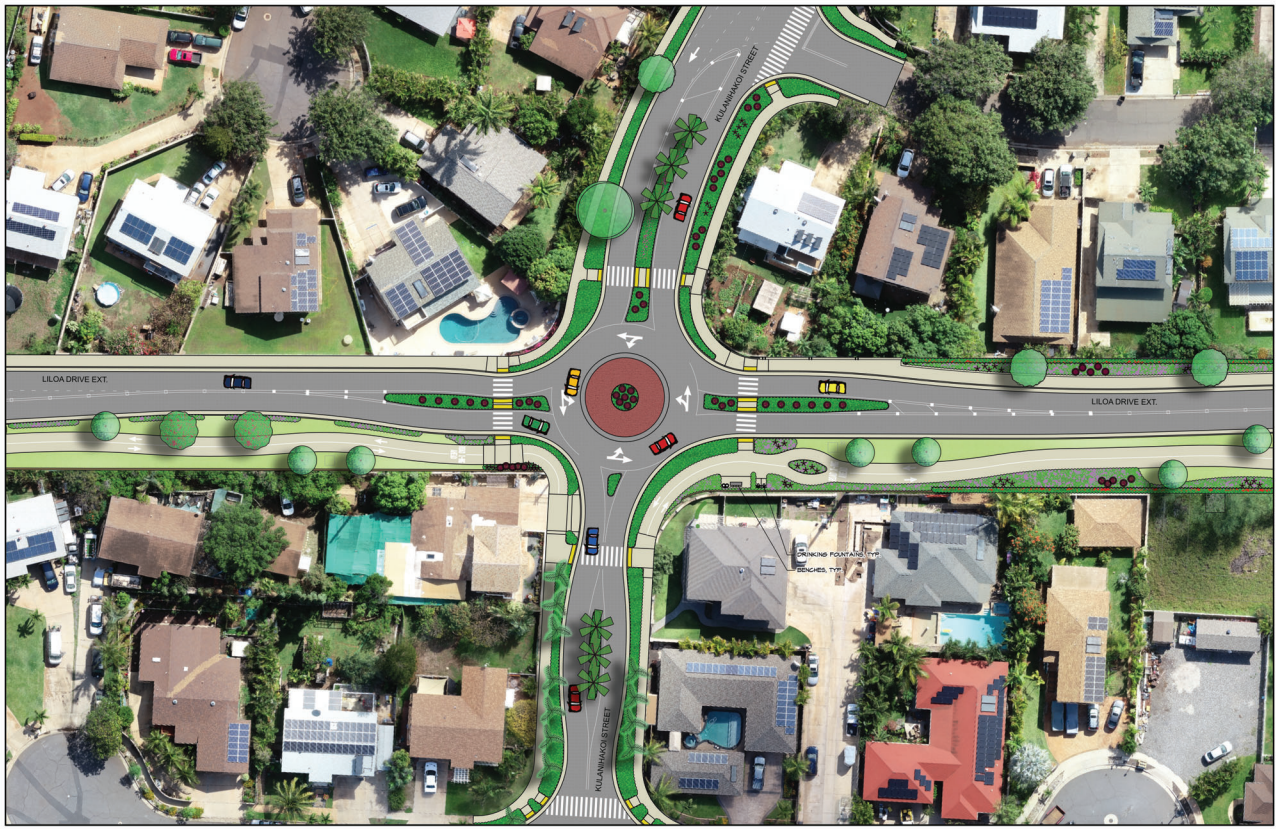


FIGURE 15.2 - Roundabout at Intersection of Liloa Drive Ext. & Kulanihakoi Street

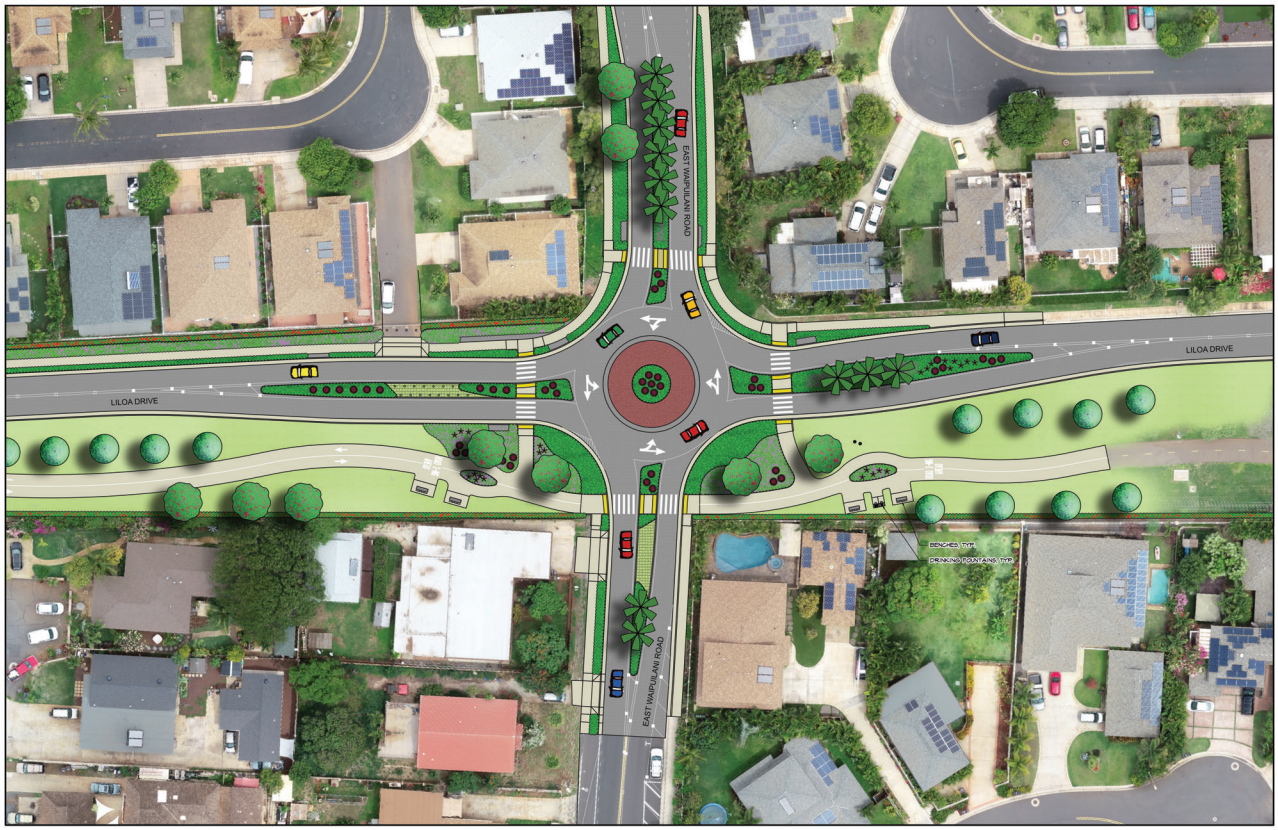


FIGURE 15.1 - Roundabout at Intersection of Liloa Drive Ext. & East Waipuilani Road



FIGURE 15.3 - Roundabout at Intersection of Liloa Drive Ext. & Kaonoulu Street

II. ROADWAY IMPROVEMENTS AND TRAFFIC ASSESSMENT:

A. EXISTING CONDITIONS:

1. PI'ILANI HIGHWAY:

Pi'ilani Highway, which provides access to Kihei and Wailea from areas north of Kihei, is a four-lane, undivided, State arterial highway (between its northerly terminus at South Kihei Road / Maui Veterans Highway (fka Mokulele Highway), and Kilohana Drive / Mapu Place), generally aligned in a north-south direction, parallel to the coastline and South Kihei Road. Pi'ilani Highway narrows to a two-lane, undivided highway from its intersection with Kilohana Drive / Mapu Place to its southerly terminus at Wailea Ike Drive. The shoulder areas of Pi'ilani Highway are designated as bicycle lanes. At the intersection of Pi'ilani Highway and Kulanihakoi Street, the State of Hawaii Department of Transportation (HDOT) recently constructed and opened a Double-Lane Roundabout with two (2) lanes of travel in both the north and south directions along Pi'ilani Highway, to accommodate the the connection to Kulanihakoi High School and Kulanihakoi Street.

Pi'ilani Highway is a high-volume, congested highway, and currently classified as an Urban Principal Arterial. The posted speed limit on Pi'ilani Highway is generally 35 miles per hour (mph). The speed limit on Pi'ilani Highway is reduced to 20 mph between the north and south ends of the recently opened Double-Lane Roundabout at its intersection with Kulanihakoi Street. The speed limit is also reduced to 30 mph near its intersection with Okolani Drive / Mikio Place for a short segment where it is further reduced to 20 mph as it approaches Wailea Ike Drive.

The existing segment of Pi'ilani Highway north of Kilohana Drive was widened to four lanes in 2003. The remaining approximately 1,000 ft. of two-lane highway (from Kilohana Drive to its southerly terminus at Wailea Ike Drive) is expected to be widened to four lanes in the near future (the Final Environmental Assessment was filed in 2012 with Findings of No Significant Impact).

2. LILOA DRIVE (fka N-S Collector):

The existing Liloa Drive (fka N-S Collector) is oriented in a northerly (Maalaea) to southerly (Wailea) alignment, between its current northerly (Maalaea end) terminus at East Waipuilani Road and its southerly terminus at Halekuai Street (where it then continues into the South Maui Community Park as a driveway). Liloa Drive was also constructed as a joint County and private interest project (Road "C" / N-S Collector Federal Aid project) in 2001, and provides



Figure 16 – Existing Segment of Liloa Drive and Kihei Bikeway – Phase I Near Northern Terminus [looking in a northerly direction from the intersection of Liloa Drive and Kauha'a Street]

circulation between East Waipuilani Road and Halekuai Street, and access to the adjoining commercial and residential developments.

From its existing northerly (Maalaea end) terminus at Kulanihakoi Street to East Waipuilani Road, Liloa Drive is an unimproved roadway corridor. A narrow asphalt concrete bike and jogging path exists from Kulanihakoi Street along the Pi'ilani Subdivision – Phase I but terminates at a temporary turnaround short of and just to the north of Waipuilani Gulch. Dirt pathways have been created by pedestrians and bicyclist travelling further along the unimproved segments of this corridor, and some adjacent residents have even utilized this unimproved area for planting gardens.

From East Waipuilani Road, traveling southerly, Liloa Drive is a fully improved two-lane, undivided roadway to Kauha'a Street (i.e., entrance to Meadowlands Subdivision - Phase II), with designated left-turn lanes at each of its intersections, including concrete curbs and gutters on both sides of the roadway, a concrete sidewalk on its easterly (mauka) side. This is the north terminus of the existing fully improved segments of Kihei Bikeway, which is located on the westerly (makai) side of the roadway (see Figure 16).



Figure 17 – Existing Segment of Kihei Bikeway – Phase I Near Northern Driveway of Pi'ilani Shopping Center [looking in a northerly direction from the vicinity of Pi'ikea Park]

Liloa Drive continues as a substantially improved two-lane, undivided roadway, with designated left-turn lanes at the driveway intersections serving Pi'ilani Village Shopping Center, including concrete curb and gutter with sidewalk along its easterly (mauka) side, and an asphalt concrete shoulder and Kihei Bikeway on the westerly (makai) side to the Roundabout at the intersection of Pi'ikea Avenue and Liloa Drive (see Figure 17).



Figure 18 – Existing Roundabout at the Intersection of Pi'ikea Avenue and Liloa Drive [looking in a northeasterly direction towards Pi'ilani Village Shopping Center]



Figure 19 – Existing Segment of Kihei Bikeway – Phase II Near Existing Pi'ikea Avenue & Liloa Drive Roundabout [looking in a southerly direction in the vicinity of existing Pi'ikea Avenue & Liloa Drive Roundabout]



Figure 20 – Existing Segment of Kihei Bikeway – Phase II Along Kihei Elementary and Lokelani Intermediate Schools [looking in a northerly direction in the vicinity of South Maui Community Park]

In 2012, a single-lane roundabout was constructed by the County of Maui at the intersection of Pi'ikea Avenue and Liloa Drive (see Figure 18). Pedestrian crossings across both Liloa Drive approaches are provided with pedestrian-activated flashing beacons.

Liloa Drive continues from the roundabout to Lipoa Street as a substantially improved three-lane, undivided roadway (two northbound lanes and one southbound lane) with concrete curb and gutter and sidewalk along its easterly (mauka) side, and an asphalt concrete shoulder and the Kihei Bikeway on the westerly (makai) side (see Figure 19).

The balance of Liloa Drive, from Lipoa Street to Halekuai Street, consists of a two-lane, undivided roadway with curb and gutter on both sides, a sidewalk on the westerly (makai) side, and the Kihei Bikeway on the easterly (mauka) side (see Figure 20). Portions of both sides of the roadway have on-street parallel parking stalls for the section fronting the Kihei Elementary and Lokelani Intermediate Schools. The Kihei Bikeway currently ends at the existing driveway into South Maui Community Park.

3. KENOLIO ROAD:

Kenolio Road is a two-lane roadway oriented in a northerly (Maalaea) to southerly (Wailea) alignment, between its current northerly (Maalaea end) terminus at Uwapo Road and its southerly improved terminus at the southern driveway of the recently constructed Kenolio Apartments complex (see Figure 21). From Alulike Street to Ho'opili Akau Street, Kenolio Road is a fully improved roadway with two travel lanes, a striped median allowing for designated left-turn lanes at its intersections with local streets, asphalt shoulders, concrete curb and gutters on both sides of the roadway

and sidewalk on the east (mauka) side. Continuing south, Kenolio Road was recently improved along the frontage of the Kenolio Apartment complex with two-lane asphalt roadway with curb and gutter and sidewalk along the east (mauka) side. An asphalt shoulder was constructed on the west (makai) side of the roadway and grades were coordinated with LDE for the full buildout of the roadway with the Kihei Bikeway (see Figure 22). Improved Kenolio Road then starts up again at Heona Place (where there is a stub out at Kulanihakoi Gulch for future extension of the roadway to the north) and continues south to its intersection with Kulanihakoi Street, where the roadway name is changed to Liloa Drive.



Figure 21 – Kenolio Road Northern Terminus at Uwapo Road [looking in a southerly direction towards northern terminus of Liloa Drive Ext.]

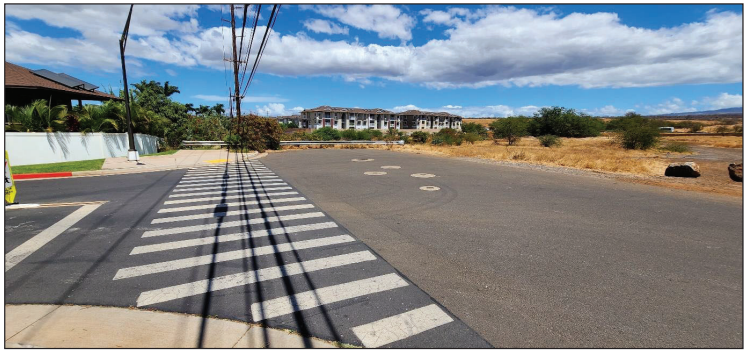


Figure 22 – Kenolio Road Stubout at Heona Place for Future Roadway Extension [looking in a northerly direction towards Kenolio Apartments across Kulanihakoi Gulch]

4. ADJACENT ROADWAYS:

Existing roadways aligned in an east (mauka) to west (makai) direction will provide enhanced access between proposed LDE and Pi'ilani Highway or South Kihei Road include:

- Kaonoulu Street (which is the northerly terminus of LDE) extends easterly (mauka) from its unsignalized intersection with South Kihei Road for approximately 2,500 ft., crossing Kenolio Road at an unsignalized intersection, and terminating at its unsignalized intersection with Pi'ilani Highway.
- Kulanihakoi Street begins at its unsignalized intersection with South Kihei Road, extends easterly (mauka) approximately 2,800 ft., where it crosses Kenolio Road at an unsignalized intersection and continues to the newly constructed Double-Lane Roundabout at its intersection with Pi'ilani Highway.
- Namau'u Place is an approximately 2,000 ft. long roadway that begins at an unsignalized intersection at South Kihei Road, extends easterly (mauka) until it abruptly terminates, stopping just west (makai) of the undeveloped LDE corridor right-of-way.
- East Waipuilani Road begins at its unsignalized intersection at South Kihei Road, extends easterly (mauka) approximately 3,000 ft., crossing Liloa Drive (at its current northern terminus) at an unsignalized intersection, and terminates at a right turn in, right turn out intersection with Pi'ilani Highway.

Pursuant to design collaboration with and ultimate direction from DPW, there will be no connection (either vehicular or pedestrian) to Eleu Place.

- Eleu Place is located approximately 320' north of, and parallel to, East Waipuilani Road and terminates (i.e., dead end) approximately 30'± west (makai) of the existing LDE right-of-way.
  - Eleu Place currently has two (2) ingress/egress locations along East Waipuilani Road; and,
  - Finish grade elevations of LDE cannot be accommodated without significant reconstruction of Eleu Place roadway, which may negatively impact existing drainage patterns.

B. PRELIMINARY TRAFFIC ASSESSMENT:

A preliminary Traffic Impact Assessment Report has been undertaken for the proposed project by a traffic engineering consultant (Austin Tsutsumi & Associates, Inc.) retained by DPW [(see "Traffic Impact Analysis Report, Liloa Drive Extension – East Waipu'ilani Road to Ka'ono'ulu Street, Kihei, Maui, Hawaii, Final Draft" (dated March 27, 2023); prepared by Austin, Tsutsumi & Associates, Inc)] (see APPENDIX "C").

Existing conditions, alternatives considered, and recommended roadway and traffic improvements (both project-specific and regional) are identified and discussed in more detail therein.

C. PROPOSED ROADWAY IMPROVEMENTS:

LDE is proposed to be a community oriented, pedestrian friendly, two-lane road that will enhance access to the regional roadway network and improve circulation, by connecting the existing portions of Liloa Drive and Kenolio Road to ultimately provide one continuous roadway from Uwapo Road in North Kihei to the South Maui Community Park. LDE will help to alleviate the existing traffic congestion with an alternate north-south route parallel to Pi'ilani Highway and South Kihei Road. It will include pedestrian-friendly access and connectivity to nearby residential subdivisions, multi-family apartments, recreational facilities, shopping, eating attractions, schools, parks, and other community-oriented destinations.

LDE is proposed to be a two-lane road (one in each direction and supplemental left and right turn lanes) incorporating a community oriented, pedestrian-friendly, landscaped multi-use path (i.e., Kihei Bikeway) along its entire length on the west (makai) side and concrete sidewalk on the east (mauka) side (see Exhibit "D" - Typical Sections and Exhibit "E" - Conceptual Plan & Profile). This will provide continuity to the previous phases of the County's Kihei Bikeway projects resulting in an attractive, landscaped shared use path that runs approximately 8,300 ft from Kaonoulu Street to the entrance of the South Maui Community Park.

In addition, enhanced circulation and access will be provided between LDE and Pi'ilani Highway, South Kihei Road, and the local Kihei area by extending and/or improving the east-west (mauka-makai) roadway intersections on LDE where adjoining properties and existing right-of-way constraints allow.

New single-lane roundabouts are proposed at the following intersections:

- East Waipuilani Road, the southerly (Wailea end) terminus of LDE (see Figure 15.1).
- Kulanihakoi Street (see Figure 15.2)
- Kaonoulu Street, the northerly (Maalaea end) terminus of LDE (see Figure 15.3).

Features adopted by DPW for these roundabouts include:

- All three (3) roundabouts will be designed to accommodate all turning movements for school buses (S-Bus 40 design vehicle), to enhance access and circulation.
- Curvi-linear splitter islands along with visual and landscaping elements (within any existing spatial constraints) that provide visual cues and delineation to further enhance speed reduction and discourage random pedestrian crossings.
- Pedestrian-activated rectangular rapid flashing beacons (RRFBs) will be installed at the pedestrian crossings at the roundabouts to enhance safety.
- Reasonable accommodation for bicycle connectivity and for residential driveways in close proximity to the roundabouts.

In addition, access to/from existing east-west (mauka-makai) roads and new or updated un-signalized intersections (with extensions of existing east-west roads where required) are proposed at the following locations:

- LDE / Ho'opili Akau Street
- LDE / Heona Place
- LDE / Mahealani Street
  - With enhanced access and circulation in the vicinity at the other nearby intersections, the proposed LDE / Mahealani Street intersection will be restricted to right turns in and out only.
- LDE / Namau'u Place
- In addition, pedestrian access to LDE will be improved and provided through existing reserve corridors for the existing residents at the Pi'ilani Subdivision – Phase I and Kamali'i Alayna Subdivision.

The lane geometry of all intersections and accesses to the LDE project are discussed in more detail in the TIAR ["Traffic Impact Analysis Report, Liloa Drive Extension – East Waipuilani Road to Kaonoulu Street, Kihei, Maui, Hawaii, Draft Final (dated March 27, 2023, prepared by Austin, Tsutsumi & Associates, Inc.)] and is contained in APPENDIX "C".

- This report has been updated to reflect the recently completed State of Hawaii Department of Transportation's (HDOT) Double-Lane Roundabout at the intersection of Pi'ilani Highway and Kulanihakoi Street.

III. DRAINAGE SYSTEM:

A. EXISTING CONDITIONS:

The approximately 4,900 ft. long Liloa Drive Extension (LDE) project is aligned generally in a north-south direction; and, varies in elevation from approximately 6 feet to approximately 35 feet M.S.L., typically with prevailing slopes in the easterly to westerly (mauka to makai) direction, perpendicular to the corridor.

- A Preliminary Drainage Study and Report has been undertaken for the proposed project by Warren S. Unemori Engineering, Inc. (and is contained in APPENDIX "A" - Preliminary Drainage Report).

The existing runoff from the project site and in the adjacent areas generally flows in an easterly to westerly (mauka to makai) direction. It is generally conveyed along existing gulches, small drainageways, or by existing underground drainage systems; and, conveyed further downstream through existing drainage culverts across South Kihei Road, and eventually to the ocean. Due to limitations in existing downstream drainage facilities, significant sedimentation along downstream segments of existing gulches and drainageways, and the placement of what appears to be temporary diversion berms along portions of the westerly (makai) edge of the corridor, runoff typically tends to also disperse along the mauka edge of the existing residential subdivisions abutting the westerly (makai) edge of the LDE corridor; and, tends to flow into the adjoining residential properties, pond in low-lying areas, and/or dissipate over time through infiltration and evaporation.

The entire LDE project site currently generates approximately 32.5 cfs of surface runoff based on a 50-year recurrence interval, 1-hour duration storm.

There are three (3) major drainageways along the LDE that convey the majority of the existing runoff from drainage areas east (mauka) of the project area: Kulanihakoi Gulch, Waipuilani Gulch and an Un-Named Drainageway.

- Kulanihakoi Gulch crosses LDE approximately 1,100(±) south of Kaonoulu Street. The existing gulch is a natural earth channel mauka of the proposed LDE and becomes a trapezoidal channel with boulder-lined side slopes and geotextile on the invert as it runs along the limits of Kaonoulu Estates – Phase IV. The runoff is conveyed further downstream where the gulch starts to flatten out as it is conveyed by the four (4) 6'x4' box culverts at South Kihei Road and eventually to the ocean.
- Waipuilani Gulch is located between Pi'ilani Subdivision – Phase I and Pi'ilani Village Phase II Subdivision. Between Pi'ilani Highway and LDE, the Waipuilani Gulch drainageway is lined with a combination of grassed composite three-dimensional polymer turf reinforcement mat, rock boulder armor and isolated areas of grouted rock slope lining and grouted rock retaining walls. The gulch is a natural earth channel makai of LDE that then flattens out as it is conveyed within the existing 10'x3' box culvert across South Kihei Road and eventually to the ocean.
- The Un-Named Drainageway crosses LDE approximately 420(±) south of the Kulanihakoi Street intersection at an existing concrete ford crossing. Upstream the runoff is conveyed via an existing 10'-0" x 4'-0" box culvert that daylights at the existing concrete ford crossing at the LDE corridor. Downstream, a boulder rip-rap drainage channel conveys the runoff along the south side of Alii Village Subdivision and Trinity Church and into the Oluea Street drainage system, along Kulanihakoi Street to South Kihei Road and eventually to the ocean.

Based on field observations and on-ground topographic surveys, it appears that Kulanihakoi Gulch and Waipuilani Gulch have considerable sedimentation and/or debris (including garbage) within the drainageways.

- Parcels containing the gulches mauka and makai of the project corridor at Kulanihakoi Gulch, and makai of the project corridor at Waipuilani Gulch, are privately owned. The County is thus pursuing (with the respective private landowners) the removal of all upstream and downstream sedimentation and debris (including garbage) from these drainageways and the restoration of the finish grades to their previously designed and constructed conditions (which includes downstream detention basins).
- Immediately upstream segments of Waipuilani Gulch (between Pi'ilani Highway and LDE) are under County ownership and maintained by the County on a regular basis.

B. PROPOSED DRAINAGE IMPROVEMENTS:

All drainage improvements are expected to be implemented pursuant to the current County of Maui's "Rules for the Design of Storm Drainage Facilities", and the "Rules for the Design of Storm Water Treatment Best Management Practices" (adopted 11/09/2012). The existing pre-development drainage patterns will generally be maintained and/or restored; and, any potential increase in runoff generated by the proposed project improvements will be mitigated, so that the runoff released downstream will be no greater than pre-development conditions or what the existing downstream drainage systems were master-planned and/or designed to accommodate from the project site. The drainage system will be designed to remain flexible to accommodate the ultimate layouts and improvements required by the County at the proposed intersections. The project is expected to be consistent with the proposed concepts of the Kihei Drainage Master Plan (Pre-Final Report for the Kihei Drainage Master Plan by R.M. Towill, dated November 2016), directed by DPW to be considered for this project (e.g., the Kulanihakoi Gulch bridge crossing was designed to potentially accommodate any potential future diverted flow from Waipuilani Gulch in the event this concept was ultimately embraced in the future).

Wherever practicable, to minimize the disruption to the community and traffic, where directed by DPW, anticipated, master-planned drainlines and drainage structures are expected to be installed in conjunction with the construction of LDE.

Two (2) new concrete bridges are proposed for the LDE crossings at Kulanihakoi Gulch and Waipuilani Gulch. Based on direction from DPW, the bridge has been designed to accommodate the existing flow rates of Kulanihakoi Gulch and Waipuilani Gulch of 10,061 cfs and 9,275 cfs, respectively (FEMA 100-yr). The bridges (along with modified invert linings and side-slopes) are designed to maintain a "no rise" condition with no loss of flow conveyance and no increase in the base flood elevation at the gulch for the 100-yr flood discharge; and therefore, will allow the runoff to continue down the existing drainage channels, towards South Kihei Road, and eventually to the ocean.

- Nationwide Permit Pre-Construction Notifications (PCNs) have been submitted to U.S. Army Corps of Engineers (USACE) for both gulches; and,
- USACE has provided this project with a letter that confirms that the work complies with the terms and conditions of Nationwide Permit (NWP) NO. 14, Linear Transportation (see APPENDIX "A").

At the Un-Named Drainageway, the existing 10'-0" x 4'-0" concrete box culvert that runs through Pi'ilani Subdivision – Phase I will be extended to the makai side of the LDE.

- Pursuant to correspondence from USACE to DPW on 02/14/2023, the Un-Named Drainageway has been confirmed to be a non-reporting NWP.

Existing non-coherent runoff that has tended to disperse along the mauka edge of the existing residential subdivisions abutting the westerly (makai) edge of the LDE corridor, that may have flow into the adjoining residential properties, pond in low-lying areas,

and/or dissipate over time through infiltration and evaporation, will now be intercepted, conveyed underground and discharged downstream along the intended existing natural drainageways and existing underground drainage systems. Thus, uncontrolled stormwater runoff will no longer tend to flow into the adjoining residential properties westerly (makai) of the LDE corridor, as it is currently doing.

The majority of the onsite and offsite runoff within LDE will be intercepted by drain inlets and conveyed by underground drainage systems to onsite detention basins, subsurface drainage (detention) systems, or drywells, which will be sized to accommodate the fully developed project site. These facilities will be strategically located along the project corridor, to provide the necessary capacity and storage to meet or exceed the County water quality standards and attenuate any potential increase in post-development runoff. Thus, no more than the master-planned and/or designed allowable total release rate will be permitted to discharge downstream and continue to flow downstream as it is presently doing.

- In undeveloped areas, the runoff generated within the improved LDE corridor will be intercepted by drain inlets instead of being allowed to sheet flow into adjacent private properties; and,
- Pre-existing, original drainage patterns will be restored to follow its master-planned course (e.g., Waipuilani Gulch), consistent with existing flood zoning maps.

Therefore, since the onsite runoff discharging downstream will not exceed the pre-development conditions or the master-planned and/or designed allowable release allocated for the developed project sites and are thus within the design capacity of the downstream drainage system, the proposed project improvements are not expected to adversely affect the downstream and adjoining properties.

A more detailed discussion of the existing onsite and offsite surface runoff drainage conditions for each section are contained in APPENDIX “A” – Preliminary Drainage Report.

IV. WASTEWATER SYSTEM:

A. EXISTING CONDITIONS:

The County’s wastewater facilities generally collect wastewater from the Kihei Area and convey it through a series of gravity sewerlines and pumping stations with force mains along South Kihei Road to the Kihei Wastewater Reclamation Facility.

According to the Wastewater Reclamation Division, County of Maui (WWRD), it is our understanding that flow to the Kihei Wastewater Reclamation Facility is currently approximately 3.9 MGD. The facility itself is designed for 8.0 MGD, which is well in excess of current demand. Thus, it is our understanding that there are no near-future plans for expansion at this time.

There are existing 8” sewerlines along Kaiola Street, Ho’opili Akau Street, Heona Place (along with a 4” force main that runs east along Heona Place, from the local pump station at the makai cul-de-sac end of the street to Kenolio Road), portions of Kenolio Road, Kulanihakoi Street, and portions of the undeveloped LDE corridor. These existing sewerlines in the area convey the effluent by gravity flow toward and/or along South Kihei Road to Sewer Pump Stations No. 3 or No. 4, which then pump the effluent southward toward the Kihei Wastewater Reclamation Facility via a 12" force main and/or gravity flow.

According to WWRD, it is our understanding that flow to the Kihei Wastewater Reclamation Facility is currently approximately 3.9 MGD. The facility itself is designed for 8.0 MGD, which is well in excess of current demand. Thus, it is our understanding that there are no plans for expansion at this time.

B. PROPOSED WASTEWATER IMPROVEMENTS:

Minor relocations of existing sewerlines and/or adjustments of existing manholes and appurtenances to final finish grade are expected to be undertaken with the LDE project.

C. ANTICIPATED WASTEWATER DEMANDS:

The LDE project in itself (excluding any existing or proposed adjoining developments by others), is not expected to generate any significant additional wastewater demand.

D. CONDENSATE DISCHARGES:

There are no long-term condensate discharges anticipated for this project, as there are no permanent improvements expected to generate condensate discharges.

V. WATER SYSTEM:

A. EXISTING CONDITIONS:

1. POTABLE WATER SYSTEM:

Potable water is typically supplied to South Maui from the Maui County Department of Water Supply’s (DWS) Central Maui System (a potable water storage, transmission and distribution system, developed and managed by DWS). The 36” diameter high-pressure Central Maui Transmission Line and an 18” diameter transmission/distribution system serve the region and, in the vicinity of the project, are generally located along a utility corridor that runs in a north-south alignment along the existing or future master planned segments of Liloa Drive, alongside the existing:

- Maui Electric Company's 69kV overhead transmission line;
- Segments of the County Wastewater Reclamation Division's 12" reclaimed (R1) water transmission/distribution line; and,
- Segments of the Kihei Bikeway.

A 2.0 MG potable water concrete reservoir (at overflow Elevation 248± M.S.L.) located immediately above the Maui Research and Technology Park, and approximately 1.0 mile easterly (mauka) of the Liloa Drive / LDE corridor, was constructed in 2000 by a joint venture between the DWS and Pi'ilani Village. This reservoir is serviced from the existing 36" diameter Central Maui Transmission line and is connected to the existing 18" diameter transmission/distribution system, at Lipoa Street, and provides adequate storage capacity to the project vicinity south of Kulanihakoi Gulch.

The project vicinity near the north terminus of the project site, north of Kulanihakoi Gulch to Kaonoulu Street, is served by the 2.0 MG potable water concrete reservoir (at overflow Elevation 240± M.S.L.) located above the Makai Heights Subdivision and approximately 1.0 Mile easterly (mauka) of the LDE / Kenolio Road corridor, which was constructed in the 1970s. This reservoir is also serviced from the existing 36" diameter Central Maui Transmission line, is connected to the existing 18" diameter transmission/distribution system in the vicinity of the intersection of Ohukai Road and Kaiola Place; and, provides adequate storage capacity to the project vicinity north of Kulanihakoi Gulch to Kaonoulu Street.

Multiple existing 8", 12", and 16" waterlines tie off the 18" diameter transmission/distribution main that provide water service to the adjacent residential Subdivisions located on both sides of the LDE corridor.

2. NON-POTABLE (R1) RECLAIMED WATER SYSTEM:

A non-potable reclaimed water storage, transmission and distribution system, developed and managed by the County Department of Environmental Management, Wastewater Reclamation Division, services portions of this area of Kihei.

The Kihei Wastewater Reclamation Facility (KWRF), which serves the South Maui area from Wailea to Sugar Beach, produces R1 water, which is the highest quality of recycled water identified by the State of Hawaii's Department of Health.

It potentially has a dry weather flow capacity near 8.0 MGD; and, a reclaimed (R1) water production capacity of approximately 2.5 MGD (with a redundancy reserve of an additional 2.5 MGD).

- In 2019, the daily average volume of reclaimed (R1) water used has been approximately 1.8 MGD or approximately 50% of the total daily reclaimed (R1) water produced.
- As of August 24, 2021 (based on information provided by the Wastewater Reclamation Division.

- The current reclaimed (R1) water production capacity remains approximately 5 MGD, based on two retrofitted channels (each with a capacity of 2.5 MGD) in operation. A third channel (still with an older disinfection system) is currently not in operation and is anticipated to potentially become online the end of this year.
- The current influent flow to the KWRF is approximately 3.7 MGD.
- Current peak reclaimed (R1) water used is approximately 2.2 MGD.
- Past peak reuse has been up to approximately 60% (which corresponded to a month of lower influent flow than the 3.7 MGD). However, it has increased up to 82% during periods of reduced tourism where influent flow to the KWRF decreased to approximately 2.7 MGD.

A 12" diameter transmission/distribution system provides non-potable reclaimed (R1) water service to the region, and is located along a utility corridor that runs in a north-south alignment along the existing or future master-planned segments of Liloa Drive ROW, alongside the existing:

- The Maui Electric Company's 69kV overhead transmission line; and,
- Existing portions/segments of the Kihei Bikeway.

This reclaimed transmission line currently extends north along this corridor to East Waipuilani Road, then heads west (makai) along East Waipuilani Road to South Kihei Road. Recently the Wastewater Reclamation Division in 2018 extended this 12" transmission line along Kulanihakoi Street to service additional consumers in the vicinity.

It is our understanding that service to the Kulanihakoi High School (with an expected consumption of approximately 0.2 MGD) is being implemented. Although reuse consumption volumes and timelines are not completely known at this time, projects currently being served by the County's reclaimed (R1) water that is expected to expand its use in the future include Maui R&T Park, South Maui Community Park, and the Hokulani Golf Villas.

A second 1.0 MG Tank was completed and put into service in 2020, which will allow reclaimed (R1) water to be used for a wider range of projects in the community.

B. PROPOSED WATER IMPROVEMENTS:

1. POTABLE WATER SYSTEM:

Wherever practicable, to minimize the disruption to the community and traffic, distribution waterlines are expected to be installed in conjunction with the construction of LDE.

A section of the existing 36" diameter high-pressure Central Maui Transmission Line is proposed to be relocated and realigned from the middle of the eastern (mauka)

boundary of the Kamali'i Alayna Subdivision, run south below Waipuilani Gulch, and then tie back into the existing alignment near East Waipuilani Road.

A section of the existing 18" diameter transmission/distribution system is proposed to be relocated and realigned starting from the existing stub out at the end of Kenolio Road (fronting Kaonoulu Estates – Phase IV), heading south to run below Kulanihakoi Gulch, and then tie back into the existing alignment at Heona Place. In addition, a portion of the 18" transmission line is proposed to be relocated starting at the south end of Kamali'i Alayna Subdivision, run south below Waipuilani Gulch, and tie back into the existing alignment north of Namau'u Place. This section of the relocated 18" line is proposed to be interconnected with the section of the relocated 36" line between the Waipuilani Bridge and Namau'u Place. Also, relevant appurtenances (e.g. vertical offsets, etc.) and adjustments to the smaller waterlines that tie into the 18" line will be required at certain locations.

In accordance with current water system standards, fire hydrants are proposed to be installed with a maximum spacing of 350 feet along the existing residential Subdivision areas, unless otherwise required by the respective governing agencies.

2. NON-POTABLE (R1) RECLAIMED WATER SYSTEM:

The 12" diameter transmission/distribution system that provides non-potable reclaimed (R1) water service to the region, will be extended from its current terminus at East Waipuilani Road along the north-south utility corridor alignment that runs within the Liloa Drive ROW to connect to the existing 12" reclaimed water main in Kulanihakoi Street, with a stubout to the north of the LDE / Kulanihakoi Street intersection.

To conserve precious potable water resources, drought-tolerant and Hawaiian native plants are being considered, and all landscape irrigation is proposed to be serviced from the County's non-potable reclaimed (R1) water system for any landscaping within the roadway right-of-ways that are adjacent to the 12" reclaimed (R1) water main extension. Applicable County and State Department of Health permits will be obtained at the time of final design.

The northern section of LDE between the vicinity of Kaonoulu Street and Kulanihakoi Gulch is located approximately 800 ft. north of the proposed 12" diameter reclaimed (R1) water transmission line extension, and thus may have the option of providing landscape irrigation service from the County Department of Water Supply's potable water system. The ultimate source of landscape irrigation water will be determined during the future final design phase for this section.

C. ANTICIPATED DOMESTIC AND IRRIGATION WATER DEMANDS:

The LDE project in itself (excluding any existing or proposed adjoining developments), is not expected to generate any significant additional water demands, other than that for

incidental landscape irrigation and minor amenities such as drinking fountains along the proposed adjoining multi-use trail shared use path.

Based on preliminary projections provided by the Landscape Architect, anticipated average daily landscape irrigation demands, for the linear landscaping along the proposed LDE corridor (approximately 0.9 miles), is expected to be approximately 34,800 GPD during plant establishment (see APPENDIX "D"). This anticipated average daily landscape irrigation demand includes:

- Service from Kauha'a Street to Kulanihakoi Gulch (Station No. 1-4), along the County's non-potable reclaimed (R1) water transmission/distribution line, with an anticipated average daily demand of 30,000 GPD; and,
- Service from the north side of Kulanihakoi Gulch to Kaonoulu Street (Station No. 5), along the County's potable transmission/distribution system, with an anticipated average daily demand of 4,800 GPD.

Water service for landscape irrigation is expected to be provided by new, strategically located water meter service laterals, ranging from 3/4" to 1" sizes, since the peak irrigation water demand is not expected to exceed 50 gpm for any given service area.

As of January 22, 2019, it is our understanding that the Wastewater Reclamation Division has confirmed that adequate capacity exists to provide the anticipated irrigation needs for this project with reclaimed (R1) water. Adequate capacity is expected to be confirmed in the future, prior to the construction of this project, since expanded use of reclaimed (R1) water is expected to occur in the future as discussed above.

Domestic water service for the drinking fountains would be expected to be provided by new 5/8" standard water meter service laterals.

VI. ELECTRICAL, TELEPHONE AND CATV SERVICE:

A. EXISTING CONDITIONS:

Electrical, telephone and cable TV service in the Kihei region is provided by Hawaiian Electric Company, Ltd., Hawaiian Telcom, and Spectrum, respectively, along the primary overhead utility corridor for Hawaiian Electric Company's 69kV overhead transmission line, that runs in a north-south alignment, just within the LDE right-of-way corridor.

B. PROPOSED ELECTRICAL, TELEPHONE AND CATV IMPROVEMENTS:

Electrical, overhead 69kV transmission line utility poles along the LDE corridor will typically be relocated and replaced as required, with overhead transmission lines (including the Hawaiian Electric 69kV transmission lines) remaining overhead. New, hurricane-resistant metal utility poles are expected to be utilized, thereby significantly enhancing the storm-resistance, and potentially reducing susceptibility of damage from brush fires, of the electrical transmission infrastructure.

Existing secondary distribution overhead service connections to the existing adjacent residential Subdivisions along LDE will be reconnected to the relocated infrastructure.

Streetlights are expected to be installed along LDE, supplemented by pole-mounted lights and wall-mounted lights for the adjoining Kihei Bikeway.

All new electrical, telephone and cable television distribution systems within the project are expected to be placed underground.

VII. ANTICIPATED CONSTRUCTION COSTS:

A. ORDER OF MAGNITUDE PROBABLE CONSTRUCTION COSTS:

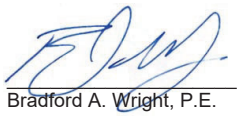
The projected order-of-magnitude probable construction costs are expected to be:

- Phase I [from the southerly (Makena end) terminus at the vicinity of East Waipuilani Road, to the northerly (Maalaea end) terminus of Phase I at the vicinity of Kulanihakoi Street (including the improvements to the connecting or adjacent roadways)]: $50,000,000
- Phase II [from the southerly terminus at the vicinity of Kulanihakoi Street, to the northerly terminus at the vicinity of Kaonoulu Street (including the improvements to the connecting or adjacent roadways)]: $30,000,000

The above projections are subject to refinement based on scope of ultimate regulatory requirements from Federal, State and County agencies, public utilities, final design documents, and contemporary construction costs at the time the improvements will actually be constructed.

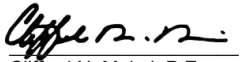
Accordingly, this report has been prepared as a summary and preliminary engineering evaluation of the proposed Liloa Drive Extension (LDE) project, including existing infrastructure in the vicinity of the project and anticipated project improvements, which will be refined as needed based on the ultimate, final design of the project.

Prepared by:



Bradford A. Wright, P.E.

Reviewed and Approved by:



Clifford N. Mukai, P.E.

VIII. REFERENCES:

1. United States Department of Agriculture, Soil Conservation Service, *Soil Survey of Island of Maui, Hawaii, Version 14* September 20, 2016. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

2. Federal Emergency Management Agency, Federal Insurance Administration, *Flood Insurance Rate Map, Maui County, Hawaii*. Community-Panel Number 150003 00586G. November 4, 2015.

3. U.S. Department of Commerce, Weather Bureau, *Rainfall Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43*. 1962.

4. Department of Public Works and Waste Management, County of Maui, *Rules for the Design of Storm Drainage Facilities in the County of Maui.* July 1995.

5. Department of Public Works, County of Maui, *Rules for the Design of Storm Water Treatment Best Management Practices.* November 9, 2012.

6. Warren S. Unemori Engineering, Inc., *Drainage and Soil Erosion Control Report for Pi'ilani Residential Subdivision – Phase I*. June 1990.

7. Warren S. Unemori Engineering, Inc., *Drainage and Soil Erosion Control Report – Offsite Improvements for Pi'ilani Village Phase II Subdivision & Pi'ilani Commercial*. October 1998.

8. Otomo Engineering, Inc., *Drainage and Soil Erosion Control Report for Kaonoulu Estates – Phase IV*. August 2001.

9. Otomo Engineering, Inc., *Drainage Report for Kenolio Apartments*. August 2001.

10. State of Hawaii, Department of Transportation, Highways Division, *Design Criteria for Highway Drainage* 2010.

11. Geolabs, Inc., *Geotechnical Engineering Exploration – Liloa Drive Extension, Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street.* July 30, 2021.

12. Austin, Tsutsumi & Associates, Inc., *Traffic Impact Analysis Report, Liloa Drive Extension – East Waipuilani Road to Kaonoulu Street, Kihei, Maui, Hawaii, Pre-Final Draft*. March 27, 2023.

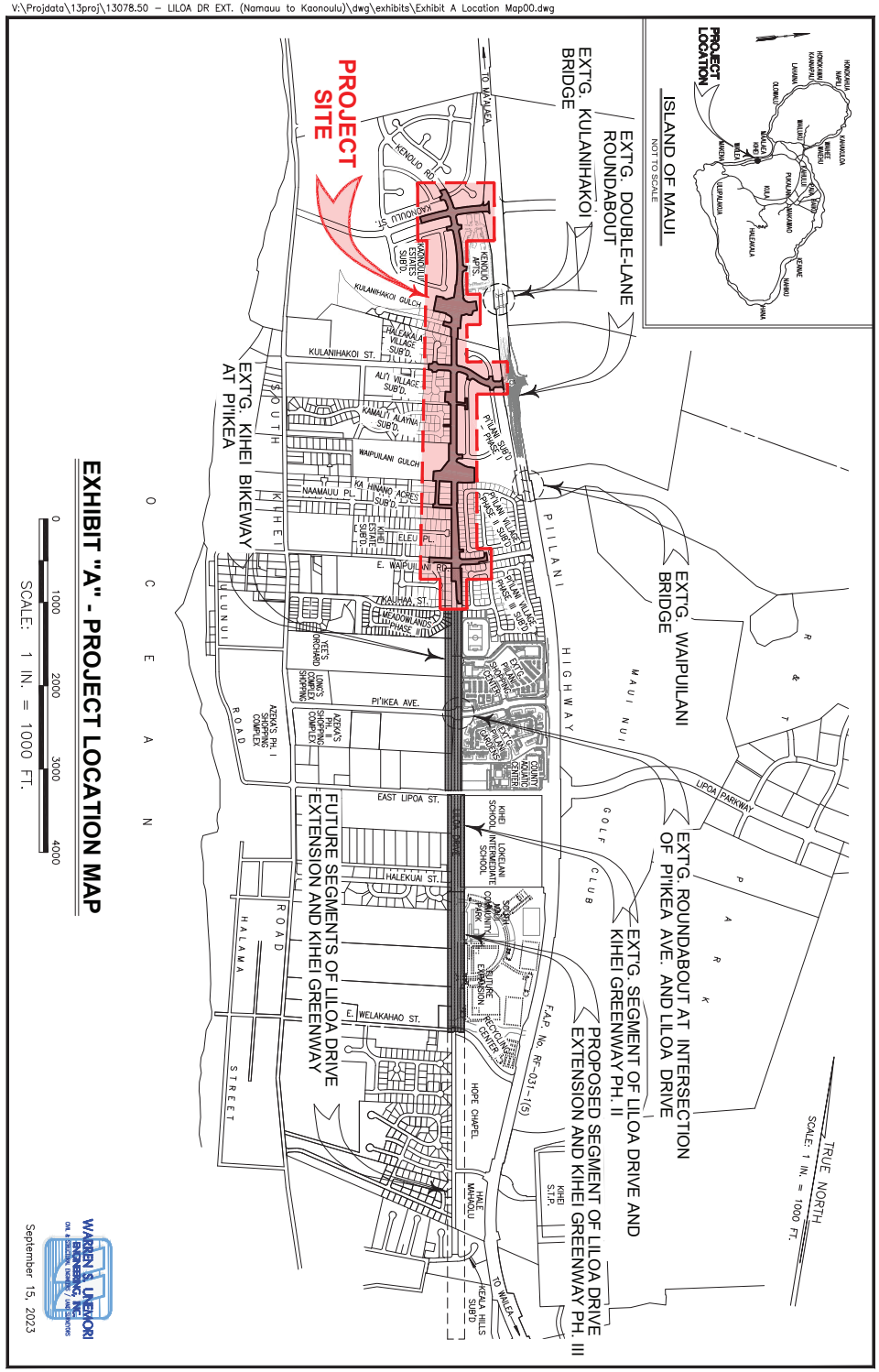
13. *Water System Standards, Department of Water Supply, County of Maui 2002*.

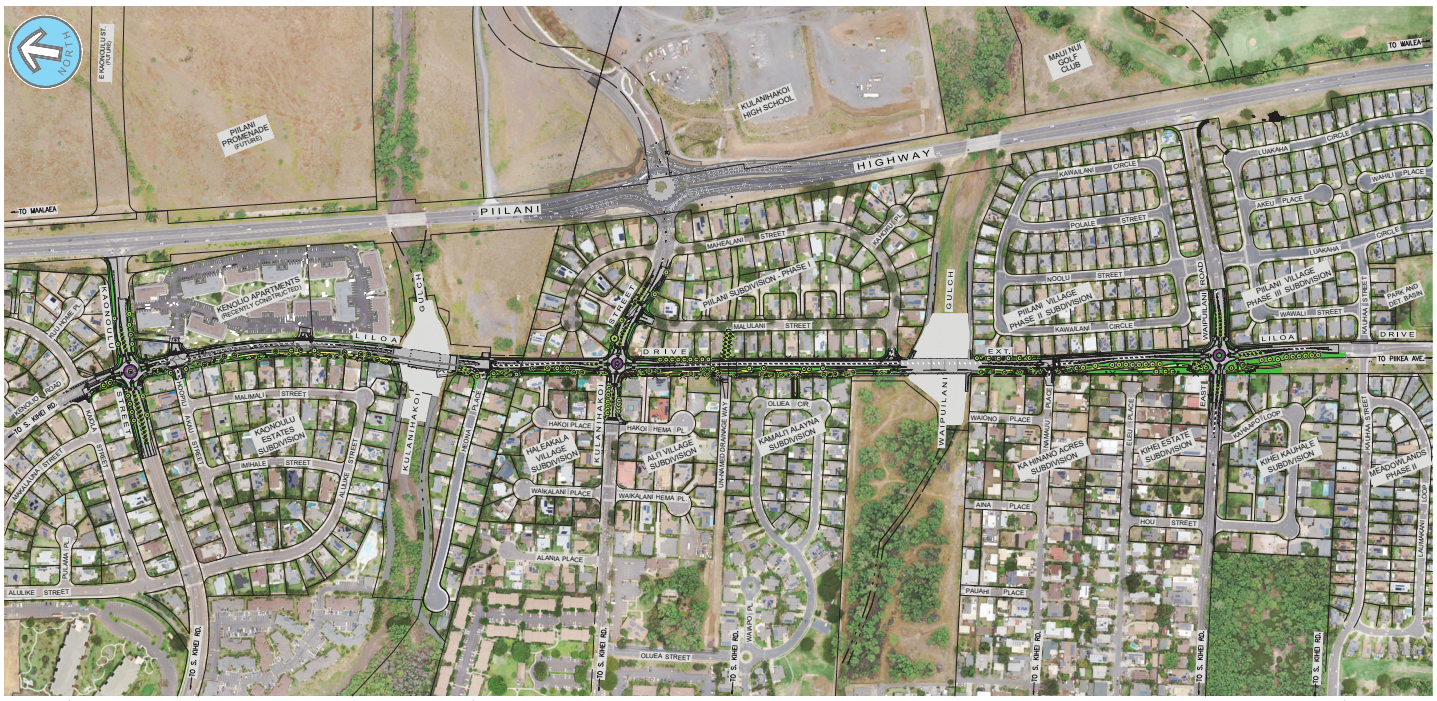
14. *Construction Best Management Practices (BMPs) for County of Maui* May 2001.

EXHIBITS

A. Project Location Map
B. General Plan
C. Conceptual Site Plan (1 of 2 thru 2 of 2)
D. Typical Sections (1 of 10 thru 10 of 10)
E. Conceptual Plan & Profile (1 of 13 thru 13 of 13)
F. Topographic Survey Map of Existing Grades (1 of 6 thru 6 of 6)
G. Soils Classification Report
H. Flood Insurance Rate Map (1 of 4 thru 4 of 4)
I. Sea Level Rise Map
J. Tsunami Evacuation Map (Kihei Map 2)
K. Existing Wetlands
L. Special Management Areas
M. Proactive, Master-Planned Roadway Corridor; and, Reserves and Easements Established by County Department of Public Works for Future Pedestrian-Friendly, Landscaped Bikeway (1 of 4 thru 4 of 4)

V:\Projdata\13proj\13078.50 – LILOA DR EXT. (Namauu to Kaonoulu)\dwg\exhibits\Exhibit A Location Map00.dwg





APPROX. LIMITS OF PHASE II
[L=1,600±FT.]

APPROX. LIMITS OF PHASE I
[L=3,300±FT.]

0 350 700 1050 1400

SCALE: 1 IN. = 350 FT.

EXHIBIT "C" (1 of 2) - CONCEPTUAL SITE PLAN - LILOA DRIVE EXTENSION

(VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET)

NOTES:
1. ORTHOPHOTO OBTAINED BY WARREN S. UNEMORI ENGINEERING, INC. ON 4/18/2023

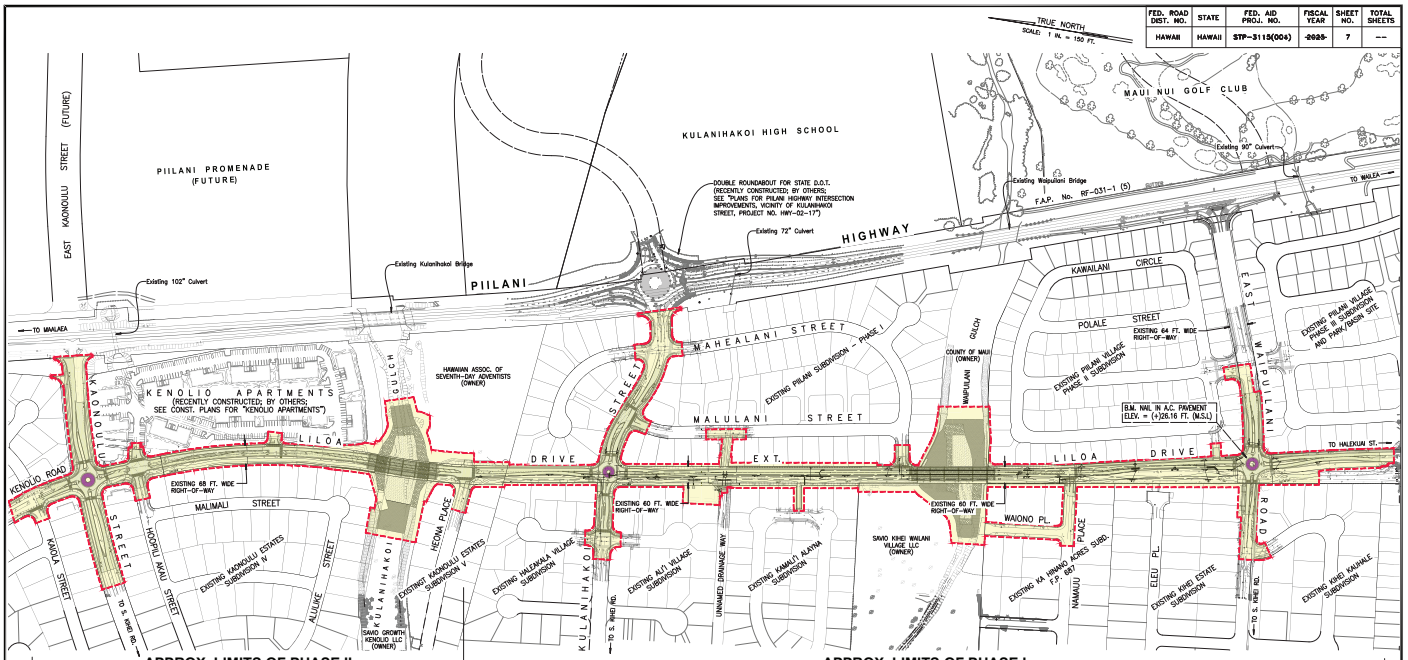
DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

WARREN S. UNEMORI ENGINEERING, INC. | MUNEKIYO HIRAGA | AUSTIN, TSUTSUMI & ASSOCIATES, INC. | PBR HAWAII & ASSOCIATES, INC. | ECS, Inc. Consulting Electrical Engineers | KSF | GEOLABS, INC.

LEGEND:
- SHARED USE PATH
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE

WARREN S. UNEMORI ENGINEERING, INC.

September 15, 2023



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(004)	2025	7	---

APPROX. LIMITS OF PHASE II
[L=1,600±FT.]

APPROX. LIMITS OF PHASE I
[L=3,300±FT.]

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)
[L=4,900±FT.; A=19.5± ACRES*]

LEGEND:
- APPROXIMATE LIMITS OF AREA OF POTENTIAL EFFECT (APE)

NOTES:
1. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST ALONG, ACROSS, AND IN THE VICINITY OF THE PROPOSED IMPROVEMENTS AND MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE RESPECTIVE COUNTY OR STATE AGENCIES, UTILITIES (INCLUDING WITHOUT LIMITATION MAUI ELECTRIC COMPANY, LTD., HAWAIIAN TELCOM, AND SPECTRUM), EXAMINING ANY AVAILABLE RECORD DRAWINGS, TONING OF UNDERGROUND UTILITIES TEST PITS, AND CONFIRMING THE PRESENCE, DEPTH, SIZE, AND TYPE OF ANY EXISTING UTILITIES ALONG AND ACROSS THE PROPOSED IMPROVEMENTS. CONTRACTOR SHALL NOTIFY AND COORDINATE CONSTRUCTION ACTIVITIES, AND ANY REQUIRED RELOCATION, WITH RESPECTIVE AGENCIES AND UTILITIES.
2. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
3. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
4. SEE SHEETS C-1.01 – C-1.04 FOR ADDITIONAL NOTES.
5. * – AREA INCLUDES IMPROVEMENTS FOR KULANIHAKOI AND WAIPUILANI GULCHES.

LICENSED PROFESSIONAL ENGINEER NO. 6667-C
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
License Expires April 30, 2025

REVISION	DATE	BRIEF	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

GENERAL LAYOUT PLAN

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (004)

DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM

APPROVED | SUBMITTED BY

DATE | FIRM MEMBER | DATE

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

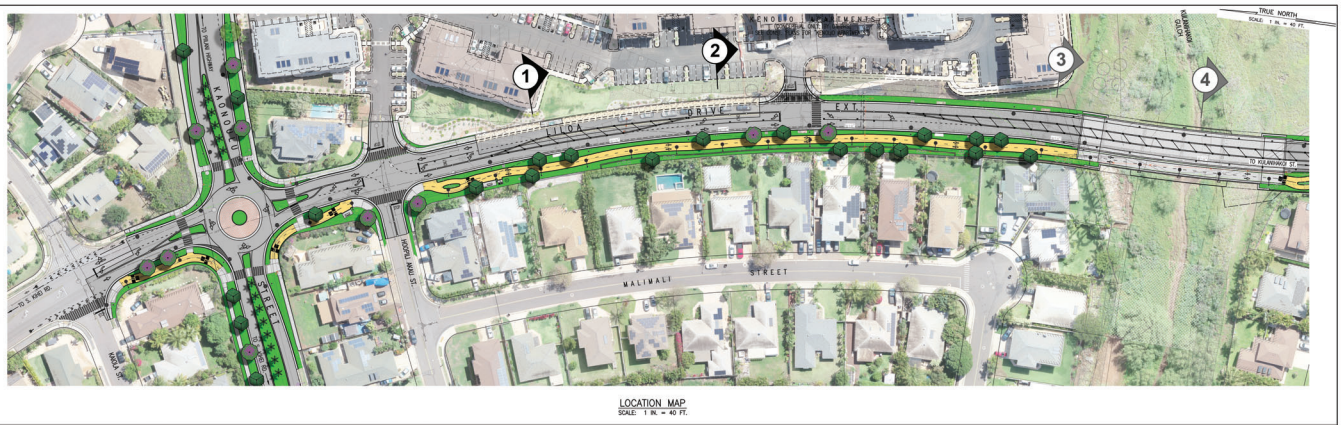
FILE	POCKET	FOLDER	NO.

C-4

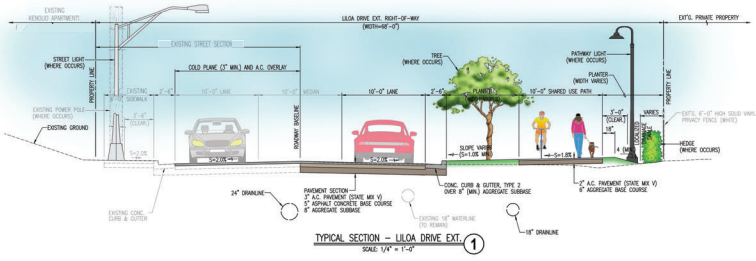
JOB NO.

SHEET OF

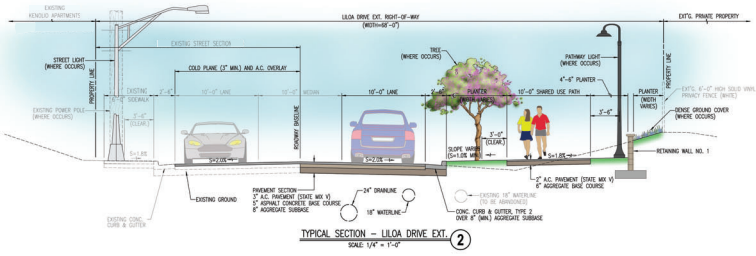
EXHIBIT "B" - GENERAL PLAN



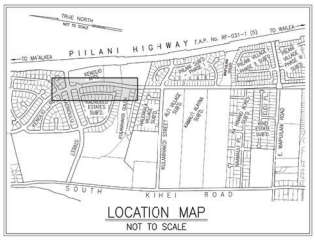
LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE EXT. ①
SCALE: 1/4" = 1'-0"



TYPICAL SECTION – LILOA DRIVE EXT. ②
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

Prepared by:
WARREN S. UNEMORI ENGINEERING, INC.
MUNEKIYO HIRAGA
KSF
PBR HAWAII & ASSOCIATES, INC.
ECS, Inc. Consulting Electrical Engineers
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
GEOLABS, INC.

September 15, 2023

11" x 17"

EXHIBIT "D" (1 of 10) - TYPICAL SECTIONS





0 200 400 600 800
SCALE: 1 IN. = 200 FT.

EXHIBIT "C" (2 of 2) CONCEPTUAL SITE PLAN - LILOA DRIVE EXT. (VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

NOTES:
1. ORTHOPHOTO OBTAINED BY WARREN S. UNEMORI ENGINEERING, INC. ON 4/18/2023
2. THIS DOCUMENT IS CONCEPTUAL ONLY AND IS INTENDED SOLELY FOR SPATIAL PLANNING PURPOSES.

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI

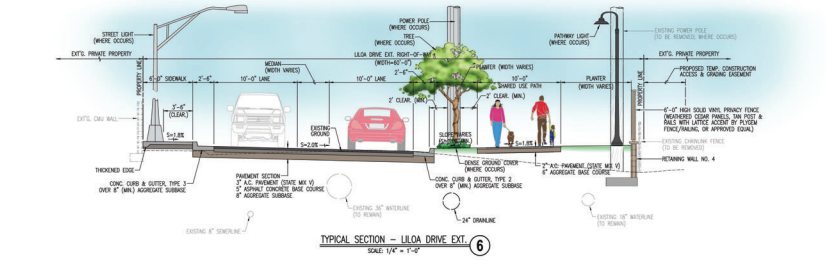
WARREN S. UNEMORI ENGINEERING, INC. | MUNEKIYO HIRAGA | AUSTIN, TSUTSUMI & ASSOCIATES, INC. | PBR HAWAII & ASSOCIATES, INC. | ECS, Inc. Consulting Electrical Engineers | KSF | GEOLABS, INC.

LEGEND:
- SHARED USE PATH
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE

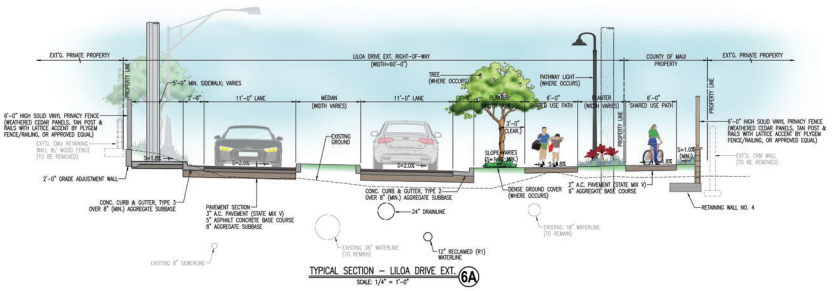
September 15, 2023



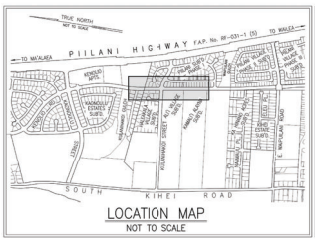
LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE EXT. 6
SCALE: 1/4" = 1'-0"

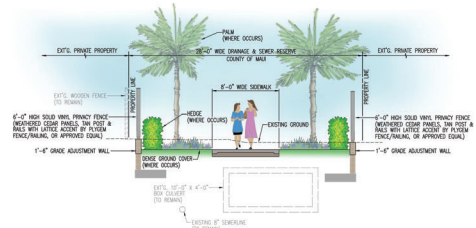


TYPICAL SECTION – LILOA DRIVE EXT. 6A
SCALE: 1/4" = 1'-0"

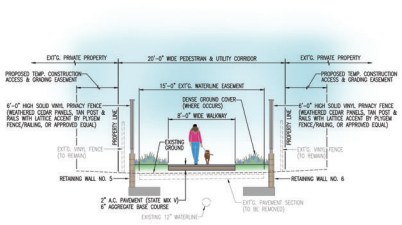

TRUE NORTH
NOT TO SCALE
PIILANI HIGHWAY F.A.P. No. RF-031-1 (5)
TO MAKAWAO
TO WAILEA
KENOLIO ROAD
KAONOULU STREET
KULANIHAKOI STREET
LILOA DRIVE
HOOKAHUA PLACE
KAIHUALU PLACE
KAMAKANI PLACE
KAMAUA PLACE
KAMOKU PLACE
KAMOLE PLACE
KAMOLE STREET
KAMOLE PLACE
KAMOLE STREET
KAMOLE PLACE
KAMOLE STREET



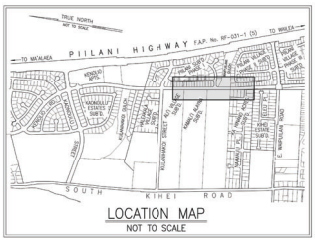
LOCATION MAP
SCALE: 1 IN. = 40 FT.



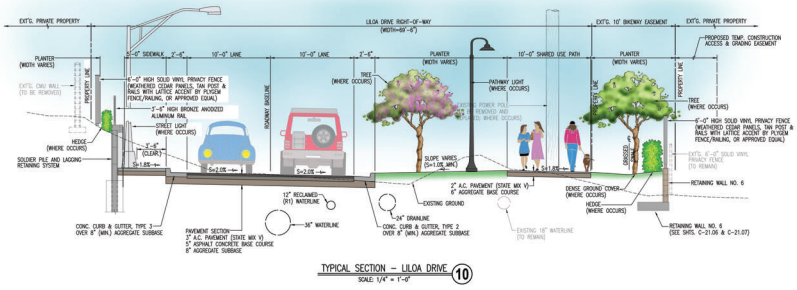
TYPICAL SECTION – SHARED USE PATH CONNECTION (8)
SCALE: 1/4" = 1'-0"



TYPICAL SECTION – SHARED USE PATH CONNECTION (9)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE



TYPICAL SECTION – LILOA DRIVE (10)
SCALE: 1/4" = 1'-0"

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

Prepared for:
Engineering Division
Department of Public Works
County of Maui

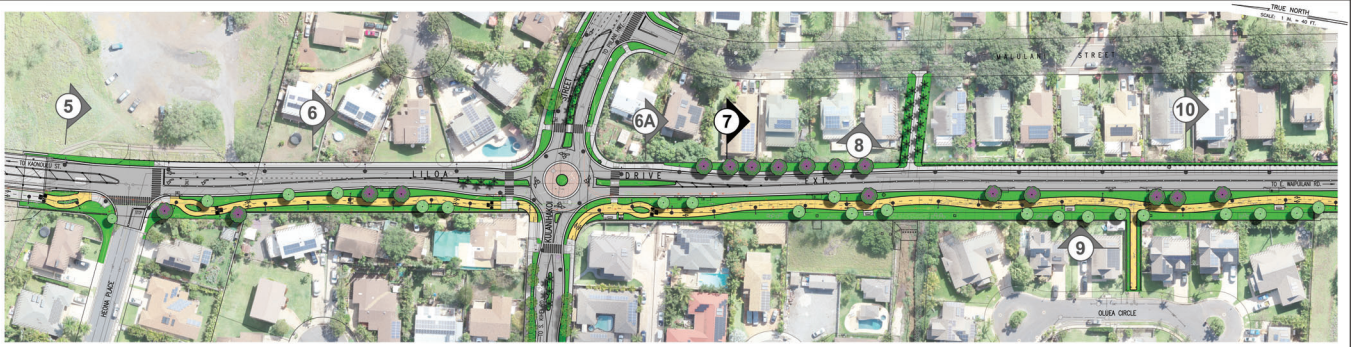
Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

Prepared by:
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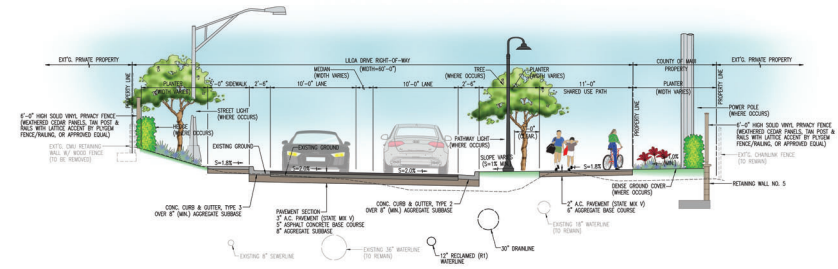
September 15, 2023

11" x 17"

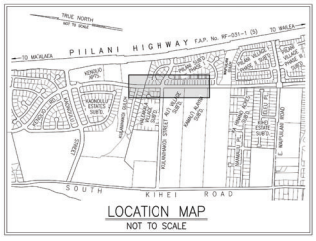
EXHIBIT "D" (5 of 10) - TYPICAL SECTIONS



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (7)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
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- CONCRETE
- TURNING MOVEMENTS

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
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(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

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September 15, 2023

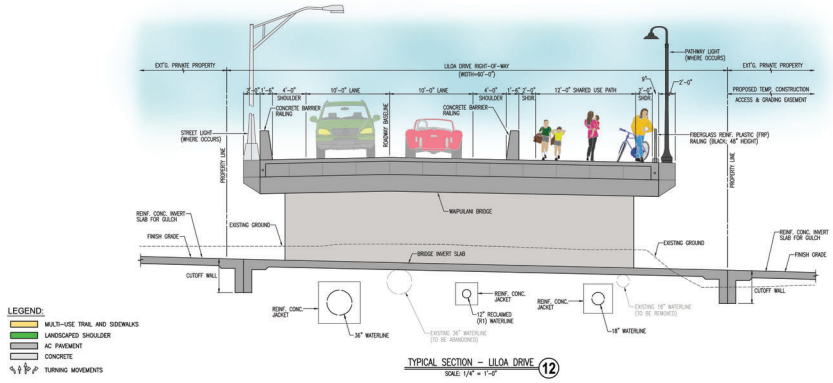
11" x 17"

EXHIBIT "D" (4 of 10) - TYPICAL SECTIONS

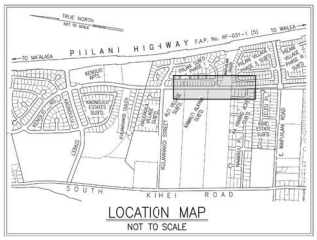
EXHIBIT "D" (7 of 10) - TYPICAL SECTIONS



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (12)
SCALE: 1/4" = 1'-0"



Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

Prepared by:
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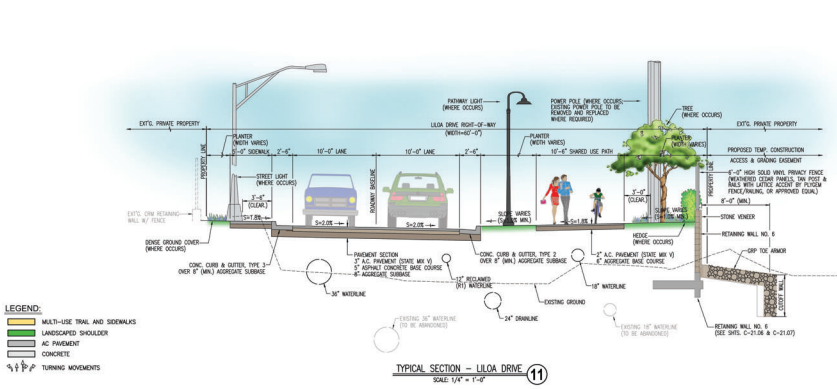
September 15, 2023

11" x 17"

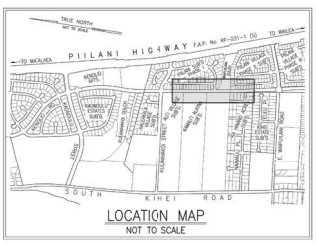
EXHIBIT "D" (6 of 10) - TYPICAL SECTIONS



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (11)
SCALE: 1/4" = 1'-0"



Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

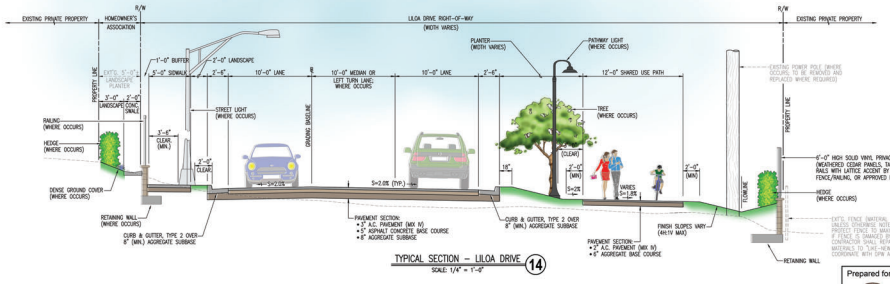
Prepared by:
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AUSTIN, TSUTSUMI & ASSOCIATES, INC.
GEOLABS, INC.

September 15, 2023

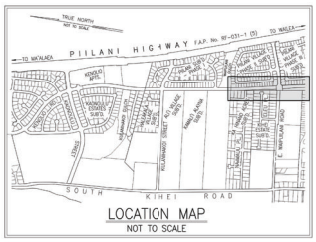
11" x 17"



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (14)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

11" x 17"

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

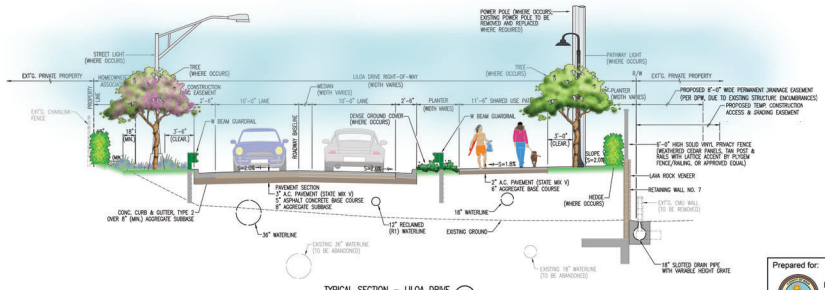
Prepared by:
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September 15, 2023

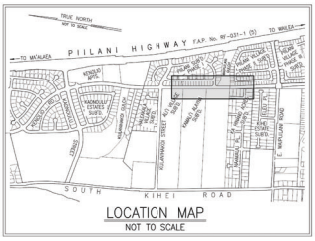
EXHIBIT "D" (9 of 10) - TYPICAL SECTIONS



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (13)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

11" x 17"

Prepared for:
Engineering Division
Department of Public Works
County of Maui

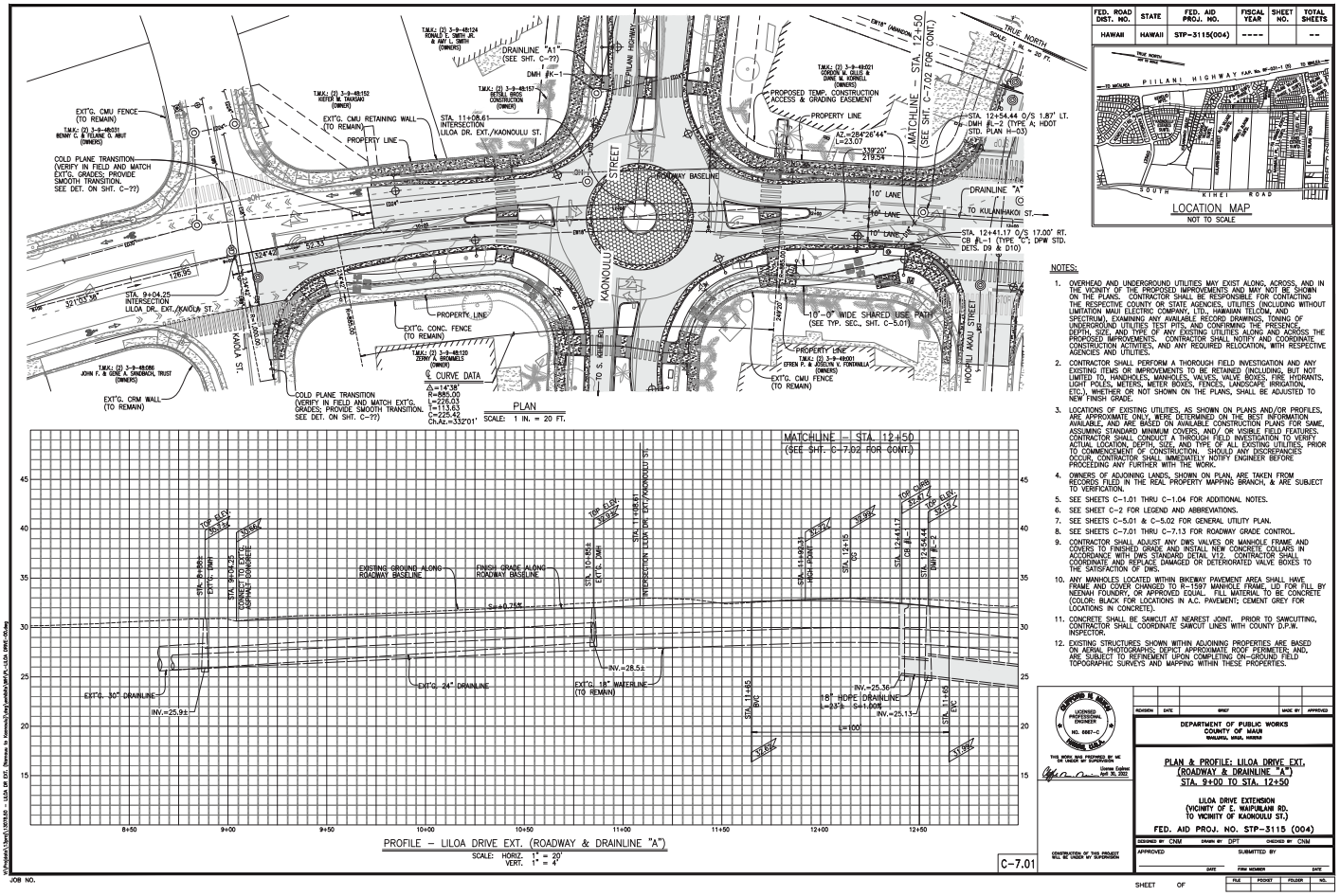
Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

Prepared by:
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GEOLABS, INC.

September 15, 2023

EXHIBIT "D" (8 of 10) - TYPICAL SECTIONS

EXHIBIT "E" (1 of 13) - CONCEPTUAL PLAN & PROFILE



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(004)	----		--

NOTES:

1. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST ALONG, ACROSS, AND IN THE VICINITY OF THE PROPOSED IMPROVEMENTS AND MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE RESPECTIVE COUNTY OR STATE AGENCIES, UTILITIES (INCLUDING WITHOUT LIMITATION MAUI ELECTRIC COMPANY, LTD., HAWAIIAN TELCOM, AND SPECTRUM), EXAMINING ANY AVAILABLE RECORD DRAWINGS, TONING OF UNDERGROUND UTILITIES TEST PITS, AND CONFIRMING THE PRESENCE, DEPTH, SIZE, AND TYPE OF ANY EXISTING UTILITIES ALONG AND ACROSS THE PROPOSED IMPROVEMENTS. CONTRACTOR SHALL NOTIFY AND COORDINATE CONSTRUCTION ACTIVITIES, AND ANY REQUIRED RELOCATION, WITH RESPECTIVE AGENCIES AND UTILITIES.
2. CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND ANY EXISTING ITEMS OR IMPROVEMENTS TO BE RETAINED (INCLUDING, BUT NOT LIMITED TO, HANDHOLES, MANHOLES, VALVES, VALVE BOXES, FIRE HYDRANTS, LIGHT POLES, METERS, METER BOXES, FENCES, LANDSCAPE IRRIGATION, ETC.), WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ADJUSTED TO NEW FINISH GRADE.
3. LOCATIONS OF EXISTING UTILITIES, AS SHOWN ON PLANS AND/OR PROFILES, ARE APPROXIMATE ONLY. WERE DETERMINED ON THE BEST INFORMATION AVAILABLE, AND ARE BASED ON AVAILABLE CONSTRUCTION PLANS FOR SAME, ASSUMING STANDARD MINIMUM COVERS, AND/ OR VISIBLE FIELD FEATURES. CONTRACTOR SHALL CONDUCT A THOROUGH FIELD INVESTIGATION TO VERIFY ACTUAL LOCATION, DEPTH, SIZE, AND TYPE OF ALL EXISTING UTILITIES, PRIOR TO COMMENCEMENT OF CONSTRUCTION. SHOULD ANY DISCREPANCIES OCCUR, CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER BEFORE PROCEEDING ANY FURTHER WITH THE WORK.
4. OWNERS OF ADJOINING LANDS, SHOWN ON PLAN, ARE TAKEN FROM RECORDS FILED IN THE REAL PROPERTY MAPPING BRANCH, & ARE SUBJECT TO VERIFICATION.
5. SEE SHEETS C-1.01 THRU C-1.04 FOR ADDITIONAL NOTES.
6. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
7. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
8. SEE SHEETS C-7.01 THRU C-7.13 FOR ROADWAY GRADE CONTROL.
9. CONTRACTOR SHALL ADJUST ANY DWS VALVES OR MANHOLE FRAME AND COVERS TO FINISHED GRADE AND INSTALL NEW CONCRETE COLLARS IN ACCORDANCE WITH DWS STANDARD DETAIL V12. CONTRACTOR SHALL COORDINATE AND REPLACE DAMAGED OR DETERIORATED VALVE BOXES TO THE SATISFACTION OF DWS.
10. ANY MANHOLES LOCATED WITHIN BIKEWAY PAVEMENT AREA SHALL HAVE FRAME AND COVER CHANGED TO R-1597 MANHOLE FRAME, LID FOR FILL BY NEENAH FOUNDRY, OR APPROVED EQUAL. FILL MATERIAL TO BE CONCRETE (COLOR: BLACK FOR LOCATIONS IN A.C. PAVEMENT; CEMENT GREY FOR LOCATIONS IN CONCRETE).
11. CONCRETE SHALL BE SAWCUT AT NEAREST JOINT. PRIOR TO SAWCUTTING, CONTRACTOR SHALL COORDINATE SAWCUT LINES WITH COUNTY D.P.W. INSPECTOR.
12. EXISTING STRUCTURES SHOWN WITHIN ADJOINING PROPERTIES ARE BASED ON AERIAL PHOTOGRAPHS; DEPICT APPROXIMATE ROOF PERIMETER, AND, ARE SUBJECT TO REFINEMENT UPON COMPLETING ON-GROUND FIELD TOPOGRAPHIC SURVEYS AND MAPPING WITHIN THESE PROPERTIES.

REGISTERED PROFESSIONAL ENGINEER — STATE OF HAWAII — NO. 6667-C — CHRISTOPHER M. CHINN

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

License Expires: April 30, 2023

REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 9+00 TO STA. 12+50

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (004)

DESIGNED BY: CNM | DRAWN BY: DPT | CHECKED BY: CNM

APPROVED | SUBMITTED BY

DATE | FIRM MEMBER | DATE

FILE	PERMIT	FOLDER	NO.

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

C-7.01

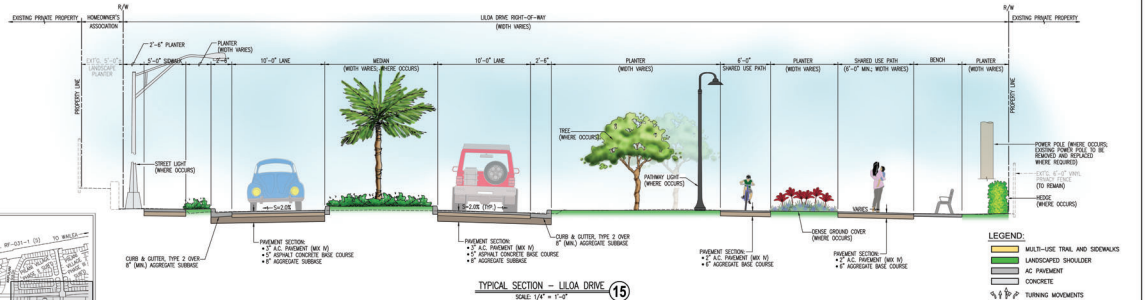
SHEET OF

JOB NO.

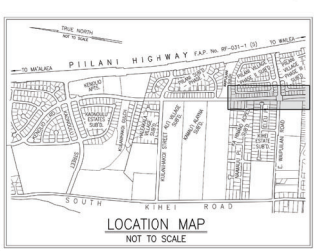
EXHIBIT "D" (10 of 10) - TYPICAL SECTIONS



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION — LILOA DRIVE (15)
SCALE: 1/4" = 1'-0"



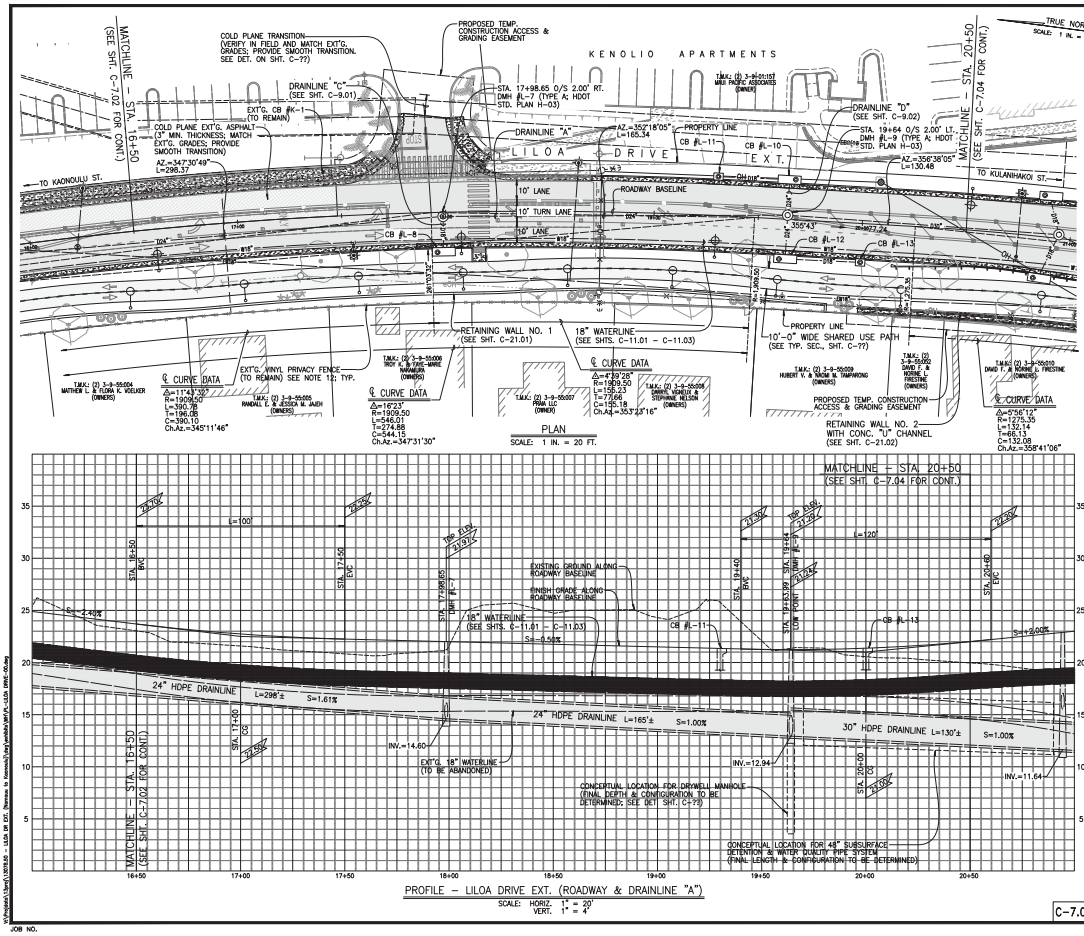
11" x 17"

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

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September 15, 2023



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2. CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND ANY EXISTING ITEMS OR IMPROVEMENTS TO BE RETAINED (INCLUDING, BUT NOT LIMITED TO, HANDHOLES, MANHOLES, VALVES, VAULTS, FIRE HYDRANTS, LIGHT POLES, METERS, METER BOXES, FENCES, LANDSCAPE IRRIGATION, ETC.), WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ADJUSTED TO NEW FINISH GRADE.
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4. OWNERS OF ADJOINING LANDS, SHOWN ON PLAN, ARE TAKEN FROM RECORDS FILED IN THE REAL PROPERTY MAPPING BRANCH, & ARE SUBJECT TO VERIFICATION.
5. SEE SHEETS C-1.01 THRU C-1.04 FOR ADDITIONAL NOTES.
6. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
7. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
8. SEE SHEETS C-7.01 THRU C-7.13 FOR ROADWAY GRADE CONTROL.
9. CONTRACTOR SHALL ADJUST ANY DWS VALVES OR MANHOLE FRAME AND COVERS TO FINISHED GRADE AND INSTALL NEW CONCRETE COLLARS IN ACCORDANCE WITH DWS STANDARD DETAIL. CONTRACTOR SHALL COORDINATE AND REPLACE DAMAGED OR DETERIORATED VALVE BOXES TO THE SATISFACTION OF DWS.
10. ANY MANHOLES LOCATED WITHIN BIKEWAY PAVEMENT AREA SHALL HAVE FRAME AND COVER CHANGED TO R-1597 MANHOLE FRAME, LID FOR FILL BY NEENAH FOUNDRY, OR APPROVED EQUAL. FILL MATERIAL TO BE CONCRETE (COLOR: BLACK FOR LOCATIONS IN A.C. PAVEMENT; CEMENT GREY FOR LOCATIONS IN CONCRETE).
11. CONCEPTUAL IMPROVEMENTS FOR KENOLIO APARTMENTS PROVIDED BY PACIFIC WEST ARCHITECTURE SHALL BE CONFIRMED PRIOR TO CONSTRUCTION.
12. CONTRACTOR SHALL PRESSURE WASH EXISTING VINYL FENCE ALONG WEST (MAKAI) SIDE OF ROADWAY (TYPICAL; TMK: (2)3–9–55:001 THRU TMK: (2)3–9–55:009); AND COMPLETE ANY REPAIRS AND/OR MAINTENANCE TO RESTORE FENCE TO "LIKE NEW" CONDITION TO SATISFACTION OF DPW–ED AND PROPERTY OWNER. COORDINATE WITH PROPERTY OWNER, AS NEEDED.
13. CONCRETE SHALL BE SAWCUT AT NEAREST JOINT. PRIOR TO SAWCUTTING, CONTRACTOR SHALL COORDINATE SAWCUT LINES WITH COUNTY D.P.W. INSPECTOR.
14. EXISTING STRUCTURES SHOWN WITHIN ADJOINING PROPERTIES ARE BASED ON AERIAL PHOTOGRAPHS; DEPICT APPROXIMATE ROOF PERIMETERS; AND, ARE SUBJECT TO REFINEMENT UPON COMPLETING ON–GROUND FIELD TOPOGRAPHIC SURVEYS AND MAPPING WITHIN THESE PROPERTIES.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP–3115(004)	----		--

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 16+50 TO STA. 20+50

LILOA DRIVE EXTENSION (VICINITY OF E. MAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP–3115 (004)

DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM

APPROVED | SUBMITTED BY

DATE | FIRM MEMBER | DATE

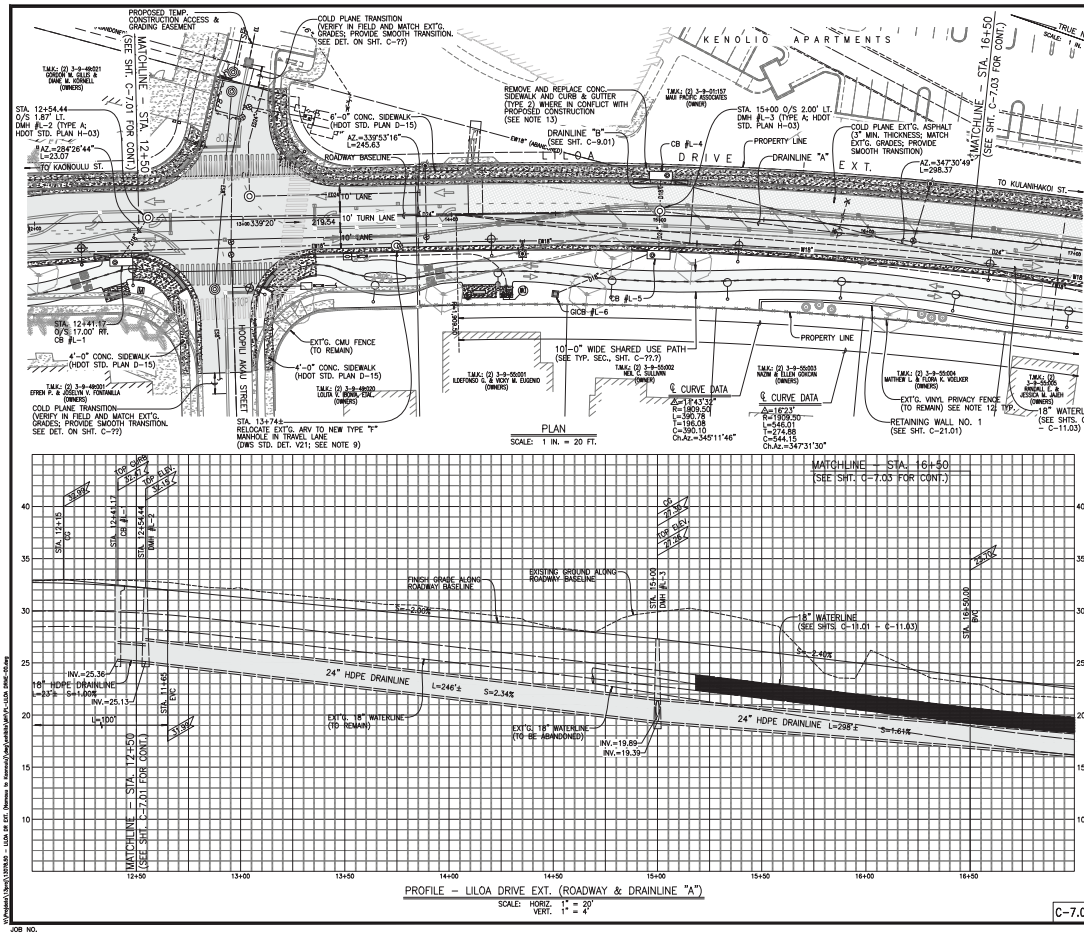
FILE | POCKET | FOLDER | NO.

C-7.03

SHEET OF

JOB NO.

EXHIBIT "E" (3 of 13) - CONCEPTUAL PLAN & PROFILE



NOTES:

1. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST ALONG, ACROSS, AND IN THE VICINITY OF THE PROPOSED IMPROVEMENTS AND MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE RESPECTIVE COUNTY OR STATE AGENCIES, UTILITIES (INCLUDING WITHOUT LIMITATION MAUI ELECTRIC COMPANY, LTD., HAWAIIAN TELCOM, AND SPECTRUM), EXAMINING ANY AVAILABLE RECORD DRAWINGS, TONING OF UNDERGROUND UTILITIES TEST PITS, AND CONFIRMING THE PRESENCE, DEPTH, SIZE, AND TYPE OF ANY EXISTING UTILITIES ALONG AND ACROSS THE PROPOSED IMPROVEMENTS. CONTRACTOR SHALL NOTIFY AND COORDINATE CONSTRUCTION ACTIVITIES, AND ANY REQUIRED RELOCATION, WITH RESPECTIVE AGENCIES AND UTILITIES.
2. CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND ANY EXISTING ITEMS OR IMPROVEMENTS TO BE RETAINED (INCLUDING, BUT NOT LIMITED TO, HANDHOLES, MANHOLES, VALVES, VAULTS, FIRE HYDRANTS, LIGHT POLES, METERS, METER BOXES, FENCES, LANDSCAPE IRRIGATION, ETC.), WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ADJUSTED TO NEW FINISH GRADE.
3. LOCATIONS OF EXISTING UTILITIES, AS SHOWN ON PLANS AND/OR PROFILES, ARE APPROXIMATE ONLY, WERE DETERMINED ON THE BEST INFORMATION AVAILABLE, AND ARE BASED ON AVAILABLE CONSTRUCTION PLANS FOR SAME, ASSUMING STANDARD MINIMUM COVERS, AND/ OR VISIBLE FIELD FEATURES. CONTRACTOR SHALL CONDUCT A THROUGH FIELD INVESTIGATION TO VERIFY ACTUAL LOCATION, DEPTH, SIZE, AND TYPE OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION. SHOULD ANY DISCREPANCIES OCCUR, CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER BEFORE PROCEEDING ANY FURTHER WITH THE WORK.
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6. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
7. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
8. SEE SHEETS C-7.01 THRU C-7.13 FOR ROADWAY GRADE CONTROL.
9. CONTRACTOR SHALL ADJUST ANY DWS VALVES OR MANHOLE FRAME AND COVERS TO FINISHED GRADE AND INSTALL NEW CONCRETE COLLARS IN ACCORDANCE WITH DWS STANDARD DETAIL V12. CONTRACTOR SHALL COORDINATE AND REPLACE DAMAGED OR DETERIORATED VALVE BOXES TO THE SATISFACTION OF DWS.
10. ANY MANHOLES LOCATED WITHIN BIKEWAY PAVEMENT AREA SHALL HAVE FRAME AND COVER CHANGED TO R-1597 MANHOLE FRAME, LID FOR FILL BY NEENAH FOUNDRY, OR APPROVED EQUAL. FILL MATERIAL TO BE CONCRETE (COLOR: BLACK FOR LOCATIONS IN A.C. PAVEMENT; CEMENT GREY FOR LOCATIONS IN CONCRETE).
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP–3115(004)	----		--

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 12+50 TO STA. 16+50

LILOA DRIVE EXTENSION (VICINITY OF E. MAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP–3115 (004)

DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM

APPROVED | SUBMITTED BY

DATE | FIRM MEMBER | DATE

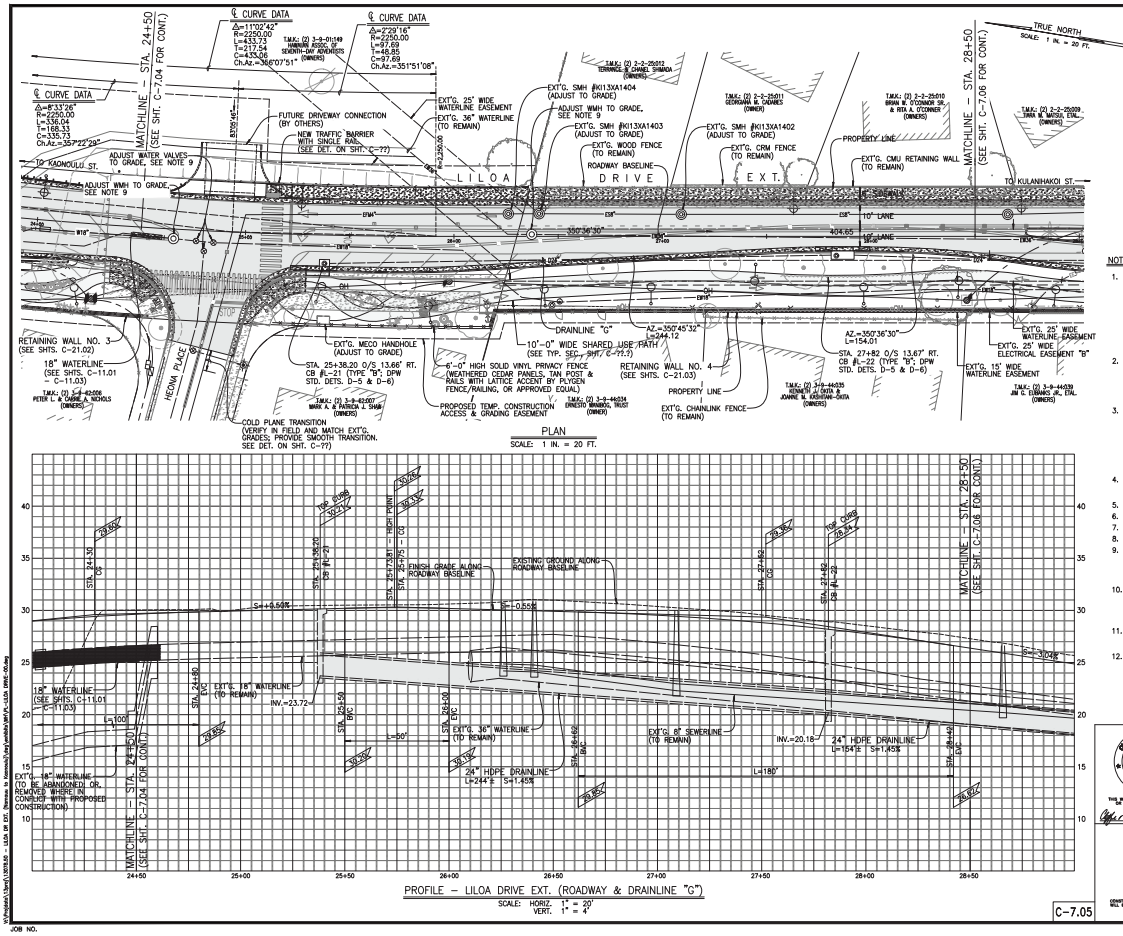
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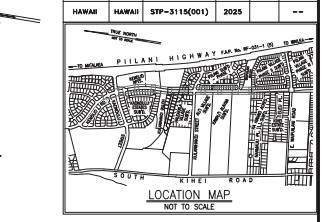
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SHEET OF

JOB NO.

EXHIBIT "E" (2 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

NOTES:

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REVISION	DATE	BY	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "G") STA. 24+50 TO STA. 28+50

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM
APPROVED | SUBMITTED BY
DATE | FIRM MEMBER | DATE

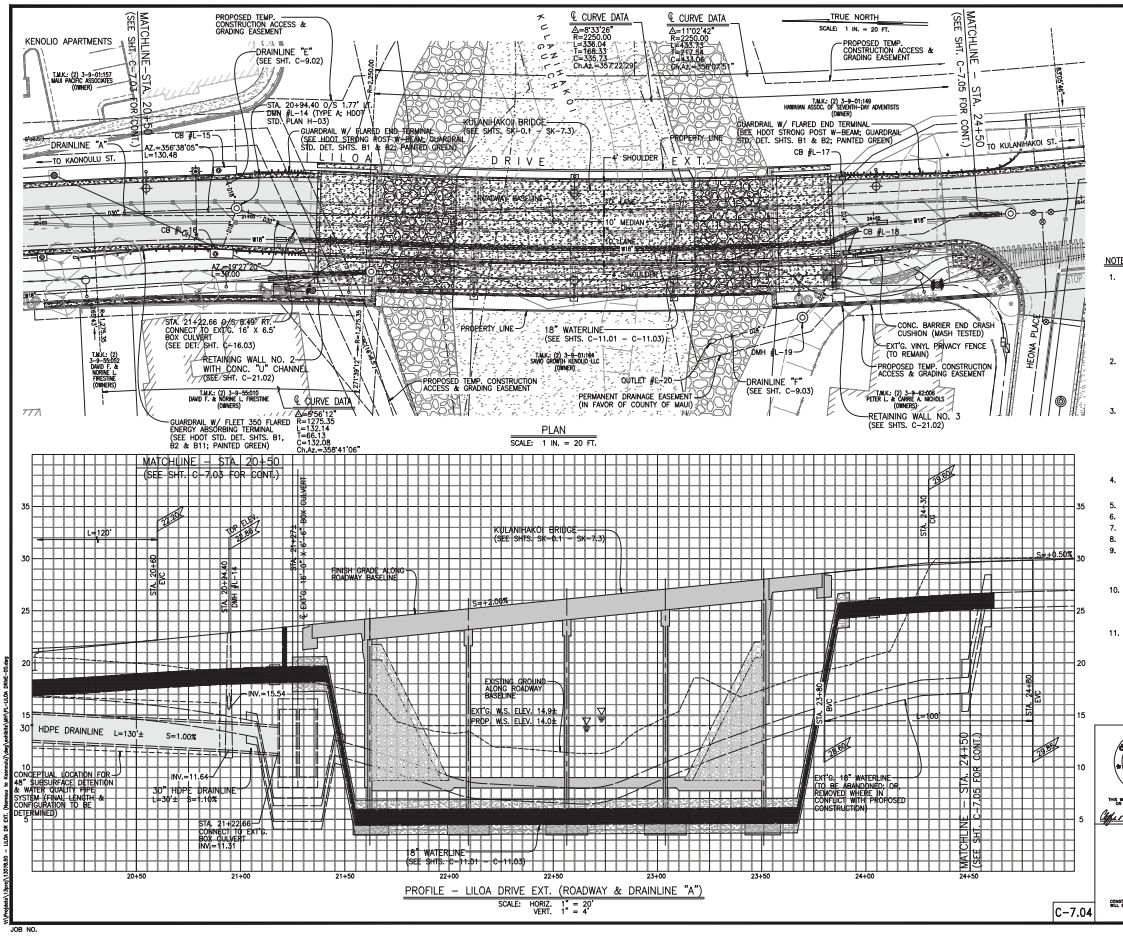
CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

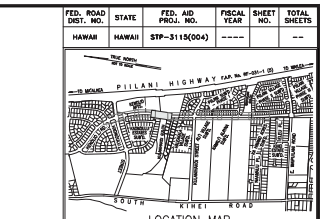
FILE	POCKET	FOLDER	NO.

SHEET OF

JOB NO.

EXHIBIT "E" (5 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(004)	-----		--

NOTES:

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REVISION	DATE	BY	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 20+50 TO STA. 24+50

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (004)

DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM
APPROVED | SUBMITTED BY
DATE | FIRM MEMBER | DATE

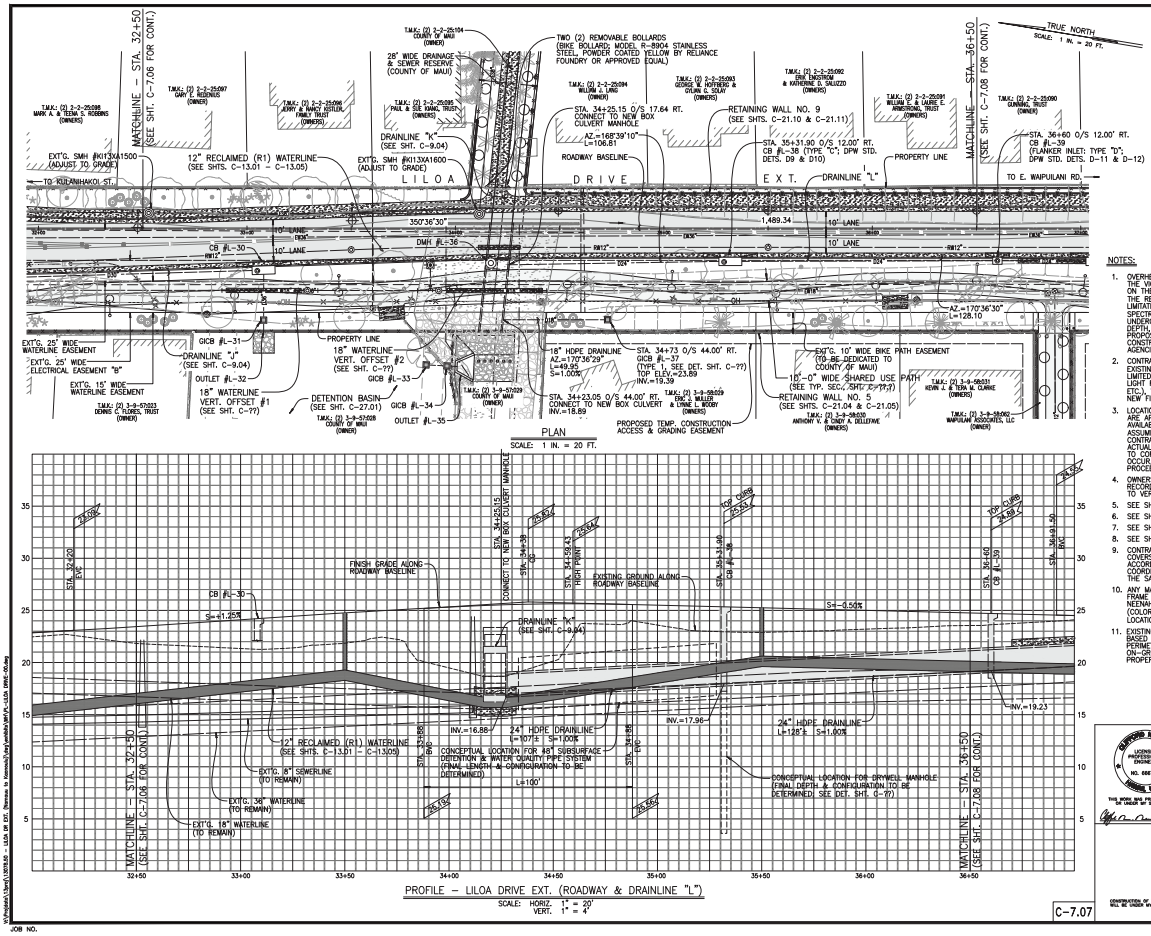
CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

FILE	POCKET	FOLDER	NO.

SHEET OF

JOB NO.

EXHIBIT "E" (4 of 13) - CONCEPTUAL PLAN & PROFILE



PLAN
SCALE: 1 IN. = 20 FT.

PROFILE – LILOA DRIVE EXT. (ROADWAY & DRAINLINE "L")
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

LOCATION MAP
NOT TO SCALE

NOTES:

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

DARLENE H. ARIOLA, LICENSED PROFESSIONAL ENGINEER, NO. 6667-C, COUNTY OF MAUI, STATE OF HAWAII
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
License Expires: April 30, 2025

REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "L")
STA. 32+50 TO STA. 36+50

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY	DRAWN BY	CHECKED BY
CNM	DPT	CNM

APPROVED — SUBMITTED BY
DATE — FIRM MEMBER — DATE

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

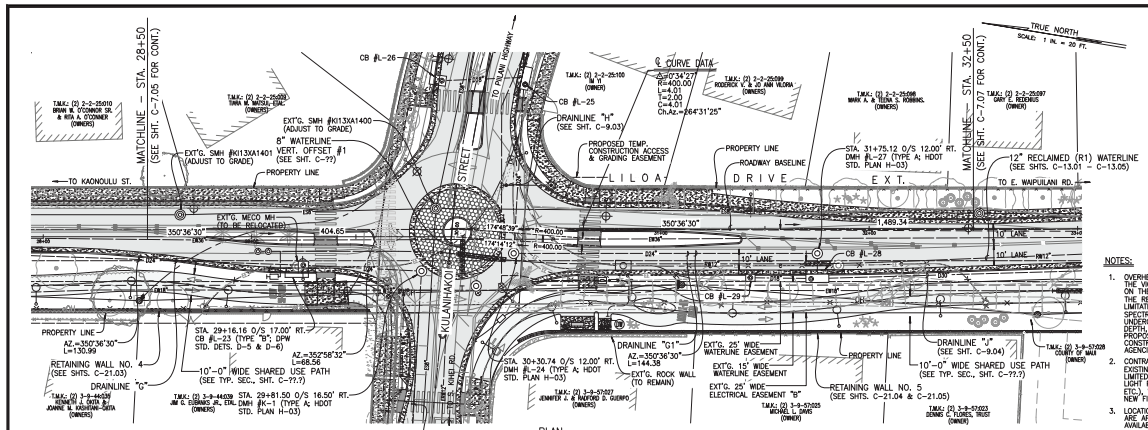
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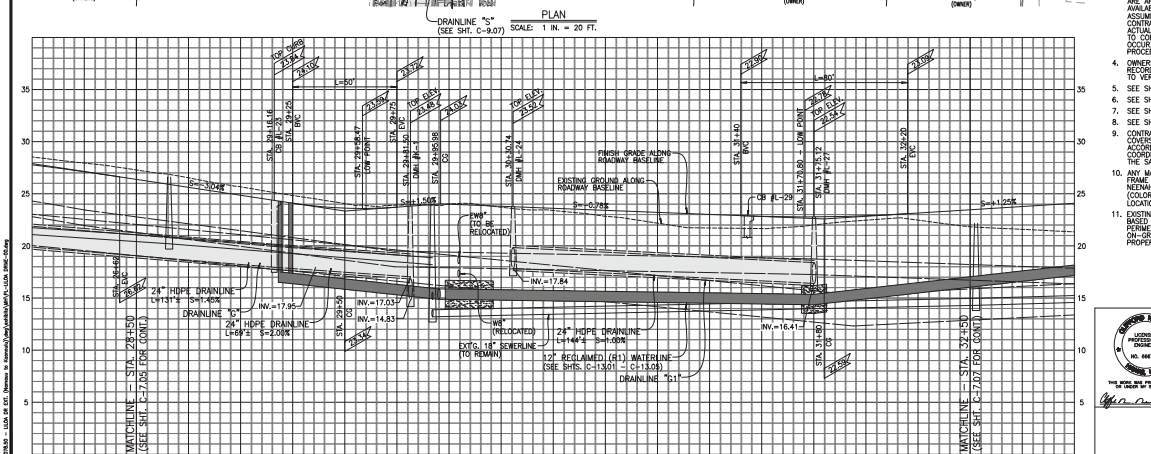
SHEET OF

JOB NO.

EXHIBIT "E" (7 of 13) - CONCEPTUAL PLAN & PROFILE



PLAN
SCALE: 1 IN. = 20 FT.



PROFILE – LILOA DRIVE EXT. (ROADWAY & DRAINLINES "G" & "G1")
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

LOCATION MAP
NOT TO SCALE

NOTES:

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2. CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND ANY EXISTING ITEMS OR IMPROVEMENTS TO BE RETAINED (INCLUDING, BUT NOT LIMITED TO, MANHOLES, MANHOLE FRAME AND COVERS, VALVE BOXES, FIRE HYDRANTS, LIGHT POLES, METERS, METER BOXES, FENCES, LANDSCAPE IRRIGATION, ETC.), WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ADJUSTED TO NEW FINISH GRADE.
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5. SEE SHEETS C-1.01 THRU C-1.04 FOR ADDITIONAL NOTES.
6. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
7. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
8. SEE SHEETS C-7.01 THRU C-7.13 FOR ROADWAY GRADE CONTROL.
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10. ANY MANHOLES LOCATED WITHIN BIKEWAY PAVEMENT AREA SHALL HAVE FRAME AND COVER CHANGED TO R-1597 MANHOLE FRAME, LID FOR FILL BY NEENAH FOUNDRY, OR APPROVED EQUAL. FILL MATERIAL TO BE CONCRETE (COLOR: BLACK FOR LOCATIONS IN A.C. PAVEMENT; CEMENT GREY FOR LOCATIONS IN CONCRETE).
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

DARLENE H. ARIOLA, LICENSED PROFESSIONAL ENGINEER, NO. 6667-C, COUNTY OF MAUI, STATE OF HAWAII
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
License Expires: April 30, 2025

REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINES "G" & "G1")
STA. 28+50 TO STA. 32+50

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY	DRAWN BY	CHECKED BY
CNM	DPT	CNM

APPROVED — SUBMITTED BY
DATE — FIRM MEMBER — DATE

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

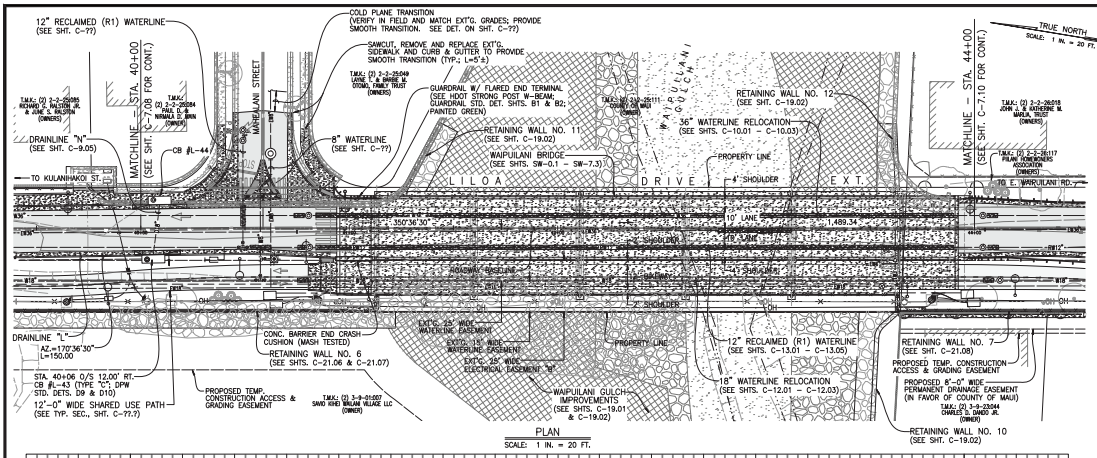
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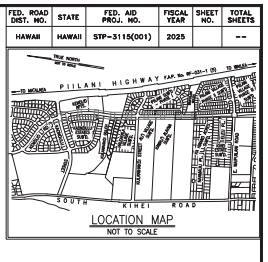
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SHEET OF

JOB NO.

EXHIBIT "E" (6 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

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REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "L") STA. 40+00 TO STA. 44+00

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY: CNM | DRAWN BY: DPT | CHECKED BY: CNM
APPROVED | SUBMITTED BY
DATE | FIRM NUMBER | DATE

FILE	POCKET	FOLDER	NO.

LICENSED PROFESSIONAL ENGINEER No. 6667-C — THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION. License Expires April 30, 2025

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

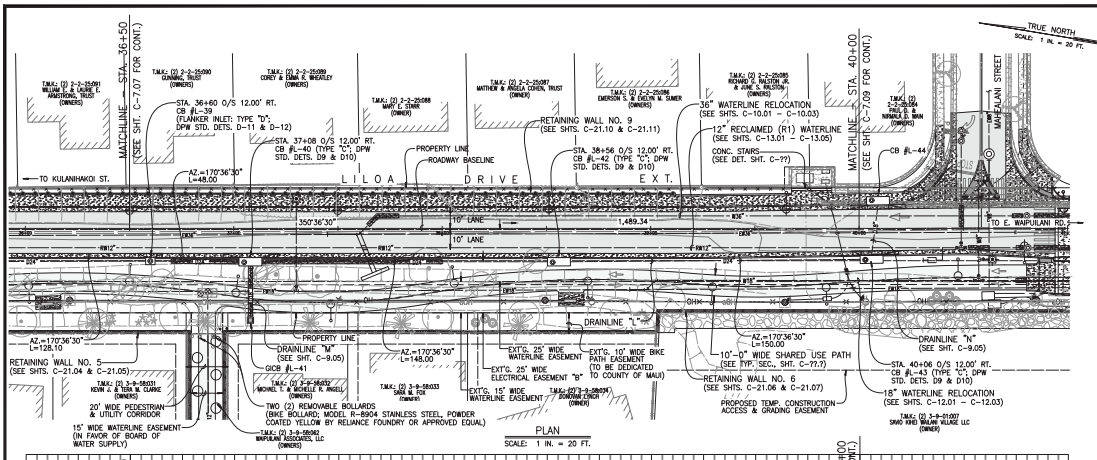
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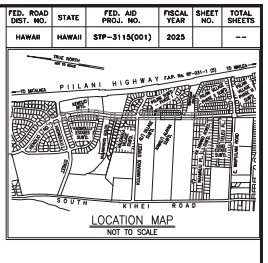
SHEET OF

JOB NO.

W:\Projects\Liloa\LILOA.dgn - LILOA DR EXT. (Roadway to Roadway)\Layouts\MAP\PL-LILOA DRWG-00.dwg

EXHIBIT "E" (9 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

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DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "L") STA. 36+50 TO STA. 40+00

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY: CNM | DRAWN BY: DPT | CHECKED BY: CNM
APPROVED | SUBMITTED BY
DATE | FIRM NUMBER | DATE

FILE	POCKET	FOLDER	NO.

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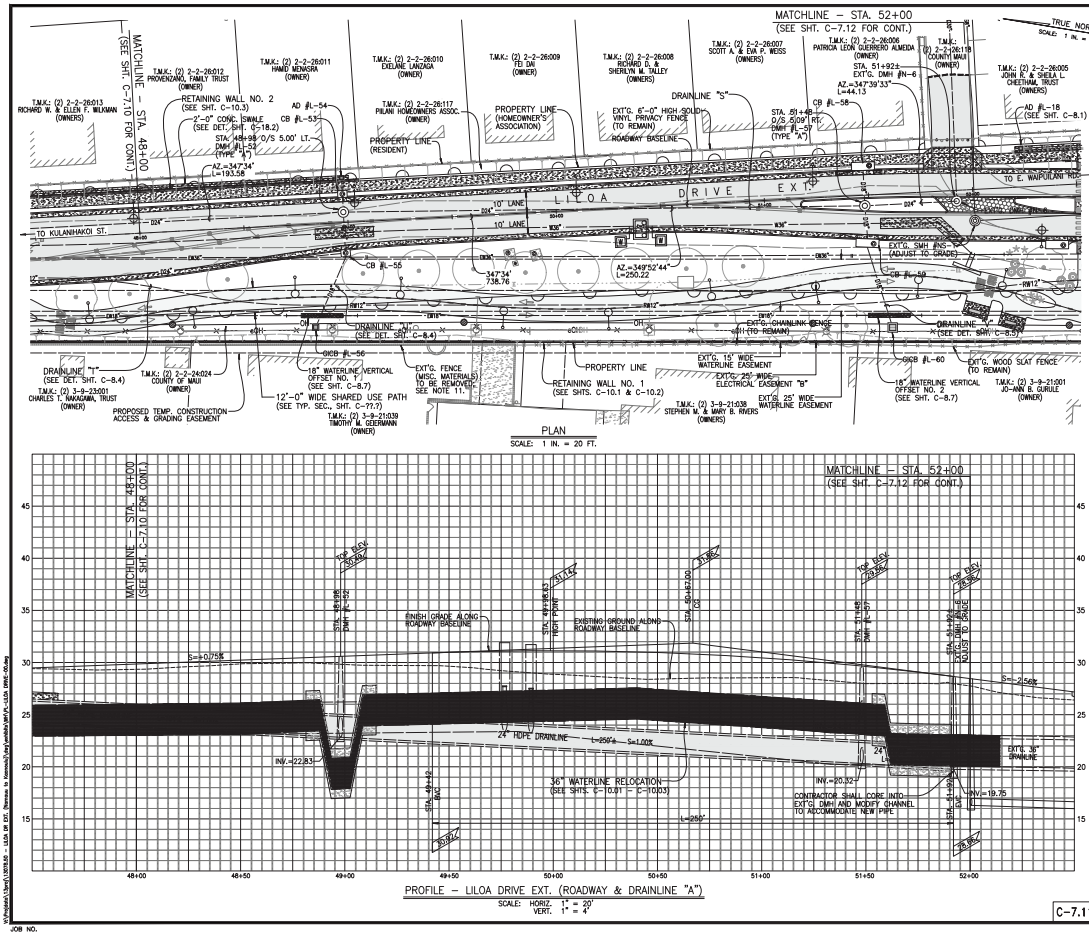
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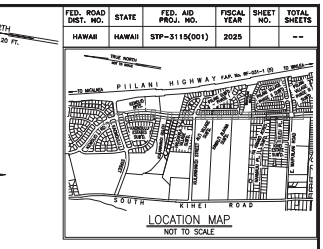
SHEET OF

JOB NO.

W:\Projects\Liloa\LILOA.dgn - LILOA DR EXT. (Roadway to Roadway)\Layouts\MAP\PL-LILOA DRWG-00.dwg

EXHIBIT "E" (8 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

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11. EXISTING FENCE FOR T.M.K.: (2) 3-9-21:039, ADJACENT TO LILOA DRIVE SHALL BE REMOVED IN ITS ENTIRETY. NEW VINYL FENCING MATERIALS (MATCHING THE RETAINING WALL FENCE) SHALL BE USED TO TIE THE EXISTING PROPERTY BOUNDARY FENCES TO THE RETAINING WALL. CONTRACTOR SHALL GRADE AREA ON PRIVATE SIDE TO PROVIDE SMOOTH TRANSITION TO SATISFACTION OF PROPERTY OWNER AND COUNTY DPW-ED. EXTENTS OF WORK TO BE DETERMINED IN THE FIELD.

LICENSED PROFESSIONAL ENGINEER
NO. 6667-C
CHENG HSIEH
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
License Expires: April 30, 2025

REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 48+00 TO STA. 52+00

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY	DRAWN BY	CHECKED BY
CNM	DPT	CNM

APPROVED | SUBMITTED BY | DATE | FIRM MEMBER | DATE

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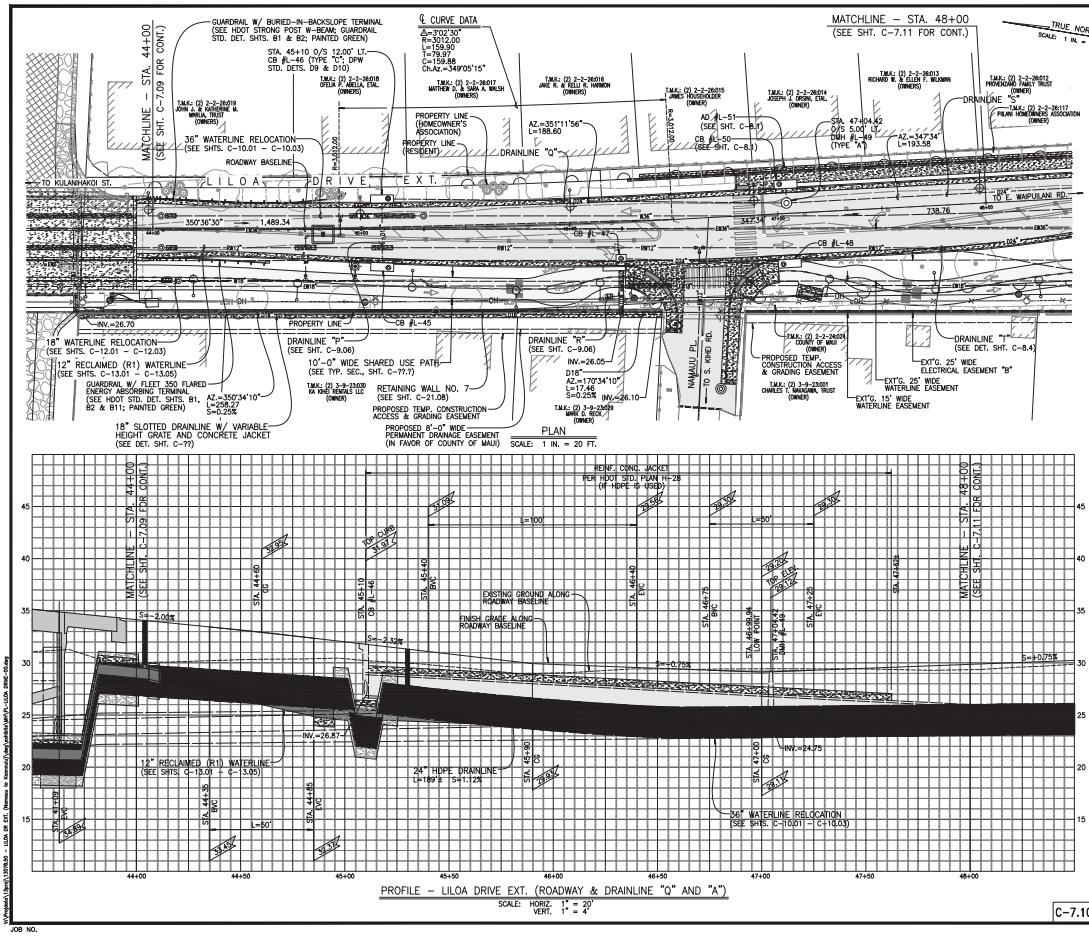
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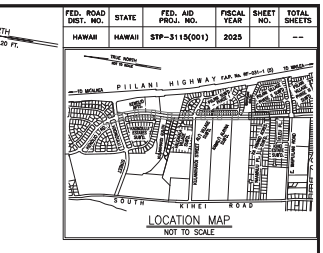
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JOB NO.

SHEET OF

EXHIBIT "E" (11 of 13) - CONCEPTUAL PLAN & PROFILE





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

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LICENSED PROFESSIONAL ENGINEER
NO. 6667-C
CHENG HSIEH
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License Expires: April 30, 2025

REVISION	DATE	SHEET	MADE BY	APPROVED

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "Q" AND "A") STA. 44+00 TO STA. 48+00

LILOA DRIVE EXTENSION
(VICINITY OF E. WAIPULANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

DESIGNED BY	DRAWN BY	CHECKED BY
CNM	DPT	CNM

APPROVED | SUBMITTED BY | DATE | FIRM MEMBER | DATE

CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

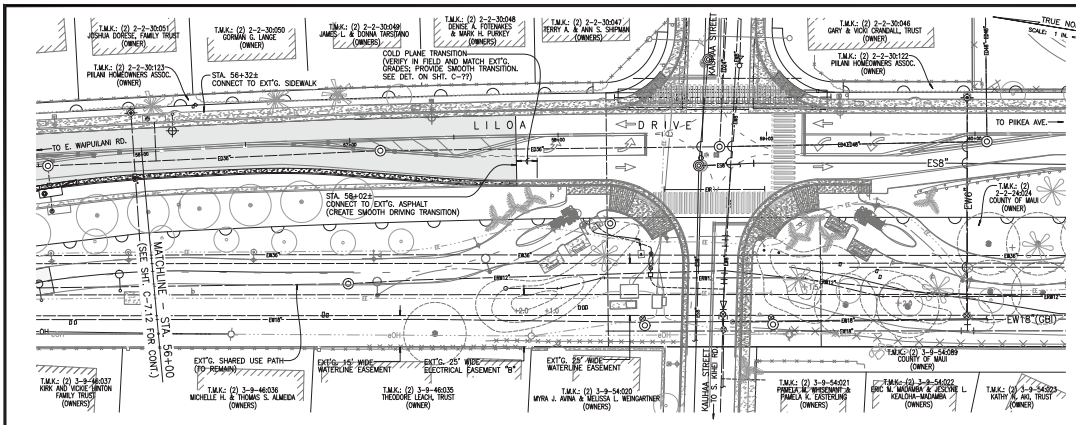
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C-7.10

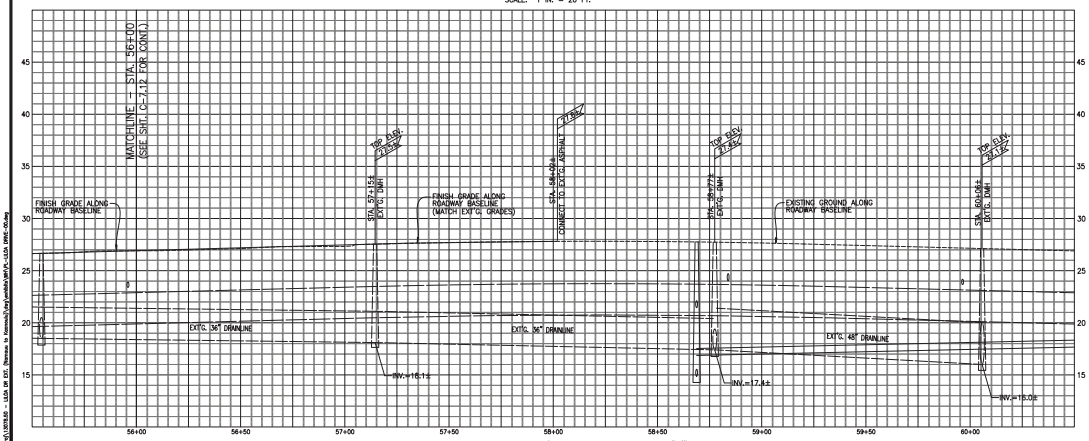
JOB NO.

SHEET OF

EXHIBIT "E" (10 of 13) - CONCEPTUAL PLAN & PROFILE



PLAN
SCALE: 1 IN. = 20 FT.



PROFILE – LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A")
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

NOTES:

1. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST ALONG, ACROSS, AND IN THE VICINITY OF THE PROPOSED IMPROVEMENTS AND MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE RESPECTIVE COUNTY OR STATE AGENCIES, UTILITIES (INCLUDING WITHOUT LIMITATION MAUI ELECTRIC COMPANY, LTD., HAWAIIAN TELCOM, AND SPECTRUM), EXAMINING ANY AVAILABLE RECORD DRAWINGS, TONING OF UNDERGROUND UTILITIES TEST PITS, AND CONFIRMING THE PRESENCE, DEPTH, SIZE, AND TYPE OF ANY EXISTING UTILITIES ALONG AND ACROSS THE PROPOSED IMPROVEMENTS. CONTRACTOR SHALL NOTIFY AND COORDINATE CONSTRUCTION ACTIVITIES, AND ANY REQUIRED RELOCATION, WITH RESPECTIVE AGENCIES AND UTILITIES.
2. CONTRACTOR SHALL PERFORM A THOROUGH FIELD INVESTIGATION AND ANY EXISTING ITEMS OR IMPROVEMENTS TO BE RETAINED (INCLUDING, BUT NOT LIMITED TO, MANHOLES, MANHOLES, VALVES, VALVE BOXES, FIRE HYDRANTS, LIGHT POLES, METERS, METER BOXES, FENCES, LANDSCAPE IRRIGATION, ETC.), WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ADJUSTED TO NEW FINISH GRADE.
3. LOCATIONS OF EXISTING UTILITIES, AS SHOWN ON PLANS AND/OR PROFILES, ARE APPROXIMATE ONLY, WERE DETERMINED ON THE BEST INFORMATION AVAILABLE, AND ARE BASED ON AVAILABLE CONSTRUCTION PLANS FOR SAME, ASSUMING STANDARD MINIMUM COVERS, AND/OR VISIBLE FIELD FEATURES. CONTRACTOR SHALL CONDUCT A THROUGH FIELD INVESTIGATION TO VERIFY ACTUAL LOCATION, DEPTH, SIZE, AND TYPE OF ALL EXISTING UTILITIES, PRIOR TO COMMENCEMENT OF CONSTRUCTION. SHOULD ANY DISCREPANCIES OCCUR, CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER BEFORE PROCEEDING ANY FURTHER WITH THE WORK.
4. OWNERS OF ADJOINING LANDS, SHOWN ON PLAN, ARE TAKEN FROM RECORDS FILED IN THE REAL PROPERTY MAPPING BRANCH, & ARE SUBJECT TO VERIFICATION.
5. SEE SHEETS C-1.01 THRU C-1.04 FOR ADDITIONAL NOTES.
6. SEE SHEET C-2 FOR LEGEND AND ABBREVIATIONS.
7. SEE SHEETS C-5.01 & C-5.02 FOR GENERAL UTILITY PLAN.
8. SEE SHEETS C-7.01 THRU C-7.13 FOR ROADWAY GRADE CONTROL.
9. CONTRACTOR SHALL ADJUST ANY DWS VALVES OR MANHOLE FRAME AND COVERS TO FINISHED GRADE AND INSTALL NEW CONCRETE COLLARS IN ACCORDANCE WITH DWS STANDARD DETAIL W12. CONTRACTOR SHALL COORDINATE AND REPLACE DAMAGED OR DETERIORATED VALVE BOXES TO THE SATISFACTION OF DWS.
10. ANY MANHOLES LOCATED WITHIN BIKEWAY PAVEMENT AREA SHALL HAVE FRAME AND COVER CHANGED TO R-1597 MANHOLE FRAME, LID FOR FILL BY NEENAH FOUNDRY, OR APPROVED EQUAL. FILL MATERIAL TO BE CONCRETE (COLOR: BLACK FOR LOCATIONS IN A.C. PAVEMENT; CEMENT GREY FOR LOCATIONS IN CONCRETE).
11. EXISTING FENCE FOR T.M.K.: (2) 3-9-21:039, ADJACENT TO LILOA DRIVE SHALL BE REMOVED IN ITS ENTIRETY. NEW VINYL FENCING MATERIALS (MATCHING THE RETAINING WALL FENCE) SHALL BE USED TO TIE THE EXISTING PROPERTY BOUNDARY FENCES TO THE RETAINING WALL. CONTRACTOR SHALL GRADE AREA ON PRIVATE SIDE TO PROVIDE SMOOTH TRANSITION TO SATISFACTION OF PROPERTY OWNER AND COUNTY DPW-ED. EXTENTS OF WORK TO BE DETERMINED IN THE FIELD.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 56+00 TO STA. 60+00

LILOA DRIVE EXTENSION (VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

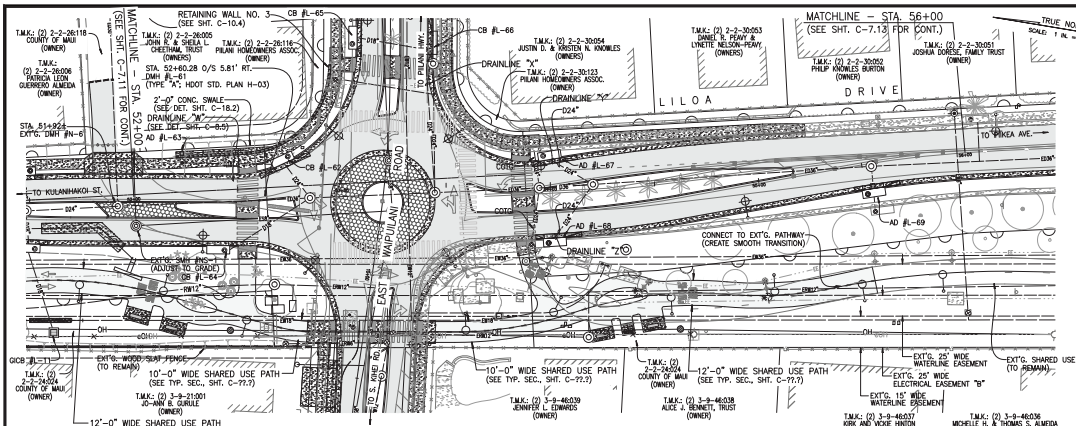
DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM
APPROVED | SUBMITTED BY
DATE | FIRM MEMBER | DATE

FILE | POCKET | FOLDER | NO.

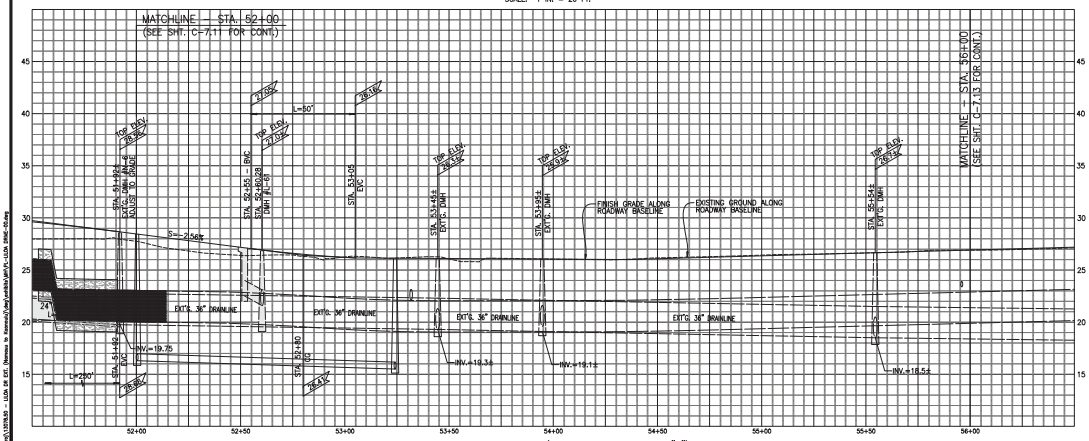
C-7.13

SHEET OF

EXHIBIT "E" (13 of 13) - CONCEPTUAL PLAN & PROFILE



PLAN
SCALE: 1 IN. = 20 FT.



PROFILE – LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A")
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

NOTES:

1. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST ALONG, ACROSS, AND IN THE VICINITY OF THE PROPOSED IMPROVEMENTS AND MAY NOT BE SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE RESPECTIVE COUNTY OR STATE AGENCIES, UTILITIES (INCLUDING WITHOUT LIMITATION MAUI ELECTRIC COMPANY, LTD., HAWAIIAN TELCOM, AND SPECTRUM), EXAMINING ANY AVAILABLE RECORD DRAWINGS, TONING OF UNDERGROUND UTILITIES TEST PITS, AND CONFIRMING THE PRESENCE, DEPTH, SIZE, AND TYPE OF ANY EXISTING UTILITIES ALONG AND ACROSS THE PROPOSED IMPROVEMENTS. CONTRACTOR SHALL NOTIFY AND COORDINATE CONSTRUCTION ACTIVITIES, AND ANY REQUIRED RELOCATION, WITH RESPECTIVE AGENCIES AND UTILITIES.
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	STP-3115(001)	2025		--

DEPARTMENT OF PUBLIC WORKS
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII

PLAN & PROFILE: LILOA DRIVE EXT. (ROADWAY & DRAINLINE "A") STA. 52+00 TO STA. 56+00

LILOA DRIVE EXTENSION (VICINITY OF E. WAIPUILANI RD. TO VICINITY OF KAONOULU ST.)

FED. AID PROJ. NO. STP-3115 (001)

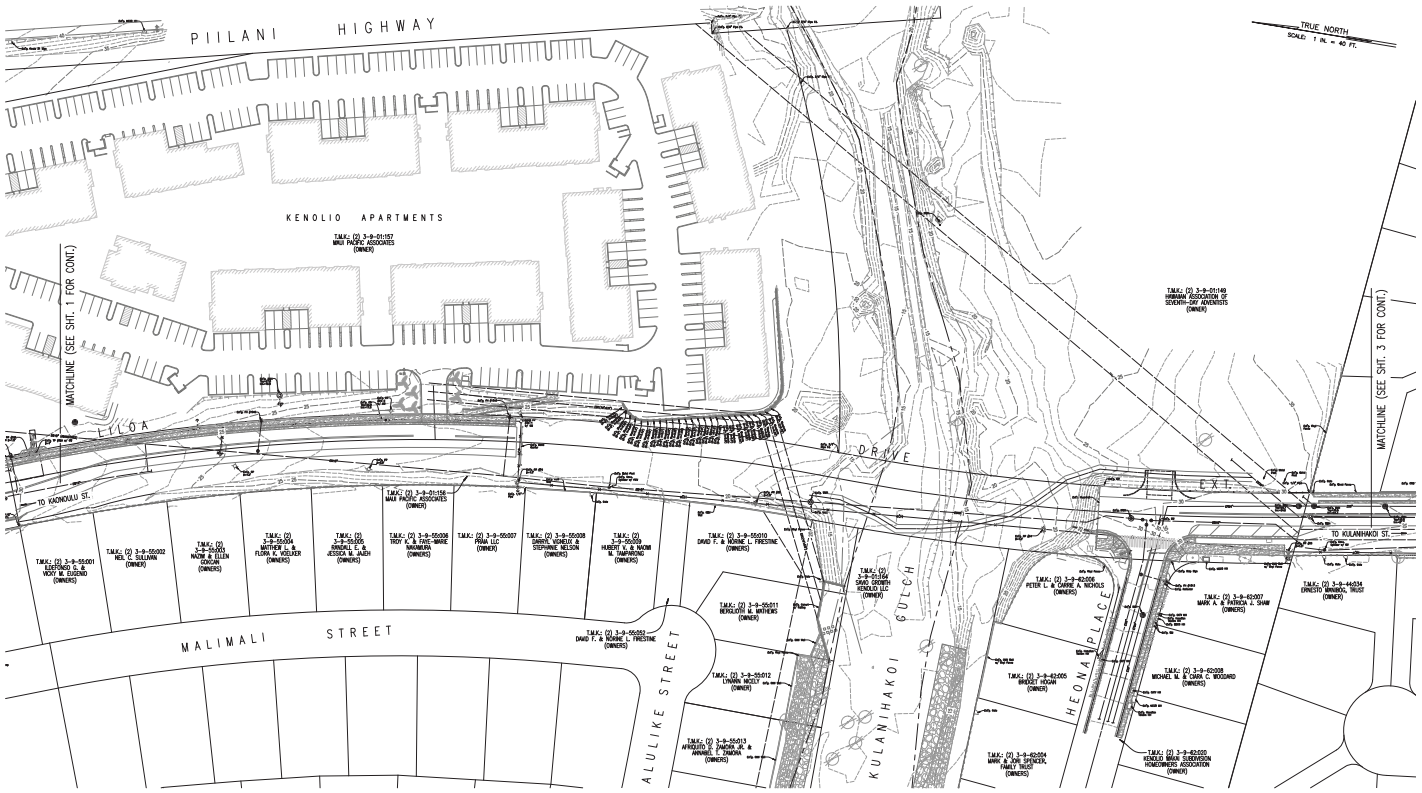
DESIGNED BY CNM | DRAWN BY DPT | CHECKED BY CNM
APPROVED | SUBMITTED BY
DATE | FIRM MEMBER | DATE

FILE | POCKET | FOLDER | NO.

C-7.12

SHEET OF

EXHIBIT "E" (12 of 13) - CONCEPTUAL PLAN & PROFILE



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

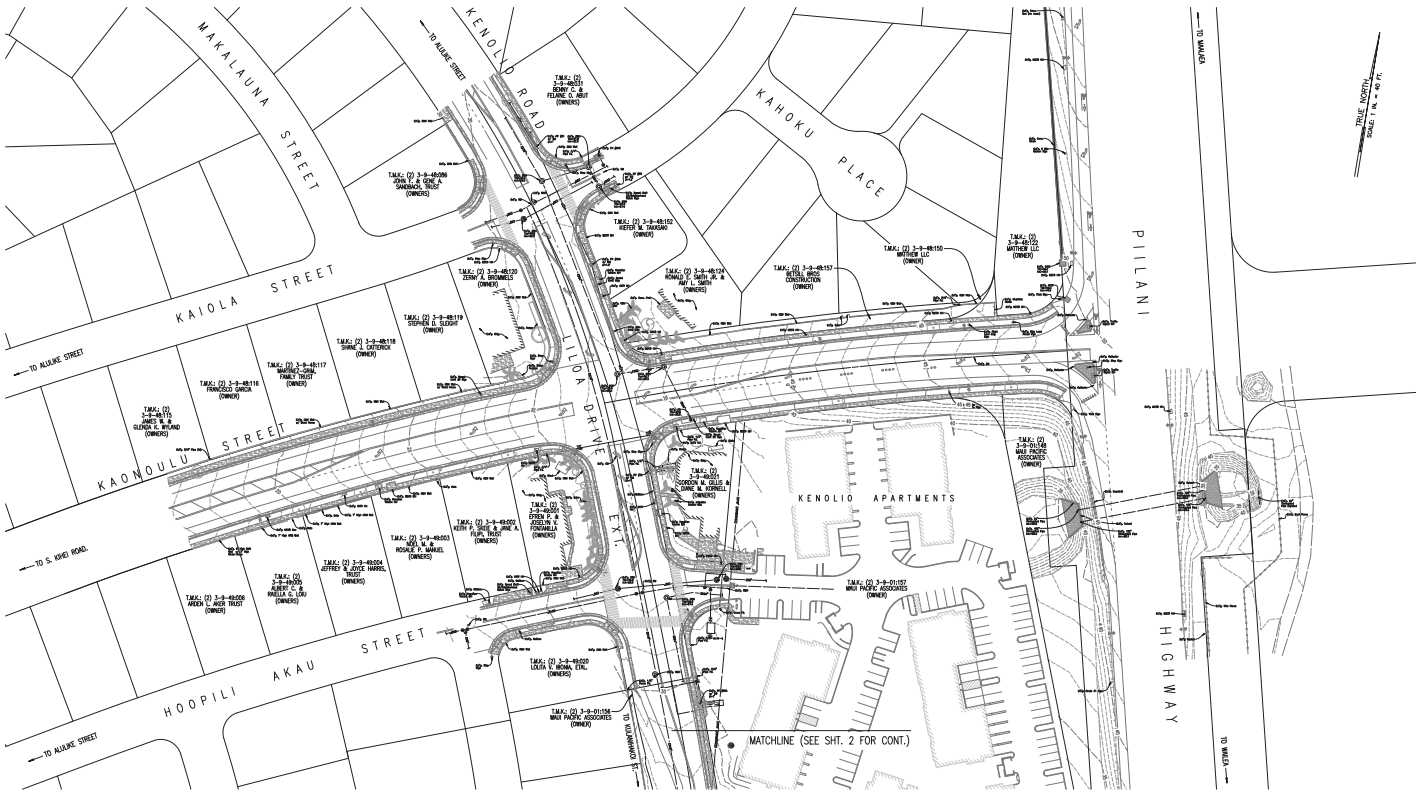
(SHEET 2 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (2 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

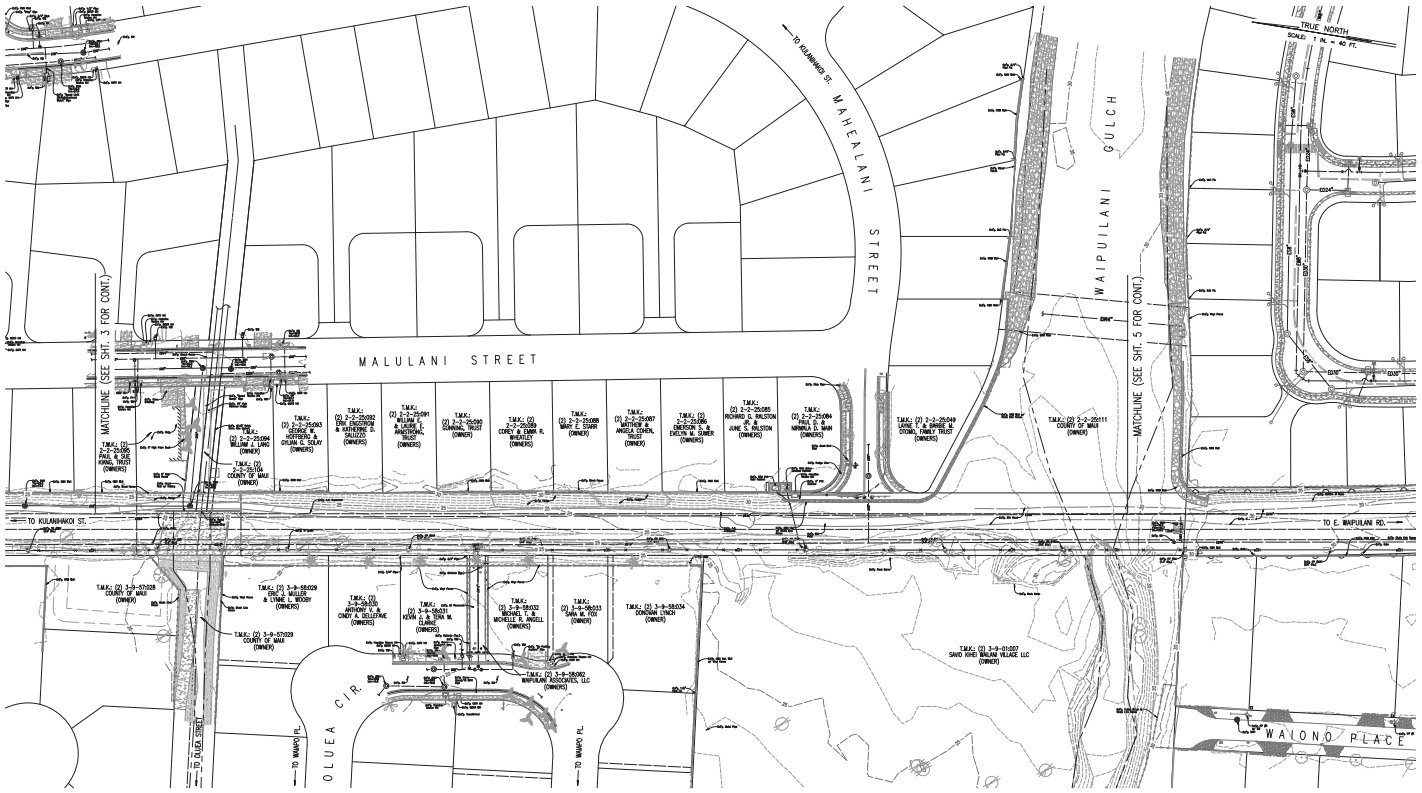
(SHEET 1 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (1 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

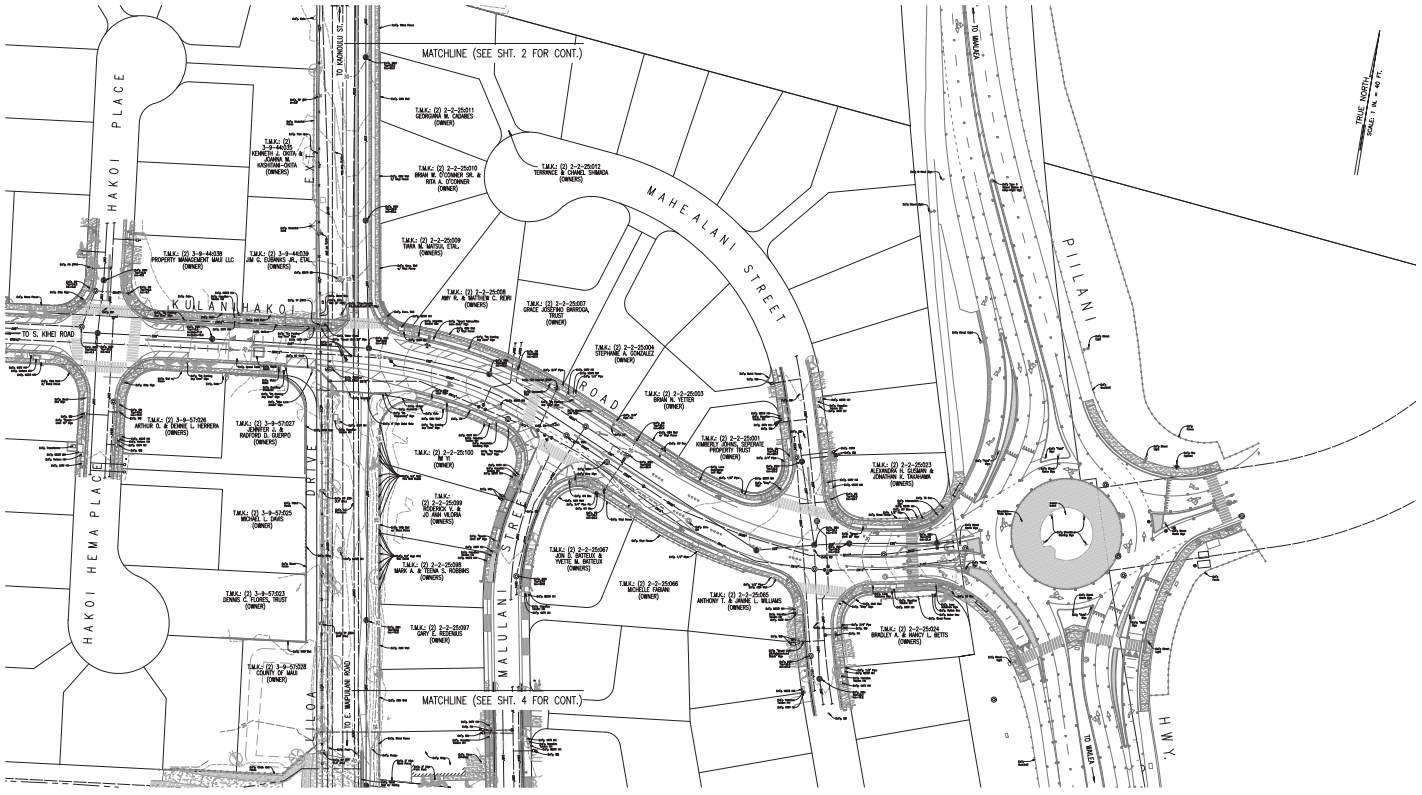
(SHEET 4 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (4 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

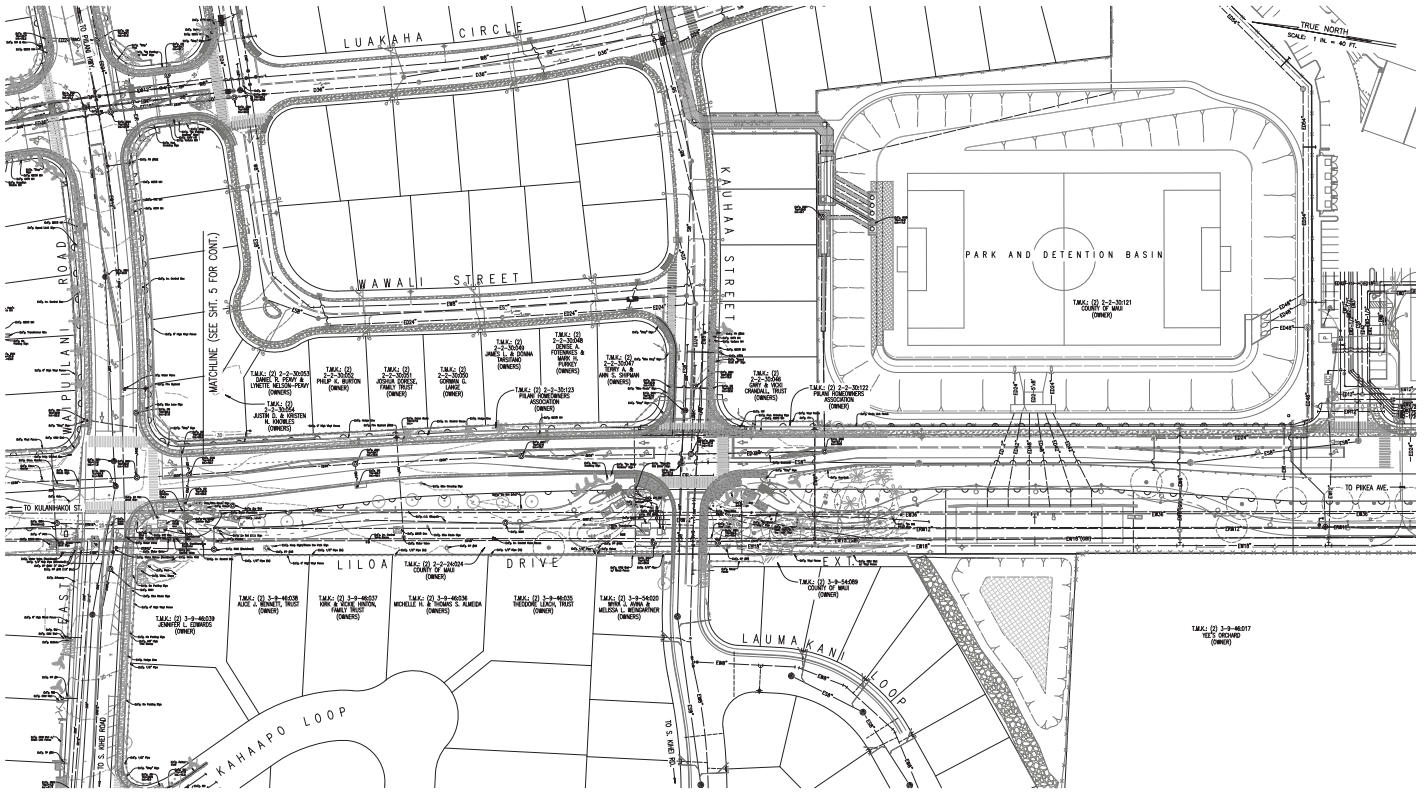
(SHEET 3 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (3 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

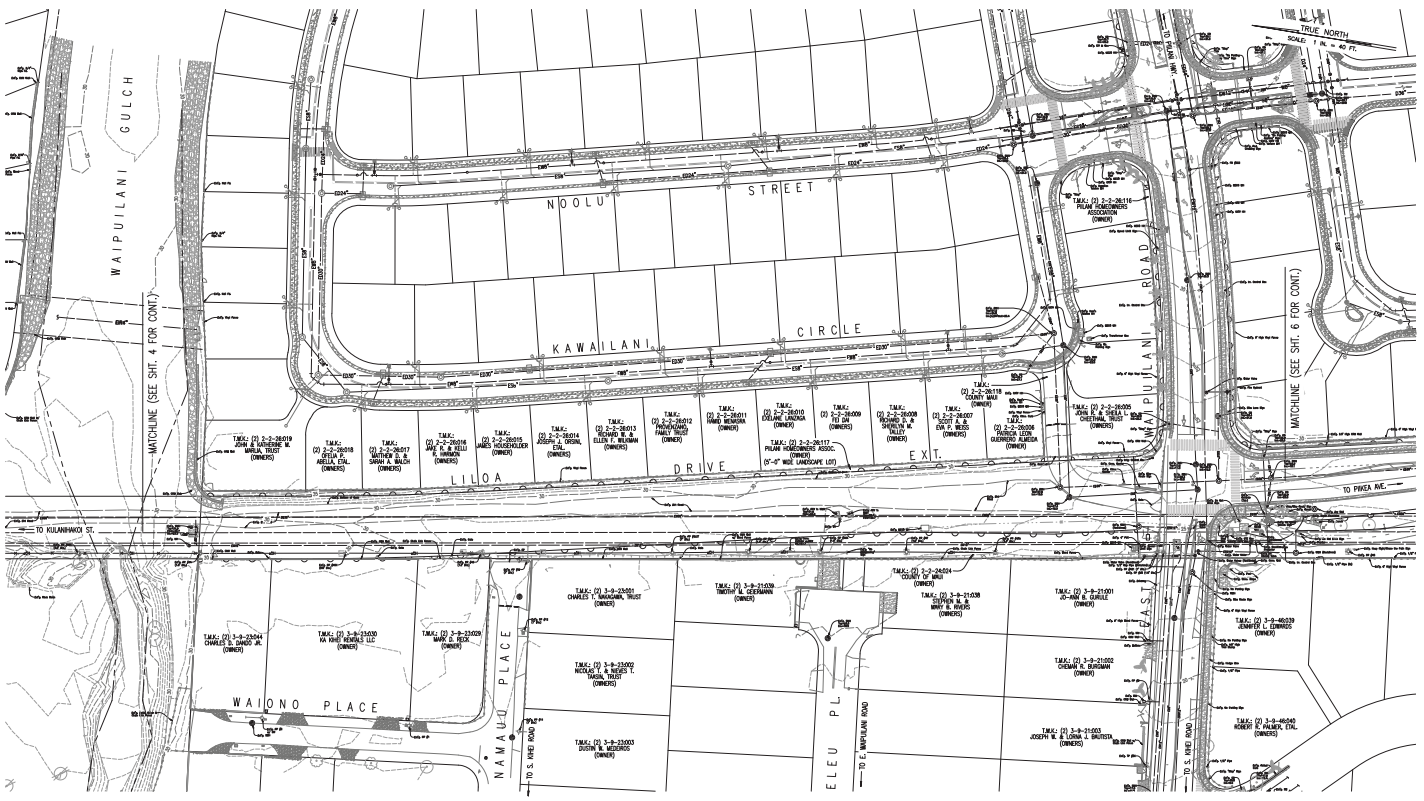
(SHEET 6 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (6 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES



LILOA DRIVE EXT. (E. WAIPUILANI RD. TO KAONOULU ST.)

TOPOGRAPHIC SURVEY MAP

(SHEET 5 OF 6)

0 40 80 120 160

SCALE: 1 IN. = 40 FT.

SEPTEMBER 15, 2023

EXHIBIT "F" (5 of 6) - TOPOGRAPHIC SURVEY MAP OF EXISTING GRADES

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Island of Maui, Hawaii

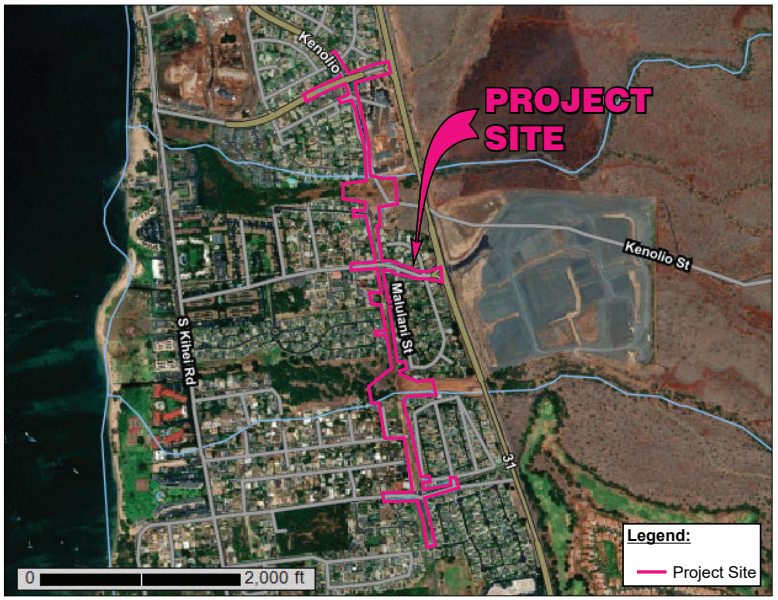


Exhibit "G" - SOILS CLASSIFICATION REPORT September 15, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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WID2—Waiakoa extremely stony silty clay loam, 3 to 25 percent slopes, eroded, MLRA 157 16
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 20, Aug 30, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaB	Alae sandy loam, 3 to 7 percent slopes, MLRA 158	16.3	77.8%
PsA	Pulehu clay loam, 0 to 3 percent slopes , MLRA 163	0.2	0.8%
WID2	Waiakoa extremely stony silty clay loam, 3 to 25 percent slopes, eroded, MLRA 157	4.5	21.5%
Totals for Area of Interest		**21.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Island of Maui, Hawaii

AaB—Alae sandy loam, 3 to 7 percent slopes, MLRA 158

Map Unit Setting

National map unit symbol: 2yyrw
Elevation: 10 to 450 feet
Mean annual precipitation: 13 to 19 inches
Mean annual air temperature: 77 to 81 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alae and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alae

Setting

Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Parent material: Volcanic ash derived from basalt over alluvium derived from basalt

Typical profile

A - 0 to 2 inches: sandy loam
AC - 2 to 7 inches: sandy loam
CB - 7 to 14 inches: stratified sandy loam
2Bk1 - 14 to 29 inches: stratified gravelly sand
2Bk2 - 29 to 55 inches: stratified very gravelly sand

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: R158XY004HI - Rocky Isohyperthermic Torric Naturalized Grassland

Hydric soil rating: No

Minor Components

Pulehu

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

Ewa

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

PsA—Pulehu clay loam, 0 to 3 percent slopes , MLRA 163

Map Unit Setting

National map unit symbol: 2x1vv
Elevation: 0 to 300 feet
Mean annual precipitation: 10 to 50 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pulehu and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pulehu

Setting

Landform: Flood plains, stream terraces, alluvial fans
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, tread, rise
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, concave
Parent material: Alluvium derived from igneous rock

Typical profile

Ap - 0 to 21 inches: clay loam

2C1 - 21 to 33 inches: loam
3C2 - 33 to 37 inches: loamy sand
4C3 - 37 to 47 inches: fine sandy loam
5C4 - 47 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

Minor Components

Mala

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Ewa

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Waialua

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

WID2—Waiakoa extremely stony silty clay loam, 3 to 25 percent slopes, eroded, MLRA 157

Map Unit Setting

National map unit symbol: 2xn19
Elevation: 100 to 1,000 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Waiakoa, extremely stony, eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waiakoa, Extremely Stony, Eroded

Setting

Landform: Ash fields
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash and/or residuum weathered from basalt

Typical profile

A - 0 to 1 inches: extremely stony silty clay loam
Bw1 - 1 to 8 inches: silty clay loam
Bw2 - 8 to 16 inches: silty clay loam
2Bw3 - 16 to 25 inches: paragravelly silty clay loam
2C - 25 to 33 inches: stony silty clay loam
2R - 33 to 43 inches: bedrock

Properties and qualities

Slope: 3 to 25 percent
Surface area covered with cobbles, stones or boulders: 8.5 percent
Depth to restrictive feature: 31 to 35 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R158XY004HI - Rocky Isohyperthermic Torric Naturalized Grassland

Hydric soil rating: No

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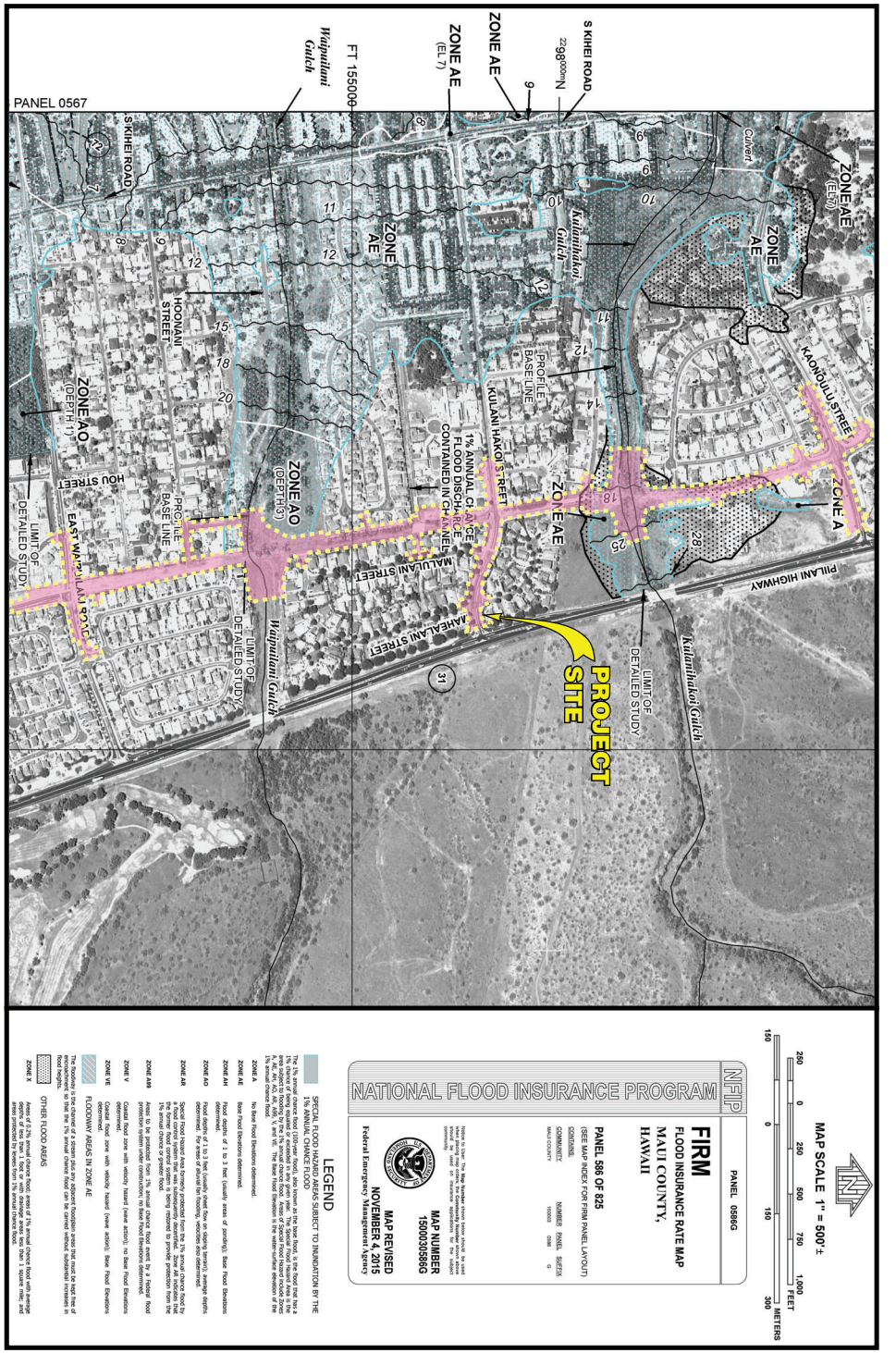
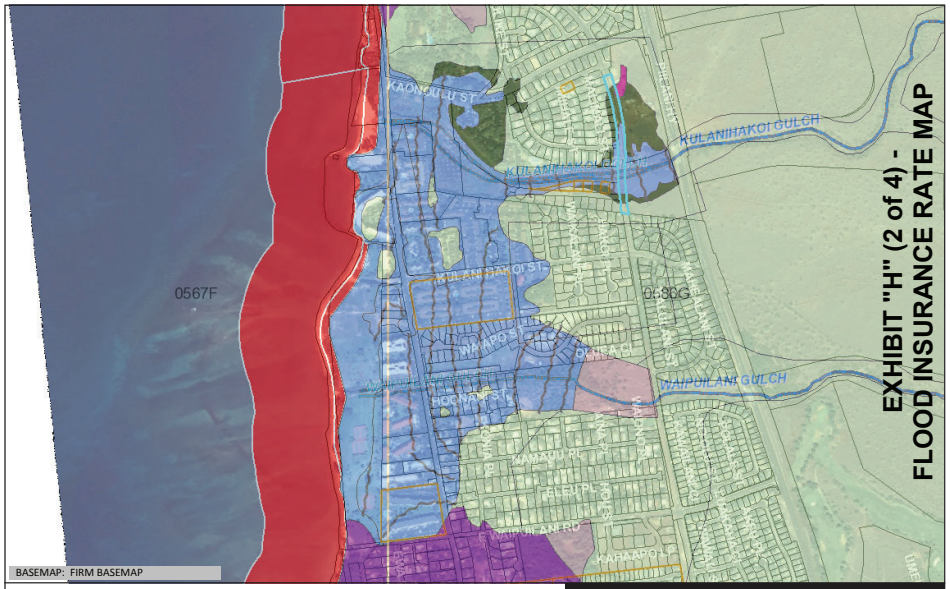


EXHIBIT "H" (1 of 4) - FLOOD INSURANCE RATE MAP



Flood Hazard Assessment Report

www.hawaiinfip.org

Kulanihakoi Gulch

Property Information

COUNTY: MAUI

TMK NO: (2) 3-9-001:156

WATERSHED: HAPAPA

PARCEL ADDRESS: KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE: NOVEMBER 04, 2015

LETTER OF MAP CHANGE(S): NONE

FEMA FIRM PANEL: 1500030586G

PANEL EFFECTIVE DATE: NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: YES
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 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:

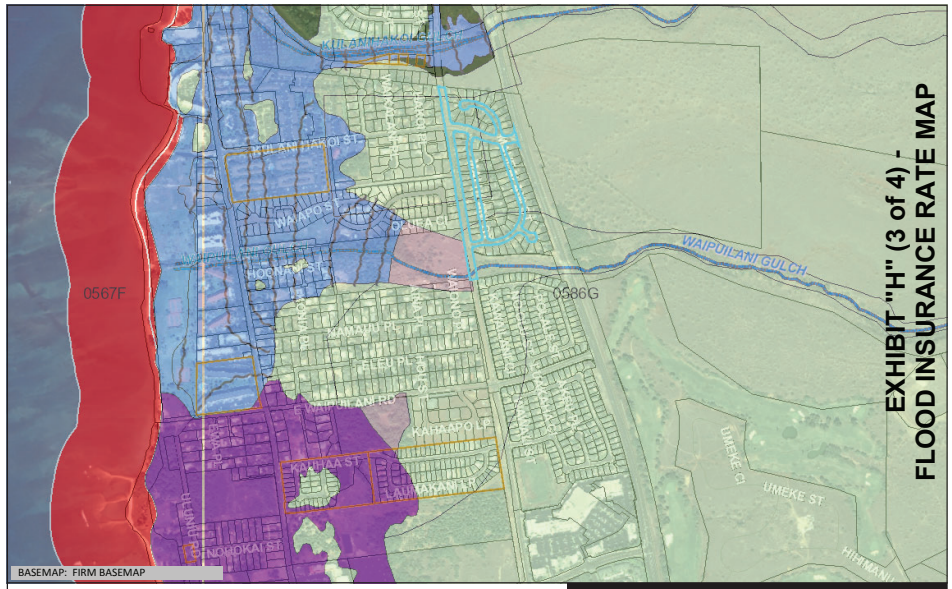
- **Zone A**: No BFE determined.
- **Zone AE**: BFE determined.
- **Zone AH**: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO**: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V**: Coastal flood zone with velocity 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.



Flood Hazard Assessment Report

www.hawaiinfip.org

Waipuilani Gulch

Property Information

COUNTY: MAUI

TMK NO: (2) 2-2-025:999

WATERSHED: HAPAPA

PARCEL ADDRESS: KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE: NOVEMBER 04, 2015

LETTER OF MAP CHANGE(S): NONE

FEMA FIRM PANEL: 1500030586G

PANEL EFFECTIVE DATE: 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: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 ft

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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.

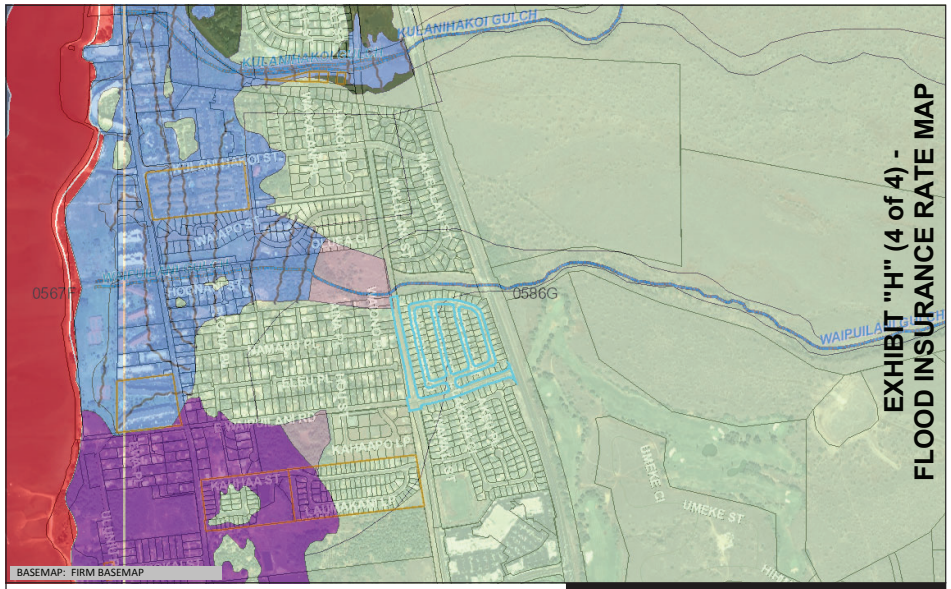


EXHIBIT "H" (4 of 4) - FLOOD INSURANCE RATE MAP

Flood Hazard Assessment Report

www.hawaiinfip.org

Pi'ilani Village Subdivision- Phase 2

Property Information

COUNTY:	MAUI
TMK NO:	(2) 2-2-026:999
WATERSHED:	HAPAPA
PARCEL ADDRESS:	40 NOOLU ST KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030586G
PANEL EFFECTIVE DATE:	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: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 ft

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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.

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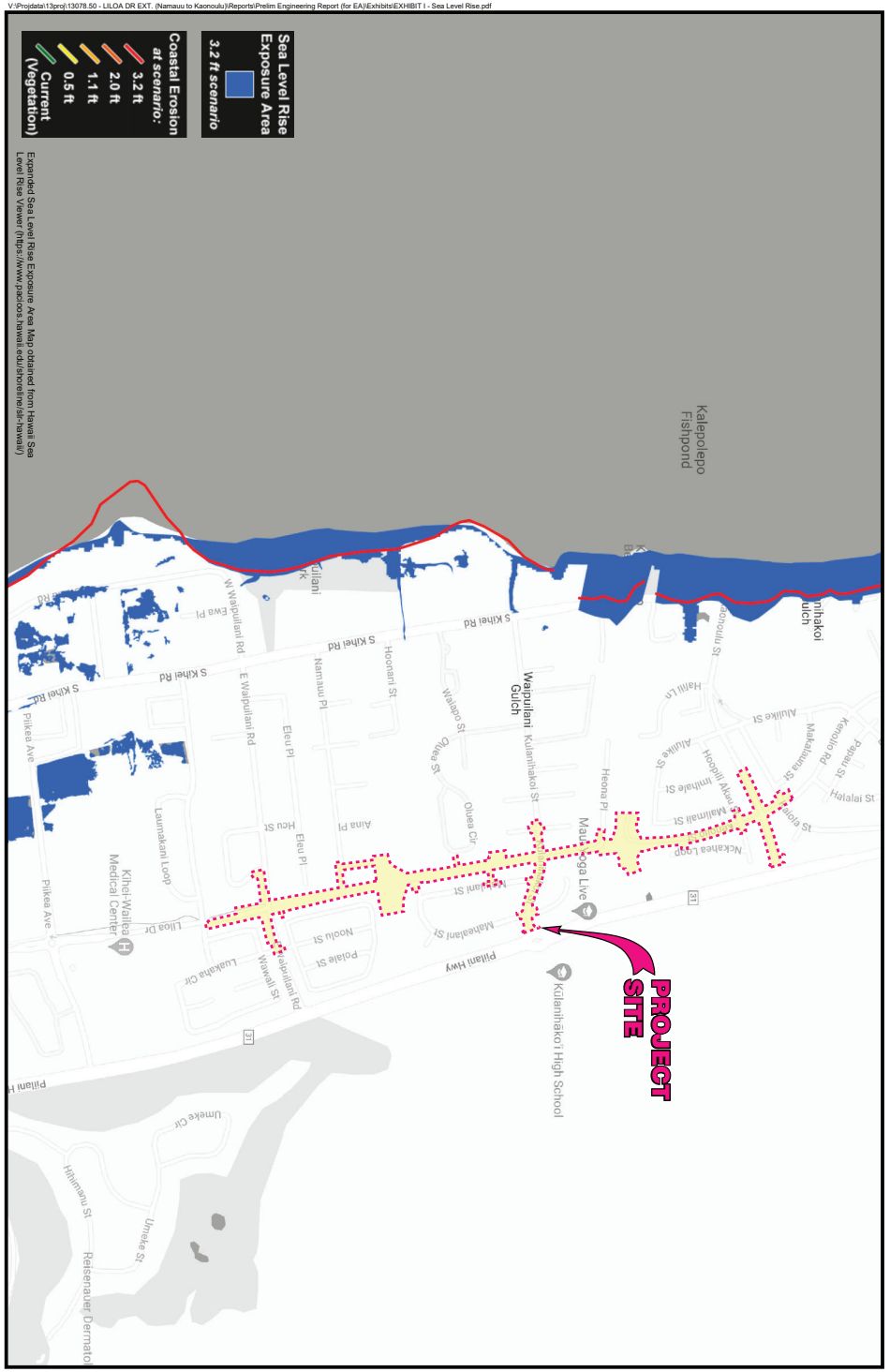
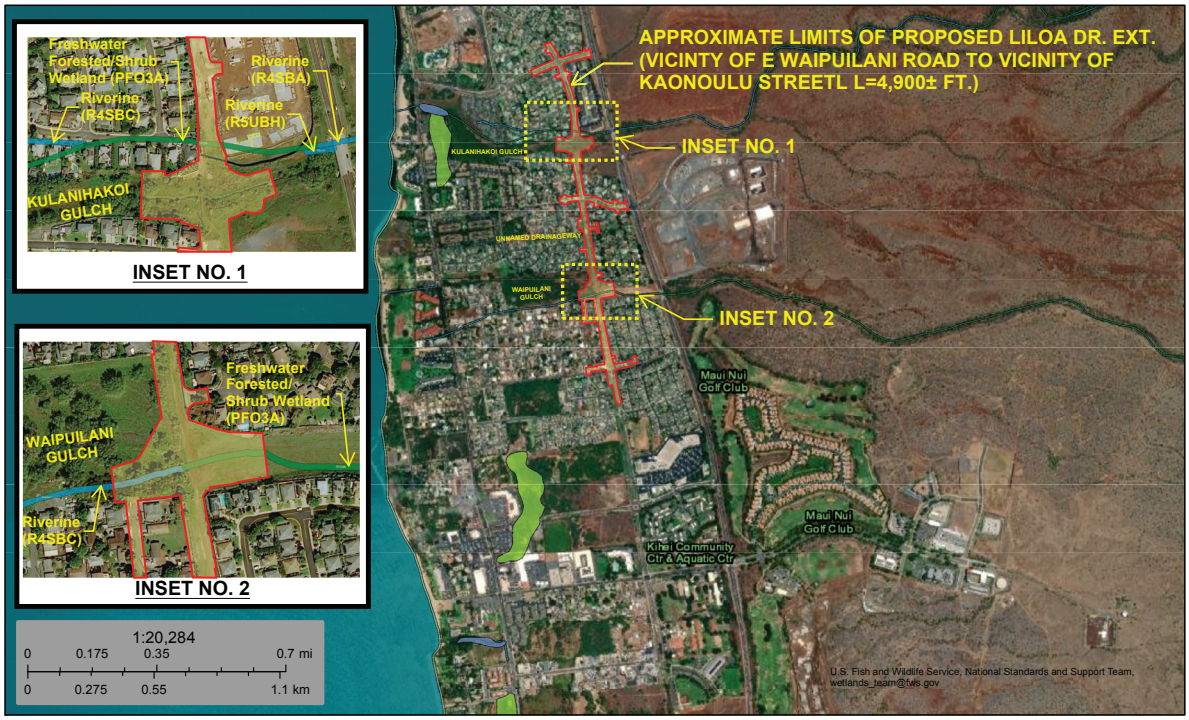


EXHIBIT "I" - SEA LEVEL RISE MAP

U.S. Fish and Wildlife Service
National Wetlands Inventory

South Maui Wetlands



September 15, 2023

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

EXHIBIT "K" - EXISTING WETLANDS

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

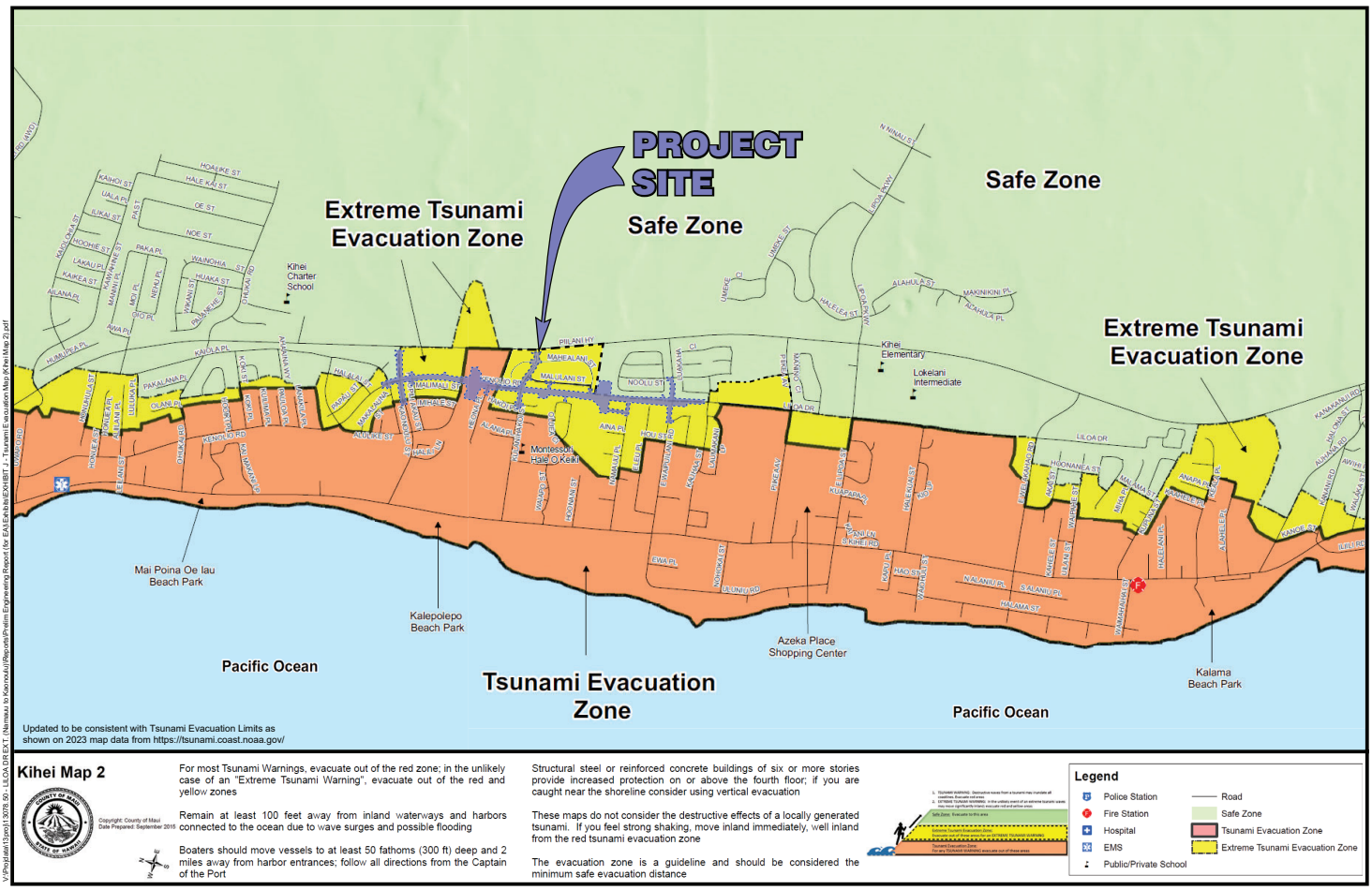


EXHIBIT "J" - TSUNAMI EVACUATION MAP (KIHEI MAP 2)

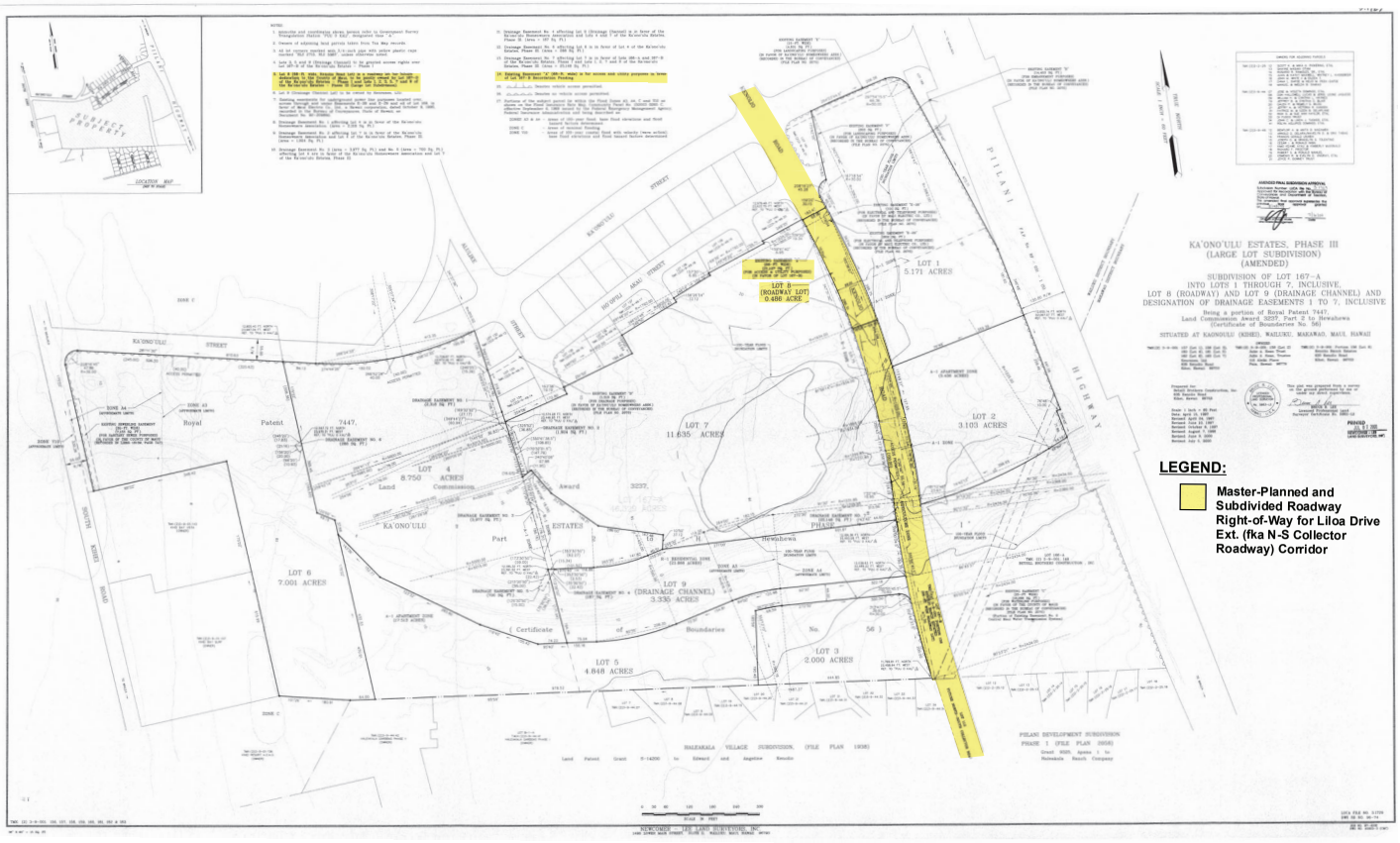
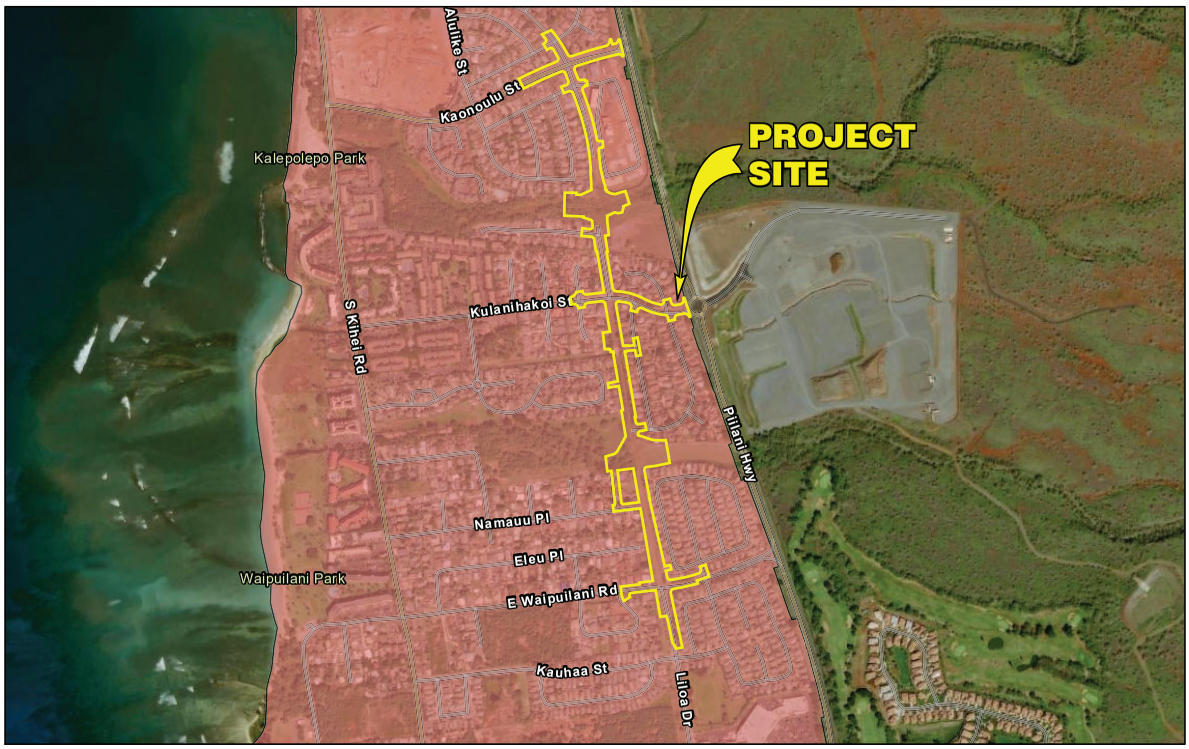


EXHIBIT "M" (1 of 4) - PROACTIVE, MASTER-PLANNED ROADWAY CORRIDOR; AND, RESERVES AND EASEMENTS ESTABLISHED BY COUNTY DEPARTMENT OF PUBLIC WORKS FOR FUTURE PEDESTRIAN-FRIENDLY, LANDSCAPED BIKEWAY

South Maui - Special Management Areas



September 15, 2023

Special Management Areas (SMA)

Expanded Special Management Areas (SMA) Map for the State of Hawaii obtained from Hawaii Statewide GIS Program (County of Maui, dated: May, 2022) (https://geoportal.hawaii.gov/datasets/HiStateGIS::special-management-areas-sma/explore)

1:12,000

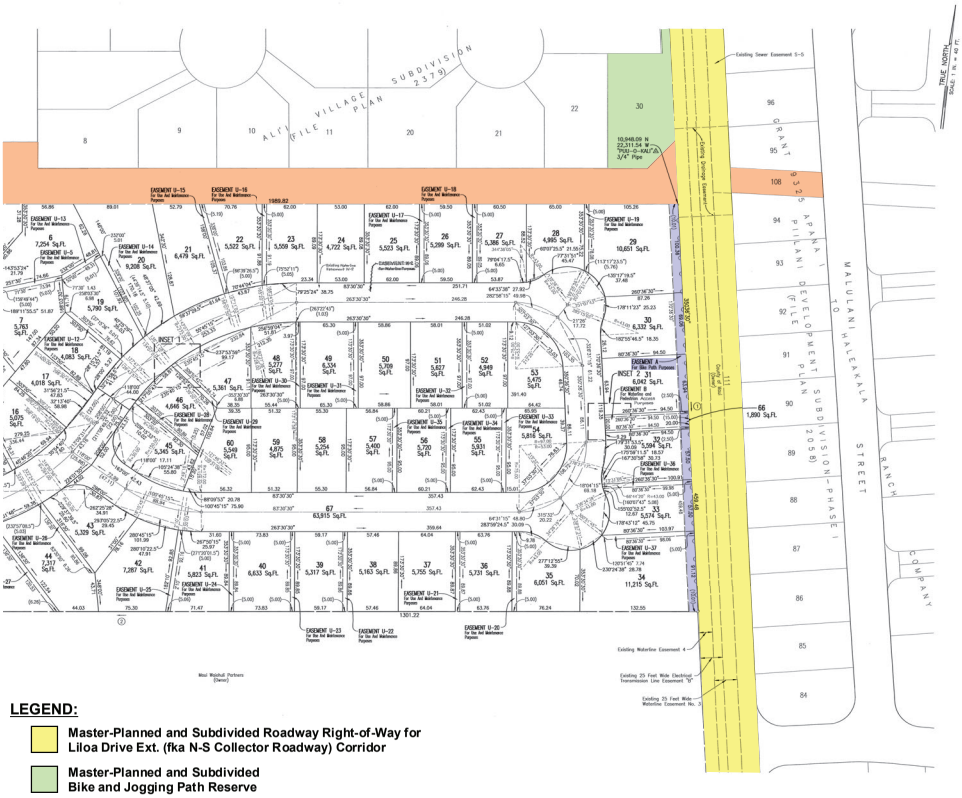
0 0.07 0.15 0.3 mi

0 0.15 0.3 0.6 km

Resource Mapping Hawaii, Maxar, Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS,

EXHIBIT "L" - SPECIAL MANAGEMENT AREAS

FILE PLAN 2456



KAMALI'I ALAYNA SUBDIVISION

LAND SITUATED ON THE EASTERLY SIDE OF KIHEI ROAD AND ON THE SOUTHERLY SIDE OF ALI'I VILLAGE SUBDIVISION (FILE PLAN 2379)

WAIOHULI, MAKAWAO, MAUI, HAWAII

BEING A PORTION OF GRANT 9681 TO MRS. MARY K. ROSE

OWNER: WAIPUILANI ASSOCIATES, LLC
ADDRESS: 635 KENOLIO ROAD
KIHEI, MAUI, HAWAII, 96753

SUBDIVIDED INTO LOTS 1 TO 70 INCLUSIVE, DESIGNATION OF EASEMENTS A, B, C, D, R-1 AND R-2, U-1 TO U-37, INCLUSIVE, ~~W-1~~ AND ~~W-2~~, AND DESIGNATION OF RESTRICTION VEHICULAR ACCESS RIGHTS AFFECTING LOTS 63 AND 64.
SUBJECT, HOWEVER, TO THE FOLLOWING EXISTING EASEMENTS: 1. WATERLINE EASEMENT D AFFECTING LOT 9 2. WATERLINE EASEMENT E AFFECTING LOT 15 3. WATERLINE EASEMENT W-1 AFFECTING LOTS 68, 69 AND 70 4. WATERLINE EASEMENT W-2 AFFECTING LOT 67
TOTAL AREA = 20.002 ACRES

This map and description were prepared by or under the direct supervision of the undersigned between April 30, 2007 and April 14, 2008 and may be checked by the State Land Surveyor with calculation folder numbered 05960-A.

2145 Wells Street – Suite 403
Wailuku, Maui, Hawaii 96793
April 14, 2008

WARREN S. UNEMORI – ENGINEERING, INC.

By: _____ 4/30/10
Licensed Professional Land Surveyor Certificate Number 1569 — License Expiration Date

This map is from an actual survey on the ground made by, or under the direct supervision of the undersigned, between the dates 11/06 and 11/07 and may be checked by the State Land Surveyor with field book numbers 534, 542, 543, 545, 550, 553, 555, 556, 557, 558, 560, 561 and 562 and folder filed under 205186.

P.O. Box 1748
Makawao, Maui, Hawaii 96768
April 14, 2008

AKAMAI LAND SURVEYING, INC.

By: _____ 4/30/10
Sherman Dudley Deporte Licensed Professional Land Surveyor Certificate Number 6960 — License Expiration Date

LEGEND:

- Master-Planned and Subdivided Roadway Right-of-Way for Liloa Drive Ext. (fka N-S Collector Roadway) Corridor
- Master-Planned and Subdivided Bike and Jogging Path Reserve
- Owned by County of Maui (Drainage and/or Sewer Reserve)
- Existing 10-ft. Wide Bikeway Easement [as required by County of Maui, Department of Planning on Approved Construction Plans; and, Approval of SMA (SMA Project Specific Condition No. 18; dated 12/29/2003)]

Easements D, W-1 and W-2 have been deleted and Existing Easements D, E, W-1 and W-2 have been added by Amendment to File Plan No. 2058 Kamali'i Alayna Subdivision recorded as Document No. 2007-028068.
Honolulu, Hawaii
February 25, 2009
State Land Surveyor

I hereby certify that the description of survey and map hereon has been examined and checked as to form and mathematical correctness, but not on the ground and the same is approved in accordance with Sections 502-17, 18 and 19, of the Hawaii Revised Statutes.
Honolulu, Hawaii
May 16, 2008
State Land Surveyor

EXHIBIT "M" (3 of 4) - PROACTIVE, MASTER-PLANNED ROADWAY CORRIDOR; AND, RESERVES AND EASEMENTS ESTABLISHED BY COUNTY DEPARTMENT OF PUBLIC WORKS FOR FUTURE PEDESTRIAN-FRIENDLY, LANDSCAPED BIKEWAY

FILE PLAN 2379



ALI'I VILLAGE SUBDIVISION

Land situated on the southerly side of Kulanihakoi Road and on the westerly side of Piilani Development Subdivision – Phase I (File Plan 2058)

at Waiohuli, Wailuku, Maui, Hawaii

Being a portion of Grant 8767 to E. N. Wilcox

OWNER: KAWE PARTNERS
ADDRESS: 1585 KAPI'OLANI BOULEVARD, SUITE 910
HONOLULU, HAWAI'I 96814

SUBDIVIDED INTO LOTS 1 TO 31, INCLUSIVE
DESIGNATION OF EASEMENTS D-1, D-2, E-1 TO E-4, INCLUSIVE AND DESIGNATION OF RESTRICTION OF VEHICULAR ACCESS RIGHTS AFFECTING LOTS 1, 2, 15, 16, 26, 27, AND 30

SUBJECT, HOWEVER to the following Existing Easements:
1. Easement W-1 for Waterline Purposes affecting Lot 11
2. Easement W-2 for Waterline Purposes affecting Lot 12
3. Easement W-3 for Waterline Purposes affecting Lot 19
4. Easement W-4 for Waterline Purposes affecting Lot 20
5. Easement for Cable Television Purposes affecting Lots 1 to 31, inclusive

TOTAL AREA = 7.418 ACRES

This map and description was prepared by or under the direct supervision of the undersigned between December 2003 and August 2004 and may be checked by the State Surveyor with my calculation folder number 03801-08

1129 Lower Main Street, Suite 102
Wailuku, Hawaii 96793
September 20, 2004

CONTROLPOINT SURVEYING, INC.
Norman K. Murakami
Licensed Professional Land Surveyor
Certificate Number LS-5824
EXP. 04/06

This map is from an actual survey on the ground made by or under the direct supervision of the undersigned between September 15, 2004 and October 2, 2004 and may be checked by the State Surveyor with my calculation folder filed under 204005.

P.O. Box 1748
Makawao, Hawaii 96768
September 20, 2004

AKAMAI LAND SURVEYING, INC.
Sherman Dudley DePorte
Licensed Professional Land Surveyor
Certificate Number LS-6960
EXP. 04/06

LEGEND:

- Master-Planned and Subdivided Roadway Right-of-Way for Liloa Drive Ext. (fka N-S Collector Roadway) Corridor
- Master-Planned and Subdivided Bike and Jogging Path Reserve
- Owned by County of Maui (Drainage and/or Sewer Reserve)

NOTES:
1. Azimuths and coordinates refer to Government Survey Triangulation Station "PUU-O-KIAU".
2. Figures indicated thus (2) indicate number of course in description.
3. Owners of adjoining lots are from Real Property Tax Office records.
4. ~~~~ denotes no vehicular access permitted.
5. ~~~~ denotes vehicular access permitted.
6. All boundary corners are marked with 1/2" pipe unless otherwise noted.

AREA OF EASEMENTS:
Easement D-1 for Drainage Purposes affecting Lots 9 and 10 = 1,358 Sq. Ft.
Easement D-2 for Drainage Purposes affecting Lots 20 and 21 = 1,591 Sq. Ft.
Easement E-1 for Electrical Purposes affecting Lot 13 = 45 Sq. Ft.
Easement E-2 for Electrical Purposes affecting Lot 14 = 45 Sq. Ft.
Easement E-3 for Electrical Purposes affecting Lot 17 = 45 Sq. Ft.
Easement E-4 for Electrical Purposes affecting Lot 18 = 45 Sq. Ft.

I hereby certify that the description of survey and map hereon has been examined and checked as to form and mathematical correctness but not on the ground and the same is approved in accordance with Sections 502-17, 18, and 19 of the Hawaii Revised Statutes.
Honolulu, Hawaii
October 6, 2004
Acting State Land Surveyor

State of Hawaii
Office of
Bureau of Conveyances
Received for filing this 20th day of October, A.D. 2004, at 10:10 A.M. and filed in File No. 2379

Registrar of Conveyances

Metes and Bounds description recorded in Document Number 2004B-204837

TAX MAP KEY: (2) 3-9-1: 155

36" X 36" = 7.5 Sq. Ft.

EXHIBIT "M" (2 of 4) - PROACTIVE, MASTER-PLANNED ROADWAY CORRIDOR; AND, RESERVES AND EASEMENTS ESTABLISHED BY COUNTY DEPARTMENT OF PUBLIC WORKS FOR FUTURE PEDESTRIAN-FRIENDLY, LANDSCAPED BIKEWAY

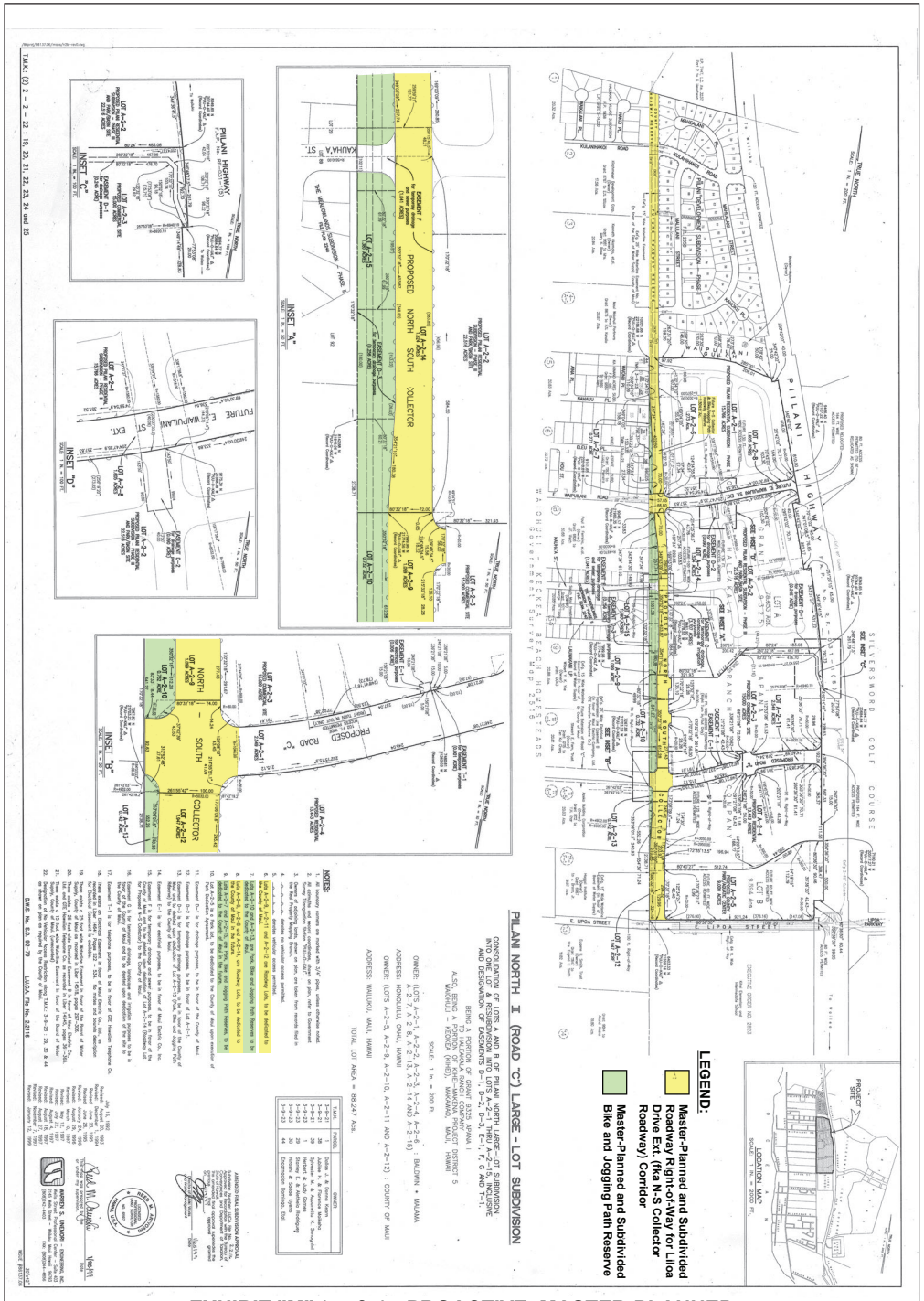


EXHIBIT "M" (4 of 4) - PROACTIVE, MASTER-PLANNED ROADWAY CORRIDOR; AND, RESERVES AND EASEMENTS ESTABLISHED BY COUNTY DEPARTMENT OF PUBLIC WORKS FOR FUTURE PEDESTRIAN-FRIENDLY, LANDSCAPED BIKEWAY

APPENDIX A

Preliminary Drainage Report

Established 1969

Draft - Preliminary Drainage Report for

Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road)

County Project No. 16-23
Federal Aid Project Nos. STP - 3115(001) & 3115(004)

Kihei, Maui, Hawaii
TMK: (2)3-9-01: 156 & (2)3-9-57: 028 and
Portions of TMK: (2)2-2-24: 024; (2)2-2-25: 11;
(2)2-2-26: 117; (2)3-9-01: 007, 149, 158, 164;
(2)3-9-57: 029; and (2)3-9-62: 020

Prepared For:

Engineering Division
Department of Public Works
County of Maui

CLIFFORD N. MUKAI
LICENSED PROFESSIONAL ENGINEER
NO. 6667-C
HAWAII, U.S.A.

License Expires April 30, 2026

Warren S. Unemori Engineering, Inc.
Civil and Structural Engineers - Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, Hawaii 96793

Date: May 2023
Revised: December 2024

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V. **REFERENCES** 15-16

EXHIBITS:

A Project Location Map
B Soils Classification Report
C Flood Insurance Rate Map
D Tsunami Evacuation Zone Map
E Pre-Development Drainage Area Map
F Post-Development Drainage Area Map

APPENDICES:

A Hydrologic Calculations
B Preliminary Detention Basin and Subsurface Drainage Storage System Volume Estimation Calculations
C USACE Responses from Nationwide Permit Pre-Construction Notifications (PCNs)

Preliminary Drainage Report
for
Liloa Drive Extension
(Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road)
Kihei, Maui, Hawaii

I. PURPOSE

This report has been prepared to examine both the existing drainage conditions and the proposed drainage plan for the County of Maui DPW's Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road) project.

II. PROPOSED PROJECT

A. Site Location

The Liloa Drive Extension (LDE) project is located in Kihei, on the island of Maui, and in the State of Hawaii. The project site is approximately 400 to 800 feet west (makai) of Piilani Highway, and is approximately 4,900 feet in length. This roadway extension project will improve Liloa Drive (f.k.a. North-South Collector), between the vicinity of its intersection with Kaonoulu Street to the vicinity of its intersection with East Waipuilani Road. Also included in the LDE project are improvements to the existing intersections of Kaonoulu Street, Kulanihakoi Street and East Waipuilani Road; and, transitions at the connection of these roadways to Piilani Highway, where required. (see EXHIBIT "A").

B. Project Description:

The proposed LDE will improve traffic circulation, providing better connectivity between Piilani Highway and South Kihei Road in an easterly (mauka) to westerly (makai) direction. This will assist in alleviating the existing traffic congestion with an additional route through Kihei west (makai) of, and roughly parallel to, the existing Piilani Highway. The proposed LDE will also serve as an alternate route in the event of emergencies or during unexpected closures of Piilani Highway and/or South Kihei Road.

The approximately 4,900± feet long project corridor will follow the master planned existing roadway reserve corridor that runs in the north-south direction and is bordered to the east (mauka) and west (makai) by existing residential subdivisions for a majority of the project. A bridge will be

constructed at its crossings with both Kulanihakoi and Waipuilani Gulches. Other improvements are expected to include, but are not limited to:

- Extension of asphalt concrete paved roadway and shared use path (aka, Kihei Bikeway);
- Single-lane roundabouts at its major intersections with Kaonoulu Street, Kulanihakoi Street, and, East Waipuilani Road;
- Concrete curbs, curb and gutters, curb ramps, and sidewalk;
- Drainage systems that generally consist of drain inlets, manholes, drainage piping, subsurface detention systems, drywells, as well as above-ground grassed detention basins and drainage swales;
- Underground reclaimed (R1) water facilities;
- Underground water facilities for potable water and fire protection;
- Retaining walls and fences;
- Installations and relocations of both overhead and underground electrical, telephone, and cable television systems (including streetlights, power poles, transmission lines, pathway lights, underground conduits, handholes, etc.);
- Landscaping and irrigation [expected to be supplied from Maui County's Reclaimed (R1) Wastewater system south of and including Kulanihakoi Gulch; and County's potable waterline north of Kulanihakoi Gulch];
- Benches, drinking fountains, trash/recycling bins, etc.

In addition to enhancing vehicular circulation throughout this area, LDE will also encourage alternatives to vehicular modes of transportation by incorporating a landscaped multi-use pedestrian and bicycle path (aka, Kihei Bikeway) along this section. This attractive, pedestrian-friendly pathway will provide connectivity and continuity to the previous phases of the County's Kihei Bikeway projects that currently extend the pathway to its southerly terminus fronting the South Maui Community Park.

Typical temporary construction-phase measures to control erosion and wind-blown silt are expected to be implemented during the earthmoving phase as required (e.g., dust fences, silt fences, filtration berms, sedimentation basins, etc.) and appropriate measures will be maintained throughout the duration of construction. In addition, diversion plans will be developed to accommodate construction within the main drainage channels. Furthermore, upon completion of the proposed grading and improvements, all disturbed areas that are still exposed (and not paved or otherwise landscaped) will be grassed as required to minimize potential erosion.

All site work construction is expected to conform to the recommendations and requirements of the Geotechnical Engineering Exploration for Liloa Drive Extension, Vicinity of East Waipuilani Road to Vicinity of Kaonoulu

Street, conducted by Geolabs, Inc. (dated July 30, 2021; and, all amendments thereto) and the applicable requirements of "Rules for the Design of Storm Drainage Facilities for the County of Maui", Title MC-15, Chapter 4; and, the "Rules for the Design of Storm Water Treatment Best Management Practices" (adopted 11/09/2012The Owner or Contractor is expected to retain the Project Geotechnical Engineer (i.e., Geolabs) to provide all construction phase monitoring and testing in accordance with requirements within the forementioned Geotechnical Engineering Exploration for Liloa Drive Extension report.

III. EXISTING CONDITIONS

A. Topography, Groundcover and Soil Classifications

The existing LDE roadway corridor extends from the vicinity of Kaonoulu Street and proceeds southerly along an existing master planned corridor, where it crosses Kulanihakoi Gulch, an unnamed drainageway, and Waipuilani Gulch, until it connects in the vicinity of East Waipuilani Road. The majority of the LDE roadway corridor is currently undeveloped, and traverses through an unpaved corridor that is currently used by pedestrians and bicyclists traveling to and from the adjacent subdivisions and streets. The existing ground is characterized by a gently sloping topography with longitudinal slopes generally ranging from 0 to 5%, and cross slopes of approximately 1 to 4% [in an easterly (mauka) to westerly (makai) direction]. Natural vegetation includes, but is not limited to buffelgrass, keawe trees, and a variety of weeds and shrubbery native to the area.

According to the *Soil Survey of the Island of Maui, Hawaii* [1], prepared by the United States Department of Agriculture, Soil Conservation Service, the soil classifications of the proposed LDE project site are (see EXHIBIT "B"):

- Alae sandy loam (AaB);
  - The predominant Alae sandy loam is characterized as being an excessively drained soil, with low runoff and an erosion hazard which is not more than slight.
  - Slopes: 3 to 7 percent.
- Waiakoa extremely silty clay loam (WID2); and,
  - The Waiakoa extremely silty clay loam is characterized as being eroded, a well-drained soil, with medium runoff and a severe erosion hazard.
  - Slopes: 3 to 25 percent.
- Pulehu clay loam (PsA).
  - The Pulehu clay loam, which only occurs at the southernmost portion of the already developed corridor, is characterized as being a well-drained soil, with low runoff.
  - Slopes: 0 to 3 percent.

B. Existing Drainage Conditions

The existing runoff from the project site and in the adjacent areas generally flows in an easterly to westerly (mauka to makai) direction. It is generally conveyed along existing gulches, small drainageways, or by existing underground drainage systems where it is conveyed downstream through existing drainage culverts across South Kihei Road, and eventually to the ocean.

The entire LDE project site currently generates approximately 32.5 cfs of surface runoff based on a 50-year recurrence interval, 1-hour duration storm.

For the purposes of this drainage report, the LDE project will be evaluated in six (6) distinct drainage sections (see EXHIBIT "A"):

1) From the vicinity of the intersection of Kaiola Street (Sta 9+00±) to the vicinity of the intersection of Hoopili Akau Street (Sta 12+00±);
2) From the vicinity of Hoopili Akau Street intersection (Sta 12+00±) to the vicinity of Heona Place (Sta 25+75±);
3) From the vicinity fo Heona Place (Sta 25+75±) to the intersection of Kulanihakoi Street (Sta 30+35±);
4) From Kulanihakoi Street (Sta 30+35±) to Waipuilani Gulch (Sta 42+36±), including the intersection with Mahealani Street; and
5) From Waipuilani Gulch (Sta 42+36±) to the E. Waipuilani Road intersection (Sta 53+25±), including the intersection with Namauu Place; and,
6) From the E. Waipuilani Road intersection (Sta 52+80±) southerly to limits of construction at Sta 58+02±, which is currently an existing drainage system.

"Sections" referred to in this drainage report are solely to assist the reader in identifying and examining the drainage plan in various parts of the project site and shall not be construed as a phasing plan (see EXHIBIT "A"). The existing onsite and offsite surface runoff drainage conditions for each section are discussed below.

Section 1 – Vicinity of Kaiola Street to Vicinity of Hoopili Akua Street

Kaonoulu Street and Kenolio Road (aka, Liloa Drive Extension) are currently fully developed roadways with concrete curb and gutters, sidewalk, and existing drainage systems that were constructed in conjunction with Kaonoulu Estates – Phase 1. Existing curb inlets near at the intersections of Kenolio Road and southerly near the intersection of Kaonoulu Street and Alulike Street convey the existing generated runoff in an underground piped system to the west (makai) and ultimately to the ocean.

Section 2 – Vicinity of Hoopili Akua Street to Vicinity of Heona Place

East (mauka) of project site there are two (2) 102" existing culverts that convey runoff under Piilani Highway (north of the Kulanihakoi Bridge, near the Piilani Highway/Kaonoulu Street intersection) and into a shallow earth channel that enters a double 8'-0" x 6'-6" box culvert immediately east (mauka) of the existing Kenolio Road (aka, Liloa Drive Ext.). According to the Drainage Report for Kenolio Apartments (dated January 2018 by Otomo Engineering, Inc.) that was recently constructed, the underground box culvert has been extended and the project's subsurface chambers and onsite retention basins will mitigate the increase in runoff from the development before discharging into the box culvert extension. The existing box culvert then runs under the southeast corner of Kaonoulu Estates – Phase IV and combines with Kulanihakoi Gulch approximately 80± feet west (makai) of the proposed bridge where LDE will cross Kulanihakoi Gulch.

Kulanihakoi Gulch is a major drainageway in the area that conveys approximately 10,061 cfs (FEMA 100-yr.)[3]. Piilani Highway crosses Kulanihakoi Gulch at the existing Kulanihakoi Bridge. The existing gulch is a natural earth channel mauka of the proposed Liloa Drive Extension and becomes a trapezoidal channel with boulder-lined side slopes and geotextile on the invert as it runs along the limits of Kaonoulu Estates - Phase IV. The runoff is conveyed further downstream where the gulch starts to flatten out as it is conveyed by the four (4) 6'x4' box culverts at South Kihei Road and eventually to the ocean.

There are existing drainage detention/retention basins adjacent to the Kulanihakoi Gulch (makai of Kaonoulu Estates – Phase IV) that mitigate the increase in runoff from the previously developed Kaonoulu Estates projects. Based on direction from DPW Engineering Division, it is our understanding that the accumulated sediment along the gulch invert and sidebanks, and within the existing drainage basins, is currently in the process of being removed by the existing property owner. Furthermore, it is our understanding that County is maintaining or pursuing removal of all downstream sedimentation and debris (including garbage) from the drainageway.

Existing runoff generated within the LDE roadway corridor (comprised of both developed and undeveloped areas) from the vicinity of Hoopili Akua Street to the vicinity of Heona Place travels aboveground and into Kulanihakoi Gulch.

Section 3 – Vicinity of Heona Place to Kulanihakoi Street

According to the previously approved Piilani Residential Subdivision – Phase I drainage report (dated June 1990 by Warren S. Unemori Engineering, Inc.), north of Kulanihakoi Street approximately 2.7 cfs of runoff from the Piilani Subdivision Phase I makai lots (adjacent to LDE)

along with the portion of previously constructed Kenolio Road (aka, Liloa Drive Extension) from the vicinity of Heona Place drains in an easterly to westerly (mauka to makai) direction to a berm that runs along the mauka boundary of Haleakala Village Subdivision. This runoff, as well as that generated within Kulanihakoi Street west (makai) of Maulani Street, is conveyed along Kulanihakoi Street and captured by curb inlet catch basins and conveyed by the existing underground drainage system within Kulanihakoi Street and eventually to the ocean, as it is presently doing. Runoff generated in the vicinity of Malulani Street and easterly (mauka) along Kulanihakoi Street is captured by curb inlet catch basins and conveyed downstream to the existing 10'-0" x 4'-0" box culvert that daylights at the existing concrete ford crossing at the LDE corridor.

Section 4 – Kulanihakoi Street to Waipuilani Gulch

According to the previously approved Piilani Residential Subdivision – Phase I drainage report (dated June 1990 by Warren S. Unemori Engineering, Inc.), the onsite runoff from the lots and subdivision roadways along with the offsite runoff from an existing 72" culvert crossing Piilani Highway are intercepted by the subdivision's drainage system and outlets to an open, Unnamed Drainageway via an existing 10'-0" x 4'-0" box culvert that daylights at the existing concrete ford crossing at the LDE corridor. Downstream, a boulder rip-rap drainage channel conveys the runoff along the south side of Alii Village Subdivision and Trinity Church and into the Oluea Street drainage system. It is then conveyed along Kulanihakoi Street towards three (3) 7'-0" x 3'-0" culverts at South Kihei Road and eventually to the ocean.

A two-lane roundabout has been recently constructed at the intersection of Piilani Highway and Kulanihakoi Street per HDOT's Plans for Piilani Highway Intersection Improvements (Project No. HWY-02-17). Based on the construction plans, the anticipated runoff generated by the improvements will be intercepted by curb inlets and/or grated inlet catch basins and conveyed to the existing 72" culvert noted above.

- According to the previously approved *Kihei High School – Phase 2 Drainage Report (dated* November 2018 by G70 International, Inc.), the pre-existing 100-year, 24-hour peak flow rate of the existing 72" culvert was determined to be 303 cfs. Per this report, the generated runoff for the ultimately constructed Kihei High School project will be routed through a flood- controlled detention basin which will limit the post development peak flow rate to 297 cfs being conveyed thru the existing 72" culvert.
- Subsequently, the approved *Drainage Report for Piilani Highway Intersection Improvements, Vicinity of Kulanihakoi Street (dated* August 2021 by WSP USA, Inc.) indicates that the 100-year peak, 24-hour discharge rate of 301.4 cfs will be conveyed through the existing 72" culvert at the completion of construction of the intersection and of the Kihei High School. This project has also

extended the existing 72" culvert to accommodate the additional roadway width needed for those improvements. Any additional runoff generated by this project is not expected to be conveyed in the existing drainage system on Kulanihakoi Street.

Approximately 5.3 cfs of runoff from the LDE corridor and the upstream fringe areas from the adjacent Piilani Subdivision – Phase I makai lots, from the southern side of Kulanihakoi Street to northern side of Waipuilani Gulch, currently sheet flows in a westerly (makai) direction through the project site, into a diversion ditch that runs south along the east (mauka) boundary of the Ali'i Village Subdivision, into a shallow retention basin (located at the southeast corner of the Ali'i Village Subdivision), and eventually into the existing downstream unnamed drainage channel.

Based on field observations and on-ground topographic surveys, it appears that an earthern berm was constructed within Waipuilani Gulch, near the makai edge of the LDE corridor (at some point after the completion of Piilani Village Subdivision – Phase I) which may result in a portion of the stormwater being conveyed by Waipuilani Gulch to be diverted in a northerly direction, along the existing LDE corridor and along Kamalii Alayna Subdivision.

Since a portion of Kamalii Alayna is prone to flooding [as it is within Flood Zone 'AO' (Depth 3-ft), and 'AE'], in an effort to minimize the potential impacts to the residential properties, it is our understanding that what may be a temporary earthen berm was recently constructed along the western (makai) side of the LDE corridor, adjacent to Kamalii Alayna Subdivision, to allow the diverted runoff to continue northerly to be discharged the Unnamed Drainageway channel. It is our understanding that this diverted runoff (especially during larger storm events) may potentially exceed the capacity of the downstream drainage systems and exacerbate flooding.

Section 5 – Waipuilani Gulch to East Waipuilani Road

Waipuilani Gulch is a major drainageway in the area that accommodates approximately 9,275 cfs (FEMA 100-yr.)[3]. Piilani Highway crosses this gulch at its existing Waipuilani Bridge. Between Piilani Highway and LDE, the Waipuilani Gulch drainageway is lined with a combination of grassed composite three-dimensional polymer turf reinforcement mat, rock boulder armor and isolated areas of grouted rock slope lining and grouted rock retaining walls. The gulch is a natural earth channel makai of LDE that then flattens out as it is conveyed in culverts across South Kihei Road and eventually to the ocean.

It is our understanding that County is maintaining or pursuing removal of all downstream sedimentation and debris (including garbage) from the drainageway.

Warren S. Unemori Engineering, Inc. Civil and Structural Engineers • Land Surveyors
Preliminary Drainage Report for Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road)

According to the previously approved Drainage and Soil Erosion Control Report for Piilani Residential Subdivision – Phase 1 (dated June 1990 by Warren S. Unemori Engineering, Inc.), a study of the area immediately downstream of the Waipuilani Gulch drainageway was conducted to further evaluate the anticipated effect of the proposed gulch improvements associated with Piilani Residential Subdivision – Phase I. The study concluded that significant increases or decreases in the range of anticipated velocities in both the channel and the overbank portions were not encountered. In addition, the existing water surface profile was not expected to be significantly affected.

After construction of Piilani Residential Subdivision – Phase I (completed in early 1992); and, between the completion of construction of Kamalii Alayna Subdivision – Phase 1 (2006) and our topographic on-ground surveys conducted in 2017, it appears that an earthen berm was created along the makai side of the LDE corridor (within the road right-of-way), beginning approximately 95-ft(±) from the southern bank (i.e., existing CRM retaining wall) of Waipuilani Gulch and extending northerly to the vicinity of the existing concrete ford crossing mention above in Section 4. The creation of the berm has resulted in the diversion of a portion of flow within Waipuilani Gulch drainageway flow to be directed to the north along the LDE corridor and into the unnamed drainageway. It is our understanding that this increase in runoff along the LDE corridor has resulted in multiple flooding events observed by residents within Kamalii Alayna Subdivision and further downstream, due to limited capacity of existing aboveground channels and underground drainage systems, during storm events.

According to the previously approved Offsite Improvements for Piilani Village Phase II Subdivision & Piilani Commercial drainage report (dated October 1998 by Warren S. Unemori Engineering, Inc.), the existing offsite drainage system and detention basin along Liloa Drive was master-planned to accommodate the runoff generated from the fully-developed condition of Piilani Village Phase II and the roadway reserve corridor designated for the Liloa Drive Extension, with a cumulative allowable runoff of 29.0 cfs. The existing drainage facilities convey the runoff south along the existing Liloa Drive to the existing drainage detention basin located immediately mauka of Liloa Drive and south of Piilani Village Subdivision – Phase 3. However, the northern lots adjacent to Waipuilani Gulch were allowed to sheet flow into the gulch and the makai fringe of the roadway reserve corridor was allowed to sheet flow off the project site as it was currently doing, without increasing the runoff to the downstream properties. Therefore, only approximately 5.3 cfs of runoff from the upstream fringe areas from the adjacent Piilani Villages – Phase II lots and 1.9 cfs from the LDE corridor currently sheet flows in a westerly direction through the project site where it encounters an existing berm and is conveyed to East Waipuilani Road.

Section 6 – East Waipuilani Road to southerly Limits of Construction

At the existing intersection of East Waipuilani Road and Liloa Drive, both roadways are fully developed with curb and gutter, sidewalk and an underground drainage system. Surface runoff is collected in the existing curb inlets on East Waipuilani Road and Liloa Drive and conveyed to the drainage basin mentioned in Section 5, above.

C. Flood and Tsunami Zone

According to Panel Number 150003 0586G of the Flood Insurance Rate Map [2], dated November 4, 2015, prepared by the United States Federal Emergency Management Agency, the majority of the project site is situated within Zone "X", which is designated as an area outside the 0.2% chance flood plain and of minimal flood hazard (See EXHIBIT "C"). At the crossing with Waipuilani Gulch, a portion of the makai side of the project site is in Zone "AO" (Depth 3'), which indicates it is in special flood hazard area subject to inundation by the 1% (e.g., 100-year) annual chance flood where depths are between one (1) and three (3) feet (usually sheet flow on sloping terrain), with the average depth determined to be 3 feet.

At the crossing with Kulanihakoi Gulch, a portion of the project site is within Zone "AE" (18'-25') and Zone "XS". Zone "AE" (18'-25') indicates it is within a special flood hazard area subject to inundation by the 1% (e.g., 100-year) annual chance flood where the base flood elevation is determined. Zone "XS" is an area in a low-to-moderate risk flood zone (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).

According to Tsunami Evacuation Map – Kihei Map 2 (dated September 2015) areas adjacent to and including Kulanihakoi Gulch are within the designated Tsunami Evacuation Zone. However, the majority of LDE is typically within the Extreme Tsunami Zone; and, LDE is the upper boundary of this designation between E. Waipuilani Road and Mahealani Street, where makai (or east) of LDE is outside a designated tsunami evacuation zone (see EXHIBIT "D").

IV. DRAINAGE PLAN

A. General

The general drainage plan that will be implemented for the proposed improvements shall generally include minimal alteration to the natural pre-development drainage patterns, and mitigating the increase in runoff generated by the proposed roadway improvements such that the runoff

released downstream will be no greater than the pre-development conditions or the allowable runoff that the existing drainage systems were originally master-planned to accommodate from the project site (see EXHIBITS "E" & "F"). The drainage system will be designed to remain flexible to accommodate the ultimate layouts and improvements required by the County at the proposed intersections. All drainage improvements are expected to be implemented pursuant to the current County of Maui's "Rules for the Design of Storm Drainage Facilities", and the "Rules for the Design of Storm Water Treatment Best Management Practices" (adopted 11/09/2012). The project is expected to be consistent with the proposed concepts of the Kihei Drainage Master Plan (Pre-Final Report for the Kihei Drainage Master Plan by R.M. Towill, dated November 2016), directed by DPW to be considered for this project (e.g., the Kulanihakoi Gulch bridge crossing was designed to accommodate any potential future diverted flow from Waipuilani Gulch in the event this concept was ultimately embraced in the future).

In the absence of any onsite stormwater detention systems, the total onsite surface runoff that could potentially be generated by the construction of the Liloa Drive Extension and the intersection improvements with the existing roadways, is approximately 39 cfs, based on a 50-year frequency interval, 1-hour duration storm. However, a combination of subsurface drainage systems, drywells and an offsite detention basin will be implemented to mitigate the potential 6.5 cfs increase in surface runoff and limit the peak onsite runoff so there will be no net increase in onsite runoff leaving the project site. In areas with existing drainage systems that were master-planned to accommodate the future development of the LDE, the runoff released downstream will not exceed the original master-planned capacity of the existing drainage systems and it will continue to flow downstream as it is presently doing.

Section 1 – Vicinity of Kaiola Street to Vicinity of Hoopili Akua Street

As this area has been previously developed, there is approximately 7.55 cfs of runoff being generated and directed to the existing underground drainage system via curb inlet catch basins along Kaonoulu Street. With incorporation of a single-lane roundabout at the intersection of Kaonoulu Street and Kenolio Road (aka, Liloa Drive Ext.), approximately 6.73 cfs of surface runoff will be generated for this area. The runoff will be directed to relocated curb inlet catch basins that are to be connected into the existing underground drainage system, as it is presently doing. This results in an anticipated overall decrease of 0.82 cfs in runoff discharge being conveyed in the existing drainage system for Kaonoulu Estates Subdivision.

Section 2 – Vicinity of Hoopili Akua Street to Vicinity of Heona Place

Approximately 4.97 cfs of surface runoff generated from the makai fringe of the proposed Kenolio Apartments projects and the developed LDE corridor is expected to be captured by new curb inlet catch basins and conveyed to

the south by the new LDE underground drainage system that connects to the existing double 8'-0" x 6'-6" box culvert. This runoff will be allowed to discharge into Kulanihakoi Gulch, as it is presently doing, at a rate no greater than pre-development conditions.

A new bridge is proposed for the Liloa Drive Extension crossing of Kulanihakoi Gulch. Based on direction from DPW Engineering Division, the bridge shall accommodate the existing flow rate in the gulch of 10,061 cfs (FEMA 100-yr)[3]. The bridge is designed to maintain a "no rise" condition with no loss of flow conveyance and no increase in the base flood elevation at the gulch for the 100-yr flood discharge; and therefore, will allow the runoff to continue down the existing trapezoidal channel (with boulder-lined side slopes and three-dimensional geotextile on the invert) along the limits of Kaonoulu Estates Phase IV, towards South Kihei Road, and eventually to the ocean.

- Nationwide Permit Pre-Construction Notifications (PCNs) has been submitted to U.S. Army Corps of Engineers (USACE) for Kulanihakoi Gulch; and,
- A letter was received from USACE that verifies that the work complies with the terms and conditions of Nationwide Permit (NWP) NO. 14, Linear Transportation (see APPENDIX "C").

Section 3 – Vicinity of Heona Place to Kulanihakoi Street

As Kulanihakoi Street has been previously developed, there is approximatey 2.22 cfs of runoff being generated along Kulanihakoi Street from the vicinity of Mahealani Street to the vicinity of Malulani Street which discharges to the existing 10'-0" x 4'-0" box culvert in Piilani Residential Subdivision - Phase 1. This will be decreased to 2.09 cfs with the incorporation of landscape median and transition islands in this area.

West (makai) of Malulani Street, there is approximately 5.15 cfs of runoff being generated and directed to the existing underground drainage system via curb inlet catch basins along Kulanihakoi Street. With incorporation of a single-lane roundabout at the intersection of Liloa Drive Ext. and Kulanihakoi Street, approximately 5.65 cfs of surface runoff will be generated in this area. The runoff will be collected in relocated curb inlet catch basins and conveyed within the existing underground drainage system within Kulanihakoi Street, as it is presently doing. This runoff will be allowed to discharge into Kulanihakoi Street, as it is presently doing, at a rate no greater than pre-development conditions.

Section 4 – Kulanihakoi Street to Waipuilani Gulch

The existing 10'-0" x 4'-0" concrete box culvert that runs through Piilani Subdivision – Phase I will be extended to the makai side of the LDE.

- Pursuant to correspondence from USACE to DPW on 02/14/2023, the Unnamed Drainageway was confirmed to be a non-reporting NWP.

The onsite surface runoff generated within the new roadway and improvements for this section of the LDE will be collected in new curb-and-gutters, intercepted by curb inlet catch basins and/or grated inlet catch basins, and either conveyed to the existing retention basin that was previously installed with the Ali'i Village Subdivision project or tied directly to the box culvert extension. The runoff that could potentially be generated by the roadway improvements in this section is approximately 7.45 cfs, which would result in an increase of approximately 3.0 cfs from pre-development conditions. However, the existing shallow retention basin will be rehabilitated into a detention basin and sized to mitigate this potential additional runoff. In addition, a subsurface detention system and/or drywells will be implemented to ensure that runoff discharging into the downstream channel is no greater than the pre-development conditions. The existing drainage channel will continue to convey the runoff into the downstream drainage systems towards South Kihei Road and eventually to the ocean, as it is presently doing.

According to our calculations, the LDE project is not expected to discharge any additional runoff into the downstream master-planned drainage systems than it is presently doing; and, therefore will not increase runoff to the adjoining and downstream properties.

Section 5 – Waipuilani Gulch to E. Waipuilani Road

A new bridge is proposed for the Liloa Drive Extension crossing of Waipuilani Gulch. Based on direction from DPW Engineering Division, the bridge will accommodate the existing flow rate in the gulch of approximately 9,275 cfs (FEMA). The bridge is designed to maintain a "no rise" condition with no loss of flow conveyance and no increase in the base flood elevation at the gulch for the 100-yr flood discharge; and therefore, will allow the runoff to continue down the existing natural earth channel makai of LDE and conveyed by the downstream culvert at South Kihei Road. Once construction is completed for the bridge and gulch invert lining, runoff from Waipuilani Gulch will no longer be diverted northerly along LDE and into the Unnamed Drainageway channel. The gulch flow will maintain its original drainage pattern downstream towards South Kihei Road and to the ocean.

- Nationwide Permit Pre-Construction Notifications (PCNs) have been submitted to U.S. Army Corps of Engineers (USACE) for Waipuilani Gulch; and,
- A letter was received from USACE that verifies that the work complies with the terms and conditions of Nationwide Permit (NWP) NO. 14, Linear Transportation (see APPENDIX "C").

The onsite surface runoff generated within this segment of new roadway and improvements for this section of the LDE will be intercepted by new curb-and-gutters, curb inlet catch basins, and conveyed to the existing Piilani Village drainage system via the new LDE underground drainage system. The existing drainage system along Liloa Drive (south of E. Waipuilani Road), is conveyed to the existing County-owned detention basin to the north of Piilani Village Shopping Center on Liloa Drive, which was master-planned to accommodate runoff from this project. Based on our drainage calculations for LDE and the calculations in the previously approved Offsite Improvements for Piilani Village Phase II Subdivision & Piilani Commercial drainage report, LDE and Piilani Village Phase II will contribute no more than the allowable 29.0 cfs that the existing offsite Liloa Drive drainage system was originally designed to accommodate this project, and thus no additional runoff will be released offsite beyond the allowable, master-planned peak flow rate. A portion of the makai fringe of the LDE corridor will be allowed to continue to sheet flow off the project site as it is currently doing, without increasing the runoff to the downstream properties.

Section 6 – East Waipuilani Road to southerly Limits of Construction

As this area has been previously developed, there is approximately 5.93 cfs of runoff being generated and directed to the existing underground drainage system via curb inlet catch basins along Liloa Drive. With incorporation of a single-lane roundabout at the intersection of LDE and East Waipuilani Road, approximately 5.46 cfs of surface runoff will be generated for this area. The runoff will be directed to relocated curb inlet catch basins that are to be connected into the existing underground drainage system, as it is presently doing. This results in an anticipated overall decrease in runoff discharge of approximately 0.5 cfs being conveyed in the existing Piilani Village drainage system via Liloa Drive and conveyed to the County-owned detention basin mentioned in Section 5, above.

B. Hydrologic Calculations

The hydrologic calculations are based on the "Rules for the Design of Storm Drainage Facilities in the County of Maui", Title MC-15, Chapter 4 and the "Rainfall Frequency Atlas of the Hawaiian Islands", Technical Paper No. 43, U. S. Department of Commerce, Weather Bureau. The rational method was used to estimate the runoff for this project.

Rational Formula used (for component onsite project areas):

$$Q = CIA$$

Where Q = Rate of Flow (cfs)
C = Runoff Coefficient
I = Rainfall Intensity (inches/hour)
A = Area (Acres)

The design storm used in the calculations for this project is a 50-year recurrence interval, 1-hour duration storm with a precipitation of approximately 2.0 inches. A minimum time of concentration of 10 minutes was used, per the "Design Criteria for Highway Drainage," State of Hawaii Department of Transportation, 2010.

The hydraulic calculations for drainage areas greater than one hundred (100) acres are based on procedures developed by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). This procedure is described in detail in the NRCS National Engineering Handbook, Section 4, Hydrology (NEH-4). Hydrologic calculations were computed by utilizing the "NCRS Computer Program for Project Formulation, Hydrology (TR-20)", which is based on the procedure outlines in NEH-4.

APPENDIX A contains the hydrologic calculations used to determine the impact of the proposed project in terms of drainage conditions by comparing the peak flows from before and after development.

C. Conclusion

This report evaluates both the existing drainage conditions and the proposed drainage improvements for the Liloa Drive Extension project, which also includes the intersection improvements with the adjacent existing roadways. According to the analyses contained herein, the proposed LDE project could potentially generate approximately 6.5 cfs of additional runoff along the roadway corridor. Some of the existing drainage systems in the area were master planned to accommodate portions of the fully built-out condition of LDE, and runoff discharge in these areas will be allowed to be released from the site at no more than their master planned, allowable rates.

For the remaining areas, new subsurface detention systems will be strategically located along the project alignment, along with a new aboveground detention basin, to provide the necessary capacity and storage to mitigate any additional increase in onsite runoff, to ensure no net increase of runoff is allowed to leave the project site.

The LDE project will meet or exceed the County's "Rules for the Design of Storm Water Treatment Best Management Practices" for all new roadway corridor construction.

Therefore, it is our professional opinion, that the proposed Liloa Drive Extension Project will not adversely affect the adjoining and downstream properties.

VII. REFERENCES

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EXHIBITS

A Project Location Map

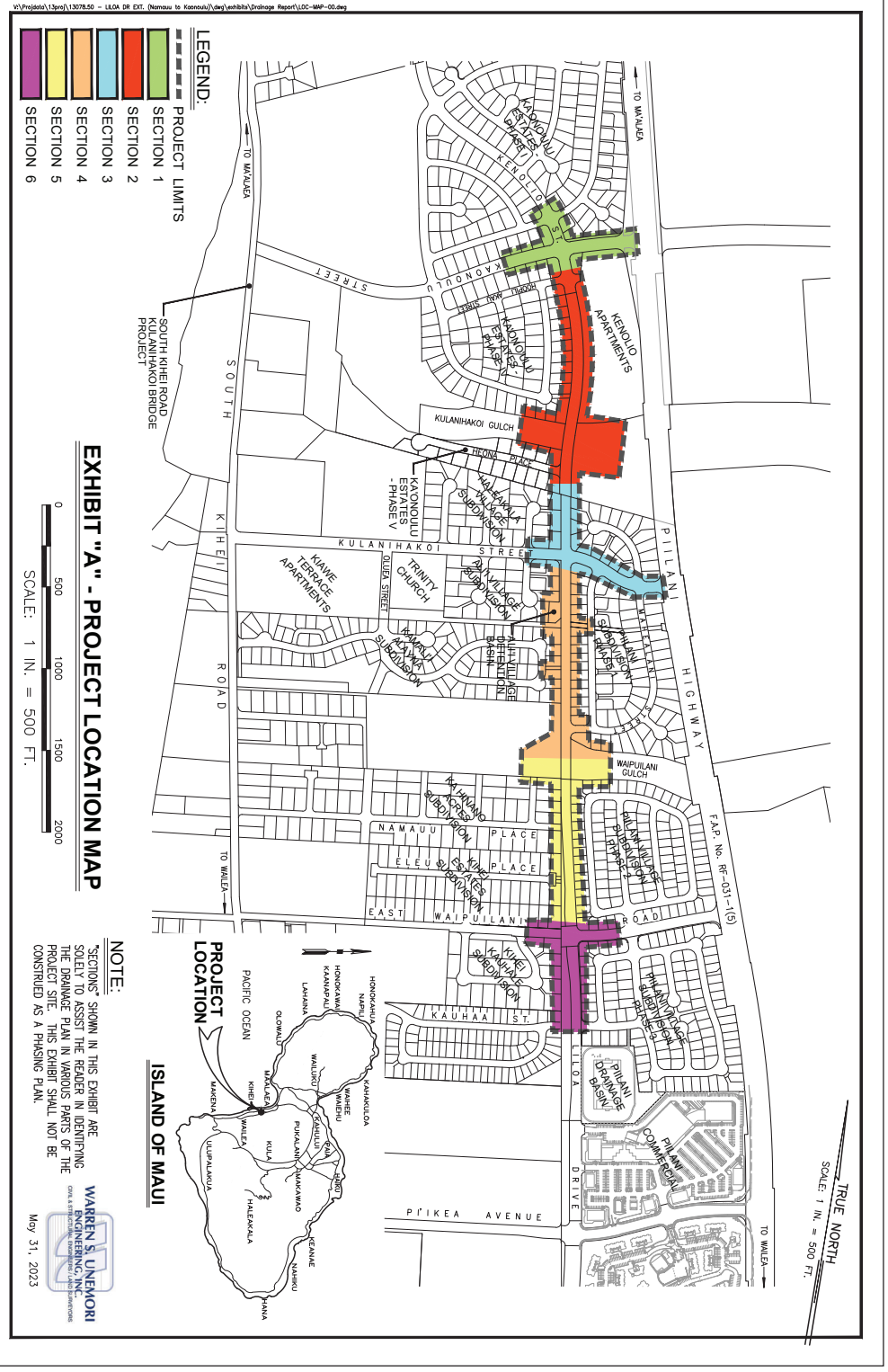
B Soils Classification Map

C Flood Insurance Rate Map

D Tsunami Evacuation Map

E Pre-Development Drainage Area Map

F Conceptual Post- Development Drainage Area Map



United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Island of Maui, Hawaii



Exhibit "B" - Soils Classification Report

May 5, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 20, Aug 30, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaB	Alae sandy loam, 3 to 7 percent slopes, MLRA 158	16.3	77.8%
PsA	Pulehu clay loam, 0 to 3 percent slopes , MLRA 163	0.2	0.8%
WID2	Waiakoa extremely stony silty clay loam, 3 to 25 percent slopes, eroded, MLRA 157	4.5	21.5%
Totals for Area of Interest		**21.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Island of Maui, Hawaii

AaB—Alae sandy loam, 3 to 7 percent slopes, MLRA 158

Map Unit Setting

National map unit symbol: 2yyrw
Elevation: 10 to 450 feet
Mean annual precipitation: 13 to 19 inches
Mean annual air temperature: 77 to 81 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alae and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alae

Setting

Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Parent material: Volcanic ash derived from basalt over alluvium derived from basalt

Typical profile

A - 0 to 2 inches: sandy loam
AC - 2 to 7 inches: sandy loam
CB - 7 to 14 inches: stratified sandy loam
2Bk1 - 14 to 29 inches: stratified gravelly sand
2Bk2 - 29 to 55 inches: stratified very gravelly sand

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: R158XY004HI - Rocky Isohyperthermic Torric Naturalized Grassland

Hydric soil rating: No

Minor Components

Pulehu

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

Ewa

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces, mountain slopes, ash fields
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Lower third of mountainflank, base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

PsA—Pulehu clay loam, 0 to 3 percent slopes , MLRA 163

Map Unit Setting

National map unit symbol: 2x1vv
Elevation: 0 to 300 feet
Mean annual precipitation: 10 to 50 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pulehu and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pulehu

Setting

Landform: Flood plains, stream terraces, alluvial fans
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, tread, rise
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, concave
Parent material: Alluvium derived from igneous rock

Typical profile

Ap - 0 to 21 inches: clay loam

2C1 - 21 to 33 inches: loam
3C2 - 33 to 37 inches: loamy sand
4C3 - 37 to 47 inches: fine sandy loam
5C4 - 47 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R158XY002HI - Isohyperthermic Torric Naturalized Grassland
Hydric soil rating: No

Minor Components

Mala

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Ewa

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Waialua

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

WID2—Waiakoa extremely stony silty clay loam, 3 to 25 percent slopes, eroded, MLRA 157

Map Unit Setting

National map unit symbol: 2xn19
Elevation: 100 to 1,000 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 72 to 75 degrees F
Frost-free period: 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Waiakoa, extremely stony, eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waiakoa, Extremely Stony, Eroded

Setting

Landform: Ash fields
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash and/or residuum weathered from basalt

Typical profile

A - 0 to 1 inches: extremely stony silty clay loam
Bw1 - 1 to 8 inches: silty clay loam
Bw2 - 8 to 16 inches: silty clay loam
2Bw3 - 16 to 25 inches: paragravelly silty clay loam
2C - 25 to 33 inches: stony silty clay loam
2R - 33 to 43 inches: bedrock

Properties and qualities

Slope: 3 to 25 percent
Surface area covered with cobbles, stones or boulders: 8.5 percent
Depth to restrictive feature: 31 to 35 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R158XY004HI - Rocky Isohyperthermic Torric Naturalized Grassland

Hydric soil rating: No

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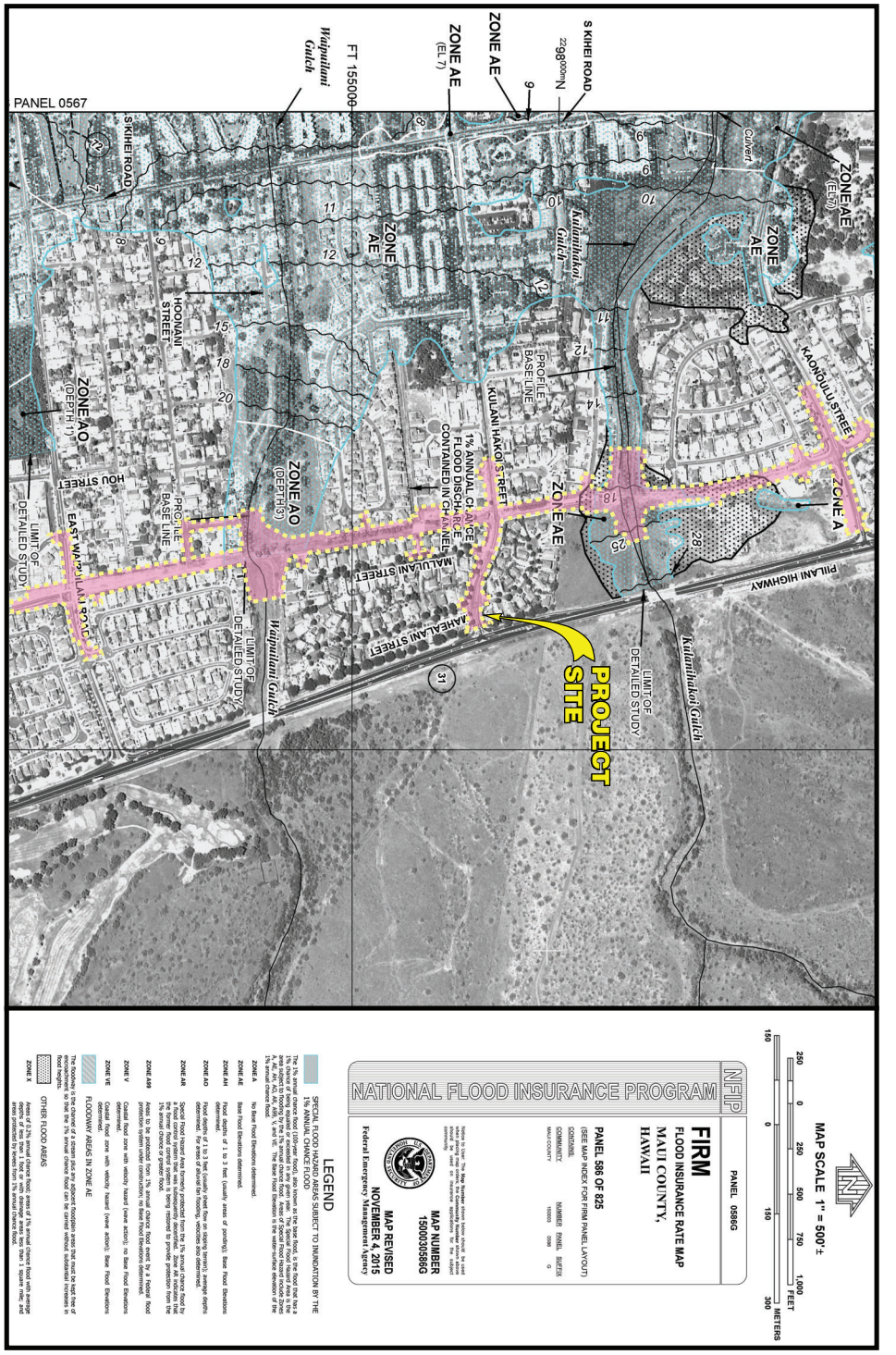
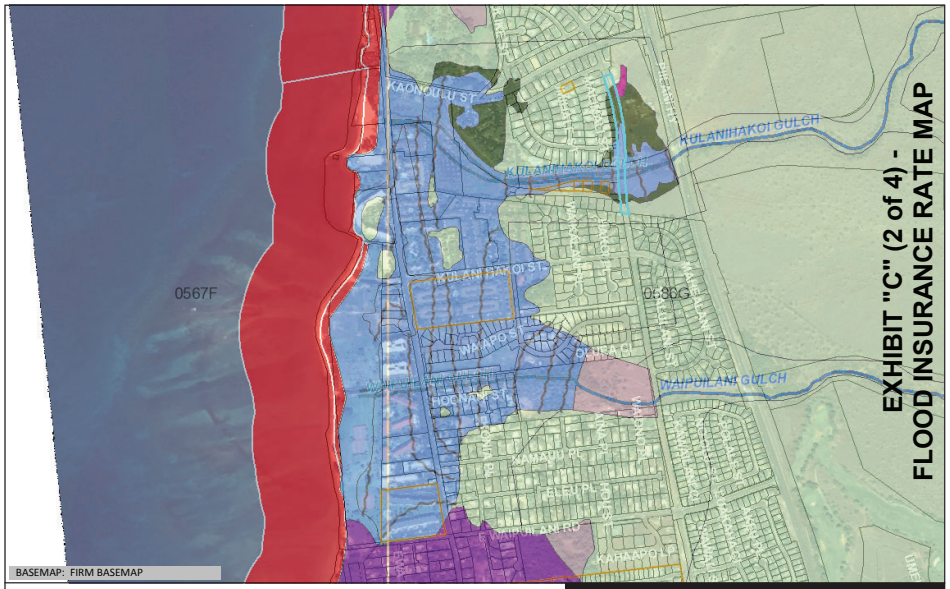


EXHIBIT "C" (1 of 4) - FLOOD INSURANCE RATE MAP



Flood Hazard Assessment Report

www.hawaiinfip.org

Kulanihakoi Gulch

Property Information

COUNTY: MAUI

TMK NO: (2) 3-9-001:156

WATERSHED: HAPAPA

PARCEL ADDRESS: KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030586G
PANEL EFFECTIVE DATE:	NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: YES
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 ft

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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:

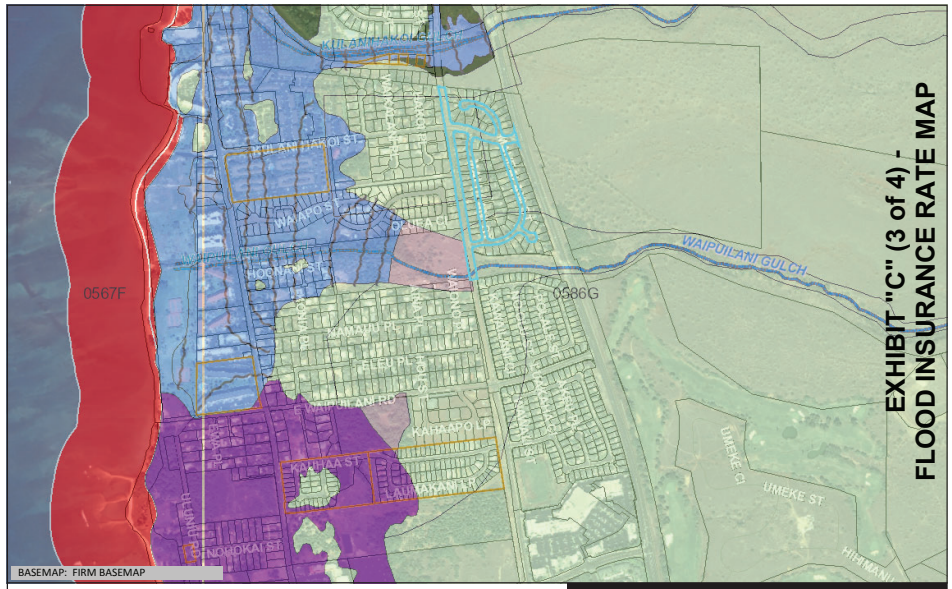
- **Zone A**: No BFE determined.
- **Zone AE**: BFE determined.
- **Zone AH**: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO**: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V**: Coastal flood zone with velocity 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.



Flood Hazard Assessment Report

www.hawaiinfip.org

Waipuilani Gulch

Property Information

COUNTY: MAUI

TMK NO: (2) 2-2-025:999

WATERSHED: HAPAPA

PARCEL ADDRESS: KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030586G
PANEL EFFECTIVE DATE:	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: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 ft

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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.

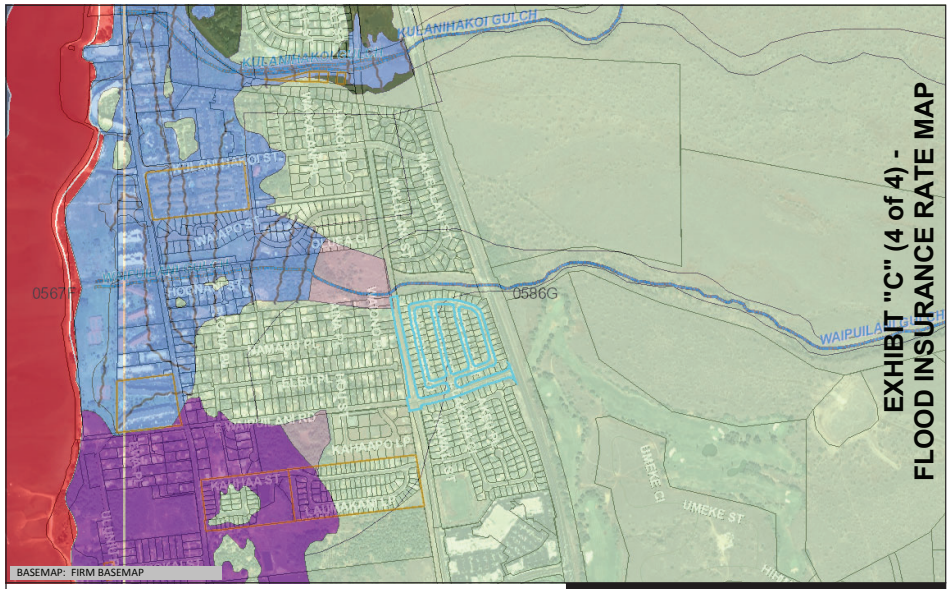


EXHIBIT "C" (4 of 4) -
FLOOD INSURANCE RATE MAP

Flood Hazard Assessment Report

www.hawaiinfip.org

Pi'ilani Village Subdivision- Phase 2

Property Information

COUNTY:	MAUI
TMK NO:	(2) 2-2-026:999
WATERSHED:	HAPAPA
PARCEL ADDRESS:	40 NOOLU ST KIHEI, HI 96753

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030586G
PANEL EFFECTIVE DATE:	NOVEMBER 04, 2015

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: NO
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

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FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 600 1,200 ft

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Notes:

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.

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Reports\Prelim Engineering Report (for EA)\Exhibits\EXHIBIT D - Tsunami Evacuation Map (Kihei Map 2).pdf

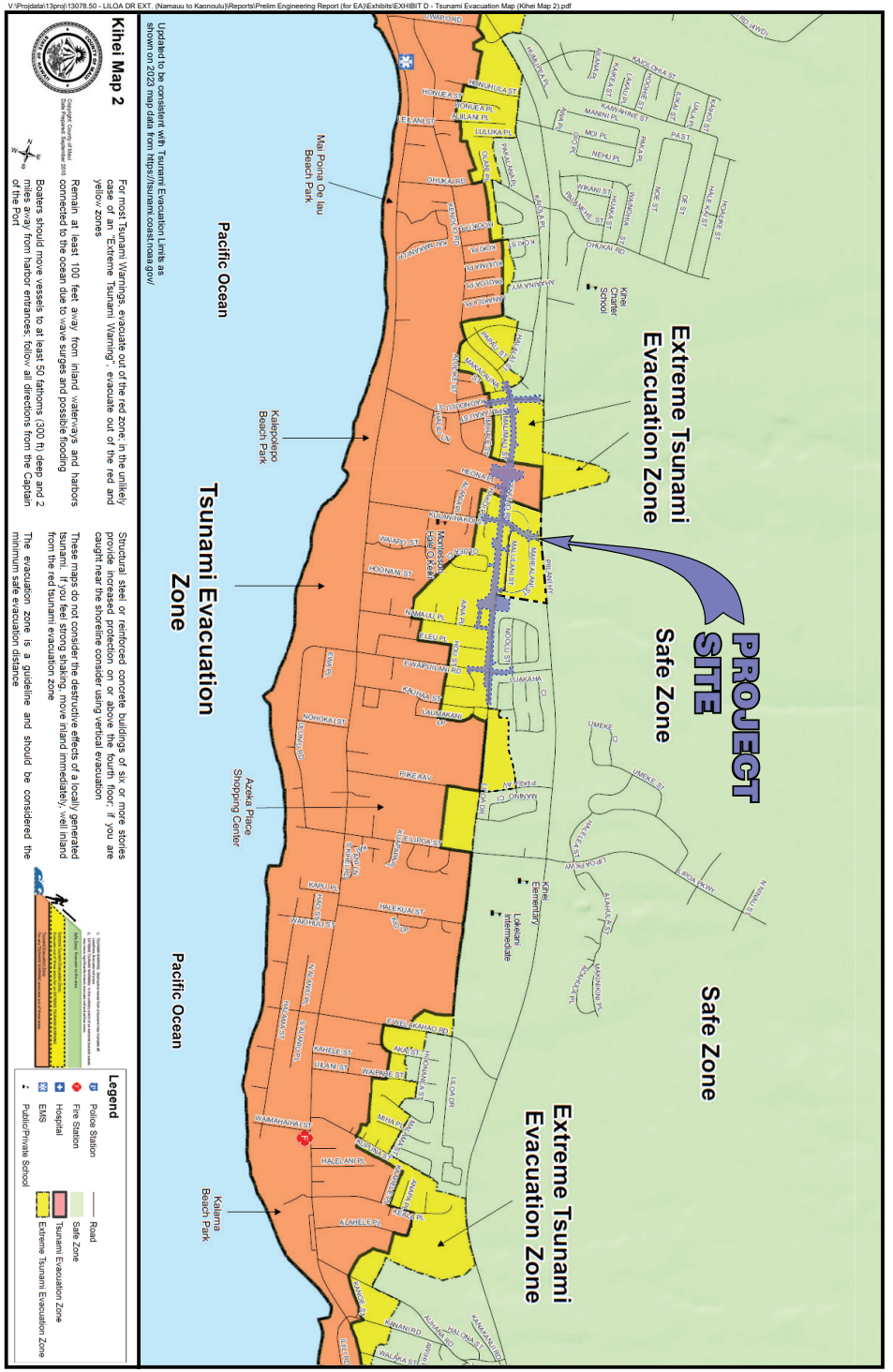


EXHIBIT "D" - Tsunami Evacuation Map (Kihei Map 2)

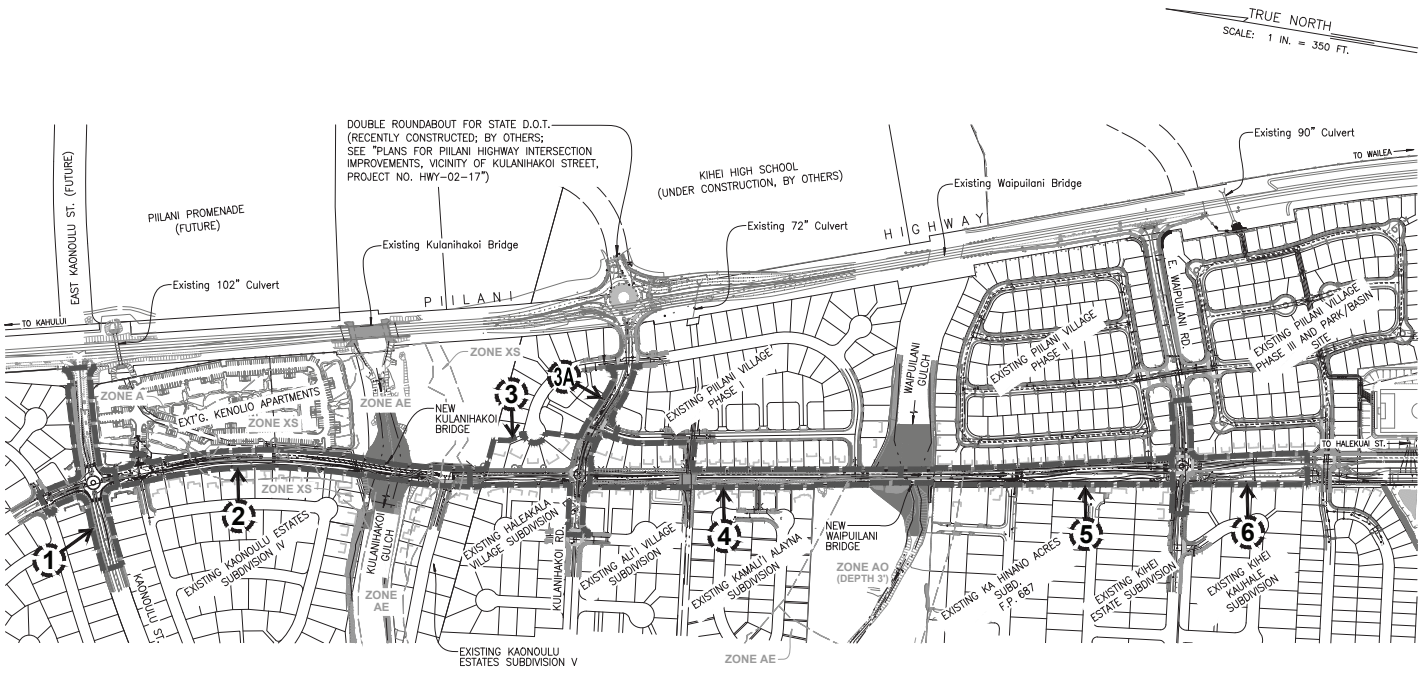


EXHIBIT "F" - POST-DEVELOPMENT DRAINAGE AREA MAP

0 350 700 1050 1400

SCALE: 1 IN. = 350 FT.

LEGEND:

- DRAINAGE AREAS BOUNDARIES
- (1) DRAINAGE AREA ID'S
- FLOW ARROWS

NOTE:

PROPOSED DRAINAGE IMPROVEMENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE (INCLUDING BUT NOT LIMITED TO SUBSURFACE DRAINS, DRYWELLS, DRAINLINES, DRAIN INLETS, ROADWAY CULVERTS, DETENTION BASINS, ETC.)

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

May 31, 2023

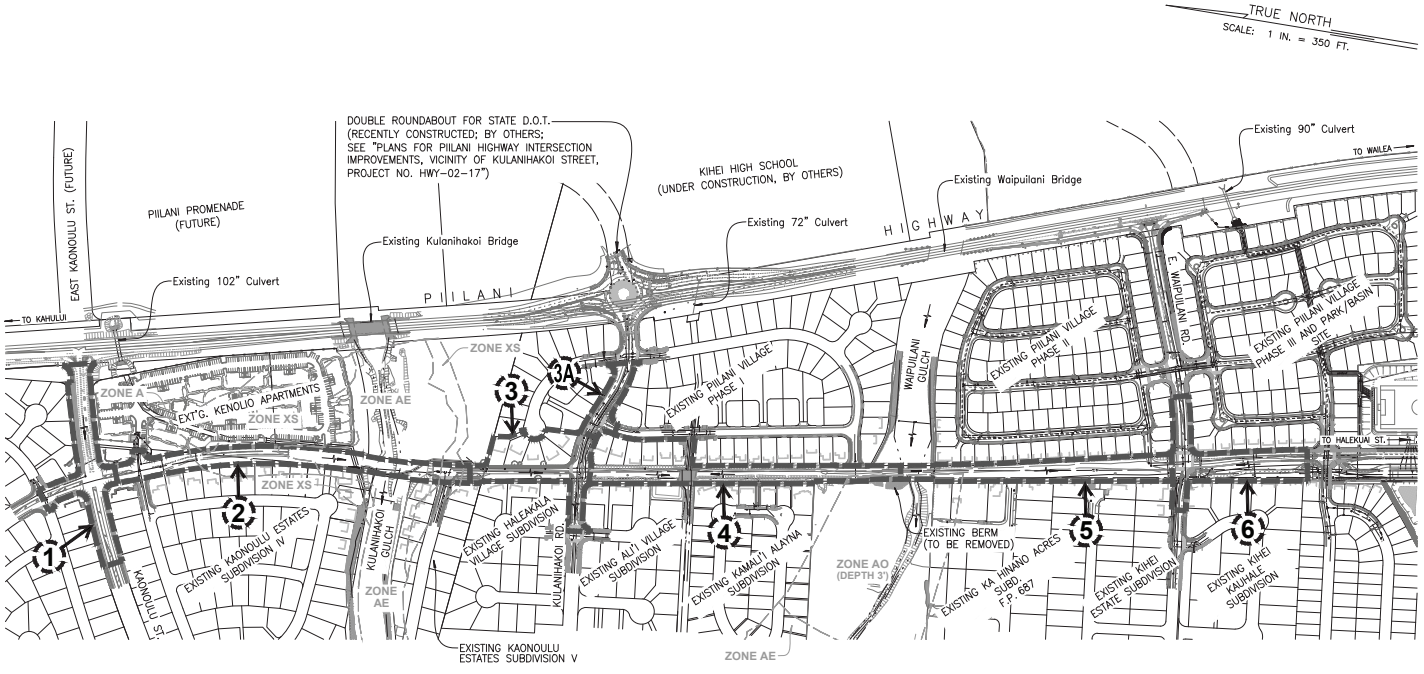


EXHIBIT "E" - PRE-DEVELOPMENT DRAINAGE AREA MAP

0 350 700 1050 1400

SCALE: 1 IN. = 350 FT.

LEGEND:

- DRAINAGE AREAS BOUNDARIES
- (1) DRAINAGE AREA ID'S
- FLOW ARROWS

NOTE:

PROPOSED DRAINAGE IMPROVEMENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE (INCLUDING BUT NOT LIMITED TO SUBSURFACE DRAINS, DRYWELLS, DRAINLINES, DRAIN INLETS, ROADWAY CULVERTS, DETENTION BASINS, ETC.)

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

May 31, 2023

APPENDIX A

Hydrologic Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 1 - From the vicinity of Kaiola Street (Sta 9+00±) to the vicinity of the intersection of Hoopili Akau Street (Sta 12+00±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	1.835

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	1.569	0.81
Driveway/Walks (Bike Path):	0.85	0.00	0.00
Landscape:	0.22	0.226	0.03
Undeveloped:	0.30	0.00	0.00
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.84

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		14.5
Higher Elev. (ft.):	48.8	
Lower Elev. (ft.):	34.3	
Approx. Runoff Length (ft.):		410
Average Slope:		3.5%
Time of Concentration (min.):		6.2

5. Intensity:

Intensity (in./hr.):	4.90

6. Total Runoff:

Q = C x I x A (cfs):	**7.55**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 1 - From the vicinity of Kaiola Street (Sta 9+00±) to the vicinity of the intersection of Hoopili Akau Street (Sta 12+00±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.): 1.835

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	1.273	0.66
Driveway/Walks (Bike Path):	0.85	0.042	0.02
Landscape:	0.22	0.520	0.06
Undeveloped:	0.30	0.00	0.00
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient: 0.74

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):	14.5
Higher Elev. (ft.):	48.8
Lower Elev. (ft.):	34.3
Approx. Runoff Length (ft.):	410
Average Slope:	3.5%
Time of Concentration (min.):	5.8

5. Intensity:

Intensity (in./hr.): 4.95

6. Total Runoff:

Q = C x I x A (cfs): 6.73

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 2 - From the vicinity of Hoopili Akau Street (Sta 12+00±) to the vicinity of Heona Place (Sta 25+75±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.): 2.146

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.930	0.41
Driveway/Walks (Bike Path):	0.85	0.000	0.00
Landscape:	0.22	0.084	0.01
Undeveloped:	0.30	1.133	0.16
Residential Areas:	0.55	0.000	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient: 0.58

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):	10.2
Higher Elev. (ft.):	32.7
Lower Elev. (ft.):	22.5
Approx. Runoff Length (ft.):	558
Average Slope:	1.8%
Time of Concentration (min.):	11.4

5. Intensity:

Intensity (in./hr.): 4

6. Total Runoff:

Q = C x I x A (cfs): 4.97

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 2 - From the vicinity of Hoopili Akau Street (Sta 12+00±) to the vicinity of Heona Place (Sta 25+75±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	2.15

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	1.423	0.63
Driveway/Walks (Bike Path):	0.85	0.293	0.12
Landscape:	0.22	0.431	0.04
Undeveloped:	0.30	0.000	0.00
Residential Areas:	0.55	0.000	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.79

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		5.9
Higher Elev. (ft.):	32.7	
Lower Elev. (ft.):	26.8	
Approx. Runoff Length (ft.):		312
Average Slope:		1.9%
Time of Concentration (min.):		10.3

5. Intensity:

Intensity (in./hr.):	4

6. Total Runoff:

Q = C x I x A (cfs):	**6.78**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 3 - From the vicinity of Heona Place (Sta 25+75±) to the intersection of Kulanihakoi Street (Sta 30+35±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	2.03

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.782	0.37
Driveway/Walks (Bike Path):	0.85	0.000	0.00
Landscape:	0.22	0.133	0.01
Undeveloped:	0.30	0.215	0.03
Residential Areas:	0.55	0.896	0.24

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.66

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		14.5
Higher Elev. (ft.):	30.9	
Lower Elev. (ft.):	16.4	
Approx. Runoff Length (ft.):		604
Average Slope:		2.4%
Time of Concentration (min.):		12.5

5. Intensity:

Intensity (in./hr.):	3.87

6. Total Runoff:

Q = C x I x A (cfs):	**5.15**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 3 - From the vicinity of Heona Place (Sta 25+75±) to the intersection of Kulanihakoi Street (Sta 30+35±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	2.03

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.790	0.37
Driveway/Walks (Bike Path):	0.85	0.097	0.04
Landscape:	0.22	0.242	0.03
Undeveloped:	0.30	0.000	0.00
Residential Areas:	0.55	0.896	0.24

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.68

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		3.1
Higher Elev. (ft.):	30.9	
Lower Elev. (ft.):	27.8	
Approx. Runoff Length (ft.):		163
Average Slope:		1.9%
Time of Concentration (min.):		10

5. Intensity:

Intensity (in./hr.):	4.1

6. Total Runoff:

Q = C x I x A (cfs):	**5.65**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Kulanihakoi Street., Section 3A - From the vicinity of Mehealani Street to the vicinity of intersection of Malulani Street.

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	0.56

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.516	0.88
Driveway/Walks (Bike Path):	0.85	0.000	0.00
Landscape:	0.22	0.044	0.02
Undeveloped:	0.30	0.000	0.00
Residential Areas:	0.55	0.000	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.89

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		2.1
Higher Elev. (ft.):	31.7	
Lower Elev. (ft.):	29.6	
Approx. Runoff Length (ft.):		143
Average Slope:		1.5%
Time of Concentration (min.):		8

5. Intensity:

Intensity (in./hr.):	4.45

6. Total Runoff:

Q = C x I x A (cfs):	**2.22**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Kulanihakoi Street., Section 3A - From the vicinity of Mehealani Street to the vicinity of intersection of Malulani Street.

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	0.56

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.475	0.81
Driveway/Walks (Bike Path):	0.85	0.000	0.00
Landscape:	0.22	0.086	0.03
Undeveloped:	0.30	0.000	0.00
Residential Areas:	0.55	0.000	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.84

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		2.1
Higher Elev. (ft.):	31.7	
Lower Elev. (ft.):	29.6	
Approx. Runoff Length (ft.):		143
Average Slope:		1.5%
Time of Concentration (min.):		8

5. Intensity:

Intensity (in./hr.):	4.45

6. Total Runoff:

Q = C x I x A (cfs):	**2.09**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 4 - From the intersection of Kulanihakoi Street (Sta 30+35±) to Waipuilani Gulch (Sta 42+36±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	2.76

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.224	0.08
Driveway/Walks (Bike Path):	0.85	0.000	0.00
Landscape:	0.22	0.000	0.00
Undeveloped:	0.30	1.587	0.17
Residential Areas:	0.55	0.953	0.19

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.44

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		8.3
Higher Elev. (ft.):	27.7	
Lower Elev. (ft.):	19.4	
Approx. Runoff Length (ft.):		695
Average Slope:		1.2%
Time of Concentration (min.):		15.8

5. Intensity:

Intensity (in./hr.):	3.7

6. Total Runoff:

Q = C x I x A (cfs):	**4.49**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 4 - From the intersection of Kulanihakoi Street (Sta 30+35±) to Waipuilani Gulch (Sta 42+36±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	2.76

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.947	0.33
Driveway/Walks (Bike Path):	0.85	0.322	0.10
Landscape:	0.22	0.542	0.04
Undeveloped:	0.30	0.000	0.00
Residential Areas:	0.55	0.953	0.19

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.66

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		3.4
Higher Elev. (ft.):	25.4	
Lower Elev. (ft.):	22.0	
Approx. Runoff Length (ft.):		150
Average Slope:		2.3%
Time of Concentration (min.):		10

5. Intensity:

Intensity (in./hr.):	4.1

6. Total Runoff:

Q = C x I x A (cfs):	**7.45**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 5 - From Waipuilani Gulch (Sta 42+36±) to the East Waipuilani Road intersection (Sta 53+25±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	1.84

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.16	0.08
Driveway/Walks (Bike Path):	0.85	0.00	0.00
Landscape:	0.22	0.00	0.00
Undeveloped:	0.30	1.68	0.27
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.36

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		10.3
Higher Elev. (ft.):	35.5	
Lower Elev. (ft.):	25.2	
Approx. Runoff Length (ft.):		842
Average Slope:		1.2%
Time of Concentration (min.):		20

5. Intensity:

Intensity (in./hr.):	3.3

6. Total Runoff:

Q = C x I x A (cfs):	**2.17**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 5 - From Waipuilani Gulch (Sta 42+36±) to the East Waipuilani Road intersection (Sta 53+25±)

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui,
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	1.84

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.91	0.47
Driveway/Walks (Bike Path):	0.85	0.27	0.12
Landscape:	0.22	0.66	0.08
Undeveloped:	0.30	0.00	0.00
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.67

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		4.7
Higher Elev. (ft.):	36.2	
Lower Elev. (ft.):	31.5	
Approx. Runoff Length (ft.):		256
Average Slope:		1.8%
Time of Concentration (min.):		10.9

5. Intensity:

Intensity (in./hr.):	4.0

6. Total Runoff:

Q = C x I x A (cfs):	**4.95**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: PRE-DEVELOPMENT (EXISTING)

Purpose: To estimate the 50-year, 1-hour pre-development peak runoff from the project area for Liloa Drive Ext., Section 6 - From East Waipuilani Road intersection (Sta 53+25±) to limits of construction at Sta 58+02±

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	1.84

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	1.04	0.54
Driveway/Walks (Bike Path):	0.85	0.14	0.06
Landscape:	0.22	0.66	0.08
Undeveloped:	0.30	0.00	0.00
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.68

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		1.5
Higher Elev. (ft.):	27.7	
Lower Elev. (ft.):	26.2	
Approx. Runoff Length (ft.):		252
Average Slope:		0.6%
Time of Concentration (min.):		6.9

5. Intensity:

Intensity (in./hr.):	4.75

6. Total Runoff:

Q = C x I x A (cfs):	**5.93**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

V:\Projdata\13proj\13078.50 - LILOA DR EXT. (Namauu to Kaonoulu)\Calcs\Drainage_BAW working\Runoff Calculations

Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street , Suite 403
Wailuku, Maui , Hawaii 96793

Date: September 2022

HYDROLOGIC CALCULATIONS: POST-DEVELOPMENT (PROPOSED)

Purpose: To estimate the 50-year, 1-hour post-development peak runoff from the project area for Liloa Drive Ext., Section 6 - From East Waipuilani Road intersection (Sta 53+25±) to limits of construction at Sta 58+02±

I. 50-Yr. - 1 Hr. Rainfall:

From "Rainfall Frequency Atlas of the Hawaiian Islands", for Kihei, Maui, Hawaii
R(50 Yr.-1Hr.) = 2.0 inches

2. Total Area:

Area (Total) (Ac.):	1.84

3. Runoff Coefficents:

		Comp. Area	Comp. 'C'
Streets (Asphalt):	0.95	0.90	0.46
Driveway/Walks (Bike Path):	0.85	0.14	0.07
Landscape:	0.22	0.80	0.10
Undeveloped:	0.30	0.00	0.00
Residential Areas:	0.55	0.00	0.00

Min. Runoff Coeff't., Weighted 'C' Coefficient:	0.63

4. Time of Concentration:

Approx. Elev. Diff'l. (ft.):		1.5
Higher Elev. (ft.):	27.7	
Lower Elev. (ft.):	26.2	
Approx. Runoff Length (ft.):		257
Average Slope:		0.6%
Time of Concentration (min.):		6.9

5. Intensity:

Intensity (in./hr.):	4.75

6. Total Runoff:

Q = C x I x A (cfs):	**5.46**

* Ref. Table 2 from "Rules for the Design of Storm Drainage Facilities in the County of Maui"

APPENDIX B

Preliminary Detention Basin and Subsurface Drainage Storage System
Volume Estimation Calculations

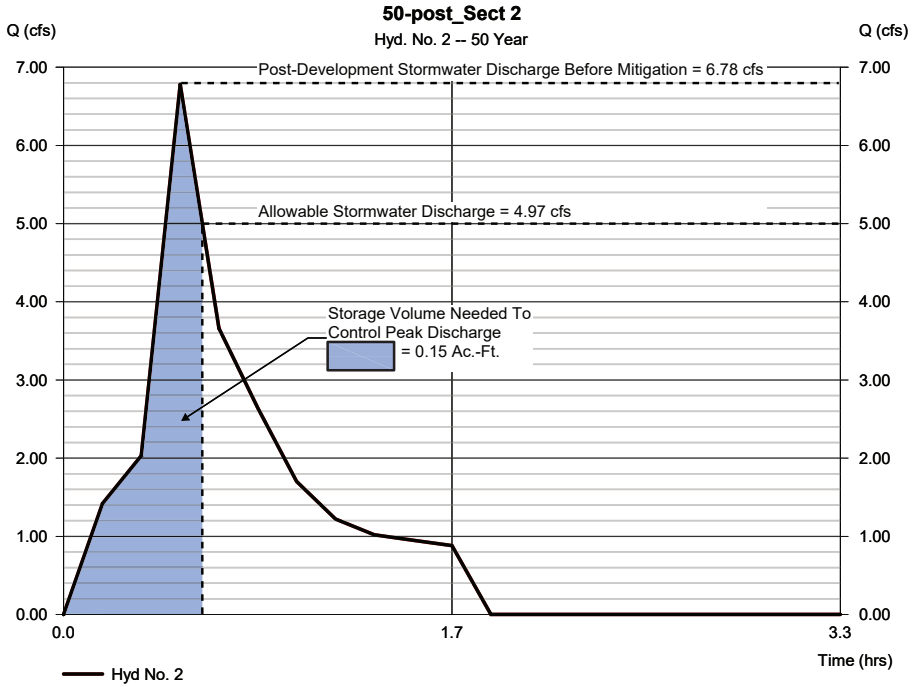
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 09 / 27 / 2022

Hyd. No. 2

50-post_Sect 2

Hydrograph type	= Manual	Peak discharge	= 6.780 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.50 hrs
Time interval	= 10 min	Hyd. volume	= 13,380 cuft



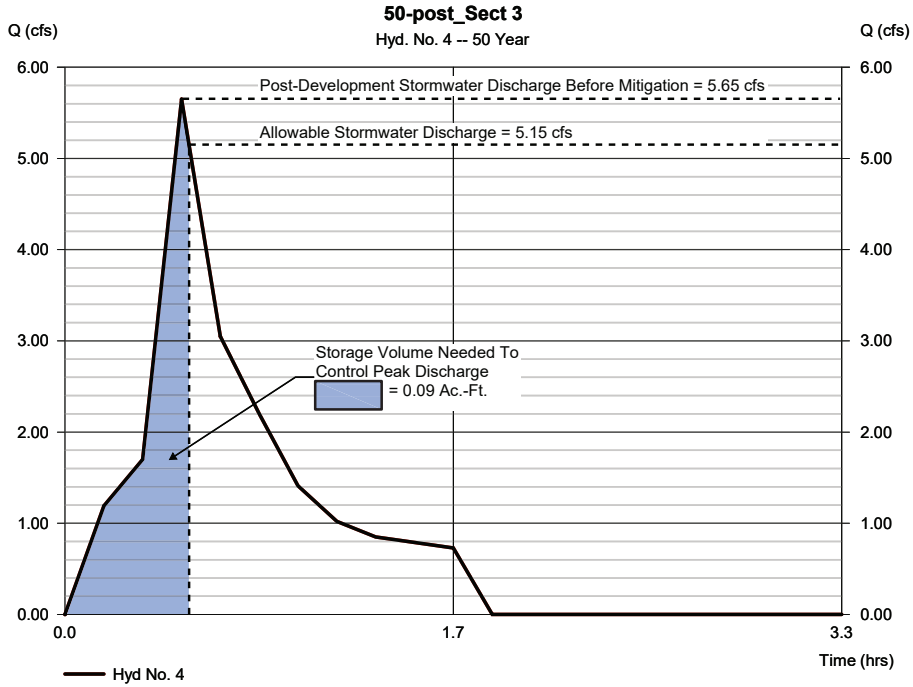
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 09 / 27 / 2022

Hyd. No. 4

50-post_Sect 3

Hydrograph type	= Manual	Peak discharge	= 5.650 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.50 hrs
Time interval	= 10 min	Hyd. volume	= 11,154 cuft



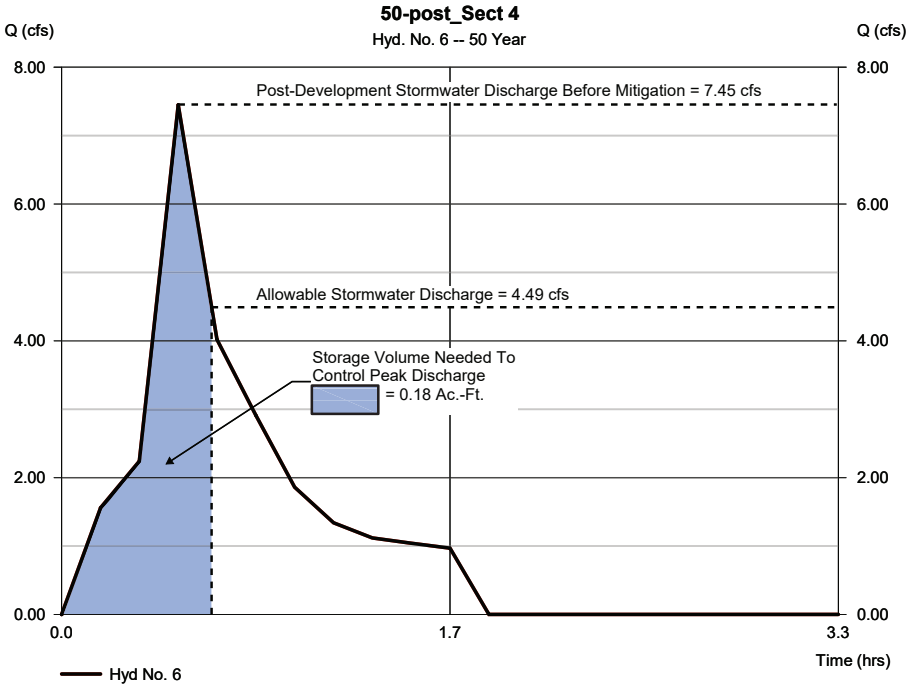
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 09 / 27 / 2022

Hyd. No. 6

50-post_Sect 4

Hydrograph type	= Manual	Peak discharge	= 7.450 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.50 hrs
Time interval	= 10 min	Hyd. volume	= 14,706 cuft



APPENDIX C

USACE Responses from Nationwide Permit
Pre-Construction Notifications (PCNs)

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
230 OTAKE STREET
FORT SHAFTER, HAWAII 96858-5440

March 24, 2023

SUBJECT: Nationwide Permit Verification for County of Maui, Kulanihako'i Gulch Bridge Construction and Improvements, Kulanihako'i Gulch, Kihei, Island of Maui, HI Department of the Army File No. POH-2023-00046

Jordan Molina
County of Maui, Department of Public Works
200 South High Street, 4th Floor
Wailuku, HI 96793

Dear Mr. Molina,

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Office has completed review of your Pre-Construction Notification dated February 2, 2023 requesting authorization for the proposed Kulanihako'i Gulch Bridge Construction and Improvements located in Kihei, Island of Maui, Hawaii at 20.76414º, -156.45227º. Please reference Department of the Army (DA) file number POH-2023-00046 in any future correspondence related to this permit.

This letter verifies your activity complies with the terms and conditions of Nationwide Permit (NWP) No. 14, (Linear Transportation) issued on February 25, 2022. This NWP verification letter is being issued pursuant to Section 404 of the Clean Water Act for the discharge of dredged and/or fill material into waters of the U.S. You are authorized to conduct the following work below the Ordinary High Water Mark (OHWM) of Kulanihako'i Gulch as described below and as depicted on the enclosed drawings (Enclosure 1):

- Vegetation removal, including trees and their roots within the 0.494-acre project area
- The temporary discharge of 500 cubic yards of sandbags and filter berms for erosion and stormwater control best management practices
- Grading of the 0.494-acre project area along 448.5 linear feet of Kulanihako'i Gulch
- The permanent discharge of 22.4 cubic yards of fill consisting of grassed turf reinforcement mats (TRM) geotextiles, grouted rubble paving (GRP), and concrete slabs

Based upon the information and plans you provided, we hereby verify that the work described above, which would be performed in accordance with the project plans (Enclosure 1), is authorized by Nationwide Permit (NWP) No. 14, (Linear

Transportation). NWP No. 14 and its associated Regional and General Conditions can be accessed at: www.poh.usace.army.mil/Missions/Regulatory/Permits. You must comply with all terms and conditions associated with NWP No. 14, as well as with the special conditions listed below:

a. Removal of trees or vegetation taller than 15 feet should not be performed from June 1 to September 15 to minimize impacts to Hawaiian Hoary Bats or Blackburn's Sphinx Moths.

Verification of your project under this NWP is valid until **March 14, 2026** unless this NWP is modified, reissued, or revoked prior to that date. It is incumbent upon you to remain informed of changes to the NWPs. If the Corps modifies, reissues, or revokes any NWP at an earlier date, we will issue a public notice announcing the changes. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of the Clean Water Act and subsequent enforcement action. This authorization does not relieve you of the responsibility to obtain any other federal, state, and/or local authorizations required by law.

Your project complies with the requirements of the Clean Water Act, Section 401 Blanket Water Quality Certification (WQC) WQC1092 issued for this Nationwide Permit by the State of Hawaii Department of Health, Clean Water Branch. You are responsible for complying with the attached General Conditions of this WQC (Enclosure 2).

Your project complies with the requirements of the Coastal Zone Management Consistency Concurrence for this Nationwide Permit issued by the State of Hawaii Department of Business, Economic Development and Tourism, Office of Planning; during the Nationwide Permit reissuance process in 2021.

Finally, General Condition #30 requires a signed certification be submitted to this office upon completion of work. Therefore, please sign, date, and return the enclosed *Compliance Certification* form (Enclosure 3) within 30 days of completion of work to the email address specified below or to the mailing address indicated on the letterhead above.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions related to this authorization, please contact Jeremy Morgan at (808) 835-4308 or via e-mail at Jeremy.K.Morgan@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District

Regulatory Office by accessing our web-based customer survey form at https://regulatory.ops.usace.army.mil/customer-service-survey/.

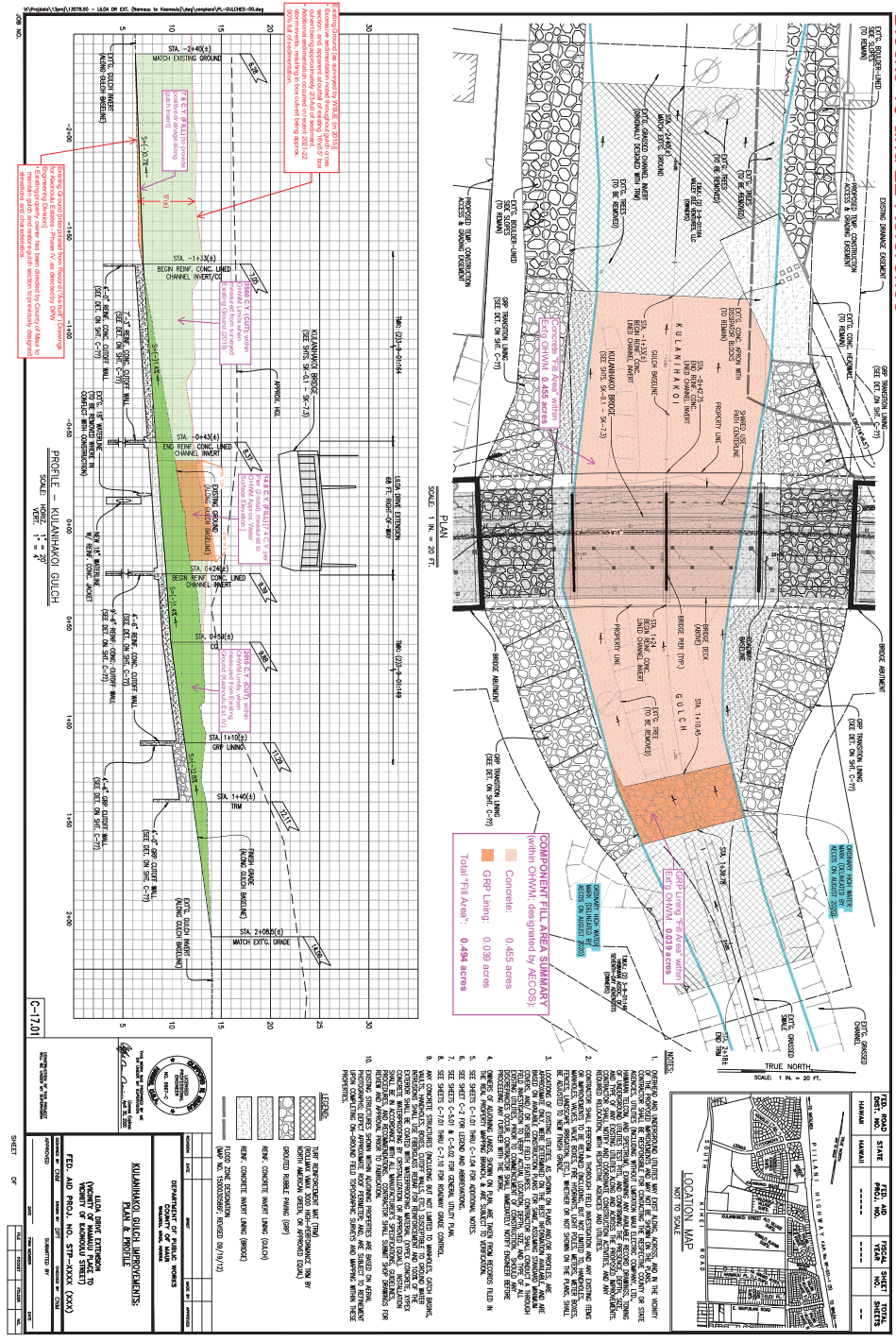
Sincerely,

Jeremy Morgan
Regulatory Specialist, Regulatory Branch

Enclosures

Electronic cc:
State of Hawaii Department of Health, Clean Water Branch
Darryl C Lum darryl.lum@doh.hawaii.gov
CleanWaterBranch@doh.hawaii.gov
State of Hawaii Office of Planning, Coastal Zone Management Program
Debra.L.Mendes@hawaii.gov
Kari Nunokawa, Munekiyo Hiraga kari@munekiyohiraga.com

Blocks 19 and 22 Reference



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
230 OTAKE STREET
FORT SHAFTER, HAWAII 96858-5440

March 24, 2023

SUBJECT: Nationwide Permit Verification for County of Maui, Waipu'ilani Gulch Bridge Construction and Improvements, Waipuilani Gulch, Kihei, Island of Maui, HI
Department of the Army File No. POH-2023-00048

Jordan Molina
County of Maui, Department of Public Works
200 South High Street, 4th Floor
Wailuku, HI 96793

Dear Mr. Molina,

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Office has completed review of your Pre-Construction Notification dated February 2, 2023 requesting authorization for the proposed Waipu'ilani Gulch Bridge Construction and Improvements located in Kihei, Island of Maui, Hawaii at 20.75868º, -156.45133º. Please reference Department of the Army (DA) file number POH-2023-00048 in any future correspondence related to this permit.

This letter verifies your activity complies with the terms and conditions of Nationwide Permit (NWP) No. 14, (Linear Transportation) issued on February 25, 2022. This NWP verification letter is being issued pursuant to Section 404 of the Clean Water Act for the discharge of dredged and/or fill material into waters of the U.S. You are authorized to conduct the following work below the ordinary high water mark (OHWM) of the Waipu'ilani Gulch as described below and as depicted on the enclosed drawings (Enclosure 1):

- Vegetation removal, including trees and their roots, within the 0.416-acre project area
- The temporary discharge of 450 cubic yards of sandbags and filter berms for erosion and stormwater control best management practices
- Grading of the 0.416-acre project area along 427 linear feet of Waipu'ilani Gulch
- The permanent discharge of 105.3 cubic yards of fill material consisting of grassed turf reinforcement mats (TRM) geotextiles, grouted rubble paving (GRP), and concrete slabs

Based upon the information and plans you provided, we hereby verify that the work described above, which would be performed in accordance with the project plans (Enclosure 1), is authorized by Nationwide Permit (NWP) No. 14, (Linear Transportation). NWP No. 14 and its associated Regional and General Conditions can

be accessed at: www.poh.usace.army.mil/Missions/Regulatory/Permits. You must comply with all terms and conditions associated with NWP No. 14, as well as with the special conditions listed below:

a. Removal of trees or vegetation taller than 15 feet should not be performed from June 1 to September 15 to minimize impacts to Hawaiian Hoary Bats and Blackburn's Sphinx Moths.

Verification of your project under this NWP is valid until **March 14, 2026** unless this NWP is modified, reissued, or revoked prior to that date. It is incumbent upon you to remain informed of changes to the NWPs. If the Corps modifies, reissues, or revokes any NWP at an earlier date, we will issue a public notice announcing the changes. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of the Clean Water Act and subsequent enforcement action. This authorization does not relieve you of the responsibility to obtain any other federal, state, and/or local authorizations required by law.

Your project complies with the requirements of the Clean Water Act, Section 401 Blanket Water Quality Certification (WQC) WQC1092 issued for this Nationwide Permit by the State of Hawaii Department of Health, Clean Water Branch. You are responsible for complying with the attached General Conditions of this WQC (Enclosure 2).

Your project complies with the requirements of the Coastal Zone Management Consistency Concurrence for this Nationwide Permit issued by the State of Hawaii Department of Business, Economic Development and Tourism, Office of Planning; during the Nationwide Permit reissuance process in 2021.

Finally, General Condition #30 requires a signed certification be submitted to this office upon completion of work. Therefore, please sign, date, and return the enclosed *Compliance Certification* form (Enclosure 3) within 30 days of completion of work to the email address specified below or to the mailing address indicated on the letterhead above.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions related to this authorization, please contact Jeremy Morgan at (808) 835-4308 or via e-mail at Jeremy.K.Morgan@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District

Regulatory Office by accessing our web-based customer survey form at https://regulatory.ops.usace.army.mil/customer-service-survey/.

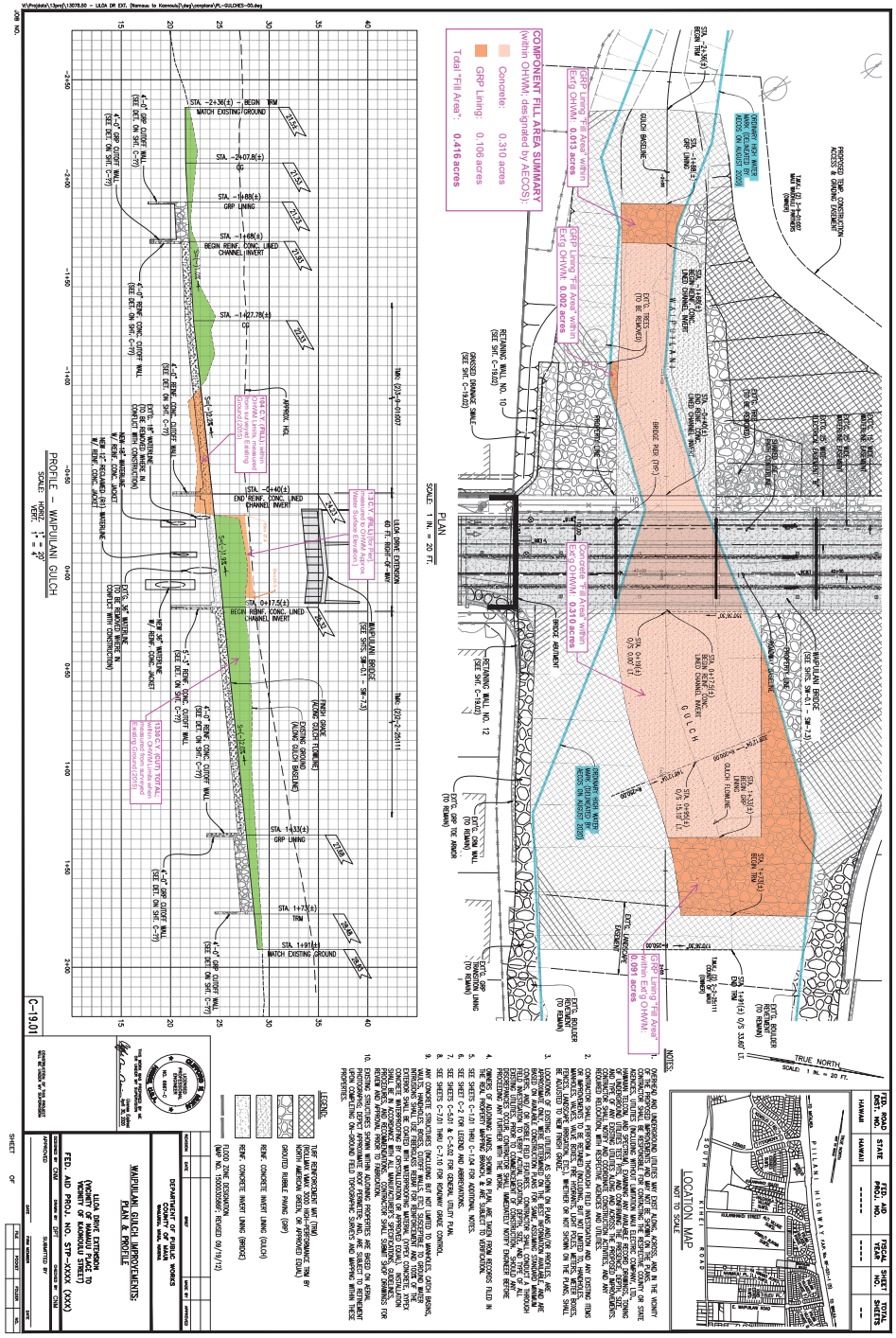
Sincerely,

Jeremy Morgan
Regulatory Specialist, Regulatory Branch

Enclosures

Electronic cc:
State of Hawaii Department of Health, Clean Water Branch
Darryl C Lum darryl.lum@doh.hawaii.gov
CleanWaterBranch@doh.hawaii.gov
State of Hawaii Office of Planning, Coastal Zone Management Program
Debra.L.Mendes@hawaii.gov
Kari Nunokawa, Munekiyo Hiraga kari@munekiyohiraga.com

Blocks 19 and 22 Reference



DAVID Y. IGE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
File:

WQC1092.FNL.22

April 28, 2022

David S. Hobbie
Regional Regulatory Chief
Honolulu District
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Hobbie:

Subject: **Blanket Section 401 Water Quality Certification (WQC) for Certain 2021 Department of the Army (DA) Nationwide Permits (NWP) and Activities**
File No. WQC1092

Purpose. This letter is a blanket Section 401 WQC (Blanket Certification) and sets forth applicable qualifications and activity-specific conditions to certain NWPs and activities, as described below. This Blanket Certification may be utilized by any applicant that is seeking authorization and/or verification from the U.S. Army Corps of Engineers (USACE), Honolulu District of the Pacific Ocean Division (POH) for work in Waters of the United States.

This Blanket Certification supersedes and replaces previous WQC0901.FNL.20 issued in May and November of 2020 (WQC0901). The following shall apply:

1. Requirements and conditions set forth in WQC0901 which are not set forth in this Blanket Certification shall no longer be applicable;
2. Activities covered under WQC0901 shall be subject to this Blanket Certification, including requirements and conditions different from or in addition to WQC0901;
3. Pending applications, including those currently under review by USACE or the Department of Health (DOH), shall be subject to this Blanket Certification.

Note: A previous version of this Blanket Certification was public noticed on September 23 and 24, 2020, for the proposed 2020 NWPs. Since the aforementioned public notices, the NWPs were reissued and modified in 2021, the federal Section 401 WQC regulations were revised, and the State Section 401 WQC rules were revised. This Blanket Certification incorporates these revisions.

Overview. The DA has published a list of NWPs and applicable general conditions that attach to those NWPs.[1] Certain NWPs may require a Section 401 WQC from the State of Hawaii. The DOH has the authority to issue a Blanket Certification and may qualify or condition the Blanket Certification. The conditions in this Blanket Certification become additional conditions to the NWPs. The qualifications would set forth the applicability of the Blanket Certification to a NWP or other described activity.

The DOH reviewed the NWP and General Conditions published in the Federal Register: Final Rules and the additional comments submitted by USACE POH. DOH believes that when all requirements and conditions contained in this Blanket Certification are fully complied with, there is a reasonable assurance that the activities will be conducted in a manner which will not violate the applicable State water quality standards and will comply with the applicable provisions of the CWA, Sections 301, 302, 303, 306, and 307.

The NWPs and activities in Item 2.a below do not require a Section 401 WQC. The NWPs and activities in Item 2.b below are covered under this Blanket Certification. The DOH has determined that projects authorized by the USACE POH for the NWPs and activities in Item 2.b below, subject to the requirements of the General Conditions in Item 3 below, will not cause adverse environmental impacts or effects; are in the public interest; and represent the optimum balance between economic development and environmental quality.

1. Term of this Blanket Certification

   a. This Blanket Certification becomes effective with respect to a specific project on **April 28, 2022.**

   b. This Blanket Certification will expire at midnight, **March 14, 2026**.

   c. This Blanket Certification's coverage is administratively extended to a certain project beyond midnight, March 14, 2026, when the USACE POH extends the project authorization/verification.

2. Coverage of this Blanket Certification

   a. The NWPs and activities listed below do not require a Section 401 WQC.

      - NWP 1 – Aids to Navigation
      - NWP 8 – Oil and Gas Structures on the Outer Continental Shelf

[1] The DA NWP authorizes activities under 1) Section 404 of the Clean Water Act (CWA), 2) Section 10 of the Rivers and Harbors Act of 1899 (RHA), and/or 3) a Letter of Permission. The NWPs were published on September 15, 2020, in the Federal Register, Volume 85, Number 179 and December 27. 2021, Volume 86, Number 245 (Federal Register).

- Projects in response to a public emergency proclaimed by the President of the United States or Governor of Hawaii where HRS Chapter 342D has been suspended
- Any emergency project as determined by the Director of Health
- Projects granted an exemption under Act 048 of 2017 (temporary exemption of certain bridge rehabilitation projects)
- Activities exempt under CWA, Section 404(f)(1)
- Directional drilling under a waterbody where entry and exit pits are located on land and all slurry/spoils/runoff is contained on land
- Structures over a waterbody where debris and other pollutants associated with the installation, construction, and operation do not enter the waterbody
- Installation of temporary Best Management Practices (BMPs) with inert material in State waters, excluding material used to divert or dam stream flow
- Comprehensive Environmental Response, Compensation, and Liability Act actions with oversight from DOH Hazard Evaluation and Emergency Response (HEER) Office and/or EPA
- DOH HEER response actions
- Bridge inspections
- Improvements or modifications to Department of Land and Natural Resources, Division of Boating and Ocean Recreation permitted existing offshore moorings installed prior to October 4, 2017
- Coral transplant with National Oceanic and Atmospheric Administration oversight
- Fireworks where visible debris is collected after event
- Lanterns and rubber duckies collected after event
- Ashes from funeral ceremonies 3 miles away from shore
- After-The-Fact applications for USACE POH enforcement actions[2]

b. The NWPs and activities listed below are hereby granted coverage under this Blanket Certification in the State of Hawaii if the applicant of the activity/discharge complies with the General Conditions (Item No. 3) and USACE POH provides notification (Item No. 4). Any person, including any public body, conducting activities authorized by these NWPs and activities that cannot or will not comply with this Blanket Certification must apply for and obtain an individual Section 401 WQC from DOH Clean Water Branch (CWB).

- NWP 2 – Structures in Artificial Canals
- NWP 3 – Maintenance

[2] DOH has decided not to process After-The-Fact applications so the USACE POH can proceed with their enforcement action.

- NWP 4 – Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
- NWP 5 – Scientific Measurement Devices
- NWP 6 – Survey Activities
- NWP 7 – Outfall Structures and Associated Intake Structures
- NWP 9 – Structures in Fleeting and Anchorage Areas
- NWP 10 – Mooring Buoys
- NWP 11 – Temporary Recreational Structures
- NWP 12 – Oil or Natural Gas Pipeline Activities
- NWP 13 – Bank Stabilization
- NWP 14 – Linear Transportation Projects
- NWP 15 – U.S. Coast Guard Approved Bridges
- NWP 16 – Return Water from Upland Contained Disposal Areas
- NWP 17 – Hydropower Projects
- NWP 18 – Minor Discharge
- NWP 19 – Minor Dredging
- NWP 20 – Response Operations for Oil or Hazardous Substances
- NWP 22 – Removal of Vessels
- NWP 23 – Approved Categorical Exclusions
- NWP 25 – Structural Discharges
- NWP 27 – Aquatic Habitat Restoration, Establishment, and Enhancement Activities
- NWP 28 – Modifications of Existing Marinas
- NWP 29 – Residential Developments
- NWP 31 – Maintenance of Existing Flood Control Facilities
- NWP 32 – Completed Enforcement Actions
- NWP 33 – Temporary Construction, Access and Dewatering
- NWP 35 – Maintenance Dredging of Existing Basins
- NWP 36 – Boat Ramps
- NWP 37 – Emergency Watershed Protection and Rehabilitation
- NWP 38 – Cleanup of Hazardous and Toxic Waste
- NWP 39 – Commercial and Institutional Developments
- NWP 40 – Agricultural Activities
- NWP 41 – Reshaping Existing Drainage Ditches
- NWP 42 – Recreational Facilities
- NWP 43 – Stormwater Management Facilities
- NWP 45 – Repair of Uplands Damaged By Discrete Events
- NWP 46 – Discharges in Ditches
- NWP 48 – Commercial Shellfish Mariculture Activities
- NWP 51 – Land-Based Renewable Energy Generation Facilities
- NWP 53 – Removal of Low-Head Dams
- NWP 54 – Living Shorelines

- NWP 55 – Seaweed Mariculture Activities
- NWP 56 – Finfish Mariculture Activities
- NWP 57 – Electric Utility Line and Telecommunications Activities
- NWP 58 – Utility Line Activities to Water and Other Substances
- NWP 59 – Water Reclamation and Reuse Facilities
- Letters of Permission – Section 10 only activities with no discharge of fill material
- Any activity conducted in compliance with DOH pre-approved Standard Operating Procedures

c. Limitations on Coverage

This Blanket Certification shall not cover:

(1) Discharge(s) regulated under CWA, Section 402.
(2) Any project that may result in downstream/downdrift post construction impacts to the physical, chemical, and/or biological environment.
(3) Concrete lining any section of natural streambed or bank.[3]
(4) Projects involving the removal of dams, impoundments, structures, or sand bars that will result in the downstream/downdrift mobilization of material, sediment, and/or water pollutants.
(5) Waste Discharges to natural lakes and anchialine pools as specified in HAR 11-54 or any State waters.
"Waste" means sewage, industrial and agricultural matter, and all other liquid, gaseous, or solid substance, including radioactive substance, whether treated or not, which may pollute or tend to pollute the waters of this State. Hawaii Revised Statutes (HRS) §342D-1.
Non-contaminated and suitable dredge and fill material authorized under a 2021 NWP is not considered waste.
(6) New sewage discharges and new industrial discharges to estuaries as specified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.
(7) New sewage and industrial discharges to Embayments: Class AA and Class A as identified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.

[3] This type of activity is prohibited as it will result in adverse post construction impacts by eliminating ground water recharge, raising pH, and lowering dissolved oxygen or causing downstream bank erosion.

3. General Conditions

The applicant of the activity/discharge shall:

a. Report any non-compliance with the conditions of this Blanket Certification to the USACE POH. Do not report or submit compliance related information to DOH. This Blanket Certification is a condition of the USACE POH permit.[4]

b. Maintain records at the project site or in the nearby field office demonstrating that all Blanket Certification requirements have been fully complied with.

c. Ensure that all activities are conducted in a manner that will comply with the "Basic Water Quality Criteria Applicable to All Waters" as specified in HAR 11-54.

d. Ensure that all material(s) placed or to be placed in State waters are free of waste metal products, organic materials, debris, and any pollutants at toxic or potentially hazardous concentrations to aquatic life as specified in HAR 11-54.

e. Ensure that the activities will not permanently interfere with or become injurious to any designated uses and/or existing uses of the receiving State water. Any permanent adverse impacts to the designated uses and/or existing uses of the receiving State water is a violation of HAR Chapter 11-54.

f. Ensure that pollution control measures and BMPs are utilized that prevent water pollutants from leaving the in-water work area authorized by the USACE POH permit.[5] Any visual plume emanating from the authorized in-water work area is a violation of HAR Chapter 11-54.

g. Ensure that all construction debris from any portion of the activities (including but not limited to debris caused by hydraulic saws, water jets, or drilling equipment) are contained and prevented from entering or re-entering State waters. All construction debris and sidecast material shall be properly removed from the aquatic environment and disposed of at an upland State and county approved site. Before the start of the activities, a Solid Waste Disclosure Form for Construction Sites shall be completed and returned to the DOH's Solid and Hazardous Waste Branch,

[4] With respect to USACE projects granted coverage under Item 2.c above, non-compliance reports from USACE POH should be submitted to DOH CWB.
[5] With respect to USACE projects granted coverage under Item 2.c above, the relevant in-water work area is identified in the USACE project.

Office of Solid Waste Management. No construction material or construction related materials shall be stockpiled in the aquatic environment or stored or placed in ways that will disturb the aquatic environment. The Solid Waste Disclosure Form for Construction Sites is available online at:
https://health.hawaii.gov/shwb/files/2018/04/swdiscformapr2018.pdf.

h. Utilize only BMPs that are inert and not sources of pollution themselves. Examples of inappropriate in-water porous material BMPs include but are not limited to: compost biosocks since they are a source of nutrients; and a soil berm since the soil particles will erode.

i. Collect activity/discharge related water pollutants utilizing appropriate catchment/detention devices (e.g. construction debris, airborne particulates, dust, concrete slurry, concrete chips, concrete surface preparation washing effluent, excess water and overflow from boring related activity, horizontal directional drilling slurry, etc.) from localized work areas and minimize or prevent the release of these water pollutants into State waters, including the in-water work area.

j. Utilize BMPs for all upland project activity to minimize the discharge of water pollutants into State waters, including the designated in-water work area.

k. For a stream, ditch, or gulch: Allow unimpeded flow around the in-water work area to allow for aquatic animal migration and/or to prevent work site and downstream flooding situations. The unimpeded flow shall be equivalent to a 2-year, 24-hour duration storm event and/or the existing flow capacity of the stream, ditch, or gulch. Pumped diversions may be utilized if the stream, ditch, or gulch is dry or there is only standing/ponded water without the existence of living aquatic animals.

l. Not discharge any type of wash water and/or effluent into State waters without first obtaining from DOH a National Pollutant Discharge Elimination System (NPDES) permit authorizing such type of water pollutant discharge to State waters.

m. Not allow any concrete truck wash water to be disposed by percolation into the ground.

n. Ensure that all areas temporarily impacted, either directly or indirectly, by the project construction activities are fully restored to its pre-construction conditions. For example: Incidental construction debris is cleaned up prior to removal of BMPs; remove all scientific measurement devices and any other structures or fills associated with installation and use of these

devices (e.g., foundations, anchors, buoys, lines, etc.) when no longer in use; etc.

o. When projects involve dredging/excavation activities:

(1) Be required to check the DOH, HEER Office Sites, Incidents and Records through the "Viewer" in iHEER at: https://eha-cloud.doh.hawaii.gov/iheer.[6]
(2) Be required to contact the HEER Office at (808) 586-4249 and through e-permitting Form "Notification of Construction Activities" at Form Finder https://eha-cloud.doh.hawaii.gov/epermit/finder if contaminated soil, sediment, vapor, or groundwater is known to be present at your project site. The applicant shall notify the HEER Office at least 90 days prior to surface and subsurface disturbing activities that may disturb the ground surface at HEER sites. If the 90-days prior notification is missed, the applicant shall notify the HEER Office as soon as possible to avoid any potential delays regarding the covered project.
(3) Contain return flow or runoff from upland dredged spoils dewatering site(s)/disposal site(s), including the confined disposal facility (CDF), which shall be contained on land and not allowed to discharge and/or re-enter any State waters without first obtaining the required discharge permit from USACE POH or CWB. Unless authorized by a USACE POH or NPDES permit, the applicant shall not allow any runoff, return flow, or airborne particulate pollutants from the excavated or dredged material dewatering or stockpiling site, including the CDF, to enter or re-enter State waters.
(4) Properly deploy warning signs, which shall be maintained until the portion of the in-water work is completed and the affected area water quality has returned to its preconstruction condition and turbidity control devices have been removed from the waterway.

p. When projects involve moorings:

(1) Avoid locating moorings (including anchors and floats) in sensitive aquatic habitats such as coral reefs, fish spawning areas, and submerged aquatic vegetation (unless location is acceptable to the Department of Land and Natural Resources, Division of Aquatic Resources or the National Oceanic Atmospheric Administration);
(2) Ensure moorings (including anchors and floats) are made of clean, inert material. Treated lumber shall not be used as it may contain

[6] The HEER Office is currently updating site information for sites. Most, but not all, sites may be displayed on the viewer map. Site Document data upload is ongoing and not all documents may be currently available via this website. To get the complete record for the site, a record request form can be filled and submitted it to the HEER Office. Users will then be notified when they are able to download all information via the iHEER system website.

compounds that can be released into the water and become toxic to the aquatic environment;

(3) Pre-cast and cure concrete anchors, if required, away from State waters prior to use to prevent seepage of potentially toxic substances into the waterbody;

(4) Locate moorings in depths that allow structures and vessels to remain afloat at the lowest possible water levels and that prevent propellers from disturbing bottom sediments;

(5) Select mooring anchors of an adequate size to secure vessels or structures and prevent the anchor from shifting or dragging along the bottom of the State water;

(6) Size the length of mooring lines, chains, or cables to avoid excess line, chain, or cable accumulation on the bed of the State water;

(7) Ensure native beach material such as logs, sand, gravel, and boulders that are important components of fish habitat are not used as mooring structures and are left in place on the foreshore;

(8) Properly dispose of derelict or unused floats, lines, chains, or cables in accordance with appropriate laws and rules; and

(9) Ensure moorings are kept in good repair by regularly inspecting and maintaining the structure. Mooring maintenance must be performed into perpetuity (or until it is properly disposed of) or it will itself become a pollution source.

4. USACE POH shall e-mail to CWB (cleanwaterbranch@doh.hawaii.gov and darryl.lum@doh.hawaii.gov) a pdf copy of all issued final verifications. This Blanket Certification coverage shall become valid with respect to an activity only when USACE POH notifies CWB via email of a project authorization/verification and conditions of this Blanket Certification have been incorporated as part of the USCE POH final verification; provided, that this email notification requirement shall not apply to activities that do not require a pre-construction notification, and this Blanket Certification shall automatically become valid with respect to such activities.

If you agree with the terms and conditions of this Blanket Certification, please sign and date below; make a copy for your administrative record; and submit this entire letter with your original signature to CWB within 14 calendar days from your signature date.

If you have any questions, please contact Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

for

ELIZABETH A. CHAR, M.D.
Director of Health

c: Regulatory Office, POH, COE [via e-mails linda.speerstra@usace.army.mil only]
Ms. Debra Mendes, CZM Program, Office of Planning, DBEDT
[via e-mail debra.l.mendes@hawaii.gov only]
U.S. Fish and Wildlife Service [via e-mail pifwo_admin@fws.gov only]
U.S. National Marine Fisheries Service [via e-mail pirohonolulu@noaa.gov only]
Division of Aquatic Resources, DLNR [via e-mail dlnr.aquatics@hawaii.gov only]
CWRM, DLNR [via e-mail dlnr.cwrm@hawaii.gov only]
OCCL, DLNR [via e-mail dlnr.occl@hawaii.gov only]
DHO (Hawaii, Maui, Kauai) and EHS, Molokai/Lanai [via e-mail only]

I AGREE WITH THE TERMS AND CONDITIONS OF THIS LETTER:

_____

David S. Hobbie
Regional Regulatory Chief
Honolulu District

DATE

US Army Corps of Engineers
Honolulu District
BUILDING STRONG®

DEPARTMENT OF THE ARMY PERMIT

COMPLIANCE CERTIFICATION

File Number: POH-2023-00048
Project Title: Waipu'ilani Gulch Bridge Construction and Improvements

PERMIT TYPE: Nationwide Permit #14, (Linear Transportation)

NAME OF PERMITTEE: Mr. Jordan Molina, County of Maui, Department of Public Works, 200 South High Street, 4th Floor, Wailuku, HI 96793

DATE OF ISSUANCE: March 24, 2023

DATE OF EXPIRATION: March 14, 2026

The permittee must, upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address or via email within thirty (30) days of completion of work:

U.S. Army Corps of Engineers, Honolulu District
Regulatory Office
Building 230, CEPOH-RO
Fort Shafter, HI 96858-5440
Email: CEPOH-RO@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of this permit, you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____
Signature of Permittee Date

ENCLOSURE 3

APPENDIX B

Preliminary Geotechnical Engineering Exploration Report

FINAL DRAFT SUBMITTAL
PAVEMENT JUSTIFICATION REPORT
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

W.O. 7296-00(B) JULY 30, 2021

Prepared for

WARREN S. UNEMORI ENGINEERING, INC.

and

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

FINAL DRAFT SUBMITTAL
PAVEMENT JUSTIFICATION REPORT
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

W.O. 7296-00(B) JULY 30, 2021

Prepared for

WARREN S. UNEMORI ENGINEERING, INC.

and

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

DRAFT

SIGNATURE	4-30-22 EXPIRATION DATE OF THE LICENSE

GEOLABS, INC.
Geotechnical Engineering and Drilling Services
94-429 Koaki Street, Suite 200 • Waipahu, HI 96797

Hawaii • California

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

July 30, 2021
W.O. 7296-00(B)

Mr. Clifford Mukai
Warren S. Unemori Engineering, Inc.
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, HI 96793

Dear **Mr. Mukai:**

Geolabs, Inc. is pleased to submit our report entitled "Pavement Justification Report, Liloa Drive Extension, Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street, Kihei, Maui, Hawaii," prepared specifically for the design of pavements for the project. It should be noted that a geotechnical engineering exploration report presenting our recommendations for bridge foundations, retaining walls, site grading, and utilities for the project will be provided separately.

Our work was performed in general accordance with the scope of services outlined in our fee proposal dated November 11, 2015.

Please note that the soil samples recovered during our field exploration (remaining after testing) will be stored for a period of two months from the date of this report. The samples will be discarded after that date unless special arrangements are made for a longer sample storage period. Please contact our office for alternative sample storage requirements, if appropriate.

Detailed discussion and specific design recommendations are contained in the body of this report. If there are any questions regarding this report, please contact our office.

Very truly yours,

GEOLABS, INC.

DRAFT

Gerald Y. Seki, P.E.
Vice President

GS:lf

94-429 Kaoki Street, Suite 200 • Waipahu, Hawaii 96797
Telephone: (808) 841-5064 • E-mail: hawaii@geolabs.net

Hawaii • California

FINAL DRAFT SUBMITTAL
PAVEMENT JUSTIFICATION REPORT
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII
W.O. 7296-00(B) JULY 30, 2021

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PAVEMENT JUSTIFICATION REPORT

LILOA DRIVE EXTENSION

VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET

KIHEI, MAUI, HAWAII

W.O. 7296-00(B) JULY 30, 2021

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Our borings generally encountered a surface alluvial deposit ranging from about 2 to 31.5 feet thick. The alluvial deposit was underlain by saprolite and basalt rock formation to the maximum depth explored of 75.5 feet below the existing ground surface. The alluvial deposits generally consisted of medium dense to very dense silty sand/gravel, sand, sandy cobbles and boulders, and soft to hard sandy silt. Groundwater was encountered in 10 of the 12 drilled borings at depths from about 15 to 27.5 feet below the existing ground surface at the time of our field exploration. The groundwater depths correspond to elevation from about -5 to 3.2 feet MSL.

New pavements will be constructed as part of the *Liloa Drive Extension* project. Based on the results of our field exploration, the pavement subgrades along the proposed new roadway alignment are generally underlain by medium dense to very dense silty sand/gravel north of Kulanihakoi Road and stiff sandy silt south of Kulanihakoi Road. Design R-values of 55 and 19.5 were adopted in our pavement analyses for the anticipated subgrade conditions along the proposed roadway north and south of Kulanihakoi Road, respectively.

Since the existing Liloa Drive does not have a permeable drainage layer in the existing pavement, only pavement structural sections without a permeable drainage layer in the pavement analyses were considered for the project.

Based on the traffic data provided, the R-Value of the subgrade soils, and the economic analyses performed, we recommend using the following structural pavement sections for the new pavements for the *Liloa Drive Extension* project.

Flexible Pavement - Liloa Road (North of Kulanihakoi Road)

2.5-Inch Asphaltic Concrete
4.0-Inch Asphaltic Concrete Base
7.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
13.5-Inch Total Pavement Thickness on Moist Compacted Subgrade

Flexible Pavement - Liloa Road (South of Kulanihakoi Road)

3.0-Inch Asphaltic Concrete
6.0-Inch Asphaltic Concrete Base
18.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
27.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

We understand that the area south of Kulanihakoi Road will mainly be in a fill condition. Provided a minimum of 24 inches of select granular fill material with a CBR value of 20 or greater is placed below the pavement section, the following pavement section may be considered.

Liloa Drive (South of Kulanihakoi Road)

3.0-Inch Asphaltic Concrete
4.0-Inch Asphaltic Concrete Base
8.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
15.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

One of the primary distress mechanisms in pavement structures is pumping due to the saturation of the base and/or subgrade soils. Therefore, the pavement surface should be sloped adequately, and drainage gradients should be maintained to carry surface water off the pavement to appropriate drainage structures.

The text of this report should be referred to for detailed discussion and specific recommendations for the design of pavements.

END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS

SECTION 1. GENERAL

1.1 Introduction

This report presents the results of our geotechnical engineering exploration performed for the proposed *Liloa Drive Extension, Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street* project, located in the Kihei area on the Island of Maui, Hawaii. The project location and general site vicinity are shown on the Project Location Map, Plate 1.

This report summarizes our findings and presents our geotechnical engineering recommendations derived from our field exploration, laboratory testing, and engineering analyses. These recommendations are intended for the design of pavements only. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.2 Project Considerations

The project is located within the Kihei area on the Island of Maui, Hawaii. The project site is located in the vicinity of East Waipuilani Road to the vicinity of Kaonoulu Street and runs parallel to Piilani Highway and South Kihei Road, as shown on the General Site Plan, Plate 2. A new roadway with two lanes of traffic and paved shoulders with a multi-use trail (e.g. shared use path) is planned.

It should be noted that we prepared a separate geotechnical engineering report in support of the design of the bridge foundations, retaining walls, site grading, and utility installation. Detailed discussion and geotechnical recommendations for the design of the other elements of the project are presented in the geotechnical engineering report.

END OF GENERAL

SECTION 2. SITE CHARACTERIZATION

2.1 Regional Geology

The Island of Maui was built by two major volcanoes, the older West Maui (Tertiary Epoch) and the more recent East Maui, also known as Haleakala (Pleistocene Epoch). The Isthmus of Maui is a narrow, gently sloping plain located between these two volcanoes. The project site is located at the southern area of this gently sloping plain.

The Isthmus of Maui was created by lava flows from East Maui (Haleakala) ponding on West Maui. It is comprised of alluvium washed from the slopes of West Maui and Haleakala. The erosional processes are dominated by the detachment of soil and rock masses from the mountain walls, and the soil materials are transported downslope toward the Isthmus primarily by gravity as colluvium. Once these materials reach the stream in the central portion of a valley, the alluvial process becomes dominant, and the sediments are transported and deposited as alluvium. In general, stream flows in Hawaii are intermittent and flashy, such that the stream flows transmit large volumes of water for very short durations. Because of this, the transport of sediments is intermittent, and the bulk of the stream's hydraulic load consists of a poorly sorted mixture of boulders, cobbles, gravel, sands, and fines. When the erosional base levels change, these sediment loads are left as deposits.

When deposits are left in-place for long periods of time, chemical processes begin to alter the materials simultaneously, causing a breakdown or weathering of the materials. Chemical processes also cause induration, or cementation, of the coarse-grained portion of the sediment into a poorly consolidated sedimentary rock or conglomerate. Simultaneously, erosion continues in the areas above the valley floors and upstream in headwaters. This continued erosion generates material, which is transported downslope covering the older alluvial deposits. Depending on the local base level and rate of transport, these newer sediments are generally transient in terms of geologic time. In addition, their consistency and density are generally less than those of the older, partially consolidated deposits.

Underlying the alluvial deposits are overlapping lavas from the West Maui and East Maui volcanoes. The bulk of the Haleakala shield was built during the late Pliocene and early Pleistocene Epoch by thinly bedded basaltic lava flows of the Honomanu Volcanic Series. During the Pleistocene Epoch, the characteristics of the lavas changed to very hard, thickly bedded flows of andesitic composition. These lavas have been grouped as the Kula Volcanic Series. Typically, the basalt consists of thinly to thickly bedded a'a and pahoehoe type flows.

2.2 Existing Site Conditions

The proposed roadway project runs parallel to Piilani Highway and South Kihei Road and is located in the vicinity of East Waipuilani Road to the vicinity of Kaonoulu Street in the District of Kihei on the Island of Maui, Hawaii. The new roadway will traverse two existing drainageways at Kulanihakoi and Waipuilani Gulches. Both gulches are between 190 to 250 feet in width. Kulanihakoi and Waipuilani Gulches are about 15 and 8 feet in depths, respectively. In addition, existing 18-inch and 36-inch waterlines run parallel to the new roadway.

Based on our observations, the project site is generally undeveloped except for Kenolio Road between Kaonoulu Street and Hoopili Akau Street, and between Kulanihakoi Gulch and Kulanihakoi Street. The site is generally covered with brush, tall grass, and trees. Based on topographic survey maps, the existing ground surface elevations along the alignment ranges from about +8 to +33 feet Mean Sea Level (MSL).

2.3 Subsurface Conditions

Our field exploration program consisted of drilling and sampling eight borings, designated as Boring Nos. 101 through 108, extending to depths of about 15 to 75.5 feet below the existing ground surface. In addition, four borings designated as Boring Nos. P-1 through P-4 extending to depths of about 30.5 to 32.5 feet were performed for percolation testing. Five bulk surface samples were obtained for California Bearing Ratio (CBR) and sieve analysis testing. The approximate boring and bulk sample locations are shown on the General Site Plan, Plate 2, and Site Plans, Plates 3.1 through 3.3.

The borings generally encountered a surface alluvial deposit ranging from about 2 to 31.5 feet thick. The alluvial deposit was underlain by saprolite and basalt rock

formation to the maximum depth explored of 75.5 feet below the existing ground surface. Clinker layers and voids were encountered in the basalt rock formation. In Boring Nos. P-1 and P-2, a surface fill layer about 3 to 7.5 feet thick were encountered.

The alluvial deposits generally consisted of medium dense to very dense silty sand/gravel, sand, sandy cobbles and boulders, and soft to hard sandy silt. The basalt rock formation was very soft to very hard. The saprolite was composed of dense silty sand. The fill was generally composed of asphaltic concrete and dense to very dense silty sand and sandy gravel.

Groundwater was encountered in 10 of the 12 drilled borings at depths from about 15 to 27.5 feet below the existing ground surface at the time of our field exploration. The groundwater depths correspond to elevations from about -5 to +3.2 feet MSL. It should be noted that the groundwater levels at the project site may vary with seasonal precipitation, time of year, and other factors.

Detailed descriptions of the field exploration methodology are presented in Appendix A. Descriptions and graphic representations of the materials encountered in the drilled borings are provided on the Logs of Borings, Plates A-1.1 through A-12. Laboratory tests were performed on selected soil and/or rock samples, and the test results are presented in Appendix B, Plates B-1 through B-11.

END OF SITE CHARACTERIZATION

SECTION 3. DISCUSSION AND RECOMMENDATIONS

Our exploratory borings drilled along the project site generally encountered a surface alluvial deposit ranging from about 2 to 31.5 feet thick underlain by saprolite and basalt rock formation extending to the maximum depth explored of about 75.5 feet below the existing ground surface. The alluvial deposits generally consisted of medium dense to very dense silty sand/gravel, sand, sandy cobbles and boulders, and soft to hard sandy silt.

We encountered groundwater in 10 of the 12 drilled borings at depths from about 15 to 27.5 feet below the existing ground surface at the time of our field exploration. The groundwater depths correspond to elevations from about -5 to +3.2 feet MSL.

Based on the results of our field exploration, the pavement subgrades along the proposed new roadway alignments are generally underlain by medium dense to dense silty gravel/sand and stiff sandy silt. Detailed discussions and recommendations for these items and other pavement aspects of the project are presented in the following sections.

3.1 Pavement Design

New pavements are planned for the Liloa Drive Extension roadway project. The following subsections provide discussion on the areas necessary for pavement analyses and design.

1. Methodology of Pavement Design
2. Design Traffic Loading Conditions
3. Design Subgrade Conditions
4. Design Pavement Section
5. Pavement Drainage

3.1.1 Methodology of Pavement Design

Two types of pavement structural sections (flexible and rigid pavements) were considered in the pavement analyses. The flexible pavement sections presented herein were generally determined based on the methodology described in Chapter 3 of the revised Pavement Design Manual dated March 2002 prepared by the State of Hawaii - Department of Transportation, Highways Division, Material Testing and

Research Branch. The pavement design methodology is based on the Hveem Stabilometer method developed and used by the California Department of Transportation (Caltrans).

The design procedures for the rigid pavement sections are generally based on the design procedures described in the Portland Cement Association "Thickness Design for Concrete Highway and Street Pavements".

3.1.2 Design Traffic Loading Conditions/Traffic Index

Based on the design guidelines from the revised Pavement Design Manual dated March 2002, we believe that the roadway may be classified as a "Medium Volume Urban" roadway. Therefore, the pavements will need to be designed for a pavement life of 30 years. The following table summarizes the design traffic parameters provided by others and used in our pavement analyses.

LILOA DRIVE EXTENSION (NORTH OF KULANIHAKOI STREET) DESIGN TRAFFIC PARAMETERS	
Design Period	30 Years
Average Daily Traffic (ADT) Year 2020 Year 2050	Vehicles per day per direction 515 12,136
24-Hour Truck Traffic	2.4%
Type of Axle 2-axle 3-axle 4-axle 5-axle 6-axle 7-axle	Truck Traffic Distribution 29.58% 24.58% 32.08% 4.58% 9.17% 0.00%

LILOA DRIVE EXTENSION (SOUTH OF KULANIHAKOI STREET) DESIGN TRAFFIC PARAMETERS	
Design Period	30 Years
Average Daily Traffic (ADT) Year 2020 Year 2050	Vehicles per day per direction 335 21,230
24-Hour Truck Traffic	2.4%
Type of Axle 2-axle 3-axle 4-axle 5-axle 6-axle 7-axle	Truck Traffic Distribution 29.58% 24.58% 32.08% 4.58% 9.17% 0.00%

Based on a design period of 30 years, the traffic volume, and the truck distribution information provided, Traffic Indices (TI) of 10.5 and 11 have been determined for the project. Detailed analyses on the Traffic Index Determination are presented in Appendix C of this report.

3.1.3 Design Subgrade Conditions

Based on the results of our field exploration, the pavement subgrades along the proposed new roadway alignment are generally underlain by medium dense to dense silty gravel/sand north of Kulanihakoi Road and stiff sandy silt south of Kulanihakoi Road. Based on the laboratory CBR test results, Design R-values of 55 and 19.5 were adopted in our pavement analyses for the anticipated subgrade conditions along the proposed roadway north and south of Kulanihakoi Road, respectively.

3.1.4 Design Pavement Section

Based on the relatively high traffic volumes anticipated for the project roadway, we believe that the asphalt concrete base (ACB) should be used as the base material for the project. Therefore, pavement sections utilizing untreated aggregate base courses were not considered in our pavement design analyses. Based on the

assumptions presented above, we considered the following two pavement structural sections for use as the pavements for the project.

Liloa Drive (North of Kulanihakoi Road)

Option A

2.5-Inch Asphaltic Concrete
4.0-Inch Asphaltic Concrete Base
7.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
13.5-Inch Total Pavement Thickness on Moist Compacted Subgrade

Option B

8.0-Inch Portland Cement Concrete
6.0-Inch Aggregate Subbase (95 Percent Relative Compaction)
14.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

Liloa Drive (South of Kulanihakoi Road)

Option A

3.0-Inch Asphaltic Concrete
6.0-Inch Asphaltic Concrete Base
18.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
27.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

Option B

9.0-Inch Portland Cement Concrete
6.0-Inch Aggregate Subbase (95 Percent Relative Compaction)
15.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

An economic analysis was performed on the two pavement structural sections presented above for each roadway location to evaluate the initial construction cost and life cycle cost of the pavement sections presented. The estimated cost of the placed asphalt concrete consisted of the current cost of the asphalt concrete material; estimated hauling, labor, and equipment costs; and tack coat cost. For the Portland Cement Concrete, the estimated in-place cost was determined from the recent State of Hawaii, Department of Transportation, Highways Division project bid tabs. Based on our cost comparisons of the pavement design options, it appears that the following pavement structural sections would result in the most economical pavement design over the design life of the pavement.

Roadway	Most Economical Option
Liloa Drive (North of Kulanihakoi Road)	Option A
Liloa Drive (South of Kulanihakoi Road)	Option B

The Option A pavement structural section consists of asphaltic concrete (AC) on an asphaltic concrete base (ACB) over the aggregate base course (ABC). Although Option B was slightly more economical than Option A south of Kulanihakoi Road, we recommend that Option A be used for this portion of the roadway for consistency. The results of our economic analysis are presented in Appendix C.

We understand that the area south of Kulanihakoi Road will mainly be in a fill condition. Provided a minimum of 24 inches of select granular fill material with a CBR value of 20 or greater is placed below the pavement section, the following pavement section may be considered.

Liloa Drive (South of Kulanihakoi Road)

3.0-Inch Asphaltic Concrete
4.0-Inch Asphaltic Concrete Base
8.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
15.0-Inch Total Pavement Thickness on Moist Compacted Subgrade

3.1.5 Pavement Drainage

The recommended pavement sections assume that adequate drainage will be provided for the paved areas which should be sloped, and drainage gradients maintained to carry surface water off the pavements to appropriate drainage structures. Surface water ponding should not be allowed on-site during or after construction. When concrete curbs are used to isolate landscaping in or adjacent to the pavement areas, we recommend extending the curbs a minimum of 2 inches into the soils below the aggregate base layer to reduce the potential for migration of excessive landscape water into the pavement section.

Alternatively, a subdrain system could be constructed to collect excess water from landscaping irrigation. For long-term performance, we recommend constructing a subdrain system adjacent to the paved/landscaped areas.

3.2 Subgrade Preparation Below Pavement Section

We anticipate that the new roadway pavements will be constructed in both cut and fill conditions. In general, the area within the contract grading limits should be thoroughly cleared and grubbed at the onset of earthwork. Vegetation, debris, deleterious material, and other unsuitable materials should be removed and properly disposed of off-site or disposed of in a designated area to reduce the potential for contamination of the excavated materials.

Soft and yielding areas encountered during clearing and grubbing below areas designated to receive fill or future improvements should be over-excavated to expose stiff and/or dense materials. The resulting excavation should be backfilled with aggregate subbase materials. The excavated soft and/or organic soils should be properly disposed of off-site.

After clearing and grubbing, the future pavement areas should be excavated, where necessary, to the pavement subgrade level (i.e., bottom of the aggregate base course layer). The pavement subgrade soils should be scarified to a depth of at least 8 inches, moisture-conditioned to above the optimum moisture content, and compacted to no less than 95 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same soil determined in accordance with AASHTO T180 (ASTM D1557). Optimum moisture is the water content (percentage by dry weight) corresponding to the maximum dry density.

Where shrinkage cracks are noted after compaction of the subgrade, we recommend scarifying and re-preparing the soils as recommended above. Saturation and subsequent yielding of the exposed subgrade due to inclement weather and poor drainage may require over-excavation of the soft areas and replacement with well-compacted fill. Contract documents should include additive and deductive unit prices for over-excavation and compacted fill placement to account for variations in the over-excavation quantities.

END OF DISCUSSION AND RECOMMENDATIONS

SECTION 4. LIMITATIONS

The analyses and recommendations presented herein are based, in part, upon information obtained from the borings and bulk samples. Variations of the subsurface conditions between and beyond the borings and bulk samples may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations provided in this report.

The boring locations indicated in this report are approximate, having been taped from existing visible features at the project site. Elevations noted on the boring logs were estimated using a topographic survey plan transmitted by Warren S. Unemori Engineering, Inc. on November 2, 2018. The physical locations and elevations of the borings and bulk samples should be considered accurate only to the degree implied by the methods used.

The stratification lines shown on the graphic representations of the borings depict the approximate boundaries between the soil and/or rock types and, as such, may denote a gradual transition. Water level data from the borings were measured at the times shown on the graphic representations and/or presented in the text of this report. These data have been reviewed and interpretations made in the formulation of this report. It should be noted that groundwater fluctuations may occur due to variation in rainfall, seepage, temperature, and other factors.

This report has been prepared for the exclusive use of Warren S. Unemori Engineering, Inc. and their client for specific application to the design of the proposed Liloa Drive Extension in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied.

This report has been prepared solely for the purpose of assisting the engineer in the preparation of the design drawings related to the pavements for the project only. Therefore, this report may not contain sufficient data or the proper information to serve as the basis to prepare construction cost estimates. A contractor wishing to bid on this project is urged to retain a competent geotechnical engineer to assist in the interpretation

of this report and or in the performance of additional site-specific exploration for bid estimating purposes.

The owner/client should be aware that unanticipated soil and/or rock conditions are encountered commonly during construction. Unforeseen subsurface conditions, such as soft deposits, hard layers, cavities, or perched groundwater, may occur in localized areas and may require additional probing or corrections in the field (which may result in construction delays) to attain a properly constructed project. Therefore, a sufficient contingency fund is recommended to accommodate these possible extra costs.

This geotechnical engineering exploration conducted at the project site was not intended to investigate the potential presence of hazardous materials existing at the site. It should be noted that the equipment, techniques, and personnel used to conduct a geo-environmental exploration differ substantially from those applied in geotechnical engineering.

END OF LIMITATIONS

CLOSURE

The following plates and appendices are attached and complete this report:

Project Location Map ..... Plate 1
General Site Plan ..... Plate 2
Site Plans ..... Plates 3.1 thru 3.3
Field Exploration ..... Appendix A
Laboratory Tests ..... Appendix B
Pavement Design ..... Appendix C

-ΩΩΩΩΩΩΩΩΩ-

Respectfully submitted,

GEOLABS, INC.

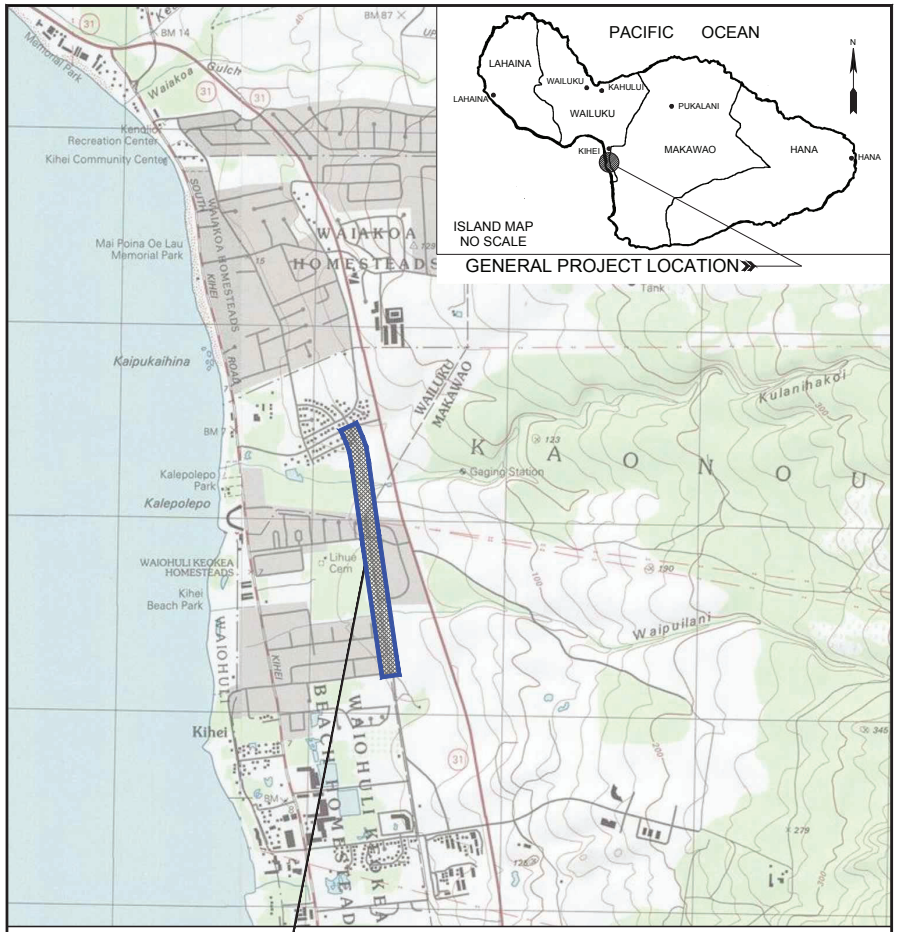
DRAFT

By _____
Gerald Y. Seki, P.E.
Vice President

GS:lf

h:\7200 Series\7296-00B.gs1

PLATES



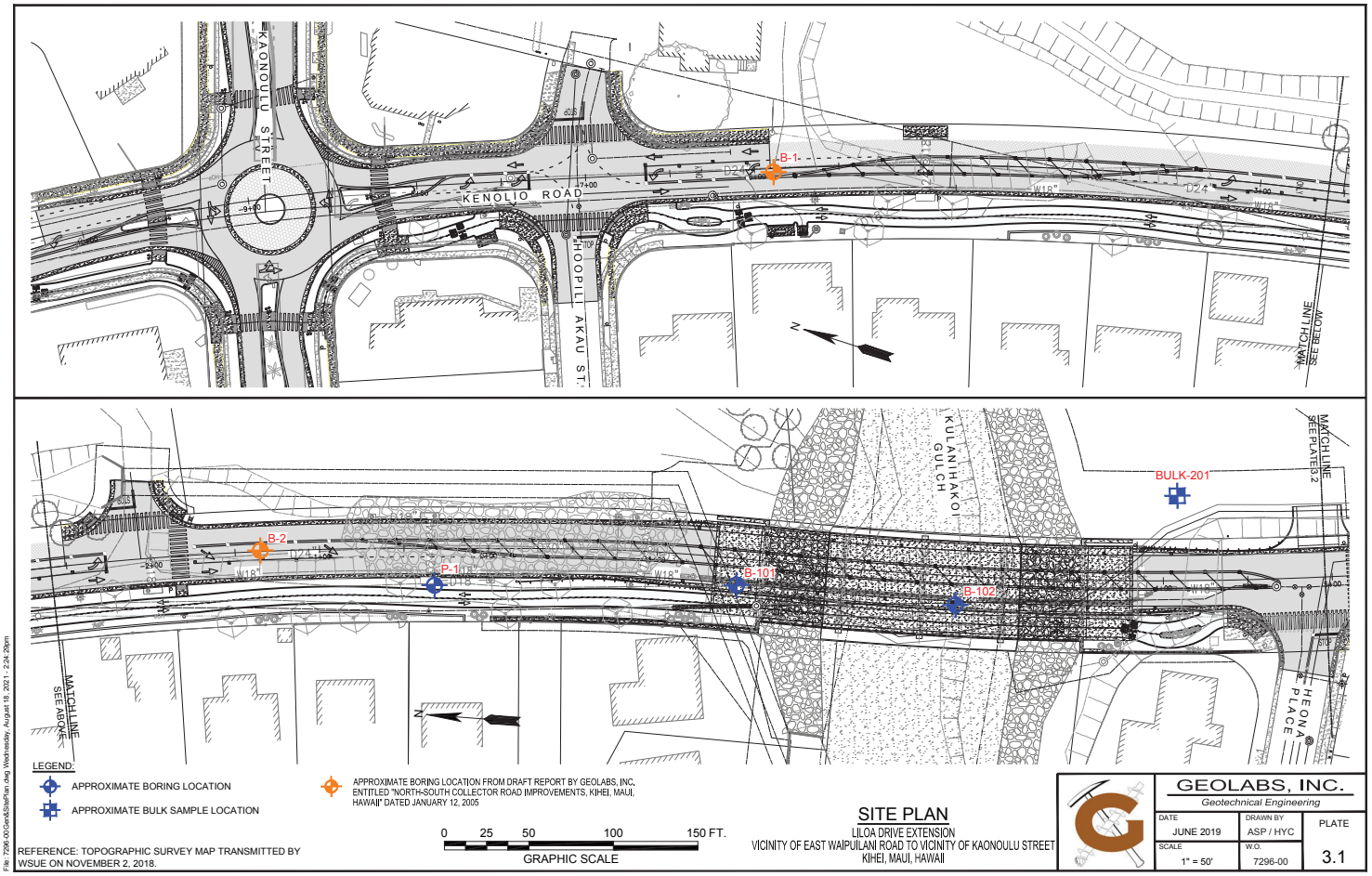
PROJECT LOCATION MAP

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

REFERENCE: HAWAII USGS TOPOGRAPHIC MAPS BY NATIONAL GEOGRAPHIC (2002).

GEOLABS, INC.		
Geotechnical Engineering		
DATE: AUGUST 2021	DRAWN BY: HYC	PLATE: 1
SCALE: 1" = 2,000'	W.O.: 7296-00	

File: 7296-00PLM.dwg Monday, August 09, 2021 - 7:42:41pm



LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE BULK SAMPLE LOCATION
- APPROXIMATE BORING LOCATION FROM DRAFT REPORT BY GEOLABS, INC, ENTITLED "NORTH-SOUTH COLLECTOR ROAD IMPROVEMENTS, KIHEI, MAUI, HAWAII" DATED JANUARY 12, 2005

REFERENCE: TOPOGRAPHIC SURVEY MAP TRANSMITTED BY WSUE ON NOVEMBER 2, 2018.

0 25 50 100 150 FT.
GRAPHIC SCALE

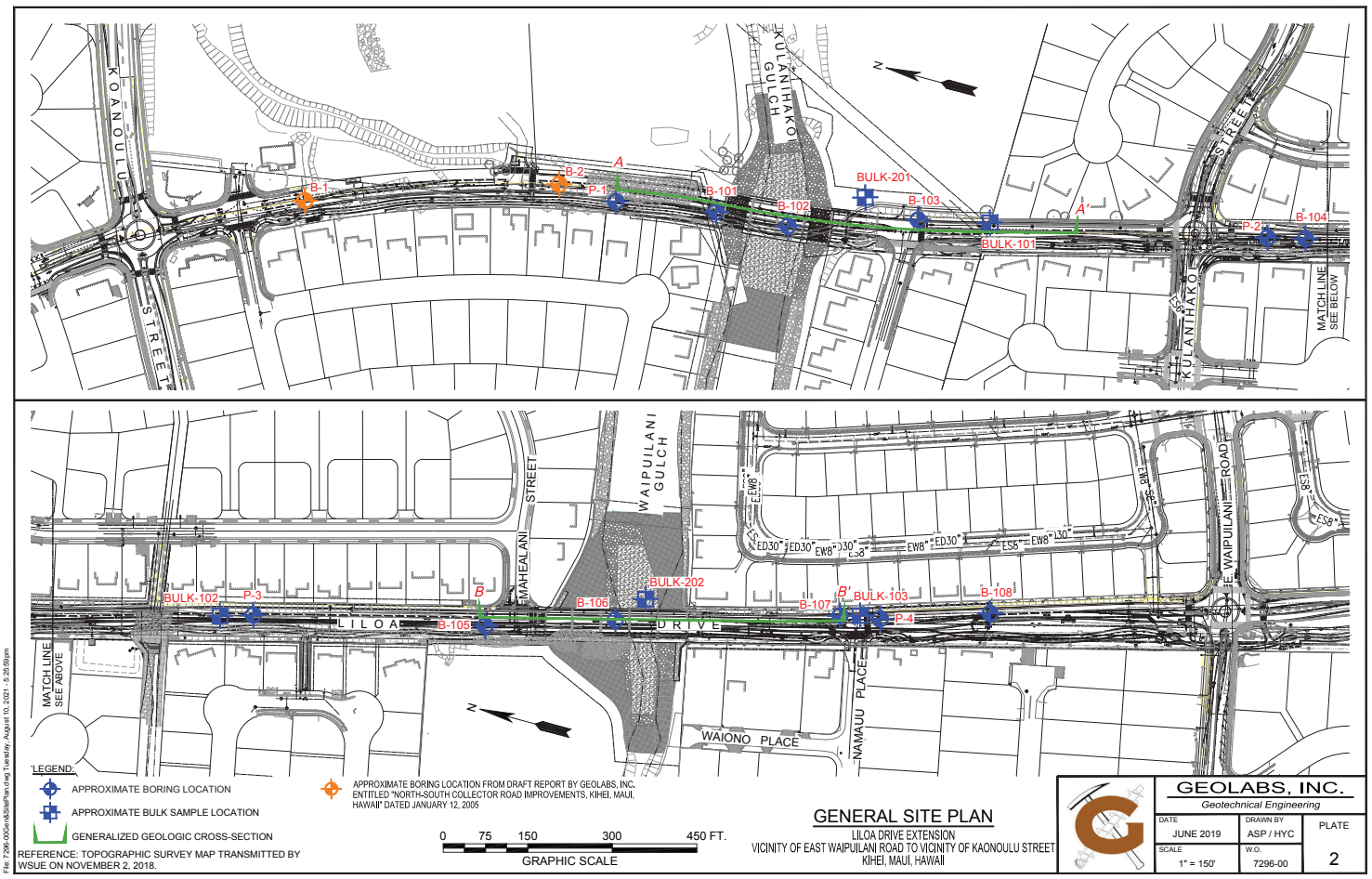
SITE PLAN

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
JUNE 2019	ASP / HYC	3.1
SCALE	W.O.	
1" = 50'	7296-00	

File: 7296-00\Gen\BSitePlan.dwg Wednesday, August 18, 2021 - 2:24:29pm



LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE BULK SAMPLE LOCATION
- GENERALIZED GEOLOGIC CROSS-SECTION
- APPROXIMATE BORING LOCATION FROM DRAFT REPORT BY GEOLABS, INC, ENTITLED "NORTH-SOUTH COLLECTOR ROAD IMPROVEMENTS, KIHEI, MAUI, HAWAII" DATED JANUARY 12, 2005

REFERENCE: TOPOGRAPHIC SURVEY MAP TRANSMITTED BY WSUE ON NOVEMBER 2, 2018.

0 75 150 300 450 FT.
GRAPHIC SCALE

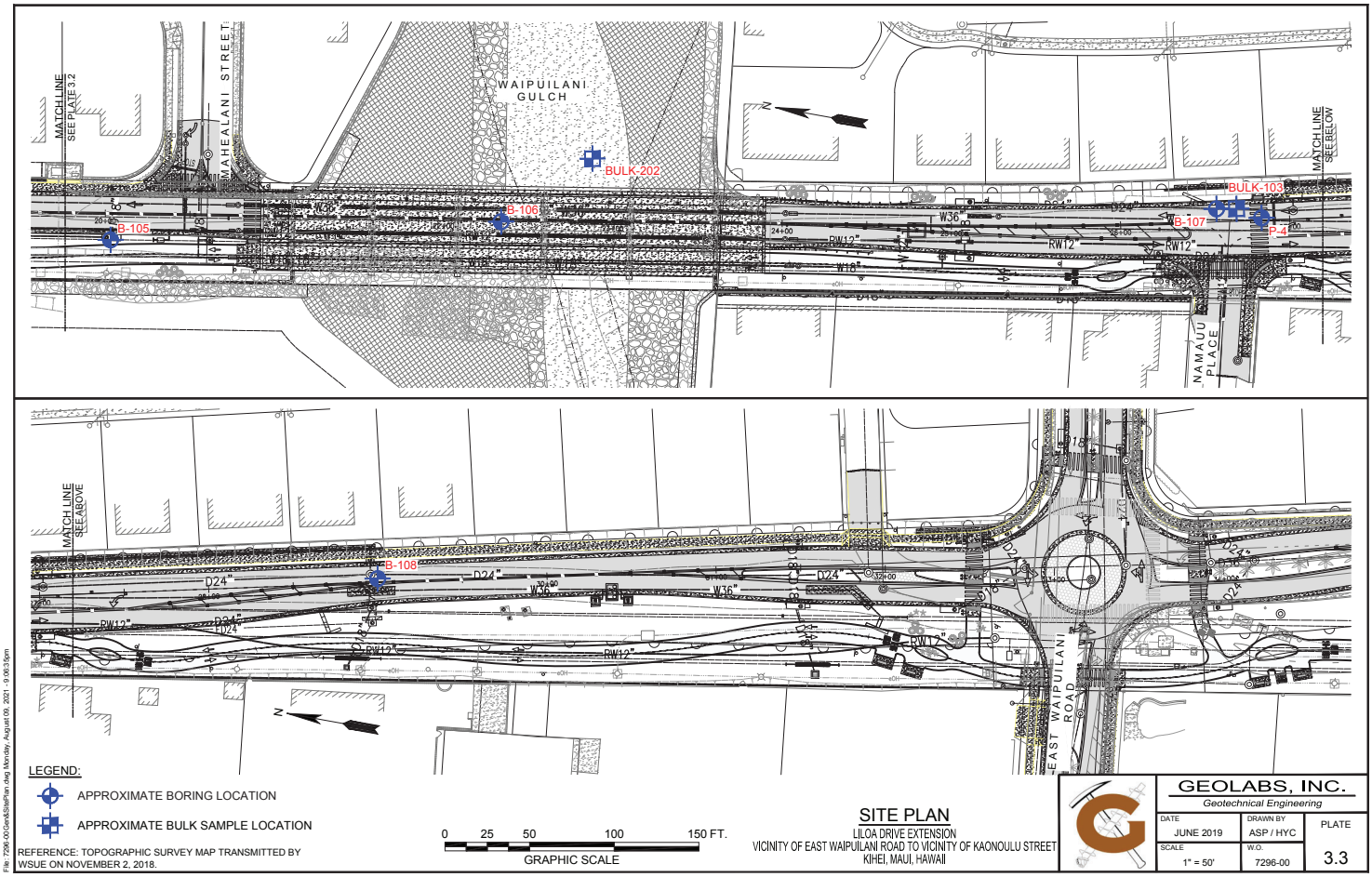
GENERAL SITE PLAN

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
JUNE 2019	ASP / HYC	2
SCALE	W.O.	
1" = 150'	7296-00	

File: 7296-00\Gen\BSitePlan.dwg Tuesday, August 10, 2021 - 5:25:59pm



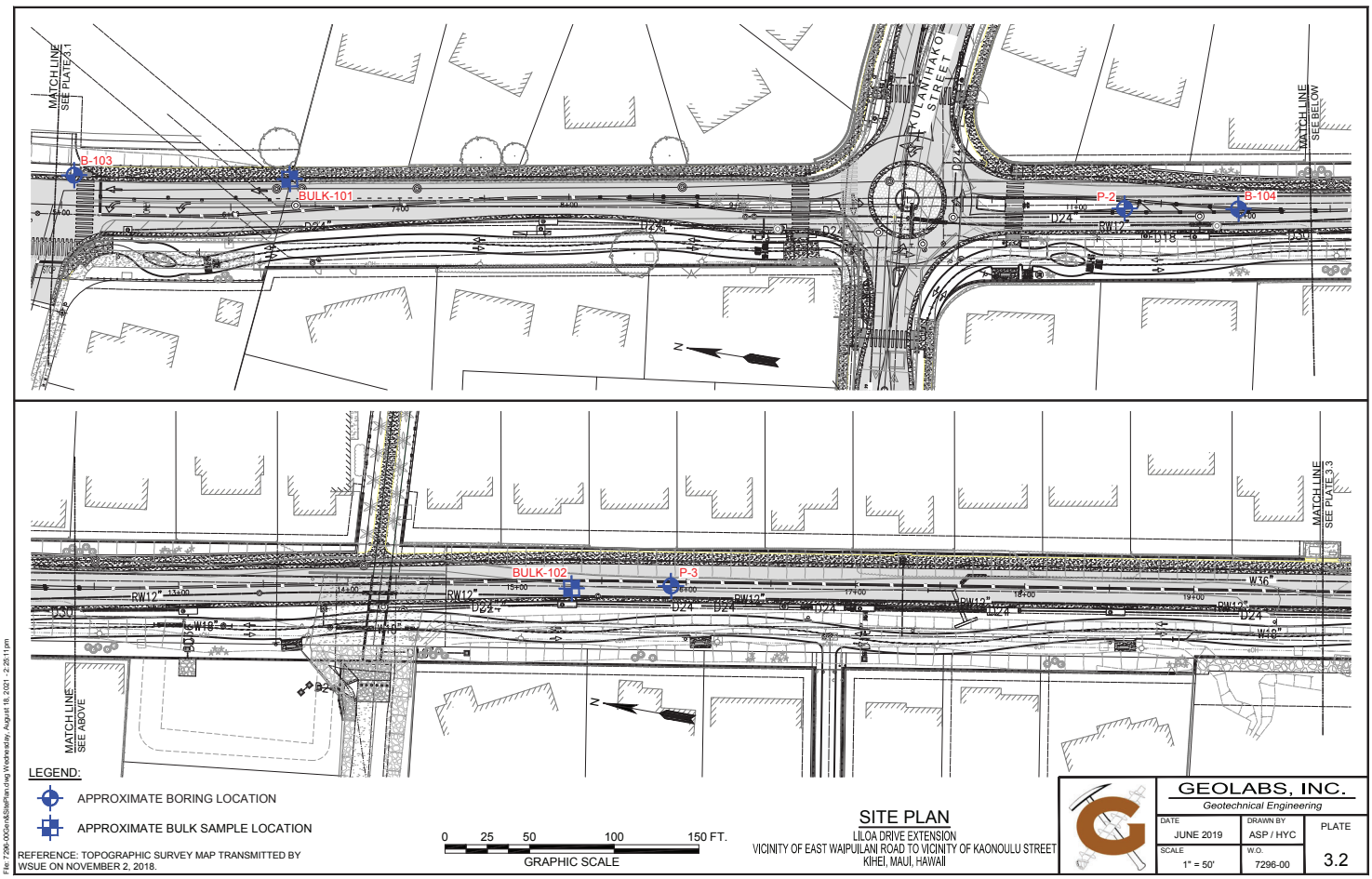
SITE PLAN

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
JUNE 2019	ASP / HYC	3.3
SCALE	W.O.	
1" = 50'	7296-00	

File: 7296-00\Gen\BSitePlan.dwg Monday, August 09, 2021 - 9:05:53pm



SITE PLAN

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
JUNE 2019	ASP / HYC	3.2
SCALE	W.O.	
1" = 50'	7296-00	

File: 7296-00\Gen\BSitePlan.dwg Wednesday, August 18, 2021 - 2:26:11pm

APPENDIX A

APPENDIX A

Field Exploration

The subsurface conditions at the project site were explored by drilling and sampling eight borings, designated as Boring Nos. 101 through 108, extending to depths ranging from about 15 to 75.5 feet below the existing ground surface. In addition, drilling and sampling of four borings extending to about 30.5 to 32.5 feet deep for percolation testing. The borings were drilled using a truck-mounted drill rig equipped with continuous-flight augers and coring tools. The approximate boring locations are shown on the General Site Plan, Plate 2, and the Site Plans, Plates 3.1 through 3.3.

The materials encountered in the borings were classified by visual and textural examination in the field by our engineer or geologist, who monitored the drilling operations on a near-continuous basis. These classifications were further reviewed visually and by testing in the laboratory. Soils were classified in general conformance with the Unified Soil Classification System, as shown on the Soil Log Legend, Plate A-0.1. Deviations made to the soil classification in accordance with ASTM D2487 are described on the Soil Classification Log Key, Plate A-02. Graphic representations of the materials encountered in the borings are presented on the Logs of Borings, Plates A-1.1 through A-12.

Relatively “undisturbed” soil samples were obtained in general accordance with ASTM D3550, Ring-Lined Barrel Sampling of Soils, by driving a 3-inch OD Modified California sampler with a 140-pound hammer falling 30 inches. In addition, some samples were obtained from the drilled borings in general accordance with ASTM D1586, Penetration Test and Split-Barrel Sampling of Soils, by driving a 2-inch OD standard penetration sampler using the same hammer and drop. The blow counts needed to drive the sampler the second and third 6 inches of an 18-inch drive are shown as the “Penetration Resistance” on the Logs of Borings at the appropriate sample depths.

Please note that the efficiencies of the safety hammer used for this project were measured in May 2015 and the resulting energy transfer ratio is shown on the Logs of Borings. The soil consistencies and densities presented on the boring logs have been adjusted based on the energy transfer ratio, as appropriate.

Pocket penetrometer tests were performed on selected cohesive soil samples retrieved in the field. The pocket penetrometer test provides an indication of the unconfined compressive strength of the soil sample. Results of the pocket penetrometer tests are presented on the Logs of Borings at the appropriate sample depths.

Core samples of rock materials encountered at the site were obtained using diamond core drilling techniques in general accordance with ASTM D2113, Diamond Core Drilling for Site Investigation. Core drilling is a rotary drilling method that uses a hollow bit to cut into the rock formation. The rock material left in the hollow core of the bit is mechanically recovered for examination and description. Rock cores were described in

general accordance with the Rock Description System, as shown on the Rock Log Legend, Plate A-0.3.

Recovery (REC) is used as a subjective guide to the interpretation of the relative quality of rock masses. Recovery is defined as the actual length of material recovered from a coring attempt versus the length of the core attempt. For example, if 3.7 feet of material is recovered from a 5.0-foot core run, the recovery would be 74 percent and would be shown on the Logs of Borings as REC = 74%.

The Rock Quality Designation (RQD) is also a subjective guide to the relative quality of rock masses. RQD is defined as the percentage of the core run that is sound material in excess of 4 inches in length without discontinuities, discounting drilling-induced fractures or breaks. If 2.5 feet of sound material is recovered from a 5.0-foot core run, the RQD would be 50 percent and would be shown on the Logs of Borings as RQD = 50%. Generally, the following is used to describe the relative quality of the rock, based on the "Practical Handbook of Physical Properties of Rocks and Minerals."

Rock Quality	RQD (%)
Very Poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 – 100

GEOLABS, INC.
Geotechnical Engineering

Soil Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS: MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVELS: MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS: LESS THAN 5% FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES: MORE THAN 12% FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS: 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS: LESS THAN 5% FINES	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES: MORE THAN 12% FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS: 50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS: LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS: LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

- (2-INCH) O.D. STANDARD PENETRATION TEST
- (3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE
- SHELBY TUBE SAMPLE
- GRAB SAMPLE
- CORE SAMPLE
- WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING
- WATER LEVEL OBSERVED IN BORING AFTER DRILLING
- WATER LEVEL OBSERVED IN BORING OVERNIGHT

- LL LIQUID LIMIT (NP=NON-PLASTIC)
- PI PLASTICITY INDEX (NP=NON-PLASTIC)
- TV TORVANE SHEAR (tsf)
- UC UNCONFINED COMPRESSION OR UNIAXIAL COMPRESSIVE STRENGTH
- TXUU UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)

Plate
A-0.1

LOG LEGEND FOR SOIL 7296-00.GPJ GEOLABS.GDT 3/28/17

GEOLABS, INC.

Geotechnical Engineering

Soil Classification Log Key

(with deviations from ASTM D2488)

GEOLABS, INC. CLASSIFICATION*

GRANULAR SOIL (- #200 <50%)	COHESIVE SOIL (- #200 ≥ 50%)
• **PRIMARY** constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., **GRAVEL, SAND**)	• **PRIMARY** constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., **CLAY, SILT**)
• **SECONDARY** constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (**SILTY** or **CLAYEY**); otherwise, a granular constituent is used (**GRAVELLY** or **SANDY**) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** GRAVEL, **CLAYEY** SAND) and precede the primary constituent.	• **SECONDARY** constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** CLAY, **SILTY** CLAY, **CLAYEY** SILT) and precede the primary constituent.
• **accessory descriptions** compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY GRAVEL **with a little sand**)	• **accessory descriptions** compose of the following: with some: >12% with a little: 5 - 12% with traces of: <5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY CLAY **with some sand**)

EXAMPLE: Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: **SILTY GRAVEL** with some sand

RELATIVE DENSITY / CONSISTENCY

Granular Soils			Cohesive Soils			
N-Value (Blows/Foot)		Relative Density	N-Value (Blows/Foot)		PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS		
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4		Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	< 0.5	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	0.5 - 1.0	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	1.0 - 2.0	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	2.0 - 4.0	Very Stiff
			> 30	> 55	> 4.0	Hard

MOISTURE CONTENT DEFINITIONS

Dry: Absence of moisture, dry to the touch

Moist: Damp but no visible water

Wet: Visible free water, usually soil is below water table

ABBREVIATIONS

WOH: Weight of Hammer

WOR: Weight of Drill Rods

SPT: Standard Penetration Test Split-Spoon Sampler

MCS: Modified California Sampler

PP: Pocket Penetrometer

GRAIN SIZE DEFINITION

Description	Sieve Number and / or Size
Boulders	> 12 inches (305-mm)
Cobbles	3 to 12 inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-inch to 3/4-inch (75-mm to 19-mm)
Fine Gravel	3/4-inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).

Plate

A-0.2

SOIL_CLASS_LOG_KEY 7296-00.GPJ GEOLABS.GDT 3/28/17

GEOLABS, INC.

Geotechnical Engineering

Rock Log Legend

ROCK DESCRIPTIONS

	BASALT		**FINGER CORAL**
	BOULDERS		**LIMESTONE**
	BRECCIA		**SANDSTONE**
	CLINKER		**SILTSTONE**
	COBBLES		**TUFF**
	CORAL		**VOID/CAVITY**

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

Massive: Greater than 24 inches apart

Slightly Fractured: 12 to 24 inches apart

Moderately Fractured: 6 to 12 inches apart

Closely Fractured: 3 to 6 inches apart

Severely Fractured: Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

Unweathered: Rock shows no sign of discoloration or loss of strength.

Slightly Weathered: Slight discoloration inwards from open fractures.

Moderately Weathered: Discoloration throughout and noticeably weakened though not able to break by hand.

Highly Weathered: Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.

Extremely Weathered: Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard: Specimen breaks with difficulty after several "pinging" hammer blows.
Example: Dense, fine grain volcanic rock

Hard: Specimen breaks with some difficulty after several hammer blows.
Example: Vesicular, vugular, coarse-grained rock

Medium Hard: Specimen can be broked by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce.
Example: Porous rock such as clinker, cinder, and coral reef

Soft: Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot.
Example: Weathered rock, chalk-like coral reef

Very Soft: Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure.
Example: Saprolite

Plate

A-0.3

LOG LEGEND FOR ROCK 7296-00.GPJ GEOLABS.GDT 3/28/17

GEOLABS, INC.
Geotechnical Engineering

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **101**

Approximate Ground Surface Elevation (feet): 18 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GM	Gray **SILTY GRAVEL** with some sand, very dense, dry (alluvium)
											Gray **BOULDER**, very dense (alluvium)
Direct Shear - #200 = 24.0%	7	102			56					GM	Gray **SILTY GRAVEL** with some sand, dense, dry (alluvium)
	20				13		5			SM	Grayish brown **SILTY SAND (BASALTIC)** with some gravel, medium dense, moist (alluvium)
	13				54		10				Gray vesicular **BASALT**, moderately to closely fractured, moderately weathered, hard
			50	33							
UC= 2180 psi			50	10	15/0"		15				grades to loose
			97	50			20				
			92	60			25				
UC= 3120 psi			83	70			30				

Date Started:	March 14, 2017	Water Level: ▼ 16.0 ft. 03/15/2017 1117 HRS	Plate
Date Completed:	March 15, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	
Total Depth:	75.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	A - 1.1
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

GEOLABS, INC.
Geotechnical Engineering

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **101**

(Continued from previous plate)

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			88	70							grades to moderately to slightly fractured
			95	95			40				
			68	68			45				
	26				25		50				
			19	0						GP-GM	Reddish brown **SANDY GRAVEL (BASALTIC)** with a little silt, medium dense (clinker)
	14				14		55				
			36								
	14				8		60				grades to loose
			21								
	15				35		65				grades to dense
			95	14							Brownish gray vesicular **BASALT**, closely to moderately fractured, moderately weathered, medium hard
							70				

Date Started:	March 14, 2017	Water Level: ▼ 16.0 ft. 03/15/2017 1117 HRS	Plate
Date Completed:	March 15, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	
Total Depth:	75.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	A - 1.2
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

GEOLABS, INC.

Geotechnical Engineering

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **101**

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
			98	58			75			

(Continued from previous plate)

Description

Boring terminated at 75.5 feet

* Elevations estimated from contours on the Topographic Survey transmitted by Warren S. Unemori Engineering, Inc. on April 5, 2017.

Date Started:	March 14, 2017	Water Level: ▼ 16.0 ft. 03/15/2017 1117 HRS	Plate
Date Completed:	March 15, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 1.3
Total Depth:	75.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

GEOLABS, INC.

Geotechnical Engineering

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **102**

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	27	102			27	1.0				ML
	31				9					
TXUU S_u=1.8 ksf	21	104			18	1.0	5			
					18		10			
			0							
	13	136			92		15			
			19							
	11				50/3" Ref.		20			
			74	74						
			95	85			25			
UC= 1750 psi										
			98	80			30			
UC= 2610 psi							35			

Approximate Ground Surface Elevation (feet): 10 *

Description

Brown **SANDY SILT**, very stiff, moist (alluvium)

grades to stiff

Gray with brown mottling **SANDY COBBLES** with some gravel, medium dense, moist (alluvium)

grades to very dense

Gray **BASALT**, closely to moderately fractured, moderately weathered, medium hard

Date Started:	March 16, 2017	Water Level: ▼ 15.0 ft. 03/16/2017 1330 HRS	Plate
Date Completed:	March 16, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 2.1
Total Depth:	50.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

GEOLABS, INC.

Geotechnical Engineering

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **102**

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate) Description
			58	0							
			0		15/0" Ref.		40			GP	Gray with red mottling **SANDY GRAVEL (BASALTIC)**, very dense (clinker)
	12		98	60	15/0" Ref.		45				Gray vugular **BASALT**, closely fractured, moderately weathered, medium hard
							50				Boring terminated at 50.5 feet
							55				
							60				
							65				
							70				

Date Started:	March 16, 2017	Water Level: ▼ 15.0 ft. 03/16/2017 1330 HRS	Plate
Date Completed:	March 16, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 2.2
Total Depth:	50.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **103**

Laboratory			Field								Approximate Ground Surface Elevation (feet): 26 *
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
LL=32 PI=6	10	107			50					ML	Brown **SANDY SILT** with some gravel, hard, moist (alluvium)
	10				33					SM	Brown **SILTY SAND** with a little gravel, dense, moist (alluvium)
UC= 1610 psi	10	95	80	50	30/1" Ref.		5				Gray **BASALT**, moderately fractured, slightly weathered, hard
			98	52			10				
UC= 1850 psi			78	78			15				
	45				35		20				grades to red, severely fractured, extremely weathered, very soft
			95	85							grades to gray, moderately fractured, slightly weathered, hard
	32		93	59	50/2" Ref.		25				grades to closely fractured
			90	80			30				
							35				

Date Started:	March 14, 2017	Water Level: ▼ 27.5 ft. 03/14/2017 1159 HRS	Plate
Date Completed:	March 14, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 3.1
Total Depth:	50.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **103**

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS

(Continued from previous plate)

Description

			98	50			40			
			97	45			45			
			100	56			50			

Boring terminated at 50.5 feet

Date Started:	March 14, 2017	Water Level: ▼ 27.5 ft. 03/14/2017 1159 HRS	Plate
Date Completed:	March 14, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 3.2
Total Depth:	50.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **104**

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS

Approximate Ground Surface Elevation (feet): 21.5 *

Description

							0			ML	Brown **SANDY SILT** with some gravel, soft, moist (alluvium)
											Grayish brown **BOULDERS**, very dense (alluvium)
LL=37 PI=5	17	79			18	0.8	5			ML	Brown **SANDY SILT** with some gravel, stiff, moist (alluvium)
	16				13						
	18	83			22/6" +25/1" Ref.		10			SM	Gray with multi-color mottling **SILTY SAND**, dense, moist (saprolite)
											Gray **BASALT**, moderately fractured, slightly weathered, hard
					15/0"		15				Boring terminated at 15 feet

Date Started:	March 9, 2017	Water Level: ▼ Not Encountered	Plate
Date Completed:	March 9, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 4
Total Depth:	15 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **105**

Approximate Ground Surface Elevation (feet): 26 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
Direct Shear Sieve - #200 = 10.9%	24 9	89			26 15		0			SW-SM	Grayish brown **SAND (BASALTIC)** with a little silt and gravel, medium dense, moist (alluvium)
	5	104			26		5				
	5		0		16		10				
	5		0		22		15				
			50	40	15/0" Ref.		20				Gray **BASALT**, closely to moderately fractured, moderately weathered, medium hard
			97	64			25				
							30				Boring terminated at 30.5 feet
							35				

Date Started:	March 8, 2017	Water Level: ▼ 26.7 ft. 03/08/2017 1845 HRS	Plate
Date Completed:	March 8, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 5
Total Depth:	30.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **106**

Approximate Ground Surface Elevation (feet): 26.5 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
					35		0			ML	Brown **SANDY SILT**, very stiff, moist (alluvium)
	14				14						grades to stiff
					5		5				grades to soft
Sieve - #200 = 26.8%	22				13		10			SM	Dark brownish gray **SILTY SAND (BASALTIC)** with a little gravel, medium dense, moist (alluvium)
	18	81			8		15				grades to loose
	53				10		20				grades to medium dense
UC= 3310 psi			85	85							Gray **BASALT**, moderately to slightly fractured, moderately weathered, hard
			70	70			25				
UC= 3700 psi			100	100			30				
							35				

Date Started:	March 8, 2017	Water Level: ▼ 26.0 ft. 03/08/2017 1403 HRS	Plate
Date Completed:	March 8, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 6.1
Total Depth:	51 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **106**

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate) Description
			77	70							
							40				**VOID**
			75	30							Red **BASALT**, severely fractured, extremely weathered, soft
							45				grades to gray vesicular, closely to moderately fractured, moderately weathered, hard
			73	48						GP-GM	Grayish brown **SANDY GRAVEL (BASALTIC)** with a little silt, medium dense, moist (clinker)
							50				Gray vugular **BASALT**, moderately fractured, slightly weathered, hard
											Boring terminated at 51 feet
							55				
							60				
							65				
							70				

Date Started:	March 8, 2017	Water Level: ▼ 26.0 ft. 03/08/2017 1403 HRS		Plate
Date Completed:	March 8, 2017			
Logged By:	B. Aiu	Drill Rig:	CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 6.2
Total Depth:	51 feet	Drilling Method:	4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **107**

Approximate Ground Surface Elevation (feet): 29 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										ML	Brown **SANDY SILT** with some gravel (alluvium)
Direct Shear	7	93			30					SW-SM	Grayish brown **BOULDERS**, very dense, dry (alluvium)
	4				20						Grayish brown **SAND (BASALTIC)** with a little silt and gravel, medium dense, moist (alluvium)
Sieve - #200 = 6.1%	4	103			27		5				
	4				14		10				
	14	122			24		15			ML	Brown **SANDY SILT** with a little gravel, stiff, moist (alluvium)
			0								
	34				7		20				grades to medium stiff
			12	12							
UC= 4000 psi			80	70	15/0" Ref.		25				Gray **BASALT**, moderately to slightly fractured, moderately weathered, hard
							30				Boring terminated at 30 feet
							35				

Date Started:	March 7, 2017	Water Level: ▼ 25.8 ft. 03/07/2017 1248 HRS		Plate
Date Completed:	March 7, 2017			
Logged By:	B. Aiu	Drill Rig:	CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 7
Total Depth:	30 feet	Drilling Method:	4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy:	140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **108**

Approximate Ground Surface Elevation (feet): 29 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	16	80			52					SM	Grayish brown **SILTY SAND** with some gravel, medium dense, moist (alluvium)
	15				45						grades to dense
	7	103			58/6" +30/1" Ref.		5				grades to very dense
											Grayish brown **BOULDERS**, very dense (alluvium)
			100	100	15/0" Ref.		10				Gray vugular **BASALT**, moderately to slightly fractured, moderately weathered, hard
							15				Boring terminated at 15 feet
							20				
							25				
							30				
							35				

Date Started:	March 7, 2017	Water Level: ▼ Not Encountered	Plate
Date Completed:	March 7, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 8
Total Depth:	15 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **P-1**

Approximate Ground Surface Elevation (feet): 21.5 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	12	98			59					SM	Grayish brown **SILTY SAND (BASALTIC)**, dense, moist (fill)
	14				16					ML	Reddish brown **SANDY SILT** with some gravel, very stiff, moist (residual soil)
	13	96			27/6" +30/1" Ref.		5				grades to hard
			65	40							Brownish gray vesicular **BASALT**, closely to moderately fractured, moderately weathered, medium hard
			87	60			10				
			100	20			15				
			97	50			20				
			100	50			25				
							30				Boring terminated at 31 feet
							35				

Date Started:	March 15, 2017	Water Level: ▼ 19.5 ft. 03/15/2017 1434 HRS	Plate
Date Completed:	March 15, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 9
Total Depth:	31 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring **P-2**

Approximate Ground Surface Elevation (feet): 21 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											2-inches **ASPHALTIC CONCRETE**
	15				75/5" Ref.					GP-GM	Brown **SANDY GRAVEL** with a little silt and boulders, very dense, moist (fill)
Sieve - #200 = 11.3%	7				20						grades to medium dense
	13	88			24		5				
										SM	Brownish tan **SILTY SAND (CORALLINE)** with a little gravel, medium dense, moist (alluvium)
Sieve - #200 = 21.1%	7				23		10				grades with cobbles
			60								
			72	72			15				Gray **BASALT**, moderately fractured, slightly weathered, hard
	41	82			46		20				grades to red, severely fractured, extremely weathered, very soft
			73	11							
										SM	Brown **SILTY SAND** with a little gravel, very dense (extremely weathered clinker)
	38		70	66	35/3" Ref.		25				Brownish gray vesicular **BASALT**, moderately fractured, moderately weathered, medium hard
							30				Boring terminated at 30.5 feet
							35				

Date Started:	March 13, 2017	Water Level: ▼ 21.0 ft. 03/13/2017 1544 HRS	Plate
Date Completed:	March 13, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 10
Total Depth:	30.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
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KIHEI, MAUI, HAWAII

Log of Boring **P-3**

Approximate Ground Surface Elevation (feet): 22 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	19	90			32					ML	Dark grayish brown **SANDY SILT**, very stiff, moist (alluvium)
	17				4						grades to medium stiff
	13	94			11		5				
	23				7		10				
Sieve - #200 = 52.2%	36	76			6		15				grades with clay seams, soft
			33	0							Gray **BASALT**, severely fractured, moderately weathered, hard
	38				22/6" +25/1" Ref.		20				
			98	0							
			72	32			25				
	48				15		30				grades to reddish brown, severely fractured, extremely weathered, very soft
							35				Boring terminated at 32.5 feet

Date Started:	March 9, 2017	Water Level: ▼ 26.3 ft. 03/09/2017 1137 HRS	Plate
Date Completed:	March 9, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 11
Total Depth:	32.5 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

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LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Log of Boring

P-4

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											Approximate Ground Surface Elevation (feet): 28.5 *
										ML	Brown **SANDY SILT** with some gravel, medium stiff, moist (alluvium)
Sieve - #200 = 42.7%	8	95			18					SM	Gray **SILTY SAND** with a little gravel, medium dense, moist (alluvium)
	13				50					ML	Reddish brown **SANDY SILT** with a little gravel, hard, moist (alluvium)
LL=33 PI=7	8	123			17/6" +50/3" Ref.		5				
			88	88							Gray **BASALT**, closely to moderately fractured, moderately weathered, hard
	21				13		10			SP-SM	Gray with brown mottling **SILTY SAND** with some gravel (basaltic), medium dense, moist (clinker)
			69	10							Gray vugular **BASALT**, massive to slightly fractured, moderately weathered, very hard
			98	94	15/0" Ref.		15				
			95	90			20				
			50	40			25				
										GP-GM	Grayish brown **SANDY GRAVEL**, medium dense (clinker)
							30				Gray **BASALT**, moderately fractured, moderately weathered, hard
											Boring terminated at 31 feet
							35				

Date Started:	March 7, 2017	Water Level: ▼ 26.5 ft. 03/08/2017 0927 HRS	Plate
Date Completed:	March 8, 2017		
Logged By:	B. Aiu	Drill Rig: CME-75DG1 *(Energy Transfer Ratio = 83.9%)*	A - 12
Total Depth:	31 feet	Drilling Method: 4" Solid Stem Auger & PQ Coring	
Work Order:	7296-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING LOG 7296-00.GPJ GEOLABS.GDT 8/9/21

APPENDIX B

APPENDIX B

Laboratory Tests

Moisture Content (ASTM D2216) and Unit Weight (ASTM D2937) determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

Three Atterberg Limits tests (ASTM D4318) were performed on selected soil samples to evaluate the liquid and plastic limits and to aid in soil classification. The test results are summarized on the Logs of Borings at the appropriate sample depths. Graphic presentation of the test results is provided on Plate B-1.

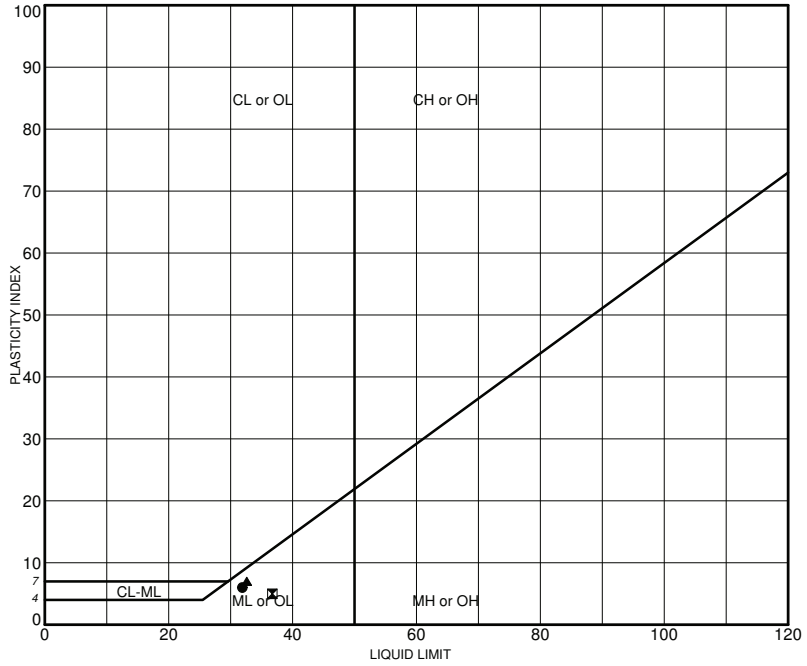
Ten Sieve Analysis tests (ASTM C117 & C136) were performed on selected soil samples to evaluate the gradation characteristics of the soils and to aid in soil classification. Graphic presentations of the grain size distribution are provided on Plates B-2 and B-3.

Three Direct Shear tests (ASTM D3080) were performed on selected soil samples to evaluate the shear strength parameters. The test results are presented on Plates B-4 through B-6.

One Triaxial UU Compression test (ASTM D2850) was performed on a selected soil sample to evaluate the compressive strength characteristics of the soil. Graphic presentation of the test results is provided on Plate B-7.

Nine Uniaxial Compression tests (ASTM D7012 Method C) were performed on rock core samples to evaluate the unconfined compressive strength of the rock core samples. The test results are presented on the Logs of Borings at the appropriate sample depths. A summary of the test results is presented on Plate B-8.

Three California Bearing Ratio (CBR) tests (ASTM D1883) were performed on bulk samples of near-surface soils to evaluate the strength characteristics for pavement subgrade support and the quality of the materials for use as fill materials. The CBR test results are presented on Plates B-9 through B-11.



	Sample	Depth (ft)	LL	PL	PI	Description
●	B-103	1.0-2.5	32	26	6	Brown sandy silt (ML) with some gravel
⊠	B-104	4.0-5.5	37	32	5	Brown sandy silt (ML) with some gravel
▲	P-4	5.0-6.5	33	26	7	Reddish brown sandy silt (ML) with a little gravel

NP = NON-PLASTIC

G ATTERBERG PI-100 LL-120 7296-00.GPJ GEOLABS.GDT 8/9/21

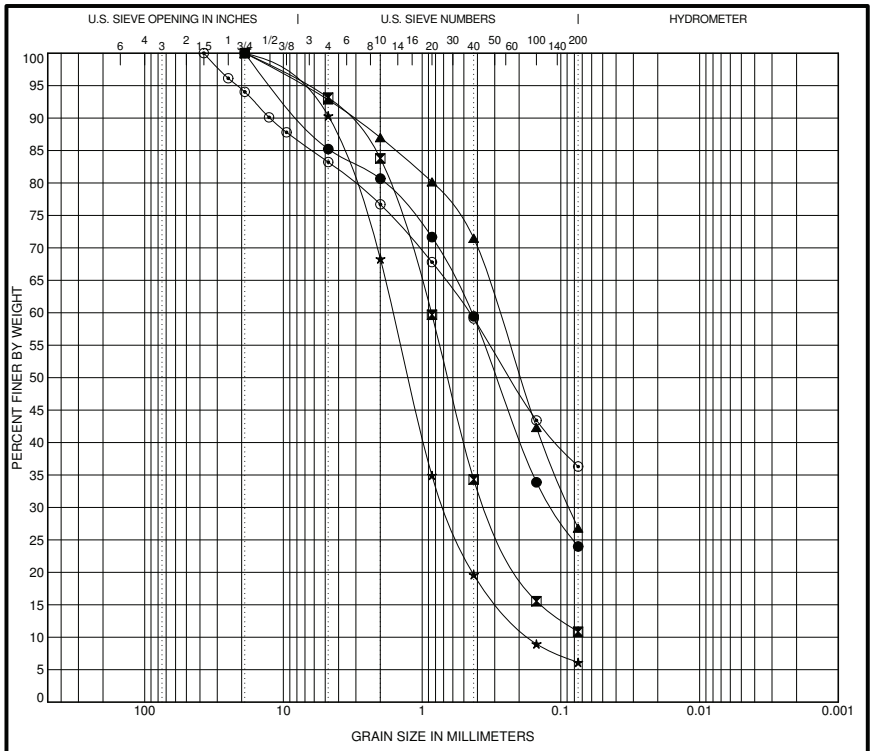
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ATTERBERG LIMITS TEST RESULTS - ASTM D4318

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	B-101	4.5-6.0	Grayish brown silty sand (SM) with some gravel					
⊠	B-105	2.5-4.0	Grayish brown sand (SW-SM) with a little silt and gravel				2.0	13.0
▲	B-106	10.0-11.5	Dark brownish gray silty sand (SM) with a little gravel					
★	B-107	5.0-6.5	Grayish brown sand (SW-SM) with little silt and gravel				1.7	9.7
⊙	BULK-201	0.0-1.0	Brown silty sand (SM) with some gravel					

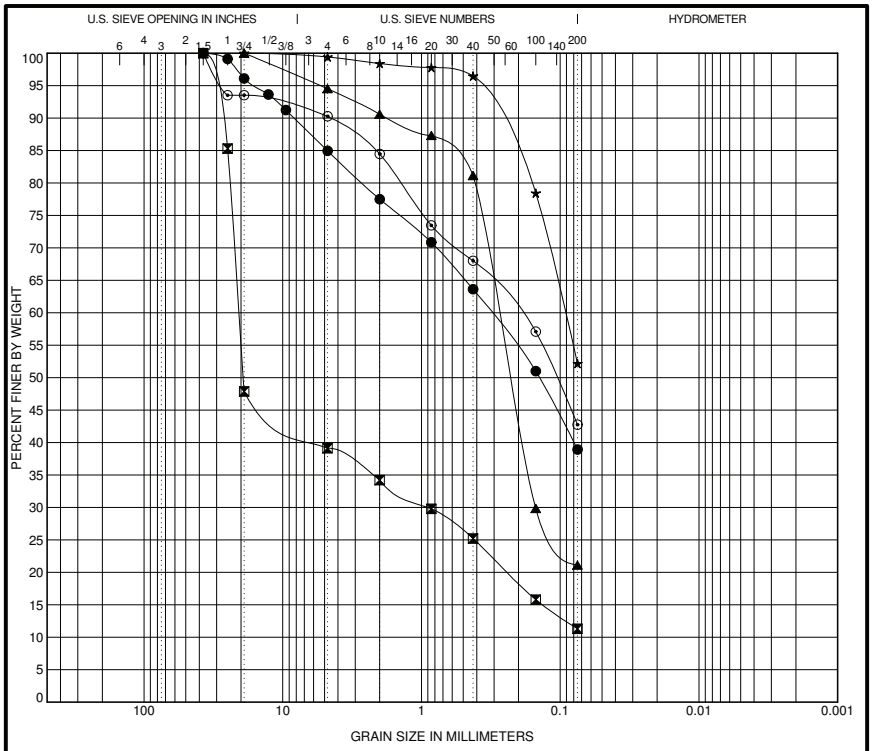
	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine
●	B-101	4.5-6.0	19	0.439	0.114		14.8	61.2	24.0
⊠	B-105	2.5-4.0	19	0.859	0.335		6.9	82.3	10.9
▲	B-106	10.0-11.5	19	0.282	0.087		7.2	66.0	26.8
★	B-107	5.0-6.5	19	1.617	0.68	0.166	9.7	84.2	6.1
⊙	BULK-201	0.0-1.0	37.5	0.456			16.8	46.9	36.3

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W.O. 7296-00

GRAIN SIZE DISTRIBUTION - ASTM C117 & C136
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 2

G GRAIN SIZE_MOD 7296-00.GPJ GEOLABS.GDT 8/9/21



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	BULK-202	0.0-1.0	Brown silty sand (SM) with some gravel					
⊠	P-2	2.5-4.0	Brown sandy gravel (GP-GM) with a little silt				0.6	339.2
▲	P-2	10.0-11.5	Brownish tan silty sand (SM) with a little gravel					
★	P-3	15.0-16.5	Dark grayish brown sandy silt (ML)					
⊙	P-4	1.5-3.0	Gray silty sand (SM) with a little gravel					

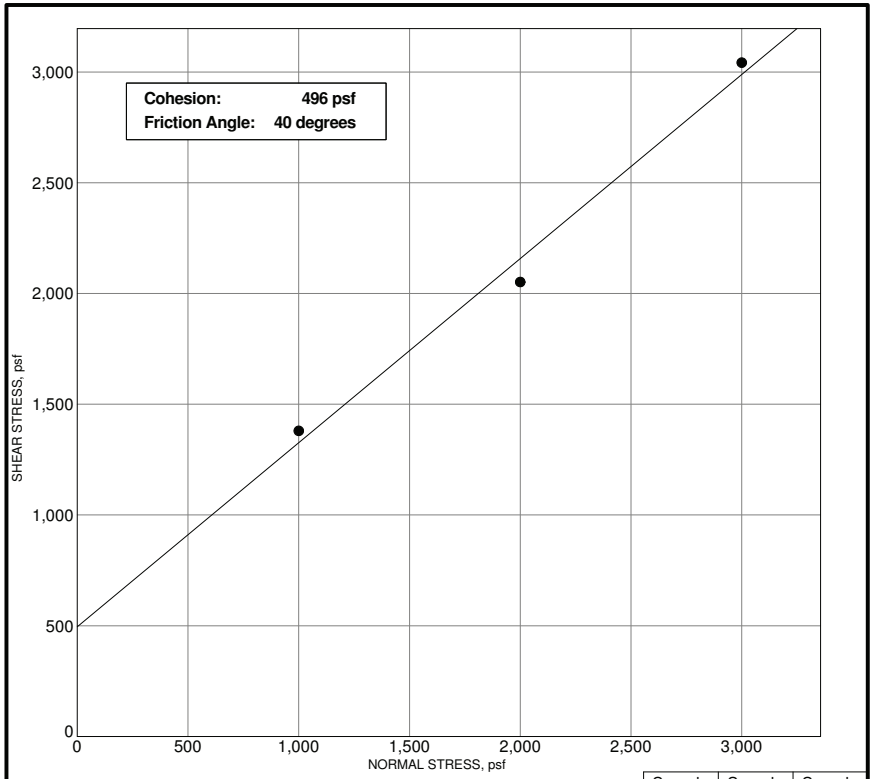
	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine
●	BULK-202	0.0-1.0	37.5	0.315			15.1	46.0	38.9
⊠	P-2	2.5-4.0	37.5	20.767	0.888		60.9	27.8	11.3
▲	P-2	10.0-11.5	19	0.277	0.151		5.5	73.4	21.1
★	P-3	15.0-16.5	19	0.092			0.6	47.2	52.2
⊙	P-4	1.5-3.0	37.5	0.198			9.7	47.5	42.7

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W.O. 7296-00

GRAIN SIZE DISTRIBUTION - ASTM C117 & C136
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 3

G GRAIN SIZE_MOD 7296-00.GPJ GEOLABS.GDT 8/9/21



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	8.3	8.2	9.0
	Dry Density, pcf	95.0	94.9	96.9
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	16.3	15.4	15.9
	Dry Density, pcf	94.0	94.8	96.4
	Height, inches	1.011	1.002	1.005
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0023	0.0023	0.0022
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**1380**	**2052**	**3042**
	Shear Displacement, inches	0.43	0.42	0.41

Sample: B-101
Depth: 3.0 - 4.5 feet
Description: Gray silty gravel with some sand

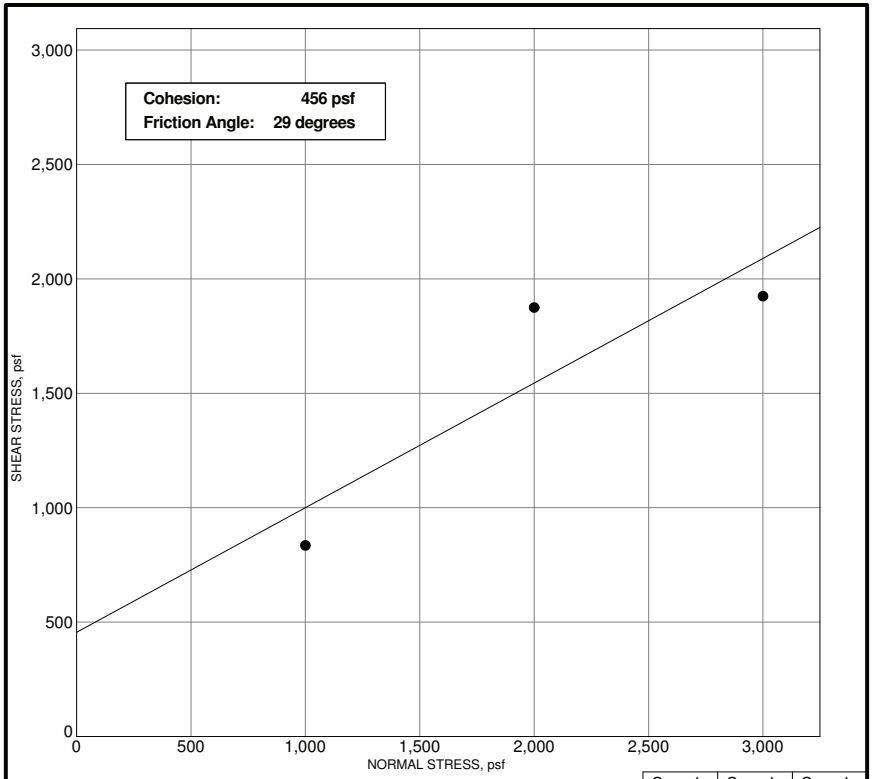
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DIRECT SHEAR TEST - ASTM D3080

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 4

G DIRECT SHEAR 7296-00.GPJ GEOLABS.GDT 8/9/21



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	12.1	17.8	33.7
	Dry Density, pcf	71.2	84.4	84.7
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	30.0	28.9	32.0
	Dry Density, pcf	72.5	85.3	87.4
	Height, inches	0.983	0.989	0.970
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0021	0.0023
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**835**	**1875**	**1925**
	Shear Displacement, inches	0.44	0.42	0.43

Sample: B-105
Depth: 1.0 - 2.5 feet
Description: Grayish brown sand with a little silt and gravel

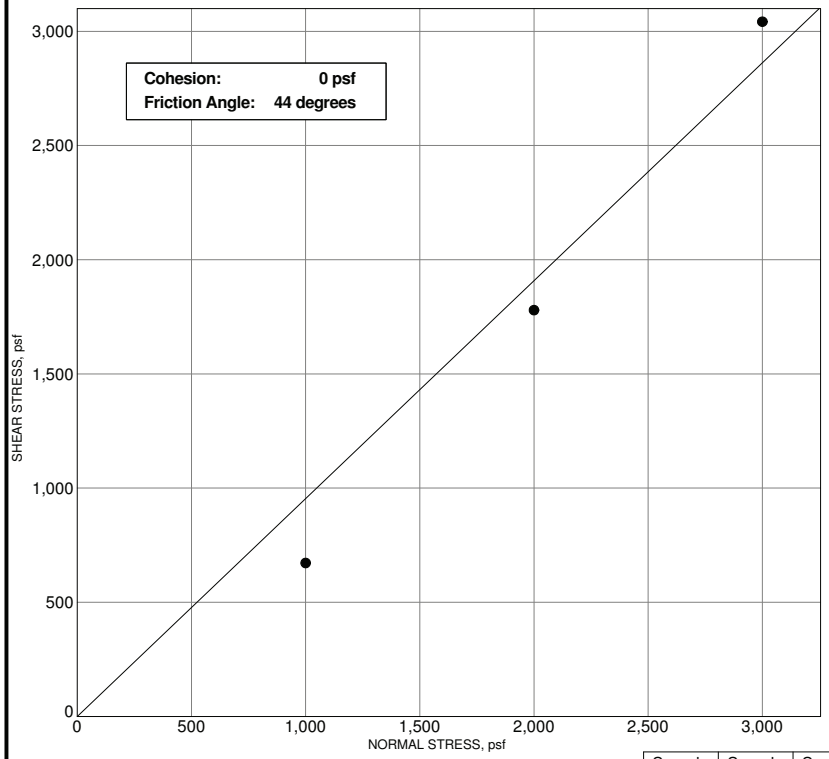
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DIRECT SHEAR TEST - ASTM D3080

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 5

G DIRECT SHEAR 7296-00.GPJ GEOLABS.GDT 8/9/21



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	23.7	18.3	33.5
	Dry Density, pcf	63.9	70.2	86.1
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	41.2	30.9	21.3
	Dry Density, pcf	66.0	72.3	86.2
	Height, inches	0.969	0.970	0.999
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0023	0.0024	0.0020
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**672**	**1779**	**3042**
	Shear Displacement, inches	0.44	0.43	0.42

Sample: B-107
Depth: 1.5 - 3.0 feet
Description: Grayish brown sand with a little silt and gravel

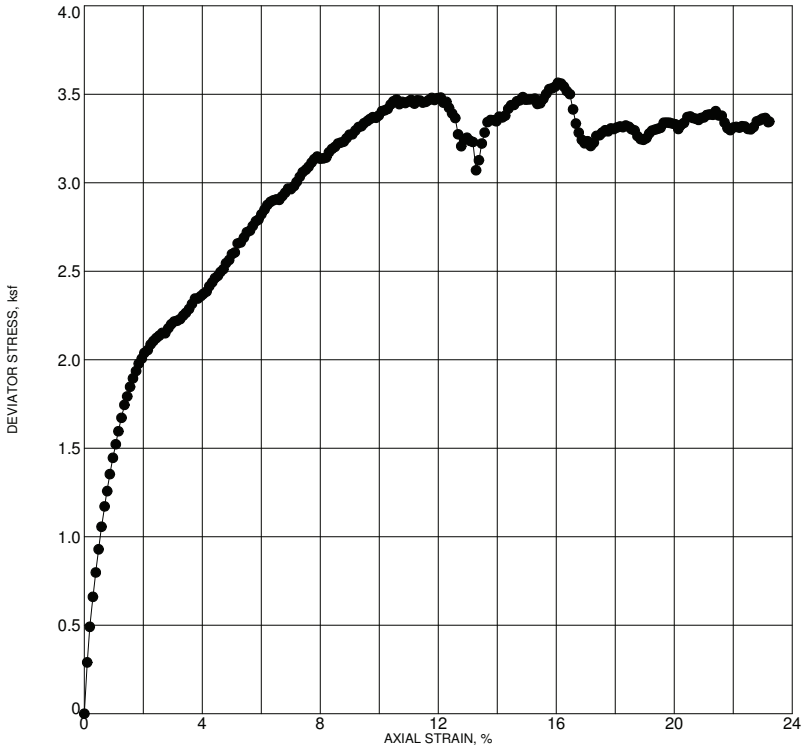
G DIRECT SHEAR 7296-00.GPJ GEOLABS.GDT 8/9/21

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DIRECT SHEAR TEST - ASTM D3080

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 6



Max. Deviator Stress (ksf):	3.6
Confining Stress (ksf):	0.6

Location: B-102
Depth: 5.0 - 6.5 feet
Description: Brown sandy silt
Test Date: 3/31/2017

Dry Density (pcf)	103.9	Sample Diameter (inches)	2.407
Moisture (%)	21.1	Sample Height (inches)	4.987
Axial Strain at Failure (%)	16.2	Strain Rate (% / minute)	1.00

G TXUU 7296-00.GPJ GEOLABS.GDT 8/9/21

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TRIAXIAL UU COMPRESSION TEST - ASTM D2850

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 7

Location	Depth	Length	Diameter	Length/ Diameter Ratio	Density	Load	Compressive Strength
	(feet)	(inches)	(inches)		(pcf)	(lbs)	(psi)
B-101	14.5 - 15	6.500	3.250	2.00	176.5	18,100	2,180
B-101	29.5 - 30	6.500	3.250	2.00	183.5	25,860	3,120
B-102	27.5 - 28	6.500	3.250	2.00	150.2	14,520	1,750
B-102	33.5 - 34	6.500	3.250	2.00	172.9	21,680	2,610
B-103	6.1 - 6.6	6.500	3.250	2.00	177.7	13,380	1,610
B-103	15.75 - 16.25	6.500	3.250	2.00	178.6	15,340	1,850
B-106	21.5 - 22	6.500	3.250	2.00	181.2	27,440	3,310
B-106	31 - 31.5	6.500	3.250	2.00	179.2	30,660	3,700
B-107	25.5 - 26	6.500	3.250	2.00	173.9	33,220	4,000

ASTM D7012 (METHOD C)

Note: Samples were not prepared in accordance with ASTM D4543. Therefore, results reported may differ from results obtained from a test speciment that meets the requirements of Practice D4543

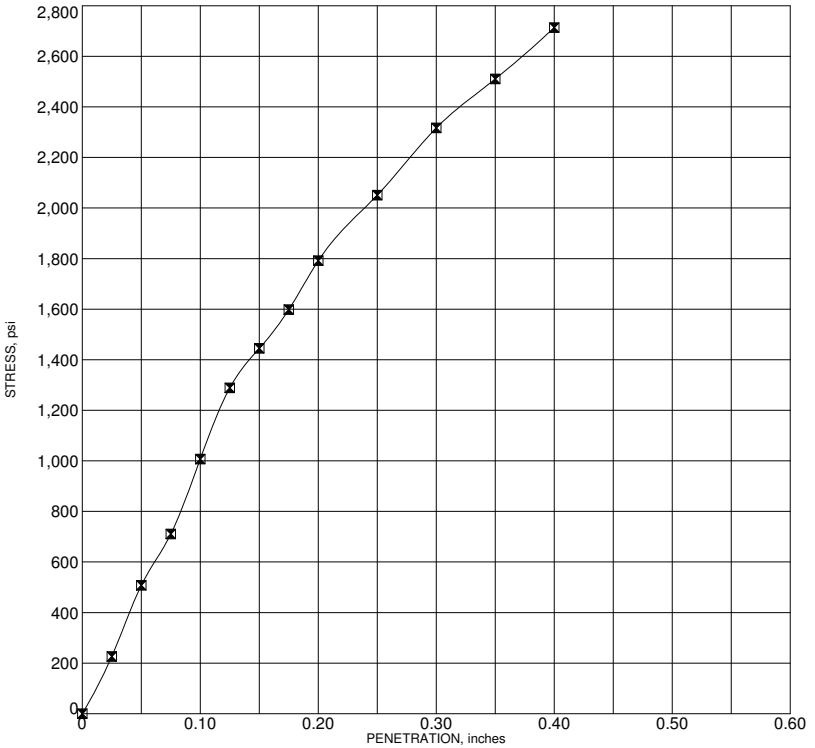
G ROCK UC TEST PORTRAIT 7296-00.GPJ GEOLABS.GDT 8/9/21

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UNIAXIAL COMPRESSIVE STRENGTH TEST

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 8



Corr. CBR @ 0.1"	100.7
Corr. CBR @ 0.2"	119.4
Swell (%)	0.00

Sample: BULK-101
Depth: 0.0 - 1.0 feet
Description: Brown silty gravel with some sand

Molding Dry Density (pcf)	134.1	Hammer Wt. (lbs)	10
Molding Moisture (%)	9.7	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

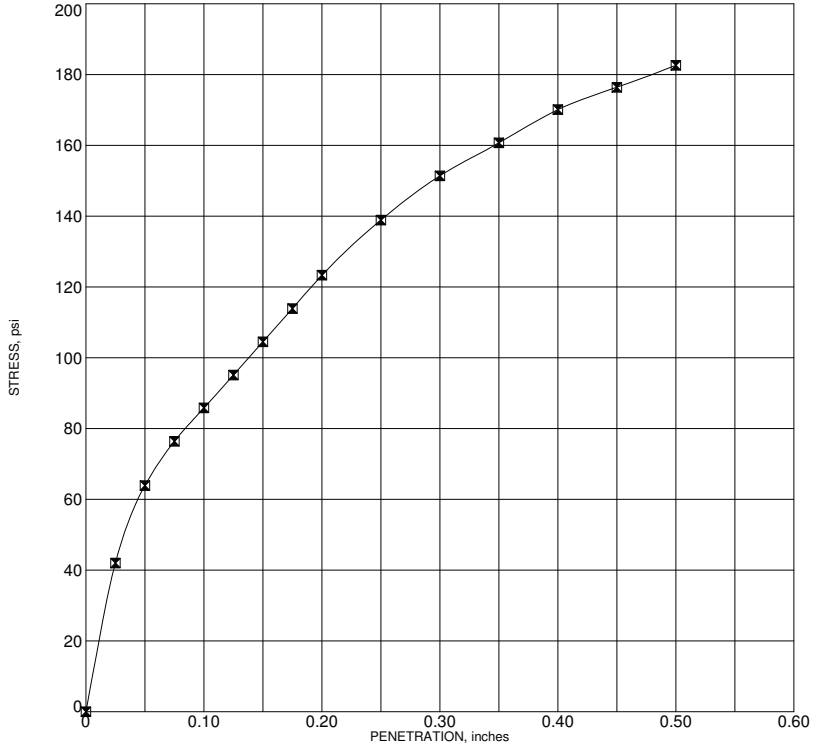
G CBR 7296-00.GPJ GEOLABS.GDT 8/9/21

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CALIFORNIA BEARING RATIO - ASTM D1883

LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 9



Corr. CBR @ 0.1"	8.8
Corr. CBR @ 0.2"	8.2
Swell (%)	2.31

Sample: BULK-102
Depth: 0.0 - 1.0 feet
Description: Brown sandy silt

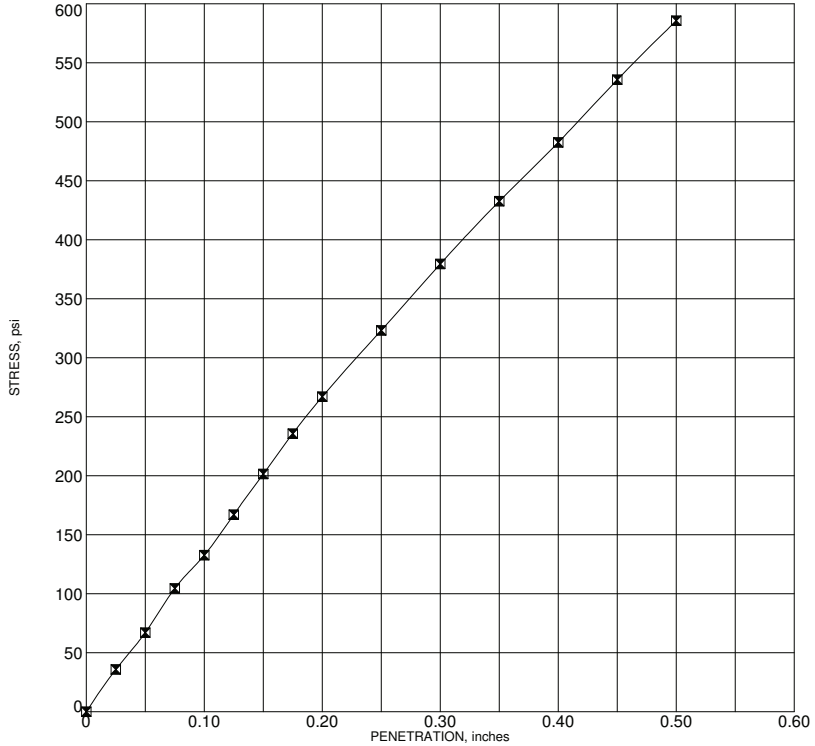
Molding Dry Density (pcf)	89.2	Hammer Wt. (lbs)	10
Molding Moisture (%)	26.7	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

G CBR 7296-00.GPJ GEOLABS.GDT 8/3/21

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CALIFORNIA BEARING RATIO - ASTM D1883
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 10



Corr. CBR @ 0.1"	13.3
Corr. CBR @ 0.2"	17.8
Swell (%)	0.65

Sample: BULK-103
Depth: 0.0 - 1.0 feet
Description: Brown sandy silt

Molding Dry Density (pcf)	112.6	Hammer Wt. (lbs)	10
Molding Moisture (%)	17.1	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

G CBR 7296-00.GPJ GEOLABS.GDT 8/9/21

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W.O. 7296-00

CALIFORNIA BEARING RATIO - ASTM D1883
LILOA DRIVE EXTENSION
VICINITY OF EAST WAIPUILANI ROAD TO
VICINITY OF KAONOULU STREET
KIHEI, MAUI, HAWAII

Plate
B - 11

APPENDIX C

TRAFFIC INDEX DETERMINATION

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (North of Kulanihakoi Road)

(1) Design Period (years) — 30

(2) Current Average Daily Traffic (ADT) Per Direction — 512

(3) Future Average Daily Traffic (ADT) Per Direction — 12136

(4) Average ADT Per Direction Over Design Period — 6324

(5) Design Lane Factor — 1

Number of Lanes In One Direction	Design Lane Factor
1	1
2	1
3	0.8
4	0.75

(6) 24-Hour Truck Traffic, T_{24} (%) — 2.4

Truck Traffic Distribution :

2-axle	=	29.58%
3-axle	=	24.58%
4-axle	=	32.08%
5-axle	=	4.58%
6-axle	=	9.17%
7-axle	=	0.00%

(7) Average Daily Truck Traffic Per Direction, ADTT — 152

(8) Equivalent 18-kip Single Axle Loads, ESAL

2-axle : % of 2-axle trucks x No. trucks x 65	=	2919
3-axle : % of 3-axle trucks x No. trucks x 525	=	19590
4-axle : % of 4-axle trucks x No. trucks x 1162	=	56588
5-axle : % of 5-axle trucks x No. trucks x 1462	=	10171
6-axle : % of 6-axle trucks x No. trucks x 968	=	13469
Annual ESAL :	=	102736
Total ESAL For Design Period	=	3082085
TRAFFIC INDEX (TI) = 9 (ESAL/1,000,000)EXP(0.119)		10.29
	SAY	**10.5**

Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (North of Kulanihakoi Road)
Design Period = 30 years (Two-Way Traffic)

	2 Axles		3 Axles		4 Axles		5 Axles		6 Axles		TOTAL	Axle/1000
Single Axle	ADTT= 45		ADTT= 37		ADTT= 49		ADTT= 7		ADTT= 14		ADTT= 152	
Loads (kips)	Factors	Repetition	Factors	Repetition	Factors	Repetition	Factors	Repetition	Factors	Repetition	REPETITIONS	
20-22	103.5	4658	183.75	6799	1063.8	52126.2	2,273.10	15912	1933.05	27062.7	106557	64.02118
22-24	72.15	3247	26.85	993	1339.5	65635.5	646.35	4524	3464.1	48497.4	122898	73.83895
24-26	52.2	2349	11.25	416	909.45	44563.1	51	357	651.15	9116.1	56801	34.12725
26-28	10.05	452	8.4	311	345.15	16912.4	9	63			17738	10.65753
28-30	10.05	452	8.1	300	343.8	16846.2	9	63			17661	10.61112
30-32			7.35	272	64.2	3145.8					3418	2.05344
32-34			7.35	272	63	3087					3359	2.01811
34-36			7.35	272	63	3087					3359	2.01811
Tandem Axle Loads (kips)												
30-32			761.1	28161	609.15	29848.4	272.85	1910	651.15	9116.1	69035	41.47747
32-34			555.6	20557	439.8	21550.2	312.15	2185			44292	
34-36			156.9	5805	561.15	27496.4	199.65	1398			34699	47.45953
36-38			156.9	5805	188.1	9216.9	278.7	1951			16973	
38-40			100.2	3707	125.85	6166.65	112.95	791			10665	16.60526
40-42			44.4	1643	83.7	4101.3	60.15	421			6165	
42-44					83.7	4101.3	38.4	269			4370	6.32976
44-46					40.8	1999.2	49.65	348			2347	
46-48			5.7	211			37.5	263			473	1.69439
48-50			5.7	211			37.5	263			473	0.28443

W.O. 7296-00(B)

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Hawaii • California

PLATE C-3

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street: Liloa Drive (North of Kulanihakoi Road)

Design Parameters

Traffic Index	10.5
R value of ACB	90
R value of AB	80
R value of Subgrade	55

Pavement Section using Asphalt Concrete Base and Aggregate Base

Trial Thickness of AC + ACB 13.5 Inches

(1) **Asphalt Concrete (AC)**

GE required					0.336	
GE with Tolerance =	0.336	+	0.240	=	0.576	
Gf of AC					2.246	
GE/Gf	=	3.08		SAY	3.500	Inches
				USE	2.500	Inches

(2) **Asphalt Concrete Base (ACB)**

GE required	=				0.672	
GE of AC	=				0.228	
GE required of ACB	=				0.444	
Gf of ACB					2.134	
GE/Gf	=	2.50		SAY	2.50	Inches
				USE	4.00	Inches

(3) **Calculate New Gf of AC**

Thickness of AC + Thickness of ACB					0.542	
New Gf of AC					1.765	
New Gf of ACB					1.676	

(4) **Aggregate Base (AB)**

GE required	=				1.512	
GE of AC	=				0.128	
GE of ACB	=				0.559	
GE required of AB	=				0.826	
GE less tolerance	=				0.586	
Gf of ASB	=				1.100	
GE/Gf	=	6.39		SAY	7.00	Inches
				USE	7.00	Inches

Design Pavement Section

2.5	**Inches**	**AC**
4.0	**Inches**	**ACB**
7.0	**Inches**	**ASB**
13.5	**Inches**	**Total Thickness**

W.O. 7296-00(B)

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Hawaii • California

PLATE C-2

PCAPAV Results – Liloa Drive (North of Kulanihakoi Road)

```
16:39:19                    PCAPAV(TM) 2.10                    Page 2 of 2
02-11-<0    Proprietary Software of PORTLAND CEMENT ASSOCIATION
                          Pavement  Design  Data
Modulus of Subg/Subb K  250.0 PCI        Axle Load Cat.  1.Light
Modulus of Rupture  MR  650.0 PSI                        2.Medium
                                                         3.Heavy
A D T T     152.00                                       4.Very Heavy
                                                         5.Input Axles
Design Life  30 Years                    Maximum Single axle load   36  KIPS
                                         Maximum Tandem axle load   52  KIPS
Load Transfer:                                  A X L E   L O A D S
  At Joint       1.Dowel                 SAL    Axles    TAL    Axles
                 2.Agg. Interlock        KIPS   /1000    KIPS   /1000
                                          36      2.02    52      0.28
  At Shoulder    1.Conc. Shoulder         34      2.02    48      1.69
                 2.No Conc. Shoulder      32      2.05    44      6.33
                                          30     10.61    40     16.61
 Load Safety Factor   1. 1.0             28     10.66    36     47.46
                      2. 1.1             26     34.13    32     41.48
                      3. 1.2             24     73.84    28      0.00
                      4. 1.3             22     64.02    24      0.00
                                         20      0.00    20      0.00
 Estimated Pavement Thickness 8.0  IN    18      0.00    16      0.00
```

```
                        SINGLE AXLE LOAD COMPUTATIONS

Design Thickness =  8.0 Inches

          Load Repetitions  ---Fatigue Analysis-----  ----Erosion Analysis---

SAL *LSF    Axle/  Expected Stress Allowable Fatigue   Power  Allowable Erosion
             1000     Reps   Ratio     Reps   Consump          Reps
 36 43.2     2.02     1679.  0.666     4887.  34.36   50.909    39690.  4.23
 34 40.8     2.02     1679.  0.632    12884.  13.03   45.409    55203.  3.04
 32 38.4     2.05     1706.  0.597    34086.   5.00   40.224    78725.  2.17
 30 36.0    10.61     8830.  0.561    90507.   9.76   35.353   115746.  7.63
 28 33.6    10.66     8871.  0.526   260733.   3.40   30.797   176797.  5.02
 26 31.2    34.13    28403.  0.491  1229287.   2.31   26.554   283766. 10.01
 24 28.8    73.84    61450.  0.455 26679851.   0.23   22.626   487286. 12.61
 22 26.4    64.02    53277.  0.419 **********  0.00   19.012   923680.  5.77
 20 24.0     0.00        0.  0.384 **********  0.00   15.713 **********  0.00
 18 21.6     0.00        0.  0.347 **********  0.00   12.727 **********  0.00
```

```
                        TANDEM AXLE LOAD COMPUTATIONS

Design Thickness =  8.0 Inches

          Load Repetitions  ---Fatigue Analysis-----  ----Erosion Analysis---

TAL *LSF    Axle/  Expected Stress Allowable Fatigue   Power  Allowable Erosion
             1000     Reps   Ratio     Reps   Consump          Reps
 52 62.4     0.28      233.  0.415 **********  0.00   31.363   167047.  0.14
 48 57.6     1.69     1406.  0.385 **********  0.00   26.723   277949.  0.51
 44 52.8     6.33     5268.  0.354 **********  0.00   22.455   500438.  1.05
 40 48.0    16.61    13823.  0.324 **********  0.00   18.558  1015427.  1.36
 36 43.2    47.46    39496.  0.293 **********  0.00   15.032  2535700.  1.56
 32 38.4    41.48    34520.  0.263 **********  0.00   11.877 10167579.  0.34
 28 33.6     0.00        0.  0.232 **********  0.00    9.093 **********  0.00
 24 28.8     0.00        0.  0.200 **********  0.00    6.681 **********  0.00
 20 24.0     0.00        0.  0.169 **********  0.00    4.639 **********  0.00
 16 19.2     0.00        0.  0.137 **********  0.00    2.969 **********  0.00

                    TOTAL FATIGUE USED =   68.10    EROSION DAMAGE = 55.43

7.5 Inch Thickness Inadequate, Fatigue Used= 341.62   Erosion Damage =  95.01
```


ECONOMIC JUSTIFICATION

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (North of Kulanihakoi Road)
Unit Prices: **In-Place Costs**

1	Asphalt Concrete Pavement (AC) - per ton	$ 230.00
2	Asphalt Concrete Base (ACB) - per ton	$ 225.00
3	Asphalt Treated Permeable Base (ATPB) - per ton	$ 225.00
4	Cement Treated Permeable Base (CTPB) - per cubic yard	$ 200.00
5	Untreated Permeable Base (UTPB) - per cubic yard	$ 100.00
6	Aggregate Base (AB) - per cubic yard	$ 85.00
7	Aggregate Subbase (ASB) - per cubic yard	$ 75.00
8	Portland Cement Concrete Pavement (PCC) - per cubic yard	$ 450.00
9	Roadway Excavation - per cubic yard	$ 50.00
10	Cold Planing of Existing AC - per cubic yard	$ 72.00
11	AC Overlay - per ton	$ 230.00
12	Retexturing of Concrete Pavement - per square yard	$ 40.00

Assumptions/Limitations:

1. The new pavement sections are based on the current HDOT design guidelines

2. HDOT Conversion Factors:

Asphalt Concrete Pavement (Mix IV):	2.07 Tons/cubic yard
Asphalt Concrete Base:	2.12 Tons/cubic yard
Asphalt Treated Permeable Base:	2.19 Tons/cubic yard

3. Assume cold-plane and overlay 2.0 inches of AC every 7 to 8 years for AC pavement /untreated bases

4. Economic analysis based on excavated pavement sections.

5. Assume rate of inflation at 6 percent per year.

6. Assume rate of discount at 6 percent per year.

PAVEMENT COST COMPARISON	
OPTION	**TOTAL COST**
A	$ 154.51 per square yard
B	$ 171.94 per square yard

A. **AC Pavement Section with ACB over AB**

New Pavement Section: 2.5" AC, 4" ACB, 7" AB (13.5 " Roadway Excavation)

Initial Cost

Items	Thickness (inches)	Quantity (cy/sy)	Unit Price	Cost Per Square Yard
AC	2.5	0.07	$ 230.00	$ 33.06
ACB	4	0.11	$ 225.00	$ 53.00
ATPB	0	0.00	$ 225.00	$ -
CTPB	0	0.00	$ 200.00	$ -
UTPB	0	0.00	$ 100.00	$ -
AB	7	0.19	$ 85.00	$ 16.53
ASB		0.00	$ 75.00	$ -
Roadway Excavation	13.5	0.38	$ 50.00	$ 18.75
			Total Initial Cost	$ 121.34

Maintenance Cost

Year	Items	Thickness (inches)	Quantity (cy/sy)	Present Unit Price	Inflated Unit Price	Inflated Cost Per Sq. Yd.	Present Cost Per Sq. Yd.
7	Cold-Planing	2.0	0.06	$ 50.00	$ 75.18	$ 4.18	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 108.26	$ 12.45	$ 8.28
15	Cold-Planing	2.0	0.06	$ 50.00	$ 119.83	$ 6.66	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 172.55	$ 19.84	$ 8.28
23	Cold-Planing	2.0	0.06	$ 50.00	$ 190.99	$ 10.61	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 275.02	$ 31.63	$ 8.28

Number of Overlay = 3 **Total Maint. Cost** $ 33.17

OPTION A: **TOTAL COST** **$ 154.51**

Street Name: Liloa Drive (North of Kulanihakoi Road)

B. **PCC Pavement over ASB**

New Pavement Section: 8" PCC, 6" ASB (14 " Roadway Excavation)

Initial Cost

Items	Thickness (inches)	Quantity (cy/sy)	Unit Price	Cost Per Square Yard
PCC	8	0.22	$ 450.00	$ 100.00
ACB	0	0.00	$ 225.00	$ -
ATPB	0	0.00	$ 225.00	$ -
CTPB	0	0.00	$ 200.00	$ -
UTPB	0	0.00	$ 100.00	$ -
AB	0	0.00	$ 85.00	$ -
ASB	6	0.17	$ 75.00	$ 12.50
Roadway Excavation	14	0.39	$ 50.00	$ 19.44
Maintenance Cost				$ 40.00
OPTION B:			**TOTAL COST**	**$ 171.94**

TRAFFIC INDEX DETERMINATION

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (South of Kulanihakoi Road)

(1) Design Period (years) — 30

(2) Current Average Daily Traffic (ADT) Per Direction — 335

(3) Future Average Daily Traffic (ADT) Per Direction — 21230

(4) Average ADT Per Direction Over Design Period — 10783

(5) Design Lane Factor — 1

Number of Lanes In One Direction	Design Lane Factor
1	1
2	1
3	0.8
4	0.75

(6) 24-Hour Truck Traffic, T_{24} (%) — 2.4

Truck Traffic Distribution :

2-axle	=	29.58%
3-axle	=	24.58%
4-axle	=	32.08%
5-axle	=	4.58%
6-axle	=	9.17%
7-axle	=	0.00%

(7) Average Daily Truck Traffic Per Direction, ADTT — 259

(8) Equivalent 18-kip Single Axle Loads, ESAL

2-axle : % of 2-axle trucks x No. trucks x 65	=	4976
3-axle : % of 3-axle trucks x No. trucks x 525	=	33399
4-axle : % of 4-axle trucks x No. trucks x 1162	=	96477
5-axle : % of 5-axle trucks x No. trucks x 1462	=	17341
6-axle : % of 6-axle trucks x No. trucks x 968	=	22963
Annual ESAL :	=	175156
Total ESAL For Design Period	=	5254681
TRAFFIC INDEX (TI) = 9 (ESAL/1,000,000)EXP(0.119)		10.96
	SAY	11.0

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street: Liloa Drive (South of Kulanihakoi Road)

Design Parameters

Traffic Index	11.0
R value of ACB	90
R value of AB	80
R value of Subgrade	20

Pavement Section using Asphalt Concrete Base and Aggregate Base

Trial Thickness of AC + ACB — 27 Inches

(1) **Asphalt Concrete (AC)**

GE required					0.352	
GE with Tolerance =	0.352	+	0.240	=	0.592	
Gf of AC					2.758	
GE/Gf	=	2.58		SAY	3.000	Inches
				USE	3.000	Inches

(2) **Asphalt Concrete Base (ACB)**

GE required	=			0.704	
GE of AC	=			0.450	
GE required of ACB	=			0.254	
Gf of ACB				2.620	
GE/Gf	=	1.17	SAY	1.50	Inches
			USE	6.00	Inches

(3) **Calculate New Gf of AC**

Thickness of AC + Thickness of ACB	0.750
New Gf of AC	1.919
New Gf of ACB	1.823

(4) **Aggregate Base (AB)**

GE required	=			2.834	
GE of AC	=			0.240	
GE of ACB	=			0.912	
GE required of AB	=			1.682	
GE less tolerance	=			1.442	
Gf of ASB	=			1.100	
GE/Gf	=	15.73	SAY	16.00	Inches
			USE	18.00	Inches

Design Pavement Section

3.0	**Inches**	**AC**
6.0	**Inches**	**ACB**
18.0	**Inches**	**ASB**
27.0	**Inches**	**Total Thickness**

PCAPAV Results – Liloa Drive (South of Kulanihakoi Road)

```
16:44:45                    PCAPAV(TM) 2.10                    Page 2 of 2
02-11-<0    Proprietary Software of PORTLAND CEMENT ASSOCIATION
                        Pavement  Design  Data
Modulus of Subg/Subb K  135.0 PCI          Axle Load Cat.  1.Light
Modulus of Rupture  MR  _650.0 PSI                         2.Medium
                                                           3.Heavy
A D T T     260.00                                         4.Very Heavy
                                                           5.Input Axles
Design Life  30 Years                       Maximum Single axle load   36  KIPS
                                            Maximum Tandem axle load   52  KIPS
Load Transfer:                                      A X L E   L O A D S
  At Joint        1.Dowel                   SAL     Axles     TAL     Axles
                  2.Agg. Interlock          KIPS    /1000     KIPS    /1000
                                             36      2.00      52      0.29
  At Shoulder     1.Conc. Shoulder           34      2.00      48      1.68
                  2.No Conc. Shoulder        32      2.04      44      6.29
                                             30     10.51      40     16.58
 Load Safety Factor   1. 1.0                 28     10.56      36     47.36
                      2. 1.1                 26     33.88      32     41.51
                      3. 1.2                 24     73.53      28      0.00
                      4. 1.3                 22     63.82      24      0.00
                                             20      0.00      20      0.00
 Estimated Pavement Thickness 9.0  IN        18      0.00      16      0.00
```

SINGLE AXLE LOAD COMPUTATIONS

Design Thickness = 9.0 Inches

SAL	*LSF	Axle/ 1000	Load Repetitions Expected Reps	Fatigue Analysis Stress Ratio	Allowable Reps	Fatigue Consump	Erosion Analysis Power	Allowable Reps	Erosion
36	43.2	2.00	2847.	0.631	13155.	21.64	41.349	71940.	3.96
34	40.8	2.00	2847.	0.598	32931.	8.65	36.882	100981.	2.82
32	38.4	2.04	2904.	0.565	82709.	3.51	32.671	145864.	1.99
30	36.0	10.51	14961.	0.531	218140.	6.86	28.715	218360.	6.85
28	33.6	10.56	15032.	0.498	836391.	1.80	25.014	342320.	4.39
26	31.2	33.88	48228.	0.465	8658009.	0.56	21.568	571194.	8.44
24	28.8	73.53	104670.	0.431	**********	0.00	18.377	1042948.	10.04
22	26.4	63.82	90848.	0.397	**********	0.00	15.442	2199115.	4.13
20	24.0	0.00	0.	0.363	**********	0.00	12.762	**********	0.00
18	21.6	0.00	0.	0.329	**********	0.00	10.337	**********	0.00

TANDEM AXLE LOAD COMPUTATIONS

Design Thickness = 9.0 Inches

TAL	*LSF	Axle/ 1000	Load Repetitions Expected Reps	Fatigue Analysis Stress Ratio	Allowable Reps	Fatigue Consump	Erosion Analysis Power	Allowable Reps	Erosion
52	62.4	0.29	413.	0.410	**********	0.00	31.793	158652.	0.26
48	57.6	1.68	2391.	0.381	**********	0.00	27.089	263310.	0.91
44	52.8	6.29	8954.	0.351	**********	0.00	22.763	472156.	1.90
40	48.0	16.58	23602.	0.321	**********	0.00	18.812	951266.	2.48
36	43.2	47.36	67417.	0.290	**********	0.00	15.238	2341388.	2.88
32	38.4	41.51	59089.	0.260	**********	0.00	12.040	9003278.	0.66
28	33.6	0.00	0.	0.229	**********	0.00	9.218	**********	0.00
24	28.8	0.00	0.	0.198	**********	0.00	6.772	**********	0.00
20	24.0	0.00	0.	0.167	**********	0.00	4.703	**********	0.00
16	19.2	0.00	0.	0.135	**********	0.00	3.010	**********	0.00

TOTAL FATIGUE USED = 43.01 EROSION DAMAGE = 51.70

8.5 Inch Thickness Inadequate, Fatigue Used= 173.90 Erosion Damage = 84.07

Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (South of Kulanihakoi Road)
Design Period = 30 years (Two-Way Traffic)

Single Axle Loads (kips)	2 Axles ADTT= 77 Factors	Repetition	3 Axles ADTT= 64 Factors	Repetition	4 Axles ADTT= 83 Factors	Repetition	5 Axles ADTT= 12 Factors	Repetition	6 Axles ADTT= 24 Factors	Repetition	TOTAL ADTT= 260 REPETITIONS	Axle/1000
20-22	103.5	7970	183.75	11760	1063.8	88295.4	2,273.10	27277	1933.05	46393.2	181695	63.81992
22-24	72.15	5556	26.85	1718	1339.5	111179	646.35	7756	3464.1	83138.4	209347	73.53251
24-26	52.2	4019	11.25	720	909.45	75484.4	51	612	651.15	15627.6	96463	33.88246
26-28	10.05	774	8.4	538	345.15	28647.5	9	108			30067	10.56091
28-30	10.05	774	8.1	518	343.8	28535.4	9	108			29936	10.51481
30-32			7.35	470	64.2	5328.6					5799	2.03688
32-34			7.35	470	63	5229					5699	2.00190
34-36			7.35	470	63	5229					5699	2.00190
Tandem Axle Loads (kips)												
30-32			761.1	48710	609.15	50559.5	272.85	3274			118172	41.50743
32-34			555.6	35558	439.8	36503.4	312.15	3746	651.15	15627.6	75808	
34-36			156.9	10042	561.15	46575.5	199.65	2396			59013	47.35527
36-38			156.9	10042	188.1	15612.3	278.7	3344			28998	
38-40			100.2	6413	125.85	10445.6	112.95	1355			18214	16.58309
40-42			44.4	2842	83.7	6947.1	60.15	722			10511	
42-44					83.7	6947.1	38.4	461			7408	6.29378
44-46					40.8	3386.4	49.65	596			3982	
46-48			5.7	365			37.5	450			815	1.68493
48-50			5.7	365			37.5	450			815	0.28620

ECONOMIC JUSTIFICATION

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street Name: Liloa Drive (South of Kulanihakoi Road)
Unit Prices:

		In-Place Costs
1	Asphalt Concrete Pavement (AC) - per ton	$ 230.00
2	Asphalt Concrete Base (ACB) - per ton	$ 225.00
3	Asphalt Treated Permeable Base (ATPB) - per ton	$ 225.00
4	Cement Treated Permeable Base (CTPB) - per cubic yard	$ 200.00
5	Untreated Permeable Base (UTPB) - per cubic yard	$ 100.00
6	Aggregate Base (AB) - per cubic yard	$ 85.00
7	Aggregate Subbase (ASB) - per cubic yard	$ 75.00
8	Portland Cement Concrete Pavement (PCC) - per cubic yard	$ 450.00
9	Roadway Excavation - per cubic yard	$ 50.00
10	Cold Planing of Existing AC - per cubic yard	$ 72.00
11	AC Overlay - per ton	$ 230.00
12	Retexturing of Concrete Pavement - per square yard	$ 40.00

Assumptions/Limitations:

1. The new pavement sections are based on the current HDOT design guidelines

2. HDOT Conversion Factors:

Asphalt Concrete Pavement (Mix IV):	2.07 Tons/cubic yard
Asphalt Concrete Base:	2.12 Tons/cubic yard
Asphalt Treated Permeable Base:	2.19 Tons/cubic yard

3. Assume cold-plane and overlay 2.0 inches of AC every 7 to 8 years for AC pavement /untreated bases

4. Economic analysis based on excavated pavement sections.

5. Assume rate of inflation at 6 percent per year.

6. Assume rate of discount at 6 percent per year.

PAVEMENT COST COMPARISON	
OPTION	**TOTAL COST**
A	$ 239.85 per square yard
B	$ 185.83 per square yard

Street Name: Liloa Drive (South of Kulanihakoi Road)

A. AC Pavement Section with ACB over AB

New Pavement Section: 3" AC, 6" ACB, 20" AB (29 " Roadway Excavation)

Initial Cost

Items	Thickness (inches)	Quantity (cy/sy)	Unit Price	Cost Per Square Yard
AC	3	0.08	$ 230.00	$ 39.68
ACB	6	0.17	$ 225.00	$ 79.50
ATPB	0	0.00	$ 225.00	$ -
CTPB	0	0.00	$ 200.00	$ -
UTPB	0	0.00	$ 100.00	$ -
AB	20	0.56	$ 85.00	$ 47.22
ASB		0.00	$ 75.00	$ -
Roadway Excavation	29	0.81	$ 50.00	$ 40.28
			Total Initial Cost	$ 206.68

Maintenance Cost

Year	Items	Thickness (inches)	Quantity (cy/sy)	Present Unit Price	Inflated Unit Price	Inflated Cost Per Sq. Yd.	Present Cost Per Sq. Yd.
7	Cold-Planing	2.0	0.06	$ 50.00	$ 75.18	$ 4.18	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 108.26	$ 12.45	$ 8.28
15	Cold-Planing	2.0	0.06	$ 50.00	$ 119.83	$ 6.66	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 172.55	$ 19.84	$ 8.28
23	Cold-Planing	2.0	0.06	$ 50.00	$ 190.99	$ 10.61	$ 2.78
	AC Overlay	2.0	0.06	$ 72.00	$ 275.02	$ 31.63	$ 8.28

Number of Overlay = 3 **Total Maint. Cost** $ 33.17

OPTION A: **TOTAL COST** **$ 239.85**

Street Name: Liloa Drive (South of Kulanihakoi Road)

B. PCC Pavement over ASB

New Pavement Section: 9" PCC, 6" ASB (15 " Roadway Excavation)

Initial Cost

Items	Thickness (inches)	Quantity (cy/sy)	Unit Price	Cost Per Square Yard
PCC	9	0.25	$ 450.00	$ 112.50
ACB	0	0.00	$ 225.00	$ -
ATPB	0	0.00	$ 225.00	$ -
CTPB	0	0.00	$ 200.00	$ -
UTPB	0	0.00	$ 100.00	$ -
AB	0	0.00	$ 85.00	$ -
ASB	6	0.17	$ 75.00	$ 12.50
Roadway Excavation	15	0.42	$ 50.00	$ 20.83
Maintenance Cost				$ 40.00
OPTION B:			**TOTAL COST**	**$ 185.83**

Project: Liloa Drive Extension
Namauu Place to Kaonoulu Street
Kihei, Maui, Hawaii

Street: Liloa Drive (South of Kulanihakoi Road)

Design Parameters

Traffic Index	11.0	
R value of ACB	90	
R value of AB	80	
R value of Subgrade	52	(CBR>= 20)

Pavement Section using Asphalt Concrete Base and Aggregate Base

Trial Thickness of AC + ACB 7 Inches

(1) **Asphalt Concrete (AC)**

GE required					0.352	
GE with Tolerance =	0.352	+	0.240	=	0.592	
Gf of AC					1.767	
GE/Gf	=	4.02		SAY	4.500	Inches
				USE	3.000	Inches

(2) **Asphalt Concrete Base (ACB)**

GE required	=			0.704	
GE of AC	=			0.202	
GE required of ACB	=			0.502	
Gf of ACB				1.678	
GE/Gf	=	3.59	SAY	4.00	Inches
			USE	4.00	Inches

(3) **Calculate New Gf of AC**

Thickness of AC + Thickness of ACB			0.583	
New Gf of AC			1.767	
New Gf of ACB			1.678	

(4) **Aggregate Base (AB)**

GE required	=			1.690	
GE of AC	=			0.202	
GE of ACB	=			0.559	
GE required of AB	=			0.928	
GE less tolerance	=			0.688	
Gf of ASB	=			1.100	
GE/Gf	=	7.51	SAY	8.00	Inches
			USE	8.00	Inches

Design Pavement Section

3.0	**Inches**	**AC**
4.0	**Inches**	**ACB**
8.0	**Inches**	**ASB**
15.0	**Inches**	**Total Thickness**

APPENDIX C

Preliminary Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT
LILOA DRIVE EXTENSION – EAST WAIPU‘ILANI ROAD TO KA‘ONO‘ULU STREET

KĪHEI, MAUI, HAWAII

FINAL DRAFT

March 27, 2023

Prepared for:

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TRAFFIC IMPACT ANALYSIS REPORT

LILOA DRIVE EXTENSION – EAST WAIPU‘ILANI ROAD TO KA‘ONO‘ULU STREET

Kīhei, Maui, Hawaii

FINAL DRAFT

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Prepared by

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March 27, 2023

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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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TRAFFIC IMPACT ANALYSIS REPORT

LILOA DRIVE EXTENSION – EAST WAIPU'ILANI ROAD TO KA'ONO'ULU STREET

Kīhei, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi, and Associates, Inc. (ATA) to evaluate the traffic impacts resulting from the Liloa Drive Extension from the vicinity of East Waipu'ilani Road to the vicinity of Ka'ono'ulu Street (hereinafter referred to as the "Project").

1.1 Location

The extent of the Project is limited to the extension of Liloa Drive from its current northern terminus at the vicinity of East Waipu'ilani Road to the vicinity of Ka'ono'ulu Street in Kīhei, Maui, Hawaii. A proposed, integrated shared use path will also be constructed adjacent to Liloa Drive, from East Waipu'ilani Road to Ka'ono'ulu Street. See Figure 1.1 for the Project location.

1.2 Project Description

Liloa Drive currently extends southward from East Waipu'ilani Road and temporarily dead ends just south of Halekuai Street at the north access driveway to the South Maui Community Park. The completed Kīhei Bikeway Phase I currently provides a paved shared use path adjacent to, and to the west of Liloa Drive, extending from East Waipu'ilani Road to Lipoa Street. Kīhei Bikeway Phase II was recently constructed and extends the shared use path from Lipoa Street to Halekuai Street, transitioning the shared use path to the east side of Liloa Drive. Kīhei Bikeway Phase II also includes segments of parallel parking on either side of Liloa Drive, an exclusive northbound left-turn lane from Liloa Drive onto Halekuai Street, and a crosswalk with pedestrian-controlled rectangular rapid flashing beacon (RRFB) on the north leg of the Liloa Drive/Lokelani Intermediate School driveway intersection. See Figure 1.2 for the Project Site Plan.

CONCEPTUAL PLAN

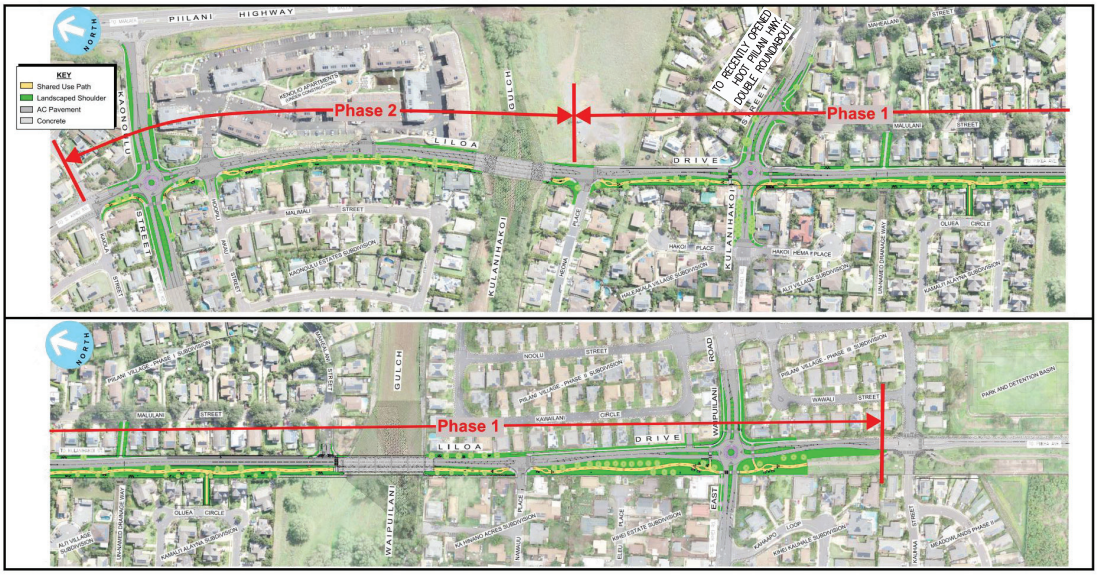


FIGURE 1.2

SITE PLAN

LILOA DRIVE EXTENSION TIAR

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

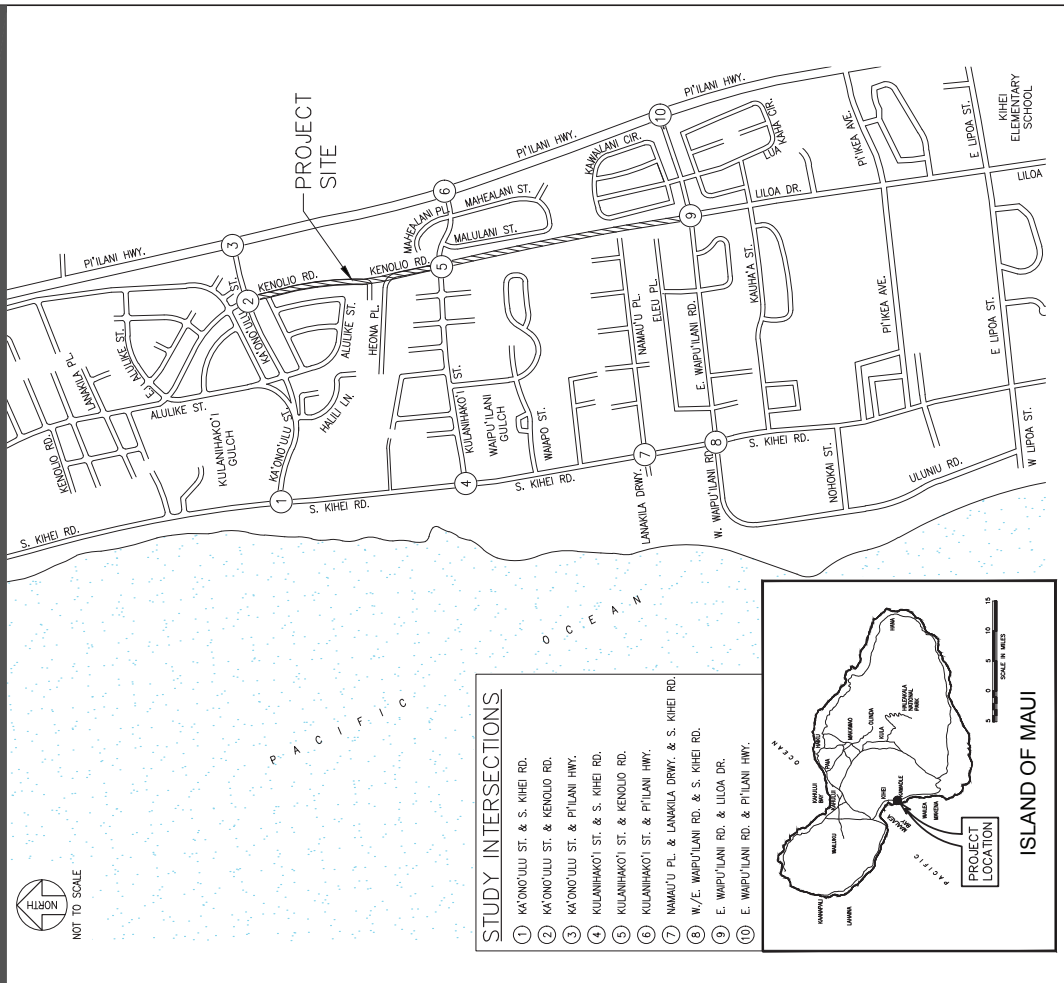


FIGURE 1.1

LOCATION MAP

The Project is expected to be constructed by the County of Maui with Federal Aid funding in two segments:

- Phase I is expected to extend northerly from the vicinity of East Waipuʻilani Road to the vicinity of Kūlanihākoʻi Street.
- Phase II is expected to extend northerly from the vicinity of Kūlanihākoʻi Street to the vicinity of Kaʻonoʻulu Street.

In combination with the extension as described in the Liloa Drive Extension – South Maui Community Park To East Welakahao Road TIAR published by ATA in December 2016, Liloa Drive/Kenolio Road will ultimately provide a 3.5-mile continuous north-south thoroughfare from Uwapo Road to Auhana Road. In addition, the Project will extend the Kīhei Bikeway shared use path further north from East Waipuʻilani Road to Kaʻonoʻulu Street.

The County Department of Public Works anticipates that the build-out of the Project will likely occur by Year 2025, however for planning purposes Year 2040 was used.

2. STUDY 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. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

2.1 Intersection Analysis

Analyses for the unsignalized stop-controlled and signalized 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 prepares reports based on SIDRA methodologies and is consistent with State and County guidance for roundabout analysis. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.

2.2 Signal Warrant Analysis

The Manual of Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration (FHWA) in 2009 provides nine (9) different warrants which define the minimum conditions under which installing traffic control signals might be justified. It should be noted that MUTCD states that even if a signal is warranted, it shall not in itself require the installation of a traffic signal or be the recommended mitigation measure. For purposes of this TIAR, the following two (2) warrants were applicable to the roadway conditions at the unsignalized study intersections, which are described below:

Warrant 1 – Eight-Hour Vehicular Volume: This warrant can be satisfied by either Condition A, Condition B, or a combination of Conditions A & B.

1. **Condition A – Minimum Vehicular Volume:** Intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
2. **Condition B – Interruption of Continuous Traffic:** Intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.
3. **Combination of Conditions A & B:** Intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 1 requires that certain volume thresholds for the total of both major street approaches and the higher volume minor street approach be satisfied for each of any eight hours of a typical day.

Note: If Condition A is satisfied, then Warrant 1 is satisfied and analysis of Condition B and the combination of Conditions A & B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and analysis of the combination of Conditions A & B is not needed.

Warrant 2 – Four-Hour Vehicular Volume: This warrant is intended to be applied where the volume of intersection traffic is the principal reason to consider installing a traffic control signal. Warrant 2 requires that the total of both major street approaches and the higher volume minor street approach volumes exceed the graphed threshold.

2.3 Study Area Intersection Analysis

Intersection analysis within the Project's study area was performed on the following intersections due to their proximity to the Project. Refer to Figure 1.1 for reference:

1. Kaʻonoʻulu Street/South Kīhei Road (Unsignalized)
2. Kaʻonoʻulu Street/Kenolio Road (Unsignalized)
3. Kaʻonoʻulu Street/Piʻilani Highway (Unsignalized)
4. Kūlanihākoʻi Street/South Kīhei Road (Unsignalized)
5. Kūlanihākoʻi Street/Kenolio Road (Unignalized)
6. Kūlanihākoʻi Street/Piʻilani Highway (Unsignalized)
7. Namauu Place/Lanakila Driveway/South Kīhei Road (Unsignalized)
8. East/West Waipuʻilani Road/South Kīhei Road (Unsignalized)
9. East Waipuʻilani Road/Liloa Drive (Unsignalized)
10. East Waipuʻilani Road/Piʻilani Highway (Unsignalized)

3. EXISTING TRAFFIC CONDITIONS

The existing conditions scenario represents the traffic conditions within the Project area as it currently stands, with no build-out of the Project.

3.1 Roadway Network

The following are brief descriptions of the existing roadways studied within the vicinity of the Project:

South Kīhei Road is generally a two-way, two-lane, undivided, north-south County roadway that traverses the Kīhei coastline. This roadway begins at a T-intersection with North Kīhei Road near Maui Veterans Highway and eventually terminates at Okolani Drive in Wailea. South Kīhei Road provides local access to shopping centers and visitor accommodations. The posted speed limit along this roadway is 30 miles per hour (mph) with 20 mph school zones that are in effect from 7:00 AM to 6:00 PM on school days.

Kenolio Road is currently a two-way, two-lane, undivided, north-south County road that provides for travel between Uwapo Road and Hoopili Akau Street. Further south, Kenolio Road continues as a short roadway segment providing vehicle access to residential homes along Heona Place via Kūlanihāko'i Street. The posted speed limit along this roadway is 20 mph.

Liloa Drive (fka North-South Collector) is currently a two-way, two-lane, undivided, north-south County road that provides for travel between East Waipu'ilani Road and South Maui Community Park. Further south, Liloa Drive continues as a short roadway segment that provides access for residential homes and churches between East Welakahao Road and Ehiku Street. The posted speed limit along this roadway is 20 mph.

Pi'ilani Highway is a north-south State Highway that extends southward from Maui Veterans Highway (fka Mokulele Highway) at its intersection with North Kīhei Road and terminates approximately seven (7) miles to the south at Wailea Ike Drive. In the vicinity of the Project, Pi'ilani Highway is a two-way, four-lane, principal arterial that provides regional access to Kīhei and Wailea. Exclusive left-turn lanes and right-turn deceleration lanes are provided at all major intersections with the shoulder areas of the highway designated as bicycle lanes. At the intersection of Pi'ilani Highway and Kūlanihāko'i Street, the State of Hawaii Department of Transportation (HDOT) recently opened a double-lane roundabout with two (2) lanes of travel in both the North and South directions along Pi'ilani Highway. Within the study area, the posted speed limit along this roadway is 40 mph.

Ka'ono'ulu Street is a generally two-way, two-lane, east-west County roadway that begins at South Kīhei Road and extends eastward to Pi'ilani Highway. Left turns are permitted into and out of Ka'ono'ulu Street at its intersections with Pi'ilani Highway and South Kīhei Road. The posted speed limit along this roadway is 20 mph.

Kūlanihāko'i Street is a generally two-way, two-lane, east-west County roadway that begins at South Kīhei Road and extends eastward to Pi'ilani Highway at the double-roundabout. Left turns are permitted into and out of Kūlanihāko'i Street at its intersections with Pi'ilani Highway and South Kīhei Road. The posted speed limit along this roadway is 20 mph.

Namauu Place is a two-way, two-lane, east-west, local County roadway that begins across from the Lanakila Townhomes driveway at South Kīhei Road and terminates approximately 180 feet to the east past Waiono Place. The posted speed limit along this roadway is 20 mph.

East Waipu'ilani Road is a two-way, two-lane, east-west County roadway that begins across from West Waipu'ilani Road at South Kīhei Road and terminates to the east at Pi'ilani Highway. East Waipu'ilani Road is restricted to a right-in, right-out (RIRO) intersection with Pi'ilani Highway, restricting left turn movements into and out of East Waipu'ilani Road. The posted speed limit along this roadway is 20 mph.

3.2 Existing Traffic Volumes

The hourly traffic volume data utilized in this report were collected on Thursday, February 9, 2017. Due to COVID-19, traffic volumes throughout the state were significantly lower than normal levels for the greater parts of 2020 and 2021; thus, the 2017 volumes are most conservative. Traffic count data is provided in Appendix A for the existing intersections studied and their corresponding traffic count data.

Based on the traffic count data, the weekday AM and PM peak hours of traffic were determined to occur between 7:30 AM and 8:30 AM and between 3:30 PM to 4:30 PM, respectively.

3.3 Existing Traffic Conditions Analysis and Observations

Traffic along Pi'ilani Highway is generally higher in the southbound direction in the AM peak hour and higher in the northbound direction in the PM peak hour due to commuter traffic.

Ka'ono'ulu Street & South Kīhei Road – This two-way stop-controlled (TWSC) T-intersection provides an exclusive turn lane on the minor westbound approach. All movements currently operate at LOS D or better during the AM and PM peak hours of traffic except the westbound left-turn, which operates at LOS E during the PM peak hour. No significant queues were observed at this location during peak hours of traffic.

Ka'ono'ulu Street & Kenolio Road – This TWSC intersection provides exclusive left-turn lanes on all approaches, with the northbound and southbound approaches stop-controlled. All movements currently operate at LOS B or better with no significant delays or queuing observed at this location during peak hours of traffic.

Ka'ono'ulu Street & Pi'ilani Highway – This TWSC T-intersection provides exclusive turn lanes on every approach along with a median acceleration lane for eastbound left-turn vehicles onto Pi'ilani Highway. Due to high vehicle speeds and traffic volumes along Pi'ilani Highway, the eastbound left-turn movement operates at LOS F during the AM and PM peak hour of traffic and the eastbound right-turn movement operates at LOS F during the AM peak hour of traffic. A signal warrant analysis indicates that a traffic signal is warranted based on the 8-hour and 4-hour warrants for mainline southbound through traffic and conflicting mainline northbound left-turn traffic. However, all movements operate below capacity with minimal queues, since gaps in mainline traffic occur from platoons created upstream at the Ohukai Road signal and downstream at the Pi'ikea Avenue signal.

Kūlanihāko'i Street & South Kīhei Road – This TWSC T-intersection provides exclusive turn lanes on the minor westbound approach as well as an exclusive southbound left-turn lane. All movements currently operate at LOS C or better during the AM and PM peak hours of traffic

except the westbound left-turn, which operates at LOS E during the PM peak of traffic. No significant delays or queuing were observed at this location during peak hours of traffic.

Kūlanihāko'i Street & Kenolio Road – This TWSC T-intersection includes shared lanes on all approaches with the southbound approach stop-controlled. All movements currently operate at LOS B or better with no significant delays or queuing at this location during peak hours of traffic.

Kūlanihāko'i Street & Pi'ilani Highway – Due to high vehicle speeds and traffic volumes along Pi'ilani Highway, the eastbound left-turn movement operates at LOS F during the AM and PM peak hour of traffic and the eastbound right-turn movement operates at LOS F during the AM peak hour of traffic. Traffic movements generally operate below capacity with minimal queues, since gaps in mainline traffic occur from platoons created upstream at the Ohukai signal and downstream at the Pi'ikea Avenue signal. At the time of the traffic count, this intersection operated as a TWSC intersection and was therefore analyzed accordingly. HDOT recently opened a double-lane roundabout with two (2) lanes of travel in both the North and South directions along Pi'ilani Highway. This intersection will be analyzed with a double-lane roundabout for Base Year and Future Year scenarios.

Namauu Place/Lanakila Drwy & South Kīhei Road – This TWSC intersection provides an exclusive southbound left-turn lane. All movements currently operate at LOS D or better with no significant delays or queuing observed at this location during peak hours of traffic.

East/West Waipu'ilani Road & South Kīhei Road - This TWSC intersection provides exclusive left-turn lanes on the northbound and southbound uncontrolled approaches. All movements currently operate at LOS C or better during the AM and PM peak hours of traffic except for the westbound and eastbound approaches, which operate at LOS E/F during the PM peak hour of traffic, respectively. All movements operate below capacity, with no significant delays or queuing observed at this location during peak hours of traffic.

East Waipu'ilani Road & Liloa Drive – This all-way stop-controlled (AWSC) T-intersection provides exclusive turn lanes on the northbound approach and an exclusive left-turn lane on the westbound approach. All movements currently operate at LOS B or better with no significant delays or queuing observed at this location during peak hours of traffic.

East Waipu'ilani Road & Pi'ilani Highway – This right-turn only T-intersection provides exclusive right-turn lanes at the eastbound and southbound approaches. All movements currently operate at LOS C or better with no significant delays or queuing observed at this location during peak hours of traffic.

Figure 3.1 illustrates the existing lane configuration, existing traffic volumes, and LOS for each study intersection. Table 3.1 summarizes the existing LOS at the study intersections. LOS worksheets are provided in Appendix C.

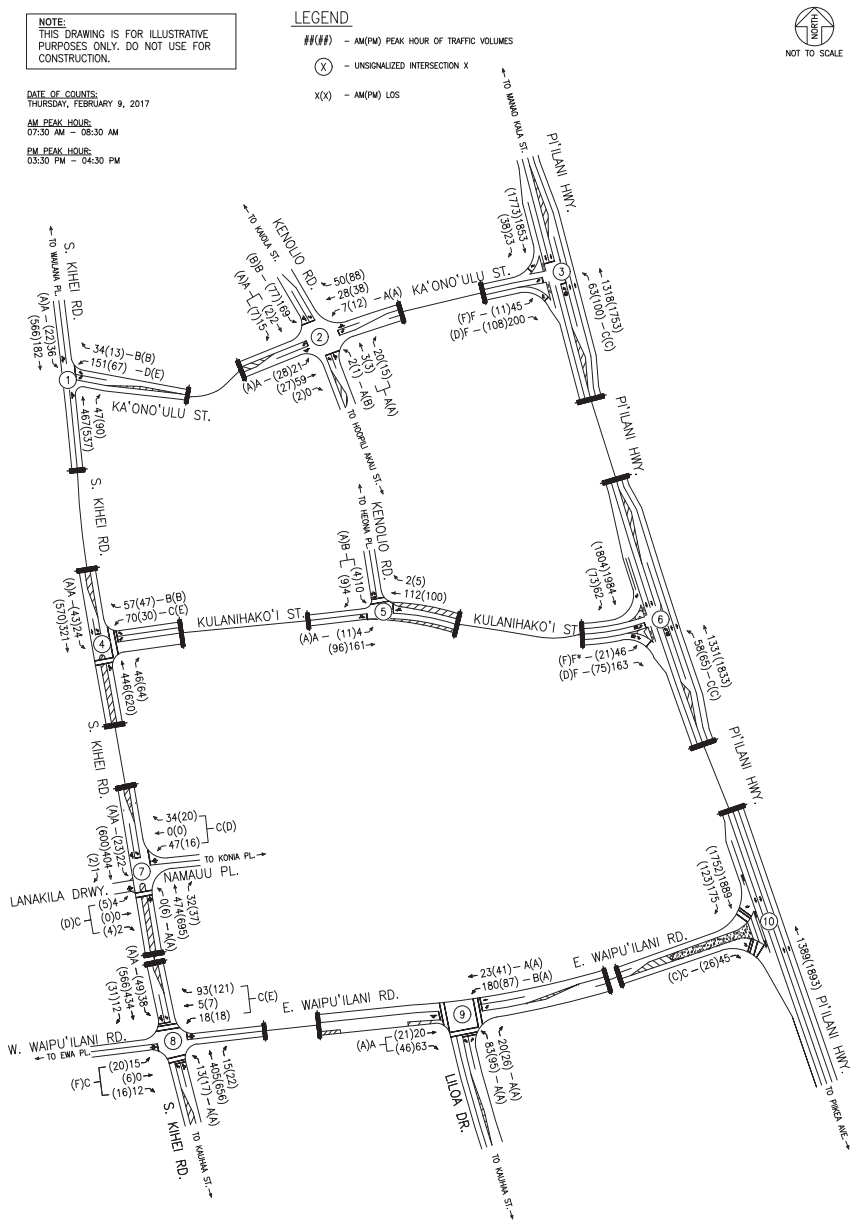


FIGURE 3.1

EXISTING CONDITIONS, LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 3.1: Existing Intersection Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Kaonoulu Street & S. Kihei Road						
WB LT	31.5	0.56	D	43.4	0.44	E
WB RT	12.5	0.07	B	12.9	0.03	B
SB LT	8.8	0.04	A	9.1	0.03	A
Overall	6.0	-	-	2.5	-	-
Kaonoulu Street & Kenolio Road						
NB LT	9.9	0.00	A	10.0	0.00	B
NB TH/RT	8.9	0.03	A	8.9	0.02	A
EB LT	7.4	0.02	A	7.5	0.02	A
WB LT	7.4	0.01	A	7.3	0.01	A
SB LT	11.6	0.25	B	10.7	0.12	B
SB TH/RT	8.8	0.02	A	9.1	0.01	A
Overall	6.7	-	-	4.6	-	-
Kaonoulu Street & Piilani Highway						
NB LT	22.1	0.25	C	23.6	0.36	C
EB LT	224.4	0.92	F	115.0	0.25	F
EB RT	80.8	0.91	F	29.9	0.44	D
Overall	7.9	-	-	1.8	-	-
Kulanihakoi Street & S. Kihei Road						
WB LT	24.6	0.29	C	40.3	0.24	E
WB RT	12.4	0.11	B	14.7	0.12	B
SB LT	8.6	0.03	A	9.4	0.05	A
Overall	2.7	-	-	1.7	-	-
Kulanihakoi Street & Kenolio Road						
EB LT	7.5	0.00	A	7.5	0.01	A
SB LT/RT	10.0	0.02	B	9.2	0.02	A
Overall	0.6	-	-	0.9	-	-
Kulanihakoi Street & Piilani Highway						
NB LT	24.7	0.26	C	21.1	0.24	C
EB LT	324.3	1.14	F*	123.5	0.45	F
EB RT	71.2	0.83	F	26.3	0.33	D
Overall	7.8	-	-	1.6	-	-
Namauu Place/Lanakila Drwy & S. Kihei Road						
NB LT	0.0	0.00	A	9.0	0.01	A
EB LT/TH/RT	21.6	0.03	C	33.3	0.07	D
WB LT/TH/RT	24.4	0.32	C	33.7	0.24	D
SB LT	8.7	0.02	A	9.6	0.03	A
Overall	2.2	-	-	1.3	-	-
W./E. Waipuilani Road & S. Kihei Road						
NB LT	8.4	0.01	A	8.9	0.02	A
EB LT/TH/RT	23.2	0.13	C	76.4	0.49	F
WB LT/TH/RT	16.7	0.29	C	37.8	0.61	E
SB LT	8.4	0.04	A	9.4	0.06	A
Overall	2.9	-	-	6.1	-	-
E. Waipuilani Road & Liloa Drive						
NB LT	9.6	0.15	A	9.3	0.16	A
NB RT	7.5	0.03	A	7.2	0.03	A
EB TH/RT	8.1	0.11	A	7.9	0.09	A
WB LT	10.4	0.30	B	9.1	0.14	A
WB TH	7.8	0.03	A	8.0	0.06	A
Overall	9.4	-	A	8.6	-	A
E. Waipuilani Road & Piilani Highway						
EB RT	24.6	0.21	C	20.5	0.11	C
Overall	0.3	-	-	0.1	-	-

4. BASE YEAR 2040 TRAFFIC CONDITIONS

The anticipated build-out of the Project will likely occur by 2025, however for planning purposes a long-range traffic forecast was used. Therefore, Year 2040 was selected to reflect the benchmark year. The Base Year 2040 scenario represents the traffic conditions within the study area without the Project. Traffic projections were formulated by applying a defacto growth rate to the existing traffic count volumes as well as trips generated by known future developments in the vicinity of the Project.

4.1 Defacto Growth Rate

Projections for Base Year 2040 traffic were based upon a correlation between the existing traffic counts collected by ATA, the Maui Regional Travel Demand Model (MRTDM) growth for forecast years between 2007 and 2035, and nearby developments in the immediate vicinity of the Project. Due to the levels of traffic increases generated by numerous background projects discussed below, overall annual growth rates along the studied roadways were maintained at 1 percent or less per year.

4.2 Traffic Forecasts for Known Developments

By the Year 2040, numerous developments are forecast to be completed within the Project study area. Many of the following known developments were determined to be accounted for in the MRTDM, so some developments are embedded in the defecto growth rate. The known developments that are projected to be complete by Year 2040 and generate traffic within the Project study area are illustrated in Figures 4.1-4.4 and are listed below based on the available information:

Pulehunui Developments

1. Central Maui Baseyard Expansion – This approximately 53-acre baseyard is Maui's most centrally located industrial park and is home to a variety of businesses including Maui Budget Cars, Hammerhead Metals Recycling, Commercial Tire Source, and more. According to the Waikapu Maalaea North Kihei Development Projects Long Range Plan, expansion is anticipated for the baseyard. It is currently only listed in the Maui Island Plan, with no anticipated timeline. For the purposes of this report, it was assumed the Central Maui Baseyard Expansion trips were included in the MRTDM growth rate and was not separately calculated.
2. DHHL Pulehunui North & South Parcels – Proposed to construct a mixed-use development on approximately 830.4 acres of vacant land and will include industrial, commercial, hotel, agricultural, and residential uses. This development assumed that new regional transportation improvements would provide for additional roadway capacity in the area to accommodate traffic volumes at full build-out. It is anticipated that approximately 50 percent of the forecast trips generated by full build-out of DHHL Pulehunui can be accommodated upon maximum improvements at the Piʻilani Highway/Kaʻonoʻulu Street intersection before large scale regional widening improvements may be needed. However, for the purposes of this report and due to uncertainty on the timeframe of these improvements, 100 percent of the forecast DHHL Pulehunui trips were added to the network.
3. Department of Land and Natural Resources (DLNR) Industrial and Business Park – This development is part of the overall Pulehunui Master Planned Subdivision. The total DLNR

site encompasses approximately 227 acres, exclusive of internal roadways and open space. An additional 26.1 acres is estimated to be allocated for undevelopable drainage and easement space. Therefore, for traffic projection purposes, approximately 200.9 acres was used to forecast traffic based on anticipated available developable land. It was assumed that approximately 70 percent would be allocated to light industrial use and 30 percent would be allocated to commercial use. Access to the northern side of the Project will be provided along the existing Kamaaina Road via the Maui Veterans Highway. Additionally, a new signalized intersection is proposed along Maui Veterans Highway, between Kamaaina Road and Mehameha Loop (South)/Maui Raceway Park Access Road to provide primary access to this development and to be shared with the adjacent DHHL North Parcel. Access will also be provided via the Maui Raceway Park Access Road on the south side of this project, with secondary access provided via South Firebreak Road. This development may require new regional transportation improvements similar to DHHL Pulehunui above, in order for Pi'ilani Highway to operate adequately. However, for the purposes of this report and due to uncertainty on the timeframe of these improvements, 100 percent of the forecast DLNR Pulehunui trips were added to the network.

4. Maui Regional Public Safety Complex (MRPSC) – This development is part of the overall Pulehunui Master Planned Subdivision. This development is proposed to be located east of Maui Veterans Highway near the Army National Guard Armory and the Maui Raceway Park. Based on the MRPSC Environmental Impact Statement Preparation Notice, dated May 2010, the complex may include up to 843 beds when fully constructed. Although the MRPSC is currently on hold, it was assumed to be completed by Base Year 2038. Primary vehicular access to the Project will be provided via the Maui Raceway Park Access Road at its intersection with Maui Veterans Highway. This development may require new regional transportation improvements similar to DHHL Pulehunui above, in order for Pi'ilani Highway to operate adequately. However, for the purposes of this report and due to uncertainty on the timeframe of these improvements, 100 percent of the forecast MRPSC trips were added to the network.

Kīhei Developments

1. Kamalani (formerly Kīhei Residential) – Proposed to construct approximately 631 total single-family & multi-family dwelling units and a 3,000 SF recreational center with access via Kaiwahine Street. This development is partially completed and occupied.
2. Kaiwahine Village – Proposed to construct approximately 120 multi-family dwelling units with access via Kaiwahine Street.
3. Hale Kaiola (formerly Ohukai Affordable Housing) – Proposed to construct approximately 40 duplex units with access via Ohukai Road.
4. Maui Bay Villas (formerly Maui Lu) – Upon full build-out, this project proposes to construct approximately 388 timeshare dwelling units and 12 beach parking stalls with access via Ka'ono'ulu Street.
5. Kenolio Apartments – Constructed in 2020, 186 apartments with access via Liloa Drive. Since traffic counts were taken prior to completion of Kenolio Apartments, project trips were added to network.
6. Pi'ilani Promenade – Multiple plans have been proposed over the years. Based on recent developments, it appears the development will revert back to its originally approved 123-lot commercial and light industrial subdivision.

7. Kūlanihāko'i High School – Proposed along the mauka side of Pi'ilani Highway with access via the eastern leg of the new double-lane roundabout at the intersection of Pi'ilani Highway and Kūlanihāko'i Street. Currently under construction, the high school is anticipated to initially serve approximately 800 students.
8. Hale Waipu'ilani – Proposed to construct 28 multi-family affordable housing dwelling units along East Waipu'ilani Road.
9. Krausz Downtown Kīhei – Proposed to construct approximately 91,075 SF of commercial/office space, 223 affordable residential units, and a 150-room specialty hotel along Pi'ikea Avenue, west of Liloa Drive.
10. Welakahao Village Residential Subdivision – Proposed to construct approximately 86 single-family dwelling units and up to 86 ohana units with access via East Welakahao Road.
11. South Maui Community Park Phases 2 and 3 – Phase 1 of the development is complete and is located just south of the Liloa Drive/Halekuai Street intersection. Phases 2 and 3 will extend Liloa Drive further south to Welakahao Road. Plans are continually being modified, but will ultimately provide a Recreation Center (gymnasium), two (2) soccer fields, two (2) baseball/softball fields, multi-use courts, and a pavilion. The gymnasium, playground, a soccer field and a softball field have been constructed as part of Phase 1.
12. Maui Research & Technology Park – Proposed residential, mixed-use commercial, civic, and employment development located east of Pi'ilani Highway with access via Lipoa Parkway. Phase I will consist of 723,000 SF of employment, 100,000 SF of retail, 750 residential dwelling units, 150 hotel rooms, and 102,000 SF of elementary school. Phase II will consist of 1,014,800 SF of employment and 500 residential dwelling units.
13. Liloa Hale – Proposed to construct 166 senior housing units with access via Liloa Drive.
14. Keokea Kai (formerly Alahele Subdivision) – Proposes to construct 110 units of affordable housing with a mix of apartments, duplexes and townhomes. Access to the site is proposed at a new driveway at Alahele Place/Alaloa Road and another from Auhana Road.
15. Kalama Kai – Proposed to construct approximately 40 affordable multi-family residential units with access via Kanani Road
16. Maui Coast Hotel Expansion – Proposed to construct 170-room hotel and 4,000 square feet restaurant with access via South Kīhei Road.
17. Kamaole Pointe – Proposed to construct 129 multi-family dwelling units with access via Liloa Hema Street.
18. Kamaole Grand – Proposed to construct 217 condos with access via Liloa Hema Street.

Wailea Developments

1. Kahoolawe Island Reserve Commission (KIRC) Education & Operations Center – Proposed 23,950 square feet building that will provide educational, administrative exhibition, and office functions.
2. Kilohana Makai – Proposed to construct approximately 28 affordable single-family residential units with access via Wela Street.
3. AC Hotel by Marriott (fka Hotel Ike) – This project is constructed and provides a 110-room hotel at the northeast corner of the Wailea Ike Drive and Wailea Ike Place (North)

intersection. Primary access to the site occurs at the Wailea Ike Drive/Wailea Ike Place (North) intersection with the Project access located along Wailea Ike Place (North). The project also shares an internal easement with the adjacent Marriott Residence Inn Hotel to the east, and secondary access at the Wailea Ike Drive/Wailea Ekolu Place intersection.

4. Grand Wailea Expansion – The existing Grand Wailea Hotel is proposing to increase the room count by an additional 224 rooms.
5. Wailea Village Center Expansion – This project proposes to expand the existing Wailea Village Center by developing an additional 22,000 square-feet of shopping center use. The project is completed and located to the south of Wailea Ike Drive between Wailea Alanui Drive and Wailea Ike Place.
6. Makalii at Wailea (MF-15) – This project proposes to develop 68 multi-family residential units. The project is located on the northeast corner of the Wailea Alanui Drive/Kaukahi Street intersection.
7. The Ridge at Wailea (MF-19) – This project proposes to develop nine (9) single-family residential units as part of the Wailea Resort. The project is located east of Kalai Waa Street and north of Hotel Wailea.
8. Ledcor Parcel MF-7 – Proposed to construct approximately 75 resort multi-family residential units with access via Okolani Drive.
9. Ledcor MF-10 (portion), Large Parcel (SF-S, SF-7a, MF-12, MF-13), SF-8, MF-6, MF-16, B-1 & B-2 – Collectively, these parcels are proposed to be developed by Ledcor as part of the Wailea Resort Master Plan and will include a mix of residential multi-family, single-family and transient vacation rental (TVR) units. The total number of units are as of yet, unknown but may include 900 to 1,050 residential units.
10. Honua'ula – This 670-acre project located to the south of Pi'ilani Highway, proposes to develop 1,150 dwelling units, 24 acres of village mixed use, 103 acres of recreation and open space, and 170 acres conservation.

Makena Developments

1. Makena Parcel H-1 Ocean Villas Maluaka Development – Construction is ongoing for this project, which proposes to develop 13 single-family residential units and six (6) multi-family condominium units. Parcel H-1 is located south of the former Makena Beach & Golf Resort and is bordered by the Makena Golf Course to the south and west and by Makena Keoneoio Road to the east.
2. Makena Resort H-M Development – This project proposes to convert the former 310-room hotel at the Makena Beach & Golf Resort into 65 multi-family resort residential units, including a beach club for residents only.
3. Makena M-5/M-6/S-7/B-2 – This project will consist of 46 resort single-family and residential units, 88 resort multi-family residential units, 10 Transient Vacation Rental (TVR) units, 14 residential condominium units, and approximately 27,300 square feet (SF) of retail space. The project also proposes to provide two new vehicular accesses; one (1) access along Honoiki Street and one (1) access along Makena Alanui Road.
4. Makena H-2 - This Project proposes to develop a 53-unit Condominium Project Regime (CPR) residential development with a 57-stall beach parking lot. An existing 51-stall beach parking lot will be replaced, resulting in a beach parking stall count increase of 6 stalls.

The forecast trip generation for each of the background developments in Pulehunui, Kīhei, Wailea, and Makena are summarized in Table 4.1, Table 4.2, and Table 4.3.

4.3 Planned Roadway Improvements

The following roadway improvements are anticipated to be constructed to support various developments and overall growth of the Kīhei region and were assumed to be completed by Year 2040 without the Project.

Liloa Drive Extension

As discussed in Section 1.2, Liloa Drive/Kenolio Road will ultimately be constructed, in total, from its northern terminus at Uwapo Road and extended continuously to its southern terminus at Auhana Road, with design and construction funds identified in the current Statewide Transportation Improvement Program (STIP). For purposes of the Base Year 2040 without Project scenario, Liloa Drive Extension was assumed to be constructed in two sections; namely: Liloa Drive (north section) from Ka'ono'ulu Street to East Waipu'ilani Road; and, Liloa Drive (south section) from South Maui Community Park to Auhana Road. The Liloa Drive segment between Ka'ono'ulu Street to East Waipu'ilani Road is omitted from the Base Year 2040 scenario to compare traffic operations with the Future Year 2040 with the Project scenario in Section 5.

Kīhei Mauka North-South Collector Road

According to the Maui Research and Technology Park TIAR prepared by Parsons Brinckerhoff in 2013, a regional Kīhei Mauka North-South Collector Road was recommended to be constructed by full build-out of the Project. However, based upon discussion with Maui County Department of Public Works (DPW), this roadway is not currently planned to be complete by Year 2040 and was therefore not included in this analysis. The state also has no plans to widen Pi'ilani Highway.

South Kīhei Road/Ka'ono'ulu Street Traffic Signal

Based on the Maui Bay Villas TIAR published by ATA in 2015, a traffic signal is recommended at this location by Year 2020 along with an exclusive southbound left-turn lane and was therefore, included in this TIAR.

Pi'ilani Highway/Ka'ono'ulu Street Traffic Signal

This TIAR assumes Pi'ilani Promenade will construct a 123-lot commercial and light industrial subdivision. As a result, a signal will be installed at the Pi'ilani Highway/Ka'ono'ulu Street intersection with left-turn and right-turn storage lanes on all approaches.

Pi'ilani Highway/Kūlanihāko'i Street Double-Lane Roundabout

HDOT recently opened a double-lane roundabout with two (2) lanes of travel in both the North and South directions along Pi'ilani Highway. Eastbound and westbound access via Kūlanihāko'i Street and Kūlanihāko'i High School is forthcoming. The completed double-lane roundabout is included in the analysis for Base Year and Future Year conditions.

LILOA DRIVE EXTENSION TIAR

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

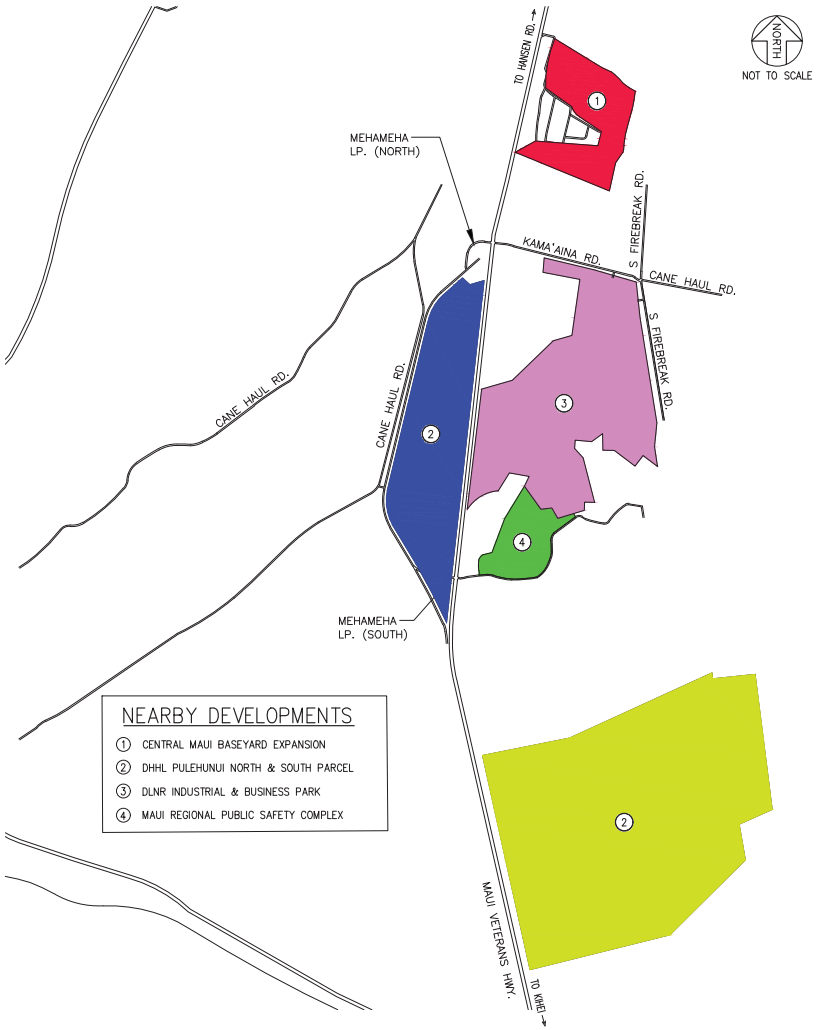


FIGURE 4.1 PULEHUNUI BACKGROUND PROJECTS

LILOA DRIVE EXTENSION TIAR

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors



FIGURE 4.2 KIHEI BACKGROUND PROJECTS

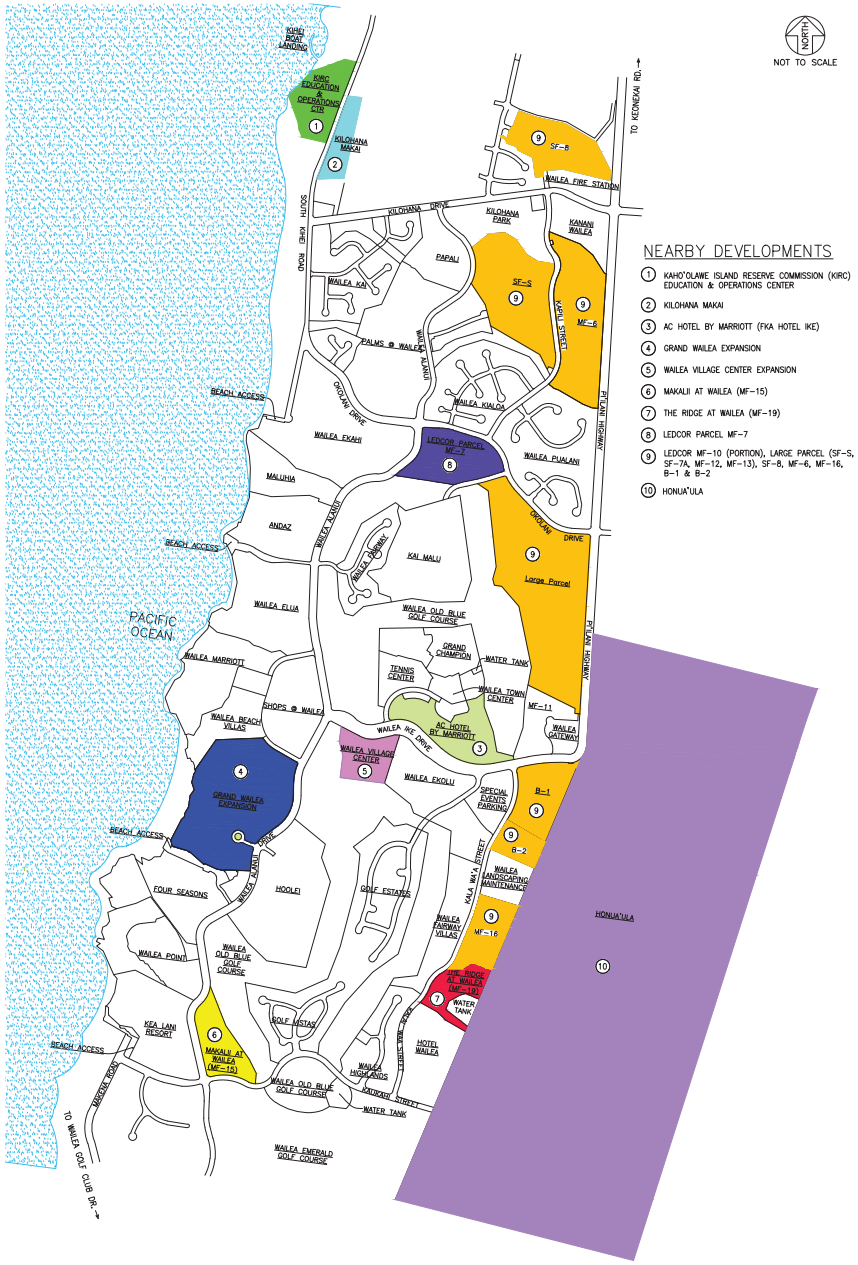


FIGURE 4.3 WAILEA BACKGROUND PROJECTS

LILOA DRIVE EXTENSION TIAR

AustinTsutsumi & ASSOCIATES, INC. Engineers & Surveyors

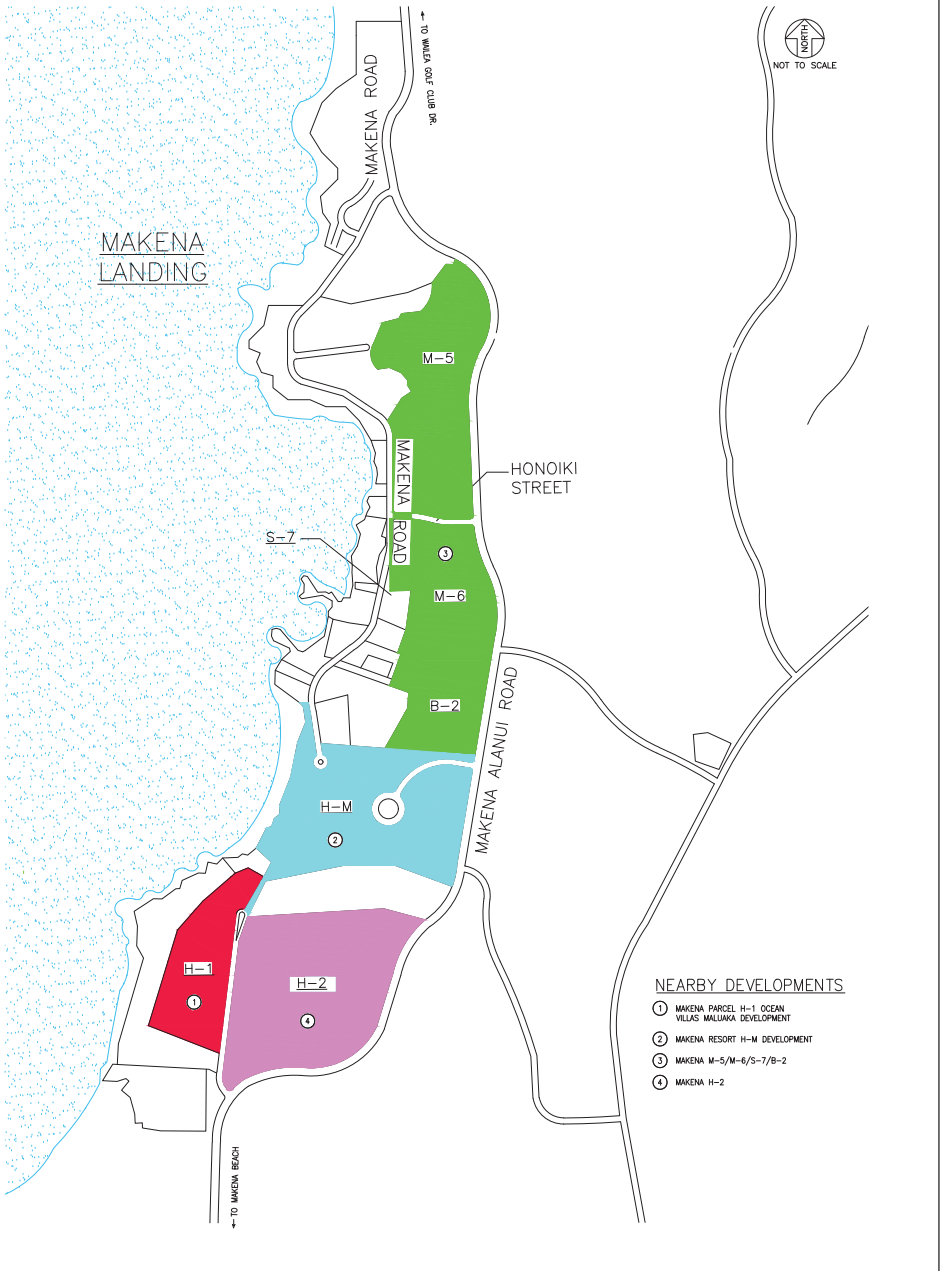


FIGURE 4.4 MAKENA BACKGROUND PROJECTS

Table 4.1: Trips Generated by Known Developments in Kīhei[1]

Project	ITE Code	Independent Variable	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Exit
South Maui Community Park	Obtained from Project's TIAR		57	42	99	80	45	125
Kenolio Apartments	Obtained from Project's TIAR		30	73	103	77	50	127
Kaiwahine Village	Obtained from Project's TIAR		19	47	66	49	31	80
Kamalani (Kīhei Residential)	Obtained from Project's TIAR		93	290	383	311	178	489
Kūlanihāko'i High School [2]	Obtained from Project's TIAR		228	108	336	49	55	104
Maui Bay Villas	Obtained from Project's TIAR		110	60	170	210	136	346
Welakahao Village	Obtained from Project's TIAR		33	95	128	109	63	172
Ohukai Affordable Housing	220	40 DU	5	15	20	16	10	26
Kalama Kai	220	40 DU	5	15	20	16	10	26
Pi'ilani Promenade	130	88 Acres [3]	435	102	537	113	424	537
Maui Research & Technology Park	Obtained from Project's TIAR		1,227	558	1,785	456	1,135	1,591
Krausz Downtown Kīhei	Obtained from Project's TIAR		179	154	333	292	289	581
Waipu'ilani Village	Obtained from Project's TIAR		3	12	15	13	7	20
Liloa Hale	Senior Housing (252)	117 Units	9	15	24	18	13	31
Keokea Kai (Former Alahele Subd)	MF Homes (220)	110 Units	12	40	52	40	24	64
Kalama Kai	MF Homes (220)	40 Units	5	15	20	16	10	26

Maui Coast Hotel Expansion	Obtained from Project's TIAR		70	50	120	78	64	142
Kamaole Pointe	MF Homes (220)	129 Units	14	47	61	47	28	75
Kamaole Grand	MF Homes (220)	217 Units	23	77	100	74	44	118

Notes:

1. Table 4.1 shows total trips generated by known developments in the vicinity of the Project. Not all traffic generated by these developments travel through the study area of this TIAR, since some traffic will be routed to various roadways and intersections that were not included in this TIAR.
2. Assumes the high school will serve approximately 800 students by the Year 2040. Majority of these trips are existing traffic heading to Maui High School.
3. Assumed a floor-to-area ratio of approximately 35%.

Table 4.3: Trips Generated by Known Developments in Wailea and Makena [1]

Project	ITE Code	Independent Variable	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Exit
KIRC	Obtained from Project's TIAR		52	6	58	10	55	65
Kilohana Makai	Obtained from Project's TIAR		6	19	25	19	11	30
Ledcor MF-10, SF-S, Large Parcel, SF-8, MF-6, MF-16, B-1 & B-2 [2]	PB/210/220	900 to 1,050 DU	150	220	370	260	215	475
MF-7	PB/220	75 DU	7	12	19	15	14	29
Wailea Village Center Expansion	820	22,000 SF	7	5	12	60	66	126
Hotel Ike (MF-10)	330	110 Rooms	25	10	35	20	26	46
Keala O Wailea (MF-11)	PB	70 DU	6	25	31	24	13	37
Honua'ula	Obtained from Project's TIAR		336	607	943	799	603	1402
Grand Wailea Expansion	330	224 rooms	55	21	76	46	61	107
Makalii at Wailea (MF-15)	PB	68 DU	6	9	15	11	12	23
The Ridge at Wailea (MF-19)	PB (SF)	9 DU	2	2	4	2	2	4
Makena M5/M6/S7/B2	Obtained from Project's TIAR		65	61	126	62	70	132
Makena Parcel H-1	PB	6 MF 13 SF	3	4	7	3	4	7
Makena Resort H-M	210/PB	65 DU	54	25	79	46	47	93
Makena H-2	210/PB	53 DU	17	15	32	14	14	28

Notes:

1. Table 4.3 shows total trips generated by known developments in the vicinity of the Project. Not all traffic generated by these developments travel through the study area of this TIAR, since some traffic will be routed to various roadways and intersections that were not included in this TIAR.
2. Ledcor MF-10, SF-S, Large Parcel, SF-8, MF-6, MF-16, B-1 & B-2 trip generation estimated since unit count is as of yet, unknown.

Table 4.2 Trips Generated by Known Developments in Pulehunui

Land Use	Independent Variable (ITE Code)	Size	AM Peak Hour			PM Peak Hour		
			Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
DLNR Industrial & Business Park [1,2]	Industrial Park (130)	140.6 acres	548	112	661	125	469	594
	Shopping Center (820)	656.3 KSF GLA	278	171	449	939	1,017	1,956
		Pass-by reduction				-188	-188	-376
	DLNR Industrial & Business Park Subtotal		827	283	1,110	876	1,298	2,174
Maui Regional Public Safety Complex [3]	Prison (571)	843 beds	46	39	85	4	39	43
Central Maui Baseyard Expansion	Industrial Park (130)	100 acres	506	104	610	123	465	588
DHHL Pulehunui North	Refer to Project's TIAR		452	154	606	390	612	1,002
DHHL Pulehunui South	Refer to Project's TIAR		672	345	1,017	238	493	731
Total NEW External Trips			2,503	925	3,428	1,631	2,907	4,538

Notes:

- kSF = 1,000 Square Feet of Gross Leasable Area

1. Due to its close proximity with one another, trips were generated as a single aggregate for the total build-out of the industrial and/or commercial component for the following three (3) developments. Trips generated by each development were then calculated based on a percentage of its size in relation to the derived aggregate total. Commercial SF calculated based on a 25% floor-area-ratio (FAR).
   a. DHHL North Parcel
   b. DHHL South Parcel
   c. DLNR Industrial & Business Park.
2. Table 4.2 shows trip generation for full build-out of the DLNR Industrial & Business Park. Note the total DLNR site encompasses approximately 227 acres, exclusive of internal roadways and open space. An additional 26.1 acres is estimated to be allocated for undevelopable drainage and easement space. Therefore, for traffic projection purposes, approximately 200.9 acres was used to forecast traffic based on anticipated available developable land.
3. Trip generation taken from TIAR's prepared for each respective development.

4.4 Base Year 2040 Analysis

By Year 2040 without the Project, overall north-south traffic is estimated to increase overall by approximately 30-35% along South Kīhei Road and increase overall by approximately 50-55% along Pi'ilani Highway. As a result, timing plans for many of the signalized intersections will need to be adjusted and optimized to account for the traffic increases. Some intersections in the Base Year 2040 without the Project scenario will operate at LOS F and over-capacity conditions.

- Ka'ono'ulu Street & Pi'ilani Highway – Various movements including mainline through movements are forecast to operate at LOS F and overcapacity conditions due to heavy through vehicle traffic along Pi'ilani Highway in combination with high turning volumes during the AM and PM peak hours of traffic.
- Kūlanihāko'i Street & South Kīhei Road – The westbound left-turn movement is forecast to operate below capacity at LOS F during the PM peak hour, but will only service about 40 vehicles.
- Kūlanihāko'i Street & Pi'ilani Highway – Several movements including mainline through movements are forecast to operate at LOS E or F and overcapacity due to high vehicle traffic along Pi'ilani Highway in combination with high turning volumes during the AM and PM peak hours of traffic.
- Namauu Place/Lanakila Driveway & South Kīhei Road – The westbound approach is forecast to operate below capacity at LOS E during the AM peak hour of traffic and LOS F during the PM peak hour of traffic. The eastbound approach is forecast to operate at LOS F only during the PM peak hour of traffic.
- West/East Waipu'ilani Road & South Kīhei Road – The eastbound and westbound approaches are forecast to operate overcapacity at LOS F during the PM peak hour of traffic.
- East Waipu'ilani Road & Pi'ilani Highway – The eastbound right-turn movement is forecast to operate at LOS E during the AM peak hour of traffic and LOS F during the PM peak hour of traffic.

Overcapacity conditions along Pi'ilani Highway indicate that additional capacity is needed in the form of the planned Liloa Drive Extension, additional through lanes along the highway, or the regional Kīhei Mauka North-South Collector. As discussed in Section 4.3, the State and County have no plans to construct the Kīhei Mauka North-South Collector Road or widen Pi'ilani Highway. Figure 4.5 illustrates the Base Year 2040 lane configuration, existing traffic volumes, and LOS for each study intersection with the planned roadway improvements discussed in Section 4.3. Table 4.4 summarizes the Base Year 2040 LOS at these study intersections. LOS worksheets are provided in Appendix C.

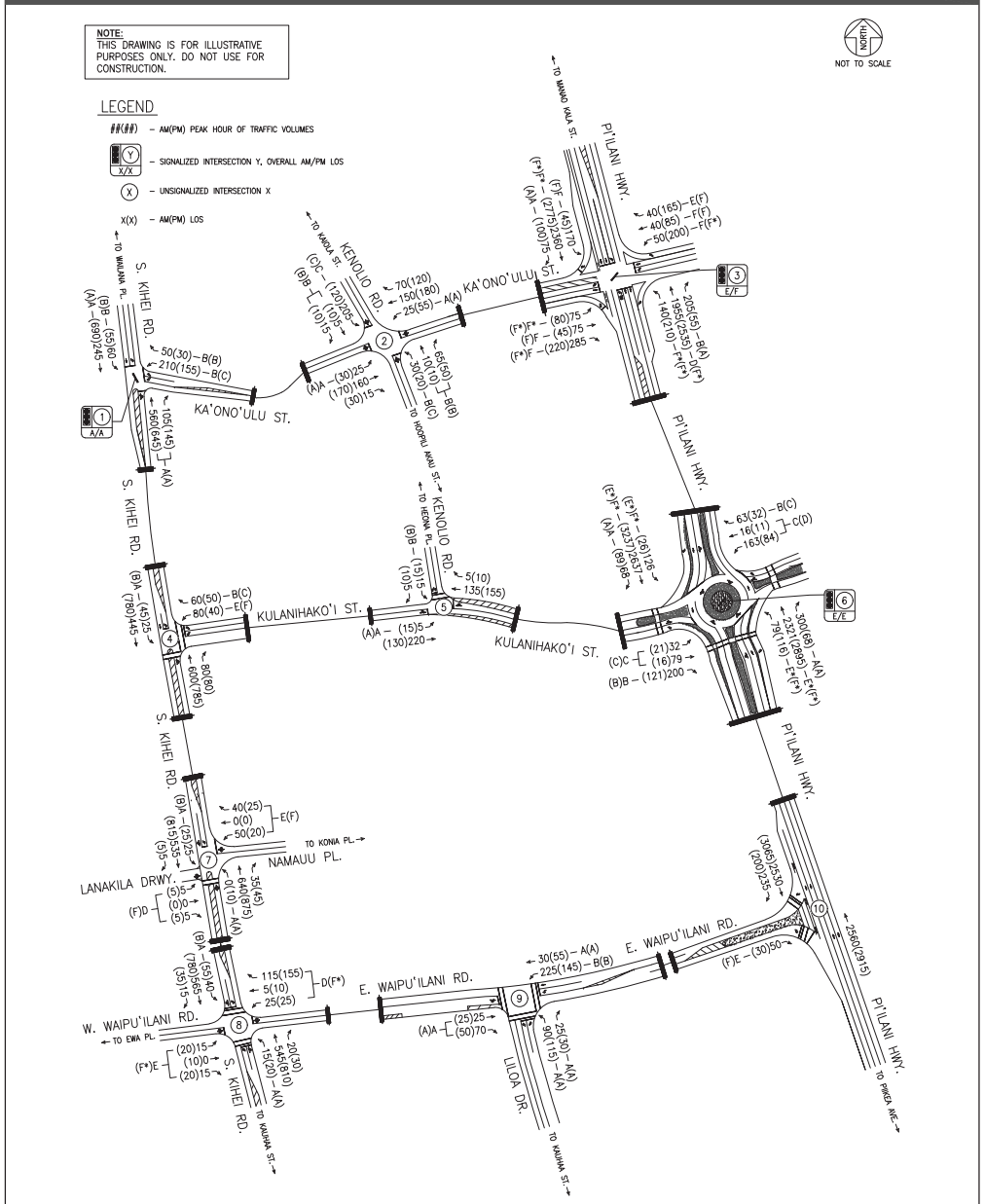


FIGURE 4.5

BASE YEAR 2040 LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 4.4: Base Year 2040 Intersection Level of Service Summary

Intersection	Base Year 2040 Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Kaonoulu Street & S. Kihei Road						
NB TH/RT	7.2	0.73	A	6.3	0.75	A
WB LT	16.8	0.73	B	21.8	0.74	C
WB RT	11.9	0.03	B	15.6	0.02	B
SB LT	11.2	0.17	B	11.2	0.16	B
SB TH	4.5	0.27	A	5.3	0.64	A
Overall	8.6	-	A	7.5	-	A
Kaonoulu Street & Kenolio Road						
NB LT	13.6	0.07	B	16.2	0.06	C
NB TH/RT	10.3	0.11	B	11.0	0.10	B
EB LT	7.8	0.02	A	8.0	0.03	A
WB LT	7.7	0.02	A	7.8	0.04	A
SB LT	24.7	0.56	C	24.4	0.42	C
SB TH/RT	10.4	0.03	B	12.7	0.05	B
Overall	8.8	-	-	6.0	-	-
Kaonoulu Street & Piilani Highway						
NB LT	287.7	1.28	F*	339.9	1.46	F*
NB TH	42.7	0.91	D	46.1	1.02	F*
NB RT	13.5	0.16	B	2.7	0.04	A
EB LT	215.3	1.00	F*	256.5	1.07	F*
EB TH	99.0	0.38	F	237.8	0.93	F
EB RT	120.8	0.88	F	203.5	1.04	F*
WB LT	200.4	0.91	F	242.0	1.16	F*
WB TH	99.1	0.22	F	129.0	0.56	F
WB RT	74.9	0.03	E	129.3	0.68	F
SB LT	159.2	0.96	F	177.6	0.82	F
SB TH	65.1	1.04	F*	137.6	1.20	F*
SB RT	8.5	0.06	A	9.5	0.08	A
Overall	70.1	-	E	112.6	-	F
Kulanihakoi Street & S. Kihei Road						
WB LT	48.8	0.53	E	109.9	0.60	F
WB RT	14.9	0.15	B	18.1	0.17	C
SB LT	9.3	0.03	A	10.3	0.07	B
Overall	3.9	-	-	3.3	-	-
Kulanihakoi Street & Kenolio Road						
EB LT	7.5	0.00	A	7.6	0.01	A
SB LT/RT	10.7	0.03	B	10.2	0.04	B
Overall	0.7	-	-	1.1	-	-
Kulanihakoi Street & Piilani Highway						
NB TH	62.4	1.12	E*	74.5	1.16	F*
NB LT/TH	64.3	1.12	E*	75.8	1.16	F*
NB RT	0.5	0.18	A	0.1	0.04	A
EB LT/TH	31.2	0.59	C	21.5	0.24	C
EB RT	11.3	0.12	B	1.4	0.07	B
WB LT/TH	21.3	0.63	C	39.7	0.59	D
WB RT	15.2	0.33	B	28.5	0.30	C
SB TH	53.9	1.10	E*	110.7	1.24	F*
SB LT/TH	56.2	1.10	E*	112.2	1.24	F*
SB RT	0.2	0.04	A	0.2	0.05	A
Overall	51.7	-	E	88.8	-	F

Table 4.4: Base Year 2040 Intersection Level of Service Summary (Cont'd)

Intersection	Base Year 2040 Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Namauu Place/Lanakila Drwy & S. Kihei Road						
NB LT	0.0	-	A	9.9	0.02	A
EB LT/TH/RT	29.1	0.07	D	64.7	0.15	F
WB LT/TH/RT	50.4	0.57	F	95.5	0.58	F
SB LT	9.4	0.03	A	10.5	0.04	B
Overall	3.8	-	-	2.9	-	-
W./E. Waipuilani Road & S. Kihei Road						
NB LT	8.8	0.02	A	9.8	0.03	A
EB LT/TH/RT	38.7	0.24	E	504.4	1.51	F*
WB LT/TH/RT	29.2	0.52	D	292.4	1.44	F*
SB LT	8.9	0.05	A	10.2	0.08	B
Overall	4.3	-	-	41.4	-	-
E. Waipuilani Road & Liloa Drive						
NB LT	9.9	0.16	A	10.0	0.20	A
NB RT	7.7	0.04	A	7.5	0.04	A
EB TH/RT	8.3	0.13	A	8.2	0.11	A
WB LT	11.4	0.37	B	10.1	0.24	B
WB TH	7.9	0.05	A	8.2	0.09	A
Overall	10.1	-	B	9.3	-	A
E. Waipuilani Road & Piilani Highway						
EB RT	48.6	0.40	E	70.4	0.38	F
Overall	0.5	-	-	0.4	-	-

* Denotes overcapacity condition, v/c ≥ 1.0

5. FUTURE YEAR 2040 TRAFFIC CONDITIONS

The Future Year 2040 scenario represents the traffic conditions within the Project study area with the full build-out of the Project.

5.1 Background

The Project will consist of the extension of Liloa Drive from East Waipuʻilani Road to Kaʻonoʻulu Street. In total, Liloa Drive/Kenolio Road will ultimately provide a 3.5-mile continuous north-south thoroughfare from Uwapo Road to Auhana Road. In addition, the Project will extend the Kīhei Bikeway shared use path further north from East Waipuʻilani Road to Kaʻonoʻulu Street. As Kenolio Road currently begins at Kūlanihākoʻi Street, it is assumed that the designation of Liloa Drive will end at Kūlanihākoʻi Street. It is also assumed that Heona Place and Namauu Place will be provided with stop control at their new T-intersections with Kenolio Road and Liloa Drive, respectively. While South Kīhei Road and Piʻilani Highway continue to provide for regional circulation in the Wailea and Kīhei regions, the Liloa Drive Extension will provide an alternative localized north-south route between many residential subdivisions and retail centers in the greater Kīhei region.

5.2 Travel Demand Management (TDM) Assumptions

The State of Hawaii Department of Transportation (HDOT) and Maui County provide various TDM programs that promote the use of transit, walking, biking and alternative modes of transportation, to reduce the use of single-occupant vehicles on roadways.

Maui County currently provides bus service in and between the major areas in Maui. Within the vicinity of the Project, the Maui Bus provides two (2) bus routes:

11. Kīhei Village Route 15: Provides local service between Maalaea to Piʻilani Shopping Center, with frequent bus stops along the North Kīhei Road, South Kīhei Road and Piʻikea Avenue routes.
12. Kīhei Islander Route 10: Provides regional service from Wailuku to Wailea, with frequent bus stops along South Kīhei Road and Wailea Alanui Drive. The Kīhei Islander currently provides stops along Lipoa Street between South Kīhei Road and Liloa Drive before continuing on Liloa Drive to stop at Piʻilani Shopping Center.

Various bike facilities are currently implemented in the area and many other routes are planned to be constructed. Piʻilani Highway is currently a signed-shared bike facility.

5.3 Trip Distribution & Assignment

The Project itself will provide a direct connection between the primarily residential homes north of East Waipuʻilani Road to the various attractions that include industrial areas, offices, retail space, and schools further south along Piʻikea Avenue and Lipoa Street. Assuming Liloa Drive extends further south of East Welakahao Road, Liloa Drive will also service many residential areas that can use the Liloa Drive extension for more localized travel. As such, it was determined that in total, Liloa Drive Extension is anticipated to service approximately 20-25% of the total north-south traffic in the study area, which would generally translate to approximately 400-1,000 throughput vehicles along various parts of Liloa Drive Extension. Various turning movement reroutes were also considered that include rerouting a portion of traffic forecast for the nearby residential neighborhoods and commercial properties. In addition, a portion of southbound vehicles were

rerouted from Piʻilani Highway to the Liloa Drive Extension as an alternate route to get to nearby destinations. Piʻilani Highway will continue to primarily service the largest volume of regional traffic. South Kīhei Road will also continue to provide for a mix of regional and local traffic supplementing Piʻilani Highway. Liloa Drive Extension will provide secondary circulation similar to the function of South Kīhei Road.

5.4 Future Year 2040 Analysis

Based on a comparison of delay, capacity, and LOS conditions between Base Year 2040 and Future Year 2040 scenarios, the reroute of traffic generated by the Liloa Drive extension will result in significantly lower delays and increased capacity at all signalized and unsignalized intersections along South Kīhei Road and Piʻilani Highway. All study intersections will improve from Base Year 2040 conditions, with most movements operating at a v/c ratio below 1.0. With reroutes to Liloa Drive Extension, through movements along Piʻilani Highway will improve to LOS D or better and below capacity conditions from Base Year conditions.

The new two-way, stop-controlled (TWSC) intersections at Heona Place and Namauu Place along Liloa Drive/Kenolio Road are forecast to operate at LOS C or better for all movements during the AM and PM peak hours of traffic. At the intersections along Liloa Drive at Kaʻonoʻulu Street, Kūlanihākoʻi Street, and East Waipuʻilani Road, various intersection control options were evaluated and are described below. It is recommended that exclusive left-turn lanes be provided at all approaches at these three intersections for all intersection control options, with the exception of the roundabout.

Kaʻonoʻulu Street & Kenolio Road (Liloa Drive Extension)

As a TWSC Kaʻonoʻulu Street/Kenolio Road intersection, this intersection is forecast to experience LOS E/F and overcapacity conditions on various movements during the AM and PM peak hours of traffic. As an AWSC intersection, all movements are forecast to operate at LOS C or better during the AM and PM peak hours of traffic. Based on Future Year 2040 traffic forecasts, either a traffic signal system or roundabout would both yield adequate delays and no over-capacity conditions with LOS B or better for all movements.

Kūlanihākoʻi Street & Kenolio Road (Liloa Drive Extension)

As a TWSC Kūlanihākoʻi Street/Kenolio Road intersection, this intersection is forecast to experience LOS E/F and overcapacity conditions on various movements during the AM and PM peak hours of traffic. As an AWSC intersection, all movements are forecast to operate at LOS D or better during both peak hours of traffic except the southbound through/right turn movement which is forecast to operate at LOS F and overcapacity conditions during both peak hours. Based on Future Year 2040 traffic forecasts, either a traffic signal system or roundabout would both yield adequate delays and no over-capacity conditions with LOS B or better for all movements. Based on the queue analysis, westbound queues entering this roundabout are estimated to only queue for 1-2 vehicles and will therefore not spill back into Malulani Street or into Piʻilani Highway. Similarly, eastbound queues from the double-lane roundabout at the Piʻilani Highway/Kūlanihākoʻi Street intersection will not spill back into the Liloa Drive Extension, primarily due to the eastbound right-turn bypass lane at the Piʻilani Highway/Kūlanihākoʻi Street intersection.

Liloa Drive Extension and East Waipu'ilani Road

As a TWSC Liloa Drive Extension/East Waipu'ilani Road intersection, this intersection is forecast to experience LOS F and overcapacity conditions on various movements during the AM and PM peak hours of traffic. As an AWSC intersection, northbound and southbound movements are forecast to operate at LOS F and overcapacity conditions during the AM and PM peak hour of traffic. Based on Future Year 2040 traffic forecasts, either a traffic signal system or roundabout would both yield adequate delays and no over-capacity conditions with LOS D or better for all movements.

Figure 5.1 illustrates the Future Year 2040 lane configuration, existing traffic volumes, and LOS for each study intersection assuming roundabouts at the Liloa Drive intersections with Ka'ono'ulu Street, Kūlanihāko'i Street, and East Waipu'ilani Road. Table 5.1 summarizes the Future Year 2040 LOS at the study intersections with the Project. Table 5.2 summarizes the LOS at the Liloa Drive intersections with Ka'ono'ulu Street, Kūlanihāko'i Street, and East Waipu'ilani Road with various intersection controls. LOS worksheets are provided in Appendix C. Appendix D provides the Future Year 2040 LOS analysis at the Pi'ilani Highway/Kūlanihāko'i Street intersection with and without the construction of the previously mentioned double-lane roundabout

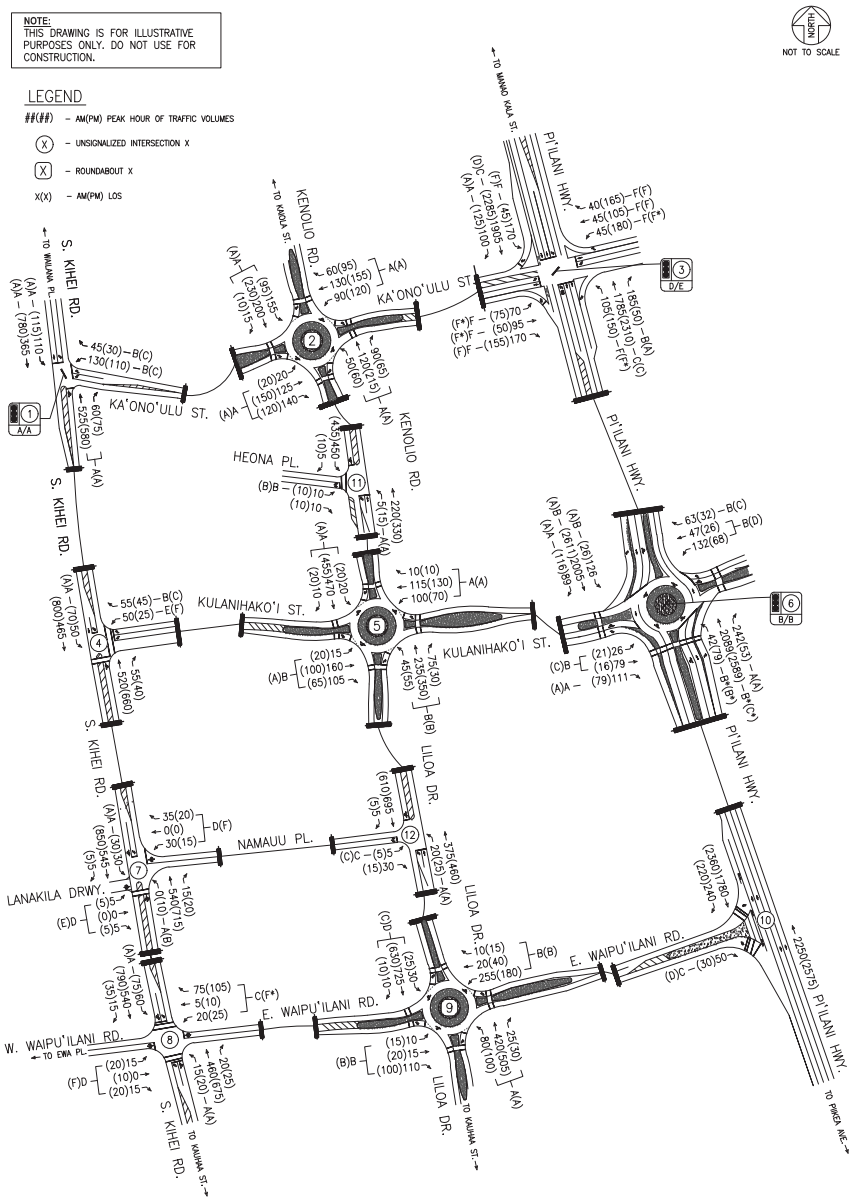


FIGURE 5.1

FUTURE YEAR 2040, LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 5.1: Future Year 2040 Intersection Level of Service Summary

Intersection	Future Year 2040 Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Kaonoulu Street & S. Kihei Road						
NB TH/RT	5.9	0.56	A	5.2	0.56	A
WB LT	17.5	0.47	B	23.8	0.49	C
WB RT	15.2	0.03	B	20.8	0.02	C
SB LT	4.7	0.30	A	4.0	0.30	A
SB TH	4.6	0.35	A	6.4	0.66	A
Overall	7.0	-	A	7.2	-	A
Kaonoulu Street & Kenolio Road						
NB LT/TH/RT	6.7	0.29	A	7.5	0.37	A
EB LT/TH/RT	8.9	0.38	A	9.0	0.39	A
WB LT/TH/RT	6.0	0.28	A	8.4	0.41	A
SB LT/TH/RT	8.0	0.40	A	8.3	0.39	A
Overall	7.5	-	A	8.3	-	A
Kaonoulu Street & Piilani Highway						
NB LT	181.5	0.96	F	181.8	1.04	F*
NB TH	29.2	0.80	C	30.7	0.93	C
NB RT	10.9	0.13	B	2.7	0.03	A
EB LT	190.6	0.93	F	238.4	1.01	F*
EB TH	109.9	0.63	F	271.1	1.03	F*
EB RT	95.6	0.54	F	128.6	0.65	F
WB LT	174.6	0.83	F	205.7	1.05	F*
WB TH	107.1	0.35	F	138.3	0.69	F
WB RT	80.8	0.04	F	129.3	0.68	F
SB LT	159.2	0.96	F	177.6	0.82	F
SB TH	24.4	0.80	C	57.1	0.99	E
SB RT	6.7	0.07	A	9.7	0.09	A
Overall	42.8	-	D	62.9	-	E
Kulanihakoi Street & S. Kihei Road						
WB LT	36.6	0.33	E	71.6	0.34	F
WB RT	13.4	0.12	B	15.1	0.12	C
SB LT	9.0	0.06	A	9.7	0.09	A
Overall	2.5	-	-	1.9	-	-
Kulanihakoi Street & Liloa Drive/Kenolio Road						
NB LT/TH/RT	6.9	0.36	A	7.3	0.41	A
EB LT/TH/RT	11.3	0.44	B	8.1	0.28	A
WB LT/TH/RT	6.2	0.25	A	7.3	0.27	A
SB LT/TH/RT	10.3	0.54	B	10.1	0.53	B
Overall	9.0	-	A	8.5	-	A
Kulanihakoi Street & Piilani Highway						
NB TH	17.0	1.00	B	21.1	1.03	C
NB LT/TH	19.6	1.00	B	19.7	1.03	B
NB RT	0.5	0.15	A	0.1	0.03	A
EB LT/TH	11.3	0.36	B	20.7	0.23	C
EB RT	4.9	0.07	A	9.8	0.05	A
WB LT/TH	15.1	0.53	B	37.1	0.58	D
WB RT	11.5	0.28	B	27.4	0.29	C
SB TH	4.8	0.84	A	12.8	0.99	B
SB LT/TH	3.4	0.84	A	15.8	0.99	B
SB RT	0.2	0.05	A	0.2	0.07	A
Overall	10.5	-	B	17.1	-	B

Table 5.1: Future Year 2040 Intersection Level of Service Summary (Cont'd)

Intersection	Future Year 2040 Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Namauu Place/Lanakila Drwy & S. Kihei Road						
NB LT	0.0	-	A	10.1	0.02	B
EB LT/TH/RT	25.7	0.06	D	51.0	0.12	F
WB LT/TH/RT	28.6	0.32	D	55.5	0.35	F
SB LT	8.9	0.03	A	9.6	0.04	A
Overall	2.0	-	-	1.7	-	-
W./E. Waipuilani Road & S. Kihei Road						
NB LT	8.8	0.02	A	9.9	0.03	A
EB LT/TH/RT	30.2	0.19	D	222.6	0.95	F
WB LT/TH/RT	22.4	0.35	C	167.2	1.10	F*
SB LT	8.7	0.06	A	9.7	0.10	A
Overall	3.1	-	-	19.6	-	-
E. Waipuilani Road & Liloa Drive						
NB LT/TH/RT	7.4	0.45	A	9.0	0.55	A
EB LT/TH/RT	14.2	0.34	B	10.8	0.28	B
WB LT/TH/RT	10.1	0.41	B	10.6	0.38	B
SB LT/TH/RT	34.9	0.92	D	19.1	0.77	C
Overall	20.7	-	C	13.4	-	B
E. Waipuilani Road & Piilani Highway						
EB RT	23.0	0.21	C	34.1	0.21	D
Overall	0.3	-	-	0.2	-	-
Heona Place & Kenolio Road						
NB LT	8.4	0.01	A	8.4	0.02	A
EB LT	13.2	0.05	B	14.2	0.05	B
Overall	0.4	-	-	0.5	-	-
Namauu Place/Liloa Drive						
NB LT	9.3	0.03	A	9.0	0.03	A
EB LT	16.5	0.11	C	16.3	0.06	C
Overall	0.7	-	-	0.5	-	-

* Denotes overcapacity condition, v/c ≥ 1.0

Table 5.2b: Future Year 2040 Liloa Drive Intersection Scenarios - PM Peak

Future Year 2040 Conditions															
Intersection	PM Peak Hour of Traffic														
	TWSC North-South			TWSC East-West			All-Way Stop Control			Roundabout (SIDRA)			Traffic Signal		
	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
Kaonoulu Street & Kenolio Road															
NB LT	337.2	1.25	F*	7.9	0.05	A	12.9	0.16	B	-	-	-	9.8	0.13	A
NB TH/RT	67.9	0.92	F	-	-	-	25.4	0.67	D	-	-	-	8.6	0.48	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.0	0.32	A	-	-	-
EB LT	7.8	0.02	A	63.1	0.26	F	12.0	0.05	B	-	-	-	9.2	0.04	A
EB TH/RT	-	-	-	51.1	0.84	F	23.9	0.64	C	-	-	-	8.3	0.41	A
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.9	0.32	A	-	-	-
WB LT	8.2	0.10	A	452.9	1.69	F*	15.2	0.31	C	-	-	-	10.6	0.26	B
WB TH/RT	-	-	-	46.5	0.80	E	21.2	0.59	C	-	-	-	8.2	0.39	A
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.7	0.36	A	-	-	-
SB LT	431.9	1.59	F*	8.1	0.08	A	14.2	0.25	B	-	-	-	10.9	0.22	B
SB TH/RT	74.9	0.92	F	-	-	-	21.7	0.59	C	-	-	-	8.3	0.41	A
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.8	0.34	A	-	-	-
Overall	74.4	-	-	61.6	-	-	21.2	-	C	2.6	-	A	8.9	-	A
Kulanihakoi Street & Liloa Drive/Kenolio Road															
NB LT	-	-	-	8.6	0.06	A	11.8	0.13	B	-	-	-	9.5	0.13	A
NB TH/RT	49.0	0.89	E	-	-	-	35.7	0.84	E	-	-	-	6.3	0.50	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	1.2	0.38	A	-	-	-
EB LT	7.6	0.02	A	75.3	0.30	F	12.3	0.06	B	-	-	-	11.0	0.05	B
EB TH/RT	-	-	-	41.6	0.67	E	16.4	0.41	C	-	-	-	10.5	0.37	B
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	3.5	0.23	A	-	-	-
WB LT	7.7	0.06	A	169.0	0.93	F	13.8	0.19	B	-	-	-	11.7	0.18	B
WB TH/RT	-	-	-	54.8	0.71	F	15.6	0.36	C	-	-	-	10.4	0.37	B
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	3.3	0.23	A	-	-	-
SB LT	56.6	0.24	F	8.2	0.02	A	10.9	0.05	B	-	-	-	7.8	0.04	A
SB TH/RT	130.8	1.18	F*	-	-	-	76.9	1.02	F*	-	-	-	7.1	0.62	A
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	1.9	0.47	A	-	-	-
Overall	48.3	-	-	21.5	-	-	43.1	-	E	2.1	-	A	8.0	-	A
E. Waipuilani Road & Liloa Drive															
NB LT	-	-	-	9.5	0.12	A	13.6	0.25	B	-	-	-	13.3	0.29	B
NB TH/RT	265.5	1.50	F*	-	-	-	118.7	1.24	F*	-	-	-	6.8	0.57	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	0.9	0.51	A	-	-	-
EB LT	7.4	0.01	A	108.6	0.33	F	13.5	0.05	B	-	-	-	14.2	0.04	B
EB TH/RT	-	-	-	30.2	0.48	D	15.8	0.33	C	-	-	-	13.8	0.12	B
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	6.4	0.24	A	-	-	-
WB LT	7.9	0.14	A	1737.0	4.45	F*	21.2	0.53	C	-	-	-	17.2	0.45	B
WB TH/RT	-	-	-	62.5	0.50	F	13.2	0.15	B	-	-	-	13.8	0.12	B
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	6.1	0.30	A	-	-	-
SB LT	-	-	-	8.9	0.03	A	11.4	0.06	B	-	-	-	9.6	0.06	A
SB TH/RT	464.2	1.95	F*	-	-	-	216.4	1.45	F*	-	-	-	7.7	0.68	A
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	4.2	0.67	A	-	-	-
Overall	0.9	-	-	193.1	-	-	125.9	-	F	3.4	-	A	9.3	-	A

Table 5.2a: Future Year 2040 Liloa Drive Intersection Scenarios - AM Peak

Future Year 2040 Conditions															
Intersection	AM Peak Hour of Traffic														
	TWSC North-South			TWSC East-West			All-Way Stop Control			Roundabout (SIDRA)			Traffic Signal		
	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
Kaonoulu Street & Kenolio Road															
NB LT	44.8	0.38	E	7.8	0.04	A	11.9	0.12	B	-	-	-	8.4	0.10	A
NB TH/RT	20.0	0.49	C	-	-	-	15.9	0.46	C	-	-	-	7.1	0.31	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.2	0.25	A	-	-	-
EB LT	7.7	0.02	A	46.5	0.20	E	11.1	0.05	B	-	-	-	8.7	0.04	A
EB TH/RT	-	-	-	40.1	0.77	E	18.7	0.57	C	-	-	-	8.5	0.45	A
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.9	0.31	A	-	-	-
WB LT	8.1	0.08	A	216.3	1.11	F*	13.0	0.22	B	-	-	-	10.2	0.21	B
WB TH/RT	-	-	-	34.6	0.65	D	15.1	0.42	C	-	-	-	8.0	0.34	A
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	1.9	0.25	A	-	-	-
SB LT	82.9	0.86	F	8.1	0.13	A	14.9	0.36	B	-	-	-	9.1	0.29	A
SB TH/RT	35.0	0.68	E	-	-	-	16.2	0.47	C	-	-	-	7.3	0.36	A
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.8	2.80	A	-	-	-
Overall	23.2	-	-	32.8	-	-	15.9	-	C	2.5	-	A	8.2	-	A
Kulanihakoi Street & Liloa Drive/Kenolio Road															
NB LT	-	-	-	8.6	0.05	A	12.6	0.12	B	-	-	-	12.3	0.13	B
NB TH/RT	39.8	0.80	E	-	-	-	28.6	0.75	D	-	-	-	7.7	0.44	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	1.5	0.32	A	-	-	-
EB LT	7.5	0.01	A	40.0	0.14	E	12.3	0.04	B	-	-	-	9.9	0.03	A
EB TH/RT	-	-	-	82.4	0.97	F	24.8	0.66	C	-	-	-	10.5	0.48	B
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	4.0	0.36	A	-	-	-
WB LT	8.1	0.09	A	634.7	2.01	F*	15.7	0.29	C	-	-	-	13.0	0.26	B
WB TH/RT	-	-	-	34.1	0.53	D	15.8	0.34	C	-	-	-	9.2	0.24	A
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	2.8	0.22	A	-	-	-
SB LT	43.5	0.19	E	8.0	0.02	A	11.4	0.05	B	-	-	-	9.0	0.04	A
SB TH/RT	267.7	1.50	F*	-	-	-	103.9	1.10	F*	-	-	-	9.4	0.69	A
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	1.9	0.48	A	-	-	-
Overall	95.8	-	-	66.7	-	-	51.4	-	F	2.4	-	A	9.5	-	A
E. Waipuilani Road & Liloa Drive															
NB LT	-	-	-	9.9	0.11	A	14.2	0.22	B	-	-	-	22.4	0.34	C
NB TH/RT	297.8	1.56	F*	-	-	-	79.3	1.14	F*	-	-	-	8.7	0.49	A
NB LT/TH/RT	-	-	-	-	-	-	-	-	-	0.8	0.42	A	-	-	-
EB LT	7.3	0.01	A	64.7	0.15	F	14.2	0.03	B	-	-	-	15.0	0.02	B
EB TH/RT	-	-	-	28.8	0.48	D	17.3	0.37	C	-	-	-	15.4	0.17	B
EB LT/TH/RT	-	-	-	-	-	-	-	-	-	9.5	0.32	A	-	-	-
WB LT	8.1	0.19	A	2498.6	6.16	F*	32.0	0.77	D	-	-	-	21.6	0.61	C
WB TH/RT	-	-	-	40.3	0.24	E	12.8	0.09	B	-	-	-	14.7	0.05	B
WB LT/TH/RT	-	-	-	-	-	-	-	-	-	5.6	0.33	A	-	-	-
SB LT	-	-	-	8.6	0.03	A	11.8	0.08	B	-	-	-	11.7	0.07	B
SB TH/RT	871.2	2.85	F*	-	-	-	344.1	1.70	F*	-	-	-	14.4	0.80	B
SB LT/TH/RT	-	-	-	-	-	-	-	-	-	7.6	0.79	A	-	-	-
Overall	1.2	-	-	376.4	-	-	175.8	-	F	5.3	-	A	14.4	-	B

6. CONCLUSIONS

Liloa Drive, in a southerly direction, currently extends from East Waipuʻilani Road and dead ends just south of Halekuai Street at the north access to the South Maui Community Park. The Project will extend Liloa Drive further north, to provide the link between East Waipuʻilani Road and Kaʻonoʻulu Street, for a total Project length of approximately 4,200 ft. Liloa Drive will continue north as Kenolio Road to Uwapo Road. In combination with the extension as described in the Liloa Drive Extension – South Maui Community Park to East Welakahao Road TIAR published by ATA in December 2016:

- Liloa Drive/Kenolio Road will ultimately provide a 3.5-mile continuous north-south thoroughfare from Uwapo Road to Auhana Road; and,
- Extend the Kīhei Bikeway further north from East Waipuʻilani Road to Kaʻonoʻulu St.; which will ultimately provide a continuous landscaped Shared Use Path that will extend 1.9 miles from Kaʻonoʻulu Street to East Welakahao Road.

6.1 Existing Conditions

Various minor street movements operate at LOS E/F conditions and below capacity during the AM and PM peak hours of traffic. However, no significant delays or queuing were observed in the general study area. A signal warrant analysis at the Kaʻonoʻulu Street/Piʻilani Highway intersection indicates that a traffic signal is warranted based on the 8-hour and 4-hour warrants for mainline southbound through traffic and conflicting mainline northbound left-turn traffic. However, all movements operate below capacity with minimal queues, since gaps in mainline traffic occur from platoons created upstream at the Ohukai Road signal and downstream at the Piʻikea Avenue signal. HDOT recently opened a double-lane roundabout with two (2) lanes of travel in both the North and South directions along Piʻilani Highway. This intersection will be analyzed with a double-lane roundabout for Base Year and Future Year scenarios.

6.2 Base Year 2040 Without the Project

The anticipated build-out of the Project will likely occur by 2025; but, for planning purposes, a 20-year traffic forecast was used. Therefore, Year 2040 was selected to reflect the benchmark year. By the year 2040, numerous developments are forecast to be complete within the Project study area, many of which are accounted for in the MRTDM. Additionally, Liloa Drive is anticipated to be extended from South Maui Community Park to Auhana Road by Year 2040 with the exception of the Project segment between Kaʻonoʻulu Street and East Waipuʻilani Road.

North-south traffic is estimated to increase overall by approximately 35 percent along South Kīhei Road and by approximately 55 percent along Piʻilani Highway. Majority of the study intersections are forecast to operate worse than the existing conditions due to the increase of growth until 2040. As a result, timing plans for many of the signalized intersections will need to be adjusted and optimized to account for the traffic increases. Some intersections in the Base Year 2040 without the Project scenario will operate at LOS F and over-capacity conditions. Overcapacity conditions along Piʻilani Highway indicate that additional capacity is needed in the form of the planned Liloa Drive Extension, additional through lanes along the highway, or the regional Kīhei Mauka North-South Collector. As discussed in Section 4.3, the State and County have no plans to construct the Kīhei Mauka North-South Collector Road or widen Piʻilani Highway.

6.3 Future Year 2040 WITH the Project

The Project will consist of the extension of Liloa Drive from East Waipuʻilani Road to Kaʻonoʻulu Street. In total, Liloa Drive/Kenolio Road will ultimately provide a 3.5-mile continuous north-south thoroughfare from Uwapo Road to Auhana Road. In addition, the Project will extend the Kīhei Bikeway shared use path further north from East Waipuʻilani Road to Kaʻonoʻulu Street.

It was determined that in total, Liloa Drive Extension is anticipated to service approximately 20-25% of the total north-south traffic in the study area, which would generally translate to approximately 400-700 throughput vehicles along various parts of Liloa Drive Extension. Various turning movement reroutes were also considered that include rerouting a portion of traffic forecast for the nearby residential neighborhoods and commercial properties. All study intersection will improve from Base Year 2040 conditions, with the majority of movements operating at a v/c ratio below 1.0. With reroutes to Liloa Drive Extension, through movements along Piʻilani Highway will improve to LOS D or better however, some movements will continue to operate at over-capacity conditions, similar to Base Year conditions.

A roundabout or traffic signal system should be implemented at these three (3) intersections:

- Liloa Drive Extension/Kaʻonoʻulu Street/Kenolio Road
- Liloa Drive Extension/Kūlanihākoʻi Street/Kenolio Road
- Liloa Drive Extension/East Waipuʻilani Road

If a roundabout is not implemented, it is recommended that exclusive left-turn lanes be provided at all approaches at these three intersections for the signalized intersection control options.

7. RECOMMENDATIONS

7.1 Base Year 2040 Without the Project (includes proposed developments)

1. Optimize signal timing plans along South Kīhei Road and Piʻilani Highway.
2. Construct Liloa Drive Extension from S. Maui Community Park to Auhana Road.
3. Install traffic signal at the Piʻilani Highway/Kaʻonoʻulu Street intersection and South Kīhei Road/Kaʻonoʻulu Street intersection.
    - Note, the recommended laneage at these intersections are based on ATA's assumption of the latest available plans for the adjacent Piʻilani Promenade development and Kūlanihākoʻi High School development as described in Section 4.2. The intersection designs may be subject to change based on development changes or HDOT input.

7.2 Future Year 2040 With the Project

1. Construct Liloa Drive Extension to provide a link between the Kaʻonoʻulu Street and East Waipuʻilani Road.
2. Construct a single-lane roundabout along Liloa Drive Extension at its intersections with Kaʻonoʻulu Street, Kūlanihākoʻi Street, and East Waipuʻilani Road.
3. If a roundabout is not feasible given geometric and right-of-way constraints, a traffic signal may be installed along Liloa Drive Extension at its intersections with Kaʻonoʻulu

Street, Kūlanihāko'i Street, and East Waipu'ilani Road. Exclusive left-turn lanes are recommended on all approaches at these three (3) intersections.

4. Construct left-turn storage lanes at all major intersections and driveway accesses along Liloa Drive Extension where feasible to limit disruptions on Liloa Drive.
5. Provide two-way, stop-controlled (TWSC) intersections along Liloa Drive Extension at its intersections with Heona Place and Namauu Place, with stop approaches along Heona Place and Namauu Place.

8. REFERENCES

1. Austin, Tsutsumi & Associates, Hotel Ike TIAR, 2018.
2. Austin, Tsutsumi & Associates, Kīhei Residential TIAR, 2013.
3. Austin, Tsutsumi & Associates, KIRC TIAR, 2018.
4. Austin, Tsutsumi & Associates, Krausz Downtown Kīhei TIAR, 2014.
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7. Austin, Tsutsumi & Associates, Welakahao Village TIAR, 2019.
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10. Parsons Brinckerhoff, Maui Research and Technology Park TIAR, February 2013.
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12. Phillip Rowell & Associates, Puunene Heavy Industrial Subdivision TIAR, January, 24, 2012.
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15. Phillip Rowell & Associates, Traffic Impact Assessment Report for Wailea MF-11, June 22, 2012.
16. Transportation Research Board, Highway Capacity Manual, 6th Edition, 2016.
17. Wilson Okamoto Corporation, MRPSC Environmental Impact Statement Preparation Notice, May 2010.
18. Wilson Okamoto Corporation, Traffic Impact Report for Kīhei High School, September 2011.

APPENDICES

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

APPENDIX A

TRAFFIC COUNT DATA

Austin, Tsutsumi & Associates

501 Sumner Street, Suite 521
Honolulu, HI 96817-5031
Phone: (808) 533-3646 Fax: (808) 526-1267

File Name : AM_S Kihei Rd - Kaonoulu St
Site Code : 00000000
Start Date : 2/9/2017
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Groups Printed- Unshifted - Bank 1

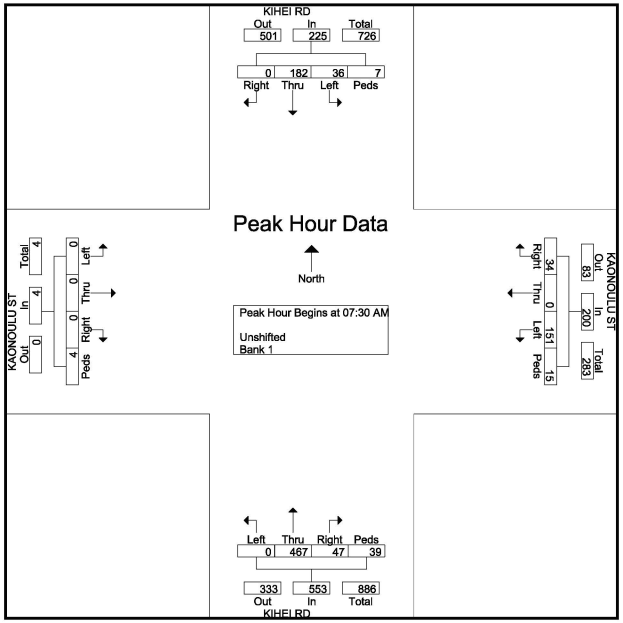
	KIHEI RD Southbound				KAONOULU ST Westbound				KIHEI RD Northbound				KAONOULU ST Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	0	45	3	0	13	0	7	1	1	108	0	2	0	0	0	0	180
06:45 AM	0	53	0	1	11	0	16	3	9	117	0	0	0	0	0	5	215
Total	0	98	3	1	24	0	23	4	10	225	0	2	0	0	0	5	395
07:00 AM	0	49	2	2	9	0	12	10	6	118	0	4	0	0	0	4	216
07:15 AM	0	72	3	2	6	0	7	3	9	117	0	6	0	0	0	0	225
07:30 AM	0	30	4	3	8	0	28	1	15	133	0	8	0	0	0	0	230
07:45 AM	0	19	14	2	11	0	54	7	11	122	0	7	0	0	0	0	247
Total	0	170	23	9	34	0	101	21	41	490	0	25	0	0	0	4	918
08:00 AM	0	49	15	2	10	0	48	5	12	116	0	13	0	0	0	2	272
08:15 AM	0	84	3	0	5	0	21	2	9	96	0	11	0	0	0	2	233
Grand Total	0	401	44	12	73	0	193	32	72	927	0	51	0	0	0	13	1818
Apprch %	0	87.7	9.6	2.6	24.5	0	64.8	10.7	6.9	88.3	0	4.9	0	0	0	100	
Total %	0	22.1	2.4	0.7	4	0	10.6	1.8	4	51	0	2.8	0	0	0	0.7	
Unshifted	0	401	44	12	73	0	193	32	72	927	0	51	0	0	0	13	1818
% Unshifted	0	100	100	100	100	0	100	100	100	100	0	100	0	0	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	KIHEI RD Southbound					KAONOULU ST Westbound					KIHEI RD Northbound					KAONOULU ST Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	30	4	**3**							**15**	**133**			**156**	0	0	0	0	0	230
07:45 AM	0	19	14	2	35	**11**	0	**54**	**7**	**72**	11	122	0	7	140	0	0	0	0	0	247
08:00 AM	0	49	**15**											**13**					**2**	**2**	**272**
08:15 AM	0	**84**	3	0	**87**	5	0	21	2	28	9	96	0	11	116	0	0	0	2	2	233
Total Volume	0	182	36	7	225	34	0	151	15	200	47	467	0	39	553	0	0	0	4	4	982
% App. Total	0	80.9	16	3.1		17	0	75.5	7.5		8.5	84.4	0	7.1		0	0	0	100		
PHF	.000	.542	.600	.583	.647	.773	.000	.699	.536	.694	.783	.878	.000	.750	.886	.000	.000	.000	.500	.500	.903



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Groups Printed- Unshifted - Bank 1

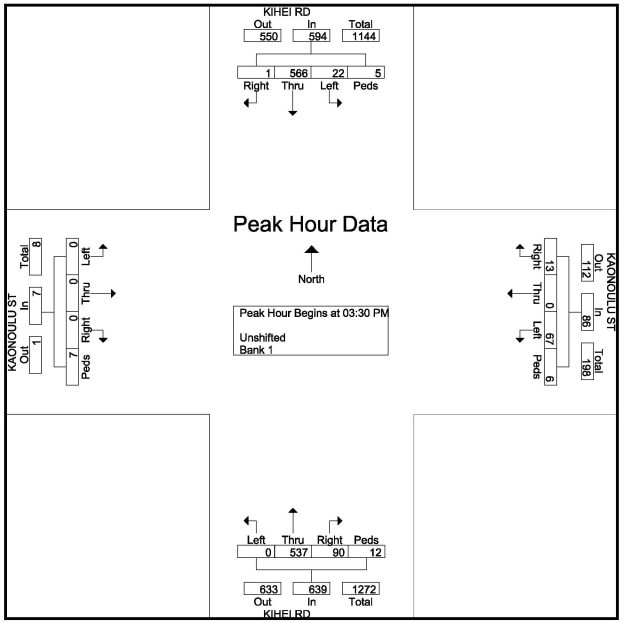
	KIHEI RD Southbound				KAONOULU ST Westbound				KIHEI RD Northbound				KAONOULU ST Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
03:00 PM	0	140	3	4	7	0	11	8	19	139	0	2	0	0	0	0	333
03:15 PM	0	133	5	1	2	0	10	2	28	132	0	3	0	0	0	0	316
03:30 PM	1	137	6	2	1	0	12	1	22	150	0	2	0	0	0	1	335
03:45 PM	0	133	4	0	6	0	21	0	21	126	0	5	0	0	0	0	316
Total	1	543	18	7	16	0	54	11	90	547	0	12	0	0	0	1	1300
04:00 PM	0	138	3	1	4	0	18	3	24	122	0	3	0	0	0	6	322
04:15 PM	0	158	9	2	2	0	16	2	23	139	0	2	0	0	0	0	353
04:30 PM	0	119	10	2	5	0	15	1	30	145	0	1	0	0	0	1	329
04:45 PM	0	163	3	1	4	0	13	1	18	108	0	2	0	0	0	0	313
Total	0	578	25	6	15	0	62	7	95	514	0	8	0	0	0	7	1317
Grand Total	1	1121	43	13	31	0	116	18	185	1061	0	20	0	0	0	8	2617
Apprch %	0.1	95.2	3.7	1.1	18.8	0	70.3	10.9	14.6	83.8	0	1.6	0	0	0	100	
Total %	0	42.8	1.6	0.5	1.2	0	4.4	0.7	7.1	40.5	0	0.8	0	0	0	0.3	
Unshifted	1	1121	43	13	31	0	116	18	185	1061	0	20	0	0	0	8	2617
% Unshifted	100	100	100	100	100	0	100	100	100	100	0	100	0	0	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
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	KIHEI RD Southbound					KAONOULU ST Westbound					KIHEI RD Northbound					KAONOULU ST Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	**1**			**2**								**150**			**174**	0	0	0	1	1	335
03:45 PM	0	133	4	0	137	**6**	0	**21**		**27**	21	126	0	**5**							
04:00 PM	**0**	**138**	**3**	**1**	**142**	**4**	**0**	**18**	**3**	25	**24**	**122**	**0**	**3**	**149**	**0**	**0**	**0**	**6**	**6**	322
04:15 PM	0	**158**	**9**		**169**	2	0	16	2	20	23	139	0	2	164	0	0	0	0	0	**353**
Total Volume	1	566	22	5	594	13	0	67	6	86	90	537	0	12	639	0	0	0	7	7	1326
% App. Total	0.2	95.3	3.7	0.8		15.1	0	77.9	7		14.1	84	0	1.9		0	0	0	100		
PHF	.250	.896	.611	.625	.879	.542	.000	.798	.500	.796	.938	.895	.000	.600	.918	.000	.000	.000	.292	.292	.939



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Site Code : 00000000
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Groups Printed- Unshifted - Bank 1

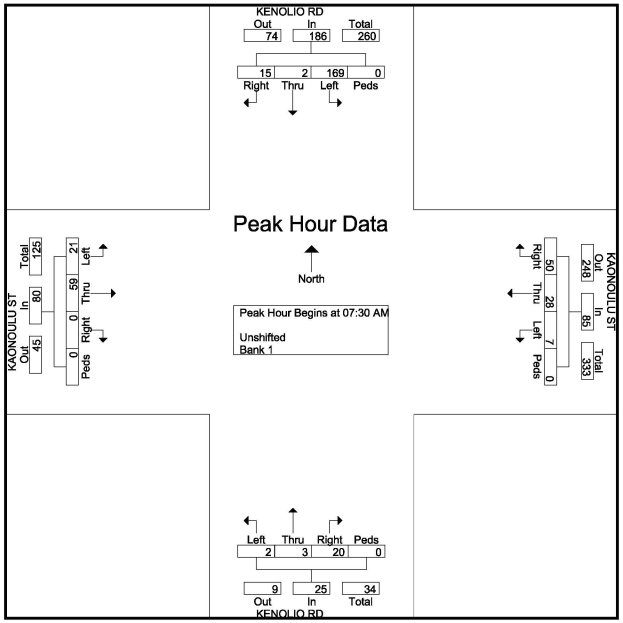
	KAONOULU ST Eastbound				KAONOULU ST Westbound				KENOLIO RD Northbound				KENOLIO RD Southbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	0	4	3	0	3	2	2	0	3	1	1	0	2	0	20	0	41
06:45 AM	1	8	1	0	3	6	0	0	2	1	0	0	3	0	30	0	55
Total	1	12	4	0	6	8	2	0	5	2	1	0	5	0	50	0	96
07:00 AM	0	9	2	0	8	1	0	0	5	2	0	0	3	0	25	0	55
07:15 AM	0	6	4	0	14	2	0	0	4	2	0	0	1	0	35	0	68
07:30 AM	0	15	7	0	15	6	2	0	7	2	1	0	2	1	53	0	111
07:45 AM	0	15	4	0	10	9	1	0	4	0	0	0	9	0	41	0	93
Total	0	45	17	0	47	18	3	0	20	6	1	0	15	1	154	0	327
08:00 AM	0	21	6	0	11	10	1	0	4	1	0	0	2	1	45	0	102
08:15 AM	0	8	4	0	14	3	3	0	5	0	1	0	2	0	30	0	70
Grand Total	1	86	31	0	78	39	9	0	34	9	3	0	24	2	279	0	595
Apprch %	0.8	72.9	26.3	0	61.9	31	7.1	0	73.9	19.6	6.5	0	7.9	0.7	91.5	0	
Total %	0.2	14.5	5.2	0	13.1	6.6	1.5	0	5.7	1.5	0.5	0	4	0.3	46.9	0	
Unshifted	1	86	31	0	78	39	9	0	34	9	3	0	24	2	279	0	595
% Unshifted	100	100	100	0	100	100	100	0	100	100	100	0	100	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
Start Date : 2/9/2017
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	KAONOULU ST Eastbound					KAONOULU ST Westbound					KENOLIO RD Northbound					KENOLIO RD Southbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	15	**7**			**15**	6	2	0	**23**	**7**	**2**	**1**	0	**10**	2	**1**	**53**		**56**	**111**
07:45 AM	0	15	4	0	19	10	9	1	0	20	4	0	0	0	4	**9**					
08:00 AM	**0**	**21**	6	0	**27**	11	**10**	**1**	**0**	22	**4**	**1**	**0**	**0**	**5**	**2**	**1**	**45**	**0**	**48**	**102**
08:15 AM	**0**	**8**	**4**	**0**	**12**	**14**	**3**	**3**	**0**	**20**	**5**	**0**	**1**	**0**	**6**	**2**	**0**	**30**	**0**	**32**	**70**
Total Volume	0	59	21	0	80	50	28	7	0	85	20	3	2	0	25	15	2	169	0	186	376
% App. Total	0	73.8	26.2	0		58.8	32.9	8.2	0		80	12	8	0		8.1	1.1	90.9	0		
PHF	.000	.702	.750	.000	.741	.833	.700	.583	.000	.924	.714	.375	.500	.000	.625	.417	.500	.797	.000	.830	.847



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Groups Printed- Unshifted - Bank 1

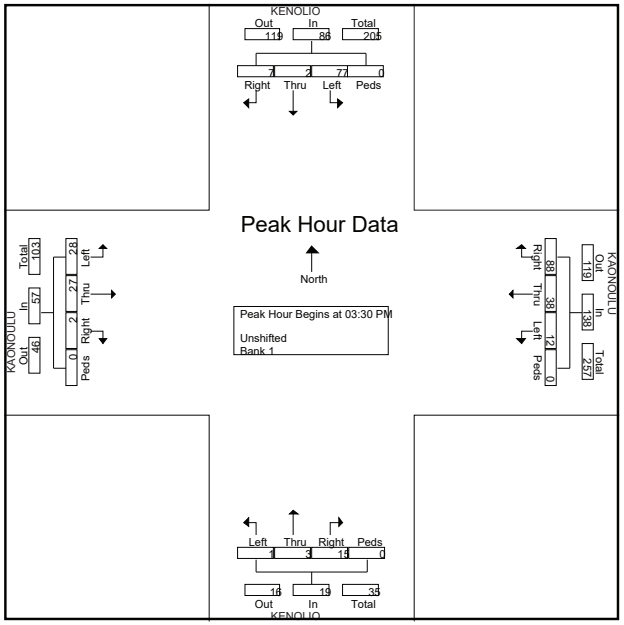
	KENOLIO Southbound				KAONOULU Westbound				KENOLIO Northbound				KAONOULU Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	17	0	1	0	4	9	26	0	0	1	3	0	7	4	0	0	72
03:15 PM	22	0	3	0	4	10	24	0	0	0	2	0	8	12	1	0	86
03:30 PM	13	0	1	0	0	7	20	0	0	1	5	0	6	7	1	0	61
03:45 PM	22	0	2	0	4	9	19	0	0	0	4	0	1	9	0	0	70
Total	74	0	7	0	12	35	89	0	0	2	14	0	22	32	2	0	289
04:00 PM	17	0	1	0	5	14	19	0	0	1	2	0	12	6	1	0	78
04:15 PM	25	2	3	0	3	8	30	0	1	1	4	0	9	5	0	0	91
04:30 PM	29	1	3	0	3	9	26	0	0	1	7	0	5	4	0	0	88
04:45 PM	31	1	3	0	3	10	18	0	0	0	6	0	6	4	0	0	82
Total	102	4	10	0	14	41	93	0	1	3	19	0	32	19	1	0	339
Grand Total	176	4	17	0	26	76	182	0	1	5	33	0	54	51	3	0	628
Apprch %	89.3	2	8.6	0	9.2	26.8	64.1	0	2.6	12.8	84.6	0	50	47.2	2.8	0	
Total %	28	0.6	2.7	0	4.1	12.1	29	0	0.2	0.8	5.3	0	8.6	8.1	0.5	0	
Unshifted	176	4	17	0	26	76	182	0	1	5	33	0	54	51	3	0	628
% Unshifted	100	100	100	0	100	100	100	0	100	100	100	0	100	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	KENOLIO Southbound					KAONOULU Westbound					KENOLIO Northbound					KAONOULU 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	13	0	1	0	14	0	7	20	0	27	0	**1**	**5**	0	**6**	6	7	**1**	0	14	61
03:45 PM	22	0	2	0	24	4	9	19	0	32	0	0	4	0	4	1	**9**	0	0	10	70
04:00 PM	17	0	1	0	18	**5**	**14**	19	0	38	0	1	2	0	3	**12**	6	1	0	**19**	78
04:15 PM	**25**	**2**	**3**	0	**30**	3	8	**30**	0	**41**	**1**	1	4	0	6	9	5	0	0	14	**91**
Total	77	2	7	0	86	12	38	88	0	138	1	3	15	0	19	28	27	2	0	57	300
Volume % App. Total	89.5	2.3	8.1	0		8.7	27.5	63.8	0		5.3	15.8	78.9	0		49.1	47.4	3.5	0		
PHF	.770	.250	.583	.000	.717	.600	.679	.733	.000	.841	.250	.750	.750	.000	.792	.583	.750	.500	.000	.750	.824



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Site Code : 00000000
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Groups Printed- Unshifted - Bank 1

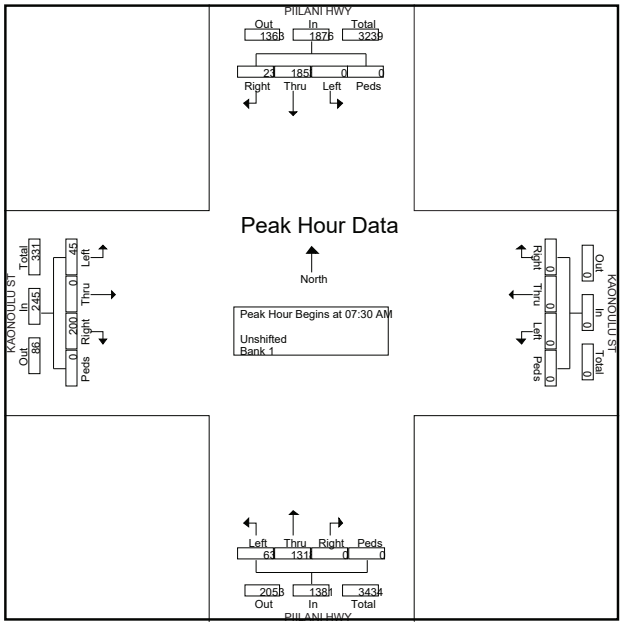
	PIILANI HWY Southbound				KAONOULU ST Westbound				PIILANI HWY Northbound				KAONOULU ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30 AM	0	281	1	0	0	0	0	0	7	212	0	0	6	0	22	0	529
06:45 AM	0	338	1	0	0	0	0	0	8	288	0	0	8	0	32	0	675
Total	0	619	2	0	0	0	0	0	15	500	0	0	14	0	54	0	1204
07:00 AM	0	352	1	0	0	0	0	0	9	317	0	0	6	0	33	0	718
07:15 AM	0	479	3	0	0	0	0	0	13	318	0	0	4	0	41	0	858
07:30 AM	0	493	6	0	0	0	0	0	17	336	0	0	11	0	64	0	927
07:45 AM	0	440	5	0	0	0	0	0	16	276	0	0	19	0	40	0	796
Total	0	1764	15	0	0	0	0	0	55	1247	0	0	40	0	178	0	3299
08:00 AM	0	464	6	0	0	0	0	0	16	344	0	0	10	0	59	0	899
08:15 AM	0	456	6	0	0	0	0	0	14	362	0	0	5	0	37	0	880
Grand Total	0	3303	29	0	0	0	0	0	100	2453	0	0	69	0	328	0	6282
Apprch %	0	99.1	0.9	0	0	0	0	0	3.9	96.1	0	0	17.4	0	82.6	0	
Total %	0	52.6	0.5	0	0	0	0	0	1.6	39	0	0	1.1	0	5.2	0	
Unshifted	0	3303	29	0	0	0	0	0	100	2453	0	0	69	0	328	0	6282
% Unshifted	0	100	100	0	0	0	0	0	100	100	0	0	100	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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501 Sumner Street, Suite 521
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File Name : AM_Piilani Hwy - Kaonoulu St
Site Code : 00000000
Start Date : 2/9/2017
Page No : 2

	PIILANI HWY Southbound					KAONOULU ST Westbound					PIILANI HWY Northbound					KAONOULU 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 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	493	6	0	499	0	0	0	0	0	17	336	0	0	353	11	0	64	0	75	927
07:45 AM	0	440	5	0	445	0	0	0	0	0	16	276	0	0	292	19	0	40	0	59	796
08:00 AM	0	464	6	0	470	0	0	0	0	0	16	344	0	0	360	10	0	59	0	69	899
08:15 AM	0	456	6	0	462	0	0	0	0	0	14	362	0	0	376	5	0	37	0	42	880
Total Volume	0	1853	23	0	1876	0	0	0	0	0	63	1318	0	0	1381	45	0	200	0	245	3502
% App. Total	0	98.8	1.2	0		0	0	0	0		4.6	95.4	0	0		18.4	0	81.6	0		
PHF	.000	.940	.958	.000	.940	.000	.000	.000	.000	.000	.926	.910	.000	.000	.918	.592	.000	.781	.000	.817	.944



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File Name : PM_Piilani Hwy - Kaonoulu St
Site Code : 00000000
Start Date : 2/9/2017
Page No : 1

Groups Printed- Unshifted - Bank 1

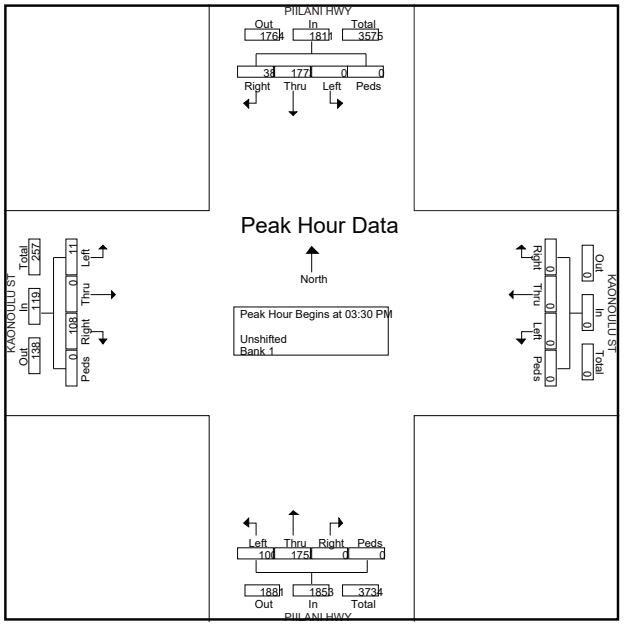
	PIILANI HWY Southbound				KAONOULU ST Westbound				PIILANI HWY Northbound				KAONOULU ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	0	384	10	0	0	0	0	0	29	369	0	0	1	0	23	0	816
03:15 PM	0	420	11	0	0	0	0	0	27	400	0	0	9	0	27	0	894
03:30 PM	0	421	5	0	0	0	0	0	22	455	0	0	1	0	23	0	927
03:45 PM	0	494	9	0	0	0	0	0	23	425	0	0	6	0	30	0	987
Total	0	1719	35	0	0	0	0	0	101	1649	0	0	17	0	103	0	3624
04:00 PM	0	446	13	0	0	0	0	0	25	433	0	0	3	0	22	0	942
04:15 PM	0	412	11	0	0	0	0	0	30	440	0	0	1	0	33	0	927
04:30 PM	0	457	14	0	0	0	0	0	23	415	0	0	1	0	38	0	948
04:45 PM	0	463	9	0	0	0	0	0	22	366	0	0	2	0	38	0	900
Total	0	1778	47	0	0	0	0	0	100	1654	0	0	7	0	131	0	3717
Grand Total	0	3497	82	0	0	0	0	0	201	3303	0	0	24	0	234	0	7341
Apprch %	0	97.7	2.3	0	0	0	0	0	5.7	94.3	0	0	9.3	0	90.7	0	
Total %	0	47.6	1.1	0	0	0	0	0	2.7	45	0	0	0.3	0	3.2	0	
Unshifted	0	3497	82	0	0	0	0	0	201	3303	0	0	24	0	234	0	7341
% Unshifted	0	100	100	0	0	0	0	0	100	100	0	0	100	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
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	PIILANI HWY Southbound					KAONOULU ST Westbound					PIILANI HWY Northbound					KAONOULU 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	421	5	0	426	0	0	0	0	0	22	455	0	0	477	1	0	23	0	24	927
03:45 PM	0	494	9	0	503	0	0	0	0	0	23	425	0	0	448	6	0	30	0	36	987
04:00 PM	0	446	13	0	459	0	0	0	0	0	25	433	0	0	458	3	0	22	0	25	942
04:15 PM	0	412	11	0	423	0	0	0	0	0	30	440	0	0	470	1	0	33	0	34	927
Total Volume	0	1773	38	0	1811	0	0	0	0	0	100	1753	0	0	1853	11	0	108	0	119	3783
% App. Total	0	97.9	2.1	0		0	0	0	0		5.4	94.6	0	0		9.2	0	90.8	0		
PHF	.000	.897	.731	.000	.900	.000	.000	.000	.000	.000	.833	.963	.000	.000	.971	.458	.000	.818	.000	.826	.958



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File Name : AM_S Kihei Rd - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
Page No : 1

Groups Printed- Unshifted - Bank 1

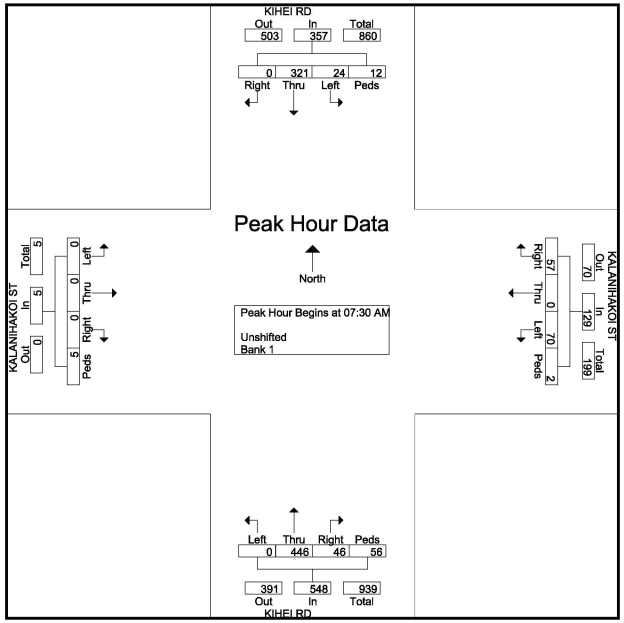
	KIHEI RD Southbound				KALANIHAKOI ST Westbound				KIHEI RD Northbound				KALANIHAKOI ST Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	0	49	1	2	6	0	8	4	3	92	0	2	0	0	0	0	167
06:45 AM	0	66	8	1	20	0	4	4	6	106	0	3	0	0	0	1	219
Total	0	115	9	3	26	0	12	8	9	198	0	5	0	0	0	1	386
07:00 AM	0	61	3	2	12	0	9	1	5	105	0	1	0	0	0	1	200
07:15 AM	0	79	2	3	25	0	9	4	4	107	0	4	0	0	0	0	237
07:30 AM	0	57	2	2	19	0	15	1	9	120	0	13	0	0	0	0	238
07:45 AM	0	67	12	4	14	0	16	0	12	123	0	11	0	0	0	1	260
Total	0	264	19	11	70	0	49	6	30	455	0	29	0	0	0	2	935
08:00 AM	0	95	4	4	12	0	20	0	12	115	0	15	0	0	0	0	277
08:15 AM	0	102	6	2	12	0	19	1	13	88	0	17	0	0	0	4	264
Grand Total	0	576	38	20	120	0	100	15	64	856	0	66	0	0	0	7	1862
Apprch %	0	90.9	6	3.2	51.1	0	42.6	6.4	6.5	86.8	0	6.7	0	0	0	100	
Total %	0	30.9	2	1.1	6.4	0	5.4	0.8	3.4	46	0	3.5	0	0	0	0.4	
Unshifted	0	576	38	20	120	0	100	15	64	856	0	66	0	0	0	7	1862
% Unshifted	0	100	100	100	100	0	100	100	100	100	0	100	0	0	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
Start Date : 2/9/2017
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	KIHEI RD Southbound					KALANIHAKOI ST Westbound					KIHEI RD Northbound					KALANIHAKOI ST Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	57	2	2	61	**19**	0	15	**1**	**35**	9	120	0	13	142	0	0	0	0	0	238
07:45 AM	0	67	**12**	**4**								**123**			**146**	0	0	0	1	1	260
08:00 AM	0	95	4	4	103	12	0	**20**													**277**
08:15 AM	0	**102**	6	2	**110**	12	0	19	1	32	**13**			**17**					**4**	**4**	264
Total Volume	0	321	24	12	357	57	0	70	2	129	46	446	0	56	548	0	0	0	5	5	1039
% App. Total	0	89.9	6.7	3.4		44.2	0	54.3	1.6		8.4	81.4	0	10.2		0	0	0	100		
PHF	.000	.787	.500	.750	.811	.750	.000	.875	.500	.921	.885	.907	.000	.824	.938	.000	.000	.000	.313	.313	.938



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File Name : PM_S Kihei Rd - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
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Groups Printed- Unshifted - Bank 1

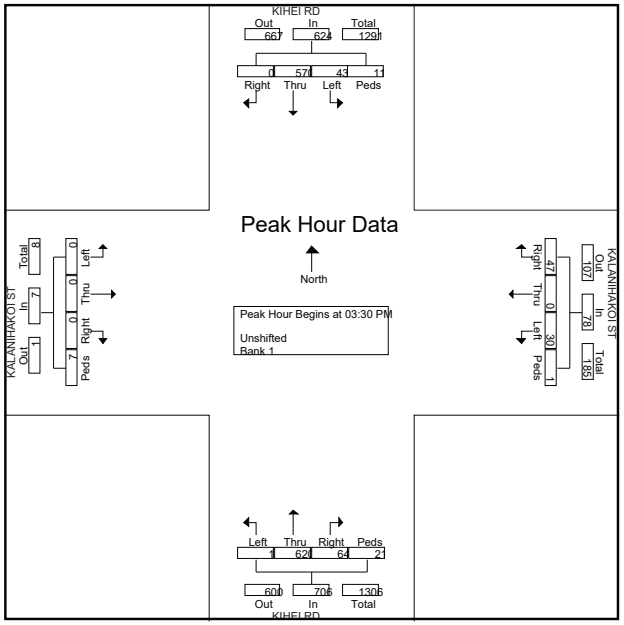
	KIHEI RD Southbound				KALANIHAKOI ST Westbound				KIHEI RD Northbound				KALANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	10	151	0	3	10	4	16	1	0	139	20	4	0	3	0	1	362
03:15 PM	8	141	0	4	11	1	13	0	0	160	15	2	0	0	0	0	355
03:30 PM	4	135	0	3	14	0	14	0	0	164	18	7	0	0	0	3	362
03:45 PM	21	144	0	4	3	0	14	1	0	135	15	4	0	0	0	3	344
Total	43	571	0	14	38	5	57	2	0	598	68	17	0	3	0	7	1423
04:00 PM	10	135	0	3	7	0	9	0	1	154	17	6	0	0	0	1	343
04:15 PM	8	156	0	1	6	0	10	0	0	167	14	4	0	0	0	0	366
04:30 PM	18	129	1	2	11	0	11	0	0	160	11	10	0	0	0	4	357
04:45 PM	12	158	0	1	9	0	10	0	0	134	17	5	0	0	0	5	351
Total	48	578	1	7	33	0	40	0	1	615	59	25	0	0	0	10	1417
Grand Total	91	1149	1	21	71	5	97	2	1	1213	127	42	0	3	0	17	2840
Apprch %	7.2	91	0.1	1.7	40.6	2.9	55.4	1.1	0.1	87.7	9.2	3	0	15	0	85	
Total %	3.2	40.5	0	0.7	2.5	0.2	3.4	0.1	0	42.7	4.5	1.5	0	0.1	0	0.6	
Unshifted	91	1149	1	21	71	5	97	2	1	1213	127	42	0	3	0	17	2840
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	0	100	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : PM_S Kihei Rd - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
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	KIHEI RD Southbound					KALANIHAKOI ST Westbound					KIHEI RD Northbound					KALANIHAKOI 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	4	135	0	3	142	**14**	0	**14**	0	**28**	0	164	**18**	**7**	**189**	0	0	0	**3**	**3**	362
03:45 PM	**21**	144	0	**4**	**169**	3	0	14	**1**	18	0	135	15	4	154	0	0	0	3	3	344
04:00 PM	10	135	0	3	148	7	0	9	0	16	**1**	154	17	6	178	0	0	0	1	1	343
04:15 PM	8	**156**	0	1	165	6	0	10	0	16	0	**167**	14	4	185	0	0	0	0	0	**366**
Total	43	570	0	11	624	30	0	47	1	78	1	620	64	21	706	0	0	0	7	7	1415
Volume % App. Total	6.9	91.3	0	1.8		38.5	0	60.3	1.3		0.1	87.8	9.1	3		0	0	0	100		
PHF	.512	.913	.000	.688	.923	.536	.000	.839	.250	.696	.250	.928	.889	.750	.934	.000	.000	.000	.583	.583	.967



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File Name : AM_Heona Pl - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
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Groups Printed- Unshifted - Bank 1

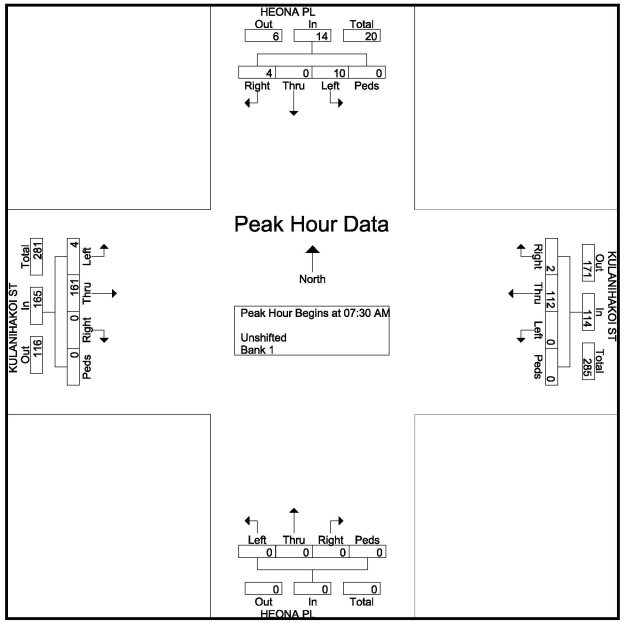
	HEONA PL Southbound				KULANIHAKOI ST Westbound				HEONA PL Northbound				KULANIHAKOI ST Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	1	0	3	0	0	6	0	0	0	0	0	0	0	19	0	0	29
06:45 AM	1	0	0	0	0	4	0	0	0	0	0	0	0	28	3	0	36
Total	2	0	3	0	0	10	0	0	0	0	0	0	0	47	3	0	65
07:00 AM	1	0	1	0	3	7	1	0	0	0	0	0	0	34	1	0	48
07:15 AM	1	0	1	0	0	21	0	0	0	0	0	0	0	25	0	0	48
07:30 AM	0	0	3	0	0	18	0	0	0	0	0	0	0	35	2	0	58
07:45 AM	1	0	4	0	0	27	0	0	0	0	0	0	0	27	1	0	60
Total	3	0	9	0	3	73	1	0	0	0	0	0	0	121	4	0	214
08:00 AM	2	0	2	0	1	42	0	0	0	0	0	0	0	48	0	0	95
08:15 AM	1	0	1	0	1	25	0	0	0	0	0	0	0	51	1	0	80
Grand Total	8	0	15	0	5	150	1	0	0	0	0	0	0	267	8	0	454
Apprch %	34.8	0	65.2	0	3.2	96.2	0.6	0	0	0	0	0	0	97.1	2.9	0	
Total %	1.8	0	3.3	0	1.1	33	0.2	0	0	0	0	0	0	58.8	1.8	0	
Unshifted	8	0	15	0	5	150	1	0	0	0	0	0	0	267	8	0	454
% Unshifted	100	0	100	0	100	100	100	0	0	0	0	0	0	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	HEONA PL Southbound					KULANIHAKOI ST Westbound					HEONA PL Northbound					KULANIHAKOI ST Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	3	0	3	0	18	0	0	18	0	0	0	0	0	0	35	**2**			
07:45 AM	**1**	**0**	**4**	**0**	**5**	0	27	0	0	27	0	0	0	0	0	0	27	1	0	28	60
08:00 AM	**2**					**1**	**42**			**43**	0	0	0	0	0	0	48	0	0	48	**95**
08:15 AM	1	0	1	0	2	1	25	0	0	26	0	0	0	0	0	0	**51**	1	0	**52**	80
Total Volume	4	0	10	0	14	2	112	0	0	114	0	0	0	0	0	0	161	4	0	165	293
% App. Total	28.6	0	71.4	0		1.8	98.2	0	0		0	0	0	0		0	97.6	2.4	0		
PHF	.500	.000	.625	.000	.700	.500	.667	.000	.000	.663	.000	.000	.000	.000	.000	.000	.789	.500	.000	.793	.771



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Start Date : 2/9/2017
Page No : 1

Groups Printed- Unshifted - Bank 1

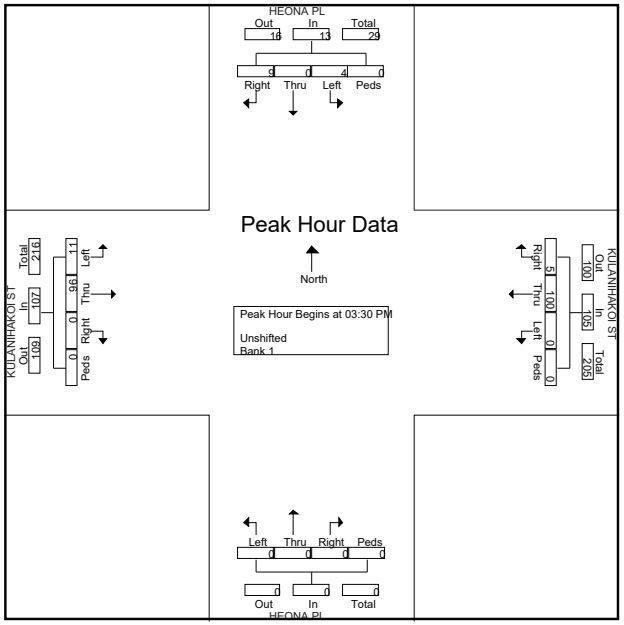
	HEONA PL Southbound				KULANIHAKOI ST Westbound				HEONA PL Northbound				KULANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	1	0	1	0	0	41	2	0	0	0	0	0	1	43	0	0	89
03:15 PM	1	0	2	0	0	30	2	0	0	0	0	0	0	27	0	0	62
03:30 PM	1	0	2	0	0	30	2	0	0	0	0	0	4	21	0	0	60
03:45 PM	2	0	1	0	0	23	1	0	0	0	0	0	2	27	0	0	56
Total	5	0	6	0	0	124	7	0	0	0	0	0	7	118	0	0	267
04:00 PM	1	0	3	0	0	23	2	0	0	0	0	0	2	21	0	0	52
04:15 PM	0	0	3	0	0	24	0	0	0	0	0	0	3	27	0	0	57
04:30 PM	2	0	0	0	1	27	2	0	0	0	0	0	0	24	0	0	56
04:45 PM	3	0	0	0	0	30	3	0	0	0	0	0	0	22	0	0	58
Total	6	0	6	0	1	104	7	0	0	0	0	0	5	94	0	0	223
Grand Total	11	0	12	0	1	228	14	0	0	0	0	0	12	212	0	0	490
Apprch %	47.8	0	52.2	0	0.4	93.8	5.8	0	0	0	0	0	5.4	94.6	0	0	
Total %	2.2	0	2.4	0	0.2	46.5	2.9	0	0	0	0	0	2.4	43.3	0	0	
Unshifted	11	0	12	0	1	228	14	0	0	0	0	0	12	212	0	0	490
% Unshifted	100	0	100	0	100	100	100	0	0	0	0	0	100	100	0	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : PM_Heona Pl - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
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	HEONA PL Southbound					KULANIHAKOI ST Westbound					HEONA PL Northbound					KULANIHAKOI 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	1	0	2	0	3	0	**30**	**2**	0	**32**	0	0	0	0	0	**4**	21	0	0	25	**60**
03:45 PM	**2**	0	1	0	3	0	23	1	0	24	0	0	0	0	0	2	**27**	0	0	29	56
04:00 PM	1	0	**3**	0	**4**	0	23	2	0	25	0	0	0	0	0	2	21	0	0	23	52
04:15 PM	0	0	3	0	3	0	24	0	0	24	0	0	0	0	0	3	27	0	0	**30**	57
Total Volume	4	0	9	0	13	0	100	5	0	105	0	0	0	0	0	11	96	0	0	107	225
% App. Total	30.8	0	69.2	0		0	95.2	4.8	0		0	0	0	0		10.3	89.7	0	0		
PHF	.500	.000	.750	.000	.813	.000	.833	.625	.000	.820	.000	.000	.000	.000	.000	.688	.889	.000	.000	.892	.938



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File Name : AM_Piilani Hwy - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
Page No : 1

Groups Printed- Unshifted - Bank 1

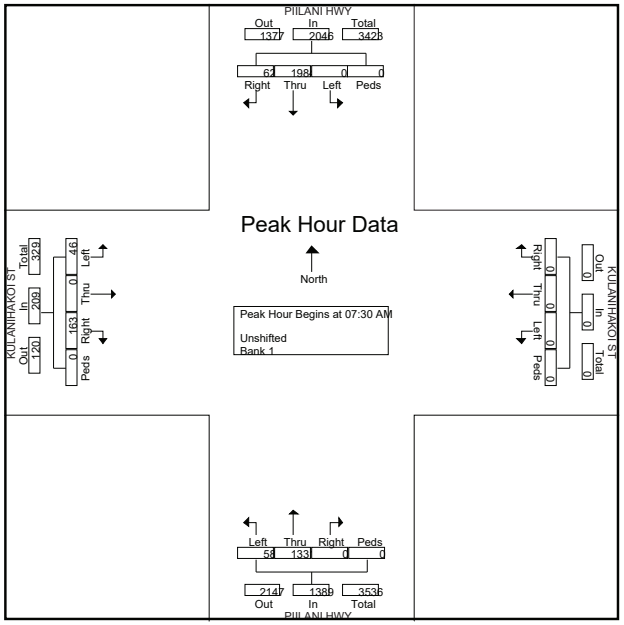
	PIILANI HWY Southbound				KULANIHAKOI ST Westbound				PIILANI HWY Northbound				KULANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30 AM	0	300	3	0	0	0	0	0	3	207	0	0	12	0	13	0	538
06:45 AM	0	364	3	0	0	0	0	0	2	282	1	0	13	0	15	0	680
Total	0	664	6	0	0	0	0	0	5	489	1	0	25	0	28	0	1218
07:00 AM	0	380	6	0	0	0	0	0	3	308	0	0	17	0	18	0	732
07:15 AM	0	500	17	0	0	0	0	0	5	320	0	0	12	0	26	0	880
07:30 AM	0	552	4	0	0	0	0	0	11	339	0	0	12	0	40	0	958
07:45 AM	0	463	18	0	0	0	0	0	18	287	0	0	5	0	31	0	822
Total	0	1895	45	0	0	0	0	0	37	1254	0	0	46	0	115	0	3392
08:00 AM	0	493	25	0	0	0	0	0	18	345	0	0	14	0	50	0	945
08:15 AM	0	476	15	0	0	0	0	0	11	360	0	0	15	0	42	0	919
Grand Total	0	3528	91	0	0	0	0	0	71	2448	1	0	100	0	235	0	6474
Apprch %	0	97.5	2.5	0	0	0	0	0	2.8	97.1	0	0	29.9	0	70.1	0	
Total %	0	54.5	1.4	0	0	0	0	0	1.1	37.8	0	0	1.5	0	3.6	0	
Unshifted	0	3528	91	0	0	0	0	0	71	2448	1	0	100	0	235	0	6474
% Unshifted	0	100	100	0	0	0	0	0	100	100	100	0	100	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
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	PIILANI HWY Southbound					KULANIHAKOI ST Westbound					PIILANI HWY Northbound					KULANIHAKOI 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 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	**552**	4	0	**556**	0	0	0	0	0	11	339	0	0	350	12	0	40	0	52	**958**
07:45 AM	0	463	18	0	481	0	0	0	0	0	**18**	287	0	0	305	5	0	31	0	36	822
08:00 AM	0	493	**25**	0	518	0	0	0	0	0	18	345	0	0	363	14	0	**50**	0	**64**	945
08:15 AM	0	476	15	0	491	0	0	0	0	0	11	**360**	0	0	**371**	**15**	0	42	0	57	919
Total	0	198 4	62	0	2046	0	0	0	0	0	58	133 1	0	0	1389	46	0	163	0	209	3644
Volume																					
% App. Total	0	97	3	0		0	0	0	0		4.2	95.8	0	0		22	0	78	0		
PHF	.000	.899	.620	.000	.920	.000	.000	.000	.000	.000	.806	.924	.000	.000	.936	.767	.000	.815	.000	.816	.951



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File Name : PM_Piilani Hwy - Kulanihakoi St
Site Code : 00000000
Start Date : 2/9/2017
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Groups Printed- Unshifted - Bank 1

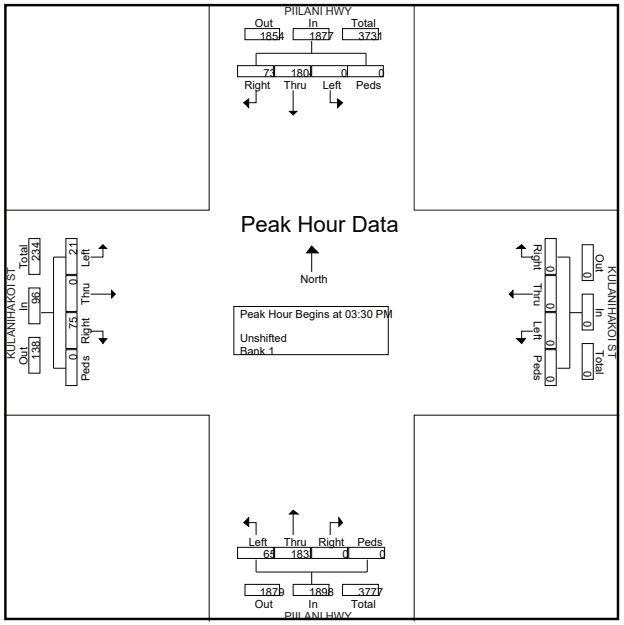
	PIILANI HWY Southbound				KULANIHAKOI ST Westbound				PIILANI HWY Northbound				KULANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	0	393	14	0	0	0	0	0	26	390	0	0	8	0	31	0	862
03:15 PM	0	428	18	0	0	0	0	0	23	423	0	0	4	0	26	0	922
03:30 PM	0	425	19	0	0	0	0	0	20	470	0	0	5	0	20	0	959
03:45 PM	0	509	14	0	0	0	0	0	15	450	0	0	3	0	22	0	1013
Total	0	1755	65	0	0	0	0	0	84	1733	0	0	20	0	99	0	3756
04:00 PM	0	443	24	0	0	0	0	0	14	452	0	0	2	0	19	0	954
04:15 PM	0	427	16	0	0	0	0	0	16	461	0	0	11	0	14	0	945
04:30 PM	0	465	25	0	0	0	0	0	11	436	0	0	4	0	18	0	959
04:45 PM	0	475	25	0	0	0	0	0	9	384	0	0	4	0	23	0	920
Total	0	1810	90	0	0	0	0	0	50	1733	0	0	21	0	74	0	3778
Grand Total	0	3565	155	0	0	0	0	0	134	3466	0	0	41	0	173	0	7534
Apprch %	0	95.8	4.2	0	0	0	0	0	3.7	96.3	0	0	19.2	0	80.8	0	
Total %	0	47.3	2.1	0	0	0	0	0	1.8	46	0	0	0.5	0	2.3	0	
Unshifted	0	3565	155	0	0	0	0	0	134	3466	0	0	41	0	173	0	7534
% Unshifted	0	100	100	0	0	0	0	0	100	100	0	0	100	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : PM_Piilani Hwy - Kulanihakoi St
Site Code : 00000000
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	PIILANI HWY Southbound					KULANIHAKOI ST Westbound					PIILANI HWY Northbound					KULANIHAKOI 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	425	19	0	444	0	0	0	0	0	**20**	**470**	0	0	**490**	5	0	20	0	**25**	959
03:45 PM	0	**509**	14	0	**523**	0	0	0	0	0	15	450	0	0	465	3	0	**22**	0	25	**1013**
04:00 PM	0	443	**24**	0	467	0	0	0	0	0	14	452	0	0	466	2	0	19	0	21	954
04:15 PM	0	427	16	0	443	0	0	0	0	0	16	461	0	0	477	**11**	0	14	0	25	945
Total	0	1804	73	0	1877	0	0	0	0	0	65	1833	0	0	1898	21	0	75	0	96	3871
Volume																					
% App. Total	0	96.1	3.9	0		0	0	0	0		3.4	96.6	0	0		21.9	0	78.1	0		
PHF	.000	.886	.760	.000	.897	.000	.000	.000	.000	.000	.813	.975	.000	.000	.968	.477	.000	.852	.000	.960	.955



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File Name : AM_S Kihei Rd - Namuu Pl
Site Code : 00000000
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Groups Printed- Unshifted - Bank 1

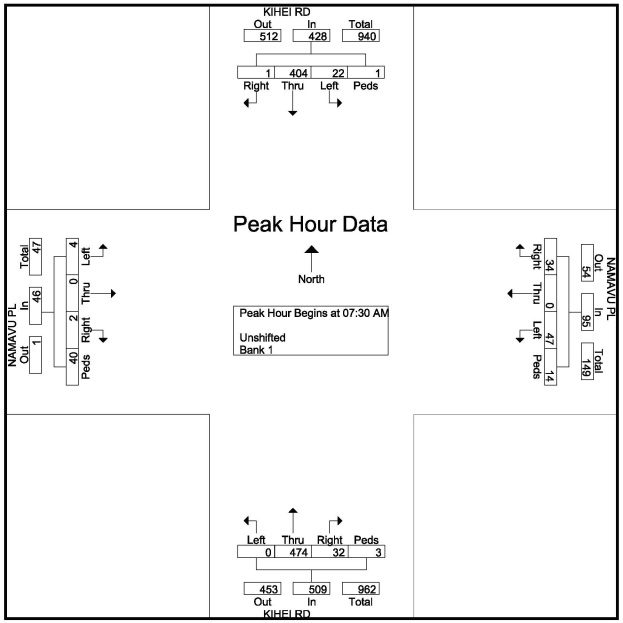
	KIHEI RD Southbound				NAMAVU PL Westbound				KIHEI RD Northbound				NAMAVU PL Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	0	54	3	0	6	0	4	2	1	69	0	0	0	0	1	0	140
06:45 AM	1	74	1	0	15	0	18	0	8	96	0	0	1	0	0	0	214
Total	1	128	4	0	21	0	22	2	9	165	0	0	1	0	1	0	354
07:00 AM	0	82	4	0	8	0	11	3	8	99	1	0	0	0	2	1	219
07:15 AM	0	105	1	0	6	0	11	2	9	108	0	0	2	0	1	0	245
07:30 AM	0	85	3	0	14	0	20	6	4	113	0	0	1	0	1	15	262
07:45 AM	0	87	5	1	6	0	9	3	11	135	0	2	0	0	1	5	265
Total	0	359	13	1	34	0	51	14	32	455	1	2	3	0	5	21	991
08:00 AM	0	109	10	0	5	0	8	3	11	116	0	1	0	0	1	7	271
08:15 AM	1	123	4	0	9	0	10	2	6	110	0	0	1	0	1	13	280
Grand Total	2	719	31	1	69	0	91	21	58	846	1	3	5	0	8	41	1896
Apprch %	0.3	95.5	4.1	0.1	38.1	0	50.3	11.6	6.4	93.2	0.1	0.3	9.3	0	14.8	75.9	
Total %	0.1	37.9	1.6	0.1	3.6	0	4.8	1.1	3.1	44.6	0.1	0.2	0.3	0	0.4	2.2	
Unshifted	2	719	31	1	69	0	91	21	58	846	1	3	5	0	8	41	1896
% Unshifted	100	100	100	100	100	0	100	100	100	100	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : AM_S Kihei Rd - Namuu Pl
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	KIHEI RD Southbound					NAMAVU PL Westbound					KIHEI RD Northbound					NAMAVU PL Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	85	3	0	88	**14**	0	**20**	**6**	**40**	4	113	0	0	117	**1**		**1**	**15**	**17**	262
07:45 AM	0	87	5	**1**							**11**	**135**		**2**	**148**	0	0	1	5	6	265
08:00 AM	0	109	**10**																		
08:15 AM	**1**	**123**	4	0	**128**	9	0	10	2	21	6	110	0	0	116	1	0	1	13	15	**280**
Total Volume	1	404	22	1	428	34	0	47	14	95	32	474	0	3	509	2	0	4	40	46	1078
% App. Total	0.2	94.4	5.1	0.2		35.8	0	49.5	14.7		6.3	93.1	0	0.6		4.3	0	8.7	87		
PHF	.250	.821	.550	.250	.836	.607	.000	.588	.583	.594	.727	.878	.000	.375	.860	.500	.000	1.00	.667	.676	.963



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File Name : PM_S Kihei Rd - Namuu Pl
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Groups Printed- Unshifted - Bank 1

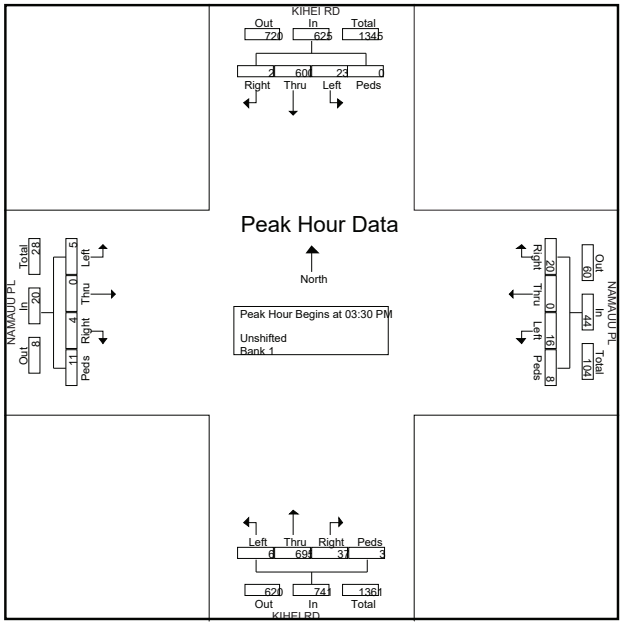
	KIHEI RD Southbound				NAMAUU PL Westbound				KIHEI RD Northbound				NAMAUU PL Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	6	168	1	0	5	0	3	5	5	167	9	0	0	0	1	4	374
03:15 PM	6	144	1	0	9	0	5	3	0	178	8	1	0	0	0	5	360
03:30 PM	2	140	1	0	2	0	3	1	2	181	7	0	0	0	0	2	341
03:45 PM	6	162	1	0	4	0	8	3	2	167	8	0	2	0	1	1	365
Total	20	614	4	0	20	0	19	12	9	693	32	1	2	0	2	12	1440
04:00 PM	6	149	0	0	5	0	3	2	2	165	8	3	2	0	0	5	350
04:15 PM	9	149	0	0	5	0	6	2	0	182	14	0	1	0	3	3	374
04:30 PM	7	143	1	0	11	0	8	5	3	173	12	0	0	0	0	3	366
04:45 PM	10	161	1	0	6	0	7	3	0	160	8	2	2	0	1	6	367
Total	32	602	2	0	27	0	24	12	5	680	42	5	5	0	4	17	1457
Grand Total	52	1216	6	0	47	0	43	24	14	1373	74	6	7	0	6	29	2897
Apprch %	4.1	95.4	0.5	0	41.2	0	37.7	21.1	1	93.6	5	0.4	16.7	0	14.3	69	
Total %	1.8	42	0.2	0	1.6	0	1.5	0.8	0.5	47.4	2.6	0.2	0.2	0	0.2	1	
Unshifted	52	1216	6	0	47	0	43	24	14	1373	74	6	7	0	6	29	2897
% Unshifted	100	100	100	0	100	0	100	100	100	100	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	KIHEI RD Southbound					NAMAUU PL Westbound					KIHEI RD Northbound					NAMAUU PL Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	2	140	**1**	0	143	2	0	3	1	6	**2**	181	7	0	190	0	0	0	2	2	341
03:45 PM	6	**162**	1	0	**169**	4	0	**8**	**3**	**15**	2	167	8	0	177	**2**	0	1	1	4	365
04:00 PM	6	149	0	0	155	**5**	0	3	2	10	2	165	8	**3**	178	2	0	0	**5**	**7**	350
04:15 PM	**9**	149	0	0	158	5	0	6	2	13	0	**182**	**14**	0	**196**	1	0	**3**	3	7	**374**
Total Volume	23	600	2	0	625	16	0	20	8	44	6	695	37	3	741	5	0	4	11	20	1430
% App. Total	3.7	96	0.3	0		36.4	0	45.5	18.2		0.8	93.8	5	0.4		25	0	20	55		
PHF	.639	.926	.500	.000	.925	.800	.000	.625	.667	.733	.750	.955	.661	.250	.945	.625	.000	.333	.550	.714	.956



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File Name : AM_S Kihei Rd - Waipuilani Rd
Site Code : 00000000
Start Date : 2/9/2017
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Groups Printed- Unshifted - Bank 1

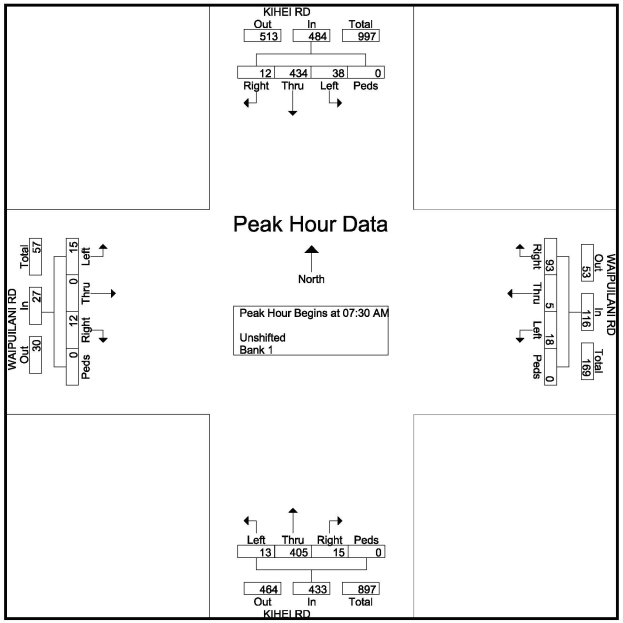
	KIHEI RD Southbound				WAIPUILANI RD Westbound				KIHEI RD Northbound				WAIPUILANI RD Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30 AM	1	55	6	0	11	0	5	0	0	55	3	0	2	0	5	0	143
06:45 AM	2	85	14	0	16	0	7	0	5	85	3	0	4	0	4	0	225
Total	3	140	20	0	27	0	12	0	5	140	6	0	6	0	9	0	368
07:00 AM	6	82	7	0	21	2	3	0	3	72	2	0	3	0	4	0	205
07:15 AM	4	114	7	0	21	1	5	0	3	98	4	0	4	1	4	0	266
07:30 AM	2	109	7	0	22	2	5	0	4	94	1	0	3	0	3	0	252
07:45 AM	3	89	7	0	25	1	3	0	3	128	4	0	2	0	2	0	267
Total	15	394	28	0	89	6	16	0	13	392	11	0	12	1	13	0	990
08:00 AM	3	104	17	0	18	0	5	0	5	104	6	0	4	0	6	0	272
08:15 AM	4	132	7	0	28	2	5	0	3	79	2	0	3	0	4	0	269
Grand Total	25	770	72	0	162	8	38	0	26	715	25	0	25	1	32	0	1899
Apprch %	2.9	88.8	8.3	0	77.9	3.8	18.3	0	3.4	93.3	3.3	0	43.1	1.7	55.2	0	
Total %	1.3	40.5	3.8	0	8.5	0.4	2	0	1.4	37.7	1.3	0	1.3	0.1	1.7	0	
Unshifted	25	770	72	0	162	8	38	0	26	715	25	0	25	1	32	0	1899
% Unshifted	100	100	100	0	100	100	100	0	100	100	100	0	100	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : AM_S Kihei Rd - Waipuilani Rd
Site Code : 00000000
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	KIHEI RD Southbound					WAIPUILANI RD Westbound					KIHEI RD Northbound					WAIPUILANI RD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	2	109	7	0	118	22	**2**	**5**													
07:45 AM	**3**	**89**	**7**	**0**	**99**	**25**	**1**	**3**	**0**	**29**	**3**	**128**	**4**	**0**	**135**	2	0	2	0	4	267
08:00 AM	3	104	**17**								**5**		**6**	0	115	**4**		**6**		**10**	**272**
08:15 AM	**4**	**132**	7	0	**143**	**28**	2	5	0	**35**	3	79	2	0	84	3	0	4	0	7	269
Total Volume	12	434	38	0	484	93	5	18	0	116	15	405	13	0	433	12	0	15	0	27	1060
% App. Total	2.5	89.7	7.9	0		80.2	4.3	15.5	0		3.5	93.5	3	0		44.4	0	55.6	0		
PHF	.750	.822	.559	.000	.846	.830	.625	.900	.000	.829	.750	.791	.542	.000	.802	.750	.000	.625	.000	.675	.974



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File Name : PM_S Kihei Rd - Waipuilani Rd
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Groups Printed- Unshifted - Bank 1

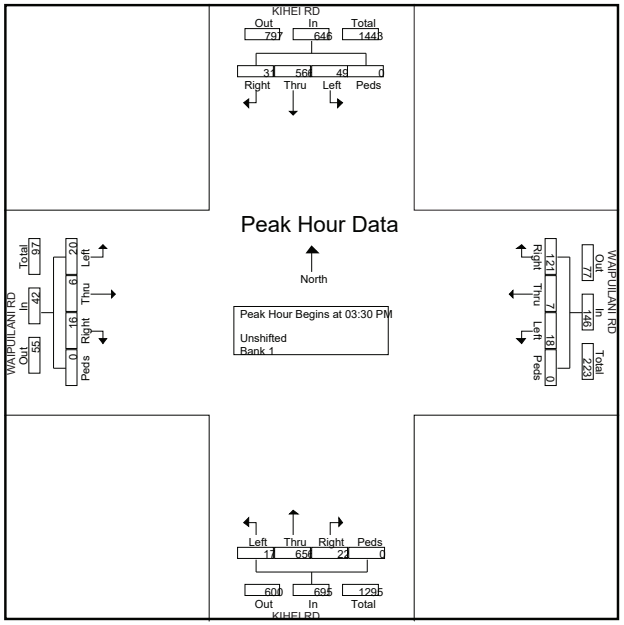
	KIHEI RD Southbound				WAIPUILANI RD Westbound				KIHEI RD Northbound				WAIPUILANI RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	17	143	10	0	5	1	29	0	8	148	3	0	3	1	2	0	370
03:15 PM	6	143	8	0	1	0	40	0	3	155	1	0	3	1	4	0	365
03:30 PM	9	131	5	0	2	5	29	0	5	165	2	0	7	1	4	0	365
03:45 PM	14	142	10	0	8	0	26	0	7	155	8	0	6	0	3	0	379
Total	46	559	33	0	16	6	124	0	23	623	14	0	19	3	13	0	1479
04:00 PM	13	143	13	0	2	2	27	0	2	155	9	0	4	2	5	0	377
04:15 PM	13	150	3	0	6	0	39	0	3	181	3	0	3	3	4	0	408
04:30 PM	12	138	6	0	5	2	40	0	5	181	8	0	7	0	8	0	412
04:45 PM	15	141	7	0	3	4	21	0	6	159	4	0	5	1	8	0	374
Total	53	572	29	0	16	8	127	0	16	676	24	0	19	6	25	0	1571
Grand Total	99	1131	62	0	32	14	251	0	39	1299	38	0	38	9	38	0	3050
Apprch %	7.7	87.5	4.8	0	10.8	4.7	84.5	0	2.8	94.4	2.8	0	44.7	10.6	44.7	0	
Total %	3.2	37.1	2	0	1	0.5	8.2	0	1.3	42.6	1.2	0	1.2	0.3	1.2	0	
Unshifted	99	1131	62	0	32	14	251	0	39	1299	38	0	38	9	38	0	3050
% Unshifted	100	100	100	0	100	100	100	0	100	100	100	0	100	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	KIHEI RD Southbound					WAIPUILANI RD Westbound					KIHEI RD Northbound					WAIPUILANI 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	9	131	5	0	145	2	**5**	29	0	36	5	165	2	0	172	**7**	1	4	0	**12**	365
03:45 PM	**14**	142	10	0	166	**8**	0	26	0	34	**7**	155	8	0	170	6	0	3	0	9	379
04:00 PM	13	143	**13**	0	**169**	2	2	27	0	31	2	155	**9**	0	166	4	2	**5**	0	11	377
04:15 PM	13	**150**	3	0	166	6	0	**39**	0	**45**	3	**181**	3	0	**187**	3	**3**	4	0	10	**408**
Total Volume	49	566	31	0	646	18	7	121	0	146	17	656	22	0	695	20	6	16	0	42	1529
% App. Total	7.6	87.6	4.8	0		12.3	4.8	82.9	0		2.4	94.4	3.2	0		47.6	14.3	38.1	0		
PHF	.875	.943	.596	.000	.956	.563	.350	.776	.000	.811	.607	.906	.611	.000	.929	.714	.500	.800	.000	.875	.937



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File Name : AM_Liloa Dr - Waipuilani Rd
Site Code : 00000000
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Groups Printed- Unshifted - Bank 1

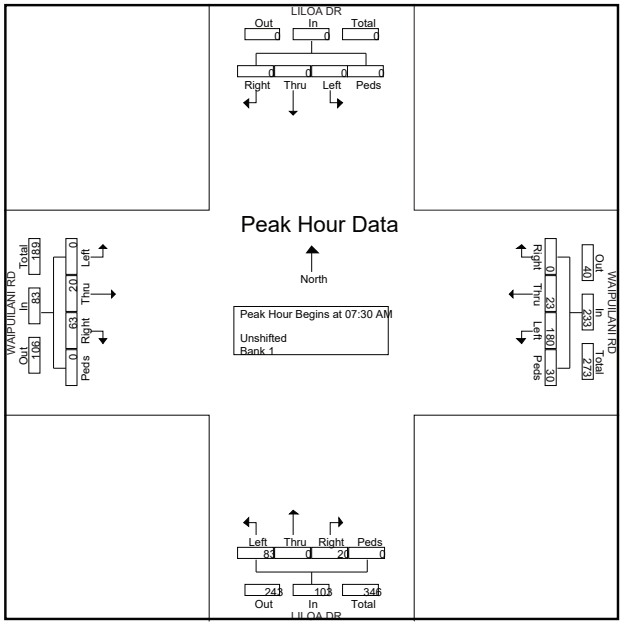
	LILOA DR Southbound				WAIPUILANI RD Westbound				LILOA DR Northbound				WAIPUILANI RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30 AM	0	0	0	0	11	4	0	7	3	0	1	0	0	5	11	0	42
06:45 AM	0	0	0	0	10	6	0	1	10	0	0	0	0	7	18	0	52
Total	0	0	0	0	21	10	0	8	13	0	1	0	0	12	29	0	94
07:00 AM	0	0	0	0	19	9	0	6	10	0	1	0	0	3	17	0	65
07:15 AM	0	0	0	0	38	8	0	8	11	0	0	1	0	4	19	0	89
07:30 AM	0	0	0	0	75	3	0	8	18	0	4	0	0	3	18	0	129
07:45 AM	0	0	0	0	50	9	0	8	22	0	6	0	0	4	20	0	119
Total	0	0	0	0	182	29	0	30	61	0	11	1	0	14	74	0	402
08:00 AM	0	0	0	0	23	5	0	3	16	0	5	0	0	9	15	0	76
08:15 AM	0	0	0	0	32	6	0	11	27	0	5	0	0	4	10	0	95
Grand Total	0	0	0	0	258	50	0	52	117	0	22	1	0	39	128	0	667
Apprch %	0	0	0	0	71.7	13.9	0	14.4	83.6	0	15.7	0.7	0	23.4	76.6	0	
Total %	0	0	0	0	38.7	7.5	0	7.8	17.5	0	3.3	0.1	0	5.8	19.2	0	
Unshifted	0	0	0	0	258	50	0	52	117	0	22	1	0	39	128	0	667
% Unshifted	0	0	0	0	100	100	0	100	100	0	100	100	0	100	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site Code : 00000000
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	LILOA DR Southbound					WAIPUILANI RD Westbound					LILOA DR Northbound					WAIPUILANI 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 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	**75**	3	0	8	**86**	18	0	4	0	22	0	3	18	0	21	**129**
07:45 AM	0	0	0	0	0	50	**9**	0	8	67	22	0	**6**	0	28	0	4	**20**	0	**24**	119
08:00 AM	0	0	0	0	0	23	5	0	3	31	16	0	5	0	21	0	**9**	15	0	24	76
08:15 AM	0	0	0	0	0	32	6	0	**11**	49	**27**	0	5	0	**32**	0	4	10	0	14	95
Total Volume	0	0	0	0	0	180	23	0	30	233	83	0	20	0	103	0	20	63	0	83	419
% App. Total	0	0	0	0		77.3	9.9	0	12.9		80.6	0	19.4	0		0	24.1	75.9	0		
PHF	.000	.000	.000	.000	.000	.600	.639	.000	.682	.677	.769	.000	.833	.000	.805	.000	.556	.788	.000	.865	.812



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Groups Printed- Unshifted - Bank 1

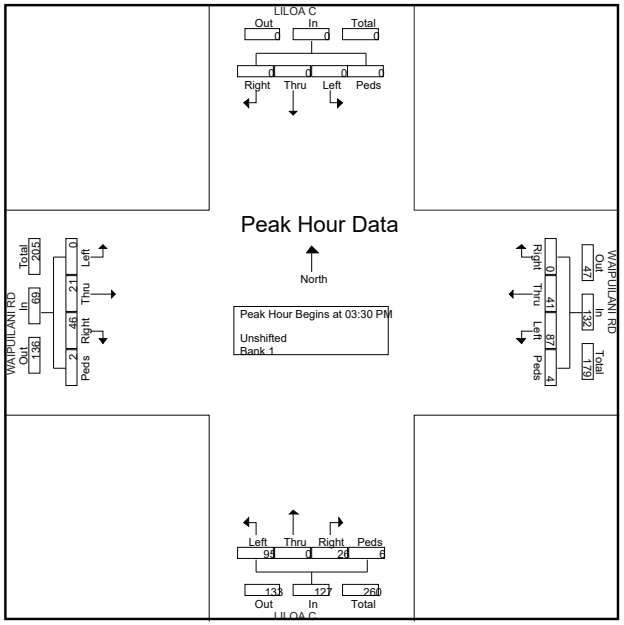
	LILOA C Southbound				WAIPUILANI RD Westbound				LILOA C Northbound				WAIPUILANI RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	0	0	2	0	16	9	0	2	28	0	13	4	0	4	20	2	100
03:15 PM	0	0	0	0	15	17	0	0	30	0	6	0	0	8	8	2	86
03:30 PM	0	0	0	0	16	12	0	3	28	0	8	0	0	4	13	1	85
03:45 PM	0	0	0	0	29	10	0	1	25	0	4	1	0	6	14	0	90
Total	0	0	2	0	76	48	0	6	111	0	31	5	0	22	55	5	361
04:00 PM	0	0	0	0	23	7	0	0	21	0	9	4	0	9	10	0	83
04:15 PM	0	0	0	0	19	12	0	0	21	0	5	1	0	2	9	1	70
04:30 PM	0	0	0	0	16	10	0	1	31	0	11	0	0	5	12	3	89
04:45 PM	0	0	0	0	30	9	0	3	24	0	6	0	0	4	17	2	95
Total	0	0	0	0	88	38	0	4	97	0	31	5	0	20	48	6	337
Grand Total	0	0	2	0	164	86	0	10	208	0	62	10	0	42	103	11	698
Apprch %	0	0	100	0	63.1	33.1	0	3.8	74.3	0	22.1	3.6	0	26.9	66	7.1	
Total %	0	0	0.3	0	23.5	12.3	0	1.4	29.8	0	8.9	1.4	0	6	14.8	1.6	
Unshifted	0	0	2	0	164	86	0	10	208	0	62	10	0	42	103	11	698
% Unshifted	0	0	100	0	100	100	0	100	100	0	100	100	0	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	LILOA C Southbound					WAIPUILANI RD Westbound					LILOA C Northbound					WAIPUILANI 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 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	0	0	0	0	16	**12**	0	**3**	31	**28**	0	8	0	**36**	0	4	13	**1**	18	85
03:45 PM	0	0	0	0	0	**29**	10	0	1	**40**	25	0	4	1	30	0	6	**14**	0	**20**	**90**
04:00 PM	0	0	0	0	0	23	7	0	0	30	21	0	**9**	**4**	34	0	**9**	10	0	19	83
04:15 PM	0	0	0	0	0	19	12	0	0	31	21	0	5	1	27	0	2	9	1	12	70
Total	0	0	0	0	0	87	41	0	4	132	95	0	26	6	127	0	21	46	2	69	328
Volume																					
% App. Total	0	0	0	0		65.9	31.1	0	3		74.8	0	20.5	4.7		0	30.4	66.7	2.9		
PHF	.000	.000	.000	.000	.000	.750	.854	.000	.333	.825	.848	.000	.722	.375	.882	.000	.583	.821	.500	.863	.911



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File Name : AM_Piilani Hwy - Waipuilani Rd
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Groups Printed- Unshifted - Bank 1

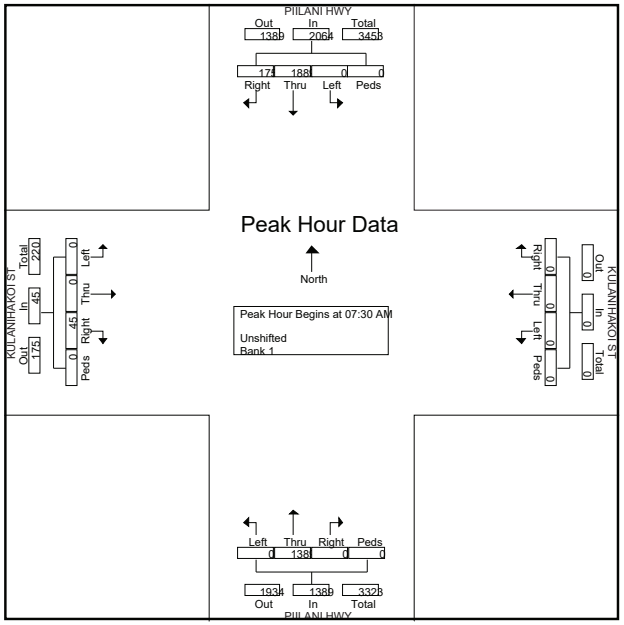
	PIILANI HWY Southbound				KULANIHAKOI ST Westbound				PIILANI HWY Northbound				KULANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30 AM	0	305	8	0	0	0	0	0	0	210	0	0	0	0	7	0	530
06:45 AM	0	367	12	0	0	0	0	0	0	284	0	0	0	0	6	0	669
Total	0	672	20	0	0	0	0	0	0	494	0	0	0	0	13	0	1199
07:00 AM	0	382	16	0	0	0	0	0	0	311	0	0	0	0	5	0	714
07:15 AM	0	490	36	0	0	0	0	0	0	325	0	0	0	0	10	0	861
07:30 AM	0	493	69	0	0	0	0	0	0	350	0	0	0	0	11	0	923
07:45 AM	0	438	53	0	0	0	0	0	0	305	0	0	0	0	15	0	811
Total	0	1803	174	0	0	0	0	0	0	1291	0	0	0	0	41	0	3309
08:00 AM	0	468	25	0	0	0	0	0	0	363	0	0	0	0	11	0	867
08:15 AM	0	490	28	0	0	0	0	0	0	371	0	0	0	0	8	0	897
Grand Total	0	3433	247	0	0	0	0	0	0	2519	0	0	0	0	73	0	6272
Apprch %	0	93.3	6.7	0	0	0	0	0	0	100	0	0	0	0	100	0	
Total %	0	54.7	3.9	0	0	0	0	0	0	40.2	0	0	0	0	1.2	0	
Unshifted	0	3433	247	0	0	0	0	0	0	2519	0	0	0	0	73	0	6272
% Unshifted	0	100	100	0	0	0	0	0	0	100	0	0	0	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	PIILANI HWY Southbound					KULANIHAKOI ST Westbound					PIILANI HWY Northbound					KULANIHAKOI 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 AM to 08:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	**493**	**69**	0	**562**	0	0	0	0	0	0	350	0	0	350	0	0	11	0	11	**923**
07:45 AM	0	438	53	0	491	0	0	0	0	0	0	305	0	0	305	0	0	**15**	0	**15**	811
08:00 AM	0	468	25	0	493	0	0	0	0	0	0	363	0	0	363	0	0	11	0	11	867
08:15 AM	0	490	28	0	518	0	0	0	0	0	0	**371**	0	0	**371**	0	0	8	0	8	897
Total	0	188	175	0	2064	0	0	0	0	0	0	138	0	0	1389	0	0	45	0	45	3498
Volume		9										9									
% App. Total	0	91.5	8.5	0		0	0	0	0		0	100	0	0		0	0	100	0		
PHF	.000	.958	.634	.000	.918	.000	.000	.000	.000	.000	.000	.936	.000	.000	.936	.000	.000	.750	.000	.750	.947



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Groups Printed- Unshifted - Bank 1

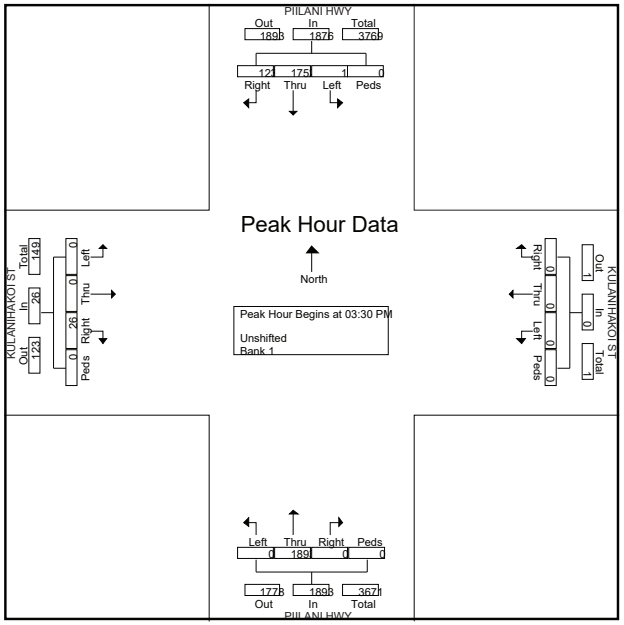
	PIILANI HWY Southbound				KULANIHAKOI ST Westbound				PIILANI HWY Northbound				KULANIHAKOI ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	0	402	22	0	0	0	0	0	0	416	0	0	0	0	6	0	846
03:15 PM	0	427	27	0	0	0	0	0	0	446	0	0	0	0	11	0	911
03:30 PM	0	416	29	0	0	0	0	0	0	490	0	0	0	0	5	0	940
03:45 PM	0	501	30	0	0	0	0	0	0	465	0	0	0	0	5	0	1001
Total	0	1746	108	0	0	0	0	0	0	1817	0	0	0	0	27	0	3698
04:00 PM	0	430	32	0	0	0	0	0	0	466	0	0	0	0	9	0	937
04:15 PM	1	405	32	0	0	0	0	0	0	472	0	0	0	0	7	0	917
04:30 PM	0	457	26	0	0	0	0	0	0	447	0	0	0	0	8	0	938
04:45 PM	0	462	36	0	0	0	0	0	0	393	0	0	0	0	6	0	897
Total	1	1754	126	0	0	0	0	0	0	1778	0	0	0	0	30	0	3689
Grand Total	1	3500	234	0	0	0	0	0	0	3595	0	0	0	0	57	0	7387
Apprch %	0	93.7	6.3	0	0	0	0	0	0	100	0	0	0	0	100	0	
Total %	0	47.4	3.2	0	0	0	0	0	0	48.7	0	0	0	0	0.8	0	
Unshifted	1	3500	234	0	0	0	0	0	0	3595	0	0	0	0	57	0	7387
% Unshifted	100	100	100	0	0	0	0	0	0	100	0	0	0	0	100	0	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AUSTIN TSUTSUMI & ASSOCIATES

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File Name : PM_Piilani Hwy - Waipuilani Rd
Site Code : 00000000
Start Date : 2/9/2017
Page No : 2

	PIILANI HWY Southbound					KULANIHAKOI ST Westbound					PIILANI HWY Northbound					KULANIHAKOI 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 03:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	416	29	0	445	0	0	0	0	0	0	**490**	0	0	**490**	0	0	5	0	5	940
03:45 PM	0	**501**	30	0	**531**	0	0	0	0	0	0	465	0	0	465	0	0	5	0	5	**1001**
04:00 PM	0	430	**32**	0	462	0	0	0	0	0	0	466	0	0	466	0	0	**9**	0	**9**	937
04:15 PM	**1**	405	32	0	438	0	0	0	0	0	0	472	0	0	472	0	0	7	0	7	917
Total	1	1752	123	0	1876	0	0	0	0	0	0	1893	0	0	1893	0	0	26	0	26	3795
Volume																					
% App. Total	0.1	93.4	6.6	0		0	0	0	0		0	100	0	0		0	0	100	0		
PHF	.250	.874	.961	.000	.883	.000	.000	.000	.000	.000	.000	.966	.000	.000	.966	.000	.000	.722	.000	.722	.948



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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

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing AM Conditions

Intersection	
Int Delay, s/veh	6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	151	34	467	47	36	182
Future Vol, veh/h	151	34	467	47	36	182
Conflicting Peds, #/hr	39	7	0	15	15	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	80	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	164	37	508	51	39	198

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	864	556	0	0	574	0
Stage 1	549	-	-	-	-	-
Stage 2	315	-	-	-	-	-
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	325	531	-	-	999	-
Stage 1	579	-	-	-	-	-
Stage 2	740	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	295	520	-	-	985	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	713	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28	0	1.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	295	520	985	-
HCM Lane V/C Ratio	-	-	0.556	0.071	0.04	-
HCM Control Delay (s)	-	-	31.5	12.5	8.8	0
HCM Lane LOS	-	-	D	B	A	A
HCM 95th %tile Q(veh)	-	-	3.2	0.2	0.1	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	59	0	7	28	50	2	3	20	169	2	15
Future Vol, veh/h	21	59	0	7	28	50	2	3	20	169	2	15
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	100	-	-	60	-	-	75	-	-	50	-	-
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	23	64	0	8	30	54	2	3	22	184	2	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	84	0	0	64	0	0	192	210	64	196	183	57
Stage 1	-	-	-	-	-	-	110	110	-	73	73	-
Stage 2	-	-	-	-	-	-	82	100	-	123	110	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1513	-	-	1538	-	-	768	687	1000	763	711	1009
Stage 1	-	-	-	-	-	-	895	804	-	937	834	-
Stage 2	-	-	-	-	-	-	926	812	-	881	804	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1513	-	-	1538	-	-	742	673	1000	732	697	1009
Mov Cap-2 Maneuver	-	-	-	-	-	-	742	673	-	732	697	-
Stage 1	-	-	-	-	-	-	882	792	-	923	830	-
Stage 2	-	-	-	-	-	-	904	808	-	845	792	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0.6	9	11.3
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	742	940	1513	-	-	1538	-	-	732	959
HCM Lane V/C Ratio	0.003	0.027	0.015	-	-	0.005	-	-	0.251	0.019
HCM Control Delay (s)	9.9	8.9	7.4	-	-	7.4	-	-	11.6	8.8
HCM Lane LOS	A	A	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	1	0.1

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	200	63	1318	1853	23
Future Vol, veh/h	45	200	63	1318	1853	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	300	0	400	-	-	350
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	49	217	68	1433	2014	25

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2867	1007	2014	0	-	0
Stage 1	2014	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 13	239	279	-	-	-
Stage 1	89	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	~ 10	239	279	-	-	-
Mov Cap-2 Maneuver	53	-	-	-	-	-
Stage 1	67	-	-	-	-	-
Stage 2	378	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	107.2	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	279	-	53	239	-	-
HCM Lane V/C Ratio	0.245	-	0.923	0.91	-	-
HCM Control Delay (s)	22.1	-	224.4	80.8	-	-
HCM Lane LOS	C	-	F	F	-	-
HCM 95th %tile Q(veh)	0.9	-	4	7.8	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	57	446	46	24	321
Future Vol, veh/h	70	57	446	46	24	321
Conflicting Peds, #/hr	56	12	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
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	62	485	50	26	349

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	969	524	0	0	537	0
Stage 1	512	-	-	-	-	-
Stage 2	457	-	-	-	-	-
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	281	553	-	-	1031	-
Stage 1	602	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	259	546	-	-	1029	-
Mov Cap-2 Maneuver	259	-	-	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	604	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.1	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	259	546	1029	-
HCM Lane V/C Ratio	-	-	0.294	0.113	0.025	-
HCM Control Delay (s)	-	-	24.6	12.4	8.6	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.2	0.4	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	161	112	2	10	4
Future Vol, veh/h	4	161	112	2	10	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	175	122	2	11	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	124	0	-	0	306	123
Stage 1	-	-	-	-	123	-
Stage 2	-	-	-	-	183	-
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	1463	-	-	-	686	928
Stage 1	-	-	-	-	902	-
Stage 2	-	-	-	-	848	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1463	-	-	-	684	928
Mov Cap-2 Maneuver	-	-	-	-	684	-
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	848	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1463	-	-	-	740
HCM Lane V/C Ratio	0.003	-	-	-	0.021
HCM Control Delay (s)	7.5	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	46	163	58	1331	1984	62
Future Vol, veh/h	46	163	58	1331	1984	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	0	425	-	-	375
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	50	177	63	1447	2157	67

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3007	1079	2157	0	-	0
Stage 1	2157	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 10	214	245	-	-	0
Stage 1	74	-	-	-	-	0
Stage 2	379	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 7	214	245	-	-	-
Mov Cap-2 Maneuver	~ 44	-	-	-	-	-
Stage 1	55	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	126.9	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	245	-	44	214	-
HCM Lane V/C Ratio	0.257	-	1.136	0.828	-
HCM Control Delay (s)	24.7	-	$ 324.3	71.2	-
HCM Lane LOS	C	-	F	F	-
HCM 95th %tile Q(veh)	1	-	4.7	6.2	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↰	↱	
Traffic Vol, veh/h	4	0	2	47	0	34	0	474	32	22	404	1
Future Vol, veh/h	4	0	2	47	0	34	0	474	32	22	404	1
Conflicting Peds, #/hr	1	0	3	3	0	1	40	0	14	14	0	40
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	4	0	2	51	0	37	0	515	35	24	439	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1080	1092	483	1039	1075	548	480	0	0	564	0	0
Stage 1	528	528	-	547	547	-	-	-	-	-	-	-
Stage 2	552	564	-	492	528	-	-	-	-	-	-	-
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	196	215	584	209	220	536	1082	-	-	1008	-	-
Stage 1	534	528	-	521	517	-	-	-	-	-	-	-
Stage 2	518	508	-	558	528	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	172	199	560	201	204	528	1041	-	-	995	-	-
Mov Cap-2 Maneuver	172	199	-	201	204	-	-	-	-	-	-	-
Stage 1	514	496	-	514	510	-	-	-	-	-	-	-
Stage 2	481	501	-	541	496	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.6	24.4	0	0.4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1041	-	-	224	272	995	-	-
HCM Lane V/C Ratio	-	-	-	0.029	0.324	0.024	-	-
HCM Control Delay (s)	0	-	-	21.6	24.4	8.7	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1.4	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱		↰	↱	
Traffic Vol, veh/h	15	0	12	18	5	93	13	405	15	38	434	12
Future Vol, veh/h	15	0	12	18	5	93	13	405	15	38	434	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	16	0	13	20	5	101	14	440	16	41	472	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1090	1045	479	1043	1043	448	485	0	0	456	0	0
Stage 1	561	561	-	476	476	-	-	-	-	-	-	-
Stage 2	529	484	-	567	567	-	-	-	-	-	-	-
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	193	229	587	207	229	611	1078	-	-	1105	-	-
Stage 1	512	510	-	570	557	-	-	-	-	-	-	-
Stage 2	533	552	-	508	507	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	218	587	195	218	611	1078	-	-	1105	-	-
Mov Cap-2 Maneuver	152	218	-	195	218	-	-	-	-	-	-	-
Stage 1	505	491	-	563	550	-	-	-	-	-	-	-
Stage 2	435	545	-	478	488	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	23.2	16.7	0.3	0.7
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1078	-	-	227	434	1105	-	-
HCM Lane V/C Ratio	0.013	-	-	0.129	0.291	0.037	-	-
HCM Control Delay (s)	8.4	-	-	23.2	16.7	8.4	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	1.2	0.1	-	-

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	20	63	180	23	83	20
Future Vol, veh/h	20	63	180	23	83	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	68	196	25	90	22
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.1	10.1	9.2
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	24%	0%	100%
Vol Right, %	0%	100%	76%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	83	20	83	180	23
LT Vol	83	0	0	180	0
Through Vol	0	0	20	0	23
RT Vol	0	20	63	0	0
Lane Flow Rate	90	22	90	196	25
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.146	0.028	0.112	0.295	0.034
Departure Headway (Hd)	5.829	4.622	4.472	5.424	4.922
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	616	775	802	663	729
Service Time	3.555	2.349	2.498	3.146	2.644
HCM Lane V/C Ratio	0.146	0.028	0.112	0.296	0.034
HCM Control Delay	9.6	7.5	8.1	10.4	7.8
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.5	0.1	0.4	1.2	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	45	0	1389	1889	175
Future Vol, veh/h	0	45	0	1389	1889	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	49	0	1510	2053	190

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1027	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	232	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	232	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	232	-
HCM Lane V/C Ratio	-	0.211	-
HCM Control Delay (s)	-	24.6	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.8	-

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing PM Conditions

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	67	13	537	90	22	566
Future Vol, veh/h	67	13	537	90	22	566
Conflicting Peds, #/hr	12	5	0	6	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	80	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	73	14	584	98	24	615

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1314	644	0	0	688	0
Stage 1	639	-	-	-	-	-
Stage 2	675	-	-	-	-	-
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	174	473	-	-	906	-
Stage 1	526	-	-	-	-	-
Stage 2	506	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	468	-	-	901	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	502	-	-	-	-	-
Stage 2	500	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	38.4	0	0.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	164	468	901	-
HCM Lane V/C Ratio	-	-	0.444	0.03	0.027	-
HCM Control Delay (s)	-	-	43.4	12.9	9.1	0
HCM Lane LOS	-	-	E	B	A	A
HCM 95th %tile Q(veh)	-	-	2	0.1	0.1	-

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	28	27	2	12	38	88	1	3	15	77	2	7
Future Vol, veh/h	28	27	2	12	38	88	1	3	15	77	2	7
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	100	-	-	60	-	-	75	-	-	50	-	-
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	30	29	2	13	41	96	1	3	16	84	2	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	137	0	0	31	0	0	210	253	30	215	206	89
Stage 1	-	-	-	-	-	-	90	90	-	115	115	-
Stage 2	-	-	-	-	-	-	120	163	-	100	91	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1447	-	-	1582	-	-	747	650	1044	742	691	969
Stage 1	-	-	-	-	-	-	917	820	-	890	800	-
Stage 2	-	-	-	-	-	-	884	763	-	906	820	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1447	-	-	1582	-	-	723	631	1044	712	671	969
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	631	-	712	671	-
Stage 1	-	-	-	-	-	-	898	803	-	871	794	-
Stage 2	-	-	-	-	-	-	867	757	-	870	803	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.7	0.6	9	10.5
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	723	941	1447	-	-	1582	-	-	712	882
HCM Lane V/C Ratio	0.002	0.021	0.021	-	-	0.008	-	-	0.118	0.011
HCM Control Delay (s)	10	8.9	7.5	-	-	7.3	-	-	10.7	9.1
HCM Lane LOS	B	A	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0	0.1	0.1	-	-	0	-	-	0.4	0

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	104	101	1753	1773	37
Future Vol, veh/h	10	104	101	1753	1773	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	300	0	400	-	-	350
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	113	110	1905	1927	40

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	3100	964	1927	0	-	0
Stage 1	1927	-	-	-	-	-
Stage 2	1173	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 9	255	302	-	-	-
Stage 1	100	-	-	-	-	-
Stage 2	256	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 6	255	302	-	-	-
Mov Cap-2 Maneuver	43	-	-	-	-	-
Stage 1	64	-	-	-	-	-
Stage 2	256	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	37.4	1.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	302	-	43	255	-	-
HCM Lane V/C Ratio	0.364	-	0.253	0.443	-	-
HCM Control Delay (s)	23.6	-	115	29.9	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	1.6	-	0.8	2.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	47	620	64	43	570
Future Vol, veh/h	30	47	620	64	43	570
Conflicting Peds, #/hr	21	11	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
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	33	51	674	70	47	620

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1445	721	0	0	745	0
Stage 1	710	-	-	-	-	-
Stage 2	735	-	-	-	-	-
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	145	427	-	-	863	-
Stage 1	487	-	-	-	-	-
Stage 2	474	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	134	422	-	-	862	-
Mov Cap-2 Maneuver	134	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	465	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.7	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	134	422	862	-
HCM Lane V/C Ratio	-	-	0.243	0.121	0.054	-
HCM Control Delay (s)	-	-	40.3	14.7	9.4	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	0.9	0.4	0.2	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	96	100	5	4	9
Future Vol, veh/h	11	96	100	5	4	9
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	12	104	109	5	4	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	114	0	-	0	240	112
Stage 1	-	-	-	-	112	-
Stage 2	-	-	-	-	128	-
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	1475	-	-	-	748	941
Stage 1	-	-	-	-	913	-
Stage 2	-	-	-	-	898	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1475	-	-	-	741	941
Mov Cap-2 Maneuver	-	-	-	-	741	-
Stage 1	-	-	-	-	905	-
Stage 2	-	-	-	-	898	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1475	-	-	-	869
HCM Lane V/C Ratio	0.008	-	-	-	0.016
HCM Control Delay (s)	7.5	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	75	65	1833	1804	73
Future Vol, veh/h	21	75	65	1833	1804	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	0	425	-	-	375
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	23	82	71	1992	1961	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3099	981	1961	0	-	0
Stage 1	1961	-	-	-	-	-
Stage 2	1138	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 9	249	293	-	-	0
Stage 1	95	-	-	-	-	0
Stage 2	268	-	-	-	-	0
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	~ 7	249	293	-	-	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	72	-	-	-	-	-
Stage 2	268	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	47.6	0.7	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	293	-	51	249	-
HCM Lane V/C Ratio	0.241	-	0.448	0.327	-
HCM Control Delay (s)	21.1	-	123.5	26.3	-
HCM Lane LOS	C	-	F	D	-
HCM 95th %tile Q(veh)	0.9	-	1.7	1.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	4	16	0	20	6	695	37	23	600	2
Future Vol, veh/h	5	0	4	16	0	20	6	695	37	23	600	2
Conflicting Peds, #/hr	0	0	3	3	0	0	11	0	8	8	0	11
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	0	4	17	0	22	7	755	40	25	652	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1514	1531	667	1505	1512	783	665	0	0	803	0	0
Stage 1	714	714	-	797	797	-	-	-	-	-	-	-
Stage 2	800	817	-	708	715	-	-	-	-	-	-	-
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	98	117	459	100	120	394	924	-	-	821	-	-
Stage 1	422	435	-	380	399	-	-	-	-	-	-	-
Stage 2	379	390	-	426	434	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	88	110	453	95	113	391	914	-	-	815	-	-
Mov Cap-2 Maneuver	88	110	-	95	113	-	-	-	-	-	-	-
Stage 1	412	417	-	372	390	-	-	-	-	-	-	-
Stage 2	353	381	-	408	416	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.3	33.7	0.1	0.4
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	914	-	-	137	164	815	-	-
HCM Lane V/C Ratio	0.007	-	-	0.071	0.239	0.031	-	-
HCM Control Delay (s)	9	0	-	33.3	33.7	9.6	-	-
HCM Lane LOS	A	A	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.9	0.1	-	-

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	6	16	18	7	121	17	656	22	49	566	31
Future Vol, veh/h	20	6	16	18	7	121	17	656	22	49	566	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	22	7	17	20	8	132	18	713	24	53	615	34

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1569	1511	632	1511	1516	725	649	0	0	737	0	0
Stage 1	738	738	-	761	761	-	-	-	-	-	-	-
Stage 2	831	773	-	750	755	-	-	-	-	-	-	-
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	90	120	480	99	119	425	937	-	-	869	-	-
Stage 1	410	424	-	398	414	-	-	-	-	-	-	-
Stage 2	364	409	-	403	417	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	55	111	480	86	110	425	937	-	-	869	-	-
Mov Cap-2 Maneuver	55	111	-	86	110	-	-	-	-	-	-	-
Stage 1	402	398	-	390	406	-	-	-	-	-	-	-
Stage 2	242	401	-	359	392	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	76.4	37.8	0.2	0.7
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	937	-	-	93	262	869	-	-
HCM Lane V/C Ratio	0.02	-	-	0.491	0.606	0.061	-	-
HCM Control Delay (s)	8.9	-	-	76.4	37.8	9.4	-	-
HCM Lane LOS	A	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	2.1	3.6	0.2	-	-

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	21	46	87	41	95	26
Future Vol, veh/h	21	46	87	41	95	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	50	95	45	103	28
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	7.9	8.7	8.8
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	31%	0%	100%
Vol Right, %	0%	100%	69%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	95	26	67	87	41
LT Vol	95	0	0	87	0
Through Vol	0	0	21	0	41
RT Vol	0	26	46	0	0
Lane Flow Rate	103	28	73	95	45
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.16	0.034	0.09	0.143	0.061
Departure Headway (Hd)	5.565	4.361	4.452	5.455	4.954
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	646	822	807	659	726
Service Time	3.283	2.079	2.469	3.17	2.668
HCM Lane V/C Ratio	0.159	0.034	0.09	0.144	0.062
HCM Control Delay	9.3	7.2	7.9	9.1	8
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.6	0.1	0.3	0.5	0.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	26	0	1893	1752	123
Future Vol, veh/h	0	26	0	1893	1752	123
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	28	0	2058	1904	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	952	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	260	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	260	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	260	-
HCM Lane V/C Ratio	-	0.109	-
HCM Control Delay (s)	-	20.5	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

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

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2040 without Project AM Peak Conditions



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	210	50	560	105	60	245
Future Volume (veh/h)	210	50	560	105	60	245
Number	3	18	2	12	1	6
Initial Q, veh	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00	1.00		0.99	1.00	
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Lanes Open During Work Zone						
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	228	9	609	103	65	266
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Opposing Right Turn Influence	Yes				No	
Cap, veh/h	312	277	834	141	383	1003
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.18	0.18	0.54	0.54	0.54	0.54
Unsig. Movement Delay						
Ln Grp Delay, s/veh	16.8	11.9	0.0	7.2	11.2	4.5
Ln Grp LOS	B	B	A	A	B	A
Approach Vol, veh/h	237		712			331
Approach Delay, s/veh	16.6		7.2			5.8
Approach LOS	B		A			A

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2	8			6		
Case No		8.0	9.0			6.0		
Phs Duration (G+Y+Rc), s		23.6	11.1			23.6		
Change Period (Y+Rc), s		5.0	5.0			5.0		
Max Green (Gmax), s		60.0	20.0			60.0		
Max Allow Headway (MAH), s		5.3	3.8			5.4		
Max Q Clear (g_c+I1), s		12.3	6.2			14.9		
Green Ext Time (g_e), s		6.3	0.6			2.3		
Prob of Phs Call (p_c)		1.00	0.90			1.00		
Prob of Max Out (p_x)		0.00	0.00			0.00		

Left-Turn Movement Data								
Assigned Mvmt		5	3			1		
Mvmt Sat Flow, veh/h		0	1781			735		

Through Movement Data								
Assigned Mvmt		2	8			6		
Mvmt Sat Flow, veh/h		1556	0			1870		

Right-Turn Movement Data								
Assigned Mvmt		12	18			16		
Mvmt Sat Flow, veh/h		263	1585			0		

Left Lane Group Data								
Assigned Mvmt	0	5	3	0	0	1	0	0
Lane Assignment			L			L		

Lanes in Grp	0	0	1	0	0	1	0	0
Grp Vol (v), veh/h	0	0	228	0	0	65	0	0
Grp Sat Flow (s), veh/h/ln	0	0	1781	0	0	735	0	0
Q Serve Time (g_s), s	0.0	0.0	4.2	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	4.2	0.0	0.0	12.9	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1781	0	0	735	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	18.6	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0
Time to First Blk (g_f), s	0.0	18.6	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	312	0	0	383	0	0
V/C Ratio (X)	0.00	0.00	0.73	0.00	0.00	0.17	0.00	0.00
Avail Cap (c_a), veh/h	0	0	1028	0	0	1261	0	0
Upstream Filter (I)	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	13.5	0.0	0.0	11.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.3	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	16.8	0.0	0.0	11.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	1.3	0.0	0.0	0.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	1.6	0.0	0.0	0.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.51	0.00	0.00	0.12	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	0	0	6	0	0
Lane Assignment						T		
Lanes in Grp	0	0	0	0	0	1	0	0
Grp Vol (v), veh/h	0	0	0	0	0	266	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	1870	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	1003	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	3238	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	0	0	16	0	0
Lane Assignment		T+R	R					
Lanes in Grp	0	1	1	0	0	0	0	0
Grp Vol (v), veh/h	0	712	9	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1819	1585	0	0	0	0	0
Q Serve Time (g_s), s	0.0	10.3	0.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.3	0.2	0.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.14	1.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	976	277	0	0	0	0	0
V/C Ratio (X)	0.00	0.73	0.03	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	3148	915	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.1	11.9	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.2	11.9	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		8.6
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	160	15	25	150	70	30	10	65	205	5	15
Future Vol, veh/h	25	160	15	25	150	70	30	10	65	205	5	15
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	100	-	-	60	-	-	75	-	-	50	-	-
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	27	174	16	27	163	76	33	11	71	223	5	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	239	0	0	190	0	0	502	529	182	532	499	201
Stage 1	-	-	-	-	-	-	236	236	-	255	255	-
Stage 2	-	-	-	-	-	-	266	293	-	277	244	-
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	1328	-	-	1384	-	-	480	455	861	458	473	840
Stage 1	-	-	-	-	-	-	767	710	-	749	696	-
Stage 2	-	-	-	-	-	-	739	670	-	729	704	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1328	-	-	1384	-	-	452	437	861	400	454	840
Mov Cap-2 Maneuver	-	-	-	-	-	-	452	437	-	400	454	-
Stage 1	-	-	-	-	-	-	752	696	-	734	682	-
Stage 2	-	-	-	-	-	-	705	657	-	645	690	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.8	11.2	23.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	452	762	1328	-	-	1384	-	-	400	693
HCM Lane V/C Ratio	0.072	0.107	0.02	-	-	0.02	-	-	0.557	0.031
HCM Control Delay (s)	13.6	10.3	7.8	-	-	7.7	-	-	24.7	10.4
HCM Lane LOS	B	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.4	0.1	-	-	0.1	-	-	3.3	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	75	285	50	40	40	140	1955	205	170	2360	75
Future Volume (veh/h)	75	75	285	50	40	40	140	1955	205	170	2360	75
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, 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	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	82	256	54	43	10	152	2125	174	185	2565	68
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
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	82	218	291	59	195	337	119	2325	1090	193	2473	1176
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
Prop Arrive On Green	0.05	0.12	0.12	0.03	0.10	0.10	0.07	0.65	0.65	0.11	0.70	0.70
Unsig. Movement Delay												
Ln Grp Delay, s/veh	215.3	99.0	120.8	200.4	99.1	74.9	287.7	42.7	13.5	159.2	65.1	8.5
Ln Grp LOS	F	F	F	F	F	E	F	D	B	F	F	A
Approach Vol, veh/h		420			107			2451			2818	
Approach Delay, s/veh		135.0			148.0			55.8			70.0	
Approach LOS		F			F			E			E	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Case No	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0
Phs Duration (G+Y+Rc), s	31.0	163.0	13.0	33.0	21.0	173.0	16.0	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 (Gmax), s	26.0	157.0	8.0	28.0	16.0	167.0	11.0	25.0
Max Allow Headway (MAH), s	3.7	4.8	3.8	4.3	3.7	4.9	3.8	5.0
Max Q Clear (g_c+I1), s	26.8	125.5	9.3	30.0	18.0	169.0	13.0	7.1
Green Ext Time (g_e), s	0.0	22.4	0.0	0.0	0.0	0.0	0.0	0.2
Prob of Phs Call (p_c)	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Prob of Max Out (p_x)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00

Left-Turn Movement Data								
Assigned Mvmt	1		3		5		7	
Mvmt Sat Flow, veh/h	1781		1781		1781		1781	

Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3554		1870		3554		1870

Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		1585		1585		1585		1585

Left Lane Group Data								
Assigned Mvmt	1	0	3	0	5	0	7	0
Lane Assignment	L (Prot)		L (Prot)		L (Prot)		L (Prot)	

Lanes in Grp	1	0	1	0	1	0	1	0
Grp Vol (v), veh/h	185	0	54	0	152	0	82	0
Grp Sat Flow (s), veh/h/ln	1781	0	1781	0	1781	0	1781	0
Q Serve Time (g_s), s	24.8	0.0	7.3	0.0	16.0	0.0	11.0	0.0
Cycle Q Clear Time (g_c), s	24.8	0.0	7.3	0.0	16.0	0.0	11.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	0	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	193	0	59	0	119	0	82	0
V/C Ratio (X)	0.96	0.00	0.91	0.00	1.28	0.00	1.00	0.00
Avail Cap (c_a), veh/h	193	0	59	0	119	0	82	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d1), s/veh	106.5	0.0	115.6	0.0	112.0	0.0	114.5	0.0
Incr Delay (d2), s/veh	52.7	0.0	84.8	0.0	175.7	0.0	100.8	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	159.2	0.0	200.4	0.0	287.7	0.0	215.3	0.0
1st-Term Q (Q1), veh/ln	11.5	0.0	3.4	0.0	7.5	0.0	5.2	0.0
2nd-Term Q (Q2), veh/ln	2.8	0.0	1.4	0.0	5.8	0.0	2.3	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	14.4	0.0	4.8	0.0	13.3	0.0	7.5	0.0
%ile Storage Ratio (RQ%)	1.04	0.00	0.25	0.00	0.84	0.00	0.63	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	8.3	0.0	0.1	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Grp	0	2	0	1	0	2	0	1
Grp Vol (v), veh/h	0	2125	0	82	0	2565	0	43
Grp Sat Flow (s), veh/h/ln	0	1777	0	1870	0	1777	0	1870
Q Serve Time (g_s), s	0.0	123.5	0.0	9.7	0.0	167.0	0.0	5.1
Cycle Q Clear Time (g_c), s	0.0	123.5	0.0	9.7	0.0	167.0	0.0	5.1
Lane Grp Cap (c), veh/h	0	2325	0	218	0	2473	0	195
V/C Ratio (X)	0.00	0.91	0.00	0.38	0.00	1.04	0.00	0.22
Avail Cap (c_a), veh/h	0	2325	0	218	0	2473	0	195
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	35.7	0.0	97.9	0.0	36.5	0.0	98.6
Incr Delay (d2), s/veh	0.0	7.0	0.0	1.1	0.0	28.6	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	42.7	0.0	99.0	0.0	65.1	0.0	99.1
1st-Term Q (Q1), veh/ln	0.0	51.5	0.0	4.8	0.0	68.0	0.0	2.5
2nd-Term Q (Q2), veh/ln	0.0	2.3	0.0	0.1	0.0	9.8	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	53.8	0.0	4.9	0.0	77.8	0.0	2.5
%ile Storage Ratio (RQ%)	0.00	0.90	0.00	0.28	0.00	3.40	0.00	0.10
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	23.1	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	174	0	256	0	68	0	10
Grp Sat Flow (s), veh/h/ln	0	1585	0	1585	0	1585	0	1585
Q Serve Time (g_s), s	0.0	9.2	0.0	28.0	0.0	2.8	0.0	1.2
Cycle Q Clear Time (g_c), s	0.0	9.2	0.0	28.0	0.0	2.8	0.0	1.2
Prot RT Sat Flow (s_R), veh/h/ln	0.0	1585.1	0.0	1585.1	0.0	1585.1	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	8.0	0.0	16.0	0.0	11.0	0.0	26.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	1090	0	291	0	1176	0	337
V/C Ratio (X)	0.00	0.16	0.00	0.88	0.00	0.06	0.00	0.03
Avail Cap (c_a), veh/h	0	1090	0	291	0	1176	0	337
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	13.2	0.0	95.4	0.0	8.4	0.0	74.9
Incr Delay (d2), s/veh	0.0	0.3	0.0	25.3	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	13.5	0.0	120.8	0.0	8.5	0.0	74.9
1st-Term Q (Q1), veh/ln	0.0	3.5	0.0	15.7	0.0	1.0	0.0	0.5
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	2.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.6	0.0	17.8	0.0	1.0	0.0	0.5
%ile Storage Ratio (RQ%)	0.00	0.26	0.00	9.03	0.00	0.08	0.00	0.04
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	70.1
HCM 6th LOS	E

Intersection	
Int Delay, s/veh	3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	60	600	80	25	445
Future Vol, veh/h	80	60	600	80	25	445
Conflicting Peds, #/hr	56	12	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
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	87	65	652	87	27	484

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1292	710	0	0	741	0
Stage 1	698	-	-	-	-	-
Stage 2	594	-	-	-	-	-
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	180	434	-	-	866	-
Stage 1	494	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	165	428	-	-	864	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	506	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	34.3	0	0.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	165	428	864	-
HCM Lane V/C Ratio	-	-	0.527	0.152	0.031	-
HCM Control Delay (s)	-	-	48.8	14.9	9.3	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	2.6	0.5	0.1	-

HCM 6th TWSC
5: Kulanihakoi St & Kenolio Rd 07/06/2021

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	220	135	5	15	5
Future Vol, veh/h	5	220	135	5	15	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	-	-	-	-	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	239	147	5	16	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	399	150
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	249	-
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	-	-	-	607	896
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	792	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	605	896
Mov Cap-2 Maneuver	-	-	-	-	605	-
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	792	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1429	-	-	-	658
HCM Lane V/C Ratio	0.004	-	-	-	0.033
HCM Control Delay (s)	7.5	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Capacity Analysis
6: Piilani Hwy & Kulanihakoi St 07/06/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	75	190	155	15	60	75	2205	285	120	2505	65
Future Volume (veh/h)	30	75	190	155	15	60	75	2205	285	120	2505	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, 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	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	82	175	168	16	54	82	2397	253	130	2723	58
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
Opposing Right Turn Influence	No			No			Yes			Yes		
Cap, veh/h	91	217	310	195	16	380	67	2465	1099	145	2621	1169
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
Prop Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.04	0.69	0.69	0.08	0.74	0.74
Unsig. Movement Delay												
Ln Grp Delay, s/veh	91.4	0.0	89.6	133.7	0.0	72.0	299.0	47.3	13.9	137.1	60.2	8.7
Ln Grp LOS	F	A	F	F	A	E	F	D	B	F	F	A
Approach Vol, veh/h		290			238			2732			2911	
Approach Delay, s/veh		90.3			119.7			51.8			62.6	
Approach LOS		F			F			D			E	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Case No	2.0	3.0		7.0	2.0	3.0		7.0
Phs Duration (G+Y+Rc), s	24.5	172.5		43.0	14.0	183.0		43.0
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green (Gmax), s	28.0	158.0		38.0	9.0	177.0		38.0
Max Allow Headway (MAH), s	3.7	4.8		4.5	3.7	4.9		5.1
Max Q Clear (g_c+I1), s	19.4	154.4		26.0	11.0	179.0		40.0
Green Ext Time (g_e), s	0.2	3.5		0.9	0.0	0.0		0.0
Prob of Phs Call (p_c)	1.00	1.00		1.00	1.00	1.00		1.00
Prob of Max Out (p_x)	0.01	0.00		0.02	1.00	0.00		1.00

Left-Turn Movement Data								
Assigned Mvmt	1			7	5			3
Mvmt Sat Flow, veh/h	1781			454	1781			1051
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3554		1373		3554		100
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		1585		1585		1585		1585

Left Lane Group Data								
Assigned Mvmt	1	0	0	7	5	0	0	3
Lane Assignment	L (Prot)			L+T	L (Prot)			L+T

Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	130	0	0	115	82	0	0	184
Grp Sat Flow (s), veh/h/ln	1781	0	0	1827	1781	0	0	1152
Q Serve Time (g_s), s	17.4	0.0	0.0	0.0	9.0	0.0	0.0	24.5
Cycle Q Clear Time (g_c), s	17.4	0.0	0.0	13.5	9.0	0.0	0.0	38.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1419	0	0	0	1337
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1821	0	0	0	789
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	38.0	0.0	0.0	0.0	38.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5
Time to First Blk (g_f), s	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.29	1.00	0.00	0.00	0.91
Lane Grp Cap (c), veh/h	145	0	0	309	67	0	0	211
V/C Ratio (X)	0.90	0.00	0.00	0.37	1.23	0.00	0.00	0.87
Avail Cap (c_a), veh/h	208	0	0	309	67	0	0	211
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	109.2	0.0	0.0	90.6	115.5	0.0	0.0	103.3
Incr Delay (d2), s/veh	27.8	0.0	0.0	0.7	183.5	0.0	0.0	30.4
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	137.1	0.0	0.0	91.4	299.0	0.0	0.0	133.7
1st-Term Q (Q1), veh/ln	8.1	0.0	0.0	6.5	4.2	0.0	0.0	11.7
2nd-Term Q (Q2), veh/ln	1.1	0.0	0.0	0.1	3.4	0.0	0.0	1.8
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	9.2	0.0	0.0	6.6	7.6	0.0	0.0	13.4
%ile Storage Ratio (RQ%)	0.67	0.00	0.00	0.45	0.45	0.00	0.00	1.14
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	2397	0	0	0	2723	0	0
Grp Sat Flow (s), veh/h/ln	0	1777	0	0	0	1777	0	0
Q Serve Time (g_s), s	0.0	152.4	0.0	0.0	0.0	177.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	152.4	0.0	0.0	0.0	177.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	2465	0	0	0	2621	0	0
V/C Ratio (X)	0.00	0.97	0.00	0.00	0.00	1.04	0.00	0.00
Avail Cap (c_a), veh/h	0	2465	0	0	0	2621	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	34.6	0.0	0.0	0.0	31.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	12.7	0.0	0.0	0.0	28.7	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	47.3	0.0	0.0	0.0	60.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	62.2	0.0	0.0	0.0	69.6	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	4.4	0.0	0.0	0.0	10.5	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	66.5	0.0	0.0	0.0	80.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.85	0.00	0.00	0.00	4.49	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	25.5	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	253	0	175	0	58	0	54
Grp Sat Flow (s), veh/h/ln	0	1585	0	1585	0	1585	0	1585
Q Serve Time (g_s), s	0.0	14.0	0.0	24.0	0.0	2.4	0.0	6.4
Cycle Q Clear Time (g_c), s	0.0	14.0	0.0	24.0	0.0	2.4	0.0	6.4
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1585.1	0.0	0.0	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	9.0	0.0	0.0	0.0	19.5
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	1099	0	310	0	1169	0	380
V/C Ratio (X)	0.00	0.23	0.00	0.56	0.00	0.05	0.00	0.14
Avail Cap (c_a), veh/h	0	1099	0	310	0	1169	0	380
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	13.4	0.0	87.2	0.0	8.6	0.0	71.8
Incr Delay (d2), s/veh	0.0	0.5	0.0	2.3	0.0	0.1	0.0	0.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	13.9	0.0	89.6	0.0	8.7	0.0	72.0
1st-Term Q (Q1), veh/ln	0.0	5.1	0.0	10.0	0.0	0.8	0.0	2.7
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.2	0.0	10.2	0.0	0.9	0.0	2.7
%ile Storage Ratio (RQ%)	0.00	0.38	0.00	0.70	0.00	0.06	0.00	0.91
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay	61.3	
HCM 6th LOS	E	

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↰	↱	
Traffic Vol, veh/h	5	0	5	50	0	40	0	640	35	25	535	5
Future Vol, veh/h	5	0	5	50	0	40	0	640	35	25	535	5
Conflicting Peds, #/hr	1	0	3	3	0	1	40	0	14	14	0	40
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	0	5	54	0	43	0	696	38	27	582	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1417	1427	628	1373	1410	730	627	0	0	748	0	0
Stage 1	679	679	-	729	729	-	-	-	-	-	-	-
Stage 2	738	748	-	644	681	-	-	-	-	-	-	-
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	115	135	483	123	138	422	955	-	-	861	-	-
Stage 1	441	451	-	414	428	-	-	-	-	-	-	-
Stage 2	410	420	-	461	450	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	97	124	463	117	127	416	919	-	-	850	-	-
Mov Cap-2 Maneuver	97	124	-	117	127	-	-	-	-	-	-	-
Stage 1	424	420	-	409	422	-	-	-	-	-	-	-
Stage 2	367	415	-	440	419	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.1	50.4	0	0.4
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	919	-	-	160	172	850	-	-
HCM Lane V/C Ratio	-	-	-	0.068	0.569	0.032	-	-
HCM Control Delay (s)	0	-	-	29.1	50.4	9.4	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	3	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱		↰	↱	
Traffic Vol, veh/h	15	0	15	25	5	115	15	545	20	40	565	15
Future Vol, veh/h	15	0	15	25	5	115	15	545	20	40	565	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	16	0	16	27	5	125	16	592	22	43	614	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1408	1354	622	1351	1351	603	630	0	0	614	0	0
Stage 1	708	708	-	635	635	-	-	-	-	-	-	-
Stage 2	700	646	-	716	716	-	-	-	-	-	-	-
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	116	150	487	127	150	499	952	-	-	965	-	-
Stage 1	426	438	-	467	472	-	-	-	-	-	-	-
Stage 2	430	467	-	421	434	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	81	141	487	117	141	499	952	-	-	965	-	-
Mov Cap-2 Maneuver	81	141	-	117	141	-	-	-	-	-	-	-
Stage 1	419	418	-	459	464	-	-	-	-	-	-	-
Stage 2	313	459	-	389	414	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	38.7	29.2	0.2	0.6
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	952	-	-	139	302	965	-	-
HCM Lane V/C Ratio	0.017	-	-	0.235	0.522	0.045	-	-
HCM Control Delay (s)	8.8	-	-	38.7	29.2	8.9	-	-
HCM Lane LOS	A	-	-	E	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	2.8	0.1	-	-

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	25	70	225	30	90	25
Future Vol, veh/h	25	70	225	30	90	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	76	245	33	98	27
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.3	11	9.4
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	26%	0%	100%
Vol Right, %	0%	100%	74%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	90	25	95	225	30
LT Vol	90	0	0	225	0
Through Vol	0	0	25	0	30
RT Vol	0	25	70	0	0
Lane Flow Rate	98	27	103	245	33
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.163	0.036	0.132	0.372	0.045
Departure Headway (Hd)	6.011	4.803	4.602	5.481	4.979
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	597	745	779	658	720
Service Time	3.746	2.538	2.634	3.208	2.706
HCM Lane V/C Ratio	0.164	0.036	0.132	0.372	0.046
HCM Control Delay	9.9	7.7	8.3	11.4	7.9
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.6	0.1	0.5	1.7	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	50	0	2560	2530	235
Future Vol, veh/h	0	50	0	2560	2530	235
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	54	0	2783	2750	255

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1375	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	135	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	135	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	48.6	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	135	-
HCM Lane V/C Ratio	-	0.403	-
HCM Control Delay (s)	-	48.6	-
HCM Lane LOS	-	E	-
HCM 95th %tile Q(veh)	-	1.7	-

Intersection												
Int Delay, s/veh	0											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
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	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1	0	0	2	2	1	2	2	1
Stage 1	-	-	-	-	-	-	1	1	-	1	1	-
Stage 2	-	-	-	-	-	-	1	1	-	1	1	-
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	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1020	894	-	1020	894	-
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1622	-	-	1622	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
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	-	-	1622	-	1021	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1622	-	1021	1084
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1622	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	-
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	4.13	-	6.63	-
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	-
Pot Cap-1 Maneuver	-	-	1621	-	1020	0
Stage 1	-	-	-	-	1022	0
Stage 2	-	-	-	-	1022	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1621	-	1020	-
Mov Cap-2 Maneuver	-	-	-	-	1020	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1621	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1161	2.0	899	1.291	100	156.0	LOS F	128.3	3259.3	Full	1600	0.0	33.5
Lane 2[d]	1239	2.0	960	1.291	100	154.8	LOS F	136.2	3460.4	Full	1600	0.0	37.4
Lane 3	300	2.0	1642	0.183	100	3.7	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2700	2.0		1.291		138.5	LOS F	136.2	3460.4				
East: WB Kulanihakoi St													
Lane 1[d]	179	2.0	269	0.664	100	39.5	LOS E	3.0	75.7	Full	1600	0.0	0.0
Lane 2	63	2.0	224	0.282	100	23.6	LOS C	0.9	22.9	Full	1600	0.0	0.0
Approach	242	2.0		0.664		35.4	LOS E	3.0	75.7				
North: SB Piilani Hwy													
Lane 1	1335	2.0	1057	1.263	100	141.5	LOS F	134.8	3424.3	Full	1600	0.0	36.7
Lane 2[d]	1428	2.0	1131	1.263	100	140.4	LOS F	143.4	3642.1	Full	1600	0.0	41.3
Lane 3	68	2.0	1642	0.042	100	2.4	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2832	2.0		1.263		137.6	LOS F	143.4	3642.1				
West: EB Kulanihakoi St													
Lane 1[d]	111	2.0	181	0.612	100	50.1	LOS F	2.3	57.5	Full	1600	0.0	0.0
Lane 2	200	2.0	1642	0.122	100	6.0	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	311	2.0		0.612		21.7	LOS C	2.3	57.5				
Intersection	6084	2.0		1.291		128.0	LOS F	143.4	3642.1				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	79	1082	-	1161	2.0	899	1.291	100	NA	NA
Lane 2	-	1239	-	1239	2.0	960	1.291	100	NA	NA
Lane 3	-	-	300	300	2.0	1642	0.183	100	0.0	2

Approach	79	2321	300	2700	2.0		1.291				
East: WB Kulanihakoi St											
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	163	16	-	179	2.0	269	0.664	100	NA	NA	
Lane 2	-	-	63	63	2.0	224	0.282	100	NA	NA	
Approach	163	16	63	242	2.0		0.664				
North: SB Piilani Hwy											
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	126	1209	-	1335	2.0	1057	1.263	100	NA	NA	
Lane 2	-	1428	-	1428	2.0	1131	1.263	100	NA	NA	
Lane 3	-	-	68	68	2.0	1642	0.042	100	0.0	2	
Approach	126	2637	68	2832	2.0		1.263				
West: EB Kulanihakoi St											
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	32	79	-	111	2.0	181	0.612	100	NA	NA	
Lane 2	-	-	200	200	2.0	1642	0.122	100	0.0	1	
Approach	32	79	200	311	2.0		0.612				
	Total	%HV	Deg.Satn (v/c)								
Intersection	6084	2.0		1.291							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1131	1153	3.00	2.00	200	933	0.214	3.9	6.0
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1131	1800	0.628	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	179	183	3.00	2.00	300	1626	0.185	2.2	3.6
Merge Lane	1	-	100.0	Merge Lane is not Opposed				179	1800	0.099	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	77	78	3.00	2.00	68	1723	0.040	2.1	2.4
Merge Lane	1	-	100.0	Merge Lane is not Opposed				77	1800	0.043	0.0	0.0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2040 without Project PM Peak Conditions

HCM 6th Signalized Intersection Capacity Analysis
1: S Kihei Rd & Kaonoulu St 07/06/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations									
Traffic Volume (veh/h)	155	30	645	145	55	690			
Future Volume (veh/h)	155	30	645	145	55	690			
Number	3	18	2	12	1	6			
Initial Q, 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			
Lanes Open During Work Zone									
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	168	4	701	147	60	750			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	2	2	2	2			
Opposing Right Turn Influence	Yes				No				
Cap, veh/h	228	203	940	197	371	1173			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
Prop Arrive On Green	0.13	0.13	0.63	0.63	0.63	0.63			
Unsig. Movement Delay									
Ln Grp Delay, s/veh	21.8	15.6	0.0	6.3	11.2	5.3			
Ln Grp LOS	C	B	A	A	B	A			
Approach Vol, veh/h	172		848			810			
Approach Delay, s/veh	21.6		6.3			5.8			
Approach LOS	C		A			A			

Timer:	1	2	3	4	5	6	7	8
Assigned Phs		2	8			6		
Case No		8.0	9.0			6.0		
Phs Duration (G+Y+Rc), s		30.6	10.2			30.6		
Change Period (Y+Rc), s		5.0	5.0			5.0		
Max Green (Gmax), s		60.0	20.0			60.0		
Max Allow Headway (MAH), s		5.3	3.8			5.3		
Max Q Clear (g_c+I1), s		15.4	5.7			18.3		
Green Ext Time (g_e), s		8.4	0.4			7.3		
Prob of Phs Call (p_c)		1.00	0.86			1.00		
Prob of Max Out (p_x)		0.01	0.00			0.01		
Left-Turn Movement Data								
Assigned Mvmt		5	3			1		
Mvmt Sat Flow, veh/h		0	1781			650		
Through Movement Data								
Assigned Mvmt		2	8			6		
Mvmt Sat Flow, veh/h		1498	0			1870		
Right-Turn Movement Data								
Assigned Mvmt		12	18			16		
Mvmt Sat Flow, veh/h		314	1585			0		
Left Lane Group Data								
Assigned Mvmt	0	5	3	0	0	1	0	0
Lane Assignment			L			L		

Lanes in Grp	0	0	1	0	0	1	0	0
Grp Vol (v), veh/h	0	0	168	0	0	60	0	0
Grp Sat Flow (s), veh/h/ln	0	0	1781	0	0	650	0	0
Q Serve Time (g_s), s	0.0	0.0	3.7	0.0	0.0	2.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	3.7	0.0	0.0	16.3	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1781	0	0	650	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	25.6	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	12.2	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Time to First Blk (g_f), s	0.0	25.6	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	228	0	0	371	0	0
V/C Ratio (X)	0.00	0.00	0.74	0.00	0.00	0.16	0.00	0.00
Avail Cap (c_a), veh/h	0	0	872	0	0	917	0	0
Upstream Filter (I)	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	17.2	0.0	0.0	11.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	4.6	0.0	0.0	0.2	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	21.8	0.0	0.0	11.2	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	1.3	0.0	0.0	0.3	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	1.6	0.0	0.0	0.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.51	0.00	0.00	0.12	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	8	0	0	6	0	0
Lane Assignment						T		
Lanes in Grp	0	0	0	0	0	1	0	0
Grp Vol (v), veh/h	0	0	0	0	0	750	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	1870	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	1173	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	2747	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	18	0	0	16	0	0
Lane Assignment		T+R	R					
Lanes in Grp	0	1	1	0	0	0	0	0
Grp Vol (v), veh/h	0	848	4	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1812	1585	0	0	0	0	0
Q Serve Time (g_s), s	0.0	13.4	0.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	13.4	0.1	0.0	0.0	0.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.17	1.00	0.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	1137	203	0	0	0	0	0
V/C Ratio (X)	0.00	0.75	0.02	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	2661	776	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	5.3	15.6	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	6.3	15.6	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	7.5
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	170	30	55	180	120	20	10	50	120	10	10
Future Vol, veh/h	30	170	30	55	180	120	20	10	50	120	10	10
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	100	-	-	60	-	-	75	-	-	50	-	-
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	33	185	33	60	196	130	22	11	54	130	11	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	326	0	0	218	0	0	660	714	202	681	665	261
Stage 1	-	-	-	-	-	-	268	268	-	381	381	-
Stage 2	-	-	-	-	-	-	392	446	-	300	284	-
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	1234	-	-	1352	-	-	376	357	839	364	381	778
Stage 1	-	-	-	-	-	-	738	687	-	641	613	-
Stage 2	-	-	-	-	-	-	633	574	-	709	676	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1234	-	-	1352	-	-	343	332	839	314	354	778
Mov Cap-2 Maneuver	-	-	-	-	-	-	343	332	-	314	354	-
Stage 1	-	-	-	-	-	-	718	668	-	624	586	-
Stage 2	-	-	-	-	-	-	585	549	-	635	658	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	1.2	12.3	22.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	343	669	1234	-	-	1352	-	-	314	487
HCM Lane V/C Ratio	0.063	0.097	0.026	-	-	0.044	-	-	0.415	0.045
HCM Control Delay (s)	16.2	11	8	-	-	7.8	-	-	24.4	12.7
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	0.3	0.1	-	-	0.1	-	-	2	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	45	220	200	85	165	210	2535	55	45	2775	100
Future Volume (veh/h)	80	45	220	200	85	165	210	2535	55	45	2775	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, 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	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	87	49	191	217	92	131	228	2755	51	49	3016	92
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
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	81	53	184	188	164	192	156	2698	1370	60	2506	1190
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
Prop Arrive On Green	0.05	0.03	0.03	0.11	0.09	0.09	0.09	0.76	0.76	0.03	0.71	0.71
Unsig. Movement Delay												
Ln Grp Delay, s/veh	256.5	237.8	203.5	242.0	129.0	129.3	339.9	46.1	2.7	177.6	137.6	9.5
Ln Grp LOS	F	F	F	F	F	F	F	F	A	F	F	A
Approach Vol, veh/h		327			440			3034			3157	
Approach Delay, s/veh		222.7			184.8			67.4			134.5	
Approach LOS		F			F			E			F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Case No	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0
Phs Duration (G+Y+Rc), s	14.6	222.4	35.0	13.0	30.0	207.0	18.0	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 (Gmax), s	12.0	214.0	30.0	8.0	25.0	201.0	13.0	25.0
Max Allow Headway (MAH), s	3.7	4.9	3.8	4.3	3.7	4.9	3.8	4.5
Max Q Clear (g_c+I1), s	9.8	218.4	32.0	10.0	27.0	203.0	15.0	24.6
Green Ext Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prob of Phs Call (p_c)	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prob of Max Out (p_x)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00
Left-Turn Movement Data								
Assigned Mvmt	1		3		5		7	
Mvmt Sat Flow, veh/h	1781		1781		1781		1781	
Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3554		1870		3554		1870
Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		1585		1585		1585		1585
Left Lane Group Data								
Assigned Mvmt	1	0	3	0	5	0	7	0
Lane Assignment	L (Prot)		L (Prot)		L (Prot)		L (Prot)	

Lanes in Grp	1	0	1	0	1	0	1	0
Grp Vol (v), veh/h	49	0	217	0	228	0	87	0
Grp Sat Flow (s), veh/h/ln	1781	0	1781	0	1781	0	1781	0
Q Serve Time (g_s), s	7.8	0.0	30.0	0.0	25.0	0.0	13.0	0.0
Cycle Q Clear Time (g_c), s	7.8	0.0	30.0	0.0	25.0	0.0	13.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	0	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	60	0	188	0	156	0	81	0
V/C Ratio (X)	0.82	0.00	1.16	0.00	1.46	0.00	1.07	0.00
Avail Cap (c_a), veh/h	75	0	188	0	156	0	81	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	0.09	0.00	1.00	0.00
Uniform Delay (d1), s/veh	136.8	0.0	127.5	0.0	130.0	0.0	136.0	0.0
Incr Delay (d2), s/veh	40.8	0.0	114.5	0.0	209.9	0.0	120.5	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	177.6	0.0	242.0	0.0	339.9	0.0	256.5	0.0
1st-Term Q (Q1), veh/ln	3.7	0.0	14.2	0.0	11.8	0.0	6.2	0.0
2nd-Term Q (Q2), veh/ln	0.7	0.0	6.0	0.0	9.1	0.0	2.7	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	4.4	0.0	20.2	0.0	20.9	0.0	8.9	0.0
%ile Storage Ratio (RQ%)	0.32	0.00	1.03	0.00	1.32	0.00	0.75	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	7.4	0.0	17.9	0.0	1.4	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.3	0.0	0.4	0.0	0.3	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Grp	0	2	0	1	0	2	0	1
Grp Vol (v), veh/h	0	2755	0	49	0	3016	0	92
Grp Sat Flow (s), veh/h/ln	0	1777	0	1870	0	1777	0	1870
Q Serve Time (g_s), s	0.0	216.4	0.0	7.5	0.0	201.0	0.0	13.5
Cycle Q Clear Time (g_c), s	0.0	216.4	0.0	7.5	0.0	201.0	0.0	13.5
Lane Grp Cap (c), veh/h	0	2698	0	53	0	2506	0	164
V/C Ratio (X)	0.00	1.02	0.00	0.93	0.00	1.20	0.00	0.56
Avail Cap (c_a), veh/h	0	2698	0	53	0	2506	0	164
Upstream Filter (I)	0.00	0.09	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	34.3	0.0	138.2	0.0	42.0	0.0	124.7
Incr Delay (d2), s/veh	0.0	11.8	0.0	99.5	0.0	95.6	0.0	4.3
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	46.1	0.0	237.8	0.0	137.6	0.0	129.0
1st-Term Q (Q1), veh/ln	0.0	86.8	0.0	3.7	0.0	84.1	0.0	6.7
2nd-Term Q (Q2), veh/ln	0.0	4.4	0.0	1.5	0.0	33.3	0.0	0.2

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	91.3	0.0	5.2	0.0	117.3	0.0	6.9
%ile Storage Ratio (RQ%)	0.00	1.15	0.00	0.29	0.00	3.92	0.00	0.27
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	14.2	0.0	0.0	0.0	127.4	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	51	0	191	0	92	0	131
Grp Sat Flow (s), veh/h/ln	0	1585	0	1585	0	1585	0	1585
Q Serve Time (g_s), s	0.0	1.3	0.0	8.0	0.0	4.4	0.0	22.6
Cycle Q Clear Time (g_c), s	0.0	1.3	0.0	8.0	0.0	4.4	0.0	22.6
Prot RT Sat Flow (s_R), veh/h/ln	0.0	1585.1	0.0	1585.1	0.0	1585.1	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	30.0	0.0	25.0	0.0	13.0	0.0	9.6
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	1370	0	184	0	1190	0	192
V/C Ratio (X)	0.00	0.04	0.00	1.04	0.00	0.08	0.00	0.68
Avail Cap (c_a), veh/h	0	1370	0	184	0	1190	0	192
Upstream Filter (I)	0.00	0.09	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	2.7	0.0	126.0	0.0	9.4	0.0	119.9
Incr Delay (d2), s/veh	0.0	0.0	0.0	77.5	0.0	0.1	0.0	9.4
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	2.7	0.0	203.5	0.0	9.5	0.0	129.3
1st-Term Q (Q1), veh/ln	0.0	0.4	0.0	13.9	0.0	1.6	0.0	9.5
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.5
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.0	17.9	0.0	1.7	0.0	10.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	9.08	0.00	0.12	0.00	0.85
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	112.6
HCM 6th LOS	F

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	40	50	785	80	45	780
Future Vol, veh/h	40	50	785	80	45	780
Conflicting Peds, #/hr	21	11	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
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	43	54	853	87	49	848

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1865	909	0	0	941	0
Stage 1	898	-	-	-	-	-
Stage 2	967	-	-	-	-	-
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	80	333	-	-	729	-
Stage 1	398	-	-	-	-	-
Stage 2	369	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	73	329	-	-	728	-
Mov Cap-2 Maneuver	73	-	-	-	-	-
Stage 1	398	-	-	-	-	-
Stage 2	337	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	58.9	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	73	329	728	-
HCM Lane V/C Ratio	-	-	0.596	0.165	0.067	-
HCM Control Delay (s)	-	-	109.9	18.1	10.3	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	2.6	0.6	0.2	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	130	155	10	15	10
Future Vol, veh/h	15	130	155	10	15	10
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	16	141	168	11	16	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	179	0	-	0	347	174
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	173	-
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	1397	-	-	-	650	869
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	857	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1397	-	-	-	642	869
Mov Cap-2 Maneuver	-	-	-	-	642	-
Stage 1	-	-	-	-	846	-
Stage 2	-	-	-	-	857	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1397	-	-	-	717
HCM Lane V/C Ratio	0.012	-	-	-	0.038
HCM Control Delay (s)	7.6	0	-	-	10.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	15	115	80	10	30	110	2750	65	25	3075	85
Future Volume (veh/h)	20	15	115	80	10	30	110	2750	65	25	3075	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, 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	
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	22	16	112	87	11	1	120	2989	61	27	3342	79
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
Opposing Right Turn Influence	No			No			Yes			Yes		
Cap, veh/h	93	61	212	127	13	150	104	2980	1329	35	2842	1268
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
Prop Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.84	0.84	0.02	0.80	0.80
Unsig. Movement Delay												
Ln Grp Delay, s/veh	105.6	0.0	99.0	117.6	0.0	98.4	248.9	36.6	3.3	122.9	103.6	5.1
Ln Grp LOS	F	A	F	F	A	F	F	F	A	F	F	A
Approach Vol, veh/h		150			99			3170			3448	
Approach Delay, s/veh		100.6			117.4			44.0			101.5	
Approach LOS		F			F			D			F	

Timer:	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Case No	2.0	3.0		7.0	2.0	3.0		7.0
Phs Duration (G+Y+Rc), s	9.7	207.2		23.1	19.0	197.9		23.1
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green (Gmax), s	6.0	193.0		25.0	14.0	185.0		25.0
Max Allow Headway (MAH), s	3.7	4.9		4.4	3.7	4.9		5.3
Max Q Clear (g_c+I1), s	5.6	203.2		17.8	16.0	193.9		17.6
Green Ext Time (g_e), s	0.0	0.0		0.3	0.0	0.0		0.2
Prob of Phs Call (p_c)	0.83	1.00		1.00	1.00	1.00		1.00
Prob of Max Out (p_x)	1.00	0.00		0.12	1.00	0.00		0.23

Left-Turn Movement Data								
Assigned Mvmt	1			7	5			3
Mvmt Sat Flow, veh/h	1781			914	1781			1316

Through Movement Data								
Assigned Mvmt		2		4		6		8
Mvmt Sat Flow, veh/h		3554		815		3554		166

Right-Turn Movement Data								
Assigned Mvmt		12		14		16		18
Mvmt Sat Flow, veh/h		1585		1585		1585		1585

Left Lane Group Data								
Assigned Mvmt	1	0	0	7	5	0	0	3
Lane Assignment	L (Prot)			L+T	L (Prot)			L+T

Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	27	0	0	38	120	0	0	98
Grp Sat Flow (s), veh/h/ln	1781	0	0	1730	1781	0	0	1482
Q Serve Time (g_s), s	3.6	0.0	0.0	0.0	14.0	0.0	0.0	10.8
Cycle Q Clear Time (g_c), s	3.6	0.0	0.0	4.8	14.0	0.0	0.0	15.6
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1426	0	0	0	1419
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1743	0	0	0	1604
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	18.1	0.0	0.0	0.0	18.1
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	2.4	0.0	0.0	0.0	13.2
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8
Time to First Blk (g_f), s	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.58	1.00	0.00	0.00	0.89
Lane Grp Cap (c), veh/h	35	0	0	154	104	0	0	140
V/C Ratio (X)	0.78	0.00	0.00	0.25	1.15	0.00	0.00	0.70
Avail Cap (c_a), veh/h	45	0	0	199	104	0	0	181
Upstream Filter (I)	0.09	0.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	117.1	0.0	0.0	104.8	113.0	0.0	0.0	109.6
Incr Delay (d2), s/veh	5.8	0.0	0.0	0.8	135.9	0.0	0.0	7.9
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	122.9	0.0	0.0	105.6	248.9	0.0	0.0	117.6
1st-Term Q (Q1), veh/ln	1.7	0.0	0.0	2.3	6.5	0.0	0.0	6.2
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.0	3.9	0.0	0.0	0.3
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	1.8	0.0	0.0	2.3	10.5	0.0	0.0	6.5
%ile Storage Ratio (RQ%)	0.13	0.00	0.00	0.16	0.62	0.00	0.00	0.55
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0

Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	2989	0	0	0	3342	0	0
Grp Sat Flow (s), veh/h/ln	0	1777	0	0	0	1777	0	0
Q Serve Time (g_s), s	0.0	201.2	0.0	0.0	0.0	191.9	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	201.2	0.0	0.0	0.0	191.9	0.0	0.0
Lane Grp Cap (c), veh/h	0	2980	0	0	0	2842	0	0
V/C Ratio (X)	0.00	1.00	0.00	0.00	0.00	1.18	0.00	0.00
Avail Cap (c_a), veh/h	0	2980	0	0	0	2842	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.09	0.00	0.00
Uniform Delay (d1), s/veh	0.0	19.4	0.0	0.0	0.0	24.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	17.2	0.0	0.0	0.0	79.6	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	36.6	0.0	0.0	0.0	103.6	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	66.5	0.0	0.0	0.0	69.5	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	7.1	0.0	0.0	0.0	31.4	0.0	0.0

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	73.7	0.0	0.0	0.0	100.9	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.94	0.00	0.00	0.00	1.27	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	2.3	0.0	0.0	0.0	125.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	61	0	112	0	79	0	1
Grp Sat Flow (s), veh/h/ln	0	1585	0	1585	0	1585	0	1585
Q Serve Time (g_s), s	0.0	1.6	0.0	15.8	0.0	2.5	0.0	0.1
Cycle Q Clear Time (g_c), s	0.0	1.6	0.0	15.8	0.0	2.5	0.0	0.1
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	1585.1	0.0	0.0	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	14.0	0.0	0.0	0.0	4.7
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	1329	0	212	0	1268	0	150
V/C Ratio (X)	0.00	0.05	0.00	0.53	0.00	0.06	0.00	0.01
Avail Cap (c_a), veh/h	0	1329	0	258	0	1268	0	196
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.09	0.00	1.00
Uniform Delay (d1), s/veh	0.0	3.3	0.0	96.9	0.0	5.1	0.0	98.4
Incr Delay (d2), s/veh	0.0	0.1	0.0	2.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.3	0.0	99.0	0.0	5.1	0.0	98.4
1st-Term Q (Q1), veh/ln	0.0	0.5	0.0	6.6	0.0	0.8	0.0	0.1
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.5	0.0	6.7	0.0	0.8	0.0	0.1
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	0.46	0.00	0.06	0.00	0.02
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		75.2
HCM 6th LOS		E

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↰	↱	
Traffic Vol, veh/h	5	0	5	20	0	25	10	875	45	25	815	5
Future Vol, veh/h	5	0	5	20	0	25	10	875	45	25	815	5
Conflicting Peds, #/hr	0	0	3	3	0	0	11	0	8	8	0	11
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	0	5	22	0	27	11	951	49	27	886	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1965	1984	903	1954	1962	984	902	0	0	1008	0	0
Stage 1	954	954	-	1006	1006	-	-	-	-	-	-	-
Stage 2	1011	1030	-	948	956	-	-	-	-	-	-	-
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	47	61	336	48	63	301	754	-	-	687	-	-
Stage 1	311	337	-	291	319	-	-	-	-	-	-	-
Stage 2	289	311	-	313	336	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	40	56	332	44	57	299	746	-	-	682	-	-
Mov Cap-2 Maneuver	40	56	-	44	57	-	-	-	-	-	-	-
Stage 1	297	320	-	279	306	-	-	-	-	-	-	-
Stage 2	254	298	-	295	319	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	64.7	95.5	0.1	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	746	-	-	71	84	682	-	-
HCM Lane V/C Ratio	0.015	-	-	0.153	0.582	0.04	-	-
HCM Control Delay (s)	9.9	0	-	64.7	95.5	10.5	-	-
HCM Lane LOS	A	A	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	2.6	0.1	-	-

Intersection	
Int Delay, s/veh	41.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱		↰	↱	
Traffic Vol, veh/h	20	10	20	25	10	155	20	810	30	55	780	35
Future Vol, veh/h	20	10	20	25	10	155	20	810	30	55	780	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	22	11	22	27	11	168	22	880	33	60	848	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2017	1944	867	1945	1947	897	886	0	0	913	0	0
Stage 1	987	987	-	941	941	-	-	-	-	-	-	-
Stage 2	1030	957	-	1004	1006	-	-	-	-	-	-	-
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	43	65	352	49	65	339	764	-	-	746	-	-
Stage 1	298	325	-	316	342	-	-	-	-	-	-	-
Stage 2	282	336	-	291	319	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 17	58	352	36	58	339	764	-	-	746	-	-
Mov Cap-2 Maneuver	~ 17	58	-	36	58	-	-	-	-	-	-	-
Stage 1	289	299	-	307	332	-	-	-	-	-	-	-
Stage 2	133	326	-	242	293	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 504.4	292.4	0.2	0.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	764	-	-	36	143	746	-	-
HCM Lane V/C Ratio	0.028	-	-	1.51	1.444	0.08	-	-
HCM Control Delay (s)	9.8	-	-	$ 504.4	292.4	10.2	-	-
HCM Lane LOS	A	-	-	F	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	5.8	13.6	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Traffic Vol, veh/h	25	50	145	55	115	30
Future Vol, veh/h	25	50	145	55	115	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	54	158	60	125	33
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.2	9.6	9.5
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	33%	0%	100%
Vol Right, %	0%	100%	67%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	30	75	145	55
LT Vol	115	0	0	145	0
Through Vol	0	0	25	0	55
RT Vol	0	30	50	0	0
Lane Flow Rate	125	33	82	158	60
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.201	0.042	0.105	0.243	0.084
Departure Headway (Hd)	5.796	4.59	4.646	5.549	5.047
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	620	780	770	648	710
Service Time	3.527	2.321	2.679	3.276	2.774
HCM Lane V/C Ratio	0.202	0.042	0.106	0.244	0.085
HCM Control Delay	10	7.5	8.2	10.1	8.2
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.7	0.1	0.4	0.9	0.3

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	30	0	2915	3065	200
Future Vol, veh/h	0	30	0	2915	3065	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	33	0	3168	3332	217

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1666	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	86	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	86	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	70.4	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	86	-
HCM Lane V/C Ratio	-	0.379	-
HCM Control Delay (s)	-	70.4	-
HCM Lane LOS	-	F	-
HCM 95th %tile Q(veh)	-	1.5	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
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	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1	0	0	2	2	1	2	2	1
Stage 1	-	-	-	-	-	-	1	1	-	1	1	-
Stage 2	-	-	-	-	-	-	1	1	-	1	1	-
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	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1020	894	-	1020	894	-
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1622	-	-	1622	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
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	-	-	1622	-	1021	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1622	-	1021	1084
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1622	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	-
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	4.13	-	6.63	-
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	-
Pot Cap-1 Maneuver	-	-	1621	-	1020	0
Stage 1	-	-	-	-	1022	0
Stage 2	-	-	-	-	1022	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1621	-	1020	-
Mov Cap-2 Maneuver	-	-	-	-	1020	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1621	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1464	2.0	1027	1.425	100	211.0	LOS F	285.7	7258.0	Full	1600	0.0	100.0
Lane 2 [d]	1546	2.0	1085	1.425	100	210.3	LOS F	302.2	7676.0	Full	1600	0.0	100.0
Lane 3	68	2.0	1642	0.042	100	2.3	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	3079	2.0		1.425		206.0	LOS F	302.2	7676.0				
East: WB Kulanihakoi St													
Lane 1 [d]	95	2.0	217	0.436	100	30.8	LOS D	1.5	37.8	Full	1600	0.0	0.0
Lane 2	32	2.0	177	0.178	100	25.4	LOS D	0.5	13.0	Full	1600	0.0	0.0
Approach	126	2.0		0.436		29.5	LOS D	1.5	37.8				
North: SB Piilani Hwy													
Lane 1	1580	2.0	1122	1.409	100	202.7	LOS F	206.2	5236.6	Full	1600	0.0	100.0
Lane 2 [d]	1683	2.0	1195	1.409	100	201.8	LOS F	218.6	5553.5	Full	1600	0.0	100.0
Lane 3	89	2.0	1642	0.054	100	2.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	3353	2.0		1.409		196.9	LOS F	218.6	5553.5				
West: EB Kulanihakoi St													
Lane 1 [d]	37	2.0	173	0.213	100	27.3	LOS D	0.6	15.5	Full	1600	0.0	0.0
Lane 2	121	2.0	1642	0.074	100	5.3	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	158	2.0		0.213		10.5	LOS B	0.6	15.5				
Intersection	6716	2.0		1.425		193.5	LOS F	302.2	7676.0				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy											
Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	116	1348	-	1464	2.0	1027	1.425	100	NA	NA
Lane 2	-	1546	-	1546	2.0	1085	1.425	100	NA	NA
Lane 3	-	-	68	68	2.0	1642	0.042	100	0.0	2
Approach	116	2895	68	3079	2.0		1.425			
East: WB Kulanihakoi St										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	84	11	-	95	2.0	217	0.436	100	NA	NA
Lane 2	-	-	32	32	2.0	177	0.178	100	NA	NA
Approach	84	11	32	126	2.0		0.436			
North: SB Piilani Hwy										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	26	1554	-	1580	2.0	1122	1.409	100	NA	NA
Lane 2	-	1683	-	1683	2.0	1195	1.409	100	NA	NA
Lane 3	-	-	89	89	2.0	1642	0.054	100	0.0	2
Approach	26	3237	89	3353	2.0		1.409			
West: EB Kulanihakoi St										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	16	-	37	2.0	173	0.213	100	NA	NA
Lane 2	-	-	121	121	2.0	1642	0.074	100	0.0	1
Approach	21	16	121	158	2.0		0.213			
	Total	%HV	Deg.Satn (v/c)							
Intersection	6716	2.0	1.425							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1195	1219	3.00	2.00	121	897	0.135	4.0	5.3
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1195	1800	0.664	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	34	35	3.00	2.00	68	1765	0.039	2.0	2.3
Merge Lane	1	-	100.0	Merge Lane is not Opposed				34	1800	0.019	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	92	94	3.00	2.00	89	1709	0.052	2.1	2.5
Merge Lane	1	-	100.0	Merge Lane is not Opposed				92	1800	0.051	0.0	0.0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2040 with Project AM Peak Conditions

HCM 6th Signalized Intersection Summary
1: S Kihei Rd & Kaonoulu St

07/06/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	130	45	525	60	110	365	
Future Volume (veh/h)	130	45	525	60	110	365	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00		0.99	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	141	4	571	58	120	397	
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	208	185	915	93	490	1027	
Arrive On Green	0.12	0.12	0.55	0.55	0.55	0.55	
Sat Flow, veh/h	1781	1585	1668	169	793	1870	
Grp Volume(v), veh/h	141	4	0	629	120	397	
Grp Sat Flow(s),veh/h/ln	1781	1585	0	1837	793	1870	
Q Serve(g_s), s	2.3	0.1	0.0	7.0	3.7	3.6	
Cycle Q Clear(g_c), s	2.3	0.1	0.0	7.0	10.7	3.6	
Prop In Lane	1.00	1.00		0.09	1.00		
Lane Grp Cap(c), veh/h	208	185	0	1008	490	1027	
V/C Ratio(X)	0.68	0.02	0.00	0.62	0.25	0.39	
Avail Cap(c_a), veh/h	1190	1059	0	3682	1645	3749	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	12.7	11.7	0.0	4.6	8.3	3.9	
Incr Delay (d2), s/veh	3.8	0.0	0.0	0.6	0.3	0.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	1.0	0.4	0.5	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	16.5	11.7	0.0	5.3	8.6	4.1	
LnGrp LOS	B	B	A	A	A	A	
Approach Vol, veh/h	145		629			517	
Approach Delay, s/veh	16.3		5.3			5.1	
Approach LOS	B		A			A	

Timer - Assigned Phs	2				6	8
Phs Duration (G+Y+Rc), s	21.4				21.4	8.5
Change Period (Y+Rc), s	5.0				5.0	5.0
Max Green Setting (Gmax), s	60.0				60.0	20.0
Max Q Clear Time (g_c+I1), s	9.0				12.7	4.3
Green Ext Time (p_c), s	5.2				3.7	0.3

Intersection Summary	
HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

HCM 6th TWSC
2: Kenolio Rd & Kaonoulu St

07/06/2021

Intersection	
Int Delay, s/veh	23.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
Future Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
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	100	-	-	60	-	-	75	-	-	50	-	-
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	22	136	152	98	141	65	54	130	98	168	217	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	206	0	0	288	0	0	742	658	212	740	702	174
Stage 1	-	-	-	-	-	-	256	256	-	370	370	-
Stage 2	-	-	-	-	-	-	486	402	-	370	332	-
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	1365	-	-	1274	-	-	332	384	828	333	362	869
Stage 1	-	-	-	-	-	-	749	696	-	650	620	-
Stage 2	-	-	-	-	-	-	563	600	-	650	644	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1365	-	-	1274	-	-	143	349	828	195	329	869
Mov Cap-2 Maneuver	-	-	-	-	-	-	143	349	-	195	329	-
Stage 1	-	-	-	-	-	-	737	685	-	640	572	-
Stage 2	-	-	-	-	-	-	316	554	-	457	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	2.6	24.8	55.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	143	464	1365	-	-	1274	-	-	195	344
HCM Lane V/C Ratio	0.38	0.492	0.016	-	-	0.077	-	-	0.864	0.679
HCM Control Delay (s)	44.8	20	7.7	-	-	8.1	-	-	82.9	35
HCM Lane LOS	E	C	A	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	1.6	2.7	0	-	-	0.2	-	-	6.5	4.7

HCM 6th Signalized Intersection Summary
3: Piilani Hwy & Kaonoulu St

07/06/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	95	170	45	45	40	105	1785	185	170	1905	100
Future Volume (veh/h)	70	95	170	45	45	40	105	1785	185	170	1905	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	76	103	131	49	49	11	114	1940	152	185	2071	84
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	82	163	243	59	139	290	119	2430	1137	193	2579	1223
Arrive On Green	0.05	0.09	0.09	0.03	0.07	0.07	0.07	0.68	0.68	0.11	0.73	0.73
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	76	103	131	49	49	11	114	1940	152	185	2071	84
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	10.2	12.8	18.3	6.6	6.0	1.4	15.3	91.2	7.2	24.8	92.0	3.1
Cycle Q Clear(g_c), s	10.2	12.8	18.3	6.6	6.0	1.4	15.3	91.2	7.2	24.8	92.0	3.1
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	82	163	243	59	139	290	119	2430	1137	193	2579	1223
V/C Ratio(X)	0.93	0.63	0.54	0.83	0.35	0.04	0.96	0.80	0.13	0.96	0.80	0.07
Avail Cap(c_a), veh/h	82	218	291	59	195	337	119	2430	1137	193	2579	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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	114.1	105.9	93.7	115.3	105.6	80.7	111.7	26.4	10.6	106.5	21.7	6.6
Incr Delay (d2), s/veh	76.5	4.0	1.8	59.3	1.5	0.1	69.8	2.8	0.2	52.7	2.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	6.5	7.8	4.1	3.0	0.6	9.4	38.4	2.8	14.4	37.5	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	190.6	109.9	95.6	174.6	107.1	80.8	181.5	29.2	10.9	159.2	24.4	6.7
LnGrp LOS	F	F	F	F	F	F	F	C	B	F	C	A
Approach Vol, veh/h		310			109			2206			2340	
Approach Delay, s/veh		123.6			134.8			35.8			34.4	
Approach LOS		F			F			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.0	170.1	13.0	25.9	21.0	180.1	16.0	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	26.0	157.0	8.0	28.0	16.0	167.0	11.0	25.0
Max Q Clear Time (g_c+I1), s	26.8	93.2	8.6	20.3	17.3	94.0	12.2	8.0
Green Ext Time (p_c), s	0.0	28.9	0.0	0.6	0.0	33.9	0.0	0.2

Intersection Summary		
HCM 6th Ctrl Delay		42.8
HCM 6th LOS		D

HCM 6th TWSC
4: S Kihei Rd & Kulanihakoi St

07/06/2021

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	55	520	55	50	465
Future Vol, veh/h	50	55	520	55	50	465
Conflicting Peds, #/hr	56	12	0	2	2	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	60	565	60	54	505

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1266	609	0	0	627	0
Stage 1	597	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	187	495	-	-	955	-
Stage 1	550	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	167	488	-	-	953	-
Mov Cap-2 Maneuver	167	-	-	-	-	-
Stage 1	549	-	-	-	-	-
Stage 2	455	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.4	0	0.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	167	488	953	-
HCM Lane V/C Ratio	-	-	0.325	0.123	0.057	-
HCM Control Delay (s)	-	-	36.6	13.4	9	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	1.3	0.4	0.2	-

HCM 6th TWSC
5: Kulanihakoi St & Kenolio Rd 07/06/2021

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	160	115	10	20	10
Future Vol, veh/h	15	160	115	10	20	10
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	16	174	125	11	22	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	136	0	-	0	337	131
Stage 1	-	-	-	-	131	-
Stage 2	-	-	-	-	206	-
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	1448	-	-	-	658	919
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	829	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1448	-	-	-	650	919
Mov Cap-2 Maneuver	-	-	-	-	650	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	829	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1448	-	-	-	720
HCM Lane V/C Ratio	0.011	-	-	-	0.045
HCM Control Delay (s)	7.5	0	-	-	10.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
6: Piilani Hwy & Kulanihakoi St 07/06/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	75	105	125	45	60	40	1985	230	120	1905	85
Future Volume (veh/h)	25	75	105	125	45	60	40	1985	230	120	1905	85
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	27	82	82	136	49	54	43	2158	200	130	2071	70
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	75	219	299	169	52	380	54	2465	1099	145	2646	1180
Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.03	0.69	0.69	0.08	0.74	0.74
Sat Flow, veh/h	358	1384	1585	905	326	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	109	0	82	185	0	54	43	2158	200	130	2071	70
Grp Sat Flow(s),veh/h/ln	1741	0	1585	1231	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	10.6	23.0	0.0	6.4	5.8	113.7	10.6	17.4	85.7	2.8
Cycle Q Clear(g_c), s	13.1	0.0	10.6	36.1	0.0	6.4	5.8	113.7	10.6	17.4	85.7	2.8
Prop In Lane	0.25		1.00	0.74		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	294	0	299	221	0	380	54	2465	1099	145	2646	1180
V/C Ratio(X)	0.37	0.00	0.27	0.84	0.00	0.14	0.79	0.88	0.18	0.90	0.78	0.06
Avail Cap(c_a), veh/h	294	0	299	221	0	380	67	2465	1099	208	2646	1180
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	90.4	0.0	83.3	102.1	0.0	71.8	115.6	28.7	12.9	109.2	18.8	8.2
Incr Delay (d2), s/veh	0.8	0.0	0.5	23.6	0.0	0.2	39.2	4.7	0.4	27.8	2.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.0	4.5	13.1	0.0	2.7	3.3	48.0	4.0	9.2	34.3	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	91.2	0.0	83.8	125.7	0.0	72.0	154.7	33.4	13.3	137.1	21.2	8.3
LnGrp LOS	F	A	F	F	A	E	F	C	B	F	C	A
Approach Vol, veh/h		191			239			2401			2271	
Approach Delay, s/veh		88.0			113.6			33.9			27.4	
Approach LOS		F			F			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	24.5	172.5		43.0	12.3	184.7		43.0				
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0				
Max Green Setting (Gmax), s	28.0	158.0		38.0	9.0	177.0		38.0				
Max Q Clear Time (g_c+I1), s	19.4	115.7		15.1	7.8	87.7		38.1				
Green Ext Time (p_c), s	0.2	28.2		0.8	0.0	36.2		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		36.8
HCM 6th LOS		D

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↰	↱	
Traffic Vol, veh/h	5	0	5	30	0	35	0	540	15	30	545	5
Future Vol, veh/h	5	0	5	30	0	35	0	540	15	30	545	5
Conflicting Peds, #/hr	1	0	3	3	0	1	40	0	14	14	0	40
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	0	5	33	0	38	0	587	16	33	592	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1316	1318	638	1275	1312	610	637	0	0	617	0	0
Stage 1	701	701	-	609	609	-	-	-	-	-	-	-
Stage 2	615	617	-	666	703	-	-	-	-	-	-	-
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	135	157	477	144	159	494	947	-	-	963	-	-
Stage 1	429	441	-	482	485	-	-	-	-	-	-	-
Stage 2	479	481	-	449	440	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	116	144	458	136	146	487	911	-	-	950	-	-
Mov Cap-2 Maneuver	116	144	-	136	146	-	-	-	-	-	-	-
Stage 1	413	409	-	476	479	-	-	-	-	-	-	-
Stage 2	441	475	-	427	408	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.7	28.6	0	0.5
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	911	-	-	185	222	950	-	-
HCM Lane V/C Ratio	-	-	-	0.059	0.318	0.034	-	-
HCM Control Delay (s)	0	-	-	25.7	28.6	8.9	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1.3	0.1	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↱		↰	↱	
Traffic Vol, veh/h	15	0	15	20	5	75	15	460	20	60	540	15
Future Vol, veh/h	15	0	15	20	5	75	15	460	20	60	540	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	16	0	16	22	5	82	16	500	22	65	587	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1312	1279	595	1276	1276	511	603	0	0	522	0	0
Stage 1	725	725	-	543	543	-	-	-	-	-	-	-
Stage 2	587	554	-	733	733	-	-	-	-	-	-	-
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	136	166	504	144	167	563	975	-	-	1044	-	-
Stage 1	416	430	-	524	520	-	-	-	-	-	-	-
Stage 2	496	514	-	412	426	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	106	153	504	131	154	563	975	-	-	1044	-	-
Mov Cap-2 Maneuver	106	153	-	131	154	-	-	-	-	-	-	-
Stage 1	409	403	-	516	512	-	-	-	-	-	-	-
Stage 2	413	506	-	374	400	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.2	22.4	0.3	0.8
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	975	-	-	175	314	1044	-	-
HCM Lane V/C Ratio	0.017	-	-	0.186	0.346	0.062	-	-
HCM Control Delay (s)	8.8	-	-	30.2	22.4	8.7	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	1.5	0.2	-	-

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	15	110	255	20	80	25
Future Vol, veh/h	15	110	255	20	80	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	120	277	22	87	27
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.5	11.8	9.4
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	12%	0%	100%
Vol Right, %	0%	100%	88%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	25	125	255	20
LT Vol	80	0	0	255	0
Through Vol	0	0	15	0	20
RT Vol	0	25	110	0	0
Lane Flow Rate	87	27	136	277	22
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.148	0.037	0.17	0.421	0.03
Departure Headway (Hd)	6.134	4.925	4.517	5.474	4.972
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	584	725	792	657	720
Service Time	3.877	2.668	2.553	3.206	2.704
HCM Lane V/C Ratio	0.149	0.037	0.172	0.422	0.031
HCM Control Delay	9.9	7.9	8.5	12.1	7.9
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.5	0.1	0.6	2.1	0.1

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	50	0	2250	1780	240
Future Vol, veh/h	0	50	0	2250	1780	240
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	54	0	2446	1935	261

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	968	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	254	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	-	254	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	254	-
HCM Lane V/C Ratio	-	0.214	-
HCM Control Delay (s)	-	23	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.8	-

Intersection												
Int Delay, s/veh	0											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
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	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1	0	0	2	2	1	2	2	1
Stage 1	-	-	-	-	-	-	1	1	-	1	1	-
Stage 2	-	-	-	-	-	-	1	1	-	1	1	-
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	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1020	894	-	1020	894	-
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1622	-	-	1622	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
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	-	-	1622	-	1021	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1622	-	1021	1084
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1622	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	-
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	4.13	-	6.63	-
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	-
Pot Cap-1 Maneuver	-	-	1621	-	1020	0
Stage 1	-	-	-	-	1022	0
Stage 2	-	-	-	-	1022	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1621	-	1020	-
Mov Cap-2 Maneuver	-	-	-	-	1020	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1621	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1030	2.0	883	1.167	100	106.1	LOS F	90.5	2298.0	Full	1600	0.0	17.0
Lane 2[d]	1102	2.0	944	1.167	100	104.6	LOS F	95.9	2437.1	Full	1600	0.0	19.3
Lane 3	242	2.0	1642	0.147	100	3.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2374	2.0		1.167		94.9	LOS F	95.9	2437.1				
East: WB Kulanihakoi St													
Lane 1[d]	179	2.0	277	0.646	100	37.1	LOS D	2.9	72.7	Full	1600	0.0	0.0
Lane 2	63	2.0	231	0.274	100	22.6	LOS C	0.9	22.1	Full	1600	0.0	0.0
Approach	242	2.0		0.646		33.3	LOS C	2.9	72.7				
North: SB Piilani Hwy													
Lane 1	1031	2.0	1081	0.953	100	36.8	LOS D	48.0	1220.0	Full	1600	0.0	0.0
Lane 2[d]	1101	2.0	1155	0.953	100	35.4	LOS D	49.9	1268.7	Full	1600	0.0	0.0
Lane 3	89	2.0	1642	0.054	100	2.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2221	2.0		0.953		34.7	LOS C	49.9	1268.7				
West: EB Kulanihakoi St													
Lane 1[d]	105	2.0	196	0.538	100	40.7	LOS D	1.9	49.0	Full	1600	0.0	0.0
Lane 2	111	2.0	1642	0.067	100	4.9	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	216	2.0		0.538		22.3	LOS C	1.9	49.0				
Intersection	5053	2.0		1.167		62.4	LOS E	95.9	2437.1				

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 Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	42	988	-	1030	2.0	883	1.167	100	NA	NA
Lane 2	-	1102	-	1102	2.0	944	1.167	100	NA	NA
Lane 3	-	-	242	242	2.0	1642	0.147	100	0.0	2

Approach	42	2089	242	2374	2.0		1.167				
East: WB Kulanihakoi St											
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	132	47	-	179	2.0	277	0.646	100	NA	NA	
Lane 2	-	-	63	63	2.0	231	0.274	100	NA	NA	
Approach	132	47	63	242	2.0		0.646				
North: SB Piilani Hwy											
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	126	904	-	1031	2.0	1081	0.953	100	NA	NA	
Lane 2	-	1101	-	1101	2.0	1155	0.953	100	NA	NA	
Lane 3	-	-	89	89	2.0	1642	0.054	100	0.0	2	
Approach	126	2005	89	2221	2.0		0.953				
West: EB Kulanihakoi St											
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	26	79	-	105	2.0	196	0.538	100	NA	NA	
Lane 2	-	-	111	111	2.0	1642	0.067	100	0.0	1	
Approach	26	79	111	216	2.0		0.538				

	Total	%HV	Deg.Satn (v/c)
Intersection	5053	2.0	1.167

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1101	1123	3.00	2.00	111	949	0.116	3.8	4.9
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1101	1800	0.612	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	205	209	3.00	2.00	242	1601	0.151	2.2	3.4
Merge Lane	1	-	100.0	Merge Lane is not Opposed				205	1800	0.114	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	83	85	3.00	2.00	89	1717	0.052	2.1	2.5
Merge Lane	1	-	100.0	Merge Lane is not Opposed				83	1800	0.046	0.0	0.0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

• Future Year 2040 with Project PM Peak Conditions

HCM 6th Signalized Intersection Summary
1: S Kihei Rd & Kaonoulu St

07/06/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (veh/h)	110	30	580	75	115	780	
Future Volume (veh/h)	110	30	580	75	115	780	
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	120	3	630	77	125	848	
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	170	151	1053	129	499	1205	
Arrive On Green	0.10	0.10	0.64	0.64	0.64	0.64	
Sat Flow, veh/h	1781	1585	1634	200	740	1870	
Grp Volume(v), veh/h	120	3	0	707	125	848	
Grp Sat Flow(s),veh/h/ln	1781	1585	0	1833	740	1870	
Q Serve(g_s), s	2.5	0.1	0.0	8.6	4.5	11.3	
Cycle Q Clear(g_c), s	2.5	0.1	0.0	8.6	13.1	11.3	
Prop In Lane	1.00	1.00		0.11	1.00		
Lane Grp Cap(c), veh/h	170	151	0	1181	499	1205	
V/C Ratio(X)	0.71	0.02	0.00	0.60	0.25	0.70	
Avail Cap(c_a), veh/h	928	826	0	2866	1180	2924	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	16.8	15.7	0.0	4.0	7.7	4.4	
Incr Delay (d2), s/veh	5.3	0.1	0.0	0.5	0.3	0.8	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.0	1.2	0.5	1.7	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	22.2	15.8	0.0	4.4	8.0	5.2	
LnGrp LOS	C	B	A	A	A	A	
Approach Vol, veh/h	123		707			973	
Approach Delay, s/veh	22.0		4.4			5.6	
Approach LOS	C		A			A	

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		29.7				29.7	8.7
Change Period (Y+Rc), s		5.0				5.0	5.0
Max Green Setting (Gmax), s		60.0				60.0	20.0
Max Q Clear Time (g_c+I1), s		10.6				15.1	4.5
Green Ext Time (p_c), s		6.2				9.6	0.3

Intersection Summary			
HCM 6th Ctrl Delay		6.2	
HCM 6th LOS		A	

HCM 6th TWSC
2: Kenolio Rd & Kaonoulu St 07/06/2021

Intersection												
Int Delay, s/veh	74.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Future Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
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	100	-	-	60	-	-	75	-	-	50	-	-
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	22	163	130	130	168	103	65	234	71	103	250	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	271	0	0	293	0	0	882	803	228	905	817	220
Stage 1	-	-	-	-	-	-	272	272	-	480	480	-
Stage 2	-	-	-	-	-	-	610	531	-	425	337	-
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	1292	-	-	1269	-	-	267	317	811	257	311	820
Stage 1	-	-	-	-	-	-	734	685	-	567	554	-
Stage 2	-	-	-	-	-	-	482	526	-	607	641	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1292	-	-	1269	-	-	~ 52	280	811	~ 65	275	820
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 52	280	-	~ 65	275	-
Stage 1	-	-	-	-	-	-	722	673	-	557	497	-
Stage 2	-	-	-	-	-	-	212	472	-	356	630	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	2.6	115.4	176.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	52	330	1292	-	-	1269	-	-	65	283
HCM Lane V/C Ratio	1.254	0.922	0.017	-	-	0.103	-	-	1.589	0.922
HCM Control Delay (s)	$ 337.2	67.9	7.8	-	-	8.2	-	-	$ 431.9	74.9
HCM Lane LOS	F	F	A	-	-	A	-	-	F	F
HCM 95th %tile Q(veh)	5.8	9.2	0.1	-	-	0.3	-	-	9.1	8.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
3: Piilani Hwy & Kaonoulu St 07/06/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	50	155	180	105	165	150	2310	50	45	2285	125
Future Volume (veh/h)	75	50	155	180	105	165	150	2310	50	45	2285	125
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	82	54	120	196	114	131	163	2511	45	49	2484	113
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	81	53	184	188	164	192	156	2698	1370	60	2506	1190
Arrive On Green	0.05	0.03	0.03	0.11	0.09	0.09	0.09	0.76	0.76	0.03	0.71	0.71
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	82	54	120	196	114	131	163	2511	45	49	2484	113
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	13.0	8.0	8.0	30.0	16.9	22.6	25.0	165.2	1.1	7.8	195.1	5.5
Cycle Q Clear(g_c), s	13.0	8.0	8.0	30.0	16.9	22.6	25.0	165.2	1.1	7.8	195.1	5.5
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	81	53	184	188	164	192	156	2698	1370	60	2506	1190
V/C Ratio(X)	1.01	1.03	0.65	1.05	0.69	0.68	1.04	0.93	0.03	0.82	0.99	0.09
Avail Cap(c_a), veh/h	81	53	184	188	164	192	156	2698	1370	75	2506	1190
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	0.31	0.31	0.31	1.00	1.00	1.00
Uniform Delay (d), s/veh	136.0	138.5	120.5	127.5	126.3	119.9	130.0	28.1	2.7	136.8	41.1	9.5
Incr Delay (d2), s/veh	102.4	132.6	8.1	78.2	12.0	9.4	51.8	2.6	0.0	40.8	16.0	0.2
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	8.5	5.9	9.1	18.3	9.0	10.0	14.0	67.2	0.4	4.4	87.2	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	238.4	271.1	128.6	205.7	138.3	129.3	181.8	30.7	2.7	177.6	57.1	9.7
LnGrp LOS	F	F	F	F	F	F	F	C	A	F	E	A
Approach Vol, veh/h		256			441			2719			2646	
Approach Delay, s/veh		193.8			165.5			39.3			57.3	
Approach LOS		F			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	222.4	35.0	13.0	30.0	207.0	18.0	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	12.0	214.0	30.0	8.0	25.0	201.0	13.0	25.0
Max Q Clear Time (g_c+I1), s	9.8	167.2	32.0	10.0	27.0	197.1	15.0	24.6
Green Ext Time (p_c), s	0.0	35.8	0.0	0.0	0.0	3.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	62.9
HCM 6th LOS	E

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	45	660	40	70	800
Future Vol, veh/h	25	45	660	40	70	800
Conflicting Peds, #/hr	21	11	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	140	-	-	75	-
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	27	49	717	43	76	870

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1783	751	0	0	761	0
Stage 1	740	-	-	-	-	-
Stage 2	1043	-	-	-	-	-
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	90	411	-	-	851	-
Stage 1	472	-	-	-	-	-
Stage 2	339	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	80	406	-	-	850	-
Mov Cap-2 Maneuver	80	-	-	-	-	-
Stage 1	472	-	-	-	-	-
Stage 2	303	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	35.3	0	0.8
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	80	406	850	-
HCM Lane V/C Ratio	-	-	0.34	0.12	0.09	-
HCM Control Delay (s)	-	-	71.6	15.1	9.7	-
HCM Lane LOS	-	-	F	C	A	-
HCM 95th %tile Q(veh)	-	-	1.3	0.4	0.3	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	100	130	10	20	20
Future Vol, veh/h	20	100	130	10	20	20
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	22	109	141	11	22	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	152	0	-	0	300	147
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	153	-
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	-	-	-	691	900
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	875	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	680	900
Mov Cap-2 Maneuver	-	-	-	-	680	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	875	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1429	-	-	-	775
HCM Lane V/C Ratio	0.015	-	-	-	0.056
HCM Control Delay (s)	7.6	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 6th Signalized Intersection Summary
6: Piilani Hwy & Kulanihakoi St

07/06/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	15	75	65	25	30	75	2460	50	25	2480	110
Future Volume (veh/h)	20	15	75	65	25	30	75	2460	50	25	2480	110
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	16	69	71	27	1	82	2674	45	27	2696	99
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	83	55	200	106	31	146	96	2989	1333	35	2867	1279
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.05	0.84	0.84	0.02	0.81	0.81
Sat Flow, veh/h	818	751	1585	1107	421	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	38	0	69	98	0	1	82	2674	45	27	2696	99
Grp Sat Flow(s),veh/h/ln	1569	0	1585	1528	0	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	0.0	0.0	9.5	9.9	0.0	0.1	11.0	115.9	1.1	3.6	145.7	3.1
Cycle Q Clear(g_c), s	5.3	0.0	9.5	15.2	0.0	0.1	11.0	115.9	1.1	3.6	145.7	3.1
Prop In Lane	0.58		1.00	0.72		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	0	200	137	0	146	96	2989	1333	35	2867	1279
V/C Ratio(X)	0.28	0.00	0.34	0.72	0.00	0.01	0.86	0.89	0.03	0.78	0.94	0.08
Avail Cap(c_a), veh/h	187	0	250	184	0	196	104	2989	1333	45	2867	1279
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	1.00	1.00	1.00	1.00	0.14	0.14	0.14
Uniform Delay (d), s/veh	105.6	0.0	95.7	110.2	0.0	99.0	112.6	12.2	3.1	117.1	18.5	4.8
Incr Delay (d2), s/veh	1.1	0.0	1.0	8.3	0.0	0.0	44.2	4.7	0.0	8.8	1.3	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	2.3	0.0	4.0	6.5	0.0	0.1	6.3	40.0	0.3	1.8	52.6	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	106.6	0.0	96.8	118.4	0.0	99.0	156.9	16.9	3.2	125.9	19.9	4.8
LnGrp LOS	F	A	F	F	A	F	F	B	A	F	B	A
Approach Vol, veh/h		107			99			2801			2822	
Approach Delay, s/veh		100.3			118.2			20.8			20.3	
Approach LOS		F			F			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.7	207.9		22.4	17.9	199.7		22.4				
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0				
Max Green Setting (Gmax), s	6.0	193.0		25.0	14.0	185.0		25.0				
Max Q Clear Time (g_c+I1), s	5.6	117.9		11.5	13.0	147.7		17.2				
Green Ext Time (p_c), s	0.0	55.5		0.3	0.0	32.1		0.2				

Intersection Summary	
HCM 6th Ctrl Delay	23.7
HCM 6th LOS	C

HCM 6th TWSC
7: S Kihei Rd & Lanakila Drwy/Namauu Pl

07/06/2021

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	0	5	15	0	20	10	715	20	30	850	5
Future Vol, veh/h	5	0	5	15	0	20	10	715	20	30	850	5
Conflicting Peds, #/hr	0	0	3	3	0	0	11	0	8	8	0	11
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	75	-	-
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	0	5	16	0	22	11	777	22	33	924	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1825	1833	941	1816	1824	796	940	0	0	807	0	0
Stage 1	1004	1004	-	818	818	-	-	-	-	-	-	-
Stage 2	821	829	-	998	1006	-	-	-	-	-	-	-
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	59	76	319	60	77	387	729	-	-	818	-	-
Stage 1	291	320	-	370	390	-	-	-	-	-	-	-
Stage 2	369	385	-	294	319	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	52	70	315	55	70	384	721	-	-	812	-	-
Mov Cap-2 Maneuver	52	70	-	55	70	-	-	-	-	-	-	-
Stage 1	280	304	-	357	376	-	-	-	-	-	-	-
Stage 2	338	371	-	276	303	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	51	55.5	0.1	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	721	-	-	89	108	812	-	-
HCM Lane V/C Ratio	0.015	-	-	0.122	0.352	0.04	-	-
HCM Control Delay (s)	10.1	0	-	51	55.5	9.6	-	-
HCM Lane LOS	B	A	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	1.4	0.1	-	-

Intersection	
Int Delay, s/veh	19.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	10	20	25	10	105	20	675	25	75	790	35
Future Vol, veh/h	20	10	20	25	10	105	20	675	25	75	790	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
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	22	11	22	27	11	114	22	734	27	82	859	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1896	1847	878	1851	1853	748	897	0	0	761	0	0
Stage 1	1042	1042	-	792	792	-	-	-	-	-	-	-
Stage 2	854	805	-	1059	1061	-	-	-	-	-	-	-
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	53	75	347	57	74	412	757	-	-	851	-	-
Stage 1	277	307	-	382	401	-	-	-	-	-	-	-
Stage 2	353	395	-	271	300	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	30	66	347	42	65	412	757	-	-	851	-	-
Mov Cap-2 Maneuver	30	66	-	42	65	-	-	-	-	-	-	-
Stage 1	269	278	-	371	389	-	-	-	-	-	-	-
Stage 2	241	384	-	221	271	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	222.6	167.2	0.3	0.8
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	757	-	-	57	139	851	-	-
HCM Lane V/C Ratio	0.029	-	-	0.953	1.095	0.096	-	-
HCM Control Delay (s)	9.9	-	-	222.6	167.2	9.7	-	-
HCM Lane LOS	A	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.4	8.4	0.3	-	-

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	20	100	180	40	100	30
Future Vol, veh/h	20	100	180	40	100	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	109	196	43	109	33
Number of Lanes	1	0	1	1	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	8.5	10.2	9.5
HCM LOS	A	B	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	100%	0%
Vol Thru, %	0%	0%	17%	0%	100%
Vol Right, %	0%	100%	83%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	30	120	180	40
LT Vol	100	0	0	180	0
Through Vol	0	0	20	0	40
RT Vol	0	30	100	0	0
Lane Flow Rate	109	33	130	196	43
Geometry Grp	7	7	4	7	7
Degree of Util (X)	0.18	0.043	0.164	0.301	0.061
Departure Headway (Hd)	5.959	4.751	4.538	5.547	5.045
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	602	752	789	648	710
Service Time	3.697	2.489	2.571	3.278	2.775
HCM Lane V/C Ratio	0.181	0.044	0.165	0.302	0.061
HCM Control Delay	10	7.7	8.5	10.7	8.1
HCM Lane LOS	A	A	A	B	A
HCM 95th-tile Q	0.7	0.1	0.6	1.3	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	30	0	2575	2360	220
Future Vol, veh/h	0	30	0	2575	2360	220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	-	0	-	-	-	300
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	0	33	0	2799	2565	239

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1283	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	156	0	-	-	0
Stage 1	0	-	0	-	-	0
Stage 2	0	-	0	-	-	0
Platoon blocked, %					-	-
Mov Cap-1 Maneuver	-	156	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	34.1	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT
Capacity (veh/h)	-	156	-
HCM Lane V/C Ratio	-	0.209	-
HCM Control Delay (s)	-	34.1	-
HCM Lane LOS	-	D	-
HCM 95th %tile Q(veh)	-	0.8	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0	0	0	0	0	0	0
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	125	-	-	175	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0	0	0	0	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1	0	0	2	2	1	2	2	1
Stage 1	-	-	-	-	-	-	1	1	-	1	1	-
Stage 2	-	-	-	-	-	-	1	1	-	1	1	-
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	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1622	-	-	1622	-	-	1020	894	1084	1020	894	1084
Mov Cap-2 Maneuver	-	-	-	-	-	-	1020	894	-	1020	894	-
Stage 1	-	-	-	-	-	-	1022	895	-	1022	895	-
Stage 2	-	-	-	-	-	-	1022	895	-	1022	895	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1622	-	-	1622	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0	-	-	0
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
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	-	-	1622	-	1021	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1622	-	1021	1084
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1622	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
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	0	0	0	0	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1	0	2	-
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	4.13	-	6.63	-
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	-	-	2.219	-	3.519	-
Pot Cap-1 Maneuver	-	-	1621	-	1020	0
Stage 1	-	-	-	-	1022	0
Stage 2	-	-	-	-	1022	0
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1621	-	1020	-
Mov Cap-2 Maneuver	-	-	-	-	1020	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1621	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1298	2.0	1023	1.268	100	144.1	LOS F	208.3	5290.7	Full	1600	0.0	100.0
Lane 2[d]	1371	2.0	1081	1.268	100	143.2	LOS F	220.3	5596.3	Full	1600	0.0	100.0
Lane 3	53	2.0	1642	0.032	100	2.3	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2721	2.0		1.268		140.9	LOS F	220.3	5596.3				
East: WB Kulanihakoi St													
Lane 1[d]	95	2.0	219	0.432	100	30.4	LOS D	1.5	37.5	Full	1600	0.0	0.0
Lane 2	32	2.0	179	0.176	100	25.1	LOS D	0.5	12.9	Full	1600	0.0	0.0
Approach	126	2.0		0.432		29.1	LOS D	1.5	37.5				
North: SB Piilani Hwy													
Lane 1	1278	2.0	1142	1.119	100	82.9	LOS F	111.7	2836.5	Full	1600	0.0	25.9
Lane 2[d]	1359	2.0	1215	1.119	100	81.7	LOS F	117.4	2981.2	Full	1600	0.0	28.4
Lane 3	116	2.0	1642	0.071	100	2.6	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2753	2.0		1.119		78.9	LOS F	117.4	2981.2				
West: EB Kulanihakoi St													
Lane 1[d]	37	2.0	170	0.217	100	28.0	LOS D	0.6	15.8	Full	1600	0.0	0.0
Lane 2	79	2.0	1642	0.048	100	4.9	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	116	2.0		0.217		12.3	LOS B	0.6	15.8				
Intersection	5716	2.0		1.268		106.0	LOS F	220.3	5596.3				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy										
Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	79	1219	-	1298	2.0	1023	1.268	100	NA	NA
Lane 2	-	1371	-	1371	2.0	1081	1.268	100	NA	NA
Lane 3	-	-	53	53	2.0	1642	0.032	100	0.0	2
Approach	79	2589	53	2721	2.0		1.268			
East: WB Kulanihakoi St										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	68	26	-	95	2.0	219	0.432	100	NA	NA
Lane 2	-	-	32	32	2.0	179	0.176	100	NA	NA
Approach	68	26	32	126	2.0		0.432			
North: SB Piilani Hwy										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	26	1251	-	1278	2.0	1142	1.119	100	NA	NA
Lane 2	-	1359	-	1359	2.0	1215	1.119	100	NA	NA
Lane 3	-	-	116	116	2.0	1642	0.071	100	0.0	2
Approach	26	2611	116	2753	2.0		1.119			
West: EB Kulanihakoi St										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	16	-	37	2.0	170	0.217	100	NA	NA
Lane 2	-	-	79	79	2.0	1642	0.048	100	0.0	1
Approach	21	16	79	116	2.0		0.217			
	Total	%HV	Deg.Satn (v/c)							
Intersection	5716	2.0	1.268							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1215	1239	3.00	2.00	79	887	0.089	4.1	4.9
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1215	1800	0.675	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	39	40	3.00	2.00	53	1760	0.030	2.0	2.3
Merge Lane	1	-	100.0	Merge Lane is not Opposed				39	1800	0.022	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	89	90	3.00	2.00	116	1712	0.068	2.1	2.6
Merge Lane	1	-	100.0	Merge Lane is not Opposed				89	1800	0.049	0.0	0.0

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

• Future Year 2040 AM Scenarios for Liloa Drive Intersections

HCM 6th AWSC
2: Kenolio Rd & Kaonoulu St 08/05/2020

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
Future Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	136	152	98	141	65	54	130	98	168	217	16
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	18.2	14.4	15.1	15.7
HCM LOS	C	B	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	57%	0%	47%	0%	68%	0%	93%
Vol Right, %	0%	43%	0%	53%	0%	32%	0%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	50	210	20	265	90	190	155	215
LT Vol	50	0	20	0	90	0	155	0
Through Vol	0	120	0	125	0	130	0	200
RT Vol	0	90	0	140	0	60	0	15
Lane Flow Rate	54	228	22	288	98	207	168	234
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.121	0.456	0.048	0.566	0.217	0.416	0.364	0.468
Departure Headway (Hd)	8.012	7.19	7.967	7.075	7.999	7.258	7.773	7.211
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	447	500	449	510	448	496	462	498
Service Time	5.774	4.952	5.724	4.831	5.759	5.018	5.531	4.969
HCM Lane V/C Ratio	0.121	0.456	0.049	0.565	0.219	0.417	0.364	0.47
HCM Control Delay	11.9	15.9	11.1	18.7	13	15.1	14.9	16.2
HCM Lane LOS	B	C	B	C	B	C	B	C
HCM 95th-tile Q	0.4	2.4	0.2	3.5	0.8	2	1.6	2.5

HCM 6th AWSC
5: Liloa Drive/Kenolio Rd & Kulanihakoi St 08/05/2020

Intersection	
Intersection Delay, s/veh	51.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
Future Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	174	114	109	125	11	49	255	82	22	511	11
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	24.1	15.8	26.6	100.2
HCM LOS	C	C	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	76%	0%	60%	0%	92%	0%	98%
Vol Right, %	0%	24%	0%	40%	0%	8%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	45	310	15	265	100	125	20	480
LT Vol	45	0	15	0	100	0	20	0
Through Vol	0	235	0	160	0	115	0	470
RT Vol	0	75	0	105	0	10	0	10
Lane Flow Rate	49	337	16	288	109	136	22	522
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.114	0.717	0.04	0.64	0.273	0.32	0.05	1.116
Departure Headway (Hd)	8.738	8.043	9.193	8.384	9.496	8.916	8.228	7.698
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	413	452	392	435	380	406	438	475
Service Time	6.438	5.743	6.893	6.084	7.196	6.616	5.928	5.398
HCM Lane V/C Ratio	0.119	0.746	0.041	0.662	0.287	0.335	0.05	1.099
HCM Control Delay	12.6	28.6	12.3	24.8	15.7	15.8	11.4	103.9
HCM Lane LOS	B	D	B	C	C	C	B	F
HCM 95th-tile Q	0.4	5.6	0.1	4.4	1.1	1.4	0.2	17.8

HCM 6th AWSC
9: Liloa Drive & E Waipuilani Rd 08/05/2020

Intersection	
Intersection Delay, s/veh	175.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Future Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	16	120	277	22	11	87	457	27	33	788	11
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	17.1	30	69.4	331.1
HCM LOS	C	D	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	94%	0%	12%	0%	67%	0%	99%
Vol Right, %	0%	6%	0%	88%	0%	33%	0%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	445	10	125	255	30	30	735
LT Vol	80	0	10	0	255	0	30	0
Through Vol	0	420	0	15	0	20	0	725
RT Vol	0	25	0	110	0	10	0	10
Lane Flow Rate	87	484	11	136	277	33	33	799
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.197	1.021	0.029	0.32	0.683	0.074	0.074	1.701
Departure Headway (Hd)	9.217	8.654	11.137	9.95	10.106	9.333	8.392	7.866
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	392	426	323	364	360	386	429	471
Service Time	6.917	6.354	8.837	7.65	7.806	7.033	6.092	5.566
HCM Lane V/C Ratio	0.222	1.136	0.034	0.374	0.769	0.085	0.077	1.696
HCM Control Delay	14.2	79.3	14.2	17.3	32	12.8	11.8	344.1
HCM Lane LOS	B	F	B	C	D	B	B	F
HCM 95th-tile Q	0.7	13.2	0.1	1.4	4.8	0.2	0.2	46.4

HCM 6th Signalized Intersection Summary
2: Kenolio Rd & Kaonoulu St 08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	125	140	90	130	60	50	120	90	155	200	15
Future Volume (veh/h)	20	125	140	90	130	60	50	120	90	155	200	15
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	136	99	98	141	43	54	130	56	168	217	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	524	305	222	478	417	127	542	424	183	573	600	33
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1200	1006	732	1145	1375	419	1152	1240	534	1198	1756	97
Grp Volume(v), veh/h	22	0	235	98	0	184	54	0	186	168	0	229
Grp Sat Flow(s),veh/h/ln	1200	0	1739	1145	0	1795	1152	0	1774	1198	0	1853
Q Serve(g_s), s	0.4	0.0	3.1	2.1	0.0	2.2	1.0	0.0	2.2	3.4	0.0	2.6
Cycle Q Clear(g_c), s	2.7	0.0	3.1	5.2	0.0	2.2	3.7	0.0	2.2	5.6	0.0	2.6
Prop In Lane	1.00		0.42	1.00		0.23	1.00		0.30	1.00		0.05
Lane Grp Cap(c), veh/h	524	0	527	478	0	544	542	0	607	573	0	634
V/C Ratio(X)	0.04	0.00	0.45	0.21	0.00	0.34	0.10	0.00	0.31	0.29	0.00	0.36
Avail Cap(c_a), veh/h	1649	0	2158	1553	0	2228	1987	0	2832	2075	0	2958
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.7	0.0	7.9	10.0	0.0	7.6	8.3	0.0	6.8	8.9	0.0	7.0
Incr Delay (d2), s/veh	0.0	0.0	0.6	0.2	0.0	0.4	0.1	0.0	0.3	0.3	0.0	0.3
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	0.1	0.0	0.8	0.4	0.0	0.6	0.2	0.0	0.5	0.6	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.7	0.0	8.5	10.2	0.0	8.0	8.4	0.0	7.1	9.1	0.0	7.3
LnGrp LOS	A	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		257			282			240			397	
Approach Delay, s/veh		8.5			8.8			7.4			8.1	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.6		13.5		14.6		13.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		45.0		35.0		45.0		35.0				
Max Q Clear Time (g_c+I1), s		5.7		5.1		7.6		7.2				
Green Ext Time (p_c), s		1.4		1.6		2.1		1.5				

Intersection Summary		
HCM 6th Ctrl Delay	8.2	
HCM 6th LOS	A	

HCM 6th Signalized Intersection Summary
5: Liloa Drive/Kenolio Rd & Kulanihakoi St

08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	160	105	100	115	10	45	235	75	20	470	10
Future Volume (veh/h)	15	160	105	100	115	10	45	235	75	20	470	10
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	16	174	79	109	125	7	49	255	68	22	511	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	518	362	164	415	521	29	369	580	155	507	746	15
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1258	1218	553	1127	1754	98	881	1423	379	1057	1828	36
Grp Volume(v), veh/h	16	0	253	109	0	132	49	0	323	22	0	521
Grp Sat Flow(s),veh/h/ln	1258	0	1771	1127	0	1853	881	0	1802	1057	0	1864
Q Serve(g_s), s	0.3	0.0	4.0	3.0	0.0	1.8	1.6	0.0	4.4	0.5	0.0	7.8
Cycle Q Clear(g_c), s	2.2	0.0	4.0	6.9	0.0	1.8	9.4	0.0	4.4	4.9	0.0	7.8
Prop In Lane	1.00		0.31	1.00		0.05	1.00		0.21	1.00		0.02
Lane Grp Cap(c), veh/h	518	0	526	415	0	550	369	0	735	507	0	760
V/C Ratio(X)	0.03	0.00	0.48	0.26	0.00	0.24	0.13	0.00	0.44	0.04	0.00	0.69
Avail Cap(c_a), veh/h	1629	0	2090	1410	0	2187	1050	0	2127	1323	0	2200
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.8	0.0	9.8	12.6	0.0	9.0	12.1	0.0	7.2	9.0	0.0	8.2
Incr Delay (d2), s/veh	0.0	0.0	0.7	0.3	0.0	0.2	0.2	0.0	0.4	0.0	0.0	1.1
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	0.1	0.0	1.2	0.6	0.0	0.6	0.3	0.0	1.1	0.1	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	0.0	10.5	13.0	0.0	9.2	12.3	0.0	7.7	9.0	0.0	9.4
LnGrp LOS	A	A	B	B	A	A	B	A	A	A	A	A
Approach Vol, veh/h		269			241			372			543	
Approach Delay, s/veh		10.4			10.9			8.3			9.3	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		18.8		15.1		18.8		15.1				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		40.0		40.0		40.0		40.0				
Max Q Clear Time (g_c+I1), s		11.4		6.0		9.8		8.9				
Green Ext Time (p_c), s		2.4		1.7		3.8		1.2				
Intersection Summary												
HCM 6th Ctrl Delay			9.5									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
9: Liloa Drive & E Waipuilani Rd

08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	110	255	20	10	80	420	25	30	725	10
Future Volume (veh/h)	10	15	110	255	20	10	80	420	25	30	725	10
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		0.97	0.99		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	11	16	65	277	22	2	87	457	25	33	788	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	514	93	379	458	488	44	254	940	51	464	987	14
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.54	0.54	0.54	0.54	0.54	0.54
Sat Flow, veh/h	1387	323	1311	1317	1689	154	680	1754	96	906	1840	26
Grp Volume(v), veh/h	11	0	81	277	0	24	87	0	482	33	0	799
Grp Sat Flow(s),veh/h/ln	1387	0	1634	1317	0	1843	680	0	1850	906	0	1866
Q Serve(g_s), s	0.3	0.0	2.1	11.4	0.0	0.5	6.8	0.0	9.3	1.4	0.0	19.9
Cycle Q Clear(g_c), s	0.9	0.0	2.1	13.5	0.0	0.5	26.7	0.0	9.3	10.7	0.0	19.9
Prop In Lane	1.00		0.80	1.00		0.08	1.00		0.05	1.00		0.01
Lane Grp Cap(c), veh/h	514	0	472	458	0	532	254	0	992	464	0	1000
V/C Ratio(X)	0.02	0.00	0.17	0.61	0.00	0.05	0.34	0.00	0.49	0.07	0.00	0.80
Avail Cap(c_a), veh/h	1205	0	1286	1114	0	1450	306	0	1132	533	0	1142
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.0	0.0	15.2	20.3	0.0	14.6	21.6	0.0	8.3	11.7	0.0	10.8
Incr Delay (d2), s/veh	0.0	0.0	0.2	1.3	0.0	0.0	0.8	0.0	0.4	0.1	0.0	3.6
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	0.1	0.0	0.7	3.3	0.0	0.2	1.1	0.0	3.0	0.3	0.0	7.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.0	0.0	15.4	21.6	0.0	14.7	22.4	0.0	8.7	11.7	0.0	14.4
LnGrp LOS	B	A	B	C	A	B	C	A	A	B	A	B
Approach Vol, veh/h		92			301			569			832	
Approach Delay, s/veh		15.3			21.0			10.8			14.3	
Approach LOS		B			C			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		35.7		21.5		35.7		21.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		35.0		45.0		35.0		45.0				
Max Q Clear Time (g_c+I1), s		28.7		4.1		21.9		15.5				
Green Ext Time (p_c), s		2.0		0.5		5.0		1.0				
Intersection Summary												
HCM 6th Ctrl Delay			14.4									
HCM 6th LOS			B									

HCM 6th TWSC
2: Kenolio Rd & Kaonoulu St 08/05/2020

Intersection												
Int Delay, s/veh	32.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
Future Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	60	-	-	75	-	-	50	-	-
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	22	136	152	98	141	65	54	130	98	168	217	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	951	897	225	992	856	179	233	0	0	228	0	0
Stage 1	561	561	-	287	287	-	-	-	-	-	-	-
Stage 2	390	336	-	705	569	-	-	-	-	-	-	-
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	240	279	814	225	295	864	1335	-	-	1340	-	-
Stage 1	512	510	-	720	674	-	-	-	-	-	-	-
Stage 2	634	642	-	427	506	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	108	234	814	~ 88	248	864	1335	-	-	1340	-	-
Mov Cap-2 Maneuver	108	234	-	~ 88	248	-	-	-	-	-	-	-
Stage 1	492	446	-	691	647	-	-	-	-	-	-	-
Stage 2	440	616	-	211	443	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	40.5	93	1.5	3.4
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1335	-	-	108	375	88	320	1340	-	-
HCM Lane V/C Ratio	0.041	-	-	0.201	0.768	1.112	0.645	0.126	-	-
HCM Control Delay (s)	7.8	-	-	46.5	40.1	216.3	34.6	8.1	-	-
HCM Lane LOS	A	-	-	E	E	F	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	6.3	6.7	4.2	0.4	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC
5: Liloa Drive & Kulanihakoi St 08/05/2020

Intersection												
Int Delay, s/veh	66.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
Future Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	150	-	-	150	-	-
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	16	174	114	109	125	11	49	255	82	22	511	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1023	996	517	1099	960	296	522	0	0	337	0	0
Stage 1	561	561	-	394	394	-	-	-	-	-	-	-
Stage 2	462	435	-	705	566	-	-	-	-	-	-	-
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	214	244	558	190	257	743	1044	-	-	1222	-	-
Stage 1	512	510	-	631	605	-	-	-	-	-	-	-
Stage 2	580	580	-	427	507	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	228	558	~ 54	241	743	1044	-	-	1222	-	-
Mov Cap-2 Maneuver	119	228	-	~ 54	241	-	-	-	-	-	-	-
Stage 1	488	501	-	601	577	-	-	-	-	-	-	-
Stage 2	427	553	-	218	498	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	80.1	$ 301	1.1	0.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1044	-	-	119	298	54	255	1222	-	-
HCM Lane V/C Ratio	0.047	-	-	0.137	0.967	2.013	0.533	0.018	-	-
HCM Control Delay (s)	8.6	-	-	40	82.4	$ 634.7	34.1	8	-	-
HCM Lane LOS	A	-	-	E	F	F	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	9.8	10.7	2.9	0.1	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	376.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Future Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	30	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	75	-	-	75	-	-
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	11	16	120	277	22	11	87	457	27	33	788	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1521	1548	794	1603	1540	501	799	0	0	514	0	0
Stage 1	860	860	-	675	675	-	-	-	-	-	-	-
Stage 2	661	688	-	928	865	-	-	-	-	-	-	-
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	97	114	388	~ 85	115	570	824	-	-	1052	-	-
Stage 1	351	373	-	444	453	-	-	-	-	-	-	-
Stage 2	452	447	-	321	371	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	71	96	388	~ 45	97	554	824	-	-	1022	-	-
Mov Cap-2 Maneuver	71	96	-	~ 45	97	-	-	-	-	-	-	-
Stage 1	314	361	-	386	393	-	-	-	-	-	-	-
Stage 2	374	388	-	~ 205	359	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.5	$ 2239.8	1.5	0.3
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	824	-	-	71	284	45	134	1022	-	-
HCM Lane V/C Ratio	0.106	-	-	0.153	0.478	6.159	0.243	0.032	-	-
HCM Control Delay (s)	9.9	-	-	64.7	28.$	2498.6	40.3	8.6	-	-
HCM Lane LOS	A	-	-	F	D	F	E	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.5	2.4	32.2	0.9	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	23.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
Future Vol, veh/h	20	125	140	90	130	60	50	120	90	155	200	15
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	0	-	-	60	-	-	75	-	-	50	-	-
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	22	136	152	98	141	65	54	130	98	168	217	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	206	0	0	288	0	0	742	658	212	740	702	174
Stage 1	-	-	-	-	-	-	256	256	-	370	370	-
Stage 2	-	-	-	-	-	-	486	402	-	370	332	-
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	1365	-	-	1274	-	-	332	384	828	333	362	869
Stage 1	-	-	-	-	-	-	749	696	-	650	620	-
Stage 2	-	-	-	-	-	-	563	600	-	650	644	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1365	-	-	1274	-	-	143	349	828	195	329	869
Mov Cap-2 Maneuver	-	-	-	-	-	-	143	349	-	195	329	-
Stage 1	-	-	-	-	-	-	737	685	-	640	572	-
Stage 2	-	-	-	-	-	-	316	554	-	457	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	2.6	24.8	55.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	143	464	1365	-	-	1274	-	-	195	344
HCM Lane V/C Ratio	0.38	0.492	0.016	-	-	0.077	-	-	0.864	0.679
HCM Control Delay (s)	44.8	20	7.7	-	-	8.1	-	-	82.9	35
HCM Lane LOS	E	C	A	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	1.6	2.7	0	-	-	0.2	-	-	6.5	4.7

Intersection	
Int Delay, s/veh	95.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
Future Vol, veh/h	15	160	105	100	115	10	45	235	75	20	470	10
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	150	-	-	150	-	-	150	-	-	150	-	-
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	16	174	114	109	125	11	49	255	82	22	511	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	136	0	0	288	0	0	873	617	231	781	669	131
Stage 1	-	-	-	-	-	-	263	263	-	349	349	-
Stage 2	-	-	-	-	-	-	610	354	-	432	320	-
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	1448	-	-	1274	-	-	271	405	808	312	~ 379	919
Stage 1	-	-	-	-	-	-	742	691	-	667	633	-
Stage 2	-	-	-	-	-	-	482	630	-	602	652	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1448	-	-	1274	-	-	-	366	808	115	~ 343	919
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	366	-	115	~ 343	-
Stage 1	-	-	-	-	-	-	734	683	-	660	579	-
Stage 2	-	-	-	-	-	-	51	576	-	335	645	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	3.6		258.7
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	422	1448	-	-	1274	-	-	115	348
HCM Lane V/C Ratio	-	0.798	0.011	-	-	0.085	-	-	0.189	1.499
HCM Control Delay (s)	-	39.8	7.5	-	-	8.1	-	-	43.5	267.7
HCM Lane LOS	-	E	A	-	-	A	-	-	E	F
HCM 95th %tile Q(veh)	-	7.1	0	-	-	0.3	-	-	0.7	28.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Future Vol, veh/h	10	15	110	255	20	10	80	420	25	30	725	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	30	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	75	-	-	75	-	-	75	-	-	75	-	-
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	11	16	120	277	22	11	87	457	27	33	788	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	33	0	0	136	0	0	1079	685	106	952	740	28
Stage 1	-	-	-	-	-	-	98	98	-	582	582	-
Stage 2	-	-	-	-	-	-	981	587	-	370	158	-
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	1579	-	-	1448	-	-	196	~ 371	948	239	~ 345	1047
Stage 1	-	-	-	-	-	-	908	814	-	499	~ 499	-
Stage 2	-	-	-	-	-	-	300	497	-	650	~ 767	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1579	-	-	1448	-	-	-	~ 298	921	-	~ 277	1047
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 298	-	-	~ 277	-
Stage 1	-	-	-	-	-	-	902	808	-	496	~ 404	-
Stage 2	-	-	-	-	-	-	-	~ 402	-	265	~ 762	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	7.2		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	310	1579	-	-	1448	-	-	-	280
HCM Lane V/C Ratio	-	1.56	0.007	-	-	0.191	-	-	-	2.853
HCM Control Delay (s)	-	297.8	7.3	-	-	8.1	-	-	-	$ 871.2
HCM Lane LOS	-	F	A	-	-	A	-	-	-	F
HCM 95th %tile Q(veh)	-	28.2	0	-	-	0.7	-	-	-	69.2

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

LANE SUMMARY

Site: 101 [Liloa Dr - Kaonoulu St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	274	2.0	1084	0.252	100	2.2	LOS A	1.4	36.6	Full	1600	0.0	0.0
Approach	274	2.0		0.252		2.2	LOS A	1.4	36.6				
East: WB Kaonoulu St													
Lane 1[d]	295	2.0	1174	0.251	100	1.9	LOS A	1.5	37.4	Full	1600	0.0	0.0
Approach	295	2.0		0.251		1.9	LOS A	1.5	37.4				
North: SB Liloa Dr													
Lane 1[d]	389	2.0	1108	0.352	100	2.8	LOS A	2.2	55.8	Full	1600	0.0	0.0
Approach	389	2.0		0.352		2.8	LOS A	2.2	55.8				
West: EB Kaonoulu St													
Lane 1[d]	300	2.0	956	0.314	100	2.9	LOS A	2.0	49.9	Full	1600	0.0	0.0
Approach	300	2.0		0.314		2.9	LOS A	2.0	49.9				
Intersection	1258	2.0		0.352		2.5	LOS A	2.2	55.8				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	53	126	95	274	2.0	1084	0.252	100	NA	NA
Approach	53	126	95	274	2.0		0.252			

East: WB Kaonoulu St

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	95	137	63	295	2.0	1174	0.251	100	NA	NA
Approach	95	137	63	295	2.0		0.251			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	163	211	16	389	2.0	1108	0.352	100	NA	NA
Approach	163	211	16	389	2.0		0.352			

West: EB Kaonoulu St

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	132	147	300	2.0	956	0.314	100	NA	NA
Approach	21	132	147	300	2.0		0.314			

	Total	%HV	Deg. Satn (v/c)
Intersection	1258	2.0	0.352

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: WB Kaonoulu St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: SB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: EB Kaonoulu St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: 101 [Liloa Dr - Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	374	2.0	1154	0.324	100	1.5	LOS A	2.1	54.1	Full	1600	0.0	0.0
Approach	374	2.0		0.324		1.5	LOS A	2.1	54.1				
East: WB Kulanihakoi St													
Lane 1[d]	237	2.0	1075	0.220	100	2.8	LOS A	1.3	32.0	Full	1600	0.0	0.0
Approach	237	2.0		0.220		2.8	LOS A	1.3	32.0				
North: SB Liloa Dr													
Lane 1[d]	526	2.0	1109	0.475	100	1.9	LOS A	3.4	85.9	Full	1600	0.0	0.0
Approach	526	2.0		0.475		1.9	LOS A	3.4	85.9				
West: EB Kulanihakoi St													
Lane 1[d]	295	2.0	826	0.357	100	4.0	LOS A	2.4	60.8	Full	1600	0.0	0.0
Approach	295	2.0		0.357		4.0	LOS A	2.4	60.8				
Intersection	1432	2.0		0.475		2.4	LOS A	3.4	85.9				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	47	247	79	374	2.0	1154	0.324	100	NA	NA
Approach	47	247	79	374	2.0		0.324			

East: WB Kulanihakoi St

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	105	121	11	237	2.0	1075	0.220	100	NA	NA
Approach	105	121	11	237	2.0		0.220			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	495	11	526	2.0	1109	0.475	100	NA	NA
Approach	21	495	11	526	2.0		0.475			

West: EB Kulanihakoi St

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	168	111	295	2.0	826	0.357	100	NA	NA
Approach	16	168	111	295	2.0		0.357			

	Total	%HV	Deg.Satn (v/c)
Intersection	1432	2.0	0.475

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: WB Kulanihakoi St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: SB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

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LANE SUMMARY

Site: 101 [Liloa Dr - E Waipuilani Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	553	2.0	1320	0.419	100	0.8	LOS A	3.1	79.6	Full	1600	0.0	0.0
Approach	553	2.0		0.419		0.8	LOS A	3.1	79.6				
East: WB E Waipuilani Rd													
Lane 1[d]	300	2.0	919	0.327	100	5.6	LOS A	2.0	51.0	Full	1600	0.0	0.0
Approach	300	2.0		0.327		5.6	LOS A	2.0	51.0				
North: SB Liloa Dr													
Lane 1[d]	805	2.0	1015	0.794	100	7.6	LOS A	11.7	297.4	Full	1600	0.0	0.0
Approach	805	2.0		0.794		7.6	LOS A	11.7	297.4				
West: EB E Waipuilani Rd													
Lane 1[d]	142	2.0	441	0.322	100	9.5	LOS A	2.4	61.7	Full	1600	0.0	0.0
Approach	142	2.0		0.322		9.5	LOS A	2.4	61.7				
Intersection	1800	2.0		0.794		5.3	LOS A	11.7	297.4				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	84	442	26	553	2.0	1320	0.419	100	NA	NA
Approach	84	442	26	553	2.0		0.419			

East: WB E Waipuilani Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	268	21	11	300	2.0	919	0.327	100	NA	NA
Approach	268	21	11	300	2.0		0.327			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	32	763	11	805	2.0	1015	0.794	100	NA	NA
Approach	32	763	11	805	2.0		0.794			

West: EB E Waipuilani Rd

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	11	16	116	142	2.0	441	0.322	100	NA	NA
Approach	11	16	116	142	2.0		0.322			

	Total	%HV	Deg. Satn (v/c)
Intersection	1800	2.0	0.794

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: WB E Waipuilani Rd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: SB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: EB E Waipuilani Rd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2040 PM Scenarios for Liloa Drive Intersections

Intersection	
Intersection Delay, s/veh	21.2
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Future Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	163	130	130	168	103	65	234	71	103	250	11
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	23.1	19.3	23.2	19.6
HCM LOS	C	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	77%	0%	56%	0%	62%	0%	96%
Vol Right, %	0%	23%	0%	44%	0%	38%	0%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	60	280	20	270	120	250	95	240
LT Vol	60	0	20	0	120	0	95	0
Through Vol	0	215	0	150	0	155	0	230
RT Vol	0	65	0	120	0	95	0	10
Lane Flow Rate	65	304	22	293	130	272	103	261
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.156	0.67	0.053	0.644	0.311	0.59	0.248	0.586
Departure Headway (Hd)	8.611	7.927	8.723	7.903	8.584	7.81	8.63	8.082
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	417	457	411	458	419	462	416	446
Service Time	6.344	5.658	6.473	5.633	6.336	5.544	6.383	5.835
HCM Lane V/C Ratio	0.156	0.665	0.054	0.64	0.31	0.589	0.248	0.585
HCM Control Delay	12.9	25.4	12	23.9	15.2	21.2	14.2	21.7
HCM Lane LOS	B	D	B	C	C	C	B	C
HCM 95th-tile Q	0.5	4.8	0.2	4.4	1.3	3.7	1	3.7

HCM 6th AWSC
5: Liloa Drive/Kenolio Rd & Kulanihakoi St 08/05/2020

Intersection	
Intersection Delay, s/veh	43.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
Future Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	109	71	76	141	11	60	380	33	22	495	22
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	16	15	32.7	74.2
HCM LOS	C	B	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	92%	0%	61%	0%	93%	0%	96%
Vol Right, %	0%	8%	0%	39%	0%	7%	0%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	55	380	20	165	70	140	20	475
LT Vol	55	0	20	0	70	0	20	0
Through Vol	0	350	0	100	0	130	0	455
RT Vol	0	30	0	65	0	10	0	20
Lane Flow Rate	60	413	22	179	76	152	22	516
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.128	0.82	0.053	0.399	0.185	0.346	0.047	1.037
Departure Headway (Hd)	7.978	7.407	9.135	8.328	9.056	8.485	7.773	7.23
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	452	492	394	436	399	426	463	506
Service Time	5.678	5.107	6.835	6.028	6.756	6.185	5.473	4.93
HCM Lane V/C Ratio	0.133	0.839	0.056	0.411	0.19	0.357	0.048	1.02
HCM Control Delay	11.8	35.7	12.3	16.4	13.8	15.6	10.9	76.9
HCM Lane LOS	B	E	B	C	B	C	B	F
HCM 95th-tile Q	0.4	7.9	0.2	1.9	0.7	1.5	0.1	15.1

HCM 6th AWSC
9: Liloa Drive & E Waipuilani Rd 08/05/2020

Intersection	
Intersection Delay, s/veh	125.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Future Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	22	109	196	43	16	109	549	33	27	685	11
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	15.5	19.3	102.1	208.7
HCM LOS	C	C	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	94%	0%	17%	0%	73%	0%	98%
Vol Right, %	0%	6%	0%	83%	0%	27%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	100	535	15	120	180	55	25	640
LT Vol	100	0	15	0	180	0	25	0
Through Vol	0	505	0	20	0	40	0	630
RT Vol	0	30	0	100	0	15	0	10
Lane Flow Rate	109	582	16	130	196	60	27	696
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.232	1.157	0.042	0.297	0.48	0.135	0.059	1.406
Departure Headway (Hd)	8.365	7.807	10.392	9.248	9.797	9.071	8.149	7.622
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	432	471	347	391	370	398	442	480
Service Time	6.065	5.507	8.092	6.948	7.497	6.771	5.849	5.322
HCM Lane V/C Ratio	0.252	1.236	0.046	0.332	0.53	0.151	0.061	1.45
HCM Control Delay	13.6	118.7	13.5	15.8	21.2	13.2	11.4	216.4
HCM Lane LOS	B	F	B	C	C	B	B	F
HCM 95th-tile Q	0.9	19.4	0.1	1.2	2.5	0.5	0.2	31.8

HCM 6th Signalized Intersection Summary
2: Kenolio Rd & Kaonoulu St

08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	150	120	120	155	95	60	215	65	95	230	10
Future Volume (veh/h)	20	150	120	120	155	95	60	215	65	95	230	10
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	163	84	130	168	68	65	234	57	103	250	9
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	504	393	203	493	428	173	492	492	120	463	608	22
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1144	1163	599	1133	1266	512	1120	1453	354	1088	1794	65
Grp Volume(v), veh/h	22	0	247	130	0	236	65	0	291	103	0	259
Grp Sat Flow(s),veh/h/ln	1144	0	1762	1133	0	1778	1120	0	1807	1088	0	1859
Q Serve(g_s), s	0.5	0.0	3.3	3.1	0.0	3.1	1.5	0.0	3.9	2.6	0.0	3.3
Cycle Q Clear(g_c), s	3.6	0.0	3.3	6.4	0.0	3.1	4.8	0.0	3.9	6.5	0.0	3.3
Prop In Lane	1.00		0.34	1.00		0.29	1.00		0.20	1.00		0.03
Lane Grp Cap(c), veh/h	504	0	596	493	0	601	492	0	612	463	0	630
V/C Ratio(X)	0.04	0.00	0.41	0.26	0.00	0.39	0.13	0.00	0.48	0.22	0.00	0.41
Avail Cap(c_a), veh/h	1780	0	2562	1757	0	2585	1380	0	2043	1325	0	2102
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	7.9	10.4	0.0	7.8	9.7	0.0	8.1	10.6	0.0	7.9
Incr Delay (d2), s/veh	0.0	0.0	0.5	0.3	0.0	0.4	0.1	0.0	0.6	0.2	0.0	0.4
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	0.1	0.0	0.9	0.6	0.0	0.8	0.3	0.0	1.1	0.5	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.2	0.0	8.3	10.6	0.0	8.2	9.8	0.0	8.6	10.9	0.0	8.3
LnGrp LOS	A	A	A	B	A	A	A	A	A	B	A	A
Approach Vol, veh/h		269			366			356			362	
Approach Delay, s/veh		8.4			9.1			8.9			9.0	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		15.5		15.5		15.5		15.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		35.0		45.0		35.0		45.0				
Max Q Clear Time (g_c+I1), s		6.8		5.6		8.5		8.4				
Green Ext Time (p_c), s		2.1		1.7		2.0		2.1				
Intersection Summary												
HCM 6th Ctrl Delay			8.9									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
5: Liloa Drive/Kenolio Rd & Kulanihakoi St

08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	100	65	70	130	10	55	350	30	20	455	20
Future Volume (veh/h)	20	100	65	70	130	10	55	350	30	20	455	20
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	109	37	76	141	7	60	380	29	22	495	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	429	292	99	427	386	19	448	764	58	523	795	32
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	1240	1335	453	1242	1767	88	886	1716	131	977	1785	72
Grp Volume(v), veh/h	22	0	146	76	0	148	60	0	409	22	0	515
Grp Sat Flow(s),veh/h/ln	1240	0	1789	1242	0	1855	886	0	1847	977	0	1857
Q Serve(g_s), s	0.5	0.0	2.1	1.6	0.0	2.0	1.7	0.0	4.7	0.5	0.0	6.3
Cycle Q Clear(g_c), s	2.5	0.0	2.1	3.7	0.0	2.0	8.0	0.0	4.7	5.2	0.0	6.3
Prop In Lane	1.00		0.25	1.00		0.05	1.00		0.07	1.00		0.04
Lane Grp Cap(c), veh/h	429	0	391	427	0	405	448	0	822	523	0	827
V/C Ratio(X)	0.05	0.00	0.37	0.18	0.00	0.37	0.13	0.00	0.50	0.04	0.00	0.62
Avail Cap(c_a), veh/h	1409	0	1805	1409	0	1871	1543	0	3105	1730	0	3123
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.9	0.0	9.9	11.5	0.0	9.9	9.4	0.0	5.9	7.7	0.0	6.3
Incr Delay (d2), s/veh	0.0	0.0	0.6	0.2	0.0	0.6	0.1	0.0	0.5	0.0	0.0	0.8
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	0.1	0.0	0.6	0.4	0.0	0.6	0.2	0.0	1.0	0.1	0.0	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.0	0.0	10.5	11.7	0.0	10.4	9.5	0.0	6.3	7.8	0.0	7.1
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		168			224			469			537	
Approach Delay, s/veh		10.5			10.8			6.8			7.1	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		18.2		11.5		18.2		11.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		50.0		30.0		50.0		30.0				
Max Q Clear Time (g_c+I1), s		10.0		4.5		8.3		5.7				
Green Ext Time (p_c), s		3.3		0.9		3.9		1.0				
Intersection Summary												
HCM 6th Ctrl Delay			8.0									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
9: Liloa Drive & E Waipuilani Rd

08/05/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	20	100	180	40	15	100	505	30	25	630	10
Future Volume (veh/h)	15	20	100	180	40	15	100	505	30	25	630	10
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		0.97	0.99		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	16	22	24	196	43	4	109	549	31	27	685	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	433	177	193	431	365	34	380	967	55	454	1014	16
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.55	0.55	0.55	0.55	0.55	0.55
Sat Flow, veh/h	1359	818	892	1360	1685	157	749	1750	99	828	1836	29
Grp Volume(v), veh/h	16	0	46	196	0	47	109	0	580	27	0	696
Grp Sat Flow(s),veh/h/ln	1359	0	1710	1360	0	1842	749	0	1849	828	0	1865
Q Serve(g_s), s	0.4	0.0	0.9	5.9	0.0	0.9	5.3	0.0	8.9	1.0	0.0	11.5
Cycle Q Clear(g_c), s	1.3	0.0	0.9	6.8	0.0	0.9	16.8	0.0	8.9	9.8	0.0	11.5
Prop In Lane	1.00		0.52	1.00		0.09	1.00		0.05	1.00		0.02
Lane Grp Cap(c), veh/h	433	0	371	431	0	399	380	0	1022	454	0	1031
V/C Ratio(X)	0.04	0.00	0.12	0.45	0.00	0.12	0.29	0.00	0.57	0.06	0.00	0.68
Avail Cap(c_a), veh/h	1235	0	1381	1235	0	1488	744	0	1920	856	0	1936
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.2	0.0	13.7	16.4	0.0	13.6	12.9	0.0	6.3	9.5	0.0	6.9
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.7	0.0	0.1	0.4	0.0	0.5	0.1	0.0	0.8
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	0.1	0.0	0.3	1.6	0.0	0.3	0.8	0.0	2.3	0.1	0.0	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.2	0.0	13.8	17.2	0.0	13.8	13.3	0.0	6.8	9.6	0.0	7.7
LnGrp LOS	B	A	B	B	A	B	B	A	A	A	A	A
Approach Vol, veh/h		62			243			689			723	
Approach Delay, s/veh		13.9			16.5			7.9			7.8	
Approach LOS		B			B			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		14.4		29.0		14.4				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		45.0		35.0		45.0		35.0				
Max Q Clear Time (g_c+I1), s		18.8		3.3		13.5		8.8				
Green Ext Time (p_c), s		5.1		0.3		5.8		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

HCM 6th TWSC
2: Kenolio Rd & Kaonoulu St

08/05/2020

Intersection	
Int Delay, s/veh	61.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Future Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	60	-	-	75	-	-	50	-	-
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	22	163	130	130	168	103	65	234	71	103	250	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	997	897	256	1008	867	270	261	0	0	305	0	0
Stage 1	462	462	-	400	400	-	-	-	-	-	-	-
Stage 2	535	435	-	608	467	-	-	-	-	-	-	-
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	223	279	783	219	291	769	1303	-	-	1256	-	-
Stage 1	580	565	-	626	602	-	-	-	-	-	-	-
Stage 2	529	580	-	483	562	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	83	243	783	~ 77	254	769	1303	-	-	1256	-	-
Mov Cap-2 Maneuver	83	243	-	~ 77	254	-	-	-	-	-	-	-
Stage 1	551	519	-	595	572	-	-	-	-	-	-	-
Stage 2	307	551	-	253	516	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	51.9	178.3	1.4	2.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1303	-	-	83	350	77	341	1256	-	-
HCM Lane V/C Ratio	0.05	-	-	0.262	0.839	1.694	0.797	0.082	-	-
HCM Control Delay (s)	7.9	-	-	63.1	51.1$	452.9	46.5	8.1	-	-
HCM Lane LOS	A	-	-	F	F	F	E	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	7.5	11.1	6.7	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	21.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
Future Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	150	-	-	150	-	-
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	22	109	71	76	141	11	60	380	33	22	495	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1143	1083	506	1157	1078	397	517	0	0	413	0	0
Stage 1	550	550	-	517	517	-	-	-	-	-	-	-
Stage 2	593	533	-	640	561	-	-	-	-	-	-	-
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	177	217	566	173	219	652	1049	-	-	1146	-	-
Stage 1	519	516	-	541	534	-	-	-	-	-	-	-
Stage 2	492	525	-	464	510	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	72	201	566	82	203	652	1049	-	-	1146	-	-
Mov Cap-2 Maneuver	72	201	-	82	203	-	-	-	-	-	-	-
Stage 1	489	506	-	510	504	-	-	-	-	-	-	-
Stage 2	328	495	-	313	500	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.2	92.9	1.1	0.3
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1049	-	-	72	269	82	214	1146	-	-
HCM Lane V/C Ratio	0.057	-	-	0.302	0.667	0.928	0.711	0.019	-	-
HCM Control Delay (s)	8.6	-	-	75.3	41.6	169	54.8	8.2	-	-
HCM Lane LOS	A	-	-	F	E	F	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.1	4.3	5	4.6	0.1	-	-

Intersection	
Int Delay, s/veh	193.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Future Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	30	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	75	-	-	75	-	-	75	-	-
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	16	22	109	196	43	16	109	549	33	27	685	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1558	1575	691	1624	1564	596	696	0	0	612	0	0
Stage 1	745	745	-	814	814	-	-	-	-	-	-	-
Stage 2	813	830	-	810	750	-	-	-	-	-	-	-
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	91	110	445	~ 82	112	504	900	-	-	967	-	-
Stage 1	406	421	-	372	391	-	-	-	-	-	-	-
Stage 2	372	385	-	374	419	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	50	91	445	~ 44	93	490	900	-	-	939	-	-
Mov Cap-2 Maneuver	50	91	-	~ 44	93	-	-	-	-	-	-	-
Stage 1	357	409	-	318	334	-	-	-	-	-	-	-
Stage 2	275	329	-	260	407	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	38.9	$ 1345.1	1.5	0.3
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	900	-	-	50	270	44	119	939	-	-
HCM Lane V/C Ratio	0.121	-	-	0.326	0.483	4.447	0.502	0.029	-	-
HCM Control Delay (s)	9.5	-	-	108.6	30.2	$ 1737	62.5	8.9	-	-
HCM Lane LOS	A	-	-	F	D	F	F	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	1.1	2.5	22.3	2.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th TWSC
2: Kenolio Rd & Kaonoulu St 08/05/2020

Intersection	
Int Delay, s/veh	74.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
Future Vol, veh/h	20	150	120	120	155	95	60	215	65	95	230	10
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	100	-	-	60	-	-	75	-	-	50	-	-
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	22	163	130	130	168	103	65	234	71	103	250	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	271	0	0	293	0	0	882	803	228	905	817	220
Stage 1	-	-	-	-	-	-	272	272	-	480	480	-
Stage 2	-	-	-	-	-	-	610	531	-	425	337	-
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	1292	-	-	1269	-	-	267	317	811	257	311	820
Stage 1	-	-	-	-	-	-	734	685	-	567	554	-
Stage 2	-	-	-	-	-	-	482	526	-	607	641	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1292	-	-	1269	-	-	~ 52	280	811	~ 65	275	820
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 52	280	-	~ 65	275	-
Stage 1	-	-	-	-	-	-	722	673	-	557	497	-
Stage 2	-	-	-	-	-	-	212	472	-	356	630	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	2.6	115.4	176.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	52	330	1292	-	-	1269	-	-	65	283
HCM Lane V/C Ratio	1.254	0.922	0.017	-	-	0.103	-	-	1.589	0.922
HCM Control Delay (s)	$ 337.2	67.9	7.8	-	-	8.2	-	-	$ 431.9	74.9
HCM Lane LOS	F	F	A	-	-	A	-	-	F	F
HCM 95th %tile Q(veh)	5.8	9.2	0.1	-	-	0.3	-	-	9.1	8.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC
5: Liloa Drive/Kenolio Rd & Kulanihakoi St 08/05/2020

Intersection	
Int Delay, s/veh	48.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
Future Vol, veh/h	20	100	65	70	130	10	55	350	30	20	455	20
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	0	-	-	0	-	-	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	22	109	71	76	141	11	60	380	33	22	495	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	152	0	0	180	0	0	746	493	145	694	523	147
Stage 1	-	-	-	-	-	-	189	189	-	299	299	-
Stage 2	-	-	-	-	-	-	557	304	-	395	224	-
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	1429	-	-	1396	-	-	330	477	902	357	~ 459	900
Stage 1	-	-	-	-	-	-	813	744	-	710	666	-
Stage 2	-	-	-	-	-	-	515	663	-	630	718	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1429	-	-	1396	-	-	-	445	902	91	~ 428	900
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	445	-	91	~ 428	-
Stage 1	-	-	-	-	-	-	801	733	-	699	630	-
Stage 2	-	-	-	-	-	-	102	627	-	288	707	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	2.6	-	127.8
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	464	1429	-	-	1396	-	-	91	438
HCM Lane V/C Ratio	-	0.89	0.015	-	-	0.055	-	-	0.239	1.179
HCM Control Delay (s)	-	49	7.6	-	-	7.7	-	-	56.6	130.8
HCM Lane LOS	-	E	A	-	-	A	-	-	F	F
HCM 95th %tile Q(veh)	-	9.7	0	-	-	0.2	-	-	0.9	19.6

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Future Vol, veh/h	15	20	100	180	40	15	100	505	30	25	630	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	30	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	75	-	-	75	-	-	75	-	-	75	-	-
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	16	22	109	196	43	16	109	549	33	27	685	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	59	0	0	131	0	0	900	560	107	873	606	51
Stage 1	-	-	-	-	-	-	109	109	-	443	443	-
Stage 2	-	-	-	-	-	-	791	451	-	430	163	-
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	1545	-	-	1454	-	-	259	~ 437	947	271	~ 411	1017
Stage 1	-	-	-	-	-	-	896	805	-	594	~ 576	-
Stage 2	-	-	-	-	-	-	383	571	-	603	763	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1545	-	-	1454	-	-	-	~ 374	920	-	~ 352	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 374	-	-	~ 352	-
Stage 1	-	-	-	-	-	-	887	797	-	588	~ 498	-
Stage 2	-	-	-	-	-	-	-	~ 494	-	174	755	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	6		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	387	1545	-	-	1454	-	-	-	356
HCM Lane V/C Ratio	-	1.503	0.011	-	-	0.135	-	-	-	1.954
HCM Control Delay (s)	-	265.5	7.4	-	-	7.9	-	-	-	$ 464.2
HCM Lane LOS	-	F	A	-	-	A	-	-	-	F
HCM 95th %tile Q(veh)	-	31.3	0	-	-	0.5	-	-	-	47.9

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

LANE SUMMARY

Site: 101 [Liloa Dr - Kaonoulu St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	358	2.0	1107	0.323	100	2.0	LOS A	2.0	50.8	Full	1600	0.0	0.0
Approach	358	2.0		0.323		2.0	LOS A	2.0	50.8				
East: WB Kaonoulu St													
Lane 1[d]	389	2.0	1076	0.362	100	2.7	LOS A	2.3	59.7	Full	1600	0.0	0.0
Approach	389	2.0		0.362		2.7	LOS A	2.3	59.7				
North: SB Liloa Dr													
Lane 1[d]	353	2.0	1043	0.338	100	2.8	LOS A	2.1	54.5	Full	1600	0.0	0.0
Approach	353	2.0		0.338		2.8	LOS A	2.1	54.5				
West: EB Kaonoulu St													
Lane 1[d]	305	2.0	956	0.319	100	2.9	LOS A	2.0	51.1	Full	1600	0.0	0.0
Approach	305	2.0		0.319		2.9	LOS A	2.0	51.1				
Intersection	1405	2.0		0.362		2.6	LOS A	2.3	59.7				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	63	226	68	358	2.0	1107	0.323	100	NA	NA
Approach	63	226	68	358	2.0		0.323			

East: WB Kaonoulu St

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	126	163	100	389	2.0	1076	0.362	100	NA	NA
Approach	126	163	100	389	2.0		0.362			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	100	242	11	353	2.0	1043	0.338	100	NA	NA
Approach	100	242	11	353	2.0		0.338			

West: EB Kaonoulu St

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	158	126	305	2.0	956	0.319	100	NA	NA
Approach	21	158	126	305	2.0		0.319			

	Total	%HV	Deg.Satn (v/c)
Intersection	1405	2.0	0.362

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: WB Kaonoulu St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: SB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: EB Kaonoulu St Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

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LANE SUMMARY

Site: 101 [Liloa Dr - Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	458	2.0	1217	0.376	100	1.2	LOS A	2.6	66.0	Full	1600	0.0	0.0
Approach	458	2.0		0.376		1.2	LOS A	2.6	66.0				
East: WB Kulanihakoi St													
Lane 1[d]	221	2.0	971	0.228	100	3.3	LOS A	1.3	33.8	Full	1600	0.0	0.0
Approach	221	2.0		0.228		3.3	LOS A	1.3	33.8				
North: SB Liloa Dr													
Lane 1[d]	521	2.0	1110	0.469	100	1.9	LOS A	3.4	85.5	Full	1600	0.0	0.0
Approach	521	2.0		0.469		1.9	LOS A	3.4	85.5				
West: EB Kulanihakoi St													
Lane 1[d]	195	2.0	859	0.227	100	3.5	LOS A	1.4	35.6	Full	1600	0.0	0.0
Approach	195	2.0		0.227		3.5	LOS A	1.4	35.6				
Intersection	1395	2.0		0.469		2.1	LOS A	3.4	85.5				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	58	368	32	458	2.0	1217	0.376	100	NA	NA
Approach	58	368	32	458	2.0		0.376			

East: WB Kulanihakoi St

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	74	137	11	221	2.0	971	0.228	100	NA	NA
Approach	74	137	11	221	2.0		0.228			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	21	479	21	521	2.0	1110	0.469	100	NA	NA
Approach	21	479	21	521	2.0		0.469			

West: EB Kulanihakoi St

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	105	68	195	2.0	859	0.227	100	NA	NA
Approach	21	105	68	195	2.0		0.227			

	Total	%HV	Deg.Satn (v/c)
Intersection	1395	2.0	0.469

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
East Exit: WB Kulanihakoi St Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
North Exit: SB Liloa Dr Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: EB Kulanihakoi St Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									

LANE SUMMARY

Site: 101 [Liloa Dr - E Waipuilani Rd (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Liloa Dr													
Lane 1[d]	668	2.0	1314	0.509	100	0.9	LOS A	4.3	109.7	Full	1600	0.0	0.0
Approach	668	2.0		0.509		0.9	LOS A	4.3	109.7				
East: WB E Waipuilani Rd													
Lane 1[d]	247	2.0	828	0.299	100	6.1	LOS A	1.9	47.6	Full	1600	0.0	0.0
Approach	247	2.0		0.299		6.1	LOS A	1.9	47.6				
North: SB Liloa Dr													
Lane 1[d]	700	2.0	1048	0.668	100	4.2	LOS A	7.1	179.6	Full	1600	0.0	0.0
Approach	700	2.0		0.668		4.2	LOS A	7.1	179.6				
West: EB E Waipuilani Rd													
Lane 1[d]	142	2.0	597	0.238	100	6.4	LOS A	1.7	42.1	Full	1600	0.0	0.0
Approach	142	2.0		0.238		6.4	LOS A	1.7	42.1				
Intersection	1758	2.0		0.668		3.4	LOS A	7.1	179.6				

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.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Liloa Dr

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	105	532	32	668	2.0	1314	0.509	100	NA	NA
Approach	105	532	32	668	2.0		0.509			

East: WB E Waipuilani Rd

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	189	42	16	247	2.0	828	0.299	100	NA	NA
Approach	189	42	16	247	2.0		0.299			

North: SB Liloa Dr

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	26	663	11	700	2.0	1048	0.668	100	NA	NA
Approach	26	663	11	700	2.0		0.668			

West: EB E Waipuilani Rd

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	21	105	142	2.0	597	0.238	100	NA	NA
Approach	16	21	105	142	2.0		0.238			

	Total	%HV	Deg.Satn (v/c)
Intersection	1758	2.0	0.668

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
East Exit: WB E Waipuilani Rd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
North Exit: SB Liloa Dr Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: EB E Waipuilani Rd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

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APPENDIX D

DOUBLE-LANE ROUNDABOUT ANALYSIS

• Level Of Service Calculations

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1114	2.0	994	1.121	100	64.3	LOS E	63.8	1619.5	Full	1600	0.0	5.4
Lane 2[d]	1286	2.0	1147	1.121	100	62.4	LOS E	70.7	1796.7	Full	1600	0.0	8.5
Lane 3	300	2.0	1642	0.183	100	0.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2700	2.0		1.121		56.3	LOS E	70.7	1796.7				
East: WB Kulanihakoi St													
Lane 1[d]	179	2.0	284	0.630	100	21.3	LOS C	4.2	106.3	Full	1600	0.0	0.0
Lane 2	63	2.0	190	0.333	100	15.2	LOS B	1.6	41.6	Full	1600	0.0	0.0
Approach	242	2.0		0.630		19.7	LOS B	4.2	106.3				
North: SB Piilani Hwy													
Lane 1	1281	2.0	1162	1.102	100	56.2	LOS E	66.7	1693.2	Full	1600	0.0	6.7
Lane 2[d]	1482	2.0	1345[1]	1.102	100	53.9	LOS E	74.1	1882.3	Full	1600	0.0	10.0
Lane 3	68	2.0	1642	0.042	100	0.2	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2832	2.0		1.102		53.6	LOS E	74.1	1882.3				
West: EB Kulanihakoi St													
Lane 1[d]	111	2.0	187	0.592	100	31.2	LOS C	3.7	93.3	Full	1600	0.0	0.0
Lane 2	200	2.0	1642	0.122	100	11.3	LOS B	0.0	0.0	Short	200	0.0	NA
Approach	311	2.0		0.592		18.3	LOS B	3.7	93.3				
Intersection	6084	2.0		1.121		51.7	LOS E	74.1	1882.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	79	1035	-	1114	2.0	994	1.121	100	NA	NA
Lane 2	-	1286	-	1286	2.0	1147	1.121	100	NA	NA

Table D.1: Base Year 2040 and Future Year 2040 Level of Service Summary

Intersection	Base Year 2040								Future Year 2040							
	Traffic Signal		Double-Lane Roundabout (HCM6)			Double-Lane Roundabout (SIDRA)			Traffic Signal		Double-Lane Roundabout (HCM6)			Double-Lane Roundabout (SIDRA)		
	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
AM Piilani Hwy & Kulanihakoi St																		
NB LT	299.0	1.23	F*	-	-	-	-	-	-	154.7	0.79	F	-	-	-	156.9	0.86	F
NB TH	44.9	0.96	D	154.8	1.29	F*	62.4	1.12	E*	32.3	0.86	C	104.6	1.17	F*	143.2	1.27	F
NB LT/TH	-	-	-	156.0	1.29	F*	64.3	1.12	E*	-	-	-	106.1	1.17	F*	144.1	1.27	F*
NB RT	13.9	0.23	B	3.7	0.18	A	0.5	0.18	A	13.2	0.18	B	3.5	0.15	A	2.3	0.03	A
EB LT/TH	91.4	0.37	F	50.1	0.61	F	31.2	0.59	C	91.2	0.37	F	40.3	0.54	D	28.0	0.22	D
EB RT	89.6	0.56	F	6.0	0.12	A	11.3	0.12	B	83.8	0.27	F	4.9	0.07	A	4.9	0.07	A
WB LT/TH	133.7	0.87	F	39.5	0.66	E	21.3	0.63	C	125.7	0.84	F	37.0	0.65	D	15.1	0.53	B
WB RT	72.0	0.14	E	23.6	0.28	C	15.2	0.33	B	72.0	0.14	E	22.6	0.27	C	11.5	0.28	B
SB LT	137.1	0.90	F	-	-	-	53.9	1.10	E*	137.1	0.90	F	-	-	-	4.8	0.84	A
SB TH	58.8	1.03	F*	140.4	1.26	F	54.7	1.10	E*	21.1	0.78	C	35.4	0.95	D	3.4	0.84	A
SB LT/TH	-	-	-	141.5	1.26	F*	0.2	0.04	A	-	-	-	36.8	0.95	D	0.2	0.05	A
SB RT	8.7	0.05	A	2.4	0.04	A	0.2	0.04	A	8.3	0.06	A	2.5	0.05	A	0.2	0.05	A
Overall	59.9	-	E	128.0	1.29	F*	51.7	1.12	E*	36.3	-	D	62.4	1.17	E	10.5	1.00	B*
PM Piilani Hwy & Kulanihakoi St																		
NB LT	248.9	1.15	F*	-	-	-	-	-	-	156.9	0.86	F	-	-	-	21.1	-	-
NB TH	35.1	1.00	D*	210.3	1.43	F*	74.5	1.16	F*	16.5	0.89	B	143.2	1.27	F*	19.7	1.03	C*
NB LT/TH	-	-	-	207.9	1.43	F*	75.8	1.16	F*	-	-	-	144.1	1.27	F*	19.7	1.03	B*
NB RT	3.3	0.05	A	2.3	0.04	A	0.1	0.04	A	3.2	0.03	A	2.3	0.03	A	0.1	0.03	A
EB LT/TH	105.6	0.25	F	27.3	0.21	D	21.5	0.24	C	106.6	0.28	F	28.0	0.22	D	20.7	0.23	C
EB RT	99.0	0.53	F	5.3	0.07	A	1.4	0.07	B	96.8	0.34	F	4.9	0.05	A	9.8	0.05	A
WB LT/TH	117.6	0.70	F	30.8	0.44	D	39.7	0.59	D	118.4	0.72	F	30.4	0.43	D	37.1	0.58	D
WB RT	98.4	0.01	F	25.4	0.18	D	28.5	0.30	C	99.0	0.01	F	25.1	0.18	D	27.4	0.29	C
SB LT	122.9	0.78	F	-	-	-	-	-	-	127.1	0.78	F	-	-	-	-	-	-
SB TH	99.4	1.17	F*	201.8	1.41	F*	110.7	1.24	F*	19.4	0.93	B	81.7	1.12	F*	12.8	0.99	B
SB LT/TH	-	-	-	202.7	1.41	F*	112.2	1.24	F*	-	-	-	82.9	1.12	F*	15.8	0.99	B
SB RT	5.1	0.06	A	2.5	0.05	A	0.2	0.05	A	4.8	0.08	A	2.6	0.07	A	0.2	0.07	A
Overall	72.4	-	E	193.5	1.43	F*	88.8	1.24	F*	23.3	-	C	103.1	1.26	F*	15.0	1.03	B*

*Denotes overcapacity condition, v/c ≥ 1.0

Lane 3	-	-	300	300	2.0	1642	0.183	100	0.0	2
Approach	79	2321	300	2700	2.0		1.121			
East: WB Kulanihakoi St										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	163	16	-	179	2.0	284	0.630	100	NA	NA
Lane 2	-	-	63	63	2.0	190	0.333	100	NA	NA
Approach	163	16	63	242	2.0		0.630			
North: SB Piilani Hwy										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	126	1155	-	1281	2.0	1162	1.102	100	NA	NA
Lane 2	-	1482	-	1482	2.0	1345[1]	1.102	100	NA	NA
Lane 3	-	-	68	68	2.0	1642	0.042	100	0.0	2
Approach	126	2637	68	2832	2.0		1.102			
West: EB Kulanihakoi St										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	32	79	-	111	2.0	187	0.592	100	NA	NA
Lane 2	-	-	200	200	2.0	1642	0.122	100	0.0	1
Approach	32	79	200	311	2.0		0.592			
	Total	%HV	Deg.Satn (v/c)							
Intersection	6084	2.0	1.121							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1345	1372	3.00	2.00	200	378	0.528	6.6	11.2
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1345	1800	0.747	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	194	197	3.00	2.00	300	1600	0.187	0.3	0.4
Merge Lane	1	-	100.0	Merge Lane is not Opposed				194	1800	0.108	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	86	88	3.00	2.00	68	1712	0.040	0.1	0.1
Merge Lane	1	-	100.0	Merge Lane is not Opposed				86	1800	0.048	0.0	0.0

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LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1373	2.0	1186	1.158	100	75.8	LOS F	126.4	3210.3	Full	1600	0.0	32.5
Lane 2 [d]	1638	2.0	1414	1.158	100	74.5	LOS F	148.7	3776.9	Full	1600	0.0	44.5
Lane 3	68	2.0	1642	0.042	100	0.1	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	3079	2.0		1.158		73.4	LOS F	148.7	3776.9				
East: WB Kulanihakoi St													
Lane 1 [d]	95	2.0	160	0.592	100	39.7	LOS D	3.8	95.6	Full	1600	0.0	0.0
Lane 2	32	2.0	105	0.299	100	28.5	LOS C	1.5	36.9	Full	1600	0.0	0.0
Approach	126	2.0		0.592		36.9	LOS D	3.8	95.6				
North: SB Piilani Hwy													
Lane 1	1519	2.0	1229	1.236	100	112.2	LOS F	122.9	3120.5	Full	1600	0.0	30.9
Lane 2 [d]	1744	2.0	1411	1.236	100	110.7	LOS F	138.0	3505.4	Full	1600	0.0	38.4
Lane 3	89	2.0	1642	0.054	100	0.2	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	3353	2.0		1.236		108.4	LOS F	138.0	3505.4				
West: EB Kulanihakoi St													
Lane 1 [d]	37	2.0	151	0.244	100	21.5	LOS C	1.3	33.4	Full	1600	0.0	0.0
Lane 2	121	2.0	1642	0.074	100	11.8	LOS B	0.0	0.0	Short	200	0.0	NA
Approach	158	2.0		0.244		14.1	LOS B	1.3	33.4				
Intersection	6716	2.0		1.236		88.8	LOS F	148.7	3776.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
South: NB Piilani Hwy										
Lane 1	116	1257	-	1373	2.0	1186	1.158	100	NA	NA
Lane 2	-	1638	-	1638	2.0	1414	1.158	100	NA	NA
Lane 3	-	-	68	68	2.0	1642	0.042	100	0.0	2
Approach	116	2895	68	3079	2.0		1.158			
East: WB Kulanihakoi St										
Lane 1	84	11	-	95	2.0	160	0.592	100	NA	NA
Lane 2	-	-	32	32	2.0	105	0.299	100	NA	NA
Approach	84	11	32	126	2.0		0.592			
North: SB Piilani Hwy										
Lane 1	26	1493	-	1519	2.0	1229	1.236	100	NA	NA
Lane 2	-	1744	-	1744	2.0	1411	1.236	100	NA	NA
Lane 3	-	-	89	89	2.0	1642	0.054	100	0.0	2
Approach	26	3237	89	3353	2.0		1.236			
West: EB Kulanihakoi St										
Lane 1	21	16	-	37	2.0	151	0.244	100	NA	NA
Lane 2	-	-	121	121	2.0	1642	0.074	100	0.0	1
Approach	21	16	121	158	2.0		0.244			
	Total	%HV	Deg.Satn (v/c)							
Intersection	6716	2.0	1.236							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1411	1439	3.00	2.00	121	317	0.382	8.0	11.7
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1411	1800	0.784	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	37	38	3.00	2.00	68	1762	0.039	0.0	0.1
Merge Lane	1	-	100.0	Merge Lane is not Opposed				37	1800	0.021	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	111	113	3.00	2.00	89	1687	0.053	0.1	0.2
Merge Lane	1	-	100.0	Merge Lane is not Opposed				111	1800	0.061	0.0	0.0

LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	989	2.0	991	0.998	100	19.6	LOS B	25.3	641.8	Full	1600	0.0	0.0
Lane 2[d]	1143	2.0	1145	0.998	100	17.0	LOS B	26.1	661.8	Full	1600	0.0	0.0
Lane 3	242	2.0	1642	0.147	100	0.5	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2374	2.0		0.998		16.4	LOS B	26.1	661.8				
East: WB Kulanihakoi St													
Lane 1[d]	179	2.0	337	0.531	100	15.1	LOS B	3.4	85.2	Full	1600	0.0	0.0
Lane 2	63	2.0	225	0.281	100	11.5	LOS B	1.3	33.8	Full	1600	0.0	0.0
Approach	242	2.0		0.531		14.2	LOS B	3.4	85.2				
North: SB Piilani Hwy													
Lane 1	990	2.0	1186	0.835	100	4.8	LOS A	13.5	342.0	Full	1600	0.0	0.0
Lane 2[d]	1142	2.0	1368	0.835	100	3.4	LOS A	13.3	338.6	Full	1600	0.0	0.0
Lane 3	89	2.0	1642	0.054	100	0.2	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2221	2.0		0.835		3.9	LOS A	13.5	342.0				
West: EB Kulanihakoi St													
Lane 1[d]	105	2.0	296	0.356	100	11.3	LOS B	1.9	49.1	Full	1600	0.0	0.0
Lane 2	111	2.0	1642	0.067	100	4.9	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	216	2.0		0.356		8.0	LOS A	1.9	49.1				
Intersection	5053	2.0		0.998		10.5	LOS B	26.1	661.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	42	947	-	989	2.0	991	0.998	100	NA	NA
Lane 2	-	1143	-	1143	2.0	1145	0.998	100	NA	NA
Lane 3	-	-	242	242	2.0	1642	0.147	100	0.0	2

Approach	42	2089	242	2374	2.0		0.998				
East: WB Kulanihakoi St											
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	132	47	-	179	2.0	337	0.531	100	NA	NA	
Lane 2	-	-	63	63	2.0	225	0.281	100	NA	NA	
Approach	132	47	63	242	2.0		0.531				
North: SB Piilani Hwy											
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	126	863	-	990	2.0	1186	0.835	100	NA	NA	
Lane 2	-	1142	-	1142	2.0	1368	0.835	100	NA	NA	
Lane 3	-	-	89	89	2.0	1642	0.054	100	0.0	2	
Approach	126	2005	89	2221	2.0		0.835				
West: EB Kulanihakoi St											
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	26	79	-	105	2.0	296	0.356	100	NA	NA	
Lane 2	-	-	111	111	2.0	1642	0.067	100	0.0	1	
Approach	26	79	111	216	2.0		0.356				
	Total	%HV	Deg.Satn (v/c)								
Intersection	5053	2.0		0.998							

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1142	1165	3.00	2.00	111	584	0.189	3.8	4.9
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1142	1800	0.634	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	205	209	3.00	2.00	242	1588	0.152	0.3	0.4
Merge Lane	1	-	100.0	Merge Lane is not Opposed				205	1800	0.114	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	89	91	3.00	2.00	89	1708	0.052	0.1	0.1
Merge Lane	1	-	100.0	Merge Lane is not Opposed				89	1800	0.050	0.0	0.0

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LANE SUMMARY

Site: 101 [Piilani Hwy/Kulanihakoi St (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Piilani Hwy													
Lane 1	1218	2.0	1180	1.032	100	21.1	LOS C	70.2	1784.1	Full	1600	0.0	8.3
Lane 2 [d]	1451	2.0	1406	1.032	100	19.7	LOS B	81.9	2081.5	Full	1600	0.0	13.4
Lane 3	53	2.0	1642	0.032	100	0.1	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2721	2.0		1.032		19.9	LOS B	81.9	2081.5				
East: WB Kulanihakoi St													
Lane 1 [d]	95	2.0	164	0.576	100	37.1	LOS D	3.7	93.0	Full	1600	0.0	0.0
Lane 2	32	2.0	108	0.292	100	27.4	LOS C	1.4	36.1	Full	1600	0.0	0.0
Approach	126	2.0		0.576		34.7	LOS C	3.7	93.0				
North: SB Piilani Hwy													
Lane 1	1245	2.0	1254	0.993	100	15.8	LOS B	39.6	1005.7	Full	1600	0.0	0.0
Lane 2 [d]	1392	2.0	1401 [1]	0.993	100	12.8	LOS B	37.9	962.5	Full	1600	0.0	0.0
Lane 3	116	2.0	1642	0.071	100	0.2	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	2753	2.0		0.993		13.6	LOS B	39.6	1005.7				
West: EB Kulanihakoi St													
Lane 1 [d]	37	2.0	159	0.231	100	20.7	LOS C	1.3	32.1	Full	1600	0.0	0.0
Lane 2	79	2.0	1642	0.048	100	9.8	LOS A	0.0	0.0	Short	200	0.0	NA
Approach	116	2.0		0.231		13.3	LOS B	1.3	32.1				
Intersection	5716	2.0		1.032		17.1	LOS B	81.9	2081.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Piilani Hwy

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	79	1139	-	1218	2.0	1180	1.032	100	NA	NA
Lane 2	-	1451	-	1451	2.0	1406	1.032	100	NA	NA
Lane 3	-	-	53	53	2.0	1642	0.032	100	0.0	2
Approach	79	2589	53	2721	2.0		1.032			

East: WB Kulanihakoi St

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	68	26	-	95	2.0	164	0.576	100	NA	NA
Lane 2	-	-	32	32	2.0	108	0.292	100	NA	NA
Approach	68	26	32	126	2.0		0.576			

North: SB Piilani Hwy

Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	26	1219	-	1245	2.0	1254	0.993	100	NA	NA
Lane 2	-	1392	-	1392	2.0	1401 [1]	0.993	100	NA	NA
Lane 3	-	-	116	116	2.0	1642	0.071	100	0.0	2
Approach	26	2611	116	2753	2.0		0.993			

West: EB Kulanihakoi St

Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	16	-	37	2.0	159	0.231	100	NA	NA
Lane 2	-	-	79	79	2.0	1642	0.048	100	0.0	1
Approach	21	16	79	116	2.0		0.231			

	Total	%HV	Deg.Satn (v/c)
Intersection	5716	2.0	1.032

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Piilani Hwy Merge Type: **Priority**												
Exit Short Lane	3	200	0.0	1392	1420	3.00	2.00	79	334	0.236	7.6	9.8
Merge Lane	2	-	100.0	Merge Lane is not Opposed				1392	1800	0.773	0.0	0.0
East Exit: WB Kulanihakoi St Merge Type: **Priority**												
Exit Short Lane	2	200	0.0	42	43	3.00	2.00	53	1757	0.030	0.1	0.1
Merge Lane	1	-	100.0	Merge Lane is not Opposed				42	1800	0.023	0.0	0.0
North Exit: SB Piilani Hwy Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Kulanihakoi St Merge Type: **Priority**												

Exit Short Lane	2	200	0.0	103	105	3.00	2.00	116	1695	0.068	0.1	0.2
Merge Lane	1	-	100.0	Merge Lane is not Opposed				103	1800	0.057	0.0	0.0

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APPENDIX D

Preliminary Landscape Irrigation Demand
(from Landscape Architect)

PBR HAWAII
& ASSOCIATES, INC.

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CATIE CULLISON, AICP
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MEMORANDUM

DATE: December 8, 2021

TO: Bradford Wright
Warren S. Unemori Engineering
2145 Wells Street, Suite 403
Wailuku, Hawai'i 96793

FROM: Raymond Higa, PBR HAWAII

SUBJECT: PRELIMINARY IRRIGATION DEMAND CALCULATIONS LĪLOA BIKEWAY EXTENSION – KAUHA'A STREET TO KA'ONO'ULU STREET, KĪHEI, MAUI, HAWAI'I

The irrigation demand breakdown for five landscape roadway stations from East Waipu'ilani Road to Ka'ono'ulu Street with irrigation meter sizes shown below. Refer to attached plan for landscape areas.

- Station 1 (Kauha'a Street to south side of East Waipu'ilani Road) – 4,152 GPD, 16 GPM max./6-hour watering window with a 3/4" irrigation water meter.
- Station 2 (East Waipu'ilani Road to south side of Waipu'ilani Gulch) – 5,002 GPD, 20 GPM max./6-hour watering window with a 3/4" irrigation water meter.
- Station 3 (Waipu'ilani Gulch to south side of Kūlanihāko'i Street) – 12,713 GPD, 50 GPM max./6-hour watering window with a 1" irrigation water meter.
- Station 4 (Kūlanihāko'i Street to Kūlanihāko'i Gulch) – 8,036 GPD, 32 GPM max./6-hour watering window with 3/4" irrigation water meter.
- Station 5 (North of Kūlanihāko'i Gulch to Ka'ono'ulu Street) – 4,703 GPD, 19 GPM max./6-hour watering with 3/4" irrigation water meter.

Total GPD for the landscape irrigation from Kauha'a Street to Ka'ono'ulu Street is 34,606 and five irrigation meters ranging from 3/4" to 1" sizes. Calculation tables attached for reference. Please let me know if you have any questions.

O:\JOB18\1850.16 Kihei Liloa Drive Extension\GPD-calculations memo.doc

LILOA BIKEWAY EXTENTENSION MAP
KAUHAA STREET TO KAONOULU STREET



PET GPM Capacity12/7/2021

Station No. 1	LILOA DRIVE EXTENSION (KAUHAA ST. TO SOUTH SIDE OF EAST WAIPUILANI RD.)			KIHEI, MAUI
	8-Dec-21			
GPM Demand on Annual Rainfall				
GPM	AREA (SF)	Rainfall (in/yr)	Operating Time	DU
16.48	26,642	10.84	6 hrs	85 % Irrg & Rain
Acres				0.61
PETc (in/day)				0.03
Adj. Annual Rainfall (in/week)				0.21
Adj. Annual Rainfall (avg. ft/day)				0.00
Adj. Annual Rainfall (avg. ft/week)				0.02
Adj. Irrigation Output (in/week)				1.54
Adj. Irrigation Output (in/day)				0.22
PETc Avg. Daily Water Use (GPD)				3,659.00
PETc Max. Daily Water Use - Dry (GPD)				6,420.84
PETc MIn. Daily Water Use - Wet (GPD)				897.16
GPM Demand During Establishment				
GPM	AREA (SF)	Irrigated Output (in/yr)	Operating Time	DU
16.48	26,642	91.25	6 hrs	70 % Irrigation
Acres				0.61
Irrigated (in/day)				0.25
Controlled Irrigation Output (in/week)				1.75
Controlled Irrigation Output (avg. ft/day)				0.02
Controlled Irrigation Output (avg. ft/week)				0.15
Avg. Daily Water Use (GPD)				4,152.27
Max. Daily Water Use - Dry (GPD)				7,283.43
MIn. Daily Water Use - Wet (GPD)				1,021.10

Notes:

DU — Distributution Uniformity or System Efficiency. 70% min. to 100% Max.

PET — Pan Evapotranspiration: measurement that combines or integrates the effects of several climate elements: temperature, humidity, rain fall, drought dispersion, solar radiation, and wind.

PETc — Average Peak PET (Pan Evaptranspiration) between rainfall (in/day)

Distribution Uniformity
http://www.rainbird.com/documents/ag/L383_DistributionUniformity_en.pdf

Rainfall Atlas ofHawaii
http://rainfall.geography.hawaii.edu/interactivemap.html

Reference to Formula:
http://www.atomicirrigation.com/estimating_capacity.html

P:\PROJECTS\MAUI\KIHEI\PIILANI\Liloa Bikeway Extension\CAD\GPM Capacity AREA 1 (KAUHAA RD TO SOUTH SIDE OF E.WAIPUILANI RD)

PET GPM Capacity12/7/2021

Station No. 2	LILOA DRIVE EXTENSION (E.WAIPUILANI RD TO SOUTH SIDE OF WAIPUILANI GULCH)			KIHEI, MAUI
	8-Dec-21			
GPM Demand on Annual Rainfall				
GPM	AREA (SF)	Rainfall (in/yr)	Operating Time	DU
19.85	32,095	10.84	6 hrs	85 % Irrg & Rain
Acres				0.74
PETc (in/day)				0.03
Adj. Annual Rainfall (in/week)				0.21
Adj. Annual Rainfall (avg. ft/day)				0.00
Adj. Annual Rainfall (avg. ft/week)				0.02
Adj. Irrigation Output (in/week)				1.54
Adj. Irrigation Output (in/day)				0.22
PETc Avg. Daily Water Use (GPD)				4,407.91
PETc Max. Daily Water Use - Dry (GPD)				7,735.04
PETc MIn. Daily Water Use - Wet (GPD)				1,080.79
GPM Demand During Establishment				
GPM	AREA (SF)	Irrigated Output (in/yr)	Operating Time	DU
19.85	32,095	91.25	6 hrs	70 % Irrigation
Acres				0.74
Irrigated (in/day)				0.25
Controlled Irrigation Output (in/week)				1.75
Controlled Irrigation Output (avg. ft/day)				0.02
Controlled Irrigation Output (avg. ft/week)				0.15
Avg. Daily Water Use (GPD)				5,002.14
Max. Daily Water Use - Dry (GPD)				8,774.79
MIn. Daily Water Use - Wet (GPD)				1,229.49

Notes:

DU — Distributution Uniformity or System Efficiency. 70% min. to 100% Max.

PET — Pan Evapotranspiration: measurement that combines or integrates the effects of several climate elements: temperature, humidity, rain fall, drought dispersion, solar radiation, and wind.

PETc — Average Peak PET (Pan Evaptranspiration) between rainfall (in/day)

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Reference to Formula:
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PET GPM Capacity12/7/2021

Station No. 3	LILOA DRIVE EXTENSION (WAIPUILANI GULCH TO SOUTH SIDE OF KULANIHAKOI ST.)	KIHEI, MAUI
	30-Nov-21	

GPM Demand on Annual Rainfall

GPM	AREA (SF)	Rainfall (in/yr)	Operating Time	DU
50.45	81,572	10.84	6 hrs	85 % Irrg & Rain

Acres	1.87
PETc (in/day)	0.03
Adj. Annual Rainfall (in/week)	0.21
Adj. Annual Rainfall (avg. ft/day)	0.00
Adj. Annual Rainfall (avg. ft/week)	0.02
Adj. Irrigation Output (in/week)	1.54
Adj. Irrigation Output (in/day)	0.22
PETc Avg. Daily Water Use (GPD)	11,203.06
PETc Max. Daily Water Use - Dry (GPD)	19,659.22
PETc MIn. Daily Water Use - Wet (GPD)	2,746.90

GPM Demand During Establishment

GPM	AREA (SF)	Irrigated Output (in/yr)	Operating Time	DU
50.45	81,572	91.25	6 hrs	70 % Irrigation

Acres	1.87
Irrigated (in/day)	0.25
Controlled Irrigation Output (in/week)	1.75
Controlled Irrigation Output (avg. ft/day)	0.02
Controlled Irrigation Output (avg. ft/week)	0.15
Avg. Daily Water Use (GPD)	12,713.34
Max. Daily Water Use - Dry (GPD)	22,306.46
MIn. Daily Water Use - Wet (GPD)	3,120.21

Notes:

DU — Distributution Uniformity or System Efficiency. 70% min. to 100% Max.

PET — Pan Evapotranspiration: measurement that combines or integrates the effects of several climate elements: temperature, humidity, rain fall, drought dispersion, solar radiation, and wind.

PETc — Average Peak PET (Pan Evaptranspiration) between rainfall (in/day)

Distribution Uniformity
http://www.rainbird.com/documents/ag/L383_DistributionUniformity_en.pdf

Rainfall Atlas ofHawaii
http://rainfall.geography.hawaii.edu/interactivemap.html

Reference to Formula:
http://www.atomicirrigation.com/estimating_capacity.html

P:\PROJECTS\MAUI\KIHEI\PIILANI\Liloa Bikeway Extension\CAD\GPM Capacity AREA 3 (WAIPUILANI GULCH TO SOUTH SIDE OF KULANIHAKOI RD)

PET GPM Capacity12/7/2021

Station No. 4	LILOA DRIVE EXTENSION (KULANIHAKOI ST TO KULANIHAKOI GULCH)	KIHEI, MAUI
	30-Nov-21	

GPM Demand on Annual Rainfall

GPM	AREA (SF)	Rainfall (in/yr)	Operating Time	DU
31.89	51,566	10.84	6 hrs	85 % Irrg & Rain

Acres	1.18
PETc (in/day)	0.03
Adj. Annual Rainfall (in/week)	0.21
Adj. Annual Rainfall (avg. ft/day)	0.00
Adj. Annual Rainfall (avg. ft/week)	0.02
Adj. Irrigation Output (in/week)	1.54
Adj. Irrigation Output (in/day)	0.22
PETc Avg. Daily Water Use (GPD)	7,082.05
PETc Max. Daily Water Use - Dry (GPD)	12,427.64
PETc MIn. Daily Water Use - Wet (GPD)	1,736.46

GPM Demand During Establishment

GPM	AREA (SF)	Irrigated Output (in/yr)	Operating Time	DU
31.89	51,566	91.25	6 hrs	70 % Irrigation

Acres	1.18
Irrigated (in/day)	0.25
Controlled Irrigation Output (in/week)	1.75
Controlled Irrigation Output (avg. ft/day)	0.02
Controlled Irrigation Output (avg. ft/week)	0.15
Avg. Daily Water Use (GPD)	8,036.78
Max. Daily Water Use - Dry (GPD)	14,100.00
MIn. Daily Water Use - Wet (GPD)	1,973.56

Notes:

DU — Distributution Uniformity or System Efficiency. 70% min. to 100% Max.

PET — Pan Evapotranspiration: measurement that combines or integrates the effects of several climate elements: temperature, humidity, rain fall, drought dispersion, solar radiation, and wind.

PETc — Average Peak PET (Pan Evaptranspiration) between rainfall (in/day)

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http://www.rainbird.com/documents/ag/L383_DistributionUniformity_en.pdf

Rainfall Atlas ofHawaii
http://rainfall.geography.hawaii.edu/interactivemap.html

Reference to Formula:
http://www.atomicirrigation.com/estimating_capacity.html

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PET GPM Capacity12/7/2021

Station No. 5	LILOA DRIVE EXTENSION (NORTH OF KULANIHAKOI GULCH TO KAONOULU ST)			KIHEI, MAUI
	30-Nov-21			
GPM Demand on Annual Rainfall				
GPM	AREA (SF)	Rainfall (in/yr)	Operating Time	DU
18.66	30,175	10.84	6 hrs	85 % Irrg & Rain
Acres				0.69
PETc (in/day)				0.03
Adj. Annual Rainfall (in/week)				0.21
Adj. Annual Rainfall (avg. ft/day)				0.00
Adj. Annual Rainfall (avg. ft/week)				0.02
Adj. Irrigation Output (in/week)				1.54
Adj. Irrigation Output (in/day)				0.22
PETc Avg. Daily Water Use (GPD)				4,144.22
PETc Max. Daily Water Use - Dry (GPD)				7,272.31
PETc Mln. Daily Water Use - Wet (GPD)				1,016.13
GPM Demand During Establishment				
GPM	AREA (SF)	Irrigated Output (in/yr)	Operating Time	DU
18.66	30,175	91.25	6 hrs	70 % Irrigation
Acres				0.69
Irrigated (in/day)				0.25
Controlled Irrigation Output (in/week)				1.75
Controlled Irrigation Output (avg. ft/day)				0.02
Controlled Irrigation Output (avg. ft/week)				0.15
Avg. Daily Water Use (GPD)				4,702.90
Max. Daily Water Use - Dry (GPD)				8,249.68
Mln. Daily Water Use - Wet (GPD)				1,156.11

Notes:

DU — Distributution Uniformity or System Efficiency. 70% min. to 100% Max.

PET — Pan Evapotranspiration: measurement that combines or integrates the effects of several climate elements: temperature, humidity, rain fall, drought dispersion, solar radiation, and wind.

PETc — Average Peak PET (Pan Evaptranspiration) between rainfall (in/day)

Distribution Uniformity
http://www.rainbird.com/documents/ag/L383_DistributionUniformity_en.pdf

Rainfall Atlas ofHawaii
http://rainfall.geography.hawaii.edu/interactivemap.html

Reference to Formula:
http://www.atomicirrigation.com/estimating_capacity.html

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APPENDIX

HAWAIʻI STATE PLAN ASSESSMENT

L-1

APPENDIX "L-1"

Analysis of Project Applicability to Hawai'i State Plan

Chapter 226, HRS, also known as the Hawai'i State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The Plan consists of three (3) parts. Part I includes the Overall Theme, Goals, Objectives, and Policies; Part II includes Planning, Coordination, and Implementation; and Part III establishes Priority Guidelines. Inasmuch as Part II of the State Plan covers its administrative structure and implementation process, discussion of the proposed project's applicability to Part II is not appropriate. Below is an analysis of the project's applicability to Part I and Part III of the Hawai'i State Plan.

The methodology for the analysis involves examining the project's applicability to the Hawai'i State Plan's goals, objectives, and policies. "Applicability" refers to a project's need, purpose and effects, and how these advance or promote a particular set of goals, objectives and priority guidelines. In assessing the relationship between a proposed action and the Hawai'i State Plan, an action may be categorized in one of the following groups:

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

   Example: A county project to develop a new water source and related transmission facilities would be directly applicable to the objectives and policies for Facility Systems-Water (HRS 226-16) which states: *(5) Support water supply services to areas experiencing critical water problems.*

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

   Example: The county water source project cited above supports other related objectives and policies for the economy (HRS 226-6, General), which, by example, states: *(9) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.* In this case, the principle purpose of the project was not to create new construction activities, but nonetheless, supports this policy by creating temporary construction activity during the implementation of the project. In this instance, the proposed action may be deemed to be indirectly applicable to the objective and policy of the Hawai'i State Plan.

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.

Example: That same county water source improvement project referenced above, may not have direct or indirect linkage to objectives and policies for the economy-Federal Expenditures (HRS 226-9) which states: *(1) Encourage the sustained flow of federal expenditures in Hawaii that generates long-term government civilian employment*. From the standpoint of the agency proposing the water system improvement, and assuming no Federal Funding for the project, it is unlikely that the intention of the proposed water source project would be connected to or reliant upon the foregoing policy. Hence, from the standpoint of judiciously applied policy analysis, the proposed action would be considered not applicable to the policy.

In general, a proposed action's applicability 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.

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 ensure, for the present and future generations, those elements of choice and mobility that ensure that individuals and groups may approach their desired levels of self-reliance and self determination, it shall be the goal of the State to achieve: (1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations. (2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people. (3) Physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring, and of participation in community life.			
Analysis: **The proposed action involves the extension of Liloa Drive along an existing unimproved County right-of-way. The proposed action holds the overall goal of improving traffic circulation and congestion reduction. In the context of the region's anticipated continued growth, the project will improve the quality of the area's mobility characteristics, which also benefits the physical and economic well-being of the community.**			
Chapter 226-5 Objective and Policies for Population			
Objective:			
(a) 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:			
(b) To achieve the population objective, it shall be the policy of this State to:			
(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.			✓

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
(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.			✓
Analysis: **The proposed Liloa Drive Extension project indirectly supports the objectives and policies for population, as it creates short-term employment opportunities within the construction trade for Maui's residents while advancing a much-needed public infrastructure project.**			
Chapter 226-6 Objectives and policies for the economy – – in general			
Objectives:			
(a) 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:			
(b) To achieve general economic objectives, it shall be the policy of this State to:			
(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.			✓

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) 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.			✓
(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.			✓

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 supports construction activity which contributes to increased employment opportunities, job choices and living standards. Businesses positively affected by the project are those that support construction such as materials suppliers, equipment rental companies, and landscape companies.**			
Chapter 226-7 Objectives and policies for the economy – – agriculture.			
Objectives:			
(a) 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:			
(b) To achieve the agriculture objectives, it shall be the policy of this State to:			
(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.			✓
(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.			✓

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) 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 and policies relating to agriculture. In particular, the project does not impact the sugar and pineapple industries or diversified agriculture. As well, the project does not affect the role of agriculture in terms of Hawai'i's strategic, economic and social fabric.**			
Chapter 226-8 Objective and policies for the economy – – visitor industry.			
Objective:			
(a) 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:			
(b) To achieve the visitor industry objective, it shall be the policy of this State to:			
(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.			✓

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 not directly or indirectly applicable to the objectives for the visitor industry. The proposed action has no implications for enhancement and growth of the visitor industry, such as improving the quality of visitor destination areas.**			
Chapter 226-9 Objective and policies for the economy – – federal expenditures.			
Objective:			
(a) 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:			
(b) To achieve the federal expenditures objective, it shall be the policy of this State to:			
(1) Encourage the sustained flow of federal expenditures in Hawaii that generates long-term government civilian employment;			✓
(2) Promote Hawaii's supportive role in national defense, in a manner consistent with Hawaii's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean engineering, aerospace research and development, and related dual-use technology sectors in Hawaii's economy;			✓
(3) Promote the development of federally supported activities in Hawaii that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawaii's environment;			✓
(4) Increase opportunities for entry and advancement of Hawaii's people into federal government service;			✓
(5) Promote federal use of local commodities, services, and facilities available in Hawaii;			✓
(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 project is directly applicable to the objective related to the economy and federal expenditures. Phase 1 of the project will be partially funded by the discretionary Federal Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant. This represents an instance in which the Federal government is investing in a project that will indirectly boost the State's economy through the creation of construction-related jobs.**			
Chapter 226-10 Objective and policies for the economy – – potential growth and innovative activities.			
Objective:			
(a) 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.			✓

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:			
(b) To achieve the potential growth and innovative activity objective, it shall be the policy of this State to:			
(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;			✓
(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;			✓

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
(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: **As a roadway infrastructure project, the proposed action does not directly or indirectly affect the development and expansion of innovative activities to increase and diversify Hawai'i's economic base. As an example, the project does not affect the research and development of health care information technology industries.**			
Chapter 226-10.5 Objectives and policies for the economy – – information industry.			
Objective:			
(a) 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:			
(b) To achieve the information industry objective, it shall be the policy of this State to:			
(1) Promote efforts to attain the highest speeds of electronic and wireless communication within Hawaii and between Hawaii and the world, and make high speed communication available to all residents and businesses in Hawaii;			✓
(2) Encourage the continued development and expansion of the telecommunications infrastructure serving Hawaii to accommodate future growth and innovation in Hawaii's economy;			✓
(3) Facilitate the development of new or innovative business and service ventures in the information industry which will provide employment opportunities for the people of Hawaii;			✓
(4) Encourage mainland- and foreign-based companies of all sizes, whether information technology-focused or not, to allow their principals, employees, or contractors to live in and work from Hawaii, using technology to communicate with their headquarters, offices, or customers located out-of-state;			✓
(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			✓

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
(9) Assist in the promotion of Hawaii as a broker, creator, and processor of information in the Pacific.			✓
Analysis: **The proposed action does not 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:			
(a) 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:			
(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:			
(1) Exercise an overall conservation ethic in the use of Hawaii's natural resources.			✓
(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.		✓	
(3) Take into account the physical attributes of areas when planning and designing activities and facilities.			✓
(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.			✓
(5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.			✓
(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.		✓	
(7) Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.			✓
(8) Pursue compatible relationships among activities, facilities, and natural resources.		✓	
(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.			✓
Analysis: **The proposed project encompasses the use of Best Management Practices (BMPs) to ensure that natural resources such as the coastal environment are not directly 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 proposed action represents an effort to protect rare and endangered plant and animal species, and habitats native to Hawai'i.**			

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 226-12 Objective and policies for the physical environment – – scenic, natural beauty, and historic resources.			
Objective:			
(a) 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:			
(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:			
(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: **Archaeological investigations and coordination for the proposed action are aimed at ensuring the preservation of historic resources which may be impacted by the project. Landscaping proposed in connection with the project is intended to enhance the project area's visual relationship with its immediate surrounding environs.**			
Chapter 226-13 Objectives and policies for the physical environment – – land, air, and water quality.			
Objectives:			
(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives.			
(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.	✓		
(2) Greater public awareness and appreciation of Hawaii's environmental resources.			✓
Policies:			
(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:			
(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.		✓	

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
(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: **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 during grading operations to minimize downstream water quality impacts. A noise study has been conducted to address noise impacts and required mitigation for the proposed action. Work on the project is not anticipated to be affected by natural hazards, and the highest standards of design and construction practices have been and will be employed for the project.**			
Chapter 226-14 Objective and policies for facility systems – – in general.			
Objective:			
(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, sustainable development, climate change adaptation, sea level rise adaptation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.	✓		
Policies:			
(b) To achieve the general facility systems objective, it shall be the policy of this State to:			
(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.	✓		
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.	✓		
(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.			✓
(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.			✓
(5) Identify existing and planned state facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards.			✓
(6) Assess a range of options to mitigate the impacts of sea level rise to existing and planned state facilities.			✓

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 supports the County's transportation network by creating a needed link to provide redundancy for automobile traffic in the Kīhei region. By addressing regional automobile congestion demands, the proposed action reflects a coordinated effort to implement capital improvement priorities for the island's residents. Since the project was originally conceived, it has undergone significant design changes in response to changing priorities, including the incorporation of Complete Streets design principles to diversify the forms of mobility it supports.**			
Chapter 226-15 Objectives and policies for facility systems – – solid and liquid waste.			
Objectives:			
(a) 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:			
(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:			
(1) Encourage the adequate development of sewerage facilities that complement planned growth.			✓
(2) Promote reuse 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 action includes the installation of an 12-inch wastewater reuse line within the right-of-way of the proposed Liloa Drive Extension. This infrastructure component advances the reuse and recycling conservation ethic promoted by the State.**			
Chapter 226-16 Objective and policies for facility systems – – water.			
Objective:			
(a) 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:			
(b) To achieve the facility systems water objective, it shall be the policy of this State to:			
(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.			✓

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
(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 proposed effluent reuse line to be installed as part of the proposed action is directly related to the policy of encouraging the reclamation of wastewater discharges. This line will ultimately expand the service area for the distribution of reclaimed effluent from the Kīhei Wastewater Reclamation Facility. In this context, the proposed action supports the objective of managing water resource capacities.**			
Chapter 226-17 Objectives and policies for facility systems – – transportation.			
Objectives:			
(a) 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:			
(b) To achieve the transportation objectives, it shall be the policy of this State to:			
(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;	✓		

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
(12) Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives; and			✓
(13) Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.	✓		
Analysis: **While the proposed action does not directly link to the Statewide transportation system, at the local level, it is an infrastructure component sensitive to the needs of the community. As part of a broader roadway network in Maui County, the proposed action meets the current and future needs of the community in an area where existing roadways are reaching saturation. The proposed project's use of Complete Streets design principles and incorporation of the shared pedestrian/bike path directly encourages the safe use of low-cost, energy-efficient, non-polluting means of transportation and directly encourages the diversification of transportation modes and infrastructure that promotes energy efficiency.**			
Chapter 226-18 Objectives and policies for facility systems – – energy.			
Objectives:			
(a) 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.			✓
Policies:			
(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.			
(c) To further achieve the energy objectives, it shall be the policy of this State to:			
(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;			✓

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) Education;			✓
(C) Adoption of energy-efficient practices and technologies; and			✓
(D) Increasing energy efficiency and decreasing energy use in public infrastructure			✓
(5) Ensure, to the extent that new supply-side resources are needed, that the development or expansion of energy systems uses the least-cost energy supply option and maximizes efficient technologies; and			✓
(6) Support research, development, demonstration, and use of energy efficiency, load management, and other demand-side management programs, practices, and technologies;			✓
(7) Promote alternate fuels and transportation energy efficiency;	✓		
(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;	✓		
(9) Support actions that reduce, avoid, or sequester Hawaii's greenhouse gas emissions through agriculture and forestry initiatives;			✓
(10) Provide priority handling and processing for all state and county permits required for renewable energy projects;			✓
(11) Ensure that liquefied natural gas is used only as a cost-effective transitional, limited-term replacement of petroleum for electricity generation and does not impede the development and use of other cost-effective renewable energy sources; and			✓
(12) Promote the development of indigenous geothermal energy resources that are located on public trust land as an affordable and reliable source of firm power for Hawaii.			✓
Analysis: **The proposed project is directly applicable to the objective related to planning for the State's facility systems with respect to energy. The proposed project's use of Complete Streets design principles and incorporation of the shared pedestrian/bike path promotes transportation energy efficiency and promotes the reduction of greenhouse gas use in transportation.**			
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.			
Policies:			
(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.			✓
(c) To further achieve the telecommunications objective, it shall be the policy of this State to:			
(1) Facilitate research and development of telecommunications systems and resources;			✓

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
(2) Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning;			✓
(3) Promote efficient management and use of existing telecommunications systems and services; and			✓
(4) Facilitate the development of education and training of telecommunications personnel.			✓
Analysis: **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:			
(a) 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 rental and for sale affordable housing is made available to very low-, very low-,lower-, moderate-, and above 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:			
(b) To achieve the housing objectives, it shall be the policy of this State to:			
(1) Effectively accommodate the housing needs of Hawaii's people.			✓
(2) Stimulate and promote feasible approaches that increase affordable rental and for sale housing choices for extremely low-, very low-, lower-, moderate-, and above moderate-income 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 rental and for sale 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.			✓

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
(8) Promote research and development of methods to reduce the cost of housing construction in Hawaii.			✓
Analysis: **The proposed project will connect two (2) existing segments of Liloa Drive. With its limited roadway improvement scope of work, the project will not affect the provision of quality affordable housing for Hawai'i's residents.**			
Chapter 226-20 Objectives and policies for socio-cultural advancement – – health.			
Objectives:			
(a) 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:			
(b) To achieve the health objectives, it shall be the policy of this State to:			
(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 proposed action does not directly or indirectly affect the Hawai'i State Plan's objectives and policies for health. The proposed action does not affect individual health needs, sanitation and health conditions and health disparities. As an example, the project does not address strategies for reducing health care and related insurance costs.**			

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 226-21 Objectives and policies for socio-cultural advancement – – education.			
Objective:			
(a) 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:			
(b) To achieve the education objective, it shall be the policy of this State to:			
(1) Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.			✓
(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.			✓
(3) Provide appropriate educational opportunities for groups with special needs.			✓
(4) Promote educational programs which enhance understanding of Hawaii's cultural heritage.			✓
(5) Provide higher educational opportunities that enable Hawaii's people to adapt to changing employment demands.			✓
(6) Assist individuals, especially those experiencing critical employment problems or barriers, or undergoing employment transitions, by providing appropriate employment training programs and other related educational opportunities.			✓
(7) Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.			✓
(8) Emphasize quality educational programs in Hawaii's institutions to promote academic excellence.			✓
(9) Support research programs and activities that enhance the education programs of the State.			✓
Analysis: **The proposed action does not directly or indirectly affect the spectrum of educational opportunities for Hawai'i's varied target groups. For example, the proposed action does not affect research programs that enhance statewide educational programs, nor does it promote programs that facilitate the acquisition of basic learning skills.**			
Chapter 226-22 Objective and policies for socio-cultural advancement – – social services.			
Objective:			
(a) 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:			
(a) To achieve the social service objective, it shall be the policy of the State to:			

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
(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 Hawai'i State Plan's objective and policies to improve public and private social services, including the attainment of adequate standards of living, the provision of alternative institutional care for elder and disabled populations and the development of programs for family planning, will not be affected by the proposed action.**			
Chapter 226-23 Objective and policies for socio-cultural advancement – – leisure.			
Objective:			
(a) 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:			
(b) To achieve the leisure objective, it shall be the policy of this State to:			
(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.			✓

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
(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: **While the proposed action is not directly aimed at advancing recreational opportunities to accommodate Hawai'i's diverse set of needs, it was designed using Complete Streets principles, which promote walking, jogging, and bicycling in a safe environment. As such, the proposed project is indirectly applicable to the policies to enhance the enjoyment of recreation experiences through safety and security measures and ensure opportunities for everyone to use and enjoy Hawai'i's recreational resources.**			
Chapter 226-24 Objective and policies for socio-cultural advancement – – individual rights and personal well-being.			
Objective:			
(a) 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:			
(b) To achieve the individual rights and personal well-being objective, it shall be the policy of this State to:			
(1) Provide effective services and activities that protect individuals from criminal acts and unfair practices and that alleviate the consequences of criminal acts in order to foster a safe and secure environment.			✓
(2) Uphold and protect the national and state constitutional rights of every individual.			✓
(3) Assure access to, and availability of, legal assistance, consumer protection, and other public services which strive to attain social justice.			✓
(4) Ensure equal opportunities for individual participation in society.			✓
Analysis: **The proposed roadway extension project does not directly or indirectly affect individual rights and their related protections. The proposed action, for example, does not affect access to and availability of legal assistance and consumer protection to all sectors of Hawai'i's population.**			
Chapter 226-25 Objective and policies for socio-cultural advancement – – culture.			
Objective:			
(a) 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.		✓	

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:			
(b) To achieve the culture objective, it shall be the policy of this State to:			
(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. The CIA fosters increased knowledge of Native Hawaiian cultural practices, as well as the history of the project area. In this context, the project indirectly advances the goal related to culture.**			
Chapter 226-26 Objectives and policies for socio-cultural advancement – – public safety.			
Objectives:			
(a) 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):			
(b) To achieve the public safety objectives, it shall be the policy of this State to:			
(1) Ensure that public safety programs are effective and responsive to community needs.			✓
(2) Encourage increased community awareness and participation in public safety programs.			✓
Policies (Public Safety-Criminal Justice):			
(c) To further achieve public safety objectives related to criminal justice, it shall be the policy of this State to:			
(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.			✓

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) 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):			
(d) To further achieve public safety objectives related to emergency management, it shall be the policy of this State to:			
(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 proposed project is directly applicable to the objective related to public safety. The project will provide an alternative route, where road closures and traffic congestion are increasing in frequency due to climate change, making emergency evacuations difficult. The extension of Liloa Drive will provide much needed redundancy to ensure the adequate protection of life and property in the event of a natural disaster or other major disturbance.**			
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
Objectives:			
(a) 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:			
(b) To achieve the government objectives, it shall be the policy of this State to:			
(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 both directly and indirectly applicable to the objectives and policies related to government. The proposed action is a County project, meaning that it is an effort by the government to provide a necessary service not assumed by the private sector. Additionally, the project will comply with regulatory requirements which advance transparency in the flow of project-related information to the public. Such requirements include the Chapter 343, HRS EA and Special Management Area processes.**			

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines 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:			
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(4) Seek to ensure that state business tax and labor laws and administrative policies are equitable, rational, and predictable.			✓
(5) Streamline the processes for building and development permit and review, and telecommunication infrastructure installation approval and eliminate or consolidate other burdensome or duplicative governmental requirements imposed on business, where scientific evidence indicates that public health, safety and welfare would not be adversely affected.			✓
(6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaii's small-scale producers, manufacturers, and distributors.			✓
(7) Continue to seek legislation to protect Hawaii from transportation interruptions between Hawaii and the continental United States.			✓
(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics:			✓
(A) An industry that can take advantage of Hawaii's unique location and available physical and human resources.			✓
(B) A clean industry that would have minimal adverse effects on Hawaii's environment.			✓
(C) An industry that is willing to hire and train Hawaii's people to meet the industry's labor needs at all levels of employment.			✓
(D) An industry that would provide reasonable income and steady employment.			✓
(9) Support and encourage, through educational and technical assistance programs and other means, expanded opportunities for employee ownership and participation in Hawaii business.			✓
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair, and maintenance of visitor facilities.			✓
(4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawaii's significant natural, scenic, historic, and cultural resources.			✓
(5) Develop and maintain career opportunities in the visitor industry for Hawaii's people, with emphasis on managerial positions.			✓
(6) Support and coordinate tourism promotion abroad to enhance Hawaii's share of existing and potential visitor markets.			✓
(7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.			✓
(8) Support law enforcement activities that provide a safer environment for both visitors and residents alike.			✓
(9) Coordinate visitor industry activities and promotions to business visitors through the state network of advanced data communication techniques.			✓
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:			
(1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.			✓
(2) Continue efforts to maintain federal support to provide stable sugar prices high enough to allow profitable operations in Hawaii.			✓
(3) Support research and development, as appropriate, to improve the quality and production of sugar and pineapple crops.			✓
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:			
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(e) Priority guidelines for water use and development:			
(1) Maintain and improve water conservation programs to reduce the overall water consumption rate.			✓
(2) Encourage the improvement of irrigation technology and promote the use of nonpotable water for agricultural and landscaping purposes.	✓		
(3) Increase the support for research and development of economically feasible alternative water sources.			✓
(4) Explore alternative funding sources and approaches to support future water development programs and water system improvements.			✓
(f) Priority guidelines for energy use and development:			
(1) Encourage the development, demonstration, and commercialization of renewable energy sources.			✓
(2) Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy.			✓
(3) Provide incentives to encourage the use of energy conserving technology in residential, industrial, and other buildings.			✓
(4) Encourage the development and use of energy conserving and cost-efficient transportation systems.			✓
(g) Priority guidelines to promote the development of the information industry:			
(1) Establish an information network, with an emphasis on broadband and wireless infrastructure and capability that will serve as the foundation of and catalyst for overall economic growth and diversification in Hawaii.			✓
(2) Encourage the development of services such as financial data processing, a products and services exchange, foreign language 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 project is directly applicable to the priority guideline to promote the use of nonpotable water for agricultural and landscaping purposes. An infrastructure element of the project is the inclusion of a R-1 effluent reuse line, which will expand the use of treated effluent from the Kīhei Wastewater Reclamation Facility towards the northern section of Kīhei.**			
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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(2) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.			✓
(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.		✓	
(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.			✓
(5) Explore the possibility of making available urban land, low-interest loans, and housing subsidies to encourage the provision of housing to support selective economic and population growth on the neighbor islands.			✓
(6) Seek federal funds and other funding sources outside the State for research, program development, and training to provide future employment opportunities on the neighbor islands.			✓
(7) Support the development of high technology parks on the neighbor islands.			✓
(b) Priority guidelines for regional growth distribution and land resource utilization:			
(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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(12) Utilize Hawaii's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands, and other limited resources for future generations.			✓
(13) Protect and enhance Hawaii's shoreline, open spaces, and scenic resources.			✓
Analysis: **The Hawai'i State Plan's priority guidelines for population growth and land resources are, for the most part, not applicable to the proposed action. However, priority guideline "a(3)", relating to the adequacy of facilities to accommodate growth is indirectly applicable to the proposed action. As a roadway infrastructure project, the action is viewed as a means to accommodate growth by providing a traffic congestion relief measure.**			
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 Hawai'i State Plan's 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 extremely low-, very low-, lower-, moderate-, and above and moderate-income 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-, very low-, lower-, and moderate-income 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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(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 action does not directly or indirectly affect the Hawai'i State Plan's priority guidelines for the provision of affordable housing. As a roadway improvement project, the action does not promote, incentivize, or encourage innovation and delivery of affordable housing.**			
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 support the Hawai'i State Plan's priority guidelines for quality education. The project, for example, does not affect capacities to expand educational programs for students with special needs, nor does it affect programs for early childhood 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.			✓

Hawai'i State Plan, Chapter 226, HRS Part III. Priority Guidelines Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
Analysis: **The proposed action does not promote and encourage principles of the Hawai'i State Plan's priority guidelines for sustainability. While resource conservation measures will be taken as part of the project implementation process, these are considered project specific and do not necessarily advance strategic measures for sustainability.**			
CHAPTER 226-109: Climate change adaptation priority guidelines			
Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the built environment, such as housing, recreation, transportation; and the economy shall:			
(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 action is indirectly applicable to the priority guideline related to climate change adaptation. The project will provide an alternative route in and out of South Maui, where road closures and traffic congestion are increasing in frequency due to climate change, making emergency evacuations difficult. As such, the proposed project promotes resilience in the road sector.**			

COUNTYWIDE POLICY PLAN ASSESSMENT

APPENDIX L-2

APPENDIX "L-2"

Analysis of Project Applicability to Countywide Policy Plan

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

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

Discussion of the proposed project conforms to the relevant goals, objectives, policies, and implementing actions of the Countywide Policy Plan is provided below. The methodology for assessing a project's relationship to the Countywide Policy Plan involves examining the project's applicability to the Plan's goals, objectives, and policies. "Applicability" refers to a project's need, purpose and effects, and how they advance or promote a particular set of goals, objectives and policies. In assessing the relationship between a proposed action and the Countywide Policy Plan, an action may be categorized in one of the following groups:

1. **Directly applicable:** the action and its potential effects directly advance, promote or affect the relevant goal, objective, or policy.

   Example: A County project to develop a new water source and related transmission facilities would be directly applicable to improving physical infrastructure. The relevant objective states: *"Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water*" (Objective I.1). A policy within this objective category states: *Ensure that adequate supplies of water are available prior to approval of subdivision or construction documents* (Policy I.1.a).

   In this instance, the proposed action is considered to be directly applicable to the cited objective and policy.

2. **Indirectly applicable:** the action and its potential effects indirectly support, advance or affect the objective, policy or priority guideline.

   Example: The county water source project cited above supports the objective to: *"Improve land use management and implement a directed-growth strategy"* (Objective J.1). A related policy encompassed by this objective states: *"Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources"* (Policy J.1.h). In this case, the principle purpose of the project is not to create a water source specifically intended to improve land use management. Nonetheless, the proposed action indirectly supports the Countywide Policy Plan's directives relating to appropriate locations for new development.

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.

   Example: The county water source improvement project referenced above, may not have direct or indirect linkage to Objective D.1, which states: *"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"*. Hence, from a policy analysis and linkage standpoint, the proposed action would be considered not applicable to this set of objectives and policies.

It is recognized that policy analysis is subject to interpretation and is best considered in the context of the proposed action's local and regional conditions.

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 ahupua'a.			✓
(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.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **The assessment of the proposed action included a Biological Resources Survey addressing flora and fauna in the project area. While this assessment does not directly advance the policy of securing an interconnected network of indigenous and endemic species habitats, it does add to a data base which may be used for future network acquisition studies. The proposed action extends the existing greenway system along Liloa Drive and is, therefore, directly applicable to the implementing action to develop island-wide networks of greenways.**			
Objective:			
(2) Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.			✓
Policies:			
(a) Protect and restore nearshore reef environments and water quality.			✓
(b) Protect marine resources and valued wildlife.			✓
(c) Improve the connection between urban environments and the natural landscape, and incorporate natural features of the land into urban design.			✓
(d) Utilize land-conservation tools to ensure the permanence of valued open spaces.			✓
(e) Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.			✓
(f) Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.			✓
(g) Regulate the use and maintenance of stormwater-treatment systems that incorporate the use of native vegetation and mimic natural systems.			✓
(h) Advocate for stronger regulation of fishing, boating, cruise ship, and ecotourism activities.			✓
(i) Restore watersheds and aquifer-recharge areas to healthy and productive status, and increase public knowledge about the importance of watershed stewardship, water conservation, and groundwater protection.			✓
Implementing Actions:			
(a) Develop regulations to minimize runoff of pollutants into nearshore waters and reduce nonpoint and point source pollution.			✓
Analysis: **The proposed action does not have direct or indirect relationships to the objective to improve the quality of environmentally sensitive, valued natural resources and native ecology. For example, the proposed action does not affect open space preservation or regulatory mechanisms for ecotourism.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Provide public access to beaches and shorelines for recreational and cultural purposes where appropriate.			✓
(i) Educate the construction and landscape industries and property owners about the use of best management practices to prevent erosion and nonpoint source pollution.		✓	
(j) Support the acquisition of resources with scenic, environmental, and recreational value, and encumber their use.			✓
(k) Improve enforcement activities relating to the natural environment.			✓
(l) For each shoreline community, identify and prioritize beach-conservation objectives, and develop action plans for their implementation.			✓
Implementing Actions:			✓
(a) Document, record, and monitor existing conditions, populations, and locations of flora and fauna communities.		✓	
(b) Implement Federal and State policies that require a reduction of greenhouse-gas emissions.			✓
(c) Establish a baseline inventory of available natural resources and their respective carrying capacities.			✓
Analysis: **The assessment of the proposed action included a Biological Resources Survey addressing flora and fauna in the project area. This assessment addresses the objective of improving the stewardship of our natural environment by documenting the biological resources in the project area. Additionally, project specifications will include BMPs to address soil erosion during construction activities. This Chapter 343, HRS Environmental Assessment document includes an evaluation of the project to assess potential short-term and long-term impacts on land, air, aquatic, and marine environments. Furthermore, the proposed project is directly applicable to the policy to improve efforts to mitigate and plan for the impact of natural disasters, human-influenced emergencies and global warming. Road closures and traffic congestion are increasing in frequency in South Maui due to climate change, making emergency evacuations difficult. During natural disasters, such as tsunamis or wildfires, many residents are left with a limited ability to evacuate. The proposed action will provide alternative routes in and out of South Maui.**			
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: **While the Biological Resource Survey does not directly educate residents and visitors about responsible stewardship practices and the interconnectedness of the natural environment and people, it indirectly provides data that could enhance such educational efforts. The project's biological resources inventory provides an additional data source for education.**			
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.		✓	

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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 ahupua'a 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 ahupua'a 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 ahupua'a or district.			✓
(b) Develop requirements for all County applicants to perpetuate and use proper traditional place names in all applications submitted.			✓
Analysis: **While the proposed action itself does not directly address Hawaiian cultural practices and rights, the CIA does serve to acknowledge the valued cultural context associated with the project area. In particular, the CIA address the relationship between land resources and cultural practices.**			
Objective:			
(2) Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment.			✓
Policies:			
(a) Acknowledge the Hawaiian culture as the host culture, and foster respect and humility among residents and visitors toward the Hawaiian people and their practices.			✓
(b) Perpetuate a respect for diversity, and recognize the historic blending of cultures and ethnicities.			✓
(c) Encourage the perpetuation of each culture's unique cuisine, attire, dance, music, and folklore, and other unique island traditions and recreational activities.			✓
(d) Recognize the interconnectedness between the natural environment and the cultural heritage of the islands.			✓
(e) Protect and prioritize funding for recreational activities that support local cultural practices, such as surfing, fishing, and outrigger-canoe paddling.			✓
Analysis: **The proposed action does not directly or indirectly affect the community's relationship to its island lifestyle, local cultures or the natural environment.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Broaden opportunities for public art and the display of local artwork.			✓
(d) Foster the Aloha Spirit by celebrating the Hawaiian host culture and other Maui County cultures through support of cultural-education programs, festivals, celebrations, and ceremonies.			✓
(e) Support the perpetuation of Hawaiian arts and culture.			✓
(f) Support programs and activities that record the oral and pictorial history of residents.			✓
(g) Support the development of repositories for culture, history, genealogy, oral history, film, and interactive learning.		✓	
Implementing Actions:			
(a) Establish incentives for the display of public art.			✓
(b) Establish centers and programs of excellence for the perpetuation of Hawaiian arts and culture.			✓
Analysis: **Although the proposed action does not directly address the perpetuation of the arts, culture and history, the CIA does serve to document and acknowledge the valued cultural context associated with the project area. The CIA provides information and data sources relating to the culture and history of the project area. As well, the CIA's oral history documentation provides insight to Native Hawaiian cultural practices.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(c) Enact an Archaeological District Ordinance.			✓
(d) Nominate important historic sites to the State and Federal historic registers.			✓
Analysis: **The proposed action has indirect relationships to the objective to preserve and restore historic architecture, structures, cultural sites, cultural districts, and cultural landscapes. Both the Archaeological Literature Review and Field Inspection Report and CIA provide information on the project area's archaeology, history and culture. The CIA study process, as well, honors the traditions and practices of the host culture.**			
C. IMPROVE EDUCATION			
Goal: Residents will have access to lifelong formal and informal educational options enabling them to realize their ambitions.			✓
Objective:			
(1) Encourage the State to attract and retain school administrators and educators of the highest quality.			✓
Policies:			
(a) Encourage the State to provide teachers with nationally competitive pay and benefit packages.			✓
(b) Encourage the State to ensure teachers will have the teaching tools and support staff needed to provide students with an excellent education.			✓
(c) Explore Maui County district- and school-based decision making in public education.			✓
Analysis: **The proposed action does not have direct or indirect relationships to the goal to provide access to educational options, including the objective to attract and retain administrators and educators of the highest quality.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(n) Encourage alternative learning and educational opportunities.			✓
Implementing Actions:			
(a) Develop safe walking and bicycling programs for school children.			✓
Analysis: **The proposed action does not have direct or indirect relationships to the goal to provide access to educational options, including the objective of providing nurturing learning environments that build skills for the 21st Century.**			
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 action does not have direct or indirect relationships to the objective of providing educational opportunities for residents. For example, policies relating to the teaching of the arts, vocational learning opportunities and graduate-level research programs and institutions are not advanced by the proposed action.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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 proposed action does not have direct or indirect relationships to the objective of maximizing community-based educational opportunities.**			
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 action is not applicable to the goal to provide comprehensive health services to all segments of the population, including the objective of broadening access to social and healthcare services and expanding options to improving overall wellness.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Support programs that address needs of veterans.			✓
(i) Support programs that address the needs of immigrants.			✓
Implementing Actions:			
(a) Invest in programs designed to improve the general welfare and quality of life of Native Hawaiians.			✓
(b) Assist and facilitate the State Department of Public Safety and others in efforts to strengthen programs and facilities that will improve the mental and social health of incarcerated people and assist in prison inmates' successful transition back into Maui County communities.			✓
(c) Develop and maintain a comprehensive index that will measure the health and wellness needs of families.			✓
(d) Provide heliports countywide for emergency health and safety purposes.			✓
Analysis: **The goal for strengthening social and health care services and its objective of encouraging Federal and State governments and the private sector to improve the quality and delivery of social and health care services are not advanced by the proposed action.**			
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 of strengthening public awareness programs related to healthy lifestyles and social and medical services has no direct or indirect relationship to the proposed action.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Explore taxation mechanisms to increase and maintain access to affordable housing.			✓
(i) Improve awareness regarding available affordable homeowner's insurance.			✓
(j) Redevelop commercial areas with a mixture of affordable residential and business uses, where appropriate.			✓
(k) Ensure residents are given priority to obtain affordable housing units developed in their communities, consistent with all applicable regulations.			✓
(l) Establish pricing for affordable housing that is more reflective of Maui County's workforce than the United States Housing and Urban Development's median-income estimates for Maui County.			✓
(m) Develop neighborhoods with a mixture of accessible and integrated community facilities and services.			✓
(n) Provide alternative regulatory frameworks to facilitate the use of Kuleana lands by the descendants of Native Hawaiians who received those lands pursuant to the Kuleana Act of 1850.			✓
(o) Work with lending institutions to expand housing options and safeguard the financial security of homeowners.			✓
(p) Promote the use of the community land trust model and other land-lease and land-financing options.			✓
(q) Support the opportunity to age in place by providing accessible and appropriately designed residential units.			✓
Analysis: **The proposed action does not have direct or indirect relationships to the objective of reducing the affordable housing deficit for residents. As an example, the proposed action does not affect taxation mechanisms to increase affordable housing, nor does it promote innovative methods for lowering the cost of housing.**			
Objective:			
(2) Increase the mix of housing types in towns and neighborhoods to promote sustainable land use planning, expand consumer choice, and protect the County's rural and small town character.			✓
Policies:			
(a) Seek innovative ways to develop 'ohana cottages and accessory-dwelling units as affordable housing.			✓
(b) Design neighborhoods to foster interaction among neighbors.			✓
(c) Encourage a mix of social, economic, and age groups within neighborhoods.			✓
(d) Promote infill housing in urban areas at scales that capitalize on existing infrastructure, lower development costs, and are consistent with existing or desired patterns of development.			✓
(e) Encourage the building industry to use environmentally sustainable materials, technologies, and site planning.			✓
(f) Develop workforce housing in proximity to job centers and transit facilities.			✓
(g) Provide incentives to developers and owners who incorporate green building practices and energy-efficient technologies into their housing developments.			✓
Implementing Actions:			
(a) Revise laws to support neighborhood designs that incorporate a mix of housing types that are appropriate for island living.			✓
Analysis: **The proposed action does not have direct or indirect relationships to the objective to increase a mix of housing types in appropriate areas of the island.**			
Objective:			
(3) Increase and maintain the affordable housing inventory.			✓
Policies:			
(a) Recognize housing as a basic human need, and work to fulfill that need.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **The proposed action does not have a direct or indirect relationship to increasing and maintaining the affordable housing inventory.**			
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 objective of expanding access to education related to housing options, homeownership, financing, and residential construction is not applicable to the proposed action.**			
F. STRENGTHEN THE LOCAL ECONOMY			
Goal: Maui County's economy will be diverse, sustainable, and supportive of community values.		✓	
Objective:			
(1) Promote an economic climate that will encourage diversification of the County's economic base and a sustainable rate of economic growth.		✓	
Policies:			
(a) Support economic decisions that create long-term benefits.			✓
(b) Promote lifelong education, career development, and technical training for existing and emerging industries.			✓
(c) Invest in infrastructure, facilities, and programs that foster economic diversification.		✓	
(d) Support and promote locally produced products and locally owned operations and businesses that benefit local communities and meet local demand.		✓	
(e) Support programs that assist industries to retain and attract more local labor and facilitate the creation of jobs that offer a living wage.			✓
(f) Encourage work environments that are safe, rewarding, and fulfilling to employees.			✓
(g) Support home-based businesses that are appropriate for and in character with the community.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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 action does not directly promote the goal for economic diversification, sustainability and community values. Indirectly, however, the proposed action is an investment in infrastructure that will support local businesses that are linked to the construction industry. Such businesses may include materials suppliers, equipment rental companies and specialty construction companies. From a long-term perspective, the proposed action is not anticipated to affect economic diversification and the overall business environment.**			
Objective:			
(2) Diversify and expand sustainable forms of agriculture and aquaculture.			✓
Policies:			
(a) Support programs that position Maui County's agricultural products as premium export products.			✓
(b) Prioritize the use of agricultural land to feed the local population, and promote the use of agricultural lands for sustainable and diversified agricultural activities.			✓
(c) Capitalize on Hawai'i's economic opportunities in the ecologically sensitive aquaculture industries.			✓
(d) Assist farmers to help make Maui County more self-sufficient in food production.			✓
(e) Support ordinances, programs, and policies that keep agricultural land and water available and affordable to farmers.			✓
(f) Support a tax structure that is conducive to the growth of the agricultural economy.			✓
(g) Enhance County efforts to monitor and regulate important agricultural issues.			✓
(h) Support education, research, and facilities that strengthen the agricultural industry.			✓
(i) Maintain the genetic integrity of existing food crops.			✓
(j) Encourage healthy and organic farm practices that contribute to land health and regeneration.			✓
(k) Support cooperatives and other types of nontraditional communal farming and efforts.			✓
(l) Encourage methods of monitoring and controlling genetically modified crops to prevent adverse effects.			✓
(m) Work with the State to ease the permitting process for the revitalization of traditional fish ponds.			✓
Implementing Actions:			
(a) Redirect efforts in the Office of Economic Development to further facilitate the development of the agricultural section and to monitor agricultural legislation and issues.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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 proposed action does not have direct or indirect relationships to the objective to expand sustainable agriculture and aquaculture. For example, the proposed project does not affect the management of genetically modified crops or support self-sufficiency in food production.**			
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 kama'aina 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 objective of supporting the visitor industry is not applicable to the proposed action. For example, the proposed action does not affect beach and open space conservation for visitors, nor does it promote resident ownership of visitor-related businesses.**			
Objective:			
(4) Expand economic sectors that increase living-wage job choices and are compatible with community values.			✓
Policies:			
(a) Support emerging industries, including the following: • Health and wellness industry; • Sports and recreation industry; • Film and entertainment industry; • Arts and culture industry; • Renewable-energy industry; • Research and development industry; • High-technology and knowledge-based industries; • Education and training industry; • Ecotourism industry; and • Agritourism industry.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **The proposed action does not have direct or indirect relationships to the objective to expand economic sectors that increase living-wage job choices compatible with community values. Such sectors may include agritourism, sports and recreation, and film and entertainment.**			
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: **While the proposed action is not specifically designed to provide linkages to passive and active recreational areas, it does offer improvements that facilitate pedestrian and bicycle access within a portion of the community. From a long-term perspective, the improvements provided by the project offer a broadened network of multi-use paths and bikeways.**			
Objective:			
(2) Improve the quality and adequacy of community facilities.			✓
Policies:			
(a) Provide an adequate supply of dedicated shelters and facilities for disaster relief.			✓
(b) Provide and maintain community facilities that are appropriately designed to reflect the traditions and customs of local cultures.			✓
(c) Ensure that parks and public facilities are safe and adequately equipped for the needs of all ages and physical abilities to the extent reasonable.			✓
(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 proposed project does not have direct or indirect relationships to the objective to improve community facilities. The project does not affect the provision of shelters for disaster, relief, and does not address parks and facility requirements for the spectrum of ages and physical abilities.**			
Objective:			
(3) Enhance the funding, management, and planning of public facilities and park lands.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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 objective of enhancing funding, management and planning for public facilities and parks is not applicable 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.			✓
(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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Implementing Actions:			
(a) Create incentives and implement strategies to reduce visitor dependence on rental cars.			✓
(b) Establish efficient public-transit routes between employment centers and primary workforce residential areas.			✓
(c) Create attractive, island-appropriate, conveniently located park-and-ride and ride-share facilities.			✓
Analysis: **The proposed action provides new connectivity for the regional roadway system, thereby reducing congestion on local roadways. The proposed project was designed using Complete Streets principles to accommodate bicycles, automobiles, and pedestrians in a well-designed and safe configuration. As well, the project's design and accompanying landscaping elements enhance the existing character of the Liloa Drive corridor. The proposed project incorporates the use of roundabouts and traffic-calming techniques, such as curved roadways and landscaping.**			
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 project was designed using Complete Streets principles to accommodate bicycles, automobiles, and pedestrians in a well-designed and safe configuration. The project promotes connectivity within the Kīhei community, and is considered supportive of the concept of a countywide network of bikeways and pedestrian paths. The proposed bike path would be separated from the roadway by a curb and landscaping.**			
Objective:			
(3) Improve opportunities for affordable, efficient, safe, and reliable air transportation.			✓
Policies:			
(a) Discourage private helicopter and fixed-wing landing sites to mitigate environmental and social impacts.			✓
(b) Encourage the use of quieter aircraft and noise-abatement procedures for arrivals and departures.			✓
(c) Encourage the modernization and maintenance of air-transportation facilities for general-aviation activities.			✓
(d) Encourage a viable and competitive atmosphere for air carriers to expand service and ensure sufficient intra-County flights and affordable fares for consumers.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **The proposed action does not have direct or indirect relationships to the objective of improving the affordability, efficiency, safety, and reliability of 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: **The objective of improving opportunities for affordable, efficient, safe, and reliable ocean transportation is not affected by the proposed action.**			
Objective:			
(5) Improve and expand the planning and management of transportation systems.	✓		
Policies:			
(a) Encourage progressive community design and development that will reduce transportation trips.		✓	
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.			✓
(c) Establish appropriate user fees for private enterprises that utilize public transportation facilities for recreational purposes.			✓
(d) Support the revision of roadway-design criteria and standards so that roads are compatible with surrounding neighborhoods and the character of rural areas.	✓		
(e) Plan for multi-modal transportation and utility corridors on each island.	✓		
(f) Support designing all transportation facilities, including airport, harbor, and mass-transit stations, to reflect Hawaiian architecture.			✓
(g) Utilize transportation-demand management as an integral part of transportation planning.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(h) Accommodate the planting of street trees and other appropriate landscaping in all public rights-of-way.	✓		
Analysis: **The design of the proposed action incorporates Complete Streets principles to accommodate bicycles, automobiles, and pedestrians in a way that supports transportation systems management. Landscaping will be an integral element of the streetscape, creating a character compatible with the surrounding neighborhood. The proposed project includes the development of a Shared Use Path for pedestrians and cyclists, making it a multi-modal transportation corridor.**			
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: **A component of the proposed project is the installation of a R-1 effluent reuse line which will expand the use of treated effluent from the Kīhei Wastewater Reclamation Facility toward the northern end of Kīhei. As such, the proposed project is directly applicable to the policies to promote the reclamation of gray water and enable the use of reclaimed water for activities that do not require potable water and to expand public control and ownership of water resources and delivery systems.**			
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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 proposed project includes the installation of the 12-inch effluent reuse line. As such, it is directly applicable to the policy to support alternative practices in recycling wastewater.**			
Objective:			
(3) Significantly increase the use of renewable and green technologies to promote energy efficiency and energy self-sufficiency.	✓		
Policies:			
(a) Promote the use of locally renewable energy sources, and reward energy efficiency.			✓
(b) Consider tax incentives and credits for the development of sustainable- and renewable-energy sources.			✓
(c) Expand education about energy conservation and self-sufficiency.			✓
(d) Encourage small-scale energy generation that utilizes wind, sun, water, biowaste, and other renewable sources of energy.			✓
(e) Expand renewable-energy production.			✓
(f) Develop public-private partnerships to ensure the use of renewable energy and increase energy efficiency.			✓
(g) Require the incorporation of locally appropriate energy-saving and green building design concepts in all new developments by providing energy efficient urban design guidelines and amendments to the Building Code.			✓
(h) Encourage the use of sustainable energy to power vehicles.			✓
(i) Promote the retrofitting of existing buildings and new development to incorporate energy-saving design concepts and devices.	✓		
(j) Encourage green footprint practices.		✓	
(k) Reduce Maui County's dependence on fossil fuels and energy imports.	✓		
(l) Support green building practices such as the construction of buildings that aim to minimize carbon dioxide production, produce renewable energy, and recycle water.			✓
(m) Promote and support environmentally friendly practices in all energy sectors.			✓
Implementing Actions:			
(a) Adopt an energy-efficiency policy for Maui County government as a model for other jurisdictions.			✓
(b) Adopt a Green Building Code, and support green building practices.			✓
Analysis: **The proposed pedestrian- and bicycle-friendly street reduces the County's dependency on fossil fuel and encourages green practices. As such, the proposed project is directly applicable to the policy to reduce Maui County's dependence on fossil fuels and energy imports. Additionally, since the proposed project was originally conceived, the Department of Public Works significantly revised its design to incorporate Complete Streets principles. Based on the foregoing, the proposed project is also directly applicable to the policy to promote the retrofitting of new development to incorporate energy-saving design concepts.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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 action provides improved roadway infrastructure which will indirectly support growth in the Urban Growth Boundary. The proposed action utilizes an existing roadway right-of-way to ensure the project is implemented in a cost-efficient manner.**			
Objective:			
(5) Improve the planning and management of infrastructure systems.	✓		
Policies:			
(a) Provide a reliable and sufficient level of funding to enhance and maintain infrastructure systems.			✓
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.			✓
(c) Improve coordination among infrastructure providers and planning agencies to minimize construction impacts.			✓
(d) Maintain inventories of infrastructure capacity, and project future infrastructure needs.		✓	
(e) Require social-justice and -equity issues to be considered during the infrastructure-planning process.			✓
(f) Discourage the development of critical infrastructure systems within hazard zones and the tsunami-inundation zone to the extent practical.			✓
(g) Ensure that infrastructure is built concurrent with or prior to development.			✓
(h) Ensure that basic infrastructure needs can be met during a disaster.	✓		
(i) Locate public facilities and emergency services in appropriate locations that support the health, safety, and welfare of each community and that minimize delivery inefficiencies.			✓
(j) Promote the undergrounding of utility and other distribution lines for health safety, and aesthetic reasons.			✓
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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **South Kīhei Road, one of only two (2) north-south roadways that span the length of Kīhei, has increasingly experienced closures due to weather/climate events. During these events, some roads, such as Nāmauʻu Place, are not accessible from South Kīhei Road, leaving residents there with limited ability to evacuate. The proposed action will provide alternative routes in and out of South Maui. As such, the proposed project is directly applicable to the policy to ensure that basic infrastructure needs can be met during a disaster.**			
J. PROMOTE SUSTAINABLE LAND USE AND GROWTH MANAGEMENT			
Goal: Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.		✓	
Objective:			
(1) Improve land use management and implement a directed-growth strategy.		✓	
Policies:			
(a) Establish, map, and enforce urban- and rural-growth limits.			✓
(b) Direct urban and rural growth to designated areas.			✓
(c) Limit the number of visitor-accommodation units and facilities in Community Plan Areas.			✓
(d) Maintain a sustainable balance between the resident, part-time resident, and visitor populations.			✓
(e) Encourage redevelopment and infill in existing communities on lands intended for urban use to protect productive farm land and open-space resources.		✓	
(f) Discourage new entitlements for residential, resort, or commercial development along the shoreline.			✓
(g) Restrict development in areas that are prone to natural hazards, disasters, or sea-level rise.			✓
(h) Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources.		✓	
(i) Establish and maintain permanent open space between communities to protect each community's identity.			✓
(j) Support the dedication of land for public uses.			✓
(k) Preserve the public's rights of access to and continuous lateral access along all shorelines.			✓
(l) Enable existing and future communities to be self-sufficient through sustainable land use planning and management practices.			✓
(m) Protect summits, slopes, and ridgelines from inappropriate development.			✓
Implementing Actions:			
(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: **While the proposed action does not directly support the goal for managed growth, indirectly it provides roadway capacity to accommodate growth within the Urban Growth Boundary of the region. The project represents an infill action that serves to improve service capacity in an existing community.**			
Objective:			
(2) Improve planning for and management of agricultural lands and rural areas.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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: **The proposed action does not directly or indirectly support the objective to plan and manage agricultural and rural lands. For example, the project does support or advance the protection of productive agricultural lands or provide opportunities and incentives for subsistence homesteads and farms.**			
Objective:			
(3) Design all developments to be in harmony with the environment and to protect each community's sense of place.	✓		
Policies:			
(a) Support and provide incentives for green building practices.			✓
(b) Encourage the incorporation of green building practices and technologies into all government facilities to the extent practicable.			✓
(c) Protect and enhance the unique architectural and landscape characteristics of each Community Plan Area, small town, and neighborhood.			✓
(d) Ensure that adequate recreational areas, open spaces, and public-gathering places are provided and maintained in all urban centers and neighborhoods.			✓
(e) Ensure business districts are distinctive, attractive, and pedestrian-friendly destinations.			✓
(f) Use trees and other forms of landscaping along rights-of-way and within parking lots to provide shade, beauty, urban-heat reduction, and separation of pedestrians from automobile traffic in accordance with community desires.	✓		
(g) Where appropriate, integrate public-transit, equestrian, pedestrian, and bicycle facilities, and public rights-of-way as design elements in new and existing communities.	✓		
(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.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **The proposed action utilizes Complete Streets design principles, incorporating a pedestrian- and bicycle-friendly Shared Use Path. As such, it is directly applicable to the policy to integrate these elements into existing communities and the policy to facilitate safe pedestrian access and create linkages between destinations. Additionally, the proposed project involves landscaping, which makes it directly applicable to the policy to use landscaping along rights-of-way to provide shade, beauty, and urban-heat reduction and to separate pedestrians from automobile traffic.**			
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.			✓
Analysis: **By engaging in the Chapter 343, Hawai'i Revised Statutes (HRS) and Special Management Area (SMA) processes, the Department of Public Works is ensuring that the proposed project demonstrates a community need, shows consistency with the General Plan, and provides an analysis of impacts. As well, the applicant has facilitated a community outreach program which fosters engagement with interested stakeholders, and which supports the project's analysis of impacts.**			
K. STRIVE FOR GOOD GOVERNANCE			
Goal: Government services will be transparent, effective, efficient, and responsive to the needs of residents.	✓		
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.	✓		

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(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: **South Kīhei Road, one of only two (2) north-south roadways that span the length of Kīhei, has increasingly experienced closures due to weather/climate events. During these events, some roads, such as Nāmauʻu Place, are not accessible from South Kīhei Road, leaving residents there with limited ability to evacuate. The proposed action will provide alternative routes in and out of South Maui. As such, the proposed project is directly applicable to the policy to plan and prepare for large-scale emergencies and contingencies.**			
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.		✓	
(g) Expand opportunities for all members of the public to participate in public meetings and forums.	✓		
(h) Facilitate the community's ability to obtain relevant documentation.		✓	
(i) Increase voter registration and turnout.			✓
Implementing Actions:			
(a) Implement two-way communication using audio-visual technology that allows residents to participate in the County's planning processes.			✓
(b) Ensure and expand the use of online notification of County business and public meetings, and ensure the posting of all County board and commission meeting minutes.			✓
(c) Explore funding mechanisms to improve participation by volunteers on boards and commissions.			✓
(d) Develop a project-review process that mandates early and ongoing consultation in and with communities affected by planning and land use activities.	✓		
Analysis: **The proposed action promotes civic engagement through the Chapter 343, HRS, Environmental Assessment (EA) and SMA processes. Public participation is promoted through the review processes for the Draft EA and SMA applications, as well as through the Urban Design Review Board and Maui Planning Commission proceedings. Additionally, the applicant has undertaken a community outreach process designed to inform nearby residents and the larger community of the proposed project. Collectively, the foregoing processes support community-based decision-making.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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: **Participation in the Chapter 343, HRS, and SMA processes advances the objective to promote efficiency, reliability and transparency in governmental decision-making. The concurrent processing of the EA and SMA applications for the project simplifies the permitting process. The project has been assessed in the context of the General Plan and advances transparency in the project planning process.**			
Objective:			
(4) Adequately fund in order to effectively administer, implement, and enforce the General Plan.	✓	✓	
Policies:			
(a) Adequately fund, staff, and support the timely update and implementation of planning policy, programs, functional plans, and enforcement activities.			✓
(b) Ensure that the County's General Plan process provides for efficient planning at the County, island, town, and neighborhood level.			✓
(c) Encourage ongoing professional development, education, and training of County employees.			✓
(d) Encourage competitive compensation packages for County employees to attract and retain County personnel.			✓
(e) Enable the County government to be more responsive in implementing our General Plan and Community Plans.		✓	
(f) Review discretionary permits for compliance with the Countywide Policy Plan.	✓		
(g) Strengthen the enforcement of County, State, and Federal land use laws.			✓
Implementing Actions:			
(a) Establish penalties to ensure compliance with County, State, and Federal land use laws.			✓
Analysis: **The proposed action has been assessed in the context of the General Plan and advances the County's transportation goal in the Community Plan to provide for the extension of the Liloa Drive. The project's SMA application, a discretionary permit process, will be reviewed in the context of the County General Plan.**			

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
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: **Studies prepared for the proposed action have been assessed in the context of applicable cultural and environmental policies and objectives. As well, construction specifications for the project will incorporate environmentally sound and culturally appropriate measures for the project's contractor.**			
L. MITIGATE CLIMATE CHANGE AND WORK TOWARD RESILIENCE			
Goal: Minimize the causes and negative effects of climate change.			✓
Objective:			
(1) Lower carbon emissions levels to mitigate climate change impacts and limit the rate of global warming.			✓
Policies:			
(a) Increase reforestation efforts by encouraging residents and visitors to plant non-invasive gardens and trees.			✓
(b) Improve communication, coordination, and collaboration among those that work to mitigate climate change impacts.			✓
(c) Promote the teaching and use of regenerative agriculture.			✓
(d) Invest in infrastructure that is not dependent on fossil fuels and utilizes renewable energy.			✓
(e) Improve efforts to mitigate and plan for the impact of natural disasters and global warming.	✓		
(f) Encourage the building industry to use environmentally sustainable materials, technology, and site planning.			✓
(g) Reduce air, noise, light, land, and water pollution, and reduce Maui County's contribution to global climate change.			✓
(h) Plan and prepare for and educate visitors and residents about the possible effects of global warming.			✓
(i) Promote programs and incentives that decrease greenhouse-gas emissions and improve environmental stewardship.			✓
(j) Support the development of carbon-emission standards and an incentive program aimed at achieving County carbon-emission goals.			✓
Implementing Actions:			
(a) Implement Federal and State policies that require a reduction of greenhouse-gas emissions.			✓
(b) Establish a Countywide Climate Action Plan			✓
(c) Develop programs that assist residents and businesses with obtaining access to renewable energy sources.			✓
(d) Revise laws to support neighborhood designs that incorporate the use of renewable energy sources that are appropriate for island living.			✓
(e) Incorporate planting of native and indigenous trees as a major component of Urban Design to both cool neighborhoods and reduce carbon dioxide.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
(f) Coordinate with State, County, and private landowners in the development of forestry and prioritizing of native and indigenous trees to reduce carbon dioxide.			✓
(g) Strongly support efforts to restore and improve Maui County's watersheds for the purpose of improving the water supply, controlling carbon dioxide levels, decreasing soil runoff, and reducing coastal flooding.			✓
Analysis: **Due to climate change, South Kīhei Road, one of only two (2) north-south roadways that span the length of Kīhei, has become increasingly prone to flooding and closures. As such, residents who rely on South Kīhei Road to enter and exit the area are becoming more and more vulnerable during disasters and emergencies. The proposed project will provide alternative routes into and out of Kīhei. Based on the foregoing, the proposed project is directly applicable to the policy to improve efforts to plan for the impact of natural disasters and global warming. It is noted that congestion relief does support free flowing vehicular traffic which in turn, reduces fuel consumption.**			
Objective:			
(2) Reduce the impacts of sea-level rise by acknowledging climate change, adapting, mitigating, and planning accordingly.			✓
Policies:			
(a) Evaluate development to assess potential short-term and long-term sea-level rise impacts on nearshore environments.			✓
(b) Improve efforts to mitigate and plan for the impact of sea-level rise.	✓		
(c) Protect undeveloped beaches, dunes, and ecosystems, and restore natural shoreline processes.			✓
(d) Develop an inventory of private wastewater systems (septic systems, cesspools) that may be affected by sea-level rise.			✓
(e) Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.			✓
(f) Educate the construction and landscape industries and property owners about the use of best management practices to prevent erosion and nonpoint source pollution.			✓
(g) Discourage beach hardening processes such as building sea walls and revetments that block movement of the shoreline and can accelerate erosion.			✓
(h) Discourage new entitlements for residential, resort, or commercial development along the shoreline.			✓
(i) Restrict development in areas that are prone to sea-level rise.			✓
(j) Move or rebuild public facilities away from nearshore environments to account for sea-level rise to the extent reasonable.	✓		
(k) Move or rebuild roads that are in sea-level rise inundation zones to the extent reasonable.	✓		
(l) Ensure that public or affordable housing projects include siting and design standards that promote equity and resilience for vulnerable populations.			✓
(m) Identify, research, and evaluate innovative and sustainable financing to support mitigation and adaptation to sea level rise.			✓
Implementing Actions:			
(a) Develop programs to help transition shoreline property owners out of their nearshore locations and develop a long-term plan to stay out of the way of natural beach migration.			✓
(b) Identify buildings, roads, and other infrastructure that are in sea-level rise inundation zones and assist in adaptive efforts, including nature-based solutions, elevation, or moving them away from such zones.	✓		
(c) Identify disaster redevelopment alternatives that support resilience-focused adaptation to sea level rise in the event of a catastrophic coastal event.			✓

COUNTYWIDE POLICY PLAN (Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable)	DA	IA	NA
Analysis: **Due to climate change, South Kīhei Road, one of only two (2) north-south roadways that span the length of Kīhei, has become increasingly prone to flooding and closures. As such, residents who rely on South Kīhei Road to enter and exit the area are becoming more and more vulnerable during disasters and emergencies. Additionally, portions of South Kīhei Road are located within the 3.2-foot Sea Level Rise Exposure Area. The proposed project will provide alternative routes into and out of Kīhei. Based on the foregoing, the proposed project is directly applicable to several policies and implementing actions related to sea-level rise.**			
Objective:			
(3) Significantly increase the use of renewable and green technologies to. promote energy efficiency and energy self-sufficiency.		✓	
Policies:			
(a) Promote the use of locally renewable energy sources, and reward energy efficiency.			✓
(b) Consider tax incentives and credits for the development of sustainable- and renewable-energy sources.			✓
(c) Expand education about energy conservation and self-sufficiency.			✓
(d) Encourage small-scale energy generation that utilizes wind, sun, water, biowaste, and other renewable sources of energy.			✓
(e) Expand renewable-energy production.			✓
(f) Develop public-private partnerships to ensure the use of renewable energy and increase energy efficiency.			✓
(g) Require the incorporation of locally appropriate energy-saving and green building design concepts in all new developments by providing energy-efficient urban design guidelines and amendments to the Building Code.			✓
(h) Encourage the use of sustainable energy to power vehicles.			✓
(i) Promote the retrofitting of existing buildings and new development to incorporate energy-saving design concepts anddevices.			✓
(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 proposed action indirectly relates to the use of green technologies to promote energy efficiency and energy self-sufficiency. An infrastructure element of the project is the inclusion of a R-1 effluent reuse line which will expand the use of treated effluent from the Kīhei Wastewater Reclamation Facility towards the northern section of Kīhei. This line is considered a green building practice that will support the safe and functional disposal of treated wastewater from the facility.**			

APPENDIX

L-3

MAUI ISLAND PLAN ASSESSMENT

APPENDIX "L-3"

Analysis of Project Applicability to 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*

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

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

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

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.

The methodology used for assessing a project's relationship to the MIP involves examining the project's applicability to the Plan's goals, objectives, and policies. "Applicability" refers to a project's need, purpose and effects, and how these advance or promote a particular set of goals, objectives and priority guidelines. In assessing the relationship between a proposed action and the MIP, an action may be categorized in one of the following groups:

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

   Example: Using a county project to develop a new water source and related transmission facilities as an example, a project of this nature would be directly applicable to the MIP's Objective 6.3.2, which states: *"Increase the efficiency and capacity of the water systems in striving to meet the needs and balance the island's water needs".* As well, this action would directly advance the MIP's Policy 6.3.2.f, which states: *"Acquire and develop additional sources of potable water".* The need, purpose and effects of the proposed new water source project is directly applicable to the foregoing objective and policy.

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

   Example: The county water source project cited above supports the MIP's Objective 7.3.2 which states: *"Facilitate more self-sufficient and sustainable communities".* Additionally, this kind of action is indirectly applicable to the related MIP Policy 7.3.2.f, which states: *"Facilitate the development of housing by focusing projects in locations where land and infrastructure costs facilitate the development of affordably-priced housing".* In this case, the principle purpose of the project was not to specifically facilitate the development of affordably-priced housing. However, the project's contribution to adequate infrastructure systems is supportive of the policy. In this instance, the proposed action may be deemed to be indirectly applicable to the objective and policy of the MIP.

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.

   Example: That same county water source improvement project referenced above, may not have direct or indirect linkage to the MIP's Objective 4.2.1, which states: *"Increase the economic contribution of the visitor industry to the island's environmental well-being for the island's residents' quality of life".* In this case, there is no reasonably deduced direct or indirect relationship between the proposed action and Objective 4.2.1. Hence, the proposed action would be considered not applicable to the objective.

In general, a proposed action's applicability to the MIP is assessed on the basis of the action's direct or indirect relationship to the respective objectives, policies and implementing actions. 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.

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
CHAPTER 1 – POPULATION			
Goal:			
1.1 Maui's people, values, and lifestyles thrive through strong, healthy, and vibrant island communities.			✓
Objective:			
1.1.1 Greater retention and return of island residents by providing viable work, education, and lifestyle options.			✓
Policies:			
1.1.1.a Expand programs that enable the community to meet the education, employment, housing, and social goals of youth and young adults.			✓
1.1.1.b Expand housing, transportation, employment, and social opportunities to ensure residents are able to comfortably age within their communities.			✓
1.1.1.c Measure and track resident satisfaction through surveys and community indicators.			✓
1.1.1.d Support funding for transportation, housing, health care, recreation, and social service programs that help those with special needs (including the elderly and disabled).			✓
Analysis: **Although the proposed Liloa Drive Extension project provides funding for transportation, such funding is not directly or indirectly related to providing services that are directed towards special needs or aging within communities. Additionally, the project does not affect parameters for education, housing, and social goals of youth and young adults.**			
CHAPTER 2 – HERITAGE RESOURCES			
CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES ISSUES			
Goal:			
2.1 Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.		✓	
Objective:			
2.1.1 An island culture and lifestyle that is healthy and vibrant as measured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section 7, Hawai'i State Constitution, and Section 7-1, Hawai`i Revised Statutes (HRS).		✓	
Policies:			
2.1.1.a Perpetuate the spirit of aloha and celebrate the host Hawaiian culture and other ethnic cultures.		✓	
2.1.1.b Perpetuate a respect for diversity and recognize the broad blending of cultures and ethnicities as vital to the quality of life on Maui.		✓	
2.1.1.c Ensure traditional public access routes, including native Hawaiian trails, are maintained for public use.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
Objective:			
2.2 A more effective and efficient planning and review process that incorporates the best available cultural resources inventory, protection techniques, and preservation strategies.		✓	
Policies:			
2.1.2.a Ensure that the island has a comprehensive and up-to-date inventory of historic and archaeological resources, and their cultural significance.		✓	
2.1.2.b Require the update of existing planning and regulatory mechanisms to protect the natural, cultural, scenic, and historic resources within designated Heritage Areas (see Cultural Resources Overlay/Scenic Corridor Protection Technical Reference Map).			✓
2.1.2.c Ensure that cultural, historic, and archaeological resources are protected for the benefit of present and future generations.		✓	
Objective:			
2.3 Enhance the island's historic, archaeological, and cultural resources.	✓		
Policies:			
2.1.3.a Identify and pursue a listing of the properties and sites on the State and National Register of Historic Places.			✓
2.1.3.b Support the use of easements, dedications, and other mechanisms to acquire, maintain, and protect lands with cultural, archaeological, and historic significance.			✓
2.1.3.c Support regulations to require developers, when appropriate, to prepare an Archaeological Inventory Survey, Cultural Impact Assessment, and Ethnographic Inventories that are reviewed and commented upon by the Office of Hawaiian Affairs, Native Hawaiian advisory bodies, the State Historic Preservation Division (SHPD), and the Office of Environmental Quality Control, and systematically comply with the steps listed in SHPD's administrative rules, including consultation and monitoring during construction phases of projects.	✓		
2.1.3.d Promote the rehabilitation and adaptive reuse of historic sites, buildings, and structures.			✓
2.1.3.e Encourage property owners to register historic and archaeological sites on the State and National Register.			✓
2.1.3.f Support opportunities for public involvement with the intent to facilitate the protection and restoration of historic and archeological sites, including consultation with stakeholders.	✓		
2.1.3.g Encourage the resolution of land title questions relating to Land Commission Awards and Royal patents.			✓
2.1.3.h Ensure compliance with historic preservation laws, and discourage demolition of properties that are determined to be eligible for listing on the National or State Register of Historic Places.	✓		
Analysis: **Additionally, the preparation of the archaeological Literature Review and Field Inspection Report supports the identification of archaeological resources affected by the proposed action. The HRS 6E process and the accompanying Literature Review and Field Inspection Report work ensures appropriate public involvement which advances the protection/documentation policies for historic resources in accordance with SHPD standards and criteria. Compliance with HRS 6E has been achieved.**			

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
SHORELINE, REEFS, AND NEARSHORE WATERS			
Goal:			
2.2 An intact, ecologically functional system of reef, shoreline, and nearshore waters that are protected in perpetuity.		✓	
Objective:			
2.2.1 A more comprehensive and community-based ICZM program.			✓
Policies:			
2.2.1.a Encourage a management system that protects and temporarily rests the reef ecosystems from overuse.			✓
2.2.1.b Support the establishment of additional MMAs and reef replenishment areas.			✓
2.2.1.c Work with appropriate agencies and community members to protect any special managed conservation areas from overuse and ensure that surrounding land uses do not contribute to the degradation of the natural resources, such as ʻAhihi-Kinaʻu Natural Area Reserve, Honolua-Mokulēʻia Bay Marine Life Conservation District, and Mākena State Park.			✓
2.2.1.d Incorporate the following into the MIP, where consistent with the MIP:			✓
(1) Beach Management Plan for Maui;			✓
(2) Coastal Nonpoint Pollution Control Program Management Plan;			✓
(3) Implementation Plan for Polluted Runoff Control; and			✓
(4) Ocean Resource Management Plan.			✓
2.2.1.e Support greater coordination among governmental agencies involved with the protection of the island's marine resources.			✓
Objective:			
2.2.2 Improved reef health, coastal water quality, and marine life.		✓	
Policies:			
2.2.2.a Create additional mechanisms where needed to contain and control runoff and pollution.		✓	
2.2.2.b Allow extraction of high quality, Class A, low silt sands only when they will be used to protect or restore Maui's shorelines and beaches.			✓
2.2.2.c Carefully manage beach nourishment activities to protect the coastal and marine ecosystem.			✓
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;			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
(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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
2.2.4.c Incorporate the *Shoreline Access Inventory Update - Final Report* (March 2005), and its regular updates, into this plan.			✓
2.2.4.d Identify access points while further acquiring key shoreline parcels and easement rights to enhance and protect beach access and shoreline recreation.			✓
Analysis: **The proposed action is located inland, approximately 2,000 feet from the shoreline. With this spatial separation, there are no direct project considerations as they relate 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 Best Management Practices 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 ahupua'a 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 ahupua'a management practices.			✓
2.3.1.e Work with private and non-profit entities to educate the public about the connection between upland activities within the watershed and the impacts on nearshore ecosystems and coral reefs.			✓
2.3.1.f Provide adequate funding and staff to develop and implement watershed protection plans and policies, including acquisition and management of watershed resources and land.			✓
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.		✓	

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
2.3.2.b Support the use of LID Techniques such as those described in the State of Hawai'i LID Practitioner's Guide (June 2006), as amended.			✓
2.3.2.c Encourage farmers and ranchers to use agricultural BMPs to address NPS pollution.			✓
Objective:			
2.3.3 Preserve existing wetlands and improve and restore degraded wetlands.			✓
Policies:			
2.3.3.a Prohibit the destruction and degradation of existing upland, mid-elevation, and coastal wetlands.			✓
2.3.3.b Support and fund wetland protection and improvement, and restoration of degraded wetlands.			✓
2.3.3.c Where applicable, require developers to provide a wetland protection buffer and/or other protective measures around and between development and wetland resources.			✓
Objective:			
2.3.4 Greater preservation of native flora and fauna biodiversity to protect native species.			✓
Policies:			
2.3.4.a Work with appropriate agencies to eliminate feral ungulate populations and invasive species.			✓
2.3.4.b Encourage the State to provide adequate funding to preserve biodiversity, protect native species, and contain or eliminate invasive species.			✓
2.3.4.c Support the work of conservation groups and organizations that protect, reestablish, manage, and nurture sensitive ecological areas and threatened indigenous ecosystems.			✓
Objective:			
2.3.5 Limited development in critical watershed areas.			✓
Policies:			
2.3.5.a Discourage development and subdivision of land within critical watersheds and in areas susceptible to high erosion and sediment loss.			✓
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 ahupua'a.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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 lo'i, and maintain adequate flows for the production of healthy kalo crops.			✓
Analysis: **Both the Waipu'ilani Gulch and the Kūlanihāko'i Gulch are classified as "ephermeral gulches", which flow only during times of heavy rainfall. Nonetheless, gulch stabilization work such as the placement of Grouted Rubble Pavement (GRP) will involve ground disturbance below the Ordinary High Water Mark for these gulches. As such, BMPs will be utilized to ensure that there are no adverse downstream water quality effects. The engineered placement of GRP will help to stabilize the natural bed of the gulches. The proposed action will not affect management regimes for watersheds and streams, wetlands, and watershed development parameters.**			
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
Analysis: **The assessment of the proposed action included a Biological Resources Survey addressing flora and fauna in the project area. This assessment addresses the objective of identification, protection and restoration of wildlife habitats.**			
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, 'Īao Valley, the Mauna Kahalawai (West Maui Mountains), Pu'u Ō'la'i, Kaho'olawe, Molokini, Moloka'i, and Lāna'i, Mauna Kea, Mauna Loa, sea stacks, the Pacific Ocean, and significant water features, ridgelines, and landforms.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
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: **Aside from the bridge crossings at Kūlanihāko'i and Waipu'ilani Gulches and new poles for street and pedestrian lighting, there are no vertical structures proposed. Scenic vistas, access points and lookout points are not affected by the proposed action.**			
CHAPTER 3 – NATURAL HAZARDS			
Goal:			
3.1 Maui will be disaster resilient.	✓		

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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.			✓
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.			✓

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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 proposed Liloa Drive Extension project enhances automobile circulation and connectivity by completing a long-planned segment of roadway infrastructure in Kīhei. The proposed project provides for a more efficient evacuation routing program through circulation redundancy. The project does not directly or indirectly affect inter-agency coordination, life and property protection and public education as it relates to natural hazards.**			
CHAPTER 4 – ECONOMIC DEVELOPMENT			
ECONOMIC DIVERSIFICATION			
Goal:			
4.1 Maui will have a balanced economy composed of a variety of industries that offer employment opportunities and well-paying jobs and a business environment that is sensitive to resident needs and the island's unique natural and cultural resources.		✓	
Objective:			
4.1.1 A more diversified economy.			✓
Policies:			
4.1.1.a Encourage an economy that is driven by innovation, research and development, and human resource development, including but not limited to, increasing technology- and knowledge-based sectors to be a major component in Maui County's economic base.			✓
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.			✓

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Policies:			
4.1.3.a Upgrade, maintain the quality of, and improve access to telecommunications infrastructure.			✓
4.1.3.b Ensure an adequate supply of affordable workforce housing.			✓
4.1.3.c Develop neighborhoods and communities that are attractive to the workforce of a diversified economy.			✓
4.1.3.d Encourage, nurture, and reward entrepreneurship and innovation.			✓
4.1.3.e Encourage employers to establish incentive programs. Support flexibility in workforce policies compatible with business and quality of life goals.			✓
4.1.3.f Assist community development organizations with revitalization and development of neighborhoods and communities that are attractive to the workforce of a diversified economy.			✓
Analysis: **The proposed action does not directly promote the goal for economic diversification. Indirectly, however, the proposed action will support local businesses that are linked to the construction industry. Such businesses may include materials suppliers, equipment rental companies and specialty construction companies. From a long-term perspective, the proposed action is not anticipated to affect economic diversification and the overall business environment.**			
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 kama'āina discount programs.			✓
Objective:			
4.2.2 Comprehensively manage future visitor-unit expansion.			✓

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Policies:			
4.2.2.a Mitigate the impact of tourism on the host culture, natural environment, and resident lifestyles.			✓
4.2.2.b Allow, where permitted by the community plan, the development of business hotels and small, sensitively-designed inns.			✓
4.2.2.c Manage impacts from transient vacation rentals, hotels, bed and breakfast units, timeshares, and resort condominiums on residential communities, public infrastructure, and community facilities.			✓
4.2.2.d Discourage supplanting of existing island housing to visitor accommodations that may have a negative impact on long-term rental housing, price of housing, and price of land.			✓
4.2.2.e Allow the designation of retreat/mini-conference centers in appropriate locations through the community plan process.			✓
4.2.2.f Community plans should consider establishing standards such as limits on building size, room count, and the number of inns, if any, that will be allowed in small towns.			✓
Objective:			
4.2.3 Maximize residents' benefits from the visitor industry.			✓
Policies:			
4.2.3.a Promote a desirable island population by striving to not exceed an island-wide visitor population of roughly 33 percent of the resident population.			✓
4.2.3.b Use the required General Plan Annual Status Report to monitor trends related to residents and visitors.			✓
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.			✓

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Objective:			
4.3.2 Maintain or increase agriculture's share of the total island economy.			✓
Policies:			
4.3.2.a Encourage the export of the island's agricultural products to offshore markets.			✓
4.3.2.b Support infrastructure investments at harbors, such as ferry service, airports, and other facilities for the rapid and cost-effective export of island-grown products.			✓
4.3.2.c Encourage the continued viability of sugar cane production, or other agricultural crops, in central Maui and all of Maui Island.			✓
4.3.2.d Work with the State to reduce excise taxes for commercial agricultural products produced within the State.			✓
4.3.2.e Coordinate with appropriate State and Federal Departments and agencies, private shipping companies, and farmers associations to assist in the rapid and cost-effective export of Maui's agricultural products to off-island markets.			✓
Objective:			
4.3.3 Expand diversified agriculture production at an average annual rate of 4 percent.			✓
Policies:			
4.3.3.a Promote the development of locally-grown and ecologically-sound biofuels, aquaculture, and forest products.			✓
4.3.3.b Support the development of farming associations/cooperatives.			✓
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.**			
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.			✓

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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.			✓
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.			✓

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Analysis: **The proposed construction of the Liloa Drive Extension project will involve a range of businesses in the construction industry. These may include small businesses involved, for example, in signage, landscaping, materials sales, and equipment rental. While the proposed project does not directly advance the goal for small businesses, it does indirectly benefit small businesses.**			
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 is directly applicable to the policy to improve access to emergency care in all communities. The proposed project will create redundancy in Kīhei's transportation network. Many of the roadways in Kīhei are projected to operate at LOS F by the year 2040 without the proposed project, which could increase the amount of time it would take those experiencing a medical emergency to reach a care facility. The increased redundancy created by the proposed project would help to alleviate the stress placed on Kīhei's aging transportation network and increase mobility for those experiencing medical emergencies.**			
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.			✓

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4.7.2.b Encourage the State to expand accredited 2-year, 4-year, and graduate programs through the UHMC.			✓
4.7.2.c Encourage the education and training of our residents to meet the needs of a diversified economy.			✓
4.7.2.d Support education and training programs such as student internships, vocational training, and career development opportunities to ensure a highly skilled workforce			✓
4.7.2.e Work with educational institutions to improve and expand access to education and training through multiple modes, including distance learning.			✓
Objective:			
4.7.3 Strive to ensure that more of Maui's jobs are developed in STEM-related sectors by 2030.			✓
Policies:			
4.7.3.a Support the development of STEM-related certificates and degrees at the two- and four year levels.			✓
4.7.3.b Support the education initiatives of the Maui Agricultural Development Plan.			✓
4.7.3.c Expand and seek funding for internships, mentoring, job shadowing, etc. to foster interest in health and green workforce careers.			✓
4.7.3.d Work with MEDB, UHMC, and other similar organizations to expand internship/education programs to support STEM careers.			✓
4.7.3.e Continue to partner with the MEDB and other similar organizations to recruit, assist, and retain emerging industries, research and development activities, and educational/workforce opportunities.			✓
Analysis: **The goal for education and workforce development is not directly or indirectly affected by 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 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.			✓

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5.1.1.d Provide incentives for the rehabilitation or adaptive reuse of historic structures to facilitate more housing choices.			✓
5.1.1.e Use planning and regulatory approaches to provide higher housing densities.			✓
Objective:			
5.1.2 Better monitoring, evaluation, and refinement of affordable housing policy in conjunction with the economic cycle.			✓
Policies:			
5.1.2.a Improve data on resident and nonresident housing.			✓
5.1.2.b Utilize the following approaches to promote resident housing and to minimize offshore market impacts:			✓
(1) Ensure that the future housing stock is composed of a mix of housing types (multifamily, small lots, ohana units, co-housing, cottage houses, etc.);			✓
(2) Encourage new housing in proximity to jobs and services, in places that are conducive/affordable to island residents; and			✓
(3) Explore taxation alternatives and building fee structures.			✓
Objective:			
5.1.3 Provide affordable housing, rental or in fee, to the broad spectrum of our island community.			✓
Policies:			
5.1.3.a Consider regulations that can help keep affordable housing available at affordable rents.			✓
5.1.3.b Seek to have ownership of affordable for-sale and rental housing vested in a non-profit community land trust, or other qualified housing provider, committed to keeping such housing affordable in perpetuity.			✓
5.1.3.c Facilitate the use of public lands in urban areas that are suitable for affordable housing.			✓
5.1.3.d Develop or support partnerships and initiatives that provide housing-related education/outreach.			✓
5.1.3.e Support the continuing efforts of the County and its community partners to:			✓
(1) Disseminate information on different housing/financial assistance programs (loans, grants, etc.) including information on housing rehabilitation/restoration/adaptive reuse;			✓
(2) Provide housing-related counseling including budget, credit, and financial planning assistance; and			✓
(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 will include a Shared Use Path, utilizing a large portion of the ROW to provide transportation infrastructure for those who wish or need to walk, cycle, or use other forms of transportation that are not permitted within the roadway. By providing for a range of transportation options, the proposed project directly applies to the policy to promote livable communities.**			

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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: **Project specifications will provide that construction-related solid waste from the project (i.e., discarded reinforcing steel and concrete scraps, grubbed vegetation, etc.) be recycled, composted or disposed of at an approved construction waste disposal site. While these diversion measures are not directly advancing the goal, objectives, and policies for solid waste, they do indirectly carry out the broader intent of this policy set. The proposed action does not directly affect the objective and policies relating to the 60 percent solid waste reduction threshold.**			
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.	✓		

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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 goal for wastewater is directly affected by the proposed action. The project includes the installation of a wastewater reuse line which supports effluent reuse.**			
WATER			
Goal:			
6.3 Maui will have an environmentally sustainable, reliable, safe, and efficient water system.			✓

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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.			
Analysis: **The proposed project includes the installation of a wastewater reuse line to treat effluent to R-1 quality, so that it can be recycled for landscaping and other non-potable uses. As such, the proposed project is directly applicable to the policy to maximize the efficient use of reclaimed wastewater to serve non-potable needs.**			

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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.			✓
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.			✓

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6.4.3.c Design all transit systems to respect visual corridors and Maui's character.	✓		
Analysis: **The proposed Liloa Drive Extension project provides new connectivity for the Kīhei regional roadway system, thereby reducing congestion on local roadways. The project's design incorporates Complete Streets principles to accommodate bicycles, automobiles and pedestrians in a well-designed and safe configuration.**			
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.			✓
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.			✓

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6.5.2.c Coordinate with appropriate Federal, State, and County agencies to fund transportation projects in areas where growth is anticipated.			✓
Analysis: **While the proposed Liloa Drive Extension project represents a roadway infrastructure project, it 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 ahupua'a 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 lo'i 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 'Āhihi-Kīna'u and La Perouse-Keone'ō'io Bay to Kanaloa Point region.			✓
Objective:			
6.6.2 Achieve parks and recreation opportunities to meet the diverse needs of our community.			✓
Policies:			
6.6.2.a Establish appropriate level-of-service standards at the neighborhood, community, and regional levels.			✓
6.6.2.b Identify and acquire parks and recreational facilities that address existing park inadequacies and complement and enhance neighborhoods, communities, and natural land features.			✓
6.6.2.c Design park facilities to preserve and enhance natural site characteristics, maximize views, protect environmental and cultural sites, and minimize water demands.			✓

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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: **The proposed project includes the construction of a Shared Use Path, which will facilitate pedestrian and bicycle access within a portion of the community. As such, the proposed project is directly applicable to the objective related to an expanded network of greenways, trails, pathways, and bikeways. From a long-term perspective, the improvements provided by the project form a foundation for future improvements which may ultimately form a broader network for accessibility to recreational areas.**			
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.			✓

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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 a direct or indirect relationship to the goal for public facilities. In this context, the project does not advance or promote the objective of more effective planning for public facilities that meet community needs.**			
SCHOOLS AND LIBRARIES			
Goal:			
6.8 Maui will have school and library facilities that meet residents' needs and goals.		✓	
Objective:			
6.8.1 Assist in providing appropriate school and library facilities in a timely manner and in strategic locations.			✓
Policies:			
6.8.1.a Work in partnership with all educational institutions to meet current and future needs including appropriate location, timing, and design of future facilities.			✓
6.8.1.b Allow for the expansion and intensification of uses at the UHMC including satellite campuses operating in remote areas.			✓
6.8.1.c Encourage the DOE to build and maintain smaller, community-oriented schools.			✓
6.8.1.d Encourage better cooperation by the State and County for use of State and County facilities.			✓

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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: **The proposed action does not directly or indirectly affect the objective of providing schools and libraries in a timely manner in strategic locations. However, indirectly, the proposed action does support the objective of providing pedestrian and bicycle friendly streets that may be incorporated in a "Safe Routes to School" initiative.**			
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.			✓

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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.			✓
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.			✓

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Analysis: **The proposed action does not have a direct or indirect relationship to the goal for healthcare. In this context, the project does not advance or promote the objectives related to greater healthcare system autonomy, increased long-term care capacity and alternatives, support for home care and community based programs, and improved 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.			✓
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.			✓

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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 proposed action does not have a direct or indirect relationship to the goal for energy. In this context, the project does not address fossil fuel consumption and renewable energy utilization thresholds, nor does it address power distribution efficiency parameters.**			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
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 is not applicable to the proposed project. In particular, the project does not advance or promote the upgrading of harbor and airport facilities, nor does it establish 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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
7.1.3.b Discourage land use and urban design that impedes interconnectivity between adjacent communities.		✓	
Analysis: **While the proposed action does not directly relate to the goal for agriculture, as a roadway extension project, it does indirectly facilitate greater community connectivity. However, in itself the project does not affect the inventory of productive agricultural lands and does not affect the island's dependency on off-island products.**			
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
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 does not directly or indirectly affect the goal for the island's rural landscape or lifestyle. In the context of its existing surrounding land use character, the proposed action does not affect residential development patterns and does not address service and infrastructure standards for the island's rural character and natural systems.**			
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 Waihe'e; Pukalani and Makawao; Pukalani and Kula; Makawao and Hāli'imaile; Lahaina and Kā'anapali; Kīhei and Mā'alaea; and Mā'alaea 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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.		✓	
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable	DA	IA	N/A
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.			✓
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 Kā'anapali. "Large Scale Resort" is defined as complexes that include multiple accommodation facilities, activity businesses, retail complexes, and other amenities.			✓
Objective:			
7.3.5 Ensure that Maui's planning and development review process becomes more transparent, efficient, and innovative.		✓	
Policies:			
7.3.5.a Encourage greater community involvement in land use planning and decision making.		✓	
7.3.5.b Establish a predictable and timely development review process that facilitates the approval of projects that meet planning and regulatory requirements.			✓
7.3.5.c Increase inter-agency coordination between the Department of Planning and all State and County agencies responsible for infrastructure and public facilities provision, particularly as it relates to the mitigation of long-term cumulative impacts resulting from development projects.			✓
7.3.5.d Provide greater certainty and transparency in the development review process.		✓	
7.3.5.e Expand and maintain land use and geographic information system databases for improved decisions, and make data and products available to the public.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable		DA	IA	N/A
Analysis: **Located within the Urban Growth Boundary, the proposed action facilitates interconnectivity within the Kīhei community. Additionally, by engaging in the Chapter 343, HRS and Special Management Area processes, the project advances transparency in the project planning process. As well, the applicant has facilitated a community outreach program which fosters engagement with interested stakeholders.**				
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable		DA	IA	N/A
Analysis: **As a roadway infrastructure project within the Urban Growth Boundary, the proposed action is in accordance with the policy for focusing capital projects within the Urban Growth Boundary.**				
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.			✓
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.			✓

Maui Island Plan Goals, Objectives and Policies Key: DA = Directly Applicable, IA = Indirectly Applicable, NA = Not Applicable		DA	IA	N/A
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 action is not applicable to the goal of maintaining opportunities for agricultural and rural communities.**				
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 within protected areas as delineated within Diagrams E-1, NW-1, N-1, S-1, SE-1, and WC-1.**				

DEPARTMENT OF ARMY NATIONWIDE PERMIT

APPENDIX M-1

Kūlanihākoʻi Gulch

(Department of the Army File No. POH-2023-00046)

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
230 OTAKE STREET
FORT SHAFTER, HAWAII 96858-5440

March 24, 2023

SUBJECT: Nationwide Permit Verification for County of Maui, Kulanihako'i Gulch Bridge Construction and Improvements, Kulanihako'i Gulch, Kihei, Island of Maui, HI Department of the Army File No. POH-2023-00046

Jordan Molina
County of Maui, Department of Public Works
200 South High Street, 4th Floor
Wailuku, HI 96793

Dear Mr. Molina,

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Office has completed review of your Pre-Construction Notification dated February 2, 2023 requesting authorization for the proposed Kulanihako'i Gulch Bridge Construction and Improvements located in Kihei, Island of Maui, Hawaii at 20.76414º, -156.45227º. Please reference Department of the Army (DA) file number POH-2023-00046 in any future correspondence related to this permit.

This letter verifies your activity complies with the terms and conditions of Nationwide Permit (NWP) No. 14, (Linear Transportation) issued on February 25, 2022. This NWP verification letter is being issued pursuant to Section 404 of the Clean Water Act for the discharge of dredged and/or fill material into waters of the U.S. You are authorized to conduct the following work below the Ordinary High Water Mark (OHWM) of Kulanihako'i Gulch as described below and as depicted on the enclosed drawings (Enclosure 1):

- Vegetation removal, including trees and their roots within the 0.494-acre project area
- The temporary discharge of 500 cubic yards of sandbags and filter berms for erosion and stormwater control best management practices
- Grading of the 0.494-acre project area along 448.5 linear feet of Kulanihako'i Gulch
- The permanent discharge of 22.4 cubic yards of fill consisting of grassed turf reinforcement mats (TRM) geotextiles, grouted rubble paving (GRP), and concrete slabs

Based upon the information and plans you provided, we hereby verify that the work described above, which would be performed in accordance with the project plans (Enclosure 1), is authorized by Nationwide Permit (NWP) No. 14, (Linear

Transportation). NWP No. 14 and its associated Regional and General Conditions can be accessed at: www.poh.usace.army.mil/Missions/Regulatory/Permits. You must comply with all terms and conditions associated with NWP No. 14, as well as with the special conditions listed below:

a. Removal of trees or vegetation taller than 15 feet should not be performed from June 1 to September 15 to minimize impacts to Hawaiian Hoary Bats or Blackburn's Sphinx Moths.

Verification of your project under this NWP is valid until **March 14, 2026** unless this NWP is modified, reissued, or revoked prior to that date. It is incumbent upon you to remain informed of changes to the NWPs. If the Corps modifies, reissues, or revokes any NWP at an earlier date, we will issue a public notice announcing the changes. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of the Clean Water Act and subsequent enforcement action. This authorization does not relieve you of the responsibility to obtain any other federal, state, and/or local authorizations required by law.

Your project complies with the requirements of the Clean Water Act, Section 401 Blanket Water Quality Certification (WQC) WQC1092 issued for this Nationwide Permit by the State of Hawaii Department of Health, Clean Water Branch. You are responsible for complying with the attached General Conditions of this WQC (Enclosure 2).

Your project complies with the requirements of the Coastal Zone Management Consistency Concurrence for this Nationwide Permit issued by the State of Hawaii Department of Business, Economic Development and Tourism, Office of Planning; during the Nationwide Permit reissuance process in 2021.

Finally, General Condition #30 requires a signed certification be submitted to this office upon completion of work. Therefore, please sign, date, and return the enclosed *Compliance Certification* form (Enclosure 3) within 30 days of completion of work to the email address specified below or to the mailing address indicated on the letterhead above.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions related to this authorization, please contact Jeremy Morgan at (808) 835-4308 or via e-mail at Jeremy.K.Morgan@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District

Regulatory Office by accessing our web-based customer survey form at https://regulatory.ops.usace.army.mil/customer-service-survey/.

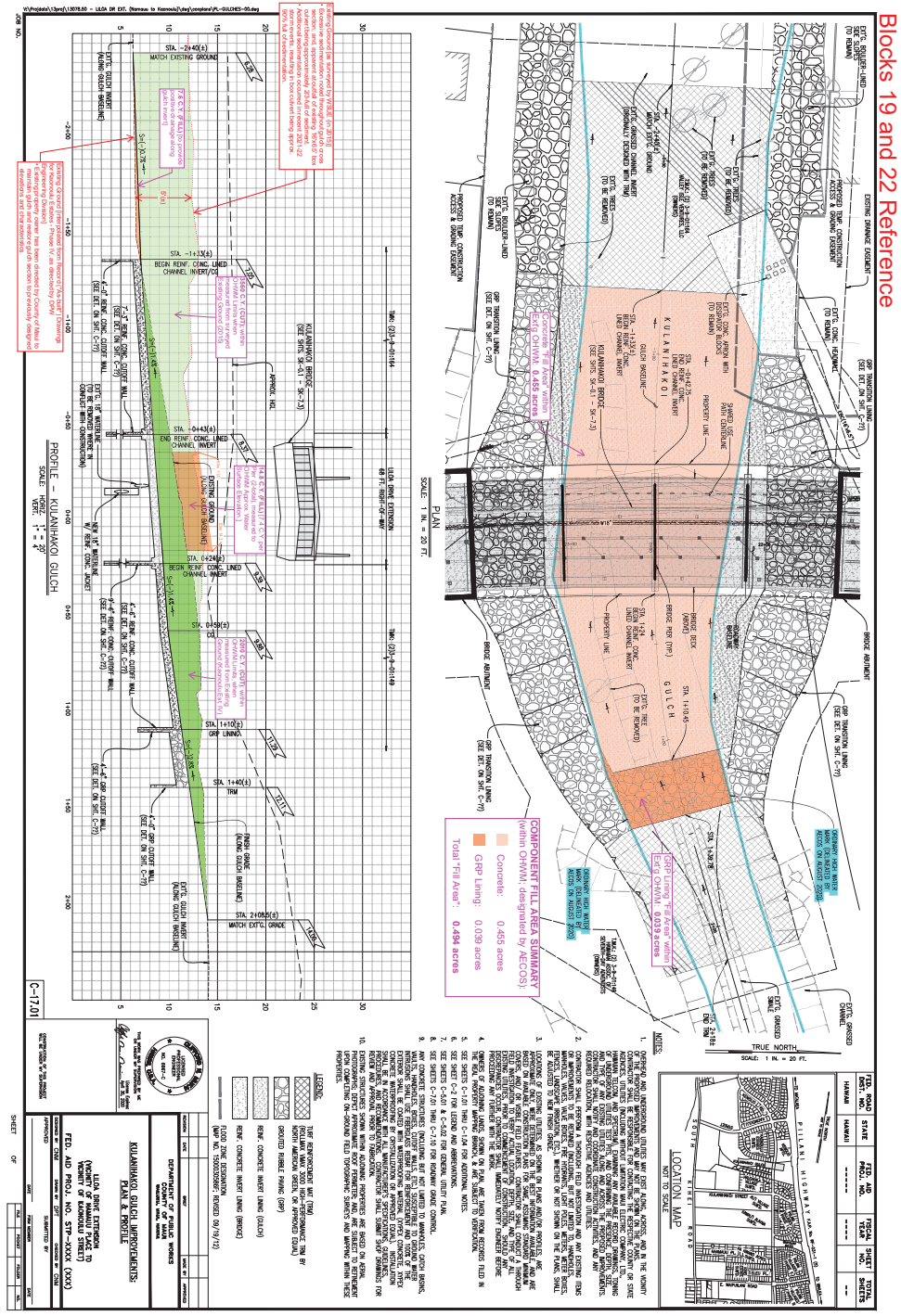
Sincerely,

Jeremy Morgan
Regulatory Specialist, Regulatory Branch

Enclosures

Electronic cc:
State of Hawaii Department of Health, Clean Water Branch
Darryl C Lum darryl.lum@doh.hawaii.gov
CleanWaterBranch@doh.hawaii.gov
State of Hawaii Office of Planning, Coastal Zone Management Program
Debra.L.Mendes@hawaii.gov
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Blocks 19 and 22 Reference



DAVID Y. IGE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
File:

WQC1092.FNL.22

April 28, 2022

David S. Hobbie
Regional Regulatory Chief
Honolulu District
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Hobbie:

Subject: Blanket Section 401 Water Quality Certification (WQC) for Certain 2021 Department of the Army (DA) Nationwide Permits (NWP) and Activities
File No. WQC1092

Purpose. This letter is a blanket Section 401 WQC (Blanket Certification) and sets forth applicable qualifications and activity-specific conditions to certain NWPs and activities, as described below. This Blanket Certification may be utilized by any applicant that is seeking authorization and/or verification from the U.S. Army Corps of Engineers (USACE), Honolulu District of the Pacific Ocean Division (POH) for work in Waters of the United States.

This Blanket Certification supersedes and replaces previous WQC0901.FNL.20 issued in May and November of 2020 (WQC0901). The following shall apply:

1. Requirements and conditions set forth in WQC0901 which are not set forth in this Blanket Certification shall no longer be applicable;
2. Activities covered under WQC0901 shall be subject to this Blanket Certification, including requirements and conditions different from or in addition to WQC0901;
3. Pending applications, including those currently under review by USACE or the Department of Health (DOH), shall be subject to this Blanket Certification.

Note: A previous version of this Blanket Certification was public noticed on September 23 and 24, 2020, for the proposed 2020 NWPs. Since the aforementioned public notices, the NWPs were reissued and modified in 2021, the federal Section 401 WQC regulations were revised, and the State Section 401 WQC rules were revised. This Blanket Certification incorporates these revisions.

Overview. The DA has published a list of NWPs and applicable general conditions that attach to those NWPs.[1] Certain NWPs may require a Section 401 WQC from the State of Hawaii. The DOH has the authority to issue a Blanket Certification and may qualify or condition the Blanket Certification. The conditions in this Blanket Certification become additional conditions to the NWPs. The qualifications would set forth the applicability of the Blanket Certification to a NWP or other described activity.

The DOH reviewed the NWP and General Conditions published in the Federal Register: Final Rules and the additional comments submitted by USACE POH. DOH believes that when all requirements and conditions contained in this Blanket Certification are fully complied with, there is a reasonable assurance that the activities will be conducted in a manner which will not violate the applicable State water quality standards and will comply with the applicable provisions of the CWA, Sections 301, 302, 303, 306, and 307.

The NWPs and activities in Item 2.a below do not require a Section 401 WQC. The NWPs and activities in Item 2.b below are covered under this Blanket Certification. The DOH has determined that projects authorized by the USACE POH for the NWPs and activities in Item 2.b below, subject to the requirements of the General Conditions in Item 3 below, will not cause adverse environmental impacts or effects; are in the public interest; and represent the optimum balance between economic development and environmental quality.

1. Term of this Blanket Certification

   a. This Blanket Certification becomes effective with respect to a specific project on **April 28, 2022.**

   b. This Blanket Certification will expire at midnight, **March 14, 2026**.

   c. This Blanket Certification's coverage is administratively extended to a certain project beyond midnight, March 14, 2026, when the USACE POH extends the project authorization/verification.

2. Coverage of this Blanket Certification

   a. The NWPs and activities listed below do not require a Section 401 WQC.

      - NWP 1 – Aids to Navigation
      - NWP 8 – Oil and Gas Structures on the Outer Continental Shelf

[1] The DA NWP authorizes activities under 1) Section 404 of the Clean Water Act (CWA), 2) Section 10 of the Rivers and Harbors Act of 1899 (RHA), and/or 3) a Letter of Permission. The NWPs were published on September 15, 2020, in the Federal Register, Volume 85, Number 179 and December 27. 2021, Volume 86, Number 245 (Federal Register).

- Projects in response to a public emergency proclaimed by the President of the United States or Governor of Hawaii where HRS Chapter 342D has been suspended
- Any emergency project as determined by the Director of Health
- Projects granted an exemption under Act 048 of 2017 (temporary exemption of certain bridge rehabilitation projects)
- Activities exempt under CWA, Section 404(f)(1)
- Directional drilling under a waterbody where entry and exit pits are located on land and all slurry/spoils/runoff is contained on land
- Structures over a waterbody where debris and other pollutants associated with the installation, construction, and operation do not enter the waterbody
- Installation of temporary Best Management Practices (BMPs) with inert material in State waters, excluding material used to divert or dam stream flow
- Comprehensive Environmental Response, Compensation, and Liability Act actions with oversight from DOH Hazard Evaluation and Emergency Response (HEER) Office and/or EPA
- DOH HEER response actions
- Bridge inspections
- Improvements or modifications to Department of Land and Natural Resources, Division of Boating and Ocean Recreation permitted existing offshore moorings installed prior to October 4, 2017
- Coral transplant with National Oceanic and Atmospheric Administration oversight
- Fireworks where visible debris is collected after event
- Lanterns and rubber duckies collected after event
- Ashes from funeral ceremonies 3 miles away from shore
- After-The-Fact applications for USACE POH enforcement actions[2]

b. The NWPs and activities listed below are hereby granted coverage under this Blanket Certification in the State of Hawaii if the applicant of the activity/discharge complies with the General Conditions (Item No. 3) and USACE POH provides notification (Item No. 4). Any person, including any public body, conducting activities authorized by these NWPs and activities that cannot or will not comply with this Blanket Certification must apply for and obtain an individual Section 401 WQC from DOH Clean Water Branch (CWB).

- NWP 2 – Structures in Artificial Canals
- NWP 3 – Maintenance

[2] DOH has decided not to process After-The-Fact applications so the USACE POH can proceed with their enforcement action.

- NWP 4 – Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
- NWP 5 – Scientific Measurement Devices
- NWP 6 – Survey Activities
- NWP 7 – Outfall Structures and Associated Intake Structures
- NWP 9 – Structures in Fleeting and Anchorage Areas
- NWP 10 – Mooring Buoys
- NWP 11 – Temporary Recreational Structures
- NWP 12 – Oil or Natural Gas Pipeline Activities
- NWP 13 – Bank Stabilization
- NWP 14 – Linear Transportation Projects
- NWP 15 – U.S. Coast Guard Approved Bridges
- NWP 16 – Return Water from Upland Contained Disposal Areas
- NWP 17 – Hydropower Projects
- NWP 18 – Minor Discharge
- NWP 19 – Minor Dredging
- NWP 20 – Response Operations for Oil or Hazardous Substances
- NWP 22 – Removal of Vessels
- NWP 23 – Approved Categorical Exclusions
- NWP 25 – Structural Discharges
- NWP 27 – Aquatic Habitat Restoration, Establishment, and Enhancement Activities
- NWP 28 – Modifications of Existing Marinas
- NWP 29 – Residential Developments
- NWP 31 – Maintenance of Existing Flood Control Facilities
- NWP 32 – Completed Enforcement Actions
- NWP 33 – Temporary Construction, Access and Dewatering
- NWP 35 – Maintenance Dredging of Existing Basins
- NWP 36 – Boat Ramps
- NWP 37 – Emergency Watershed Protection and Rehabilitation
- NWP 38 – Cleanup of Hazardous and Toxic Waste
- NWP 39 – Commercial and Institutional Developments
- NWP 40 – Agricultural Activities
- NWP 41 – Reshaping Existing Drainage Ditches
- NWP 42 – Recreational Facilities
- NWP 43 – Stormwater Management Facilities
- NWP 45 – Repair of Uplands Damaged By Discrete Events
- NWP 46 – Discharges in Ditches
- NWP 48 – Commercial Shellfish Mariculture Activities
- NWP 51 – Land-Based Renewable Energy Generation Facilities
- NWP 53 – Removal of Low-Head Dams
- NWP 54 – Living Shorelines

- NWP 55 – Seaweed Mariculture Activities
- NWP 56 – Finfish Mariculture Activities
- NWP 57 – Electric Utility Line and Telecommunications Activities
- NWP 58 – Utility Line Activities to Water and Other Substances
- NWP 59 – Water Reclamation and Reuse Facilities
- Letters of Permission – Section 10 only activities with no discharge of fill material
- Any activity conducted in compliance with DOH pre-approved Standard Operating Procedures

c. Limitations on Coverage

This Blanket Certification shall not cover:

(1) Discharge(s) regulated under CWA, Section 402.
(2) Any project that may result in downstream/downdrift post construction impacts to the physical, chemical, and/or biological environment.
(3) Concrete lining any section of natural streambed or bank.[3]
(4) Projects involving the removal of dams, impoundments, structures, or sand bars that will result in the downstream/downdrift mobilization of material, sediment, and/or water pollutants.
(5) Waste Discharges to natural lakes and anchialine pools as specified in HAR 11-54 or any State waters.
"Waste" means sewage, industrial and agricultural matter, and all other liquid, gaseous, or solid substance, including radioactive substance, whether treated or not, which may pollute or tend to pollute the waters of this State. Hawaii Revised Statutes (HRS) §342D-1.
Non-contaminated and suitable dredge and fill material authorized under a 2021 NWP is not considered waste.
(6) New sewage discharges and new industrial discharges to estuaries as specified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.
(7) New sewage and industrial discharges to Embayments: Class AA and Class A as identified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.

[3] This type of activity is prohibited as it will result in adverse post construction impacts by eliminating ground water recharge, raising pH, and lowering dissolved oxygen or causing downstream bank erosion.

3. General Conditions

The applicant of the activity/discharge shall:

a. Report any non-compliance with the conditions of this Blanket Certification to the USACE POH. Do not report or submit compliance related information to DOH. This Blanket Certification is a condition of the USACE POH permit.[4]

b. Maintain records at the project site or in the nearby field office demonstrating that all Blanket Certification requirements have been fully complied with.

c. Ensure that all activities are conducted in a manner that will comply with the "Basic Water Quality Criteria Applicable to All Waters" as specified in HAR 11-54.

d. Ensure that all material(s) placed or to be placed in State waters are free of waste metal products, organic materials, debris, and any pollutants at toxic or potentially hazardous concentrations to aquatic life as specified in HAR 11-54.

e. Ensure that the activities will not permanently interfere with or become injurious to any designated uses and/or existing uses of the receiving State water. Any permanent adverse impacts to the designated uses and/or existing uses of the receiving State water is a violation of HAR Chapter 11-54.

f. Ensure that pollution control measures and BMPs are utilized that prevent water pollutants from leaving the in-water work area authorized by the USACE POH permit.[5] Any visual plume emanating from the authorized in-water work area is a violation of HAR Chapter 11-54.

g. Ensure that all construction debris from any portion of the activities (including but not limited to debris caused by hydraulic saws, water jets, or drilling equipment) are contained and prevented from entering or re-entering State waters. All construction debris and sidecast material shall be properly removed from the aquatic environment and disposed of at an upland State and county approved site. Before the start of the activities, a Solid Waste Disclosure Form for Construction Sites shall be completed and returned to the DOH's Solid and Hazardous Waste Branch,

[4] With respect to USACE projects granted coverage under Item 2.c above, non-compliance reports from USACE POH should be submitted to DOH CWB.
[5] With respect to USACE projects granted coverage under Item 2.c above, the relevant in-water work area is identified in the USACE project.

Office of Solid Waste Management. No construction material or construction related materials shall be stockpiled in the aquatic environment or stored or placed in ways that will disturb the aquatic environment. The Solid Waste Disclosure Form for Construction Sites is available online at:
https://health.hawaii.gov/shwb/files/2018/04/swdiscformapr2018.pdf.

h. Utilize only BMPs that are inert and not sources of pollution themselves. Examples of inappropriate in-water porous material BMPs include but are not limited to: compost biosocks since they are a source of nutrients; and a soil berm since the soil particles will erode.

i. Collect activity/discharge related water pollutants utilizing appropriate catchment/detention devices (e.g. construction debris, airborne particulates, dust, concrete slurry, concrete chips, concrete surface preparation washing effluent, excess water and overflow from boring related activity, horizontal directional drilling slurry, etc.) from localized work areas and minimize or prevent the release of these water pollutants into State waters, including the in-water work area.

j. Utilize BMPs for all upland project activity to minimize the discharge of water pollutants into State waters, including the designated in-water work area.

k. For a stream, ditch, or gulch: Allow unimpeded flow around the in-water work area to allow for aquatic animal migration and/or to prevent work site and downstream flooding situations. The unimpeded flow shall be equivalent to a 2-year, 24-hour duration storm event and/or the existing flow capacity of the stream, ditch, or gulch. Pumped diversions may be utilized if the stream, ditch, or gulch is dry or there is only standing/ponded water without the existence of living aquatic animals.

l. Not discharge any type of wash water and/or effluent into State waters without first obtaining from DOH a National Pollutant Discharge Elimination System (NPDES) permit authorizing such type of water pollutant discharge to State waters.

m. Not allow any concrete truck wash water to be disposed by percolation into the ground.

n. Ensure that all areas temporarily impacted, either directly or indirectly, by the project construction activities are fully restored to its pre-construction conditions. For example: Incidental construction debris is cleaned up prior to removal of BMPs; remove all scientific measurement devices and any other structures or fills associated with installation and use of these

devices (e.g., foundations, anchors, buoys, lines, etc.) when no longer in use; etc.

o. When projects involve dredging/excavation activities:

(1) Be required to check the DOH, HEER Office Sites, Incidents and Records through the "Viewer" in iHEER at: https://eha-cloud.doh.hawaii.gov/iheer.[6]
(2) Be required to contact the HEER Office at (808) 586-4249 and through e-permitting Form "Notification of Construction Activities" at Form Finder https://eha-cloud.doh.hawaii.gov/epermit/finder if contaminated soil, sediment, vapor, or groundwater is known to be present at your project site. The applicant shall notify the HEER Office at least 90 days prior to surface and subsurface disturbing activities that may disturb the ground surface at HEER sites. If the 90-days prior notification is missed, the applicant shall notify the HEER Office as soon as possible to avoid any potential delays regarding the covered project.
(3) Contain return flow or runoff from upland dredged spoils dewatering site(s)/disposal site(s), including the confined disposal facility (CDF), which shall be contained on land and not allowed to discharge and/or re-enter any State waters without first obtaining the required discharge permit from USACE POH or CWB. Unless authorized by a USACE POH or NPDES permit, the applicant shall not allow any runoff, return flow, or airborne particulate pollutants from the excavated or dredged material dewatering or stockpiling site, including the CDF, to enter or re-enter State waters.
(4) Properly deploy warning signs, which shall be maintained until the portion of the in-water work is completed and the affected area water quality has returned to its preconstruction condition and turbidity control devices have been removed from the waterway.

p. When projects involve moorings:

(1) Avoid locating moorings (including anchors and floats) in sensitive aquatic habitats such as coral reefs, fish spawning areas, and submerged aquatic vegetation (unless location is acceptable to the Department of Land and Natural Resources, Division of Aquatic Resources or the National Oceanic Atmospheric Administration);
(2) Ensure moorings (including anchors and floats) are made of clean, inert material. Treated lumber shall not be used as it may contain

[6] The HEER Office is currently updating site information for sites. Most, but not all, sites may be displayed on the viewer map. Site Document data upload is ongoing and not all documents may be currently available via this website. To get the complete record for the site, a record request form can be filled and submitted it to the HEER Office. Users will then be notified when they are able to download all information via the iHEER system website.

compounds that can be released into the water and become toxic to the aquatic environment;

(3) Pre-cast and cure concrete anchors, if required, away from State waters prior to use to prevent seepage of potentially toxic substances into the waterbody;

(4) Locate moorings in depths that allow structures and vessels to remain afloat at the lowest possible water levels and that prevent propellers from disturbing bottom sediments;

(5) Select mooring anchors of an adequate size to secure vessels or structures and prevent the anchor from shifting or dragging along the bottom of the State water;

(6) Size the length of mooring lines, chains, or cables to avoid excess line, chain, or cable accumulation on the bed of the State water;

(7) Ensure native beach material such as logs, sand, gravel, and boulders that are important components of fish habitat are not used as mooring structures and are left in place on the foreshore;

(8) Properly dispose of derelict or unused floats, lines, chains, or cables in accordance with appropriate laws and rules; and

(9) Ensure moorings are kept in good repair by regularly inspecting and maintaining the structure. Mooring maintenance must be performed into perpetuity (or until it is properly disposed of) or it will itself become a pollution source.

4. USACE POH shall e-mail to CWB (cleanwaterbranch@doh.hawaii.gov and darryl.lum@doh.hawaii.gov) a pdf copy of all issued final verifications. This Blanket Certification coverage shall become valid with respect to an activity only when USACE POH notifies CWB via email of a project authorization/verification and conditions of this Blanket Certification have been incorporated as part of the USCE POH final verification; provided, that this email notification requirement shall not apply to activities that do not require a pre-construction notification, and this Blanket Certification shall automatically become valid with respect to such activities.

If you agree with the terms and conditions of this Blanket Certification, please sign and date below; make a copy for your administrative record; and submit this entire letter with your original signature to CWB within 14 calendar days from your signature date.

If you have any questions, please contact Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

for

ELIZABETH A. CHAR, M.D.
Director of Health

c: Regulatory Office, POH, COE [via e-mails linda.speerstra@usace.army.mil only]
Ms. Debra Mendes, CZM Program, Office of Planning, DBEDT
[via e-mail debra.l.mendes@hawaii.gov only]
U.S. Fish and Wildlife Service [via e-mail pifwo_admin@fws.gov only]
U.S. National Marine Fisheries Service [via e-mail pirohonolulu@noaa.gov only]
Division of Aquatic Resources, DLNR [via e-mail dlnr.aquatics@hawaii.gov only]
CWRM, DLNR [via e-mail dlnr.cwrm@hawaii.gov only]
OCCL, DLNR [via e-mail dlnr.occl@hawaii.gov only]
DHO (Hawaii, Maui, Kauai) and EHS, Molokai/Lanai [via e-mail only]

I AGREE WITH THE TERMS AND CONDITIONS OF THIS LETTER:

_____

David S. Hobbie DATE
Regional Regulatory Chief
Honolulu District

US Army Corps of Engineers
Honolulu District
BUILDING STRONG®

DEPARTMENT OF THE ARMY PERMIT

COMPLIANCE CERTIFICATION

File Number: POH-2023-00046
Project Title: Kulanihako'i Gulch Bridge Construction and Improvements

PERMIT TYPE: Nationwide Permit #14, (Linear Transportation)

NAME OF PERMITTEE: Mr. Jordan Molina, County of Maui, Department of Public Works, 200 South High Street, 4th Floor, Wailuku, HI 96793

DATE OF ISSUANCE: March 24, 2023

DATE OF EXPIRATION: March 14, 2026

The permittee must, upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address or via email within thirty (30) days of completion of work:

U.S. Army Corps of Engineers, Honolulu District
Regulatory Office
Building 230, CEPOH-RO
Fort Shafter, HI 96858-5440
Email: CEPOH-RO@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of this permit, you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____
Signature of Permittee Date

ENCLOSURE 3

Waipu‘ilani Gulch

(Department of the Army File No. POH-2023-00048)

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
230 OTAKE STREET
FORT SHAFTER, HAWAII 96858-5440

March 24, 2023

SUBJECT: Nationwide Permit Verification for County of Maui, Waipu'ilani Gulch Bridge Construction and Improvements, Waipuilani Gulch, Kihei, Island of Maui, HI
Department of the Army File No. POH-2023-00048

Jordan Molina
County of Maui, Department of Public Works
200 South High Street, 4th Floor
Wailuku, HI 96793

Dear Mr. Molina,

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Office has completed review of your Pre-Construction Notification dated February 2, 2023 requesting authorization for the proposed Waipu'ilani Gulch Bridge Construction and Improvements located in Kihei, Island of Maui, Hawaii at 20.75868º, -156.45133º. Please reference Department of the Army (DA) file number POH-2023-00048 in any future correspondence related to this permit.

This letter verifies your activity complies with the terms and conditions of Nationwide Permit (NWP) No. 14, (Linear Transportation) issued on February 25, 2022. This NWP verification letter is being issued pursuant to Section 404 of the Clean Water Act for the discharge of dredged and/or fill material into waters of the U.S. You are authorized to conduct the following work below the ordinary high water mark (OHWM) of the Waipu'ilani Gulch as described below and as depicted on the enclosed drawings (Enclosure 1):

- Vegetation removal, including trees and their roots, within the 0.416-acre project area
- The temporary discharge of 450 cubic yards of sandbags and filter berms for erosion and stormwater control best management practices
- Grading of the 0.416-acre project area along 427 linear feet of Waipu'ilani Gulch
- The permanent discharge of 105.3 cubic yards of fill material consisting of grassed turf reinforcement mats (TRM) geotextiles, grouted rubble paving (GRP), and concrete slabs

Based upon the information and plans you provided, we hereby verify that the work described above, which would be performed in accordance with the project plans (Enclosure 1), is authorized by Nationwide Permit (NWP) No. 14, (Linear Transportation). NWP No. 14 and its associated Regional and General Conditions can

be accessed at: www.poh.usace.army.mil/Missions/Regulatory/Permits. You must comply with all terms and conditions associated with NWP No. 14, as well as with the special conditions listed below:

a. Removal of trees or vegetation taller than 15 feet should not be performed from June 1 to September 15 to minimize impacts to Hawaiian Hoary Bats and Blackburn's Sphinx Moths.

Verification of your project under this NWP is valid until **March 14, 2026** unless this NWP is modified, reissued, or revoked prior to that date. It is incumbent upon you to remain informed of changes to the NWPs. If the Corps modifies, reissues, or revokes any NWP at an earlier date, we will issue a public notice announcing the changes. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of the Clean Water Act and subsequent enforcement action. This authorization does not relieve you of the responsibility to obtain any other federal, state, and/or local authorizations required by law.

Your project complies with the requirements of the Clean Water Act, Section 401 Blanket Water Quality Certification (WQC) WQC1092 issued for this Nationwide Permit by the State of Hawaii Department of Health, Clean Water Branch. You are responsible for complying with the attached General Conditions of this WQC (Enclosure 2).

Your project complies with the requirements of the Coastal Zone Management Consistency Concurrence for this Nationwide Permit issued by the State of Hawaii Department of Business, Economic Development and Tourism, Office of Planning; during the Nationwide Permit reissuance process in 2021.

Finally, General Condition #30 requires a signed certification be submitted to this office upon completion of work. Therefore, please sign, date, and return the enclosed *Compliance Certification* form (Enclosure 3) within 30 days of completion of work to the email address specified below or to the mailing address indicated on the letterhead above.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should you have any questions related to this authorization, please contact Jeremy Morgan at (808) 835-4308 or via e-mail at Jeremy.K.Morgan@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District

Regulatory Office by accessing our web-based customer survey form at https://regulatory.ops.usace.army.mil/customer-service-survey/.

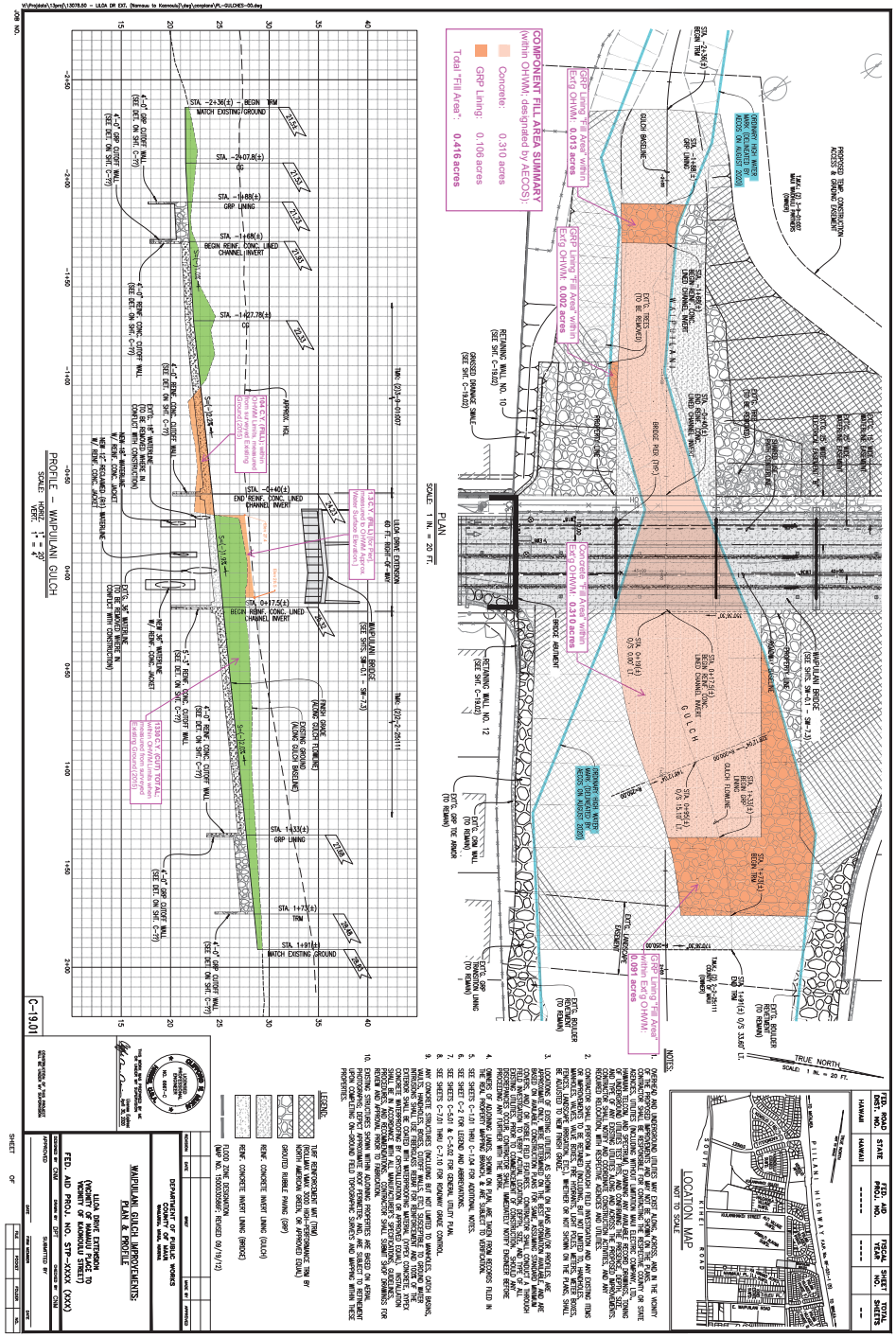
Sincerely,

Jeremy Morgan
Regulatory Specialist, Regulatory Branch

Enclosures

Electronic cc:
State of Hawaii Department of Health, Clean Water Branch
Darryl C Lum darryl.lum@doh.hawaii.gov
CleanWaterBranch@doh.hawaii.gov
State of Hawaii Office of Planning, Coastal Zone Management Program
Debra.L.Mendes@hawaii.gov
Kari Nunokawa, Munekiyo Hiraga kari@munekiyohiraga.com

Blocks 19 and 22 Reference



DAVID Y. IGE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
File:

WQC1092.FNL.22

April 28, 2022

David S. Hobbie
Regional Regulatory Chief
Honolulu District
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Hobbie:

Subject: Blanket Section 401 Water Quality Certification (WQC) for Certain 2021 Department of the Army (DA) Nationwide Permits (NWP) and Activities
File No. WQC1092

Purpose. This letter is a blanket Section 401 WQC (Blanket Certification) and sets forth applicable qualifications and activity-specific conditions to certain NWPs and activities, as described below. This Blanket Certification may be utilized by any applicant that is seeking authorization and/or verification from the U.S. Army Corps of Engineers (USACE), Honolulu District of the Pacific Ocean Division (POH) for work in Waters of the United States.

This Blanket Certification supersedes and replaces previous WQC0901.FNL.20 issued in May and November of 2020 (WQC0901). The following shall apply:

1. Requirements and conditions set forth in WQC0901 which are not set forth in this Blanket Certification shall no longer be applicable;
2. Activities covered under WQC0901 shall be subject to this Blanket Certification, including requirements and conditions different from or in addition to WQC0901;
3. Pending applications, including those currently under review by USACE or the Department of Health (DOH), shall be subject to this Blanket Certification.

Note: A previous version of this Blanket Certification was public noticed on September 23 and 24, 2020, for the proposed 2020 NWPs. Since the aforementioned public notices, the NWPs were reissued and modified in 2021, the federal Section 401 WQC regulations were revised, and the State Section 401 WQC rules were revised. This Blanket Certification incorporates these revisions.

Overview. The DA has published a list of NWPs and applicable general conditions that attach to those NWPs.[1] Certain NWPs may require a Section 401 WQC from the State of Hawaii. The DOH has the authority to issue a Blanket Certification and may qualify or condition the Blanket Certification. The conditions in this Blanket Certification become additional conditions to the NWPs. The qualifications would set forth the applicability of the Blanket Certification to a NWP or other described activity.

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   a. This Blanket Certification becomes effective with respect to a specific project on **April 28, 2022.**

   b. This Blanket Certification will expire at midnight, **March 14, 2026**.

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   a. The NWPs and activities listed below do not require a Section 401 WQC.

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[1] The DA NWP authorizes activities under 1) Section 404 of the Clean Water Act (CWA), 2) Section 10 of the Rivers and Harbors Act of 1899 (RHA), and/or 3) a Letter of Permission. The NWPs were published on September 15, 2020, in the Federal Register, Volume 85, Number 179 and December 27. 2021, Volume 86, Number 245 (Federal Register).

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[2] DOH has decided not to process After-The-Fact applications so the USACE POH can proceed with their enforcement action.

- NWP 4 – Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
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- Letters of Permission – Section 10 only activities with no discharge of fill material
- Any activity conducted in compliance with DOH pre-approved Standard Operating Procedures

c. Limitations on Coverage

This Blanket Certification shall not cover:

(1) Discharge(s) regulated under CWA, Section 402.
(2) Any project that may result in downstream/downdrift post construction impacts to the physical, chemical, and/or biological environment.
(3) Concrete lining any section of natural streambed or bank.[3]
(4) Projects involving the removal of dams, impoundments, structures, or sand bars that will result in the downstream/downdrift mobilization of material, sediment, and/or water pollutants.
(5) Waste Discharges to natural lakes and anchialine pools as specified in HAR 11-54 or any State waters.
"Waste" means sewage, industrial and agricultural matter, and all other liquid, gaseous, or solid substance, including radioactive substance, whether treated or not, which may pollute or tend to pollute the waters of this State. Hawaii Revised Statutes (HRS) §342D-1.
Non-contaminated and suitable dredge and fill material authorized under a 2021 NWP is not considered waste.
(6) New sewage discharges and new industrial discharges to estuaries as specified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.
(7) New sewage and industrial discharges to Embayments: Class AA and Class A as identified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.

[3] This type of activity is prohibited as it will result in adverse post construction impacts by eliminating ground water recharge, raising pH, and lowering dissolved oxygen or causing downstream bank erosion.

3. General Conditions

The applicant of the activity/discharge shall:

a. Report any non-compliance with the conditions of this Blanket Certification to the USACE POH. Do not report or submit compliance related information to DOH. This Blanket Certification is a condition of the USACE POH permit.[4]

b. Maintain records at the project site or in the nearby field office demonstrating that all Blanket Certification requirements have been fully complied with.

c. Ensure that all activities are conducted in a manner that will comply with the "Basic Water Quality Criteria Applicable to All Waters" as specified in HAR 11-54.

d. Ensure that all material(s) placed or to be placed in State waters are free of waste metal products, organic materials, debris, and any pollutants at toxic or potentially hazardous concentrations to aquatic life as specified in HAR 11-54.

e. Ensure that the activities will not permanently interfere with or become injurious to any designated uses and/or existing uses of the receiving State water. Any permanent adverse impacts to the designated uses and/or existing uses of the receiving State water is a violation of HAR Chapter 11-54.

f. Ensure that pollution control measures and BMPs are utilized that prevent water pollutants from leaving the in-water work area authorized by the USACE POH permit.[5] Any visual plume emanating from the authorized in-water work area is a violation of HAR Chapter 11-54.

g. Ensure that all construction debris from any portion of the activities (including but not limited to debris caused by hydraulic saws, water jets, or drilling equipment) are contained and prevented from entering or re-entering State waters. All construction debris and sidecast material shall be properly removed from the aquatic environment and disposed of at an upland State and county approved site. Before the start of the activities, a Solid Waste Disclosure Form for Construction Sites shall be completed and returned to the DOH's Solid and Hazardous Waste Branch,

[4] With respect to USACE projects granted coverage under Item 2.c above, non-compliance reports from USACE POH should be submitted to DOH CWB.
[5] With respect to USACE projects granted coverage under Item 2.c above, the relevant in-water work area is identified in the USACE project.

Office of Solid Waste Management. No construction material or construction related materials shall be stockpiled in the aquatic environment or stored or placed in ways that will disturb the aquatic environment. The Solid Waste Disclosure Form for Construction Sites is available online at:
https://health.hawaii.gov/shwb/files/2018/04/swdiscformapr2018.pdf.

h. Utilize only BMPs that are inert and not sources of pollution themselves. Examples of inappropriate in-water porous material BMPs include but are not limited to: compost biosocks since they are a source of nutrients; and a soil berm since the soil particles will erode.

i. Collect activity/discharge related water pollutants utilizing appropriate catchment/detention devices (e.g. construction debris, airborne particulates, dust, concrete slurry, concrete chips, concrete surface preparation washing effluent, excess water and overflow from boring related activity, horizontal directional drilling slurry, etc.) from localized work areas and minimize or prevent the release of these water pollutants into State waters, including the in-water work area.

j. Utilize BMPs for all upland project activity to minimize the discharge of water pollutants into State waters, including the designated in-water work area.

k. For a stream, ditch, or gulch: Allow unimpeded flow around the in-water work area to allow for aquatic animal migration and/or to prevent work site and downstream flooding situations. The unimpeded flow shall be equivalent to a 2-year, 24-hour duration storm event and/or the existing flow capacity of the stream, ditch, or gulch. Pumped diversions may be utilized if the stream, ditch, or gulch is dry or there is only standing/ponded water without the existence of living aquatic animals.

l. Not discharge any type of wash water and/or effluent into State waters without first obtaining from DOH a National Pollutant Discharge Elimination System (NPDES) permit authorizing such type of water pollutant discharge to State waters.

m. Not allow any concrete truck wash water to be disposed by percolation into the ground.

n. Ensure that all areas temporarily impacted, either directly or indirectly, by the project construction activities are fully restored to its pre-construction conditions. For example: Incidental construction debris is cleaned up prior to removal of BMPs; remove all scientific measurement devices and any other structures or fills associated with installation and use of these

devices (e.g., foundations, anchors, buoys, lines, etc.) when no longer in use; etc.

o. When projects involve dredging/excavation activities:

(1) Be required to check the DOH, HEER Office Sites, Incidents and Records through the "Viewer" in iHEER at: https://eha-cloud.doh.hawaii.gov/iheer.[6]
(2) Be required to contact the HEER Office at (808) 586-4249 and through e-permitting Form "Notification of Construction Activities" at Form Finder https://eha-cloud.doh.hawaii.gov/epermit/finder if contaminated soil, sediment, vapor, or groundwater is known to be present at your project site. The applicant shall notify the HEER Office at least 90 days prior to surface and subsurface disturbing activities that may disturb the ground surface at HEER sites. If the 90-days prior notification is missed, the applicant shall notify the HEER Office as soon as possible to avoid any potential delays regarding the covered project.
(3) Contain return flow or runoff from upland dredged spoils dewatering site(s)/disposal site(s), including the confined disposal facility (CDF), which shall be contained on land and not allowed to discharge and/or re-enter any State waters without first obtaining the required discharge permit from USACE POH or CWB. Unless authorized by a USACE POH or NPDES permit, the applicant shall not allow any runoff, return flow, or airborne particulate pollutants from the excavated or dredged material dewatering or stockpiling site, including the CDF, to enter or re-enter State waters.
(4) Properly deploy warning signs, which shall be maintained until the portion of the in-water work is completed and the affected area water quality has returned to its preconstruction condition and turbidity control devices have been removed from the waterway.

p. When projects involve moorings:

(1) Avoid locating moorings (including anchors and floats) in sensitive aquatic habitats such as coral reefs, fish spawning areas, and submerged aquatic vegetation (unless location is acceptable to the Department of Land and Natural Resources, Division of Aquatic Resources or the National Oceanic Atmospheric Administration);
(2) Ensure moorings (including anchors and floats) are made of clean, inert material. Treated lumber shall not be used as it may contain

[6] The HEER Office is currently updating site information for sites. Most, but not all, sites may be displayed on the viewer map. Site Document data upload is ongoing and not all documents may be currently available via this website. To get the complete record for the site, a record request form can be filled and submitted it to the HEER Office. Users will then be notified when they are able to download all information via the iHEER system website.

compounds that can be released into the water and become toxic to the aquatic environment;

(3) Pre-cast and cure concrete anchors, if required, away from State waters prior to use to prevent seepage of potentially toxic substances into the waterbody;

(4) Locate moorings in depths that allow structures and vessels to remain afloat at the lowest possible water levels and that prevent propellers from disturbing bottom sediments;

(5) Select mooring anchors of an adequate size to secure vessels or structures and prevent the anchor from shifting or dragging along the bottom of the State water;

(6) Size the length of mooring lines, chains, or cables to avoid excess line, chain, or cable accumulation on the bed of the State water;

(7) Ensure native beach material such as logs, sand, gravel, and boulders that are important components of fish habitat are not used as mooring structures and are left in place on the foreshore;

(8) Properly dispose of derelict or unused floats, lines, chains, or cables in accordance with appropriate laws and rules; and

(9) Ensure moorings are kept in good repair by regularly inspecting and maintaining the structure. Mooring maintenance must be performed into perpetuity (or until it is properly disposed of) or it will itself become a pollution source.

4. USACE POH shall e-mail to CWB (cleanwaterbranch@doh.hawaii.gov and darryl.lum@doh.hawaii.gov) a pdf copy of all issued final verifications. This Blanket Certification coverage shall become valid with respect to an activity only when USACE POH notifies CWB via email of a project authorization/verification and conditions of this Blanket Certification have been incorporated as part of the USCE POH final verification; provided, that this email notification requirement shall not apply to activities that do not require a pre-construction notification, and this Blanket Certification shall automatically become valid with respect to such activities.

If you agree with the terms and conditions of this Blanket Certification, please sign and date below; make a copy for your administrative record; and submit this entire letter with your original signature to CWB within 14 calendar days from your signature date.

If you have any questions, please contact Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

for

ELIZABETH A. CHAR, M.D.
Director of Health

c: Regulatory Office, POH, COE [via e-mails linda.speerstra@usace.army.mil only]
Ms. Debra Mendes, CZM Program, Office of Planning, DBEDT
[via e-mail debra.l.mendes@hawaii.gov only]
U.S. Fish and Wildlife Service [via e-mail pifwo_admin@fws.gov only]
U.S. National Marine Fisheries Service [via e-mail pirohonolulu@noaa.gov only]
Division of Aquatic Resources, DLNR [via e-mail dlnr.aquatics@hawaii.gov only]
CWRM, DLNR [via e-mail dlnr.cwrm@hawaii.gov only]
OCCL, DLNR [via e-mail dlnr.occl@hawaii.gov only]
DHO (Hawaii, Maui, Kauai) and EHS, Molokai/Lanai [via e-mail only]

I AGREE WITH THE TERMS AND CONDITIONS OF THIS LETTER:

_____

David S. Hobbie DATE
Regional Regulatory Chief
Honolulu District

US Army Corps of Engineers
Honolulu District
BUILDING STRONG®

DEPARTMENT OF THE ARMY PERMIT

COMPLIANCE CERTIFICATION

File Number: POH-2023-00048
Project Title: Waipu'ilani Gulch Bridge Construction and Improvements

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PERMIT TYPE: Nationwide Permit #14, (Linear Transportation)

NAME OF PERMITTEE: Mr. Jordan Molina, County of Maui, Department of Public Works, 200 South High Street, 4th Floor, Wailuku, HI 96793

DATE OF ISSUANCE: March 24, 2023

DATE OF EXPIRATION: March 14, 2026

The permittee must, upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address or via email within thirty (30) days of completion of work:

U.S. Army Corps of Engineers, Honolulu District
Regulatory Office
Building 230, CEPOH-RO
Fort Shafter, HI 96858-5440
Email: CEPOH-RO@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of this permit, you are subject to permit suspension, modification or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____
Signature of Permittee Date

ENCLOSURE 3

Un-Named Drainageway

(Department of the Army File No. POH-2023-00047)

Subject: FW: POH-2023-00047 Unnamed Drainage Way Bridge Construction and Improvements

From: Morgan, Jeremy K CIV USARMY CEPOH (USA) <Jeremy.K.Morgan@usace.army.mil>
Sent: Tuesday, February 14, 2023 11:02 AM
To: jordan.k.molina@co.maui.hi.us
Cc: Kari Luna Nunokawa <kari@munekiyohiraga.com>; General eMail <planning@munekiyohiraga.com>
Subject: POH-2023-00047 Unnamed Drainage Way Bridge Construction and Improvements

Aloha Mr. Molina,

Thank you for reaching out to us regarding the proposed Liloa Drive Extension Project. Each drainage way/gulch crossing location has been assigned it's own project number. This email will refer to the Unnamed Drainage Way Crossing Location. (I will contact you about the other locations shortly.) The location that crosses the Unnamed Drainage Way has been assigned Department of the Army (DA) project number POH-2023-00047. Please refer to this project number for future inquiries regarding this project.

Based on the information you have provided, the proposed project would have no effect to ESA-listed species and critical habitat, no potential to cause effect to historic properties under Section 106 of the National Historic Preservation Act and would meet the terms and conditions of a non-reporting Nationwide Permit (NWP) 14. Therefore, the proposed project would be a non-reporting NWP 14, provided that the project complies with NWP general and regional conditions, which can be found on the Corps website at https://www.poh.usace.army.mil/Missions/Regulatory/Permits/Nationwide-Permits/. Please verify that your project complies with the attached 2021 NWP Hawaii Coastal Zone Management Act (CZMA) consistency determination (dated 01 FEB 2021) and the Blanket Water Quality Certification (WQC) (dated 28 APR 2022).

As a non-reporting NWP, you may proceed without submitting a Pre-Construction Notification (application) to the Corps.

While a DA permit is not required for your proposed projects, you are responsible for obtaining all other applicable Federal, state, or local authorizations required by law. Be advised, a DA permit may be required if you alter the method, scope, or location of your proposed work. You should contact our office if you are considering modifying your project.

Mahalo,

Jeremy Morgan
Biologist
Regulatory Office
U.S. Army Corps of Engineers
Honolulu District
Building 252 Fort Shafter, HI 96858-5440
Phone: (808) 835-4308
Jeremy.K.Morgan@usace.army.mil

DAVID Y. IGE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
File:

WQC1092.FNL.22

April 28, 2022

David S. Hobbie
Regional Regulatory Chief
Honolulu District
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Hobbie:

Subject: **Blanket Section 401 Water Quality Certification (WQC) for Certain 2021 Department of the Army (DA) Nationwide Permits (NWP) and Activities**
File No. WQC1092

Purpose. This letter is a blanket Section 401 WQC (Blanket Certification) and sets forth applicable qualifications and activity-specific conditions to certain NWPs and activities, as described below. This Blanket Certification may be utilized by any applicant that is seeking authorization and/or verification from the U.S. Army Corps of Engineers (USACE), Honolulu District of the Pacific Ocean Division (POH) for work in Waters of the United States.

This Blanket Certification supersedes and replaces previous WQC0901.FNL.20 issued in May and November of 2020 (WQC0901). The following shall apply:

1. Requirements and conditions set forth in WQC0901 which are not set forth in this Blanket Certification shall no longer be applicable;
2. Activities covered under WQC0901 shall be subject to this Blanket Certification, including requirements and conditions different from or in addition to WQC0901;
3. Pending applications, including those currently under review by USACE or the Department of Health (DOH), shall be subject to this Blanket Certification.

Note: A previous version of this Blanket Certification was public noticed on September 23 and 24, 2020, for the proposed 2020 NWPs. Since the aforementioned public notices, the NWPs were reissued and modified in 2021, the federal Section 401 WQC regulations were revised, and the State Section 401 WQC rules were revised. This Blanket Certification incorporates these revisions.

Overview. The DA has published a list of NWPs and applicable general conditions that attach to those NWPs.[1] Certain NWPs may require a Section 401 WQC from the State of Hawaii. The DOH has the authority to issue a Blanket Certification and may qualify or condition the Blanket Certification. The conditions in this Blanket Certification become additional conditions to the NWPs. The qualifications would set forth the applicability of the Blanket Certification to a NWP or other described activity.

The DOH reviewed the NWP and General Conditions published in the Federal Register: Final Rules and the additional comments submitted by USACE POH. DOH believes that when all requirements and conditions contained in this Blanket Certification are fully complied with, there is a reasonable assurance that the activities will be conducted in a manner which will not violate the applicable State water quality standards and will comply with the applicable provisions of the CWA, Sections 301, 302, 303, 306, and 307.

The NWPs and activities in Item 2.a below do not require a Section 401 WQC. The NWPs and activities in Item 2.b below are covered under this Blanket Certification. The DOH has determined that projects authorized by the USACE POH for the NWPs and activities in Item 2.b below, subject to the requirements of the General Conditions in Item 3 below, will not cause adverse environmental impacts or effects; are in the public interest; and represent the optimum balance between economic development and environmental quality.

1. Term of this Blanket Certification

    a. This Blanket Certification becomes effective with respect to a specific project on **April 28, 2022.**

    b. This Blanket Certification will expire at midnight, **March 14, 2026**.

    c. This Blanket Certification's coverage is administratively extended to a certain project beyond midnight, March 14, 2026, when the USACE POH extends the project authorization/verification.

2. Coverage of this Blanket Certification

    a. The NWPs and activities listed below do not require a Section 401 WQC.

    - NWP 1 – Aids to Navigation
    - NWP 8 – Oil and Gas Structures on the Outer Continental Shelf

[1] The DA NWP authorizes activities under 1) Section 404 of the Clean Water Act (CWA), 2) Section 10 of the Rivers and Harbors Act of 1899 (RHA), and/or 3) a Letter of Permission. The NWPs were published on September 15, 2020, in the Federal Register, Volume 85, Number 179 and December 27. 2021, Volume 86, Number 245 (Federal Register).

- Projects in response to a public emergency proclaimed by the President of the United States or Governor of Hawaii where HRS Chapter 342D has been suspended
- Any emergency project as determined by the Director of Health
- Projects granted an exemption under Act 048 of 2017 (temporary exemption of certain bridge rehabilitation projects)
- Activities exempt under CWA, Section 404(f)(1)
- Directional drilling under a waterbody where entry and exit pits are located on land and all slurry/spoils/runoff is contained on land
- Structures over a waterbody where debris and other pollutants associated with the installation, construction, and operation do not enter the waterbody
- Installation of temporary Best Management Practices (BMPs) with inert material in State waters, excluding material used to divert or dam stream flow
- Comprehensive Environmental Response, Compensation, and Liability Act actions with oversight from DOH Hazard Evaluation and Emergency Response (HEER) Office and/or EPA
- DOH HEER response actions
- Bridge inspections
- Improvements or modifications to Department of Land and Natural Resources, Division of Boating and Ocean Recreation permitted existing offshore moorings installed prior to October 4, 2017
- Coral transplant with National Oceanic and Atmospheric Administration oversight
- Fireworks where visible debris is collected after event
- Lanterns and rubber duckies collected after event
- Ashes from funeral ceremonies 3 miles away from shore
- After-The-Fact applications for USACE POH enforcement actions[2]

b. The NWPs and activities listed below are hereby granted coverage under this Blanket Certification in the State of Hawaii if the applicant of the activity/discharge complies with the General Conditions (Item No. 3) and USACE POH provides notification (Item No. 4). Any person, including any public body, conducting activities authorized by these NWPs and activities that cannot or will not comply with this Blanket Certification must apply for and obtain an individual Section 401 WQC from DOH Clean Water Branch (CWB).

- NWP 2 – Structures in Artificial Canals
- NWP 3 – Maintenance

[2] DOH has decided not to process After-The-Fact applications so the USACE POH can proceed with their enforcement action.

- NWP 4 – Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
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This Blanket Certification shall not cover:

(1) Discharge(s) regulated under CWA, Section 402.
(2) Any project that may result in downstream/downdrift post construction impacts to the physical, chemical, and/or biological environment.
(3) Concrete lining any section of natural streambed or bank.[3]
(4) Projects involving the removal of dams, impoundments, structures, or sand bars that will result in the downstream/downdrift mobilization of material, sediment, and/or water pollutants.
(5) Waste Discharges to natural lakes and anchialine pools as specified in HAR 11-54 or any State waters.
"Waste" means sewage, industrial and agricultural matter, and all other liquid, gaseous, or solid substance, including radioactive substance, whether treated or not, which may pollute or tend to pollute the waters of this State. Hawaii Revised Statutes (HRS) §342D-1.
Non-contaminated and suitable dredge and fill material authorized under a 2021 NWP is not considered waste.
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(7) New sewage and industrial discharges to Embayments: Class AA and Class A as identified in HAR 11-54. New industrial discharges do not include the repair and/or replacement within the footprint of an existing structure.

[3] This type of activity is prohibited as it will result in adverse post construction impacts by eliminating ground water recharge, raising pH, and lowering dissolved oxygen or causing downstream bank erosion.

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The applicant of the activity/discharge shall:

a. Report any non-compliance with the conditions of this Blanket Certification to the USACE POH. Do not report or submit compliance related information to DOH. This Blanket Certification is a condition of the USACE POH permit.[4]

b. Maintain records at the project site or in the nearby field office demonstrating that all Blanket Certification requirements have been fully complied with.

c. Ensure that all activities are conducted in a manner that will comply with the "Basic Water Quality Criteria Applicable to All Waters" as specified in HAR 11-54.

d. Ensure that all material(s) placed or to be placed in State waters are free of waste metal products, organic materials, debris, and any pollutants at toxic or potentially hazardous concentrations to aquatic life as specified in HAR 11-54.

e. Ensure that the activities will not permanently interfere with or become injurious to any designated uses and/or existing uses of the receiving State water. Any permanent adverse impacts to the designated uses and/or existing uses of the receiving State water is a violation of HAR Chapter 11-54.

f. Ensure that pollution control measures and BMPs are utilized that prevent water pollutants from leaving the in-water work area authorized by the USACE POH permit.[5] Any visual plume emanating from the authorized in-water work area is a violation of HAR Chapter 11-54.

g. Ensure that all construction debris from any portion of the activities (including but not limited to debris caused by hydraulic saws, water jets, or drilling equipment) are contained and prevented from entering or re-entering State waters. All construction debris and sidecast material shall be properly removed from the aquatic environment and disposed of at an upland State and county approved site. Before the start of the activities, a Solid Waste Disclosure Form for Construction Sites shall be completed and returned to the DOH's Solid and Hazardous Waste Branch,

[4] With respect to USACE projects granted coverage under Item 2.c above, non-compliance reports from USACE POH should be submitted to DOH CWB.
[5] With respect to USACE projects granted coverage under Item 2.c above, the relevant in-water work area is identified in the USACE project.

Office of Solid Waste Management. No construction material or construction related materials shall be stockpiled in the aquatic environment or stored or placed in ways that will disturb the aquatic environment. The Solid Waste Disclosure Form for Construction Sites is available online at:
https://health.hawaii.gov/shwb/files/2018/04/swdiscformapr2018.pdf.

h. Utilize only BMPs that are inert and not sources of pollution themselves. Examples of inappropriate in-water porous material BMPs include but are not limited to: compost biosocks since they are a source of nutrients; and a soil berm since the soil particles will erode.

i. Collect activity/discharge related water pollutants utilizing appropriate catchment/detention devices (e.g. construction debris, airborne particulates, dust, concrete slurry, concrete chips, concrete surface preparation washing effluent, excess water and overflow from boring related activity, horizontal directional drilling slurry, etc.) from localized work areas and minimize or prevent the release of these water pollutants into State waters, including the in-water work area.

j. Utilize BMPs for all upland project activity to minimize the discharge of water pollutants into State waters, including the designated in-water work area.

k. For a stream, ditch, or gulch: Allow unimpeded flow around the in-water work area to allow for aquatic animal migration and/or to prevent work site and downstream flooding situations. The unimpeded flow shall be equivalent to a 2-year, 24-hour duration storm event and/or the existing flow capacity of the stream, ditch, or gulch. Pumped diversions may be utilized if the stream, ditch, or gulch is dry or there is only standing/ponded water without the existence of living aquatic animals.

l. Not discharge any type of wash water and/or effluent into State waters without first obtaining from DOH a National Pollutant Discharge Elimination System (NPDES) permit authorizing such type of water pollutant discharge to State waters.

m. Not allow any concrete truck wash water to be disposed by percolation into the ground.

n. Ensure that all areas temporarily impacted, either directly or indirectly, by the project construction activities are fully restored to its pre-construction conditions. For example: Incidental construction debris is cleaned up prior to removal of BMPs; remove all scientific measurement devices and any other structures or fills associated with installation and use of these

devices (e.g., foundations, anchors, buoys, lines, etc.) when no longer in use; etc.

o. When projects involve dredging/excavation activities:

(1) Be required to check the DOH, HEER Office Sites, Incidents and Records through the "Viewer" in iHEER at: https://eha-cloud.doh.hawaii.gov/iheer.[6]

(2) Be required to contact the HEER Office at (808) 586-4249 and through e-permitting Form "Notification of Construction Activities" at Form Finder https://eha-cloud.doh.hawaii.gov/epermit/finder if contaminated soil, sediment, vapor, or groundwater is known to be present at your project site. The applicant shall notify the HEER Office at least 90 days prior to surface and subsurface disturbing activities that may disturb the ground surface at HEER sites. If the 90-days prior notification is missed, the applicant shall notify the HEER Office as soon as possible to avoid any potential delays regarding the covered project.

(3) Contain return flow or runoff from upland dredged spoils dewatering site(s)/disposal site(s), including the confined disposal facility (CDF), which shall be contained on land and not allowed to discharge and/or re-enter any State waters without first obtaining the required discharge permit from USACE POH or CWB. Unless authorized by a USACE POH or NPDES permit, the applicant shall not allow any runoff, return flow, or airborne particulate pollutants from the excavated or dredged material dewatering or stockpiling site, including the CDF, to enter or re-enter State waters.

(4) Properly deploy warning signs, which shall be maintained until the portion of the in-water work is completed and the affected area water quality has returned to its preconstruction condition and turbidity control devices have been removed from the waterway.

p. When projects involve moorings:

(1) Avoid locating moorings (including anchors and floats) in sensitive aquatic habitats such as coral reefs, fish spawning areas, and submerged aquatic vegetation (unless location is acceptable to the Department of Land and Natural Resources, Division of Aquatic Resources or the National Oceanic Atmospheric Administration);

(2) Ensure moorings (including anchors and floats) are made of clean, inert material. Treated lumber shall not be used as it may contain

[6] The HEER Office is currently updating site information for sites. Most, but not all, sites may be displayed on the viewer map. Site Document data upload is ongoing and not all documents may be currently available via this website. To get the complete record for the site, a record request form can be filled and submitted it to the HEER Office. Users will then be notified when they are able to download all information via the iHEER system website.

compounds that can be released into the water and become toxic to the aquatic environment;

(3) Pre-cast and cure concrete anchors, if required, away from State waters prior to use to prevent seepage of potentially toxic substances into the waterbody;

(4) Locate moorings in depths that allow structures and vessels to remain afloat at the lowest possible water levels and that prevent propellers from disturbing bottom sediments;

(5) Select mooring anchors of an adequate size to secure vessels or structures and prevent the anchor from shifting or dragging along the bottom of the State water;

(6) Size the length of mooring lines, chains, or cables to avoid excess line, chain, or cable accumulation on the bed of the State water;

(7) Ensure native beach material such as logs, sand, gravel, and boulders that are important components of fish habitat are not used as mooring structures and are left in place on the foreshore;

(8) Properly dispose of derelict or unused floats, lines, chains, or cables in accordance with appropriate laws and rules; and

(9) Ensure moorings are kept in good repair by regularly inspecting and maintaining the structure. Mooring maintenance must be performed into perpetuity (or until it is properly disposed of) or it will itself become a pollution source.

4. USACE POH shall e-mail to CWB (cleanwaterbranch@doh.hawaii.gov and darryl.lum@doh.hawaii.gov) a pdf copy of all issued final verifications. This Blanket Certification coverage shall become valid with respect to an activity only when USACE POH notifies CWB via email of a project authorization/verification and conditions of this Blanket Certification have been incorporated as part of the USCE POH final verification; provided, that this email notification requirement shall not apply to activities that do not require a pre-construction notification, and this Blanket Certification shall automatically become valid with respect to such activities.

If you agree with the terms and conditions of this Blanket Certification, please sign and date below; make a copy for your administrative record; and submit this entire letter with your original signature to CWB within 14 calendar days from your signature date.

If you have any questions, please contact Mr. Darryl Lum of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

for ELIZABETH A. CHAR, M.D.
Director of Health

c: Regulatory Office, POH, COE [via e-mails linda.speerstra@usace.army.mil only]
Ms. Debra Mendes, CZM Program, Office of Planning, DBEDT
[via e-mail debra.l.mendes@hawaii.gov only]
U.S. Fish and Wildlife Service [via e-mail pifwo_admin@fws.gov only]
U.S. National Marine Fisheries Service [via e-mail pirohonolulu@noaa.gov only]
Division of Aquatic Resources, DLNR [via e-mail dlnr.aquatics@hawaii.gov only]
CWRM, DLNR [via e-mail dlnr.cwrm@hawaii.gov only]
OCCL, DLNR [via e-mail dlnr.occl@hawaii.gov only]
DHO (Hawaii, Maui, Kauai) and EHS, Molokai/Lanai [via e-mail only]

I AGREE WITH THE TERMS AND CONDITIONS OF THIS LETTER:

4-28-22

David S. Hobbie DATE
Regional Regulatory Chief
Honolulu District

OFFICE OF PLANNING
STATE OF HAWAII

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

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

DTS202101261135NA

February 1, 2021

Lieutenant Colonel Eric S. Marshall
Commander and District Engineer
U.S. Army Corps of Engineers, Honolulu District
Building 230
Fort Shafter, Hawaii 96858-5440

Attention: Ms. Linda Speerstra, Chief, Regulatory Branch

Dear LTC Marshall:

Subject: Clarification of the Hawaii Coastal Zone Management Program Federal Consistency Decisions for the 2021 Nationwide Permits and Current 2017 Nationwide Permits

The Hawaii Coastal Zone Management (CZM) Program issued federal consistency decisions on December 15, 2020 for the U.S. Army Corps of Engineers (Corps) proposed reissuance of 52 existing Nationwide Permits (NWP) with modifications, issuance of 5 new NWPs, and associated general conditions and definitions with modifications as published in the Federal Register on September 15, 2020. On January 13, 2021 the Corps published a final rule in the Federal Register for the reissuance of 12 of the existing NWPs and issuance of 4 new NWPs, while retaining 40 existing NWPs and not taking action on the proposed new NWP E (Water Reclamation and Reuse Facilities) at this time. The Hawaii CZM Program previously issued federal consistency decisions for the 2017 NWPs on February 22, 2017. Because there are currently two sets of NWPs (2021, 2017) in effect with different issuance and expiration dates, as well as different federal consistency decisions, the Hawaii CZM Program is issuing this clarification statement to avoid any mis-application of our consistency concurrences, conditional concurrences, and objections (individual CZM reviews required) to the NWPs.

The Hawaii CZM Program decisions for each of the NWPs are listed below and summarized in the attached table.

CONCURRENCES

Federal consistency concurrences have been issued for the following NWPs. The currently active version of the NWP and the applicable CZM decision date are indicated in parenthesis. No further review or verification by the Hawaii CZM Program is required for activities authorized by these NWPs until their expiration date.

NWP 1 Aids to Navigation (NWP 2017, CZM 2/22/2017)

NWP 2 **Structures in Artificial Canals** (NWP 2017, CZM 2/22/2017)

NWP 3 **Maintenance** (NWP 2017, CZM 2/22/2017)

NWP 4 **Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities** (NWP 2017, CZM 2/22/2017)

NWP 5 **Scientific Measurement Devices** (NWP 2017, CZM 2/22/2017)

NWP 6 **Survey Activities** (NWP 2017, CZM 2/22/2017)

NWP 7 **Outfall Structures and Associated Intake Structures** (NWP 2017, CZM 2/22/2017)

NWP 9 **Structures in Fleeting and Anchorage Areas** (NWP 2017, CZM 2/22/2017)

NWP 10 **Mooring Buoys** (NWP 2017, CZM 2/22/2017)

NWP 11 **Temporary Recreational Structures** (NWP 2017, CZM 2/22/2017)

NWP 15 **U.S. Coast Guard Approved Bridges** (NWP 2017, CZM 2/22/2017)

NWP 16 **Return Water From Upland Contained Disposal Areas** (NWP 2017, CZM 2/22/2017)

NWP 18 **Minor Discharges** (NWP 2017, CZM 2/22/2017)

NWP 19 **Minor Dredging** (NWP 2017, CZM 2/22/2017)

NWP 20 **Response Operations for Oil or Hazardous Substances** (NWP 2017, CZM 2/22/2017)

NWP 22 **Removal of Vessels** (NWP 2017, CZM 2/22/2017)

NWP 23 **Approved Categorical Exclusions** (NWP 2017, CZM 2/22/2017)

Note: A separate federal consistency review, independent of this NWP concurrence, may be required in accordance with 15 CFR Part 930, Subpart C - Federal Agency Activities, or Subpart F - Federal Assistance to State and Local Governments. Therefore, applicable federal agencies should consult the Hawaii CZM Program prior to initiation of the federal action.

NWP 25 **Structural Discharges** (NWP 2017, CZM 2/22/2017)

NWP 27 **Aquatic Habitat Restoration, Establishment, and Enhancement Activities** (NWP 2017, CZM 2/22/2017)

NWP 28 **Modifications of Existing Marinas** (NWP 2017, CZM 2/22/2017)

NWP 31 **Maintenance of Existing Flood Control Facilities** (NWP 2017, CZM 2/22/2017)

NWP 32 **Completed Enforcement Actions** (NWP 2017, CZM 2/22/2017)

NWP 33 **Temporary Construction, Access, and Dewatering** (NWP 2017, CZM 2/22/2017)

NWP 35 **Maintenance Dredging of Existing Basins** (NWP 2017, CZM 2/22/2017)

NWP 36 **Boat Ramps** (NWP 2017, CZM 2/22/2017)

NWP 37 **Emergency Watershed Protection and Rehabilitation** (NWP 2017, CZM 2/22/2017)

NWP 38 **Cleanup of Hazardous and Toxic Waste** (NWP 2017, CZM 2/22/2017)

NWP 41 **Reshaping Existing Drainage and Irrigation Ditches** (NWP 2017, CZM 2/22/2017)

NWP 46 **Discharges in Ditches** (NWP 2017, CZM 2/22/2017)

NWP 53 **Removal of Low-Head Dams** (NWP 2017, CZM 2/22/2017)

CONDITIONAL CONCURRENCES

Federal consistency conditional concurrences have been issued for the following NWPs. The currently active version of the NWP and the applicable CZM decision date are indicated in parenthesis. The CZM conditions are identified for each NWP as they were issued in 2020 and 2017. If an activity authorized by one of these NWPs meets the applicable CZM condition(s), then an individual CZM federal consistency review is required. Otherwise, no further review or verification by the Hawaii CZM Program is required for activities authorized by these NWPs until their expiration date.

NWP 12 **Oil or Natural Gas Pipeline Activities** (NWP 2021, CZM 12/15/2020)
Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal or tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 13 **Bank Stabilization** (NWP 2017, CZM 2/22/2017)

With the exceptions listed below, CZM consistency concurrence is issued for NWP 13 and no further CZM federal consistency review or verification is required.

Hawaii CZM Exceptions for NWP 13

The following NWP 13 activities can have significant coastal effects and, therefore, need to be reviewed individually for consistency with the Hawaii CZM Program enforceable policies.

1. Discharges of dredged or fill material in any stream, including intermittent and ephemeral streams, that exceed 200 linear feet.
2. Shoreline stabilization activities, structures, and fills, both permanent and temporary, occurring on oceanfront sites.

NWP 14 **Linear Transportation Projects** (NWP 2017, CZM 2/22/2017)

With the exceptions listed below, CZM consistency concurrence is issued for NWP 14 and no further CZM review or verification is required.

Hawaii CZM Exceptions for NWP 14

The following NWP 14 activities can have significant coastal effects and, therefore, need to be reviewed individually for consistency with the Hawaii CZM Program enforceable policies.

1. NWP 14 activities that will result in the permanent loss of greater than 0.10-acre to a special aquatic site for the total project.
2. Discharges of dredged or fill material in any stream, including intermittent and ephemeral streams, that exceed 200 linear feet.

NWP 29 Residential Developments (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 39 Commercial and Institutional Developments (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 40 Agricultural Activities (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 42 Recreational Facilities (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 43 Stormwater Management Facilities (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 45 Repair of Uplands Damaged by Discrete Events
(NWP 2017, CZM 2/22/2017)

With the exceptions listed below, CZM consistency concurrence is issued for NWP 45 and no further CZM review or verification is required.

Hawaii CZM Exceptions for NWP 45

The following NWP 45 activities can have significant coastal effects and, therefore, need to be reviewed individually for consistency with the Hawaii CZM Program enforceable policies.

1. NWP 45 activities that will result in the permanent loss of greater than 0.10-acre to a special aquatic site for the total project.
2. Discharges of dredged or fill material in any stream, including intermittent and ephemeral streams, that exceed 200 linear feet.

NWP 48 Commercial Shellfish Mariculture Activities (NWP 2021, CZM 12/15/2020) Concurrence is issued for commercial shellfish mariculture activities occurring within existing Hawaiian fishponds and no further review or verification by the Hawaii CZM Program is required. Hawaiian fishponds are mariculture and/or aquaculture structures, which include man-made and natural enclosures of water in which aquatic animal and plant species are raised and harvested. Individual CZM federal consistency review is required for all commercial shellfish mariculture activities eligible for authorization under NWP 48 that do not occur within an existing Hawaiian fishpond.

NWP 51 Land-Based Renewable Energy Generation Facilities (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

NWP 55 Seaweed Mariculture Activities (NWP 2021, CZM 12/15/2020) Concurrence is issued for seaweed mariculture activities occurring within existing Hawaiian fishponds and no further review or verification by the Hawaii CZM Program is required. Hawaiian fishponds are mariculture and/or aquaculture structures, which include man-made and natural enclosures of water in which aquatic animal and plant species are raised and harvested. Individual CZM federal consistency review is required for all seaweed mariculture activities eligible for authorization under NWP A that do not occur within an existing Hawaiian fishpond.

NWP 56 Finfish Mariculture Activities (NWP 2021, CZM 12/15/2020) Concurrence is issued for finfish mariculture activities occurring within existing Hawaiian fishponds and no further review or verification by the Hawaii CZM Program is required. Hawaiian fishponds are mariculture and/or aquaculture structures, which include man-made and natural enclosures of water in which aquatic animal and plant species are raised and harvested. Individual CZM federal consistency review is required for all finfish mariculture activities eligible for authorization under NWP B that do not occur within an existing Hawaiian fishpond.

NWP 57 Electric Utility Line & Telecommunications Activities (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal or tidal waters of the United States; or (2) any amount of fill

resulting in the permanent loss of any amount of wetlands and/or special aquatic sites. No CZM review is required for open trench excavation and backfilling, horizontal directional drilling, micro-tunneling, or other similar installation methods.

NWP 58 Utility Line Activities for Water & Other Substances (NWP 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal or tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites. No CZM review is required for open trench excavation and backfilling, horizontal directional drilling, micro-tunneling, or other similar installation methods.

NWP E Water Reclamation and Reuse Facilities (No action taken by corps of Engineers 2021, CZM 12/15/2020) Individual CZM federal consistency review is required for activities involving: (1) an aggregate or single fill resulting in the permanent loss of greater than 0.10-acre of non-tidal waters of the United States; or (2) any amount of fill resulting in the permanent loss of any amount of wetlands and/or special aquatic sites.

If the requirements for conditional concurrences specified in 15 CFR § 930.4(a), (1) through (3), are not met, then all parties shall treat these conditional concurrences as an objection pursuant to 15 CFR Part 930, Subpart C.

OBJECTIONS

Federal consistency objections have been issued for the following NWPs so that activities authorized by these NWPs can be reviewed individually for consistency with the Hawaii CZM Program enforceable policies.

NWP 8 Oil and Gas Structures on the Outer Continental Shelf (NWP 2017, CZM 2/22/2017)

NWP 17 Hydropower Projects (NWP 2017, CZM 2/22/2017)

NWP 54 Living Shorelines (NWP 2017, CZM 2/22/2017)

NWPs 8, 17 and 54 (2017) authorize activities that potentially have significant coastal effects, therefore, individual federal consistency reviews are required for all activities authorized by these NWPs.

NO CONSISTENCY DECISION ISSUED

No Hawaii CZM Program consistency decisions have been issued for the following NWPs because these are not available for use in the State of Hawaii. CZM consistency concurrence shall not to be presumed for these NWPs in the State of Hawaii.

NWP 21 Surface Coal Mining Activities (NWP 2021, CZM 12/15/2020) Revoked within the Honolulu District's Area of Responsibility

NWP 24 Indian Tribe or State Administered Section 404 Programs (NWP 2017, CZM 2/22/2017) Revoked within the Honolulu District's Area of Responsibility

NWP 26 Reserved (NWP 2021, CZM 12/15/2020)

NWP 30 Moist Soil Management for Wildlife (NWP 2017, CZM 2/22/2017) Revoked within the Honolulu District's Area of Responsibility

NWP 34 Cranberry Production Activities (NWP 2017, CZM 2/22/2017) Revoked within the Honolulu District's Area of Responsibility

NWP 44 Mining Activities (NWP 2021, CZM 12/15/2020) Revoked within the Honolulu District's Area of Responsibility

NWP 47 Reserved (NWP 2021, CZM 12/15/2020)

NWP 49 Coal Remining Activities (NWP 2017, CZM 2/22/2017) Revoked within the Honolulu District's Area of Responsibility

NWP 50 Underground Coal Mining Activities (NWP 2021, CZM 12/15/2020) Revoked within the Honolulu District's Area of Responsibility

NWP 52 Water-Based Renewable Energy Generation Pilot Projects (NWP 2021, CZM 12/15/2020) Revoked within the Honolulu District's Area of Responsibility

The CZM federal consistency concurrences and conditional concurrences do not represent an endorsement of any activity authorized by an NWP, nor does it convey approval by any other state or county agency. If you have any questions, please contact John Nakagawa of our Hawaii CZM Program at john.d.nakagawa@hawaii.gov or (808) 587-2878.

Sincerely,

Mary Alice Evans

Mary Alice Evans
Director

Enclosure

2021/2017 Nationwide Permits
Hawaii CZM Program Federal Consistency Decisions[1]

Nationwide Permits	Applicable Hawaii CZM Program Decisions
1. Aids to Navigation - 2017	Concurrence - 2017
2. Structures in Artificial Canals - 2017	Concurrence - 2017
3. Maintenance - 2017	Concurrence - 2017
4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities - 2017	Concurrence - 2017
5. Scientific Measurement Devices - 2017	Concurrence - 2017
6. Survey Activities - 2017	Concurrence - 2017
7. Outfall Structures and Associated Intake Structures - 2017	Concurrence - 2017
8. Oil and Gas Structures on the Outer Continental Shelf - 2017	Objection - 2017: CZM Review Required
9. Structures in Fleeting and Anchorage Areas - 2017	Concurrence - 2017
10. Mooring Buoy - 2017s	Concurrence - 2017
11. Temporary Recreational Structures - 2017	Concurrence - 2017
12. Oil or Natural Gas Pipeline Activities - **2021**	Conditional Concurrence - **2020**
13. Bank Stabilization - 2017	Conditional Concurrence - 2017
14. Linear Transportation Projects - 2017	Conditional Concurrence - 2017
15. U.S. Coast Guard Approved Bridges - 2017	Concurrence - 2017
16. Return Water From Upland Contained Disposal Areas - 2017	Concurrence - 2017
17. Hydropower Projects - 2017	Objection - 2017: CZM Review Required
18. Minor Discharges - 2017	Concurrence - 2017
19. Minor Dredging - 2017	Concurrence - 2017
20. Response Operations for Oil or Hazardous Substances - 2017	Concurrence - 2017
21. Surface Coal Mining Activities - **2021**	Revoked by Honolulu District
22. Removal of Vessels - 2017	Concurrence - 2017
23. Approved Categorical Exclusions - 2017	Concurrence - 2017
24. Indian Tribe or State Administered Section 404 Programs - 2017	Revoked by Honolulu District
25. Structural Discharges - 2017	Concurrence - 2017
26. [Reserved] - **2021**	No Hawaii CZM Decision - **2020**
27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities - 2017	Concurrence - 2017
28. Modifications of Existing Marinas - 2017	Concurrence - 2017
29. Residential Developments - **2021**	Conditional Concurrence - **2020**
30. Moist Soil Management for Wildlife - 2017	Revoked by Honolulu District
31. Maintenance of Existing Flood Control Facilities - 2017	Concurrence - 2017
32. Completed Enforcement Actions - 2017	Concurrence - 2017
33. Temporary Construction, Access, and Dewatering - 2017	Concurrence - 2017
34. Cranberry Production Activities - 2017	Revoked by Honolulu District

Nationwide Permits	Hawaii CZM Program Decisions
35. Maintenance Dredging of Existing Basins - 2017	Concurrence - 2017
36. Boat Ramps - 2017	Concurrence - 2017
37. Emergency Watershed Protection and Rehabilitation - 2017	Concurrence - 2017
38. Cleanup of Hazardous and Toxic Waste - 2017	Concurrence - 2017
39. Commercial and Institutional Developments - **2021**	Conditional Concurrence - **2020**
40. Agricultural Activities - **2021**	Conditional Concurrence - **2020**
41. Reshaping Existing Drainage and Irrigation Ditches - 2017	Concurrence - 2017
42. Recreational Facilities - **2021**	Conditional Concurrence - **2020**
43. Stormwater Management Facilities - **2021**	Conditional Concurrence - **2020**
44. Mining Activities - **2021**	Revoked by Honolulu District
45. Repair of Uplands Damaged by Discrete Events - 2017	Conditional Concurrence - 2017
46. Discharges in Ditches - 2017	Concurrence - 2017
47. [Reserved] - **2021**	No Hawaii CZM Decision - **2020**
48. Commercial Shellfish Mariculture Activities - **2021**	Conditional Concurrence - **2020**
49. Coal Remining Activities - 2017	Revoked by Honolulu District
50. Underground Coal Mining Activities - **2021**	Revoked by Honolulu District
51. Land-Based Renewable Energy Generation Facilities - **2021**	Conditional Concurrence - **2020**
52. Water-Based Renewable Energy Generation Pilot Projects - **2021**	Revoked by Honolulu District
53. Removal of Low-Head Dams - 2017	Concurrence - 2017
54. Living Shorelines - 2017	Objection - 2017: CZM Review Required
55. Seaweed Mariculture Activities - **2021**	Conditional Concurrence - **2020**
56. Finfish Mariculture Activities - **2021**	Conditional Concurrence - **2020**
57. Electric Utility Line and Telecommunications Activities - **2021**	Conditional Concurrence - **2020**
58. Utility Line Activities for Water and Other Substances - **2021**	Conditional Concurrence - **2020**
E. Water Reclamation and Reuse Facilities - **2021** No action taken by Corps of Engineers	Conditional Concurrence - **2020**

[1] 2017 NWPs - Hawaii CZM Program decisions issued 2/22/2017; 2021 NWPs - Hawaii CZM Program decisions issued 12/15/2020

COMMISSION ON WATER RESOURCE MANAGEMENT DETERMINATION LETTER DATED OCTOBER 27, 2022

APPENDIX M-2

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON

MICHAEL G. BUCK
ELIZABETH A. CHAR, M.D.
NEIL J. HANNAHS
AURORA KAGAWA-VIVIANI, PH.D.
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

October 27, 2022

Ref: RFD.5957.6

Kari Luna Nunokawa
Munekiyo Hiraga
303 High Street, Suite 104
Wailuku, HI 96793
Via email: planning@munekiyohiraga.com

Aloha Ms. Nunokawa:

Request for Determination
Stream Channel Alteration Permit Application
Liloa Drive Extension
Kūlanihāko‘i and Waipu‘ilani Gulches, Kihei, Maui, TMKs Various

The Commission on Water Resource Management (Commission) is responding to your submission dated October 24, 2022. The proposed work will include crossings at the two (2) gulches, work will occur around the existing Pi‘ilani Village drainageway, which conveys offsite stormwater from an existing Pi‘ilani Highway 72-inch culvert crossing and surface water from the Pi‘ilani Village Subdivision Phase 1. Work includes extending the existing stormwater box culvert beneath the Liloa Drive Extension, and constructing a detention basin adjacent to the right bank of the existing drainageway in the two (2) gulches and an unnamed drainageway.

The National Hydrography Dataset classified the Kūlanihāko‘i and Waipu‘ilani Gulches as intermittent. The Division of Aquatic Resources classified the Kūlanihāko‘i Gulch as intermittent and the Waipu‘ilani Gulch as non-perennial. Our understanding of these gulches are that they are typically dry throughout the year and do not support instream uses. There are no diversions located on these dry stream channels.

Based on the information that you provided and the analysis above, the Commission **will not** require a Stream Channel Alteration Permit application to be submitted because instream uses will not be adversely affected.

The Commission’s Stream Protection and Management Branch has the responsibility to protect stream channels from alteration whenever practicable to provide for beneficial instream uses of water in the State under the authorization of the State Water Code, HRS §174C-71, and HAR §13-169-50, Protection of Instream Uses of Water. The Commission requires that a permit be approved prior to undertaking a stream channel alteration, other than in the course of normal

maintenance. All efforts shall be made to ensure that streamflow continues to flow unimpeded past the project area during construction activities and that all water quality best management practices are followed.

Please be advised that the project may require other agency approvals regarding wetlands, water quality, grading, stockpiling, and floodways. This letter should not be used for other regulatory jurisdictions or used to imply compliance with other federal, state, or county rules. Work performed without appropriate permits or authorizations may be subject to fines and/or remedial actions. Prior to work in the stream channel, please implement best management practices and communicate with up/downstream owners and surrounding community, as practicable, your actions to be taken. If you have any questions, contact Rebecca Alakai at rebecca.r.alakai@hawaii.gov or call (808) 587-0266.

Ola i ka wai,

M. KALEO MANUEL
Deputy Director

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

APPENDIX

N-1

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

The following agencies and organizations were consulted during preparation of the Draft Environmental Assessment (EA). Agencies that provided comments are identified with an astersk. Comments received and responses to substantive comments are included herein.

FEDERAL AGENCIES

1. *National Marine Fisheries Service
   Pacific Islands Regional Office
   1845 Wasp Boulevard, Building 176
   Honolulu, HI 96818

2. Mr. Wally Jennings
   Natural Resources Conservation Service
   U.S. Department of Agriculture
   P. O. Box 396
   Hoolehua, HI 96729

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

4. Mr. Larry Yamamoto, State Conservationist
   Natural Resources Conservation Service
   U.S. Department of Agriculture
   P.O. Box 50004
   Honolulu, HI 96850-0001

5. Ms. Kay Zukeran
   NOAA Inouye Regional Center
   NMFS/PIRO
   1845 Wasp Blvd., Building 176
   Honolulu, HI 96818

6. Ms. Linda Speerstra, Chief
   U.S. Department of the Army, Regulatory Branch
   U.S. Army Engineer District, Honolulu
   Regulatory Branch, Building 230
   Fort Shafter, HI 96858-5440
   Via email: CEPOH-RO@usace.army.mil

7. U.S. Department of the Army
   Army Corps of Engineers
   Pacific Ocean Division
   Building 525, Suite 300
   Fort Shafter, HI 96858-5440

8. U.S. Department of Transportation
   Federal Aviation Administration
   300 Ala Moana Boulevard, Room 7-128
   Honolulu, HI 96850-7128

9. U.S. Department of Transportation
   Federal Highways Administration
   Hawaii Division, Box 50206
   300 Ala Moana Boulevard, Room 3306
   Honolulu, HI 96850

10. U.S. Department of Transportation
    Federal Transit Administration
    Region 9 Office, Building 90
    7th Street, Suite 15-300
    San Francisco, CA 94103

11. U.S. Environmental Protection Agency
    Region IV
    Pacific Islands Contact Office
    P.O. Box 50003
    Honolulu, HI 96850

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

13. U.S. Geological Survey
    Pacific Islands Water Science Center
    Inouye Regional Center
    1845 Wasp Blvd., B176
    Honolulu, HI 96818

14. Department of Interior
National Parks Service
Pacific Islands Support Office
300 Ala Moana Boulevard, Room 6-226
Honolulu, HI 96850

15. Department of Commerce
National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

STATE AGENCIES

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

17. Senator Rosalyn H. Baker
Hawai‘i State Senate
Hawai‘i State Capitol, Room 230
415 S. Beretania Street
Honolulu, HI 96813

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

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

20. Ms. Phyllis Shimabukuro-Geiser, Chair
State of Hawai‘i
Department of Agriculture
1428 South King Street
Honolulu, HI 96814-2512

21. Mr. Roderick K. Becker, Director
State of Hawai‘i
Department of Budget and Finance
P.O. Box 150
Honolulu, HI 96810

22. Mr. Mike McCartney, Director
State of Hawai‘i
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804

23. State of Hawai‘i
Department of Business, Economic Development & Tourism
Office of Planning
235 S. Beretania Street, 6th Floor
Honolulu, HI 96813

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

25. Heidi Meeker
State of Hawai‘i
Department of Education
Office of Business Services
3633 Waialae Avenue, Room C-209
Honolulu, Hawai‘i 96816

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

27. Ms. Libby Char, Interim Director
State of Hawai‘i
Department of Health
1250 Punchbowl St., Room 325
Honolulu, HI 96813

28. Mr. 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, HI 96782

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

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

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

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

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

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

35. Dr. Sylvia Hussey, Interim Chief Executive Officer
State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, HI 96817

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

MAUI COUNTY AGENCIES

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

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

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

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

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

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

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

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

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

46. Honorable Yuki Lei Sugimura
Maui County Council
200 South High Street
Wailuku, HI 96793

47. Honorable Keani Rawlins-Fernandez,
Council Vice Chair
Maui County Council
200 South High Street
Wailuku, HI 96793

48. Honorable Kelly King
Maui County Council
200 South High Street
Wailuku, HI 96793

49. Honorable Gabe Johnson
Maui County Council
200 South High Street
Wailuku, HI 96793

50. Honorable Tasha Kama
Maui County Council
200 South High Street
Wailuku, HI 96793

51. Honorable Alice Lee, Council Chair
Maui County Council
200 South High Street
Wailuku, HI 96793

52. Honorable Mike Molina
Maui County Council
200 South High Street
Wailuku, HI 96793

53. Honorable Tamara Paltin
Maui County Council
200 South High Street
Wailuku, HI 96793

54. Honorable Shane Sinenci
Maui County Council
200 South High Street
Wailuku, HI 96793

MAUI COUNTY ORGANIZATIONS

55. Mr. Allen Baybayan, Principal Engineering
Hawaiian Electric
900 Richard Street
Honolulu, HI 96813

56. Hawaiian Telecom
60 South Church Street
Wailuku, HI 96793

57. Kīhei Community Association
P. O. Box 662
Kīhei, HI 96753

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

59. Maui Hotel & Lodging Association
85 North Church Street
Wailuku, HI 96793

60. Mr. Albert Perez, Executive Director
Maui Tomorrow
55 North Chuch Street, Suite A4
Wailuku, HI 96793

61. Spectrum
158 Ma‘a Street
Kahului, HI 96732

62. Vernon Kalanikau
Aha Moku Council
426 Kenolio Road
Kīhei, Hawaii 96753

EARLY CONSULTATION LETTER SENT TO CONSULTED PARTIES

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

March 12, 2021

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Project at Liloa Drive, Kīhei, Maui, Hawai'i

Dear Sir or Madame:

The County of Maui, Department of Public Works ("Applicant") is proposing to extend Liloa Drive (also known as the North-South (N-S) Collector Road) and its integrated, landscaped Shared Use Path (also known as the Kīhei Bikeway) from the vicinity of East Waipu'ilani Road to the vicinity of Ka'ono'ulu Street. The proposed Liloa Drive Extension project is located in an urbanized area of Kīhei, Maui, Hawai'i and involves an approximately 0.93 mile extension of Liloa Drive. See **Figure 1** and **Figure 2**. The Liloa Drive Extension will cross two (2) gulches, Kūlanihāko'i Gulch and Waipu'ilani Gulch and an unnamed drainageway.

PROJECT PURPOSE

The Liloa Drive Extension, East Waipu'ilani Road to Ka'ono'ulu Road is a segment of the N-S Collector Road identified in the Federal-Aid Highways 2035 Transportation Plan for the District of Maui dated July 2014, as a potential long-range capacity solution. The Kīhei N-S Collector Road (Liloa Drive) is included and programmed in the 2019-2022 Maui Transportation Improvement Program (TIP). The project will increase capacity, improve traffic circulation, alleviate traffic congestion, and provide a safe corridor complete with landscaped pedestrian and bicycle facilities across two (2) modern bridge spans. The project will fulfill a priority need identified by master plans collaboratively developed by the Applicant and the State of Hawai'i Department of Transportation, that reflects community and stakeholder input.

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

PROPOSED ACTION

The proposed roadway improvements will include constructing a two-lane roadway with curbs, gutters, sidewalk, curb ramps, landscaped shared use paths for bicycle and pedestrians, retaining walls, street lights, storm drain systems, relocating and installing new overhead and underground utility facilities (including relocating/replacing existing 69 kV utility poles), fencing, railings, landscaping and irrigation. Three (3) roundabouts are incorporated into the design of the Liloa Drive Extension, at its intersections with East Waipu'ilani Road, Kūlanihāko'i Street, and Ka'ono'ulu Street and a box culvert is proposed at an unnamed drainageway. Two (2) bridges are proposed at the Kūlanihāko'i Gulch and Waipu'ilani Gulch. The proposed project is expected to improve the physical environment surrounding the project corridor with enhanced safety mobility features.

DPW anticipates construction in two phases: Phase I consisting of the segment between East Waipu'ilani Road to the vicinity of Kūlanihāko'i Street; and, Phase II consisting of the segment from the vicinity of Kūlanihāko'i Street northward to Ka'ono'ulu Street.

REGULATORY CONSIDERATIONS

The proposed project will utilize County lands and funds, which are triggers for the preparation of an Environmental Assessment (EA), pursuant to Chapter 343, Hawai'i Revised Statutes (HRS). The County of Maui, Department of Public Works will serve as the approving agency for the EA.

The proposed project will also utilize Federal funds and as such, compliance with the National Environmental Policy Act; Section 4(f) of the Department of Transportation Act; Title VI (Environmental Justice) of the Civil Rights Act of 1964; Section 7 of the Endangered Species Act; and Section 106 of the National Historic Preservation Act will be required.

The Liloa Drive extension falls within the County of Maui's Special Management Area (SMA). A SMA Use Permit will be required from the Maui Planning Commission.

As previously mentioned, the proposed project crosses two (2) gulches, Kūlanihāko'i Gulch in the northern portion of the project corridor and Waipu'ilani Gulch in the southern portion of the project corridor. An unnamed drainageway lies to the south of Kūlanihāko'i Street. A Preliminary Jurisdictional Determination is being sought from the U.S. Army Corps of Engineers (USACE) to determine if portions of the project are within the federal jurisdiction of the USACE.

As applicable, Stream Channel Alteration Permits will be obtained from the State Commission on Water Resource Management. Coastal Zone Management Consistency approvals will also be sought from the State Office of Planning.

Lastly, portions of the proposed project corridor are also located within the County's High Hazard Flood Zone D, Zone AO and Zone AE. Applicable Flood Hazard Area regulations will be complied with.

REQUESTS FOR COMMENTS

On behalf of the County of Maui, Department of Public Works, 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, Hawai'i Administrative Rules.

We would appreciate receiving any comments you may have at the address listed below by April 5, 2021.

Munekiyo Hiraga
Attention: 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 or email liloadrive@munekiyohiraga.com. Thank you.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:yp
Enclosures
cc: Nolly Yagin, Department of Public Works, Engineering Division (w/enclosures)
Clifford Mukai, Warren S. Unemori Engineering (w/enclosures)
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC.mrg.letters.docx



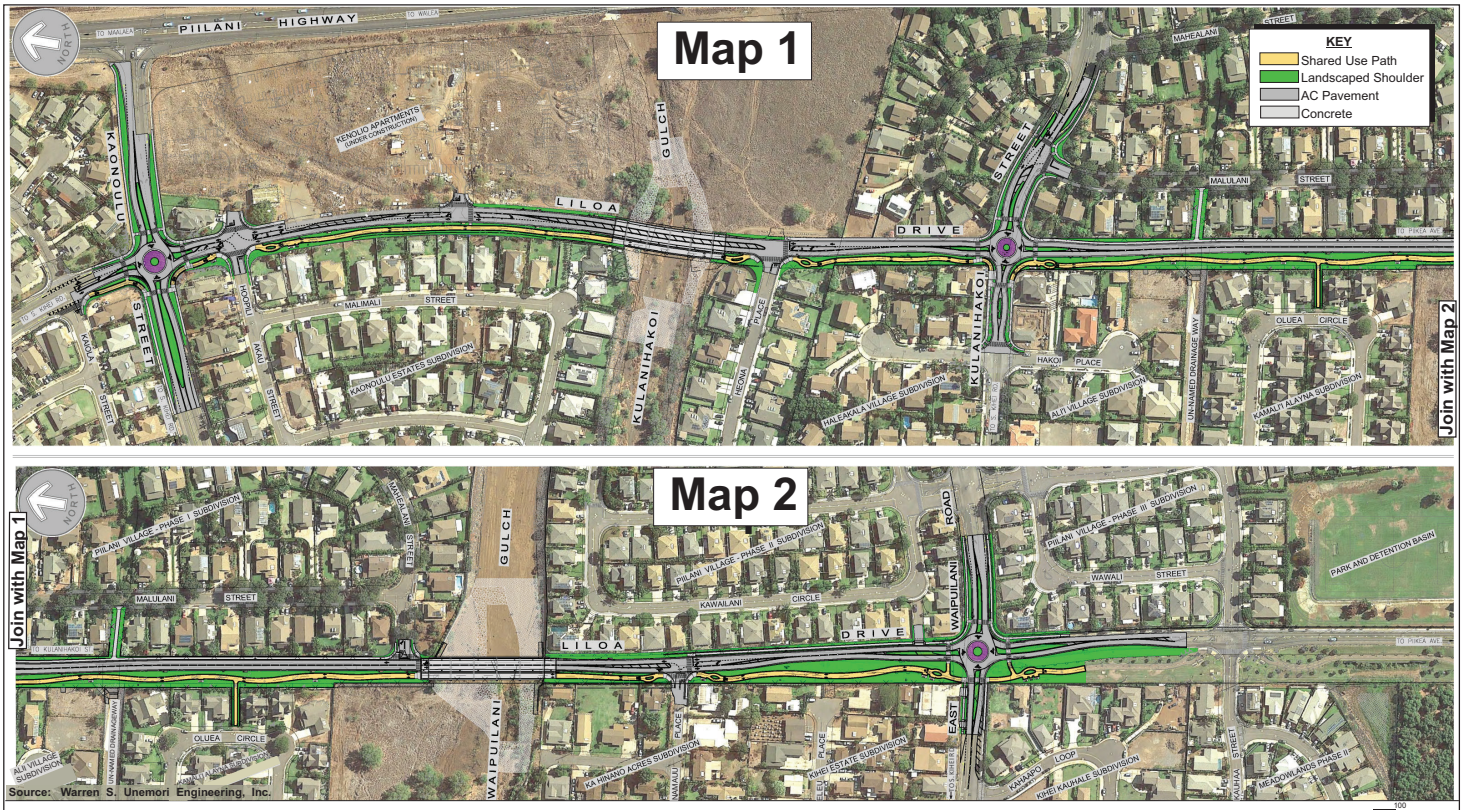


Figure 2

Proposed Liloa Drive Extension
Conceptual Plan

0 50 100 200 Feet

Prepared for: County of Maui, Department of Public Works

MUNEKIYO HIRAGA

WUE/Liloa Dr Ext (Namauu-Kaonoulu)/Applications/Figures/Conceptual Plan

LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

From: Richards, Christina E
To: Liloa Drive Extension
Subject: 01EPIF00-2021-TA-0226 Technical Assistance for the Proposed Liloa Drive Extension in Kihei, Maui
Date: Monday, April 12, 2021 3:39:08 AM
Attachments: 2021-TA-0226 Proposed Liloa Drive Extension Maui.pdf

Dear Ms. Shibuya,

Attached you will find the FWS Pacific Islands Fish and Wildlife Office's response to your species list request for the above named project.

We thank you for your efforts to conserve listed species and native habitats. Please contact me should you have any questions pertaining to this response or require further guidance. When referring to this project, please include this reference number: 01EPIF00-2021-TA-0226.

Thank you,

Christina Richards
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Pacific Islands fish and Wildlife Office
300 Ala Moana Boulevard, Rm. 3-122
Honolulu, Hawaii 96850
Phone 808-792-9450

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
01EPIF00-2021-TA-0226

April 8, 2021

Ms. Charlene S. Shibuya
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Subject: Technical Assistance for the Proposed Liloa Drive Extension in Kihei, Maui

Dear Ms. Shibuya:

Thank you for your recent correspondence requesting technical assistance on species biology, habitat, or life requisite requirements. The Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (Service) appreciates your efforts to avoid or minimize effects to protected species associated with your proposed actions. We provide the following information for your consideration under the authorities of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq*.), as amended.

Due to significant workload constraints, PIFWO is currently unable to specifically address your information request. The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. Based on your project location and description, we have noted the species most likely to occur within the vicinity of the project area, in the '**Occurs In or Near Project Area'** column. Please note this list is not comprehensive and should only be used for general guidance. We have added to the PIFWO website, located at https://www.fws.gov/pacificislands/promo.cfm?id=177175840 recommended conservation measures intended to avoid or minimize adverse effects to these federally protected species and best management practices to minimize and avoid sedimentation and erosion impacts to water quality. If your project occurs on the island of Hawai'i, we have also enclosed our biosecurity protocol for activities in or near natural areas.

If you are representing a federal action agency, please request an official species list following the instructions at our PIFWO https://www.fws.gov/pacificislands/articles.cfm?id=149489558. You can find out if your project occurs in or near designated critical habitat here: https://ecos.fws.gov/ipac/.

Under section 7 of the ESA, it is the Federal agency's (or their non-Federal designee) responsibility to make the determination of whether or not the proposed project "may affect" federally listed species or designated critical habitat. A "may affect, not likely to adversely affect" determination is appropriate when effects to federally listed species are expected to be discountable (i.e., unlikely to occur), insignificant (minimal in size), or completely beneficial. This conclusion requires written concurrence from the Service. If a "may affect, likely to adversely affect" determination is made, then the Federal agency must initiate formal consultation with the Service. Projects that are determined to have "no effect" on federally listed species and/or critical habitat do not require additional coordination or consultation.

Implementing the avoidance, minimization, or conservation measures for the species that may occur in your project area will normally enable you to make a "may affect, not likely to adversely affect" determination for your project. If it is determined that the proposed project may affect federally listed species, we recommend you contact our office early in the planning process so that we may assist you with the ESA compliance. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 10 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats and defines measures to minimize and mitigate those adverse effects.

We appreciate your efforts to conserve endangered species. We regret that we cannot provide you with more specific protected species information for your project site. If you have questions that are not answered by the information on our website, you can contact PIFWO at (808) 792-9400 and ask to speak to the lead biologist for the island where your project is located.

Sincerely,

Island Team Manager
Pacific Islands Fish and Wildlife Office

Enclosures (2)

The table below lists the protected species most likely to be encountered by projects implemented within the Hawaiian Islands. For your guidance, we have marked species that may occur in the vicinity of your project, this list is not comprehensive and should only be used for general guidance.

Enclosure 1. Federal Status of Animal Species

Scientific Name	**Common Name / Hawaiian Name**	**Federal Status**	**May Occur In Project Area**
Mammals			
Lasiurus cinereus semotus	Hawaiian hoary bat/ʻōpeʻapeʻa	E	☒
Reptiles			
Chelonia mydas	green sea turtle/honu - Central North Pacific distinct population segment (DPS)	T	☐
Eretmochelys imbricata	hawksbill sea turtle/ honu ʻea or ʻea	E	☐
Birds			
Anas wyvilliana	Hawaiian duck/koloa	E	☐
Branta sandvicensis	Hawaiian goose/nēnē	T	☐
Fulica alai	Hawaiian coot/ʻalae keʻokeʻo	E	☐
Gallinula galeata sandvicensis	Hawaiian gallinule/ʻalae ʻula	E	☐
Himantopus mexicanus knudseni	Hawaiian stilt/aeʻo	E	☐
Oceanodroma castro	band-rumped storm-petrel Hawaiʻi DPS/ʻakēʻakē	E	☒
Pterodroma sandwichensis	Hawaiian petrel/ʻuaʻu	E	☒
Puffinus auricularis newelli	Newell's shearwater/ʻaʻo	T	☒
Ardenna pacificus	wedge-tailed shearwater/ʻuaʻu kani	MBTA	☐
Buteo solitarius	Hawaiian hawk/ʻio	MBTA	☐
Gygis alba	white tern/manu-o-kū	MBTA	☐
Insects			
Manduca blackburni	Blackburn's sphinx moth	E	☐
Megalagrion pacificum	Pacific Hawaiian damselfly	E	☐
Megalagrion xanthomelas	orangeblack Hawaiian damselfly	E	☐
Megalagrion nigrohamatum nigrolineatum	blackline Hawaiian damselfly	E	☐

Enclosure 2. Federal Status of Plant Species

Plants				
Scientific Name	**Common Name or Hawaiian Name**	**Federal Status**	**Locations**	**May Occur In Project Area**
Abutilon menziesii	koʻoloaʻula	E	O, L, M, H	☐
Achyranthes splendens var. *rotundata*	ʻewa hinahina	E	O	☐
Bonamia menziesii	no common name	E	K, O, L, M, H	☐
Canavalia pubescens	ʻāwikiwiki	E	Ni, K, L, M	☐
Colubrina oppositifolia	kauila	E	O, M, H	☐
Cyperus trachysanthos	puʻukaʻa	E	K, O	☐
Gouania hillebrandii	no common name	E	Mo, M	☐
Hibiscus brackenridgei	maʻo hau hele	E	O, Mo, L, M, H	☐
Ischaemum byrone	Hilo ischaemum	E	K, O, Mo, M, H	☐
Isodendrion pyrifolium	wahine noho kula	E	O, H	☐
Marsilea villosa	ʻihiʻihi	E	Ni, O, Mo	☐
Mezoneuron kavaiense	uhiuhi	E	O, H	☐
Nothocestrum breviflorum	ʻaiea	E	H	☐
Panicum fauriei var. *carteri*	Carter's panicgrass	E	Molokini Islet (O), Mo	☐
Panicum niihauense	lauʻehu	E	K	☐
Peucedanum sandwicense	makou	E	K, O, Mo, M	☐
Pleomele (Chrysodracon) hawaiiensis	halapepe	E	H	☐
Portulaca sclerocarpa	ʻihi	E	L, H	☐
Portulaca villosa	ʻihi	E	Le, Ka, Ni, O, Mo, M, L, H, Nihoa	☐
Pritchardia affinis (maideniana)	loulu	E	H	☐
Pseudognaphalium sandwicensium var. *molokaiense*	ʻenaʻena	E	Mo, M	☐
Scaevola coriacea	dwarf naupaka	E	Mo, M	☐
Schenkia (*Centaurium*) *sebaeoides*	ʻāwiwi	E	K, O, Mo, L, M	☐
Sesbania tomentosa	ʻōhai	E	Ni, Ka, K, O, Mo, M, L, H, Necker, Nihoa	☐
Tetramolopium rockii	no common name	T	Mo	☐
Vigna o-wahuensis	no common name	E	Mo, M, L, H, Ka	☐

Location key: O=Oʻahu, K=Kauaʻi, M=Maui, H=island of Hawaiʻi, L=Lānaʻi, Mo=Molokaʻi, Ka=Kahoʻolawe, Ni=Niʻihau, Le=Lehua

MUNEKIYO HIRAGA
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Via email: pifwo_admin@fws.gov

United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipuʻilani Road to Vicinity of Kaʻonoʻulu Street), Kīhei, Maui, Hawai'i

Dear Sir or Madame:

Thank you for your Department's letter dated April 8, 2021 responding to our request for early consultation comments.

We understand that due to workload constraints, the Pacific Islands Fish and Wildlife Office (PIFWO) is unable to specifically address the information request described in our early consultation request letter. Notwithstanding, we appreciate receiving the list of protected species most likely to be encountered by projects implemented within the Hawaiian Islands.

We note that the proposed action will be funded in part by the Federal Highway Administration. Accordingly, consultation with the PIFWO will be undertaken to ensure that requirements under Section 7 of the Endangered Species Act are appropriately addressed.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\USFWS.doc

MAR 22 2021

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)21.040

MAR 17 2021

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

Dear Ms. Shibuya:

Subject: Chapter 343, Hawaii Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street) Project at Liloa Drive Kihei, Maui, Hawaii

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. Gayle Takasaki of the Planning Branch at 586-0584.

Sincerely,

CHRISTINE L. KINIMAKA
Public Works Administrator

GT:mo

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Keith Regan, Comptroller
State of Hawaii
Department of Accounting and General Service
1151 Punchbowl Street #426
Honolulu, Hawai'i 96813

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Mr. Regan:

Thank you for your Department's letter dated March 17, 2021 responding to our request for early consultation comments.

We appreciate your acknowledgment that the proposed action does not impact any of the Department's projects or existing facilities.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\DAGS.doc

APR - 5 2021

DAVID Y. IGE
GOVERNOR OF HAWAII

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

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

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

March 30, 2021

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

Dear Ms. Shibuya:

Subject: Chapter 343, Hawaii Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipu`ilani Road to Vicinity of Ka`ono`ulu Street) Project at Liloa Drive, Kihei, Maui, Hawaii

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

1. National Pollutant Discharge Elimination System (NPDES) permit coverage may be required for this project. The Clean Water Branch should be contacted at 808 586-4309.

2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please contact the Indoor & Radiological Health Branch at 808 586-4700.

It is strongly recommended that you review the department's website at https://health.hawaii.gov/epo/landuse/ and contact the appropriate program that concerns your project.

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

Sincerely,

Patti Kitkowski
District Environmental Health Program Chief

c Joanna L. Seto, P.E.

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Patti Kitkowski, District Environmental Health
Program Chief
State of Hawai'i
Department of Health
Maui Sanitation Branch
Environmental Management Division
Environmental Health Services Division (EHSD)
54 South High Street, Room #301
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Ms. Kitkowski:

Thank you for your letter dated March 30, 2021 responding to our request for early consultation comments.

In response to comments provided by your office, we note the following:

1. As applicable, a National Pollutant Discharge Elimination System (NPDES) permit will be secured. Appropriate coordination with the Department's Clean Water Branch will be undertaken.

2. As may be required, a noise permit will be obtained in accordance with Hawai'i Administrative Rules, Chapter 11-46, "Community Noise Control". Applicable coordination with the Department's Indoor & Radiological Health Branch will be conducted.

3. The project's design team will address other applicable regulatory requirements in coordination with the Department.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori 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

April 5, 2021

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 Proposed **Liloa Drive Extension** (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street Project located at Kihei, Island of Maui; Various TMKs, on behalf of County of Maui, Department of Public Works

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 and (b) 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

March 18, 2021

MEMORANDUM

FROM:

~~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.omellas@hawaii.gov)

TO:

~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for Proposed **Liloa Drive Extension** (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street Project
LOCATION: Kihei, Island of Maui; Various TMKs
APPLICANT: Munekiyo Hiraga on behalf of County of Maui, Department of Public Works

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **April 1, 2021.**

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

Signed: *Carty S. Chang*
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Mar 25, 2021

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street Project
Location: Kihei, Island of Maui
TMK(s): Various
Applicant: Munekiyo Hiraga on behalf of County of Maui, Department of Public Works

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: Mar 25, 2021

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

March 18, 2021

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)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Early Consultation Request for Proposed **Liloa Drive Extension** (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street Project
LOCATION: Kihei, Island of Maui; Various TMKs
APPLICANT: Munekiyo Hiraga on behalf of County of Maui, Department of Public Works

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **April 1, 2021.**

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.

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

Signed: _____
Print Name: Daniel Ornellas
Division: MDLO
Date: 3/18/21

Attachments
cc: Central Files

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Via email: dlnr@hawaii.gov and dlnr.land@hawaii.gov

Dawn N. S. Chang, Chairperson
State of Hawai'i
Department of Land and Natural
Resources
P.O. Box 621
Honolulu, Hawai'i 96809

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Ms. Chang:

Thank you for your Department's letter dated April 5, 2021 responding to our request for early consultation comments.

We appreciate the responses provided by the Engineering Division and the Maui District Land Division. In response to comments provided by the foregoing Departmental divisions, we offer the following:

Engineering Division

Thank you for providing us with information regarding the rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR). As indicated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the area, a copy of which will be included in the Draft Environmental Assessment, majority of the project corridor is within Flood Zone X, which is an area of minimal flood hazard. However, there are portions of the project site that are within Flood Zone A, Flood Zone AO, and Flood Zone AE.

As such, development of the project site will be in accordance with the standards for development set forth by the National Flood Insurance Program and Maui County's Flood Hazard Areas Ordinance (Chapter 19.62, Maui County Code).

Maui District Land Division

We acknowledge that the Maui District Land Division has no comments to offer at this time.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,



Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\DLNR.doc

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

April 1, 2021

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

SUBJECT: CHAPTER 343, HAWAII REVISED STATUES, EARLY CONSULTATION REQUEST FOR PROPOSED LILOA DRIVE EXTENSION (VICINITY OF EAST WAIPUILANI ROAD TO VICINTY OF KAONOULU STREET) PROJECT AT LILOA DRIVE, KIHEI, MAUI, HAWAII

Dear Charlene,

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

Please provide our office with the civil drawings for review once they are ready.
We would possibly like to comment on divided lane widths, turning radius and curbing which may affect response time.

If there are any questions or comments, please feel free to contact me at (808) 876-4694 or by email at oliver.vaas@mauicounty.gov.

Thank you,

Oliver Vaas – Fire Prevention Bureau

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Fire Prevention Bureau
Department of Fire and Public Safety
County of Maui
313 Manea Place
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Sir or Madame:

Thank you for your Department's letter dated April 1, 2021 responding to our request for early consultation comments.

We note that as part of the construction documents review process, civil engineering plans will be provided to the Department of Fire and Public Safety for review and comment.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
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MAR 2 2 2021

MICHAEL P. VICTORINO
Mayor

LORI TSUHAKO
Director

LINDA R. MUNSELL
Deputy Director



DEPARTMENT OF HOUSING
& HUMAN CONCERNS
COUNTY OF MAUI
2200 MAIN STREET, SUITE 546
WAILUKU, MAUI, HAWAI'I 96793
PHONE: (808) 270-7805

March 17, 2021

Munekiyo Hiraga
Attention: Charlene S. Shibuya
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES, EARLY CONSULTATION REQUEST FOR PROPOSED LILOA DRIVE EXTENSION (VICINITY OF EAST WAIPUILANI ROAD TO VICINITY OF KAONOULU STREET) PROJECT AT LILOA DRIVE, KIHEI, MAUI, HAWAII

The Department is in receipt of your request for an Early Consultation Request for the above subject project. Based on our review, the department has no comments to offer.

Sincerely,

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

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Lori Tsuhako, Director
County of Maui
Department of Human Concerns
2200 Main Street, Suite 546
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Ms. Tsuhako:

Thank you for your letter dated March 17, 2021 responding to our request for early consultation comments.

We acknowledge that the Department of Housing and Human Concerns has no comments at this time.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\DHC.doc

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

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

March 25, 2021

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

Dear Ms. Shibuya:

SUBJECT: CHAPTER 343, HAWAI'I REVISED STATUTES, EARLY CONSULTATION REQUEST FOR PROPOSED LILOA DRIVE EXTENSION (VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE, KIHEI, MAUI, HAWAI'I

Thank you for the opportunity to review and comment on the subject project. The Department of Parks and Recreation would like to request additional information regarding the anticipated timeline of the extension of Liloa Drive to East Welakahao Road.

This timing of this segment will affect design and development of the adjacent South Maui Community Park.

Should you have any questions, please feel free to contact me or Samual Marvel, Chief of Planning and Development at samual.marvel@co.maui.hi.us or (808) 270-6173.

Sincerely,

KARLA H. PETERS
Director of Parks and Recreation

c: Samual Marvel, Chief of Planning and Development

KHP:SM

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Patrick McCall, Director
County of Maui
Department of Parks and Recreation
700 Hali'a Nakoa Street, Unit 2F
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Mr. McCall:

Thank you for your Department's letter dated March 25, 2021 responding to our request for early consultation comments.

In response to your request for information regarding the timeline of the Liloa Drive Extension to East Welakahao Road, we note that the segment of Liloa Drive in the vicinity of the South Maui Community Park will be in Phase II of the project, with design and construction dates and durations to be determined. Once funding is secured for this future phase, the Department of Public Works will coordinate with the Department of Parks and Recreation to ensure that project effects on the South Maui Community Park can be appropriately coordinated and addressed.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\DPR.doc

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

MICHAEL P. VICTORINO
Mayor
MICHELE CHOUTEAU MCLEAN, AICP
Director
JORDAN E. HART
Deputy Director

APR - 5 2021

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

March 29, 2021

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

Dear Ms. Shibuya:

SUBJECT: REQUEST FOR COMMENT (RFC 2021/0049) FOR PROPOSED LILOA DRIVE EXTENSION, KIHEI, ISLAND OF MAUI, HAWAII

In response to your early consultation request received on March 12, 2021, the Department of Planning (Department) has reviewed the early proposal for the Liloa Drive Extension. The Department has no comments at this time and looks forward to further review when appropriate permit applications are formally submitted.

Thank you for your cooperation. If additional clarification is required, please contact Staff Planner Wesley Bradshaw at wesley.bradshaw@mauicounty.gov or at (808) 270-3867.

Sincerely,

CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

for MICHELE MCLEAN, AICP
Planning Director

xc: John S. Rapacz, Planning Program Administrator (PDF)
Wesley C. Bradshaw, Staff Planner (PDF)
Project File
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MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Kate Blystone, Director
County of Maui
Department of Planning
One Main Plaza, Suite 315
2200 Main Street
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Ms. Blystone:

Thank you for your Department's letter dated March 29, 2021 responding to our request for early consultation comments.

We acknowledge that the Planning Department has no comments at this time and will review further when the appropriate permit applications are formally submitted.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\Planning.doc

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

APR 11 2021

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

April 5, 2021

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

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Project at Liloa Drive, Kīhei, Maui, Hawai'i

Dear Ms. Shibuya,

Thank you for the opportunity to provide comments on this early consultation request for the Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Project at Liloa Drive, in Kīhei, Maui.

The County of Maui Department of Transportation (MDOT) looks forward to seeing this important and vital project move forward. While there are currently no Maui Bus routes that traverses on Kenolio Road between Uwapo Road and Ka'ono'ulu Street and on Liloa Road between Waipu'ilani Road and Kauhaa Street, there has been future route expansion suggestions in our Short Range Transit Plan. Should this north-south collector road open between Uwapo Road and Pi'ikea Road, this would allow for future route modifications to the Kihei Villager Route #15 as well as allow our current Kīhei Islander Route #10 to detour when South Kīhei Road closes for various reasons.

As public transportation is a vital service for many residents of Maui, we ask that pre-determined locations along the new north-south collector road include future areas that could be used as bus stops.

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

Sincerely,

Marc Takamori
Director

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Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Marc Takamori, Director
County of Maui
Department of Transportation
110 Ala'ihi Street, Suite 210
Kahului, Hawai'i 96732

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Mr. Takamori:

Thank you for your letter dated April 5, 2021 responding to our request for early consultation comments.

We appreciate the Department of Transportation's comments as they relate to routes for the Maui Bus. We understand that the proposed project may allow for future route modifications to the Kīhei Villager Route #15 and serve as a possible detour alternative for the Kīhei Islander Route #10. As engineering plans are further developed, coordination will be undertaken with the Department of Transportation to facilitate identification of future bus stop locations.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\MDOT.doc

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

APR 20 2021

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

April 15, 2021

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

Re: Chapter 343, Hawaii Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street) Project at Liloa Drive, Kihei, Maui, Hawaii

Dear Mr. Sugidono:

This is in response to your letter dated March 12, 2021 requesting comments for the proposed Liloa Drive Extension project.

In review of the submitted documents, we would like to suggest leaving an access way for pedestrians to walk or children to ride their bicycles safely around the construction site. This will allow pedestrians to commute between Kaonoulu Road, Kulanihakoi Street, and Waipuilani Road and children to ride their bicycles to and from school.

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

Sincerely,

Assistant Chief John Jakubczak
for: TIVOLI S. FAAUMU
Chief of Police

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Karlynn K. Fukuda
PRESIDENT

Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT

Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

John Pelletier, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Chief Pelletier:

Thank you for your Department's letter dated April 15, 2021 responding to our request for early consultation comments.

We appreciate the Department's suggestion that access be provided for pedestrians and cyclists around the construction site. Unfortunately, during construction, the full width of the Liloa Drive right-of-way will be utilized by the contractor to establish the roadway prism and install the underlying utility lines. In order to preserve the safety and integrity of the construction zone, we will not be able to offer pedestrian and bicycle access during construction. As well, intersections that require improvements will be temporarily affected to accommodate construction. Alternative routes will be identified with signage to inform the public of the detouring plans. Such measures will seek to provide safe alternatives for both pedestrians and cyclists. Once completed, the Liloa Drive Extension will include a Shared Use Path for pedestrians and cyclists.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\EC\EC Response\MPD.doc

MICHAEL P. VICTORINO
Mayor

JEFFREY T. PEARSON, P.E.
Director

HELENE KAU
Deputy Director



DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAI'I 96793

August 30, 2021

Ms. Charlene Shibuya
MUNEKIYO HIRAGA
via email: liloadrive@munekiyohiraga.com

Dear Ms. Shibuya:

SUBJECT: EARLY CONSULTATION REQUEST FOR THE PROPOSED LILOA DRIVE EXTENSION (VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT
Kihei, Maui, Hawaii

Thank you for the opportunity to review and comment on the subject project, which includes the construction of a two-land roadway and landscaped shared use path.

Along the proposed Liloa Drive Extension, the Department of Water Supply has existing 8, 12, 18 and 36-inch waterlines. These existing waterlines may need to be adjusted in accordance with the Department's Water System Standards 2002, as amended. Requirements will be determined at the time of civil plan review and approval. These requirements may include, but are not limited to the following:

- Minimum horizontal and vertical clearances between water mains and other utilities or obstructions
- Pipeline easements
- Concrete jacket of water mains and/or other utilities
- Installation of fire hydrants
- Installation of new concrete collars to all water valves and manholes
- Replacement of existing valve box risers and covers
- Installation of service lateral connections to provide water to landscaped shared use path

Should you have any questions or need further information, please contact Tammy Yeh of our Engineering Division at (808) 270-7682 or at tammy.yeh@co.maui.hi.us. Engineering Division's main number is (808) 270-7835.

Sincerely,

WENDY TAOMOTO, P.E.
Engineering Program Manager

TY

cc: DWS Water Resources & Planning, via email: Water.Resources@mauicounty.gov

"By Water All Things Find Life"

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

John Stufflebean, P.E., Director
County of Maui
Department of Water Supply
200 S. High Street
Kalana O Maui Bldg., 5th Floor
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Mr. Stufflebean:

Thank you for your Department's letter dated August 30, 2021 responding to our request for early consultation comments.

We acknowledge that the Department of Water Supply has existing 8, 12, 18, and 36-inch waterlines along the proposed Liloa Drive Extension and that these existing waterlines may need to be adjusted in accordance with the Department's Water System Standards 2002, as amended. We understand that the requirements will be determined at the time of civil plan review and approval.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associate

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
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MAR 30 2021

Maui Economic Opportunity, Inc.
P.O. Box 2122
Kahului, HI 96733
808-249-2990
Fax: 808-249-2991
www.meoinc.org

March 24, 2021

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

Re: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Project at Liloa Drive, Kihei, Maui, Hawai'i

TO WHOMEVER IT MAY CONCERN:

I am writing on behalf of Maui Economic Opportunity, Inc., CEO Debbie Cabebe, SHRM-SCP, SPHR.

MEO supports this project because the development of the North South Collector Road will significantly improve traffic in this often congested Kihei corridor.

MEO operates the Maui Bus paratransit service, transporting persons with disabilities, as well as youths and seniors through our Human Services transportation program. Highway projects that ease traversing the neighborhoods in the area are welcomed and have the backing of MEO.

We would like to note that Liloa Drive passes by Kihei Elementary and Lokelani Intermediate schools and the South Maui Regional Park, sites that may be serviced by our Human Services buses, and the affordable rental Kenolio Apartments project, whose tenants may include paratransit riders.

Our only concern would be traffic disruptions due to construction. We simply ask that construction plans take into consideration the safe and timely passage of our buses.

Thank you for the opportunity to comment on this project.

Lee Imada
MEO Administrative Executive Assistant

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

July 16, 2024

Debbie Cabebe, Chief Executive Officer
Maui Economic Opportunity, Inc.
99 Mahalani Street
Wailuku, Hawai'i 96793

SUBJECT: Chapter 343, Hawai'i Revised Statutes, Early Consultation Request for Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Kīhei, Maui, Hawai'i

Dear Ms. Cabebe:

Thank you for your Department's letter of March 24, 2021 responding to our request for early consultation comments.

We appreciate Maui Economic Opportunity's support for the project. We understand that projects such as the Liloa Drive Extension facilitate paratransit services for persons with disabilities, as well as for youth and seniors requiring human services-related transportation.

We note that the Department of Public Works and its engineering design team will incorporate appropriate Best Management Practices to ensure that construction is undertaken without compromising safety for the traveling public.

Thank you again for participating in the early consultation process for the Proposed Liloa Drive Extension Project.

Very truly yours,

Hoku Krueger
Associte

HK:tn
cc: Nolly Yagin, County of Maui, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
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PARTIES CONSULTED DURING THE PREPARATION OF THE FINAL ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

APPENDIX

N-2

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

The Draft Environmental Assessment (EA) for the subject action was filed and published with the Office of Planning and Sustainable Development, Environmental Review Program on July 23, 2024. The following agencies were sent a copy of the Draft EA. Comments on the Draft EA were received during the 30-day public comment period. Letters received as well as responses to substantive comments are included in this Chapter.

FEDERAL AGENCIES

1. U.S. Department of Commerce
   National Marine Fisheries Service
   Pacific Islands Regional Office
   1845 Wasp Blvd., Building 176
   Honolulu, HI 96818

2. Jason Hew, Acting District Conservationist
   U.S. Department of Agriculture-NRCS
   Natural Resources Conservation Service
   77 Hoʻokele Street, Suite 202
   Kahului, HI 96732

3. Kay Zukeran
   NOAA Inouye Regional Center
   NMFS/PIRO
   1845 Wasp Blvd., Building 176
   Honolulu, HI 96818

4. Jen Martin, Chief
   U.S. Department of the Army, Regulatory Branch
   U.S. Army Corps of Engineers, Honolulu District
   Regulatory Branch, Building 230
   Fort Shafter, HI 96858-5440
   Via email: CEPOH-RO@usace.army.mil

5. U.S. Army Corps of Engineers
   Pacific Ocean Division
   Building 525, Suite 300
   Fort Shafter, HI 96858-5440

6. U.S. Department of Transportation-Aviation
   Federal Aviation Administration
   300 Ala Moana Boulevard, Room 7-128
   Honolulu, HI 96850-7128

7. U.S. Department of Transportation-Highways
   Federal Highways Administration
   Hawaii Division, Box 50206
   300 Ala Moana Boulevard, Room 3306
   Honolulu, HI 96850

8. U.S. Department of Transportation
   Federal Transit Administration
   Region 9 Office, Building 90
   7th Street, Suite 15-300
   San Francisco, CA 94103

9. U.S. Environmental Protection Agency
   Pacific Islands Contact Office
   300 Ala Moana Blvd., Room 5124
   Honolulu, HI 96850

10. U.S. Fish and Wildlife Service
    Pacific Islands Fish and Wildlife Office
    300 Ala Moana Blvd., Rm. 3-122
    Honolulu, HI 96850
    Via email: pifwo_admin@fws.gov

11. Stephen Anthony, Center Director
    U.S. Geological Survey
    Pacific Islands Water Science Center
    Inouye Regional Center
    1845 Wasp Blvd., B176
    Honolulu, HI 96818

STATE AGENCIES

12. Kenneth Hara, Adjutant General
    State of Hawaiʻi
    Department of Defense
    3949 Diamond Head Road
    Honolulu, HI 96816-4495

13. Angus L.K. McKelvey, Senator
    Hawai‘i State Senate
    Senate District 6
    West Maui, Mā‘alaea, Waikapū, South Maui
    415 S. Beretania Street
    Hawai‘i State Capitol, Room 223
    Honolulu, HI 96813

14. Dawn N.S. Chang, Chairperson
    State of Hawai‘i
    Department of Land and Natural Resources,
    Commission on Water Resource
    Management
    P.O. Box 621
    Honolulu, HI 96809
    Via email: dlnr@hawaii.gov and
    dlnr.land@hawaii.gov

15. Keith Regan, Comptroller
    State of Hawai‘i
    Department of Accounting and General
    Services
    1151 Punchbowl Street
    Honolulu, HI 96813

16. Sharon Hurd, Chair
    State of Hawai‘i
    Department of Agriculture
    1428 South King Street
    Honolulu, HI 96814-2512

17. Roderick K. Becker, Director
    State of Hawai‘i
    Department of Budget and Finance
    P.O. Box 150
    Honolulu, HI 96810

18. James Kunane Tokioka, Director
    State of Hawai‘i
    Department of Business, Economic
    Development & Tourism (DBEDT)
    P.O. Box 2359
    Honolulu, HI 96804

19. Keith Hayashi, Superintendent
    State of Hawai‘i
    Department of Education
    P. O. Box 2360
    Honolulu, HI 96804

20. Heidi Meeker
    State of Hawai‘i
    Department of Education
    Office of Business Services
    3633 Waialae Avenue, Room C-209
    Honolulu, HI 96816

21. Kali Watson, Chair
    State of Hawai‘i
    Department of Hawaiian Home Lands
    P. O. Box 1879
    Honolulu, HI 96805

22. Kenneth S. Fink, MD, MGA, MPH, Director
    State of Hawai‘i
    Department of Health
    1250 Punchbowl St., Room 325
    Honolulu, HI 96813

23. Darryl Lum, P.E., Chief
    State of Hawai‘i
    Department of Health
    Clean Water Branch
    Environmental Management Division
    2827 Waimano Home Road
    Hale Ola, Room 225
    Pearl City, HI 96782-1487

24. Kathleen Ho, Deputy Director
    State of Hawai‘i
    Department of Health
    Environmental Health Administration
    1250 Punchbowl Street
    Honolulu, HI 96813

25. Lene Ichinotsubo, P.E., Acting Chief
    State of Hawai‘i
    Department of Health, Solid and Hazardous
    Waste Branch
    Environmental Management Division
    2827 Waimano Home Road, Suite 100
    Pearl City, HI 96782-1407

26. Patti Kitkowski, District Environmental
    Health Program Chief
    State of Hawai‘i
    Department of Health
    Maui Sanitation Branch
    Environmental Health Service Division
    (EHSD)
    54 High Street, Room 300
    Wailuku, HI 96793

27. Department of Land and Natural Resources
    State of Hawai‘i
    Division of State Parks
    P.O. Box 621
    Honolulu, HI 96809

28. Ed Sniffen, Director
State of Hawai'i
Department of Transportation
869 Punchbowl Street, Room 509
Honolulu, HI 96813-5097

29. Stacy Kealohalani Ferreira, Chief Executive Officer (Ka Pouhana)
State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, HI 96817

30. Mary Alice Evans, Director
State of Hawai'i
Office of Planning and Sustainable Development
P. O. Box 2359
Honolulu, HI 96804-2359

MAUI COUNTY AGENCIES

31. Shayne Agawa, P.E., Director
County of Maui
Department of Environmental Management
200 S. High Street
Wailuku, HI 96793

32. Bradford Ventura, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, HI 96732

33. Richard Mitchell, Director
County of Maui
Department of Housing
2065 Main Street, Suite 108
Wailuku, HI 96793

34. Lori Tsuhako, Director
County of Maui
Department of Human Concerns
2200 Main Street, Suite 546
Wailuku, HI 96793

35. Patrick McCall, Director
County of Maui
Department of Parks and Recreation
P. O. Box 1405
Wailuku, HI 96793

36. Kate Blystone, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, HI 96793

37. Marc Takamori, Director
County of Maui
Department of Transportation
200 S. High Street
Wailuku, HI 96793

38. John Stufflebean, P.E., Director
County of Maui
Department of Water Supply
200 S. High Street, 5th Floor
Wailuku, HI 96793

39. Amos Lonokailua-Hewett, Administrator
Maui Emergency Management Agency
County of Maui
200 S. High Street, 1st Floor
Wailuku, HI 96793

40. John Pelletier, Chief
County of Maui
Maui Police Department
55 Mahalani Street
Wailuku, HI 96793

41. Yuki Lei Sugimura, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

42. Keani Rawlins-Fernandez, Council Vice Chair
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

43. Thomas Cook, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

44. Gabe Johnson, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

45. Tasha Kama, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

46. Alice Lee, Council Chair
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

47. Nohe U'u-Hodgins, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

48. Tamara Paltin, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

49. Shane Sinenci, Councilmember
County of Maui
Maui County Council
200 S. High Street, 8th Floor
Wailuku, HI 96793

MAUI COUNTY ORGANIZATIONS

50. Marc Grider, Manager, Engineering
Hawaiian Electric Company, Inc.
P. O. Box 398
Kahului, HI 96733

51. Hawaiian Telcom
Plan Review Department
Via email: HT-PlanReviews@hawaiiantel.com

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

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

54. Maui Hotel & Lodging Association
85 North Church Street
Wailuku, HI 96793

55. Albert Perez, Executive Director
Maui Tomorow
P. O. Box 880390
Pukalani, HI 96788
Via email:
director.mauitomorrow@gmail.com

56. Spectrum
158 Ma'a Street
Kahului, HI 96732

57. Cody Nemet (Interim)
'Aha Moku O Maui
Kula Makai
Via email: kokoroots@gmail.com

58. Ke'eaumoku Kapu, CEO
'Aha Moku O Maui
Via email: kapukapuakea@gmail.com

Subject: FW: USACE Comments on Draft Environmental Assessment for the Proposed Liloa Drive Extension

From: Morgan, Jeremy K CIV USARMY CEPOH (USA) <Jeremy.K.Morgan@usace.army.mil>
Sent: Friday, July 26, 2024 3:50 PM
To: public.works@mauicounty.gov; Liloa Drive Extension <liloadrive@munekiyohiraga.com>
Subject: USACE Comments on Draft Environmental Assessment for the Proposed Liloa Drive Extension

This is an EXTERNAL e-mail.
Only open links and attachments from a Trusted Sender.

Aloha Hoku,

The U.S. Army Corps of Engineers has received your request for comments on the proposed Liloa Drive Extension project in Kihei, Island of Maui, HI. Based on the provided information, it appears a Corps permit would be required for this project.

According to our records, Nationwide Permit (NWP) 14 verifications were issued for the aquatic resource crossings at Kulanihako'i Gulch, Waipuilani Gulch, and an unnamed drainage channel located between them on March 24, 2023. These verifications continue to be valid until their expiration date on March 14, 2026. If copies of these verifications need to be resent to you or you have questions, feel free to reach out to us.

If there are any other potential waters of the U.S. that would be affected by the proposed project, we ask that a permit application be completed and submitted to CEPOH-RO@usace.army.mil for our review. Additional information about our program and a permit application can be found at https://www.poh.usace.army.mil/Missions/Regulatory/Permits/Nationwide-Permits/.

Mahalo,

Jeremy Morgan
Biologist/Regulatory Specialist
Regulatory Division
U.S. Army Corps of Engineers | Honolulu District
230 Otake Street, Building 252
Fort Shafter, Hawaii 96858-5440
Phone: 808-551-5496
Jeremy.K.Morgan@usace.army.mil
https://www.poh.usace.army.mil/Missions/Regulatory/

RRS REGULATORY REQUEST SYSTEM beta
Streamline the permitting process with the **Regulatory Request System (RRS)** — your new online platform for permit applications.
rrs.usace.army.mil

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PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Jeremy Morgan, Biologist/Regulatory Specialist
Regulatory Division
U.S. Army Corps of Engineers
230 Otake Street, Building 252
Fort Shafter, Hawai'i 96858-5440

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Morgan:

Thank you for your email dated July 26, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

We appreciate the U.S. Army Corps of Engineers' confirmation that Nationwide Permit (NWP) verifications were issued for the aquatic resource crossings at Kūlanihāko'i Gulch, Waipu'ilani Gulch, and the Un-Named Drainageway, which are valid until March 14, 2026. The project will apply for an updated NWP prior to construction, as necessary. No other potential waters of the U.S. will be affected by the proposed project.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\Draft EA\Draft EA Res\USACE.docx

Subject: FW: USFWS Comments on Draft EA for Proposed Liloa Drive Extention, Kīhei, Maui (USFWS IPaC code 2024-0019282)
Attachments: Invasive Species Biosecurity Protocols_FINAL_July 2024_MAUI.docx

From: Harrington, Carrie <carrie_harrington@fws.gov>
Sent: Thursday, August 22, 2024 2:09 PM
To: public.works@mauicounty.gov; Liloa Drive Extension <liloadrive@munekiyohiraga.com>
Cc: Javar-Salas, Chelsie <chelsie_javar-salas@fws.gov>
Subject: USFWS Comments on Draft EA for Proposed Liloa Drive Extention, Kīhei, Maui (USFWS IPaC code 2024-0019282)

This is an EXTERNAL e-mail.
Only open links and attachments from a Trusted Sender.

Aloha Hoku and Jordan,

Thank you for including USFWS recommendations for listed species provided during early consultation into the draft EA for the Liloa Drive Extension Project.

Upon further review of the project description, scope, and potential impacts to listed species, we recommend that before construction begins, another biological survey take place since it has been approximately 7 years since the last survey (2017).

We also encourage you to reach out to our Aquatics Team for coordination under the **Fish and Wildlife Coordination Act** (FWCA). You can email pifwo_admin@fws.gov and cc dan_polhemus@fws.gov with your request. Our records indicate there is degraded ephemeral wetland habitat within the project footprint, including the three gulches described in the draft EA. Our Aquatics Team may have project specific recommendations outside of our general BMPs for work in or near aquatic environments. For example, the size of the culverts is critical in these flood plain areas to ensure that flood waters are not accelerated resulting in impacts to listed species.

Kīhei was once a vast wetland area and there are currently severe flooding issues during heavy rains due to the abundance of wetland habitat that is no longer able to function as wetlands should. Urban development, water diversions, and sea level rise contribute to these flooding events. This flooding of contaminated water negatively impacts listed waterbirds and marine turtles. Because of these flooding events in Kīhei, we recommend you plan for 6 feet of sea level rise rather than 3.2 feet. Sea level rise is not anticpated to be linear and there is still a lot of unknowns regarding the timing of impacts associated with land ice melt.

We also recommend you restore the natural function of the gulches and streambeds rather than using concrete, and explore alternatives such as natural infrastructure. Restoring the various forms of wetland habitat types within the project footprint and adjacent areas will benefit listed species by providing foraging habitat and reducing the runoff and erosion that is known to occur in these gulches that may negatively impact listed species (e.g., waterbirds and marine turtles).

Please also find our for invasive species biosecurity protocol attached. We recommend the relevant measures be incorporated into all projects on Maui.

We look forward to continuing to provide technical assistance as you refine the Liloa Drive Extension Project. Please contact me should you have any questions pertaining to our comments provided in this email.

Best regards,
Carrie

Carrie L. Harrington (she/her)

Endangered Species Biologist, Hawai'i Island and Maui Nui Team

Pacific Islands Fish and Wildlife Office

U.S. Fish and Wildlife Service

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PIFWO Invasive Species Biosecurity Protocols

(Updated July 2024)

Project activities may introduce or spread invasive species, causing negative ecological consequences to new areas or islands, resulting in potential impacts to fish, wildlife, and their habitat. For example, seeds of invasive plant species (e.g., *Chromolaena odorata*, *Senecio madagascariensis*, *Cyathea cooperi*, or *Miconia calvescens*) can be inadvertently transported on equipment from a previous work site to a new site where the species are not present. Likewise, equipment used in an area infected with a pathogen or insect pest that can have ecological consequences (e.g., rapid ʻōhiʻa death (*Ceratocystis spp.*), black twig borer (*Xylosandrus compactus*), or naio thrips (*Klambothrips myopori*), if not properly decontaminated, can act as a vector to introduce the pathogen into a new area. Additionally, vehicles must be properly inspected and cleaned to ensure vertebrate or invertebrate pests do not stowaway and spread to other areas. These are just a few examples of how even well-intended project activities may inadvertently introduce or spread invasive species.

To avoid and minimize invasive species potential impacts to fish, wildlife, and their habitat we recommend incorporating general biosecurity protocols into your project planning (see below). Additional consultation is recommended if project activities involve transportation of materials, equipment, vehicles, etc. between islands or transpacific movement of materials or equipment.

Invasive Species Biosecurity Protocol

The following biosecurity protocol is recommended to be incorporated into planning for your project to avoid or minimize transportation of invasive species with potential to impact to fish, wildlife, and their habitat. Cleaning, treatment, and/or inspection activities are the responsibility of the equipment or vehicle owner and operator. However, it is ultimately the responsibility of the action agency to ensure that all project materials, vehicles, machinery, equipment, and personnel are free of invasive species before entry into a project site. Please refer to the resources listed below for current removal/treatment recommendations that may be relevant to your project.

1. Cleaning and treatment:
   Project applicants should assume that all project materials (i.e., construction materials, or aggregate such as dirt, sand, gravel, etc.), vehicles, machinery, and equipment contain dirt and mud, debris, plant seeds, and other invasive species, and therefore require thorough cleaning. Treatment for specific pests, for example, trapping and poison baiting for rodents, or baiting and fumigation for insects, should be considered when applicable. For effective cleaning we offer the following recommendations prior to entry into a project site:
   a. Project materials, vehicles, machinery, and equipment must be pressure washed thoroughly (preferably with hot water) in a designated cleaning area. Project materials, vehicles, machinery, and equipment should be visibly free of mud/dirt (excluding aggregate), seeds, plant debris, insects, spiders, frogs (including frog eggs), other vertebrate species (e.g., rodents, mongoose, feral cats, reptiles, etc.), and rubbish. Areas of particular concern include bumpers, grills, hood compartments, wheel wells, undercarriage, cabs, and truck beds. Truck beds with accumulated material are prime sites for hitchhiking invasive species.
   b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food, which can attract pests (i.e., rodents and insects). The interiors of vehicles and the cabs of machinery should be vacuumed clean particularly for any plant material or seeds.

2. Inspection:
   a. Following cleaning and/or treatment, project materials, vehicles, machinery, and equipment, must be visually inspected by its user, and be free of mud/dirt (excluding aggregate), debris, and invasive species prior to entry into a project site. For example, careful visual inspection of a vehicle's tires and undercarriage is recommended for any remaining mud that could contain invasive plant seeds.
   b. Any project materials, vehicles, machinery, or equipment found to contain invasive species (e.g., plant seeds, invertebrates, rodents, mongoose, cats, reptiles, etc.) must not enter the project site until those invasive species are properly removed/treated.

3. For all project site personnel:
   a. Prior to entry into the project site, visually inspect and clean your clothes, boots or other footwear, backpack, radio harness, tools and other personal gear and equipment for insects, seeds, soil, plant parts, or other debris. We recommend the use of a cleaning brush with sturdy bristles. Seeds found on clothing, footwear, backpacks, etc., should be placed in a secure bag or similar container and discarded in the trash rather than being dropped to ground at the project site or elsewhere.

4. Additional considerations:
    a. Consider implementing a Hazard Analysis and Critical Control Point (HACCP) plan (https://www.fws.gov/policy/A1750fw1.html) to improve project planning around reducing the risk of introducing or spreading invasive species.
    b. When applicable, use pest-free or low-risk sources of plants, mulch, wood, animal feed or other materials to be transported to a project site.
    c. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected, and if necessary, appropriately cleaned or treated for invasive species prior to being transported to the project site.
    d. Avoid unnecessary exposure to invasive species at a particular site (to the extent practical) to reduce contamination and spread. For example, if your project involves people or equipment moving between multiple locations, plan and organize timelines so that work is completed in native habitat prior to working in a disturbed location to reduce the likelihood of introducing a pest into the native habitat.
    e. Maintain good communication about invasive species risks between project managers and personnel working on the project site (e.g., conduct briefings and training about invasive species). Ensure prevention measures are communicated to the entire project team. Also consider adding language on biosecurity into contracts or permitting mechanisms to provide clarity to all involved in the project. Report any species of concern or possible introduction of invasive species to appropriate land managers.

For current removal/treatment recommendations please refer to the following:
Hawaiian Islands:

- Hawai‘i Island – https://www.biisc.org/
- Maui – https://mauiinvasive.org/
- Moloka‘i - https://www.molokaiisc.org/
- Lāna‘i - https://pulamalanai.com/
- O‘ahu – https://www.oahuisc.org/
- Kaua‘i – https://www.kauaiisc.org/

Species-Specific Biosecurity Protocols

The following section contains specific protocols for a few select invasive species of concern in the Pacific Islands highlighted because of their potential to easily spread and cause great harm to native species and habitats. Other invasive species may not have existing specific protocols or may already be minimized by implementing the general invasive species protocols above (e.g., invasive plants, invertebrates, larger vertebrates). Information on other invasive species can be found in the island specific links below. As new threats emerge that require development of species-specific protocols, those may be added to this list.

Table 1. Current island distribution of invasive species with specific biosecurity protocols in the Pacific Islands (PIFWO jurisdiction).

Island	**Invasive Species with Specific Protocols**			
	Rapid ‘Ōhi‘a Death	**Little Fire Ant**	**Coconut Rhinoceros Beetle**	**Brown Treesnake**
Island of Hawai‘i	widespread	widespread	not present	not present
Maui	present	incipient	detected in Nov 2023, not observed since but we recommend implementing related biosecurity BMPs	not present
O‘ahu	incipient	incipient	widespread	not present
Kaua‘i	widespread	not present	not present	not present

Rapid ‘Ōhi‘a Death (ROD)

If working directly with ‘ōhi‘a trees (e.g., sampling suspected trees, clearing an area of ‘ōhi‘a, etc.) or in an area(s) known to be highly infested with ROD, additional consultation is recommended.

Current Distribution of ROD: island of Hawai‘i, Maui, O‘ahu, Kaua‘i (https://cms.ctahr.hawaii.edu/rod

While ROD is not currently reported on Moloka‘i at this time, if you are in ‘ōhi‘a forest it would be prudent to take precautions. Also, consider where the equiptment to be used on Moloka‘i will be coming from, and if from an island with confirmed ROD, take the necessary precautions.

Rapid ‘Ōhi‘a Death (ROD) is a caused by a fungal pathogen (*Ceratocystis* spp.) that attacks and kills ‘ōhi‘a trees (*Metrosideros polymorpha*). ‘Ōhi‘a is endemic to the Hawaiian Islands and is the most abundant native tree species, comprising approximately 80 percent of Hawai‘i’s remaining native forests.

For more information about ROD including its current distribution, ROD science updates, and the latest on ROD protocol, please visit www.rapidohiadeath.org.

To reduce the risk of spreading ROD, the following best management practices and decontamination protocol are recommended:

Best Management Practices for ROD

1. Never transport any part of an ʻōhiʻa tree between different areas of an island or to a different island.

2. Do not use equipment from ROD infected islands on another island unless it is very specialized equipment and follows the decontamination protocol described below.

3. Avoid wounding ʻōhiʻa trees and roots with mowers, chainsaws, weed eaters, and other tools. If an ʻōhiʻa receives a minor injury like a small broken branch, then give the injury a clean, pruning-type cut (close to the main part of the trunk or branch) to promote healing, and then spray the entire wounded area with a pruning seal.

4. Always report suspect ROD ʻōhiʻa trees observed within you project area. ROD is a wilt disease that cuts off the supply of water and nutrients to the tree. The primary symptom to look for is an entire canopy or a large branch with dying leaves or red discolored leaves. Please record the GPS coordinates and location and take a picture of the tree if possible. Please report suspected ROD ʻōhiʻa trees to the following agencies:
    a. Island of Hawaiʻi – BIISC: 808-969-8268 (ohialove@hawaii.edu)
    b. Maui – MISC: 808-573-6472 (miscpr@hawaii.edu)
    c. Molokaʻi – TNC: 808-553-5236 ext. 6585 (lbuchanan@tnc.org)
    d. Oʻahu – OISC: 808-266-7994 (oisc@hawaii.edu)
    e. Kauaʻi – KISC: 808-821-1490 (kisc@hawaii.edu)

ROD Decontamination Protocol

1. Clothes, footwear, backpacks, and other personal equipment
    a. Before leaving the project site, remove as much mud and other contaminants as possible. Use of a brush with soap and water to clean gear is preferred. Footwear, backpacks, and other gear must be sanitized by spraying with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution.

2. Vehicles, machinery, and other equipment
    a. Vehicles, machinery, and other equipment must be thoroughly hosed down with water (pressure washing preferred) and visibly free of mud and debris, then sprayed with a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. Use of a "pump-pot" sprayer is recommended for the solution and a hot water wash is preferred. Be sure to thoroughly clean the undercarriage, truck bed, bumpers, and wheel wells.
    b. If non-decontaminated personnel or items enter a vehicle, then the inside of the vehicle (i.e., floor mats, etc.) must be subsequently decontaminated by removing mud and other contaminants and sprayed with the one of the same aforementioned sanitizing solutions.

3. Cutting tools
    a. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible mud and other contaminants. Tools must be sanitized using a solution of >70 percent isopropyl alcohol or a freshly mixed 10 percent bleach solution. One minute after sanitizing, one may apply an oil-based lubricant to chainsaw chains or other metallic parts to prevent corrosion as bleach is corrosive to metal.

    NOTE: When using a 10 percent bleach solution, surfaces should be cleaned with a minimum contact time of 30 seconds. Bleach must be mixed daily and used within 24 hours, as once mixed it degrades. Bleach will not work to disinfect surfaces that have high levels of organic matter such as sawdust or soil. Because bleach is also corrosive to metal, a water rinse after proper sanitization is recommended to avoid corrosion.

Little Fire Ant (LFA)

For the most current status on distribution and infestations, please visit http://stoptheant.org/lfa-in-hawaii/

The little fire ant (*Wasmannia auropunctata*), or LFA, is an invasive species with a painful sting that can inhabit many different environments. In Hawaiʻi, it often infests agricultural fields and farms, damaging crops and stinging unsuspecting workers. Little fire ants are also highly disruptive to native tropical ecosystems and harmful to wildlife. Slow moving, but tiny and capable of foraging 24 hours a day with multiple queens per colony, LFA is a formidable threat to biodiversity, agriculture, and quality of life on tropical islands in the Pacific.

For more information about LFA including helpful guides and workshops for treating or detecting LFA, please visit www.littlefireants.com.

To reduce the risk of spreading LFA, the following biosecurity protocol is recommended:

Biosecurity Protocol for LFA

1. For projects involving plants from nurseries (e.g., outplanting activities, etc.), all plants should be inspected for little fire ants and other pests prior to being transported to the project site. If plants are found to be infested by ants of any species, plants should be sourced from an alternative nursery and the infested nursery should follow treatment protocols recommended by the Hawaiʻi Ant Lab (https://littlefireants.com/wp-content/uploads/2020-Management-of-Pest-Ants-in-Nurseries-min.pdf).

2. All work vehicles, machinery, and equipment should follow steps 1 and 2 in the "Invasive Species Biosecurity Protocol" for (1) cleaning and treatment and (2) inspection for invasive ants prior to entering a project site.

3. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter the project site until it is properly treated (https://littlefireants.com/how-to-treat-for-little-fire-ants-for-homeowners/#recommended-bait-products) and re-tested. Infested vehicles must be treated following recommendations by the Hawai'i Ant Lab (https://littlefireants.com/resource-center/) or another ant control expert and in accordance with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner. Ultimately however, it is the responsibility of the action agency to ensure that all project materials, vehicles, machinery, and equipment follow the appropriate protocol(s).

4. General Vehicle Ant Hygiene: Even the cleanest vehicle can pick up and spread little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in the vehicle and note that larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If the bait station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

5. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

6. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0 percent Hydramethylnon; https://labelsds.com/images/user_uploads/Maxforce%20Complete%20Label%201-5-18.pdf) or AmdroPro (0.73 percent Hydramethylnon; https://connpest.com/labels/AMDROPRO.pdf) following label guidance.

7. Vehicles that have entered a project site known or thought to overlap with areas infested with LFA should subsequently be tested for LFA with baiting in accordance with protocol recommended by the Hawai'i Ant Lab (https://littlefireants.com/survey-your-home-for-lfa/).

8. If LFA are detected, please report it to 808-643-PEST (Hawai'i), 671-475-PEST (Guam), or 684-699-1575 (American Samoa). Please visit https://littlefireants.com/identification-of-little-fire-ants/ for assistance in identifying LFA.

Coconut Rhinoceros Beetle (CRB)

Current Distribution of CRB in Hawai'i: O'ahu, detected on Maui in November 2023 but not observed since (there are ongoing search efforts: https://governor.hawaii.gov/newsroom/hdoa-news-release-on-on-going-efforts-against-the-coconut-rhinoceros-beetle-on-maui/)

The coconut rhinoceros beetle (*Oryctes rhinoceros*), or CRB, is a large, horned scarab beetle native to Southeast Asia. An invasive pest where it occurs outside of its native range, the adult beetles primarily attack coconut palms by boring into the crowns to feed on developing leaves. It is also known to feed on bananas, sugarcane, pineapples, oil palms, and pandanus trees. The larval grub stage burrow into and feed upon decomposing mulch and vegetation. On most Pacific Islands it lacks natural predators, leading to severe declines and extirpations of palm species where it has become established. On Guam, researchers have recently documented a shift of CRB to the island's native and threatened cycad tree (*Cycas micronesica*) (Marler et al. 2020). In the Hawaiian Islands, CRB is a documented threat to archipelago's native *Pritchardia* palm species.

For more information about CRB including the current situation in Guam and high/low-risk areas on O'ahu, please visit http://cnas-re.uog.edu/crb/ or https://www.crbhawaii.org/.

To reduce the risk of spreading CRB, the following biosecurity protocol is recommended:

Biosecurity Protocol for CRB used on O'ahu (most can be applied to Maui)

1. Never transport green waste between islands and minimize the creation, storage, and transport of green waste within O'ahu, this also includes:
    a. Mulch, bark, compost
    b. Soil of any kind
    c. Potted plants of any kind

    Additional consultation is recommended if the project involves transportation of materials, soil, equipment, vehicles, etc. between islands.

2. If felling or trimming palms, contact CRB Response for a free inspection ((808) 679-5244 or email at info@crbhawaii.org)

3. Keep green waste whole until it is ready to be treated and removed.
    a. Chip green waste on site and transport it on the same day to a secure and managed green waste disposal site/facility.
    b. For chipped green waste in high-risk areas, re-chip prior to movement outside the infested area, treat with pesticide (when applicable), heat treatment (>130 degrees F), spread and dry, or store in sealed durable containers.

4. Minimize accumulations of green waste by regularly treating mulch piles or depositing it in sealed green waste bins. In low-risk areas, we also recommend thinly spreading mulch (less than 2 inches deep) and allowing it to dry (no irrigation).

5. If injured or dying coconut palm trees are observed or if CRB are detected, contact CRB Response at (808) 679-5244 or email at info@crbhawaii.org or online at https://www.crbhawaii.org/report

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May 30, 2025

Via Email: carrie_harrington@fws.gov

Carrie L. Harrington, Endangered Species Biologist
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm 3-122
Honolulu, Hawai'i 96850

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Ms. Harrington:

Thank you for your comment letter dated August 22, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment 1:

Upon further review of the project description, scope, and potential impacts to listed species, we recommend that before construction begins, another biological survey take place since it has been approximately 7 years since the last survey (2017).

Response: As recommended, the existing biological surveys and findings will be updated prior to construction initiation.

Comment 2:

We also encourage you to reach out to our Aquatics Team for coordination under the Fish and Wildlife Coordination Act (FWCA). You can email pifwo_admin@fws.gov and cc dan_polhemus@fws.gov with your request. Our records indicate there is degraded ephemeral wetland habitat within the project footprint, including the three gulches described in the draft EA. Our Aquatics Team may have project specific recommendations outside of our general BMPs for work in or near aquatic environments. For example, the size of the culverts is critical in these flood plain areas to ensure that flood waters are not accelerated resulting in impacts to listed species.

Response: DPW has requested informal consultation with the U.S. Fish and Wildlife Service (USFWS) to disclose any potential impact of the project on fish and wildlife, pursuant to the FWCA, and request concurrence with the Federal Highway Administration's determination with respect to the FWCA. We will include pifwo_admin@fws.gov and dan_polhemus@fws.gov when transmitting the request.

Comment 3:

Kīhei was once a vast wetland area and there are currently severe flooding issues during heavy rains due to the abundance of wetland habitat that is no longer able to function as wetlands should. Urban development, water diversions, and sea level rise contribute to these flooding events. This flooding of contaminated water negatively impacts listed waterbirds and marine turtles. Because of these flooding events in Kīhei, we recommend you plan for 6 feet of sea level rise rather than 3.2 feet. Sea level rise is not anticipated to be linear and there is still a lot of unknowns regarding the timing of impacts associated with land ice melt.

Response: We appreciate your comments regarding planning for 6 feet of sea level rise rather than 3.2 feet. The Final EA will include a discussion of the project related to a 6-foot sea level rise scenario. It is noted that the proposed Liloa Drive corridor is located outside of the areas impacted under a 6-foot sea level rise scenario according to the National Oceanic and Atmospheric Administration's Sea Level Rise Viewer. The Liloa Drive Extension will serve as an alternative north-south roadway to South Kīhei Road, portions of which would be impacted by sea level rise.

The proposed Liloa Drive Extension project is not anticipated to exacerbate flooding in Kīhei. Temporary best management practices (BMPs) will be implemented during the construction phase of the project to contain any runoff and sedimentation. In addition, the permanent drainage improvements installed as part of the proposed action are designed to mitigate any increase in surface runoff and limit peak onsite runoff, ensuring that no net increase of runoff is allowed to leave the project site. Details on the potential drainage impacts and proposed mitigation measures are discussed in Volume I, Chapter III, Section D.4 of the Draft Environmental Assessment.

With the proposed drainage improvements, no adverse impacts to downstream or surrounding environments are anticipated from construction of the proposed Liloa Drive Extension Project, and the project is not expected to exacerbate flooding conditions generated by existing stormwater flows originating mauka of Pi'ilani Highway.

Comment 4:

We also recommend you restore the natural function of the gulches and streambeds rather than using concrete, and explore alternatives such as natural infrastructure. Restoring the various forms of wetland habitat types within the

project footprint and adjacent areas will benefit listed species by providing foraging habitat and reducing the runoff and erosion that is known to occur in these gulches that may negatively impact listed species (e.g., waterbirds and marine turtles).

Response: We appreciate your recommendation to restore the natural function of the gulches and streambeds. The project is expected to restore the original drainage pattern and flow capacity along the gulches by removing accumulated sedimentation, debris, man-made berms, and obstructions within the limits of our project area.

The project intends to utilize vegetative alternatives (e.g., turf reinforcement mates) in lieu of concrete wherever possible. The installation of concrete lining will be limited to locations critically needed to prevent scour and erosion in the vicinity of bridge abutments and foundations.

Comment 5:

Please also find our for invasive species biosecurity protocol attached. We recommend the relevant measures be incorporated into all projects on Maui

Response: Thank you for providing USFWS's invasive species biosecurity protocol. DPW will incorporate all relevant measures.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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JUL 30 2024

JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

KEITH A. REGAN
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KA LUNA HO'OMALU HANA LAULĀ

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STATE OF HAWAI'I | KA MOKU'ĀINA O HAWAI'I
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES | KA 'OIHANA LOIHELU A LAWELAWE LAULĀ
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P) 24.166

JUL 24 2024

Hoku Krueger, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Dear Hoku Krueger:

Subject: Draft Environmental Assessment for Proposed Liloa Drive Extension Project
(Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road)
Kīhei, Maui, Hawai'i

Thank you for the opportunity to provide comments on the subject project. The Department of Accounting and General Services has no facilities that it currently manages, nor any active projects that are in the Kihei area, and we therefore have no comments to offer at this time.

If you have any questions, you or your staff may call Dennis Chen of the Planning Branch at (808) 586-0491 or e-mail him at dennis.yk.chen@hawaii.gov.

Sincerely,

GORDON S. WOOD
Public Works Administrator

DE:mc
c: Jordan Molina, Director, Department of Public Works, County of Maui

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May 30, 2025

Gordon S. Wood, Public Works
Administrator
Department of Accounting
and General Services
P.O. Box 119
Honolulu, Hawai'i 96810-0119

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Wood:

Thank you for your letter dated July 24, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we acknowledge that your department does not have any comments to offer at this time.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
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OFFICE OF FACILITIES AND OPERATIONS

August 21, 2024

Ms. Hoku Krueger, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: Draft Environmental Assessment for the Proposed Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road) Project at Liloa Drive, Kihei, Maui, Hawaii

Dear Ms. Krueger:

Thank you for your letter dated July 22, 2024. The Hawaii State Department of Education (Department) has reviewed the information provided and has the following comment on the Proposed Liloa Drive Extension Project (Project).

Within six to nine months of the start of construction, the Department kindly requests that you consult with the administration of Kulanihakoi High School to identify and minimize any potential impact on pedestrian and vehicular traffic that may affect school operations.

Should you have any questions, please contact Cori China, Professional Worker of the Facilities Development Branch, Planning Section, at (808) 784-5080 or via email at cori.china@k12.hi.us.

We appreciate the opportunity to comment.

Sincerely,

Roy Ikeda
Interim Public Works Manager
Planning Section

RI:ctc
c: Jordan Molina, Director, County of Maui Department of Public Works
Facilities Development Branch

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

MUNEKIYO HIRAGA
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Mark Alexander Roy AICP, LEED AP
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Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Roy Ikeda, Interim Public
Works Manager
State of Hawaiʻi
Department of Education
P.O. Box 2360
Honolulu, Hawaiʻi 96804

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipuʻilani Road to Vicinity of Kaʻonoʻulu Street), Maui, Hawaiʻi

Dear Mr. Ikeda:

Thank you for your comment letter dated August 21, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

DPW will consult with the administration of Kūlanihāko'i High School within six (6) to nine (9) months of the start of construction to identify and minimize any potential impact on pedestrian and vehicular traffic that may affect school operations.

Thank you again for your participation in the Chapter 343, Hawaiʻi Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Applications\Draft EA\Draft EA Res\DOE PWM.docx

From: Kaneshiro, Michael <michael.kaneshiro@doh.hawaii.gov>
Sent: Tuesday, July 23, 2024 3:12 PM
To: Liloa Drive Extension
Subject: DEA for the Proposed Liloa Drive Extension (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project at Liloa Drive, Kihei, Maui, Hawai'i
Attachments: Memorandum-for-CWB-Standard-Project-Comments.pdf

This is an EXTERNAL e-mail.
Only open links and attachments from a Trusted Sender.

Aloha Cathleen Krueger,

Thank you for your letter with the subject, "Draft Environmental Assessment for the Proposed Liloa Drive Extension (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project at Liloa Drive, Kihei, Maui, Hawai'i", addressed to Darryl Lum, P.E., Chief, State of Hawaii, Department of Health, Clean Water Branch.

The CWB Standard Project Comments Memorandum-for-CWB-Standard-Project-Comments-07016CMHK.23-part-1-signed.pdf (hawaii.gov) are for agencies and project owners who are soliciting comments in fulfillment of their environmental review process. I have also enclosed CWB's memorandum for your convenience. As mentioned in the memorandum, CWB no longer responds to every solicitation for comments. Instead, CWB offers the enclosed standard project comments which you may use as part of your environmental review process. Please let me know if you have any questions. Please reference file no. 2024A194 for future correspondence.

Mahalo,
Mike Kaneshiro
Engineer | Environmental Management Branch | Clean Water Branch
Hawaii State Department of Health | Ka 'Oihana Olakino
2827 Waimano Home Road #225 | Pearl City, HI 96782
Office: (808) 586-4309
https://health.hawaii.gov/cwb/

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VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Mike Kaneshiro, Engineer
State of Hawai'i
Department of Health
Environmental Management Branch
Clean Water Branch
2827 Waimano Home Road #225
Pearl City, Hawai'i 96782

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i (File No. 2024A194)

Dear Mr. Kaneshiro:

Thank you for your comment letter dated July 23, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

The DPW acknowledges that the Clean Water Branch (CWB) uses Standard Project Comments for agencies and project owners who are soliciting comments in fulfillment of their environmental review process. The DPW will implement applicable recommendations and requirements described in the CWB's memorandum and will reference file no. 2024A194 for future correspondence.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA
SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

August 21, 2024

County of Maui
Department of Public Works
Attn: Mr. Jordan Molina, Director
200 South High Street, 4th Floor
Wailuku, Hawaii 96793

via email: public.works@mauicounty.gov

Munekiyo Hiraga
Attn: Ms. Hoku Krueger, Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

via email: liloadrive@munekiyohiraga.com

Dear Mr. Molina and Ms. Krueger:

SUBJECT: Draft Environmental Assessment for the Proposed **Liloa Drive Extension** (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project located at Kihei, Island of Maui; Various TMKs on behalf of County of Maui, Department of Public Works

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 Engineering Division 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

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

July 24, 2024

MEMORANDUM

FROM: ~~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 (dlnr.land.maui@hawaii.gov)
___Aha Moku Advisory Committee

TO: ~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the Proposed **Liloa Drive Extension** (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project
LOCATION: Kihei, Island of Maui; Various TMKs
APPLICANT: Munekiyo Hiraga on behalf of County of Maui, Department of Public Works

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **August 21, 2024.**

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.

BRIEF COMMENTS:

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

Signed: *[signature]*
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Aug 2, 2024

Attachments
cc: Central File

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Ian Hirokawa, Acting Land Administrator
Department of Land
and Natural Resources
P.O. Box 621
Honolulu, Hawai'i 96809

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Hirokawa:

Thank you for your letter dated August 21, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we acknowledge that the Department of Land and Natural Resources, Engineering Division does not have any additional comments to offer at this time.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

August 28, 2024

County of Maui
Department of Public Works
Attn: Mr. Jordan Molina, Director
200 South High Street, 4th Floor
Wailuku, Hawaii 96793
via email: public.works@mauicounty.gov

Munekiyo Hiraga
Attn: Ms. Hoku Krueger, Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793
via email: liloadrive@munekiyohiraga.com

Dear Mr. Molina and Ms. Krueger:

SUBJECT: Draft Environmental Assessment for the Proposed **Liloa Drive Extension** (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project located at Kihei, Island of Maui; Various TMKs on behalf of County of Maui, Department of Public Works

Thank you for the opportunity to review and comment on the subject matter. In addition to our previous comments dated August 21, 2024, enclosed are comments from the Division of Forestry & Wildlife 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,

Kevin E. Moore
Acting Land Administrator

Enclosures
cc: Central Files

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

DAWN N. S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA 'OIHANA KUMUWAIWAI 'ĀINA
LAND DIVISION

P.O. BOX 621
HONOLULU, HAWAII 96809

July 24, 2024

MEMORANDUM

FROM: **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 (dlnr.land.maui@hawaii.gov)
___Aha Moku Advisory Committee

TO: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Draft Environmental Assessment for the Proposed **Liloa Drive Extension** (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project
LOCATION: Kihei, Island of Maui; Various TMKs
APPLICANT: Munekiyo Hiraga on behalf of County of Maui, Department of Public Works

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit any comments by **August 21, 2024.**

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.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(☑) Comments are included/attached.

Signed: *[signature]*
Print Name: JASON D. OMICK, Acting Wildlife Prog. Mgr.
Division: Forestry and Wildlife
Date: Aug 27, 2024

Attachments
cc: Central File

JOSH GREEN, M.D.
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA

STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES
KA ʻOIHANA KUMUWAIWAI ʻĀINA

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

DAWN N.S. CHANG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RYAN K.P. KANAKAʻOLE
FIRST DEPUTY

DEAN D. UYENO
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

August 26 ,2024

Log no. 4674

MEMORANDUM

TO: RUSSELL Y. TSUJI, Administrator
Land Division

FROM: JASON D. OMICK, Acting Wildlife Program Manager
Division of Forestry and Wildlife

SUBJECT: Request for Comment on the Draft Environmental Assessment and for the Proposed Liloa Drive Extension Project, Maui

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your request for comment regarding the Draft Environmental Assessment (DEA) for the proposed Liloa Drive Extension on the island of Maui; various TMKs. The proposed project seeks to extend Liloa Drive and its integrated, landscaped shared use path from the vicinity of East Waipu'ilani Road to the vicinity of Ka'ono'ulu Street in Kīhei, Maui. It will involve approximately 4,900-foot extension of Liloa Drive. The project will primarily occur in the existing right-of-way (ROW),the project will require temporary rights-of-entry or temporary construction easements from some landowners immediately abutting the corridor to facilitate construction of the project. The project is a two-phase project consisting of the construction of a two-lane roadway with curbs, gutters, sidewalks, a shared use path, retaining walls, streetlights and related utility system improvements. The project also encompasses the installation of two bridges the first at Waipuʻilani Gulch and the second at Kūlanihākoʻi Gulch. The project's two (2) phases will complete the connection of Liloa Drive between the existing operational segments of the roadway which currently terminate at Kaʻonoʻulu Street to the north and East Waipuʻilani Road to the south.

DOFAW concurs with the measures included in the DEA intended to avoid construction and operational impacts to State-listed species including the ʻōpeʻapeʻa or Hawaiian Hoary bat (*Lasiurus cinereus semotus*), koloa maoli or Hawaiian Duck (*Anas wyvilliana*), aeʻo or Hawaiian Stilt (*Himantopus mexicanus knudseni*), ʻalae keʻokeʻo or Hawaiian Coot (*Fulica alai*), nēnē or Hawaiian Goose (*Branta sandvicensis*), Blackburn's Sphinx Moth (*Manduca blackburni*), and seabirds. For illustrations and guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawaiʻi please visit https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf. DOFAW provides the following additional comments regarding the potential for the proposed work to affect listed species in the vicinity of the project area.

The endemic pueo or Hawaiian Short-Eared Owl (*Asio flammeus sandwichensis*) could potentially nest in the project area. Pueo nest on the ground and active nests have been found year-round. Before any potential vegetative alteration, especially ground-based disturbance, we recommend that line transect surveys are conducted during crepuscular hours through the project area. If a pueo nest is discovered, a minimum buffer distance of 100 meters from the nest should be established until chicks are capable of flight.

DOFAW recommends using native plant species for landscaping that are appropriate for the area; i.e., plants for which climate conditions are suitable for them to thrive, plants that historically occurred there, etc. Please do not plant invasive species. DOFAW also recommends referring to www.plantpono.org for guidance on the selection and evaluation of landscaping plants and to determine the potential invasiveness of plants proposed for use in the project.

DOFAW recommends minimizing the movement of plant or soil material between worksites. Soil and plant material may contain detrimental fungal pathogens (e.g., Rapid ʻŌhiʻa Death), vertebrate and invertebrate pests (e.g., Coqui Frogs, Little Fire Ants, etc.), or invasive plant parts (e.g., Miconia, Mullein, etc.) that could harm our native species and ecosystems. We recommend consulting the Maui Invasive Species Committee (MISC) at (808) 573-6472 to help plan, design, and construct the project, learn of any high-risk invasive species in the area, and ways to mitigate their spread. All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

The invasive Coconut Rhinoceros Beetle (CRB) or *Oryctes rhinoceros* is found on the islands of Oʻahu, Hawaiʻi Island, Maui and Kauaʻi. On July 1, 2022, the Hawaiʻi Department of Agriculture (HDOA) approved Plant Quarantine Interim Rule 22-1. This rule restricts the movement of CRB-host material within or to and from the island of Oʻahu, which is defined as the Quarantine Area. Regulated material (host material or host plants) is considered a risk for potential CRB infestation. Host material for the beetle specifically includes a) entire dead trees, b) mulch, compost, trimmings, fruit and vegetative scraps, and c) decaying stumps. CRB host plants include the live palm plants in the following genera: *Washingtonia*, *Livistona*, and *Pritchardia* (all commonly known as fan palms), *Cocos* (coconut palms), *Phoenix* (date palms), and *Roystonea* (royal palms). When such material or these specific plants are moved there is a risk of spreading CRB because they may contain CRB in any life stage. For more information regarding CRB, please visit https://dlnr.hawaii.gov/hisc/info/invasive-species-profiles/coconut-rhinoceros-beetle/.

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawai'i Wildfire Management Organization at (808) 850-0900 or admin@hawaiiwildfire.org, on how wildfire prevention can be addressed in the project area. When engaging in activities that have a high risk of starting a wildfire (i.e. welding in grass), it is recommended that you:

- Wet down the area before starting your task,
- Continuously wet down the area as needed,
- Have a fire extinguisher on hand, and
- In the event that your vision is impaired, (i.e. welding goggles) have a spotter to watch for fire starts.

We appreciate your efforts to work with our office for the conservation of our native species. These comments are general guidelines and should not be considered comprehensive for this site or project. It is the responsibility of the applicant to do their own due diligence to avoid any negative environmental impacts. 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 Amanda Macias, Protected Species Habitat Conservation Planning Associate via email at fw.adm.kupu2.intern@hawaii.gov.

Sincerely,

JASON D. OMICK
Acting Wildlife Program Manager

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Jason D. Omick, Acting Wildlife Program Manager
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawai'i
1151 Punchbowl Street, Room 325
Honolulu, Hawai'i 96813

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Omick:

Thank you for your comment letter dated August 26, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment No. 1:

DOFAW concurs with the measures included in the DEA intended to avoid construction and operational impacts to State-listed species including the 'ōpe'ape'a or Hawaiian Hoary bat (Lasiurus cinereus semotus), koloa maoli or Hawaiian Duck (Anas wyvilliana), ae'o or Hawaiian Stilt (Himantopus mexicanus knudseni), 'alae ke'oke'o or Hawaiian Coot (Fulica alai), nēnē or Hawaiian Goose (Branta sandvicensis), Blackburn's Sphinx Moth (Manduca blackburni), and seabirds. 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. DOFAW provides the following additional comments regarding the potential for the proposed work to affect listed species in the vicinity of the project area.

Response: DPW will review DOFAW's recommended best management practices (BMPs) and implement measures, as feasible and appropriate, to prevent adverse impacts to seabirds. We appreciate your provision of information on seabird-friendly light styles that also protect dark skies.

Comment No. 2:

The endemic pueo or Hawaiian Short-Eared Owl (Asio flammeus sandwichensis) could potentially nest in the project area. Pueo nest on the ground and active nests have been found year-round. Before any potential vegetative alteration, especially ground based disturbance, we recommend that line transect surveys are conducted during crepuscular hours through the project area. If a pueo nest is discovered, a minimum buffer distance of 100 meters from the nest should be established until chicks are capable of flight.

Response: We note your comment that the pueo could potentially nest in the project area. DPW will hire a qualified professional to conduct a survey of the project area prior to the start of construction. If a pueo nest is discovered, a minimum buffer distance of 100 meters from the nest will be established until chicks are capable of flight.

Comment No. 3:

DOFAW recommends using native plant species for landscaping that are appropriate for the area; i.e., plants for which climate conditions are suitable for them to thrive, plants that historically occurred there, etc. Please do not plant invasive species. DOFAW also recommends referring to www.plantpono.org for guidance on the selection and evaluation of landscaping plants and to determine the potential invasiveness of plants proposed for use in the project.

Response: Native flora currently programmed for planting at the proposed roundabouts include true kou (*cordia subcordata*), Maui Beauty tī (*cordyline fruticose*), and pōhinahina (*vitex rotundifolia*). DPW will incorporate native plants in the project's landscaping plans to the extent practicable and refer to www.plantpono.org for guidance on the selection and evaluation of landscaping plants.

Comment No. 4:

DOFAW recommends minimizing the movement of plant or soil material between worksites. Soil and plant material may contain detrimental fungal pathogens (e.g., Rapid 'Ōhi'a Death), vertebrate and invertebrate pests (e.g., Coqui Frogs, Little Fire Ants, etc.), or invasive plant parts (e.g., Miconia, Mullein, etc.) that could harm our native species and ecosystems. We recommend consulting the Maui Invasive Species Committee (MISC) at (808) 573-6472 to help plan, design, and construct the project, learn of any high-risk invasive species in the area, and ways to mitigate their spread.

All equipment, materials, and personnel should be cleaned of excess soil and debris to minimize the risk of spreading invasive species.

Response: The project contractor will implement BMPs to minimize the risk of spreading invasive species and consult the MISC if additional information/guidance is needed.

Comment No. 5:

The invasive Coconut Rhinoceros Beetle (CRB) or Oryctes rhinoceros is found on the islands of O'ahu, Hawai'i Island, Maui and Kaua'i. On July 1, 2022, the Hawai'i Department of Agriculture (HDOA) approved Plant Quarantine Interim Rule 22-1. This rule restricts the movement of CRB-host material within or to and from the island of O'ahu, which is defined as the Quarantine Area. Regulated material (host material or host plants) is considered a risk for potential CRB infestation. Host material for the beetle specifically includes a) entire dead trees, b) mulch, compost, trimmings, fruit and vegetative scraps, and c) decaying stumps. CRB host plants include the live palm plants in the following genera: Washingtonia, Livistona, and Pritchardia (all commonly known as fan palms), Cocos (coconut palms), Phoenix (date palms), and Roystonea (royal palms). When such material or these specific plants are moved there is a risk of spreading CRB because they may contain CRB in any life stage. For more information regarding CRB, please visit https://dlnr.hawaii.gov/hisc/info/invasive-speciesprofiles/coconut-rhinoceros-beetle/.

Response: DPW appreciates the information provided by your Division regarding the invasive Coconut Rhinoceros Beetle and will comply with Plant Quarantine Interim Rule 22-1. None of the species listed as host plants for CRB (Washingtonia, Livistona, and Pritchardia (all commonly known as fan palms), Cocos (coconut palms), Phoenix (date palms), and Roystonea (royal palms)) are currently programmed to be planted as part of the proposed project.

Comment No. 6:

Due to the arid climate and risks of wildfire to listed species, we recommend coordinating with the Hawai'i Wildfire Management Organization at (808) 850-0900 or admin@hawaiiwildfire.org, on how wildfire prevention can be addressed in the project area. When engaging in activities that have a high risk of starting a wildfire (i.e. welding in grass), it is recommended that you:

- *Wet down the area before starting your task,*
- *Continuously wet down the area as needed,*
- *Have a fire extinguisher on hand, and*

- *In the event that your vision is impaired, (i.e. welding goggles) have a spotter to watch for fire starts.*

Response: The DPW provided a link to the Draft EA for the proposed project and the Hawaii Wildfire Management Organization via letter mailed on October 7, 2024 requested that any comments be provided within 30 days of receipt of the letter. The DPW will implement any BMPs recommended by HWMO, as feasible and applicable.

Comment No. 7:

We appreciate your efforts to work with our office for the conservation of our native species. These comments are general guidelines and should not be considered comprehensive for this site or project. It is the responsibility of the applicant to do their own due diligence to avoid any negative environmental impacts. 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.

Response: DPW acknowledges this comment. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, the DPW will contact DOFAW staff, as soon as possible.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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JOSH GREEN, M.D.
GOVERNOR
KE KIA'ĀINA

STATE OF HAWAI'I | KA MOKU'ĀINA 'O HAWAI'I
DEPARTMENT OF TRANSPORTATION | KA 'OIHANA ALAKAU
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

EDWIN H. SNIFFEN
DIRECTOR
KA LUNA HO'OKELE

Deputy Directors
Nā Hope Luna Ho'okele
DREANALEE K. KALILI
TAMMY L. LEE
CURT T. OTAGURO
ROBIN K. SHISHIDO

IN REPLY REFER TO:

DIR 0000755
HWY-M 2.433-24

August 22, 2024

Mr. Jordan Molina, Director
County of Maui
Department of Public Works
200 South High Street
Kalana O Maui Building, 4th Floor
Wailuku, Hawaii 96793

Ms. Hoku Krueger, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Molina and Ms. Krueger:

Subject: Draft Environmental Assessment for the Proposed Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road) Project, Liloa Drive, Kihei, Maui, Hawaii

On behalf of the Hawaii Department of Transportation, we are providing our comments on the Draft Environmental Assessment for the proposed Liloa Drive Extension (Vicinity of Kaonoulu Street to Vicinity of East Waipuilani Road) Project prepared pursuant to Hawaii Revised Statutes, Chapter 343, and Hawaii Administration Rules, Title 11, Chapter 200.1.

Since you have addressed all our previous comments on the Preliminary Draft Environmental Assessment, we have no comments to add. Should you have any questions, please contact Annette Matsuda, Highways Maui District Engineer, at (808) 873-3535 or by email at annette.dh.matsuda@hawaii.gov.

Sincerely,

EDWIN H. SNIFFEN
Director of Transportation

Attachments

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Edwin H. Sniffen, Director
State of Hawai'i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Sniffen:

Thank you for your letter dated August 22, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we acknowledge that your department does not have any comments to add to those given during early consultation for the Draft EA.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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Institute for Astronomy
Office of the Director

UNIVERSITY of HAWAI'I MĀNOA

August 19, 2024

Via email: liloadrive@munekiyohiraga.com

Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96793

Attention: Ms. Cathleen Krueger

Re: Liloa Drive Extension Project—Draft EA (AFNSI)
TMK: (2)2-2-024:024; (2)2-2-025:100; (2)2-2-025:104; etc.
Wailuku District, Island of Maui

Dear Ms. Krueger:

Thank you for the opportunity to comment on the draft environmental assessment (EA) for the Liloa Drive Extension Project (published on July 23, 2024), specifically with respect to issues and concerns regarding light pollution.

The University of Hawai'i Institute for Astronomy (IfA) conducts research in astronomy using telescopes located on Haleakalā and Maunakea and operated by IfA and our partner institutions. Both Haleakalā and Maunakea are among the best sites in the world for astronomical facilities because of the low levels of light pollution (among many other reasons). Hawai'i-based observatories have played major roles in the advancement of astronomy and astrophysics for over 50 years and are well positioned to remain at the forefront of astronomical research for decades to come. Additionally, the United States Space Force operates telescopes atop Haleakalā for national defense purposes; these observations would also be adversely affected by an increase in the night sky brightness. Our work to combat light pollution has also brought us into contact with other stakeholders concerned about light pollution for other reasons, including impacts on wildlife (particularly seabirds) and on human health.

IfA makes it a practice to comment on environmental review documents both to address issues with specific projects and to emphasize the importance of appropriate lighting standards and dark sky protection in any planning process. We commend the project team for including the mitigation measures included in Section III.A.9b, beginning on page 39 of the Draft EA, specifically as regards potential impact to native seabirds. However, a more robust discussion of dark sky protection would be welcome. Appropriate steps to keep the skies friendly to both seabirds and the observatories include:

1. Any outdoor lighting, including both construction and permanent lighting, must conform to the standards established by the Maui County Code Section 20.35 ("Outdoor Lighting"), amended in 2022 by Maui County Ordinance No. 5434. IfA

2680 Woodlawn Drive
Honolulu, Hawai'i 96822
An Equal Opportunity/Affirmative Action Institution

encourages project planners to include references to this ordinance in planning documents to confirm to readers that its requirements are being considered and addressed in project planning.

2. The minimum possible amount of outdoor/exterior lighting should be used and should be turned off when not needed. Motion sensor activated lighting is strongly preferred wherever feasible. IfA appreciates the Draft EA's specific mention of the use of motion sensor activated outdoor lighting for the project.
3. All exterior lighting should be fully shielded. IfA appreciates the Draft EA's specific recognition of this mitigation measure.
4. Conformity to Maui County Ordinance 5434 also requires the use of blue-deficient exterior lighting. This means that exterior lighting must emit less than 2% of its total energy at wavelengths less than 500 nm. The best choices for this are either filtered LED lights or amber LED lights. IfA also strongly encourages that new lighting be selected to provide only the minimum lighting level recommended by the Illuminating Engineering Society, as the energy efficiency of newer fixtures has sometimes led projects to select lights that provide significantly more illumination than necessary.

Thank you for your consideration of these comments. If you have questions or need further detail regarding these comments, please do not hesitate to contact either the undersigned or Dr. Richard Wainscoat (rjw@hawaii.edu).

Sincerely,

Doug Simons
Director, IfA

MUNEKIYO HIRAGA
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Doug Simons, Director
University of Hawai'i at Manoa
Institute for Astronomy
2680 Woodlawn Drive
Honolulu, Hawai'i 96822

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Simons:

Thank you for your comment letter dated August 19, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment 1:

We commend the project team for including the mitigation measures included in Section III.A.9b, beginning on page 39 of the Draft EA, specifically as regards potential impact to native seabirds. However, a more robust discussion of dark sky protection would be welcome.

Response: We appreciate the Institute for Astronomy's recommendation and will include a more robust discussion of dark sky protection in the Final EA for the proposed project.

Comment 2:

Any outdoor lighting, including both construction and permanent lighting, must conform to the standards established by the Maui County Code Section 20.35 ("Outdoor Lighting"), amended in 2022 by Maui County Ordinance No. 5434. IfA encourages project planners to include references to this ordinance in planning documents to confirm to readers that its requirements are being considered and addressed in project planning.

Response: Any outdoor lighting installed by the proposed project, including both construction and permanent lighting, will conform to the standards in Maui County Code (MCC) Section 20.35 ("Outdoor Lighting"), as amended in 2022 by Maui County Ordinance No. 5434. DPW notes IfA's recommendation to reference this ordinance in planning documents going forward.

Comment 3:

The minimum possible amount of outdoor/exterior lighting should be used and should be turned off when not needed. Motion sensor activated lighting is strongly preferred wherever feasible. IfA appreciates the Draft EA's specific mention of the use of motion sensor activated outdoor lighting for the project.

Response: DPW will use the minimum possible amount of outdoor/exterior lighting, and appreciates IfA's acknowledgement of its commitment to use motion sensor activated outdoor lighting for the project, where appropriate.

Comment 4:

All exterior lighting should be fully shielded. IfA appreciates the Draft EA's specific recognition of this mitigation measure.

Response: DPW acknowledges and appreciates this comment.

Comment 5:

Conformity to Maui County Ordinance 5434 also requires the use of blue-deficient exterior lighting. This means that exterior lighting must emit less than 2% of its total energy at wavelengths less than 500 nm. The best choices for this are either filtered LED lights or amber LED lights. IfA also strongly encourages that new lighting be selected to provide only the minimum lighting level recommended by the Illuminating Engineering Society, as the energy efficiency of newer fixtures has sometimes led projects to select lights that provide significantly more illumination than necessary.

Response: DPW acknowledges IfA's recommendation to select fixtures that will emit the minimum lighting level recommended by the Illuminating Engineering Society and will take it into consideration alongside energy efficiency and cost as planning progresses.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,



Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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RICHARD T. BISSEN, JR.
Mayor

RICHARD E. MITCHELL, ESQ.
Acting Director

SAUMALU MATA'AFA
Deputy Director



DEPARTMENT OF HOUSING
COUNTY OF MAUI
2065 MAIN STREET, SUITE 108
WAILUKU, MAUI, HAWAI'I 96793
PHONE: (808) 270-7351

July 31, 2024

Hoku Krueger, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED LILOA DRIVE EXTENSION (VICINITY OF KAONOULU STREET TO VICINITY OF EAST WAIPUILANI ROAD) PROJECT AT LILOA DRIVE, KIHEI, MAUI, HAWAII

Dear Ms. Krueger:

The Department of Housing has reviewed the information submitted for the above - referenced project, and determined that the project is not subject to Chapter 2.96, Maui County Code (MCC). In accordance with Section 2.96.080, MCC, the project does not require a residential workforce housing agreement. The Department has no additional comments to offer at this time.

Please contact the Department at (808) 270-7351 or housing@co.maui.hi.us if you have any questions.

Sincerely,

RICHARD E. MITCHELL, ESQ.
Acting Director of Housing

cc: Jordan Molina, Director Department of Public Works

MUNEKIYO HIRAGA
Planning Project Management Sustainable Solutions

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

July 22, 2024

Richard Mitchell, Director
County of Maui
Department of Housing
2065 Main Street, Suite 108
Wailuku, HI 96793

SUBJECT: Draft Environmental Assessment for the Proposed Liloa Drive Extension (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project at Liloa Drive, Kīhei, Maui, Hawai'i

Dear Mr. Mitchell:

On behalf of the County of Maui, Department of Public Works, we are providing for review and comment the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project prepared pursuant to Hawai'i Revised Statutes (HRS), Chapter 343, and Hawai'i Administrative Rules, Title 11, Chapter 200.1.

The Draft EA will be published in the July 23, 2024 edition of the Environmental Review Program's (ERP) *Environmental Notice* bulletin and can also be accessed through the ERP site via the links and QR codes below:

DRAFT EA
ERP LINKS AND/OR QR CODE

TINY URL:	**Volume I of II**	**https://tinyurl.com/LiloaDr-DEA-Vol-I**	
	Volume II of II	**https://tinyurl.com/LiloaDr-DEA-Vol-II**	
QR CODE:	**Volume I of II**		**Volume II of II**

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015
Oahu: 225 Queen Street, Suite 200 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

DRAFT EA
ERP LINKS AND/OR QR CODE

FULL ERP LINK BELOW:
Volume I of II
https://files.hawaii.gov/dbedt/erp/Doc_Library/2024-07-23-MA-DEA-Liloa-Drive-Extension-Project-Volume-I-of-II.pdf
Volume II of II
https://files.hawaii.gov/dbedt/erp/Doc_Library/2024-07-23-MA-DEA-Liloa-Drive-Extension-Project-Volume-II-of-II.pdf

Please note that the link will not be active prior to July 23, 2024. Should you have any problems accessing the Draft EA from the link provided, please call us at (808)244-2015.

Please note that the 30-day comment deadline for the Draft EA is **Thursday, August 22, 2024**.

Please send your comments to the following:

Agency: Jordan Molina, Director
County of Maui
Department of Public Works
200 South High Street
Kalana O Maui Building, 4th Floor
Wailuku, Hawai'i 96793
Phone No.: (808)270-7845
E-mail: public.works@mauicounty.gov

AND

Consultant: Hoku Krueger, Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793
Phone No.: (808)244-2015
E-mail: liloadrive@munekiyohiraga.com

Thank you for your participation in the HRS, Chapter 343 environmental review process.

Very truly yours,

Hoku Krueger
Associate

cc: Jordan Molina, Department of Public Works
Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
Tessa Munekiyo Ng, Munekiyo Hiraga
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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Richard E. Mitchell, ESQ., Director
Department of Housing
2065 Main Street, Suite 108
Wailuku, Hawai'i 96793

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Mitchell:

Thank you for your letter dated July 31, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we appreciate your confirmation that the proposed project does not require a residential workforce housing agreement and acknowledge that your department does not have any additional comments to offer at this time.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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RICHARD T. BISSEN, JR.
Mayor

JOSIAH K. NISHITA
Managing Director

PATRICK S. MCCALL
Director

SHANE T. DUDOIT
Deputy Director

DEPARTMENT OF PARKS AND RECREATION
COUNTY OF MAUI
700 HALI'A NAKOA STREET, UNIT 2
WAILUKU, MAUI, HAWAI'I 96793
www.mauicounty.gov

July 29, 2024

Hoku Krueger
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96763

Dear Ms. Krueger:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED LILOA DRIVE EXTENSION (VICINITY OF KA'ONO'ULU STREET TO VICINITY OF EAST WAIPU'ILANI ROAD) PROJECT AT LILOA DRIVE, KIHEI, MAUI, HAWAI'I

Thank you for the opportunity to review and comment on the subject project. The Department of Parks and Recreation has no comment at this time.

Should you have any questions, please feel free to contact me or Samual Marvel, Chief of Planning and Development, at samual.marvel@co.maui.hi.us or (808) 270-6173.

Sincerely,

PATRICK S. MCCALL
Director of Parks and Recreation

c: Samual Marvel, Chief of Planning and Development

PSM:SAM:gh

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Patrick S. McCall, Director
Department of Parks and Recreation
P. O. Box 1405
Wailuku, Hawai'i 96793

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. McCall:

Thank you for your letter dated July 29, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we acknowledge that your department does not have any comments to offer at this time.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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POLICE DEPARTMENT
COUNTY OF MAUI

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

RICHARD T. BISSEN, JR.
MAYOR

JOHN PELLETIER
CHIEF OF POLICE

WADE M. MAEDA
DEPUTY CHIEF OF POLICE

August 12, 2024

Munekiyo Hiraga
Attention: Hoku Krueger, Associate
305 High Street, Suite 104
Wailuku, HI 96793

Re: Draft Environment Assessment for the Proposed Liloa Drive Extension (Vicinity of Ka'ono'ulu Street to Vicinity of East Waipu'ilani Road) Project at Liloa Drive, Kihei, Maui, Hawai'i

Dear Ms. Krueger,

We are writing in response to the letter we received regarding the proposed Liloa Drive extension project dated July 22, 2024. The Maui Police Department has expressed concerns about the impact of the construction on pedestrian and bicycle traffic in the area. Specifically, there are worries that the construction will eliminate space for pedestrians and cyclists, which is particularly concerning given that many pedestrians and juveniles use this route to get to school.

Although this issue has already been addressed in the planning stages and is not subject to modification, we want to emphasize that we take these concerns very seriously. Ensuring the safety and accessibility of our community members is a top priority, and we will continue to monitor and address any potential issues that arise during the construction phase.

Following our review of the Liloa Drive extension project, we would like to offer the following recommendations to address potential impacts on road users and mitigate traffic congestion:

1. **Advance Notice to Road Users**: It is crucial to provide advance notice to road users about the project through multiple communication channels. We recommend using social media, news outlets, radio, and print media to keep the public informed about road closures and construction areas. This proactive approach will help minimize disruptions and ensure that road users are well-informed.
2. **Coordination with State Agencies**: We suggest that the County of Maui Department of Public Works confer with the State of Hawaii Department of Highways/Public Works. This coordination is important to ensure that there are no overlapping road construction or improvement projects in the immediate area during the Liloa Drive extension project. Such collaboration will help mitigate traffic congestion and enhance overall traffic management.

We believe these measures will contribute to a smoother implementation of the project and improve the overall experience for the community. Thank you for considering these recommendations.

Sincerely,

Assistant Chief Keola Tom
for: JOHN PELLETIER
Chief of Police

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

John Pelletier, Chief of Police
Police Department
55 Mahalani Street
Wailuku, Hawai'i 96793

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Chief Pelletier:

Thank you for your comment letter dated August 12, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

The DPW acknowledges your department's concern that construction of the proposed project will eliminate space for pedestrians and cyclists, especially given that many pedestrians and juveniles use the project corridor to get to school. The DPW also appreciates your recommendations to mitigate potential impacts on road users and traffic congestion. The DPW will provide advance notice to existing road users (e.g., pedestrians, bicyclists, emergency safety personnel, etc.) through multiple communication channels to inform the public of potential impacts to travelways. Alternate routes and traffic control plans will be implemented during construction, to the extent possible, to address routes for all users. The DPW will also coordinate work with other State and County stakeholders to ensure there are no overlapping road construction or improvement projects.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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KCA
Kihei Community Association
"e mālama pono"...dedicated to protecting,
sustaining and enhancing our 'āina, kai and 'ohana

8/19/23

Mr. Jordan Molina, Director Maui County Department of Public Works,
public.works@mauicounty.gov

Hoku Krueger, Associate Munekiyo Hiraga,
liloadrive@munekiyohiraga.com

Aloha,

Regarding the Draft EA for the Liloa Extension of the North South Collector Road, the Kihei Community Association (KCA) would like to respond affirmatively:

The Federal grant of $25M will expire unless we meet the EIS completion by this year. This roadway will enhance connectivity in northern Kihei, provide essential walking and biking for students as well as adults, improve drainage issues, and act as a firebreak.

The importance to the community of the project cannot be overstated. Additionally, after Mayor Bissen was elected, he publicly announced that completion of the North-South Collector Road was a top priority on his agenda.

While we recognize that a few Kihei residents are opposed, KCA wishes to support the draft EA without further conditions or changes. We approve of the EA and want to encourage speedy implementation of the actual construction.

Mahalo.

Respectfully submitted,

Char Schulenburg

President, Kihei Community Association

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Via Email: schulenburgchar@gmail.com

Char Schulenburg, President
Kīhei Community Association
P.O. Box 662
Kīhei, Hawai'i 96753

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Ms. Schulenburg:

Thank you for your letter dated August 19, 2024 regarding the Draft Environmental Assessment (EA) for the proposed Liloa Drive Extension project. On behalf of the Department of Public Works (DPW), we greatly appreciate the Kīhei Community Association's (KCA) ongoing support of the proposed project and look forward to continuing our dialogue with the KCA as the project proceeds.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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From: Liloa Drive Extension
Subject: FW: from laurie beitler

From: Laurie Beitler <lbnmaui@yahoo.com>
Sent: Monday, August 26, 2024 1:25 PM
To: Liloa Drive Extension <liloadrive@munekiyohiraga.com>
Subject: from laurie beitler

This is an EXTERNAL e-mail.
Only open links and attachments from a Trusted Sender.

Please can you let me know the status of the road extension of Liloa drive.

When is it expected to begin?
Are all the permits complete?

I live on Hoonani st and am concerned with the 12 acres right beside bridge that is designated to remain open space.

thank you , from,, Laurie Beitler

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Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Via Email: lbnmaui@yahoo.com

Laurie Beitler
Kīhei, Hawai'i, 96753

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Ms. Beitler:

Thank you for your email dated August 26, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

The proposed Liloa Drive Extension project is in the planning phase and undergoing environmental review. The Draft EA for the project was published in the Environmental Review Program's (ERP) The Environmental Notice (TEN) on July 23, 2024. The 30-day public comment period for the Draft EA ended on August 22, 2024. The DPW and its consultants are now in the process of responding to comments received during the public comment period and preparing the Final EA. It is currently anticipated that construction on Phase 1 of the project will begin in 2027. Phase II of the project will commence following completion of Phase I and receipt of funding.

The DPW is currently seeking the approvals and permits required to implement the Liloa Drive Extension project. These are anticipated to include:

Federal

- Compliance with Section 106, National Historic Preservation Act
- Compliance with Section 7, Endangered Species Act
- Compliance with National Environmental Policy Act

State

- Historic Review with State Historic Preservation Division
- Chapter 6E, Hawaii Revised Statutes
- Public Utilities Commission for 69kV Relocation

County

- Special Management Area Use Permit
- Flood Development Permits
- Construction Permits

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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Subject: FW: 840 Malulani

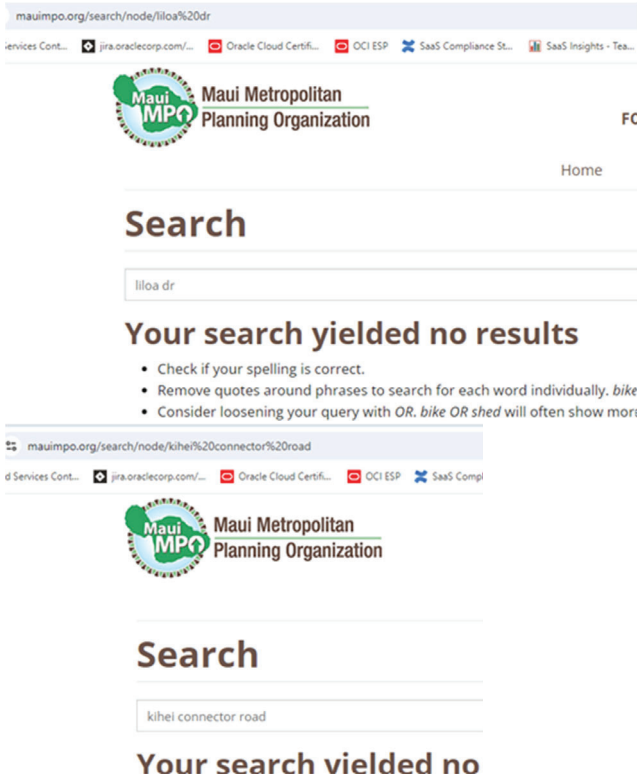
From: Karma Kiang <karma.kiang@oracle.com>
Sent: Monday, August 12, 2024 5:53 AM
To: Liloa Drive Extension <liloadrive@munekiyohiraga.com>
Subject: ASK: 840 Malulani

This is an EXTERNAL e-mail.
Only open links and attachments from a Trusted Sender.

Howzit?
I'm hoping to get some information for my folks, Paul and Sue Kiang, that live at 840 Malulani, Kihei. They are elderly and have lived in the subdivision since it was built, when one of the main selling points touted ~30 years ago was the Kihei High School.

I have been forwarded the QR code and URL to access the Environmental Assessment volumes and have been asked to do the research that they are unable to due to their discomfort with technology. In lieu of reading that tome, I found the Liloa Drive Extension area on the Maui County Website.

I saw on the Co of Maui website this address and a pointer to the Maui Metropolitan Planning Organization (mauimpo.org) website for more details, but there was no results when I searched for "Liloa Dr." or "Kihei connector road".



My folks have heard that they could be displaced/unhoused for 2 years?! So I am asking for clarification, on the Maui County website it indicates that the specific landowners that are directly effected have been contacted by the County.



Their property backs up to the 'greenway' and is adjacent to the easement as their house is very near one of the spillways. I am concerned that the "box culvert at an unnamed drainageway" could be right on the other side of their fence (and very small backyard). Is theirs a property that will be directly affected by this project? What sort of notification or communication is being sent?

I see that construction may start as soon as 2027, but with how long the HS took to finally come to fruition, is this something that will affect their quality of life? They walk that path at least once or twice a day, and they are already very concerned about the traffic getting in and out of Malulani safely. It seems like if there's a roundabout at the connector road, what would that next intersection even look like since it's so close and already a fairly blind corner?!

I can be reached by phone at +1.406-599-7753 if it's easier to talk through some of the above.

Be well,
Karma

ORACLE
Karma Wen Kiang (she/hers) | Principal Program Manager, SaaS Compliance
karma.kiang@oracle.com
Oracle Cloud | 161 Enterprise Blvd., Bozeman, MT 59718

Oracle US Holiday/Offices Closed: 2 SEP 2024

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Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT
Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Via Email: karma.kiang@oracle.com

Karma Kiang
840 Malulani Street
Kīhei, Hawai'i 96753

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Ms. Kiang:

Thank you for your email dated August 12, 2024 regarding the Draft Environmental Assessment (EA) for the proposed Liloa Drive Extension project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment 1:

I saw on the Co of Maui website this address and a pointer to the Maui Metropolitan Planning Organization (mauimpo.org) website for more details, but there was no results when I searched for "Liloa Dr." or "Kihei connector road".

Response: We apologize for the confusion. More information on the Liloa Drive Extension project can be found at https://www.liloadriveextension.com/.

The Maui Metropolitan Planning Organization's Hele Mai Maui 2040 Long-Range Transportation Plan (2019) identifies the Liloa Drive Extension project as a recommended project needed to meet the island's transportation goals. For details, please refer to the transportation plan: https://mauimpo.org/hele-mai-maui-2040-long-range-transportation-plan.

Comment 2:

My folks have heard that they could be displaced/unhoused for 2 years?! So I am asking for clarification, on the Maui County website it indicates that the specific landowners that are directly effected have been contacted by the County.

Their property backs up to the 'greenway' and is adjacent to the easement as their house is very near one of the spillways. I am concerned that the "box culvert at an unnamed drainageway" could be right on the other side of their fence (and very

small backyard). Is theirs a property that will be directly affected by this project? What sort of notification or communication is being sent?

Response: As part of the Special Management Area Use Permit application required for the proposed project, DPW is in coordination with property owners whose properties will be directly impacted by the proposed project.

The proposed project will not require any land acquisition or easements involving the property identified at 840 Malulani Street. As such, this property is not considered to be directly affected by the Liloa Drive Extension project.

The Liloa Drive Extension project is limited to the installation of roadway and infrastructure improvements and related Best Management Practices (BMPs), and does not involve the displacement or relocation of any residents.

Comment 3:

I see that construction may start as soon as 2027, but with how long the HS took to finally come to fruition, is this something that will affect their quality of life? They walk that path at least once or twice a day, and they are already very concerned about the traffic getting in and out of Malulani safely.

Response: BMPs will be implemented during construction to mitigate short-term impacts to surrounding residential properties. This includes phasing construction, so impacts to individual homeowners are limited in duration, to the extent feasible. BMPs will also include erosion and sedimentation mitigation (e.g., dust fences, silt fences, filtration berms, temporary sedimentation basins, etc.). A traffic plan will be implemented during construction to ensure continued connectivity. Privacy walls and/or fences will be constructed along the roadway corridor (as necessary) to provide privacy for the existing single-family homes.

The proposed project is designed and intended to not only address short- to long-range roadway capacity concerns in South Maui, but also to enhance the physical environment surrounding the project corridor with various safety measures and mobility amenities, including a shared use path for pedestrians and cyclists.

Comment 4:

It seems like if there's a roundabout at the connector road, what would that next intersection even look like since it's so close and already a fairly blind corner?!

Response: Where necessary, generally at corner parcels adjacent to the proposed roundabout locations, the County is pursuing permanent sight distance easements to maintain an unobstructed line of sight for vehicular and pedestrian safety by limiting the height and placement of fences, landscaping, structures, and other improvements that may obstruct sight lines. These permanent sight distance easements will ensure that drivers are able to safely navigate each of the three (3) roundabouts in perpetuity.

Roundabouts are being considered for the three (3) main intersections along the Liloa Drive Extension corridor because they result in fewer vehicle collisions than signalized intersections by reducing the number of conflict points and acting as a traffic calming measure. As well, the proposed roundabout approaches have been designed using traffic calming design principles.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,



Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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AUG 1 9 2024

E. Thomas Lewicke
917 S. Kihei Road
Kihei, Hawai'i, 96753
August 16, 2024

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

Subject: Draft Environmental Assessment
Proposed Liloa Drive Extension, Kihei, Hawai'i

Dear Ms. Evans:

Enclosed is a copy of my comments on the proposed Liloa Drive extension. I agree that most of the proposed project will have no significant adverse effect. The exception is the change in drainage pattern around the north abutment of the proposed Waipuilani bridge.

The drainage pattern will be altered to funnel athe water that now flows to the northwest and north into and existing ditch that flows westward to South Kihei Road and the ocean. This ditch has often caused flooding of South Kihei Road and the adjacent area since it was excavated in the late 1950's or early 1960's.

The Draft Environmental Assessment ignores any adverse effects resulting from the change in drainage pattern. There is already a flooding problem in the area around the intersection of the Waipuilani Ditch and South Kihei Road. Any increase in quantity of water coming down the ditch will have a significant negative impact on the road and the residents of this area.

Before the proposed Liloa Drive Extension and the Waipuilani Bridge are constructed, this flooding problem must be resolved.

I can be reached at (808)875-0326 or tlewicke@yahoo.com.

Sincerely,

E. Thomas Lewicke, MS, PE(Retired)

xc: Jordan Molina, Department of Public Works
Nolly Yagin, Department of Public Works
Zoltan Rudolics, Rainbridge Design
James Bohdy, Rainbridge Design
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc
Tehina Brito, Warren S. Unemori Engineering, Inc
Tessa Munekiyo Ng, MuneKiyo Hiraga
Hoku Krueger, MuneKiyo Hiraga

Comments on Draft Environmental Assessment
Proposed Liloa Drive Extension
August 16, 2024

Present Conditions

My main concern with this proposal is drainage. In this assessment, there are references to natural water courses. A review of the available historical material related to the Waipuilani Gulch shows that there is very little natural channel below about the 225 foot contour.

The oldest information that I could find are aerial photographs from 1951, 036-3812 (1951), which show the Waipuilani stream flowing directly westward from approximately the location of the Pi'ilani bridge to the shoreline. This stream course is confirmed by the USGS and Hawaii Land Use Commission topographic maps dated 1954.

The 1965 aerial photographs show the diversion channel that carries the Waipuilani water to a previously existing seven foot wide by three foot high culvert under South Kihei Road. This diversion cuts through slightly higher privately owned ground . This culvert and ditch still exist and are the main Waipuilani channel. A resident of the area at the time the diversion was excavated reported that the work was done by county crews using county equipment.

The present diversion ditch is 36 feet wide with a 8 foot high concrete block wall which extends about 40 inches above ground level on the south side of the ditch.

This wall acts as a retaining wall and channel wall. The south 18 feet is owned by the property owners of the lots on the north side of Ho'onani Street subject to an easement held by the County of Maui. The north half of the ditch, is an earth slope, owned by the owners of the proposed Kihei Wailani subdivision.

The present situation, shown on page 73 of the environmental assessment, has the Waipuilani water flowing in three directions, down the excavated diversion, across the surface of the Kamalii Alayna subdivision and northward along the Liloa Corridor to the unnamed water course.

The county's environmental assessment mentions that the proposed drainage system will be maintained by the Maui Department of Public Works. The Waipuilani channel mauka of South Kihei Road was cleaned by the county about twenty years ago. Residents of the area made numerous requests to have the county maintain the Waipuilani channel. Nothing was done until the developers of the proposed Kihei Wailani subdivision hired a contractor to clear the trees that had grown up in the ditch. Besides failing to maintained the channel, the county was also neglected to clear the culvert under South Kihei Road. There is presently about 8 inches of silt, about 20% of the culvert cross section, in the inlet end of the culvert, a large log under the roadway, and 18 inches of silt, 50% of the cross-sectional, in the outlet end of the culvert.

Proposed Drainage System

The proposed drainage pattern on page 75 of the Environmental Assessment shows all the water coming down the Waipuilani Gulch being funneled into the existing diversion ditch. There is no information on existing flow rates across the Kamalii Alayna subdivision, along the Liloa Drive or down the diversion ditch.

There is also no estimate of how much the flow rate in the diversion ditch will be increased.

The Environmental Assessment does not mention that the existing culvert under South Kihei Road was designed for runoff from a small drainage area, not the entire Waipuilani watershed. The existing culvert is so small, seven feet wide by three feet high, roughly 350 cfs capacity, that South Kihei Road floods on an average of once a year, a one year storm. A very rough approximation of the 2010-2011 Waipuilani flow rate based on a 42 inch depth of flow under the Pi'ilani bridge is somewhere around 9,000 cfs. I do not have any information on rainfall distribution or intensity.

Based on the available information or lack thereof it is reasonable to assume that there will be a significant but unknown worsening of flooding conditions at South Kihei Road and the surrounding residential area.

Conclusion

The information contained in the environmental assessment correctly concludes that there will be no significant adverse effects along the Liloa corridor. The assessment ignores the increased downstream flooding that will be a consequence of the construction of the proposed bridge over the Waipuilani stream bed.

Recommendations

1. Perform additional studies to determine flow rates of the main Waipuilani stream entering and leaving the project area for 25 year, 50 year and 100 year events.
2. Design and construct an adequately sized conduit (box culverts or open channel) to carry the anticipated flows. The design should include a South Kihei Road crossing and energy dissipating structures.

E. Thomas Lewicke, MS, PE (retired)

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Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

E. Thomas Lewicke, MS, PE
917 S. Kihei Road
Kīhei, Hawai'i 96753

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Mr. Lewicke:

Thank you for your comment letter dated August 16, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment 1:

The county's environmental assessment mentions that the proposed drainage system will be maintained by the Maui Department of Public Works. The Waipuilani channel mauka of South Kihei Road was cleaned by the county about twenty years ago. Residents of the area made numerous requests to have the county maintain the Waipuilani Channel. Nothing was done until the developers of the proposed Kihei Wailani subdivision hired a contractor to clear the trees that had grown up in the ditch. Besides failing to maintained the channel, the county was also neglected to clear the culvert under South Kihei Road. There is presently about 8 inches of silt, about 2% of the culvert cross section, in the inlet end of the culvert, a large log under the roadway, and 18 inches of silt, 50% of the cross-sectional, in the outlet end of the culvert.

Response: An updated comprehensive Kihei Drainage Master Plan (KDMP), dated December 2022, has been prepared to mitigate flood risks as regional development continues. The Final Report for the KDMP can be found on the County Engineering Division webpage at https://www.mauicounty.gov/DocumentCenter/View/138600/Final-Kihei-DMP-Report-Complete-2022-12?bidId=. The study recommends possible flood mitigation improvements, including estimates of associated costs, so the County can plan and program future drainage projects and guide future developments and major transportation improvement projects.

The KDMP provides recommendations for potential mitigation improvements for each drainage district. Among the improvements recommended for the Waipu'ilani District are to:

- *Replace the existing 1-10'x2' box culvert with 2-11'x4' box culverts at the South Kihei Road crossing to pass the design flow and improve the downstream channel (concrete lined rectangular channel with 15-feet bottom width and 5 feet height).*
- *Perform maintenance of the outlet regularly to be free of debris and sand dune accumulation.*

The recommended improvements in the KDMP will be used by County of Maui to plan and program these future drainage projects and guide future development, as well as major transportation improvement projects to address regional drainage issues. Though regional drainage improvements at South Kīhei Road are not included in the Liloa Drive Extension project, the County of Maui is working to address the issues described. In addition, the DPW is aware that Waipu'ilani Gulch currently contains a considerable amount of sedimentation and debris, including garbage. Immediately upstream portions of Waipu'ilani Gulch between Pi'ilani Highway and the project corridor are owned and maintained by the County of Maui on a regular basis. The parcel containing the gulch makai of the project corridor at Waipu'ilani Gulch is privately owned. Pursuant to Maui County Code, Section 12.12.030, Obstruction of Drainageway, the County will continue to coordinate with private land owners to remove all downstream sedimentation and debris from the drainageway to restore the finish grade to its previously designed and constructed condition.

Comment 2:

The proposed drainage pattern on page 75 of the Environmental Assessment shows all the water coming down the Waipuilani Gulch being funneled into the existing diversion ditch. There is no information on existing flow rates across the Kamalii Alayna subdivision, along the Liloa Drive or down the diversion ditch.

Response: As described in Chapter III, Section D.4 of Volume I of the Draft EA for the Liloa Drive Extension project, the entire existing project site currently generates approximately 32.5 cubic feet per second (cfs) of surface runoff based on a 50-year recurrence interval, 1-hour duration storm. Under existing conditions, some drainage runoff being conveyed by the Waipu'ilani Gulch (originating mauka of the future Liloa Drive corridor) is being diverted (by an earthern berm constructed within Waipu'ilani Gulch) in a northerly direction along the existing corridor, carrying mud and debris across Kamalii Alayna and into the Un-Named Drainageway.

Existing flow rates in the diversion ditch, which the DPW understands to be the portion of the Waipu'ilani Gulch makai of the project area, are also provided in Chapter III, Section D.4 of Volume I of the Draft EA. The existing flow rate in the gulch is 9,275 cubic feet per second (cfs) for the 100-year discharge.

The proposed Liloa Drive roadway improvements will include underground drainage systems (e.g., catch basins, drainlines, underground detention systems, revisions to an existing retention basin north of the Un-Named Drainageway, etc.).

This will assist in preventing the mud and debris runoff from improperly flowing across the Kamalii Alayna subdivision and being diverted along the corridor. The proposed Liloa Drive Extension will also include a new bridge over Waipu'ilani Gulch to provide a safe corridor for pedestrians, cyclists, and drivers to traverse during heavy rainstorm events. Upstream and downstream channel and bank stabilization associated with the bridge improvements will better manage storm flows in Waipu'ilani Gulch, and ensure that the required No-Rise criteria is met.

The drainage systems proposed as part of the Liloa Drive Extension project will be designed to accommodate any additional runoff resulting from hardened surfaces. Therefore, downstream flooding is not anticipated to increase from what was pre-existing (prior to the diversion berm being installed within the gulch) or previously master planned.

A majority of Kamalii Alayna Subdivision is outside of the Area of Potential Effects (APE) for the proposed project. As such, DPW limited its analysis of existing flow rates to those portions of the subdivision that fall in the APE. However, it is noted that runoff tends to disperse along the mauka edge of the residences adjacent to the makai side of the project corridor and flow into nearby residential properties, pooling in low-lying areas and dissipating over time through infiltration or evaporation. With the installation of the proposed drainage improvements, this runoff will be intercepted, conveyed underground and discharged along the intended existing natural drainageways and underground drainage systems. As such, it is anticipated that the proposed project will improve stormwater runoff conditions in those areas.

No adverse impacts to downstream or adjoining properties are anticipated from the construction of the proposed Liloa Drive Extension project, and the project is not expected to exacerbate existing flood conditions generated by existing stormwater flows originating mauka of Pi'ilani Highway. As noted in Response to Comment 1 above, regional drainage improvements, to mitigate flooding, will be undertaken in the future by other projects; and, outside of the scope of the proposed Liloa Drive Extension.

Comment 3:

There is also no estimate of how much the flow rate in the diversion ditch will be increased.

Response: Under current conditions, an existing rock berm in Waipu'ilani Gulch diverts stormwater north along the Liloa Drive Extension corridor and toward the Un-Named Drainageway. However, with the installation of the proposed bridge crossing, which has been designed to accommodate the existing flow rate of 9,275 cfs for the 100-year storm event and related drainage improvements, the drainage pattern in that area is expected to be restored and flow will be conveyed downstream in Waipu'ilani Gulch towards South Kīhei Road, as previously intended.

As described above, DPW will install permanent drainage improvements including drain inlets, subsurface detention systems, drywells, and revisions to an existing retention basin north of the Un-Named Drainageway. This will mitigate any increase in surface runoff and limit peak onsite runoff, ensuring no net increase of runoff is allowed to leave the project site. Downstream of the proposed bridge crossing, the concrete lining in the gulch will transition to grouted rubble paving, then to grasses reinforced with turf reinforcement matting (TRM), and finally to existing (i.e., natural surface conditions) to ensure that the velocity of the flow does not exceed existing rates.

Comment 4:

The Environmental Assessment does not mention that the existing culvert under South Kihei Road was designed for runoff from a small drainage area, not the entire Waipuilani watershed. The existing culvert is so small, seven feet wide by three feet high, roughly 350 cfs of capacity, that South Kihei Road floods on an average of once a year, a one year storm. A very rough approximation of the 2010-2011 Waipuilani flow rate based on a 42 inch depth of flow under the Piʻilani bridge is somewhere around 9,000 cfs. I do not have any information on rainfall distribution or intensity.

Response: It is noted that there are portions of Kīhei that are within designated flood zones and experience flooding during storm events, including stormwater originating from lands mauka of Piʻilani Highway. While these existing flooding concerns are acknowledged, the scope of the Liloa Drive Extension project is limited to addressing the impacts generated by the development of the roadway extension itself and is not designed to address larger regional stormwater flows, which would be beyond the scope of the roadway project. As noted above, potential regional drainage solutions, which includes replacement of the existing 10-ft. by 2-ft. box culvert with twin 11- ft. by 4-ft. box culverts at South Kīhei Road, are identified in the KDMP.

With the proposed drainage improvements, no adverse impacts to downstream or adjoining properties are anticipated from the construction of the proposed Liloa Drive Extension project; and, the project is not expected to exacerbate existing flooding conditions generated by existing stormwater flows originating mauka of Piʻilani Highway.

Comment 5:

Based on the available information or lack thereof it is reasonable to assume that there will be a significant but unknown worsening of flooding conditions at South Kihei Road and the surrounding residential area.

Conclusion

The information contained in the environmental assessment correctly concludes that there will be no significant adverse effects along the Liloa corridor. The assessment ignored the increased downstream flooding that will be a

consequence of the construction of the proposed bridge over the Waipuilani stream bed.

Response: As described above, drainage improvements installed as part of the proposed project will mitigate any potential increase in surface runoff and limit the peak onsite runoff so that there will be no net increase in onsite runoff leaving the project site, and that flooding in downstream properties will not be exacerbated with the installation of the proposed project. As such, no increase in downstream flooding is anticipated with the construction of the bridge crossing at Waipuʻilani Gulch, beyond what is shown on the current FEMA Flood Insurance Rate Maps.

Comment 6:

Recommendations

1. *Perform additional studies to determine flow rates of the main Waipuilani stream entering and leaving the project area for 25 year, 50 year and 100 year events.*

Response: As previously stated, additional studies concerning the 100-year storm event flow rates entering and leaving the project area at both Waipuʻilani Gulch and Kūlanihākoʻi Gulch have been completed for the KDMP.

Comment 7:

2. *Design and construct an adequately sized conduit (box culverts or open channel) to carry the anticipated flows. The design should include a South Kihei Road crossing and energy dissipating structures.*

Response: As described above, the proposed Liloa Drive Extension project will include drainage improvements to mitigate any potential increase in surface runoff and limit the peak onsite runoff so that there will be no net increase in onsite runoff leaving the project site. Though the project is not able to address regional drainage issues, the County is working to mitigate these issues through the further evaluation and programming of the potential solutions described in the KDMP.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
Bradford Wright, Warren S. Unemori Engineering, Inc.
Tehina Brito, Warren S. Unemori Engineering, Inc.
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Subject: FW: Environmental assessment for the proposed Liloa drive extension.

The draft Environmental Assessment for the Proposed Liloa Drive Extension is a commendable comprehensive review of concerns and challenges of the project. If it is going to be inevitable that we will lose the use of North and South Kihei Road in the not to distant future. Why are we wasting time and 80 million dollars on a short 2,900 feet of a road first proposed in the 1980's. With the tragedy of August 8,2023,and multiple wildfires this summer, one that caused the need to evacuate the new high school and advisory to evacuate surrounding neighborhoods in Kihei. We need at least two evacuation routes out of each community. The Liloa extension will have traffic circles at each intersection which will not facilitate evacuation. As stated in the draft:

A new North-South Collector, aligned mauka of the Kihei Research and Technology Park, was a concept previously recognized. The Kihei-Makena Community Plan states:
Support a new bypass highway mauka of Pi'ilani Highway, coordinated with a Ma'alaea-Kealia Pond bypass highway, and an Upcountry-Kihei connector road, to be constructed as growth in the region warrants.
This concept, as well, has not proceeded to the needed planning stages which would render it a timely alternative.
As such, the foregoing options for increasing north-south Pi'ilani Highway capacity are not considered appropriate in the timeframe and cost context of the proposed Liloa Kihei-Makena Community Plan states:
Support a new bypass highway mauka of Pi'ilani Highway, coordinated with a Ma'alaea-Kealia Pond bypass highway, and an Upcountry-Kihei connector road, to be constructed as growth in the region warrants.
This concept, as well, has not proceeded to the needed planning stages which would render it a timely alternative.
As such, the foregoing options for increasing north-south Pi'ilani Highway capacity are not considered appropriate in the timeframe and cost context of the proposed Liloa Drive extension.

We are proceeding with a 1980's community plan : because it is further along in the development stage than any of the newer road projects that would be more efficient for evacuation and handle increased traffic with development of Kihei and Wailea. With thousands of new housing units being proposed. The growth in the region warrants working on these roads now , not 2040.
In addition:
There are no flood control provisions included in the design of a two lane road and bridge across Waipu'ilani Gulch, a major source of flooding in Kihei and South Kihei Road. This is the same area Tre, the young firefighter, lost his life in flood waters in January 2023. FEMA maps show that with no flood control : flood waters will spread out to the homes and condos further down slope. South Kihei Road will flood blocking traffic flow and if need be evacuation. The flood waters will continue into the ocean causing a brown water alert and smother the locale reefs.

The USDOT report:"The project will create a redundancy providing an alternate route away from climate hazard areas." This is not true, it wil not reduce traffic congestion, provide an evacuation route with traffic circles at each intersection,or be a replacement for South Kihei Road when it is flooded. Each community needs more then one evacuation route out. The proposed Liloa Drive connecting to Veterans Highway some time in the future when more funds become available will not be a viable evacuation route when the Central Valley is on fire. How many times have we had to evacuate the animal shelter ?

A multi lane road like the Lahaina Bypass needs to be built diagonally over the ranch lands from Pi'ilani Highway in the area of Lapoa Drive over to Kahalui with a spur to the new high school to help evacuation Kihei, Maui Meadows, and Wailea . A second substantial road to Kahalui would reduce traffic congestion and Pi'ilani Highway can be a replacement for South Kihei Road when it is flooded by the ocean or storm run off. An additional substantial highway connecting Kihei and Kula could be an evacuation route in either direction and help with traffic as Kihei and Wailea continue to develop.

Maui will never be the same after August 8 ,2023. Disasters because of climate change are happening all over the world. The Maui community must be made strong and resilient. Our road projects must be developed to save lives from every day traffic accidents and be a viable efficient evacuation route. If we don't do it now we may have another fire tragedy and none of us want to feel we haven't done everything we can for fire mitigation and evacuation route development.

We need to think long range into the future not the past. 2024 Kihei is not the Kihei of the 1980's when the original community plan was developed. Maui needs funds for the fire recovery:we need affordable housing, flood control, fire mitigation. The community would be better served with a modification of the project,the elimination of extending the existing auto road less then half mile at the cost of millions of dollars of in public funds. Flex the Raise Grant to a greenway pedestrian/bike path only extending the existing Kihei greenway would greatly reduce the cost. It would be an asset to the community, promoting recreation in a healthy environment free of cars. The millions of dollars that would be freed up could be directed to more important projects. Such as larger roads for evacuation and to handle the increased traffic as development continues.

Dr Eric J.Muller
Kihei

Sent from my iPad

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Karlynn K. Fukuda
PRESIDENT
Mark Alexander Roy AICP, LEED AP
VICE PRESIDENT
Tessa Munekiyo Ng AICP
VICE PRESIDENT

Michael T. Munekiyo AICP
FOUNDER

May 30, 2025

Via Email: ejmvmd@aol.com

Dr. Eric J. Muller
Kīhei, Hawai'i 96753

SUBJECT: Response to Draft Environmental Assessment Comments Regarding the Proposed Liloa Drive Extension Project (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street), Maui, Hawai'i

Dear Dr. Muller:

Thank you for your comment letter dated August 18, 2024 regarding the Draft Environmental Assessment (EA) for the Proposed Liloa Drive Extension Project. On behalf of the Department of Public Works (DPW), we offer the following information in response to the comments received.

Comment 1:

The draft Environmental Assessment for the Proposed Liloa Drive Extension is a commendable comprehensive review of concerns and challenges of the project. If it is going to be inevitable that we will lose the use of North and South Kihei Road in the not to distant future. Why are we wasting time and 80 million dollars on a short 2,900 feet of a road first proposed in the 1980's. With the tragedy of August 8,2023,and multiple wildfires this summer, one that caused the need to evacuate the new high school and advisory to evacuate surrounding neighborhoods in Kihei. We need at least two evacuation routes out of each community. The Liloa extension will have traffic circles at each intersection which will not facilitate evacuation. As stated in the draft:

A new North-South Collector, aligned mauka of the Kihei Research and Technology Park, was a concept previously recognized. The Kihei-Makena Community Plan states:

> *Support a new bypass highway mauka of Piilani Highway, coordinated with a Ma'alaea-Kealia Pond bypass highway, and an Upcountry-Kihei connector road, to be constructed as growth in the region warrants.*

This concept, as well, has not proceeded to the needed planning stages which would render it a timely alternative. As such, the foregoing options for increasing north-south Pi'ilani Highway capacity are not considered appropriate in the

timeframe and cost context of the proposed Liloa Kihei-Makena Community Plan states:

> *Support a new bypass highway mauka of Pi'ilani Highway, coordinated with a Ma'alaea-Kealia Pond bypass highway, and a Upcountry-Kihei connector road, to be constructed as growth in the region warrants.*

This concept, as well, has not proceeded to the needed planning stages which would render it a timely alternative. As such, the foregoing options for increasing north-south Pi'ilani Highway capacity are not considered appropriate in the timeframe and cost context of the proposed Liloa Drive extension.

We are proceeding with a 1980's community plan : because it is further along in the development stage than any of the newer road projects that would be more efficient for evacuation and handle increased traffic with development of Kihei and Wailea. With thousands of new housing units being proposed. The growth in the region warrants working on these roads now , not 2040.

Response: An analysis of the Liloa Drive Extension project's applicability to the Kihei-Makena Community Plan is provided in Volume I, Chapter IV of the Draft Environmental Assessment. Our analysis is based on the most recent version of plan, which was published in 1998. Though it was published several decades ago, the issues and goals identified in the 1998 plan are still relevant today. In Part II, Section B.1, the plan cites transportation as one of the region's major problems, describing, among other issues, an overreliance on South Kīhei Road and Pi'ilani Highway and a need to lessen dependence on automobiles and provide bicycle and pedestrian paths. The proposed project responds directly to these needs. It also satisfies the Physical and Social Infrastructure, Transportation implementing action to:

> *b. Plan, design and construct appropriate sections of a new North-South Collector Road, from Uwapo Road to Keonekai Road, to facilitate improved traffic movement in Kīhei proper. When selecting a specific alignment, impacting existing structures should be kept to a minimum. Consideration should be given to segments between Ka'ono'ulu Street and Auhana Street as well as between Ke Alii Alanui and Keonekai Road. In terms of roadway improvements within the community plan region, this shall be the second priority.*

The only priority placed ahead of the Liloa Drive Extension (formerly known as the North-South Collector Road) project is the development of a new east-west road connecting South Kīhei Road to Pi'ilani Highway.

Both the Kīhei Sub-area Transportation Plan (March 2021) and the Maui Metropolitan Planning Organization's (MPO) Hele Mai Maui 2040 Long Range Transportation Plan (LRTP) recognized that there is a lack of internal circulation within the South Maui region, and that another North-South corridor is needed to

distribute traffic and, along with the existing east-west connector roads, create a grid network.

As a result of these transportation and community plans, the Liloa Drive corridor was master planned, so that all developments were required to set aside a road right-of-way that could accommodate the proposed Liloa Drive multi-modal, drainage, and bridge improvements. For example, as a condition of receipt of its Special Management Area Use Permit, the Kamalli Alayna subdivision was required to set aside a 10-foot (ft.) bike path strip for the future Liloa Drive.

The need for the proposed Liloa Drive Extension is further described in Volume I, Chapter I, Section C of the Draft Environmental Assessment. Without a continuous corridor along Liloa Drive, South Kīhei Road and Pi'ilani Highway will experience increased congestion, where some intersections along these routes will operate at level of service (LOS) F and over-capacity conditions.

The project will increase capacity, improve traffic circulation, alleviate traffic congestion, and provide a safe corridor complete with pedestrian and bicycle facilities. It will provide an alternative route to South Kīhei Road, which has increasingly experienced closures due to weather/climate events.

Comment 2:

There are no flood control provisions included in the design of a two lane road and bridge across Waipu'ilani Gulch, a major source of flooding in Kihei and South Kihei Road. This is the same area Tre, the young firefighter, lost his life in flood waters in January 2023. FEMA maps show that with no flood control : flood waters will spread out to the homes and condos further down slope. South Kihei Road will flood blocking traffic flow and if need be evacuation. The flood waters will continue into the ocean causing a brown water alert and smother the locale reefs.

Response: Existing conditions in the project area as they relate to drainage, as well as any potential impacts and proposed mitigation measures, are analyzed and described in the Preliminary Engineering Synopsis prepared for the Liloa Drive Extension project and included in Volume II of the Draft Environmental Assessment as Appendix "K". They are also summarized in Volume I, Chapter III, Section D.4.

In areas with existing drainage systems that were master-planned to accommodate the future development of the Liloa Drive Extension, the runoff released downstream will not exceed the capacity of those systems and will continue to flow downstream as it is presently doing. In the remaining areas of the project corridor, runoff will be intercepted by drain inlets and directed to a combination of subsurface drainage systems, drywells, and an offsite detention basin. This will mitigate any increase in surface runoff and limit peak onsite runoff, ensuring that no net increase of runoff is allowed to leave the project site. These improvements will be sized to accommodate the fully developed Liloa Drive Extension and designed and located to meet or exceed County water quality standards.

The construction of two (2) new concrete bridges is proposed as part of the Liloa Drive Extension project. Both bridges, along with modified invert linings and side slopes, have been designed to accommodate the existing flow rates of Kūlanihāko'i Gulch and Waipu'ilani Gulch, 10,061 cubic feet per second (cfs) and 9,275 cfs, respectively, for the 100-year flood discharge.

Under existing conditions, runoff tends to disperse along the mauka edge of the properties that line the makai side of the project corridor, flow into the adjacent residential properties and pond in low-lying areas. With the installation of the proposed improvements, this runoff would be intercepted, conveyed underground and discharged along the intended existing natural drainageways and underground drainage systems. As such, it is anticipated that the proposed project would improve stormwater runoff conditions in those areas.

Stormwater flow along the Un-Named Drainageway is anticipated to decrease with the implementation of the proposed project. Though the natural drainage pattern in Waipu'ilani Gulch is for runoff to be channeled downstream within the Waipu'ilani Gulch, a rock berm was constructed by an unknown party sometime between 1992 and 2016 to prevent flooding makai of the Liloa Drive corridor by diverting runoff northward along the corridor and toward the Un-Named Drainageway. However, with the installation of the proposed drainage improvements in Waipu'ilani Gulch, the natural drainage pattern in that area is expected to be restored.

It is noted that there are portions of Kīhei that are within designated flood zones and experience flooding during storm events, including stormwater originating from lands mauka of Pi'ilani Highway. While these existing flooding concerns are acknowledged, the scope of the Liloa Drive Extension project is limited to addressing the impacts generated by the development of the roadway extension itself and is not designed to address larger regional stormwater flows, which would be beyond the scope of the roadway project. Nevertheless, with the proposed drainage improvements, no adverse impacts to downstream or adjoining properties are anticipated from construction of the proposed Liloa Drive Extension project, and the project is not expected to exacerbate existing flooding conditions generated by existing stormwater flows originating mauka of Pi'ilani Highway.

To address regional drainage issues in South Maui, the County contracted R. M. Towill Corporation to prepare the Kihei Drainage Master Plan, Waiakoa Gulch to Kilohana Drive, finalized in December 2022, to establish a priority list of projects and begin to program projects for budgeting/implementation.

Comment 3:

The USDOT report: "The project will create a redundancy providing an alternate route away from climate hazard areas." This is not true, it will not reduce traffic congestion, provide an evacuation route with traffic circles at each intersection, or be a replacement for South Kihei Road when it is flooded. Each community needs more then one evacuation route out. The proposed Liloa Drive connecting to Veterans Highway some time in the future when more funds become available will not be a viable evacuation route when the Central Valley is on fire. How many times have we had to evacuate the animal shelter ?

Response: The potential impacts of the proposed Liloa Drive Extension project to roadways and regional traffic were assessed in a Traffic Impact Analysis Report (TIAR), included in the Volume II of the Draft EA as Appendix "J" and summarized in Volume I, Chapter III, Section D.1.

The TIAR, prepared in 2020, used a 20-year forecast to predict traffic outcomes. It found that by Year 2040 (without the Project), north-south traffic is estimated to increase overall by approximately 30 to 35 percent along South Kīhei Road and increase overall by approximately 50 to 55 percent along Pi'ilani Highway. Some intersections in the Base Year 2040 without the project scenario will operate at LOS F and overcapacity conditions.

The reroute of traffic generated by the Liloa Drive Extension will result in significantly lower delays and increased capacity at all signalized and unsignalized intersections along South Kīhei Road and Pi'ilani Highway. With the implementation of the proposed project, all study intersections would improve from Base Year 2040 conditions. Based on the results of the TIAR, it is anticipated that the proposed Liloa Drive Extension project would reduce traffic congestion.

With respect to the need for additional evacuation routes, the Liloa Drive Extension will help to complete a grid network in South Kīhei, providing streets, including Nāmau'u Place, where the only way in and out is along South Kīhei Road, with an additional route for ingress and egress. Neither constructing the mauka North-South Collector road, nor providing an Upcountry Connector road would provide the same. The Liloa Drive Extension project area is located outside the predicted 3.2-foot sea-level rise benchmark, and, therefore, potential impacts related to sea-level rise are minimal. This makes the proposed project a viable alternative to South Kīhei Road, portions of which are located within the 3.2-foot sea-level rise exposure area.

Comment 4:

A multi lane road like the Lahaina Bypass needs to be built diagonally over the ranch lands from Pi'ilani Highway in the area of Lapoa Drive over to Kahalui with a spur to the new high school to help evacuation Kihei, Maui Meadows, and Wailea . A second substantial road to Kahalui would reduce traffic congestion and Pi'ilani Highway can be a replacement for South Kihei Road when it is flooded by the

ocean or storm run off. An additional substantial highway connecting Kihei and Kula could be an evacuation route in either direction and help with traffic as Kihei and Wailea continue to develop.

Maui will never be the same after August 8 ,2023. Disasters because of climate change are happening all over the world. The Maui community must be made strong and resilient. Our road projects must be developed to save lives from every day traffic accidents and be a viable efficient evacuation route. If we don't do it now we may have another fire tragedy and none of us want to feel we haven't done everything we can for fire mitigation and evacuation route development.

Response: The 2021 Kihei Sub-area Transportation Plan examined community input, past plans and studies, data collection related to safety and congestion, and traffic simulations and models to develop 88 potential solutions to address Kihei's transportation needs and issues. These solutions were scored across 14 criteria based on how well they could meet the goals of the transportation plan, and ranked. These criteria included Safety (for example, does the solution provide an alternate route during an emergency?), System Preservation and Resiliency (for example, does the solution consider the effects of sea-level rise and extreme weather changes?), and Regional Capacity and Mobility (for example, does the solution improve capacity and increase throughput by reducing delay and travel times?). Those solutions with the highest scores were determined to be the most comprehensively beneficial solutions.

Though both of the mauka North-South Collector and Upcountry Connector were identified as potential solutions, estimated to cost over $75,000,000 and $109,000,000, respectively, neither ranked among the top solutions recommended by the plan in the category of projects estimated to cost over $1,500,000. The top six (6) solutions recommended by the plan in that category all involve different phases of the North-South Collector Road.

Currently, there is no existing right-of-way to support a mauka North-South Collector or an Upcountry Connector road, meaning that a corridor selection analysis and an Environmental Impact Statement would need to be undertaken before these projects could move forward. Furthermore, neither of these roadways would address the existing internal circulation problems in Kīhei.

Maui Veterans Highway (formerly known as Mokulele Highway), described in earlier transportation master plans, has been completed to address Central-South Maui traffic and drainage. It was previously a two-lane highway that frequently flooded and was inadequate to accommodate the Central-South Maui traffic volumes. It has since been widened to an elevated, four-lane, divided highway with a separated bike path stretching from Kahului to Kīhei.

Comment 5:

We need to think long range into the future not the past. 2024 Kihei is not the Kihei of the 1980's when the original community plan was developed. Maui needs funds for the fire recovery: we need affordable housing, flood control, fire mitigation. The community would be better served with a modification of the project, the elimination of extending the existing auto road less then half mile at the cost of millions of dollars of in public funds. Flex the Raise Grant to a greenway pedestrian/bike path only extending the existing Kihei greenway would greatly reduce the cost. It would be an asset to the community, promoting recreation in a healthy environment free of cars. The millions of dollars that would be freed up could be directed to more important projects. Such as larger roads for evacuation and to handle the increased traffic as development continues.

Response: The $25,000,000 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant awarded to DPW by the United States Department of Transportation (U.S. DOT) must be used to implement the proposed Liloa Drive Extension project and, per U.S. DOT regulations, and cannot be reallocated. The County will also be receiving an additional $18,000,000 in Federal funds for the Liloa Drive Extension project. The DPW notes that to receive Federal funding of this magnitude is rare. As such, with the timely construction of the proposed project, County taxpayers will benefit from this long-planned roadway at a substantially reduced cost.

Thank you again for your participation in the Chapter 343, Hawai'i Revised Statutes environmental review process. A copy of your letter and this response will be included in the Final EA being prepared for this project. Should you have any questions or require additional information, please feel free to contact me at (808)983-1233.

Very truly yours,

Tessa Ng

Tessa Munekiyo Ng, AICP
Vice President

TMN:yp
cc: Nolly Yagin, Department of Public Works
Charlene Shibuya, Department of Public Works
Clifford Mukai, Warren S. Unemori Engineering, Inc.
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WRITTEN COMMENTS FROM APRIL 8, 2021 COMMUNITY OUTREACH MEETING

APPENDIX O-1

MAR 15 2021

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name: Property Management Maui LLC Marc and Roberta Fullmer Phone No. _____

Address: _____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

I disagree with the plan of no parking between Liloa Dr + Hakio Pl
If the parking is removed on Kulanihakoi St I want a driveway apron
on my back gate. The Ramos at 6 Walani Pl have an apron at their back
gate on Kulanihaki done by workers who put in the handicap sidewalks
The Fairbanks at 157 Kulanihakoi will not be able to back out of their
driveway. Will the trees be removed on Kulanihakoi between
Liloa + Hakio Pl

Please submit your comments by April 1, 2021 via mail to the address below. The project team will be prepared to address questions and comments raised at the April 8, 2021 community meeting.

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions, please feel free to contact Charlene Shibuya, Munekiyo Hiraga, at 244-2015.

MAR 22 2021

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name: Michael Black Phone No. _____

Address: _____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

PLEASE SEE ATTACHED

Please submit your comments by April 1, 2021 via mail to the address below. The project team will be prepared to address questions and comments raised at the April 8, 2021 community meeting.

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions, please feel free to contact Charlene Shibuya, Munekiyo Hiraga, at 244-2015.

March 15, 2021

Attn: Charlene S. Shibuya, Senior Associate

Please review, forward, and consider this as my response to the Proposed Liloa Drive Extension.

Mahalo,

Michael Blaz

To Whom It May Concern:

There are several reasons for which I am adamantly opposed to the Proposed Extension of Liloa Drive. Please consider the following:

Historical Overview

To my recollection, a North-South Collector Road for south Maui (Kihei) was first conceptualized in the mid-to-late 1980's (actually 1986). As your correspondence of March 5, 2021 details, *"...(t)he project will increase capacity, improve traffic circulation, alleviate traffic congestion, and provide a safe corridor complete with landscaped pedestrian and bicycle facilities across two (2) modern bridge spans."* The letter then references "a priority need" per Applicant and the State of Hawaii Department of Transportation.

Attached please find an article published in the Maui Weekly the week of August 3-9, 2006. It seems that the County was on the precipice of approving a four-lane traffic plan for the Collector Road, while the community favored a bicycle and walking greenway only. As it was recently explained to me, for the County to receive the 80% Federal funds requested/required, two things had to happen; a) the County had to guarantee that they were able to provide their 20% of the necessary funding, and b) that the project had Community support. Apparently, neither criterion was met, and the project was set aside.

Until now.

Now It's 2021

If Phase 1 of the proposed 2-phase plan is approved—beginning in 2024 with completion scheduled in 2026—it will be 40 years since the conceptualization of a North-South Collector Road. Since Community support, I believe, continues to be a criteria for approval, conversely wouldn't Community demand have dictated quicker response for a Collector Road? I have lived on Maui since 1990 and I can assure you that the Kihei Community is not clamoring for a Collector Road. Furthermore, the roughly .5 mile section covered by Phase 1 would require bridging two gulches that would involve Army Corps of Engineering involvement and seriously escalate the cost.

Referring back to the Kihei Community Plan of 2006 (as pictured in the attached article) the Collector Road was originally planned as a "discontinuous" road spanning from Hale Kuai to Kulanihakoi streets — about 1.3 miles. The distance between North Kihei and Wailea Alanui is approximately 8 miles. It would seem that by definition if a North-South Collector Road is to alleviate supposed traffic congestion, then it must run from the North end of Kihei to the South End of Kihei. Otherwise, traffic would merely be diverted only to dump back on to one of the two existing roads, causing even more of a traffic problem.

It should be noted that to date two sections of the road have been completed—Alanui Ke Alii to Keonekai (.6 miiles) and Hale Kuai to Waipuilani (approx. .8 miles.). If Phase 1 of the proposed plan were completed, that would add an additional .5 miles—for a total of 1.9 miles. As noted, Phase 2 of the plan would be subject to "available funds"???? After 40 years, 75% of the project will be yet to be completed, depending on available funds!

Reality is, the only time there are traffic issues on Piilani Highway and Kihei Rd. is during our high visitor season from December 15-April 15—four months. The pandemic has made that more apparent than ever because even the most avid supporter of a Collector Road could not possibly justify the need over the past year when there have been few if any visitors.

So, while the Applicant and the State of Hawaii Department of Transportation are advocating pouring millions of taxpayer dollars into a marginally needed (at best) Collector Road, The County Council has made it known that they will be taking a serious look at revising zoning (per the Minatoya list, "officially" approved in June, 2018), which could render many privately owned vacation rental condos de-zoned for short-term rentals.

In addition, the current administration (Mayor Victorino, et al) has publicly stated a desire to "group" vacation rentals around the major hotels in Wailea and Kaanapali, which, among other things, would seriously alleviate traffic issues. It would also be in keeping with an obvious need on the State level for Hawaii to diversify and become less dependent on tourism. The end result of total dependence on tourism was very painful during the months after 9/11 and more recently when Maui's unemployment level of 35% was the highest in the nation due to the pandemic.

In summary, it seems that the County and the DOT are desperately clinging like a dog to an old bone that has long outlived its viability. Why not direct that money to creating green energy opportunities for Maui; more affordable housing for its citizens; expanding our world reputation as a progressive, technologically driven community—rather than continuing to encourage and accommodate more tourism!

The Impact on Those Who Will be Directly Affected by this Plan

I have been a Real Estate broker for over 30 years now—18 years in Maui. There are only a couple of constants I've learned to hang my hat on during all these years—a) it's a marketplace totally driven by supply and demand, and b) road-noise is a flaw that can never be corrected. The reason I have that copy of an article written in 2006 is because that's the year I purchased my home on Kawailani Circle. The article was provided to me by the listing agent as a disclosure prior to purchase. Fortunately, I had already done my homework and knew that the project was not going anywhere for the foreseeable future and I know how slowly things move on Maui. Fifteen years later, I guess I can take solace in the fact that I was "right", but this would obviously be a game changer.

Historically, whether it's Maui or just about anywhere, road noise can de-value a property as much as 20% compared to comparables without road noise. As I drive through the other two aforementioned "legs" of the Collector Road, I'm struck by the fact that there are no residential properties on the west side of Liloa St. to impact, and many of the properties on the east side have considerable setbacks from the road. Your proposed Phase 1 and later Phase 2 are being squeezed into a much narrower corridor, with home on both sides, and although traffic may be somewhat lighter than on Piilani Highway, there will be cars, and motorcycles, going past our homes all night just a short stone's throw away. And people walking and talking on a sidewalk so close one could reach over the fence and shake their hand as they go by.

Unfortunately, the fact that this letter has gone into mailboxes of owners that will be affected, it has now become a required disclosure for anyone planning to sell their home from now unless and until the project is deferred—or canceled.

Not to mention the horrific noise and air pollution, daily doses of red dirt covering decks, driveways, roofs, and interiors. I have some friends who live in PV 1 who have been completely inundated with centipedes since the construction on the Maui Lu and surrounding roads began two years ago.

Maui is Our Special Place and the Spirit of Aloha Still Rules

No doubt I will not be your only detractor. Hopefully clear thought and Maui sensibilities will rule, as they often do. Let's avoid an irreparable error in judgment.

malama pono

Michael Blaz

Michael Blaz

09/15/2006 13:56 FAX 808 877 9449 EKA KAHULUI 001

Melissa from Audrey Ventimiglia

August 3–9, 2006 Vol. X, No. 31 www.MauiWeel

UPCOUNTRY EDIT

KĪHEI COLLECTOR ROAD HALTED

From four lanes to greenways, state and county disagreement stopped plans for reliever road. "... now's the time to rethink the plan."

Allegra Fasnacht

Plans for a north-south collector road through Kīhei need to be reassessed in the state Department of Transportation's (DOT) Land Transportation Plan Update, scheduled to be completed during the second half of 2007. The road would have run the length of Kīhei, between Uwapo Road and Halekuai Road.

According to former Planning Director Chris Hart, the Kīhei Traffic Study between 1986 and 1991 indicated a strong need for mauka/makai access. "The Pi'ilani was designed to be the arterial road, but we wanted to provide an additional opportunity for circulation, to relieve South Kīhei Road traffic." The second road, he said, was always intended to be a "local collector road," designed primarily for pedestrians and bicycles.

The idea of a greenway was then proposed, which would entail a discontinuous two-way road, but concentrate on bike paths and walkways. "We need to stop calling it a road," said former Planning Commission member Joe Bertram III, "and start calling i a corridor." In 1998, a greenway was adopted into the Kīhei-Mākena Community Plan which would connect parks, shopping and activities while alleviating the need to drive "It was ahead of its time," said Bertram.

With the change of administration in the early 1990s came a change in the plans When chief engineer Lloyd Lee began work on the project, he envisioned a four-lane highway and shifted focus of the road to alleviate traffic congestion. Federal funding for the project was allotted for a four-lane road but community planners refused to agree to Lee's proposals, since the majority of residents were opposed to having traffic ru through their neighborhoods. Eventuall

see ROAD p.

Commentary contributed by Joe Bertram III - Kihei

Thank you for the keeping South Maui well informed on the status of the Kihei Community Association's (KCA) struggle to create the "pedestrian orientation" called for in our community plan. The lapse in federal/state funding for the road (we already gave up on federal funds for our greenway) is a direct result of the lack of a unified vision between community, county and state.

Ten years ago, when I founded the Kihei Greenway concept, I envisioned a greenway *only*, while state and county saw four auto lanes *only*. While our community plan struck a balance with a two-lane discontinuous road with a separate continuous greenway, county policies and traffic master plans didn't reflect that desire, and our current situation is the result.

This is a golden opportunity with our county, state and federal partners to create a progressive vision utilizing many new programs being advocated by the Federal Highway Administration, including roundabouts, safe routes to school, pedestrian safety action plans and transportation enhancement funds for transit and bike/pedestrian facilities.

By creating specific plans involving all stakeholders, we can have a ready supply of "off the shelf" plans for continuous federal funding. Kaua'i County has done this to successfully gather over $13 million in funding last year!

KCA is working to achieve that for Kihei through several steps our Greenways Committee is taking: 1.The adoption of our Greenway Masterplan onto the Community Plan Map (currently before Councils Parks Committee); 2. Pursuing a continuous dedicated right-of-way for the greenway through county buy-back and easements (currently working with the mayor's office and the Maui County Planning Department); 3. Partnering with Public Works and Parks to affect current projects in the corridor to provide for safe, attractive walking and biking paths. We have also initiated contact with our congressional partners for possible Federal assistance.

It is important that the public participates. Write letters of support to newspapers and government agencies. Make this a major issue in this election, to hold whoever wins accountable for implementation.

Councilmember Joanne Johnson's Parks Committee has scheduled a site visit Thursday, Aug. 17, at 1:30 p.m. at Keonekai Park to consider recommending the adoption of our Greenway master plan onto the community plan map. This will be followed by a public hearing at the Kihei Community Center at 3 p.m.

After 10 years of talk and competing plans, it's time to act together on a common vision for a "people-oriented" transportation system for Kihei. I'm ready. Are you? ✲

This map is the only legally binding part of the Kihei Community Plan, as it is approved by the County Council.

"Hard it over," said Veda Dale, one of about 62 volunteers at this year's second CompuSwap. Approximately 160 truck loads and 413 car loads of recyclable computer equipment were dropped of at the Maui County Stadium parking lot last weekend, July 28 and 29. Among the many recyclers was Carol Takashima who rode all the way from Lahaina on her Honda Shadow with an old scanner strapped to the back. Volunteer Chris Svendsen was happy to help her unload it. "I'm glad you guys are here so it doesn't go into the landfill," Takashima said. Over two container loads weighing over 36 tons were collected for shipment and proper disposal on the Mainland and some 60 working systems were given away on a first-come first-served basis on Saturday.

Road...

from p. 1

Les refined from the project, and the funding was lost. The Public Works Committee and the state DOT are now trying to devise plans to accommodate the community as a whole.

Bertram said the Kihei Community Association (KCA) believes that they need to work with the state, but say that the county and the state aren't on the same page. The new chief engineer, Joe Krueger, is very accommodating, according to Bertram, but is bound by master traffic plans that don't reflect what the community wants. "We have to change the policies in the plans," said Bertram.

In 2000, an amendment was made to the Kihei Community Plan to include the greenway system, stating that the road itself will be discontinuous, and secondary to the walking/biking path. "But the community plan is ordinance, not law," explained Bertram. There are two sections in the plan, the language and the map. The language, which states that "there is a need to lessen the dependence on automobiles through efficient land use distributions... bicycle and pedestrian paths would provide an effective alternative," is only taken as suggestion. The map is the only legally binding part of the community plan, as it is approved by the County Council.

The KCA had its first meeting recently to create a new amendment to the community plan map that reflects the right changes, Milton Arakawa, Public Works and Environmental Management director, said that the county has come to a general consensus that it will be a two-lane roadway with a bike path. "We want to get federal funding for 80 percent," said Arakawa, and the county is working with the state DOT to update the regional transportation plan for Maui. According to Arakawa, the road will again be eligible for funding once the update is complete, although they need to assess regional traffic concerns before they commit to the collector road.

Planning Director Mike Foley is determined to stay true to the community plan, according to Bertram. "A highway won't work, so now's the time to rethink the plan," said Bertram. "I think it will be a success." ✲

MAR 22 2021

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name: David Frazee Phone No. _____

Address: _____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

see attached

Please submit your comments by April 1, 2021 via mail to the address below. The project team will be prepared to address questions and comments raised at the April 8, 2021 community meeting.

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions, please feel free to contact Charlene Shibuya, Munekiyo Hiraga, at 244-2015.

K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Comm Outreach\Comment Card.doc

Mr. Hiraga:

I would like to bring my issue to your attention. Every morning all the delivery trucks from Kahalui, etc, turn off of Pi'ilani Highway onto Waipuilani Road heading towards Safeway and other Kihei business's. Waipuilani Road goes downhill and the big trucks use their jake brake making lots of noise in a residential area around 5 AM every morning.

I guess they use Waipuilani instead of Piikea Ave because of less traffic lights and faster. I consider East Waipuilani Road a residential area and would request signage that stops heavy trucks from entering the residential area. Please consider this in your design.

David Frazee

MAR 22 2021

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name: Mark & Patricia Shaw Phone No. _____

Address: _____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

* My biggest concern is the roundabouts. Please add the pedestrian flashing lights. ♡ Drivers are speeding around the roundabout on Piikea; so pedestrians can be unseen when drivers focus is on cars circling around.

* I think it will be wonderful when it is all done. ☺

* Speed bumps will be good in/by neighborhood areas which are almost all along the path route.

Please submit your comments by April 1, 2021 via mail to the address below. The project team will be prepared to address questions and comments raised at the April 8, 2021 community meeting.

* Thanks for your work ♡ all of you.

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions, please feel free to contact Charlene Shibuya, Munekiyo Hiraga, at 244-2015.

MAR 29 2021

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name: Denise Fotenakes Phone No. _____

Address: _____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

Thank you for allowing me to express my concerns regarding Liloa Drive Extension. My home backs up to Liloa Drive — the speedway / truck route! Limited access to Piilani Hwy has caused increased traffic. Drivers from Piilani 2 & 3 along with drivers from Waipuilani & Kaukoa all use Liloa to Piikea & light @ Hwy. These drivers all head South to drive North. Since roundabout was constructed, truck drivers have changed their route. They now turn right off

(cont) on back →

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Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
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Pi'ilani Hwy onto Wai'ulani & left on Liloa to reach drive behind Safeway Plaza. This includes Matson & all delivery vehicles, gas & propane trucks all drive on Liloa. These deliveries begin in early morning. Map shows two more roundabouts — unbelievable! Without access (light) @ Pulani Hwy — there will be no alleviation in traffic.

I asked for speed bumps but was told no because Liloa was a collector Rd.

If had been aware of all delivery traffic, I might have had second thoughts about buying my home!!

Landscaping, bike paths & roundabouts do not change traffic flow. Get a grip!

POSTAGE

Louisa Portmanteau

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

From:
To: Liloa Drive Extension
Subject: RE: Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Confirmation
Date: Friday, April 2, 2021 1:09:22 PM

Aloha Munekiyo,

Per the letter I received, I did submit my questions to the surveymonkey (https://www.surveymonkey.com/r/Liloadrive) referenced. I'll share the same questions here in case you don't see the submission on the survey comments. I look forward to the zoom forum.

Mahalo,

John

I live (and have a home office) at the NW corner of the Pi'ilani Villages II, immediately SE of the proposed Waipu'ilani Gulch bridge. I'm concerned with the impacts from the construction to my residence and neighbors during the Phase 1 construction. I'm most concerned with the following:

1. *The duration of the Phase 1 project, 18 - 24 months is extensive:*
   a. *Can you clarify the sub-phases of construction and resulting duration? For example: i) Waipu'ilani Gulch Bridge, ii) Waipu'ilani - Liloa Roundabout, iii) Roadway, iv) Pedestrian Path, v) Landscaping. This clarification may help alleviate my concerns with the duration of the project and the expected impact this will have on my residence and our neighbors.*
   b. *What are the hours of construction that will be followed?*
   c. *Construction projects in Hawaii take longer than other US states, with what often appears to be many days of inactivity (as evidenced during the Pi'ikea-Liloa roundabout construction). What should we expect with regards to the continuity of construction and can/will anything be done to minimize the project duration?*
2. *Past maintenance activities in the Waipu'ilani Gulch have resulted in excessive dirt being cast into our neighborhood. Additionally, the recent Kihei High School phase 1 construction involved seismic tremors resulting from construction blasting. What should be expected with regards to managing; i) Dust, ii) Seismic, and iii) Noise Pollution. Especially if pilings will have to be sunk deep into the ground for the*

bridge.

Additional questions of lesser criticality are:

3. *Can you provide a summary of the street light planning (both location and type) and confirm that the lighting will be both sufficient for pedestrians while minimizing the light pollution being broadcast into the neighborhood homes?*
4. *Will the Pi'ilani Villages HOA have input to the landscaping vegetation that will boarder the those communities?*
5. *Can the overhead power lines that will need to be moved be routed underground instead?*
6. *What will the vehicle access be (or restrictions) where at the SW corners of Pi'ilani Villages I & II (Mahealani St. & Kawailani Cir.) will intersect with the new Liloa Dr.*

Mahalo for considering my questions and facilitating the upcoming zoom meeting.

From: Munekiyo Hiraga <no-reply@zoom.us>
Sent: Thursday, April 1, 2021 9:20 PM
To: marliajk
Subject: Proposed Liloa Drive Extension (Vicinity of East Waipuʻilani Road to Vicinity of Kaʻonoʻulu Street) Confirmation

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From:
To: Liloa Drive Extension
Subject: Parking
Date: Tuesday, April 6, 2021 6:06:24 PM

How is this going to impact the parking as we don't have enough parking as it is.
The Enbanks will have to back out of their driveway right into the roundabout, how is this safe?
If I wanted could you relocate my trees in the devil strip?
Since the high school is up the street and the children will walk to school from this neighborhood will there be flashing lights when they need to go thru the roundabout?
RoBerta

From: Michael Blaz
To: Liloa Drive Extension
Subject: Liloa Drive Extension
Date: Thursday, April 8, 2021 9:17:41 AM

What is the proposed budget to complete Phase 1 of the project? What will be the County's share in order to secure Federal funding?

Has there been any consideration given to going south from Hale Kuai to Welakahao for the project rather than going north from Waipuilani? The distance would be about the same and there are no neighborhoods that would be disrupted for two years during construction. No doubt the costs would be lower, as well.

Has any thought been given to using the County's money to make much needed infrastructure improvements, like re-paving all of south Kihei Rd. for instance? Upcountry bridges? Safe passage for kids to cross Piilani Hwy when the new school is completed? instead of extending Liloa Dr.?

What makes the County think that a North-South Collector Road that was conceived 35 years ago is top of mind for Maui residents? If Phase 1 were to be completed by 2026, approximately 1.9 miles of a Collector road that stretches nearly 8 miles will have been completed in 40 years, noting that Phase 2 (another .4 of a mile) will be subject to available funding.

Michael Blaz

Michael Blaz

From: Don Gerry
To: Liloa Drive Extension
Subject: Testimony
Date: Wednesday, April 7, 2021 9:14:14 AM
Attachments: Testimony for April 8th, 2021. .docx

I would like to submit this attachment as a testimony why I think this project at 16E Waipuilani Road in Kihei should not be built unless the flooding is addressed.
Thank You Don Gerry

April 6th, 2021 A testimony from Don Gerry, resident of
The lowest elevation property in this Wapuilani Community.

I think it is time before any other development in Kihei is done that we first look at the current infrastructure for the flooding and control of it control to be improved.
I know Flood Development Planning says we are to get some improvements but their dates are too far in the future.
In talking to Doyle Betsill, he tries assure us that the engineering for this property is showing no problems.
I am sorry to share that I do not trust the engineering with the County of Maui and with those hired by the investors for the proposed project on 16 E. Waipuilani.
If you look at the past engineering done along the Ahupuaa you can see the improvements are lacking something in their design.

That bridge installed at the old Suda Store, ABC store, Kihei Canoe Club area, looks nice and took a long time but why was it engineered to still get wet with flooding. It was built 24 inches lower that the existing roads entering and exiting it. It should have been level with the exisiting S. Kihei Road elevation.

The bridge at Whale Foundation and Maui Lu Area was Closed for only 1 night and by morning the traffic was able to go thru. Rails were then installed without much traffic delays the following days.
I will never know why they left the old bridge under the new one to continue blocking trees and debris from flowing. No wonder it went fast.

Waipuilani Gulch which is owned by Fong is so full of trees, debris, washing machines, peoples green waste, gardens, chicken coops and cars when I walked it 1 year ago. This gulch starts Mauka of the Piilani Highway all the way from Kula. When the water went under the 120 foot wide bridge flood marks were noticed in December 26, 2010 and again in January 11th 2011, just 2 ½ weeks later, the water had exceeded 4 feet deep under the bridge. It was estimated the water flowed at a volume of over 120,000 gallons/ second. All of this water went across the future bypass Liloa location and down the 12-15 foot gulch where it was supposed to go and also washing out the grass area from the Betsill Kamalii Alayna project where it breached S. Kihei Road. We had a 100 foot wide area from the grass area and the gulch now heading to Waipuilani Road where all of those houses saw 20 to 30 inches of water and mud for 2 weeks. This area is the last area to get cleaned by the crews as they worked from both directions of higher elevations.

Maui Sunset had a pump going to the ocean until they covered it and removed the gulch to the ocean instead of repairing it. County knew about this from Me during the Don Couch and David Goode time. There was a grate to collect water at the corner of Waipuilani Road and S. Kihei Road which got cleaned out and just covered later. I know this was a private system but it was never turned on anytime during the past 50 years mentioned by a neighbor nextdoor.

Piilani Village 2 and 3 and the Piilani Shopping Village go to the lower retention basin which is also a Soccer field along Liloa Road. When the field over flows it goes to another minimal retention basin along Yee's Orchid. Eventually this water goes to South Kihei Road with no thought in getting it to the ocean in a manmade pump station. This could be at 1114 South Kihei Road 7-acre parcel. I am aware of the route of this retention basin because I was a part of the building of it.

I have suggested a retention basin in the 7-acre parcel at 1144 SKR to Public Works, Mayors office and Kelly Kings office in the past 2 weeks as well as all the above mention with no response or as much as an acknowledgement of receiving my concerns.

It would also behoove you to look into the Mike Reyes, "Southwest Maui Watershed Plan" and how to divert and retain some of the water Mauka of the Piilani before it even gets to Kihei. This also was suggested by myself Back in my January meeting with David Goode and Don Couch. This website shows retention ponds which are capable retaining safely hundreds of thousands of acres of water.

I know that the Liloa Road extension is coming sometime soon. I would hope there is consideration to help direct the flow, cleanup the gulch and improve it, as well as build another bridge over the gulch after removing the old culvert under SKR first.

President Biden has allocated money to improve bridges.
The infrastructure we have is not working.
Please no more development till we improve what we have now.
We need to listen to the people in this area.
I am more than willing to discuss any part of this testimony if someone desires.
Thank You,
Don Gerry

From: Bryan Molina
To: Liloa Drive Extension
Subject: Re: Questions
Date: Thursday, April 8, 2021 2:30:27 PM

Aloha,
I have 2 questions.

1. What type construction will be taking place in the Waipuilani gulch hammering, blasting, large trucks etc. Will there be any possible damage to buildings, foundations or solar panels on roof?

2. The greenbelt will run through neighborhoods will there be any barriers installed to limit access to the rear of the homes by homeless people or students once the high school is built. Homeless use the greenway leading up to Waipuilani Road as a meeting place already.

From:
To: Liloa Drive Extension
Subject: Flooding
Date: Friday, April 9, 2021 9:07:59 AM

A few questions.
How is the flooding issue going to be solved with the new Kihei Wailani Villages project, it will impact the problem.. Looks like the project land is right inline with the gulch and your bridge.
Our house is at the corner of Kulanihakoi and Hakoi, if you put trees along Kulanihakoi how will we get into our back gate?
Also during construction how will our tenants get into their unit as their entrance is on Kulnaihako?

Thank you,
RoBerta Fullmer

From: Frank Provenzano
To: Liloa Drive Extension
Subject: Liloa Drive Drawing #14
Date: Friday, April 9, 2021 12:53:52 PM

Aloha,

Mahalo for your informative presentation yesterday which we viewed on an iPad mini. We took screenshots of the slides however being so small they're very difficult to clearly view. If possible we'd like to have a large PDF copy of the location map & typical section drawing for location #14. That is the area behind our lot located at 246 Kawailani Circle which is the house to the left of the #14 circle on the location map. We're very interested in how the slope behind our house will be modified & how it might affect the drainage of our lot which goes downhill from the street. Hopefully that location map & typical section drawing will answer all of our questions & if necessary could contact you for clairification.

We're original owners and the 4th of July 2018 fire burned up to our neighbors backyard so we're interested in how the construction will improve our safety.

Mahalo,
Frank & Helena Provenzano

APR 16 2021

March 15, 2021

Attn: Charlene S. Shibuya, Senior Associate

Please review, forward, and consider this as my response to the Proposed Liloa Drive Extension.

Mahalo,

Michael Blaz

To Whom It May Concern:

There are several reasons for which I am adamantly opposed to the Proposed Extension of Liloa Drive. Please consider the following:

Historical Overview

To my recollection, a North-South Collector Road for south Maui (Kihei) was first conceptualized in the mid-to-late 1980's (actually 1986). As your correspondence of March 5, 2021 details, *"...(t)he project will increase capacity, improve traffic circulation, alleviate traffic congestion, and provide a safe corridor complete with landscaped pedestrian and bicycle facilities across two (2) modern bridge spans."* The letter then references "a priority need" per Applicant and the State of Hawaii Department of Transportation.

Attached please find an article published in the Maui Weekly the week of August 3-9, 2006. It seems that the County was on the precipice of approving a four-lane traffic plan for the Collector Road, while the community favored a bicycle and walking greenway only. As it was recently explained to me, for the County to receive the 80% Federal funds requested/required, two things had to happen; a) the County had to guarantee that they were able to provide their 20% of the necessary funding, and b) that the project had Community support. Apparently, neither criterion was met, and the project was set aside.

Until now.

Now It's 2021

If Phase 1 of the proposed 2-phase plan is approved—beginning in 2024 with completion scheduled in 2026—it will be 40 years since the conceptualization of a North-South Collector Road. Since Community support, I believe, continues to be a criteria for approval, conversely wouldn't Community demand have dictated quicker response for a Collector Road? I have lived on Maui since 1990 and I can assure you that the Kihei Community is not clamoring for a Collector Road. Furthermore, the roughly .5 mile section covered by Phase 1 would require bridging two gulches that would involve Army Corps of Engineering involvement and seriously escalate the cost.

Referring back to the Kihei Community Plan of 2006 (as pictured in the attached article) the Collector Road was originally planned as a "discontinuous" road spanning from Hale Kuai to Kulanihakoi streets — about 1.3 miles. The distance between North Kihei and Wailea Alanui is approximately 8 miles. It would seem that by definition if a North-South Collector Road is to alleviate supposed traffic congestion, then it must run from the North end of Kihei to the South End of Kihei. Otherwise, traffic would merely be diverted only to dump back on to one of the two existing roads, causing even more of a traffic problem.

It should be noted that to date two sections of the road have been completed—Alanui Ke Alii to Keonekai (.6 miiles) and Hale Kuai to Waipuilani (approx. .8 miles.). If Phase 1 of the proposed plan were completed, that would add an additional .5 miles—for a total of 1.9 miles. As noted, Phase 2 of the plan would be subject to "available funds"???? After 40 years, 75% of the project will be yet to be completed, depending on available funds!

Reality is, the only time there are traffic issues on Piilani Highway and Kihei Rd. is during our high visitor season from December 15-April 15—four months. The pandemic has made that more apparent than ever because even the most avid supporter of a Collector Road could not possibly justify the need over the past year when there have been few if any visitors.

So, while the Applicant and the State of Hawaii Department of Transportation are advocating pouring millions of taxpayer dollars into a marginally needed (at best) Collector Road, The County Council has made it known that they will be taking a serious look at revising zoning (per the Minatoya list, "officially" approved in June, 2018), which could render many privately owned vacation rental condos de-zoned for short-term rentals.

In addition, the current administration (Mayor Victorino, et al) has publicly stated a desire to "group" vacation rentals around the major hotels in Wailea and Kaanapali, which, among other things, would seriously alleviate traffic issues. It would also be in keeping with an obvious need on the State level for Hawaii to diversify and become less dependent on tourism. The end result of total dependence on tourism was very painful during the months after 9/11 and more recently when Maui's unemployment level of 35% was the highest in the nation due to the pandemic.

In summary, it seems that the County and the DOT are desperately clinging like a dog to an old bone that has long outlived its viability. Why not direct that money to creating green energy opportunities for Maui; more affordable housing for its citizens; expanding our world reputation as a progressive, technologically driven community—rather than continuing to encourage and accommodate more tourism!

The Impact on Those Who Will be Directly Affected by this Plan

I have been a Real Estate broker for over 30 years now—18 years in Maui. There are only a couple of constants I've learned to hang my hat on during all these years—a) it's a marketplace totally driven by supply and demand, and b) road-noise is a flaw that can never be corrected. The reason I have that copy of an article written in 2006 is because that's the year I purchased my home on Kawailani Circle. The article was provided to me by the listing agent as a disclosure prior to purchase. Fortunately, I had already done my homework and knew that the project was not going anywhere for the foreseeable future and I know how slowly things move on Maui. Fifteen years later, I guess I can take solace in the fact that I was "right", but this would obviously be a game changer.

Historically, whether it's Maui or just about anywhere, road noise can de-value a property as much as 20% compared to comparables without road noise. As I drive through the other two aforementioned "legs" of the Collector Road, I'm struck by the fact that there are no residential properties on the west side of Liloa St. to impact, and many of the properties on the east side have considerable setbacks from the road. Your proposed Phase 1 and later Phase 2 are being squeezed into a much narrower corridor, with homes on both sides, and although traffic may be somewhat lighter than on Piilani Highway, there will be cars, and motorcycles, going past our homes all night just a short stone's throw away. And people walking and talking on a sidewalk so close one could reach over the fence and shake their hand as they go by.

Unfortunately, the fact that this letter has gone into mailboxes of owners that will be affected, it has now become a required disclosure for anyone planning to sell their home from now unless and until the project is deferred—or canceled.

Not to mention the horrific noise and air pollution, daily doses of red dirt covering decks, driveways, roofs, and interiors. I have some friends who live in PV 1 who have been completely inundated with centipedes since the construction on the Maui Lu and surrounding roads began two years ago.

Maui is Our Special Place and the Spirit of Aloha Still Rules

No doubt I will not be your only detractor. Hopefully clear thought and Maui sensibilities will rule, as they often do. Let's avoid an irreparable error in judgment.

malama pono

Michael Blaz

Melissa from Audrey Ventimiglia

August 3–9, 2006 Vol. X, No. 31 www.MauiWeel

UPCOUNTRY EDIT

KĪHEI COLLECTOR ROAD HALTED

From four lanes to greenways, state and county disagreement stopped plans for reliever road. "... now's the time to rethink the plan."

Allegra Fasnacht

Plans for a north-south collector road through Kīhei need to be reassessed in the state Department of Transportation's (DOT) Land Transportation Plan Update, scheduled to be completed during the second half of 2007. The road would have run the length of Kīhei, between Uwapo Road and Halekuai Road.

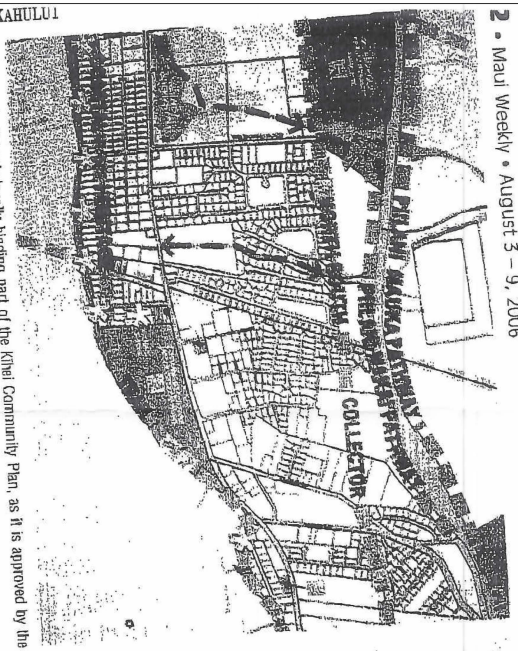
According to former Planning Director Chris Hart, the Kīhei Traffic Study between 1986 and 1991 indicated a strong need for mauka/makai access. "The Pi'ilani was designed to be the arterial road, but we wanted to provide an additional opportunity for circulation, to relieve South Kīhei Road traffic." The second road, he said, was always intended to be a "local collector road," designed primarily for pedestrians and bicycles.

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see ROAD p

09/15/2006 13:56 FAX 808 877 9449 ERA KAHULUI



This map is the only legally binding part of the Kīhei Community Plan, as it is approved by the County Council.

Road...

from p. 1

Lee retired from the project, and the funding was lost. The Public Works Committee and the state DOT are now trying to devise plans to accommodate the community as a whole.

Bertram said the Kīhei Community Association (KCA) believes that they need to work with the state, but say that the county and the state aren't on the same page. The new chief engineer, Joe Krueger, is very accommodating, according to Bertram, but is bound by master traffic plans that don't reflect what the community wants. "We have to change the policies in the plans," said Bertram.

In 2000, an amendment was made to the Kīhei Community Plan to include the greenway system, stating that the road itself will be discontinuous, and secondary to the walking/biking path. "But the community plan is ordinance, not law," explained Bertram. There are two sections in the plan. The language and the map. The language, which states that "there is a need to lessen the dependence on automobiles through efficient land use distributions... bicycle and pedestrian paths would provide an effective alternative," is only taken as suggestion. The map is the only legally binding part of the community plan, as it is approved by the County Council.

The KCA had its first meeting recently to create a new amendment to the community plan map that reflects the right changes. Milton Arakawa, Public Works and Environmental Management director, said that the county has come to a general consensus that it will be a two-lane roadway with a bike path. "We want to get federal funding for 80 percent," said Arakawa, and the county is working with the state DOT to update the regional transportation plan for Maui. According to Arakawa, the road will again be eligible for funding once the update is complete, although they need to assess regional traffic concerns before they commit to the collector road.

Planning Director Mike Foley is determined to stay true to the community plan, according to Bertram. "A highway won't work, so now's the time to rethink the plan," said Bertram. "I think it will be a success." ✱



"Hand it over," said Veda Dale, one of about 62 volunteers at this year's second ComPuSwap. Approximately 160 truck loads and 413 car loads of recyclable computer equipment were dropped off at the Maui County Stadium parking lot last weekend, July 28 and 29. Among the many recyclers was Carol Takashima who rode all the way from Lahaina on her Honda Shadow with an old scanner strapped to the back. Volunteer Chris Svendsen was happy to help her unload it. "I'm glad you guys are here so it doesn't go into the landfill," Takashima said. Over two container loads weighing over 36 tons were collected for shipment and proper disposal on the Mainland and some 60 working systems were given away on a first-come first-served basis on Saturday.

09/15/2006 13:56 FAX 808 877 9449 ERA KAHULUI

Commentary contributed by Joe Bertram III - Kihei

Thank you for the keeping South Maui well informed on the status of the Kihei Community Association's (KCA) struggle to create the "pedestrian orientation" called for in our community plan. The lapse in federal/state funding for the road (we already gave up on federal funds for our greenway) is a direct result of the lack of a unified vision between community, county and state.

Ten years ago, when I founded the Kihei Greenway concept, I envisioned a greenway *only*, while state and county saw four auto lanes *only*. While our community plan struck a balance with a two-lane discontinuous road with a separate continuous greenway, county policies and traffic master plans didn't reflect that desire, and our current situation is the result.

This is a golden opportunity with our county, state and federal parmers to create a progressive vision utilizing many new programs being advocated by the Federal Highway Administration, including roundabouts, safe routes to school, pedestrian safety action plans and transportation enhancement funds for transit and bike/pedestrian facilities.

By creating specific plans involving all stakeholders, we can have a ready supply of "off the shelf" plans for continuous federal funding. Kaua'i County has done this to successfully gather over $13 million in funding last year!

KCA is working to achieve that for Kihei through several steps our Greenways Committee is taking: 1.The adoption of our Greenway Masterplan onto the Community Plan Map (currently before Councils Parks Committee); 2. Pursuing a continuous dedicated right-of-way for the greenway through county buy-back and easements (currently working with the mayor's office and the Maui County Planning Department); 3. Partnering with Public Works and Parks to affect current projects in the corridor to provide for safe, attractive walking and biking paths. We have also initiated contact with our congressional partners for possible Federal assistance.

It is important that the public participates. Write letters of support to newspapers and government agencies. Make this a major issue in this election, to hold whoever wins accountable for implementation.

Councilmember Joanne Johnson's Parks Committee has scheduled a site visit Thursday, Aug. 17, at 1:30 p.m. at Keonekai Park to consider recommending the adoption of our Greenway master plan onto the community plan map. This will be followed by a public hearing at the Kihei Community Center at 3 p.m.

After 10 years of talk and competing plans, it's time to act together on a common vision for a "people-oriented" transportation system for Kihei. I'm ready. Are you?

May 12, 2021 Liloa Road Project: Resident's comments

From: snake2 <>
Sent: Wednesday, May 12, 2021 12:49 PM
To: 'gyliansolay
Subject: liloa drive project

as a homeowner on mahealani st i am opposed to all new construction whether it pertains to the new road, the high school, new houses, apts, condos etc. we have about 170,000 people living on maui and not enough essential infrastructure to support 100,000. not enough hospitals, doctors, carpenters, electricians, painters and plumbers. it can take weeks to get someone to return your call if at all about a job that needs to be done. 3 people died at the intersection of piilani and welakahao st 4 yrs ago. the mayor shutdown the left turn lane permanently instead of installing a light like i asked in phone calls and emails as he should have. now there is no way of getting on the piilani between kanani st and lipoa. all traffic gets backed up on kihei rd forever. i hate the mayor, city counsel and everything they stand for. good luck with your efforts to try and keep us safe and healthy but i have little hope against the politicians.

From: raquel enriquez <>
Sent: Wednesday, May 12, 2021 5:36 PM
To: gyliansolay
Subject: SAVE OUR PATH

Hi Gylian. I met Geo this morning and learned about the organizing behind saving our path next to Piilani Villages. I am working tomorrow so I can not join the meeting. I support this cause and you will be seeing more of me as I help out in the garden.

More blessings to you and Geo!

Raquel "Kelly" Velasquez

From: Kristy Ford <kristyford808@gmail.com>
Sent: Thursday, May 13, 2021 2:00 PM
To: gyliansolay@gmail.com; Geohoffberg@gmail.com
Subject: Liloa Drive Project

Hello,
I received a flyer on my door in regards to the path. I wanted to reach out and express that I do not agree with keeping this a walking path. It was always meant to become a designated road by the county. Not only do we live in a well kept neighborhood but there are many paths and clear walkways that are available outside of this particular path.
I would also ask you to consider the safety that this street will provide.
First, I would like to mention that we live where the gulch is and although it is a walking path, it is also many other things... homeless gather underneath the bridge, litter and debri is dumped back there, and the county does not maintain the path or the clearings. We have also had to call the police in the past because several boys were sexually assaulting a young girl in the tunnel! These are not positive aspects that justify keeping the path.

Second, there is a HUGE safety need for the roads from Kulanihakoi down through Waipulani to have a through access that is not bound to North or South Kihei. This is paramount in the case of an emergency which we have seen. A great example is 2 years ago the fires got very close to these neighborhoods and the highway was closed. We needed to evacuate and were not able to get out because we could only go down to South Kihei and it was backed up. In the event of a Tsunami or other natural disaster we need to have access to get out. Please consider the negative effects it could have on this community as a whole over the impact of the walking path. Again there are MANY other places to walk.

Subject: FW: Liloa Drive Project

From: Gylian Solay
Sent: Friday, May 14, 2021 7:46 PM
To: Charlene Shibuya <charlene@munekiyohiraga.com>
Cc: 'Kristy Ford'; Gylian Solay
Subject: FW: Liloa Drive Project

Aloha Charlene
I had an additional comment from Kristy Ford.
Below is her response to my response to her first email
Mahalo for your cooperation.

Keep Smiling

Gylian Solay, MS

Maui, Hawaii

www.agvop.com

From: Kristy Ford
Sent: Friday, May 14, 2021 2:05 PM
To: Gylian Solay
Subject: Re: Liloa Drive Project

Hi,
Thanks for getting back to me. I completely agree that the county has done some poor planning!!!!

Our lot sits attached to a area designated to be a "park" but has no access to ever be that?!

Anyway, I appreciate your follow up and explanations.
I too agree that the roundabouts are dangerous and have fought for it to be an overpass!!! I strongly believe this is the safest way. I also agree the flood plan needs to be updated and considered and worry about the bottlenecks once (in the next many years) that the school is built!

Thank you for your feedback. I would love for the county to think "ahead" and not just how to pacify an instant need when it comes to planning and road structure.

Sincerely,

Kristy Ford

On Fri, May 14, 2021 at 11:08 AM Gylian Solay <

> wrote:

Aloha Kristy

I very much appreciate your comments in support of creating a road.

We need to see all aspects of this.

Yes, safety is important.

However, the gulch tunnels will not disappear since they are building bridges over the gulches.

We definitely need to figure out how to keep those areas safe.

This is something to bring up to the County…

As for access, I was here with the fires and other accidents that blocked the Piilani & South Kihei and the East West roads all the way to Makena. It was a parking lot for hours.

Unfortunately, when the County created the plan back in 1998, they didn't include any access roads East & West between Waipuilani & Kulanihakoi.

Development went in as cul-de-sacs before creating infrastructure that would have included safe and logical access roads. That to me was very poor planning.

Now after everything is built, they can't create more access roads in any direction.

This one connector road without any access out between Wailpuilani & Kulanihakoi, will be at a stand still with no access in any direction when Waipuilani & Kulanihakoi are blocked as well.

That to me is more scary

Also to put a Round-about ON the Piilani seems to be even more dangerous and create more of a traffic bottleneck.

They are finally considering building a bridge over the highway as a connector to the schools.

When the EIS is completed (no date yet), we will be notified and there will be meetings about that

We also asked them about a 100 yr flood plan, since the one they have is outdated and they need to take in the rapidity of Climate Change.

I will be sending your comments to Charlene Shibuya who is has been the liaison for the Liloa Project.

Mahalo for your input.

Keep Smiling

Gylian Solay, MS

A Global Voice of Peace

Maui, Hawaii

www.agvop.com

From: Kristy Ford <
Sent: Thursday, May 13, 2021 2:00 PM
To: gyliansolay; Geohoffberg
Subject: Liloa Drive Project

Hello,

I received a flyer on my door in regards to the path. I wanted to reach out and express that I do not agree with keeping this a walking path. It was always meant to become a designated road by the county. Not only do we live in a well kept neighborhood but there are many paths and clear walkways that are available outside of this particular path.

I would also ask you to consider the safety that this street will provide.

First, I would like to mention that we live where the gulch is and although it is a walking path, it is also many other things... homeless gather underneath the bridge, litter and debri is dumped back there, and the county does not maintain the path or the clearings. We have also had to call the police in the past because several boys were sexually assaulting a young girl in the tunnel! These are not positive aspects that justify keeping the path.

Second, there is a HUGE safety need for the roads from Kulanihakoi down through Waipulani to have a through access that is not bound to North or South Kihei. This is paramount in the case of an emergency which we have seen. A great example is 2 years ago the fires got very close to these neighborhoods and the highway was closed. We needed to evacuate and were not able to get out because we could only go down to South Kihei and it was backed up. In the event of a Tsunami or other natural disaster we need to have access to get out. Please consider the negative effects it could have on this community as a whole over the impact of the walking path. Again there are MANY other places to walk.

There are many who look forward to the day that this is a road we can use as an alternative to North and South Kihei (especially with the High school being built) I would encourage you to be mindful of the community as a whole and to remember that the path was never intended to be "just a path" We need the access road and it should be welcomed not discouraged.

Sincerely,

Kristy Ford

Subject: FW: Liloa Rd Site Mtg May 13 2021
Attachments: 2021 5-13 Liloa Rd Residents Comments.docx

From: Gylian Solay [mailto:
Sent: Friday, May 14, 2021 11:31 AM
To: Charlene Shibuya <charlene@munekiyohiraga.com>
Cc: Gylian Solay; 'Michael Blaz'
Subject: Liloa Rd Site Mtg May 13 2021

Aloha Charlene
Attached is a list of names and comments from some of the residents directly affected by the Liloa Road Extension in our area..
The email from Kristy is in agreement with the road
We are asking for all comments on both sides of the issue.

I canvased the surrounding homes, on Malulani, Mahealani, the cul-de-sac on the other side of the path, the cul-de-sac opposite Mahealani,
And the cul-de-sac on the other side of Kulanihakoi that also plans on being extended, Waipuilani as well.
The majority of people are opposed to the road.

The Project Team was very attentive to our questions and concerns.
We were told there will be an EIS forthcoming and that we will be notified.
Also, we suggested an updated 100 yr Flood Plan, considering the rapidity of Climate Change.

Mahalo for your support and consideration

Keep Smiling

Gylian Solay, MS

A Global Voice of Peace

Maui, Hawaii

www.agvop.com

There are many who look forward to the day that this is a road we can use as an alternative to North and South Kihei (especially with the High school being built) I would encourage you to be mindful of the community as a whole and to remember that the path was never intended to be "just a path" We need the access road and it should be welcomed not discouraged.

Sincerely,
Kristy Ford

List of Residents who attended the site meeting on May 13, 2021. They are all opposed to the road.
Geo Hoffberg & Gylian Solay, owners of _____, met with The Project Team and other residents on the path behind _____.

LDEListofNames.pdf

Subject: FW: Bike Path (Liloa Drive)

From: Frances Hernandez [mailto:]
Sent: Thursday, May 20, 2021 3:25 PM
To: Charlene Shibuya <charlene@munekiyohiraga.com>
Subject: Re: Bike Path

Hello. Thank you for directing me to the correct email address. My property in PV2, 52 No'Olu. We are original property owners.
Regards,
Frances Hernandez

On Thu, May 20, 2021 at 3:30 PM Charlene Shibuya <charlene@munekiyohiraga.com> wrote:

> Gylian and Frances
>
> Thank you for taking the time to write in your comments and concerns on the project. On future correspondence, please direct it to the project email address liloadrive@munekiyohiraga.com and feel free to share this address with other residents that want to provide comments or input on the project.
>
> Also for Frances, can you give me your property address so we know where you are located with respect to the project limits?
>
> Appreciate your participating in the community outreach and take care.
>
> **Charlene S. Shibuya**, Senior Associate
>
> **Email:** charlene@munekiyohiraga.compar
>
> MUNEKIYO HIRAGA
>
> **Maui:** 305 High Street, Suite 104, Wailuku, Hawaii 96793 **T:** 808.244.2015 **F:** 808.244.8729
>
> **Oahu:** 735 Bishop Street, Suite 321, Honolulu, Hawaii 96813 **T:** 808.983.1233
>
> Planning. Project Management. Sustainable Solutions. www.munekiyohiraga.com

CONFIDENTIAL AND PRIVILEGED COMMUNICATION: This message (including attachments) is intended for the use of the designated recipient(s) named above. The contents of this correspondence are considered privileged and confidential. If you have received this message in error, kindly notify us immediately by email or telephone, and delete this email from your computer system. Thank you.

Due to the COVID-19 pandemic, if you have a document or package for delivery to our office via FedEx, UPS, or other courier service, please reach out to a MH team member to coordinate prior to sending. We are committed to providing our clients excellent service to further project goals and objectives during these challenging times. Please take care and stay safe. Mahalo.

From: Gylian Solay [mailto:]

Sent: Wednesday, May 19, 2021 10:44 PM
To: Charlene Shibuya <charlene@munekiyohiraga.com>
Cc: 'Frances Hernandez' <>; Gylian Solay <>

Subject: FW: Bike Path

Aloha Charlene

Please add Frances Hernandez's email below to the Liloa path extension project

Again, please contact her directly for any other info you need.

Mahalo

Keep Smiling

Gylian Solay, MS

Emergent Life Foundation,LLC

A Global Voice of Peace

Maui, Hawaii

www.agvop.com



From: Frances Hernandez <>
Sent: Thursday, May 13, 2021 12:57 PM
To: gyliansolay
Subject: Bike Path

Dear Gylian Solay and Geo Hoffberg

My name is Frances Hernandez and I am one of the few remaining PV2 Homeowners. My mom who is a retired senior citizen enjoys the use of the home full time. The bike path and the greenery associated with the path provide a welcome and safe place for my mom to walk and exercise, others more capable can jog and run, walk their dogs while children use the pathway to safely go to and from school as well as ride their bikes. The bike path is an essential part of the PV communities. They tie us together with our neighbors and allow social interaction in a safe and beautiful place. On any given day, you will see children playing and laughing, others jogging or walking for outdoor exercise. Sill others, sit and listen to the birds while drinking a refreshment or visit with a friend. The pathway and the benches also provide a safe place for our older valued community members to sit and take a break from their walk or pause with their grocery bags which can grow heavy on their walk from the grocery stores.

It is so difficult to reclaim greenery once it is destroyed. Concrete, asphalt and buildings already cover so much of this beautiful island, what is the purpose of taking away and denying our community this one little open greenspace. This green space and bike path provide a conduit that keeps neighbors talking, children playing safely, homes for birds and other wildlife like bees.

If you have any questions or would like to speak to me directly, you may email me or phone me on my cell _____ CST and I will be happy to explain in greater detail the importance of the bike path and how it affects our community life.

Warm Regards,

France Hernandez

SURVEY MONKEY COMMENTS FROM APRIL 8, 2021 COMMUNITY OUTREACH MEETING

APPENDIX O-2

PROPOSED LILOA DRIVE EXTENSION (VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT

Survey Monkey Comments/Questions Received

A comment survey link was sent to meeting participants ahead of the April 8, 2021 meeting. The survey asked for basic demographic and contact information and contained one (1) question related to the project. The question prompt was to "*Please write any comments or questions you wish to share on the proposed project."* The comments and questions the project team received from this survey were shared and answered during the April 8, 2021 meeting.

	Comment/Question
1	As the owner of the property on the corner of Namauu and the proposed Liloa extension, I have concerns as to the reasoning and need for a connecting intersection with Namauu. Also, the specifics as to the roadside improvements which will be adjacent to my property will need to be clarified. Thank you in advance for your assistance.
2	Looks good to me.
3	We are against this proposed plan and would like to put a stop to it for the safety of our children.
4	This area has had extensive flooding in the past. There is no mention of flood risk mitigation to the Kamalii Alayna subdivision. A study should be conducted to determine downstream impacts. Homeowners could hold the county accountable for any flooding if built as proposed.
5	For child safety in would be against this project.
6	Not in favor.
7	How does this project incorporate the Kihei Drainage Master Plan released in 2016? Will a new FEMA flood study be completed? Will houses not in a flood zone suddenly be in a flood zone? Will Kamalii Alayna houses have flood increase risk in general? The current drainage in the area is insufficient and previous attempts to amend the flood zones have failed (Letter of Map Revisions from mid 2000's). Warren S. Unemori Engineering was part of those attempts along with Betsill Brothers to alter the base flood elevation of the Kamalii Alayna subdivision. Those efforts have failed causing increased flood risk to the neighborhood. Without significant improvements to drainage as proposed in the Kihei Drainage Master Plan, moving forward with the Liloa Drive Extension is purely a money grab to finally build Ho'onani Homes at the expense of the existing residents property and safety. Please say no until significant drainage improvements are made to the mauka side of the highway and along South Kihei Road. Moving forward without these improvements will open the County of Maui to significant liability claims for future flooding
8	What is this really accomplishing? Our neighborhood already has flooding and having a road is going to help it? A bicycle path there would be great, but a road seems like it's poorly thought out.
9	Speed tables and raised crosswalk on Liloa. Enforcement of 20 MPH. Now cars are going 50+. No commercial traffic signs. Trucks are using Liloa to get to Safeway, etc.

	Comment/Question
10	A 2 lane road running very closely between 2 communities is dangerous. We have seen many accidents of cars running off the highway and hitting homes along the main highway which has more room. This would run right into someone's home. In addition, this encourages more cars on the road versus only a bike path which would encourage teens, families, visitors to access and use a safe and beautiful bike path that does not have cars on it. The development for a road for cars to access seems dangerous and excessive. You will also have a lot of teens driving to the new HS and teens often drive too fast and distractedly when they first get their license. This would be placing them in a position fir an accident that could severely hurt a family or small child as it's right in people's backyard.
11	At the back of our house at 246 Kawailani Cr there's a slope down to ground level. Will it be changed to be like the lots in PV3 that back up to Liloa with a retaining wall & landscaping. We're concerned about changes to drainage which currently goes downhill from the street to the back of the lot onto the current dirt area that will be renovated.
12	I live (and have a home office) at the NW corner of the Pi'ilani Villages II, immediately SE of the proposed Waipu'ilani Gulch bridge. I'm concerned with the impacts from the construction to my residence and neighbors during the Phase 1 construction. I'm most concerned with the following: 1. The duration of the Phase 1 project, 18 - 24 months is extensive: a. Can you clarify the sub-phases of construction and resulting duration? For example: i) Waipu'ilani Gulch Bridge, ii) Waipu'ilani - Liloa Roundabout, iii) Roadway, iv) Pedestrian Path, v) Landscaping. This clarification may help alleviate my concerns with the duration of the project and the expected impact this will have on my residence and our neighbors. b. What are the hours of construction that will be followed? c. Construction projects in Hawaii take longer than other US states, with what often appears to be many days of inactivity (as evidenced during the Pi'ikea-Liloa roundabout construction). What should we expect with regards to the continuity of construction and can/will anything be done to minimize the project duration? 2. Past maintenance activities in the Waipu'ilani Gulch have resulted in excessive dirt being cast into our neighborhood. Additionally, the recent Kihei High School phase 1 construction involved seismic tremors resulting from construction blasting. What should be expected with regards to managing; i) Dust, ii) Seismic, and iii) Noise Pollution. Especially if pilings will have to be sunk deep into the ground for the bridge. Additional questions of lesser criticality are: 3. Can you provide a summary of the street light planning (both location and type) and confirm that the lighting will be both sufficient for pedestrians while minimizing the light pollution being broadcast into the neighborhood homes? 4. Will the Pi'ilani Villages HOA have input to the landscaping vegetation that will boarder the those communities? 5. Can the overhead power lines that will need to be moved be routed underground instead? 6. What will the vehicle access be (or restrictions) where at the SW corners of Pi'ilani Villages I & II (Mahealani St. & Kawailani Cir.) will intersect with the new Liloa Dr. Mahalo for considering my questions and facilitating the upcoming zoom meeting.

MEETING SUMMARY FOR APRIL 8, 2021 COMMUNITY OUTREACH MEETING

APPENDIX O-3

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

August 24, 2021

MEETING MEMORANDUM

Date of Meeting: April 8, 2021

Place: via Zoom

Participants: See attached list (**Exhibit "A"**)

Subject: Proposed Liloa Drive Extension (Vicinity of East Waipuʻilani Road to Vicinity of Kaʻonoʻulu Street) Project – Outreach Community Meeting

A virtual meeting was held via Zoom for homeowners along the proposed Liloa Drive Extension project corridor on Thursday, April 8, 2021 at 5:30 p.m. The purpose of the meeting was to provide an introduction to the project to those most directly affected by the project, listen to concerns, and answer questions.

A total of 186 invitation letters were sent to property owners directly abutting the project corridor along Liloa Drive and side street approaches. See **Exhibit "B"**. The letter included a link to register for the virtual meeting and a telephone number was provided to assist with registration if needed. Property owners were provided the opportunity to submit comments and questions ahead of the meeting via an online survey or a written comment card. Comments and questions received ahead of the meeting were summarized and addressed during the presentation.

Thirty-nine (39) individuals participated in the meeting. Members of the project team present included Department of Public Works Director Rowena Dagdag-Andaya, Project Engineer Nolly Yagin, Civil Engineers Clifford Mukai and Brad Wright from Warren S. Unemori Engineering, Traffic Engineer Matt Nakamoto from Austin, Tsutsumi and Associates, Inc., and Planning Consultants Kari Luna Nunokawa, Charlene Shibuya, Yolanda Poouahi, and Tessa Munekiyo Ng.

The meeting began with introductions and a welcome by Charlene Shibuya and Rowena Dagdag-Andaya. A copy of the presentation provided is included in **Exhibit "C"**. The presentation included an overview of the project history, purpose, and scope of work. Clifford Mukai provided a review of the proposed sections along the corridor and Ms. Shibuya concluded the presentation with a discussion of the environmental review process, permitting, and next steps. It was noted that additional opportunities would be made available for public comment, including a general public meeting during the Draft Environmental Assessment (EA) 30-day public comment period. In addition, it was noted that property owners abutting Phase 1 of the project could sign up for an individual meeting with the project team to review how the project may affect their property.

At the end of the presentation, Ms. Shibuya summarized the comments and questions that were provided in advance of the meeting via the online survey or written comment card. These comments and questions covered topics such as flooding and drainage, traffic noise, traffic volumes, heavy truck traffic, speeding, safety, and on-street parking.

Throughout the presentation meeting participants were invited to type questions into the chat box. These questions were reviewed at the end of the meeting during an open question and answer session. Individuals were also provided the opportunity to verbally ask their questions at the end of the meeting if they preferred to do so rather than utilize the chat function. Below is a summary of the questions and discussion at the meeting. The questions and comments have been grouped by category and do not represent the order in which they were expressed.

	Comment	Response
A.	**Drainage**	
1.	*For Waipuilani and Kulanihakoi bridges, what will the gulches be hardened with? Who did you consult with to the work done in the gulches?*	Immediately under the bridges will be reinforced with concrete to protect the abutments. This will quickly transition to grouted rip rap and then to native grass. The intent is to limit the hardscape.
2.	*Is the work being done in the Kulanihakoi gulch related or connected to a greater design by KCA and Jordan Hart?*	At this time the design for Kūlanihāko'i Gulch is just at Liloa Drive.
3.	*Will more flood water be pushed into the neighborhood below the bridge?*	The design team worked closely with DPW to evaluate recent and historical flooding at Kūlanihāko'i and Waipu'ilani gulches. We reviewed videos from homeowners as well. The design will contain 100-year runoff so it will not flare out uncontrollably and impact abutting residences. In addition, sheetflow runoff from unimproved areas will go into drain inlets and no longer sheetflow into abutting residences.
4.	*Where will the storm water runoff go to?*	The natural drainage pattern has been along the gulches and that is where the drainage will go. There will also be drainage basins to retain runoff.
5.	*These two gulches are already not managed and have flooding issues. How will adding more stormwater be okay?*	The project does not increase the amount of stormwater in the gulches. Because of sedimentation in the gulches, stormwater flares out uncontrollably. The County will be fixing that and will ensure that everything that is contained within the gulch.
6.	*When was the flood study last updated?*	The design is based on the latest 2015 flood insurance maps and any updates that become available will be incorporated into the design.
7.	*How exactly will you dispose of runoff water?*	Roadway drainage will be collected via a series of catch basins and conveyed to the Waipu'ilani, Unnamed, and Kūlanihāko'i gulches.

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

	Comment	Response
8.	*Are you still working with Amanda Cording on biological drainage projects?*	Yes
9.	*The 2 gulches are privately owned, so how can you guarantee that homes will not be built in the streambed, or totally fill up the gulches?*	The mauka portion of the Waipuʻilani gulch is owned by the County and the makai portion is privately owned. Both the mauka and makai portions of the Kūlanihākoʻi gulch are private. The County will secure easements for maintenance at both bridges, inlet and outlet areas that will have grouted natural looking rock and turf reinforcing fabric.
10.	*Who watches the maintenance of the gulches? Cannot already keep up.*	Further downstream, the County may already be in dialogue with private owners about maintenance outside the Liloa Drive corridor.
11.	*There are concerns about Waipuilani drainage engineering. Will impact flooding. Have to do more than what was created in the past, which is not working right now. (Comment)*	----
12.	*Flooding has been substantially more devastating. How will you account for the increase in flooding due to Global Warming since construction is scheduled 9 yrs after the 2015 100yr study?*	This road will provide an alternative road to South Kīhei Road when there is flooding. Will comply with all federal drainage design standards and requirements including at minimum a 10-year flood. At this point, we are not aware of any published guidelines. Also, the Draft EA will have a discussion on global warning impacts.
13.	*Gulches should definitely not be hardened. Hardening the gulches makes the stormwater accelerate downslope. Worsening flooding at lower elevations. (Comment)*	----
B.	**Design**	
1.	*What are the dimensions of the road and pedestrian path? The scale of the map shown looks like a one lane road.*	The road will have two (2) 10 to 12 feet wide lanes with left-turn pockets at some side road connections. The pedestrian/bicycle path will be 10 feet wide.
2.	*What does Mahealani Connection look like? Is it for foot traffic only?*	The T intersection supports pedestrian and vehicular traffic. This was planned as part of the master plan development of the subdivision.
3.	*Sections 10 & 11 are at a higher elevation on the mountain side. How high will containing wall be on that side?*	The retaining wall at Section 11 on the mauka side will be very slight; the makai side will be about 8 feet. As you go north, walls will increase on mauka side and decrease on makai side in this area.
4.	*Will 10 feet pedestrian way include biking?*	Bikes will be allowed on the path, but not sure if the County will allow skating. Benches, fountains, and trash cans will be outside of the 10 ft pathway.
5.	*Are speed humps to be installed to deter speeding (very prevalent now) as well as commercial vehicles trying to avoid traffic at Piikea and shopping center?*	Collector roads also function as emergency routes and speed bumps impact response times. We will look at different methods to mitigate speed, such as enforcement to preserve

	Comment	Response
		emergency response times.
6.	What is the maximum vehicle weight allowed? Example South Kihei Road is meant to be 10,000 lb limit but larger trucks still use this street regularly. Will large Trucks be allowed on this road?	This will be reviewed during the EA process.
7.	*There are plans for 2 subdivisions (Hoʻonani Homes and Kihei Wailani Village) immediately below the Waipuilani bridge. Are these being considered with regards to flood mitigation?*	These developments would be responsible for their own flood mitigation.
8.	*Will the Hoonani Subdivison connect into Liloa Road project?*	There are no plans to connect these subdivision roads to Liloa Drive.
9.	*Can you provide a summary of the street light planning (both location and type) and confirm that the lighting will be both sufficient for pedestrians while minimizing the light pollution being broadcast into the neighborhood homes?*	The lighting will be similar to what is included in the already constructed areas of Liloa Drive, which are premium grade ornamental and not box type fixtures.
10.	*It would be nice if the power lines could be buried underground from the start. What is the cost of hurricane poles vs underground?*	Hurricane poles cost between $50k to 100k per pole. To go underground the lines would be many millions of dollars because of the high voltage 69kV lines.
11.	*Will there be barriers along residences?*	There will be 6 foot high privacy fences.
12.	*What will the privacy fence be made from? If it is white vinyl, can it to be changed to the brown/tan color one so that the red dirt won't make it dirty and ugly?*	It will be weathered cedar polymer fencing.
13.	*How close will the retaining wall be to the homes behind Malulani St.? How much noise will the cars make?*	The retaining walls will be constructed on the Liloa Drive side of homeowner's back property lines.
C.	**Cultural Resources**	
1.	*Concern with underground utilities. Need updates on the AIS and SHPD. (Comment)*	----
2.	*Through the years of development in this area especially during the time when Burial Council did not exist in the 60's and 70's, definitely AIS will need a rehaul review. Such as Maui Lani and Maui Lu AIS out dated.*	Consultation with SHPD will be initiated by DPW.
3.	*Section 106 will be needed.*	The Section 106 consultation process will be initiated.
D.	**Traffic**	
1.	*How will the traffic work with the new roundabout at Kulanihakoi Road and the new Kihei High School roundabout*	The analysis of intersections from the Traffic Impact Analysis Report indicates that the traffic should flow okay. It is anticipated that traffic will be dispersed across various intersections available along Liloa Drive. At Kulaihakoi Road, assuming the main intersection works okay at Piʻilani Highway, it is not anticipated that there will be problems at Liloa Drive.
2.	*It will be very difficult to make a left turn from Mahealani Place to Kulanihakoi. Seems like it will be dangerous. People turning from Piilani Highway to Kulanihakoi are doing a blind turn.*	Piʻilani Highway is under the State's jurisdiction so we are not sure on what is being done there. The roadway design, on the County's side with the roundabouts, are intended to slow down cars. The approaches to the roundabout are narrowed

	Comment	Response
		and curved to force cars to slow down. And jutting out of the curbs will provide for better visibility.
3.	*How will you deal with blockages?*	Vehicles may use other intersections. Liloa Drive itself will be available for traffic to use as an alternate route or detour.
4.	*What will the speed limit be?*	The existing improved segment of Liloa Drive is posted at 20 mph so that will be a consideration.
E.	**Construction**	
1.	*Past maintenance activities in the Waipu'ilani Gulch have resulted in excessive dirt being cast into our neighborhood. Additionally, the recent Kihei High School phase 1 construction involved seismic tremors resulting from construction blasting. What should be expected with regards to managing; i) Dust, ii) Seismic, and iii) Noise Pollution. Especially if pilings will have to be sunk deep into the ground for the bridge.*	There is a major underground 36-inch high pressure Central Maui water transmission line that is sensitive to seismic disruptions. The contractor must use appropriate construction methods to mitigate impacts.
2.	*The duration of the Phase 1 project, 18 - 24 months is extensive: Can you clarify if there are sub-phases of construction and expected duration of each? For example: i) Waipu'ilani Gulch Bridge, ii) Waipu'ilani - Liloa Roundabout, iii) Roadway, iv) Pedestrian Path, v) Landscaping. This clarification may help alleviate my concerns with the overall duration of the project and the expected impact this will have on each of the adjacent homeowners.*	Prior to the construction phase, the contractor will have to do outreach to the surrounding neighborhoods to take into account concerns and develop construction phasing that will minimize disruptions.
3.	*What type of construction will take place in Waipuilani Gulch? Any damage to buildings?*	The contractor will need to inform residents ahead of construction. If there is damage to buildings, there are processes to file claims.
F.	**Other**	
1.	*As of now there aren't any homeless along the path. They congregate opposite Safeway because there are water fountains, benches, soft grass. (comment)*	----

Charlene S. Shibuya
Senior Associate

CSS:yp
Attachments
cc: Nolly Yagin, Department of Public Works, Engineering Division (w/attachments)
Cliff Mukai, Warren S. Unemori, Engineering, Inc. (w/attachments)
Brad Wright, Warren S. Unemori, Engineering, Inc. (w/attachments)
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Comm Outreach\040821 Outreach Meeting.Memo.doc

EXHIBIT A.

List of Participants

Outreach Community Meeting on April 8, 2021
List of Participants

No.	Name (Original Name)
1	Eric Muller
2	Joseph Orsini
3	Frank Provenzano
4	Rowena Dagdag-Andaya
5	Donovan Lynch
6	Michelle Del Rosario (Kelly King)
7	Toby Gunning
8	Marc Fullmer
9	Terry Shipman
10	Cindy DelleFave
11	Gylian Solay
12	Susan Watanabe
13	Kelly King
14	Catherine Holmes
15	Richard Wilkman
16	Vernon Kalanikau
17	John Marlia
18	Ernesto Manibog
19	Michael Blaz
20	Rosalind Link
21	bill snipes
22	Kate Blystone
23	Cammy Clark
24	Karen Frangos
25	Eric Imada
26	Richard Link
27	alexandre de aguiar
28	Bryan Molina
29	Erik Engstrom
30	David Dorn
31	june ralston
32	John Livengood
33	Jo Gurule
34	Mark Shaw
35	MARK RECK
36	John Marlia
37	Marc Fullmer
38	Unknown
39	Unknown

No	List of Project Team Members
1	Charlene Shibuya
2	Tessa Ng
3	Matt Nakamoto
4	Kari Nunokawa
5	Nolly Yagin
6	Brad Wright
7	Cliff Mukai
8	Yolanda Poouahi

EXHIBIT B.

Outreach Letter and List of Owners/Lessees

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

March 5, 2021

1 TMK: 2220250010000
PIERCE,VIRGIL C & BONNIE S TRUST
817 MAHEALANI PL
KIHEI HI 96753

SUBJECT: Proposed Liloa Drive Extension (Vicinity of East Waipu'ilani Road to Vicinity of Ka'ono'ulu Street) Project at Liloa Drive, Kīhei, Maui, Hawai'i

Dear Mr. & Mrs. Pierce:

This letter is to inform you that the County of Maui, Department of Public Works is proposing to extend Liloa Drive (also known as the North-South (N-S) Collector Road) and its integrated, landscaped Shared Use Path (also known as the Kīhei Bikeway) from the vicinity of East Waipu'ilani Road to the vicinity of Ka'ono'ulu Street. Please see **Figure 1**. The Liloa Drive Extension will cross two (2) gulches, Kūlanihāko'i Gulch, Waipu'ilani Gulch, and an unnamed drainageway. The proposed project involves an approximately 0.93 mile extension of Liloa Drive.

The Liloa Drive Extension, East Waipu'ilani Road to Ka'ono'ulu Road is a segment of the N-S Collector Road identified in the Federal-Aid Highways 2035 Transportation Plan for the District of Maui dated July 2014, as a potential long-range capacity solution. The Kīhei N-S Collector Road (Liloa Drive) is included in the Maui Metropolitan Organization's Hele Mai Maui Long-Range Transportation Plan 2040 and programmed in the 2019-2022 Maui Transportation Improvement Program (TIP). The project will increase capacity, improve traffic circulation, alleviate traffic congestion, and provide a safe corridor complete with landscaped pedestrian and bicycle facilities across two (2) modern bridge spans. The project will fulfill a priority need identified by master plans collaboratively developed by the Applicant and the State of Hawai'i Department of Transportation, that reflects community and stakeholder input.

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

The proposed roadway improvements will include constructing a two-lane roadway with curbs, gutters, sidewalk, curb ramps, landscaped shared use paths for bicycle and pedestrians, retaining walls, street lights, storm drain systems, relocating and installing new overhead and underground utility facilities (including relocating/replacing existing 69 kV utility poles), fencing, railings, landscaping and irrigation. Three (3) roundabouts are incorporated ino the design of the Liloa Drive Extension, at its intersections with East Waipu'ilani Road, Kūlanihāko'i Street, and Ka'ono'ulu Street and a box culvert is proposed at an unnamed drainageway. Two (2) bridges are proposed at the Kūlanihāko'i Gulch and Waipu'ilani Gulch. The proposed project is expected to improve the physical environment surrounding the project corridor with enhanced safety mobility features. Please see **Figure 2**.

The project will be conducted in two (2) phases. Phase 1 will encompass the vicinity of East Waipu'ilani Road to the vicinity of Kūlanihāko'i Street. This phase is slated to begin construction in 2024 and last approximately 18 to 24 months. Phase 2 of the project will continue the Liloa Drive extension from the vicinity of Kūlanihāko'i Street northward to the vicinity of Ka'ono'ulu Street and Kenolio Road. This phase will begin construction at the completion of Phase 1 and as funding is available. Individual property owners who are directly affected by Phase 1 construction in the form of needing a temporary construction easement, permanent easement, or right-of-way acquisition have been contacted by the Department separately. Properties that will be directly affected by Phase 2 will be identified as the Phase 2 design progresses and impacted property owners will be directly contacted by the Department.

We would like to extend an invitation to you, as a homeowner along this proposed project corridor, the opportunity to listen to a brief presentation about the project and ask questions to the team. We will be holding a virtual meeting for homeowners on **Thursday, April 8, 2021 at 5:30 p.m.** You will be able to participate in this meeting via phone, computer, or mobile device. To register for the meeting, please log on to **https://tinyurl.com/liloadr**. You will be asked to fill in your name, email, and address. Once you register, you will then be sent an email to the meeting link. Please do not share your link with anyone else. We kindly ask all meeting participants to register so we are able to accurately reflect meeting attendees. If you do not have access to a computer or mobile device and wish to join by phone, please call Kari Luna Nunokawa at (808) 244-2015 for assistance.

In advance of the virtual community meeting, we also invite you to fill out the comment form, included in this letter, or via online at https://www.surveymonkey.com/r/Liloadrive. The team will be prepared to address questions and comments submitted at the meeting. To that end, we would appreciate if you could submit any written comments by April 1, 2021.

We look forward to the opportunity to hear from you. If you have any questions, please feel free to contact Nolly Yagin at (808)270-7745.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:yp
Attachments
cc: Nolly Yagin, Department of Public Works, Engineering Division (w/attachments)
Cliff Mukai, Warren S. Unemori, Engineering, Inc. (w/attachments)
K:\DATA\WUE\Liloa Dr Ext (Namauu-Kaonoulu)\Comm Outreach\Outreach Meeting.letter_mrg.docx



Figure 1 Proposed Liloa Drive Extension
Regional Location Map

0 750 1500 3000 Feet

Prepared for: County of Maui, Department of Public Works

MUNEKIYO HIRAGA

WUE/Liloa Dr Ext (Namauu-Kaonoulu)/Applications/Figures/Regional Location

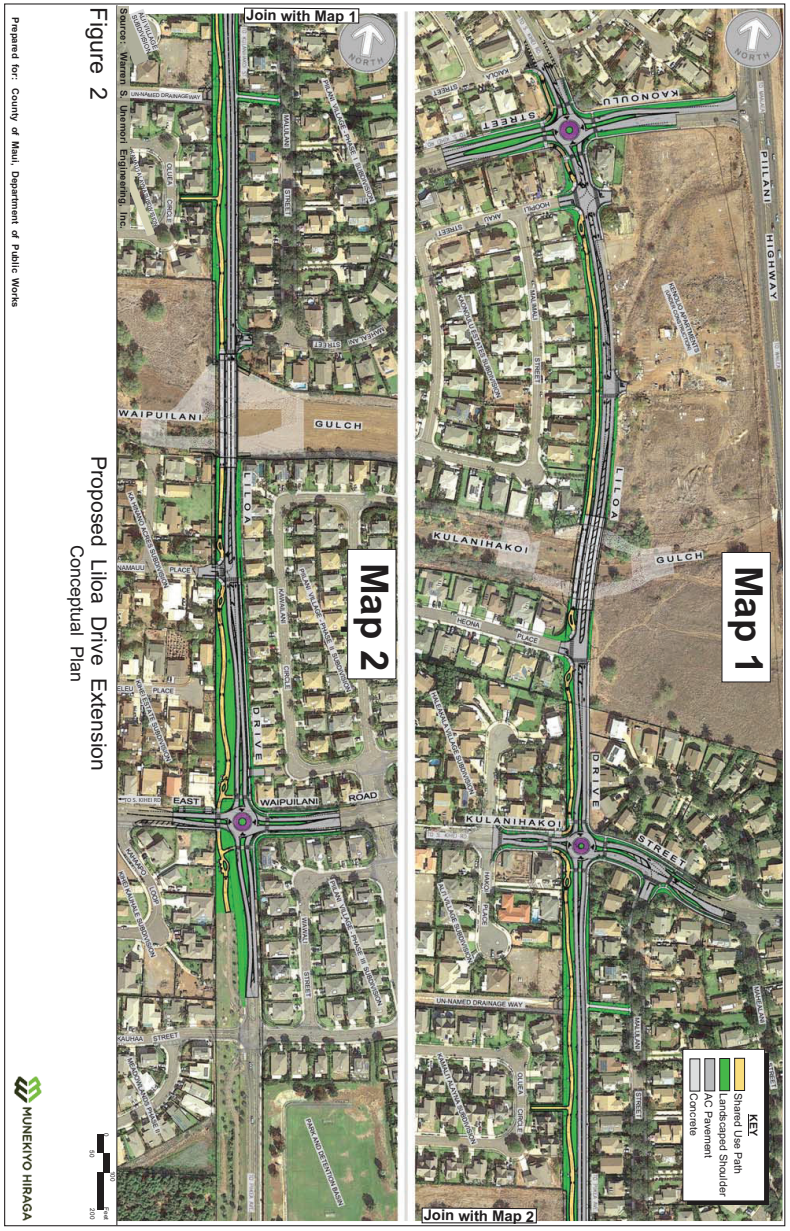


Figure 2

Proposed Liloa Drive Extension

Conceptual Plan

Prepared for: County of Maui, Department of Public Works

MUNEKIYO HIRAGA

W:\Liloa Dr. Ext. \Planning\Conceptual\Updated\Figure2ConceptualPlan.

MUNEKIYO HIRAGA

COMMENT FORM

Liloa Drive Extension Project

Name:_____ Phone No. _____

Address: _____

_____

Email Address: _____

Please write any comments you wish to share on the proposed project below.

Please submit your comments by April 1, 2021 via mail to the address below. The project team will be prepared to address questions and comments raised at the April 8, 2021 community meeting.

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Should you have any questions, please feel free to contact Charlene Shibuya, Munekiyo Hiraga, at 244-2015.

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TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
1	2220240240000	COUNTY OF MAUI			
2	2220250010000	PIERCE,VIRGIL C & BONNIE S TRUST			
3	2220250030000	YETTER,BRIAN NEIL			
4	2220250040000	GONZALEZ,STEPHANIE A			
5	2220250070000	BARROGA,JOSEFINO GALAN ETAL			
6	2220250070000	BARROGA,MARIO GALAN			
7	2220250080000	REIRI,AMY ROSE ETAL			
8	2220250090000	MATSUI,TIARA MICHI ETAL			
9	2220250100000	O'CONNOR,BRIAN W SR ETAL	OCONNOR,BRIAN W SR/RITA A		
10	2220250110000	CADABES,GEORGIANA M			
11	2220250120000	KAIWI,CORNWELL U ETAL			
12	2220250460000	HOLMES,CATHERINE L TRUST			
13	2220250470000	BURDICK,CLINTON WAYNE ETAL			
14	2220250480000	GOULDING,NIDA			
15	2220250480000	SMITH,JACK GEORGE			
16	2220250490000	OTOMO,LAYNE T & BARBIE M FAMILY TRUST			

POSTAGE

Munekiyo Hiraga
Attention: Charlene Shibuya
305 High Street, Suite 104
Wailuku, Hawai'i 96793

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PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
33	2220250940000	LANG,WILLIAM JOSEPH			
34	2220250950000	KIANG,PAUL & SUE TRUST			
35	2220250960000	KISTLER,JERRY & NANCY FAMILY TR			
36	2220250970000	REDENIUS,GARY E			
37	2220250980000	HERRERA,ARTHUR O ETAL			
38	2220250990000	VILORIA,RODERICK V ETAL			
39	2220250990000	VILORIA,RUDOLFO G			
40	2220251000000	YI,IM			
41	2220251040000	COUNTY OF MAUI			
42	2220251110000	COUNTY OF MAUI			
43	2220260010000	KERR,ROBERT F ETAL			
44	2220260020000	MENASRA,HAMID ETAL			
45	2220260030000	GADDO,BONNIE J REVOC LIVING TRUST			
46	2220260040000	SLAZYK,STEVEN R ETAL			
47	2220260050000	CHEETHAM,JOHN R AND SHEILA L TRUST			
48	2220260060000	ALMEIDA,PATRICIA LEON GUERRERO			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
17	2220250650000	WILLIAMS,ANTHONY TAKASHI ETAL			
18	2220250660000	FABIANI,LORENZO ETAL			
19	2220250670000	BATTEUX,JON DANIEL			
20	2220250670000	BATTEUX,YVETTE MICHELE			
21	2220250710000	BALDONADO,RYLAN D ETAL			
22	2220250720000	FEY,WILLAM J JR ETAL			
23	2220250840000	MAIN,PAUL DAVID			
24	2220250850000	RALSTON,RICHARD G JR ETAL			
25	2220250860000	SUMER,EMERSON S ETAL			
26	2220250870000	COHEN,MATTHEW MATKOFF ETAL			
27	2220250880000	STARR,MARY ELLEN			
28	2220250890000	WHEATLEY,COREY ETAL			
29	2220250900000	GUNNING TRUST			
30	2220250910000	ARMSTRONG,WILLIAM E TRUST ETAL			
31	2220250920000	ENGSTROM,ERIK ETAL			
32	2220250930000	HOFFBERG,GEORGE W ETAL			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
65	2220260190000	MARLIA,J JOHN TRUST ETAL			
66	2220260200000	MOLINA,BRYAN & MUELANG TRUST			
67	2220260210000	BOLOS,ROBIN ETAL			
68	2220260510000	DOWNTON'S AURORA TRUST			
69	2220261160000	PIILANI HOMEOWNERS ASSOCIATION	ATTN: ASSOCIA HAWAII		
70	2220261170000	PIILANI HOMEOWNERS ASSOCIATION	ATTN: ASSOCIA HAWAII		
71	2220261180000	COUNTY OF MAUI			
72	2220300010000	MACPHERSON,JAMES ROSS TRUST			
73	2220300470000	SHIPMAN,TERRY ALAN ETAL			
74	2220300480000	FOTENAKES,DENISE ANN ETAL			
75	2220300490000	TARSITANO,JAMES LEE ETAL			
76	2220300500000	LANGE,GORMAN GORDON ETAL			
77	2220300510000	HECKERT,CHRISTIAN ETAL			
78	2220300520000	BURTON,PHILIP KNOWLES			
79	2220300530000	PEAVY,DANIEL R ETAL			
80	2220300540000	KNOWLES,JUSTIN DAVID ETAL			

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PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
49	2220260070000	WEISS,SCOTT ALAN ETAL	C/O WEISS,ALAN/EVA		
50	2220260080000	AOKI FAMILY TRUST			
51	2220260090000	BLAZ,MICHAEL LEWIS TRUST			
52	2220260100000	ROBERTS,CASEY DEAN ETAL			
53	2220260110000	MENASRA,HAMID ETAL			
54	2220260120000	PROVENZANO,FAMILY TR			
55	2220260130000	WILKMAN,RICHARD WALTER ETAL			
56	2220260140000	COOKE,PATRICIA ANN			
57	2220260140000	LINK,GARY LOUIS			
58	2220260140000	LINK,KEVIN JAMES			
59	2220260140000	LINK,RICHARD JOSEPH			
60	2220260140000	ORSINI,JOSEPH JAMES			
61	2220260150000	HOUSEHOLDER,JAMES			
62	2220260160000	HARMON,JAKE RANDAL ETAL			
63	2220260170000	CHASE,RYAN FRANCIS ETAL			
64	2220260180000	ABELLA,OFELIA PIEDAD ETAL			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPUʻILANI ROAD TO VICINITY OF KAʻONOʻULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
96	2390210030000	BAUTISTA,LORNA JEAN A			
97	2390210040000	MARKH,SOFIA			
98	2390210050000	KAIUE,MARK I ETAL			
99	2390210380000	RIVERS,STEPHEN M ETAL			
100	2390210390000	GEIERMANN,TIMOTHY M			
101	2390230010000	NAKAGAWA,PATRICIA KUULEI			
102	2390230020000	TAASIN,NICOLAS T AND NIEVES T TRUST			
103	2390230030000	MEDEIROS,DUSTIN W			
104	2390230040000	PORTILLO,HEBER ABDIEL ETAL			
105	2390230280000	GAERLAN,RICARDO J ETAL			
106	2390230290000	RECK,MARK DAVID			
107	2390230300000	KA KIHEI RENTALS LLC ETAL			
108	2390230320000	CENZANO,SYLVIA A FAMILY TRUST			
109	2390230430000	DAGDAG,ROSALIA Q ETAL			
110	2390230440000	DANDO,CHARLES D JR			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPUʻILANI ROAD TO VICINITY OF KAʻONOʻULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
81	2220300550000	DAHL,JANIS ETAL			
82	2220300560000	LANIER,SCOTT ALAN			
83	2220300570000	WAKEFIELD FAMILY TRUST	ATTN LARRY D WAKEFIELD		
84	2220300580000	SANDERS,WILLIAM/LAIRD-SANDERS,JILL TRUST			
85	2220301230000	PIILANI HOMEOWNERS ASSOCIATION	ATTN: ASSOCIA HAWAII		
86	2390010070000	MAUI WAIOHULI PARTNERS	C/O FONG CONSTRUCTION CO		
87	2390011480000	MAUI PACIFIC ASSOCIATES			
88	2390011490000	HAWAIIAN ASSOC OF SEVENTH-DAY ADVENTISTS			
89	2390011560000	MAUI PACIFIC ASSOCIATES			
90	2390011570000	MAUI PACIFIC ASSOCIATES			
91	2390011580000	DROPPED 3/15/2018	PACIFIC WEST COMMUNITIES INC		
92	2390011640000	VALLEY ISLE VENTURES LLC	NO MAILING ADDRESS LISTED FTP/ONLINE		
93	2390210010000	GURULE,JO-ANN B			
94	2390210010000	GURULE,NED J			
95	2390210020000	BURGMAN,CHEMAN RACHEL			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
127	2390480860000	SANDBACH,JOHN F & GENE A TRUST			
128	2390481150000	WYLAND,JAMES W ETAL			
129	2390481160000	GARCIA,FRANCISCO			
130	2390481170000	MARTINEZ-GRIM,FAMILY TRUST			
131	2390481180000	CATTERICK,SHANE J			
132	2390481190000	SLEIGHT,STEPHEN D ETAL			
133	2390481200000	BROMMELS,ZERNY ANN			
134	2390481220000	KENRANES LTD	ATTN: DWAYNE BETSILL		
135	2390481230000	ARENAS,MICHAEL BUTIHI ETAL			
136	2390481240000	SMITH,RONALD EUGENE JR ETAL			
137	2390481480000	SCARBOROUGH,SANDRA J ETAL			
138	2390481500000	BETSILL BROS CONSTRUCTION			
139	2390481500000	KENRANES LTD	ATTN: DWAYNE BETSILL		
140	2390481520000	TAKASAKI,KIEFER M ETAL			
141	2390481550000	AQUINO,KEVIN			
142	2390481560000	RIVERA,PAULA ANN B ETAL			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
111	2390440270000	MAUI KEYSERS TRUST			
112	2390440340000	MANIBOG,ERNESTO TRUST			
113	2390440350000	OKITA,KENNETH JOSEPH ETAL			
114	2390440380000	PROPERTY MANAGEMENT MAUI LLC			
115	2390440390000	EUBANKS,JIM G JR ETAL			
116	2390460350000	LEACH,THEODORE TRUST			
117	2390460360000	ALMEIDA,MICHELLE HARRIS ETAL			
118	2390460370000	HINTON,KIRK AND VICKIE FAMILY TRUST			
119	2390460380000	BENNETT,ALICE J TRUST			
120	2390460390000	EDWARDS,JENNIFER LYNN			
121	2390460400000	PALMER,ROBERT R			
122	2390460400000	PALMER,DARCIE K ETAL			
123	2390460470000	ROMANO,MICHAEL			
124	2390460480000	KIHEI KAUHALE SUBDIVISION COMMUNITY ASSN	C/O SHIGEO HONE - PRESIDENT		
125	2390480310000	ABUT,BENNY C ETAL			
126	2390480850000	NATIVIDAD,CELEDONIA N ETAL			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPUʻILANI ROAD TO VICINITY OF KAʻONOʻULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
159	2390550070000	SCHERZ,KARL JOHN ETAL			
160	2390550080000	VIGNEUX,DARRYL ETAL			
161	2390550090000	TAMPARONG,HUBERT VENTURA ETAL			
162	2390550100000	FIRESTINE,DAVID F ETAL			
163	2390550110000	MATHEWS,BERGLIOTH MARIA			
164	2390550120000	NICELY,LYNANN			
165	2390550130000	ZAMORA,AFRIQUITO D JR ETAL			
166	2390550520000	FIRESTINE,DAVID F ETAL			
167	2390570160000	HERRERA,DANIEL J ETAL			
168	2390570220000	K3 FORD FAMILY TRUST			
169	2390570230000	FLORES,DENNIS C TRUST			
170	2390570250000	DAVIS,MICHAEL LYNN			
171	2390570260000	HERRERA,ARTHUR OLIVAS ETAL			
172	2390570270000	GUERPO,JENNIFER JUAN ETAL			
173	2390570280000	COUNTY OF MAUI			
174	2390570290000	COUNTY OF MAUI			

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION
(VICINITY OF EAST WAIPUʻILANI ROAD TO VICINITY OF KAʻONOʻULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
143	2390489990000	NO LISTING ON FTP SITE AND INTERNET			
144	2390490010000	FONTANILLA,EFREN P ETAL			
145	2390490020000	SKEIE,KEITH P ETAL			
146	2390490030000	MANUEL,NOEL MANUEL ETAL			
147	2390490040000	HARRIS,JEFFREY & JOYCE TRUST			
148	2390490050000	LOUI,ALBERT CHUNG LEONG ETAL			
149	2390490060000	AKER,ARDEN LYNN TRUST			
150	2390490200000	IBONIA,LOLITA V ETAL			
151	2390490210000	GILLIS,GORDON MALCOLM ETAL			
152	2390540200000	AVINA,MYRA JANE			
153	2390550010000	EUGENIO,ILDEFONSO G ETAL			
154	2390550020000	SULLIVAN,KATHLEEN C			
155	2390550030000	GOKCAN,NAZIM ETAL			
156	2390550040000	VOELKER,MATTHEW LLOYD ETAL			
157	2390550050000	JAJEH,RANDALL ELIAS ETAL			
158	2390550060000	NAKAMURA,TROY KELII ETAL			

EXHIBIT C.

PowerPoint Presentation

TMK LIST OF OWNERS/LESSEE SURROUNDING ROADWAY CORRIDOR

PROPOSED LILOA DRIVE EXTENSION

(VICINITY OF EAST WAIPU'ILANI ROAD TO VICINITY OF KA'ONO'ULU STREET) PROJECT AT LILOA DRIVE

	TMK	NAME	NAME 1	MAILING ADDRESS	ADDRESS
175	2390580290000	MULLER,ERIC J ETAL			
176	2390580300000	DELLEFAVE,ANTHONY VICTOR ETAL			
177	2390580310000	CLARKE,KEVIN JOSEPH ETAL			
178	2390580320000	ANGELL,MICHAEL T ETAL			
179	2390580330000	RASMUSSEN,KASPER ETAL	C/O FOX,SARAH		
180	2390580340000	LYNCH,DONOVAN			
181	2390580620000	WAIPUILANI ASSOCIATES,LLC	C/O KAMALII ALAYNA HOA C/O		
182	2390620040000	SPENCER,MARK & JORI FAMILY TRUST			
183	2390620050000	O'SHAUGHNESSY,CURTIS WILLIAM			
184	2390620060000	NICHOLS,PETER LEE ETAL			
185	2390620070000	SHAW,MARK ALLAN ETAL			
186	2390620080000	WOODARD,MICHAEL MORGAN ETAL			
187	2390620200000	KENOLIO MAKAI SUBD HOMEOWNERS ASSOC			

MEETING PURPOSE

- Provide introduction and overview of the Liloa Drive Extension project to homeowners and residents immediately abutting the project corridor
- Answer high-level questions regarding proposed project
- Introduce project team representatives who will be available to answer questions throughout the project

PROPOSED LILOA DRIVE EXTENSION PROJECT
Kīhei, Maui, Hawai‘i

COMMUNITY MEETING

Thursday, April 8, 2021
5:30 p.m.

MUNEKIYO HIRAGA

COUNTY OF MAUI
STATE OF HAWAII

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS

OVERVIEW OF PRESENTATION

- Project Background
- Project Location
- Proposed Action
- Environmental Review, Land Use Approvals, and Permits
- Studies
- Timeline
- Next Steps

TEAM MEMBERS

- County of Maui, Department of Public Works
- Warren S. Unemori Engineering
- Munekiyo Hiraga

PROJECT LOCATION MAP



PROJECT BACKGROUND

- Liloa Drive a.k.a. North-South (N-S) Collector Road
- Federal-Aid Highways 2035 Transportation Plan
  - ✓ Long-range capacity solution
- Hele Mai Maui Long-Range Transportation Plan 2040
  - ✓ Maui Transportation Improvement Project (TIP) – Public Priority No. 5
- State of Hawai‘i Department of Transportation Master Plan
- Kīhei-Mākena Community Plan

Photo 1: Corner of Liloa Drive and Waipu‘ilani Road



Photo 2: Liloa Drive



SITE PHOTOGRAPHS

Photo 5: Looking North on Liloa Drive and Kūlanihākoʻi Street



Photo 6: Corner of Kūlanihākoʻi Street and Liloa Drive South View



Photo 3: Waipuʻilani Gulch



Photo 4: Looking North on Liloa Drive at Unnamed Drainageway



PROPOSED IMPROVEMENTS

(continued)

Roundabouts

- ✓ East Waipuʻilani Road
- ✓ Kūlanihākoʻi Street
- ✓ Kaʻonoʻulu Street

Bridges

- ✓ Kūlanihākoʻi Gulch
- ✓ Waipuʻilani Gulch

PROPOSED IMPROVEMENTS

Two-lane roadway

- ✓ Sidewalks
- ✓ Curbs, Curb ramps, and Gutters
- ✓ Landscaped shared use path
  - Bicycle
  - Pedestrian
- ✓ Retaining walls, fencing, railings, landscape
- ✓ Street lights
- ✓ Overhead and underground utility adjustments
- ✓ Underground storm drainline systems

PHASING

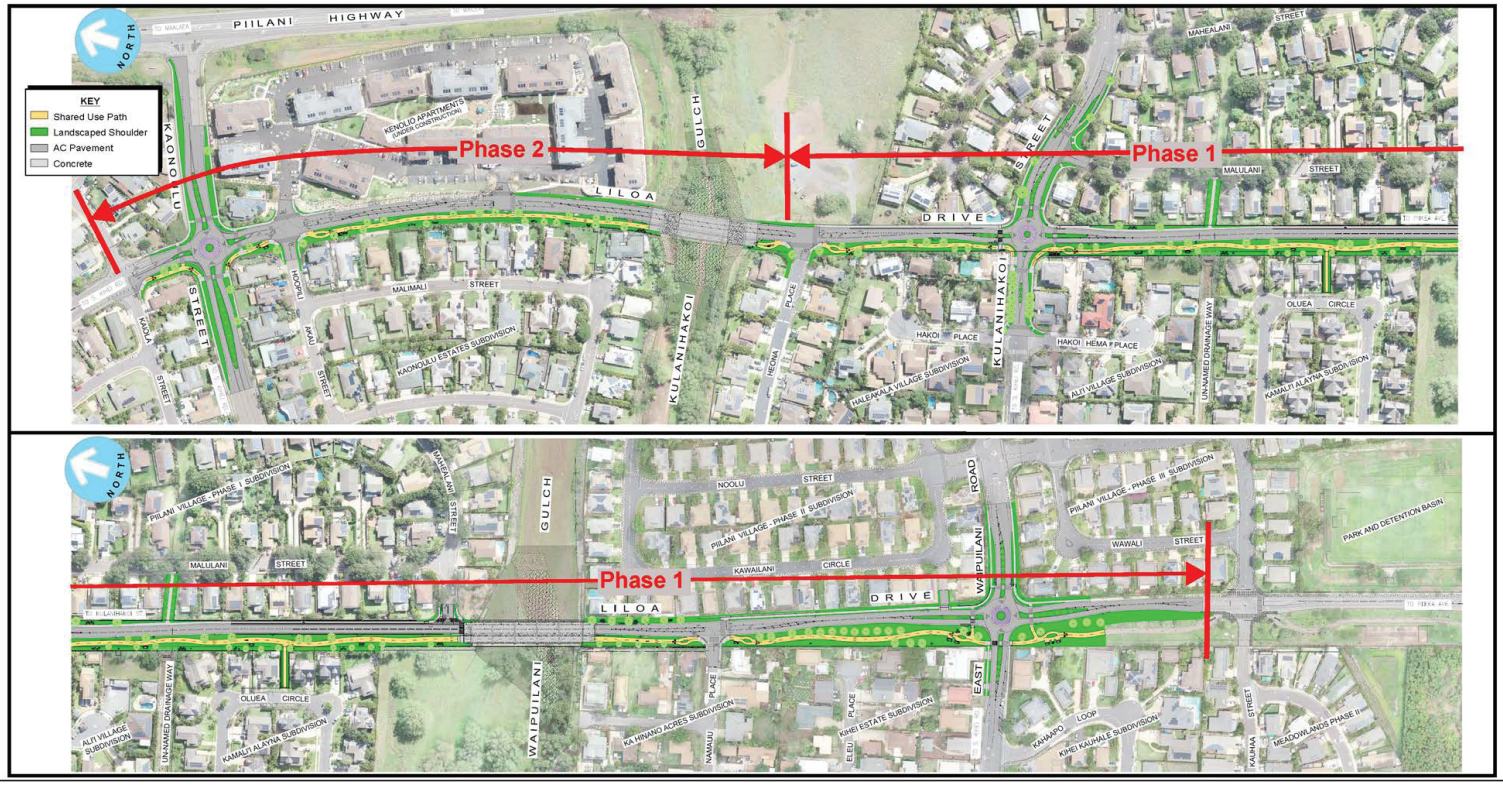
Phase 1

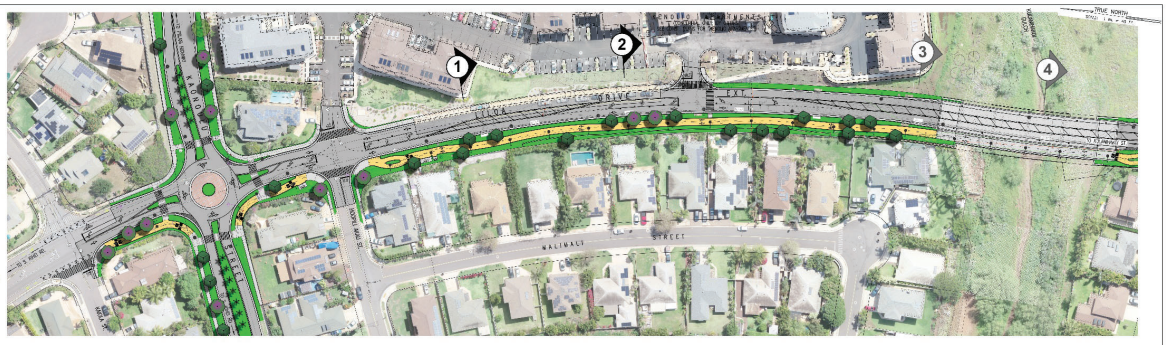
- East Waipuʻilani Road to the vicinity of Kūlanihākoʻi Street
- Construction anticipated to begin 2024 and last 18 to 24 months

Phase 2

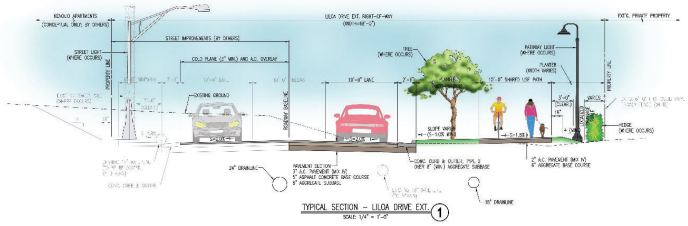
- Kūlanihākoʻi Street to Kaʻonoʻulu Street and Kenolio Road
- Construction anticipated upon receipt of funding

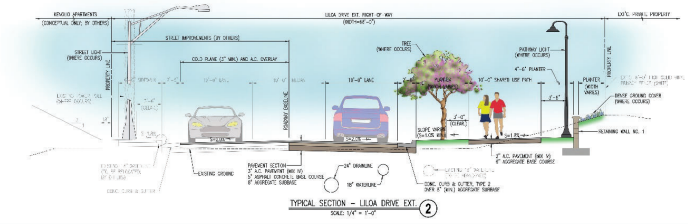
CONCEPTUAL PLAN

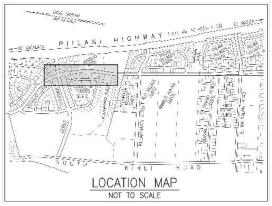




LOCATION MAP
SCALE: 1 IN. = 40 FT.







LEGEND:
- MULTI-USE TRAIL AND SIDEWALK
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

Prepared for:
Engineering Division
Department of Public Works
County of Maui

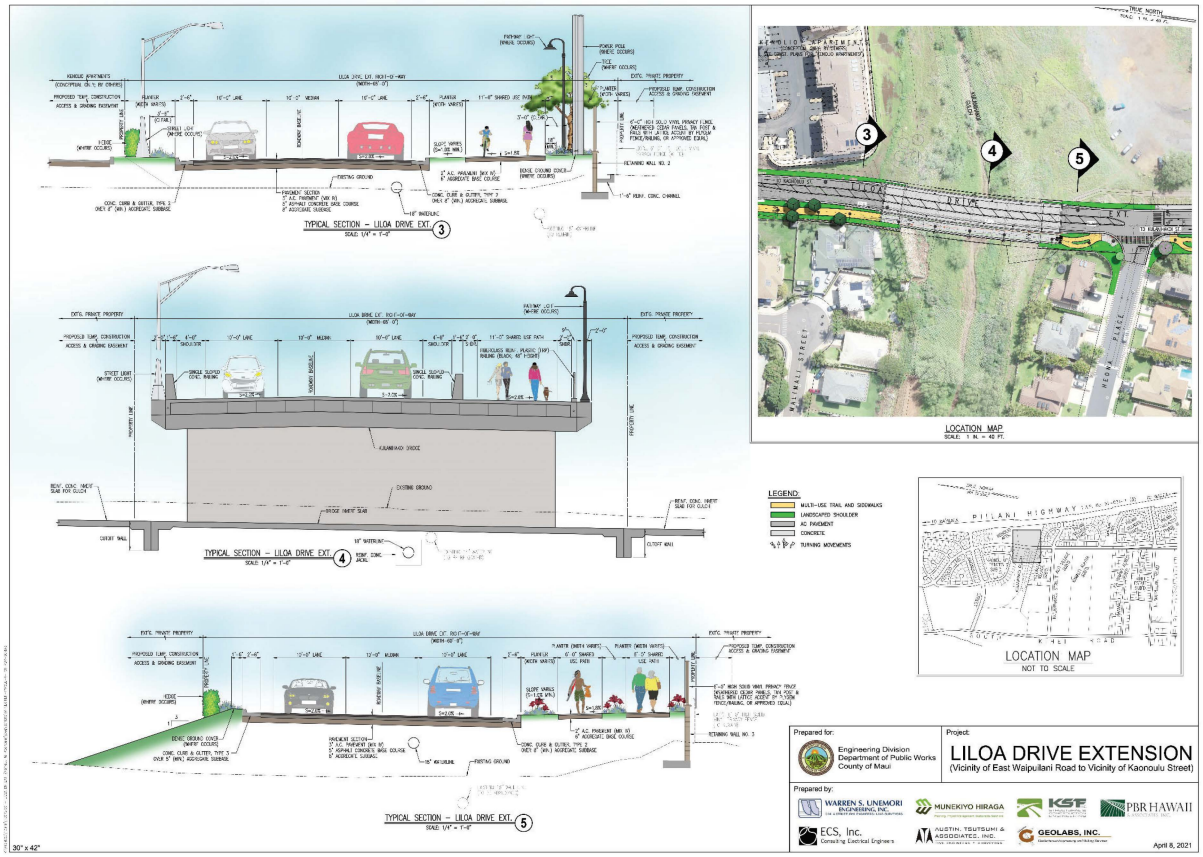
Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

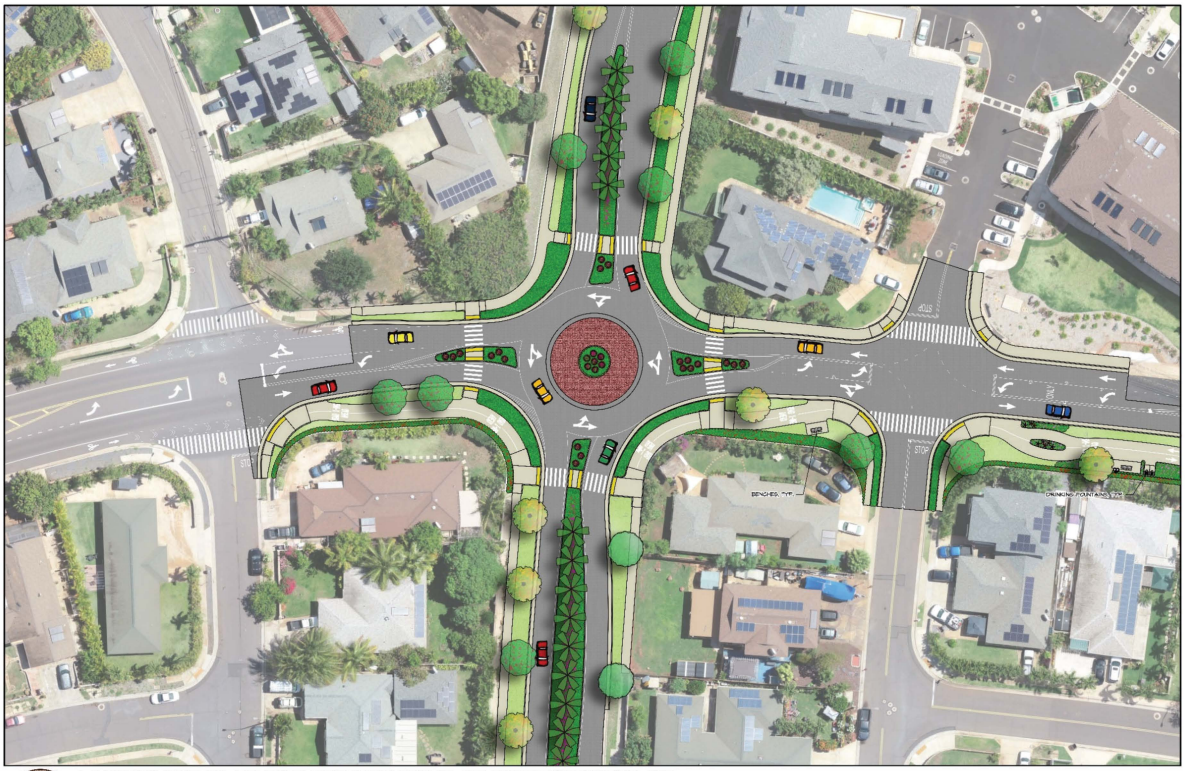
Prepared by:
WARREN S. UNEMORI ENGINEERING, INC.
MUNEKIYO HIRAGA
KSF
PBR HAWAII
ECS, Inc.
Consulting Electrical Engineers
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
GEOLABS, INC.

April 8, 2021

30" x 42"

CONCEPTUAL RENDERINGS





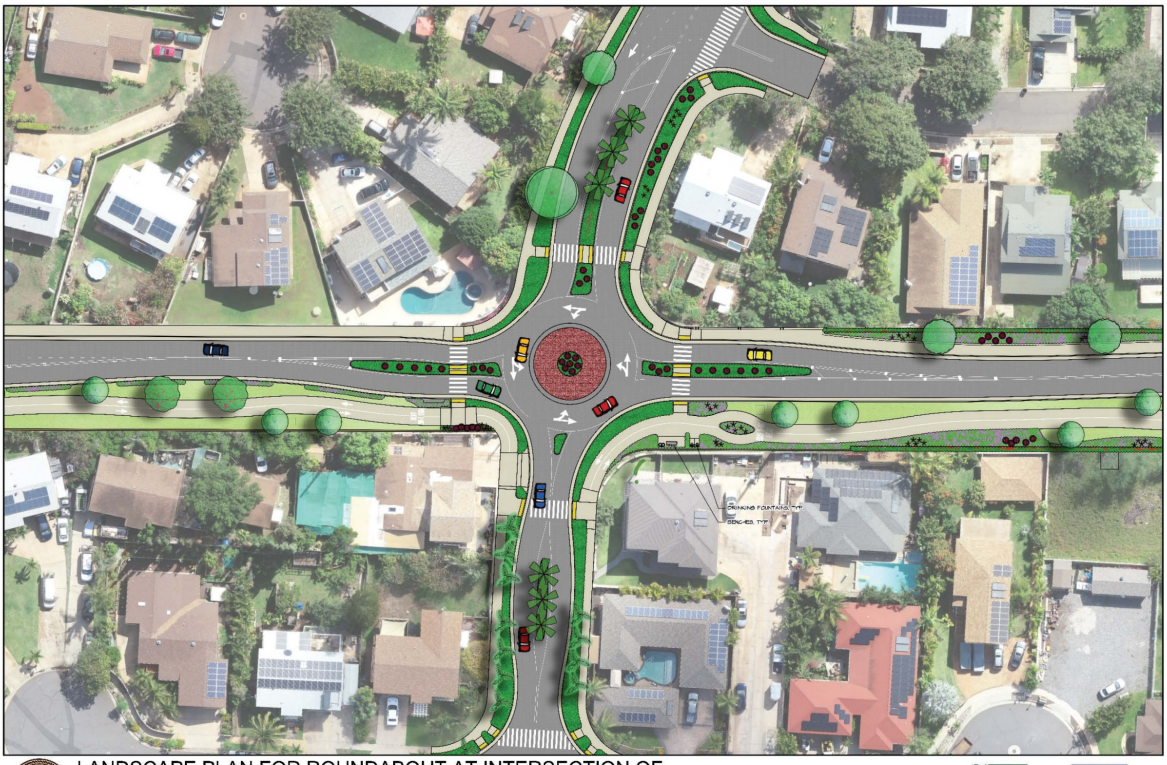
LANDSCAPE PLAN FOR ROUNDABOUT AT INTERSECTION OF
LILOA DRIVE & KAONOULU STREET

DEPARTMENT OF PUBLIC WORKS COUNTY OF MAUI

GRAPHIC SCALE

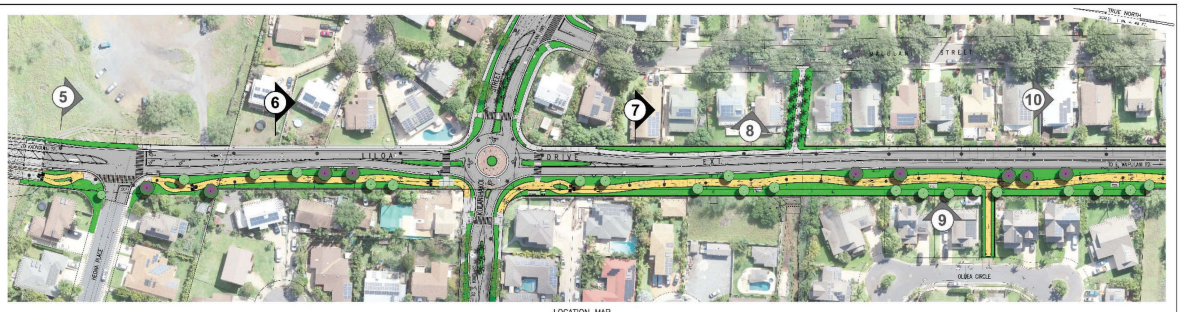
PBR HAWAII & ASSOCIATES, INC.

WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & TRAFFIC ENGINEERING • LAND SURVEYING

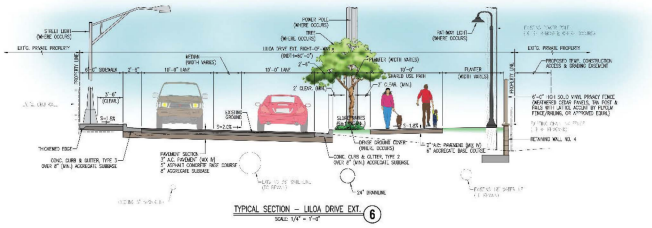


LANDSCAPE PLAN FOR ROUNDABOUT AT INTERSECTION OF
LILOA DRIVE & KULANIHAKOI STREET

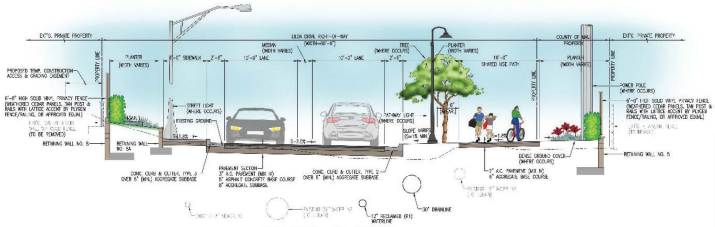
DEPARTMENT OF PUBLIC WORKS COUNTY OF MAUI



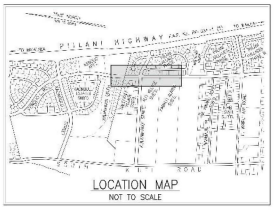
LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE EXT. (6)
SCALE: 1/4" = 1'-0"



TYPICAL SECTION – LILOA DRIVE (7)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

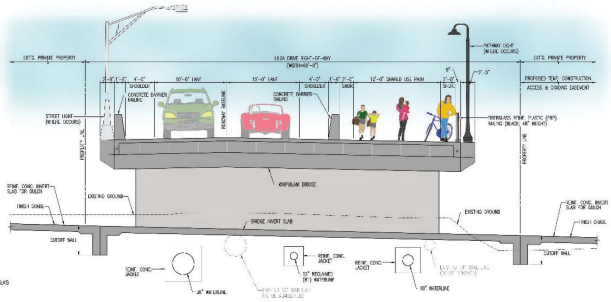
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PBR HAWAII
ECS, Inc. Consulting Electrical Engineers
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
GEOLABS, INC.

30" x 42"

April 8, 2021



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (12)
SCALE: 1/4" = 1'-0"



Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

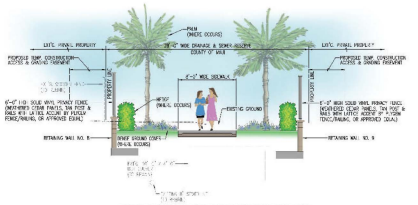
Prepared by:
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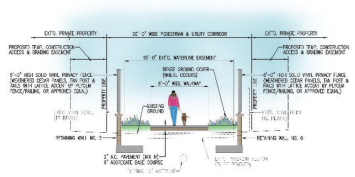
30" x 42"



LOCATION MAP
SCALE: 1 IN. = 40 FT.

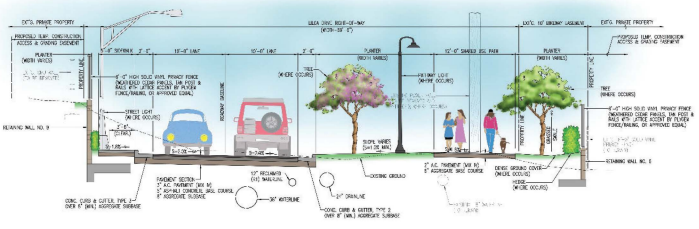


TYPICAL SECTION – SHARED USE PATH CONNECTION (8)
SCALE: 1/4" = 1'-0"



TYPICAL SECTION – SHARED USE PATH CONNECTION (9)
SCALE: 1/4" = 1'-0"





TYPICAL SECTION – LILOA DRIVE (10)
SCALE: 1/4" = 1'-0"

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

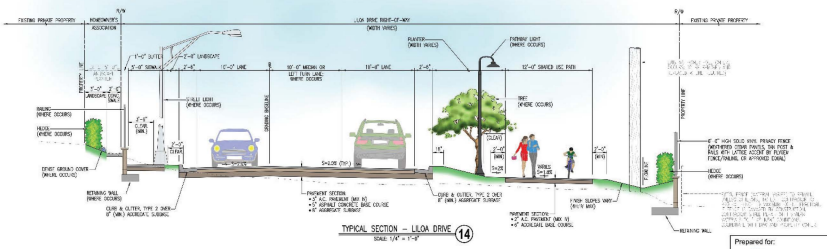
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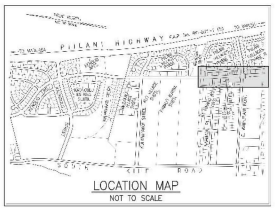
30" x 42"



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (14)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
- AC PAVEMENT
- CONCRETE
- TURNING MOVEMENTS

30" x 42"

Prepared for:
Engineering Division
Department of Public Works
County of Maui

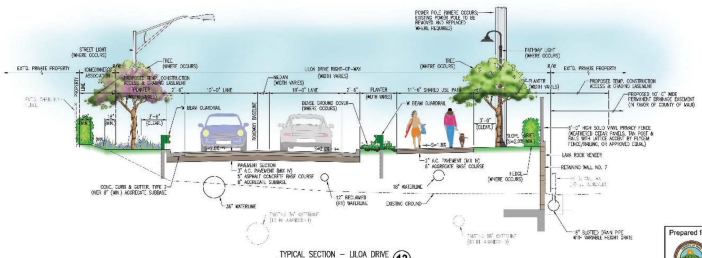
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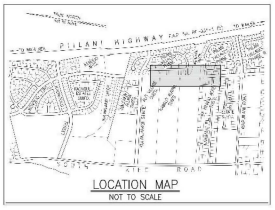
April 8, 2021



LOCATION MAP
SCALE: 1 IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE (13)
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

LEGEND:
- MULTI-USE TRAIL AND SIDEWALKS
- LANDSCAPED SHOULDER
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- CONCRETE
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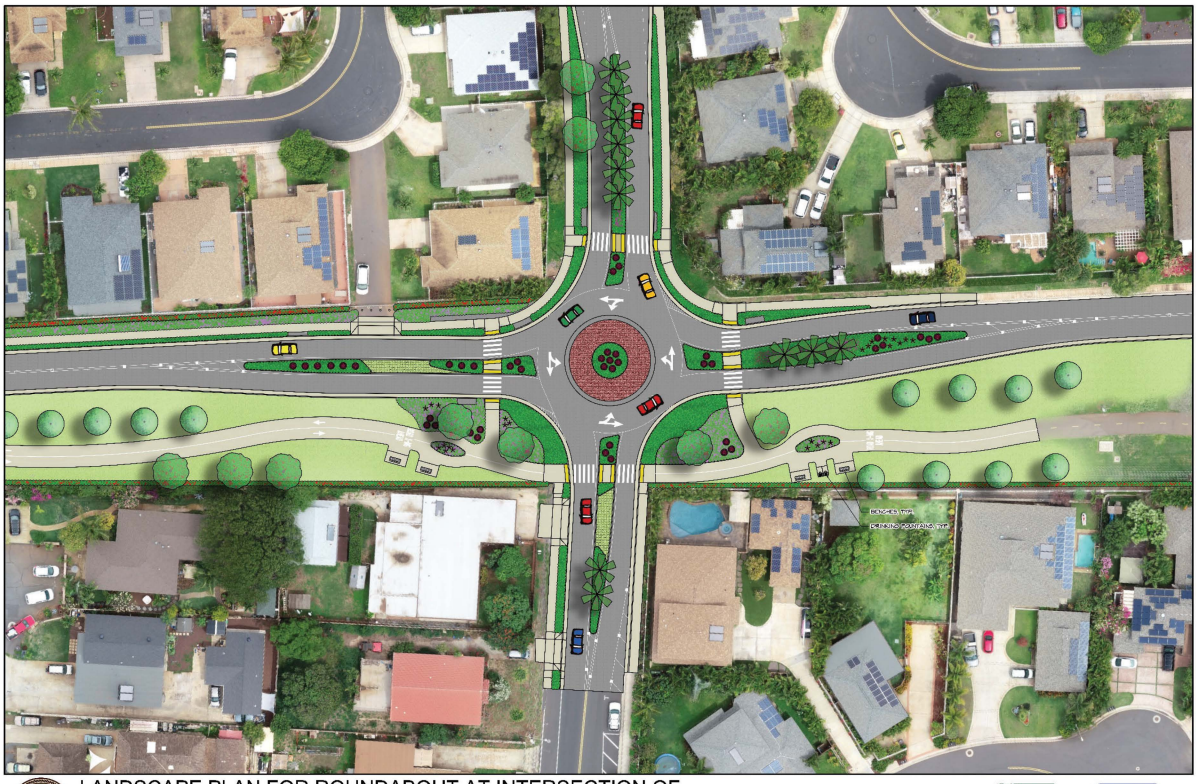
30" x 42"

Prepared for:
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Department of Public Works
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GEOLABS, INC.

April 8, 2021



LANDSCAPE PLAN FOR ROUNDABOUT AT INTERSECTION OF
LILOA DRIVE & WAIPUILANI ROAD

DEPARTMENT OF PUBLIC WORKS COUNTY OF MAUI

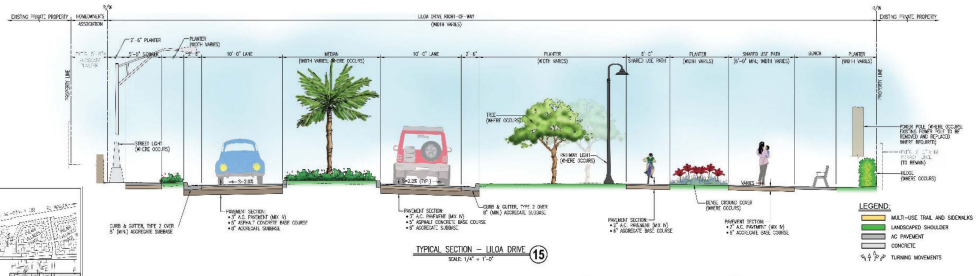
GRAPHIC SCALE

PBR HAWAII & ASSOCIATES, INC.

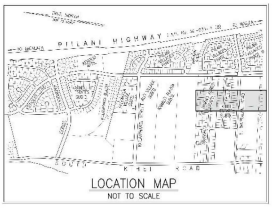
WARREN S. UNEMORI ENGINEERING, INC.
CIVIL & STRUCTURAL ENGINEERS / LAND SURVEYORS



LOCATION MAP
SCALE: 1" IN. = 40 FT.



TYPICAL SECTION – LILOA DRIVE 15
SCALE: 1/4" = 1'-0"



LOCATION MAP
NOT TO SCALE

Prepared for:
Engineering Division
Department of Public Works
County of Maui

Project:
LILOA DRIVE EXTENSION
(Vicinity of East Waipuilani Road to Vicinity of Kaonoulu Street)

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AUSTIN, TSUTSUMI & ASSOCIATES, INC.
GEOLABS, INC.

30" x 42"

April 8, 2021

PROJECT NEED AND BENEFITS

- Provide another corridor parallel to South Kīhei Road and Piʻilani Highway
- Improve safety mobility features
- Provide multi-modal transportation options
- Improve physical environment



Bike and Pedestrian Lane Along Liloa Drive



Bike and Pedestrian Lane Along Liloa Drive 2



Pedestrian Crossing at Piʻikea Avenue Roundabout



Bike and Pedestrian Lane Along Liloa Drive 3

STUDIES

- Flora Fauna Survey
- Biological Survey and Jurisdictional Waters Delineation for Gulches
- Noise Study
- Archaeological Consultation with SHPD
- Cultural Impact Assessment
- Traffic Impact Analysis Report
- Preliminary Engineering and Drainage Report

ENVIRONMENTAL REVIEW

- **Environmental Assessment**
  - ✓ Chapter 343, Hawai‘i Revised Statutes
  - ✓ Assess potential environmental impacts and identify mitigation measure

- **National Environmental Policy Act (NEPA)**
  - ✓ Federal environmental compliance will also be undertaken due to use of federal funds

PROJECT TIMELINE

Environmental Assessment – 2021

Other Regulatory Approvals – 2022

Phase 1 Construction Initiation – 2024

Phase 2 Construction Initiation - TBD

OTHER REGULATORY APPROVALS

Consultation has been initiated to confirm all regulatory approvals required for the project. Preliminarily, the following are anticipated:

FEDERAL

- Section 106, National Historic Preservation Act
- Stream Channel Alteration Permit

STATE

- Historic Review with State Historic Preservation Division
- Chapter 6E, Hawaii Revised Statutes

COUNTY

- Special Management Area Use Permit
- Flood Development Permits

CONTACT INFORMATION

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Department of Public Works
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(Planning Consultant)
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NEXT STEPS

- Ongoing community engagement
  - ✓ Draft EA will be available for public review/comment
  - ✓ General public meeting after the publication of the Draft EA
- DPW will be contacting owners who are directly affected by Phase 1 construction in the coming months
- Homeowners adjacent to Phase 1 corridor may sign up for individual meeting with Project Team representatives
- https://tinyurl.com/liloadrform

THEME OF THE QUESTIONS AND COMMENTS RAISED VIA COMMENT FORM AND/OR SURVEY MONKEY

- Drainage
  - ✓ Gulches
  - ✓ Streets
  - ✓ Subdivisions
- Noise
- Safety
  - ✓ Roundabouts
  - ✓ Pedestrian
  - ✓ Speeding
- Heavy Truck traffic
- Undergrounding of utility lines
- Property Values

SUMMARY OF MARCH 26, 2021 MEETING WITH KĪHEI COMMUNITY ASSOCIATION

APPENDIX O-4

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 20, 2021

MEETING MEMORANDUM

Date of Meeting: Friday, March 26, 2021

Place: via Zoom

Meeting Attendees: Michael Moran, ***Kīhei Community Association (KCA)***
Rob Weltman, ***KCA***
Laura Dunham, ***KCA***
Daniel Kanahele, ***KCA***
Adele Rugg, ***KCA***
Charlene Shulenburg, ***KCA***
Clifford Mukai, ***Warren S. Unemori, Engineering, Inc. (WSUE)***
Brad Wright, ***WSUE***
Charlene Shibuya, ***Munekiyo Hiraga (MH)***
Kari Luna Nunokawa, ***MH***
Yolanda Poouahi, ***MH***

Subject: Liloa Drive Extension KCA Meeting

The Liloa Drive Extension project team, consisting of Warren Unemori Engineering (Clifford Mukai and Brad Wright) and Munekiyo Hiraga (Charlene Shibuya and Kari Luna Nunokawa), met with the Kīhei Community Association (KCA) Board members to introduce the Liloa Drive Extension project. The project team presented a slide show to the KCA showing the extent of the project scope, current design, regulatory processes the project is undertaking, and timeline. Please see **Attachment "A"**. The project team also shared the plans for community outreach and engagement, including an April 8 meeting for homeowners and land owners immediately abutting the project corridor.

KCA board members were given the opportunity to ask questions to the project team at the conclusion of the presentation. Please see below for the questions, comments, and responses.

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	Questions and/or Concerns	Response
1	All school buses, large and small, are able to navigate the 3 new roundabouts?	Yes, that is the intent to make sure that can happen. Some of the intersections are very tight but the team is spending a lot of time to make that happen.
2	Waipu'ilani residents are worried about increased runoff into their properties.	Engineers are aware of the concerns and past experiences of runoff along this corridor at both gulches. The bridges will be high enough to contain and channelize the water safely downstream through the gulches. Runoff is expected to be contained by the roadway itself and piped underground.
3	What does "vicinity" of Kūlanihako'i mean? Will it be open for vehicles via roundabout?	The use of the word "vicinity" when talking about the various streets and terminus is because of the roundabouts. The approaches to the roundabouts extend out half a block to a block. Roundabouts will support all turning units and perhaps the extended semi-trucks may have issues but still working on that.
4	Just to confirm, both bridges will have separate greenway/bike paths for continuous walking, biking, yes?	Yes. The bridges will have separation of the vehicular corridor from the walking and biking paths.
5	What is the overall cost of phase 1?	The bridges are the most expensive component and can range from $12M to $20M. The cost estimate is $35 to $40M for phase 1 including the bridge across Waipu'ilani and two (2) roundabouts, one at Waipu'ilani and the other at Kūlanihāko'i.
6	What are the funding sources of phase 1?	Eighty percent (80%) Federal funds and twenty percent (20%) County funds
7	Will construction be from N to S?	Construction will be as depicted in the phasing exhibit. Phase 1 will start at Waipu'ilani Road to proposed roundabout at Kūlanihāko'i Street and extend a bit out from that.
8	Is the bridge the most expensive element of the construction?	Yes.
9	How high is the bridge above the drainage way?	The bridge will be about 10 to 12 feet with railings on both sides.
10	How can the project interface with east-west walkways along the Waipu'ilani Gulch that may be proposed for the South Maui High School?	There is a grassed path which connects Pi'ilani Village phase 1 to a narrow asphalt paved path. The temporarily dead-ended Malulani St. will be extended and connected to Liloa Dr. There is also a path connecting the Kamali'i Alayna subdivision to the shared bike/walk path.
11	What efforts are underway and by whom to get funding for phase 2?	The County and MPO are working to get a priority for funding for phase 2. The environmental assessment is being done for entire project (Phase 1 and Phase 2) so it can move forward once funding is available without having to do another assessment. Funding does have to be spread out because of the large cost.
12	Is there any fully-through access from Liloa Drive through Pi'ilani One to Pi'ilani Highway for students to walk to the new high school?	That is out of the scope for this project. "It is expected that a walking path along north edge of the Waipu'ilani Gulch will cross under the Highway for both the High school and R&T park".
13	Lauren Armstrong said the MPO is considering applying for a federal grant for complete streets next year. Kaua'i got one for $14M.	It would be great to get funding for that to help with the safety of students walking from subdivisions to the high school.
14	Has the 106 consultation process been initiated?	The 106 has not been inititated yet because the archaeologist is in initial consultation with SHPD on the Area of Potential Effect.
15	It is expected that a walking path along north edge of the Waipu'ilani Gulch will cross	

	Questions and/or Concerns	Response
	under the Highway for both the High school and R&T park.	
16	Is phase 2 on the STIP?	Project team will reach back out to Mike Moran upon finding the information.
17	What was the general reaction from residents?	The idea behind the community outreach plan is to get into contact with those homeowners and land owners along the project corridor. The first meeting is on April 8. The project team has begun receiving comments from the residents and also meeting with them. It is a mixed bag of reactions. Some are supportive and some are concerned. Kamali'i Alayna residents are concerned about flooding. Other residents are concerned with what it will look like and how it will affect their properties. Some residents were not told a road was going to be there.
18	The Kenolio Apartments at Ka'ono'ulu have constructed a road almost to Gulch, just needs the greenway so a segment is almost done. Of course the bridge is the major expense but phase 2 seems much shorter as have both edges almost completed.	Yes. It is a good start.
19	Is permeable concrete possible to use for flooding mitigation?	For the most part, here in Hawai'i the use of permeable concrete is still experimental. The challenge is the ongoing maintenance for permeable pavement. It needs to be pressure washed and possibly with chemicals so that may not be the best for this long stretch of pavement.
20	We LOVE the Roundabouts!!	

The project team emailed M. Moran on 3/29/21 regarding question No. 16, listed above, whether Phase 2 of the project is on the Statewide Transportation Improvement Program (STIP). The project team provided M. Moran with a copy of the STIP which reflected Phase 2 funding.

Kari Luna Nunokawa, Ed.D.
Senior Manager

KLN:yp
Attachment
cc: Nollie Yagin, Department of Public Works (w/attachment)
Clifford Mukai, Warren S. Unemori, Engineering, Inc. (w/attachment)
Brad Wright, Warren S. Unemori, Engineering, Inc. (w/attachment)
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