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STATE OF HAWAII
LAND USE COMMISSION

Appendix 23

Cultural Impact Assessment

Cultural Impact Assessment Report for the Kanahā Hotel at the Kahului Airport, Kahului ʻIli, Wailuku Ahupuaʻa, Wailuku District, Maui Island

TMKs: [2] 3-8-103: 014 (portion), 015, 016, 017, and 018

Prepared for

R.D. OLSON

CHRIS HART & PARTNERS, INC.
Landscape Architecture • City & Regional Planning

Prepared by

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Note on Hawaiian language usage

In keeping with other Hawaiian scholars, we do not italicize Hawaiian words. Hawaiian is both the native language of the pae ʻāina of Hawaiʻi and an official language of the State of Hawaiʻi. Some authors will leave Hawaiian words italicized if part of a quote; we do not. In the narrative, we use diacritical markings to assist our readers, except in direct quotes, in which we keep the markings used in the original text. We provide translations contextually when appropriate.

Front Cover Credit

Hawaii State Archives Digital Collections.

ca. 1948. Aero Photo Surveys (Photographer). Aerial View of Kahului Airport, Maui. Custom Fields. Call No. PP-2-3-002. Available online at: http://gallery.hawaii.gov/gallery2/main.php?g2_itemId=13874&g2_imageViewsIndex=1

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Executive Summary

At the request of R.D. Olson Development, Honua Consulting is preparing a Cultural Impact Assessment (CIA) of the proposed Windward Hotel development project to support a consolidated Draft Envionmental Impact Statement (DEIS), Change in Zoning (CIZ), Community Plan Amendment (CPA), and Special Management Area (SMA) Application. The project consists of a 200-unit hotel on vacant parcels within the Maui Business Park Phase II. The subject parcels lie in the State Urban District, is designated Light Industrial in the Wailuku-Kahului Community Plan and is zoned M-1 Light Industrail by Maui County. R.D. Olson Development is seeking to minimize environmental and cultural impacts by carefully inventorying the natural and cultural environment and avoiding any significant archaeological sites, cultural resources, and sensitive species.

An Environmental Impact Statement (EIS) that is under preparation will provide an overview analysis of the benefits and adverse impacts of Windward Hotel project to the ʻili of Kahului in the ahupuaʻa of Wailuku and its adjacent community. The State of Hawaii Land Use Commission (LUC) is the accepting authority for the EIS.

Research in preparation of this report involved a thorough search of Hawaiian language documents including, but not limited to, the Bishop Museum mele index and Bishop Museum archival documents, such as the Hawaiian language archival caché. All Hawaiian language documents were reviewed by Hawaiian language experts for relevant information that could be included in the report. Documents considered relevant to this analysis are included herein and translations are provided when appropriate to the discussion. Summaries of interviews and information on other oral testimonies are also provided. An impact analysis and *Ka Paʻakai* analysis are both included in this CIA.

Based on the extensive identification effort and thorough analysis undertaken for this assessment, which included interviews with a number of cultural experts and area practitioners, there is a negligible potential for the project to have a direct, adverse impact on valued cultural, historical, or natural resources in the project area or larger geographic extent. Additionally, there is a negliable potential for the project to have a direct, adverse impact on traditional or customary Native Hawaiian rights in the project area or in the larger geographic extent, largely in part to the extensive industrial use of the project area for over 100 years. It is unfortunate, but any cultural practices that may have not occurred in the project area or surrounding area were likely discontinued after the land was taken by foreign companies for industrial and plantation use. Cultural resources that may have once existed in the project area were likely irreparably destroyed by decades of industrial and agricultural use. Any potential for an adverse indirect or cumulative impact in the larger geographic extent can be minimized through the conditions and best management practices (BMPs) recommended herein, some of which have already been embraced by the applicant and integrated into the project design. These conditions and BMPs constitute feasible action that may be reasonably taken to protect Native Hawaiian rights and cultural rights in the larger geographic extent.

Additionally, based on the imput of practitioners interviewed for this assessment, the project redesigned the landscaping and design themes to better integrate native plants, Hawaiian-inspired motifs, and other design elements to honor Maui's unique cultural heritage while focusing on the place-based history of Kanahā. The purpose of these efforts is to honor and respect the culture of the area while utilizing an opportunity to educate visitors about native culture, history, and flora.

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Abbreviations and Acronyms

AIS: Archaeological Inventory Survey

AMSL: Above Mean Sea Level

APE: Area of Potential Effect

BMP: Best Management Practice

CIA: Cultural Impact Assessment

CWRM: State of Hawaii Commission on Water Resource Management

DEIS: Draft Environmental Impact Statement

DLNR: Department of Land and Natural Resources

DOFAW: Division of Forestry and Wildlife

EA: Environmental Assessment

GPD: Gallons Per Day

HAR: Hawaii Administrative Rules

HC&S: Hawaiian Commercial & Sugar Company

HDOT: Hawaii Department of Transportation

HRS: Hawaii Revised Statutes

IIFS: Interim Instream Flow Standards

KPWS: Kanahā Pond Wildlife Sanctuary

MDWS: Maui Department of Water Supply

MGD: Million Gallons Per Day

NASKA: Naval Air Station Kahului

NCSS: National Cooperative Soil Series

ROI: Range of Influence

SCS: Scientific Consultant Services, Inc.

SIHP: State Inventory of Historic Places

TMK: Tax Map Key

USACE: U.S. Army Corps of Engineers

WTP: Water Treatment Plant

I. Project Description

At the request of R.D. Olson Development, Honua Consulting prepared a Cultural Impact Assessment (CIA) of the proposed Kanahā Hotel at the Kahului Airport (formerly known as the "Windward Hotel"[1]) development project to support a consolidated Draft Environmental Impact Statement (DEIS), Change in Zoning, Community Plan Amendment, and Special Management Area Application. The project consists of a 200-unit hotel on vacant parcels within the Maui Business Park Phase II. The subject parcels lie in the State Urban District, is designated Light Industrial in the Wailuku-Kahului Community Plan and is zoned M-1 Light Industrial by Maui County. R.D. Olson Development is seeking to minimize environmental and cultural impacts by carefully inventorying the natural and cultural environment and avoiding any significant archaeological sites, cultural resources, and sensitive species.

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Located on TMKs [2] 3-8-103: 104 (portion), 015, 016, 017, and 018 is the land parcel that will be referred to as the "Project Area" throughout this assessment. The land is located west of the Kahului Airport Access Road. There are currently two options for the hotel's construction, one that includes the airport ramp (Figure 1) and one that excludes the airport ramp (Figure 2). The soil composition in the area is 100% Molokai Silty Clay Loam, 3-7% slopes (Foote et al. 1972). According to National Cooperative Soil Series (NCSS), the geographic setting for this soil is as follows:

> The Molokai soils are on low elevation at elevations from near sea level to 457 meters (1,500 feet). Slopes are 0 to 25 percent. The soils formed in residuum

[1] Based on input from cultural practitioners, the project underway a project name change. Whereas some appendices to this document were utilized prior to the name change, they have been left with the original "Windward Hotel" project name for accuracy.

weathered from basic igneous rocks. Mean annual precipitation ranges from 508 to 635 mm (20 to 25 inches). The average January temperature is about 22 degrees C. (71 degrees F.) The average July temperature is about 25 degrees C. (77 degrees F.), and mean annual temperature is about 23 degrees C. (73 degrees F.); with less than 6 degrees C. difference between mean summer and mean winter temperatures (NCSS 2017).

This soil has the following use and vegetation: "the production of pineapple, pasture, irrigated sugarcane and for wildlife habitat. Vegetation is [typically] kiawe (*Prosopis pallida*), pitted beardgrass (*Bothriochloa barbinodis perforatus*), feather fingergrass (*Chloris virgata*), lantana (*Lantana camara*), ilima (*Sida cordifolia*), and buffelgrass (*Cenchrus ciliaris*)" (NCSS 2017). There are no visible surface historic features.

Scientific Consultant Services, Inc. (SCS) conducted a study that complies with Hawai'i Revised Statutes (HRS) Chapter 6E. The Archaeological Inventory Sutdy (AIS) concluded that "No traditional or historic sites were identified in surface or subsurance contexts during fieldwork." Review of previous archaeological studies identified a number of historic sites outside the petition area, but none within the project region. These sites near the petition are listed below and additional details regarding these sites are discussed in the AIS. Based on the negative findings during sub-surface testing, SCS submitted an archaeological assessment report to SHPD for review. This report was accepted by SHPD on July 20, 2020.

The historic sites identified in the report are as follows:

Table 1. Historic Sites within or near the Project Area

SIHP #	Description	Author	Year
Sites within Project Area			
None Identified			
Sites near Project Area			

SIHP #	Description	Author	Year
50-50-05-1798	Burial	Welch	1988
50-50-05-1799	House Site	Welch	1988
50-50-04-2849	Cultural Site and Burial	Toenjes et al.	1991
50-50-04-5733	Burial	Hunt and Dega	2006
50-50-04-3112	Historic properties	Fredericksen and Fredericksen	1992
50-50-05-1177	Subsurface cultural deposits	None provided (identified by SHPD)	None provided
50-50-05-1178	Subsurface cultural deposits	None provided (identified by SHPD)	None provided

SHPD's acceptance noted that "as the AIS was conducted without a detailed scope of work guiding the testing strategy, and the pedestrian survey transects were spaced 10 to 15 meters apart, SHPD has insufficient information to determine if the project will adversely affect historic properties, particularly within areas of deep excavation within the construction footprint." (Letter from SHPD to Glen Ueno, Log No. 2020.00815, Doc No. 2007AM04).

In an effort to address this lack of sufficient information, R.D. Olson has hired ʻĀina Archaeology to conduct additional testing in an effort to identify any additional historic properties. ʻĀina Archaeology will conduct an additional pedestrian survey using traqnsects spaced no greater than 5 meters apart shall be conducted. ʻĀina Archaeology and Honua Consulting met with SHPD Maui on Tuesday October 6, 2020 to consult on this additional work. ʻĀina Archaeology will submit to SHPD Maui their testing strategy for this additional investigation.

Figure 1. Overall Site Plan – Option 1 (Prepared by R.D. Olson Development)

Figure 2. Overall Site Plan – Option 2 (Prepared by R.D. Olson Development)

II. Need for a Cultural Impact Assessment

A. Regulatory Background

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to protect and preserve cultural beliefs, practices, and resources of Native Hawaiians and other ethnic groups. To assist decision makers in the protection of cultural resources, Chapter 343, HRS and Hawaii Administrative Rules (HAR) § 11-200 for the environmental impact assessment process require project proponents to assess proposed actions for their potential impacts to cultural properties, practices, and beliefs.

This process was clarified by Act 50, Session Laws of Hawaii (2000), which recognized the importance of protecting Native Hawaiian cultural resources and required that Environmental Impact Statements include the disclosure of a proposed action's effects on the cultural practices of the community, state, and the Native Hawaiian community. Specifically, the Environmental Council suggested the CIAs include information about practices and beliefs of a particular cultural or ethnic group/groups. Such information may be obtained through public scoping, community meetings, ethnographic interviews, and oral histories.

B. Compliance

The State and its agencies have an obligation to preserve and protect Native Hawaiians' customarily and traditionally exercised rights to the extent feasible.[2] State law further recognizes that the cultural landscapes provide living and valuable cultural resources where Native Hawaiians have and continue to exercise traditional and customary practices, including hunting, fishing, gathering, and religious practices. In *Ka Paʻakai*, the Hawaiʻi Supreme Court provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary Native Hawaiian rights while

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[2] Article XII, Section 7 of the Hawaiʻi State Constitution, *Ka Paʻakai O Ka ʻĀina v. Land Use Commission*, 94 Haw. 31 [2000](Ka Paʻakai), Act 50 HSL 2000.

reasonably accommodating competing private development interests. This is accomplished through:

1) The identification of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area;
2) The extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and
3) The feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist.

The CIA was prepared under HRS Chapter 343 and Act 50 HSL 2000. The appropriate information concerning Wailuku ahupuaʻa has been collected, focusing on areas near or adjacent to the project area. A thorough analysis of this project and potential impacts to cultural resources, historical resources, and archaeological sites is included in this assessment.

The present analyses of archival documents, oral traditions (chants, mele (songs), and/or hula), and Hawaiian language sources including books, manuscripts, and newspaper articles, are focused on identifying recorded cultural and archaeological resources present on the landscape, including: Hawaiian and non-Hawaiian place names; landscape features (ridges, gulches, cinder cones); archaeological features (kuleana parcel walls, house platforms, shrines, heiau (places of worship), etc.); culturally significant areas (viewsheds, unmodified areas where gathering practices and/or rituals were performed); and significant biocultural resources. The information gathered through research helped to focus interview questions on specific features and elements within the project area.

Interviews with lineal and cultural descendants are instrumental in procuring information about the project area's transformation through time and changing use. Interviews were conducted with recognized cultural experts and summaries of those interviews are included herein.

The DEIS will provide an overview of cultural and historic resources in the project area thorough literature review, community and cultural practitioner consultation, and high-level, project-specific surveys. The DEIS will focus on identifying areas in which disturbance should be avoided or minimized to reduce impacts to historic properties or culturally important features. The paramount goal is to prevent impacts through avoidance of sensitive areas and mitigating for impacts only if avoidance is not possible.

Environmental factors potentially influencing the distribution of historic properties will also be evaluated in the DEIS. The resulting data will be analyzed to develop a general settlement pattern model for the area that helps estimate the likely types and distribution of historic properties. The potential significance and required treatment of expected historic properties will also be summarized. The goal of this work is to develop recommendations to assist with future infrastructure planning that minimizes adverse effects upon historic properties.

The Range of Influence (ROI) for impacts to cultural resources and historic properties includes the project area and localized surroundings. This CIA also reviews some of the resources primarily covered by the DEIS and AIS. It primarily researches and reviews the range of biocultural resources identified through historical documents, traditional knowledge, information found in the Hawaiian language historical caché, and oral histories and knowledge collected from cultural practitioners and experts.

C. Methodology

The approach to developing the CIA is as follows:

I. Gather Best Information Available

    A. Gather historic cultural information from stories and other oral histories about the affected area to provide cultural foundation for the report;
    B. Inventory as much information as can be identified about as many known cultural, historic, and natural resources, including previous archaeological inventory surveys, CIAs, etc. that may have been completed for the possible range of areas; and

C. Update the information with interviews with cultural or lineal descendants or other knowledgeable cultural practitioners.

II. Identify Potential Impacts to Cultural Resources

III. Develop Reasonable Mitigation Measures to Reduce Potential Impacts

A. Involve the community and cultural experts in developing culturally appropriate mitigation measures; and
B. Develop specific Best Management Practices (BMPs), if any are required, for conducting the project in a culturally appropriate and/or sensitive manner as to mitigate and/or reduce any impacts to cultural practices and/or resources.

While numerous studies have been conducted on this area, very few have effectively utilized Hawaiian language resources and Hawaiian knowledge. Honua Consulting developed a list of place names, which includes, but is not limited to, the following places and terms to help guide research and analyses.

Table 2. Place Names Associated with Kahului and Wailuku (near project area)

Toponym	Type	District	Definition
Kahului[3]	Town and Bay	Wailuku	Possibly “the winning” or “the fish net”
Wailuku	Ahupuaʻa	Wailuku	Waters of destruction
Kanahā[4]	Loko iʻa (fishpond)	Wailuku	The shattered
Mauʻoni	Loko iʻa	Wailuku	Unknown
Lahikeha	Hale (building)	Wailuku	Lofty heaven
Kalialinui	Stream	Wailuku	Large medicinal tree

[3] Kahului shares its name with a bay and land section south of Kailua-Kona on Hawaiʻi Island.
[4] Kanahā is also the name of a stream in Lahaina, Maui and the name of an island located in Moakea, Molokaʻi. It is part of the State Seabird Sanctuary. It was created by the posterosional eruption that created Mokuhoʻoniki Island and, through erosion, divided into its own island. It is also the name of a channel and reef in Hāʻena, Kauaʻi.

Toponym	Type	District	Definition
Kaʻa[5]	Beach and coastal area	Wailuku	Rolling
Paia	Village and Bay	Paia	Noisy
Makawela	Bay	Wailuku	Burning eyes
Kaimuhee	Place name	Kahului, near Kanahā and Mauʻoni	Possibly "ocean of cuttlefish (mūheʻe)"

III. Description of Project Area

Maui has a unique geography; it is considered to be two islands, joined together by an isthmus. Land divisions on Maui are unlike those on other islands (Sterling 1998). Ancient names for Maui include Ihikapalaumaewa and Kulua (Sterling 1998: 2). Since Kahului, and thereby the project area, is located on the isthmus, it is important to understand the unique geopolitical construct of Maui's landscape.

> The division into district of the islands of the Maui group has not simplicity observed in the other islands. The configuration of the island of Maui, which is really a double island made up of two distinct mountain masses joined by a low flat isthmus, is probably the explanation for the group number of districts on that island, namely Kaanapali and Lahaina in West Maui, and the districts of Hamakua Poko, Hamakua Loa, Koolau, Hana, Kipahulu, Kaupo, Kahikinui, Honuaula and Kula in East Maui. The *ahupuaa* of Kahakuloa in Kaanapali and the *ahupuaas*[6] [sic] of Olowalu and Ukemehame in Lahaina were at times termed *kalanas* [sic]. The *ahupuaas* [sic] of Waihee and Waiehu were independent of any *moku* and are listed in the *Book of the Mahele* as being in "Puali Komohana," i.e., West Isthmus. The large *ahupuaas* [sic] of Wailuku of

[5] Not to be confused with Kaʻā, a wahi pana on Lānaʻi, meaning the burning or the rock.

[6] In the Hawaiian language, the plural form of words is not created by adding an "s" to the end of the word, hence "[sic]" has been added where "s" was added to Hawaiian words. Words are instead made plural through the use of the kahakō and/or the plural definite article, for example, the plural form of the word he haumana (a student, singular) is nā haumāna (the students, plural).

> Waikapu, which appropriated almost the whole of the isthmus, belonged to no district and in the *Mahele* were said to be in Na Poko, Na Poko in this case meaning a smaller division of the island. C. J. Lyons says "with reference to the ahupuaas of Waihee, Waiehu, Wailuku and Waikapu, on the map it was necessary to form a new district and call it Wailuku, Nawaieha, 'the four waters,' being too cumbersome and ill understood'' (Sterling 1998: 3).

There is some uncertainty regarding the meaning of "Kahului." Pukui, Elbert and Mookini define the name as "the winning" (1974: 67). Hului is also a type of bag fish net, so considering Kahului's known history as a place with abundant fishing, it is possible the name references this bag net or a fishing technique. Hului is also the term for pulling together the ends of a fish net when the net is full, so it is possible the term is Ka-hului, "the hului."

Wailuku is widely agreed to mean the "waters of destruction." While many associate the term with the Battle of Kapaniwai, scholars believe the term to have an older origin. One moʻolelo (story) recounts a battle in Wailuku between kanaka (humans) and pueo (owls). While such tales seem far-fetched, this moʻolelo is not unique to Maui as a similar moʻolelo of a great battle between kanaka and pueo is found on Oʻahu. In the Wailuku tale, published in the Hawaiian newspaper *Ke Au Okoa* in 1871, the story speaks of how many humans and chiefs were killed, including Kapoi and his wife (Uaua 1871: 3). Clark provides an interpretation of this story:

> In 1871 the Hawaiian newspaper *Ke Au ʻOkoʻa* told a legend involving a man named Kapoi who lived with his wife at Kaimuheʻe, just above the two waters Kanahā and Mauoni. One day Kapoi's wife went out to gather *ʻūhini* (grasshoppers) and found an owl's nest with seven eggs. Thinking they were duck's eggs, she took them and gave them to Kapoi. He realized what they were, but refused to give them back to the owl who appeared and requested for their return. Kapoi then smashed the eggs against the stone wall surrounding the house. Infuriated over the senseless loss, ʻAʻapueo, the mother owl, and her mate, Pueokaia, gathered owls from all the islands. All of the men and chiefs of

> the area, including Kapoi and his wife, were destroyed. The place *mauka* of the ponds where the cruel breaking of ʻAʻapueo's eggs was avenged was called Wailuku, "water (of) destruction" (Clark 1980: 8-9).

In this moʻolelo, the place name Kaimuhee is found: "I ka wa e noho alii ana o Kanenenuiakawaikalu no Maui, ma Wailuku kona wahi noho mau, e noho ana kekahi kanaka kaulana o ia wahi, o Kapoi me kana wahine, ma Kaimuhee, mauka ae o na wai elua, o Kanaha me Mauoni, he mau loko kaulana ia no Wailuku…" (Uaua 1871: 1). This specifies that Kapoi and his wife lived in Kaimuhee, mauka (uplands) from the famed ponds of Wailuku, Kanahā and Mauʻoni.

The following research and analyses appropriately study the history and cultural resources of Kahului and Wailuku, focusing on the project area and the surrounding environment.

A. Physical Environment

The project area is located in the ahupuaʻa of Wailuku, within the moku (district) of the same name. Wailuku moku consists of four ahupuaʻa: Waihee, Waiehu, Wailuku, and Waikapu. Kahului is both the name of a bay (Kahului Bay) and the adjecent land area, sometimes known as an ʻili.[7] The project area is located on TMKs [2]3-8-103: 014 (portion), 015, 016, 017, and 018 with Haleakalā Highway serving as a boundary to the North and Airport Road running as a diagonal boundary in a Southwesterly direction. Costco and Costco Gas are in close proximity to the project area. The State of Hawaiʻi Department of Land and Natural Resources (DLNR) Maui Baseyard is located across Haleakalā Highway from the project area. The site is currently vacant and "vegetation in the project area consists mostly of a sparse growth of grasses and low shrubs" (Hobdy 2017: 3).

The botanical survey report specifies: "Seven species were of common occurrence. They included buffelgrass (*Cenchrus ciliaris*), swollen fingergrass (*Chloris barbata*), Bermuda grass (*Cynodon dactylon*), coat buttons (*Tridax procumbens*), four-spike heliotrope

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[7] It is important to note here that there is also an ʻili called Kahului located within the ahupuaʻa of Kona on Hawaiʻi Island.

(*Heliotropium procumbens*), creeping indigo (*Indigofera spicata*) and ʻuhaloa (*Waltheria indica*)" (Hobdy 2017: 3). With the exception of the ʻuhaloa, all the flora commonly found in the project area are non-native; ʻuhaloa is an indigenous species, but it is widespread and common in Hawaiʻi. The project would have no impact on the health or abundance of the population of the species across its range. Kīpūkai (*Heliotropium curassavicum* L.) and pōpolo (*Heliotropium curassavicum* L.) are the other two native species identified within the project area, but both rarely appear. Like the ʻuhaloa, neither of these species are threatened and both are also widespread and common in Hawaiʻi. The project would also have no impact on the health or abundance of these species across their range.

The project area ranges in elevations between 40 and 50 feet above mean sea level (AMSL). The annual high temperature is 84.3°F (29.1°C) and the annual low temperature is 67.3°F (19.7°C), with an average temperature of 75.8°F (24.4°C) (U.S. Climate Data 2017). Annual precipitation is low at 17.3 inches (439 mm), compared to the state average of 63.7 inches (1618 mm) (U.S. Climate Data 2017).

B. Biocultural Environment

To employ the Hawaiian landscape perspective and emphasize the symbiosis of natural and cultural resources, Honua Consulting uses the term 'biocultural' to refer to natural and cultural resources, with additional sub-classifications by attributes.

A brief further discussion of environmental zones and traditional Hawaiian land management practices is necessary to understand the tangible and intangible aspects of the Hawaiian landscape. Additionally, it is important to point out once again that in the Hawaiian landscape, all natural and cultural resources are interrelated and culturally significant. Natural unaltered landscape features such as rocky outcrops, cinder cones, intermittent streams, or an open plain can carry as much significance as a planted grove of wauke (*Broussonetia papyrifera*) or a boulder-lined ʻauwai (canal).

Maly presents a narrative of traditional Hawaiian land management strategies and the different environmental zones recorded in *Ka Hoku o Hawaii* (September 21, 1916):

Hawaiian customs and practices demonstrate the belief that all portions of the land and environment are related, like members of an extended family, each environmental zone was named, and their individual attributes were known. Acknowledging the relationship of one environmental zone (wao) to another, is rooted in traditional land management practices and values. Just as place names tell us that areas are of cultural importance, the occurrence of a Hawaiian nomenclature for environmental zones also tells us that there was an intimate relationship between Hawaiians and their environment.

The native tradition of Ka-Miki provides readers with a detailed account of Hawaiian land divisions and environmental zones. While competing in a riddling contest at the court of the chief, Palikū-a-Kīkoʻokoʻo, the hero, Ka-Miki sparred with Pīnaʻau, the foremost riddler of the district of Hilo Palikū (northern Hilo). The riddles covered topics describing regions from the mountain tips to the depths of the ocean, and descriptions of kalo (taro growth), the ala loa (trail systems), and nā mea lawaiʻa (fishing practices). As the contest unfolded, it was seen that each of the competitors were well matched. In one of the riddles, Ka-Miki described the various regions of the island of Hawaii, extending from the mountain to the sea. Ka-Miki then told his opponent, that if he could rise to the challenge of answering the riddle, his knowledge could be compared to one who has ascended to the summit of the "mauna o Paliahu" (mountain of Poliʻahu, or Mauna Kea) (in *Ka Hoku o Hawaii*, September 21, 1916).

Through one of the riddles [the] reader learn[s] about the traditional wao or regions of land, districts, and land divisions of the administrators who kept peace upon the land. The environmental zones include:

1 – Ke kuahiwi; 2 – Ke kualono; 3 – Ke kaumauna; 4 – Ke ku(a)hea; 5 – Ke kaolo; 6 – Ka wao; 7 – Ka wau maʻu kele; 8 – Ka wao kele; 9 – Ka wao akua; 10 – Ka wao lāʻau; 11 – Ka wao kānaka; 12 – Ka ʻamaʻu; 13 – Ka ʻāpaʻa; 14 – Ka paheʻe;

> 15 – Ke kula; 16 – Ka ʻilima; 17 – Ka puʻeone; 18 – Ka poʻina nalu; 19 – Ke kai kohola; 20 – Ke kai ʻele; 21 – Ke kai uli; 22 – Ke kai pualena; 23 – Kai Pōpolohua-a-Kāne-i-Tahiti.
>
> 1 – The mountain; 2 – The region near the mountain top; 3 – The mountain top; 4 – The misty ridge; 5 – The trail ways; 6 – The inland regions; 7 and 8 – The rain belt regions; 9 – The distant area inhabited by gods; 10 – The forested region; 11 – The region of people below; 12 – The place of ʻamaʻu (fern upland agricultural zone); 13 – The arid plains; 14 – The place of wet land planting; 15 – The plain or open country; 16 – The place of ʻilima growth (a seaward, and generally arid section of the kula; 17 – The dunes; 18 – The place covered by waves (shoreline); 19 – The shallow sea (shoreline reef flats); 20 – The dark sea; 21 – The deep blue-green sea; 22 – The yellow (sun-reflecting sea on the horizon); and 23 – The deep purplish black sea of Kāne at Tahiti (Maly 2001: 3).

The area of Wailuku as a whole contained a full range of wao and as a result, the area was known to be kapu (sacred or restricted). One historian explains:

> Na Wai Ehā, the Four Waters, including Wai-ka-pu Walley, waterfalls and stream, the Forbidden or Sacred Valley. Wai-lu-ku is the Destructive Waters of I-a-o Valley whose stream is best known as Wai-aka-ma-kea or Waters of Light and Shadow. Wai-ehu is the Valley of Misty Waters; and Wai-heʻe is the Valley of Racing Waters. All this area on the eastern slop of west Maui, whose name is Mauna-ka-Hala-Wai, or Mountain Blessed with Waters, was farmed dligiently in olden times. With the produce from those lovely gardens, and the fat fish from the ponds of Kana-hā and Mauʻoni at Kahului and their counterparts at Ke-alia of Ka-lepo-lepo on Maʻalaea Bay, the people of Maui were rich and happy. Here, many temples were built for prayer, ceremonials, and finally, some were rededicated as war temples.

Today little of the flourishing gardens remains. There are some active taro patches, but the land now produces sugar cane products at the Wailuku Sugar Company which began under King Kamehameha III, who has the burden of changing the ancient feudal system into a modern money-making venture (1825 to 1854) during his reign of the Kingdom of all Hawaiʻi.

The fishponds date back for many centuries and were rededicated under Kiha-a-Piilani and Umi-a-Liloa who was his brother-in-law, in the middle 1500s. During the reign of King Ke-kau-li-ke, who died in 1736, the twin ponds of kanaha and Mauʻoni were again repaired along their walls. Today Kanaha is a bird sanctuary; and Kealia is a modern commercial shrimp pond.

The area of Na Wai Ehā were kapu (sacred) to Maui Kingdom, with the beach at Kahului Bay being named Maka-wela, or literally, the Burning Eyes, indicative of the kapu of the burning sun peculies to the Aliʻi of Maui (Ashdown 1976: 3).

IV. Existing Resources

W.D. Alexander wrote in 1891 that the establishment of the district of Wailuku was a post-foreign contact construct: "On Maui the lands of Waikapu and Wailuku appropriated almost the whole of the isthmus so as to cut off half of the lands in the distrct of Kula from access to the sea. These two ahupuaʻa(s), together with Waiehu and Waiheʻe, which were independent, belonging to no Moku, were called Na Poko, and have been formed into a district in modern times" (Sterling 1998: 63; see also Van Dyke 2008: 178). F.S. Dodge would refer to the area as an ʻili kupono (Figure 3). Moffet and Fitzgerald note about Dodge's 1885 map of the island: "In addition to the standard colors of yellow for Crown and green for government lands, Dodge employed several other colors to cope with the land complexities of Maui. For example, an unusual land in Hawaiʻi is the *ʻili kupono* of Wailuku, shown in pink and covering the north half of the isthmus that connects the two halves of the island. An *ʻili kupono* was an *ʻili* that was independent of any ahupuaʻa. Wailuku was purchased by Claus Spreckels in 1882 and formed a major component of his sugar empire in Hawaiʻi" (Moffat and Fitzgerald 1987: 47). It is unclear when the area became known as its own district, but it occurred some time between the creation of Dodge's map in 1885 and the passage of the County Act by the Territorial Government in 1905 when the Act named Wailuku to the County seat of Maui.[8]

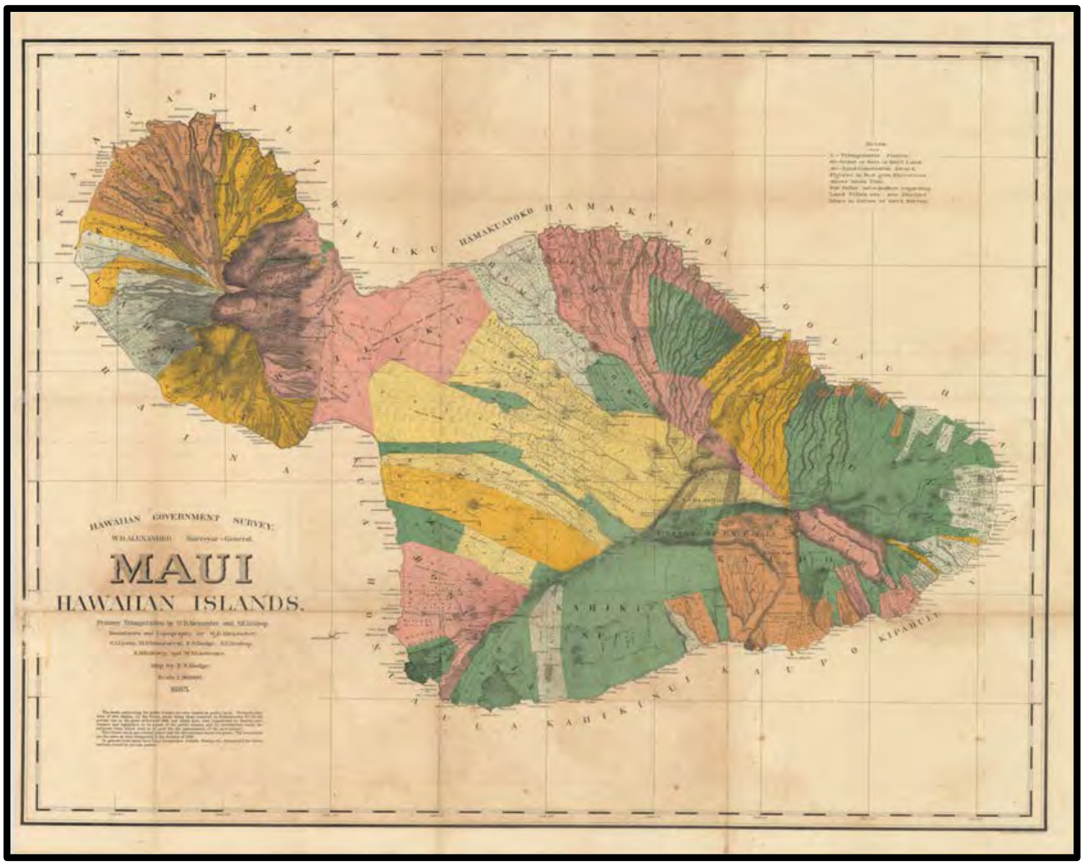

Figure 3. Map of Maui by W.D. Alexander and F.S. Dodge (1885)

A. Cultural History of Kahului

Smaller land areas like Kahului were largely impacted by activities that took place within their larger ahupuaʻa and moku. Kahului was no exception. To fully appreciate the cultural history of Kahului, it is necessary to understand the context of the larger moku. Fornander notes that Hawaiians settled within the Wailuku moku as early as the 9-10th century: "Among other southern families of note who arrived at the Hawaiian group during this

[8] The National Register of Historic Places Inventory – Nomination Form for the Wailuku Civic Center Historic District: https://npgallery.nps.gov/GetAsset/053a8c8a-3956-4c7d-831a-0c3e0a737037

migratory period, though now it is impossible to place them in their proper order, the legend mentions *Kalana-nuunui-kua-mamao*, and *Humu*, and *Kamaunua-niho* who came from Kahiki (the southern groups), and landed at Kahahawai in Waihee, Maui" (Fornander 1878: 43).

It seems best to begin a genealogy of Maui's chiefs with Moʻoinanea. Moʻoinanea appears in numerous moʻolelo throughout Hawaiian history. She is considered "the matriarch of all moʻo [(lizard)] gods and goddesses" (Pukui and Elbert 1971: 394). Accounts detail her arrival from Kahiki "with the Kū and Hina family of gods" and that she was "the ancestor of the ʻUlu / Hemo linage of Maui" (Klieger 1998: 8). It is explained:

> One of [Moʻoinanea's] descendants was Kelea (Keleanuinohoʻanaʻapiʻapi), a Maui chief and famous surfer of married Kalamakua, a prominent chief on Oʻahu. Maui was not yet a unified kingdom at the time, but soon the moʻo would be evoked for the unification of the island, and then the entire archipelago. Kelea was the daughter of Kahekili I, the alii nui of the kingdom of West Maui, and his wife Haukanuimakamaka. The moʻo lineage was most likely introduced through Kelea's mother. Kelea's paternal grandfather and great uncle were Kakaʻe and Kalaʻalaneo, alii nui of the Wailuku line who ruled West Maui and Lanai from Lele/Lahaina in the sixteenth century (Klieger 1998: 8).

After Kahekili I passed, Kelea's brother, Kawaokaohele, gained control over his kingdom. Kawaokaohele was a popular aliʻi (chief) and the reign is known for its prosperity. Most importantly, it was during the reign of Kawaokaohele that East Maui (i.e., Hana) recognized the Wailuku aliʻi as being mōʻī (King) of Maui (Klieger 1998: 8-9).

Kawaokaohele's son, Piʻilani, is widely acknowledged to this day to be the greatest aliʻi in Maui's history. He ruled all of Maui from Lahaina, which would eventually become the political center of the island and later the unified Hawaiian Kingdom. Piʻilani is known for creating a trail that circumnavigated the entire island (Klieger 1998: 9). Piʻilani married his first cousin, Laieloheloheikawai, daughter of Kelea. Piʻilani and Laieloheloheikawai had at least four children: daughter Kihawahine Mokuhinia Kalamaula Kalaaiheana, daughter Piʻikea, son Lono-a-Piʻilani[9] and son Kiha-a-Piʻilani. These children, being the result of a piʻo union (marriage between two close relatives, sometimes a brother and sister), had a very strong lineage.

Upon her death, it is believed that Kihawahine transformed into a moʻo and became a guardian of sacred places on Maui, most notably fishponds, some of which bear her names. Mary Kawena Pukui said that her home was Mauʻoni fishpond, located in Kahului (Klieger 1998: 9). Yet, it is also said that Kihawahine possessed the ability to travel between islands and fishponds (Klieger 1998: 9). Many fishponds to this day are associated with a moʻowahine (female lizard deity) that protects the pond. It is likely that this continued existence of moʻo deities originated with Kihawahine.

Historians estimate that Piʻilani ruled in the 16th century. It is important to note that Hawaiian chiefs demonstrated considerable savvy in politics. Chiefs commonly intermarried for political reasons. Piʻikea-a-Piʻilani, daughter of Piʻilani, married Umi-a-Liloa, the King of Hawaiʻi Island. When Piʻilani died, the Maui Kingdom went to his oldest son Lono-a-Piʻilani. For many years, Lono-a-Piʻilani and his younger brother Kiha-a-Piʻilani (brothers to Piʻikea) co-existed peacefully. Eventually, Lono-a-Piʻilani and Kiha-a-Piʻilani had a falling out and the latter feared his brother, the King, would try to kill him, so Kiha-a-Piʻilani fled and lived on Lānaʻi. He eventually returned and stayed in the southern parts of Maui, as to not be found by his brother. His identity was eventually discovered and he traveled to Hawaiʻi Island to stay with his sister, Piʻikea-a-Piʻilani and her husband, ʻUmi-a-Liloa (Kamakau 1992: 23-27). Kiha-a-Piʻilani joined with ʻUmi-a-Liloa, and together they planned to invade Maui. Lono-a-Piʻilani resided in Wailuku during this time.

Kiha-a-Piʻilani and ʻUmi-a-Liloa successfully invaded and conquered East Maui. Before they could reach Lono-a-Piʻilani in Wailuku, Lono-a-Piʻilani died. A prophet told Kiha-a-Piʻilani

[9] Children often bore the name of an ancestor, so names such as Lono-a-Piʻilani mean "Lono of Piʻilani." Whenever historical figures' names have this element, the name has been broken up with dashes in this report to help the reader follow geneaologies and familial relationships.

that the body of Lono-a-Piʻilani was "in Wailuku in a land called Paʻuniu" (Kamakau 1992: 31). Despite a wide search throughout Wailuku, the bones of Lono-a-Piʻilani were never found by Kiha-a-Piʻilani.

Kiha-a-Piʻilani ruled Maui in the 17th century. During ʻUmi-a-Liloa's reign of Hawaiʻi Island, the two kingdoms remained close and peaceful thanks to the intermarrying of the chiefly families. It would be this history of strategically intermarrying that would help to engender the eventual unification of the islands. Kiha-a-Piʻilani's descendant, Kekaulike, would become the King of Maui in the 18th century.

As Kekaulike ruled on Maui, Keawe ruled on Hawaiʻi Island. Keawe was a famed ruler of Hawaiʻi Island (Kamakau 1992: 64). Keawe's half sister was Ka-lani-kau-lele-ia-iwi, whose husband was Ka-uaua-nui-a-Mahi and to them was born Alapaʻi-nui-a-Kauaua (Alapaʻi) (Kamakau 1992: 64). Kamakau (1992) notes that Keawe enjoyed travel and would travel to the other islands, including Maui. When Keawe died, he left Kohala and Kona to his son Keʻeaumoku and Kaʻu to his son Kalaninuiʻiamamao (Kamakau 1992: 64-65).

Alapaʻi also lived on Maui during this time, moving there after Hilo chiefs killed his father, Ka-uaua-nui-a-Mahi. Alapaʻi's half-sister Kekuʻiapoiwanui-a-Kalaninuikauleleiaiwi (Kekuʻiapoiwanui) was the wife of Kekaulike (Kamakau 1992: 65). After Keawe's death, Alapaʻi returned to Hawaiʻi Island. He first waged war against Keʻeaumoku and gained control of Kohala and Kona. Kekaulike did not approve of this and took his own warriors to fight with Alapaʻi on Hawaiʻi Island. Kekaulike was unsuccessful in this battle and he slaughtered numerous commoners during his campaign in Kohala (Kamakau 1992: 65-66). Alapaʻi then unsuccessfully launched a campaign against Kekaulike on Maui.

Kekaulike had four biological children with his wife Kekuʻiapoiwanui: Kalola (wahine (female)), Kamehamehanui (kāne (male)), Kahekili II (kāne), and Kahuʻaimokuakama (wahine). Kalola bore children with three different men: Kalanikauōkikilokalaniakua (wahine) with her brother Kamehamehanui, Kīwalaʻo (kāne) through her union with Kalaniʻopuʻu, and Kekuʻaipoiwa Liliha (wahine) from her union with Keōua.

Kalanikauōkikilokalaniakua had many kapu on her due to her being the result of a nīʻau piʻo union between siblings, which Hawaiians believed gave a child a sacred status. Kalaniʻopuʻu and Keōua are two sons of Keawe, both of which Alapaʻi brought up as leaders in his government.

Keōua had many wives. In addition to Kalola, he also married Kekuʻaipoiwa, daughter of Kekela and Haʻae (not to be confused with Kekuʻaipoiwa Liliha, daughter of Kalola, or Kekuʻaipoiwanui, wife of Kekaulike). Keōua and Kekuʻaipoiwa would become the parents of Kamehameha I (kāne), who was born as Alapaʻi launched his attack against Kekaulike on Maui.

As Kekaulike ruled Maui, Alapaʻi ruled over Hawaiʻi Island. Alapaʻi was a peaceful and prosperous chief and additional war between the two kingdoms was avoided for a period of time. On Maui, Wailuku had been the central location of power since the time of Piʻilani. Kekaulike moved it to Kaupō, likely in preparation of attacks on Hawaiʻi Island. Kekaulike fell ill and never returned to Hawaiʻi Island. Kekaulike turned over Maui to his son, Kamehamehanui (not to be confused with Kamehameha I).

In anticipation of an attack from Alapai's forces, the weakened Kekaulike directed his family and governing officials to return to Wailuku, to Halekiʻi, "the royal residence of the Maui ruling line near Wailuku" (Kirch 2012: 240). There Kekaulike died and after his death, "fearing the arrival of Alapaʻi bent on war, the chiefs cut the flesh from the bones of Ke-kau-like in order to lighten the load in carrying the body to ʻIao" (Kamakau 1992: 69).

Alapaʻi arrived on Maui as anticipated. Yet, when Alapaʻi heard of Kekaulike's death and of Kamehamehanui's rule, he relinquished his planned attack on the island and rather opted for peace between the kingdoms.

Kahekili II, the second son of Kekaulike, would become one of Maui's most famed aliʻi. He was known to be a ferocious warrior and a staunch follower of the Hawaiian religious beliefs and protocols. He kept individuals for sacrifice at a place called Puaʻanui, near the site of the

Wailuku mill (Thrum 1917: 60). It was during Kahekili II's reign that the great battle at Kakanilua occurred.

Joseph Mokuohai Poepoe wrote of this great battle in Hawaiian language newspapers in 1905:

> As the Alapa[10] and Piipii proceeded to the plain of Kamaomao [from Kihei-puko'a] they met with no hindrance until they reached the southeastern side of a place called Kalua, close to the village of Wailuku.
>
> When the Alapa arrived there, the warriors of Kahekili concentrated upon them from many points, like sandcrabs running over the sand.
>
> A bitter fight was fought by the Alapa and Piipii armies of Kalaniopuu against the well trained warriors of Maui and those of Oahu under Kahahana…
>
> Kalaniopuu received the news on the evening of the day of the terrible battle. This battle in which the Alapa and Piipii were destroyed was called Ahulau ka Piipii i Kakanilua (completely slaughtered were the Piipii at Kakanilua) (Sterling 1998: 88, citing Poepoe 1905).

Keku'aipoiwa Liliha (daughter of Keōua and Kalola) and her half-brother Kīwala'ō married and this nī'au pi'o union resulted in the birth of Keōpuōlani (wahine). Due to the half-sibling relationship between her parents and her royal lineage, Keōpuōlani was a chiefess of substantial status and rank. While Kamehameha I would eventually take many wives, none held as high a sacred status as Keōpuōlani and she would become known as Kamehameha's sacred wife. It is through their children, Liholiho (kāne), Kauikeaouli (kāne), and Nahi'ena'ena (wahine), that the Kamehameha Dynasty was established.

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[10] "Alapa" in this case references the famed warrior company of Kalani'opu'u. The spelling of the term with diacriticals is 'ālapa.

The Wailuku district was generally abundant with resources, both from the moutains and the sea, yet its name implies a history of conflict also impacted the area. Wailuku, as previously mentioned, literally translates to “water of destruction” and while some attribute the name to the historic battle instigated by Kamehameha I that took place in this area, the name reaches further back prior to Kamehameha’s reign.

Wailuku would become an important political hub. Kahekili kept a home in Wailuku, known as Lanikeha, which was a name often used for the residences of high chiefs (Pukui and Elbert 1971: 178; Malo 1951: 104). Literally meaning “lofty heaven,” it referenced the legendary part of heaven. It is possible Kahekili kept a second home in Wailuku. One account from *Ka Naʻi Aupuni* mentions another home called Kalani-hale: “The people of Hawaii lamented greatly. Kalaniʻopuu grieved over the destruction of his ʻAlapa and Piipii warriors. At that time Kahekili was living in his house, Lanikeha, in Wailuku. Kiwalaʻo donned his royal regalia; Kameeiamoku held his spittoon and Kamanawa carried his kahili. The delegate from Hawaii went up to Wailuku, for at that time Kahekil was living in his house named Kalani-hale” (Sterling 1998: 89).[11]

B. Post-Contact Wailuku

When foreigners arrived, Hawaiians resided throughout Wailuku. The first foreigners established in Wailuku in 1832 under Jonathan S. Green (U.S. Department of the Interior 1986). It is said that “[v]ery little development occurred, however, until after the Wailuku Sugar Company commenced its operations in 1862” (U.S. Department of the Interior 1986). In 1870, Samuel Thomas Alexander and Henry Perrine Baldwin (Alexander & Baldwin) planted their first sugarcane crop on their planation; this would eventually become the foundation of Maui Agricultural Company (HC&S 2017).

Wailuku was significantly impacted by both foreign contact and the Māhele, which made the establishment of sugar operations and plantations possible. Although listed among the

[11] The original text of this account implies the home was in the mauka (mountain or inland) part of Wailuku: “Ua pii aku la nohoi ka elele o Hawaii no uka o Wailuku, a, aia ia wa, e noho ana no o Kahekili iloko o kona hale i heaia ma ka inoa o ‘Kalani-hale’” (Poepoe 1905).

Crown Lands,[12] significant acreage from these Crown Lands would be transferred to Claus Spreckels through Government Grant 3343 (Van Dyke 2008: 178); this Grant included all of Kahului. Through this land transfer, Wailuku and Kahului became a central hub of Hawai'i's sugar industry. Claus Spreckels acquired a total of 40,000 acres in East Maui: 16,000 acres in Waikapu and 24,000 acres in Wailuku. Spreckels developed a particularly close relationship with King David Kalākaua, who executed a number of questionable transactions that would significantly benefit Spreckels (Wilcox 1996: 61). These resouces allowed Spreckles to form Hawaiian Commercial Company in 1878, the predecessor to Hawaiian Commercial & Sugar Company (HC&S), which was officially incorporated and renamed in 1882 (HC&S 2017).

Historic accounts detail Spreckels' activities:

> <u>Claus Spreckels & Co.'s Sugar Mill and Plantation</u>, Wailuku and Waikapu Common, seven miles from Wailuku; Kahului Road; post office address, Kahului. Owns 30,000 acres; 3,000 acres under cultivation; 25,000 acres available for sugar planting; the balance is pasture, etc. sole right of 32 streams for irrigating purposes; said right obtained direct from the Crown; estimated yield for season of 1880, 3,000 tons of sugar. The cane will average six tons to the acre. Number of men employed, 350; horses and mules employed, 70 head.
>
> The ploughing on the whole is done by steam ploughs, and the cane is transported by the aid of portable railways to the mill. The capacity of the mill will be about twenty tons per diem; the mill will have five crushers in two sets, one of three, and one of two. The mill buildings are now in course of construction, and it is expected that grinding may be commenced about November next. Mr. Spreckels has his own landing and storehouse at Kahului, and the sugar is brought down to the landing by Captain Hobron's Wailuku and Hamakua Railway. Messrs. J. Horner & Co. plant 600 acres, all under

[12] Wailuku, not yet being its own autonomous moku, is listed under Napoko, with Wailuku being the name of the land area (Van Dyke 2008: 178).

cultivation, on shares with this company. Mr. Spreckels calculates to import, inside of four years, 40,000 tons of sugar per annum from his Hawaiian estates (Bowser 1880: 432).

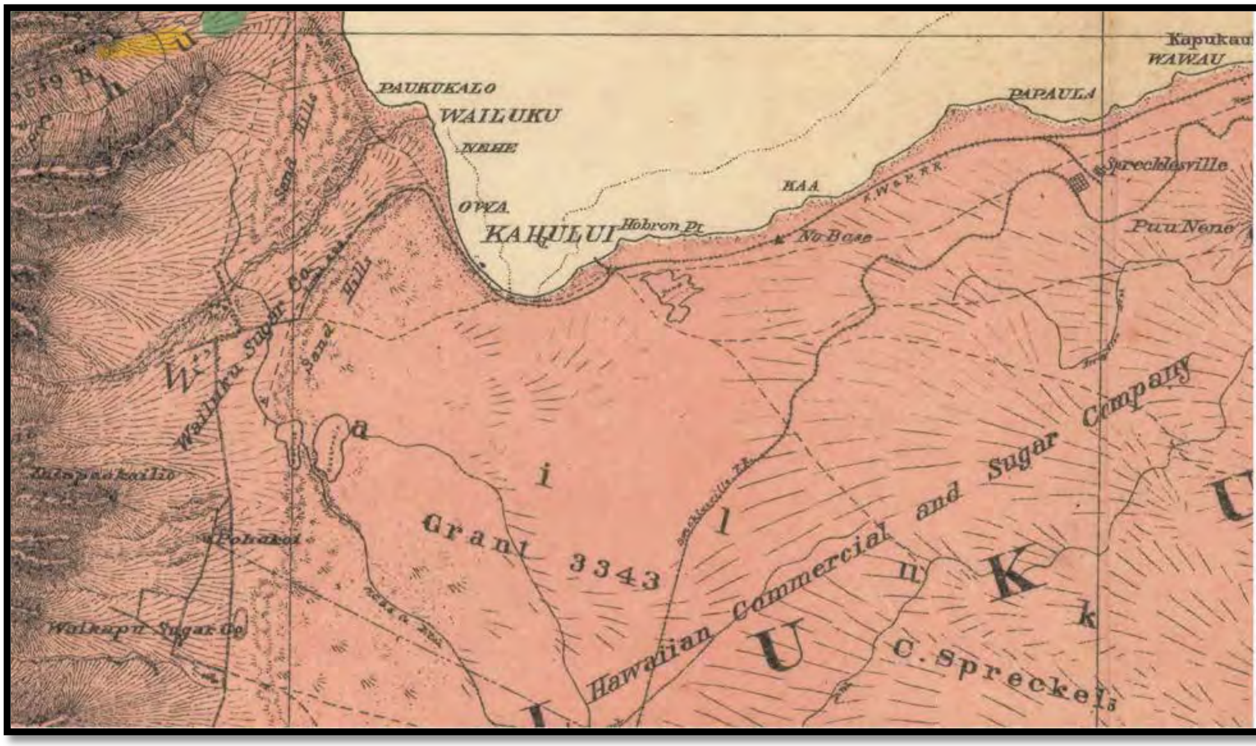

Figure 4. Portion of Map of Maui by W.D. Alexander and F.S. Dodge (1885)

By 1862, Wailuku Sugar Company was officially organized in 1875, the company officially incorporated (Wilcox 1996: 122). In 1863, Thomas Hogan built the first Western structure in Kahului: a warehouse near the beach (Clark 1980: 7); other Western structures followed in Kahului. The conversion from traditional Hawaiian agriculture, which was particularly abundant on Maui, to Western irrigation practices had long-term adverse effects on the cultural practices and ecosystem services enjoyed on the island. Unlike traditional Hawaiian practices which required lo'i (pond fields) and other stream diversion activities to have a ho'i (return flow to the stream of origin), sugar irrigation activities did not return water from perennial streams to the source. Rather, these modern irrigation practices diverted water without returning it, adversely impacting land owners downstream, particularly native tenants. Sugar also consumed an unprecendented amount of water from these water sources.

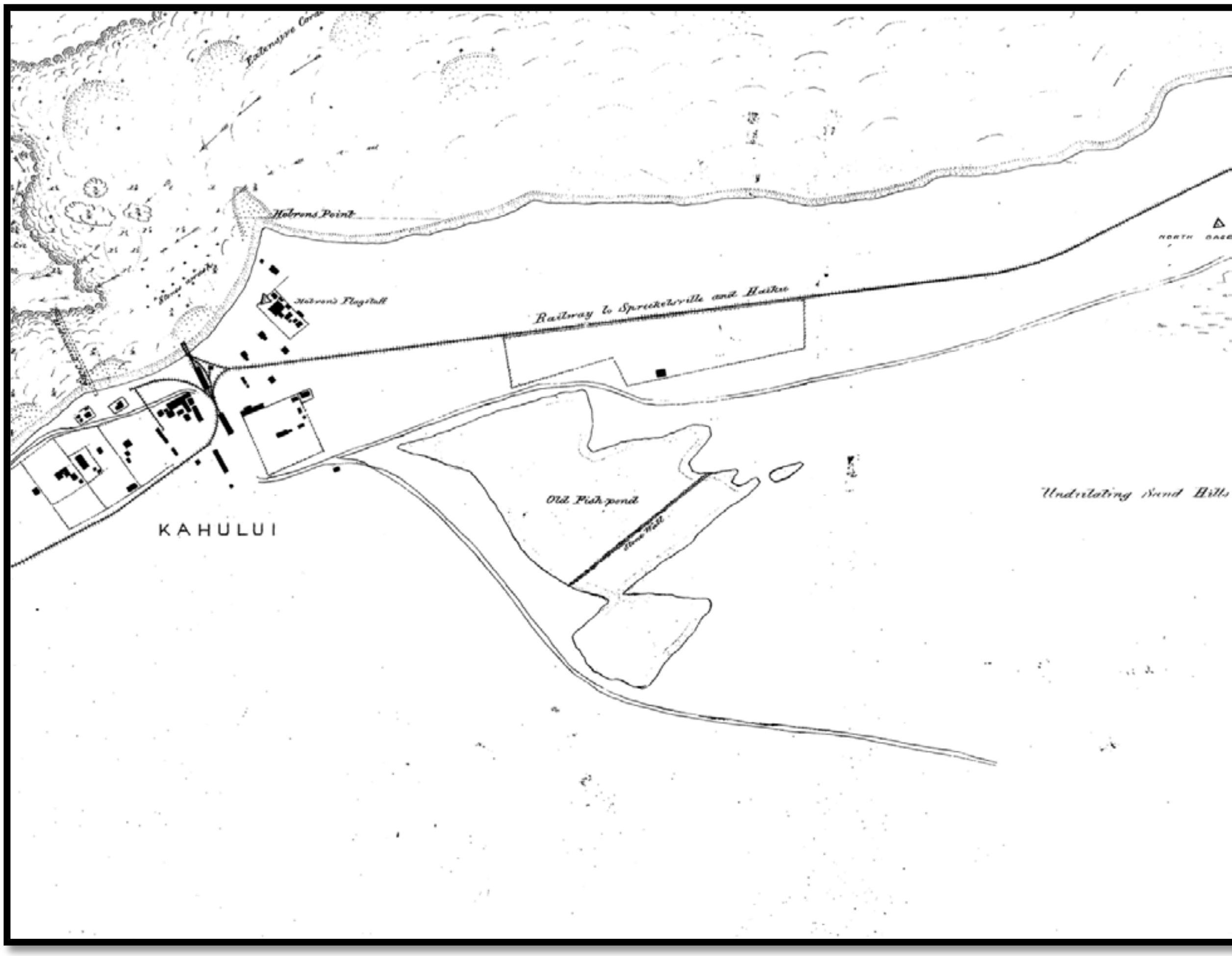

Figure 5. Portion of Registered Map 1326, Kahului Harbor and Adjacent Coastline (1881)

Hawaiʻi's rich watershed systems are dependant upon healthy streamflow. Among the many benefits are healthy crops and healthy fisheries (Gingerich et al. 2007; Field et al. 2008). The radical changes in lifestyle and economy that accompanied foreign contact resulted in many Hawaiians becoming displaced from their family and ancestral lands. In 1876, the United States and the Hawaiian Kingdom signed the Hawaiian Reciprocity Treaty, which allowed sugar from Hawaiʻi to be imported into the United States duty-free. This made the sugar industry in Hawaiʻi far more economically viable than it had been prior to the execution of the Treaty. Sugar grew significantly on Maui as a result. A small landing was built in 1879 to service the growing sugar industry and Kahului Railroad Company incorporated in 1881 and established its headquarters near Kahului Bay. This was the first railroad company in Hawaiʻi and the first route ran from Kahului to Wailuku. The company was founded by Captain Thomas Hobron, a sea captain who came to Hawaiʻi and decided to stay and become a merchant in the islands. Hobron Point is named for him (Clark 1980: 7).

Sources note that Maui had telegraph-telephone service as early as 1877. The line ran between Napili and Wailuku. Within a few years, a more sophisticated line was set up for central Maui that included Kahului. Maui Telephone Company began in 1889, taking over the system (Ramil 1984: 6). In 1898, Alexander & Baldwin gained control of HC&S (HC&S 2017).

As Maui's sugar industry grew, so did the infrastructure needed to cultivate and export the sugar. Immigrant workers were brought to Maui from Asia and the Pacific. Plantation camps popped up throughout Wailuku and Kahului. The railroad infrastructure that carried crops to mills then to Kahului Harbor also grew. By the late 1800s, a second crop was introduced for cultivation and export on Maui: pineapple. Pineapple plantations steadily grew across Maui for several decades. The small landing at Kahului Bay transformed into a modern commercial harbor in 1900 when a plague outbreak led to the controlled, intentional burning of the town as a means of killing all the rats that were spreading the infestation. By 1910, the traditional Kahului Bay became home to a fully modernized harbor, as the Kahului Railroad Company extensively altered the area to suit its commercial needs (Clark 1980: 7).

The Maui News was established in 190 and within the year, encouraged local Hawaiians "to give your children the best English education possible" (Ramil 1984: 7). At the time, the island's residents were primarily divided among three political parties: Republicans, which were led by plantation owners and managers, the Home Rule Party, led primarily by Hawaiians, and the Democratic Party (Ramil 1984). *The Maui News*, largely controlled by Republicans, weighed heavily into politics, making statements like: "Let [Hawaiians] have time to grasp the two great thoughts, first that all hopes of a restoration of the monarchy is gone forever, and secondly, that in order to have any weight in the management of the affairs of the Islands, [they] must forget that they are Hawaiians and remember only that they are Americans, and then their adjustment in the body politic will come easily and naturally" (Ramil 1984: 8). Despite their rhetoric and efforts, the Republican Party failed to elect many

Photo 1. Kahului Landing Prior to Creation of Kahului Harbor, Hawaii State Archives Call No. PPWD-5-3-019 (n.d. ca. late 1800s)

delegates to the First Territorial Legislature; the Home Rule Party won six out of nine available seats.

The Home Rule Party was unable to hold onto power. The Hawaiian led group continuously pushed to maintain elements of the sovereign kingdom, which led to regular conflict with foreign plantation owners. It was said that "The Home Rulers also opened themselves to criticism by their insistence of using the Hawaiian language in their legislative proceedings, in violation of the Organic Act which required the use of the English language" (Ramil 1984: 11). The publication also commented on foreign control of Maui lands: "It is monotonous untruth that the native Hawaiians have been cheated of their lands by the missionaries or the sugar planters or any body else. …On Maui, the bulk of the sugar plantations were formerly arid lands that nobody wanted, and have been made valuable only by outlay of vast sums for irrigating ditches and pumps" (Ramil 1984: 8).

During the First Territorial Legislature, a county bill was passed, only to be vetoed by the Governor. The 1901 effort would have changed the name of Maui Island to Liliuokalani and would have named Lahaina as the center of the county government (Ramil 1984: 10). Wailuku would nonetheless become the County seat of power when the County Act passed in 1903.

During World War II, the U.S. Military took over a substantial part of Maui for training and defense. Kahului was shelled by a Japanese submarine on January 1, 1942 (Clark 1980: 7; Pignataro 2013). Maui would shortly therefore become home to the 4th Marine Division, known as the "Maui Marines." The U.S. Marines built a camp and living facility for 18,000 troops in Wailuku (NOAA n.d.). The Navy would also take over land to build two naval air stations: NAS Puʻunēnē, now known as Maui Airport, and NAS Kahului, which would become known as Naska, and they were built in 1942 and 1943, respectively (NOAA n.d.). Clark identifies Naska as "the site of Kahului Airport and a small industrial-commerical complex. Some of the old World War II structures can still be found in the area, including the now empty Naska Swimming Pool" (Clark 1980: 9).

Post-World War II demands of the "baby boomer" generation helped to turn Maui towards the tourism industry. As in many places, when soliders began to arrive home from the war, there was an increased need for single-family homes and suitable communities. The plantation camps of the past were undesirable for Maui's growing middle class, as was work on the plantation.

HC&S merged with Maui Agricultural Company in 1948, creating the largest sugar producer in the United States (HC&S 2017). In 1949, the Kahului Development Company received approval for a new development in the town (Ramil 1984: 128); the development would break ground by the end of the year. In 1950, HC&S introduced Tournahaulers to Hawaiʻi, using them to replace the aging railroad system as a means of transporting sugar (HC&S 2017). The first traffic lights installed on Maui were placed in Kahului in 1951 (Ramil 1984:

144). This provides a sense of how large and industrialized the town of Kahului had become. HC&S also diversified significantly by this time and developed a plan to transform Kahului from a plantation town into a modern city. They sought to develop their cast holdings of sugar plantation lands adjacent to Kahului Harbor into a city, which they called "Dream City." The project was successful and this effort served as the foundation of much of Kahului today.

Evidence shows that the project area was briefly inhabited during the post-contact history, but these structures are not extant. Loko iʻa, which typically includes the boundaries of the pond itself and the surrounding ecosystem, could have possibly included the project area. Kanahā and Mauʻoni were spring-fed ponds, so there was no known stream flow or in-take from a stream source required for these ponds. Therefore, the extensive growth of Kahului around the pond, with the exceptions of acts that filled or dredged the pond, would have had negligible impacts upon the ponds.

C. Moʻolelo

1. Native Informants

The narratives cited in this collection were excerpted from the testimonies given by native residents, or those given by surveyors who recorded the boundaries based on the testimony of native guides and their own field work. The testimonies include descriptions of several ahupuaʻa extending from ocean fisheries to plateau lands and mountain peaks. They also describe a wide range of traditional practices, travel, land use, resource collection, bird catching, and changes in the landscape witnessed during their lifetime.

In the 1871 testimonies and survey for Wailuku, Puʻuhīnale upper boundaries of Wailuku and Kahului (Figure 6). Also of interest are the proceedings from Kalialinui, which document a dispute regarding the boundaries of Kamaikaaloa's Kalialinui and the Crown Land of Wailuku. As a result of the dispute, significant testimonies from elder native informants were recorded. The original Hawaiian texts are given in their entirety below with excerpts translated by Maly situated on the right of the original text to highlight pertinent sections. Place names or cultural site/practice references have been underlined in each of the

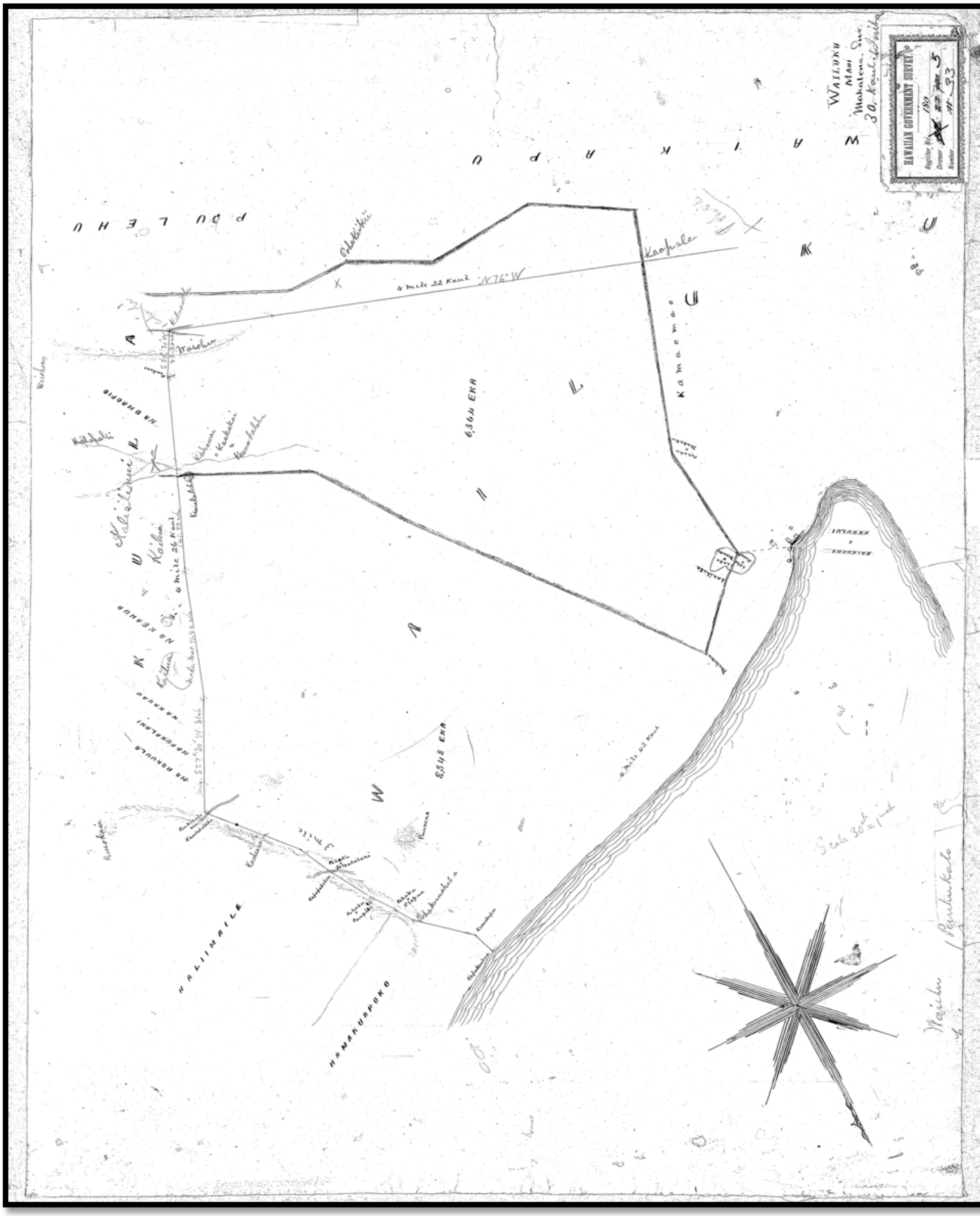

Figure 6. Registered Map No. 180. Portion of Wailuku with Boundary of Adjoining Lands and Sea. Survey by Makalena ca. 1866 (State Survey Division)

ahupuaʻa proceedings.

Kalialinui Ahupuaa
District of Kula, Island of Maui
Boundary Commission
Maui, Volume 1, pages 2-12

Wailuku, Maui
Febuari 21st, 1871
Keena Hookolokolo a ke Komisina o na palena aina ma Wailuku o ka Mokupuni o Maui o ko Hawaii Pae Aina

Ma ka hihia e pili ana i ka hooponopono ana i na palena o ka aina o Wailuku ame Kalialinui ma Wailuku, Moku o Maui Hawaii Pae Aina

a. Na Komisina o na Aina Lei Alii vs. Campbell & Turton

Ua waihoia mai imua o ke Komisina Palena Aina o ka Mokupuni o Maui o ko Hawaii Pae Aina [page 2] he palapala nonoi na na Komisina o na Aina Lei Alii ma ka la 22, o Dekamaba o ka M.H. Hookahi Tausani Ewalu Haneri ame Kanahiku.

Honolulu, Decemaba 19, 1870

I ka mea Hanohano
P. Nahaolelua
Kiaaina o Maui

Aloha oe
E ke Komisina o na palena aina o ka Mokupuni o Maui. Ua Kauohaia mai au e na Komisina o na Aina Lei Alii e waiho ʻku i palapala nonoi no ka hooponoponoana ina palena o ka Aina Lei Alii i kapaia o Wailuku e waiho la ma ka Apana o Wailuku,

Mokupuni o Maui.

O na palena a makou i manao nui ai e hooponoponoia oia no na palena mawaena o ka Aina i oleloia maluna ame ka aina i kapaia o “Kalialinui.”

I hoomaopopo no Campbell ame Turton a ke makemake nei na Komisina i na Aina Lei Alii e kauoha ‘ku ia laua

Eia mai me keia palapala ke ana o ka Aina o Wailuku e like me ka mea i maopopo i na Komisina Lei Alii i ku like me ke Kanawai, a mai poina oe i ka hoolaha mai ia makou i ka manawa ame kahi e hoolohe ai.

O wau no,
Kau Kauwa Hoolohe
Jno O. Dominis
Komisina o na Aina Lei Alii a hope luna aina

Ua haiia na aoao elua e pili ana i keia hihia i haiia ae la, oia hoi i na Komisina Aina Lei Alii e Kue ana ia Campbell ame Turton ma ka la 21, o Febuari M.H. Hookahi Tausani Ewalu Haneri ame Kanahiku kumamakahi ma Wailuku kahi i hoolohe i keia hihia ma ka Mokupuni o Maui o ko Hawaii Pae Aina. Ua hoopukaia e ke Komisina Palena Aina o ka Mokupuni o Maui o ko Hawaii Pae Aina he palapala Kii hoike ia Kaaiaweoweo (K) no ka Mokupuni o Oahu, a ua hoihoiia mai ia [page 3]

Palapala Kii hoike imua o ka Aha ma Wailuku Mokupuni o Maui o ko Hawaii Pae Aina ma ka la 21, o ke malama o Febuari o ka makahiki Hookahi Tausani Ewalu Haneri ame Kanahiku kumamakahi me ka olelo mai, ame ka hai ana mai a ka mea nana i kii i ka mea i hooakakaia e Kii maloko o ua palapala Kii hoike la i ka hope Ilamuku nui o ka Mokupuni o Oahu ame ko Hawaii Pae Aina, aole e hiki pono mai ka hoike no ka pilikia loa i ka mai pela ka mea i maopopo imua o ka Aha.

E like me Kahi ame ka manawa i hoolahaia ai e ke Komisina Palena Aina o ka Mokupuni o Maui o ko Hawaii Pae Aina. Ua hiki mai na aoao elua o keia hihia imua o ka Aha a ua hoopaneeia keia hihia a hiki i ka hora akahi o ke Awakea o keia la ma ka ae ana mai o na Aoao Elua

Ua hiki mai no na aoao elua imua o ka Aha e like me ka manawa i hoopaneeia ma ka hora akahi oia la i oleloia oia hoi na Komisina o na Palena Aina Lei Alii ka aoao hoopii i kue ana ia Campbell ame Turton ka mea i hoopiiia ua ae mai no ka mea i hoopiiia ua loaa ʻku ia laua ka lono o ka manawa ame kahi e hoolohe ai i keia hihia e like me ke Kanawai.

W. C. Jones ka loio o Campbell ame Turton

R.H. Stanley ka loio o na Komisina o na Aina Lei Alii

Ua waiho mai o W.C. Jones i keia la 21, o Febuari o ka Makahiki o ka haku Hookahi Tausani Ewalu Haneri ame Kanahiku kumamakahi i ke Kii o ka aina o "Kalialinui."

Ua waiho mai o R.H. Stanley i keia la 21, o Febuari o ka makahiki o ka haku Hookahi Tausani Ewalu Haneri ame Kanahiku kumamakahi i ke Kii o ka aina o Wailuku o ka Mokupuni o Maui o ko Hawaii Pae Aina ame ka ana pu.

A noi hou mai R.H. Stanley e hookomoia na Inoa Campbell ame Turton i mau ona no ua aina la i kapaia Kalialinui ma Wailuku, Mokupuni o Maui, H. P. A. A olelo mai o W.C. Jones imua o ka Aha ua makaukau oia e hana i keia hihia, a e nininau kela aoao Ka mea hoopii i Kona mau hoike aka he hoike Ka Ko makou aoao aole nae, oia maanei nei, no ka mea ua loaa loa oia i ka pilikila i ka mai ma Honolulu o ka Mokupuni o Oahu, H. P. A.

Kue mai o R.H. Stanley i ke noi a W.C. Jones, no ka mea he mea pono ole i Ka Aha Ke noho i hoolohe i kekahi aoao apau kana mau hoike e loaa auanei ka manawa o kela aoao e aoao a kuai i kela hoike, ma Honolulu, Mokupuni o Oahu. [page 4]

Olelo mai o R.H. Stanley imua o ka Aha ina e hoopukaia kekahi palapala kii hoike e kekahi mea ua manaoia e ka mea nana i kii ua hoike nei i hooakakaia maloko o ua palapala kii hoike nei, e kakau ma ke kua o ua palapala nei i ke ana o kona hana ana e like me ka mea ana i kauohaia ai e hana i ka makai ai oleia i ka Ilamuku o ko Hawaii Pae Aina.

Waiho hou mai la o W.C. Jones i palapala lawe ike a kela hoike ma Honolulu, Mok. o Oahu, H.P.A. e olelo ana oia no ka hoike nui a lakou i manaonui ai a ua loaa mai ka palapala kii hoike i ka hope makai nui e olelo ana ua mai loa ka mea i kiiia, aole e hiki aku i Lahaina, Mokupuni o Maui, H. P. A. Ke ano nui nae oia palapala he palapala e noi ana imua o ka Aha e hoopanee i keia hihia no ka lawe ana i ka ike a kela hoike ma Honolulu ka Mokupuni o Oahu, H. P. A. e pili ana i ka hihia hooponopono ina palena aina ame ke Ahupuaa o Wailuku ame Kalialinui, ma Wailuku o ka Mokupuni o Maui, H. P. A.

Ku mai o R.H. Stanley a kue mai i keia palapala lawe ika hoike, no ka mea aole hoi i hooakakaia mai ana ka palapala lawe ike hoike, no ka Aha hea la ka ike a kela hoike e waiho mai ai, a imua la o ka Luna Kanawai hea

Na hoike ma ka aoao o na Komisina o na Aina Lei Alii.

Kiha hoohikiia a olelo mai.	Kiha sworn and says:
I Kula kuu wahi i hanau ai ma	My birth place was in Kula at

Kamaole o ka Mokupuni o Maui, H. P. A. Ua noho au me Kamehameha Akahi iloko o ka makahiki 1797.

Kamaole, Island of Maui, Hawaiian Islands. I lived with Kamehameha First in the year 1797.

Ua ike au i ka aina o Kalialinui, a ua ike no au i ka aina e pili ana ia Kalialinui i oleloia ae la, oia no ka aina o Wailuku, no Kamehameha ia aina. Ua lilo keia wahi ia Kamehameha i ka wa e kaua ana o Kepaniwai, oia ka manawa mua aʻu i ike ai i ua Aina la a hiki wale i keia la. O koʻu poe Kupuna makuakane Ka Luna Hooponopono o Wailuku, Maui nei. Ina e komo mai kekahi Konohiki iloko o ke Ahupuaa o Wailuku alaila na kuʻu poe Kupuna e Kuhikuhi i na palena o ua Aina la. O ka wa aʻu i ike mua ai i keia aina oia no ka manawa e ola ana o Kamehameha. Aole nae au i lilo i Luna na ke Alii, aka kuʻu poe Kupuna wale no.

I know the land of Kealialinui [Kalialinui], I know the things that have been spoken of, that is for the land of Wailuku, that land is for Kamehameha. This place became Kamehameha's at the time of the battle of Kepaniwai [ca. 1790], and that was the first time that I saw that land, and to the present day. My grandfather was the one who oversaw the settlements of Wailuku. If a Konohiki came into the ahupuaa of Wailuku, my grandfather was the one who showed him the boundaries of the land. The first time that I saw this land was when Kamehameha was alive. I did not become an overseer for the chief, it was my grandfather.

Ua hele au e nana ina palena o Wailuku me kuʻu mau kupuna, a ua ike hoi au ina palena o Kalialinui e kaawale aku ai o Wailuku.

I went to look at the boundaries of Wailuku with my elders, and I saw the boundary where Kalialinui is separated from Wailuku…

Ua hele au maluna o na palena o na aina o Kalialianui & Wailuku. Ua pinepine kuʻu hele ana maluna o na palena o ua mau aina i haiia la, ua oi aku mamua [illegible] manawa hookahi kuʻu hele ana. Eia na Kanaka i [page 5] hele pu ai me au. O Makalena kekahi, Kuihelani ame Malaihi.

Ua hoomaka mai ka palena o Wailuku mai Kapukaulua mai a hiki i Keone Kapoo, a mai Keone Kapoo mai hoi, a hiki i Pohakunahaha,

…it begins at the boundary of Wailuku, from Kapukaulua to Keone Kapoo, and from Keone Kapoo to Pohakunahaha…

a mai Pohakunahaha mai holo a hiki i Pohakuolopua, alaila hui o Wailuku me Haliimaile a hiki i Papakaloa, mai Papakaloa mai a hiki i Kauhiana, a mai Kauhiana mai a hiki Puuhinale, he alanui mai laila mai oia Ke Alanui o Hobron, oia ka palena i hui ai o Haliimaile, Kula ame Wailuku. Alaila holo aku la i Kalialinui, o Hokuula mauka, a o Wailuku mai makai ona Aina o Kula keia aʻu e hai nei. Hokuula, Na Pukalani, Na Kuikuiaeo, a o Kailua hoi kekahi inoa ma ka Akau i Kailua pili aku la me Kalialinui a o Wailuku no makai. Alaila ma na Omaopio hiki aku la i Puukoae ma ka hema hui aku la i ke huina Alanui e hiki aku ai i Kealia, Wailuku ame Waikapu.

O Kaluaolohe ka inoa o ka huina o keia mau Alanui. Ilaila hui o Wailuku me Pulehu makai, a hiki aku i Pohaku ame Kaopala. Alaila hui o Wailuku me Waikapu a mai laila holo a hiki i Pohakoi, a mai Pohakoi holo aku la a hiki i Kalapakailio. He aina o Omaomao no Wailuku o Kamaomao, mai Pohakoi mai a hiki i Kalapakailio oia ka palena o Wailuku a hiki aku i Kahului no Wailuku wale no ia mau aina e pili ana me Kapukaulua, mai Kahului a hiki aku i Paukukalo hui maila o Waiehu a no Wailuku no ia mau aina.

Ua ike au he mau loko ia kekahi o Mauoni, ame Kanaha na inoa o ua mau loko ia nei. Aia keia mau loko ia iluna o ka aina o Wailuku o Maui

I know the fishponds Mauoni and Kanaha are the names of those ponds. These ponds are upon the land of Wailuku, Maui. I have known nei. Ua ike maoli au i keia mau Loko ia. He kanaka mau no na Alii. O ke kumu o kuʻu ike ana no Wailuku ia mau lokoia, noho iho la kuʻu kaikuahine me Kuaena. A oia no ka mea nana i malama ia mau loko i haiia ae la malalo o Kamehameha Akahi.

these fishponds very well. I was a man for the chief. The reason that I know Wailuku and these ponds is that I stayed with my elder sister and brother. They were the ones who cared for the above mentioned ponds under Kamehameha First.

Pau o Kamehameha Akahi noho iho o Auwae, o Naea mai kona hope ka makua o Emma. A pau oia noho iho la o Keahi. Pau no oia lilo iho la ia P. Nahaolelua ke konohiki i keia manawa.

When Kamehameha First died, they went to Auwae, then Naea was his replacement, the father of Emma. And when he was finished, it went to Keahi. When he was done, it went to P. Nahaolelua, who is the Konohiki at this time.

Ninauia i kela aoao o W. C. Jones ka Loio a olelo mai. Hanau au i Kula. I Hamakua poko au kahi i noho ai, i ka manawa e ana ia ana ka aina o Kalialinui. I laila wau kahi i kuhikuhi pololei ai i ka palena, na Kuihelani au i hoouna mai e hele aku e kuhikuhi i ka palena o Wailuku ame Kalialinui.

Question asked by the side of C.W. Jones, Attorney, and answered: I was born at Kula. I lived in Hamakua poko at the time that the surveying was done at Kalialinui. I pointed out the correct boundaries then. I was sent by Kuihelani to go and point out the boundaries of Wailuku and Kalialinui.

Ua hele pu mai no e Makalena me au. Ua hai mai no na Kanaka kahiko iaʻu ina palena o na Aina i haiia ae

Makalena also came with me. The old people are the ones who told me the boundaries of the said lands. I la. Ua hele no au maluna oia mau aina a puni iaʻu mamua o kuʻu holo pu ana me Makalena ma e kuhikuhi ai i ka palena aina. Ua hele pinepine no au iluna oia mau aina.

have been all across the lands, and around them before my traveling with Makalena folks, and shown the boundaries. I have often gone upon the lands…

Ua aoia no hoi au ina [page 6] palena i keia mau aina, mai Hawaii mai a hiki i Kauai. Ua kakauia keia mau mea maloko o ka Buke i ka M.H.1860. Ua hele makou o Kuihelani ame Napela aole no au i hele kaapuni loa i ua aina nei.

Ua aoia au e na poe kahiko i ke kuhikuhi o ka manawa o ka Niaukani. E ola ana no o Kamehameha mua ia manawa ame Kuumiumi kuʻu Kupuna Keoho (K) he kanaka no Kalialinui ame Pulehu. Kamamani, Weka, ame Kuawaeku, na poe i hele pu ai me au ma ia manawa a ia manawa aku. Ua like ka lakou ike me Kaʻu. Aole no lakou i hele a puni kela wahi.

Ua ike makou ia mau loko i Kapaia o Mauoni ame Kanaha. He Alii o Kihapiilani oia ka mea nana i kukulu i ka pa ma kai o na loko ia i hai ia ae la, oia ke Alii o Wailuku, Mok. o Maui. Aole no Ke Kukuluia ana o Ka Pa, oia mau loko he kumu ia e Kaawale ai o Kalialinui ame Ka Aina o Wailuku mai. No ke Alii Ka Aina i kapaia o Kalialinui oia no Ka Aina mai Kinohi mai.

…We saw the ponds called Mauoni and Kanaha. The Chief Kihapiilani is the one who made the walls of the ponds spoken of. He was the chief of Wailuku, Is. of Maui; the walls were built for these ponds and are the source that separates Kalialinui and the land of Wailuku. The land called Kealialinui is for the chief, it has been that way from the beginning…

Waiho mai o W.C. Jones imua o Ka Aha he kumu ninau a penei. Aole au anei i moe mai ka aina o na Alii mai ke Kuahiwi mai a hiki i Ke Kai.

Kue mai o R.H. Stanley ame ka waiho aku omua o ka Aha i keia ninau a kela aoao ua pono ole, hooholo ia e ka Aha i ka pono ole oia ninau. O ke Konohiki oia ka mea i ka wa Kahiko. O Kahikoku ke Alii o Kula i ku[u] wa uuku. Ua lohe au mai kuʻu poe kupuna o Piikea ke Alii mamua ʻku o Kahikoku a mamuli hoi o koʻu ike maoli o mea ke Alii nui o Kahikoku. Haawi aku la o Umi keiki o Liloa ia laua ka malama. Mahope o ka noho ana o Kahikoku i Alii. Lilo iho la o Keaweaheulu kona hope, mahope mai lilo o Aikanaka kona hope a pau hoi oia noho iho o Keohohiwa, a o Keohokalole mai hoi kona hope. O ke Aupuni ka hope loa mai nei, no Kula wale no keia mau Alii.

Eia na Alii o Kalialinui. Keohohiwa ka mua a pau ia noho maila, Kauikeaouli mai, a o Maikaaloa mai a mahope mai hoi o keikimahine o Maikaaloa ka mea i mare ia Panee. Aole i anaia ka aina i ka wa ia Maikaaloa.	Here are the chiefs of Kalialinui. Keohohiwa was the first. When he was finished, then it was Kauikeaouli, and then Maʻikaʻaloa (Kamaʻikaʻaloa), and afterwards, it was the daughter of Maʻikaʻaloa, who married Pāneʻe. The land was not surveyed in the time of Maʻikaʻaloa…

Aole mea i hoike mai iaʻu ina palena o Kalialinui. Malihini loa na Alii, aole i ike loa, na kamaaina wale no kai ike i ka palena o keia aina. Aole i hai mai o Keoho iaʻu ina palena o Kalialinui, aka ua hai mai oia iaʻu he loko o Kanaha no ke Ahupuaa o Wailuku, Maui. Ua kaua o Kalalakoa mauka iho o Kanaha no ka manao o ko uka poe i ka ono i ka ia o ka loko o Kanaha ua ike au ia Makaku he Pohaku. [page 8]

Aole ia he hoailona pale. Aole no au i lohe i ka poe kahiko. Ua hoopaneeia ka Aha a hiki i k a la apopo la 22, o Febuari M.H. 1871, o ka hora 10, o ke Ka kahiaka.

Noho hou ka Aha i ka la i hoopaneeia ai oia ka la 22, o Febuari, ua hiki mai no na aoao i elua imua o ka Aha, nonoi o R.H. Stanley e hoohikiia o Malaihi.

Malaihi hoohikiia a olelo mai.	Malaihi, Sworn and States:
I ka wa o Kamehameha mua kuʻu hanau ana. Aia ma Kula, mokupuni o Maui koʻu wahi e noho nei. Ma Lanai nae kuʻu hanau ana. I Hamakua poko wau kahi i noho ai mamua aku o ka Niaukani. Ua ike au ina aina o <u>Kalialinui</u> mauka mai o Kula.	My birth was during the time of Kamehameha the first. I reside in Kula on the island of Maui. But I was born on Lānaʻi. I lived in Hāmākuapoko before the time of the Nīʻaukani (ca. prior to 1811). I know the lands of Kalialinui, above Kula...

A ua hele no hoi au me kekahi mea ma ka aoao mauka o Hamakuapoko. Eia na kanaka i hele pu ai me aʻu. O Makalena, H. Kuihelani, ame Kiha. Ua hele makou ma ka aoao mauka o Hamakuapoko e pili ana ia Wailuku mai <u>Kapukaulua</u> ka makou wahi i hoomaka mai ai, mai Kapukaulua mai a hiki i <u>Keone Kapoo</u>, a mai Keone Kapoo mai holo aku a hiki i Hamakuapoko a mai Hamakuapoko aku holo aku la a hiki <u>Pohakunahanaha</u>. Alaila holo aku ma ka aoao o Hamakua ame Wailuku holo hou a hiki <u>Olopua</u> mai laila mai paleia aku la o Hamakuapoko a pili mai o <u>Haliimaile</u> mauka holo hou aku la ka palena o Wailuku me <u>Papakaloa</u> a mai

Papakaloa aku hiki aku i <u>Haliimaile</u> ma ka aoao mauka mai laila mai holo aku la i <u>Kauhiana</u>, a hiki aku la i <u>Haliimaile</u> ame <u>Wailuku</u>. Alaila loaa aku la o <u>Puuhinale</u> a mao mai o <u>Haliimaile</u> hui ae la o <u>Kula</u> me	From Papakōlea to Hāliʻimaile on the mauka side, from there on to Kauhiana, until reaching Hāliʻimaile and Wailuku. Then there will be Puʻuhīnale and beyond Hāliʻimaile Kula and Wailuku stream meet as

Wailuku kahawai kekahi. Ua koke no i ke alanui o Hopena e pili ana me Hokuula ka aina o Kula mai, Hokuula mai o Kula mauka, a o Wailuku hoi makai a loaa ai o Kalialinui. He kahawai ko ka aina o Kalialinui ame kekahi aoao o ka aina o Kula o Keahua ka inoa o ka aina e pili pu ana me ke kahawai o Kalialinui. He Ahupuaa o Kalialinui ame Keahua. Alaila hui ae la laua a holo mai ia Puukoae oia na aina mauka o Kealialinui ame Omaopio. O Wailuku hoi makai holo hou aku la a hiki i Pulehunui a hiki aku i ke kai.

well. It was close to Hopena street adjacent with Hōkūʻula, the land in Kula; From Hōkūʻula of upper Kula and to Wailuku returning toward shore there will be Kalialinui. The land of Kalialinui has a kahawai (stream gulch), on one side, on the Kula side of the land is the place called Keāhua. That is the side that adjoins the kahawai of Kalialinui. Kalialinui is an ahupuaʻa and so is Keāhua. They meet together and run to Puʻukoaʻe, the lands above Kalialinui and ʻŌmaʻopio. Wailuku is below, running to Pūlehunui, and reaching to the sea…

He huina alanui e pii ana ma Waikapu i Kula. Alaila hiki ae la no i Wailuku. Iho mai makou o Makalena ma a hiki i kai a hai aku la no hoi au ia Makalena mauka iho o Pohakoi, maanei kaʻu wahi ike e pili ana ina palena. O na aina o Pulehunui ame Wailuku. Aia no ma na aoao i Pohakoi. Oia wale iho la no kaʻu mea i ike e pili ana ina palena ame na aina aʻu i hai iho nei imua o ka Aha. I ka wa mamua he mea nui ka pio manu. Eia na mea ko [page 8] Kula poe e hele ai i ka pio manu he Aweoweo he Ilima Elua no maunu, a o ko Wailuku poe kanaka hoi he walahee ka maunu e loaa i ka manu. I Puukoae nae Kahi e hele ai i ke Kapio manu. Ina e hele mai ko Kula poe iluna o Puukoae e Kapio manu ai. Alaila alualu aku la ko Wailuku e Kipaku. Aole e hiki ke kiiia mai ka paakai o Kanaha e ko Kula poe, aole no e hiki i ka Alii ke kii mai!

Ninauia e kela aoao o W.C. Jones ka loio aoao pale.

Ua kuhikuhiia au e na kanaka kahiko ina palena o keia mau aina aʻu e hai ae la. No Kula kuʻu makuakane, kuʻu makuahine no Lanai, kamaaina koʻu makuakane no Kula.

Ua ike au ina palena mamua o ka hiki ana mai o na Missionari. He puni ia makou na palena i ka hele ia i ka pii i ke Kolea. Aole i olelo mai kuʻu mau makua.

Ua hala aku ka palena o Kalialinui a Kanaha o Puukoae ka aina e pili ana, hui ae la o Umiomaopio me Pulehunui. He kahawai mai Kalialinui mai a holo i uka ma ka aoao Omaopio a hui ae la me Kalialinui. Aohe kahawai iluna o Puukoae, ma ka hema Kekahi a me ka Akau.

Ka inoa ma ka aoao Akau o Kalialinui, Kaapakai ame Keanakalahu ma kaaoao hema o Waiohonu ame Pulehunui. Omaopio, oia mawaena hui ae la me ka Aina o Kalialinui. Aia ma ka aoao akau o Kalialinui o ke kahawai. O Kaakai ka palena nui mai Kai a hiki i uka. Ilaila hui ae la me Wailuku. O Kalialinui ma ka aoao hema, ma ka aoao Akau o Keahua o ke kahawai, he owawa ma ka Hema o Kalialinui, mai uka mai o Kalapaalii mai, a o ka Waipuilani kekahi inoa ua hai mai iau na kamaaina i keia owawa e hui ana me ke kahawainui. Ua ike no au ina kamaaina, ua make i keia manawa. Hookahi kahawai o mea Kaakakai ame Keanakalahu. Aole kahawai o Puukoae, holo aku ke kahawai o Kaakakai kona inoa a hui ae la me ka aina i kapaia Omaopio a haiki loa, ua ike au i keia mau aina ame ke kahawai mahope o ka hiki ana mai o ka poe Kaleponi oia paha ka M.H.1851 a 1852 paha. A kokoke ana ia wa aole au i ike ia Makaku. Ua ike au i ka loko ia ia Kanaha.

Ua kauoha R.H. Stanley i keia hoike e hele mai imua o ke Aha e hai i kana mea apau i ike e pili ana ina palena aina o Wailuku ame Kalialinui. Aole no he mea i hele mai a olelo mai iaʻu e hoike ma ke ano Wahahee imua o ke Aha, oia ka pane a Stanley i kue ai i ka ninau a W.C. Jones, ua hele mai keia hoike e hoike i kana mea i ike, ame kana mea i maopopo e pili ana ina palena o Hamakua, Haliimaile, Kula, ame Pulehu. [page 9]

Napue hoohikiia a olelo mai.
I Wailuku nei ku'u wahi i hanau ai. I ka wa o Kamehameha mua. Ua ike no au ina palena o Wailuku e pili ana ia Hamakuapoko, Haliimaile, Kula, ame Pulehu. Ua hele au me kekahi mea ma keia mau wahi i haiia ae la. O wau ame Kaawa. Ua ike no au ia Makalena. Aole nae au i hele pu me ia. Hui o Hamakuapoko me Wailuku i kela wahi i kapaia o Keone Kapoo, mai Keone Kapoo mai hoi, holo aku la a hiki i Puunene. A mai Puunene mai holo aku la no a hiki i Papakaloa. A e pili ana o Hokuula, a o Haliimaile mauka. Mai laila mai hoi holo aku la a loaa o Puukoae, he puu aa nae ma kela wahi i oleloia ae la o Puukoae. He alanui o Puukoae he holoia no e ka lio maluna oia wahi aa. Aia ma ka aoao makai o ke alanui oia ka Aina o Waiohonu. Haalele iho la ia Puuhinale e holo aku la a hiki i Puukoae, a o Wailuku ka aina makai, a Omaopio hoi ma ka aoao mauka. A holo hou aku la no a hiki i Pohakoi. O Pulehu hoi ka aina mauka iho o Pohakoi, a o Wailuku no makai.

Hiki no ilaila ka pau no ia. Holo no a hiki i Paukukalo. Alaila pili ana o Kahului me ke Ahupuaa o Wailuku. Ua ike au ia Mauoni ame Kanaha. He mau loko ia ia ma Wailuku nei o Maui. Ua hele au ilaila. I ku'u wa i hele ai ilaila o Auwae, ke Konohiki ia manawa no Wailuku. Apau hoi ka noho Konohiki ana o Auwae noho iho la o Kawailepolepo. Apau no hoi o Kawailepolepo, noho iho la o Kailihiwa i Konohiki. Apau no hoi o Kailihiwa noho iho la o Naea, a o P. Nahaolelua mai ka mea imua o ka Aha (he Lunakanawai). Ua noho au malalo o keia poe Konohiki a hiki wale i keia manawa. Ua ike au ia Kalialinui. Aia ia aina ma Wailuku. Ua ike au ia Kaawa, he kanaka ia no Wailuku. Ua olelo mai oia ia'u oia wale iho la no ka palena o Kalialinui a hiki i Puukoae.

Aole oia i hai mai ia'u ina palena o Kalialinui. Ua make ke kanaka o Kaawa. Ua hoi e hiamoe, aole e ala hou mai. Ua ike au ia Makaku, aia mawaena o Wailuku. Aole no i hai mai o Kaawa ia'u ina palena o Wailuku o Maui, Hawaii Pae Aina.

H. Kuihelani hoohikiia a olelo mai.

H. Kuihelani, sworn and says:

I Wailuku kuʻu wahi i hanau ai, he kanalima paha oʻu M.H. i noho ai ma keia aina o Wailuku nei a keu aku paha. Ua noho kuʻu makua i Konohiki no Wailuku nei. Aole au i noho Konohiki. Aka ua ike nae au ia Mauoni ame Kanaha. He mau loko ia ma Wailuku nei, Mokupuni o Maui. I kuu wa uuku ua hele pu au me kuʻu makuakane ma keia wahi i haiia ae la. He umi paha oʻu makahiki ia manawa no ka Moi. Elua ia mau loko ia. Ua hele au mahope iho o ka manawa o Kamehameha Ekolu. Ia makou nae ka malama oia mau loko. Na makou ao e lawe i ka I-a. [page 10]

My birth place is at Wailuku, I have lived on the land of Wailuku for fifty years, a little more perhaps. My father was the konohiki of Wailuku. I was not a konohiki. But, I do know Mauoni and Kanahā. They are fishponds of Wailuku, Island of Maui. When I was little I went with my father to this place spoken of. I was perhaps ten years old at the time. For the King, two fishponds. I went after the time of Kamehameha Third. It was us who cared for those ponds. It was us who took the fish.

Apau o Kamehameha Ekolu, o Kamehameha Eha iho, aole nae ia makou ka malama ia manawa. O P. Nahaolelua ka mea nana e malama nei i keia mau loko ia i ke ahupuaa o Wailuku, Maui. Keahua ka palena o Wailuku ma ke kai. Iaʻu ka malama oia kai mai kuʻu makuakane mai oia ka Aina i oleloia iho nei o Pukaulua. Aia no ia ili aina iaʻu i keia manawa.

When Kamehameha Third died, it went to Kamehameha Fourth; we did not take care of them then. P. Nahaʻolelua is the one who cares for these fishponds in the ahupuaʻa of Wailuku, Maui. Keāhua is the boundary of Wailuku at the shore. I am the one who has stewardship of sea (fishery); it is from my father; that land mentioned is Pukaulua. I

No ka Moi ke Kai. Aole poe i aeia e kii i kela ia iloko o na loko ia, no ka mea ua kapu loa ke kii i ka ia. Aia no a hu ka i-a mawaho o ka loko alaila hiki i kela mea, keia mea ke kii i ka i-a mawaho wale no o na loko. He paakai no Kolaila. He opeia ka paakai a laweia na na alii. Aole au i ike i ka aina o Kalialinui e oleloia nei. Aole au i hele i Kalialinui e laweia ai. Ua ike au ia Kamaomao, ua koke no ia Pohaku. Ke Ahupuaa o Wailuku, Maui nei o ko Hawaii Pae Aina.

have that land section at this time. The fishery is for the King. People are not allowed to take the fish from within the fishponds, because the harvesting of fish is restricted. Though when the fish overflow from the ponds, then this person and that person can harvest the fish that are on the outside of the ponds. There is also salt there. The salt is bundled up and taken by the chiefs. I do not know the land of Kalialinui, spoken of. I did not go to take things from Kalialinui. I know of Kamaʻomaʻo, the stone is close to pig-cairn (boundary marker) of Wailuku, Maui of the Hawaiian Islands…

Ninau e kela aoao o W.C. Jones ka loio o ka mea pale.

Ua hoohuliia kanaka i ke kukulu ana i ka pa, mawaho o na loko ia, ma Oopuola. O Kihapiilani ke Alii o Maui ia manawa, nana no i hoohuli na kanaka i ke kukulu ana i ka pa. Ua ike au i ka pohaku o Makaku.

Men were sought out to construct the wall outside of the ponds, at ʻOʻopuola. Kīhāpiʻilani was the Chief of Maui at that time, it was he who sought out the men to build the wall. I know of the stone of Makaku.

O kuʻu lohe he pohaku kela no na uhane e hui ai. Pela mai ka olelo a

What I heard was that it is a stone where the spirits gather. That is kekahi poe. Ame Kamaomao kekahi, ua hele makou e ohi i mao no na alii i mea e ala ai na Kapa Aahu o lakou. Aole poe kanaka e ae o no kanaka wale iho la no o Wailuku, Maui, Hawaii Pae Aina.

what some people say. And Kamaʻomaʻo is one also; we used to go gather maʻo [a native hibiscus] for the chiefs, as something with which they would scent their Kapa Clothing. No other people, only the people of Wailuku, Maui, Hawaiian Islands…

Napela hoohikiia a olelo mai.

I Honokowai kuu wahi i hanau ai o ka mokupuni o Maui, H.P.A. Noho au ma Wailuku i ka wa o Kamehameha mua, ma ia wa. Mai laila mai koʻu noho ana ma Wailuku nei a hiki wale i keia wa. Ua ike au ia Kanaha he loko ia aia ma Wailuku, a he loko i-a e ae no kekahi i kapaia o Mauoni, ma ia wahi hookahi no i haiia ae la. Oia kuʻu manawa i ike mua ai i ka wa o Kamehameha mua a hiki wale i keia manawa. Ua hele au ilaila a ua ike maoli au. He Luna holoholona au no ke Aupuni.

Na Kauka Judd wau i hoonoho mai, a o Keoni Ana no kekahi i hoonoho mai iaʻu i Luna holoholona no ke Aupuni. He nui ka i-a maloko oia mau loko ia i kuʻu wa e noho Luna ana. O ke Konohiki o Wailuku ke lawe i ka ia. Aole mea e ae. He paakai no ko na loko.

Ua ike no au ia Makaku. Aia ia aina i Wailuku nei, Maui. Elua paha mile ke kaawale aku mai Kula aku. [page 11]

Ua kuhikuhiia wau ina palena o Hamakua & Haliimaile. O Kaawa, Kiha, ame Humphreys, oia na mea i hai mai iaʻu ina palena o ua mau aina la. Aia nae ia mau aina iloko o Wailuku, Maui. O Naea ke Alii ia manawa, apau oia noho mai o Namakaeha. A mahope mai hoi o Namakaeha lilo iho la o Keahi ke Konohiki, a keia manawa hoi ka mea Hanohano P. Nahaolelua. He aina o Kamaomao no

Wailuku nei, kokoke loa i Makaku, mauka iho oia mau loko i-a o Wailuku, Maui.

Ninauia e ka loio W.C. Jones o ka aoao pale. Aia o Kalialinui ma uka loa aku. Ua lohe au i ka Aina o Kalialinui. A ua ike au ina hale olaila. Aole kamaaina i kuhikuhi mai ia'u ina palena o Kalialinui. I ka M.H.1846. Ko'u ike ana.

Hoomaha ka aoao hoopii, oia hoi na Komisina o na Aina Lei Alii.

Ua waiho mai o Makalena ke Ana Aina i ke ana ame ke kii o keia aina o Wailuku ame na kamaaina i hele pu ai me ia eia na inoa o lakou. Kiha, Kuihelani, ame kekahi poe e ae he nui wale. Nolaila ua ae mai na aoao i elua o keia hihia o E. Mayor ka mea nana i ana i ke kii o Kalialinui ame na mea i hoakakaia maloko oia palapala Kii. Ua hoopaneeia ka Aha a hiki i ka hora Elua o ke Awakea o keia la.

Hoike ma ka aoao pale o Campbell ame Turton.

Hikiau hoohikiia a olelo mai.	Hikiau Sworn and Stated:
Ua noho au ma keia wahi, mai ia Kamehameha mua mai (Maui) 94, o'u makahiki. Ua ike no au ina palena makai nei o Kalialinui. I ka wa i make ai o Kamehameha mua lilo iho ia Kamehameha Elua.	I have lived at this place since the time of Kamehameha the first (on Maui), I am 94 years old. I have seen the boundaries of Kalialinui. When Kamehameha the first died, it was obtained by Kamehameha the second.
Pii makou o Liholiho ame Auwae i uka nei i ka pana iole. Makai mai o ka palena o <u>Kalialinui</u> e pili ana me	We climbed up with Liholiho and 'Auwae, to shoot 'iole in the uplands. On the shoreward section,

Wailuku oia no o Aiuhini.

Kalialinui, bounds with Wailuku, at Aiuhini...

A moe aku la i Keonekapoo. Oia wale iho la no kaʻu mea i ike. Ua ike au ia Puukoae. Oia ka palena o Kula me Kalialinui. Ua loihi loa o Puukoae mai Aiuhini mai. Aia o Aiuhini ma kai loa. He mau pohaku kekahi ma Aiuhini. Hiki no iaʻu ke kuhikuhi, aka imua o P. Nahaolelua. Auwae ke Konohiki ia manawa o makou i ike ai. Make o Auwae ma Owa Wailuku nei. Aole au i ike i ka palena o Kalialinui.

Noi mai o W.C. Jones imua o ka Aha e waiho hoona ma ia ka Aha, no ka lawe i ka ike a ka makou hoike i manaonui ai ai ma Honolulu, Oahu, aole o makou. Aole o makou hoike e ae e lawe mai ana, oia wale no, ua ae kela aoao. [page 12]

b. Haliimaile Ahupuaa, District of Hamakuapoko, Island of Maui, Boundary Commission, Maui, Volume No. 1, pps. 191-194

Ahupuaa o Haliimaile ma ka apana o Makawao, Maui
No. 60

Hale Hookolokolo, Wailuku, Maui, Oct. 14, 1880
Ua noho ka Aha o ka Komisina o na Palena Aina o Maui, Molokai, ame Lanai. ma ka Hale Hookolokolo ma Wailuku, Maui, ma ka la 14 o Okatoba M.H.1880, ma ka hora 10 o ke kakahiaka, e like me ka hoolaha ana ma na nupepa ko Hawaii Pae Aina, o ka la 9 o Okatoba M.H.1880. ma ka Helu 41, Buke III a ma ka nupepa Haole "Hawaiian Gazette", no ka hooponopono ana i na palena o Haliimaile ma Makawao, Maui ko Hawaii Pae Aina, ma ke noi ana mai o S.B. Dole Esquire ma ka Palapala Hoopii i waihoia mai ma ka la 28 o Aperila M.H. 1880.

Ua hoomaopopoia ka Palapala Hoopii. Ua kaheaia ka poe kue i keia nonoi ana mai a S.B. Dole Esquire, aohe poe kue i hele mai.

O W.O. Smith Esquire ka loio a kokua hoi ma ka aoao o ka mea hoopii

Ua nonoi mai ke kokua o ka mea hoopii e hooholo keia Aha i na palena o Haliimaile e like me na palena a W.D. Alexander ka Luna Ana Aina nui o ke Aupuni. A ua ae ka Aha i keia nonoi ana mai.

L. Aholo, Komisina o na Palena Aina ma Maui, Molokai ame Lanai. [page 191]

Notes of Survey of Boundaries of the Ahupuaa of Haliimaile, Maui

Beginning at an Iron stake in the road from Makawao to Kahului at the common corner of the East Maui Plantation of the Hobron Plantation and of Royal Patent 2324:2 to Kekahuna from which the granite post on Piiholo bears S 55° 39’ E true, the Boundary runs:

1. N 62° 57’ W true (N 71° 20’ W magn) 1854 feet to a kukui tree, along land purchased by T.H. Hobron from the Haiku Sugar Co. (according to W.H. Pease’s survey corrected); thence
2. N 73° 26’ W true (N 82° W magn) 5509 feet; and
3. N 38° 12’ W true (N 46° W magn) 1202 feet along the same to a corner of Alexander and Baldwin’s purchase from Haiku Sugar Co. (which is 158 feet S 36° 45’ E true from a granite post by the road to Kahului); thence
4. N 51° 24’ W true 10939 feet along Alexander & Baldwin Purchase to the boundary of land sold by the Haiku Sugar Co. to a company of 28 natives; thence
5. S 51° 15’ W true (S 43° W magn) 1619 feet along land sold to natives, to iron pin; thence
6. N 89° 45’ w (S 81° 15’ west magn) 300 feet along land sold to natives to the rock called <u>Olopua</u> in a ravine, which forms the Boundary between this

land and Wailuku; thence

7. S 26º 40’ E true (S 35 1/2° E magn) along said ravine 1304 feet along Wailuku to a place called Puupili; thence
8. S 21° 17 E true (S 30° E magn) 1680 feet along ravine to a marked rock called Kaioleakakalani about 170 ft above the road to Kahului; thence
9. S 17° 04’ E true (S 25 3/4° E magn) 1592 ft to a pile of stones at Kauhiana or West side of the ravine; thence [page 192]
10. S 22° 15’ E true (S 40 3/4° E magn) 1390 ft to a marked rock by the path at Puhinali [Puuhinale]; thence
11. S 35° 07’ E true (S 42 1/4° E magn) 3508 ft to a wiliwili tree on West bank of the gulch, which is the corner of Wailuku and the district of Kula. From this point the middle of this gulch is the boundary between Haliimaile & Kula; thence
12. N 70° 03’ E true (N 61 1/2° E magn) 330 ft to large marked rock in the wall at the bottom of the ravine; thence
13. S 54° 50’ E true [(S 63 1/4° Magn] 558 ft to the junction of two stone walls in the gulch; thence
14. S 57° 29’ E true 482 ft along the bottom of the gulch to corner of stone wall; thence
15. S 2° 40’ E true 878 feet along bottom of the gulch;
16. S 37° 41’ E true 1400 ft along bottom of the gulch;
17. S 50° 12’ E true 824 ft along bottom of the gulch;
18. S 47° 33’ E true 1108 ft along bottom of the gulch;
19. S 75° 42’ E true 958 ft along bottom of the gulch; thence
20. S 64° 43’ East true 247 feet along bottom of gulch to the corner of the former Brewer Plantation; thence
21. S 52° 44’ E true 1995 ft along the gulch;
22. S 59° 12’ E true 1058 ft along the gulch;
23. S 72° 28’ E true 1653 ft along the gulch;
24. S 32° 02’ E true 2738 ft along the gulch;
25. S 14° 53’ E true 2475 ft along the gulch;

26. S 40° 54’ E true 506 ft along the gulch to the top of falls in the gulch, which is the corner of the former Brewer Plantation & of the land purchased from Mrs. Haalelea by J. Clark; thence
27. S 81° 52’ E true 376 ft along the bottom of the gulch;
28. S 60° 57’ E true 528 ft along the same to the boundary of Makawao; thence
29. N 35° 29’ E true 521 ft along Grant 216; thence
30. N 14° 33’ E true 1678 ft along the same, along <u>an ancient ulumaika course</u>, to an iron stake at the corner of the former Brewer Plantation and of Grants 216 & 499; thence
31. N 53° 49’ E true (N 46 E magn) 4200 f along Grants 499 & 216; thence
32. N 53° 28’ E true 1248 ft along Grant 641 to East Maui Plantation; thence
33. N 43° 15’ E Magnetic 1627 ft along Grant 64; [page 193]
34. N 52° 30’ E magnetic 1455 ft along Grant 64 to S.W. bank of the <u>Maliko</u> gulch; thence
35. N 36° E magnetic 980 ft along Grant 64, down the pali to the bottom of the deep gulch, separating this land from <u>Haiku</u>;
36. Thence the boundary follows down to centre of the Maliko gulch in a North-Westerly direction to the upper Southeast corner of <u>Hamakuapoko</u>;
37. Beginning again at the starting point of this description at the iron stake in the Makawao corner near a School house, run N 60° 07’ E true (N 51° 21’ E magn) 2655 ft along Grant 2342 to Kekahuna & Grant 187 to John Richardson, & thence
38. N 69° 33’ East true (N 58 1/2° magnc) 1002 ft to the bottom of Maliko gulch to the southeast upper corner of Hamakuapoko mentioned above.

Total area = 4230 Acres, more or less.

Makawao, June 21, 1879

W.D. Alexander, Surveyor

L. Aholo

Commissioner of Bounds for the Islands of Maui

Molokai & Lanai.

Lahaina, Oct. 16, 1880

c. ***Wailuku Ahupuaa (Aina Lei Alii) District of Wailuku, Island of Maui, Boundary Commission, Maui, Volume 1, p. 13, No. 1, Maui, Palena Aina a ke Komisina, Palapala keia o na palena o ke Ahupuaa o Wailuku o Maui***

Ma ka noi ana mai a ke Komisina o na Aina Lei Alii (Jno O. Dominis) kiaaina o Oahu, a ma ka mana hoi i haawiia mai iaʻu ma ke kanawai i Luna Komisina no na palena aina o Maui, a ma keia ke hooholo nei au ina palena o ke Ahupuaa o Wailuku ma ka Apana o Wailuku o ka Mokupuni o Maui, ke hoakakaia aku nei malalo penei.

Ua haawi malalo o kuʻu lima ma Lahaina i keia la Elua o Maraki o ka M.H. 1871

P. Nahaolelua, Komisina o na Palena Aina o ka mokupuni o Maui

Eia na palena o Wailuku i anaia e J.W. Makalena. E hoomaka ana ma ke kihi Akau loa o Wailuku ma kahi i kapaia <u>Kapukaulua, ma ka Puupohaku iwaena o ke one 3 4/10 kaulahao mai ke kai</u>. A mailaila ka moe ana ae o ka Hao Kuhikuhi o ke panana i kahi oioi loa o Puukoae i Kahakuloa

Akau 66° 30’ Komohana ame kahi oioi loa o Piiholo i Makawao

Hema 63° 30’ Hikina a holo

Hema 17° 30’ Hikina 16 1/10 kaulahao i kahi i kapaia o Keonekapoo

Hema 48° Hikina 46 9/10 kaulahao i ka Poopohaku i ka nuku o kahawai, a holo ma ke kahawai

Hema 34° Hikina 14 2/10 kaulahao ma Hamakuapoko ai <u>Haliimaile</u>, i ka pohaku i kapaia o <u>Olopua</u>

Hema 35° Hikina 20 kaulahao i ka pohaku o <u>Puuiki</u>

Hema 29° Hikina 35 4/10 kaulahao i ka pohaku i kapaia <u>Kaioleokalani</u> kokoke i ke alanui ma <u>Kapapakaloa</u>

Hema 25° Hikina 25 kaulahao iluna o kahonua

Akau 41° Hikina 73 9/10 kaulahao ma ka honua a hiki i ke kumu Wiliwili ka palena o Wailuku me Kula ma ke Ahupuaa o Nahokuula [Hokuula] kahi i kapaia o Puahinale me Kaulehulehu, alaila holo ma Kula

Hema 27° 30' Komohana 81 kaulahao ma Hokuula, Napukalani, na Kauau a hiki i Keahua ma ke kumu laau Akoko i ka puupohaku

Hema 20° 15' Komohana 91 8/10 kaulahao ma Keahua na Omaopio i ka puupohaku i ka laau Akoko alaila holo

Hema 23° Hikina 141 8/10 kaulahao ma na Omaopio ma ka lihi makai o ka Mahina Palaoa o Kekipi ma a hiki i kapohaku i kapaia o Puukoae

Hema 30° 30' Komohana 43 3/10 kaulahao ma Omaopio a hiki i ka huinao na alanui o Wailuku me Waikapu e pii ai i uka o Kula ma Pulehu i kai mai o Waihonu ka huina alanui keia i oleloia e na Luna Hoona ma ka lakou olelo hooholo no ka palena mawaena o Wailuku me Waikapu, alaila holo pololei e like me ka lakou hooholo ana

Akau 76° Komohana hiki i kahi i kapaia o Pohakoi

Akau 85° Komohana 80 7/10 kaulahao

Hema 86° 15' Komohana 16 8/10 kaulahao hiki i ke kumu o ka Lapaokailio pili keia mau aoao me Waikapu.

d. Wailuku Ahupuaa, District of Wailuku, Island of Maui, Boundary Commission, Maui, Volume No. 1, pps. 216-219, Ahupuaa o Wailuku, No. 65

Hale Hookolokolo Wailuku, Maui, Sept. 21, 1882

Ua noho ka Aha Komisina o na mokupuni o Maui, Molokai a me Lanai, ma ka Hale Hookolokolo ma Wailuku Maui, ma ka la 21st. o Dekatemaba, M.H. 1882, ma ka hora 10 o ke kakahiaka, e like me ka Hoolahaia ana ma na nupepa "Ka Elele Poakolu" a me na nupepa haole "The P.C. Advertiser".

Ua hiki mai o F.F. Porter, ma ka aoao o Claus Spreckles ka mea hoopii. A o Meekapu nona iho. O M.D. Monsarrat ma ka aoao o na Aina Lei Alii a ma ka aoao o na Kahu o ka Waiwai o ka Moi Lunalilo.

Hookakaia ka Palapala Hoopii, a ninauia ka poe kue. Aohe poe i hiki mai.

Hookaka mai o Meekapu i kekahi mau mea, a pau kana ua laweia mai o M.D. Monsarrat i Hoike a Hoohikiia a hai mai.

He Ana Aina kau hana, nau i ana ke Ahupuaa o Wailuku nei. Aole au i hele a puni o Wailuku nei, aka, ua lawe au i na palena i apono mua ia, ma ka hooponoponoia ana o na palena o Hamakuapoko, Pulehunui e pili ana me Wailuku nei. A ua hooponoponoia e au na palena e pili la me Waiehu, mai loko mai o na palena i hooholo mua ia.

Hoike mai la o M.D. Monsarrat no ka aoao o na Kahu Waiwai o ka Moi Lunalilo, a me na Komisina o na Aina Lei Alii, ua ae lakou i keia mau palena, ma keia palapala ana o M.D. Monsarrat. Aole mea kue. [page 216]

Survey of the Ahupuaa of Wailuku, Maui

Beginning at a red wood post and hill of stones on the sea shore adjoining the land of Hamakuapoko at the place called Kapukaulua. From which post the Government survey station on Puunene bears S 8° 15' W true and running.

1. S 9° 39' E true 1062 feet along Hamakuapoko to Keonekapoo
2. S 40° 7' E true 3018 feet along Hamakuapoko to a pile of stones at Nukukahawai;
3. S 22° 3' E true 934 feet to a large rock called Olopua which forms the corner of Wailuku, Haliimaile and Hamakuapoko; thence
4. S 26° 40' E true (South 35 1/2° East Magn) 1304 feet along Haliimaile to Puupili; thence
5. S 21° 17' E true (S 30 E magnc) 1680 feet along the ravine to marked rock called Kaioleakalani, about 170 feet S of the way to Kahului; thence
6. S 17° 4' E true (S 25 3/4 E magn) 1592 feet to a pile of stones at Kauhiana, on West side of the ravine; thence

7. S 32° 18' E true (S 40 3/4 E magnc) 1390 feet to a marked rock by the path at Puhinali;
8. S 35° 7' E true (S 42 1/4 E magn) 3508 feet to a wiliwili tree on West bank of the gulch, which is the corner of Wailuku, Haliimaile and the District of Kula; thence
9. S 36° 27' W true 5346 feet along Kula;
10. S 29° 21' W true 6059 feet along Kula;
11. S 28° 36' W true 932 feet along Kula to a concrete post marked with a cross at the north West corner of Kalialinui and Wailuku; From which the government survey station on Puu o Koha bears S 38° 25' E true; thence
12. S 28° 36' W true 8376 feet along Kalialinui to lots of large rock called Puukoae; thence
13. S 36° 41' W true 3060.5 feet along Kalialinui to a granite post at the corner of Kalialinui, Wailuku and Pulehunui; thence when the government Survey Station on Puu Hele bears South 82° 6' W true; thence
14. N 64° 5' W true 36030 feet along Pulehunui and Waikapu to Pohakoi, a marked rock a short distance West of road to Waikapu; thence
15. N 13° 45' W true (N 85° West magn) 5326.2 feet along Waikapu up ridge;
16. N 82° 30 W true (S 86° 15' W magn) 408.8 feet along [page 217] Waikapu to a stone post on the crest of the ridge known as Kalapakailio;
17. Thence along up the center of this ridge along Waikapu always following the water shed to the ridge forming the head of Olowalu Valley;
18. Thence following said ridge dividing this from Olowalu Valley;
19. Thence around by the ridge forming the head of Wailuku Valley to the head of the land of the land of Waihee;
20. Thence along the dividing ridge between the Wailuku and Waihee Valleys to the head of Waiehu; Thence
21. S 70° 39' E true 3366 feet along Waiehu down ridge;
22. N 80° 36' E true 2161.5 feet along same to junction of ridge called Kahoolewa;
23. N 63° 36' E true 6385.5 feet along same;

24. N 85° 6' E true 3445.3 feet along same to end of ridge; thence
25. N 89° 51' E true 1039.5 feet along same to black rock marked thus [arrow to right] at edge of gulch; thence
26. N 71° 21' E true 427.7 feet along Waiehu along edge of gulch;
27. N 16° 51' E true 569.6 feet along same to point near a large block stone marked [arrow to right];
28. N 66° 36' E true 803.9 feet along same;
29. N 46° 6' E true 937.2 feet along Waiehu;
30. N 46° 21' E true 1029.6 feet along Waiehu;
31. N 49° 36' E true 1025 feet along Waiehu to stone marked thus [arrow to right];
32. N 20° 30' W true 128 feet along Waiehu;
33. N 22° 15' E true 244 feet along Waiehu;
34. N 11° 44' W true 310 feet along Waiehu;
35. N 57° 50' E true 264 feet along Waiehu;
36. S 44° 30' E true 753 feet along Waiehu along stone wall;
37. N 73° 00' E true 674 along Waiehu along stone wall to tall stone marked [arrow to right] bears S 70° 21' W true 1458.6 feet; thence
38. S 66° 6' E true 1607.8 feet crossing the Government road to stone marked [arrow to right] at sand hills; thence
39. N 77° 52' E true 1589.3 feet along Waiehu across sandy hollow to stone marked [arrow to right]; thence
40. N 65° 45' E true 1083.7 feet along Waiehu to a stone marked [arrow to right] at sea shore; [page 218]
41. Thence along sea shore to initial point.

Area 24000 acres more or less.

Notes from various Boundary Certificates and Government Survey Maps by M.D. Monsarrat, Surveyor

Honolulu July 22nd, 1882

S. Aholo, Commissioner of Boundries for the island of Maui, Molokai and Lanai.
Lahaina, Maui
September 25, 1882

2. Ka Moolelo o Kihapiilani (The Tradition of Kihapiʻilani)

In 1884, native historian Moses Manu, a contributor to accounts published by Abraham Fornander (1918 & 1996), published *"Ka Moolelo o Kihapiilani"* in *Ku Okoa* (January 12 to August 23, 1884). A part of the account includes reference to Kihapiʻilani's rise to rule over Maui and construction of the great fishpond complex of Kanahā in Kahului. The following excerpt, translated by Maly, is a synopsis of Manu's narratives:

> …Upon securing his rule over Maui, Kihapiʻilani determined that he was going to build a *heiau,* a house for the gods… Kihapiʻilani then called upon the chiefs and commoners alike, having them gather the *ʻalā makahinu* (dense basalt stones) to build an *alanu* (trail).
>
> The trail began at the stream of Kawaipapa and Pihehe and entered the *hala* forest of Kahalaowaka. From that place, it went to the forest of ʻAkialaʻa at Honomāʻele… The trail was also set out at Kaupō, from the stream (gulch) of Manawainui to Kumunui. That was the extent of the work of the king and the people. He then began the paving in the forest of ʻOʻopuloa [i.e., ʻOʻopuola], at Koʻolau, extending from Kawahinepeʻe to Kaloa, then on to Pāpaʻaʻea, and on to Kaʻohekanu at Hāmākua Loa…
>
> Now when the King (Kihapiʻilani) completed his work in this area, he moved and lived at Kahului, where he began the collection of stones for the *kuapā* (fishpond walls) of Mauoni and Kanahā. He is the one who caused the water in those two ponds to be separated and given two names. The *kuapā* is still there to this day, but a large portion of it has been lost, covered under the sands flying in the winds. When this work was completed, Kihapiʻilani then departed

> for Waiehu and ʻĀʻāpueo… (Manu in *Nupepa Ku Okoa,* August 23, 1884: 4; Maly and Maly 2003: 81)

3. He Moolelo Kaao Hawaii no Laukaieie… (A Hawaiian Tradition of Laukaieie…) Fishery Resources on Hawaiʻi, Maui, and Oʻahu

Manu published "He Moolelo Kaao Hawaii no Laukaieie…" in *Nupepa Ka Oiaio* between January 5, 1894 and September 13, 1895. The following is excerpted from the longer narratives which describe the travels of Laukaieie, her younger brother Makanikeʻoe, and their companions. This tradition includes descriptions of fisheries and aquatic resources, history, and mele interspersed with account from other traditions and references to nineteenth century events.

> From [Makawao] he then traveled to <u>the cool pond of Kālena</u> and then he went to the top of the hill, <u>Piʻiholo,</u> from where he could look out upon the beauty of the land. While he was atop Piʻiholo the *ʻūkiukiu* mist rains and the *ʻulalena* surrounded him, and the *līhau* dropped from the leaves of the *koa* of Kokomo and the famous *kukui* grove of Lilikoʻi. There, while upon the hill he saw two young women whose features were like that of Hinauluʻōhiʻa [a goddess of the forests and water at Waipiʻo, Hawaiʻi] sitting along the side of <u>the stream of ʻAlelele.</u> In his mysterious manner, Makanikeoe appeared before these two young women. Startled, they dove into the stream of ʻAlelele and entered a cave, and in a short time these mysterious women arose below Waiʻalalā. There, the women took their mysterious body forms and Makanikeoe called out to them. He learned that <u>their names were Lauhuki and Kiliʻoe, and that they were the *moʻo* guardians of the cool waters of Kālena and all of the ponds at Makawao.</u> For them the lines of the *mele* were composed:

Ka helena a wahine i ka pali	The women travel along the cliffs
I ka luna o Piʻiholo i ʻAlelele	At the heights of Piʻiholo and ʻAlelele
O Lauhuki ma lāua o Kilioe.	They are Lauhuki and Kiliʻoe

> After exchanging their greetings, Makanikeoe passed through the cave by which the women traveled to Waiʻalalā. He then continued underground till he reached the sea fronting Māliko. He arose at the eastern point of Māliko, which is the boundary between Hāmākualoa and Hāmākuapoko. From here, the path of our traveler passed before Kūʻau and Pāʻia and he then arrived at Kapukaʻulua, the boundary between Hāmākuapoko and Wailuku. There, Makanikeoe saw a deep pit in the sea which he entered and followed to the ponds of Kanahā and Mauoni, those famous ponds that are near Kahului. The ponds were made by the commoners in the time of the chief Kihapiʻilani… (Manu in *Nupepa Ka Oiaio*, December 28, 1894; Maly and Maly 2003: 88)

D. Historic Sites

1. Kanahā and Mauʻoni Loko Iʻa

West of the project area lies the Kanahā Pond Wildlife Santuary. This sanctuary was originally the site of the famed loko iʻa of Kahului: Kanahā and Mauʻoni. Accounts differ as to the origin of the ponds, but the ponds were most likely built in ancient times and rededicated more contemporaneously. One account explains: "The fishponds date back for many centuries and were rededicated under Kiha-a-Piilani and Umi-a-liloa who was his brother-in-law, in the middle 1500s. During the reign of King Ke-kau-li-ke, who died in 1736, the twin ponds of Kanaha and Mauʻoni were again repaired along their walls" (Ashdown 1976: 5). Aliʻi used the ponds to raise fish for consumption and the ponds were of great significance to the people of the land.

Moʻolelo recount the features surrounding the loko iʻa. In one story about Kiha-a-Piilani, Manu wrote: "When the chief left Waiehu, this man went ahead and the chief behind and this is how they were as far as Wailuku, down to the sea of Pohaku and up to sand ridge called Makanipalua. In no time their feet tread the soft sounding sands of Kahului. There dawn broke over them and the sky glowed. The houses of Kahului were left behind them in the dark. They approached Kanaha and Mauoni. It was fully light when they reached the boundary of Kanaha. They rested there for a while and washed their faces with water" (Maly and Maly 2006: 19, citing Manu 1884).

The pond was still in operation as of 1837, when the village of Kahului included 26 hale pili (traditional house thatched with pili (*Heteropogon contortus*)[13] grass). There was another reference to the ponds in the Hawaiian language newspapers in 1865 which read: "Wailuku, the district to whom the Hekuawa trees belong and the best of sugar growing lands. Therefore, O ye who dwell near the fish ponds of Kanaha and Mauoni and who pull up the taro plants of Kahului" (see Sterling 1998: 74)[14]. The ponds, like most loko iʻa, consist of brackish water and are fed by a fresh water spring, which resulted in the ponds having good quality. Today, the pond ecosystem consists of over 240[15] acres of wildlife habitat.

The ponds became part of the Naval Air Station, Kahului during World War II. Kanahā Pond was designated as a wildlife refuge in 1952. It was returned to the Territory of Hawaiʻi in 1956 and fell under the control of the Hawaii Department of Transportation (HDOT) in 1969 thorugh Executive Order No. 2427. In 1971, the National Parks Service declared the area a National Natural History Landmark. In 1996, a Memorandum of Understanding codified the site to be managed for the protection of wildlife and endangered birds by the State of Hawaiʻi DLNR Division of Foresty and Wildlife (DOFAW).

Today, it is referred to as the Kanahā Pond Wildlife Sanctuary (KPWS). A review plan by the U.S. Army Corps of Engineers (USACE), Honolulu District, explained that KPWS "consists of a series of brackish ponds and associated wetlands on 23 (sic) acres of land located within the isthmus area of Maui between the town of Kahului and the main airport" (USACE 2012). The plan further explained:

---

[13] The presence of hale pili implies that pili grass was present in the area. Pili grass was commonly found throughout Hawaiʻi and it is "known in many warm regions, formerly used for thatching houses in Hawaiʻi; sometimes added to the hula altar to Laka, for knowledge to pili or cling" (Pukui and Elbert 1971).

[14] The original text reads: "O Wailuku. O ka apana nona ka Hekuawa o ka helu akahi o na apana mahi ko, nolaila, ua loko e pili ana o Kanaha la a me Mauoni, e na keiki e huki ana i ka ia huki kolo [kalo] o Kahului, ala mai a lawe i Ke Au Okoa" (Nailili 1865: 2).

[15] The U.S. Army Corps of Engineers identified the Sanctuary as being 237 acres in 2012. In 2014, DLNR added a 7.97-acre parcel to the sanctuary.

> When Kahului Harbor was dredged around 1910, a portion of Kanaha pond in the vicinity of the junction of Kahului's Main Street and Haleakala Highway was filled with material dredged from the harbor. During the partial filling of the pond, the existing overflow drainage ditch was replaced with a new channel, with control gates and an outfall to the ocean. The U.S. Navy also altered the land within KPWS considerably during construction of the Naval Air Station Kahului (NASKA) in the 1940s. During and after World War II, numerous munitions bunkers and fill-based access roadways were constructed within the KPWS. As a result of these activities, the northeastern portion of the original pond was filled between 1930 and 1954.
>
> In addition to the physical alteration of the ponds during construction of Kahului Harbor and NASKA, the A&B and airport drainage culverts were constructed along the east and west sides of KPWS in the 1970s and 1980s. These large concrete drainage culverts divert storm water runoff, keeping it from entering the ponds and consequently changing the overall amount of water recharge to and circulation within the ponds (USACE 2012).

Aside from Kanaha and Mauʻoni, there is no evidence that any other significant historic sites exist or existed in the project area. While there are a range of other historic properties, both from the pre-contact and post-contact periods, within Kahului and Wailuku, none exist on or within such proximity to the project area such that the project would have the potential to impact these properties.

The project area's proximity to the loko iʻa makes it likely that ancient Hawaiians traditionally traversed the area. Hawaiians may have been intermittently present in the areas adjacent to the loko iʻa, but the existing evidence indicates that any permanent or semi-permanent traditional hale were located closer to the coastal areas or the perennial streams to the northwest, where natural resources necessary for habitation were more abundant.

E. Natural Resources

1. Flora

In the Botanical Survey conducted within the project area, 49 plant species were discovered and seven of these species were common within the area; only three species recorded of the 49 are indigenous, including ʻuhaloa (*Waltheria indica*, which is one of the common species observed), kīpūkai (*Heliotropium curassavicum*, a rarely occuring species), and pōpolo (*Solanum americanum*, another rare species) (Hobdy 2017). All three indigenous species are present on all of the Hawaiian Islands and are not of conservation or environmental concern.

ʻUhaloa is primarily a medicinal plant. The leaves, stems and roots were pounded, strained and used as a gargle for sore throats, which is a practice that continues today (Abbott 1992). ʻUhaloa was also combined with other plants to create a tonic for young and older children, and seldom adults (Krauss 1993). Canoe builders would also occasionally add the sap of ʻuhaloa to a concoction of kukui root, ʻakoko, and banana inflorescence to create a paint that would stain the hull (Krauss 1993). This native weed remains abundant throughout the Hawaiian Islands and is still treasured as a natural and safe tonic for bodily ailments today.

Kīpūkai is one of two native species of Heliotropium located in the Hawaiian Islands, the other of which is the endemic hinahina (*Heliotropium anomalum* var. *argenteum*). Kīpūkai typically grows at elevations less than 150 feet in salty habitats where other plants are less tolerant, thus allowing it to thrive and spread out as groundcover (Whistler 1993). Kīpūkai was not vastly used by ancient Hawaiians, but there have been records of the plant being dried and brewed as a tonic (Neal 1965). Kīpūkai flowers may also be occasionally used in lei, although the flowers of its relative (hinahina) are much more common; kīpūkai can typically be found in haku or wili lei (McDonald 1981).

Pōpolo is an extremely important medicinal plant, but it also functioned in other aspects of Hawaiian culture. Pōpolo is a member of the nightshade family that grows between one to three feet high and produces purplish black, edible berries (Krauss 1993). These berries were consumed by the ancient Hawaiians as a refreshment on journeys and during times of famine but were not an essential staple to the Hawaiian diet (Krauss 1993). Dyes were also created from both the berries and the leaves, producing blackish purple dye from the former and green dye from the latter (Hiroa 1957). The most significant contribution of pōpolo to Hawaiian culture is as a medicinal treatment.

The juices of the leaves and berries were used alone or in mixtures to heal all respiratory disorders, skin eruptions, and cuts and wounds when mixed with salt (Abbott 1992). The young leaves were eaten to prevent bloating and cure coughs, and served well as a tonic when dried and steeped (Krauss 1993). A compress of the mashed leaves were also applied to the eyes for a variety of problems, including inflammation (Krauss 1993). Additionally, the pōpolo leaves were applied to tender areas as they were sunned, which was a treatment utilized by ancient Hawaiians for sore muscles, joints and tendons (Abbott 1992).

2. Fauna

The project area is arid and lacks a density in vegetation, which makes the area unsuitable for a variety of native fauna. During the Faunal Survey, no mammal species, three (3) non-native bird species, eight (8) non-native insect species, and one (1) non-native mollusk species were discovered in the project area (Hobdy 2017). The survey ensured evening visits to the site in the event that the endangered ʻōpeʻapeʻa or Hawaiian hoary bat (*Lasiurus cinereus semotus*) occurred in the project area, but there were no sightings of this native mammal (Hobdy 2017). The bird species observed include the common myna (*Acridotheres tristis*), gray francolin (*Francolinus pondicerianus*), and the zebra dove (*Geopelia striata*), although all three observed species were rarely occurring throughout the project area. Only one inspect species was common in the project area: the long-tailed blue butterfly (*Lampides boeticus*); the remaining seven insect species were either uncommon or rare (Hobdy 2017). The shell of a non-native giant East African snail (*Achatina fulica*) was also discovered during site visits (Hobdy 2017).

Although no native species were discovered, the project area may be a host to the migratory kōlea or Pacific golden-plover (*Pluvialis fulva*) during winter months. The kōlea is a shorebird indigenous to the Hawaiian Islands. This long-distance travelling plover winters on the Main Hawaiian Islands from August through April, then migrates to Siberia and western Alaska to breed from April through early August (Mitchell et al. 2005). In the winter, kōlea reside on a variety of habitats including crop fields, coastal salt marshes, beaches, pastures, and grassy areas on both urban and undeveloped lands, so the project area can be ideal for the kōlea's habitat needs.

Kōlea, among other birds, play an important role in many myths:

> Birds are notably potential gods or spirit beings. In the machinery of romance migratory birds or those which nest in high cliffs are messengers for the high chiefs in the story. Thus plover (kolea), wandering tattler (ulili), tropic bird (koae), turnstone (akekeke, akikeehiale) are sent by the divine chiefs of the story, generally in pairs, to act as scouts or to carry messages from island to island. The plover, accompanied by the tattler, remains in Hawaii or flies on south from August until the following May or June, when it migrates to Alaska for nesting, leaving behind immature birds and cripples (Beckwitch 1970: 90).

The role of kōlea as messangers to the gods and divine chiefs is further outlined in the Kana moʻolelo, where the kōlea and ulili are sent by the Molokaʻi chief Kapepeʻekauila to reconnoiter before battle (Beckwith 1970: 464).

Beckwith further explains the cultural importance of kōlea in the myth of Kolea-moku, "a man of ancient days who was taught the medicinal arts by the gods and was himself deified after death and worshipped in the heiau at Kailua" (Beckwith 1970: 119). Beckwith clarifies that Kolea-moku may be another name for the ʻaumākua (family gods) of kōlea birds that are elsewhere referred to as Kumukahi, who "was able to take the form of a man or of a kolea bird at will" (Beckwith 1970: 120). One moʻolelo details the bird hunter Kumu-hana recklessly killing the kōlea for sport, to which his neighbor, who worships Kumukahi, warns about the sacrilege. Kumu-hana does not heed his neighbor's warning, so Kumu-hana is attacked by a flock of plover, "who enter his house and peck and scratch him to death. The place where he lived is called Ai-a-kolea to this day" (Beckwith 1970: 137-138).

Although the kōlea has the potential to occur within the project area, its extremely large range and population size prevents it from entering Vulnerable status. Kōlea are protected under the Migratory Bird Treaty Act, which prohibits the taking, possessing, importing, exporting, transporting, selling, purchasing, bartering or any such offers of parts, nests or eggs of any bird listed under the Act.

3. Other Environmental Features

a. Kalialinui Stream

Historic maps indicate that Kalialinui Stream possibly ran close to the project area at one time. Kalialinui watershed[16] runs from Haleakalā down to the coastal outlet called Kaʻa. According to traditional moʻolelo, the name derives from a chief, but may also come from the name of a large medicinal tree. Today, the area of the watershed is 23.9 square miles, with the maximum elevation of 8,333 feet (Atlas 2008: 365). Historic rankings completed on the streams within the watershed determined that no streams within the watershed were of sufficient condition for protection (Atlas 2008: 367). The watershed also received a "0" stream rating (out of a possible "10") in its Native Species Rating based on the number of native species observed in the watershed (Atlas 2008: 370). It is a non-perennial stream with intermittent flow. It ran along the west side of Sunny Side Road, which became Dairy Road.

[16] DLNR Resources Division of Aquatic Resources Watershed Code: 63035

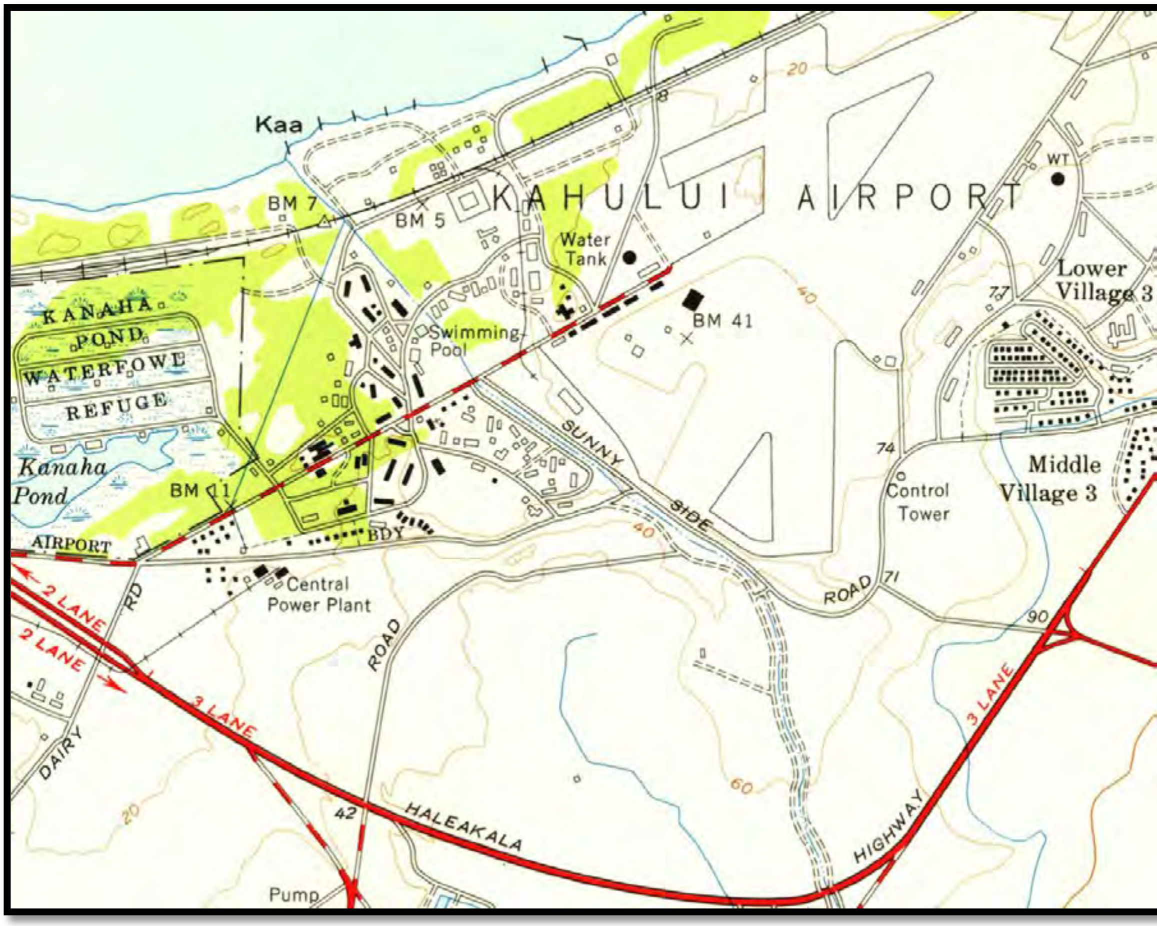

Figure 7. Portion of USGS Paia Quanrangle (1954)

Native testimonies describe the boundary between Kalialinui and Wailuku:

Kalialinui, Kula District (1870)

Kiha hoohikiia a olelo mai:

I Kula kuu wahi i hanau ai ma Kamaole o ka Mokupuni o Maui, Hawaii Pae Aina. Ua noho au me Kamehameha Akahi iloko o ka makahiki 1797. Ua ike au i ka aina o Kealialinui [Kalialinui], a ua ike no au i ka mea e pili ana ia Kealialinui i

Kiha sworn and says:

My birth place was in Kula at Kamaole, Island of Maui, Hawaiian Islands. I lived with Kamehameha First in the year 1797. I know the land of Kealialinui [Kalialinui], I know the things that have been spoken of, that is for the land of oleloia ae la, oia no ka aina o Wailuku, no Kamehameha ia aina. Ua lilo keia wahi ia Kamehameha i ka wa e kaua ana o Kepaniwai [1790], oia ka manawa mua aʻu i ike ai i ua aina la a hiki wale i keia la. O koʻu poe kupuna makuakane ka Luna Hooponopono o Wailuku, Maui nei. Ina e komo mai kekahi konohiki iloko o ke ahupuaa o Wailuku alaila na kuʻu poe kupuna e kuhikuhi i na palena o ua aina la. O ka wa aʻu i ike mua ai i keia aina oia no ka manawa e ola ana o Kamehameha. Aole nae au i lilo i Luna na ke Alii, aka kuʻu poe kupuna wale no. Ua hele au e nana ina palena o Wailuku me kuʻu mau kupuna, a ua ike hoi au ina palena o Kalialinui e kaawale aku ai o Wailuku... ...ua hoomaka mai ka palena o Wailuku mai Kapukaulua mai a hiki i Keone Kapoo, a mai Keone Kapoo mai hoi, a hiki i Pohakunahaha…

Wailuku, that land is for Kamehameha. This place became Kamehameha's at the time of the battle of Kepaniwai [ca. 1790], and that was the first time that I saw that land, and to the present day. My grandfather was the one who oversaw the settlements of Wailuku. If a *Konohiki* came into the *ahupuaa* of Wailuku, my grandfather was the one who showed him the boundaries of the land. The first time that I saw this land was when Kamehameha was alive. I did not become an overseer for the chief, it was my grandfather. I went to look at the boundaries of Wailuku with my elders, and I saw the boundary where Kalialinui is separated from Wailuku… …it begins at the boundary of Wailuku, from <u>Kapukaulua to Keone Kapoo, and from Keone Kapoo to Pohakunahaha</u>…

…Ua ike au he mau loko ia kekahi o Mauoni, ame Kanaha na inoa o ua mau loko ia nei. Aia keia mau loko ia iluna o ka aina o Wailuku o Maui nei. Ua ike maoli au i keia mai Loko ia. He

<u>I know the fishponds Mauoni and Kanaha are the names of those ponds. These ponds are upon the land of Wailuku, Maui. I have known these fishponds very well. I</u>

kanaka wau no na Alii. O ke kumu o kuʻu ike ana no Wailuku ia mau loko ia, noho iho la kuʻu kaikuahine me kuaana. A oia no ka mea nana i malama ia mau loko i haiia ae la malalo o Kamehameha Akahi. Pau o Kamehameha Akahi noho iho o Auwae, o Naea mai kona hope ka makua o Emma. A pau oia noho iho la o Keahi. Pau no oia lilo iho la ia P. Nahaolelua ke konohiki i keia manawa.

<u>was a man for the chief. The reason that I know Wailuku and these ponds is that I stayed with my elder sister and brother. They were the ones who cared for the above mentioned ponds under Kamehameha First. When Kamehameha First died, they went to Auwae, then Naea was his replacement, the father of Emma. And when he was finished, it went to Keahi. When he was done, it went to P. Nahaolelua, who is the *Konohiki* at this time</u>.

Ninauia i kela aoao o W. C. Jones ka Loio, a olelo mai:

Question asked by the side of C.W. Jones, Attorney, and answered:

Hanau au i Kula. I Hamakua poko au kahi i noho ai, i ka manawa e ana ia ana ka aina o Kalialinui. I laila wau kahi i kuhikuhi pololei ai i ka palena, na Kuihelani au i hoouna mai e hele aku e kuhikuhi i ka palena o Wailuku ame Kalialinui. Ua hele pu mai no e Makalena me au. Ua hai mai no na Kanaka kahiko iaʻu ina palena o na aina i haiia ae la. Ua hele no au maluna oia mau aina a puni iaʻu mamua o kuʻu holo pu ana me

I was born at Kula. I lived in Hamakua poko at the time that the surveying was done at Kalialinui. I pointed out the correct boundaries then. I was sent by Kuihelani to go and point out the boundaries of Wailuku and Kalialinui. Makalena also came with me. The old people are the ones who told me the boundaries of the said lands. I have been all across the lands, and around them before my traveling

Makalena ma e kuhikuhi ai i ka palena aina. Ua hele pinepine no au iluna oia mau aina…

…Ua ike makou ia mau loko i kapaia o Mauoni ame Kanaha. He Alii o Kihapiilani oia ka mea nana i kukulu i ka pa ma hai o na loko ia i hai ia ae la. Oia ke Alii o Wailuku, Mokupuni o Maui; aole no ke kukuluia ana o ka pa, oia mau loko he kumu ia e kaawale ai o Kalialinui ame ka aina o Wailuku mai. No ke Alii ka aina i kapaia o Kealialinui oia no ka aina mai Kinohi mai… [Volume 1:5-7]

with Makalena folks, and shown the boundaries. I have often gone upon the lands…

…<u>We saw the ponds called Mauoni and Kanaha. The Chief Kihapiilani is the one who made the walls of the ponds spoken of. He was the chief of Wailuku, Is. of Maui; the walls were built for these ponds and are the source that separates Kalialinui and the land of Wailuku</u>. The land called Kealialinui is for the chief, it has been that way from the beginning… [Maly, translator] (Maly and Maly 2003: 355-356)

From this testimony, we can deduce native tenants considered Kealilinui [or Kalialinui] to be an important place and resource.

b. Rain Names

Akana and Gonzalez in *Hānau Ka Ua: Hawaiian Rain Names* explain the significance of the wind and rain in Native Hawaiian culture:

> In the mind…of our Hawaiian kūpuna [(ancestors)], every being and every thing in the universe was born. Our kūpuna respected nature because we, as kānaka, are related to all that surrounds us – to plants and creatures, to rocks and sea, to sky and earth, and to natural phenomena, including rain and wind. This worldview is evident in a birth chant for Queen Emma, "Hānau ke ali'i, hānau ka ua me ka makani" (The chiefess was born, the rain and wind, too,

> were born). Our kūpuna had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people (Akana and Gonzalez 2015: xv).

To the Native Hawaiians, no two rains are ever the same. Rain can be distinguished based on its intensity, the way it falls, and its duration, among other things. The following are a collection of rains that occur within Wailuku moku. Moʻolelo, ʻōlelo noʻeau (traditional sayings), mele, oli (chants), etc., associated with the particular rain name are also provided to give insight into the importance and cultural significance that the different types of rains have to the Native Hawaiian people.

i. Kiliʻoʻopu Rain

Kiliʻoʻopu rain is associated with Wailuku, Maui and is also the name of a wind.

<u>Rain of Waiheʻe, Maui</u>

Kuʻu kāne mai ka ua Kiliʻoʻopu o Waiheʻe	*My dear husband from the Kiliʻoʻopu rain of Waiheʻe*
ʻAuʻau ka ʻuhane i ka wai o Nīʻaukawa	*The spirit bathes in the water of Nīʻaukawa*

From a kanikau (lament) for Kamakaokalani (Akana and Gonzalez 2015: 83).

<u>Rain of Waikapū, Maui</u>

Ua Kiliʻoʻopu – Waikapū, Maui.

From a list of rain names and their descriptions (Akana and Gonzalez 2015: 84).

Rain of Wailuku, Maui

Ua Kiliʻoʻpu – Wailuku, Maui.

From a list of rain names and their descriptions (Akana and Gonzalez 2015: 84).

ii. ʻUlalena Rain

ʻUlalena or Ulalenalena rain is probably related to Lena and is associated with Lilikoʻi and Piʻiholo, Maui. It is also found on other parts of Maui and on Kahoʻolawe, Oʻahu, and Kauaʻi. Also the name of a hill in Hāmākualoa, Maui. "ʻUla lena" means "yellowish-red" (Akana and Gonzalez 2015: 262).

Rain of Wailuku, Maui

Pau ʻole koʻu mahalo i ka laulā o Kamaʻomaʻo	*My admiration is endless for the expanse of Kamaʻomaʻo*
Ka hālana maikaʻi a Keālia	*The fine rising of the waters of Keālia*
Ka hemolele o ka ua ʻUlalena	*The perfection of the ʻUlalena rain*
Lena ka pua o ka māmane pala luhiehu i ka lā	*Yellow are the blossoms of the māmane, soft and lovely in the sun*

From a mele mākaʻikaʻi (travel chant) for ʻEmalani Kaleleonālani by Kaleipaʻihala (Akana and Gonzalez 2015: 267).

iii. Hōʻehaʻili Rain

Hōʻehaʻili rain is associated with Waiehu, Maui and is also found on Kauaʻi. "Hōʻeha ʻili" means "to hurt the skin." It is both the name of a specific rain and a generally descriptive term; its various usages are determined by the context (Akana and Gonzalez 2015: 36).

Rain of Waiehu, Maui

Ka ua Hōʻehaʻili o Waiehu.	*The skin-hurting [Hōʻehaʻili] rain of Waiehu.*

An ʻōlelo noʻeau (Akana and Gonzalez 2015: 37).

He aloha, he lihaliha, he kūmākena	*Loving, heartsick, grief-stricken*
He ʻū iā ʻoe	*Mourning for you*
E Hon. Iosepa Kahoʻoluhi	*O Hon. Joseph Kahoʻoluhi*
Nāwahīokalaniʻōpuʻu	*Nāwahīokalaniʻōpuʻu*
A haʻo ē!	*We shall truly miss you!*
I uē ʻia mai nei ʻoe e Nā Wai ʻEhā	*You have been mourned by the lands of the four waters*
E ka makani Kiliʻoʻopu o Waiheʻe	*By the Kiliʻoʻopu wind of Waiheʻe*
Ka ua Hōʻehaʻili o Waiehu	*And the Hōʻehaʻili rain of Waiehu*

From a message of condolence for the passing of Joseph Nāwahīokalaniʻōpuʻu from people of Nā Wai ʻEhā, Maui (Akana and Gonzalez 2015: 37).

iv. Nāulu Rain

A rain that falls when it is calm, associated with East Maui (Akana and Gonzalez 2015: 191).

Rain of Kula, Maui

Ke hoʻi nei ka ʻuhane i ka malu niu o Lele	*The spirit s returning to the shade of the niu trees of Lele*
I ka malu kuawa o Wailuku	*To the shelter of Wailuku Valley*
I ka ua Nāulu noe anu o Kula	*To the cold, misty Nāulu rain of Kula*
I ka ua noe uahi moe i ke pili	*To the smoky, misty rain that rests upn the pili grass*
I pili ʻia ka ua me ka lā	*Joined are the rain and the sun*

Ke anu hoʻi me ke koʻekoʻe *The cold and the chill*

A kanikau for L.L. Ua written by the same's students at the Lahainaluna Seminary (Akana and Gonzalez 2015: 192)

c. Wind Name

Based on the interview with Daryl Fujiwara, extensive research was conducted to identify traditional Hawaiian wind names in the area. Only two names were identified, meaning that any additional traditional names may already be lost or otherwise unknown today.

The name Iʻa-iki was identified for the Wailuku area. The name Iʻa-iki means "little fish." It is also said that the name of the wind of Wailuku is "Makani-lawe-malie, the wind that takes it easy" (Sterling 1998: 62).

d. Wai (Fresh Water)

Fresh water (wai) is of tremendous significance to Native Hawaiians. It is closely associated with a variety of Hawaiian gods. According to traditional accounts, Kāne and Kanaloa were the "water finders:" "Ka-ne and Kanaloa were the water-finders, opening springs and pools over all the islands, each pool known now as Ka-Wai-a-ke-Akua (The water provided by a god)" (Westervelt 1915: 38). Kāne is widely known to be closely associated with all forms of water, as outlined in the mele "He Mele No Kane."

There was no element more important or precious than water. There was no god more powerful than Kāne. Pua Kanahele recounts the oli "ʻO Kāne, ʻo wai ia aliʻi o Hawaiʻi?" and notes of the oli: "The chant begins with Kāne and focuses on this deity as the connective force of all the poʻe akua, or god family. All the entities mentioned in each paukū, or verse, are a manifestation of Kāne" (2011: 24). The association between water and Kāne is logical considering certain interpretations of Hawaiian mythology identify Kāne as the most powerful of all the Hawaiian gods.

Further investigation into the relationship between Kāne and Pele would be appropriate and helpful. Some interpretations identify Kāne as Pele's father (Westervelt 1915). A full analysis of the different perspectives on Pele and Kāne would be helpful to refining an approach in developing community education programs for geothermal energy and culture. A brief analysis is provided below.

He Mele No Kane asks:

E ui aku ana au ia oe,	One question I ask of you:
Aia i hea ka Wai a Kane?	Where flows the water of Kane?
Aia i lalo, i ka honua, i ka Wai hu,	Deep in the ground, in the gushing spring,
I ka wai kau a Kane me Kanaloa-	In the ducts of Kane and Kanaloa,
He waipuna, he wai e inu,	A well spring of water, to quaff,
He wai e mana, he wai e ola,	A water of magic power- The water of life!
E ola no, ea!	Life! O give us this life!

This mele and other mo'olelo are clear: Kāne is water. It is deeply valued among the Hawaiian people. The only exceptions may be mist, known to be associated with Lilinoa, and snow, associated with Poliahu. There is an extensive body of traditional knowledge about the expeditions of Kāne and Kanaloa during which Kāne drove his ʻōʻō (digging stick) into the earth in search of water.

There is heightened sensitivity regarding water in East Maui, where the project is located. Contemporaneous protections around water as a "public trust resource" extend back to the Kingdom, where the concept of owning water contradicted Hawaiian cultural values and traditions. Under the monarchy, control of water was reserved for use by the people who lived on and worked the land. The use of surface water was strictly controlled through the kapu system to ensure that all land tenants enjoyed an abundant availability of water. Farming, particularly kalo or taro, occurred regularly, especially in places with notably fertile lands like those found in the watersheds of East Maui. As early as 1839, the public use of water was codified by Kauikeaouli, Kamehameha III. His "Respecting Water for Irrigation" law stated: “In all places which are watered by irrigation, those farms which have no formally received a division of water, shall, when this new regulation respecting lands is circulated, be supplied in accordance with this law, the design of which is to correct in full all those abuses which men have introduced. All those farms which were formally denied a division of water, shall receive their equal proportion. Those bounties which God has provided for the several places should be equally distributed, in order that there may be an equal distribution of happiness among all those who labor in those places” (Cited in *Reppun v. Board of Water Supply*, 656 P.2d 57 1982). This public right eventually found its way into existing law, where the Hawaii Water Code continues to recognize and protect traditional farming and mahi ʻai (farmers).

According to the Water Availability assessment conducted by Tom Nance Water Resource Engineering, the potential impacts of the project’s water usage are as follows:

> The Kanahā Hotel project has the potential to impact water resources in the following three ways: use of groundwater for potable consumption and landscape irrigation; generation of domestic wastewater requiring treatment and disposal; and creating an increase in surface runoff in comparison to the undeveloped site. Each of these potential impacts is described and quantified in the sections following.
>
> Use of Groundwater for Potable Consumption and Landscape Irrigation. Potable and nonpotable water use within A&B’s Maui Business Park will be provided by separate privately owned and operated systems. Supply for the potable system is provided by two wells identified as State Nos. 5129- 004 and -005 and known as the Waiale-1 and Waiale-2 wells. Both wells are outfitted with 450 gallons per minute (GPM) pumps and draw water from the Kahului Aquifer System. Water from the wells is delivered into an adjacent 0.6-million-gallon storage tank, from which it flows by gravity via a 16-inch transmission pipeline to the Business Park.
>
> The projected use of potable water for the project is 150 gallons per day (GPD) per room or 30,000 GPD for the project. Notably, this use rate is substantially less than the 350 GPD/room design standard of the Maui Department of Water Supply (MDWS). However, it is based on analyses of the actual use rates of the Courtyard by Marriot in Kahului and the Residence Inn at Wailea, both of which have average potable use rates which are less than 150 GPD/room. To ensure that A&B’s private potable water system will have adequate supply for the Kanahā Hotel and all other lots in the Business Park at full build out, R. D. Olson has entered into an agreement with A&B to construct a third supply well for the system.

The non-potable water system that will provide water for the Hotel's landscape irrigation is supplied by a single well identified as State No. 5226-001. It is actually a horizontal skimming tunnel that was constructed in 1899 for sugarcane irrigation and drew water from the Kahului Aquifer System. During the period of its use by HC&S, it was also known as Shaft 19 and Puunene Pump 5. In that period, it had an installed pumping capacity of nine (9) million gallons per day (MGD) and average use on the order of six (6) to seven (7) MGD. When the Shaft was modified to supply the Business Park, three new pumps of 450 GPM capacity were installed. Delivery to customers is by an ondemand pumping system without reservoir storage.

Projected use of the water for landscape irrigation is presented in the report. It includes some potable water less salt tolerant plants (1,287 GPD on 0.44 acres) and the balance for supplied by the non-potable system (2653 GPD on 0.96 acres).

Wastewater Generation, Treatment, and Disposal. Wastewater generation of the project, as stated in Table 3 of Austin Tsutsumi & Associates (2020), is expected to be 30,000 GPD, equivalent to 100 percent of the projected domestic water use. The wastewater will be conveyed via existing infrastructure to the County's Wailuku-Kahului Wastewater Reclamation Facility where it will be treated to secondary (R-2) standards. Disposal of the treated effluent will be into the battery of eight (8) disposal wells which deliver the treated effluent at depths from 170 to 380 feet below sea level.

Surface Water Runoff. During substantial rainfall events, surface runoff from the property moves in a westerly direction to an existing catch basin in Lau'o Loop. From there it is conveyed via the existing drainage system in the Maui Business Park to an existing concrete lined channel which runs to the shoreline. Surface runoff resulting from the proposed development, due to its impervious surfaces, will be more frequent and of greater magnitude than now occurs from the undeveloped site. It will follow the same path to the shoreline as it presently occurs.

No streams will be impacted by the project.

It is critical for this CIA to consider impacts to cultural practices, even when the practices may take place outside the project area if project activities within the APE have the potential to impact traditional practices and customs. In this particular case, it is appropriate to carefully consider the impact water usage may have on farmers and other practicers within the watershed(s) from which the water for this project will be drawn, which is Kahului and ʻĪao. Even though this project area is near the shoreline, if the water usage potentially results in an allocation of water that diverts that resources from cultural and/or traditionally uses, that potential impact should be considered. Based on the report by Nance, it does not appear that water usage will impact traditional or customary practices.

F. Intanigble Cultural Resoures

It is important to note that Honua Consulting's unique methodology divides cultural resources into two categories: biocultural resources and built environment resources. We define biocultural resources as elements that exist naturally in Hawaiʻi without human contact. These resources and their significance can be shown, proven, and observed through oral histories and literature. We define built environment resources as elements that exist through human interaction with biocultural resources whose existence and history can be defined, examined, and proven through anthropological and archaeological observation. Utilizing this methodology is critical in the preparation of a CIA as many resources, such as those related to akua (Hawaiian gods), do not necessarily result in material evidence, but nonetheless are significant to members of the Native Hawaiian community.

Hawaiian culture views natural and cultural resources as being one and the same: without the resources provided by nature, cultural resources could and would not be procured. From a Hawaiian perspective, all natural and cultural resources are interrelated, and all natural and cultural resources are culturally significant. Kepā Maly, ethnographer and Hawaiian language scholar, points out, "In any culturally sensitive discussion on land use in Hawaii, one must understand that Hawaiian culture evolved in close partnership with its natural environment. Thus, Hawaiian culture does not have a clear dividing line of where culture ends and nature begins" (Maly 2001: 1).

1. ʻŌlelo Noʻeau

ʻŌlelo noʻeau are another source of cultural information about the area. ʻŌlelo noʻeau literally means "wise saying" and they encompass a wide variety of literary techniques and multiple layers of meaning common in the Hawaiian language. Considered to be the highest form of cultural expression in old Hawaiʻi, ʻōlelo noʻeau bring us closer to understanding the everyday thoughts, customs, and lives of those that created them.

The ʻōlelo noʻeau presented here relate to Kahului, and its larger ahupuaʻa, namely Wailuku. These ʻōlelo noʻeau are found in Pukui's *ʻŌlelo Noʻeau: Hawaiian Proverbs & Poetical Sayings* (1983). The number preceding each saying is provided.

1711 Ke inu aku la paha aʻu ʻĀlapa i ka wai o Wailuku.
My ʻĀlapa warriors must now be drinking the water of Wailuku.
Said when an expected success has turned into a failure. This was a remark made by Kalaniōpuʻu to his wife Kalola and son Kiwalaʻō, in the belief that his selected warriors, the ʻĀlapa, were winning in their battle against Kahekili. Instead they were utterly destroyed.

1722 Ke kai holu o Kahului.
The swaying sea of Kahului.
Refers to Kahului, Maui.

2300 Na wai ʻehā.
The four wai.
A poetic term for these places on Maui: Wailuku, Waiehu, Waiheʻe, Waikapū, each of which has a flowing water (wai).

2351 Nūnū lawe leka o Kahului.
Letter-carrying pigeon of Kahului.
In 1893 carrier pigeons arrived at Kahului, Maui. One was brought to Honolulu and released with a ltter tied to its neck. It flew back to Kahului. This was of such great interest to the people that a song was written and a quilt design made to commermorate the event.

2578 Pākāhi ka nehu a Kapiʻioho.
The nehu of Kapiʻioho are divided, one to a person.
Kapiʻioho, ruler of Molokaʻi, had two ponds, Mauʻoni and Kanaha, built on his land at Kahului, Maui. The men who were brought from Molokaʻi and Oʻahu to build the

ponds were fed on food brought over from Molokaʻi. The drain on that island was often so great that the men were reduced to eating nehu fish, freshwater ʻōpae and poi. The saying is used when poi is plentiful but fish is scarce and has to be carefully rationed.

2647 Pili ka hanu o Wailuku.
Wailuku holds its breath.
Said of one who is speechless or petrified with either fear or extreme cold. There is a play on luku (destruction). Refers to Wailuku, Maui.

2912 Wailuku i ka malu he kauwa.
Wailuku in the shelter of the valleys.
Wailuku, Maui, reposes in the shelter of the clouds and the valley.

2. Mele

Honua Consulting completed searches of mele written about the ahupuaʻa of Kahului.[17] Maui historian Inez Ashdown wrote in 1976 about the importance of mele:

> The natives of Hawaiʻi Neʻi saw the Creator in everything and the Haku Mele or Music Masters delighted in presenting the chants and songs, mele and oli, to inspire the people. Such mele tell of God's assistant spirits which, to the imaginative natives, represented the winds, rains, and so on. Each spirit of creation was depicted as male or female and was given a personality and a name indicative of purpose. Hence the name of the volcanic action creating and cleansing the earth. She is beautiful, alluring, desirable. She also is unpredictable because she is tempermental and usually full of fiery emotions. She is an old woman asking help when she lies to test mortals, and woe betide anyone who is rude or inconsiderate of this form of an older person to whom respect and Aloha must be given (Ashdown 1976: 3).

[17] It should be noted that there are numerous mele about the larger Wailuku area that have not been included in this assessment as they did not yield information closely associated with the project area.

The following mele was written by Palani Vaughan in honor of the first passenger train service in Hawaiʻi, which was between the town of Kahului and city of Wailuku on Maui on July 29, 1879. Railroad building in Hawaiʻi was the result of the encouragement by King David Kalākaua (Vaughn 2015).

Kaʻa Ahi Kahului – by Palani Vaughn

Eia ka moʻolelo pōkole	Here is the short story
No ke kaʻa ahi mua o Hawaiʻi Nei	About the first train in Hawaiʻi
Chūkū-chūkū maila, chūkū-chūkū maila	Choo-choo, choo-choo
Koʻehu (kuehu) aku ma ke alahao	Stirring dust along the tracks
Hūlō, Hūlō, no Ka Lani e	Hurrah! Hurrah! for the chief
No Ka Lani ʻO Kalākaua	For the chief, Kalākaua
Ke mea i kākau kona inoa	The one who signed his name
Ma ka Palapala no ka chūkū-chūkū	On the Act for the Railroad
Lohe mai e nā keiki hānau o ka ʻāina	Listen, oh children of the land
Lohe mai i ka moʻolelo chūkū	Listen to the train story
A i ko ʻoukou Ka Lani hope	And (hear) about your last King
Ka mea i kākau kona inoa	The one who signed his name
Hui:	Chorus:
Wū-wū Kaʻa Ahi Kahului	Woo-woo! Kahului Railroad
Ke alahao a i Wailuku	Tracks all the way to Wailuku
Wū-wū Kaʻa Ahi Kahului	Woo-woo! Kahului Railroad
Chūkū-chūkū mua o Hawaiʻi	The first train of Hawaiʻi

The following mele for Queen Emma Naʻea Rooke was composed as a greeting for her on the occasion of her trip to Maui in 1882. As her ship entered Kahului Harbor, lehua blossoms were floated on the water to greet the Queen (Verse 2). Lucy Kamalalehua Peabody, a companion of the queen, says this was written by Sylvester Kalama, who was aboard the ship that took the queen to Maui. Charles E. King credits this mele to Nuʻuanu. After the death of her husband, Alexander Liholiho Kamehameha IV, Emma campaigned for the royal office, losing the election to David Kalākaua. Her campaign headquarters was in Nuʻuanu Valley, and many believe this was used as the composer's name. The Queen was always addressed as Emma or Emalani, but was called Kalanikaumaka (the chiefess to whom everyone looks) by her immediate family. Upon the tragic death of her son, Prince Albert in 1862, she asked her people to call her Kaleleokalani, the flight of the heavenly one. When her husband, Kamehameha IV died a year later, she asked that the name be changed to the plural form, Kaleleonālani (Nuʻuanu and Kalama 2015).

Kaleleonālani (Flight of the Royal Ones) – by Nuʻuanu / Sylvester Kalama

Welo ana e ka hae Hawaiʻi	The Hawaiian flag is waving
Hāliʻi lua i ka ʻili kai	Over the surface of the sea
E haʻi mai ana i ka lono	Telling the news
Ke kuini Emalani ko luna	Queen Emma is on board
Hui:	Chorus:
Kaleleonālani kou inoa	Kaleleonālani is your name
A he hiwahiwa ʻoe na ka lāhui	You are beloved by the nation
A he lani ʻoia la no ʻoukou	She is the chiefess for all of you
A he milimili hoʻi na mākou	And cherished by us
A waho o na nalu o Kōlea	Outside the surf of Kōlea
ʻIke ʻia i ka nani o Kahului	The beauty of Kahului is seen
ʻAʻohe mea nani ʻole o laila	There is not a thing without beauty
Ua nuʻa ka lehua ʻau i ke kai	Even lehua blossoms floated out to sea

Ui aʻe nei Emalani	A question from Emalani
Pehea mai la ʻoukou	How are all of you?
Ka manawa kupono kēia	This is a suitable time (to land)
E nā hoa hele o ke kai loa	My traveling companions on the high seas

The following mele was composed by Alice Johnson as a celebration of the beauty and majesty of Maui. The mele features key locations throughout Maui including Kahului and its wharf, ʻĪao, and Haleakalā while praising Maui as the best of the Hawaiian Islands because of the unforgettable beauty it offers (Johnson 1938).

Aloha ʻIa No ʻO Maui – by Alice Johnson

Aloha ʻia nō ʻo Maui	How we love Maui
Nā hono aʻo Piʻilani	Beloved land of Chief Piʻilani
Uluwehi i ka pua roselani ē	She is decked with wreaths of roses
Nā pua ʻala onaona	And other fragrant flowers
Kaulani ʻoe e Kahului	You are famed Kahului
Ke kai holuholu ē	For your rolling waves
A me ka uapo hoʻokipa malihini ē	And for your wharf which welcomes visitors
I kou ʻāina nani ē	To your beautiful isle
Haʻaheo wale hoʻi ʻoe	Oh, how proud you look
Kepaniwai o ʻĪao	O water course of ʻĪao
Mākaʻikaʻi mau ʻia ana lā	You are constantly being visisted
E nā malihini ē	By many strangers
Kilakila Haleakalā	Majestic is Haleakalā
Kuahiwi nani o Maui	Beautiful mountain of Maui
Kaulana kona inoa puni Hawaiʻi	Whose name is known throughout Hawaiʻi
Ke alanui kīkeʻekeʻe	For its winding road

Haʻina mai ka puana	The end of my song I sing
ʻO Maui nō e ka ʻoi	Of Maui, best of the islands
Me kona nani hoʻohenoheno	Whose beauty woos us all
He nani poina ʻole	Her beauty we cannot forget

The following mele honors the Inter-Island Steamer, Hualālai, that operated between the islands in the 1930's. This steamer was named for the famous Kona volcano of the same name (Akiu 2015).

Hualālai – by Roger Akiu

Kaulana e ka holo, e, e, e	Famous is the journey
O Hualālai lā	Of Hualālai
Mana kai holo holo e	Sailing on the powerful current in the sea
Aʻo Kahului lā e	Of Kahului
O ka helena ana ia lā, e, e, e	The appearance
A ka wahine uʻi lā e, e, e	Of this beautiful woman
E kilohi iho ʻoe lā e	(I) stare at you, then look down
He malino i ke kai	At the calm sea
E kūlana hiehie lā, e, e, e	Distinguished
Kō Hualālai lā, e, e, e	Is Hualālai
Kohu kakela nui lani ʻike kai	Recognized as the castle of the sea
Nani wale ke ʻike aku	Beautiful to see
Haulani ke Hualālai lā, e, e, e	Constantly moving is Hualālai
Ke kuini hoi ike kai, e, e, e	The queen of the sea
Na ale ka moana kou hoa pili	Friend of the waves
ʻAe kohu ai ka helena	Ruler of her travels

Haʻina mai ana ka puana, e, e, e	Tell the refrain
No Hualālai lā, e, e, e	Of Hualālai
Kakela hiehie lani ike kai	Castle of the sea
Nani wale ke ike aku	Beautiful to see

Written by Eddie Kamae and Pilahi Paki then recorded by Eddie Kamae and the Sons of Hawaʻi, this succeeding mele expresses a smell that one who travels on the island of Maui will experience when traveling from Kahului to Lahaina. This scent is caused by the residue of burnt cane that is emptied into the ocean at Launuipoko, the area between the village of Olowalu and Lahaina. To experience this scent is what Hawaiians call Kela Mea Whiffa (Kamae and Paki 1975).

Kela Mea Whiffa (The Breath of Love) – by Eddie Kamae and Pilahi Paki

Mai Kahului komo Lahaina	From Kahului to Lahaina
Ke ala onaona i hanu	The fragrance that one breathes
Naue aku au ma Olowalu	As we go along pass Olowalu
He noʻe au no ke kanaka	A rare experience awaits all
Hale nui me ka ihu pinana	Then, the big house with the smoke stack
Ike aku au i ke kapulu	Where activities seldom cease
A hanu au i na mea lepo	Sends its natural products
Maluhi au kela mea whiffa	To stay at kela mea whiffa
Hui:	Chorus:
ʻAuhea e kela mea whiffa	Where is kela mea whiffa
Oia hanu a ke aloha	The breath of love
Ma ke lauko a kiawe	Between sugar cane and kiawe
A malaila kou manaʻo	For this is where you'll find me
ʻAuhea e kela mea whiffa	Where is kela mea whiffa
Oia hanu a ke aloha	The breath of love
Ma ke lauko a kiawe me ea	Between sugar cane and kiawe

Kōpaʻa ka poʻe haole	Sugar cane introduced by foreigners
Ulu ana a nui hewahewa	And grown in abundance
Mala nui nā lau uliuli	Acres and acres of green stuff
Ike ʻoe a mamao	You see all around you
Puhipuhi ia nā mala ko	The burning of the cane at the fields
I maha hoʻi ke ʻohi	Makes it easier to harvest
ʻAuhea ʻoe mea whiffa	Where are my sweet whiffa
Ma Launiupoko kela mea whiffa	At Launuipoko kela mea whiffa

G. Cultural Practices

Prior to contact and modernization, a range of cultural practices likely took place in the project area. These practices would have been predominantly related to traditional agriculture and aquaculture and were obstructed beginning in the 19th century by Western modernization. Access to wahi pana (legendary places) and resources were adversely impacted by fee simple ownership of the area by foreigners. Hawaiian historican John Clark notes, at least in the 1970s, that some cultural practices still occur at Kahului Bay: “This area of Kahului Bay is sometimes called Kahului Breakwater Park and is frequented primarily by fishermen, surfers, boaters, and *limu* gatherers” (Clark 1980: 8). Yet, in his description of the neighboring Kanahā, Clark provides more detail about where such cultural activites occur:

> Naska also included the present Kanahā Beach Park, a long park that includes about one mile of shoreline. The entire park is fronted by a wide white sand beach that is broken into numerous pockets by a series of boulder groins. These rock piles were placed in the ocean for the purpose of sand and land retention, as the entire shoreline from Kūʻau to Waiheʻe has had serious erosion problems for many years. The inshore bottom is shallow and is composed of a mixture of sand and rocks, making a swimming area that is attractive primary to children. The water is almost invariably murky. The beach, frequented primarily by fishermen, limu pickers, and strolling

picnickers, being Makai of Kahului Airport and ends at Hobron Point, the right point of Kahului Harbor (Clark 1980: 9).

Contemporaneouly, practices in the district (although not specifically in the project area) include canoe paddling, fishing, hula, and within the larger moku, traditional farming.

1. Laeʻula o Kai

Based on the information provided from interviewee Daryl Fujiwara, the Laeʻula o Kai canoe club and their activities were further researched. Laeʻula O Kai outrigger canoe club is a culturally based 501(c)(3) nonprofit organization located at Kanahā on the north shore of Maui, Hawaiʻi. Their mission is "To perpetuate the sport and culture of Hawaiian canoe paddling in an atmosphere of respect and aloha. We strive to be Laeʻula O Kai, well-trained and wise in the ways of the lowlands and seas."

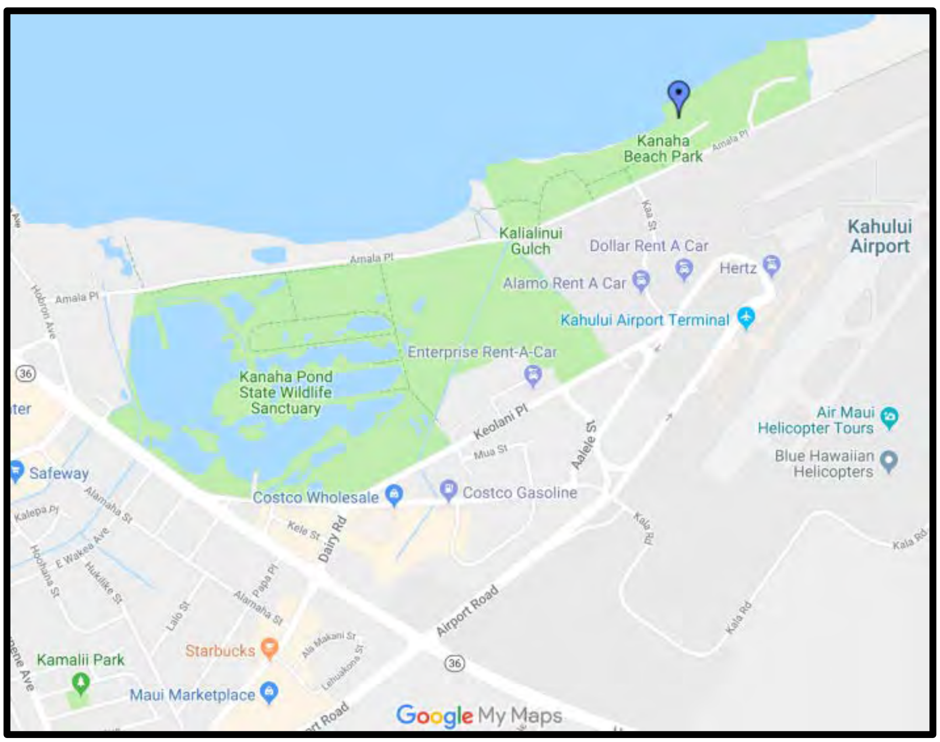

Figure 8. The blue pin denotes the location of Laeʻula o Kai hālau waʻa, which is approximately one mile from the project area (Map: Laeʻula o Kai)

The club’s hālau waʻa (canoe house) is located at Kanahā Beach Park behind Kahului Airport. It is approximately one mile from the project area. The Kahului Airport property lies between the hālau waʻa and the project area and includes the existing car rental properties and the property where the airport expansion is being proposed.

Considering the distance from the project area and the heavy industrial uses on the properties between the project area and hālau waʻa, it is highly unlikely the project has any potential to adversely impact the tangible cultural resources located at the hālau waʻa or otherwise impact any of the ongoing cultural activities that take place at Kanahā Beach Park or in the adjacent waters.

V. Oral Records, Interviews and Consultations

A. Oral Histories and Past Studies

In 2003, co-author of this study Kepā Maly and his wife Onaona Maly conducted an extensive historical study for the Nature Conservancy entitled *Ka Hana Lawaiʻa a me nā Koʻa o Nā Kai ʻEwalu*, which contained extensive oral history interviews that were reviewed for this assessment.

One interviewee was James Tatsuo Tanaka, a Japanese fisherman residing in ʻĪao Valley on Maui. He discussed the small weke he used to see in Wailuku and how ʻoama have declined. He specifically references how the plantation harmed the fisheries: “the spawning areas for the *weke*, *moi*, mullet and things like that, they got all polluted, mostly from the fertilizing, when the big rain comes and water going into the ocean” (Maly and Maly 2003). He also interviewed Robert “Bobby” Luʻuwai, a known kupuna fisherman from the Mākena area. He spoke about in the old days; fishermen respected each others’ fishing areas. He noted that “it was that unspoken rule, that you never go in front of another person’s house.” He specifically noted that Kahului fishermen had their own fishing area in the Kahului waters (Maly and Maly 2003). No other interviews in Maly and Maly’s study yielded additional information on Kahului.

Based on expertise and recommendations from members of the community, information from six interviews are included in this study: Kumu Hula Cody Pueo Pata, Kumu Hula Sissy Farm Lake, Maui Historical Society President Ashley Awakea Lindsey, Maui Civic Club Leader Daryl Fujiwara, Kumu Hula Kahulu Maluo-Pearson, and Farmer Bobby Pahia.

ʻĪao Valley farmer and resident Kainoa Horcajo was also contacted for an interview but declined to be interviewed. Waikapū farmer Hōkūao Pellegrino was also contacted multiple times by Kepā Maly for an interview and did not respond to the requests.

Interviewed individuals include those with lineal and cultural ties to the area of Kahului and its surrounding area with regard to regional biocultural resources, potential impacts to these biocultural resources, and mitigation measures to minimize and/or avoid these impacts.

A summary of each interview has been completed and will be sent first to the individual interviewed for review. Upon approval from the interviewee, it will be submitted for inclusion in this CIA, which is part of the full DEIS. Consent to participate in the assessment is obtained from each individual included herein. Consent is obtained verbally or in writing and kept on file with Honua Consulting.

The interviewees, all cultural experts in various fields, provided a rich body of information about the project area and larger geographic extent. All information provided by the interviewees was followed up on with extensive research and incorporated throughout the body of the assessment, with particular emphasis on integrating the information provided in the interviews into the impact assessment and recommendations.

B. Interview with Cody Pueo Pata

Photo 2. Kumu Hula Cody Pueo Pata (Photo Credit: Kaniʻela ʻUkulele)

Date of interview: October 25, 2017

Interviewee: Kumu Hula Pueo Pata

Interviewer: Matthew Sproat

Location: Telephone

1. Biography

Kumu Hula Pueo Pata is a fluent Hawaiian language speaker and a well-respected hula master, having been raised in the hula traditions of legends like George Naope, Nona Kaluhiokalani, Keʻala Kukona, Jay Jay Akiona, and others. His extensive training also afforded him opportunity to learn a wide range of moʻolelo and traditional skills from many revered kūpuna.

Kumu Pata's talents as a singer and musician first came to public attention when he won the statewide Frank B. Shaner Falsetto Singing Contest in 1999. Those talents have been honed and refined in the intervening years as he performed in hula and cultural events throughout the islands, continental U.S., and Japan. A panel of language experts and fellow composers have acknowledged his skills as haku mele (composer) in naming Pueo a finalist in the prestigious Nā Hōkū Hanohano haku mele category a total of four times before he won the award in 2007 for Mili'opua from his *He Aloha…* album. Kumu Pata is widely recognized as a gifted composer and he has taught the art of haku mele to students at Kamehameha Schools, Maui campus.

He was raised on Maui in Pukalani, is a cultural practitioner, and has extensive knowledge about the project area. He was the last Kumu Hula to ʻūniki from Hula great and Merrie Monarch founder George Naope. In 2003, Kumu Pata inherited the halau in which he was trained by Nona Mahilani Kaluhiokalani, a graduate of the ʻIlalaʻole hula lineage through master G. Lanakilakeikiahialii Naope. Renamed to honor her, Hālau Hula Ka Mālama Mahilani provides Kumu Pata the opportunity to stay true to the culture and traditions as they were shared with him while interpreting and choreographing mele and training dancers.

2. Overview

The interview with Kumu Hula Pueo Pata discussed limu beds and honu congregations near the project area, the moʻolelo of ʻAʻapueo and Pueokaia, the naming of Wailuku, and the effects of runoff from the project and construction.

3. General Discussion

Kumu Hula Pueo Pata stated that there are limu beds in the ocean on the makai (seaward) side of the project area where limu is still harvested, including ʻaʻalaʻula, manauea, lepeahina, and wāwaeʻiole. He advised that no one should enter this area. Kumu Pata stated that the Hana side of Maui Island has large concentrations of limu kohu, which attracts turtles, which then attracts sharks. He explained that when fresh water is cut off from the limu beds, the concentrations of limu kohu, and consequently the turtles and sharks, are also affected.

Kumu Pata explained the moʻolelo of Kaʻa, where Kapoi lived and made an enemy of ʻAʻapueo and her husband Pueokaia.[18] ʻAʻapueo and Pueokaia fought during the time of chief Kanenenuiakawaikalu in the battle of Kamaluakahekuawa, which was the original time when Wailuku was named, centuries before Kamehameha I. Kumu Pata explained that the moʻolelo does not state exactly where Kapoi and his wife resided, but that it was near Kaʻa. He later stated that Kaʻa was also tied to the naming of chief Kanenenuiakawaikalu's son, who became mōʻī and took on the name Kamaluakahekuawa.

Kumu Pata also explained that there are low-income housing areas down near the project area closer to the ocean. He stated that there is a rental car station on the street also named Kaʻa. He is unaware of any moʻolelo in that particular area.

4. Biocultural Resources

Kumu Hula Pueo Pata stated that he was unaware of any biocultural resources or traditions/customs in or near the project area.

5. Impacts

The only impacts Kumu Pata was concerned about involved runoff into gulches and oceans from the project area, which would negatively impact the limu beds. He also explained that there is an area for divers near Kanahā Beach that an individual goes out to to make throw nets and teach people the art. If the fish and limu are affected by runoff, that would affect the teachings out in that area.

Kumu Pata expressed that there were no practices occurring on the land which encompasses the project area except for the rare appearance of deer from upcountry, but that these deer are not hunted or utilized for cultural purposes.

Kumu Pata expressed a concern about any traffic impacts there will be with the erection of a hotel, but he saw that they were putting in roads now.

[18] This moʻolelo is retold and explained further in Section III: Description of the Project Area in this CIA.

6. Mitigation Measures

Kumu Hula Pueo Pata suggested a management of runoff as the major mitigation measure for the project. He stated that he considered the site to be a temporary housing situation for tourists rather than a resort destination, but he was still concerned about effects of tourists to the beaches in the area, which are predominantly visited by locals. He would prefer that these beaches remained local rather than become a central hub of tourists.

Kumu Pata reiterated the importance of consulting the Maui version of the moʻolelo of Kapoi and ʻAʻapueo to truly understand the significance of the area. With the establishment of its cultural importance, Kumu Pata stated that the hotel should welcome locals with performances of Hawaiian music and hula competitions, which would be their way of expressing support for the community. He expressed that the airport hotel, also owned by R.D. Olson Development, allowed the locals to pick the lauhala there and have offered special rates to hālau during competitions, which has ensured the community is positively impacted. He would like to see similar actions taken by the hotel owners in the future after its construction and establishment.

Lastly, Kumu Pata stated that the hotel should plant maʻo in the project area because it is within the name of the isthmus, Kamaʻomaʻo. He stated that native plants being planted there would be the most efficient and they would not drain the water sources, which are already in high demand and low supply with Maui droughts.

C. Interview with Naomi "Sissy" Lake-Farm

Photo 3. Kumu Hula Sissy Lake-Farm (Photo Credit: Bailey House Museum)

Date of interview: October 26, 2017

Interviewee: Kumu Hula Sissy Lake-Farm

Interviewers: Matt Sproat

Location: Telephone

1. Biography

Naomi "Sissy" Lake-Farm was born and raised on the island of Oʻahu in the areas of Kahala and Kaimukī. She is the niece of Maiki Aiu Lake, her first kumu hula, and Kahauanu Lake of the Kahauanu Lake Trio. Kumu Lake-Farm currently serves as the Executive Director at the Maui Historical Society, which is also known as the Hale Hōʻikeʻike at the Bailey House and resides on the island of Maui in an area known as Waiehu.

Hula has allowed her to travel the world and together with her brother, fellow Kumu Hula Kaponoʻai Molitau, they continue their traditions through their hālau, Nā Hanona Kūlike ʻO Piʻilani. She and her husband, Kyle Ēlama Farm, have educated their three children through the Hawaiian language immersion schools, where they continue to be avid and enthusiastic supporters.

2. Overview

Prior to the interview, Sissy Lake-Farm provided documentation that she had compiled, primarily from Inez Ashdown, regarding the Kanahā Pond Wildlife Sanctuary.[19] Kumu Lake-Farm referenced this documentation during the interview in regard to moʻolelo and historical information about the project area. The majority of the interview focused on the KPWS and the impacts the project would inflict on the sanctuary and its protected birds.

3. General Discussion

Kumu Hula Sissy Lake-Farm expressed concern that the project area was in close proximity to the KPWS, which she considers to be a very significant feature of the area. She stressed the importance of reviewing the documentation she had provided to understand its relevance and significance. Kumu Lake-Farm insisted that the company should always be mindful and sensitive to the bird sanctuary and Kanahā Pond during the construction process.

In the documentation she had shared, there is a moʻolelo detailed by Inez Ashdown regarding the naming of the two ponds:

> During the time of Kamehameha Nui, son of Kekaulike, an Oahu princess came searching for her brother, Prince Kanaha, heir to the Oahu realm. On her way, she married Prince Kauhi, brother of Kamehameha Nui and Kahekili (last king of Maui) and Kaeo, king of Kauai and Niiahu. On the day when King Kamehameha Nui was to dedicate the twin fishponds the Oahu princess met him and he had her name the two ponds. She named one for her brother, kanaha, and the other for the name Mauoni, which she had used as her title while disguised as a traveling commoner. The full name of the Oahu prince was Kanaha o ka Lani. The full name of the pricess, his sister, was Kaha-malu-ihi-lani, or Under the protection of the heavenly Spear. Ka-naha-o-ka-lani means,

[19] This documentation consists of images that Ms. Lake-Farm had emailed and a complete catalog of these images is provided in Appendix III.

> figuratively, The-child of highest rank-whose parents were mated in heaven. On his grandmother's side this prince was a niʻaupiʻo rank of the Naha line. It is concerned with the Naha Stone lifted by Paiea Kamehameha (the First) who later lifted that stone in order to prove his fitness as a leader-ruler. The prince's father was Prince Kapiʻi oho o ka lani of Oahu, (son of King Kuʻaliʻi who retained the Law of Mamalaʻhoa) and was attacked, on Molokai, by King Alapainui.

Kumu Lake-Farm stated that this moʻolelo was the most significant one that she knew of regarding the area and would refer to it as the one that should be known during the construction process.

Kumu Lake-Farm questioned the necessity of more hotels and expressed concern that there are too many coming into existence on the ʻāina nowadays. She was, however, appreciative of the fact that this CIA was being completed and cultural experts were being consulted.

4. Biocultural Resources

Kumu Hula Sissy Lake-Farm stated that she was unaware of any cultural resources or traditions/customs within the project area or otherwise currently associated with the project area.

5. Impacts

Kumu Hula Sissy Lake-Farm was concerned about the effects of runoff to KPWS and the impacts of construction itself to the birds. Depending on the type of work being done, she was concerned about noise or any additional issues that the birds were not accustomed to in that sanctuary habitat.

Kumu Lake-Farm was also concerned about the effects of increased populations of tourists on traffic and visitors to the area. She was concerned about the effects this increase in traffic could have on the birds within the sanctuary. She also expressed disquiet about the distractions the increased traffic would have on the birds in their habitats.

6. Mitigation measures

Kumu Hula Sissy Lake-Farm stressed the importance of making sure that the areas surrounding Kanahā Pond are considered and discussed with the documentation she had provided. She does not want the importance of the area to be overlooked.

In terms of traffic impacts, Kumu Lake-Farm suggested that there should be other roads and paths beside the ones along Kanahā Pond that should be utilized and explored, which would decrease direct impacts of traffic to the sanctuary.

Kumu Lake-Farm stated that everyone should be mindful of the ʻāina (land) and areas within or close to that spot. Be mindful of Kanahā Pond and the moʻolelo that took place centuries ago. Be mindful and sensitive to the people of the land, and always mālama (protect).

D. Interview with Ashley Awakea Lindsey

Date of interview: April 14, 2019
Interviewee: Ashley Awakea Lindsey
Interviewer: Trisha K. Watson
Location: Telephone

1. Biography

Ashley Awakea Lindsey was raised in Upcountry, Maui and educated at Seabury Hall, Hawaiʻi Pacific University, Maui Community College, Hawaiʻi Community College and the University of Hawaiʻi at Hilo. As a Native Hawaiian, she has direct multi-generational ties connecting her to the land, culture, and history of these islands which has manifested itself in a lifelong love of all things Hawaiian. The experiences she received working and growing up in a family with extensive business interests in land redevelopment and its uses have extended into Real Estate and Restaurant Management. She is currently a property manager, business owner, and respected community leader. She also sits on the Maui Redevelopment Agency, which is a Maui County authority that reviews applications for new development and renovation projects in the Wailuku Redevelopment Area as authorized by Section 53-5 of the Hawaiʻi Revised Statutes. She is currently Vice-Chair of the Agency. She is also President of the Maui Historic Society. Founded in 1951 by the Maui Women's Club, the Society collects, preserves, studies, interprets, and shares the history and heritage of Maui. It also serves as a diligent caretaker of land, artifact, photographic and archival resources. The Maui Historical Society is located approximately four miles from the project site at Hale Hōʻikeʻike at the the Baily House (237A Main Street Wailuku, Hawaiʻi 96793). Ms. Lindsey was recently part of a team that was selected for a prestigious National Endowment of the Arts grant to cultivate public art in Wailuku. She has tremendous passion for bringing history, culture, and the arts to the youth on Maui.

Photo 4. Hale Hōʻikeʻike at the Bailey House
Old Bailey House is a historic district contributing property within the Wailuku Civic Center Historic District. It has been listed on the National Register of Historic Places since March 20, 1973. It houses Maui's largest historic college and regularly hosts cultural events and exhibits.

2. Overview

Ashley Lindsey discussed the history of the area, the importance of nearby historical sites, and upcoming redevelopment efforts that should be considered in the development of this project.

3. General Discussion

While Ms. Lindsey did not know of specific moʻolelo or cultural activities that occurred on the property, as President of the Maui Historical Society and Vice-Chair of the Maui Redevelopment Agency, she is very familiar with upcoming projects in the area. She noted that it would be valuable to integrate the hotel into the upcoming shuttle service that will run between the airport, Bailey House, and other stops in Wailuku. She encourages the hotel to provide their guests with historic site information, such as the background of nearby Bailey House.

4. Biocultural Resources

Ms. Lindsey stated she was unaware of any biocultural resources or traditions/customs in or near the project area.

5. Impacts

Ms. Lindsey did not express particular concerns about any specific impacts.

6. Mitigation Measures

Ms. Lindsey urges the project to properly educate their guests about three things: 1) ocean safety, 2) proper island equiette, and 3) littering.

She feels it is critical for guests who come to Maui to understand ocean safety and how to keep themselves, and Maui's marine resources, safe when spending time on the island. Guests should also understand that Maui remains a largely rural community and local protocols should be respected. The hotel should also remind visitors to properly dispose of their trash.

E. Interview with Daryl Fujiwara

Photo 5. Daryl Fujiwara (far left) with Maui Visitors & Convention Bureau's new Cultural Advisory Group (Photo Credit: Maui Visitors & Convention Bureau)

Date of interview: April 14, 2019

Interviewee: Daryl Fujiwara

Interviewer: Trisha K. Watson

Location: Telephone

1. Biography

Daryl Fujiwara is a community and cultural leader on Maui. He was born and raised on Maui in Lahaina but currently lives in Wailuku. He recently completed a successful tenure as Pelekikena of the Lahaina Hawaiian Civic Club and now serves as their Pelekikena Iho Nei. Mr. Fujiwara is a designer and event coordinator through his successful business, Smythe Fujiwara Design, and is a highly successful public relations executive. He coordinates most of the Native Hawaiian events for the Island of Maui, including the King Kamehameha Day Celebration and the Prince Kūhiō Festival, and as such, has an excellent working knowledge of the living culture of Maui. His responsibilities include organizing cultural events for Maui (including Hāna), Lānaʻi and Molokaʻi. Mr. Fujiwara also coordinates the Emma Sharpe Hula Festival and the Richard Hoʻopiʻi Falsetto Contest. Governor Neil Abercrombie named Fujiwara to the King Kamehameha Celebration Commission in 2012. He manages the Festival of Aloha on Maui. Mr. Fujiwara oversees and coordinates the Maui Nui Canoe Race, which is a long-distance canoe race of which the course includes the channels between Maui, Lānaʻi, and Molokaʻi. He works with numerous community organizations across the island. He also works for Councilwoman Yuki Lei Sugimura and dances with Hālau Ka Mālama Mahilani. In

March 2019, he was named to the Maui Visitors and Convention Bureau's Cultural Advisory Group, along with Kumu Hula Sissy Lake-Farm, Joylynn Paman, Makalapua Kanuha, and Dane Maxwell. The Cultural Advisory Group serves as a resource to provide guidance on cultural matters in creating marketing materials and providing authentic experiences for visitors. They also have the very important task of establishing guidelines for best practices in portraying Native Hawaiian culture within the visitor industry.

Photo 6. Festivals of Aloha Courtesy Photo
The annual event includes activities in Wailuku.

2. Overview

Daryl Fujiwara discussed a range of activities that take place near the project area and considerations for proper protocol regarding naming of the hotel and other activities related to the visitor industry. He provided a wealth of information about resources and activities in the project area.

Overall, he feels the project will be well integrated into the community and area. He noted that he feels it is a "smart growth choice." He noted that he is pleased it is not on the coast or beachfront.

3. General Discussion

Mr. Fujiwara noted that he learned a meaning for the name Kahului references a battle formation for lua. He noted that the information was taught to him by his Kumu.[20] The formation was what they used in Kamehameha's warriors first attempt to take Maui.

4. Biocultural Resources

Mr. Fujiwara noted that everything is a cultural resource. If it has a name, it has a story. Prior to sugar, the project area and adjacent lands were the island's filtration system. It was a large wetland, similar to Kanahā Pond. The area included natural waterways and the project should be mindful to take that history into consideration. Since water has been diverted away from the area, it does not flow to the area as it once did. These diversions impact the larger watershed.

Kanahā area has fishing, surfing, and canoe paddling. He identified that the canoe paddling club Laeʻula o Kai is located on the coastal area of Kanahā. He noted that Laeʻula o Kai currently operates out of the coastal area.

He also noted that nēnē are becoming more frequent in the area. Specifically, the nēnē have been coming down the mountain more.

He mentioned that the area historically included a large planation camp, specifically in the Puʻunēnē area. He noted that there is a sugar mill museum down in the area.[21] He commented that plantation history is also part of the island and community's history and culture.

He also noted that the winds in Kahului are "really crazy." Kahului is where the winds all meet.[22]

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[20] Mr. Fujiwara's Kumu is Cody Pueo Pata, who was also interviewed for this project.

[21] It is interesting to note that nēnē are returning to an area called Puʻunēnē, literally nēnē hill.

[22] Wind names are discussed in Section IV.E.3.b of this CIA.

5. Impacts

Mr. Fujiwara stated that the project area has long been developed. He knew the area primarily as sugar cane field and thought the placement of the hotel in that area would be good for everyone.

6. Mitigation Measures

As part of the Maui Visitors and Convention Bureau's Cultural Advisory Group, Mr. Fujiwara is helping to develop guidelines for the visitor industry on naming practices. The hotel should follow these guidelines when they become available. Alternatively, they should seek counsel from the advisory group on naming the hotel property and the development of interpretive materials targeted for visitors. Proper naming practices and protocols are of great importance to the Hawaiian community and choosing an inappropriate name can be deeply offensive to the Hawaiian people. He noted that perhaps using the traditional names of the waterways could be incorporated into the hotel and activities.

The hotel shoud not be built too high. He would like the project to remain sensitive to the viewplane between Kahului, Wailuku and Haleakalā. He also recommends using native plants throughout the landscape.

F. Interview with Kahulu Maluo-Pearson

Photo 7. Kumu Hula Kahulu Maluo-Pearson (Photo Credit: Maui Arts & Culture Center)

Date of interview: April 15, 2019

Interviewee: Kahulu Maluo-Pearson

Interviewers: Matt Sproat

Location: Telephone

1. Biography

Kahulu Maluo-Pearson was born on Oʻahu and moved to Maui when she was two, where her family resided in Kahului for eight to ten years before they relocated "upcountry" above the ʻAʻapueo area. She currently resides in Waiʻehu. She is the cultural programs director at the Maui Arts & Cultural Center and is also the Kumu Hula for Hālau Kamaluokaleihulu. Kumu Maluo-Pearson cares deeply for Maui and its cultural history.

2. Overview

Kumu Maluo-Pearson is familiar with the project area and is not aware of any cultural resources or traditional practices associated with the area that may be impacted by this project.

3. General Discussion

Kumu Maluo-Pearson shared that the project area was once a place where sugar cane was

Photo 8. Hālau Kamaluokaleihulu (Photo Credit: Maui Arts & Culture Center)

grown and later commercialized and she believes that this history has caused many of the cultural resources or practices of this area to disappear. She shared some history pertaining to Kahului, explaining that when Kamehameha brought his warriors to Maui to fight the battle of Kepaniwai, they pulled their canoes ashore from the beach up to the lands near the project area. Kumu Maluo-Pearson explained that the warrior's canoes lined the beaches for miles and from the project area they walked into central Wailuku just below Pihana heiau. Kumu Maluo-Pearson was told that this was the place that they decided they would go to war and the following day the battle started. She shared that it was upon these shores that the term "inu i ka wai ʻawaʻawa" was coined by Kamehameha the Great.

4. Biocultural Resources

Kumu Maluo-Pearson shared her knowledge about the Kanahā Pond Wildlife Sanctuary near the proposed project area by Costco. This sanctuary is home to the endangered Hawaiian stilt (aeʻo), the Hawaiian coot (ʻalae keʻokeʻo), and the Hawaiian duck (koloa maoli). She shared that over time she has noticed that the pond is turning green. She is not aware of any other biocultural resources near the project area and does not feel that there are any biocultural resources that will be impacted by the proposed action.

5. Impacts

Kumu Maluo-Pearson expressed that it is her hope that if more hotels are built in Kahului they will not end up extending the airport runway in order to increase visitors from around the world. She explained that everything is connected, so building more hotels for tourism can lead to building up other things, like the Kahului Airport. She cautioned against letting this project result in further development and expressed that in her opinion, Maui is not ready to nor interested in hosting international flights. Kumu Maluo-Pearson stated that the Kahului area of Maui is very congested; increases in traffic and tourism are important impacts to consider.

6. Mitigation Measures

Kumu Maluo-Pearson suggested being mindful about impacts to traffic in Kahului and how this will effect local residents. She shared that when big flights come in to Maui, the road becomes overrun by tourists and creates chaos on the highway. This impacts local traffic every day because Kahului is the "cross-road" of the entire island.

G. Interview with Bobby Pahia

Photo 9. Mahi ʻai Bobby Pahia in his māla kalo (kalo patch) in Waikapū (Photo Credit: Hoaloha Farms)

Date of interview: April 22, 2019

Interviewee: Bobby Pahia

Interviewer: Kepā Maly

Location: Telephone

1. Biography

Robert Hale "Bobby" Pahia was born in Honolulu on September 30, 1955. His ʻohana are the Pahias of the Kāneʻohe-Kailua region, though he did not have a lot of contact with them during his youth. His grandfather had many brothers. Mr. Pahia is the current farm manager at Hoaloha Farms, which supplies its parent restaurant company, Na Hoaloha Ekolu (Star Noodle, Old Lahaina Lūʻau and Aloha Mixed Plate in Lahaina, as well as Leoda's Kitchen & Pie Shop in Olowalu), with several varieties of kalo and other crops. Raised in rural Oʻahu, the green-thumbed Hawaiian moved to Maui in the 1980s to work for the University of Hawaiʻi's College of Tropical Agriculture and Human Resources. Today, Bobby grows two-dozen heirloom kalo varieties on his Waikapū farm, including mana ʻulu, the popular Maui lehua, and the rare ʻeleʻele naioea.

2. Overview

Mr. Pahia is a well-respected farmer on Maui. He discussed his work, specifically his ongoing work to restore ʻāina and perpetuate kalo farming on Maui. He also shared his knowledge about the area from working with the University of Hawaiʻi.

3. General Discussion

Mr. Pahia moved to Maui in the latter part of 1980 and began working for the University of Hawaiʻi up in Kula at the Ag Research Station, which is where he got a lot of experience in the agriculture field. He worked with many varieties in vegetable crops, soil studies, etc. Mr. Pahia worked alongside Dr. John Cho, a plant pathologist, who was working on hybridizing local taros to breed disease resistance and tolerance into the native varieties. This research was a result of many native varieties failing from leaf blight and diseases, especially in Hanalei.

Mr. Pahia and Dr. Cho conducted research on different taros from around the world. They learned how to finger print the kalo, including its DNA, and then breed them. This research introduced Mr. Pahia to kalo farming. He grows exclusively māla (dry land kalo).

4. Biocultural Resources

Mr. Pahia currently grows māla in the land below Waikapū in the old cane fields. His job is to revitalize this land biologically and spiritually. He renamed the place, Lā Kāhea. To Mr. Pahia, it means that we must call out and attract people back to it. That place was sometimes called "ao kuewa." It is said that the spirts were wandering and looking for their transition point. The land was planted corporately for 144 years but there currently remains only one kanaka on the land. Mr. Pahioa noted that this is a great opportunity for him, while also a great responsibility. He feels that it is his job to bring life back to the land while improving the quality of subsequent farmers that learn from him.

Mr. Pahia previously grew kalo on the land where Costco now stands (near the project area). This area was once utilized for sugar cane and he participated in experimental work with

HC&S and Mae Nakahata. He was provided a piece of land in this area to farm.

Mr. Pahia was asked if he ever came across items while in the fields, like ulumaika, adze, etc. Mr. Pahia responded that he never did. He noted that the sugar company utilized bulldozers, so finding artifacts would have been difficult. When asked about any stories associated with where he was working, he stated that “everywhere I go, and every place I’m planting kalo, I always feel the kūpuna are happy.” He noted that the kūpuna still walk the land where he is because he can feel their presence.

He noted that the only plants that people may have gathered in the area was ‘uhaloa.

He also explained that the place around Kanahā was one of the original lua training grounds, specifically the Pā Lua for ‘ōlohe. He learned this information from Eli and Dennis Mitchell. Mr. Pahia suspects that this activiy also occurred in the project area.

5. Impacts

Mr. Pahia did not specifically identify any impacts, but he noted that more hotels are needed in the project area because people need places to stay if their flights are cancelled.

6. Mitigation Measures

Mr. Pahia urged to have monitoring for iwi (bones) during the project.

VI. Impact Assessment

A. Impacts to Flora

Impacts to the built environment will largely be covered by the AIS. Upon discovery of archaeological features, appropriate action should be taken to mitigate impacts to those features. Neither the biological assessment nor the draft AIS identified flora resources of concern, although interviewee mahi ʻai Bobby Pahia noted that historically ʻuhaloa (*Waltheria indica*) were gathered in the area. ʻUhaloa was identified during the biological assessment as being present in the project area.

The project should ensure not to impact the limu beds identified by Kumu Hula Pueo Pata. Although limu (algae) was not assessed in the biological assessment and does not occur directly in the project area, limu picking and collection is a well-established traditional and customary practice. Run-off from the project could potentially adversely impact limu populations known in the area. As a result, any impact to the limu population could impact practitioners' access to this important resource.

The project must also be mindful of its water consumption and ensure that its usage does not exceed the sustainable yield for any of the aquifers that it is drawing water from, as overuse of water can potentially impact mauka activities and practices such as kalo farming, as well as makai activities, such as limu picking, discussed above. The maintanence of fresh water systems are critical to ecosystem health and sustaining of ecosystem services.

B. Impacts to Fauna

There is unlikely to be any impacts to candidate, threatened, or endangered fauna over the course of this project based on the biological assessment. Additionally, the concerns expressed by Kumu Lake-Farm as to any potential impact (direct, indirect, or cumulative) should be taken into consideration as this project progresses. Nonetheless, the project should make an effort to plant native fauna in their landscaping to repopulate the area with indigenous, endemic, and native species within the project area. One plant to consider would be maʻo, as recommended by Kumu Pata in his interview. Further, the project should work with stakeholders like hālau hula and area schools in providing access to any overgrowth so that community members and practitioners may benefit from and partner with the project. The project should also consider working with Maui Nui Botancial Gardens, located in Kahului, on a native fauna interpretive program.

Interviewee Daryl Fujiwara noted that nēnē (*Branta sandvicensis*) have been increasingly seen in the area. As the world's rarest goose, the nēnē is on the U.S. Endangered Species List across its entire range. The nēnē appears in the Kumulipo, one of the Hawaiian creation stories as a guardian of the "hehe."[23]

C. Impacts to Historic Sites

Impacts to historic sites and properties are being assessed by SCS in the AIS. Should there be a potential for encountering iwi kūpuna (ancestral remains), cultural monitors should be utilized, as recommeded by interviewee Bobby Pahia. Cultural monitors should be properly qualified lineal or cultural descendants from the area. Considering the heightened sensitivity regarding historic properties and iwi kūpuna on Maui and in this region, the project would be well-advised to ensure a thorough archaeological assessment is prepared and that the assessment is approved by the State Historic Preservation Division prior any ground-disturbing activities.

D. Impacts to Intagible Cultural Resources

Intangible cultural resources refer to those resources without physical form, such as hula or mele. As there are no known or identified cultural practices currently taking place on the property and the property has been heavily disturbed, it is unlikely the proposed activities would adversely impact intangible cultural resources on the property or in adjacent areas, although interviewee Bobby Pahia identified the project area as a site where lua training took place. This would be consistent with the information provided by interviewee Daryl

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[23] The "hehe" is often identified as a bird, but little information is known or provided about the species. It is also possible this animal was a marine species.

Fijiwara who noted that the name Kahului was potentially a reference to a battle formation. Additionally, the project could benefit intangible cultural resources by developing an interpretive program that utilizes area mele, oli, and moʻolelo, like those found in this study, as a means of educating residents and visitors. The project could also benefit intangible cultural resources by developing programs that utilize area hālau and Hawaiian music, as suggested by Kumu Pata. Additionally, the project would be advised to work with groups like the Maui Historical Society and its experts to develop interpretive materials for the hotel to properly educate guests as to the history of the area.

E. Impacts to Cultural Practices

It is unlikely that the project would adversely impact any cultural practices as the area has been heavily developed and no cultural practices are known to currently take place in the area or benefit from resources that exist on the project property. Mr. Pahia noted that the area was used by lua practitioners and some area practitioners may gather ʻuhaloa, but ʻuhaloa is highly abundant in the area and throughout the island. It is unlikely that any loss of ʻuhaloa would impact any cultural access or cultural practices for any area practitioners. No additional cultural practices were identified by the interviewed cultural practioners or in previous CIAs.

Cultural practices do occur in the nearby makai region, specifically canoe paddling, limu picking, fishing, and surfing. With proper conditions and BMPs, discussed below, it is unlikely the project would have any impact, direct, indirect, or cumulative, on these activities.

F. Cumulative and Indirect Impacts

Adverse cumulative and indirect impacts to cultural resources are often overlooked in CIAs, as they are difficult to assess. Cumulative impacts are cultural impacts that result from the incremental impacts of an activity when added to past, present, and reasonably foreseeable future actions and activities. Indirect impacts are impacts on cultural resources which are not a direct result of the project, but a secondary or tertiary result of the project. As stated by Kumu Lake-Farm, there is concern that Maui generally, but specifically central and west

Maui, is being adversely impacted by an increase in hotel development. The greatest potential for a cumulative and indirect impact is water usage. As discussed previously in this assessment, water is a highly valued cultural resource. While the supply requirement is not anticipated to result in MDWS exceeding its permitted use, both the project and the Department of Water Supply should remain vigilant to ensure that activities in the area not result in water usage beyond the sustainable yield of 20 MGD established by CWRM. Furthermore, it is critical that the project not result in any action, direct, indirect, or cumulative, that would potentially lead to a violation of the agreement reached between the families and farmers who use Nā Wai ʻEha (Waiheʻe River, Waiehu, ʻIao, and Waikapu streams, in part or in whole) and the state regarding the Interim Instream Flow Standards (IIFS) of these streams. Nance (2018) provides a thoughtful, thorough analysis of how the supply needed for the project can be fulfilled without impacting the sustainable yield of Nā Wai ʻEha or the 10 MDG IIFS for ʻĪao Stream. Additionally, considering the highly developed nature of the project area, there are no anticipated cumulative or indirect impacts beyond the concerns expressed by Kumu Lake-Farm and Kumu Pata regarding area over-development.

G. Mitigation and Best Management Practices

Considering that there are limited adverse impacts resulting from this project, there are few mitigation measures recommended herein. The project should look into water conservation measures and carefully monitor its water usage. It would also benefit the project to pursue partnerships with the community and cultural practitioners as recommended in the interviews to develop educational interpretive materials and cultural programming. It would also benefit the site to utilize native flora throughout the property. The project should follow all environmental and cultural mitigation measures recommended by permitting agencies and follow any cultural protocols should human remains or historic sites be encountered during project activities. It is urged that the project engage lineal/cultural descendants, Native Hawaiian Organizaitons and/or cultural practitioners from the area to oversee and/or monitor any activities related to iwi kūpuna should iwi be encountered. Historic and cultural sites should be treated with equal care.

Additionally, as noted by Ms. Lindsey, the hotel would be well-served to coordinate their efforts to utilize the shuttle being developed by the Maui Redevelopment Authority. This would allow for guests to enjoy nearby sites like the Bailey House Museum.

VII. Conclusion

A. Recommendations

Kahului is rich with both pre-contact and post-contact histories. In applying *Ka Paʻakai*, no cultural, historical, or natural resources have been identified in the project area and no traditional or customary Native Hawaiian rights are currently exercised in the project area, although some customary practices do continue in the larger geographic extent of Wailuku. It should be emphasized that while there are no traditional or customary practices occurring directly within the project area, there remains a vibrant, active cultural community mauka and in neighboring makai areas. Therefore, the project should take appropriate steps to ensure that its resource usage does not adversely impact these individuals, groups, or practices. The project, as currently planned, is unlikely to have any adverse impact of this nature. While the project is unlikely to have any direct, indirect, or cumulative adverse impact on pre-contact historic properties or Hawaiian cultural practices, it would be well-advised to carefully monitor its water usage during development and operation to ensure that it does not exceed the water usage projected in its environmental impact statement. The project also has an opportunity to enrich the area through interpretive botanical, cultural and historical programs. The project should also take appropriate steps with area experts on proper naming practices and marketing materials that will be shared with their guests.

A. Ongoing Implementation of Recommendations from Cultural Practitioners

R.D. Olson has already implemented some of these recommendations. The project name has been changed from "Windward Hotel" to Kanahā Hotel at the Kahului Airport, in recognition of the traditional name Kanahā widely used in the area. Additionally, native plants have been thoroughly integrated to the landscaping plan. A māla (traditional Hawaiian garden) featuring native plants and small interpretive signs identifying the vegetation has been added to the site plan. The list of plants added to the site plan (***Figure 9***) and a description of their cultural significance are provided below. Additionally, the design of the hotel has been modified to integrate numerous elements from the native and local culture. Specifically, elements from Kanahā pond and beach have been added to the context board, as well as colors and images from Maui's iconic pāʻú riders (*Figures 10 and 11*).

Kukui

Kukui, *Aleurites moluccana*, or candlenut trees are a Polynesian-introduced species. Kukui played a significant role regarding wearing apparel and accessories of the ancient Hawaiians. The most popular usage of kukui is in lei kukui, the best-known lei hua (lei made from seeds and nuts). Each nut is sanded down, polished, punctured on the ends, has the inner meat removed, and then strung on a cord. The nuts are typically polished with a piece of tapa dipped in kukui-nut oil, and the finest lei kukui continue to consist of hand polished nuts. Kukui contributed to the dye used for kapa, as the fruit husk produces grayish/beige dye, the inner bark trunk produces brownish red dye, and the inner bark root produced reddish brown dye. Black dye was also produced by roasting kukui nuts and grinding them into a powder, which was then mixed with kukui oil and applied to the kapa until the color penetrated every fiber. The ancient Hawaiians applied a technique of painting kapa that involved a charcoal bag consisting of piece of kapa filled with roasted and ground kukui nuts, and the "bag" was brushed over the surface of kapa to produce a grayish coloring. In addition to clothes, kukui nuts were also used in tattoos. The charcoal of the kukui nut and the kukui fruit juice created black pigmentation, and the ancient Hawaiians expressed grief by tattooing a black spot or line on the tongue with a bamboo sliver dipped in these kukui concoctions. Kukui is also a prized canoe plant, brought over by Polynesians who first migrated to Hawaiʻi hundreds of years ago. Canoes would be carved from the trunks of these trees.

Kalo

Kalo or taro, *Colocasia esculentia*, was one of the most important crops for traditional Hawaiian living. Kalo, along with ʻuala (sweet potato), were the staple foods for kānaka (Native Hawaiians). Kalo was of particular importance, not only for its provisioning of carbohydrates to the traditional diet, but kalo also great cultural meaning within Hawaiian cosmology. Wākea, Sky Father, and Hoʻohokukalani, another Hawaiian goddess, bore two children together. The first was stillborn, and Hoʻohokukalani buried the child in the ground outside their home. A plant grew in this spot, and became known as Hāloanakalaukapalili, the first kalo plant. Wākea and Hoʻohokukalani had a second child, a boy, given the name Hāloa after his older sibling. This Hāloa became the first kānaka, or Native Hawaiian. Today, kalo, which is widely cultivated by traditional farmers across Maui, remains a highly regarded crop in Hawaiʻi.

Maʻo

Maʻo, *Gossypium tomentosum*, also known as Hawaiian Cotton, is an endemic shrub and vulnerable species in the islands. This coastal plan blooms a beautiful bright yellow flower throughout the year. Used for both seed and flower lei traditionally, one of the most important cultural uses of maʻo was as a dye utilized by traditional kapa (barkcloth) makers. The leaves of the maʻo plant would be utilized to make a green dye to decorate and adorn the kapa. Kapa continues to be made by master practitioners throughout Hawaiʻi today.

Pōhinahina

Pōhinahina, *Vitex rotundifolia*, is an indigenous sprawling shrub with small purple flowers and silvery-green leaves that were traditionally used to protect kapa from insects. The flower gives off a gentle, pleasing scent. The flowers and leaves from this plant can be used to create lei poʻo (head lei).

Naupaka

The naupaka, *Scaevola taccada*, is a distinct and storied indigenous shrub in Hawaiʻi. If you look closely at the naupaka, all the flowers appear to be only half of a flower. This is because according to traditional Hawaiian legend, the naupaka comes from the story of two young lovers. These two young lovers were deeply devoted to each other, yet the man attracted the attention of the volcano goddess, Pele. When the man refused Pele's advances, she chased him to the mountains, where she threw fire at him. She then chases his female lover into the sea. Taking pity on the couple, Pele's sisters stepped in and transformed the man into the mountain naupaka, its flowers only growing half a flower, and the woman into the coastal naupaka. The two half flowers are said to represent the young couple.

Naiʻo

Naiʻo, *Myoporum sandwicense*, is an endemic tree or shrub, also commonly known as false sandalwood. It is known to sometimes have a pleasantly spicy sandalwood-like fragrance that emanates from its delicate, small, white-pink flowers. A particularly hard wood, traditionally the wood of the naiʻo tree would be used in the building of traditional hale (homes) for the posts, rafters, or frames. It also was used to create netting for fishing.

Loulu

Loulu, *Pritchardia spp.*, are native single trunked palm trees. The trees are identifiable by their fan-shaped leaves. The wood from taller species were hard enough to fashion into spears by Hawaiians in traditional times. The fruit of the tree, known as hāwane, were gathered by climbing notches on the tree. Once gathered, the young fruits were peeled and enjoyed, as the interior of the fruit are similar to coconuts. The fronds of the tree, known as lau hāwane, were woven by practitioners to fashion fans or papale (hats). It is even said that one species of loulu would be used customarily for a traditional sport similar to hand gliding!

Hala

Another prized canoe plant, hala, *Pandanus tectorius*, produces sturdy leaves of the were used to make sails and kaula (cordage) for traditional wa‘a (canoes). The leaves contined to be widely used by practitioners to fashion hats, mats, bags, and jewelry. The fruit of the tree is pulled apart to make beautiful lei, mostly for special occasions. These lei are symbols of significant transitions and are given with great intention. The seeds and fruit are eligible, and traditional the fruit was known for its medicinal properties. The roots of the tree also had numerous medicinal properties.

Kamani

Kamani, *Calophyllum inophyllum*, is a tree valued for its hard, dark wood. The kamani wood has long been used for calabashes or bowls. Many poi bowls were fashioned out of kamani. The flowers give off a gentle orange scent and have been used to scent kapa. This versatile tree was also used for oil and perfumes. The nut from the tree would also be made into a whistle as used as a traditional instrument.

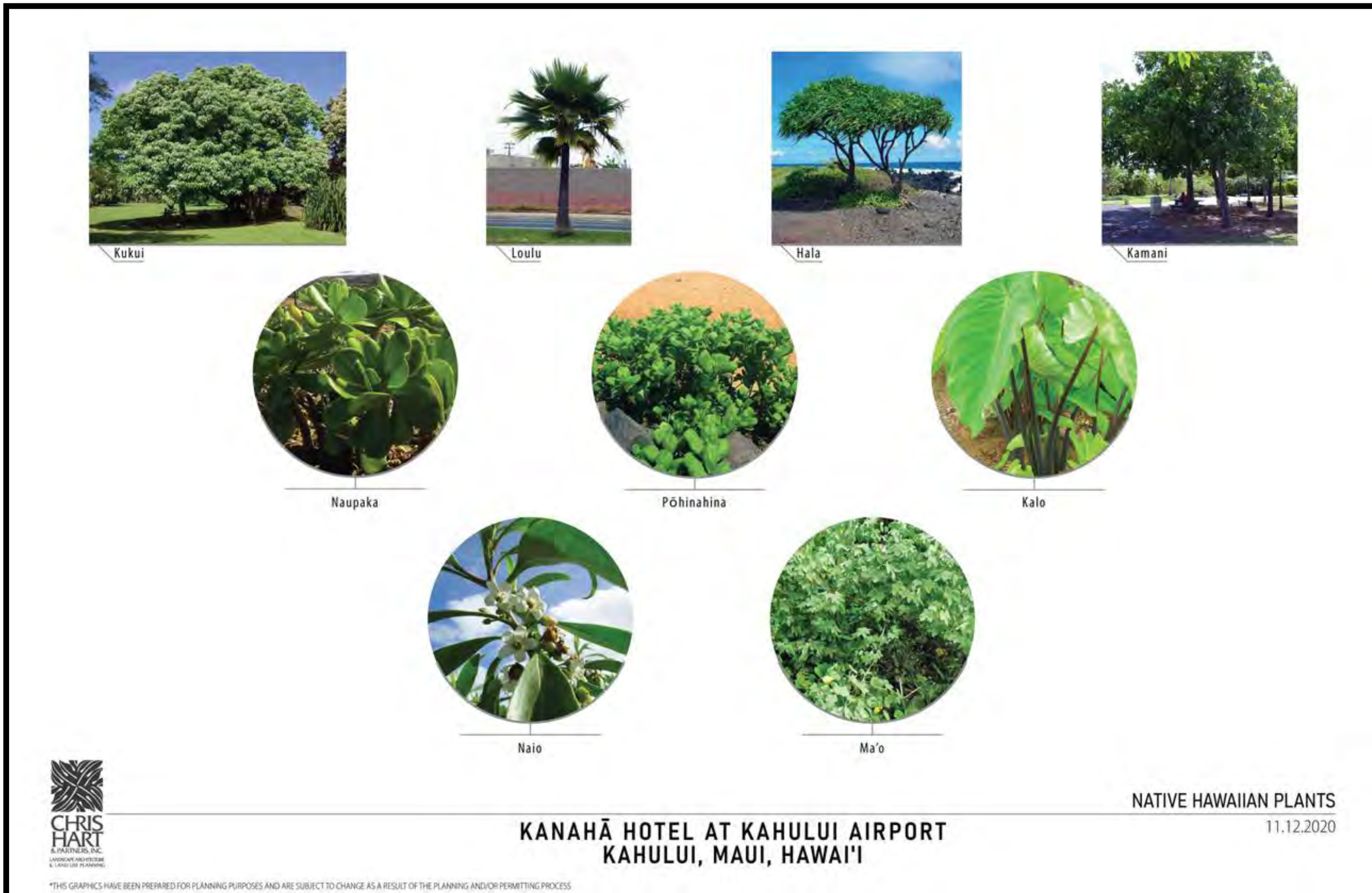

Figure 9. Native Hawaiian Plant Board for Landscaping

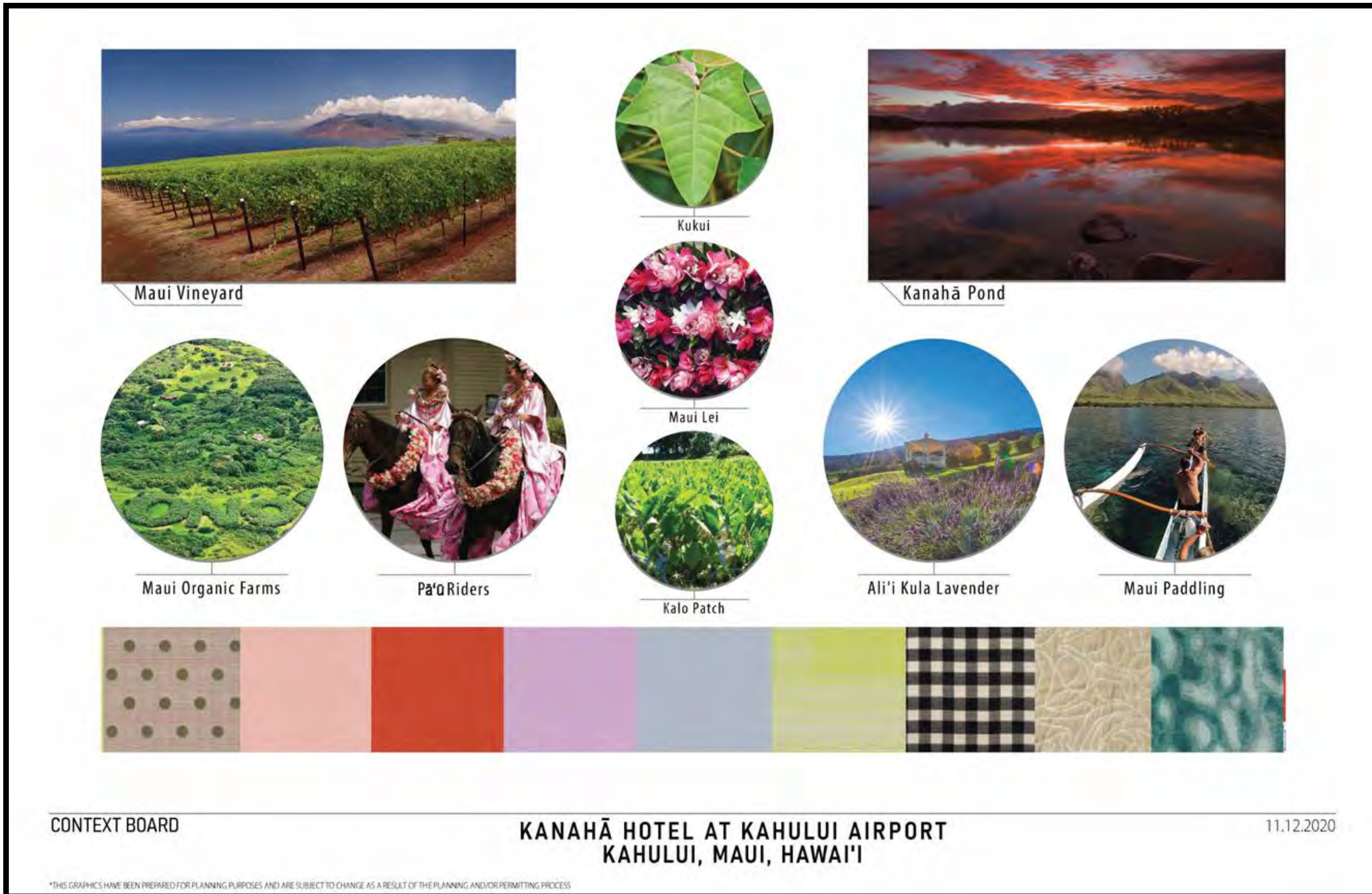

Figure 10. Context board integrating local and native cultural elements.

Figure 11. Colors and patterns for the design integrating local design and native plants.

B. *Ka Pa'akai* Analysis

Based on the guidelines set forth in *Ka Pa'akai*, the Hawai'i Supreme Court provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary Native Hawaiian rights while reasonably accommodating competing private development interests. This is accomplished through:

1) The identification of valued cultural, historical, or natural resources in the project area, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area;
2) The extent to which those resources—including traditional and customary Native Hawaiian rights—will be affected or impaired by the proposed action; and
3) The feasible action, if any, to be taken to reasonably protect Native Hawaiian rights if they are found to exist.

This assessment thoroughly identified valued cultural, historical, and natural resources in the project area and an appropriate, larger geographic extent, including the extent to which traditional and customary Native Hawaiian rights are exercised in the project area. The study concludes that while there are no resources in the direct project area, there are resources in the larger geographic extent. They have been extensively discussed in the **Impact Assessment in Section VI**. Also included in the Impact Assessment section is a thorough assessment of the extent to which the identified resources and practices, including traditional and customary Native Hawaiian rights, may potentially be affected or impaired by the proposed action.

Based on this extensive identification effort and thorough analysis, which included interviews with a number of cultural experts and area practitioners, there is a negligible potential for the project to have a direct, adverse impact on valued cultural, historical, or natural resources in the project area or larger geographic extent. Additionally, there is a negliable potential for the project to have a direct, adverse impact on traditional or customary Native Hawaiian rights in the project area or in the larger geographic extent, largely in part to the extensive industrial use of the project area for over 100 years. It is unfortunate, but any cultural practices that may have not occurred in the project area or surrounding area were likely discontinued after the land was taken by foreign companies for industrial and plantation use. Cultural resources that may have once existed in the project area were likely irreparably destroyed by decades of industrial and agricultural use. Any potential for an adverse indirect or cumulative impact in the larger geographic extent can be minimized through the conditions and BMPs recommended herein, some of which have already been embraced by the applicant and integrated into the project design. These conditions and BMPs constitute feasible action that may be reasonably taken to protect Native Hawaiian rights and cultural rights in the larger geographic extent.

Additionally, based on the imput of practitioners interviewed for this assessment, the project redesigned the landscaping and design themes to better integrate native plants, Hawaiian-inspired motifs, and other design elements to honor Maui's unique cultural heritage while focusing on the place-based history of Kanahā. The purpose of these efforts is to honor and respect the culture of the area while utilizing an opportunity to educate visitors about native culture, history, and flora.

C. Conclusion

While there are currently no known cultural resources or cultural practices in the project area, the project should nonetheless embrace all opportunities to honor both the traditional history and modern history of the region, which the local residents of Maui take great pride in perpetuating. To this end, the project is urged to continue to work closely with area practitioners and cultural experts, who generously gave their time for this assessment. The Hawaiian culture remains a thriving living culture in the larger Wailuku area and there are numerous practitioners, organizations, and initiatives that would add value to the hotel, the hotel activities, and the experiences of its future guests.

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Appendix I: Glossary of Hawaiian Terms

The following list of terms were used frequently throughout this report. All definitions were compiled using Pukui and Elbert's *Hawaiian Dictionary* (1986).

Ahupuaʻa	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (puaʻa), or because a pig or orther tribute was laid on the altar as tax to the chief.
ʻĀina	Land, earth.
Akua	1. God, goddess, spirit, ghost. 2. Divine, supernatural, godly.
Ala	Path, road, trail.
Aliʻi	1. Chief, chiefess, ruler, monarch. 2. Royal, regal. 3. To act as chief, reign.
ʻAumakua	Family or personal gods, deified ancestors who might assume the shape of sharks, owls, hawks, dogs, plants, etc. A symbiotic relationship existed; mortals did not harm or eat them, and the ʻaumakua warned or reprimanded mortals in dreams, visions, and calls.
ʻAumākua	Plural of ʻaumakua.
ʻAuwai	Irrigation ditch, canal.
Haku mele	Poet, composer; to compose song or chant.
Hālau	1. Long house, as for canoes or hula instruction; meeting house. 2. Large, numerous; much.
Hale	House, building, institution, lodge, station, hall.
Hale pili	House thatched with pili grass.
Heiau	Pre-Christian place of worship, shrine. Some heiau were elaborately constructed stone platforms, other simple earth terraces.
Hula	A Polynesian dance form accompanied by chant or song.
ʻIli	Land section, next in importance to ahupuaʻa and usually a subdivision of an ahupuaʻa.

ʻIli kūpono	A nearly independent ʻili land division within an ahupuaʻa, paying tribute to the ruling chief and not to the chief of the ahupuaʻa. Transfer of the ahupuaʻa from one chief to another did not include the ʻili kūpono located within its boundaries.
Iwi	Bone, carcass. The bones of the dead, considered the most cherished possession, were hidden, and hence there are many figurative expressions with iwi meaning life, old age.
Kalo	Taro (*Colocasia esculenta*), a kind of aroid cultivated since ancient times for food, spreading wildly from the tropics of the Old World. In Hawaiʻi, taro has been the staple from earliest times to the present, and here its culture developed greatly, including more than 300 forms. All parts of the plant are eaten, its starchy root principally as poi, and its leaves as lūʻau.
Kanaka	Human being, man, person, individual, party, mankind, population.
Kānaka	Plural of kanaka.
Kāne	Male, husband, male sweetheart, man; brother-in-law of a woman.
Kanikau	1. Dirge, lamentation, chant of mourning, lament. 2. To chant, wail, mourn.
Kapu	1. Taboo, prohibition. 2. Special privilege or exemption from ordinary taboo. 3. Sacredness, prohibited, forbidden, sacred, holy, consecrated. 4. No trespassing, keep out.
Kuleana	Right, privilege, concern, responsibility, title, business, property, estate, portion, jurisdiction, authority, liability, interest, claim, ownership, tenure, affair, province.
Kumu	Teacher, tutor, manual, primer, model, pattern.
Kumu hula	Hula teacher.
Kupuna	Grandparent, ancestor, relative or close friend of the grandparent's generation, grandaunt, granduncle.
Kūpuna	Plural of kupuna.

Limu	A general name for all kinds of plants living under water, both fresh and salt, also algae growing in any damp place in the air, as on the ground, on rocks, and on other plants; also mosses, liverworts, lichens.
Loʻi	Irrigated terrace, especially for taro, but also for rice and paddy.
Loko iʻa	Traditional Hawaiian fishpond.
Lua	A type of dangerous hand-to-hand fighting in which the fighters broke bones, dislocated bones at the joints, and inflicted severe pain by pressing on nerve centers. There was much leaping, and (rarely) quick turns of spears. Many of the techniques were secret. Lua holds were named. Lua experts were bodyguards to chiefs.
Mahi ʻai	Farmer, planter; to farm, cultivate; agricultural.
Makai	On the seaside, toward the sea, in the direction of the sea.
Māla	Garden, plantation, patch, cultivated field, as māla ʻai, māla kalo, māla kō, māla kūlina.
Mālama	To take care of, tend, attend, care for, preserve, protect, beware, save, maintain.
Manaʻo	Thought, idea, belief, opinion, theory, thesis, intention, meaning, suggestion, mind, desire, want; to think, estimate, anticipate, expect, suppose, mediate, deem, consider.
Mauka	Inland, upland, towards the mountain.
Mele	1. Song, anthem, or chant of any kind. 2. Poem, poetry. 3. To sing, chant.
Mele mākaʻikaʻi	Travel chant.
Mōʻī	King, sovereign, monarch, majesty, ruler, queen.
Moku	1. District, island, islet, section, forest, grove, clump, fragment. 2. To be cut, severed, amputated, broken in two.
Moʻo	Lizard, reptile of any kind, dragon, serpent.
Moʻolelo	Story, tale, myth, history, tradition, literature, legend, journal, log, yard, fable, essay, chronicle, record, article.
Moʻowahine	Female lizard deity.

Nīʻau-piʻo	Offspring of the marriage of a high-born brother and sister, or half-brother and half-sister.
ʻOhana	Family, relative, kin group; related.
ʻŌlelo noʻeau	Proverb, wise saying, traditional saying.
Oli	Chant that was not danced to, especially with prolonged phrases chanted in one breath, often with a trill at the end of each phrase; to chant thus.
ʻŌʻō	Digging stick, digging implement, spade.
Pae ʻāina	Group of islands, archipelago.
Piʻo	Marriage of full brother and sister of nīʻaupiʻo rank, presumably the highest possible rank. Their offspring had the rank of naha, which is less than piʻo but probably more than nīʻaupiʻo. Later piʻo included marriage with half-sibling.
Pueo	Hawaiian short-eared owl (*Asio flammeus sandwichensis*), regarded often as a benevolent ʻaumakua.
Wai	Water, liquid or liquor of any kind other than sea water.
Wahi pana	A sacred and celebrated/legendary place.
Wahine	Woman, lady, wife; sister-in-law, female cousin-in-law of a man.
Wao	1. Realm. 2. A general term for inland region usually forested but not precipitous and often uninhabited.

Appendix II: Cultural Impact Assessment Participant Agreement and Interview Questions[24]

Agreement to Participate in the Cultural Impact Assessment for the Proposed Windward Hotel, TMKs: (2) 3-8-103: 014 (portion), 015, 016, 017, and 018

Honua Consulting is requesting your participation in a Cultural Impact Assessment (CIA) for the Proposed Windward Hotel, TMKs: (2) 3-8-103: 104 (portion), 015, 016, 017, and 018, in Kahului, on the island of Maui. This parcel is referred to as the "Project Area." The proposed hotel is a 200-unit hotel to be located on vacant parcels of land in the Maui Business Park Phase II. This CIA is being completed by Honua Consulting, a Hawaiian owned resource management company, on behalf of Chris Hart & Partners, Inc. A brief description of the Project is written below.

You are free to ask your interviewers questions and may withdraw your participation at any time. A copy of this form will be provided to you.

Description of the Cultural Impact Assessment

This CIA is being conducted to collect information about the Project Area in Kahului and its surrounding area in the Wailuku on Maui Island through interviews with individuals who possess cultural information about this area, and/or about information including (but not limited to) cultural practices and beliefs, customs and traditions, moʻolelo, mele / oli, or hula associated with this area. The goal of the cultural impact assessment is to identify any traditional Hawaiian and/or historic cultural resources, or traditional cultural customs and practices on or near the Project Area. This CIA will also attempt to identify any impacts that the proposed development may have on cultural resources or activities associated with the Project Area.

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[24] It should be noted that when interviews are conducted by telephone, the consent and release are obtained verbally.

Interview Consent and Release Form

I, ____, hereby agree to be a participant in the Proposed Windward Hotel, TMKs: (2) 3-8-103: 014 (portion), 015, 016, 017, and 018 Cultural Impact Assessment (herein referred to as "CIA"). I understand that the purpose of the CIA is to conduct oral history interviews with individuals with information about the subject property and surrounding area. I understand that Honua Consulting and will retain the products of my participation (digital recording, transcripts of interviews, etc.) for use on the project, but that I will remain owner of any of these products. I have the right to request them at any time. I also retain the right to request their destruction at any time. Unless I expressly request that this information be surrendered to me or my designee, or I request destruction of this property, the material(s) will remain in the possession of Honua Consulting that the material(s) may be used for scholarly, educational, land management, and other purposes.

By consenting to be a participant in this CIA, I agree to be digitally recorded for my interview. I understand that this recording will be summarized for use in the CIA. I understand that I will be identified in the CIA. The summary will be sent to me for editing and final approval. Data from the interview will be used as part of the ethno- historical report for this project and the summary will be included as an appendix to the report. I understand that I have the right to stop my participation at any time in this process and ask that all products resulting from my participation be relinquished to me or destroyed. I also understand that I have the right to ask that certain sensitive information remain confidential – any information that I identify as confidential will not be used in the CIA.

________________________________ ________________________________

Signature **Date**

Printed Name:

Email: **Phone Number:**

Print Name

Interview Release

I have reviewed the summary of the interview and agree that the summary is written to my satisfaction. I have had a reasonable opportunity to review the language and modify to my comfort level. I understand that any intellectual property remains my own and will only be used for the purpose of completing the Cultural Impact Assessment and any associated documents related to the Project.

Participant Signature **Date**

Interview Script:

1. Please provide your name.
2. What is your profession?
3. Where were you born and raised?
4. Where do you live now?
5. What is your association, if any, with the Project Area?
6. Are you aware of any cultural resources in the Project Area or near the Project Area?
7. Are you aware of any traditions or customs that may take place near the Project Area or are otherwise associated with the Project Area?
8. Is there anything about the project area that's particularly significant you would like to share? 9. Are there any stories associated with the project area we should be aware of?
10. The proposed project includes the building of a 200-room hotel in the Project Area. Are you aware of any resources that may be impacted by such a project? What might those impacts be? Can you think of ways in which any potential impacts can be minimized, mitigated, or avoided?
11. Are you aware of any traditions or customs that may be impacted by such a project? What might that impacts be? Can you think of ways in which any potential impacts can be minimized, mitigated, or avoided?
12. Do you have any recommendations for conditions or best management practices for the project, should it proceed?
13. Is there anything else you would like to share?
14. Is there anyone else we should talk with about the project or the Project Area?
15. Is there anything in this interview you would like us to omit from the summary?

Appendix III: Kanahā Pond Wildlife Sanctuary Documentation

The following images were provided by Kumu Hula Naomi "Sissy" Lake-Farm as a reference to the importance of KPWS. The majority of the documents were penned by Maui historian Inez Ashdown and are included in the collection of Inez Ashdown's Research. Newspaper articles and clippers are also included in Ms. Lake-Farm's sent paperwork.

3 Oct. '61

Wm. J. Belknap
P.O.Box 1568
Kahului, Maui

Aloha:

Here is a copy of the letter I wrote very hastily to Oren E. Long. It contains most of the information I have gathered, and should give you a good start for publicity. Do, please, kokua all you can, eh?

Winston Miyahira told me his first aim is guidance on the spring-water in Kanaha; the possibility of motor-pumped water from HC&S Camp 7 Pump; guidance from Bob Bruce; and publicity. He hopes to see Big Mike Kirwan and party, and Rep. Inouye, this coming Friday, 6 Oct.. (See this a.m. Advertiser re the visitors.)

As to the legend I wrote for the chairman and committee: During the time of Kamehameha Nui, son of Kekaulike, an Oahu princess came searching for her brother, Prince Kanaha, heir to the Oahu realm. On her way, she married Prince Kauhi, brother of Kamehameha Nui and Kahekili (last king of Maui) and Kaeo, king of Kauai and Niihau. On the day when King Kamehameha Nui was to dedicate the twin fishponds the Oahu princess met him and he had her name the two ponds. She named one for her brother, Kanaha, and the other for the name Mauoni, which she had used as her title while disguised as a traveling commoner. The full name of the Oahu prince was Kanaha o ka Lani. The full name of the princess, his sister, was Kaha-malu-ihi-lani, or Under the protection of the heavenly Spear. Ka-naha-o-ka-lani means, figuratively, The-child of highest rank-whose parents were mated in heaven. On his grandmother's side this prince was a ni'aupi'o rank of the Naha line. It is concerned with the Naha Stone lifted by Paiea Kamehameha (the First) who later lifted that stone in order to prove his fitness as a leader-ruler. The prince's father was Prince Kapi'i oho o ka lani of Oahu, (son of King Ku'ali'i who retained the Law of the Mamala'hoa) and was attacked, on Molokai, by King Alapainui.

The twin fish ponds are a most sacred place, and, today, are the one refuge of migrating and local birds. According to Bryan's Natural History (1915), the Kukuluaeo, or Hawaiian Stilt, was a migratory bird but settled here and is found mostly at Kanaha.

Mahalo nui, and good wishes to you, Stella, and family. Welcome home to Maui.

Inez

Inez Ashdown

Kanaha Pukoa built new walls. People credit Kanaha is the menehune, but it was Ki'i'ula kai who built the first fish pond or Hamoa, Hana, who is responsible, really. His son, aiai, built Ki'i'ula ponds, & Koa after his father's death on Maui

9 November 1962

From : Ines Ashdown, Member
To : Winston Miyahara, Chairman, and fellow members of the Citizens' Advisory Committee on Kanaha Bird Sanctuary, Dept. of Economic Development of Maui County.

Subj : Master plan for Kanaha Ponds.

1. Mr. Robert Bush, Planning consultant, will be with us today during our meeting at the Board of Supervisors Chambers.

As a member of the Kanaha Ponds committee, I have written one legend-history paper for us, have consulted Mr. Robert Bruce of East Maui Irrigation (who, by the way, is an authority on the necessary procedures to insure continuous water in the ponds and to preserve them properly) who offered to meet with us. Mr. Bruce would have helped us to do the work necessary to keep the ponds filled, and he said the materials and labor would cost around one hundred dollars, unless workers volunteered their services as he was doing. I have spoken with Mr. R.R. Lyons and other fellow members of MEDA, and to everyone who might help in completing our job of proper preservation of Kanaha.

At our last meeting, I scolded about the delay and asked why it is costing so much for research and all the rest, when we can go right ahead with plans, with Mr. Bruce to advise in regard to perpetuating the water supply and the ponds. At that time, three government men from Honolulu said that there was ten thousand dollars for Maui's work, but for technicalities we were not allowed to use it. I added that we did not need ten thousand dollars to make Kanaha into a delightful sanctuary, beautiful to see and safe for our birds. I did not agree with the idea of a park which would allow people to frighten the rare water fowl and other birds making their homes at Kanaha and Mau'oni. I still do not want to see the ponds invaded by sight-seers and picnics. I did suggest that the Hawaiian Civic Club be put in charge, along with the Maui Canoe Club, and that we work with Hawaiians who know how to manage fish-ponds so as to earn income from moi and mullet. Also, that the two organizations and we have a club house near the harbor end where the birds don't go, and offer canoe trips for nominal sums in order to defray expenses. I also suggested that the Maui County Fair and Racing Association be asked to join with us in making the Kahului Fair Grounds and the adjacent pasture into a beautiful park, zoo, and playgrounds, with proper race track, polo field (also for use as a football field inside the race track oval), and allow someone to give pony rides for sale, and to have someone to give lessons in horseback riding.

2. At that time, Grove ranch had the feed mill and pastures mauka, and ran some Angus cattle there. The 4-H clubs were interested in being a part of our set-up as regards ranching, stock-raising, feed-production, and riding lessons. The Girl and Boy Scouts and several other organizations thought my plans were good.

Page 2

3. At the same time, I suggested that we go ahead and utilize the Kealia ponds on Maalaea-Kihei side by keeping the mauka part as a beautiful secondary-bird sanctuary, and create an inland harbor out of the ponds on the makai side. Dredged soil could be utilized to create real-estate lots along the harbor sides, makai, with jetties for boat owners and safety for all, including visiting yachtsmen.

Since that time, you have seen Kealia become its usual drought-time dust bowl, much to the dismay of residents and visitors there. Many arguments, pro and con, have come up, but I still insist that this is the least expensive and the most gratifying and profitable way in which time and money can be invested in our Kanaha-Kealia, Fair-grounds areas.

4. Meanwhile, the departments, bureaus, inter-departments and bureaus, committees, individuals, all have given time and money and effort to beautifying these areas of Maui and have done exactly nothing!

4. Our particular committee was formed to do something about Kanaha, and to date we have accomplished nothing. We have no power, no money, and no authority by which to go ahead and accomplish what we wish to do to beautify Maui. Neither, apparently, has the Dept. of Land and Natural Resources, the Board of Agriculture and Forestry, the Fish and Game division, et al, et al, and forever, Amen.

5. Therefore, considering what has occurred to date, I make a final suggestion: Either we be invested with the authority to go ahead with our plans, and use the money set aside for Maui in an honest way to accomplish beautification, and get down to brass tack work,.. or else disband our committee and find new membership which may be able to accomplish what we, to date, have failed to do.

Thank you, and respectfully,

Inez Ashdown, Member.

Keokea,
Waiakoa, Maui

Ashdown.. For the Kukulu-ae'o or Hawaiian Stilt, and other feathered friends of this earth. They were migratory, according to E.H.Bryan and others, but for some unexplainable reason chose to remain here at last.

Shame on those who would kill them by draining the ponds and making useless drylands or cement jungles to replace the cooling waters used by fish and birds. On Kaua'i my son,Angus, engineer for the plantations, purified the mill-waste waters, directed them to one-time dumps which formerly had been lovely ponds, and today the lands, birds, fish, everyone, see beauty and are happy. It can be done on Maui. Even if the proposed sewage plant be built in Kahului, the water can be cleaned.. The place can be beautiful instead of ugly and "eyesore vista."

God created things for good reason. The ponds received the overflow of rain. The old-timers removed over supply of silt and used it for bare lands so plants could grow.. The ponds were fragrant, habitable for birds and fish, protected and natural. Why does it all need to be changed today??

KANAHA PONDS..

Bob Bruce: ... 1946 tidal wave washed ~~washed~~ away the protective sand bar. There has to be a sand-bar and an outlet for the ponds, and HC&S promised to uppply water for the pond.. It somewhere near the railroad brddge nauka The sand bar lower along MUST be kept intact and cared for all of the time.. The fringe area is important to stilts and other birds.. All is in the State Plan now; and a stone wall should be maintained at all times. Build more rock wall if necessary. Bruce and Jack Singlehurst to go look over the area with Inez Ashdown. I am to write the story on fishponds..

Mr. Miyahira of the County Liquor Office will call the next meeting.

Olinda.. Harry Field, Frank W. Crockett, Medeiros, Atate Bd of Agriculture

Neilson, aero commission... Public Land Office.

HC&S Co,owned.. Asa Baldwin

Frank Lombardi.. Joe Medeiros.. Neilson.

Find out if the Springs still operating.. Can use Well # 7 Pump, HC&S..

Publicize; help from ~~xxx~~ populace.. Wm Belknap.. Robt Ohata.. County Planning Director... State Parks, Dunlap. John Sur.

Mary Ellen Lindley.. Hui Manu

State Land Use Comm..

Ashdown.. Kanaha-Mau'oni Ponds, Kahului

Maintain the habitat.. for birds and fish, plants and mosses. Plantations, everyone, must help. THIS IS A BIRD SANCTUARY. Clean water; Makaloa reeds; Rice; Other bird food-plants.. taro.. My son, Angus Ashdown, engineer for Lihue Plantation, solved the problems of bad odor, death of birds etc.. Yes, he continued to dump the mill waste, but it was purified before it entered the pond-swampland. Birds, fish, plants, thrived, and the entire area was like a beautiful lake with no weeds or rubbish. There are 90 kinds of native birds, 70 endemic plants, but we have lost toommany on Maui and elsewhere. NO POISON SPRAYS.. ROAD RUN*OFF SHOULDBE DIVERTED AS IT FLOWS FROM THE AIRSTRIPS AND MACADAM HIGHWAYS, BECAUSE OF TOO MUCH OIL, GASOLINE WASTE, EVERYTHING DETRIMENTAL TO POND LIFE AND HEALTH. THE PROPOSED SEWAGE PLANT PROBABLY WILL RUIN THE ENTIRE AREA AND ATMOSPHERE, AS WELL AS BIRD AND OTHER LIFE HERE. TOO BAD TO HAVE THE ONCE BEAUTIFUL,HEALTHY AREA POLLUTED WHEN IT IS ONE OF THE FIRST SITES SEEN BY ARRIVING AND DEPARTING VISITORS!
MAN CANNOT RE*CREATE SPECIES.. STUDY WILD LIFE PROGRAMS OF OTHER COUNTRIES AND AREAS BUT BE CERTAIN THRY ARE TRIED AND GOOD BEFORE WE SIMPLY EXPERIMENT ON MAUI. WAIHE'E AND OTHER PONDS ALSO SHOULD BE BEAUTIFUL , SET ASIDE FOR BIRDS AND FISH, AND NOT ENCUMBERED BY HOUSING OR INDUSTRIAL PARKS..

Even the Alae, or Gallinole, is disappearung at Kanaha, Waihe'e, Ke Alia and Kalepolepo, Kealia-ula below Ukumehame.. everywhere. Help the Audibon, Hui Manu, other societies, with their effort. Pay membership.. Help with publicity through media including the KHET Network.

KANAHA

From Inez Ashdown, 14 November 1960

1. Kanaha Pond area should remain a Bird Sanctuary.
   a. The public going there all the time will, naturally, cause the wild birds to seek other homes, and there is no other home, particularly for the Kukuluaeo, or Hawaiian Stilt, and the ducks.

2. If a public park there does become a reality, then I suggest that only the town side of the area be open to the public. Removal of trees and brush on the mauka end will ruin the birds' nesting places.
Could the Maui Canoe Club have headquarters and club house on the area nearest Kahului, a "canal" could be kept open at the mouth of the pond for an "inland harbor" there. Perhaps the Club could charge 10¢ per ride for children, on that lower end of the pond, and also be given charge of keeping the seaweed from accumulating by the east breakwater. The Board of Harbor commissioners doesn't seem to do anything about the seaweed and its odor, but the situation can, and should be, controlled.

3. On the airport side, a beautiful Hawaiian Village could be built and provide "local color" and ~~hmt~~ handcrafts products to buyers, too. This would not interfere with the bird sanctuary at all, but would help to make use of the waste area in and about Naska. The remainder of the area beyond the airport could be beautified as a beach park.

4. Provided the Race Horse committee and Al Souza and others, plus the Maui County Fair and Racing Association itself, are enabled to re-build the race track at the Fairgrounds in Kahului, our plans will coincide in the beautification of the Kanaha area. We hope to see a good racetrack, repainted and repaired grandstand and stables etc., and shade trees over the parking lot. In addition we hope that HC&S Grove ranch may allow the race committee to care for the land adjacent to the stables area, past the public dump, and as far as the Feed Mill, and use it as pasture for horses staying overnight during races. We have only a small stable, now, as the Stock-show is held in the former racing stables, and we must tie~~x~~ our mounts to kiawe trees etc..

5. All the Fairgrounds area, and Kanaha, can be one of the most beautiful "park areas" in the world. Particularly if HC&S Co. would go along with our plans to use Camp One stables as a riding academy and track, and another veternary hospital could be built where one used to be. People, particularly children, long for the opportunity to learn to ride, and to have bridle paths and trails to follow on Maui. With a good Riding Club, and a good Race Horse Committee to help the Maui County Fair and Racing Association, and with all the Government Agencies cooperating with our plans, Kahului-Sprecklesville-and Kanaha area could be a wonderland in future.

6. How~~y~~ about the water buffalo? They should be at Kanaha.

According to Joseph Medeiros, fish and wildlife warden at Kanaha and for Maui, the fresh-water spring in the pond is still flowing but the sand-bar that retains the land water has been disturbed. Consequently, water flows away too fast, allowing the pond to become too low and therefore not only endangering the life of birds and fish etc., there, but apt to cause odor from decaying moss and so on.

On September 20th I attended my first meeting with the Maui committee. It was held in the Board of Supervisors Chamber at Wailuku, and among those I know were Hollis Hardy, Al Souza, Harry Field, Uncle Hanu, and a few more local men.

Three men from the State office , Dept. of Accounting and General Services were there, and Robert Ohata, Maui County Planning Director. As I understand it, ten thousand dollars was appropriated for Kanaha, but the three Oahu men said it will take much more money just to "study" the plans and to survey, to dredge the pond, and to make a new pond opening to and from the sea.

Now, such suggestions seem to me very wrong. I feel that since the Kanaha ponds, the Kahului Fairgrounds and other areas there are below sea-level, to dredge or to bring in sea water would ruin the pond entirely. I telephoned Robert Bruce, head of the East Maui Irrigation Company of the HC&S Co., and he gave me a very simple solution. He is an engineer and he knows the geology of Maui. He told me that all we need is a retaining wall inside of the sand-bar, in order to hold the pond water at proper level, and added that salt water would ruin the pond. He said that to put a pipe in, after dredging, would cause the pond to drain entirely. If the pond drains, or is in any way ruined, the last bird sanctuary in all Hawaii is gone. Our birds, including the rare Kukuluaeo, or Hawaiian Stilt, will have no home; Plover and other migratory birds will find no haven after their long flights; and many species of ducks and mud hens, including the rare Alae bird, and the shore birds such as Ulili and Akiskeki, will soon be dead.

Please, Mr. Long, help us to save Kanaha Pond. Help us to keep our one protected-by-law bird sanctuary in the State. All we need do, and it certainly would not cost thousands of dollars, is to follow the advice of Mr. Bruce. It is nonsense to "study and survey", probably for months and years, when we already know what must be done. Trouble is, we have too many departments and bureaus and offices passing the buck,one to the other while time and money are wasted. Meanwhile, this is dry season and the pond is dangerously low. Kealia pond on the Maalaea Bay side is dried out and making a dust bowl for all that area and Kihei. I wrote to Henry J. Kaiser, and to the Maui Chamber of Commerce, and brought up to the Hawaiian Civic Club and our Canoe Club members, asking whether we might all cooperate in regard to Kealia. It would be an excellent inland harbor, and small craft, particularly fishing sampans on that side would not be endangered during Kona storms.

My father and I tried to get a harbor made there years ago while we were working on Kahoolawe. We hoped ,then, to have the upper part of that old fishpond serve as a sanctuary for wild birds, in conjunction with Kanaha.
Mr. Kaiser was definitely interested, since he now owns property at Maalaea, but can do nothing just now as he is too busy with his Hawaii Kai development at Kuapa pond on Oahu, at Koko Head-Mana'lua Bay area.
The Chamber of Commerce and the Hawaiian Clubs were definitely interested, but we have no ready money. All of this would, of necessity, take Federal, State, and County government aid and cooperation. A few of us might form a special committee and go around asking all Maui residents to kokua cash from a dollar each to as much as could be afforded. I believe all residents of Hawaii Nei are truly sincere in wanting to protect our birds. I'm certain the Hui Manu, the Audubon Society, Bishop Museum and the Honolulu Zoo staffs would help us, plus the office of the Governor and many others.

I am giving a copy of this letter to Mr. Miyahira, and am sending one to Governor Quinn. Will also try to see Representative Inouye, and, possibly, Representative "Big Mike" Kirwan of Ohio and his party, when they come to Maui next Friday. Mr. Miyahira, Girard Woods of Makawao, and Robert Bruce, have said they will try to contact the above-named visitors, and William Belknap of the Maui News has said he will help us with publicity. Also, we shall try to get help from the newly- sworn State Land Use Commission named by Circuit Judge Hewitt yesterday.

I shall also write to Senator Fong and enlist his kokua on the Kanaha Bird Sanctuary preservation and safety. What I really fear is that business men might decide to condemn all the area for commercial land purposes, unless we keep busy. We are becoming suspicious of everyone,lately, after seeing what happens to Oahu! It's disgraceful to ruin Puu Leahi (Diamond Head) and Manoa, and Nuuanu, and other places. Certainly, Kawainui Pond on Oahu should be a park and bird sanctuary, but no doubt the real-estate people will play politics and to blazes with beauty and birds. Beauty and Natural Balance of Nature, and wild life, don't, to date, earn the almighty dollar in the Fiftieth State.

I used to swim Kanaha pond back in 1915 to 1922, with the Louis von Tempski family. I can show them where the spring flows up, unless it's terribly covered with silt. The water is very cold by the spring outlet in the upper end. Help us save both Kanaha and Kealia for our birds,please. You're in the Capitol and you know all the depts. etc., where we rush around in circles of dismay and frustration, most of the time, because of changes here.

Aloha nui loa, and mahalo loa,
Sincerely,

Inez Ashdown.

Mrs. C.W. Ashdown
RR-9, Waiakoa, Maui
Hawaii.

Ashdown

lede Rare Birds

Bird Sanctuaries

The Kukuluaeo, or Hawaiian Stilt, is a very rare bird. According to Bryan's Natural History this stilt was once a migratory family, but for some unknown reason it decided to take things easy and settle down. Kukuluaeo chose the Kealia Kanaha for his home and today is found in no other part of the world. Interest in the bird, which shares Kanaha with many other feathered friends, including the Akikeki, Kolea, Alae and others, caused Maui residents to set aside the kealia, or ~~xxxxxx~~ salt-pond, at Kahului.

C.S.Childs was directly responsible for the present Bird Sanctuary, and the Hui Manu with Mrs. E.H.K. Baldwin of Ulupalakua ranch as its president, is now responsible for the Sanctuary and its valuable residents. Imported swans have been introduced here,now, by the Hui. Adults and children find much of interest and pleasure at Kealia Kanaha Bird Sanctuary, but of all the beautiful birds, Kukuluaeo remains the favorite, for he is a clown as well as a rare bird!. ..

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KANAHA BIRD SANCTUARY

By Inez Ashdown

The "lake of water" admired on the road from the airport to to Kahului is part of a one-time fishpond and swamp which reached from Kahului Harbor across part of the present Naska airport to Lower Paia. We children, back in 1915 and later, retrieved birds which hunters shot in season because wounded birds often could escape the dogs, or the water was too swift when the tide was running seaward or the pond was swollen from mountain flood-waters. Every native bird and every migratory bird imaginable was seen there, and C. S. Childs, who was manager of the Alexander House Settlement work and gym (now County management in Wailuku), was responsible for its becoming a bird sanctuary. He and Robert Bruce and all the members of the Hui Manu, or Bird Society, worked to preserve the ancient fishpond, the birds, fish, frogs, dragonflys, and the rare plants such as Makaloa from which mats were woven, soft as cloth; and Olo-na shrubs from which cordage was made. Hala grew there, and other native trees, safe among the imported Kiawe which did no harm.

Among the very rare birds was the Ku-kulu-a-e-o, or Hawaiian stilt. It once was migratory but for some reason decided to remain here. Kanaha Ponds, many places on Maui and Kaua'i, are graced by the pretty birds. The Kukulu were bird-form messengers of the gods, same as the Ko-a-e and the Kolea (Plover), and some others. The Alae is the bird-form of the kindly grandmother of Ma'ui who snared the sun. From her, he learned the secret of fire and fiery emotions and learned control of his temper.

Kana-ha, is one pond; Mau-oni is the other. Kanaha is named for a prince whose father was slain by warring chiefs on Oahu and the boy was brought to Maui for sanctuary. His sister, lonely for him, disguised herself as a commoner and after many adventures found him and they were reunited happily and these two ponds named for them long ago. Today, both these ponds at Kahului and the Kalepolepo ponds on Kihei side are much smaller than formerly.

Two rulers who repaired and rededicated, both Kahului and Kihei fishponds, were Kiha-a-Pi'ilani and Umi-a-Liloa, his brother-in-law, ruler of Hawaii. This was in the middle 1500's.

Unfortunately, ponds and sites are doomed by urban development and when the ponds go, then the birds and fish and plants will also be no more.

Flying To Extinction?

By GORDON MORSE

KAILUA, Oahu—Men and machines are driving one of Hawaii's unique birds, the Hawaiian Stilt, out of existence, according to Honolulu Zoo Director Paul Breese.

"We're real concerned," said Breese. The Hawaiian Stilt is one of the few truly Hawaiian birds we have left—and it is slowly being squeezed out of existence."

One of the favorite breeding grounds of the beautiful black and white birds, Kaelepulu Swamp, is now the Enchanted Lake Estates subdivision.

BREESE SAYS the Hawaiian Stilts once were common sights on Oahu, Kauai, Niihau and Molokai. But since the inroads into their favored swampy areas, they have been reduced to an estimated 200.

Only one living Hawaiian Stilt is to be found in captivity. It is at the Honolulu Zoo.

"We're trying to get them established on Maui, where there are adequate marshy game preserves," Breese said. "But our efforts haven't been too successful."

NOW THAT they have been pushed out of the Kailua swamplands, the birds have moved into the marshes near the Kaneohe Marine Air Station and at the ewa end of Pearl Harbor.

These areas, too, may soon be lost to the birds. They are being eyed for subdivisions.

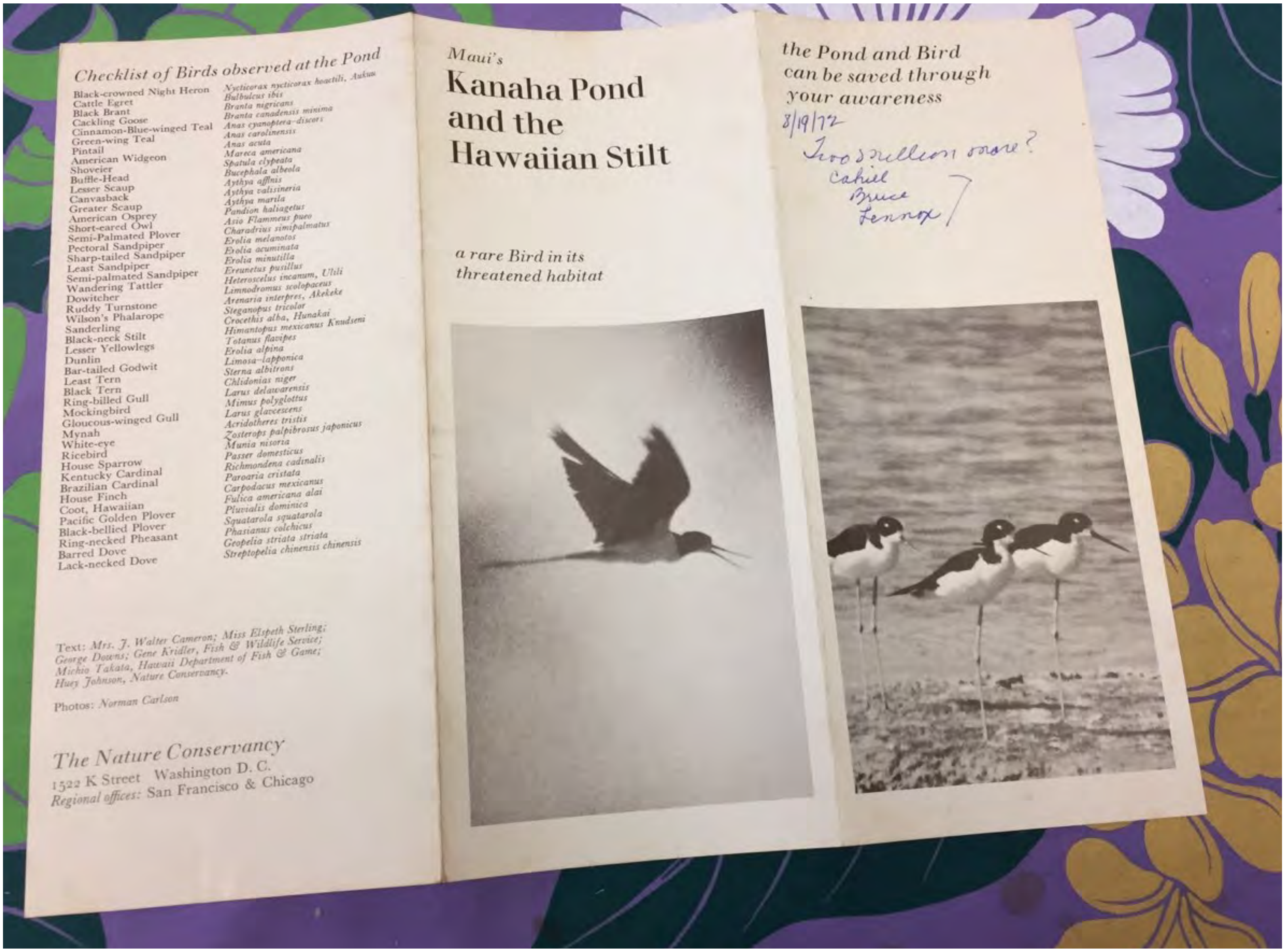
THE STILT, or Aeo as it is known to Hawaiians, is a beautiful bird in flight, with its pink, long legs sticking out almost parallel with its body.

It has a sharp cry and an ability to sidetrack intruders from its nest.

Hawaiian Stilt, or Aeo, feeding in swamp at Kaneohe Marine Corps Air Base.

Gordon Morse Photos

Stilts wading and taking off in swamp breeding area.



Checklist of Birds observed at the Pond

Black-crowned Night Heron	*Nycticorax nycticorax hoactili, Aukuu*
Cattle Egret	*Bulbulcus ibis*
Black Brant	*Branta nigricans*
Cackling Goose	*Branta canadensis minima*
Cinnamon-Blue-winged Teal	*Anas cyanoptera–discors*
Green-wing Teal	*Anas carolinensis*
Pintail	*Anas acuta*
American Widgeon	*Mareca americana*
Shoveier	*Spatula clypeata*
Buffle-Head	*Bucephala albeola*
Lesser Scaup	*Aythya affinis*
Canvasback	*Aythya valisineria*
Greater Scaup	*Aythya marila*
American Osprey	*Pandion haliagetus*
Short-eared Owl	*Asio Flammeus pueo*
Semi-Palmated Plover	*Charadrius simipalmatus*
Pectoral Sandpiper	*Erolia melanotos*
Sharp-tailed Sandpiper	*Erolia acuminata*
Least Sandpiper	*Erolia minutilla*
Semi-palmated Sandpiper	*Ereunetus pusillus*
Wandering Tattler	*Heteroscelus incanum, Ulili*
Dowitcher	*Limnodromus scolopaceus*
Ruddy Turnstone	*Arenaria interpres, Akekeke*
Wilson's Phalarope	*Steganopus tricolor*
Sanderling	*Crocethis alba, Hunakai*
Black-neck Stilt	*Himantopus mexicanus Knudseni*
Lesser Yellowlegs	*Totanus flavipes*
Dunlin	*Erolia alpina*
Bar-tailed Godwit	*Limosa–lapponica*
Least Tern	*Sterna albitrons*
Black Tern	*Chlidonias niger*
Ring-billed Gull	*Larus delawarensis*
Mockingbird	*Mimus polyglottus*
Gloucous-winged Gull	*Larus glaucescens*
Mynah	*Acridotheres tristis*
White-eye	*Zosterops palpibrosus japonicus*
Ricebird	*Munia nisoria*
House Sparrow	*Passer domesticus*
Kentucky Cardinal	*Richmondena cadinalis*
Brazilian Cardinal	*Paroaria cristata*
House Finch	*Carpodacus mexicanus*
Coot, Hawaiian	*Fulica americana alai*
Pacific Golden Plover	*Pluvialis dominica*
Black-bellied Plover	*Squatarola squatarola*
Ring-necked Pheasant	*Phasianus colchicus*
Barred Dove	*Geopelia striata striata*
Lack-necked Dove	*Streptopelia chinensis chinensis*

Text: *Mrs. J. Walter Cameron; Miss Elspeth Sterling; George Downs; Gene Kridler, Fish & Wildlife Service; Michio Takata, Hawaii Department of Fish & Game; Huey Johnson, Nature Conservancy.*

Photos: *Norman Carlson*

The Nature Conservancy
1522 K Street Washington D. C.
Regional offices: San Francisco & Chicago

Maui's

Kanaha Pond and the Hawaiian Stilt

a rare Bird in its threatened habitat

the Pond and Bird can be saved through your awareness

8/19/72
Two million more?
Cahill
Bruce
Lennox

SundayToday features, entertainment, food
section C

The Birds of Kanaha Pond

By Bob McCabe
Star-Bulletin Maui Bureau Chief


A Hawaii stilt reflected in Kanaha Pond.


A Hawaiian stilt.


Watching birds at sunrise over Kanaha Pond.

Photos by Ron Edmonds
Star-Bulletin


A flock of ducks flies in formation across an afternoon sun.


A Hawaii coot leaves a trail of ripples as it glides across Kanaha Pond.

Note: Bob Bruce of EMI is the only man who should dredge, to "open" the Waiala spring fed stream about the "gate" of these ponds. "gates", or to put a "drain pipe" in, will ruin them. Guard against ruin of the "Lower Stream" for our birds.

The real estate people are anxious to get this area for "big development" IA

Maui Bird Sanctuary

By INEZ ASHDOWN

The twin fish ponds near Kahului, Maui, which were dedicated by King Kamehameha the Great at the end of the 18th century, have recently come into the news again as the area is considered for possible development as a State park.

The historic ponds are presently reserved by the State Department of Agriculture and Conservation as a wild fowl sanctuary, but a citizen's committee is preparing recommendations for further development of the area.

The construction of the fish ponds was begun under the order of Prince Kapiiohookalani, son of Oahu's King Kualii and heir to Oahu's lands on Maui.

But the construction was interrupted when King Alapainui of Hawaii attacked Molokai, taking advantage of the fact that many of the men were working at Kahului.

During the battle, Prince Kapiiohookalani was killed, leaving a son and daughter. The son, Kanahaokalani, fled to his paternal grandmother on Maui when an uncle usurped the throne, and thus came under the protection of Kamehameha the Great.

The older sister, Kohanaiholani, worried about her little brother and, leaving her estates on Oahu in charge of her foster sister, left for Maui to find him.

As she traveled in the disguise of a commoner, she assumed the name of Mauoni, which means "traveling consciously".

Mauoni landed at Lahaina, hoping to meet Kamehameha, but he was at Hana, so she traveled just beyond Maalaea and there met the king's brother, Prince Kaulu, and married him.

Some time later, heralds brought the news that King Kamehameha would dedicate the completed fish ponds, so the princess went to Kahului to learn from the king the fate of her little brother.

As soon as the kapu sticks were set atop the fish pond walls and it was announced that the king was approaching for the sacred dedication, the princess's attendants arrayed the royal lady in precious white tapa, dressed her lovely black hair with blossoms, and completed the gowning with the Lei Palaoa, the whale-ivory pendant of royalty.

Then, as the king ascended the pond walls from one side, the princess mounted the steps from the opposite side, passing the kapu sticks and went to meet the great man of Maui.

The people cried out at such desecration, but the king called for silence. As the princess came forward the red symbol of his sacred rank fell before her, proving her right to approach him.

He embraced her, invited her to attend the ceremony and to name the twin ponds. His heralds had already told him of her arrival, her search for her brother, and her marriage to his own brother, Kaulu.

The princess named the first pond for her brother, Kanaha, and the second for her assumed name, Mauoni.

The stones for the ponds had been brought from Kapela near the fish heiau (temple) that stood where the Kahului beach road ... A long line of workmen had lined up to Wailuku today, passed the stones from hand to hand.

Unfortunately, the princess's brother died and never ruled his father's Oahu kingdom.

Prince Kaulu was killed in an uprising he headed against his brother, and the princess remained under Kamehameha's protection until she, too, died.

Today Kanaha is a bird sanctuary where many rare species are preserved, including the sacred Kukuluaeo, or Hawaiian Stilt, once a migratory bird that now lives only in these Islands.

Mainland wild ducks, rare Hawaiian Stilts, Canadian Emperor wild geese and mud hens can be found at Kanaha Pond.—Charles C. Young Photo.

Joseph Medeiros Jr., State wild life biologist, uses the telescope provided by the Hui Manu Society for the public to study the wild birds at the Kanaha Pond refuge.—Charles C. Young Photo.

A well-camouflaged mud nest of the rare Hawaiian Stilts at Kanaha Pond Wild Fowl Sanctuary on Maui is pointed out by Joseph Medeiros Jr. of the State Department of Agriculture and Conservation.

Medeiros traps wild ducks at Kanaha Pond for banding. If the birds are shot on the Mainland, the bands help local wild life authorities determine the Pacific bird flyways used.—Agriculture and Conservation Department Photo.

Appendix 24

Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT
KANAHA HOTEL
Kahului, Maui, Hawaii

DRAFT FINAL

April 30, 2021

Prepared for:

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TRAFFIC IMPACT ANALYSIS REPORT

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Honolulu • Wailuku Hawaiʻi

April 30, 2021

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AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TERRANCE S. ARASHIRO, P.E.
ADRIENNE W.L.H. WONG, P.E., LEED AP
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Maui Branch Manager

TRAFFIC IMPACT ANALYSIS REPORT

KANAHA HOTEL

Kahului, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the proposed Kanaha Hotel (hereinafter referred to as the “Project”).

1.1 Location

The Project is located on a 5.17-acre lot within the Maui Business Park North Project Area (MBP NPA) in Kahului, Maui. The Project site is bounded by Haleakala Highway to the north and Lauo Loop to the west. Figure 1.1 shows the Project location.

1.2 Project Description

The proposed action is to develop a 200-unit Hotel with associated infrastructure and landscaping. The proposed hotel building varies from one (1) two (2) and four (4) stories in height and will be massed toward the center of the Project Site with generous setbacks on all sides accommodating the width of a landscape buffer, the width of two parking stalls and a parking lot drive isle. Amenities and uses include but are not limited to, swimming pool, dining area, and other typical and similar incidental support services and accessory uses for hotel operation.

The Project is anticipated to be completed by 2025. Access to the Project will be provided by the existing Lauo Loop which services the MBP NPA. Figure 1.2 shows the Project site plan.

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WAILUKU, MAUI, HAWAII
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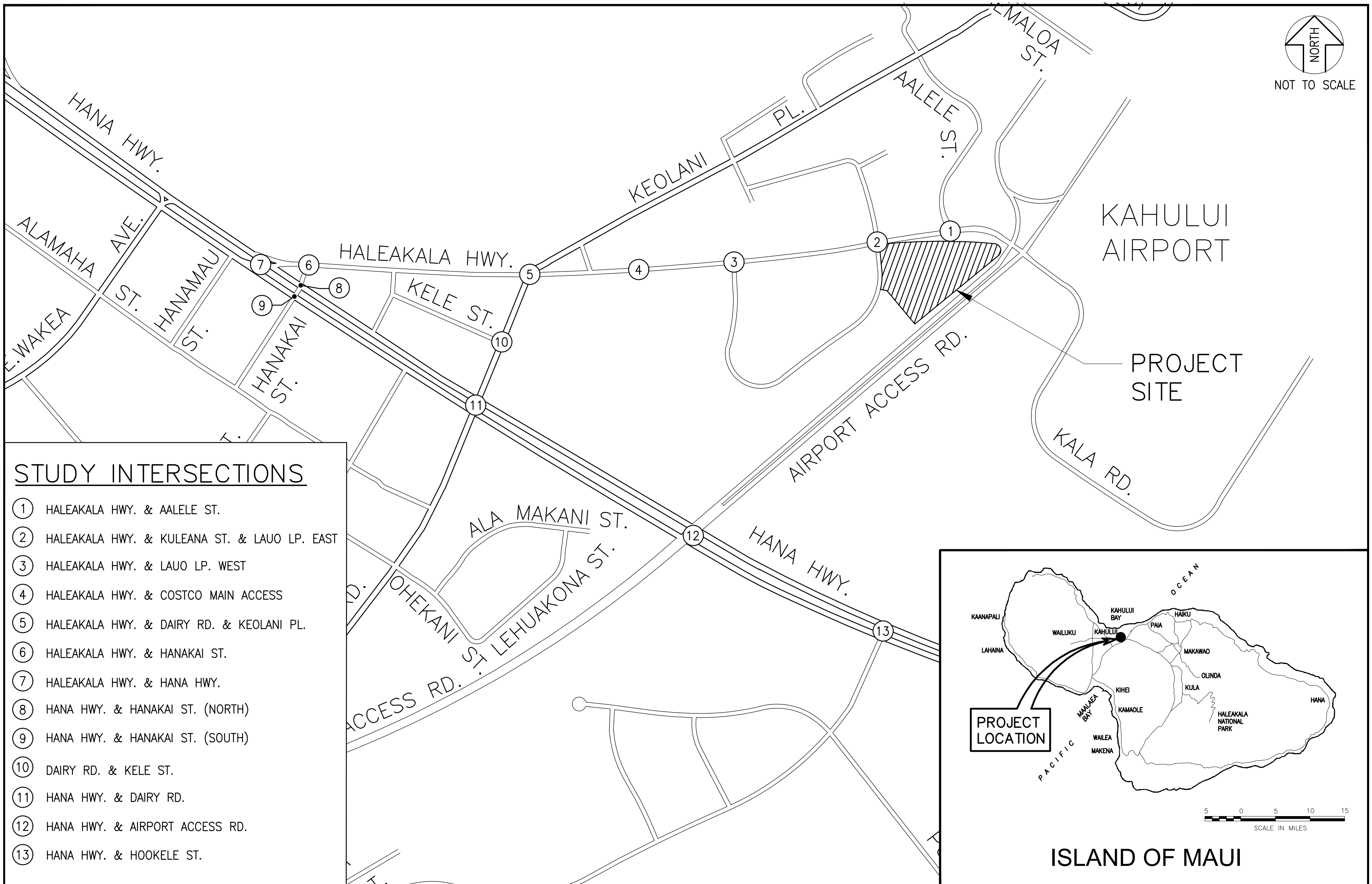

KANAHA HOTEL

TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS,SURVEYORS • HONOLULU,HAWAII

LOCATION MAP

FIGURE 1.1

SOURCE: CHIRS HART & PARTNERS, AXIS/GFA ARCHITECTURE+DESIGN

KANAHA HOTEL TIAR	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE
	SITE PLAN	1.2

2. METHODOLOGY

2.1 Study Methodology

This study will address the following:

- Assess existing traffic operating conditions at key intersections during the weekday morning (AM) and afternoon (PM) and Saturday midday (SAT MD) peak hours of traffic within the study area.
- Traffic projections for Base Year 2025 (without the Project) including traffic generated by other known developments in the vicinity of the Project in addition to an ambient growth rate. These other known developments are projects that are currently under construction or known new/future developments that are anticipated to affect traffic demand and operations within the study area.
- Trip generation and traffic assignment characteristics for the proposed Project.
- Traffic projections for Future Year 2025 (with the Project), which includes Base Year traffic volumes in addition to traffic volumes generated by the Project.
- Recommendations for Base Year and Future Year roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by known developments in the region or the Project.

2.2 Intersection Analysis

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), 6th Edition, includes methods for calculating volume to capacity ratios, delays, and corresponding Levels of Service that were utilized in this study. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

Analyses for the study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.

2.3 Study Area Intersection Analysis

Based on the proximity to the proposed Project site, the following intersections were studied in the existing conditions scenario. Note that the Haleakala Highway/Hana Highway/Hanakai Street intersection was analyzed as four (4) separate intersections for analysis purposes.

- [1] Haleakala Highway/Aalele Street (Year 2017 - unsignalized)
- [2] Haleakala Highway/Kuleana Street/Lauo Loop East (Year 2017 - unsignalized)
- [3] Haleakala Highway/Lauo Loop West (Year 2017 - unsignalized)

- [4] Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway (Year 2017 - unsignalized)
- [5] Haleakala Highway/Dairy Road/Keolani Place (Year 2019 - signalized)
- [6] Haleakala Highway/Hanakai Street (North) (Year 2017 - unsignalized)
- [7] Haleakala Highway/Hana Highway (Year 2017 - unsignalized)
- [8] Hana Highway/Hanakai Street (North) (Year 2017 - unsignalized)
- [9] Hana Highway/Hanakai Street (South) (Year 2017 - unsignalized)
- [10] Dairy Road/Kele Street (Year 2017 - signalized)
- [11] Hana Highway/Dairy Road (Year 2017 - signalized)
- [12] Hana Highway/Airport Access Road (Year 2019 - signalized)
- [13] Hana Highway/Hookele Street (Year 2017 - signalized)

Based on the traffic count data, the weekday morning and afternoon peak hours were determined to occur between 7:00 AM and 8:00 AM and 3:30 PM and 4:30 PM. Note that along Hana Highway, the weekday afternoon peak hours along the mainline occurred between 4:00 PM to 5:00 PM and were used along the three (3) Hana Highway intersections. The Saturday midday peak hour was determined to occur between 11:45 AM and 12:45 PM. The turning movement count data may be found in Appendix A.

3. EXISTING CONDITIONS

3.1 Roadway System

The following are brief descriptions of the existing roadways in the vicinity of the Project:

Aalele Street is a two-lane, undivided, north-south roadway which connects Keolani Place to Haleakala Highway with a posted speed limit of 25 miles per hour (mph).

Dairy Road/Keolani Place is a five-lane, undivided, north-south roadway which connects the Kahului Airport to Kuihelani Highway at its intersection with Puunene Avenue and also provides access to the Kahului Industrial area. At its intersection with Haleakala Highway, Dairy Road forms the south leg and Keolani Place forms the north leg of the intersection. The posted speed limit along Dairy Road and Keolani Place is 30 mph.

Haleakala Highway is a two-lane, undivided, east/west roadway fronting the MBP NPA. Haleakala Highway provides access to various commercial uses as well as the Kahului Airport. The posted speed limit on Haleakala Highway is 30 mph west of its intersection with Dairy Road 25 mph east of the intersection.

Lauo Loop is a two-lane roadway that intersects with Haleakala Highway at two locations (East and West) and will service the MBP NPA. Lauo Loop West currently services the east end of the Costco warehouse and gas station.

Hanakai Street is a two-lane, undivided, north-south roadway. Hanakai Street begins to the south at its intersection with Alamaha Street and terminates to the north at its intersection with Haleakala Highway. This roadway services various commercial uses.

Kele Street/U-Haul Driveway is a two-lane, undivided, east-west roadway. East of its intersection with Dairy Road, it provides access to the former K-mart site, currently the U-Haul baseyard. West of its intersection with Dairy Road, Kele Street provides access to various commercial and industrial uses. Note that existing traffic counts were conducted when Kmart was still in operation.

Hana Highway is generally a four- to five-lane, divided, east/west State Arterial roadway in the vicinity of the Project. Hana Highway is a regional roadway providing access to Wailuku, located west of Kahului, and towns on the north and east side of the island. Hana Highway mainly provides access to various commercial and industrial uses. The posted speed limit in the vicinity of the Project is 45 mph.

Airport Access Road (AAR) is a generally a four-lane, undivided, north/south State roadway. AAR begins at its intersection with Puunene Avenue and Kuihelani Highway and continues north through Hana Highway to serve as a direct route to the Kahului Airport. The posted speed limit on AAR is 45 mph.

Hookele Street is generally a divided, four-lane, two-way major collector roadway that provides access between Puunene Avenue and Hana Highway. Hookele Street currently services various restaurants, office buildings, and big box retailers such as Target, Home Depot and Wal-Mart. The posted speed limit along this roadway is 35 mph.

3.2 Existing Traffic Volumes

The majority of hourly traffic volume data utilized in this report was collected in 2017 as shown in Section 2.3. Existing traffic volumes were supplemented with new traffic counts collected in 2019 at the Haleakala Highway/Dairy Road/Keolani Place intersection and Hana Highway/Airport Access Road intersection, to accurately capture the redistribution of trips in the study area due to the recent opening of the Consolidated Rental Car Facility (CONRAC) and roadway circulation changes at Kahului Airport. Traffic counts at the Haleakala Highway/Costco Main Access intersection were also collected in 2019 and reflected similar to 2017 conditions.

Existing traffic volumes at the intersections collected in 2017 were modified to match the in/out volumes at the Haleakala Highway/Dairy Road/Keolani Place intersection and the Hana Highway/Airport Access Road intersection. The 2019 volumes and subsequent 2017 volume modifications include traffic generated by various businesses in the Maui Business Park South Project Area (MBP SPA) that opened between 2017 and 2019 and include Pacific Pipe, Lexus, BMW, American Savings Bank, Safeway Store, Safeway Gas Station and new tenants at the Puunene Shopping Center. In total, the 2019 volumes and 2017 adjusted volumes constitute the baseline Existing 2019 traffic condition.

3.3 Existing Traffic Conditions Observations and Analysis

3.3.1 Existing Intersection Analysis

The observations and analysis described below are based on prevailing observations during the time at which the data was collected. All study intersections generally operated adequately at LOS D or better. However, the following intersection movements operated at LOS E/F:

[3] Haleakala Highway/Lauo Loop West

The northbound left-turn operated at LOS D or better during the AM and PM peak hours of traffic and at LOS E during the SAT MD peak hours of traffic due to the high turning volumes. It should be noted, multiple northbound left-turn vehicles were able to proceed through the intersection at once, since eastbound through traffic along Haleakala Highway operated in platoons, with gaps in traffic generated by the nearby traffic signal at the Haleakala Highway/Dairy Road/Keolani Place intersection. The northbound left-turn is also provided with a median refuge lane to cut down on northbound left-turn delays by allowing two-stage left-turn movements. Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, a traffic signal is currently not warranted. Signal warrant figures are shown in Appendix D.

[4] Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway

The northbound left-turn operated at LOS F during the PM and the SAT MD peak hours of traffic due to the high turning volumes. However, similar to the Haleakala Highway/Lauo Loop West intersection, multiple northbound left-turn vehicles were able to proceed through the intersection at once, since eastbound through traffic along Haleakala Highway operated in platoons, with gaps in traffic generated by the nearby traffic signal at the Haleakala Highway/Dairy Road/Keolani Place intersection. Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, a traffic signal is currently warranted. Signal warrant figures are shown in Appendix D.

[5] Haleakala Highway/Dairy Road/Keolani Place

Since the completion of the CONRAC and roadway circulation changes at the Kahului Airport, all movements at this intersection operate adequately at LOS D or better due to reduced volumes along all approaches. The westbound left-turn movement, which previously exhibited lengthy queues prior to Kahului Airport circulation changes, has since improved, with the majority of westbound left-turn vehicles remaining within the westbound left-turn lane and generally clear in one signal cycle.

[8 & 9] Hana Highway/Hanakai Street (North) & Hana Highway/Hanakai Street (South)

During the AM, PM and SAT MD peak hours of traffic, various minor street approaches operated at LOS E/F. Delay to the minor street approaches was due to the high through volumes along Hana Highway. However, gaps in through traffic along Hana Highway were available due to upstream and downstream signals. Therefore, only 1-2 vehicles were observed to queue along Hanakai Street during both peak hours.

[10] Dairy Road/Kele Street

The westbound shared left-turn/through lane operated at LOS E during the PM peak hour and at under capacity LOS F during the SAT MD peak hour due to the high volumes along Dairy Road. However, it should be noted that the U-haul baseyard currently occupies the site east of the intersection and generates lower traffic than the previous K-mart tenant.

[11] Hana Highway/Dairy Road

During the AM and PM peak hours of traffic, various left-turn movements and the northbound and southbound through movements operated at LOS E/F due to the long cycle length at this intersection required to accommodate the high volumes along Hana Highway. However, all movements operated under capacity, and observations indicated all left-turn movements generally queued within its given storage lane lengths. During the heavier PM peak hour, eastbound queues along Hana Highway can queue to Hanakai Street and occasionally require two signal cycles to clear.

[12] Hana Highway/Airport Access Road

Similar to the Hana Highway/Dairy Road intersection, during the AM and PM peak hours of traffic, various left-turn movements and the northbound and southbound through movements operated at LOS E/F due to the long cycle length at this intersection required to accommodate the high volumes along Hana Highway. However, all movements operated under capacity, and observations indicated all left-turn movements generally queued within its given storage lane lengths.

[13] Hana Highway/Hookele Street

During the AM and PM peak hours of traffic, left-turn and minor street volumes operated at LOS E/F due to long cycle lengths which prioritize the high volumes along the mainline Hana Highway. The heavy through movement along Hana Highway operates at LOS A or B across all peak hours. Northbound queues along Hookele Street can queue near to Pulehu Road.

Figure 3.1 illustrates the existing lane configurations, volumes and LOS. See Table 3.1 for a summary of the existing conditions analysis. LOS worksheets are provided in Appendix C.

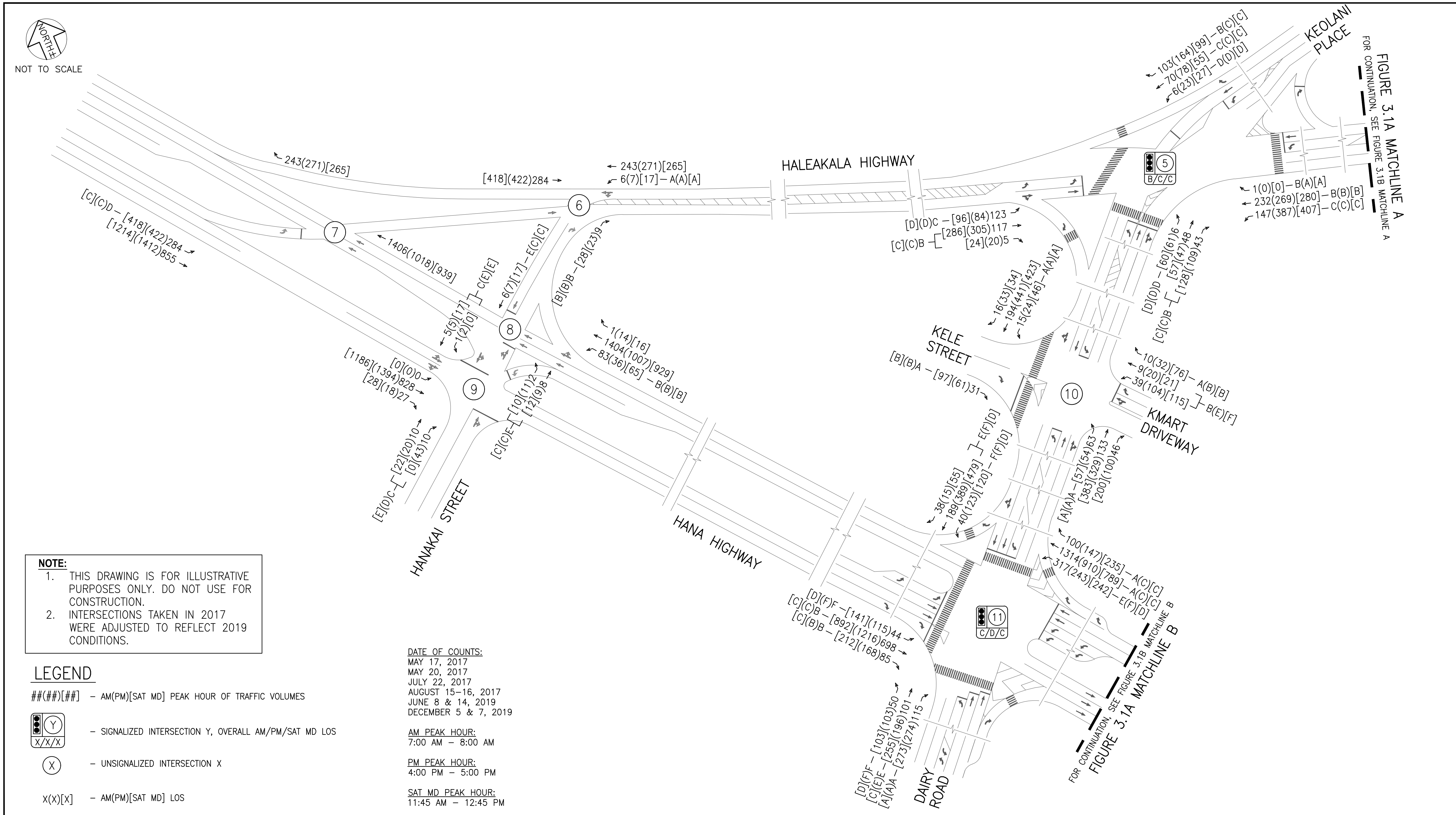

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FIGURE 3.1A

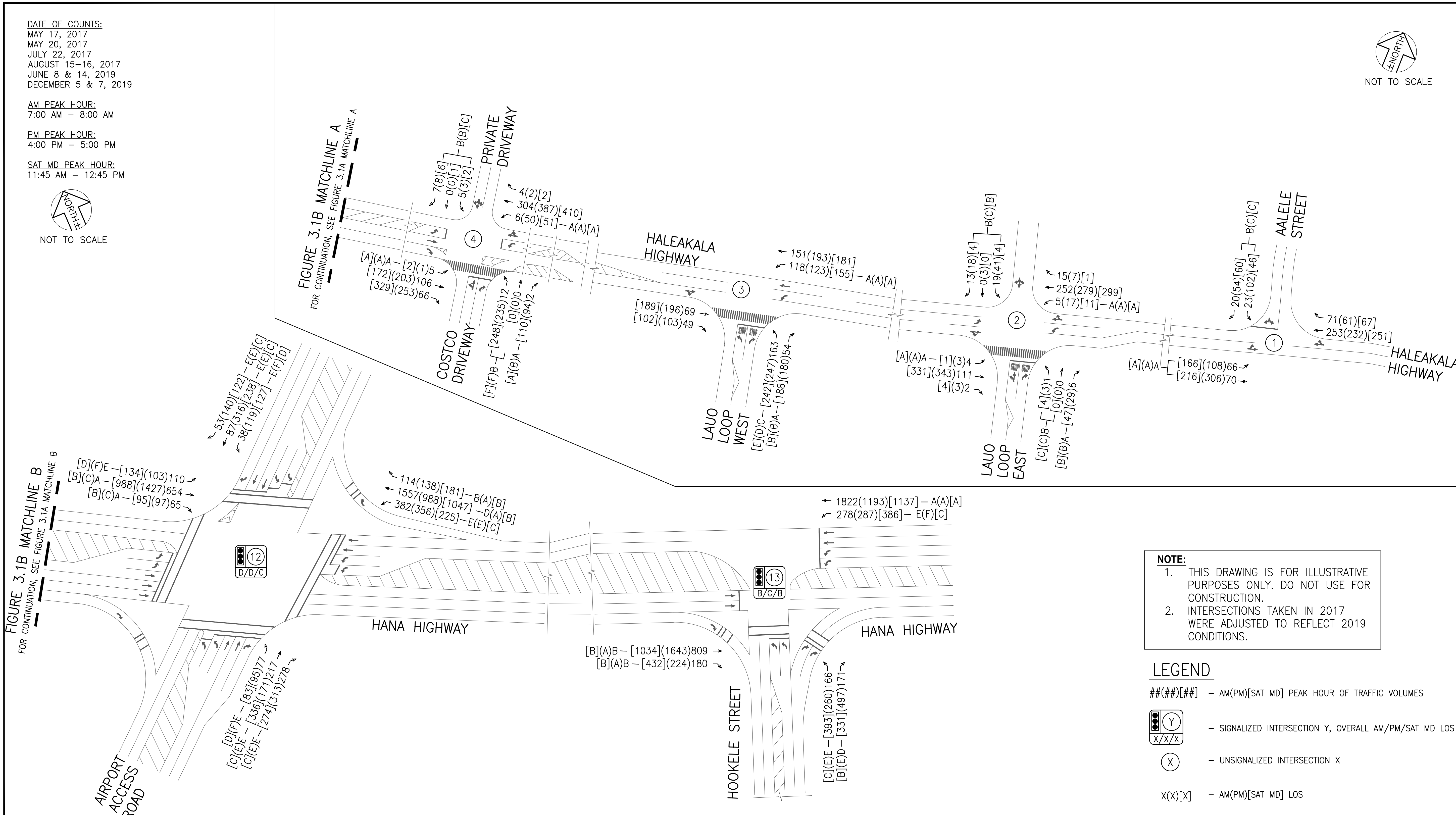
EXISTING LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

DATE OF COUNTS:
MAY 17, 2017
MAY 20, 2017
JULY 22, 2017
AUGUST 15-16, 2017
JUNE 8 & 14, 2019
DECEMBER 5 & 7, 2019

AM PEAK HOUR:
7:00 AM – 8:00 AM

PM PEAK HOUR:
4:00 PM – 5:00 PM

SAT MD PEAK HOUR:
11:45 AM – 12:45 PM



NOTE:
1. THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.
2. INTERSECTIONS TAKEN IN 2017 WERE ADJUSTED TO REFLECT 2019 CONDITIONS.

LEGEND
##(##)[##] – AM(PM)[SAT MD] PEAK HOUR OF TRAFFIC VOLUMES
X/X/X – SIGNALIZED INTERSECTION Y, OVERALL AM/PM/SAT MD LOS
X – UNSIGNALIZED INTERSECTION X
X(X)[X] – AM(PM)[SAT MD] LOS

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EXISTING LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE 3.1B

TABLE 3.1: LOS SUMMARY TABLE
EXISTING CONDITIONS

Intersection	Existing 2019 Conditions								
	AM			PM			SAT MD		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Haleakala Hwy & Aalele St									
EB LT	8.2	0.06	A	8.2	0.10	A	8.5	0.15	A
SB LT/RT	11.9	0.08	B	22.6	0.46	C	17.4	0.29	C
OVERALL	2.1	-	-	5.1	-	-	4.0	-	-
Lauo Loop East & Haleakala Hwy									
NB LT/TH	11.9	0.00	B	16.4	0.01	C	15.7	0.01	C
NB RT	8.9	0.01	A	10.6	0.05	B	10.7	0.08	B
EB LT	7.8	0.00	A	7.9	0.00	A	7.9	0.00	A
WB LT	7.5	0.00	A	8.1	0.02	A	8.0	0.01	A
SB LT/TH/RT	11.3	0.06	B	16.6	0.18	C	13.6	0.02	B
OVERALL	1.1	-	-	2.1	-	-	1.1	-	-
Lauo Loop West & Haleakala Hwy									
NB LT	16.9	0.37	C	29.6	0.66	D	37.8	0.73	E
NB RT	9.0	0.06	A	11.3	0.26	B	11.3	0.26	B
WB LT	7.7	0.09	A	8.3	0.11	A	8.3	0.14	A
OVERALL	6.9	-	-	9.9	-	-	11.9	-	-
Costco Main Driveway/Costco Dwy & Haleakala Hwy									
NB LT/TH	12.5	0.03	B	58.6	0.85	F	61.4	0.87	F
NB RT	8.9	0.00	A	10.1	0.13	B	9.9	0.14	A
EB LT	8.0	0.00	A	8.2	0.00	A	8.2	0.00	A
WB LT	7.6	0.01	A	8.6	0.05	A	8.7	0.05	A
SB LT/TH/RT	11.3	0.02	B	14.2	0.03	B	15.6	0.03	C
OVERALL	0.7	-	-	12.4	-	-	12.7	-	-
Dairy Rd/Keolani Place & Haleakala Hwy									
NB LT	48.4	0.53	D	44.9	0.77	D	44.3	0.77	D
NB TH/RT	17.9	0.19	B	27.9	0.16	C	28.7	0.23	C
EB LT	23.0	0.73	C	39.6	0.75	D	37.2	0.75	D
EB TH/RT	14.8	0.37	B	26.9	0.78	C	26.4	0.77	C
WB LT	21.6	0.73	C	27.8	0.86	C	26.5	0.86	C
WB TH	16.1	0.64	B	12.4	0.35	B	12.3	0.37	B
WB RT	12.5	0.00	B	0.0	0.00	A	0.0	0.00	A
SB LT	48.4	0.53	D	48.2	0.63	D	46.4	0.65	D
SB TH	20.3	0.50	C	33.7	0.58	C	33.0	0.51	C
SB RT	17.3	0.07	B	29.0	0.06	C	28.9	0.03	C
OVERALL	19.1	-	B	26.7	-	C	25.8	-	C
Hanakai St & Haleakala Hwy									
NB RT	10.0	0.01	B	11.2	0.04	B	11.3	0.05	B
WB LT	7.9	0.01	A	8.3	0.01	A	8.3	0.02	A
OVERALL	0.3	-	-	0.4	-	-	0.6	-	-
Hana Hwy & Haleakala Hwy									
EB LT	31.6	0.72	D	24.9	0.73	C	20.6	0.67	C
OVERALL	3.5	-	-	3.7	-	-	3.4	-	-

Intersection	Existing 2019 Conditions								
	AM			PM			SAT MD		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Hanakai St (North) & Hana Hwy									
NB LT/TH	35.0	0.08	E	18.7	0.08	C	18.5	0.08	C
SB TH	37.9	0.06	E	22.8	0.04	C	21.5	0.08	C
OVERALL	0.4	-	-	0.5	-	-	0.8	-	-
Hanakai St (South) & Hana Hwy									
NB TH/RT	19.0	0.08	C	34.5	0.36	D	45.2	0.21	E
WB LT	10.6	0.12	B	14.2	0.09	B	13.0	0.14	B
SB LT/TH	23.9	0.03	C	40.1	0.07	E	43.8	0.17	E
OVERALL	1.5	-	-	2.0	-	-	2.0	-	-
Dairy Rd & Kele St									
NB LT	7.8	0.05	A	8.7	0.06	A	8.6	0.06	A
EB RT	9.1	0.04	A	10.4	0.09	B	10.6	0.14	B
WB LT/TH	14.3	0.12	B	45.0	0.62	E	116.2	0.95	F
WB RT	8.9	0.01	A	10.0	0.05	B	11.0	0.12	B
SB LT	7.7	0.01	A	8.4	0.02	A	9.0	0.05	A
OVERALL	3.1	-	-	6.0	-	-	12.8	-	-
Dairy Rd & Hana Hwy									
NB LT	90.1	0.77	F	96.5	0.85	F	50.2	0.77	D
NB TH	66.1	0.33	E	67.2	0.46	E	32.8	0.40	C
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	92.2	0.77	F	96.3	0.86	F	47.9	0.80	D
EB TH	16.0	0.35	B	29.0	0.68	C	28.3	0.79	C
EB RT	12.7	0.05	B	18.4	0.11	B	20.7	0.12	C
WB LT	62.0	0.86	E	81.0	0.83	F	42.9	0.73	D
WB TH	0.7	0.59	A	34.8	0.50	C	27.0	0.70	C
WB RT	0.1	0.06	A	24.9	0.10	C	21.3	0.18	C
SB LT	93.9	0.77	F	103.9	0.87	F	49.0	0.79	D
SB TH/RT	75.8	0.74	E	81.7	0.85	F	38.3	0.77	D
OVERALL	23.4	-	C	48.9	-	D	33.1	-	C
Airport Access Road & Hana Hwy									
NB LT	78.8	0.66	E	82.1	0.70	F	36.3	0.46	D
NB TH	73.0	0.77	E	70.0	0.49	E	31.5	0.66	C
NB RT	65.4	0.08	E	66.7	0.12	E	28.7	0.26	C
EB LT	74.9	0.73	E	82.5	0.71	F	36.6	0.61	D
EB TH	0.2	0.23	A	32.5	0.52	C	17.7	0.53	B
EB RT	0.1	0.04	A	21.7	0.06	C	14.2	0.06	B
WB LT	78.8	0.87	E	70.2	0.89	E	34.8	0.68	C
WB TH	44.5	0.68	D	0.5	0.45	A	18.7	0.74	B
WB RT	20.0	0.07	B	0.2	0.11	A	13.6	0.21	B
SB LT	77.6	0.44	E	83.1	0.74	F	36.8	0.60	D
SB TH	68.7	0.35	E	76.8	0.83	E	28.9	0.44	C
SB RT	66.2	0.01	E	65.0	0.05	E	26.8	0.07	C
OVERALL	43.5	-	D	36.5	-	D	23.2	-	C

Intersection	Existing 2019 Conditions								
	AM			PM			SAT MD		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Hookele St & Hana Hwy									
NB LT	75.1	0.74	E	67.1	0.56	E	26.9	0.68	C
NB RT	54.7	0.18	D	60.7	0.73	E	15.9	0.26	B
EB TH	16.7	0.34	B	1.8	0.75	A	15.8	0.71	B
EB RT	12.4	0.12	B	0.3	0.17	A	12.2	0.30	B
WB LT	73.2	0.84	E	89.3	0.87	F	28.7	0.74	C
WB TH	3.9	0.64	A	5.7	0.46	A	5.3	0.51	A
OVERALL	18.1	-	B	20.2	-	C	14.8	-	B

* Denotes overcapacity conditions, v/c ≥ 1.

4. BASE YEAR 2025 TRAFFIC CONDITIONS

The Base Year 2025 was selected to reflect the Project completion year. The Base Year 2025 scenario represents the traffic conditions within the study area without the Project. Traffic projections were formulated by applying a defacto growth rate to the traffic count volumes as well as adding trips generated by known future developments in the vicinity of the Project.

4.1 Defacto Growth Rate

Projections for Base Year 2025 traffic were based upon HDOT's Maui Regional Travel Demand Model (MRTDM). Based on the MRTDM, annual growth rates along Hana Highway, Haleakala Highway, Airport Access Road, Dairy Road and Hookele Street ranged from 0.7 percent to 1 percent.

4.2 Traffic Forecasts for Known Developments

4.2.1 Background Projects

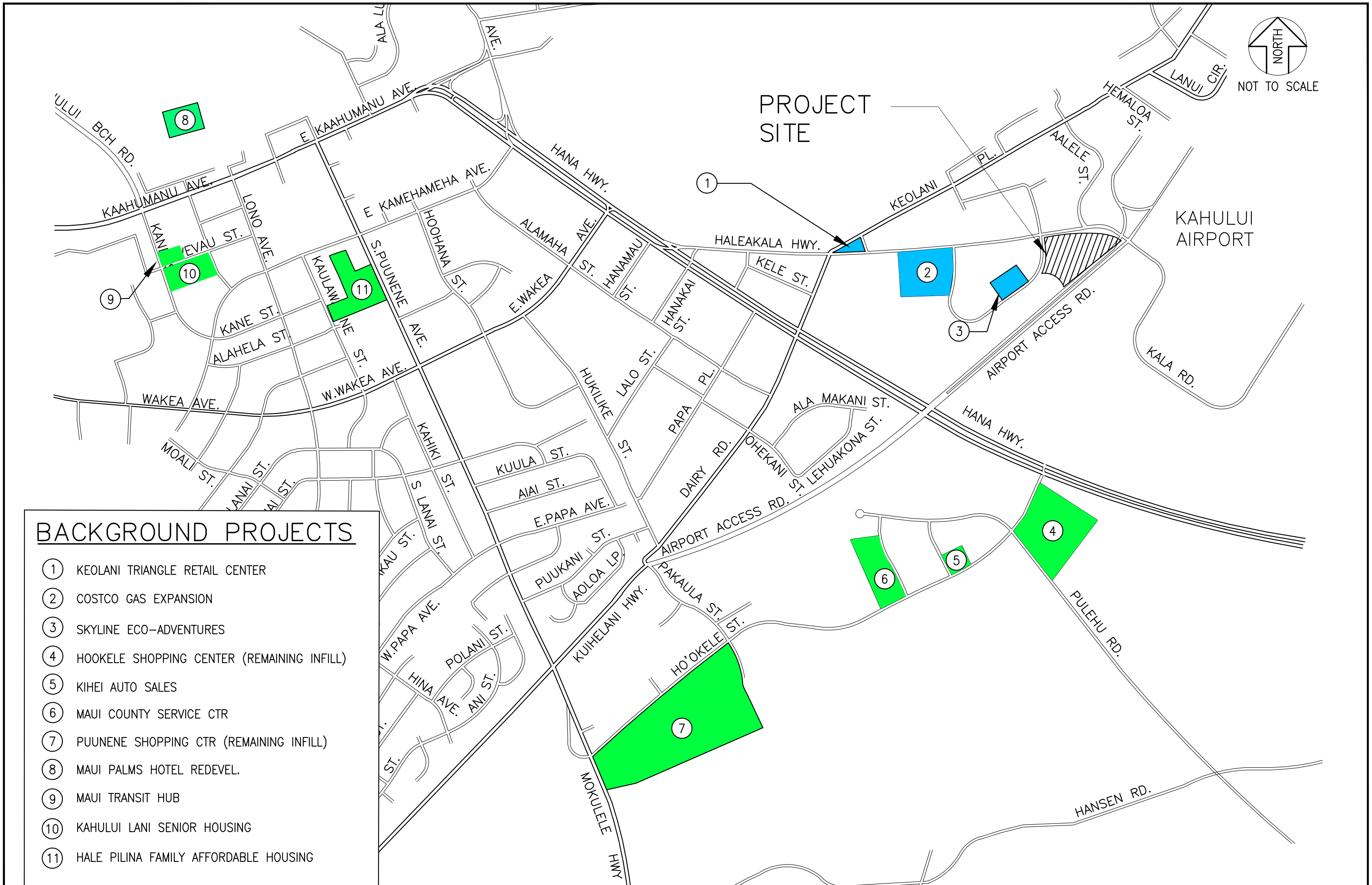
By the Year 2025, the following developments (excluding the Project) are expected to be completed that may impact the traffic in the surrounding area as described below. The trips generated by these developments have been distributed to the network based on proximity of access and expected travel patterns as described previously. Figure 4.1 shows the locations of the planned developments.

- Keolani Triangle Retail Center is planned to be located on the vacant parcel of land bound by Keolani Place to the north, Haleakala Highway to the south and the existing Courtyard Marriott Hotel to the east. The Keolani Triangle Retail Center proposes an approximate 1,800 square foot drive-through restaurant and approximately 3,000 square feet of retail space. Primary access will be provided on the south side of the parcel from a right-in right-out (RIRO) access along Haleakala Highway, and secondary access will be provided by a driveway from a shared easement on the east side of the project, which also serves the Courtyard by Marriott Hotel. The SMA permit for the Keolani Triangle Retail Center was approved by the Maui Planning Commission in January 2019. This TIAR assumes that the Keolani Triangle Retail Center will be completed by Year 2025. Projected trips from Keolani Triangle Retail Center are shown in Table 4.1 below.
- Costco Gas Expansion is planned to include the installation of 10 new fuel dispensers at the existing Costco Gas Station located at the southwest corner of the Haleakala Highway/Lauo Loop West intersection.
- Skyline Eco-Adventures is a planned development located within the Maui Business Park North Project Area (MBP NPA). The project proposes to build a 7,000 square foot corporate office building and a 5,900 square foot vehicle maintenance building and baseyard. The site will mainly be accessed by employees and company tour and hotel pick-up/drop-off vehicles, although some guests may access the site by personal vehicle. The project site will be accessible via Lauo Loop. We understand that an SMA application is currently being reviewed for approval of this project. This TIAR assumes that the Skyline Eco-Adventures will be completed by Year 2025. Projected trips from Skyline Eco-Adventures are shown in Table 4.1 below.
- Maui Business Park South Project Area (MBP SPA) is a 121.2-acre site which is located in the vicinity of Hookele Street to the south of Hana Highway and to the east of Dairy

Road. Existing traffic counts that were taken from 2017 to 2019 incorporate various completed developments in MBP SPA; Pacific Pipe, Lexus, BMW, American Savings Bank, Safeway and Safeway Gas Station and various tenants at the Puunene Shopping Center.

Three (3) future developments are also planned for development in MBP SPA including Maui County Service Center (MCSC), Kihei Auto Sales (currently operating) and remaining tenants at Hookele Shopping Center. For purposes of this traffic study, these developments were included in this TIAR. It was also conservatively assumed that Puunene Shopping Center would be fully occupied by Year 2025. Projected trips from MBP SPA are shown in Table 4.1.

- Maui Palms Hotel Redevelopment is a planned redevelopment of the old Maui Palms Hotel site. This site is adjacent to the Maui Beach Hotel and is currently vacant. Current plans propose a 136-room hotel spread across three buildings. Access to the site will likely be provided from the existing Maui Beach Hotel accesses via School Street and Lono Avenue. This TIAR assumes that the Maui Palms Redevelopment project will be completed and occupied by Year 2025.
- Kahului Lani Senior Affordable Housing proposes to construct 164 senior rental units, 1 managers unit, approximately 2,500 square feet of recreational space for the residents of the Project, 5,000 square feet of office type space for Catholic Charities of Hawaii, and park space. Access will be provided via Project driveways from School Street, Vevau Street and Kane Street. The Kane Street access is proposed as a right-in right-out access only.
- Maui Transit Hub proposes to relocate the Maui Bus Transit hub from its existing location at Queen Kaahumanu Center (QKC) to a portion of land fronting Vevau Street, on the northwest quadrant of the Vevau Street/School Street intersection. The Vevau Street Bus Hub location will provide a canopy for shade, ticket booth, restrooms, storage of six (6) buses and six (6) parking stalls for the transit hub employees.
- Hale Pilina Family Affordable Housing proposes to construct 179 multi-family residential units on a currently undeveloped lot previously hosted the Kahului Swap Meet. Access to the Project will be provided along Kaulawahine Street and and RIRO access via Puunene Avenue.



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BACKGROUND DEVELOPMENTS

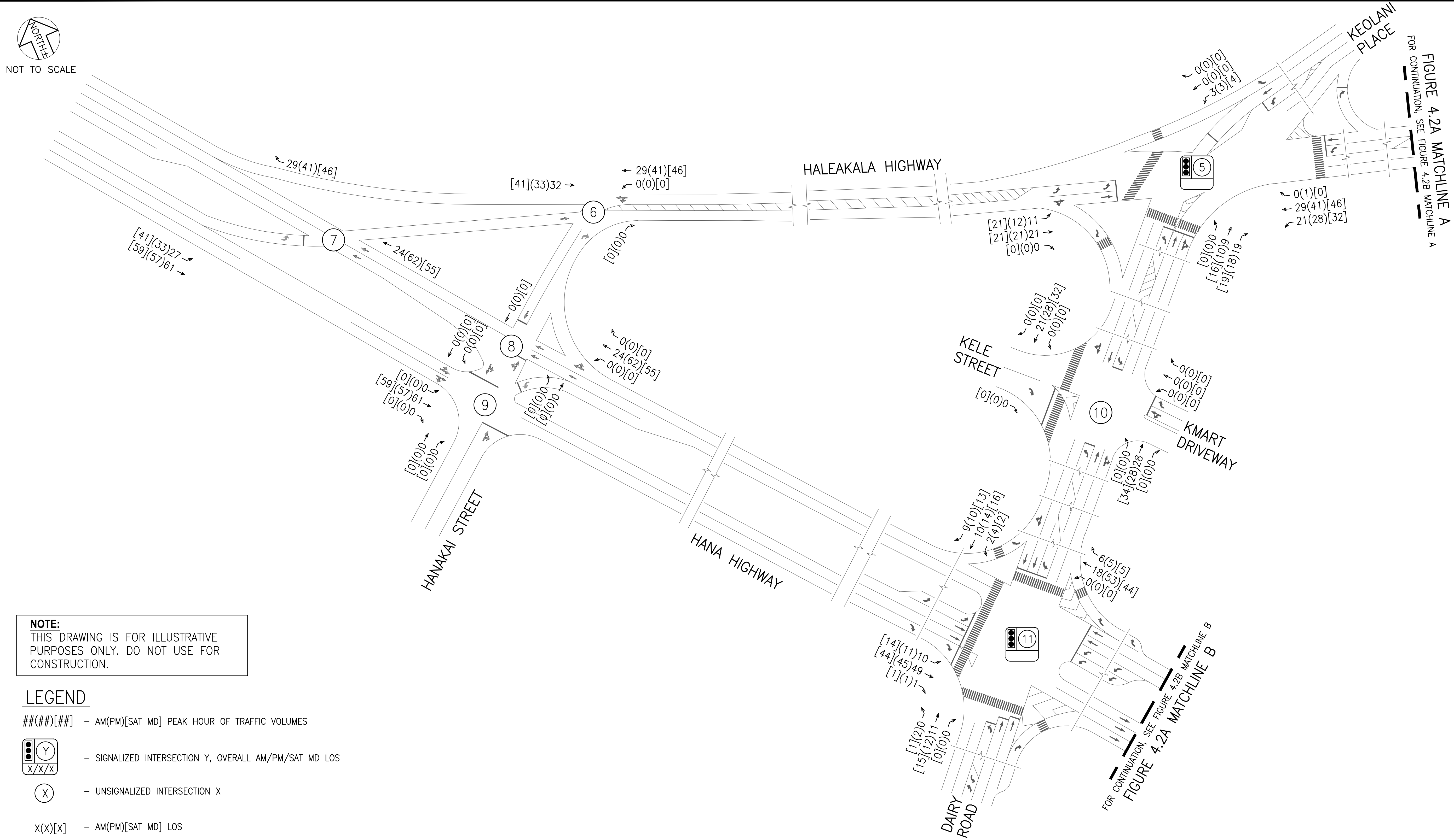
FIGURE 4.1

Table 4.1: Background Projects Trip Generation

Land Use		Independent Variable	AM Peak Hour			PM Peak Hour			SAT MD Peak Hour		
			Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
Maui Palms Hotel Redevelopment		136 Hotel Rooms	43	30	72	42	40	82	55	44	99
Kahului Lani Senior Housing		165 Dwelling Units	39	24	63	29	52	81	29	56	85
Maui Transit Hub		--	15	15	30	18	18	36	18	18	36
Hale Pilina Family Affordable Housing		179 Dwelling Units	19	64	83	63	37	100	86	74	160
Costco Gas Expansion		10 Fueling Positions	27	27	54	37	37	74	37	37	74
Keolani Triangle Retail Center		3,000 Sq. Ft. Shopping Center 1,800 Sq. Ft. Fast Food with Drive Through	54	47	101	59	58	117	101	96	197
		Keolani Triangle Retail Center Subtotal	54	47	101	59	58	117	101	96	197
Skyline Eco-Adventures		7,000 Sq. Ft. Office Building 5,900 Sq. Ft. Baseyard	33	10	43	10	39	49	5	15	20
		Skyline Eco-Adventures	33	10	43	10	39	49	5	15	20
MBP SPA [1]	Puunene Shopping Center Phase II [2, 3]	39,800 Sq. Ft. Shopping Center	16	10	26	45	50	95	70	63	133
	Lot 38 Shopping Center [4]	34,800 Sq. Ft. Shopping Center	24	14	38	59	95	154	115	106	221
	Kihei Auto Sales [5]	9,100 Sq. Ft. Car Dealership	14	5	18	10	14	24	19	19	37
	Maui County Service Center	60,000 Sq. Ft. Government Office Complex	118	15	133	53	118	171	0	0	0
		Maui Business Park South Parcel Area Subtototal	172	43	215	167	277	444	204	188	391
		Total External Background Trips	401	261	661	424	559	983	535	527	1062

Notes:

1. MBP SPA = Maui Business Park Phase II South Project Area
2. Reflects remaining vacant space from 2019.
3. Includes approximate 20% pass-by trip reduction consistent with the ITE Trip Generation Handbook, 3rd Edition.
4. Reflects remaining vacant space from 2019. Safeway Store and Gas Station trips incorporated in Existing 2019 Condition. Includes approximate 10% internal trip reduction and 20% pass-by trip reduction consistent with the ITE Trip Generation Handbook, 3rd Edition.



NOTE:
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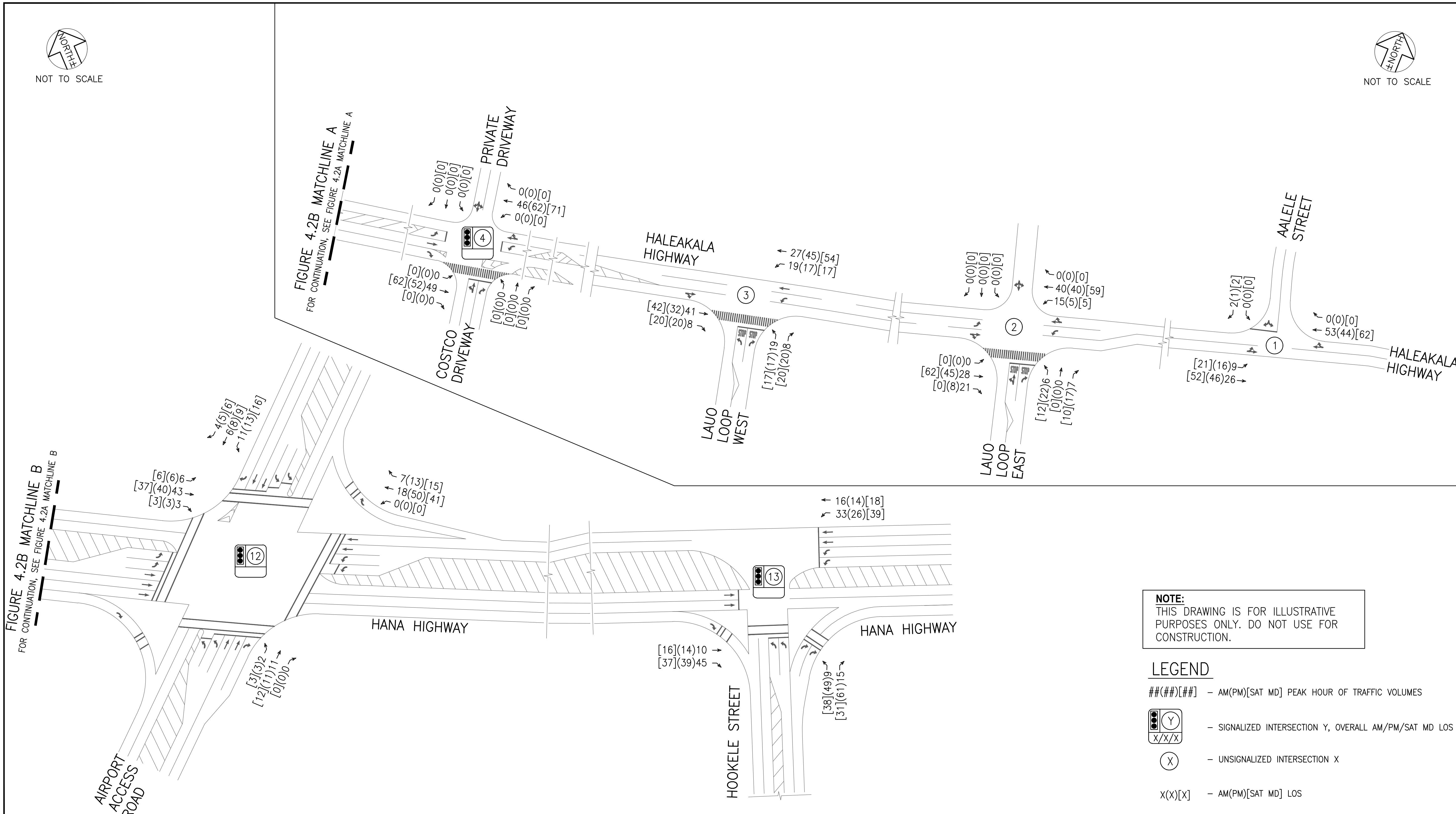
LEGEND

- ##(##)[##] – AM(PM)[SAT MD] PEAK HOUR OF TRAFFIC VOLUMES
- Y X/X/X – SIGNALIZED INTERSECTION Y, OVERALL AM/PM/SAT MD LOS
- X – UNSIGNALIZED INTERSECTION X
- X(X)[X] – AM(PM)[SAT MD] LOS

KANAHA HOTEL TIAR	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII	FIGURE
	TRIPS GENERATED BY BACKGROUND PROJECTS	4.2A



KANAHA HOTEL

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FIGURE 4.2B

TRIPS GENERATED BY BACKGROUND PROJECTS

4.3 Planned Roadway Improvements

HDOT is considering the acquisition of the east portion of the Project site to fulfill its long-term plan and goal to provide an on-ramp from Haleakala Highway onto AAR. Since the timeline and design of this on-ramp has not yet been determined, the on-ramp was not considered for the Base Year or Future Year scenarios.

4.4 Base Year 2025 Analysis

It is anticipated that by Base Year 2025, traffic will have increased over existing conditions due to the development in the Kahului region. Actual growth within the study region may vary based upon the actual construction of the various nearby developments.

4.4.1 Base Year 2025 Intersection Analysis

<u>[3] Haleakala Highway/Lauo Loop West</u>

The northbound left-turn is expected to worsen to LOS E during the SAT MD peak hour of traffic. Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, a traffic signal is not anticipated to be warranted by Base Year 2025. The intersection is expected to operate similar to existing conditions with gaps in traffic generated by nearby traffic signals. Signal warrant figures are shown in Appendix D.

<u>[4] Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway</u>

As discussed in Section 3.3.1, a signal is currently warranted under existing conditions, so the intersection was analyzed to include a traffic signal. With a signal, all movements at this intersection is anticipated to operate adequately at LOS C or better during all peak hours of traffic. If a signal is not installed, the northbound shared left-turn/through movement is anticipated to operate at LOS F and overcapacity conditions for the PM and SAT MD peak hours.

Based on zoning conditions, Costco is required to monitor this intersection on a biannual basis to determine if and when a signal will be warranted. If warranted, Costco will coordinate with the County on design and construction of a traffic signal. If HDOT constructs an on-ramp from Haleakala Highway onto AAR, this would likely reduce the critical exiting left-turn movements out of Costco and impact the warranting of the signal.

<u>[7] Haleakala Highway/Hana Highway</u>

By Base Year 2025, the eastbound left-turn is expected to worsen to LOS F during the AM and LOS E during the PM peak hour of traffic. However, based on observations of existing conditions, multiple eastbound left-turn vehicles were able to proceed through the intersection at once, since the opposing westbound through traffic along Hana Highway operates in platoons, with gaps in traffic generated by the nearby traffic signal at the Hana Highway/Dairy Road/Keolani Place intersection which may result in less delay than is projected by Synchro analysis.

[8 & 9] Hana Highway/Hanakai Street (North) & Hana Highway/Hanakai Street (South)

By Base Year 2025, various minor northbound and southbound approaches are expected to operate at LOS E/F during all peak hours of traffic. However, based on existing conditions, these movements were of relatively low volume with 10-25 vehicles per movement. Minimal existing queuing (1-2 vehicles long) and delay were observed, due to traffic being controlled by the downstream signal at Hana Highway/Dairy Road and the upstream signal at Hana Highway/Kamehameha Avenue. Traffic queues will likely continue operating similar to existing conditions.

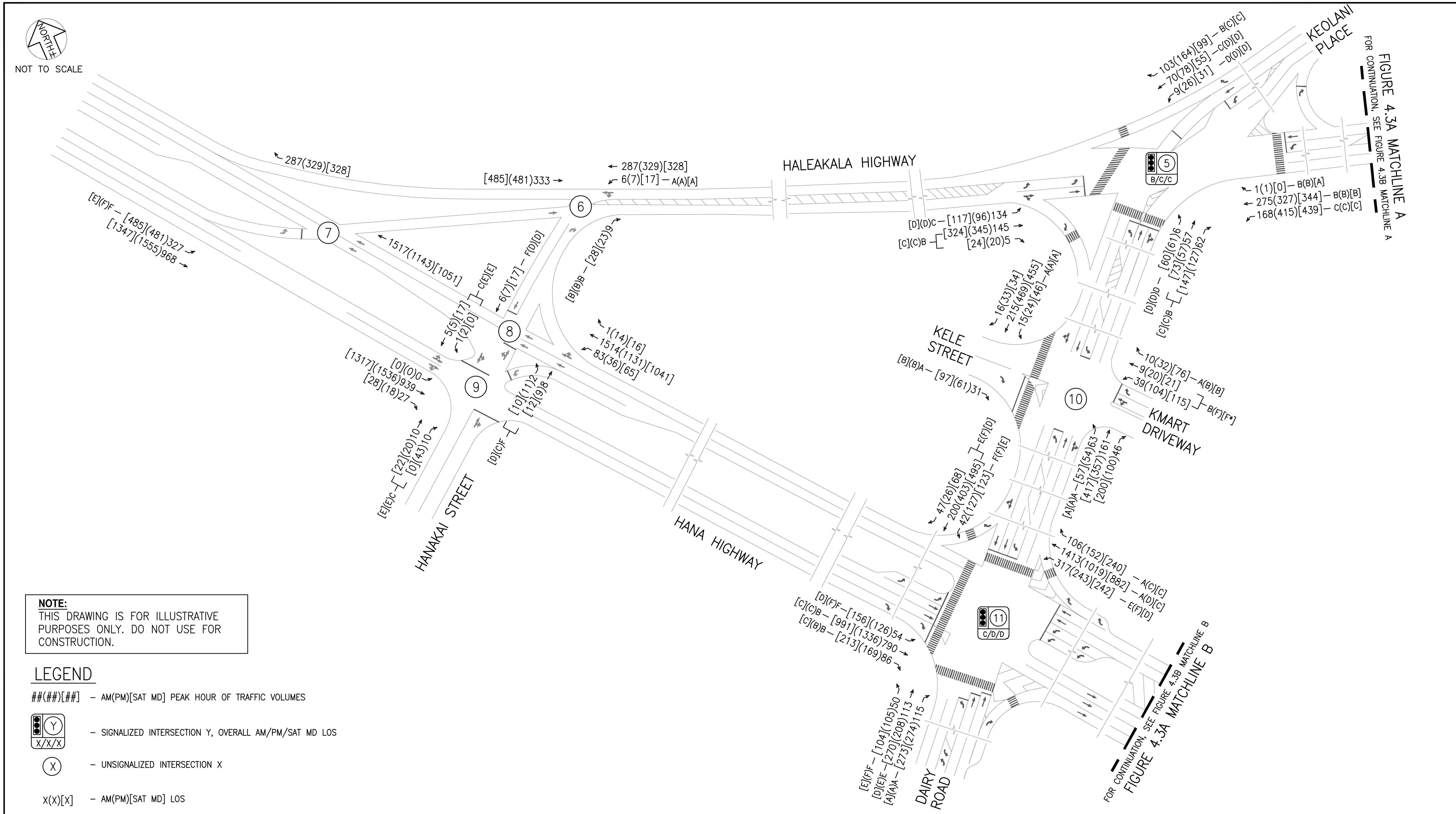
[10] Dairy Road/Kele Street

The shared westbound left-turn/through movement is expected to operate at LOS F during the PM peak hour and at LOS F and over capacity during the SAT MD peak hour. However, as noted earlier, the Kmart store has closed. Because of the anticipated reduction in traffic along the westbound approach, no mitigation is proposed.

[11-13] Hana Highway from Dairy Road to Hookele Street

By Base Year 2025, various minor street and left-turn movements are expected to continue operating at or worsen to LOS E/F during all peak hours of traffic due to the long cycle lengths at the intersections and traffic growth along Hana Highway. However, the intersections will continue to operate adequately at LOS D or better overall with all movements operating under capacity during all peak hours.

Figure 4.2 illustrates the Base Year 2025 forecast traffic volumes and LOS for the study intersection movements. Table 4.2 summarizes the Base Year 2025 LOS at the study intersections compared to existing conditions. LOS worksheets are provided in Appendix C.



NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

LEGEND

##(##)[##] – AM(PM)[SAT MD] PEAK HOUR OF TRAFFIC VOLUMES

Y X/X/X – SIGNALIZED INTERSECTION Y, OVERALL AM/PM/SAT MD LOS

X – UNSIGNALIZED INTERSECTION X

x(x)[x] – AM(PM)[SAT MD] LOS

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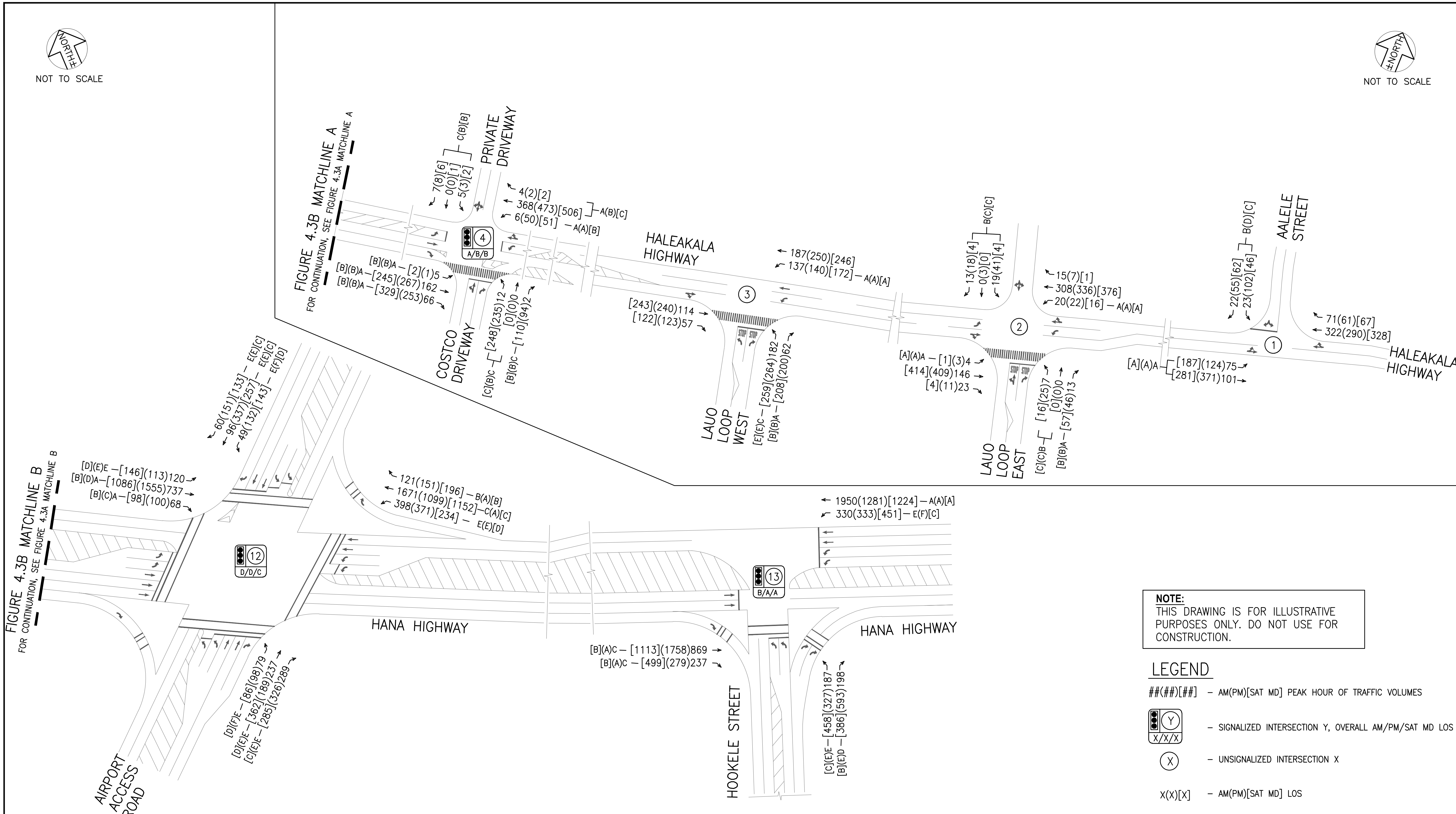
BASE YEAR 2025 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE

4.3A



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BASE YEAR 2025 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE 4.3B

TABLE 4.2: LOS SUMMARY TABLE
EXISTING AND BASE YEAR 2025 CONDITIONS

Intersection	Existing 2019 Conditions									Base Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Haleakala Hwy & Aalele St																		
EB LT	8.2	0.06	A	8.2	0.10	A	8.5	0.15	A	8.4	0.07	A	8.5	0.12	A	8.9	0.18	A
SB LT/RT	11.9	0.08	B	22.6	0.46	C	17.4	0.29	C	13.2	0.10	B	33.1	0.58	D	23.4	0.38	C
OVERALL	2.1	-	-	5.1	-	-	4.0	-	-	2.0	-	-	6.2	-	-	4.3	-	-
2: Lauo Loop East & Haleakala Hwy																		
NB LT/TH	11.9	0.00	B	16.4	0.01	C	15.7	0.01	C	13.8	0.02	B	21.2	0.11	C	20.2	0.07	C
NB RT	8.9	0.01	A	10.6	0.05	B	10.7	0.08	B	9.2	0.02	A	11.5	0.08	B	11.6	0.10	B
EB LT	7.8	0.00	A	7.9	0.00	A	7.9	0.00	A	8.0	0.00	A	8.0	0.00	A	8.1	0.00	A
WB LT	7.5	0.00	A	8.1	0.02	A	8.0	0.01	A	7.6	0.02	A	8.3	0.02	A	8.3	0.02	A
SB LT/TH/RT	11.3	0.06	B	16.6	0.18	C	13.6	0.02	B	12.8	0.07	B	21.0	0.23	C	16.3	0.03	C
OVERALL	1.1	-	-	2.1	-	-	1.1	-	-	1.4	-	-	2.8	-	-	1.4	-	-
3: Lauo Loop West & Haleakala Hwy																		
NB LT	15.4	0.34	C	25.1	0.61	D	28.2	0.64	D	18.6	0.43	C	38.5	0.76	E	47.7	0.81	E
NB RT	9.0	0.06	A	11.3	0.26	B	11.3	0.26	B	9.4	0.08	A	12.3	0.31	B	12.4	0.32	B
WB LT	7.7	0.09	A	8.3	0.11	A	8.3	0.14	A	7.9	0.11	A	8.6	0.13	A	8.7	0.16	A
OVERALL	6.5	-	-	8.9	-	-	9.7	-	-	6.8	-	-	11.4	-	-	13.2	-	-
4: Costco Main Driveway/Costco Dwy & Haleakala Hwy																		
NB LT/TH	12.5	0.03	B	58.6	0.85	F	61.4	0.87	F	27.0	0.08	C	16.9	0.52	B	24.7	0.68	C
NB RT	8.9	0.00	A	10.1	0.13	B	9.9	0.14	A	26.9	0.03	C	13.6	0.06	B	13.4	0.05	B
EB LT	8.0	0.00	A	8.2	0.00	A	8.2	0.00	A	3.7	0.01	A	11.1	0.00	B	15.9	0.01	B
EB TH	-	-	-	-	-	-	-	-	-	4.1	0.15	A	12.9	0.49	B	17.4	0.46	B
EB RT	-	-	-	-	-	-	-	-	-	3.7	0.04	A	11.2	0.18	B	15.8	0.23	B
WB LT	7.6	0.01	A	8.6	0.05	A	8.7	0.05	A	3.4	0.01	A	9.5	0.12	A	13.4	0.14	B
WB TH/RT	-	-	-	-	-	-	-	-	-	5.2	0.33	A	13.8	0.75	B	20.5	0.82	C
SB LT/TH/RT	11.3	0.02	B	14.2	0.03	B	15.6	0.03	C	27.2	0.04	C	13.8	0.02	B	15.8	0.00	B
OVERALL	0.7	-	-	12.4	-	-	12.7	-	-	5.5	-	A	13.9	-	B	19.9	-	B

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Intersection	Existing 2019 Conditions									Base Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	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
5: Dairy Rd/Keolani Place & Haleakala Hwy																		
NB LT	48.4	0.53	D	44.9	0.77	D	44.3	0.77	D	49.9	0.53	D	47.9	0.76	D	47.3	0.77	D
NB TH/RT	17.9	0.19	B	27.9	0.16	C	28.7	0.23	C	19.4	0.24	B	31.2	0.22	C	32.4	0.31	C
EB LT	23.0	0.73	C	39.6	0.75	D	37.2	0.75	D	23.5	0.73	C	41.4	0.75	D	38.6	0.76	D
EB TH/RT	14.8	0.37	B	26.9	0.78	C	26.4	0.77	C	15.4	0.42	B	28.9	0.81	C	28.5	0.80	C
WB LT	21.6	0.73	C	27.8	0.86	C	26.5	0.86	C	21.8	0.73	C	30.1	0.88	C	28.7	0.88	C
WB TH	16.1	0.64	B	12.4	0.35	B	12.3	0.37	B	16.6	0.67	B	13.0	0.40	B	13.3	0.43	B
WB RT	12.5	0.00	B	0.0	0.00	A	0.0	0.00	A	12.5	0.00	B	10.3	0.00	B	0.0	0.00	A
SB LT	48.4	0.53	D	48.2	0.63	D	46.4	0.65	D	42.9	0.54	D	52.4	0.66	D	51.2	0.70	D
SB TH	20.3	0.50	C	33.7	0.58	C	33.0	0.51	C	21.2	0.49	C	37.1	0.60	D	36.4	0.52	D
SB RT	17.3	0.07	B	29.0	0.06	C	28.9	0.03	C	18.3	0.06	B	31.9	0.05	C	31.8	0.01	C
OVERALL	19.1	-	B	26.7	-	C	25.8	-	C	19.5	-	B	28.3	-	C	27.6	-	C
6: Hanakai St & Haleakala Hwy																		
NB RT	10.0	0.01	B	11.2	0.04	B	11.3	0.05	B	10.3	0.01	B	11.8	0.05	B	11.9	0.06	B
WB LT	7.9	0.01	A	8.3	0.01	A	8.3	0.02	A	8.0	0.01	A	8.5	0.01	A	8.5	0.02	A
OVERALL	0.3	-	-	0.4	-	-	0.6	-	-	0.2	-	-	0.4	-	-	0.5	-	-
7: Hana Hwy & Haleakala Hwy																		
EB LT	31.6	0.72	D	24.9	0.73	C	20.6	0.67	C	60.6	0.92	F	52.1	0.94	F	37.6	0.87	E
OVERALL	3.5	-	-	3.7	-	-	3.4	-	-	7.5	-	-	7.9	-	-	6.4	-	-
8. Hanakai St (North) & Hana Hwy																		
NB LT/TH	35.0	0.08	E	18.7	0.08	C	18.5	0.08	C	52.8	0.13	F	23.6	0.10	C	25.1	0.12	D
SB TH	37.9	0.06	E	22.8	0.04	C	21.5	0.08	C	56.8	0.09	F	29.1	0.05	D	29.7	0.11	D
OVERALL	0.4	-	-	0.5	-	-	0.8	-	-	0.5	-	-	0.6	-	-	0.9	-	-
9. Hanakai St (South) & Hana Hwy																		
NB TH/RT	19.0	0.08	C	34.5	0.36	D	45.2	0.21	E	17.2	0.07	C	37.1	0.38	E	38.5	0.18	E
WB LT	10.6	0.12	B	14.2	0.09	B	13.0	0.14	B	0.0	-	A				0.0	-	A
SB LT/TH	23.9	0.03	C	40.1	0.07	E	43.8	0.17	E	20.1	0.03	C	40.5	0.07	E	37.8	0.14	E
OVERALL	1.5	-	-	2.0	-	-	2.0	-	-	0.5	-	-	1.6	-	-	1.1	-	-
10: Dairy Rd & Kele St																		
NB LT	7.8	0.05	A	8.7	0.06	A	8.6	0.06	A	7.9	0.05	A	8.8	0.06	A	8.7	0.06	A
EB RT	9.1	0.04	A	10.4	0.09	B	10.6	0.14	B	9.2	0.04	A	10.5	0.09	B	10.7	0.14	B
WB LT/TH	14.3	0.12	B	45.0	0.62	E	116.2	0.95	F	14.9	0.13	B	53.2	0.67	F	149.0	1.04	F*
WB RT	8.9	0.01	A	10.0	0.05	B	11.0	0.12	B	9.0	0.01	A	10.1	0.05	B	11.2	0.13	B
SB LT	7.7	0.01	A	8.4	0.02	A	9.0	0.05	A	7.7	0.01	A	8.5	0.03	A	9.2	0.06	A
OVERALL	3.1	-	-	6.0	-	-	12.8	-	-	2.9	-	-	6.6	-	-	15.2	-	-

Intersection	Existing 2019 Conditions									Base Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	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
11: Dairy Rd & Hana Hwy																		
NB LT	90.1	0.77	F	96.5	0.85	F	50.2	0.77	D	90.1	0.77	F	97.1	0.85	F	56.7	0.79	E
NB TH	66.1	0.33	E	67.2	0.46	E	32.8	0.40	C	65.7	0.35	E	66.4	0.47	E	36.5	0.40	D
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	92.2	0.77	F	96.3	0.86	F	47.9	0.80	D	89.1	0.78	F	99.5	0.87	F	53.6	0.83	D
EB TH	16.0	0.35	B	29.0	0.68	C	28.3	0.79	C	17.2	0.41	B	32.7	0.76	C	31.1	0.82	C
EB RT	12.7	0.05	B	18.4	0.11	B	20.7	0.12	C	13.1	0.05	B	19.2	0.12	B	22.0	0.15	C
WB LT	62.0	0.86	E	81.0	0.83	F	42.9	0.73	D	61.5	0.86	E	80.4	0.83	F	49.1	0.75	D
WB TH	0.7	0.59	A	34.8	0.50	C	27.0	0.70	C	0.8	0.65	A	38.3	0.58	D	30.5	0.75	C
WB RT	0.1	0.06	A	24.9	0.10	C	21.3	0.18	C	0.1	0.07	A	26.4	0.11	C	23.5	0.21	C
SB LT	93.9	0.77	F	103.9	0.87	F	49.0	0.79	D	92.7	0.77	F	105.0	0.87	F	55.1	0.80	E
SB TH/RT	75.8	0.74	E	81.7	0.85	F	38.3	0.77	D	75.2	0.75	E	82.7	0.85	F	42.0	0.78	D
OVERALL	23.4	-	C	48.9	-	D	33.1	-	C	23.4	-	C	50.8	-	D	36.5	-	D
12: Airport Access Road & Hana Hwy																		
NB LT	78.8	0.66	E	82.1	0.70	F	36.3	0.46	D	78.8	0.66	E	82.0	0.71	F	42.5	0.52	D
NB TH	73.0	0.77	E	70.0	0.49	E	31.5	0.66	C	72.4	0.78	E	69.9	0.52	E	36.2	0.70	D
NB RT	65.4	0.08	E	66.7	0.12	E	28.7	0.26	C	64.6	0.10	E	67.6	0.26	E	33.2	0.33	C
EB LT	74.9	0.73	E	82.5	0.71	F	36.6	0.61	D	74.3	0.75	E	65.8	0.23	E	42.0	0.64	D
EB TH	0.2	0.23	A	32.5	0.52	C	17.7	0.53	B	0.2	0.26	A	35.1	0.57	D	18.8	0.54	B
EB RT	0.1	0.04	A	21.7	0.06	C	14.2	0.06	B	0.1	0.04	A	22.6	0.06	C	14.7	0.06	B
WB LT	78.8	0.87	E	70.2	0.89	E	34.8	0.68	C	75.3	0.88	E	70.0	0.89	E	40.2	0.71	D
WB TH	44.5	0.68	D	0.5	0.45	A	18.7	0.74	B	31.5	0.74	C	1.2	0.61	A	20.5	0.77	C
WB RT	20.0	0.07	B	0.2	0.11	A	13.6	0.21	B	14.1	0.08	B	0.3	0.14	A	14.4	0.23	B
SB LT	77.6	0.44	E	83.1	0.74	F	36.8	0.60	D	78.5	0.53	E	82.8	0.75	F	42.1	0.64	D
SB TH	68.7	0.35	E	76.8	0.83	E	28.9	0.44	C	67.6	0.35	E	77.3	0.84	E	32.4	0.44	C
SB RT	66.2	0.01	E	65.0	0.05	E	26.8	0.07	C	65.2	0.03	E	64.2	0.07	E	30.0	0.08	C
OVERALL	43.5	-	D	36.5	-	D	23.2	-	C	36.3	-	D	37.0	-	D	25.7	-	C
13: Hookele St & Hana Hwy																		
NB LT	75.1	0.74	E	67.1	0.56	E	26.9	0.68	C	74.0	0.75	E	71.6	0.71	E	32.5	0.73	C
NB RT	54.7	0.18	D	60.7	0.73	E	15.9	0.26	B	52.3	0.24	D	66.6	0.84	E	18.4	0.31	B
EB TH	16.7	0.34	B	1.8	0.75	A	15.8	0.71	B	30.9	0.38	C	2.5	0.82	A	19.2	0.75	B
EB RT	12.4	0.12	B	0.3	0.17	A	12.2	0.30	B	22.7	0.16	C	0.3	0.22	A	14.8	0.35	B
WB LT	73.2	0.84	E	89.3	0.88	F	28.7	0.74	C	71.7	0.85	E	93.5	0.90	F	34.9	0.80	C
WB TH	3.9	0.64	A	5.7	0.46	A	5.3	0.51	A	4.9	0.69	A	6.0	0.49	A	6.4	0.54	A
OVERALL	18.1	-	B	20.2	-	C	14.8	-	B	14.5	-	B	9.3	-	A	5.6	-	A

* Denotes overcapacity conditions, v/c ≥ 1.

5. FUTURE YEAR 2025 Traffic Conditions

5.1 Background

The Project is located on a 5.17-acre lot within the Maui Business Park North Project Area (MBP NPA) in Kahului, Maui. The Project site is bounded by Haleakala Highway to the north and Lauo Loop to the west. The proposed action is to develop a 200-unit Hotel with associated infrastructure and landscaping. The proposed hotel building varies from one (1) two (2) and four (4) stories in height and will be massed toward the center of the Project Site with generous setbacks on all sides accommodating the width of a landscape buffer, the width of two parking stalls and a parking lot drive isle. Amenities and uses include but are not limited to, swimming pool, dining area, and other typical and similar incidental support services and accessory uses for hotel operation.

Project is anticipated to be completed by 2025. Access to the Project will be provided by the existing Lauo Loop which services the MBP NPA.

HDOT's requested additional discussion on cumulative traffic impacts from the Kanaha Hotel on the full build-out of MBP NPA. Appendix E discusses these cumulative impacts.

5.1.1 Travel Demand Estimations

The State of Hawaii Department of Transportation (HDOT) and Maui County provide various Transportation Demand Management (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. These TDM measures have only been identified and conservatively assumed to yield NO vehicular reductions for Project generated traffic.

Maui County currently provides a bus system that offers several routes that connect the major areas in Maui. The Kahului Loop Route 5 & 6 provides transportation within the Kahului area. Additionally, the Haiku Islander Route 35 and the Upcountry Islander Route 40 provide transportation within Kahului to the Kahului Airport as well as to nearby regions.

HDOT currently provides the Bike Plan Hawaii Master Plan, which identifies existing and proposed bike routes that could potentially be implemented in the future. Within Kahului, several bicycle facilities are currently provided or proposed. In the immediate vicinity of the Project, signed shared roadways are proposed along Hana Highway and Dairy Road/Keolani Place.

5.1.2 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation Manual, 9th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables. The independent variables can range from Dwelling Units (DU) for single-family attached homes to Gross Floor Area (GFA) for commercial or office development. These trip rates/formulae and their associated directional distributions were used to estimate the increase in the number of vehicular trips generated by the proposed Project. The rates selected were based on the land use description. See Tables 5.1 and 5.2 for Trip Generation formulae and projections for the Project.

5.1.3 Trip Distribution and Assignment

Trips generated by the Project were assigned throughout the study area generally based upon existing travel patterns and anticipated traffic reroutes from known projects in the area. The traffic generated by the Project was added to the forecast Base Year 2025 traffic volumes within the vicinity of the Project to constitute the traffic volumes for Future Year 2025 traffic conditions. Figure 5.1 illustrates the Project-generated trip distribution for Future Year 2025.

Table 5.1: Trip Generation Rates

Land Use (ITE Code)	Independent Variable	AM Peak Hour		PM Peak Hour		SAT MD Peak Hour	
		Trip Rate	% Enter	Trip Rate	% Enter	Trip Rate	% Enter
Hotel (310)	Rooms	0.53	59%	0.60	51%	[a]	56%

[a] T = 0.69X+4.32

Table 5.2: Project-Generated Trips

Land Use (ITE Code)	Independent Variable	AM Peak Hour			PM Peak Hour			SAT MD Peak Hour		
		Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
Hotel (310)	200 Rooms	63	43	106	61	59	120	80	63	143

Note:
- The Project will provide a sundry shop and offer a variety of light food options, which is a common amenity incorporated in the ITE Trip Generation rates for Hotel (ITE 310).

5.2 Future Year 2025 Analysis

By full buildout in Future Year 2025, the Project is projected to generate a total of 106(120)[143] new external trips during the AM(PM)[SAT MD] peak hours of traffic. Trips generated by the Project are expected to result in growth along major roadways in the study area. Project traffic will access the site via a driveway along the existing Lauo Loop near the Haleakala Highway/Lauo Loop East intersection.

5.2.1 Future Year 2025 Intersection Analysis

Upon completion of the Project, all study intersections are forecast to operate similar to Base Year 2025. Study intersections are anticipated to experience minimal increases in overall delay ranging from 1-5 seconds. Additionally, the majority of intersection movements are expected to experience minimal increases in delay from 1-7 seconds. All movements forecast to operate at LOS E/F for Base Year 2025 conditions will continue to operate similarly during Future Year 2025 with the Project.

As discussed in Section 4.3, HDOT is considering the acquisition of the east portion of the Project site to fulfill its long-term plan and goal to provide an on-ramp from Haleakala Highway onto AAR. Since the timeline and design of this on-ramp has not yet been determined, the on-ramp was not considered for the Future Year scenarios. The on-ramp would primarily reduce traffic at the Haleakala Highway/Dairy Road/Keolani Place intersection. However, since all movements at this intersection will continue to operate adequately at LOS D or better and below capacity conditions, the on-ramp is not needed for the Project.

As discussed in Section 3.3.1, a signal is currently warranted under existing conditions, so the Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway intersection was analyzed to include a traffic signal. With a signal, all movements at this intersection is anticipated to operate adequately at LOS C or better all peak hours of traffic. If a signal is not installed, the northbound shared left-turn/through movement will continue operating at LOS F and overcapacity conditions for the PM and SAT MD peak hours.

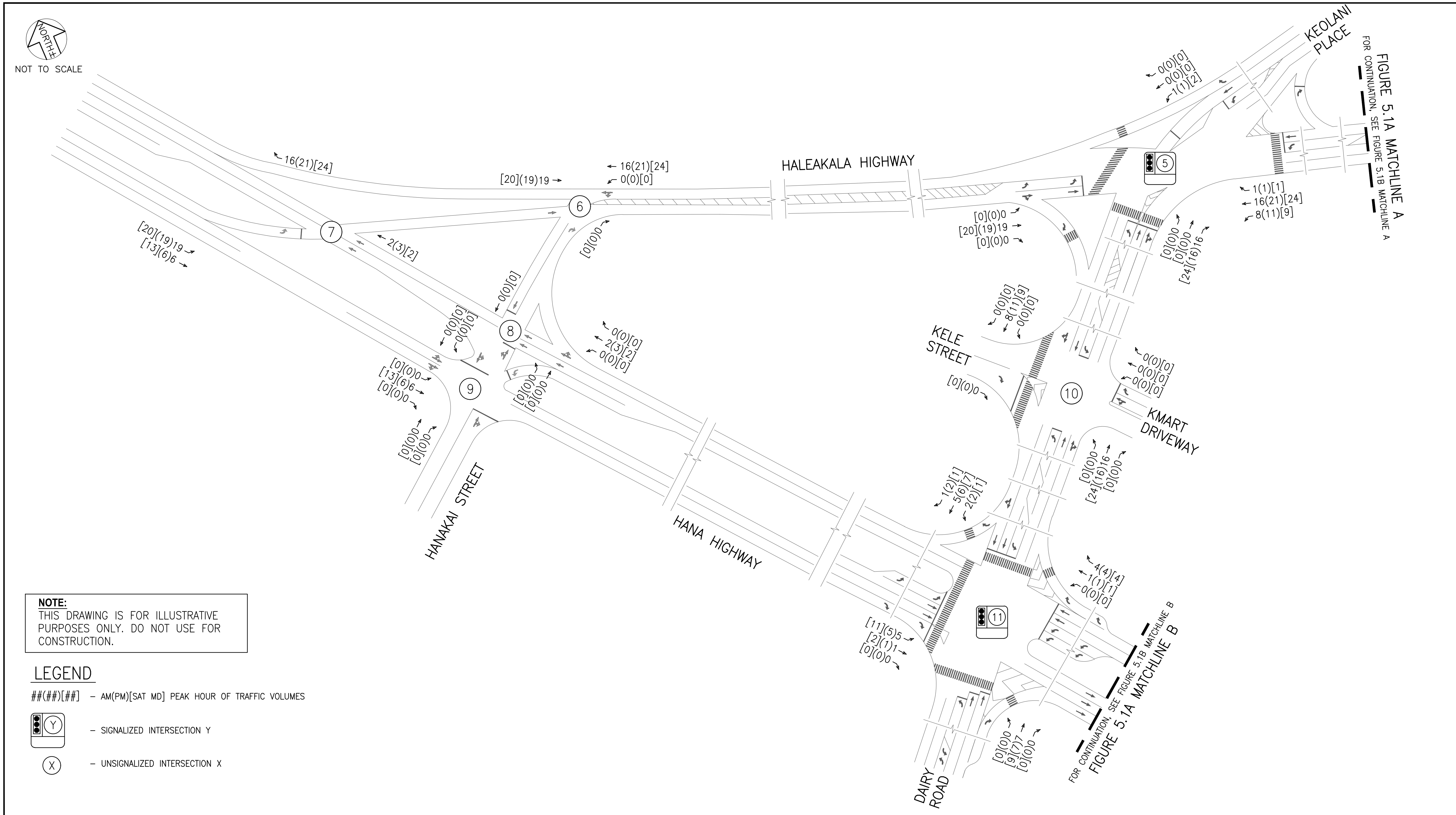
Based on zoning conditions, Costco is required to monitor this intersection on a biannual basis to determine if and when a signal will be warranted. If warranted, Costco will coordinate with the County on design and construction of a traffic signal. If HDOT constructs an on-ramp from Haleakala Highway onto AAR, this would likely reduce the critical exiting left-turn movements out of Costco and impact the warranting of the signal.

Several minor street and left-turn movements at unsignalized intersections along Hana Highway and Haleakala Highway are expected to continue operating at LOS E/F during all peak hours of traffic. However, all movements will continue to operate at under capacity conditions. Additionally, vehicles are currently able to proceed through these unsignalized intersections due to gaps in through traffic resulting from nearby upstream and downstream signals, and traffic is anticipated to operate similar to existing conditions.

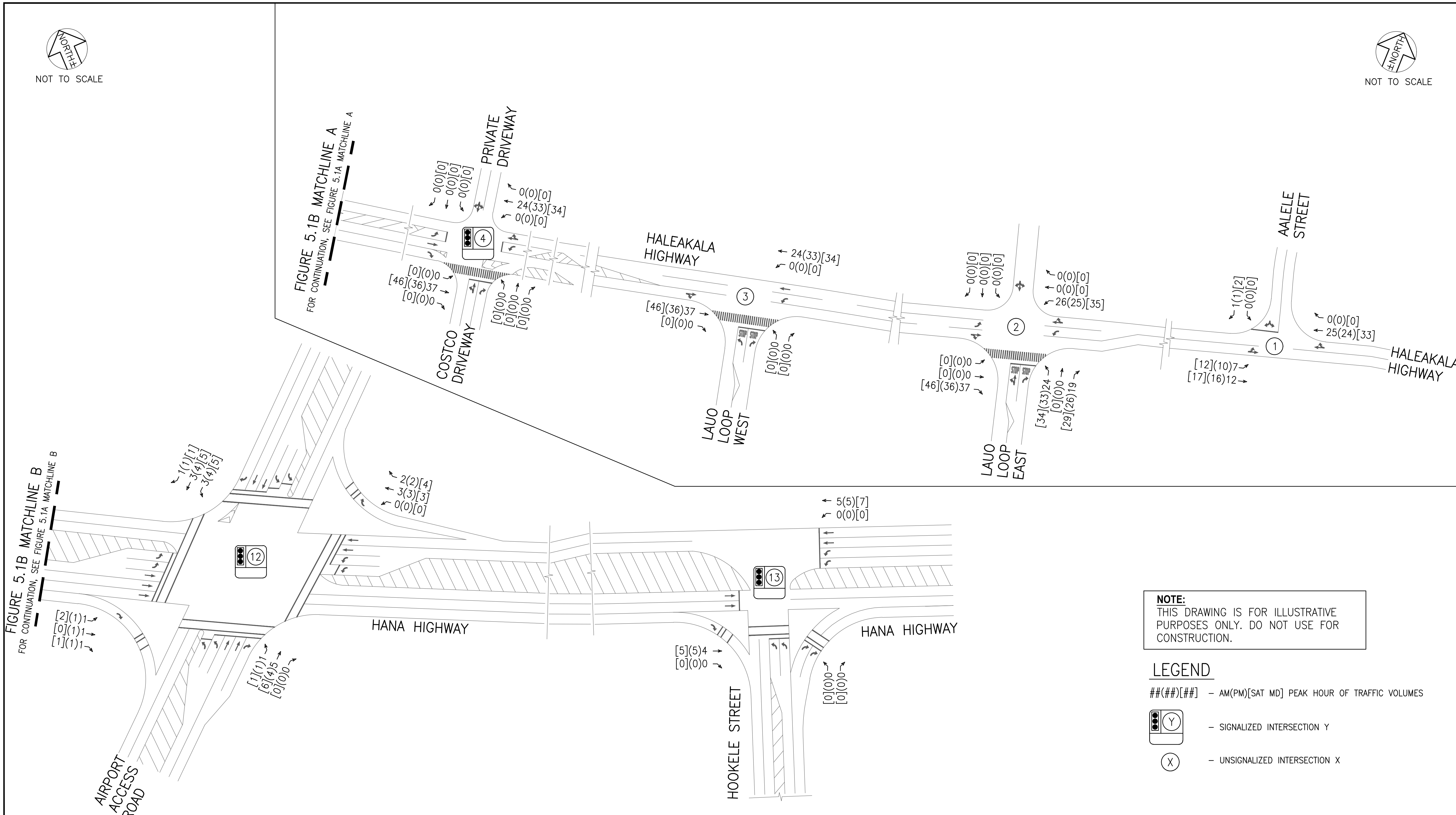
Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, at the Haleakala Highway/Lauo Loop West intersection, a traffic signal is still not anticipated to be warranted by Future Year 2025 with Project volumes. The intersection is expected to operate similar to existing conditions with gaps in traffic generated by nearby traffic signals. Signal warrant figures are shown in Appendix D.

Various minor street and left-turn movements at signalized intersections along Hana Highway from Dairy Road to Hookele Street are expected to continue operating at LOS E/F during all peak hours of traffic due to signal coordination and long cycle lengths. However, all vehicular movements are anticipated to experience minimal increases in delay of only 1-2 seconds, and the intersections will continue to operate adequately at overall LOS D or better with all movements operating under capacity during all peak hours.

Figure 5.1 illustrates the Project-generated trips for Future Year 2025. Figure 5.2 illustrates the Future Year 2025 forecast traffic volumes and LOS for the study intersection movements. Table 5.3 summarizes the Future Year 2025 LOS at the study intersections compared to Base Year 2025 conditions. LOS worksheets are provided in Appendix C.



KANAHA HOTEL TIAR	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE
	PROJECT-GENERATED TRAFFIC	5.1A



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PROJECT-GENERATED TRAFFIC

FIGURE 5.1B

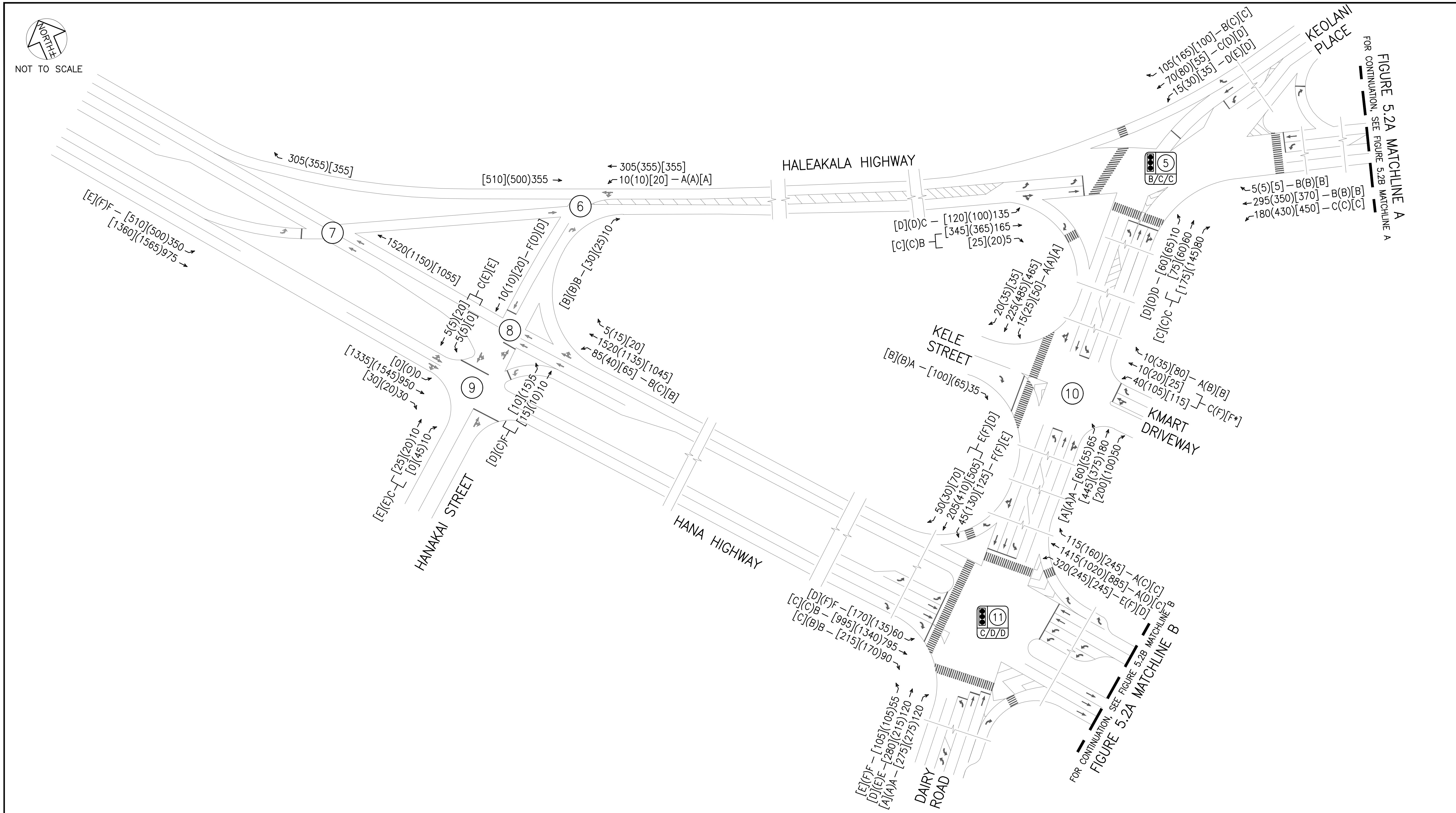

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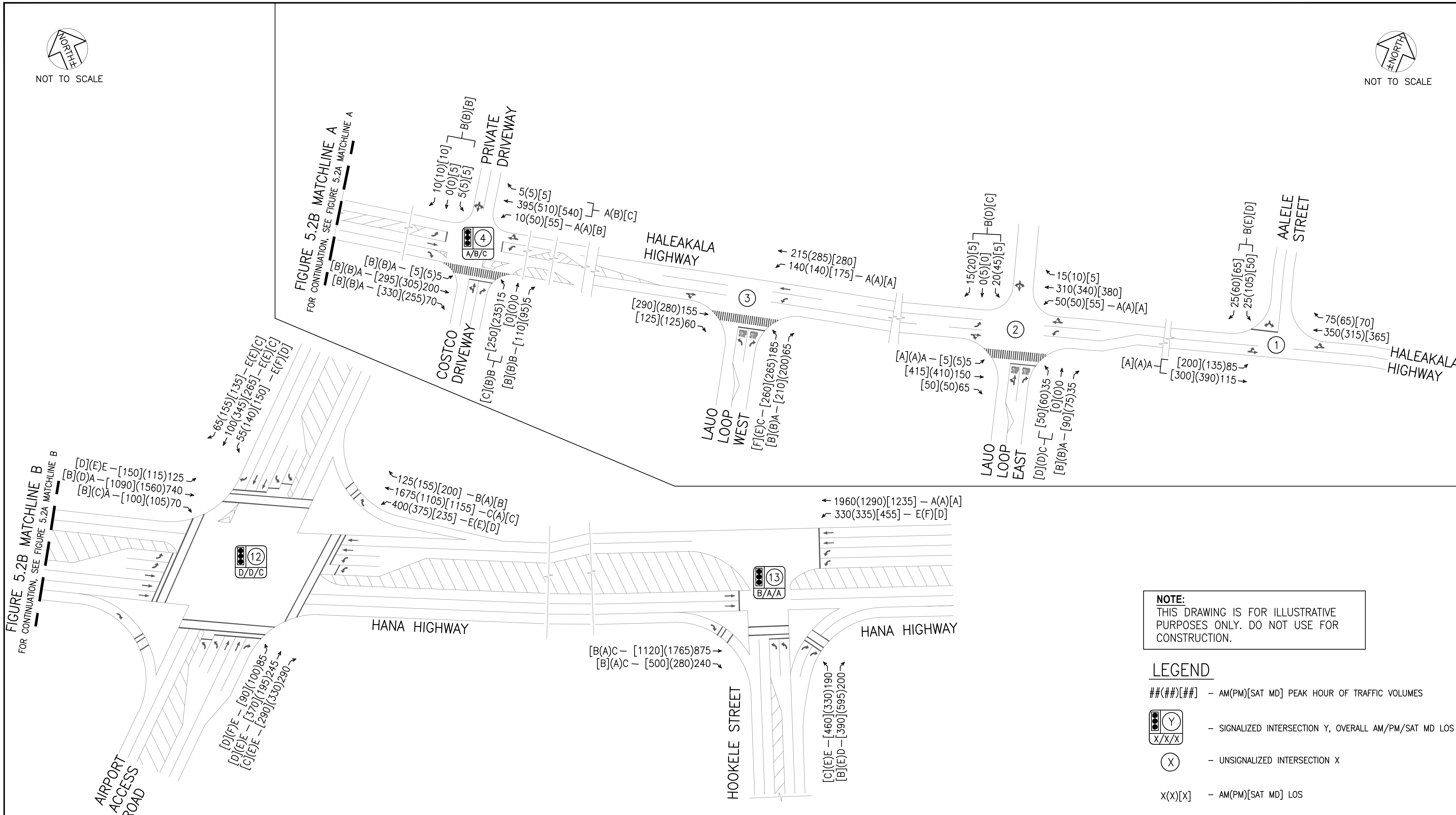
FIGURE 5.2A

FUTURE YEAR 2025 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS



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FUTURE YEAR 2025 LANE CONFIGURATION, VOLUMES AND MOVEMENT LOS

FIGURE

5.2B

TABLE 5.3: LOS SUMMARY TABLE
BASE YEAR 2025 AND FUTURE YEAR 2025 CONDITIONS

Intersection	Base Year 2025 Conditions									Future Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: Haleakala Hwy & Aalele St																		
EB LT	8.4	0.07	A	8.5	0.12	A	8.9	0.18	A	8.6	0.08	A	8.6	0.13	A	9.1	0.20	A
SB LT/RT	13.2	0.10	B	33.1	0.58	D	23.4	0.38	C	14.0	0.12	B	43.3	0.68	E	29.3	0.46	D
OVERALL	2.0	-	-	6.2	-	-	4.3	-	-	2.1	-	-	7.8	-	-	5.0	-	-
2: Lauo Loop East & Haleakala Hwy																		
NB LT/TH	13.8	0.02	B	21.2	0.11	C	20.2	0.07	C	16.5	0.11	C	30.2	0.32	D	29.4	0.27	D
NB RT	9.2	0.02	A	11.5	0.08	B	11.6	0.10	B	9.5	0.05	A	12.1	0.14	B	12.4	0.17	B
EB LT	8.0	0.00	A	8.0	0.00	A	8.1	0.00	A	8.0	0.01	A	8.1	0.01	A	8.2	0.01	A
WB LT	7.6	0.02	A	8.3	0.02	A	8.3	0.02	A	7.8	0.04	A	8.6	0.05	A	8.6	0.06	A
SB LT/TH/RT	12.8	0.07	B	21.0	0.23	C	16.3	0.03	C	14.1	0.09	B	27.8	0.33	D	19.9	0.04	C
OVERALL	1.4	-	-	2.8	-	-	1.4	-	-	2.6	-	-	4.8	-	-	3.1	-	-
3: Lauo Loop West & Haleakala Hwy																		
NB LT	18.6	0.43	C	38.5	0.76	E	47.7	0.81	E	20.5	0.47	C	46.5	0.81	E	61.8	0.88	F
NB RT	9.4	0.08	A	12.3	0.31	B	12.4	0.32	B	9.7	0.08	A	12.9	0.32	B	13.2	0.34	B
WB LT	7.9	0.11	A	8.6	0.13	A	8.7	0.16	A	8.1	0.11	A	8.7	0.14	A	8.9	0.17	A
OVERALL	6.8	-	-	11.4	-	-	13.2	-	-	6.8	-	-	12.4	-	-	15.2	-	-
4: Costco Main Driveway/Costco Dwy & Haleakala Hwy																		
NB LT/TH	27.0	0.08	C	16.9	0.52	B	24.7	0.68	C	14.3	0.06	B	17.7	0.52	B	27.1	0.71	C
NB RT	26.9	0.03	C	13.6	0.06	B	13.4	0.05	B	14.2	0.02	B	14.5	0.06	B	14.4	0.05	B
EB LT	3.7	0.01	A	11.1	0.00	B	15.9	0.01	B	6.7	0.01	A	10.8	0.02	B	15.8	0.03	B
EB TH	4.1	0.15	A	12.9	0.49	B	17.4	0.46	B	7.4	0.33	A	12.7	0.52	B	17.7	0.52	B
EB RT	3.7	0.04	A	11.2	0.18	B	15.8	0.23	B	6.5	0.07	A	10.7	0.17	B	15.5	0.22	B
WB LT	3.4	0.01	A	9.5	0.12	A	13.4	0.14	B	6.1	0.02	A	9.2	0.12	A	13.3	0.15	B
WB TH/RT	5.2	0.33	A	13.8	0.75	B	20.5	0.82	C	9.0	0.65	A	14.0	0.77	B	21.8	0.84	C
SB LT/TH/RT	27.2	0.04	C	13.8	0.02	B	15.8	0.00	B	14.4	0.02	B	14.7	0.02	B	17.0	0.07	B
OVERALL	5.5	-	A	13.9	-	B	19.9	-	B	8.5	-	A	14.0	-	B	20.8	-	C

Intersection	Base Year 2025 Conditions									Future Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	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
5: Dairy Rd/Keolani Place & Haleakala Hwy																		
NB LT	49.9	0.53	D	47.9	0.76	D	47.3	0.77	D	42.1	0.54	D	48.9	0.76	D	48.9	0.76	D
NB TH/RT	19.4	0.24	B	31.2	0.22	C	32.4	0.31	C	20.1	0.26	C	33.3	0.23	C	34.4	0.33	C
EB LT	23.5	0.73	C	41.4	0.75	D	38.6	0.76	D	24.1	0.73	C	43.3	0.76	D	40.2	0.76	D
EB TH/RT	15.4	0.42	B	28.9	0.81	C	28.5	0.80	C	16.0	0.46	B	30.5	0.83	C	29.5	0.82	C
WB LT	21.8	0.73	C	30.1	0.88	C	28.7	0.88	C	22.0	0.74	C	31.9	0.89	C	30.0	0.89	C
WB TH	16.6	0.67	B	13.0	0.40	B	13.3	0.43	B	16.9	0.69	B	13.3	0.42	B	13.4	0.45	B
WB RT	12.5	0.00	B	10.3	0.00	B	0.0	0.00	A	12.5	0.00	B	10.4	0.00	B	10.3	0.00	B
SB LT	42.9	0.54	D	52.4	0.66	D	51.2	0.70	D	37.3	0.56	D	56.2	0.71	E	54.5	0.73	D
SB TH	21.2	0.49	C	37.1	0.60	D	36.4	0.52	D	21.6	0.48	C	39.6	0.61	D	38.3	0.53	D
SB RT	18.3	0.06	B	31.9	0.05	C	31.8	0.01	C	18.8	0.05	B	34.0	0.04	C	33.5	0.01	C
OVERALL	19.5	-	B	28.3	-	C	27.6	-	C	19.9	-	B	29.7	-	C	28.5	-	C
6: Hanakai St & Haleakala Hwy																		
NB RT	10.3	0.01	B	11.8	0.05	B	11.9	0.06	B	10.5	0.02	B	12.0	0.05	B	12.2	0.06	B
WB LT	8.0	0.01	A	8.5	0.01	A	8.5	0.02	A	8.1	0.01	A	8.5	0.01	A	8.6	0.02	A
OVERALL	0.2	-	-	0.4	-	-	0.5	-	-	0.3	-	-	0.4	-	-	0.6	-	-
7: Hana Hwy & Haleakala Hwy																		
EB LT	60.6	0.92	F	52.1	0.94	F	37.6	0.87	E	74.7	0.98	F	61.4	0.98	F	45.1	0.92	E
OVERALL	7.5	-	-	7.9	-	-	6.4	-	-	9.2	-	-	9.6	-	-	7.9	-	-
8. Hanakai St (North) & Hana Hwy																		
NB LT/TH	52.8	0.13	F	23.6	0.10	C	25.1	0.12	D	53.0	0.18	F	24.0	0.13	C	26.6	0.14	D
SB TH	56.8	0.09	F	29.1	0.05	D	29.7	0.11	D	61.0	0.15	F	30.1	0.07	D	30.6	0.13	D
OVERALL	0.5	-	-	0.6	-	-	0.9	-	-	0.9	-	-	0.7	-	-	1.1	-	-
9. Hanakai St (South) & Hana Hwy																		
NB TH/RT	17.2	0.07	C	37.1	0.38	E	38.5	0.18	E	17.5	0.07	C	37.6	0.40	E	40.9	0.21	E
WB LT	0.0	-	A				0.0	-	A	0.0	-	A	0.0	-	A	0.0	-	A
SB LT/TH	20.1	0.03	C	40.5	0.07	E	37.8	0.14	E	17.9	0.04	C	37.4	0.09	E	40.1	0.18	E
OVERALL	0.5	-	-	1.6	-	-	1.1	-	-	0.5	-	-	1.7	-	-	1.3	-	-
10: Dairy Rd & Kele St																		
NB LT	7.9	0.05	A	8.8	0.06	A	8.7	0.06	A	7.9	0.06	A	8.8	0.06	A	8.8	0.06	A
EB RT	9.2	0.04	A	10.5	0.09	B	10.7	0.14	B	9.2	0.04	A	10.6	0.10	B	10.8	0.15	B
WB LT/TH	14.9	0.13	B	53.2	0.67	F	149.0	1.04	F*	15.9	0.14	C	63.9	0.73	F	209.4	1.20	F*
WB RT	9.0	0.01	A	10.1	0.05	B	11.2	0.13	B	9.0	0.01	A	10.2	0.05	B	11.4	0.14	B
SB LT	7.7	0.01	A	8.5	0.03	A	9.2	0.06	A	7.8	0.01	A	8.5	0.03	A	9.3	0.06	A
OVERALL	2.9	-	-	6.6	-	-	15.2	-	-	2.9	-	-	7.5	-	-	20.4	-	-

Intersection	Base Year 2025 Conditions									Future Year 2025 Conditions								
	AM			PM			SAT MD			AM			PM			SAT MD		
	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
11: Dairy Rd & Hana Hwy																		
NB LT	90.1	0.77	F	97.1	0.85	F	56.7	0.79	E	88.6	0.78	F	97.1	0.85	F	57.6	0.79	E
NB TH	65.7	0.35	E	66.4	0.47	E	36.5	0.40	D	65.1	0.35	E	66.2	0.48	E	37.1	0.41	D
NB RT	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00	A
EB LT	89.1	0.78	F	99.5	0.87	F	53.6	0.83	D	88.0	0.78	F	101.9	0.88	F	54.0	0.84	D
EB TH	17.2	0.41	B	32.7	0.76	C	31.1	0.82	C	17.9	0.41	B	33.6	0.77	C	31.8	0.82	C
EB RT	13.1	0.05	B	19.2	0.12	B	22.0	0.15	C	13.6	0.05	B	19.5	0.12	B	22.4	0.15	C
WB LT	61.5	0.86	E	80.4	0.83	F	49.1	0.75	D	61.3	0.86	E	80.3	0.83	F	49.9	0.76	D
WB TH	0.8	0.65	A	38.3	0.58	D	30.5	0.75	C	0.8	0.66	A	39.4	0.59	D	31.9	0.77	C
WB RT	0.1	0.07	A	26.4	0.11	C	23.5	0.21	C	0.1	0.08	A	27.3	0.12	C	24.6	0.22	C
SB LT	92.7	0.77	F	105.0	0.87	F	55.1	0.80	E	91.6	0.77	F	105.7	0.87	F	55.9	0.81	E
SB TH/RT	75.2	0.75	E	82.7	0.85	F	42.0	0.78	D	74.9	0.76	E	83.2	0.86	F	42.6	0.78	D
OVERALL	23.4	-	C	50.8	-	D	36.5	-	D	24.0	-	C	51.8	-	D	37.5	-	D
12: Airport Access Road & Hana Hwy																		
NB LT	78.8	0.66	E	82.0	0.71	F	42.5	0.52	D	78.6	0.67	E	82.0	0.71	F	43.6	0.55	D
NB TH	72.4	0.78	E	69.9	0.52	E	36.2	0.70	D	72.2	0.78	E	70.0	0.53	E	36.8	0.71	D
NB RT	64.6	0.10	E	67.6	0.26	E	33.2	0.33	C	64.2	0.09	E	68.2	0.32	E	33.8	0.35	C
EB LT	74.3	0.75	E	65.8	0.23	E	42.0	0.64	D	74.0	0.75	E	65.9	0.24	E	42.8	0.65	D
EB TH	0.2	0.26	A	35.1	0.57	D	18.8	0.54	B	0.2	0.26	A	35.7	0.58	D	19.2	0.54	B
EB RT	0.1	0.04	A	22.6	0.06	C	14.7	0.06	B	0.1	0.04	A	23.0	0.06	C	15.0	0.06	B
WB LT	75.3	0.88	E	70.0	0.89	E	40.2	0.71	D	75.3	0.88	E	69.9	0.90	E	41.1	0.71	D
WB TH	31.5	0.74	C	1.2	0.61	A	20.5	0.77	C	32.1	0.75	C	1.2	0.61	A	21.0	0.77	C
WB RT	14.1	0.08	B	0.3	0.14	A	14.4	0.23	B	14.5	0.08	B	0.3	0.14	A	14.7	0.23	B
SB LT	78.5	0.53	E	82.8	0.75	F	42.1	0.64	D	79.4	0.58	E	82.6	0.76	F	42.8	0.65	D
SB TH	67.6	0.35	E	77.3	0.84	E	32.4	0.44	C	67.5	0.36	E	77.5	0.84	E	32.7	0.45	C
SB RT	65.2	0.03	E	64.2	0.07	E	30.0	0.08	C	65.3	0.06	E	64.0	0.08	E	30.1	0.07	C
OVERALL	36.3	-	D	37.0	-	D	25.7	-	C	36.9	-	D	37.6	-	D	26.3	-	C
13: Hookele St & Hana Hwy																		
NB LT	74.0	0.75	E	71.6	0.71	E	32.5	0.73	C	73.9	0.75	E	72.0	0.71	E	33.0	0.73	C
NB RT	52.3	0.24	D	66.6	0.84	E	18.4	0.31	B	52.2	0.25	D	66.8	0.85	E	18.6	0.32	B
EB TH	30.9	0.38	C	2.5	0.82	A	19.2	0.75	B	31.1	0.37	C	2.5	0.83	A	19.4	0.75	B
EB RT	22.7	0.16	C	0.3	0.22	A	14.8	0.35	B	22.9	0.16	C	0.3	0.22	A	15.0	0.36	B
WB LT	71.7	0.85	E	93.5	0.90	F	34.9	0.80	C	71.7	0.85	E	93.7	0.90	F	35.4	0.80	D
WB TH	4.9	0.69	A	6.0	0.49	A	6.4	0.54	A	5.0	0.70	A	6.1	0.49	A	6.4	0.54	A
OVERALL	14.5	-	B	9.3	-	A	5.6	-	A	14.5	-	B	9.3	-	A	5.7	-	A

* Denotes overcapacity conditions, v/c ≥ 1.

6. CONCLUSIONS

The Project is located on a 5.17-acre lot within the Maui Business Park North Project Area (MBP NPA) in Kahului, Maui. The Project site is bounded by Haleakala Highway to the north and Lauo Loop to the west. The proposed action is to develop a 200-unit Hotel with associated infrastructure and landscaping. The proposed hotel building varies from one (1) two (2) and four (4) stories in height and will be massed toward the center of the Project Site with generous setbacks on all sides accommodating the width of a landscape buffer, the width of two parking stalls and a parking lot drive isle. Amenities and uses include but are not limited to, swimming pool, dining area, and other typical and similar incidental support services and accessory uses for hotel operation.

The Project is anticipated to be completed by 2025. Access to the Project will be provided by the existing Lauo Loop which services the MBP NPA.

6.1 Existing Conditions

Traffic counts at the study intersections were collected in 2017 and supplemented by updated counts collected in 2019 at the following intersections to capture the redistribution of trips in the study area due to the recent opening of the Consolidated Rental Car Facility (CONRAC), roadway circulation changes at Kahului Airport and inclusion of various nearby completed developments that include Pacific Pipe, Lexus, BMW, American Savings Bank, Safeway Store, Safeway Gas Station and new tenants at the Puunene Shopping Center:

- Haleakala Highway/Dairy Road/Keolani Place
- Hana Highway/Airport Access Road
- Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway

The remaining 2017 intersections were adjusted based on the 2019 intersection volumes to constitute the baseline Existing 2019 traffic condition. The majority of movements at the study intersections operated adequately at LOS D or better. Because of the high mainline through volumes, signal coordination and long cycle lengths along Hana Highway at signalized intersections, some minor street and left-turn movements experienced longer delays and LOS E/F conditions, but all movements operated below capacity.

Based on 2019 volumes at the Haleakala Highway/Costco Main Access intersection, a signal is currently warranted.

6.2 Base Year 2025

It is anticipated that by Base Year 2025, traffic will have increased over existing conditions due to ambient growth and various developments such as the Keolani Triangle Retail Center, Skyline Eco-Adventures, Maui Palms Hotel Redevelopment and a various developments within the Maui Business Park South Project Area.

HDOT is considering the acquisition of the east portion of the Project site to fulfill its long-term plan and goal to provide an on-ramp from Haleakala Highway onto AAR. Since the timeline and design of this on-ramp has not yet been determined, the on-ramp was not considered for the Base Year scenario.

Since a signal is currently warranted at the Haleakala Highway/Costco Main Access/Courtyard by Marriott Driveway under existing conditions, the intersection was analyzed to include a traffic signal for Base Year 2025 conditions. With a signal, all movements at this intersection is anticipated to operate adequately at LOS C or better during all peak hours of traffic. If a signal is not installed, the northbound shared left-turn/through movement is anticipated to operate at LOS F and overcapacity conditions for the PM and SAT MD peak hours.

Based on zoning conditions, Costco is required to monitor this intersection on a biannual basis to determine if and when a signal will be warranted. If warranted, Costco will coordinate with the County on design and construction of a traffic signal. If HDOT constructs an on-ramp from Haleakala Highway onto AAR, this would likely reduce the critical exiting left-turn movements out of Costco and impact the warranting of the signal.

At the Haleakala Highway/Lauo Loop West intersection, the northbound left-turn is expected to worsen to LOS E during the SAT MD peak hour of traffic. Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, a traffic signal is not anticipated to be warranted by Base Year 2025. The intersection is expected to operate similar to existing conditions with gaps in traffic generated by nearby traffic signals.

Various minor street and left-turn movements at the signalized intersections along Hana Highway from Dairy Road to Hookele Street are expected to continue operating at or worsen to LOS E/F during all peak hours of traffic due to the coordination and long cycle lengths at the intersections and traffic growth along Hana Highway. However, the intersections will continue to operate adequately at overall LOS D or better with all movements operating under capacity during all peak hours. No improvements are recommended for Base Year 2025 conditions.

6.3 Future Year 2025

By full buildout in Future Year 2025, the Project is projected to generate a total of 106(120)[143] new external trips during the AM(PM)[SAT MD] peak hours of traffic. Trips generated by the Project were distributed in the study area based on current traffic patterns.

Upon completion of the Project, all study intersections are forecast to operate similar to Base Year 2025. Study intersections are anticipated to experience minimal increases in overall delay ranging from 1-5 seconds. Additionally, the majority of intersection movements are expected to experience minimal increases in delay from 1-7 seconds. All movements forecast to operate at LOS E/F for Base Year 2025 conditions will continue to operate similarly during Future Year 2025 with the Project.

As discussed in Section 4.3, HDOT is considering the acquisition of the east portion of the Project site to fulfill its long-term plan and goal to provide an on-ramp from Haleakala Highway onto AAR. Since the timeline and design of this on-ramp has not yet been determined, the on-ramp was not considered for the Future Year scenarios. The on-ramp would primarily reduce traffic at the Haleakala Highway/Dairy Road/Keolani Place intersection. However, since all movements at this intersection will continue to operate adequately at LOS D or better and below capacity conditions, the on-ramp is not needed for the Project.

Several minor street and left-turn movements at unsignalized intersections along Hana Highway and Haleakala Highway are expected to continue operating at LOS E/F during all peak hours of traffic. However, all movements will continue to operate at under capacity conditions. Additionally, vehicles are currently able to proceed through these unsignalized intersections due to gaps in through traffic resulting from nearby upstream and downstream signals, and traffic is anticipated to operate similar to existing conditions.

Based on the MUTCD Four-Hour Vehicular Volume traffic signal warrant, at the Haleakala Highway/Lauo Loop West intersection, a traffic signal is still not anticipated to be warranted by Future Year 2025 with Project volumes. The intersection is expected to operate similar to existing conditions with gaps in traffic generated by nearby traffic signals. Signal warrant figures are shown in Appendix D.

Various minor street and left-turn movements at signalized intersections along Hana Highway from Dairy Road to Hookele Street are expected to continue operating at LOS E/F during all peak hours of traffic due to signal coordination and long cycle lengths. However, the majority of movements are anticipated to experience minimal increases in delay of 1-2 seconds, and the intersections will continue to operate adequately at overall LOS D or better with all movements operating under capacity during all peak hours. No improvements are recommended for Future Year 2025 conditions with the Project.

7. REFERENCES

1. Austin, Tsutsumi & Associates, Inc., Keolani Triangle Retail Center TIAR, July 19, 2018.
2. Austin, Tsutsumi & Associates, Inc., Maui Business Park Phase II – Lot 38 TIAR, June 02, 2017.
3. Austin, Tsutsumi & Associates, Inc., Maui County Service Center TIAR, October 26, 2016.
4. Austin, Tsutsumi & Associates, Inc., Skyline Eco-Adventures TIAR, February 16, 2018.
5. Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009.
6. Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.
7. Ricondo & Associates, Draft – TIAR for DEA for Kahului Airport Consolidated Rental Car Facility, October 26, 2012.
8. Transportation Research Board, Highway Capacity Manual, 6th Edition, 2016.

APPENDICES

APPENDIX A

TRAFFIC COUNT DATA

Austin, Tsutsumi & Associates

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File Name : Aalele St - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AALELE ST Southbound				HALEAKALA HWY Westbound				Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	3	0	6	0	0	30	23	0	0	0	0	0	21	7	0	0	90
06:15 AM	8	0	4	0	0	37	25	0	0	0	0	0	9	5	0	0	88
06:30 AM	5	0	5	0	0	62	27	0	0	0	0	0	11	19	0	0	129
06:45 AM	4	0	3	0	0	62	16	0	0	0	0	0	25	12	0	0	122
Total	20	0	18	0	0	191	91	0	0	0	0	0	66	43	0	0	429
07:00 AM	3	0	5	0	0	72	14	0	0	0	0	0	11	15	0	0	120
07:15 AM	8	0	5	0	0	47	17	0	0	0	0	0	17	21	0	0	115
07:30 AM	9	0	5	0	0	71	23	0	0	0	0	0	13	19	0	0	140
07:45 AM	3	0	5	0	0	63	17	0	0	0	0	0	25	15	0	0	128
Total	23	0	20	0	0	253	71	0	0	0	0	0	66	70	0	0	503
08:00 AM	8	0	7	0	0	71	21	0	0	0	0	0	10	25	0	0	142
08:15 AM	6	0	3	0	0	58	17	0	0	0	0	0	17	32	0	0	133
08:30 AM	7	0	5	0	0	57	19	0	0	0	0	0	19	19	0	0	126
08:45 AM	7	0	6	0	0	50	10	0	0	0	0	0	23	36	0	0	132
Total	28	0	21	0	0	236	67	0	0	0	0	0	69	112	0	0	533
Grand Total	71	0	59	0	0	680	229	0	0	0	0	0	201	225	0	0	1465
Apprch %	54.6	0	45.4	0	0	74.8	25.2	0	0	0	0	0	47.2	52.8	0	0	
Total %	4.8	0	4	0	0	46.4	15.6	0	0	0	0	0	13.7	15.4	0	0	
Motorcycles	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	4
% Motorcycles	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0.4	0	0	0.3
Cars	48	0	42	0	0	410	134	0	0	0	0	0	142	123	0	0	899
% Cars	67.6	0	71.2	0	0	60.3	58.5	0	0	0	0	0	70.6	54.7	0	0	61.4
Light Goods Vehicles	16	0	12	0	0	249	61	0	0	0	0	0	55	91	0	0	484
% Light Goods Vehicles	22.5	0	20.3	0	0	36.6	26.6	0	0	0	0	0	27.4	40.4	0	0	33
Buses	3	0	0	0	0	1	6	0	0	0	0	0	0	1	0	0	11
% Buses	4.2	0	0	0	0	0.1	2.6	0	0	0	0	0	0	0.4	0	0	0.8
Single-Unit Trucks	4	0	4	0	0	15	24	0	0	0	0	0	2	9	0	0	58
% Single-Unit Trucks	5.6	0	6.8	0	0	2.2	10.5	0	0	0	0	0	1	4	0	0	4
Articulated Trucks	0	0	1	0	0	1	4	0	0	0	0	0	1	0	0	0	7
% Articulated Trucks	0	0	1.7	0	0	0.1	1.7	0	0	0	0	0	0.5	0	0	0	0.5
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2
% Bicycles on Road	0	0	0	0	0	0.1	0	0	0	0	0	0	0.5	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Austin, Tsutsumi & Associates

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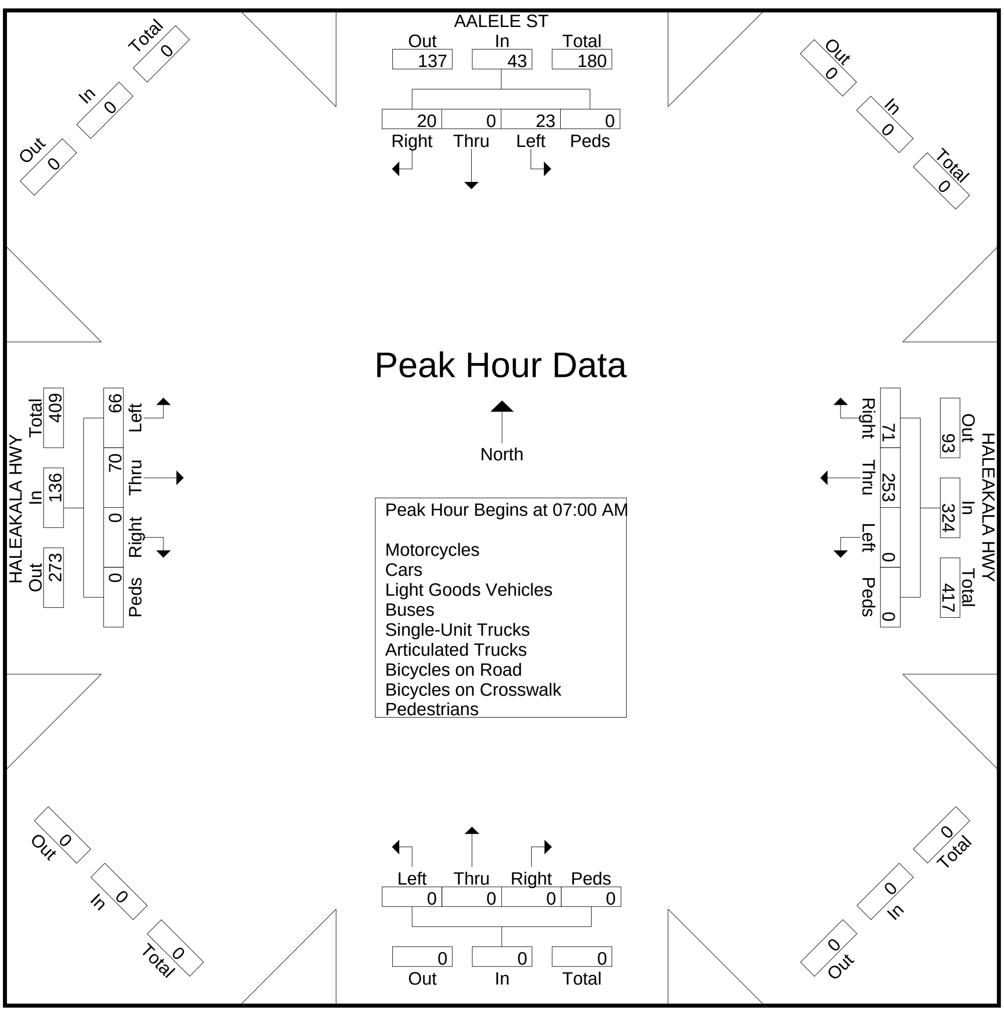
File Name : Aalele St - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 2

	AALELE ST Southbound					HALEAKALA HWY Westbound					Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	3	0	**5**				**72**														
07:15 AM	**8**	**0**	**5**	**0**	**13**	**0**	**47**	**17**	**0**	**64**	**0**	**0**	**0**	**0**	**0**	**17**	**21**	0	0	38	115
07:30 AM	**9**				**14**	0	71	**23**		**94**	0	0	0	0	0	13	19	0	0	32	**140**
07:45 AM	3	0	5	0	8	0	63	17	0	80	0	0	0	0	0	**25**				**40**	128
Total Volume	23	0	20	0	43	0	253	71	0	324	0	0	0	0	0	66	70	0	0	136	503
% App. Total	53.5	0	46.5	0		0	78.1	21.9	0		0	0	0	0		48.5	51.5	0	0		
PHF	.639	.000	1.00	.000	.768	.000	.878	.772	.000	.862	.000	.000	.000	.000	.000	.660	.833	.000	.000	.850	.898



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Start Date : 5/17/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AALELE ST Southbound				HALEAKALA HWY Westbound				Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	20	0	18	0	0	62	21	0	0	0	0	0	34	58	0	0	213
03:15 PM	23	0	14	0	0	55	18	0	0	0	0	0	29	58	0	0	197
03:30 PM	26	0	19	0	0	55	17	0	0	0	0	0	25	77	0	0	219
03:45 PM	19	0	11	0	0	64	19	0	0	0	0	0	21	76	0	0	210
Total	88	0	62	0	0	236	75	0	0	0	0	0	109	269	0	0	839
04:00 PM	34	0	14	0	0	62	12	0	0	0	0	0	30	64	0	0	216
04:15 PM	23	0	10	0	0	51	13	0	0	0	0	0	32	63	0	0	192
04:30 PM	14	0	12	1	0	65	13	0	0	0	0	0	30	86	0	0	221
04:45 PM	21	0	5	0	0	48	11	0	0	0	0	0	24	69	0	0	178
Total	92	0	41	1	0	226	49	0	0	0	0	0	116	282	0	0	807
05:00 PM	13	0	10	0	0	64	4	0	0	0	0	0	36	58	0	0	185
05:15 PM	29	0	8	0	0	53	21	0	0	0	0	0	17	69	0	0	197
Grand Total	222	0	121	1	0	579	149	0	0	0	0	0	278	678	0	0	2028
Apprch %	64.5	0	35.2	0.3	0	79.5	20.5	0	0	0	0	0	29.1	70.9	0	0	
Total %	10.9	0	6	0	0	28.6	7.3	0	0	0	0	0	13.7	33.4	0	0	
Motorcycles	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	6
% Motorcycles	0	0	0	0	0	0.9	0.7	0	0	0	0	0	0	0	0	0	0.3
Cars	148	0	99	0	0	424	116	0	0	0	0	0	208	482	0	0	1477
% Cars	66.7	0	81.8	0	0	73.2	77.9	0	0	0	0	0	74.8	71.1	0	0	72.8
Light Goods Vehicles	70	0	20	0	0	143	24	0	0	0	0	0	65	193	0	0	515
% Light Goods Vehicles	31.5	0	16.5	0	0	24.7	16.1	0	0	0	0	0	23.4	28.5	0	0	25.4
Buses	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	4
% Buses	0	0	0	0	0	0.2	2	0	0	0	0	0	0	0	0	0	0.2
Single-Unit Trucks	3	0	2	0	0	5	5	0	0	0	0	0	4	3	0	0	22
% Single-Unit Trucks	1.4	0	1.7	0	0	0.9	3.4	0	0	0	0	0	1.4	0.4	0	0	1.1
Articulated Trucks	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	3
% Articulated Trucks	0.5	0	0	0	0	0.2	0	0	0	0	0	0	0.4	0	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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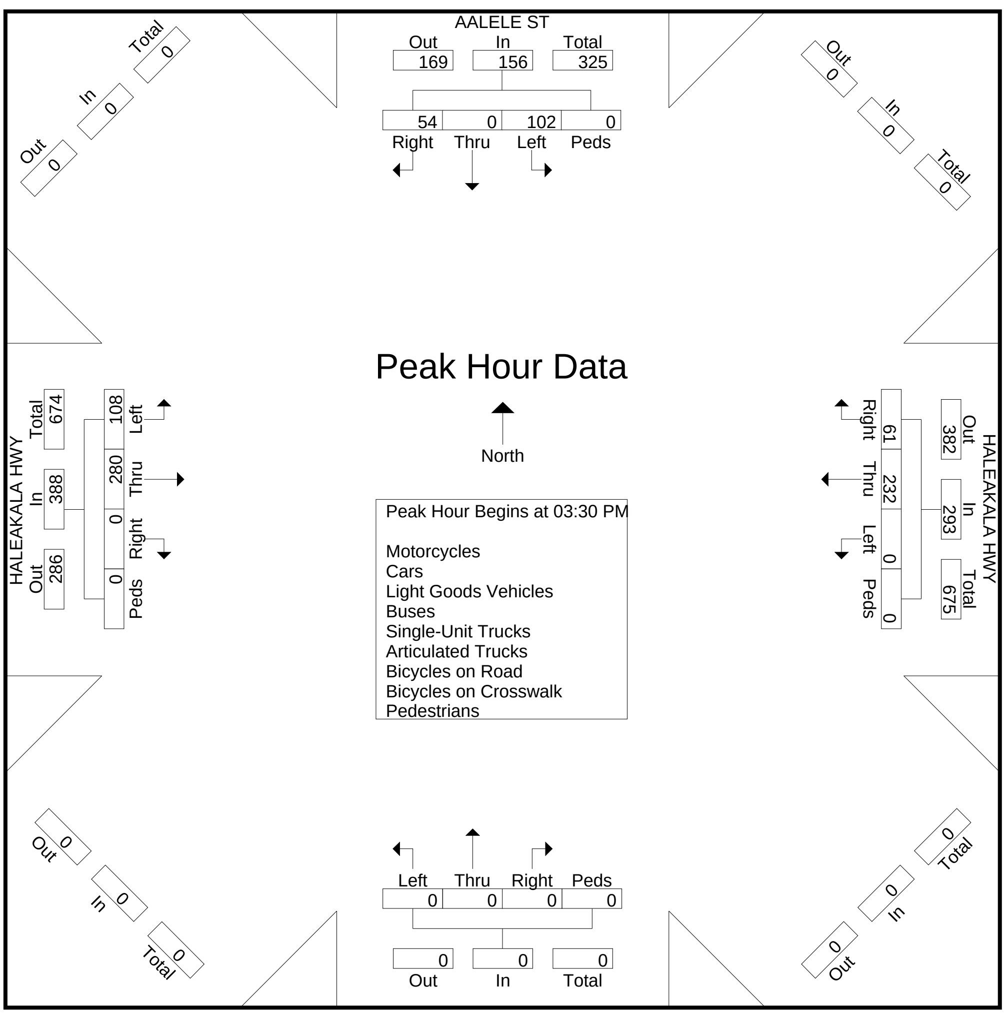
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	26	0	**19**														**77**	0	0	**102**	**219**
03:45 PM	19	0	11	0	30	0	**64**	**19**		**83**	0	0	0	0	0	21	76	0	0	97	210
04:00 PM	**34**				**48**	0	62	12	0	74	0	0	0	0	0	30	64	0	0	94	216
04:15 PM	23	0	10	0	33	0	51	13	0	64	0	0	0	0	0	**32**					
Total Volume	102	0	54	0	156	0	232	61	0	293	0	0	0	0	0	108	280	0	0	388	837
% App. Total	65.4	0	34.6	0		0	79.2	20.8	0		0	0	0	0		27.8	72.2	0	0		
PHF	.750	.000	.711	.000	.813	.000	.906	.803	.000	.883	.000	.000	.000	.000	.000	.844	.909	.000	.000	.951	.955



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File Name : WE_Aalele St - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AALELE ST Southbound				HALEAKALA HWY Westbound				Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	14	0	8	0	0	54	13	0	0	0	0	0	31	55	0	0	175
11:15 AM	14	0	15	0	0	59	10	0	0	0	0	0	28	49	0	0	175
11:30 AM	15	0	19	0	0	59	16	0	0	0	0	0	29	37	0	0	175
11:45 AM	11	0	16	0	0	77	15	0	0	0	0	0	52	43	0	0	214
Total	54	0	58	0	0	249	54	0	0	0	0	0	140	184	0	0	739
12:00 PM	14	0	14	0	0	55	13	0	0	0	0	0	47	50	0	0	193
12:15 PM	11	0	16	0	0	56	17	0	0	0	0	0	37	59	0	0	196
12:30 PM	10	0	14	0	0	63	22	0	0	0	0	0	30	64	0	0	203
12:45 PM	12	0	11	0	0	60	18	0	0	0	0	0	40	56	0	0	197
Total	47	0	55	0	0	234	70	0	0	0	0	0	154	229	0	0	789
Grand Total	101	0	113	0	0	483	124	0	0	0	0	0	294	413	0	0	1528
Apprch %	47.2	0	52.8	0	0	79.6	20.4	0	0	0	0	0	41.6	58.4	0	0	
Total %	6.6	0	7.4	0	0	31.6	8.1	0	0	0	0	0	19.2	27	0	0	
Motorcycles	1	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	4
% Motorcycles	1	0	0	0	0	0	0.8	0	0	0	0	0	0	0.5	0	0	0.3
Cars	73	0	106	0	0	385	95	0	0	0	0	0	239	313	0	0	1211
% Cars	72.3	0	93.8	0	0	79.7	76.6	0	0	0	0	0	81.3	75.8	0	0	79.3
Light Goods Vehicles	26	0	6	0	0	89	23	0	0	0	0	0	53	94	0	0	291
% Light Goods Vehicles	25.7	0	5.3	0	0	18.4	18.5	0	0	0	0	0	18	22.8	0	0	19
Buses	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	4
% Buses	0	0	0.9	0	0	0.2	0	0	0	0	0	0	0.3	0.2	0	0	0.3
Single-Unit Trucks	0	0	0	0	0	7	2	0	0	0	0	0	1	3	0	0	13
% Single-Unit Trucks	0	0	0	0	0	1.4	1.6	0	0	0	0	0	0.3	0.7	0	0	0.9
Articulated Trucks	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	4
% Articulated Trucks	1	0	0	0	0	0	2.4	0	0	0	0	0	0	0	0	0	0.3
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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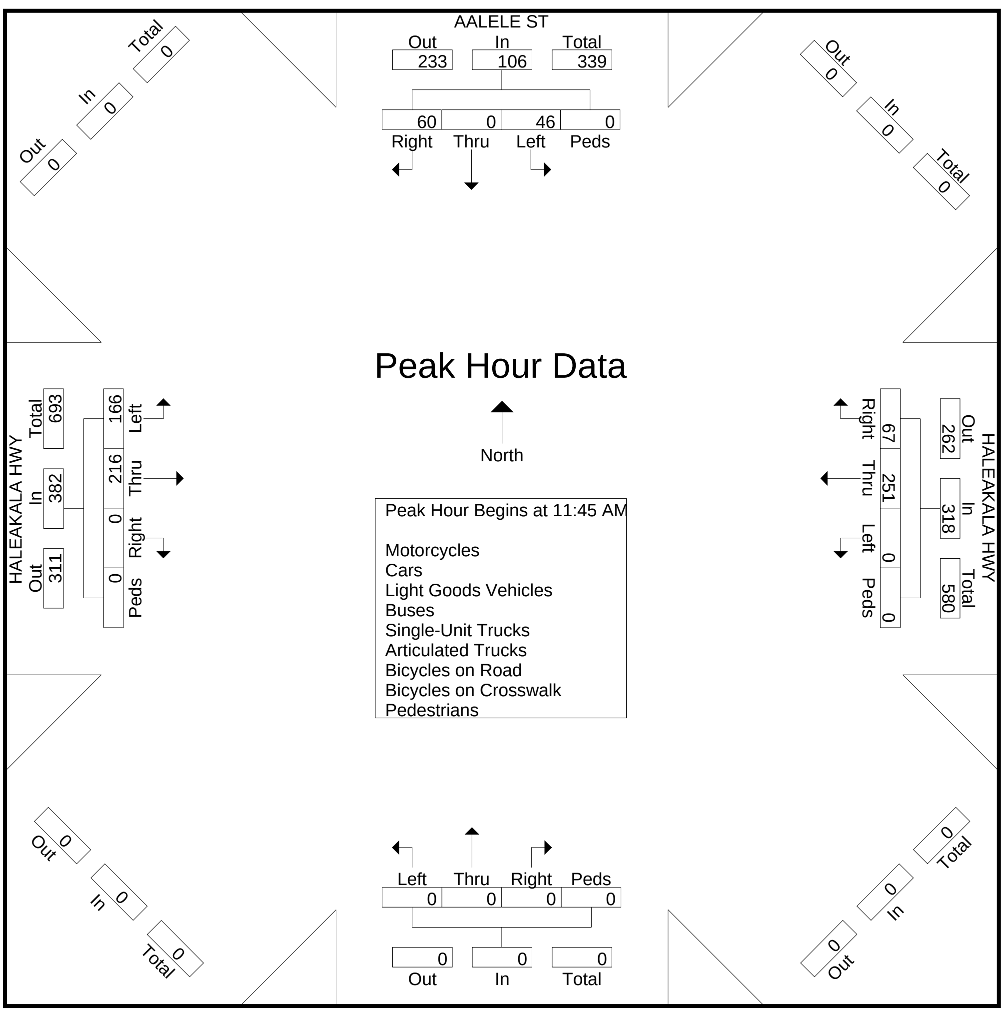
Phone: 533-3646 Fax: 526-1267

File Name : WE_Aalele St - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 2

	AALELE ST Southbound					HALEAKALA HWY Westbound					Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	11	0	**16**				**77**			**92**	0	0	0	0	0	**52**					**214**
12:00 PM	**14**				**28**	0	55	13	0	68	0	0	0	0	0	47	50	0	0	**97**	193
12:15 PM	11	0	16	0	27	0	56	17	0	73	0	0	0	0	0	37	59	0	0	96	196
12:30 PM	10	0	14	0	24	0	63	**22**									**64**	0	0	94	203
Total Volume	46	0	60	0	106	0	251	67	0	318	0	0	0	0	0	166	216	0	0	382	806
% App. Total	43.4	0	56.6	0		0	78.9	21.1	0		0	0	0	0		43.5	56.5	0	0		
PHF	.821	.000	.938	.000	.946	.000	.815	.761	.000	.864	.000	.000	.000	.000	.000	.798	.844	.000	.000	.985	.942



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File Name : Kuleana St_Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KULEANA ST Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	1	0	0	0	0	32	8	0	1	0	2	0	2	27	0	0	73
06:15 AM	0	0	0	0	1	29	9	0	1	0	0	0	5	15	0	0	60
06:30 AM	3	0	2	0	1	47	16	0	1	0	0	0	6	26	0	0	102
06:45 AM	2	1	2	0	0	46	22	0	0	0	1	1	14	37	1	0	127
Total	6	1	4	0	2	154	55	0	3	0	3	1	27	105	1	0	362
07:00 AM	0	0	4	0	2	65	9	1	0	0	2	0	0	25	0	0	108
07:15 AM	10	0	3	0	2	46	3	0	0	0	0	0	1	26	0	0	91
07:30 AM	5	0	4	0	0	71	2	0	0	0	2	0	2	26	1	0	113
07:45 AM	4	0	2	0	1	70	1	0	1	0	2	0	1	34	1	0	117
Total	19	0	13	0	5	252	15	1	1	0	6	0	4	111	2	0	429
08:00 AM	2	0	0	0	1	72	2	0	1	0	1	0	2	31	1	0	113
08:15 AM	6	1	2	0	7	52	3	0	1	0	3	0	1	42	1	0	119
08:30 AM	0	1	2	0	2	66	1	0	0	0	1	0	3	35	0	0	111
08:45 AM	3	0	1	0	3	54	0	0	0	0	5	0	0	53	1	0	120
Total	11	2	5	0	13	244	6	0	2	0	10	0	6	161	3	0	463
Grand Total	36	3	22	0	20	650	76	1	6	0	19	1	37	377	6	0	1254
Apprch %	59	4.9	36.1	0	2.7	87	10.2	0.1	23.1	0	73.1	3.8	8.8	89.8	1.4	0	
Total %	2.9	0.2	1.8	0	1.6	51.8	6.1	0.1	0.5	0	1.5	0.1	3	30.1	0.5	0	
Motorcycles	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	4
% Motorcycles	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.3	0	0	0.3
Cars	11	2	10	0	11	421	31	0	5	0	11	0	16	237	5	0	760
% Cars	30.6	66.7	45.5	0	55	64.8	40.8	0	83.3	0	57.9	0	43.2	62.9	83.3	0	60.6
Light Goods Vehicles	22	1	12	0	5	204	44	0	1	0	5	0	20	127	1	0	442
% Light Goods Vehicles	61.1	33.3	54.5	0	25	31.4	57.9	0	16.7	0	26.3	0	54.1	33.7	16.7	0	35.2
Buses	0	0	0	0	0	2	1	0	0	0	0	0	0	1	0	0	4
% Buses	0	0	0	0	0	0.3	1.3	0	0	0	0	0	0	0.3	0	0	0.3
Single-Unit Trucks	1	0	0	0	4	17	0	0	0	0	3	0	1	10	0	0	36
% Single-Unit Trucks	2.8	0	0	0	20	2.6	0	0	0	0	15.8	0	2.7	2.7	0	0	2.9
Articulated Trucks	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
% Articulated Trucks	2.8	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0.2
Bicycles on Road	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3
% Bicycles on Road	2.8	0	0	0	0	0.2	0	0	0	0	0	0	0	0.3	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0.2

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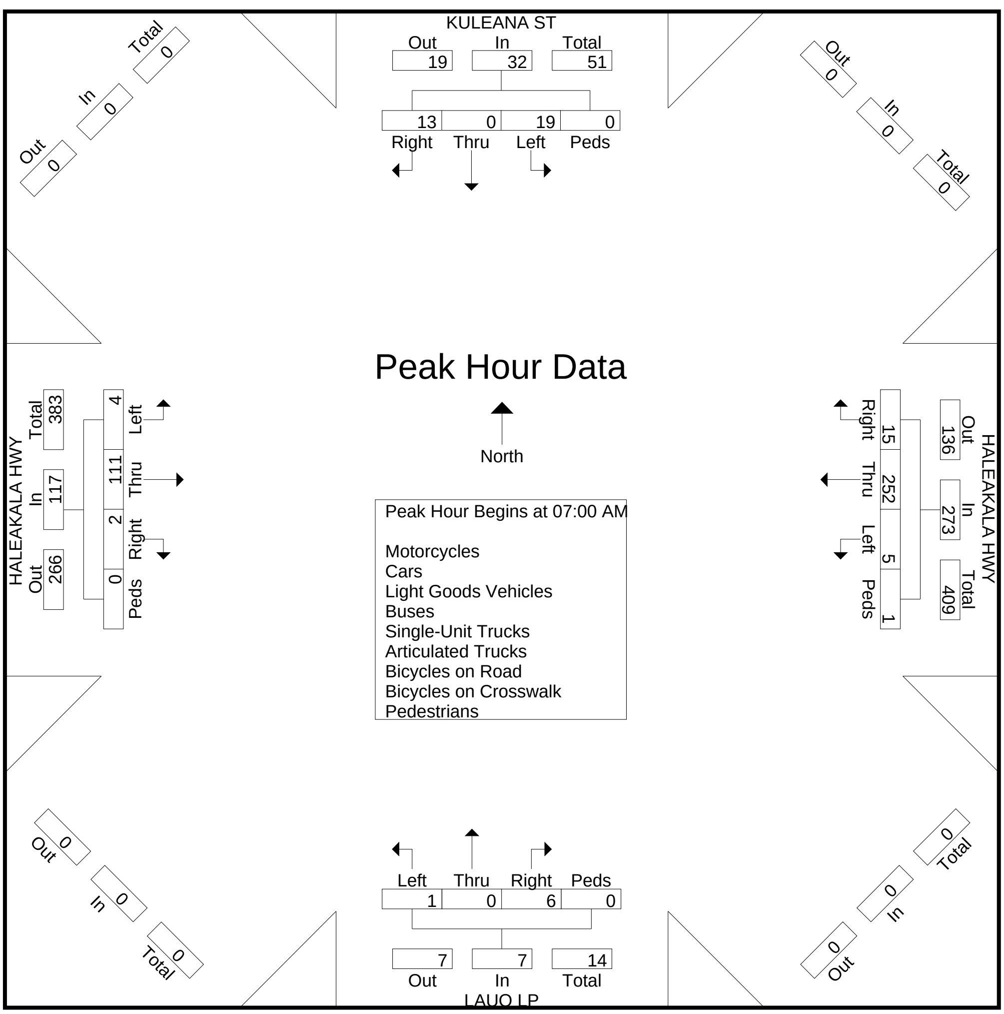
File Name : Kuleana St_Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 2

	KULEANA ST Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	**4**			**2**	65	**9**	**1**	**77**	0	0	**2**	0	2	0	25	0	0	25	108
07:15 AM	**10**				**13**	2	46	3	0	51	0	0	0	0	0	1	26	0	0	27	91
07:30 AM	5	0	4	0	9	0	**71**									**2**		**1**			
07:45 AM	**4**	**0**	**2**	**0**	**6**	**1**	**70**	**1**	**0**	**72**	**1**	**0**	**2**	**0**	**3**	1	**34**	1	0	**36**	**117**
Total Volume	19	0	13	0	32	5	252	15	1	273	1	0	6	0	7	4	111	2	0	117	429
% App. Total	59.4	0	40.6	0		1.8	92.3	5.5	0.4		14.3	0	85.7	0		3.4	94.9	1.7	0		
PHF	.475	.000	.813	.000	.615	.625	.887	.417	.250	.886	.250	.000	.750	.000	.583	.500	.816	.500	.000	.813	.917



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Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KULEANA ST Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY 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	0	0	3	73	6	0	1	0	8	3	0	85	1	0	181
03:15 PM	8	1	5	1	2	65	2	0	0	0	5	0	3	70	0	0	162
03:30 PM	32	1	15	1	2	74	1	0	1	0	3	2	0	69	0	0	201
03:45 PM	4	1	2	0	6	54	4	0	0	0	6	0	2	85	2	0	166
Total	45	3	22	2	13	266	13	0	2	0	22	5	5	309	3	0	710
04:00 PM	0	1	0	0	6	73	0	0	1	0	11	0	1	84	0	0	177
04:15 PM	5	0	1	0	3	60	2	0	1	0	9	0	0	79	1	0	161
04:30 PM	6	0	2	0	2	74	1	0	0	0	6	0	0	98	0	0	189
04:45 PM	0	0	0	0	1	57	1	0	0	0	10	0	0	86	1	0	156
Total	11	1	3	0	12	264	4	0	2	0	36	0	1	347	2	0	683
05:00 PM	1	0	2	0	2	65	0	0	0	0	4	0	0	84	0	0	158
05:15 PM	0	0	1	0	6	60	0	0	0	0	5	0	0	94	0	0	166
Grand Total	57	4	28	2	33	655	17	0	4	0	67	5	6	834	5	0	1717
Apprch %	62.6	4.4	30.8	2.2	4.7	92.9	2.4	0	5.3	0	88.2	6.6	0.7	98.7	0.6	0	
Total %	3.3	0.2	1.6	0.1	1.9	38.1	1	0	0.2	0	3.9	0.3	0.3	48.6	0.3	0	
Motorcycles	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5
% Motorcycles	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0.3
Cars	25	3	16	0	22	495	3	0	3	0	53	0	6	609	5	0	1240
% Cars	43.9	75	57.1	0	66.7	75.6	17.6	0	75	0	79.1	0	100	73	100	0	72.2
Light Goods Vehicles	32	1	12	0	9	147	11	0	0	0	13	0	0	220	0	0	445
% Light Goods Vehicles	56.1	25	42.9	0	27.3	22.4	64.7	0	0	0	19.4	0	0	26.4	0	0	25.9
Buses	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
% Buses	0	0	0	0	0	0	5.9	0	0	0	0	0	0	0	0	0	0.1
Single-Unit Trucks	0	0	0	0	2	6	1	0	1	0	1	0	0	4	0	0	15
% Single-Unit Trucks	0	0	0	0	6.1	0.9	5.9	0	25	0	1.5	0	0	0.5	0	0	0.9
Articulated Trucks	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
% Articulated Trucks	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0.1	0	0	0.1
Bicycles on Road	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	0	0	0	0	0	0.2	5.9	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	2	0	0	0	0	0	0	0	5	0	0	0	0	7
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	0.4

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Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
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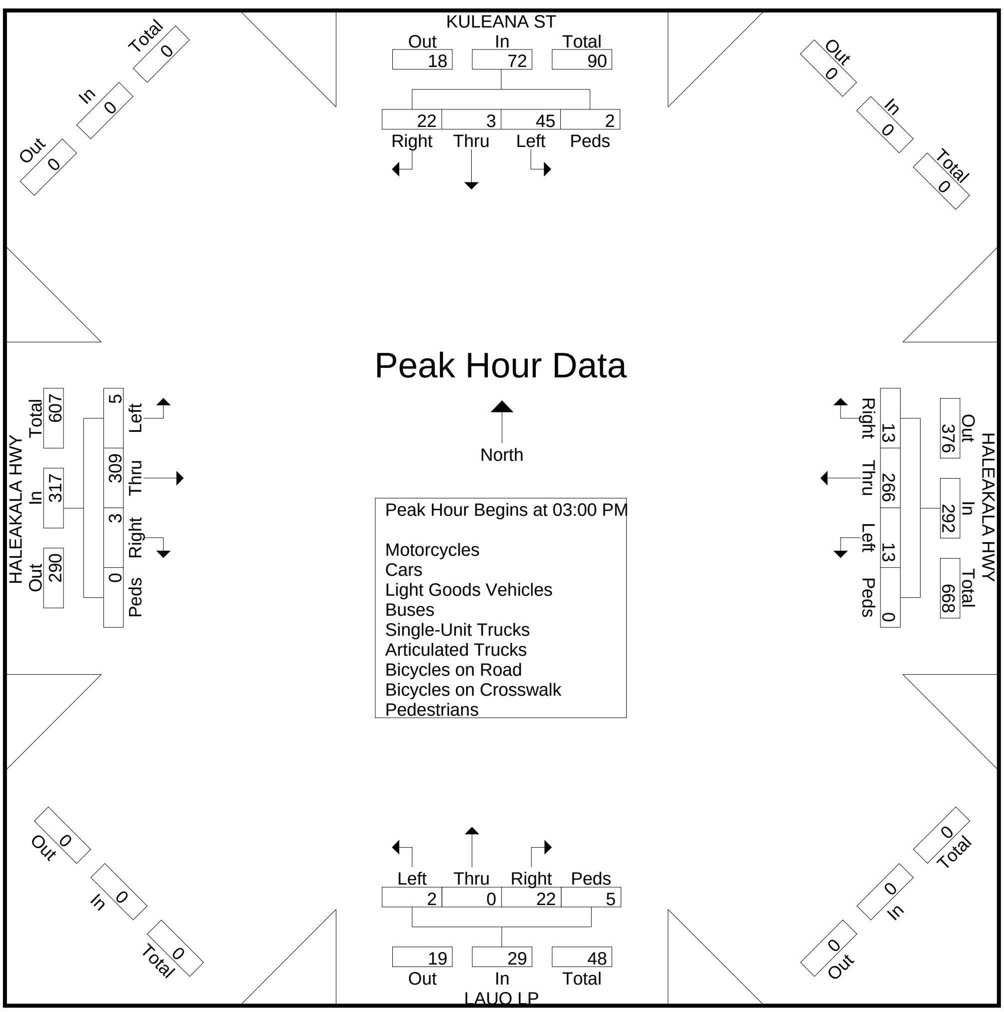
	KULEANA ST Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:00 PM																					
03:00 PM	1	0	0	0	1	3	73	**6**		**82**	**1**		**8**	**3**	**12**	0	**85**	1	0	86	181
03:15 PM	8	**1**	5	**1**												**3**					
03:30 PM	**32**	**1**	**15**	**1**	**49**	2	**74**	**1**	**0**	**77**	**1**	**0**	**3**	**2**	**6**	**0**	**69**	**0**	**0**	**69**	**201**
03:45 PM	4	1	2	0	7	**6**	54	4	0	64	0	0	6	0	6	2	85	**2**		**89**	166
Total Volume	45	3	22	2	72	13	266	13	0	292	2	0	22	5	29	5	309	3	0	317	710
% App. Total	62.5	4.2	30.6	2.8		4.5	91.1	4.5	0		6.9	0	75.9	17.2		1.6	97.5	0.9	0		
PHF	.352	.750	.367	.500	.367	.542	.899	.542	.000	.890	.500	.000	.688	.417	.604	.417	.909	.375	.000	.890	.883



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Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KULEANA ST Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	0	63	1	0	2	0	14	0	0	72	0	0	152
11:15 AM	0	0	1	0	2	71	0	0	2	0	7	0	0	70	0	0	153
11:30 AM	2	1	0	0	0	79	0	0	0	0	5	0	1	59	1	0	148
11:45 AM	0	0	0	0	4	84	0	0	0	0	14	0	1	81	3	0	187
Total	2	1	1	0	6	297	1	0	4	0	40	0	2	282	4	0	640
12:00 PM	1	0	4	0	3	69	1	0	0	0	8	0	0	86	0	0	172
12:15 PM	2	0	0	0	1	71	0	0	2	0	13	0	0	84	1	0	174
12:30 PM	1	0	0	0	3	75	0	0	2	0	12	0	0	80	0	0	173
12:45 PM	0	0	1	0	3	69	0	0	1	0	7	0	1	89	3	0	174
Total	4	0	5	0	10	284	1	0	5	0	40	0	1	339	4	0	693
Grand Total	6	1	6	0	16	581	2	0	9	0	80	0	3	621	8	0	1333
Apprch %	46.2	7.7	46.2	0	2.7	97	0.3	0	10.1	0	89.9	0	0.5	98.3	1.3	0	
Total %	0.5	0.1	0.5	0	1.2	43.6	0.2	0	0.7	0	6	0	0.2	46.6	0.6	0	
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
% Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.2
Cars	5	0	5	0	12	463	1	0	8	0	62	0	2	482	7	0	1047
% Cars	83.3	0	83.3	0	75	79.7	50	0	88.9	0	77.5	0	66.7	77.6	87.5	0	78.5
Light Goods Vehicles	1	1	1	0	4	108	1	0	1	0	17	0	1	130	1	0	266
% Light Goods Vehicles	16.7	100	16.7	0	25	18.6	50	0	11.1	0	21.2	0	33.3	20.9	12.5	0	20
Buses	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0	4
% Buses	0	0	0	0	0	0.3	0	0	0	0	1.2	0	0	0.2	0	0	0.3
Single-Unit Trucks	0	0	0	0	0	7	0	0	0	0	0	0	0	6	0	0	13
% Single-Unit Trucks	0	0	0	0	0	1.2	0	0	0	0	0	0	0	1	0	0	1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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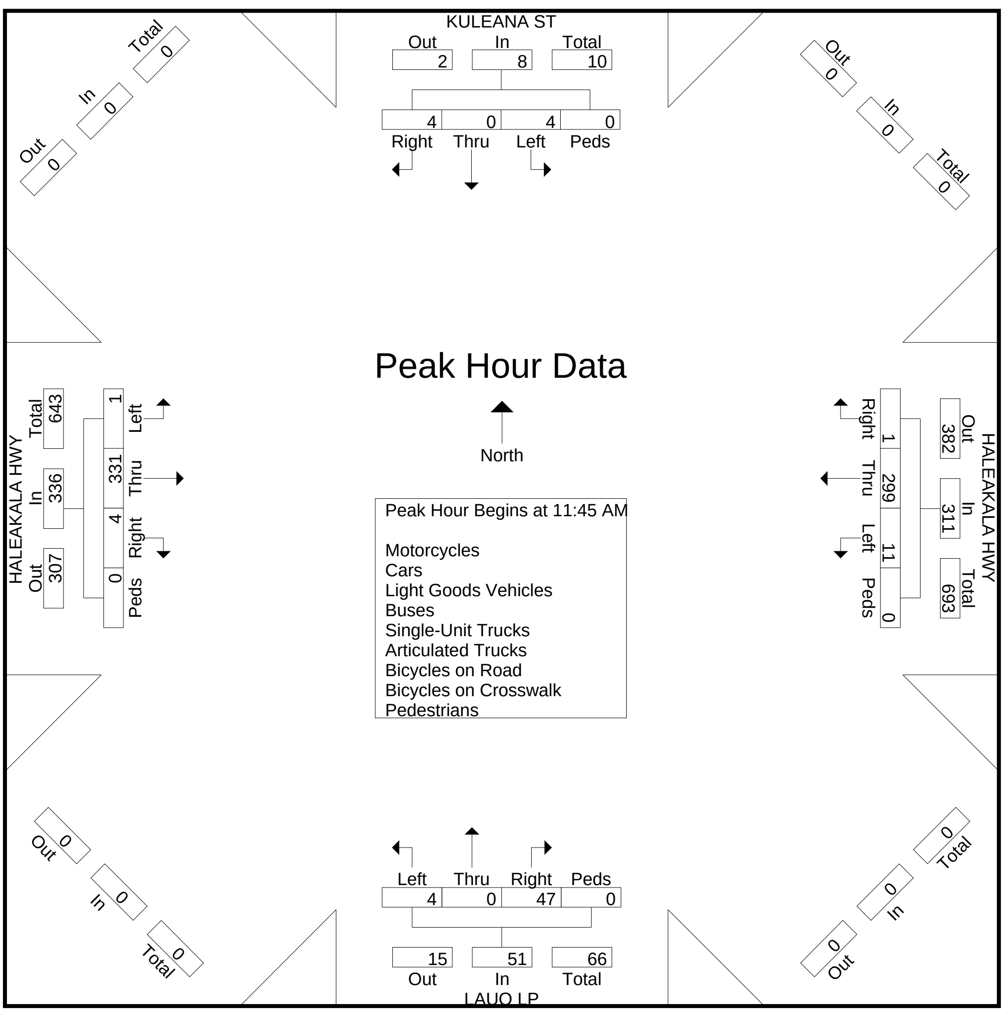
	KULEANA ST Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	0	0	0	0	0	**4**	**84**			**88**	0	0	**14**	0	14	**1**		**3**			**187**
12:00 PM	1	0	**4**		**5**	3	69	**1**									**86**	0	0	**86**	172
12:15 PM	**2**										**2**				**15**	0	84	1	0	85	174
12:30 PM	1	0	0	0	1	3	75	0	0	78	2	0	12	0	14	0	80	0	0	80	173
Total Volume	4	0	4	0	8	11	299	1	0	311	4	0	47	0	51	1	331	4	0	336	706
% App. Total	50	0	50	0		3.5	96.1	0.3	0		7.8	0	92.2	0		0.3	98.5	1.2	0		
PHF	.500	.000	.250	.000	.400	.688	.890	.250	.000	.884	.500	.000	.839	.000	.850	.250	.962	.333	.000	.977	.944



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Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	0	0	0	0	15	14	0	0	23	0	9	0	0	18	3	0	82
06:15 AM	0	0	0	0	22	11	0	0	27	0	11	0	0	11	8	0	90
06:30 AM	0	0	0	0	24	27	0	0	26	0	13	0	0	26	8	0	124
06:45 AM	0	0	0	0	27	25	0	0	31	0	20	0	0	20	8	0	131
Total	0	0	0	0	88	77	0	0	107	0	53	0	0	75	27	0	427
07:00 AM	0	0	0	0	35	40	0	0	40	0	13	1	0	12	15	0	156
07:15 AM	0	0	0	0	21	30	0	0	41	0	15	0	0	13	8	0	128
07:30 AM	0	0	0	0	27	42	0	0	40	0	14	0	0	19	13	0	155
07:45 AM	0	0	0	0	35	39	0	0	42	0	12	0	0	25	13	0	166
Total	0	0	0	0	118	151	0	0	163	0	54	1	0	69	49	0	605
08:00 AM	0	0	0	0	32	36	0	0	43	0	15	0	0	20	14	0	160
08:15 AM	0	0	0	0	22	38	0	0	56	0	15	0	0	26	4	0	161
08:30 AM	0	0	0	0	24	41	0	0	35	0	22	0	0	29	15	0	166
08:45 AM	0	0	0	0	33	40	0	0	37	0	28	0	0	25	11	0	174
Total	0	0	0	0	111	155	0	0	171	0	80	0	0	100	44	0	661
Grand Total	0	0	0	0	317	383	0	0	441	0	187	1	0	244	120	0	1693
Apprch %	0	0	0	0	45.3	54.7	0	0	70.1	0	29.7	0.2	0	67	33	0	
Total %	0	0	0	0	18.7	22.6	0	0	26	0	11	0.1	0	14.4	7.1	0	
Motorcycles	0	0	0	0	1	2	0	0	0	0	0	0	0	1	0	0	4
% Motorcycles	0	0	0	0	0.3	0.5	0	0	0	0	0	0	0	0.4	0	0	0.2
Cars	0	0	0	0	208	271	0	0	302	0	134	0	0	157	93	0	1165
% Cars	0	0	0	0	65.6	70.8	0	0	68.5	0	71.7	0	0	64.3	77.5	0	68.8
Light Goods Vehicles	0	0	0	0	108	89	0	0	133	0	53	0	0	73	25	0	481
% Light Goods Vehicles	0	0	0	0	34.1	23.2	0	0	30.2	0	28.3	0	0	29.9	20.8	0	28.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0	0.1
Single-Unit Trucks	0	0	0	0	0	18	0	0	1	0	0	0	0	11	0	0	30
% Single-Unit Trucks	0	0	0	0	0	4.7	0	0	0.2	0	0	0	0	4.5	0	0	1.8
Articulated Trucks	0	0	0	0	0	2	0	0	5	0	0	0	0	0	2	0	9
% Articulated Trucks	0	0	0	0	0	0.5	0	0	1.1	0	0	0	0	0	1.7	0	0.5
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
% Bicycles on Road	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0.4	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0.1

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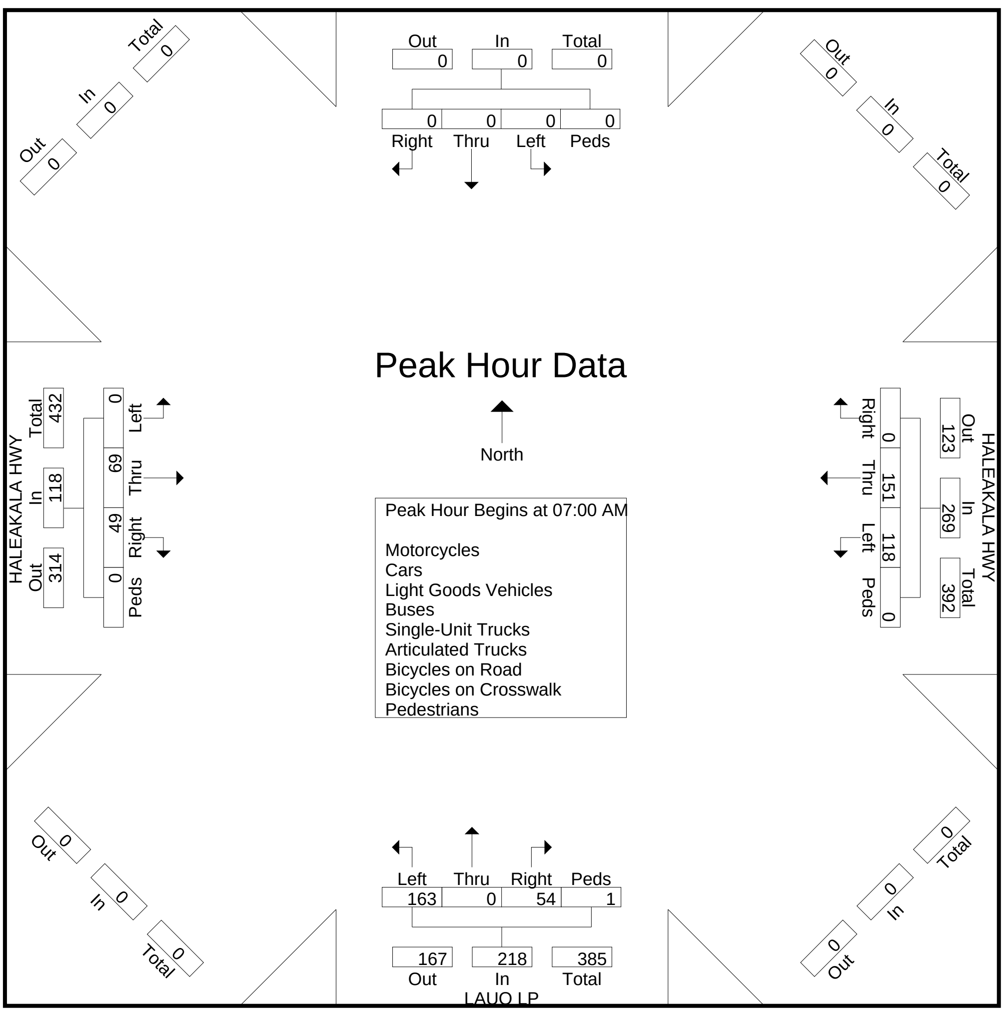
File Name : Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	**35**	40	0	0	**75**	40	0	13	**1**				**15**			
07:15 AM	**0**	**0**	**0**	**0**	**0**	**21**	**30**	**0**	**0**	**51**	**41**	**0**	**15**	0	**56**	0	13	8	0	21	128
07:30 AM	0	0	0	0	0	27	**42**														
07:45 AM	**0**	**0**	**0**	**0**	**0**	**35**	**39**	**0**	**0**	**74**	**42**	**0**	**12**	**0**	**54**	**0**	**25**	13	0	**38**	**166**
Total Volume	0	0	0	0	0	118	151	0	0	269	163	0	54	1	218	0	69	49	0	118	605
% App. Total	0	0	0	0		43.9	56.1	0	0		74.8	0	24.8	0.5		0	58.5	41.5	0		
PHF	.000	.000	.000	.000	.000	.843	.899	.000	.000	.897	.970	.000	.900	.250	.973	.000	.690	.817	.000	.776	.911



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File Name : Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY 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	0	0	29	59	0	0	58	0	53	0	0	37	28	0	264
03:15 PM	0	0	0	0	25	52	0	0	52	0	33	0	0	37	25	0	224
03:30 PM	0	0	0	0	32	56	0	0	66	0	35	0	0	46	27	1	263
03:45 PM	0	0	0	0	24	35	0	0	43	0	34	0	0	42	26	0	204
Total	0	0	0	0	110	202	0	0	219	0	155	0	0	162	106	1	955
04:00 PM	0	0	0	0	26	47	0	0	47	0	42	1	0	55	15	3	236
04:15 PM	0	0	0	0	23	55	0	0	34	0	43	0	0	53	17	0	225
04:30 PM	0	0	0	0	21	54	0	0	50	0	33	0	0	51	17	0	226
04:45 PM	0	0	0	0	17	39	0	0	39	0	41	0	0	52	12	0	200
Total	0	0	0	0	87	195	0	0	170	0	159	1	0	211	61	3	887
05:00 PM	0	0	0	0	25	48	0	0	39	0	45	0	0	49	22	0	228
05:15 PM	0	0	0	0	27	31	0	0	39	0	47	0	0	43	21	0	208
Grand Total	0	0	0	0	249	476	0	0	467	0	406	1	0	465	210	4	2278
Apprch %	0	0	0	0	34.3	65.7	0	0	53.4	0	46.5	0.1	0	68.5	30.9	0.6	
Total %	0	0	0	0	10.9	20.9	0	0	20.5	0	17.8	0	0	20.4	9.2	0.2	
Motorcycles	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
% Motorcycles	0	0	0	0	0	1.3	0	0	0	0	0	0	0	0	0	0	0.3
Cars	0	0	0	0	187	410	0	0	363	0	296	0	0	383	170	0	1809
% Cars	0	0	0	0	75.1	86.1	0	0	77.7	0	72.9	0	0	82.4	81	0	79.4
Light Goods Vehicles	0	0	0	0	62	51	0	0	102	0	109	0	0	79	40	0	443
% Light Goods Vehicles	0	0	0	0	24.9	10.7	0	0	21.8	0	26.8	0	0	17	19	0	19.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	8	0	0	2	0	1	0	0	2	0	0	13
% Single-Unit Trucks	0	0	0	0	0	1.7	0	0	0.4	0	0.2	0	0	0.4	0	0	0.6
Articulated Trucks	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
% Articulated Trucks	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0.2	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	5
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0.2

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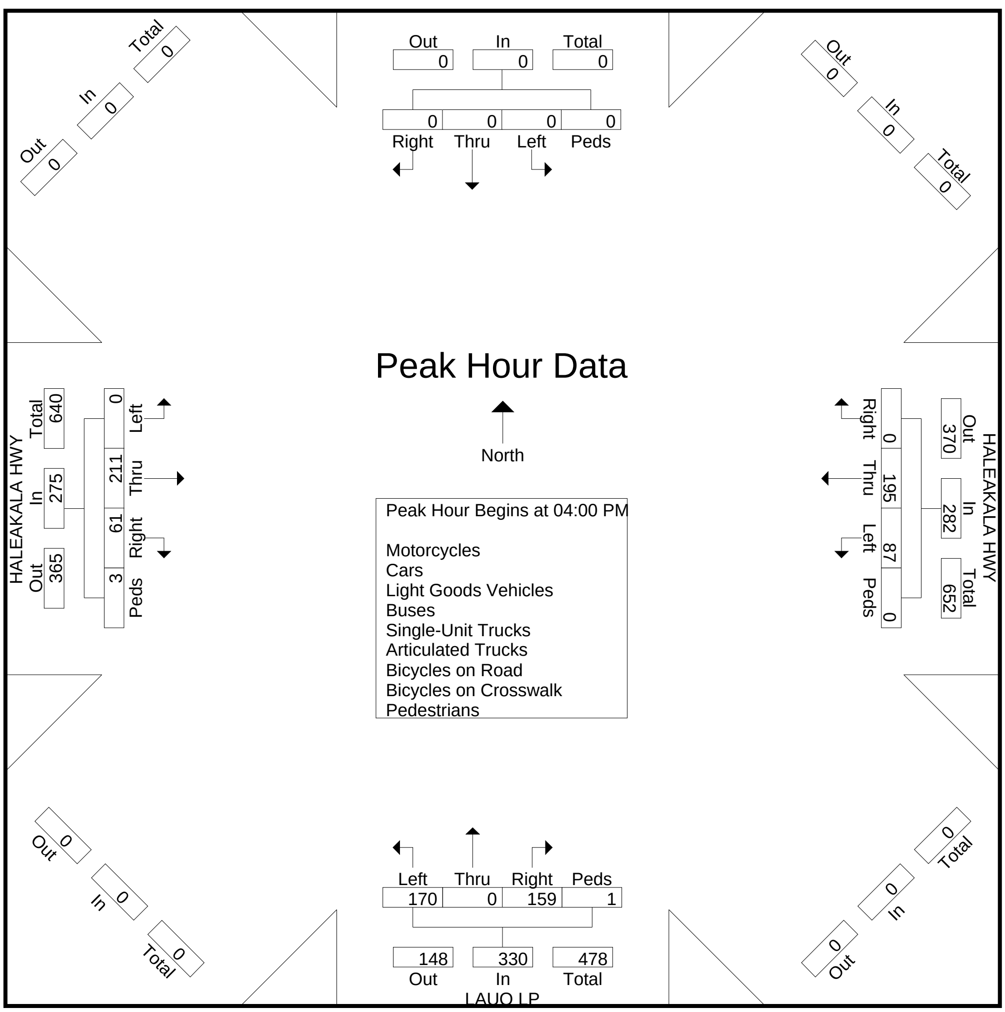
File Name : Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017

	Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	**26**	47	0	0	73	47	0	42	**1**	**90**	0	**55**	15	**3**	**73**	**236**
04:15 PM	0	0	0	0	0	23	**55**			**78**	34	0	**43**	0	77	0	53	**17**			
04:30 PM	**0**	**0**	**0**	**0**	**0**	**21**	**54**	**0**	**0**	**75**	**50**	**0**	**33**	**0**	**83**	**0**	**51**	**17**	**0**	**68**	**226**
04:45 PM	**0**	**0**	**0**	**0**	**0**	**17**	**39**	**0**	**0**	**56**	**39**	**0**	**41**	**0**	**80**	**0**	**52**	**12**	**0**	**64**	**200**
Total Volume	0	0	0	0	0	87	195	0	0	282	170	0	159	1	330	0	211	61	3	275	887
% App. Total	0	0	0	0		30.9	69.1	0	0		51.5	0	48.2	0.3		0	76.7	22.2	1.1		
PHF	.000	.000	.000	.000	.000	.837	.886	.000	.000	.904	.850	.000	.924	.250	.917	.000	.959	.897	.250	.942	.940



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File Name : WE_Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HALEAKALA HWY Westbound				LAUO LP Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	34	41	0	0	63	0	43	0	0	38	26	0	245
11:15 AM	0	0	0	0	39	38	0	0	49	0	45	0	0	39	27	0	237
11:30 AM	0	0	0	0	31	60	0	0	60	0	39	0	0	38	26	0	254
11:45 AM	0	0	0	0	44	49	0	0	53	0	46	0	0	51	27	0	270
Total	0	0	0	0	148	188	0	0	225	0	173	0	0	166	106	0	1006
12:00 PM	0	0	0	0	30	46	0	0	71	0	51	0	0	46	25	0	269
12:15 PM	0	0	0	0	41	44	0	0	59	0	48	0	0	50	23	0	265
12:30 PM	0	0	0	0	40	42	0	0	59	0	43	0	0	42	27	0	253
12:45 PM	0	0	0	0	28	49	0	0	65	0	52	0	0	51	29	0	274
Total	0	0	0	0	139	181	0	0	254	0	194	0	0	189	104	0	1061
Grand Total	0	0	0	0	287	369	0	0	479	0	367	0	0	355	210	0	2067
Apprch %	0	0	0	0	43.8	56.2	0	0	56.6	0	43.4	0	0	62.8	37.2	0	
Total %	0	0	0	0	13.9	17.9	0	0	23.2	0	17.8	0	0	17.2	10.2	0	
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0
Cars	0	0	0	0	225	294	0	0	371	0	291	0	0	270	173	0	1624
% Cars	0	0	0	0	78.4	79.7	0	0	77.5	0	79.3	0	0	76.1	82.4	0	78.6
Light Goods Vehicles	0	0	0	0	61	65	0	0	106	0	74	0	0	80	36	0	422
% Light Goods Vehicles	0	0	0	0	21.3	17.6	0	0	22.1	0	20.2	0	0	22.5	17.1	0	20.4
Buses	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	3
% Buses	0	0	0	0	0.3	0.3	0	0	0	0	0.3	0	0	0	0	0	0.1
Single-Unit Trucks	0	0	0	0	0	8	0	0	0	0	1	0	0	4	0	0	13
% Single-Unit Trucks	0	0	0	0	0	2.2	0	0	0	0	0.3	0	0	1.1	0	0	0.6
Articulated Trucks	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	3
% Articulated Trucks	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0.5	0	0.1
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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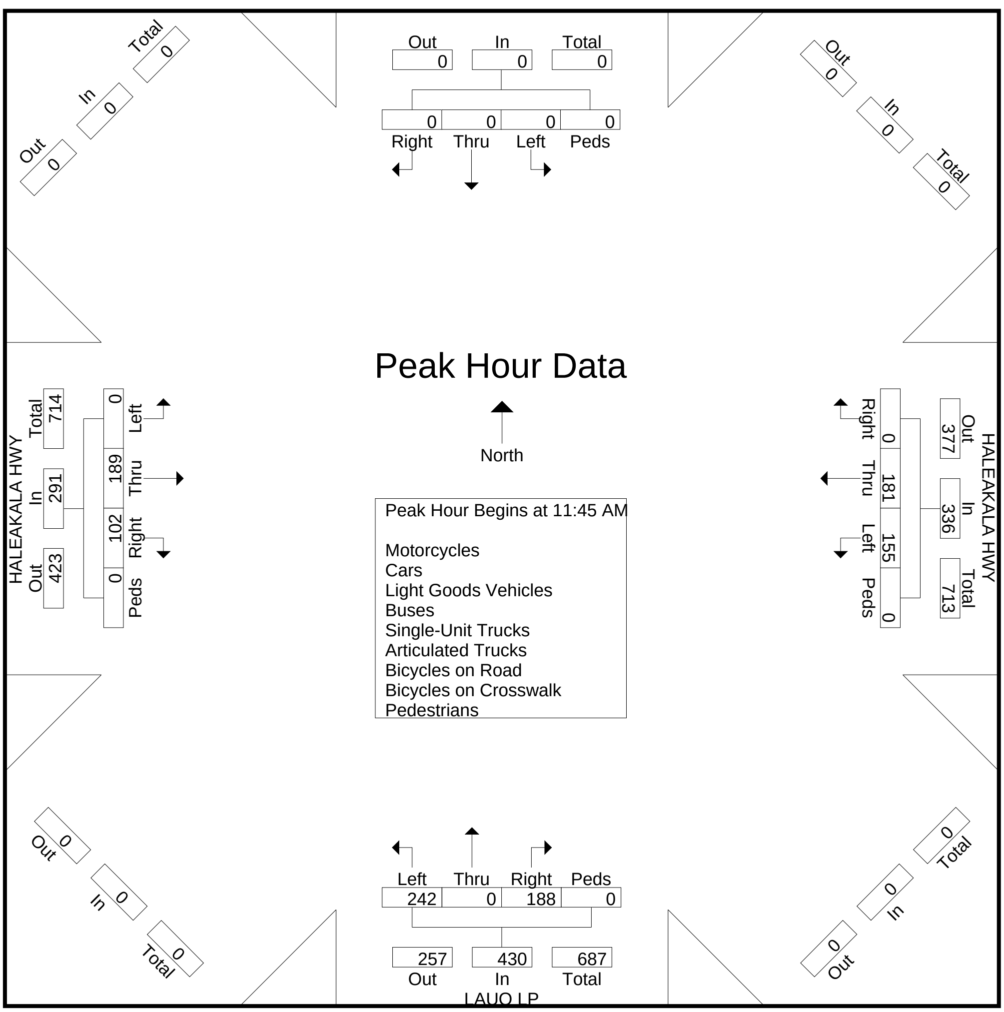
File Name : WE_Lauo Lp - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017

	Southbound					HALEAKALA HWY Westbound					LAUO LP Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:45 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	0	0	0	0	0	**44**	**49**			**93**	53	0	46	0	99	0	**51**	**27**		**78**	**270**
12:00 PM	0	0	0	0	0	30	46	0	0	76	**71**		**51**	0	**122**	0	46	25	0	71	269
12:15 PM	0	0	0	0	0	41	44	0	0	85	59	0	48	0	107	0	50	23	0	73	265
12:30 PM	0	0	0	0	0	40	42	0	0	82	59	0	43	0	102	0	42	27	0	69	253
Total Volume	0	0	0	0	0	155	181	0	0	336	242	0	188	0	430	0	189	102	0	291	1057
% App. Total	0	0	0	0		46.1	53.9	0	0		56.3	0	43.7	0		0	64.9	35.1	0		
PHF	.000	.000	.000	.000	.000	.881	.923	.000	.000	.903	.852	.000	.922	.000	.881	.000	.926	.944	.000	.933	.979



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File Name : Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	MARRIOTT HOTEL DWY Southbound				HALEAKALA HWY Westbound				COSTCO DWY Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	0	0	1	0	2	34	3	0	1	0	0	0	0	21	13	0	75
06:15 AM	1	0	3	0	0	40	0	0	3	0	0	0	0	17	13	0	77
06:30 AM	0	0	1	0	1	44	1	0	3	0	1	0	0	26	9	0	86
06:45 AM	0	0	3	0	0	48	1	1	1	0	1	0	2	35	16	0	108
Total	1	0	8	0	3	166	5	1	8	0	2	0	2	99	51	0	346
07:00 AM	1	0	1	0	5	74	0	0	4	0	1	1	0	19	15	0	121
07:15 AM	2	0	1	0	0	66	2	0	1	0	0	0	2	27	14	0	115
07:30 AM	0	0	4	0	1	85	2	0	2	0	0	0	1	28	21	0	144
07:45 AM	2	0	1	0	0	79	0	0	5	0	1	0	2	32	16	0	138
Total	5	0	7	0	6	304	4	0	12	0	2	1	5	106	66	0	518
08:00 AM	1	0	0	0	4	72	2	0	4	0	2	0	0	33	22	0	140
08:15 AM	2	0	1	0	1	91	0	0	6	1	4	0	0	29	24	0	159
08:30 AM	0	0	3	0	2	81	0	0	5	0	1	0	1	39	22	0	154
08:45 AM	0	0	0	0	2	75	0	0	6	0	1	0	0	36	13	0	133
Total	3	0	4	0	9	319	2	0	21	1	8	0	1	137	81	0	586
Grand Total	9	0	19	0	18	789	11	1	41	1	12	1	8	342	198	0	1450
Apprch %	32.1	0	67.9	0	2.2	96.3	1.3	0.1	74.5	1.8	21.8	1.8	1.5	62.4	36.1	0	
Total %	0.6	0	1.3	0	1.2	54.4	0.8	0.1	2.8	0.1	0.8	0.1	0.6	23.6	13.7	0	
Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	3
% Motorcycles	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0.3	0	0	0.2
Cars	9	0	18	0	10	584	8	0	12	0	6	0	6	216	145	0	1014
% Cars	100	0	94.7	0	55.6	74	72.7	0	29.3	0	50	0	75	63.2	73.2	0	69.9
Light Goods Vehicles	0	0	1	0	7	182	3	0	12	1	5	0	2	109	53	0	375
% Light Goods Vehicles	0	0	5.3	0	38.9	23.1	27.3	0	29.3	100	41.7	0	25	31.9	26.8	0	25.9
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.1
Single-Unit Trucks	0	0	0	0	1	13	0	0	15	0	1	0	0	11	0	0	41
% Single-Unit Trucks	0	0	0	0	5.6	1.6	0	0	36.6	0	8.3	0	0	3.2	0	0	2.8
Articulated Trucks	0	0	0	0	0	8	0	0	2	0	0	0	0	2	0	0	12
% Articulated Trucks	0	0	0	0	0	1	0	0	4.9	0	0	0	0	0.6	0	0	0.8
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0.1

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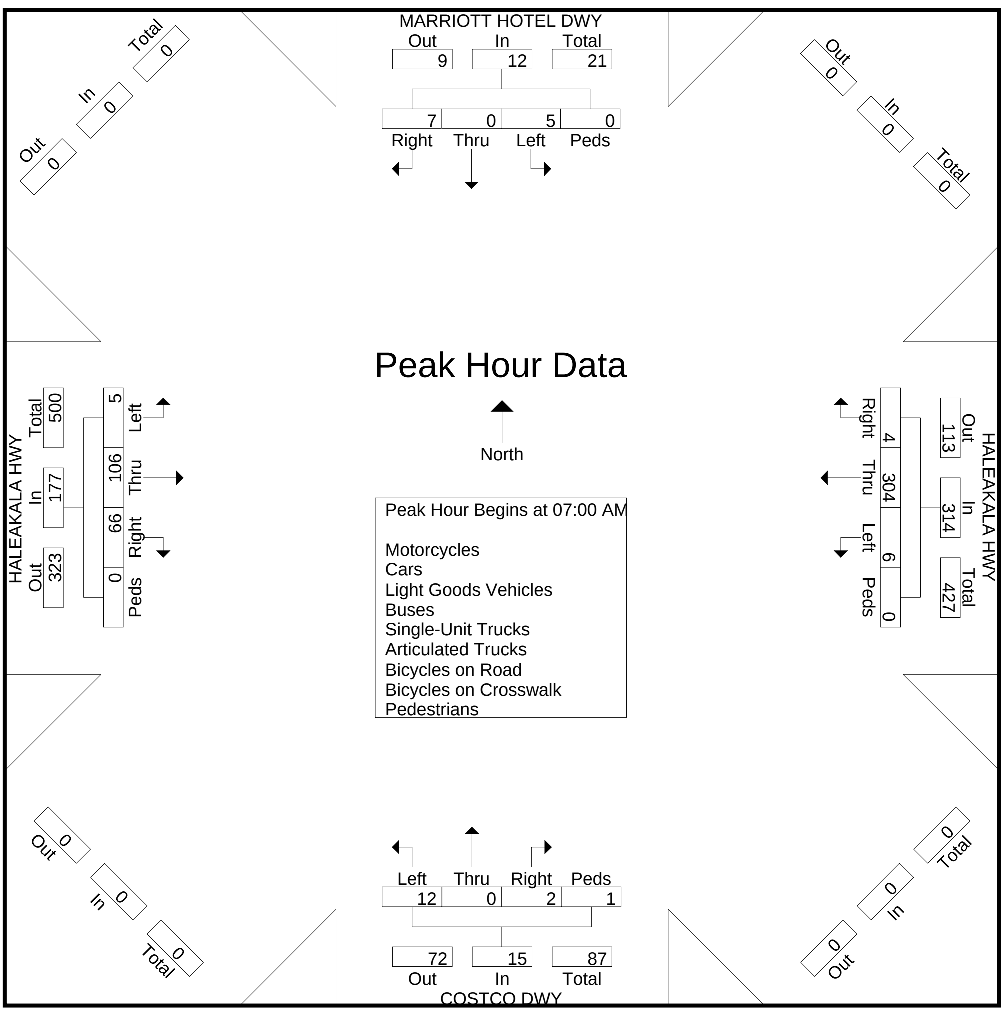
Phone: 533-3646 Fax: 526-1267

File Name : Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017

	MARRIOTT HOTEL DWY Southbound					HALEAKALA HWY Westbound					COSTCO DWY Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	0	1	0	2	**5**	74	0	0	79	4	0	**1**	**1**	**6**	0	19	15	0	34	121
07:15 AM	**2**	**0**	**1**	**0**	**3**	**0**	**66**	**2**	**0**	**68**	**1**	**0**	**0**	**0**	**1**	**2**	**27**	**14**	**0**	**43**	**115**
07:30 AM	**0**	**0**	**4**	**0**	**4**	1	**85**	**2**	**0**	**88**	2	0	0	0	2	1	28	**21**	**0**	**50**	**144**
07:45 AM	2	0	1	0	3	0	79	0	0	79	**5**	**0**	**1**	**0**	**6**	**2**	**32**	16	0	50	138
Total Volume	5	0	7	0	12	6	304	4	0	314	12	0	2	1	15	5	106	66	0	177	518
% App. Total	41.7	0	58.3	0		1.9	96.8	1.3	0		80	0	13.3	6.7		2.8	59.9	37.3	0		
PHF	.625	.000	.438	.000	.750	.300	.894	.500	.000	.892	.600	.000	.500	.250	.625	.625	.828	.786	.000	.885	.899



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File Name : Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	MARRIOTT HOTEL DWY Southbound				HALEAKALA HWY Westbound				COSTCO DWY Northbound				HALEAKALA HWY 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	1	1	0	13	99	0	0	58	0	25	0	0	52	54	0	303
03:15 PM	0	0	1	0	10	90	1	0	52	0	23	0	0	38	72	0	287
03:30 PM	0	0	0	0	15	108	0	0	47	0	26	3	0	47	61	0	307
03:45 PM	0	0	1	0	12	71	1	1	60	0	26	0	1	46	63	0	282
Total	0	1	3	0	50	368	2	1	217	0	100	3	1	183	250	0	1179
04:00 PM	3	0	7	0	14	77	0	0	50	0	21	0	0	51	72	0	295
04:15 PM	0	0	0	0	9	74	1	0	50	0	21	4	0	41	57	0	257
04:30 PM	0	0	1	0	14	89	0	0	49	0	21	1	0	54	51	0	280
04:45 PM	1	0	0	0	9	68	2	0	48	0	20	0	0	44	64	0	256
Total	4	0	8	0	46	308	3	0	197	0	83	5	0	190	244	0	1088
05:00 PM	0	0	0	0	14	68	0	0	48	0	24	1	0	48	59	0	262
05:15 PM	0	0	3	0	12	68	0	0	49	0	27	0	1	37	59	0	256
Grand Total	4	1	14	0	122	812	5	1	511	0	234	9	2	458	612	0	2785
Apprch %	21.1	5.3	73.7	0	13	86.4	0.5	0.1	67.8	0	31	1.2	0.2	42.7	57.1	0	
Total %	0.1	0	0.5	0	4.4	29.2	0.2	0	18.3	0	8.4	0.3	0.1	16.4	22	0	
Motorcycles	0	0	0	0	0	5	0	0	1	0	0	0	0	0	1	0	7
% Motorcycles	0	0	0	0	0	0.6	0	0	0.2	0	0	0	0	0	0.2	0	0.3
Cars	4	1	14	0	104	646	4	0	420	0	190	0	2	377	508	0	2270
% Cars	100	100	100	0	85.2	79.6	80	0	82.2	0	81.2	0	100	82.3	83	0	81.5
Light Goods Vehicles	0	0	0	0	18	152	1	0	89	0	43	0	0	77	101	0	481
% Light Goods Vehicles	0	0	0	0	14.8	18.7	20	0	17.4	0	18.4	0	0	16.8	16.5	0	17.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	9	0	0	1	0	1	0	0	4	2	0	17
% Single-Unit Trucks	0	0	0	0	0	1.1	0	0	0.2	0	0.4	0	0	0.9	0.3	0	0.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	1	0	0	0	9	0	0	0	0	10
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	0	0.4

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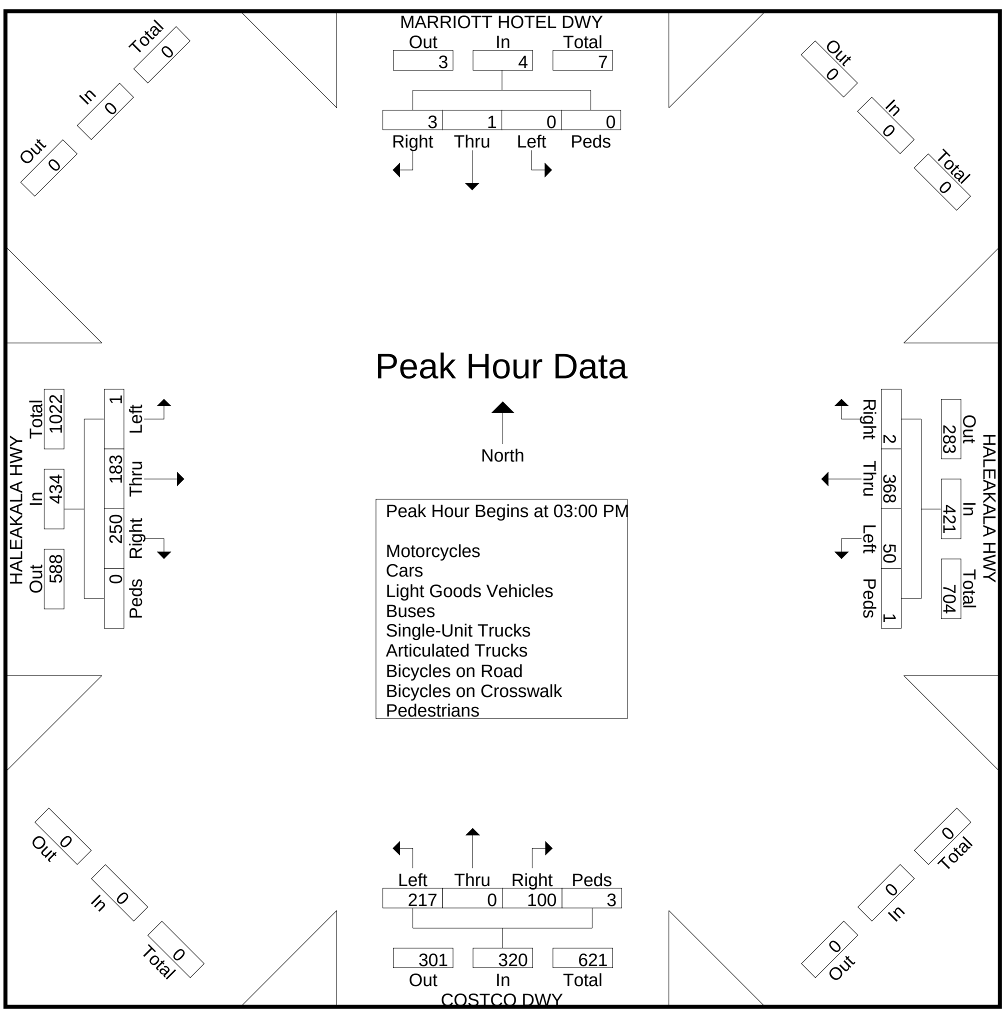
File Name : Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/16/2017

	MARRIOTT HOTEL DWY Southbound					HALEAKALA HWY Westbound					COSTCO DWY Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:00 PM																					
03:00 PM	0	**1**	**1**	**0**	**2**	13	99	0	0	112	58	0	25	0	83	0	**52**	54	0	106	303
03:15 PM	0	0	1	0	1	10	90	**1**	**0**	**101**	**52**	**0**	**23**	**0**	**75**	**0**	**38**	**72**	**0**	**110**	287
03:30 PM	0	0	0	0	0	**15**	**108**	**0**	**0**	**123**	47	0	26	**3**	**76**	**0**	**47**	61	**0**	**108**	**307**
03:45 PM	0	0	1	0	1	12	71	1	**1**	85	**60**	**0**	**26**	**0**	**86**	**1**	**46**	**63**	**0**	**110**	**282**
Total Volume	0	1	3	0	4	50	368	2	1	421	217	0	100	3	320	1	183	250	0	434	1179
% App. Total	0	25	75	0		11.9	87.4	0.5	0.2		67.8	0	31.2	0.9		0.2	42.2	57.6	0		
PHF	.000	.250	.750	.000	.500	.833	.852	.500	.250	.856	.904	.000	.962	.250	.930	.250	.880	.868	.000	.986	.960



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File Name : WE_Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	COSTCO_MARRIOTT HOTEL DWY Southbound				HALEAKALA HWY Westbound				COSTCO_MARRIOTT HOTEL DWY Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	1	0	13	89	0	0	53	0	20	0	0	40	84	0	300
11:15 AM	0	0	1	0	11	77	0	0	52	0	19	0	0	49	87	0	296
11:30 AM	0	1	3	0	21	96	0	0	52	0	17	0	0	50	80	0	320
11:45 AM	0	1	0	0	21	80	0	0	64	0	31	0	0	45	76	0	318
Total	0	2	5	0	66	342	0	0	221	0	87	0	0	184	327	0	1234
12:00 PM	0	0	1	0	14	100	0	0	72	0	31	0	0	42	78	0	338
12:15 PM	0	0	0	1	9	96	0	0	39	0	24	0	0	51	88	0	308
12:30 PM	0	0	1	1	15	83	0	0	61	0	24	0	0	49	87	0	321
12:45 PM	0	0	0	0	7	106	0	0	69	0	27	0	0	45	67	0	321
Total	0	0	2	2	45	385	0	0	241	0	106	0	0	187	320	0	1288
Grand Total	0	2	7	2	111	727	0	0	462	0	193	0	0	371	647	0	2522
Apprch %	0	18.2	63.6	18.2	13.2	86.8	0	0	70.5	0	29.5	0	0	36.4	63.6	0	
Total %	0	0.1	0.3	0.1	4.4	28.8	0	0	18.3	0	7.7	0	0	14.7	25.7	0	
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
% Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.1
Cars	0	2	7	0	83	572	0	0	372	0	154	0	0	292	533	0	2015
% Cars	0	100	100	0	74.8	78.7	0	0	80.5	0	79.8	0	0	78.7	82.4	0	79.9
Light Goods Vehicles	0	0	0	0	28	144	0	0	90	0	38	0	0	73	114	0	487
% Light Goods Vehicles	0	0	0	0	25.2	19.8	0	0	19.5	0	19.7	0	0	19.7	17.6	0	19.3
Buses	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Buses	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	7	0	0	0	0	1	0	0	3	0	0	11
% Single-Unit Trucks	0	0	0	0	0	1	0	0	0	0	0.5	0	0	0.8	0	0	0.4
Articulated Trucks	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	3
% Articulated Trucks	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0.3	0	0	0.1
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0.1

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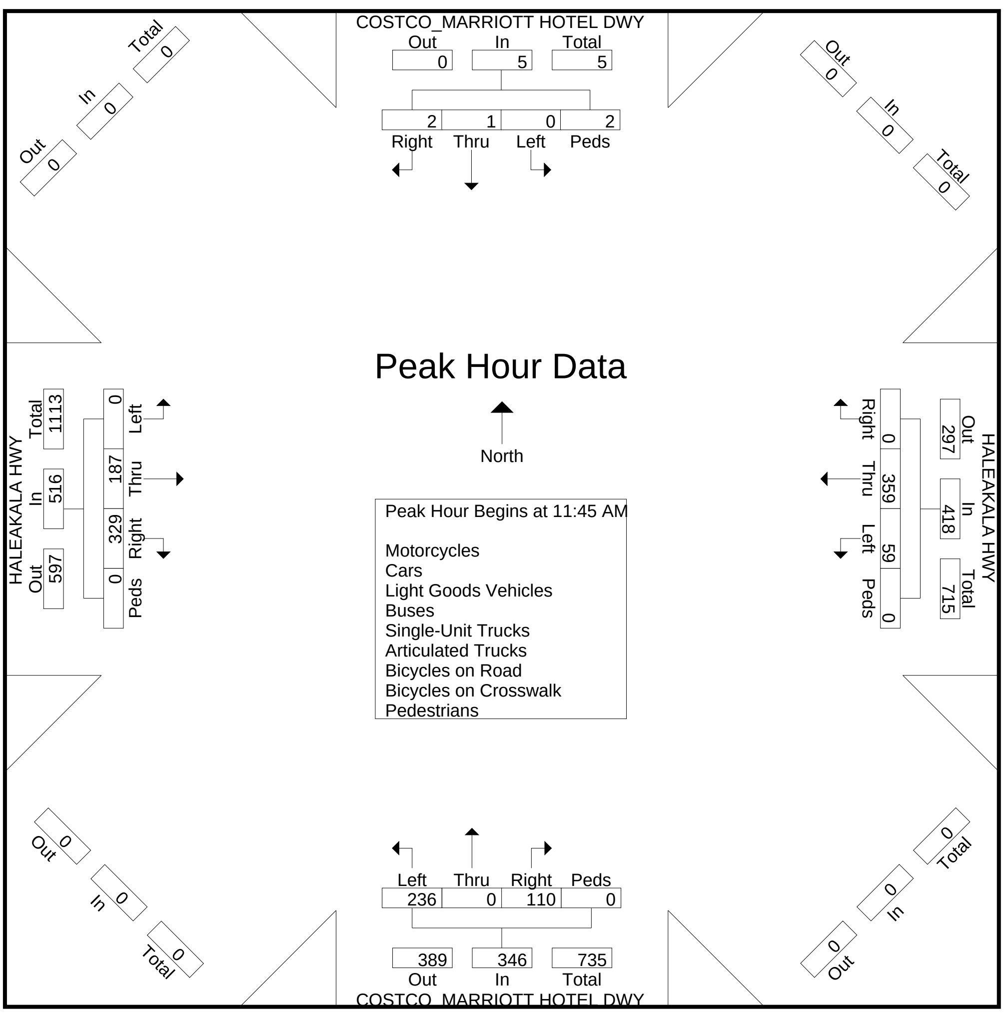
File Name : WE_Costco_Marriott Hotel Dwy - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017

	COSTCO_MARRIOTT HOTEL DWY Southbound					HALEAKALA HWY Westbound					COSTCO_MARRIOTT HOTEL DWY Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:45 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	0	**1**	0	0	1	**21**	80	0	0	101	64	0	**31**	0	95	0	45	76	0	121	318
12:00 PM	0	0	**1**				**100**			**114**	**72**				**103**	0	42	78	0	120	**338**
12:15 PM	0	0	0	**1**													**51**	**88**		**139**	308
12:30 PM	0	0	1	1	**2**	15	83	0	0	98	61	0	24	0	85	0	49	87	0	136	321
Total Volume	0	1	2	2	5	59	359	0	0	418	236	0	110	0	346	0	187	329	0	516	1285
% App. Total	0	20	40	40		14.1	85.9	0	0		68.2	0	31.8	0		0	36.2	63.8	0		
PHF	.000	.250	.500	.500	.625	.702	.898	.000	.000	.917	.819	.000	.887	.000	.840	.000	.917	.935	.000	.928	.950



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File Name : Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEOLANI PL Southbound				HALEAKALA HWY Westbound				DAIRY RD Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	1	14	12	0	19	18	0	0	1	14	10	0	25	21	1	0	136
06:15 AM	1	24	26	0	15	27	0	0	1	12	9	0	26	21	1	0	163
06:30 AM	0	21	29	0	20	33	0	0	1	21	9	0	31	30	5	0	200
06:45 AM	0	19	21	0	21	32	0	0	1	18	3	0	48	53	7	0	223
Total	2	78	88	0	75	110	0	0	4	65	31	0	130	125	14	0	722
07:00 AM	0	17	28	0	28	47	0	0	1	12	10	0	25	26	5	0	199
07:15 AM	3	23	29	0	28	43	0	0	1	16	17	0	28	23	5	0	216
07:30 AM	1	43	46	0	29	63	1	0	2	13	11	0	24	40	8	0	281
07:45 AM	2	37	30	0	37	51	0	0	5	15	17	0	20	32	8	0	254
Total	6	120	133	0	122	204	1	0	9	56	55	0	97	121	26	0	950
08:00 AM	1	27	27	0	31	48	0	0	5	17	22	0	25	32	2	0	237
08:15 AM	2	25	49	0	41	45	6	0	3	11	20	0	27	33	3	0	265
08:30 AM	6	50	39	0	31	56	0	0	2	15	15	0	28	39	2	1	284
08:45 AM	4	49	40	0	20	55	0	0	4	10	17	0	27	29	12	1	268
Total	13	151	155	0	123	204	6	0	14	53	74	0	107	133	19	2	1054
Grand Total	21	349	376	0	320	518	7	0	27	174	160	0	334	379	59	2	2726
Apprch %	2.8	46.8	50.4	0	37.9	61.3	0.8	0	7.5	48.2	44.3	0	43.2	49	7.6	0.3	
Total %	0.8	12.8	13.8	0	11.7	19	0.3	0	1	6.4	5.9	0	12.3	13.9	2.2	0.1	
Motorcycles	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	4
% Motorcycles	0	0	0.3	0	0	0.2	0	0	0	0	0	0	0.3	0.3	0	0	0.1
Cars	21	238	258	0	205	356	7	0	21	120	125	0	226	251	40	0	1868
% Cars	100	68.2	68.6	0	64.1	68.7	100	0	77.8	69	78.1	0	67.7	66.2	67.8	0	68.5
Light Goods Vehicles	0	77	66	0	103	133	0	0	1	33	28	0	79	119	17	0	656
% Light Goods Vehicles	0	22.1	17.6	0	32.2	25.7	0	0	3.7	19	17.5	0	23.7	31.4	28.8	0	24.1
Buses	0	26	29	0	4	2	0	0	5	20	1	0	23	2	0	0	112
% Buses	0	7.4	7.7	0	1.2	0.4	0	0	18.5	11.5	0.6	0	6.9	0.5	0	0	4.1
Single-Unit Trucks	0	7	16	0	6	18	0	0	0	1	5	0	2	4	0	0	59
% Single-Unit Trucks	0	2	4.3	0	1.9	3.5	0	0	0	0.6	3.1	0	0.6	1.1	0	0	2.2
Articulated Trucks	0	0	5	0	2	8	0	0	0	0	0	0	3	2	1	0	21
% Articulated Trucks	0	0	1.3	0	0.6	1.5	0	0	0	0	0	0	0.9	0.5	1.7	0	0.8
Bicycles on Road	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	0	4
% Bicycles on Road	0	0.3	0.3	0	0	0	0	0	0	0	0.6	0	0	0	1.7	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0

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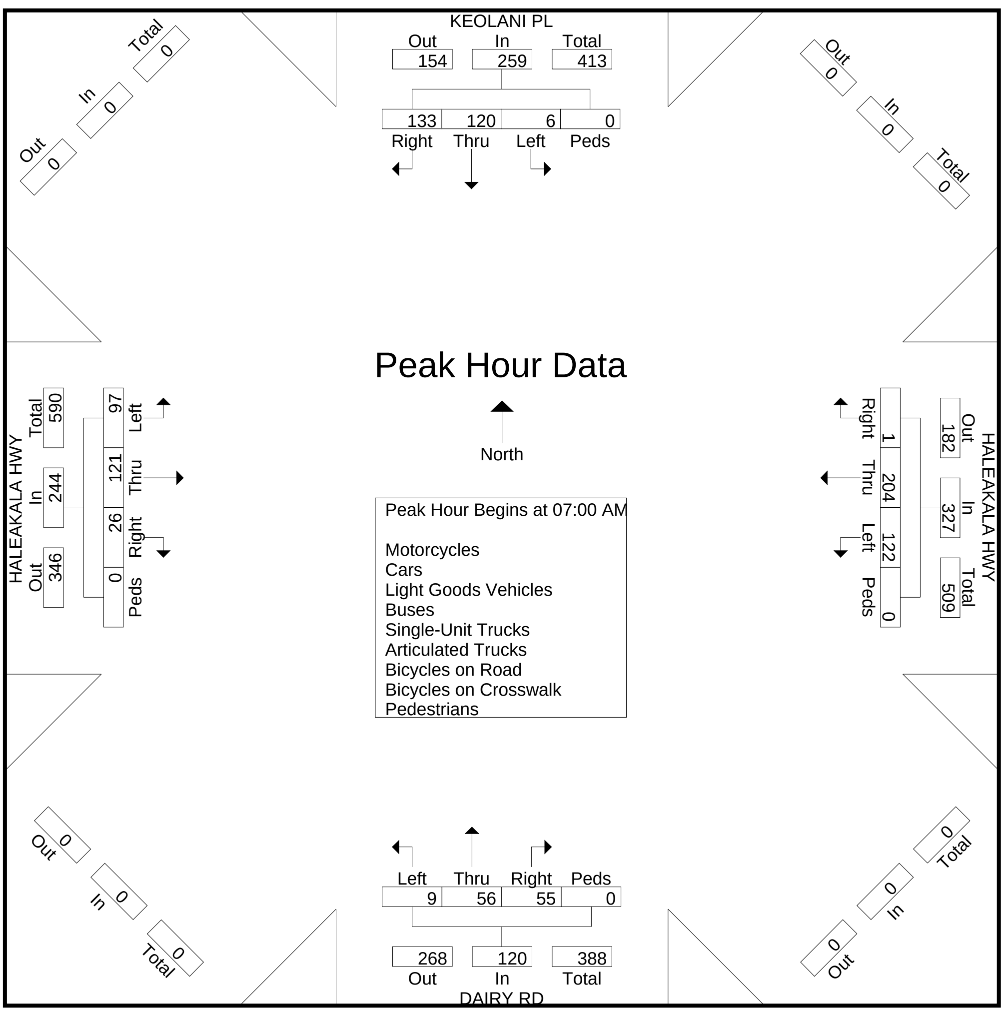
File Name : Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	KEOLANI PL Southbound					HALEAKALA HWY Westbound					DAIRY RD Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	17	28	0	45	28	47	0	0	75	1	12	10	0	23	25	26	5	0	56	199
07:15 AM	**3**											**16**	**17**	0	34	**28**					
07:30 AM	**1**	**43**	**46**	**0**	**90**	29	**63**	**1**	**0**	**93**	2	13	11	0	26	24	**40**	**8**	**0**	**72**	**281**
07:45 AM	2	37	30	0	69	**37**	51	0	0	88	**5**				**37**	20	32	8	0	60	254
Total Volume	6	120	133	0	259	122	204	1	0	327	9	56	55	0	120	97	121	26	0	244	950
% App. Total	2.3	46.3	51.4	0		37.3	62.4	0.3	0		7.5	46.7	45.8	0		39.8	49.6	10.7	0		
PHF	.500	.698	.723	.000	.719	.824	.810	.250	.000	.879	.450	.875	.809	.000	.811	.866	.756	.813	.000	.847	.845



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File Name : Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEOLANI PL Southbound				HALEAKALA HWY Westbound				DAIRY RD Northbound				HALEAKALA HWY 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	44	67	0	81	69	0	0	8	17	18	1	32	73	4	0	420
03:15 PM	16	56	71	0	73	79	0	0	13	19	25	0	40	70	12	0	474
03:30 PM	6	67	129	0	86	66	1	0	16	11	29	0	19	71	8	0	509
03:45 PM	9	73	64	0	72	59	2	0	13	11	23	0	28	79	8	0	441
Total	37	240	331	0	312	273	3	0	50	58	95	1	119	293	32	0	1844
04:00 PM	11	44	67	0	76	54	1	0	8	13	21	0	16	95	0	0	406
04:15 PM	5	39	65	0	59	69	1	0	17	9	23	0	23	72	5	0	387
04:30 PM	8	33	44	0	59	83	0	0	9	6	32	0	23	67	9	0	373
04:45 PM	8	30	43	0	57	58	0	0	8	4	23	0	29	78	8	1	347
Total	32	146	219	0	251	264	2	0	42	32	99	0	91	312	22	1	1513
05:00 PM	3	38	40	0	42	72	0	0	9	8	25	0	19	81	7	0	344
05:15 PM	6	35	29	0	49	66	0	0	10	12	22	0	27	71	9	0	336
Grand Total	78	459	619	0	654	675	5	0	111	110	241	1	256	757	70	1	4037
Apprch %	6.7	39.7	53.5	0	49	50.6	0.4	0	24	23.8	52.1	0.2	23.6	69.8	6.5	0.1	
Total %	1.9	11.4	15.3	0	16.2	16.7	0.1	0	2.7	2.7	6	0	6.3	18.8	1.7	0	
Motorcycles	0	0	3	0	1	1	0	0	0	0	0	0	1	0	0	0	6
% Motorcycles	0	0	0.5	0	0.2	0.1	0	0	0	0	0	0	0.4	0	0	0	0.1
Cars	77	356	504	0	545	607	5	0	87	78	194	0	207	630	53	0	3343
% Cars	98.7	77.6	81.4	0	83.3	89.9	100	0	78.4	70.9	80.5	0	80.9	83.2	75.7	0	82.8
Light Goods Vehicles	1	92	89	0	103	63	0	0	18	14	46	0	29	121	15	0	591
% Light Goods Vehicles	1.3	20	14.4	0	15.7	9.3	0	0	16.2	12.7	19.1	0	11.3	16	21.4	0	14.6
Buses	0	8	8	0	0	0	0	0	6	15	0	0	10	0	1	0	48
% Buses	0	1.7	1.3	0	0	0	0	0	5.4	13.6	0	0	3.9	0	1.4	0	1.2
Single-Unit Trucks	0	2	13	0	5	4	0	0	0	2	1	0	8	5	1	0	41
% Single-Unit Trucks	0	0.4	2.1	0	0.8	0.6	0	0	0	1.8	0.4	0	3.1	0.7	1.4	0	1
Articulated Trucks	0	1	2	0	0	0	0	0	0	0	0	0	1	1	0	0	5
% Articulated Trucks	0	0.2	0.3	0	0	0	0	0	0	0	0	0	0.4	0.1	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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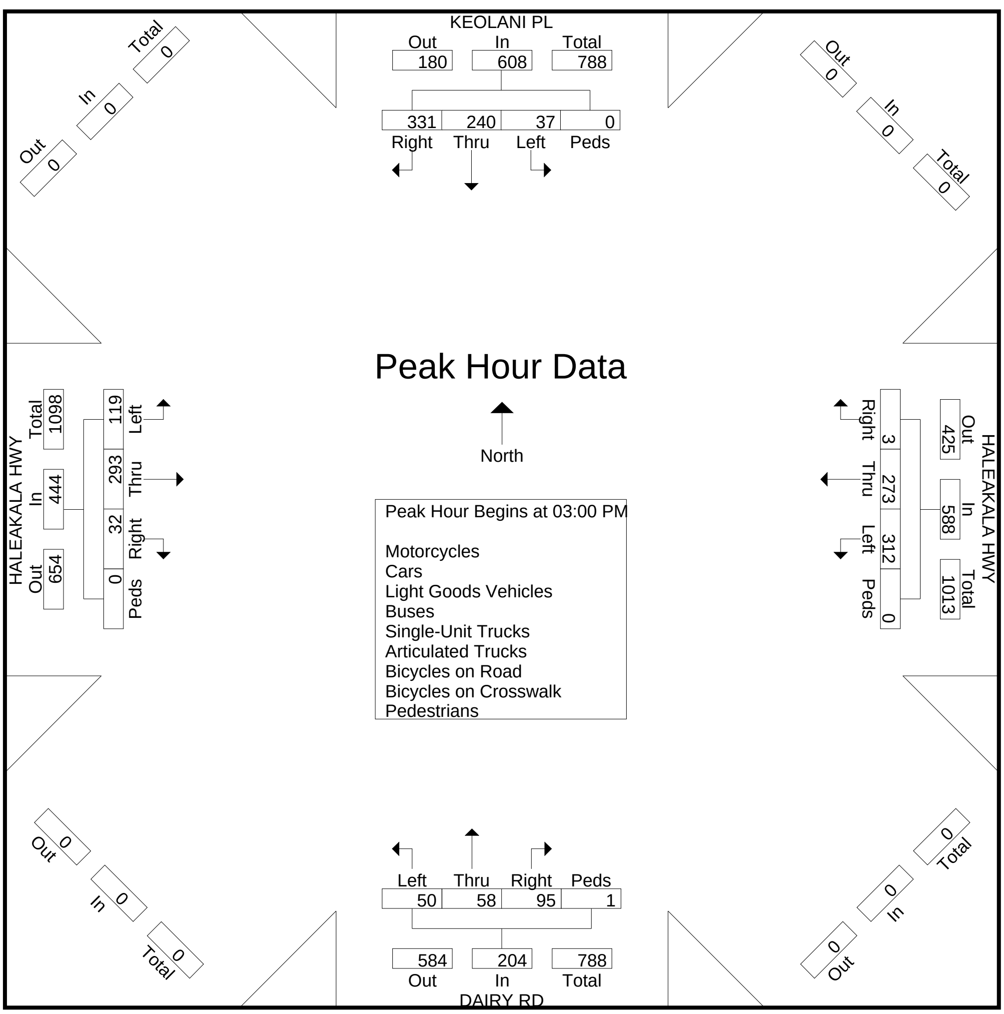
File Name : Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	KEOLANI PL Southbound					HALEAKALA HWY Westbound					DAIRY RD Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:00 PM																					
03:00 PM	6	44	67	0	117	81	69	0	0	150	8	17	18	**1**							
03:15 PM	**16**	**56**	**71**	**0**	**143**	**73**	**79**	**0**	**0**	**152**	**13**	**19**	**25**	**0**	**57**	**40**	**70**	**12**	**0**	**122**	474
03:30 PM	6	67	**129**		**202**	**86**	66	1	0	**153**	**16**		**29**	0	56	19	71	8	0	98	**509**
03:45 PM	9	**73**	64	0	146	72	59	**2**									**79**	8	0	115	441
Total Volume	37	240	331	0	608	312	273	3	0	588	50	58	95	1	204	119	293	32	0	444	1844
% App. Total	6.1	39.5	54.4	0		53.1	46.4	0.5	0		24.5	28.4	46.6	0.5		26.8	66	7.2	0		
PHF	.578	.822	.641	.000	.752	.907	.864	.375	.000	.961	.781	.763	.819	.250	.895	.744	.927	.667	.000	.910	.906



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File Name : WE_Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	KEOLANI PL Southbound				HALEAKALA HWY Westbound				DAIRY RD Northbound				HALEAKALA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	8	39	31	0	64	77	0	0	11	10	38	0	16	79	9	0	382
11:15 AM	13	43	34	0	69	54	0	0	24	10	37	0	11	85	7	0	387
11:30 AM	21	41	39	0	70	87	0	0	18	15	33	0	33	72	10	0	439
11:45 AM	19	53	51	0	75	62	5	0	27	15	23	0	16	74	15	0	435
Total	61	176	155	0	278	280	5	0	80	50	131	0	76	310	41	0	1643
12:00 PM	16	59	67	0	84	82	6	0	26	13	20	0	35	71	12	0	491
12:15 PM	13	51	42	0	74	73	3	0	25	12	40	0	31	83	12	0	459
12:30 PM	22	58	47	0	77	59	3	0	11	21	37	0	26	78	12	0	451
12:45 PM	18	68	40	0	94	86	0	0	26	13	34	0	33	64	8	0	484
Total	69	236	196	0	329	300	12	0	88	59	131	0	125	296	44	0	1885
Grand Total	130	412	351	0	607	580	17	0	168	109	262	0	201	606	85	0	3528
Apprch %	14.6	46.1	39.3	0	50.4	48.2	1.4	0	31.2	20.2	48.6	0	22.5	67.9	9.5	0	
Total %	3.7	11.7	9.9	0	17.2	16.4	0.5	0	4.8	3.1	7.4	0	5.7	17.2	2.4	0	
Motorcycles	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
% Motorcycles	0.8	0	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0.1
Cars	124	381	298	0	526	459	17	0	126	100	227	0	163	467	75	0	2963
% Cars	95.4	92.5	84.9	0	86.7	79.1	100	0	75	91.7	86.6	0	81.1	77.1	88.2	0	84
Light Goods Vehicles	5	26	25	0	78	113	0	0	37	9	34	0	23	135	10	0	495
% Light Goods Vehicles	3.8	6.3	7.1	0	12.9	19.5	0	0	22	8.3	13	0	11.4	22.3	11.8	0	14
Buses	0	2	10	0	1	0	0	0	4	0	0	0	13	0	0	0	30
% Buses	0	0.5	2.8	0	0.2	0	0	0	2.4	0	0	0	6.5	0	0	0	0.9
Single-Unit Trucks	0	2	13	0	2	5	0	0	1	0	0	0	0	3	0	0	26
% Single-Unit Trucks	0	0.5	3.7	0	0.3	0.9	0	0	0.6	0	0	0	0	0.5	0	0	0.7
Articulated Trucks	0	1	5	0	0	2	0	0	0	0	0	0	2	1	0	0	11
% Articulated Trucks	0	0.2	1.4	0	0	0.3	0	0	0	0	0	0	1	0.2	0	0	0.3
Bicycles on Road	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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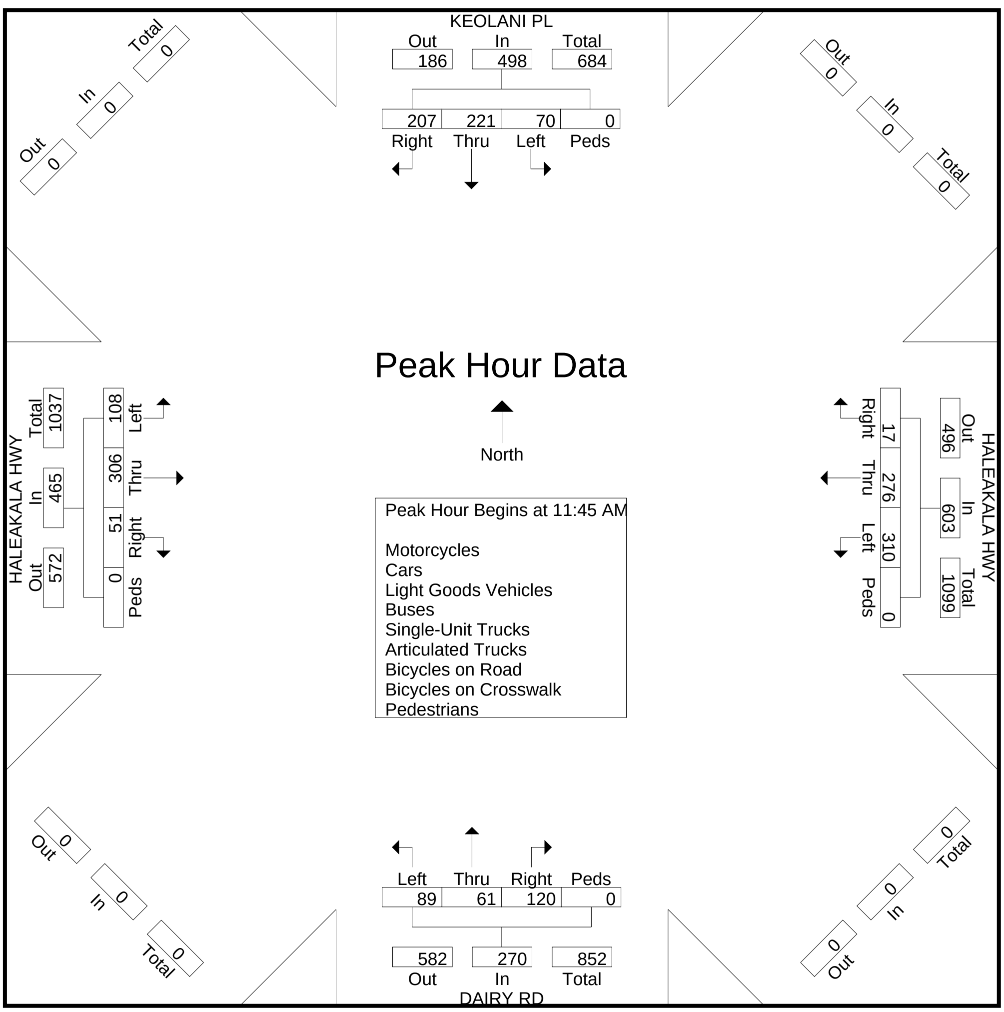
File Name : WE_Dairy Rd_Keolani Pl - Haleakala Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 2

	KEOLANI PL Southbound					HALEAKALA HWY Westbound					DAIRY RD Northbound					HALEAKALA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:45 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	19	53	51	0	123	75	62	5	0	142	**27**							**15**			
12:00 PM	**16**	**59**	**67**	**0**	**142**	**84**	**82**	**6**	**0**	**172**	26	13	20	0	59	**35**	**71**	12	**0**	**118**	**491**
12:15 PM	13	51	42	0	106	74	73	3	0	150	25	12	**40**	0	**77**	31	**83**	12	0	**126**	459
12:30 PM	**22**											**21**									
Total Volume	70	221	207	0	498	310	276	17	0	603	89	61	120	0	270	108	306	51	0	465	1836
% App. Total	14.1	44.4	41.6	0		51.4	45.8	2.8	0		33	22.6	44.4	0		23.2	65.8	11	0		
PHF	.795	.936	.772	.000	.877	.923	.841	.708	.000	.876	.824	.726	.750	.000	.877	.771	.922	.850	.000	.923	.935



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File Name : AM_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 8/16/2017
Page No : 1

Groups Printed- Unshifted

	HALEAKALA HWY SOUTHBOUND				HANA HWY WESTBOUND				HALEAKALA HWY NORTHBOUND				HANA HWY EASTBOUND				
Start Time	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Int. Total**
06:45	1	4	30	0	33	283	2	0	1	2	0	0	63	104	6	0	529
Total	1	4	30	0	33	283	2	0	1	2	0	0	63	104	6	0	529
07:00	0	1	51	0	22	276	0	0	1	3	4	0	65	187	7	0	617
07:15	1	1	58	0	25	380	0	0	0	3	2	0	67	143	5	0	685
07:30	0	3	53	0	26	378	0	0	0	0	2	0	62	172	4	0	700
07:45	0	1	61	0	16	353	1	0	0	4	1	0	75	207	10	0	729
Total	1	6	223	0	89	1387	1	0	1	10	9	0	269	709	26	0	2731
08:00	0	0	76	0	16	300	0	0	2	1	5	0	79	179	8	0	666
Grand Total	2	10	329	0	138	1970	3	0	4	13	14	0	411	992	40	0	3926
Apprch %	0.6	2.9	96.5	0	6.5	93.3	0.1	0	12.9	41.9	45.2	0	28.5	68.7	2.8	0	
Total %	0.1	0.3	8.4	0	3.5	50.2	0.1	0	0.1	0.3	0.4	0	10.5	25.3	1	0	

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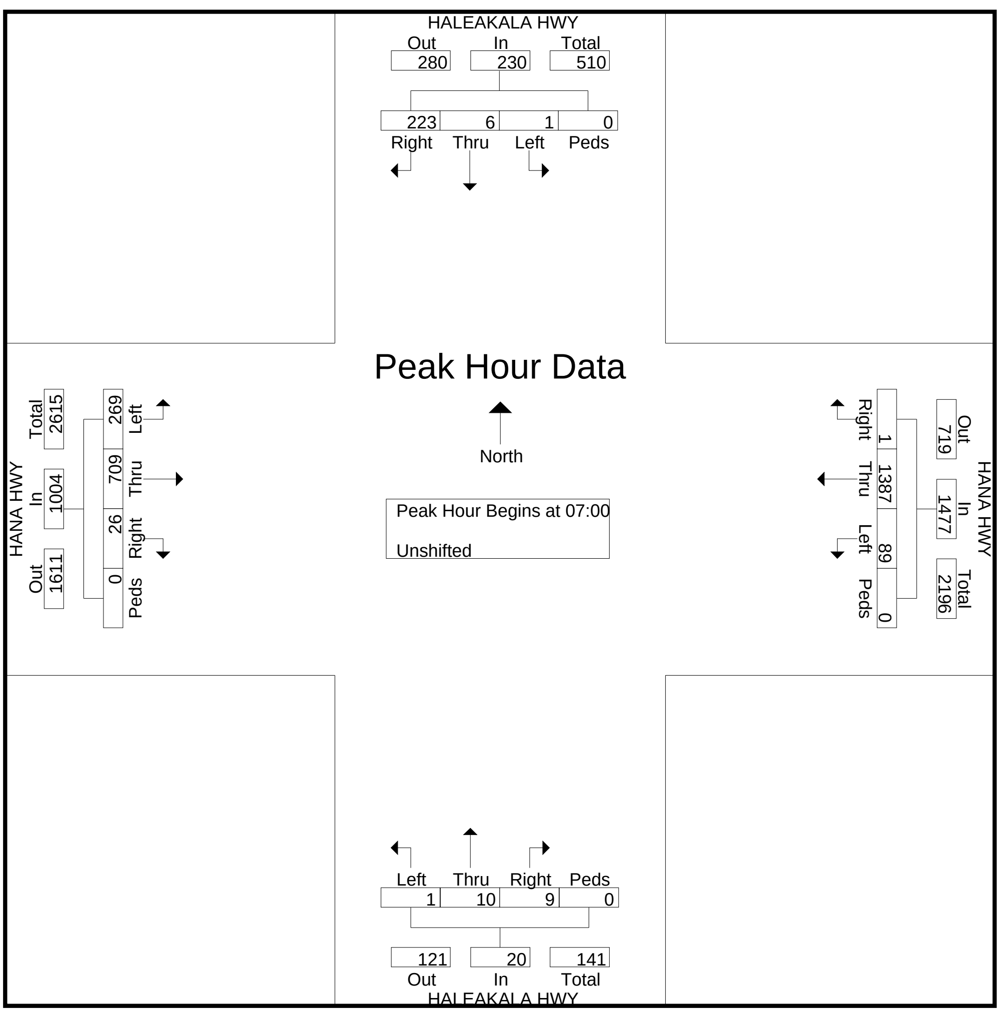
File Name : AM_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 8/16/2017

	HALEAKALA HWY SOUTHBOUND					HANA HWY WESTBOUND					HALEAKALA HWY NORTHBOUND					HANA HWY EASTBOUND					
Start Time	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Int. Total**
Peak Hour Analysis From 07:00 to 07:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00																					
07:00	0	1	51	0	52	22	276	0	0	298	**1**	3	**4**	0	**8**	65	187	7	0	259	617
07:15	**1**	1	58	0	60	25	**380**	0	0	**405**	0	3	2	0	5	67	143	5	0	215	685
07:30	0	**3**	53	0	56	**26**	378	0	0	404	0	0	2	0	2	62	172	4	0	238	700
07:45	0	1	**61**	0	**62**	16	353	**1**	0	370	0	**4**	1	0	5	**75**	**207**	**10**	0	**292**	**729**
Total Volume	1	6	223	0	230	89	1387	1	0	1477	1	10	9	0	20	269	709	26	0	1004	2731
% App. Total	0.4	2.6	97	0		6	93.9	0.1	0		5	50	45	0		26.8	70.6	2.6	0		
PHF	.250	.500	.914	.000	.927	.856	.913	.250	.000	.912	.250	.625	.563	.000	.625	.897	.856	.650	.000	.860	.937



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File Name : PM_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 8/15/2017
Page No : 1

Groups Printed- Unshifted

	HALEAKALA HWY SOUTHBOUND				HANA HWY WESTBOUND				HALEAKALA HWY NORTHBOUND				HANA HWY EASTBOUND				
Start Time	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Int. Total**
15:30	0	2	159	0	12	257	1	0	2	0	7	0	121	231	6	0	798
15:45	1	1	106	0	10	250	2	0	2	4	13	0	117	343	9	0	858
Total	1	3	265	0	22	507	3	0	4	4	20	0	238	574	15	0	1656
16:00	2	3	99	1	15	230	5	0	5	4	11	0	116	335	2	0	828
16:15	0	1	99	0	5	223	3	0	0	3	14	0	92	348	8	0	796
16:30	0	0	111	0	6	211	3	0	2	1	8	0	108	367	3	0	820
16:45	0	1	95	0	10	167	3	0	4	1	10	0	121	349	5	0	766
Total	2	5	404	1	36	831	14	0	11	9	43	0	437	1399	18	0	3210
17:00	0	4	113	0	7	187	1	0	2	1	8	0	106	380	7	0	816
Grand Total	3	12	782	1	65	1525	18	0	17	14	71	0	781	2353	40	0	5682
Apprch %	0.4	1.5	98	0.1	4	94.8	1.1	0	16.7	13.7	69.6	0	24.6	74.1	1.3	0	
Total %	0.1	0.2	13.8	0	1.1	26.8	0.3	0	0.3	0.2	1.2	0	13.7	41.4	0.7	0	

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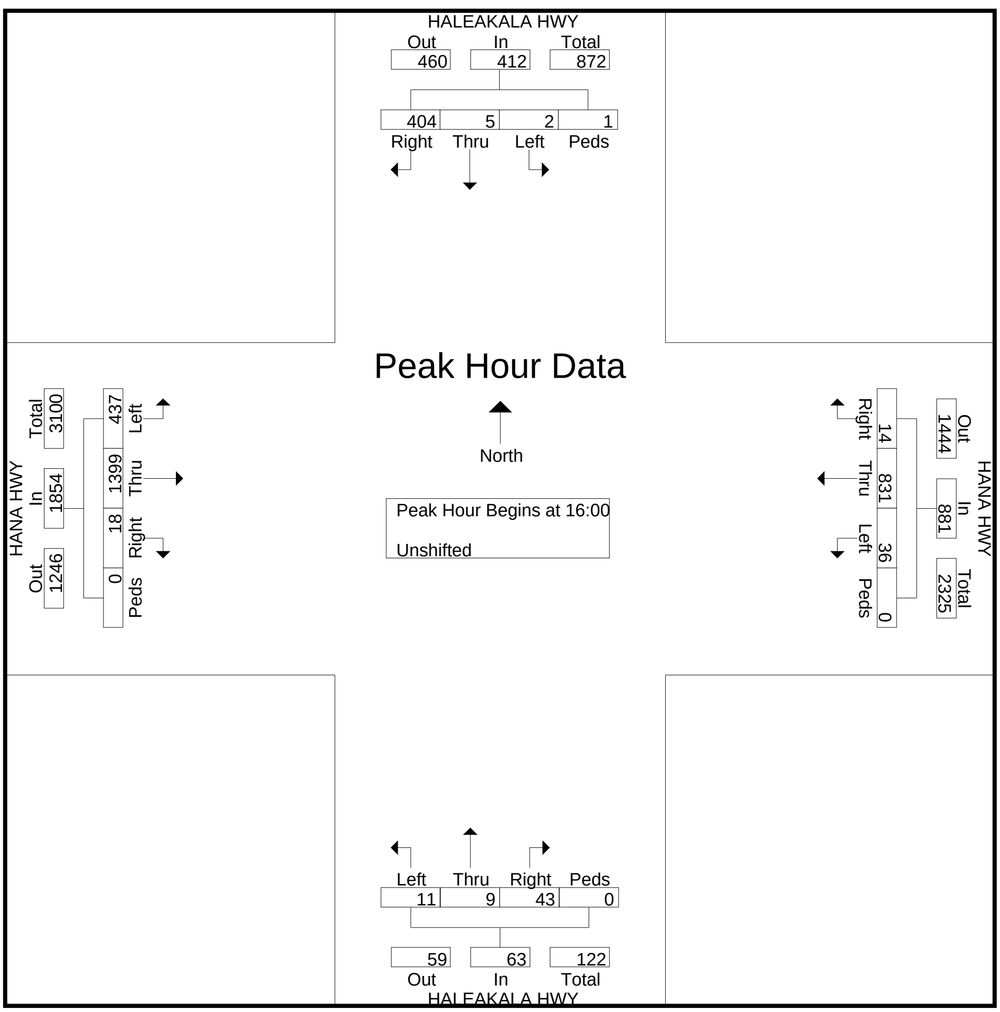
File Name : PM_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 8/15/2017
Page No : 2

	HALEAKALA HWY SOUTHBOUND					HANA HWY WESTBOUND					HALEAKALA HWY NORTHBOUND					HANA HWY EASTBOUND					
Start Time	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Int. Total**
Peak Hour Analysis From 16:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 16:00																					
16:00	**2**	**3**	99	**1**	105	**15**	**230**	**5**	0	**250**	**5**	**4**	11	0	**20**	116	335	2	0	453	**828**
16:15	0	1	99	0	100	5	223	3	0	231	0	3	**14**	0	17	92	348	**8**	0	448	796
16:30	0	0	**111**	0	**111**	6	211	3	0	220	2	1	8	0	11	108	**367**	3	0	**478**	820
16:45	0	1	95	0	96	10	167	3	0	180	4	1	10	0	15	**121**	349	5	0	475	766
Total Volume	2	5	404	1	412	36	831	14	0	881	11	9	43	0	63	437	1399	18	0	1854	3210
% App. Total	0.5	1.2	98.1	0.2		4.1	94.3	1.6	0		17.5	14.3	68.3	0		23.6	75.5	1	0		
PHF	.250	.417	.910	.250	.928	.600	.903	.700	.000	.881	.550	.563	.768	.000	.788	.903	.953	.563	.000	.970	.969



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Phone: 533-3646 Fax: 526-1267

File Name : WE_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 7/22/2017
Page No : 1

Groups Printed- Unshifted

	HALEAKALA HWY SOUTHBOUND				HANA HWY WESTBOUND				HALEAKALA HWY NORTHBOUND				HANA HWY EASTBOUND				
Start Time	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Int. Total**
11:00	0	4	99	0	14	220	7	0	0	2	0	0	100	239	9	0	694
11:15	0	2	93	0	10	251	2	0	1	6	0	0	104	205	6	0	680
11:30	0	2	79	0	19	213	1	0	3	6	0	0	110	259	9	0	701
11:45	0	3	96	0	24	264	2	0	3	2	0	0	117	264	4	0	779
Total	0	11	367	0	67	948	12	0	7	16	0	0	431	967	28	0	2854
12:00	0	5	113	0	11	223	3	0	3	4	0	0	125	260	6	0	753
12:15	0	3	96	0	15	205	3	0	2	4	0	0	118	269	10	0	725
12:30	0	6	93	0	15	210	8	0	2	2	0	0	117	258	8	0	719
12:45	0	2	95	0	14	219	4	0	1	3	0	0	108	249	3	0	698
Total	0	16	397	0	55	857	18	0	8	13	0	0	468	1036	27	0	2895
Grand Total	0	27	764	0	122	1805	30	0	15	29	0	0	899	2003	55	0	5749
Apprch %	0	3.4	96.6	0	6.2	92.2	1.5	0	34.1	65.9	0	0	30.4	67.7	1.9	0	
Total %	0	0.5	13.3	0	2.1	31.4	0.5	0	0.3	0.5	0	0	15.6	34.8	1	0	

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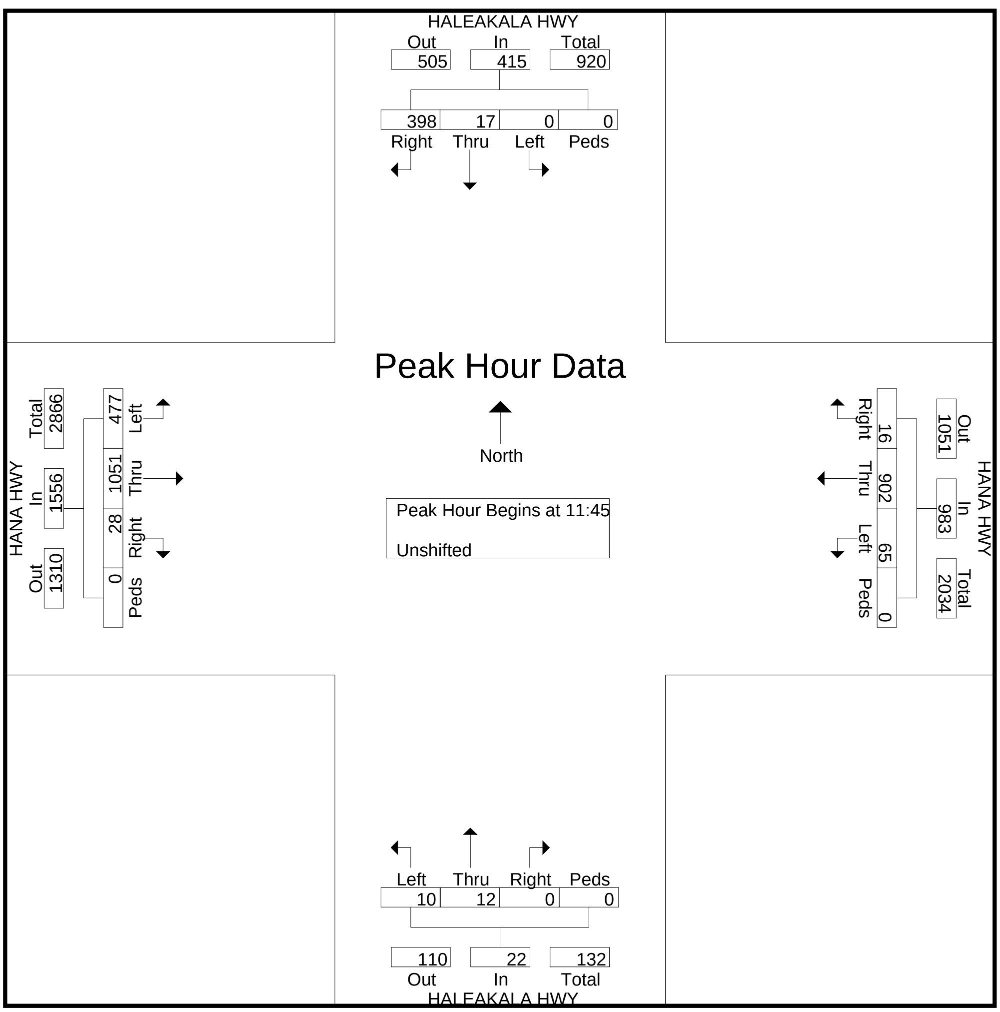
File Name : WE_Haleakala Hwy - Hana Hwy
Site Code : 00000000
Start Date : 7/22/2017

	HALEAKALA HWY SOUTHBOUND					HANA HWY WESTBOUND					HALEAKALA HWY NORTHBOUND					HANA HWY EASTBOUND					
Start Time	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Left**	**Thru**	**Right**	**Peds**	**App. Total**	**Int. Total**
Peak Hour Analysis From 11:00 to 12:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45																					
11:45	0	3	96	0	99	**24**	**264**	2	0	**290**	**3**	2	0	0	5	117	264	4	0	385	**779**
12:00	0	5	**113**	0	**118**	11	223	3	0	237	3	**4**	0	0	**7**	**125**	260	6	0	391	753
12:15	0	3	96	0	99	15	205	3	0	223	2	4	0	0	6	118	**269**	**10**	0	**397**	725
12:30	0	**6**	93	0	99	15	210	**8**	0	233	2	2	0	0	4	117	258	8	0	383	719
Total Volume	0	17	398	0	415	65	902	16	0	983	10	12	0	0	22	477	1051	28	0	1556	2976
% App. Total	0	4.1	95.9	0		6.6	91.8	1.6	0		45.5	54.5	0	0		30.7	67.5	1.8	0		
PHF	.000	.708	.881	.000	.879	.677	.854	.500	.000	.847	.833	.750	.000	.000	.786	.954	.977	.700	.000	.980	.955



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File Name : Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				KMART DWY Westbound				DAIRY RD Northbound				KELE ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	0	32	4	0	4	1	0	0	8	28	1	1	4	0	5	2	90
06:15 AM	1	41	0	0	3	1	0	0	9	37	1	0	0	0	3	0	96
06:30 AM	4	39	2	0	5	1	0	1	9	42	5	0	1	0	2	0	111
06:45 AM	2	37	6	0	3	1	0	1	17	38	8	0	2	0	4	0	119
Total	7	149	12	0	15	4	0	2	43	145	15	1	7	0	14	2	416
07:00 AM	5	48	1	0	9	1	2	1	4	30	13	0	0	0	8	0	122
07:15 AM	1	50	5	3	10	2	3	0	16	39	11	0	2	0	6	0	148
07:30 AM	4	71	5	0	3	3	1	1	23	40	9	0	1	0	8	0	169
07:45 AM	5	71	5	0	17	3	4	0	20	47	13	0	2	2	9	0	198
Total	15	240	16	3	39	9	10	2	63	156	46	0	5	2	31	0	637
08:00 AM	2	59	4	0	7	2	2	0	19	54	11	0	1	1	10	0	172
08:15 AM	1	71	2	0	9	0	1	0	15	36	13	0	2	0	13	1	164
08:30 AM	2	84	3	0	5	5	2	0	19	42	10	1	0	1	6	1	181
08:45 AM	4	62	13	1	8	3	2	1	19	41	8	1	0	1	7	0	171
Total	9	276	22	1	29	10	7	1	72	173	42	2	3	3	36	2	688
Grand Total	31	665	50	4	83	23	17	5	178	474	103	3	15	5	81	4	1741
Apprch %	4.1	88.7	6.7	0.5	64.8	18	13.3	3.9	23.5	62.5	13.6	0.4	14.3	4.8	77.1	3.8	
Total %	1.8	38.2	2.9	0.2	4.8	1.3	1	0.3	10.2	27.2	5.9	0.2	0.9	0.3	4.7	0.2	
Motorcycles	0	0	0	0	1	0	0	0	1	1	2	0	0	0	0	0	5
% Motorcycles	0	0	0	0	1.2	0	0	0	0.6	0.2	1.9	0	0	0	0	0	0.3
Cars	27	475	36	0	61	16	11	0	118	312	71	0	8	5	56	0	1196
% Cars	87.1	71.4	72	0	73.5	69.6	64.7	0	66.3	65.8	68.9	0	53.3	100	69.1	0	68.7
Light Goods Vehicles	4	144	13	0	20	6	1	0	56	120	20	0	7	0	21	0	412
% Light Goods Vehicles	12.9	21.7	26	0	24.1	26.1	5.9	0	31.5	25.3	19.4	0	46.7	0	25.9	0	23.7
Buses	0	26	0	0	0	0	5	0	0	16	5	0	0	0	3	0	55
% Buses	0	3.9	0	0	0	0	29.4	0	0	3.4	4.9	0	0	0	3.7	0	3.2
Single-Unit Trucks	0	16	1	0	0	1	0	0	2	20	4	0	0	0	1	0	45
% Single-Unit Trucks	0	2.4	2	0	0	4.3	0	0	1.1	4.2	3.9	0	0	0	1.2	0	2.6
Articulated Trucks	0	2	0	0	1	0	0	0	1	5	0	0	0	0	0	0	9
% Articulated Trucks	0	0.3	0	0	1.2	0	0	0	0.6	1.1	0	0	0	0	0	0	0.5
Bicycles on Road	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3
% Bicycles on Road	0	0.3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	4	0	0	0	4	0	0	0	3	0	0	0	4	15
% Pedestrians	0	0	0	100	0	0	0	80	0	0	0	100	0	0	0	100	0.9

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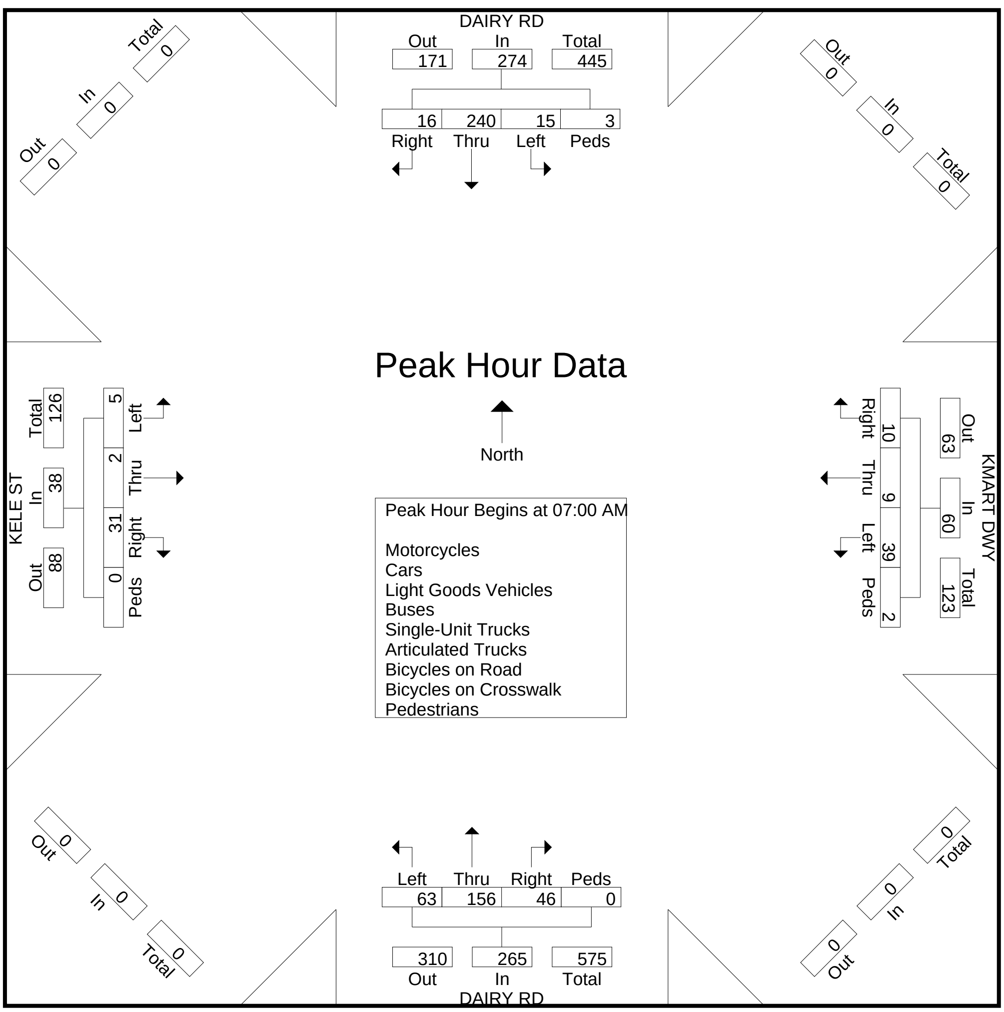
File Name : Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	DAIRY RD Southbound					KMART DWY Westbound					DAIRY RD Northbound					KELE ST Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**5**								**1**	13	4	30	**13**	0	47	0	0	8	0	8	122
07:15 AM	1	50	**5**	**3**												**2**					
07:30 AM	**4**	**71**	5	0	80	3	**3**	**1**	**1**	**8**	**23**	**40**	**9**	**0**	**72**	**1**	**0**	**8**	**0**	**9**	**169**
07:45 AM	**5**	**71**	**5**	**0**	**81**	**17**	3	**4**	**0**	**24**	20	**47**	**13**	**0**	**80**	2	**2**	**9**	**0**	**13**	**198**
Total Volume	15	240	16	3	274	39	9	10	2	60	63	156	46	0	265	5	2	31	0	38	637
% App. Total	5.5	87.6	5.8	1.1		65	15	16.7	3.3		23.8	58.9	17.4	0		13.2	5.3	81.6	0		
PHF	.750	.845	.800	.250	.846	.574	.750	.625	.500	.625	.685	.830	.885	.000	.828	.625	.250	.861	.000	.731	.804



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File Name : Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				KMART DWY Westbound				DAIRY RD Northbound				KELE 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	6	116	10	0	29	4	8	0	14	69	31	0	0	1	14	1	303
03:15 PM	3	122	8	0	24	0	7	0	12	83	31	0	1	0	21	0	312
03:30 PM	9	138	11	0	22	9	10	0	19	70	31	0	0	0	17	0	336
03:45 PM	8	127	11	0	25	5	10	0	12	77	25	0	0	1	10	0	311
Total	26	503	40	0	100	18	35	0	57	299	118	0	1	2	62	1	1262
04:00 PM	2	133	5	3	26	4	5	0	10	87	24	0	0	1	19	0	319
04:15 PM	5	95	6	0	31	2	7	0	13	72	20	0	0	1	15	3	270
04:30 PM	5	88	7	0	27	7	8	1	13	75	16	0	1	1	21	0	270
04:45 PM	4	90	5	0	25	4	2	0	12	75	35	0	0	3	20	1	276
Total	16	406	23	3	109	17	22	1	48	309	95	0	1	6	75	4	1135
05:00 PM	5	90	4	0	18	4	3	0	18	79	22	0	1	1	13	0	258
05:15 PM	10	83	8	0	23	7	3	0	13	73	22	3	1	2	22	0	270
Grand Total	57	1082	75	3	250	46	63	1	136	760	257	3	4	11	172	5	2925
Apprch %	4.7	88.9	6.2	0.2	69.4	12.8	17.5	0.3	11.8	65.7	22.2	0.3	2.1	5.7	89.6	2.6	
Total %	1.9	37	2.6	0.1	8.5	1.6	2.2	0	4.6	26	8.8	0.1	0.1	0.4	5.9	0.2	
Motorcycles	0	0	0	0	0	0	0	0	1	1	0	0	0	0	3	0	5
% Motorcycles	0	0	0	0	0	0	0	0	0.7	0.1	0	0	0	0	1.7	0	0.2
Cars	47	919	69	0	206	41	48	0	102	596	227	0	4	8	125	0	2392
% Cars	82.5	84.9	92	0	82.4	89.1	76.2	0	75	78.4	88.3	0	100	72.7	72.7	0	81.8
Light Goods Vehicles	9	149	4	0	42	5	9	0	30	144	23	0	0	3	39	0	457
% Light Goods Vehicles	15.8	13.8	5.3	0	16.8	10.9	14.3	0	22.1	18.9	8.9	0	0	27.3	22.7	0	15.6
Buses	0	9	0	0	0	0	6	0	0	15	6	0	0	0	3	0	39
% Buses	0	0.8	0	0	0	0	9.5	0	0	2	2.3	0	0	0	1.7	0	1.3
Single-Unit Trucks	1	4	2	0	2	0	0	0	3	3	1	0	0	0	2	0	18
% Single-Unit Trucks	1.8	0.4	2.7	0	0.8	0	0	0	2.2	0.4	0.4	0	0	0	1.2	0	0.6
Articulated Trucks	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
% Articulated Trucks	0	0.1	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	3
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	33.3	0	0	0	40	0.1
Pedestrians	0	0	0	3	0	0	0	1	0	0	0	2	0	0	0	3	9
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	66.7	0	0	0	60	0.3

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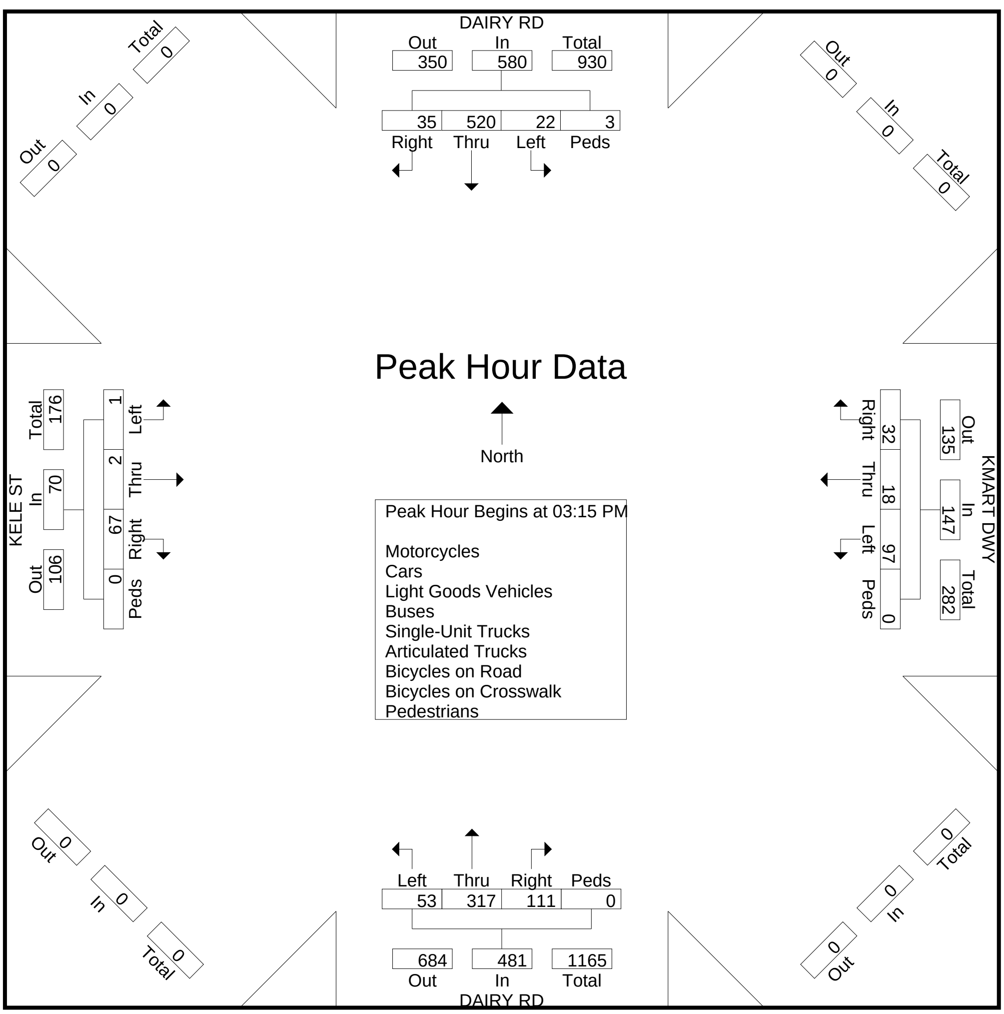
File Name : Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	DAIRY RD Southbound					KMART DWY Westbound					DAIRY RD Northbound					KELE 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 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:15 PM																					
03:15 PM	3	122	8	0	133	24	0	7	0	31	12	83	**31**	0	**126**	**1**		**21**		**22**	312
03:30 PM	**9**	**138**	**11**		**158**	22	**9**	**10**		**41**	**19**										**336**
03:45 PM	8	127	11	0	146	25	5	10	0	40	12	77	25	0	114	0	**1**	10	0	11	311
04:00 PM	2	133	5	**3**		**26**	4	5	0	35	10	**87**									
Total Volume	22	520	35	3	580	97	18	32	0	147	53	317	111	0	481	1	2	67	0	70	1278
% App. Total	3.8	89.7	6	0.5		66	12.2	21.8	0		11	65.9	23.1	0		1.4	2.9	95.7	0		
PHF	.611	.942	.795	.250	.918	.933	.500	.800	.000	.896	.697	.911	.895	.000	.954	.250	.500	.798	.000	.795	.951



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File Name : WE_Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				KMART DWY Westbound				DAIRY RD Northbound				KELE ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	10	99	7	0	30	5	8	0	21	119	39	0	2	0	19	0	359
11:15 AM	9	115	4	0	31	6	9	0	19	97	48	0	0	0	20	0	358
11:30 AM	11	111	5	0	19	9	11	0	17	112	52	0	0	0	23	0	370
11:45 AM	11	131	9	0	25	10	21	0	16	102	52	0	0	2	17	0	396
Total	41	456	25	0	105	30	49	0	73	430	191	0	2	2	79	0	1483
12:00 PM	13	137	10	0	29	4	20	0	14	108	57	0	0	0	33	0	425
12:15 PM	14	124	8	0	27	3	22	0	14	96	44	0	0	2	20	0	374
12:30 PM	8	127	7	0	34	4	13	0	13	102	47	0	1	0	27	0	383
12:45 PM	11	155	7	0	31	10	12	3	17	90	37	0	0	1	16	0	390
Total	46	543	32	0	121	21	67	3	58	396	185	0	1	3	96	0	1572
Grand Total	87	999	57	0	226	51	116	3	131	826	376	0	3	5	175	0	3055
Apprch %	7.6	87.4	5	0	57.1	12.9	29.3	0.8	9.8	62	28.2	0	1.6	2.7	95.6	0	
Total %	2.8	32.7	1.9	0	7.4	1.7	3.8	0.1	4.3	27	12.3	0	0.1	0.2	5.7	0	
Motorcycles	0	1	1	0	2	0	0	0	1	0	1	0	0	0	0	0	6
% Motorcycles	0	0.1	1.8	0	0.9	0	0	0	0.8	0	0.3	0	0	0	0	0	0.2
Cars	81	853	47	0	185	42	94	0	99	672	321	0	3	5	140	0	2542
% Cars	93.1	85.4	82.5	0	81.9	82.4	81	0	75.6	81.4	85.4	0	100	100	80	0	83.2
Light Goods Vehicles	6	138	9	0	37	9	18	0	30	150	48	0	0	0	33	0	478
% Light Goods Vehicles	6.9	13.8	15.8	0	16.4	17.6	15.5	0	22.9	18.2	12.8	0	0	0	18.9	0	15.6
Buses	0	3	0	0	1	0	4	0	0	0	5	0	0	0	2	0	15
% Buses	0	0.3	0	0	0.4	0	3.4	0	0	0	1.3	0	0	0	1.1	0	0.5
Single-Unit Trucks	0	3	0	0	0	0	0	0	1	2	0	0	0	0	0	0	6
% Single-Unit Trucks	0	0.3	0	0	0	0	0	0	0.8	0.2	0	0	0	0	0	0	0.2
Articulated Trucks	0	1	0	0	1	0	0	0	0	2	1	0	0	0	0	0	5
% Articulated Trucks	0	0.1	0	0	0.4	0	0	0	0	0.2	0.3	0	0	0	0	0	0.2
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0.1

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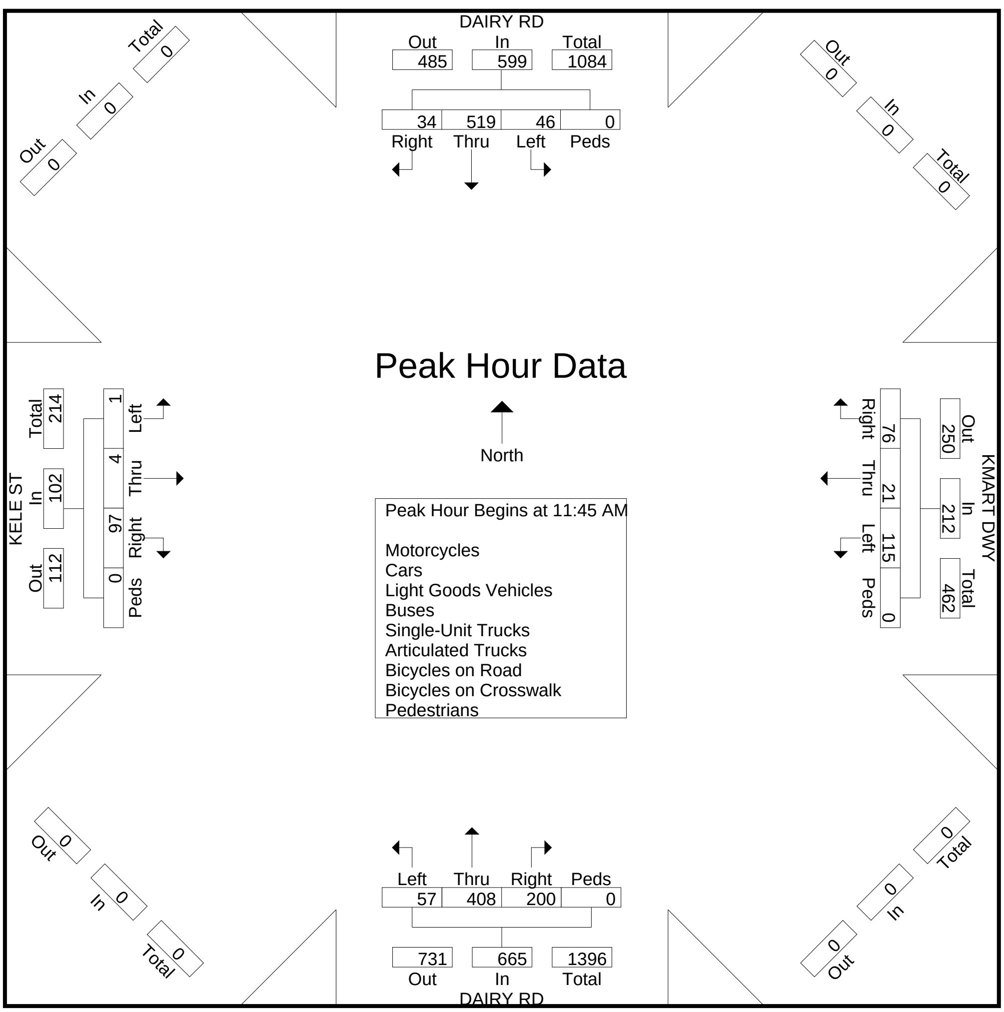
501 Sumner Street, Suite 521
Honolulu, HI 96817-5013
Phone: 533-3646 Fax: 526-1267

File Name : WE_Dairy Rd - Kele St_Kmart Dwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017

	DAIRY RD Southbound					KMART DWY Westbound					DAIRY RD Northbound					KELE 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 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	11	131	9	0	151	25	**10**			**56**	**16**						**2**	17	0	19	396
12:00 PM	13	**137**	**10**		**160**	29	4	20	0	53	14	**108**	**57**	0	**179**	0	0	**33**		**33**	**425**
12:15 PM	**14**							**22**													
12:30 PM	**8**	**127**	**7**	**0**	**142**	**34**	4	13	0	51	13	102	47	0	162	**1**	**0**	**27**	**0**	**28**	**383**
Total Volume	46	519	34	0	599	115	21	76	0	212	57	408	200	0	665	1	4	97	0	102	1578
% App. Total	7.7	86.6	5.7	0		54.2	9.9	35.8	0		8.6	61.4	30.1	0		1	3.9	95.1	0		
PHF	.821	.947	.850	.000	.936	.846	.525	.864	.000	.946	.891	.944	.877	.000	.929	.250	.500	.735	.000	.773	.928



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File Name : Dairy Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				HANA HWY Westbound				DAIRY HWY Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	5	33	2	0	39	129	13	0	3	21	13	0	5	55	10	1	329
06:15 AM	20	28	3	0	46	163	10	0	6	26	14	0	4	68	14	0	402
06:30 AM	9	35	8	0	52	183	24	0	3	25	13	0	5	73	7	0	437
06:45 AM	4	42	7	1	101	256	31	0	7	20	19	0	4	94	11	1	598
Total	38	138	20	1	238	731	78	0	19	92	59	0	18	290	42	2	1766
07:00 AM	6	48	7	0	103	288	25	0	9	13	17	0	8	138	12	1	675
07:15 AM	10	49	9	0	66	338	22	0	12	31	21	0	14	145	22	0	739
07:30 AM	13	60	15	0	87	372	26	0	13	32	19	0	13	128	19	0	797
07:45 AM	18	65	14	0	61	316	36	0	16	35	32	0	13	129	32	0	767
Total	47	222	45	0	317	1314	109	0	50	111	89	0	48	540	85	1	2978
08:00 AM	14	56	9	0	85	279	34	0	20	33	23	0	9	130	36	0	728
08:15 AM	16	71	6	0	62	239	23	0	23	35	36	0	10	112	23	0	656
08:30 AM	15	54	8	0	64	249	19	1	16	33	39	0	12	130	27	0	667
08:45 AM	20	61	3	0	66	257	24	0	24	32	19	0	10	133	32	1	682
Total	65	242	26	0	277	1024	100	1	83	133	117	0	41	505	118	1	2733
Grand Total	150	602	91	1	832	3069	287	1	152	336	265	0	107	1335	245	4	7477
Apprch %	17.8	71.3	10.8	0.1	19.9	73.3	6.9	0	20.2	44.6	35.2	0	6.3	78.9	14.5	0.2	
Total %	2	8.1	1.2	0	11.1	41	3.8	0	2	4.5	3.5	0	1.4	17.9	3.3	0.1	
Motorcycles	0	0	0	0	0	8	0	0	1	1	0	0	1	0	0	0	11
% Motorcycles	0	0	0	0	0	0.3	0	0	0.7	0.3	0	0	0.9	0	0	0	0.1
Cars	113	448	84	0	489	2743	254	0	92	227	127	0	69	975	168	0	5789
% Cars	75.3	74.4	92.3	0	58.8	89.4	88.5	0	60.5	67.6	47.9	0	64.5	73	68.6	0	77.4
Light Goods Vehicles	21	122	2	0	324	214	17	0	48	86	120	0	16	248	67	0	1285
% Light Goods Vehicles	14	20.3	2.2	0	38.9	7	5.9	0	31.6	25.6	45.3	0	15	18.6	27.3	0	17.2
Buses	10	18	1	0	4	21	8	0	1	11	0	0	5	28	0	0	107
% Buses	6.7	3	1.1	0	0.5	0.7	2.8	0	0.7	3.3	0	0	4.7	2.1	0	0	1.4
Single-Unit Trucks	5	13	1	0	14	40	6	0	6	8	17	0	15	46	6	0	177
% Single-Unit Trucks	3.3	2.2	1.1	0	1.7	1.3	2.1	0	3.9	2.4	6.4	0	14	3.4	2.4	0	2.4
Articulated Trucks	1	1	2	0	1	43	1	0	4	2	1	0	1	38	4	0	99
% Articulated Trucks	0.7	0.2	2.2	0	0.1	1.4	0.3	0	2.6	0.6	0.4	0	0.9	2.8	1.6	0	1.3
Bicycles on Road	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	3
% Bicycles on Road	0	0	1.1	0	0	0	0.3	0	0	0.3	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	6
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	0.1

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501 Sumner Street, Suite 521
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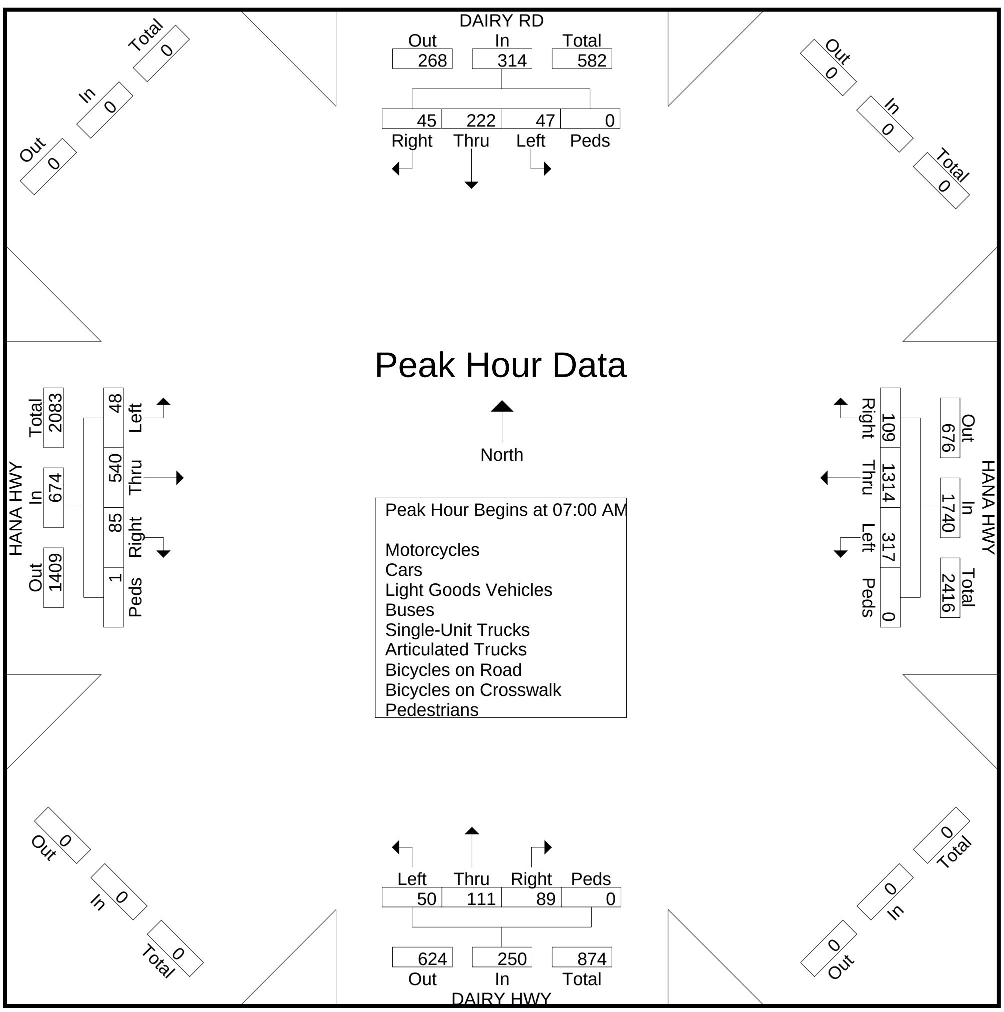
File Name : Dairy Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	DAIRY RD Southbound					HANA HWY Westbound					DAIRY HWY Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	6	48	7	0	61	**103**	288	25	0	416	9	13	17	0	39	8	138	12	**1**		
07:15 AM	**10**	**49**	**9**	**0**	**68**	**66**	**338**	**22**	**0**	**426**	**12**	**31**	**21**	**0**	**64**	**14**	**145**	22	0	**181**	739
07:30 AM	13	60	**15**				**372**			**485**	13	32	19	0	64	13	128	19	0	160	**797**
07:45 AM	**18**	**65**	14	0	**97**	61	316	**36**			**16**	**35**	**32**	0	**83**	13	129	**32**			
Total Volume	47	222	45	0	314	317	1314	109	0	1740	50	111	89	0	250	48	540	85	1	674	2978
% App. Total																					
PHF	.653	.854	.750	.000	.809	.769	.883	.757	.000	.897	.781	.793	.695	.000	.753	.857	.931	.664	.250	.931	.934



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File Name : Dairy Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				HANA HWY Westbound				DAIRY HWY Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	30	133	3	0	45	167	26	0	35	51	52	0	24	224	33	0	823
03:15 PM	40	116	11	0	63	200	34	0	22	42	55	0	35	259	37	0	914
03:30 PM	39	146	4	0	45	187	26	0	31	54	58	0	27	238	47	0	902
03:45 PM	27	106	7	0	45	202	19	0	28	41	70	0	32	267	33	0	877
Total	136	501	25	0	198	756	105	0	116	188	235	0	118	988	150	0	3516
04:00 PM	42	121	2	0	36	207	35	0	30	50	68	0	28	301	51	0	971
04:15 PM	31	108	5	2	58	214	37	0	23	51	66	0	20	286	40	0	941
04:30 PM	30	107	4	0	35	157	30	0	21	42	76	0	25	332	35	0	894
04:45 PM	32	91	6	0	42	154	38	0	29	43	64	0	36	290	42	0	867
Total	135	427	17	2	171	732	140	0	103	186	274	0	109	1209	168	0	3673
05:00 PM	32	95	14	2	41	151	39	0	15	54	93	0	23	276	37	1	873
05:15 PM	24	94	15	3	19	109	31	0	11	42	73	2	30	324	43	6	826
Grand Total	327	1117	71	7	429	1748	315	0	245	470	675	2	280	2797	398	7	8888
Apprch %	21.5	73.4	4.7	0.5	17.2	70.1	12.6	0	17.6	33.8	48.5	0.1	8	80.3	11.4	0.2	
Total %	3.7	12.6	0.8	0.1	4.8	19.7	3.5	0	2.8	5.3	7.6	0	3.2	31.5	4.5	0.1	
Motorcycles	4	3	0	0	0	1	0	0	5	1	6	0	0	10	2	0	32
% Motorcycles	1.2	0.3	0	0	0	0.1	0	0	2	0.2	0.9	0	0	0.4	0.5	0	0.4
Cars	253	992	69	0	276	1584	292	0	176	375	417	0	237	2279	343	0	7293
% Cars	77.4	88.8	97.2	0	64.3	90.6	92.7	0	71.8	79.8	61.8	0	84.6	81.5	86.2	0	82.1
Light Goods Vehicles	66	105	1	0	138	105	13	0	59	79	243	0	40	462	43	0	1354
% Light Goods Vehicles	20.2	9.4	1.4	0	32.2	6	4.1	0	24.1	16.8	36	0	14.3	16.5	10.8	0	15.2
Buses	2	9	0	0	1	15	7	0	0	11	4	0	3	21	2	0	75
% Buses	0.6	0.8	0	0	0.2	0.9	2.2	0	0	2.3	0.6	0	1.1	0.8	0.5	0	0.8
Single-Unit Trucks	2	7	1	0	8	35	3	0	4	3	5	0	0	20	7	0	95
% Single-Unit Trucks	0.6	0.6	1.4	0	1.9	2	1	0	1.6	0.6	0.7	0	0	0.7	1.8	0	1.1
Articulated Trucks	0	1	0	0	6	8	0	0	1	1	0	0	0	5	1	0	23
% Articulated Trucks	0	0.1	0	0	1.4	0.5	0	0	0.4	0.2	0	0	0	0.2	0.3	0	0.3
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	7	0	0	0	0	0	0	0	2	0	0	0	7	16
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	100	0.2

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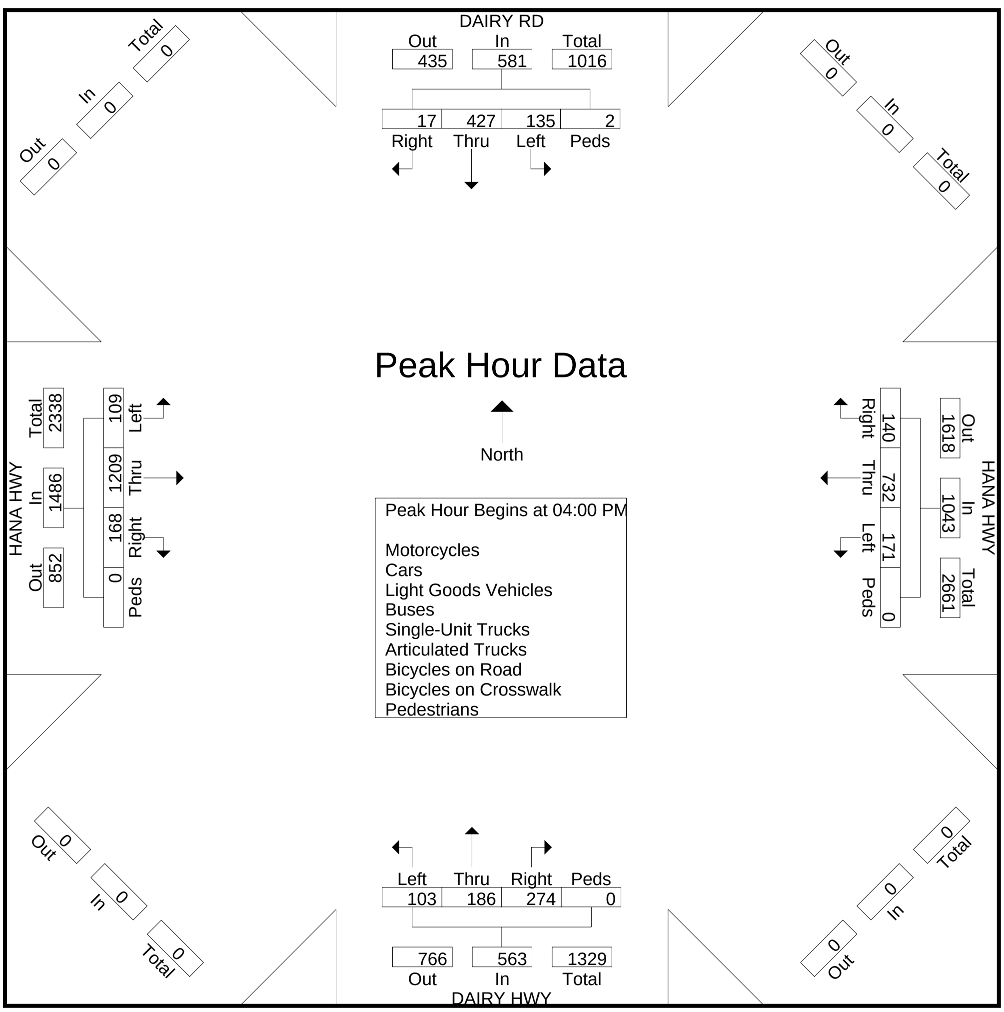
File Name : Dairy Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	DAIRY RD Southbound					HANA HWY Westbound					DAIRY HWY Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 04:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**42**	**121**	2	0	**165**	36	207	35	0	278	**30**				**148**	28	301	**51**			**971**
04:15 PM	31	108	5	**2**		**58**	**214**			**309**	23	**51**									
04:30 PM	**30**	**107**	**4**	**0**	**141**	**35**	**157**	**30**	**0**	**222**	**21**	**42**	**76**	0	139	25	**332**	35	0	**392**	894
04:45 PM	32	91	**6**					**38**								**36**					
Total Volume	135	427	17	2	581	171	732	140	0	1043	103	186	274	0	563	109	1209	168	0	1486	3673
% App. Total	23.2	73.5	2.9	0.3		16.4	70.2	13.4	0		18.3	33	48.7	0		7.3	81.4	11.3	0		
PHF	.804	.882	.708	.250	.880	.737	.855	.921	.000	.844	.858	.912	.901	.000	.951	.757	.910	.824	.000	.948	.946



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File Name : WE_Dairy Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	DAIRY RD Southbound				HANA HWY Westbound				DAIRY RD Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	30	115	16	3	37	193	61	0	28	71	38	0	50	182	33	2	859
11:15 AM	41	117	17	2	47	181	48	0	28	72	34	0	38	177	43	0	845
11:30 AM	44	96	15	0	59	207	46	0	26	76	45	0	51	162	40	2	869
11:45 AM	33	136	20	0	64	204	64	0	31	56	45	0	47	170	42	1	913
Total	148	464	68	5	207	785	219	0	113	275	162	0	186	691	158	5	3486
12:00 PM	36	146	13	0	43	182	69	0	30	70	60	0	30	170	69	1	919
12:15 PM	29	135	16	0	38	178	51	0	19	76	55	0	37	184	49	0	867
12:30 PM	40	132	14	0	27	190	60	0	23	63	70	0	33	228	52	0	932
12:45 PM	33	158	19	3	40	174	54	0	21	56	61	3	34	167	31	3	857
Total	138	571	62	3	148	724	234	0	93	265	246	3	134	749	201	4	3575
Grand Total	286	1035	130	8	355	1509	453	0	206	540	408	3	320	1440	359	9	7061
Apprch %	19.6	70.9	8.9	0.5	15.3	65.1	19.6	0	17.8	46.7	35.3	0.3	15	67.7	16.9	0.4	
Total %	4.1	14.7	1.8	0.1	5	21.4	6.4	0	2.9	7.6	5.8	0	4.5	20.4	5.1	0.1	
Motorcycles	1	0	0	0	2	6	1	0	1	0	2	0	1	5	0	0	19
% Motorcycles	0.3	0	0	0	0.6	0.4	0.2	0	0.5	0	0.5	0	0.3	0.3	0	0	0.3
Cars	239	926	126	0	269	1302	426	0	166	452	287	0	271	973	322	0	5759
% Cars	83.6	89.5	96.9	0	75.8	86.3	94	0	80.6	83.7	70.3	0	84.7	67.6	89.7	0	81.6
Light Goods Vehicles	42	101	3	0	83	109	23	0	38	85	117	0	43	364	37	0	1045
% Light Goods Vehicles	14.7	9.8	2.3	0	23.4	7.2	5.1	0	18.4	15.7	28.7	0	13.4	25.3	10.3	0	14.8
Buses	3	3	0	0	0	4	1	0	0	2	1	0	2	7	0	0	23
% Buses	1	0.3	0	0	0	0.3	0.2	0	0	0.4	0.2	0	0.6	0.5	0	0	0.3
Single-Unit Trucks	0	4	1	0	1	18	2	0	1	0	1	0	1	27	0	0	56
% Single-Unit Trucks	0	0.4	0.8	0	0.3	1.2	0.4	0	0.5	0	0.2	0	0.3	1.9	0	0	0.8
Articulated Trucks	1	1	0	0	0	70	0	0	0	1	0	0	2	64	0	0	139
% Articulated Trucks	0.3	0.1	0	0	0	4.6	0	0	0	0.2	0	0	0.6	4.4	0	0	2
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1	0
Pedestrians	0	0	0	8	0	0	0	0	0	0	0	3	0	0	0	8	19
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	88.9	0.3

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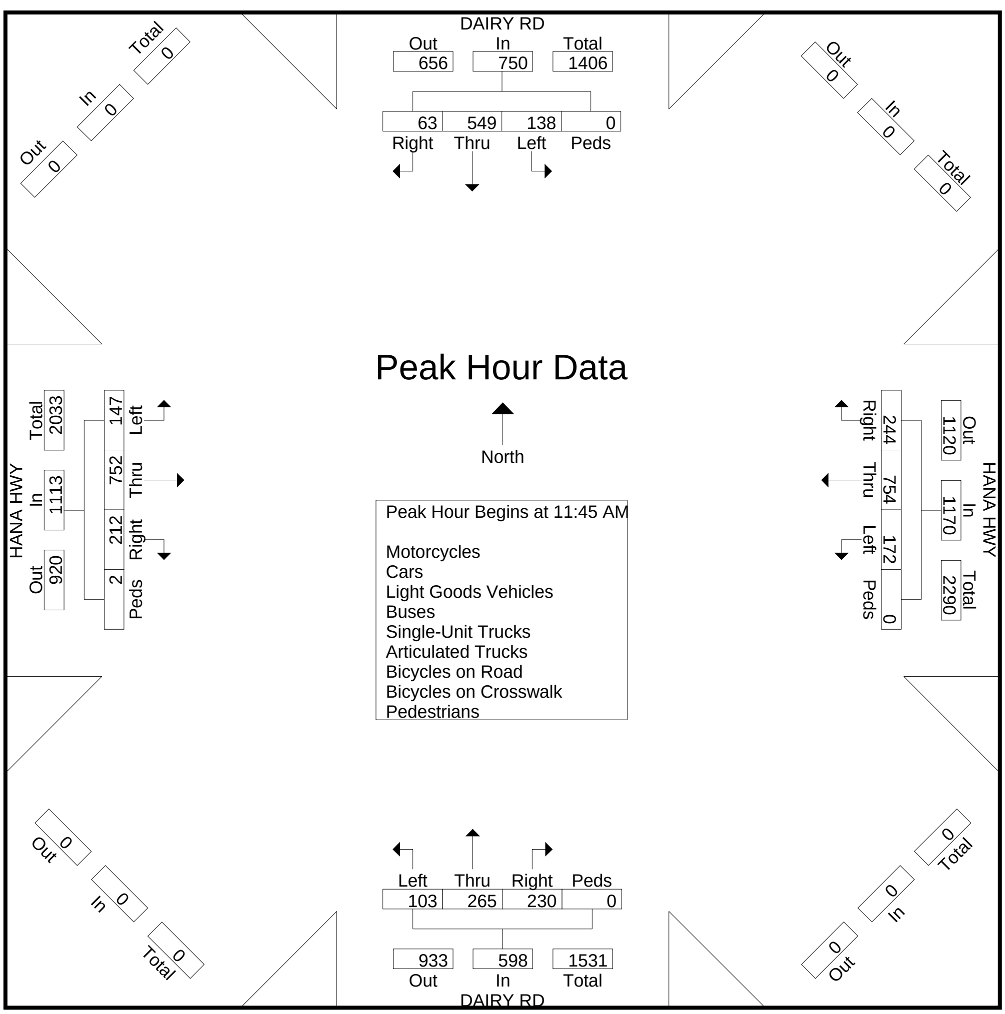
Start Date : 5/20/2017

	DAIRY RD Southbound					HANA HWY Westbound					DAIRY RD Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:45 AM to 12:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	33	136	**20**			**64**	**204**			**332**	**31**					**47**			**1**		
12:00 PM	**36**	**146**	13	0	**195**	43	182	**69**	**0**	**294**	**30**	**70**	**60**	**0**	**160**	30	170	**69**	**1**	**270**	**919**
12:15 PM	**29**	**135**	**16**	**0**	**180**	**38**	**178**	**51**	**0**	**267**	**19**	**76**	**55**	**0**	**150**	**37**	**184**	**49**	**0**	**270**	**867**
12:30 PM	**40**	**132**	**14**	**0**	**186**	**27**	**190**	**60**	**0**	**277**	**23**	**63**	**70**	0	156	33	**228**	52	0	**313**	**932**
Total Volume	138	549	63	0	750	172	754	244	0	1170	103	265	230	0	598	147	752	212	2	1113	3631
% App. Total	18.4	73.2	8.4	0		14.7	64.4	20.9	0		17.2	44.3	38.5	0		13.2	67.6	19	0.2		
PHF	.863	.940	.788	.000	.962	.672	.924	.884	.000	.881	.831	.872	.821	.000	.934	.782	.825	.768	.500	.889	.974



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501 Sumner Street, Suite 521
Honolulu, HI 96817-5013
Phone: 533-3646 Fax: 526-1267

File Name : Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AIRPORT ACCESS RD Southbound				HANA HWY Westbound				AIRPORT ACCESS RD Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	7	6	1	0	71	189	10	0	3	34	21	0	13	55	5	0	415
06:15 AM	10	2	0	0	90	225	14	0	4	49	37	0	8	81	7	0	527
06:30 AM	5	5	2	0	98	277	16	0	10	41	45	0	8	84	8	0	599
06:45 AM	7	7	0	0	91	362	22	0	76	34	44	0	5	109	5	0	762
Total	29	20	3	0	350	1053	62	0	93	158	147	0	34	329	25	0	2303
07:00 AM	6	7	0	0	107	362	19	0	38	32	77	0	14	140	5	0	807
07:15 AM	11	7	2	0	93	450	17	0	24	53	80	0	20	124	10	0	891
07:30 AM	5	9	0	0	88	514	20	0	25	50	66	0	7	144	3	0	931
07:45 AM	10	8	0	0	82	432	18	0	29	49	68	0	18	150	10	0	874
Total	32	31	2	0	370	1758	74	0	116	184	291	0	59	558	28	0	3503
08:00 AM	5	10	2	0	88	399	15	0	24	49	60	0	15	139	15	0	821
08:15 AM	6	12	1	0	44	315	18	0	24	74	75	0	14	126	12	0	721
08:30 AM	8	6	1	0	58	314	17	0	26	53	67	0	18	133	22	0	723
08:45 AM	5	6	3	0	46	295	19	0	29	98	77	0	9	134	15	0	736
Total	24	34	7	0	236	1323	69	0	103	274	279	0	56	532	64	0	3001
Grand Total	85	85	12	0	956	4134	205	0	312	616	717	0	149	1419	117	0	8807
Apprch %	46.7	46.7	6.6	0	18.1	78.1	3.9	0	19	37.4	43.6	0	8.8	84.2	6.9	0	
Total %	1	1	0.1	0	10.9	46.9	2.3	0	3.5	7	8.1	0	1.7	16.1	1.3	0	
Motorcycles	0	0	0	0	5	10	0	0	0	0	1	0	0	2	1	0	19
% Motorcycles	0	0	0	0	0.5	0.2	0	0	0	0	0.1	0	0	0.1	0.9	0	0.2
Cars	54	59	9	0	663	3875	205	0	210	534	641	0	110	988	53	0	7401
% Cars	63.5	69.4	75	0	69.4	93.7	100	0	67.3	86.7	89.4	0	73.8	69.6	45.3	0	84
Light Goods Vehicles	1	22	0	0	276	177	0	0	64	74	41	0	27	324	37	0	1043
% Light Goods Vehicles	1.2	25.9	0	0	28.9	4.3	0	0	20.5	12	5.7	0	18.1	22.8	31.6	0	11.8
Buses	2	1	0	0	7	15	0	0	1	4	5	0	4	28	1	0	68
% Buses	2.4	1.2	0	0	0.7	0.4	0	0	0.3	0.6	0.7	0	2.7	2	0.9	0	0.8
Single-Unit Trucks	26	3	3	0	3	33	0	0	16	4	18	0	8	53	9	0	176
% Single-Unit Trucks	30.6	3.5	25	0	0.3	0.8	0	0	5.1	0.6	2.5	0	5.4	3.7	7.7	0	2
Articulated Trucks	2	0	0	0	2	24	0	0	20	0	11	0	0	24	16	0	99
% Articulated Trucks	2.4	0	0	0	0.2	0.6	0	0	6.4	0	1.5	0	0	1.7	13.7	0	1.1
Bicycles on Road	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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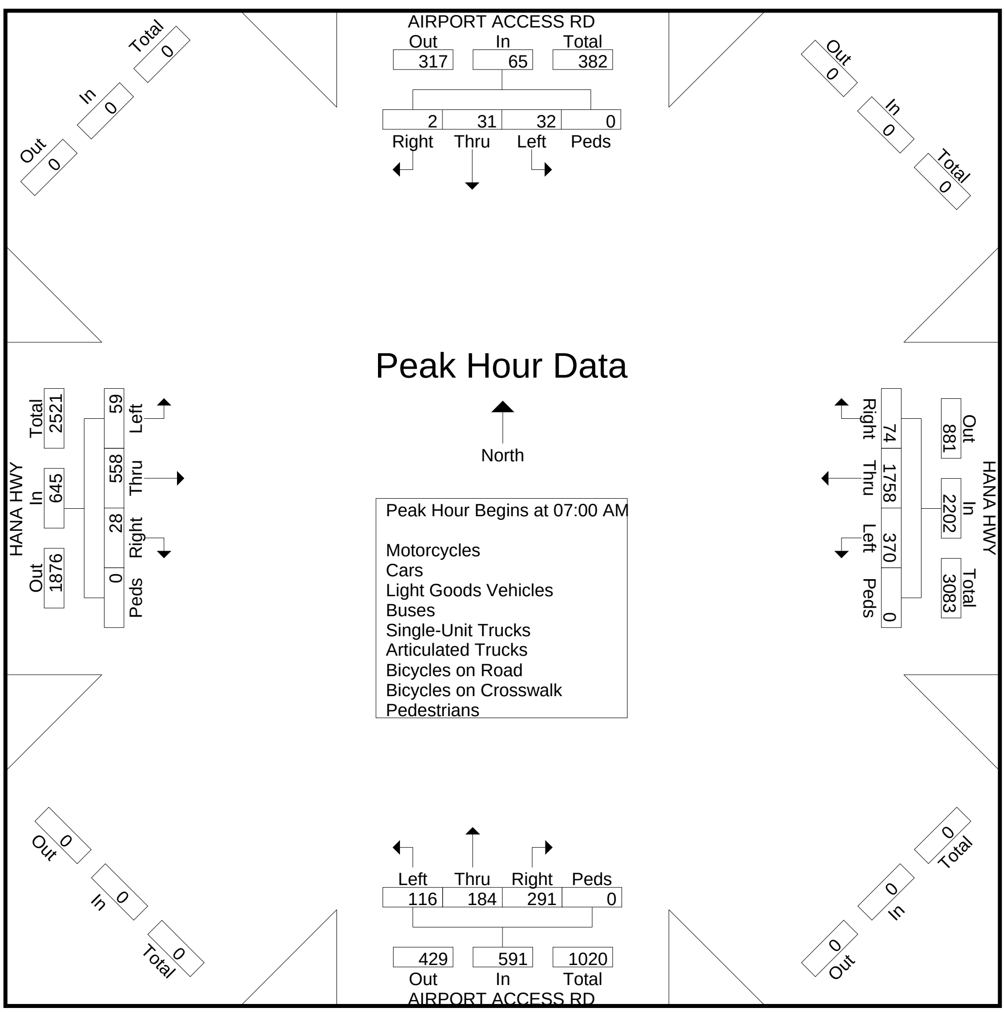
File Name : Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 2

	AIRPORT ACCESS RD Southbound					HANA HWY Westbound					AIRPORT ACCESS RD Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	6	7	0	0	13	**107**	362	19	0	488	**38**										
07:15 AM	**11**	**7**	**2**	**0**	**20**	93	450	17	0	560	24	**53**	**80**	0	**157**	**20**	**124**	**10**	**0**	**154**	**891**
07:30 AM	**5**	**9**	0	0	14	88	**514**	**20**	**0**	**622**	25	50	66	0	141	7	144	3	0	154	**931**
07:45 AM	10	8	0	0	18	82	432	18	0	532	29	49	68	0	146	18	**150**	10	0	**178**	874
Total Volume	32	31	2	0	65	370	1758	74	0	2202	116	184	291	0	591	59	558	28	0	645	3503
% App. Total																					
PHF	.727	.861	.250	.000	.813	.864	.855	.925	.000	.885	.763	.868	.909	.000	.941	.738	.930	.700	.000	.906	.941



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File Name : Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AIRPORT ACCESS RD Southbound				HANA HWY Westbound				AIRPORT ACCESS RD Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
03:00 PM	21	51	3	0	81	209	16	0	28	41	51	0	17	257	22	0	797
03:15 PM	14	37	0	0	87	204	20	0	33	35	69	0	14	269	26	0	808
03:30 PM	33	35	2	0	73	215	18	0	18	34	59	0	13	285	24	0	809
03:45 PM	15	38	0	0	77	194	17	0	15	33	79	0	12	277	26	0	783
Total	83	161	5	0	318	822	71	0	94	143	258	0	56	1088	98	0	3197
04:00 PM	15	43	3	0	78	242	15	0	16	38	76	0	12	404	19	0	961
04:15 PM	15	36	6	0	102	239	14	0	30	41	87	0	14	340	12	0	936
04:30 PM	9	29	0	0	75	197	9	0	17	29	80	0	11	408	21	0	885
04:45 PM	24	33	2	0	58	188	13	0	33	39	85	0	11	333	22	0	841
Total	63	141	11	0	313	866	51	0	96	147	328	0	48	1485	74	0	3623
05:00 PM	13	27	3	0	63	186	16	0	33	41	68	1	10	381	25	1	868
05:15 PM	13	31	4	0	65	146	15	0	20	48	82	0	8	366	21	0	819
Grand Total	172	360	23	0	759	2020	153	0	243	379	736	1	122	3320	218	1	8507
Apprch %	31	64.9	4.1	0	25.9	68.9	5.2	0	17.9	27.9	54.2	0.1	3.3	90.7	6	0	
Total %	2	4.2	0.3	0	8.9	23.7	1.8	0	2.9	4.5	8.7	0	1.4	39	2.6	0	
Motorcycles	0	0	1	0	5	4	0	0	1	3	3	0	0	10	6	0	33
% Motorcycles	0	0	4.3	0	0.7	0.2	0	0	0.4	0.8	0.4	0	0	0.3	2.8	0	0.4
Cars	142	275	19	0	624	1818	153	0	199	318	595	0	92	2621	144	0	7000
% Cars	82.6	76.4	82.6	0	82.2	90	100	0	81.9	83.9	80.8	0	75.4	78.9	66.1	0	82.3
Light Goods Vehicles	25	65	2	0	108	130	0	0	36	42	130	0	15	662	52	0	1267
% Light Goods Vehicles	14.5	18.1	8.7	0	14.2	6.4	0	0	14.8	11.1	17.7	0	12.3	19.9	23.9	0	14.9
Buses	3	15	1	0	7	23	0	0	0	12	2	0	8	13	4	0	88
% Buses	1.7	4.2	4.3	0	0.9	1.1	0	0	0	3.2	0.3	0	6.6	0.4	1.8	0	1
Single-Unit Trucks	2	5	0	0	10	32	0	0	2	4	5	0	7	8	11	0	86
% Single-Unit Trucks	1.2	1.4	0	0	1.3	1.6	0	0	0.8	1.1	0.7	0	5.7	0.2	5	0	1
Articulated Trucks	0	0	0	0	5	13	0	0	5	0	1	0	0	5	1	0	30
% Articulated Trucks	0	0	0	0	0.7	0.6	0	0	2.1	0	0.1	0	0	0.2	0.5	0	0.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	0

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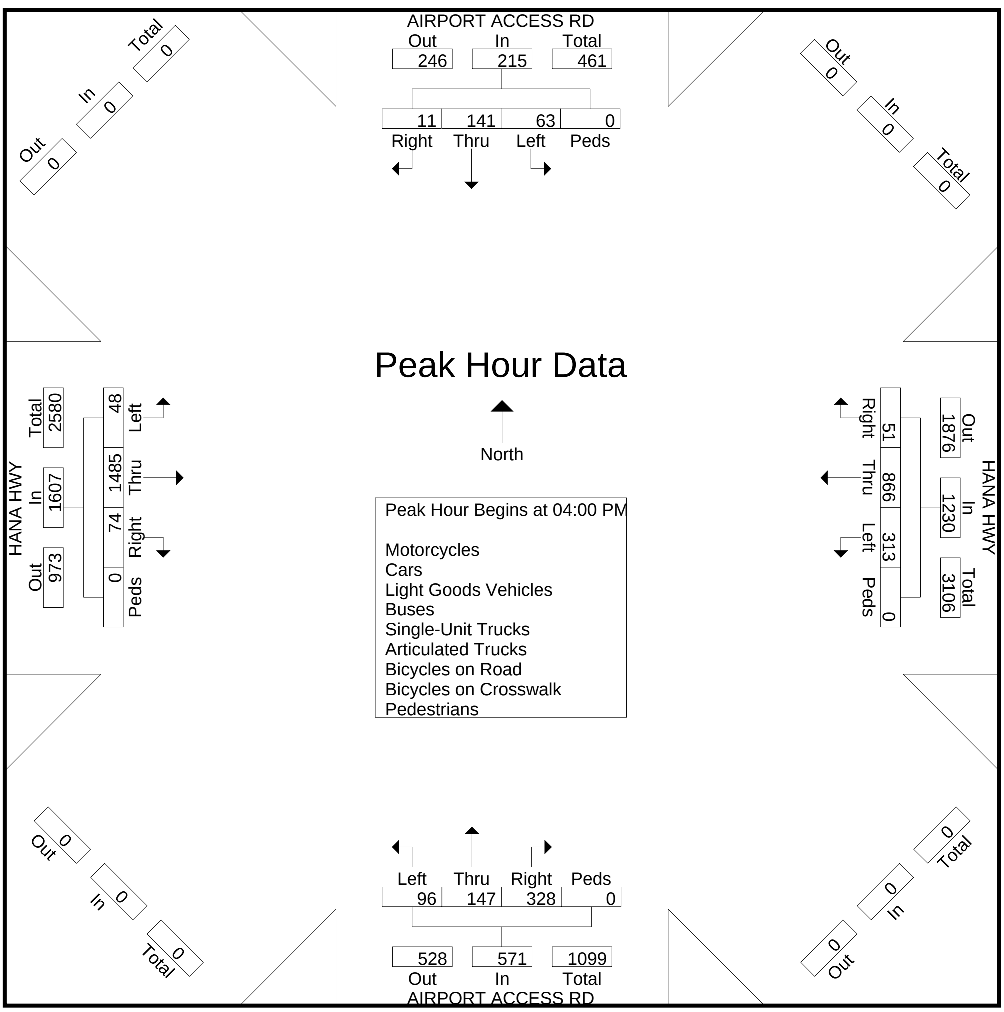
File Name : Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

	AIRPORT ACCESS RD Southbound					**HANA HWY Westbound**					**AIRPORT ACCESS RD Northbound**					**HANA HWY Eastbound**					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	15	**43**	3	0	**61**	78	**242**	**15**													**961**
04:15 PM	15	36	**6**			**102**	239	14	0	**355**	30	**41**	**87**	0	**158**	**14**					
04:30 PM	**9**	**29**	**0**	**0**	**38**	**75**	**197**	**9**	**0**	**281**	**17**	**29**	**80**	**0**	**126**	**11**	**408**	21	0	**440**	885
04:45 PM	**24**										**33**							**22**			
Total Volume	63	141	11	0	215	313	866	51	0	1230	96	147	328	0	571	48	1485	74	0	1607	3623
% App. Total	29.3	65.6	5.1	0		25.4	70.4	4.1	0		16.8	25.7	57.4	0		3	92.4	4.6	0		
PHF	.656	.820	.458	.000	.881	.767	.895	.850	.000	.866	.727	.896	.943	.000	.903	.857	.910	.841	.000	.913	.943



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File Name : WE_Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	AIRPORT ACCESS RD Southbound				HANA HWY Westbound				AIRPORT ACCESS RD Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	8	31	2	0	58	253	15	0	31	116	77	0	11	211	14	0	827
11:15 AM	7	34	0	0	64	275	24	0	24	71	60	0	15	211	22	0	807
11:30 AM	13	34	0	0	65	288	32	0	46	102	59	0	16	216	19	0	890
11:45 AM	25	35	9	0	50	272	44	0	41	65	61	0	14	200	19	0	835
Total	53	134	11	0	237	1088	115	0	142	354	257	0	56	838	74	0	3359
12:00 PM	17	52	6	0	54	227	24	0	33	76	77	0	22	193	22	0	803
12:15 PM	17	47	3	0	46	250	32	0	43	61	66	0	8	249	23	0	845
12:30 PM	15	42	5	0	70	218	24	0	40	58	68	0	28	231	25	0	824
12:45 PM	13	35	4	0	47	254	27	0	31	53	43	0	12	215	29	0	763
Total	62	176	18	0	217	949	107	0	147	248	254	0	70	888	99	0	3235
Grand Total	115	310	29	0	454	2037	222	0	289	602	511	0	126	1726	173	0	6594
Apprch %	25.3	68.3	6.4	0	16.7	75.1	8.2	0	20.6	42.9	36.4	0	6.2	85.2	8.5	0	
Total %	1.7	4.7	0.4	0	6.9	30.9	3.4	0	4.4	9.1	7.7	0	1.9	26.2	2.6	0	
Motorcycles	0	1	0	0	1	5	0	0	0	2	0	0	0	4	1	0	14
% Motorcycles	0	0.3	0	0	0.2	0.2	0	0	0	0.3	0	0	0	0.2	0.6	0	0.2
Cars	105	266	28	0	340	1823	222	0	260	579	485	0	104	1369	128	0	5709
% Cars	91.3	85.8	96.6	0	74.9	89.5	100	0	90	96.2	94.9	0	82.5	79.3	74	0	86.6
Light Goods Vehicles	1	35	1	0	105	114	0	0	27	7	22	0	11	266	40	0	629
% Light Goods Vehicles	0.9	11.3	3.4	0	23.1	5.6	0	0	9.3	1.2	4.3	0	8.7	15.4	23.1	0	9.5
Buses	2	6	0	0	1	3	0	0	0	6	1	0	2	9	2	0	32
% Buses	1.7	1.9	0	0	0.2	0.1	0	0	0	1	0.2	0	1.6	0.5	1.2	0	0.5
Single-Unit Trucks	4	2	0	0	6	20	0	0	1	8	3	0	8	18	0	0	70
% Single-Unit Trucks	3.5	0.6	0	0	1.3	1	0	0	0.3	1.3	0.6	0	6.3	1	0	0	1.1
Articulated Trucks	3	0	0	0	0	69	0	0	1	0	0	0	1	60	2	0	136
% Articulated Trucks	2.6	0	0	0	0	3.4	0	0	0.3	0	0	0	0.8	3.5	1.2	0	2.1
Bicycles on Road	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	4
% Bicycles on Road	0	0	0	0	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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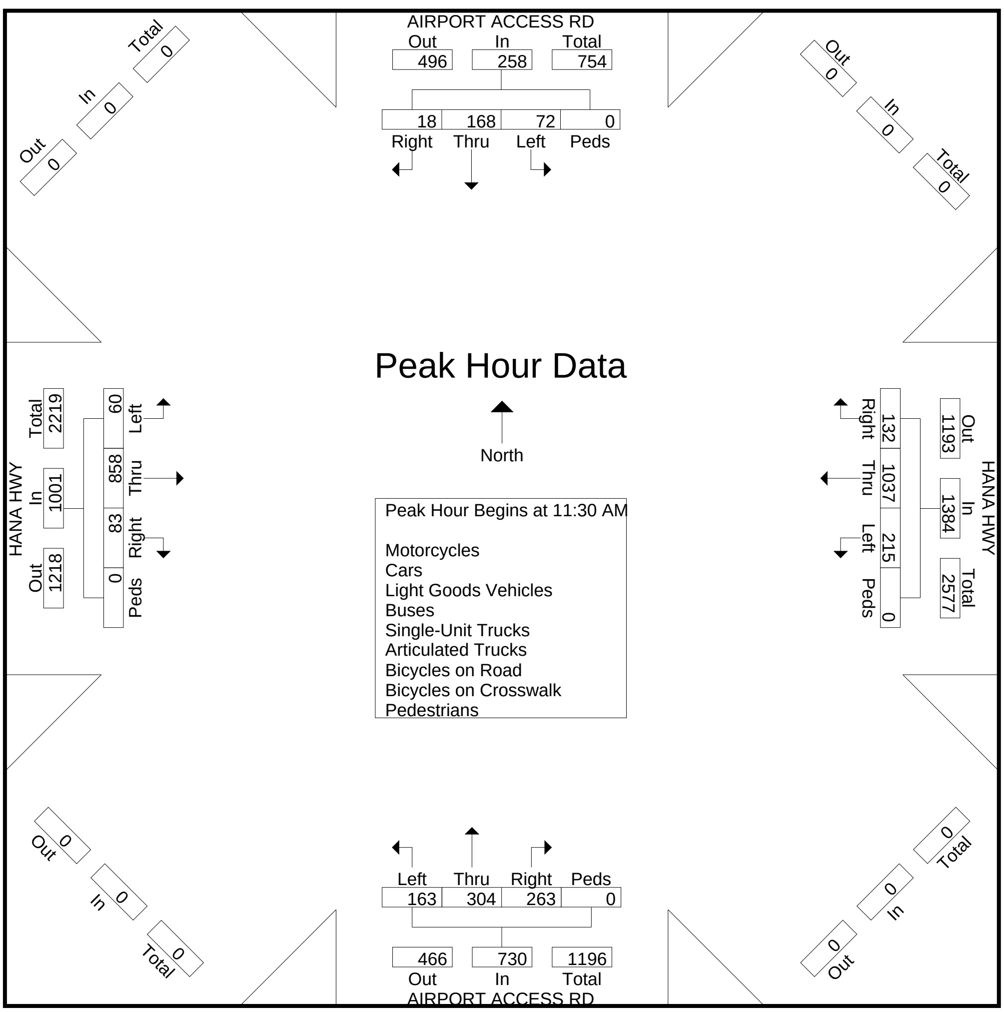
File Name : WE_Airport Access Rd - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/20/2017
Page No : 2

	AIRPORT ACCESS RD Southbound					HANA HWY Westbound					AIRPORT ACCESS RD Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:30 AM																					
11:30 AM	13	34	0	0	47	**65**	**288**			**385**	**46**	**102**			**207**	16	216	19	0	251	**890**
11:45 AM	**25**		**9**					**44**													
12:00 PM	**17**	**52**	6	0	**75**	54	227	24	0	305	33	76	**77**	0	186	**22**	**193**	**22**	**0**	**237**	**803**
12:15 PM	**17**	**47**	**3**	**0**	**67**	**46**	**250**	**32**	**0**	**328**	**43**	**61**	**66**	**0**	**170**	**8**	**249**	**23**	**0**	**280**	845
Total Volume	72	168	18	0	258	215	1037	132	0	1384	163	304	263	0	730	60	858	83	0	1001	3373
% App. Total																					
PHF	.720	.808	.500	.000	.860	.827	.900	.750	.000	.899	.886	.745	.854	.000	.882	.682	.861	.902	.000	.894	.947



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File Name : Hookele St - Hana Hwy
Site Code : 17-538 Kanaha Hotel
Start Date : 5/17/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HANA HWY Westbound				HOOKELE ST Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:00 AM	0	0	0	0	23	271	0	0	17	0	8	0	0	56	21	0	396
06:15 AM	0	0	0	0	34	330	0	0	15	0	11	0	0	123	22	0	535
06:30 AM	0	0	0	0	45	365	0	0	21	0	19	0	0	117	17	0	584
06:45 AM	0	0	0	0	53	410	0	0	34	0	16	0	0	146	24	0	683
Total	0	0	0	0	155	1376	0	0	87	0	54	0	0	442	84	0	2198
07:00 AM	0	0	0	0	56	440	0	0	30	0	25	0	0	226	25	0	802
07:15 AM	0	0	0	0	56	486	0	0	40	0	32	0	0	202	18	0	834
07:30 AM	0	0	0	0	60	456	0	0	53	0	25	0	0	183	18	0	795
07:45 AM	0	0	0	0	57	440	0	0	43	0	29	0	0	198	30	0	797
Total	0	0	0	0	229	1822	0	0	166	0	111	0	0	809	91	0	3228
08:00 AM	0	0	0	0	51	408	0	0	43	0	32	0	0	184	34	0	752
08:15 AM	0	0	0	0	57	357	0	0	40	0	31	0	0	182	30	0	697
08:30 AM	0	0	0	0	43	357	0	0	50	0	28	0	0	190	28	0	696
08:45 AM	0	0	0	0	72	325	0	0	40	0	32	0	0	194	38	0	701
Total	0	0	0	0	223	1447	0	0	173	0	123	0	0	750	130	0	2846
Grand Total	0	0	0	0	607	4645	0	0	426	0	288	0	0	2001	305	0	8272
Apprch %	0	0	0	0	11.6	88.4	0	0	59.7	0	40.3	0	0	86.8	13.2	0	
Total %	0	0	0	0	7.3	56.2	0	0	5.1	0	3.5	0	0	24.2	3.7	0	
Motorcycles	0	0	0	0	1	5	0	0	0	0	1	0	0	5	0	0	12
% Motorcycles	0	0	0	0	0.2	0.1	0	0	0	0	0.3	0	0	0.2	0	0	0.1
Cars	0	0	0	0	366	4152	0	0	231	0	185	0	0	1349	143	0	6426
% Cars	0	0	0	0	60.3	89.4	0	0	54.2	0	64.2	0	0	67.4	46.9	0	77.7
Light Goods Vehicles	0	0	0	0	229	411	0	0	166	0	86	0	0	512	120	0	1524
% Light Goods Vehicles	0	0	0	0	37.7	8.8	0	0	39	0	29.9	0	0	25.6	39.3	0	18.4
Buses	0	0	0	0	9	32	0	0	1	0	8	0	0	46	6	0	102
% Buses	0	0	0	0	1.5	0.7	0	0	0.2	0	2.8	0	0	2.3	2	0	1.2
Single-Unit Trucks	0	0	0	0	1	35	0	0	13	0	6	0	0	58	19	0	132
% Single-Unit Trucks	0	0	0	0	0.2	0.8	0	0	3.1	0	2.1	0	0	2.9	6.2	0	1.6
Articulated Trucks	0	0	0	0	1	10	0	0	15	0	2	0	0	31	17	0	76
% Articulated Trucks	0	0	0	0	0.2	0.2	0	0	3.5	0	0.7	0	0	1.5	5.6	0	0.9
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Start Date : 5/17/2017
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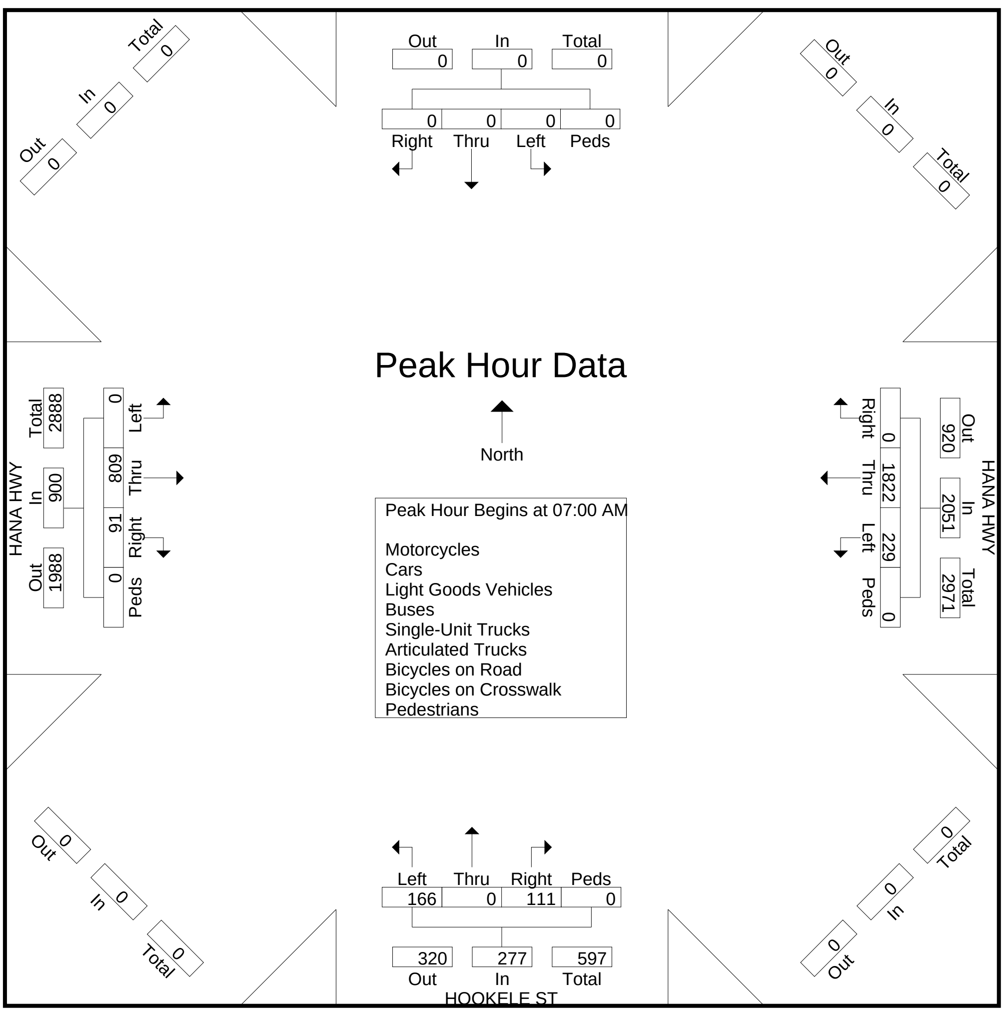
	Southbound					HANA HWY Westbound					HOOKELE ST Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	56	440	0	0	496	30	0	25	0	55	0	**226**	25	0	**251**	802
07:15 AM	0	0	0	0	0	56	**486**			**542**	40	0	**32**	0	72	0	202	18	0	220	**834**
07:30 AM	0	0	0	0	0	**60**	456	0	0	516	**53**				**78**	0	183	18	0	201	795
07:45 AM	0	0	0	0	0	57	440	0	0	497	43	0	29	0	72	0	198	**30**			
Total Volume	0	0	0	0	0	229	1822	0	0	2051	166	0	111	0	277	0	809	91	0	900	3228
% App. Total																					
PHF	.000	.000	.000	.000	.000	.954	.937	.000	.000	.946	.783	.000	.867	.000	.888	.000	.895	.758	.000	.896	.968



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Start Date : 5/17/2017

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HANA HWY Westbound				HOOKELE ST Northbound				HANA HWY 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	0	0	32	291	0	0	47	0	50	0	0	303	45	0	768
03:15 PM	0	0	0	0	44	286	0	0	54	0	65	0	0	326	59	0	834
03:30 PM	0	0	0	0	44	319	0	0	37	0	74	0	0	335	75	0	884
03:45 PM	0	0	0	0	46	289	0	0	56	0	70	0	0	339	50	0	850
Total	0	0	0	0	166	1185	0	0	194	0	259	0	0	1303	229	0	3336
04:00 PM	0	0	0	0	67	270	0	0	61	0	76	0	0	408	58	0	940
04:15 PM	0	0	0	0	51	299	0	0	40	0	94	0	0	389	48	0	921
04:30 PM	0	0	0	0	41	247	0	0	30	0	85	0	0	435	56	0	894
04:45 PM	0	0	0	0	49	223	0	0	31	0	78	0	0	411	62	0	854
Total	0	0	0	0	208	1039	0	0	162	0	333	0	0	1643	224	0	3609
05:00 PM	0	0	0	0	41	238	0	0	32	0	78	0	0	373	54	0	816
05:15 PM	0	0	0	0	36	191	0	0	35	0	76	0	0	421	44	0	803
Grand Total	0	0	0	0	451	2653	0	0	423	0	746	0	0	3740	551	0	8564
Apprch %	0	0	0	0	14.5	85.5	0	0	36.2	0	63.8	0	0	87.2	12.8	0	
Total %	0	0	0	0	5.3	31	0	0	4.9	0	8.7	0	0	43.7	6.4	0	
Motorcycles	0	0	0	0	10	3	0	0	3	0	3	0	0	18	2	0	39
% Motorcycles	0	0	0	0	2.2	0.1	0	0	0.7	0	0.4	0	0	0.5	0.4	0	0.5
Cars	0	0	0	0	341	2391	0	0	277	0	521	0	0	3002	393	0	6925
% Cars	0	0	0	0	75.6	90.1	0	0	65.5	0	69.8	0	0	80.3	71.3	0	80.9
Light Goods Vehicles	0	0	0	0	92	180	0	0	114	0	220	0	0	685	148	0	1439
% Light Goods Vehicles	0	0	0	0	20.4	6.8	0	0	27	0	29.5	0	0	18.3	26.9	0	16.8
Buses	0	0	0	0	3	33	0	0	2	0	0	0	0	19	0	0	57
% Buses	0	0	0	0	0.7	1.2	0	0	0.5	0	0	0	0	0.5	0	0	0.7
Single-Unit Trucks	0	0	0	0	5	39	0	0	18	0	2	0	0	15	3	0	82
% Single-Unit Trucks	0	0	0	0	1.1	1.5	0	0	4.3	0	0.3	0	0	0.4	0.5	0	1
Articulated Trucks	0	0	0	0	0	7	0	0	8	0	0	0	0	1	5	0	21
% Articulated Trucks	0	0	0	0	0	0.3	0	0	1.9	0	0	0	0	0	0.9	0	0.2
Bicycles on Road	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Start Date : 5/17/2017
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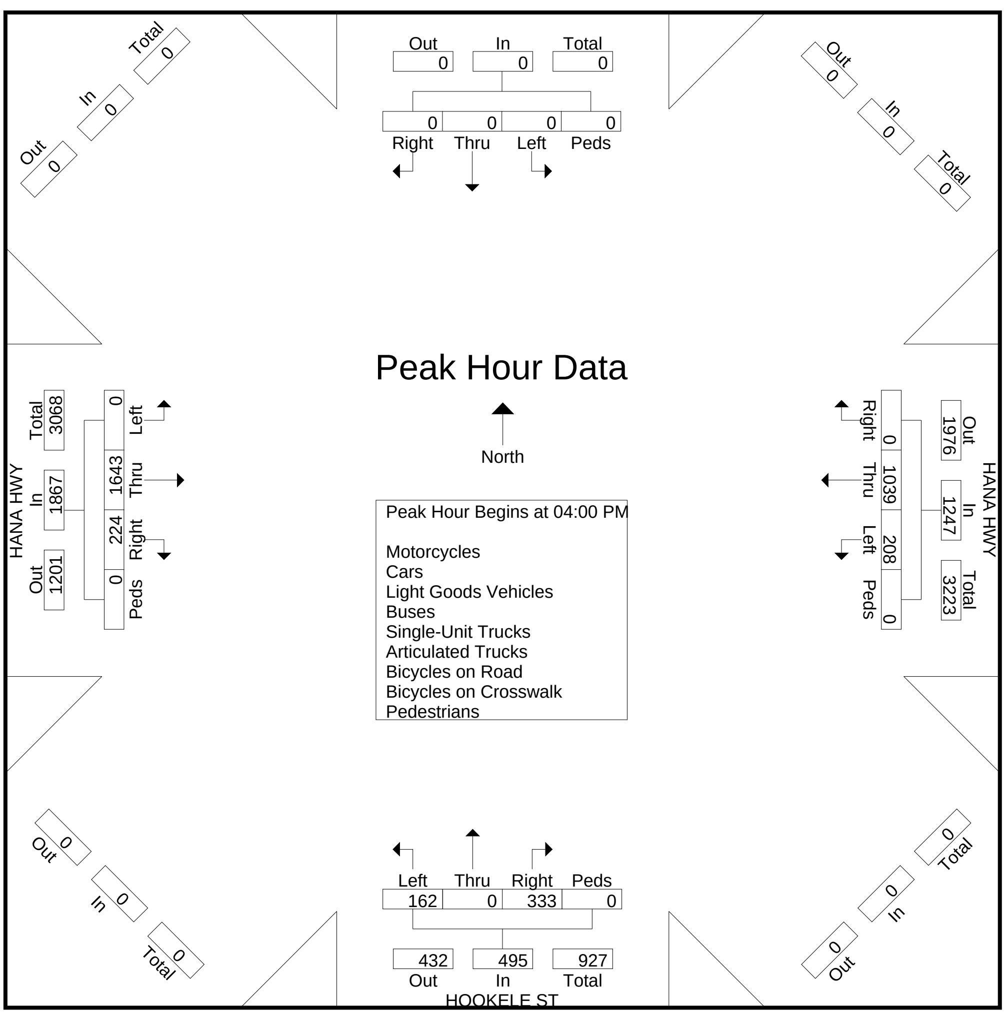
	Southbound					HANA HWY Westbound					HOOKELE ST Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	**67**	270	0	0	337	**61**				**137**	0	408	58	0	466	**940**
04:15 PM	0	0	0	0	0	51	**299**			**350**	40	0	**94**	0	134	0	389	48	0	437	921
04:30 PM	0	0	0	0	0	41	247	0	0	288	30	0	85	0	115	0	**435**	56	0	**491**	894
04:45 PM	0	0	0	0	0	49	223	0	0	272	31	0	78	0	109	0	411	**62**			
Total Volume	0	0	0	0	0	208	1039	0	0	1247	162	0	333	0	495	0	1643	224	0	1867	3609
% App. Total	0	0	0	0		16.7	83.3	0	0		32.7	0	67.3	0		0	88	12	0		
PHF	.000	.000	.000	.000	.000	.776	.869	.000	.000	.891	.664	.000	.886	.000	.903	.000	.944	.903	.000	.951	.960



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File Name : WE_Hookele St - Hana Hwy
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Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

	Southbound				HANA HWY Westbound				HOOKELE ST Northbound				HANA HWY Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
11:00 AM	0	0	0	0	71	289	0	0	64	0	43	0	0	251	44	0	762
11:15 AM	0	0	0	0	46	293	0	0	55	0	55	0	0	215	54	0	718
11:30 AM	0	0	0	0	70	317	0	0	74	0	46	0	0	252	58	0	817
11:45 AM	0	0	0	0	65	327	0	0	61	0	52	0	0	228	61	0	794
Total	0	0	0	0	252	1226	0	0	254	0	196	0	0	946	217	0	3091
12:00 PM	0	0	0	0	38	274	0	0	63	0	56	0	0	249	63	0	743
12:15 PM	0	0	0	0	62	252	0	0	68	0	38	0	0	258	67	0	745
12:30 PM	0	0	0	0	65	284	0	0	59	0	56	0	0	299	71	0	834
12:45 PM	0	0	0	0	33	250	0	0	66	0	56	0	0	245	45	0	695
Total	0	0	0	0	198	1060	0	0	256	0	206	0	0	1051	246	0	3017
Grand Total	0	0	0	0	450	2286	0	0	510	0	402	0	0	1997	463	0	6108
Apprch %	0	0	0	0	16.4	83.6	0	0	55.9	0	44.1	0	0	81.2	18.8	0	
Total %	0	0	0	0	7.4	37.4	0	0	8.3	0	6.6	0	0	32.7	7.6	0	
Motorcycles	0	0	0	0	2	6	0	0	2	0	0	0	0	6	2	0	18
% Motorcycles	0	0	0	0	0.4	0.3	0	0	0.4	0	0	0	0	0.3	0.4	0	0.3
Cars	0	0	0	0	337	1906	0	0	336	0	329	0	0	1482	319	0	4709
% Cars	0	0	0	0	74.9	83.4	0	0	65.9	0	81.8	0	0	74.2	68.9	0	77.1
Light Goods Vehicles	0	0	0	0	104	273	0	0	159	0	67	0	0	414	128	0	1145
% Light Goods Vehicles	0	0	0	0	23.1	11.9	0	0	31.2	0	16.7	0	0	20.7	27.6	0	18.7
Buses	0	0	0	0	3	9	0	0	2	0	2	0	0	12	3	0	31
% Buses	0	0	0	0	0.7	0.4	0	0	0.4	0	0.5	0	0	0.6	0.6	0	0.5
Single-Unit Trucks	0	0	0	0	4	24	0	0	5	0	2	0	0	17	11	0	63
% Single-Unit Trucks	0	0	0	0	0.9	1	0	0	1	0	0.5	0	0	0.9	2.4	0	1
Articulated Trucks	0	0	0	0	0	66	0	0	5	0	1	0	0	66	0	0	138
% Articulated Trucks	0	0	0	0	0	2.9	0	0	1	0	0.2	0	0	3.3	0	0	2.3
Bicycles on Road	0	0	0	0	0	2	0	0	1	0	1	0	0	0	0	0	4
% Bicycles on Road	0	0	0	0	0	0.1	0	0	0.2	0	0.2	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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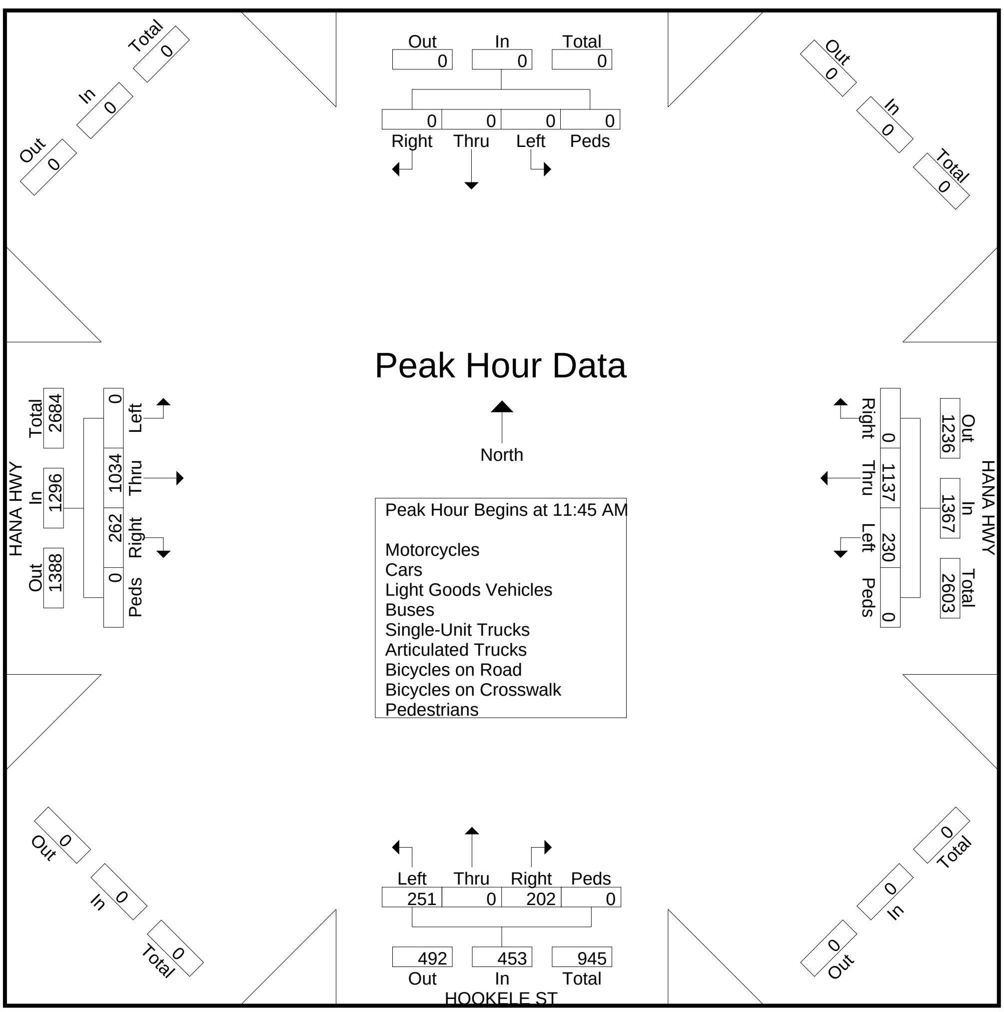
Start Date : 5/20/2017

	Southbound					HANA HWY Westbound					HOOKELE ST Northbound					HANA HWY Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	0	0	0	0	0	**65**	**327**			**392**	61	0	52	0	113	0	228	61	0	289	794
12:00 PM	0	0	0	0	0	38	274	0	0	312	63	0	**56**	0	**119**	0	249	63	0	312	743
12:15 PM	0	0	0	0	0	62	252	0	0	314	**68**										
12:30 PM	**0**	**0**	**0**	**0**	**0**	**65**	**284**	**0**	**0**	**349**	**59**	**0**	**56**	**0**	**115**	**0**	**299**	**71**	**0**	**370**	**834**
Total Volume	0	0	0	0	0	230	1137	0	0	1367	251	0	202	0	453	0	1034	262	0	1296	3116
% App. Total	0	0	0	0		16.8	83.2	0	0		55.4	0	44.6	0		0	79.8	20.2	0		
PHF	.000	.000	.000	.000	.000	.885	.869	.000	.000	.872	.923	.000	.902	.000	.952	.000	.865	.923	.000	.876	.934



APPENDIX B

LEVEL OF SERVICE CRITERIA

APPENDIX B – LEVEL OF SERVICE (LOS) CRITERIA

VEHICULAR LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS (HCM 6th Edition)

Level of service for vehicles at signalized intersections is directly related to delay values and is assigned on that basis. Level of Service is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are given in the table below.

Level-of Service Criteria for Signalized Intersections

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

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

VEHICULAR LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 6th Edition)

The level of service criteria for vehicles at unsignalized intersections is defined as the average control delay, in seconds per vehicle.

LOS delay threshold values are lower for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerate greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	> 50

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing AM Peak

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	66	70	253	71	23	20
Future Vol, veh/h	66	70	253	71	23	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	72	76	275	77	25	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	352	0	-	0	534	314
Stage 1	-	-	-	-	314	-
Stage 2	-	-	-	-	220	-
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	1207	-	-	-	507	726
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	817	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1207	-	-	-	476	726
Mov Cap-2 Maneuver	-	-	-	-	476	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	817	-

Approach	EB		WB		SB	
HCM Control Delay, s	4		0		11.9	
HCM LOS					B	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1207	-	-	-	567
HCM Lane V/C Ratio	0.059	-	-	-	0.082
HCM Control Delay (s)	8.2	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	111	2	5	252	15	1	0	6	19	0	13
Future Vol, veh/h	4	111	2	5	252	15	1	0	6	19	0	13
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	-	-	100	-	-	-	-	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	4	121	2	5	274	16	1	0	7	21	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	290	0	0	123	0	0	429	430	122	426	423	282
Stage 1	-	-	-	-	-	-	130	130	-	292	292	-
Stage 2	-	-	-	-	-	-	299	300	-	134	131	-
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	1272	-	-	1464	-	-	536	518	929	539	522	757
Stage 1	-	-	-	-	-	-	874	789	-	716	671	-
Stage 2	-	-	-	-	-	-	710	666	-	869	788	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1272	-	-	1464	-	-	523	515	929	533	519	757
Mov Cap-2 Maneuver	-	-	-	-	-	-	523	515	-	533	519	-
Stage 1	-	-	-	-	-	-	871	787	-	714	669	-
Stage 2	-	-	-	-	-	-	694	664	-	860	786	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	9.3	11.3
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	523	929	1272	-	-	1464	-	-	606
HCM Lane V/C Ratio	0.002	0.007	0.003	-	-	0.004	-	-	0.057
HCM Control Delay (s)	11.9	8.9	7.8	-	-	7.5	-	-	11.3
HCM Lane LOS	B	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	69	49	118	151	163	54
Future Vol, veh/h	69	49	118	151	163	54
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	53	128	164	177	59

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	129	0	523	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	420	-
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	-	-	1457	-	514	952
Stage 1	-	-	-	-	921	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1456	-	468	951
Mov Cap-2 Maneuver	-	-	-	-	523	-
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	605	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.4	13.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	523	951	-	-	1456	-
HCM Lane V/C Ratio	0.339	0.062	-	-	0.088	-
HCM Control Delay (s)	15.4	9	-	-	7.7	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	1.5	0.2	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	106	66	6	304	4	12	0	2	5	0	7
Future Vol, veh/h	5	106	66	6	304	4	12	0	2	5	0	7
Conflicting Peds, #/hr	0	0	1	1	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	-	0	100	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	115	72	7	330	4	13	0	2	5	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	334	0	0	188	0	0	476	474	116	508	544	332
Stage 1	-	-	-	-	-	-	126	126	-	346	346	-
Stage 2	-	-	-	-	-	-	350	348	-	162	198	-
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	1225	-	-	1386	-	-	499	489	936	475	446	710
Stage 1	-	-	-	-	-	-	878	792	-	670	635	-
Stage 2	-	-	-	-	-	-	666	634	-	840	737	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1225	-	-	1385	-	-	490	484	935	471	442	710
Mov Cap-2 Maneuver	-	-	-	-	-	-	490	484	-	471	442	-
Stage 1	-	-	-	-	-	-	874	788	-	667	632	-
Stage 2	-	-	-	-	-	-	656	631	-	835	733	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	12	11.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	490	935	1225	-	-	1385	-	-	586
HCM Lane V/C Ratio	0.027	0.002	0.004	-	-	0.005	-	-	0.022
HCM Control Delay (s)	12.5	8.9	8	-	-	7.6	-	-	11.3
HCM Lane LOS	B	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	0	-	-	0	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	117	5	147	232	1	6	48	43	6	70	103
Future Volume (veh/h)	123	117	5	147	232	1	6	48	43	6	70	103
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	134	127	4	160	252	1	7	52	4	7	76	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	183	345	11	219	397	336	13	270	20	13	151	128
Arrive On Green	0.10	0.19	0.19	0.12	0.21	0.21	0.01	0.08	0.08	0.01	0.08	0.08
Sat Flow, veh/h	1781	1803	57	1781	1870	1585	1781	3347	254	1781	1870	1585
Grp Volume(v), veh/h	134	0	131	160	252	1	7	27	29	7	76	9
Grp Sat Flow(s),veh/h/ln	1781	0	1860	1781	1870	1585	1781	1777	1825	1781	1870	1585
Q Serve(g_s), s	2.9	0.0	2.5	3.5	4.9	0.0	0.2	0.6	0.6	0.2	1.6	0.2
Cycle Q Clear(g_c), s	2.9	0.0	2.5	3.5	4.9	0.0	0.2	0.6	0.6	0.2	1.6	0.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	183	0	356	219	397	336	13	143	147	13	151	128
V/C Ratio(X)	0.73	0.00	0.37	0.73	0.64	0.00	0.53	0.19	0.20	0.53	0.50	0.07
Avail Cap(c_a), veh/h	2393	0	2314	2393	2327	1972	1064	1990	2043	1064	2094	1775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	0.0	14.1	17.0	14.4	12.5	19.9	17.3	17.3	19.9	17.7	17.1
Incr Delay (d2), s/veh	5.5	0.0	0.6	4.6	1.7	0.0	28.5	0.6	0.6	28.5	2.6	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	1.3	0.0	0.9	1.5	1.9	0.0	0.2	0.2	0.2	0.2	0.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.0	0.0	14.8	21.6	16.1	12.5	48.4	17.9	17.9	48.4	20.3	17.3
LnGrp LOS	C	A	B	C	B	B	D	B	B	D	C	B
Approach Vol, veh/h		265			413			63			92	
Approach Delay, s/veh		18.9			18.2			21.3			22.1	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	14.5	6.3	9.2	11.0	13.7	6.3	9.2
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	4.9	6.9	2.2	2.6	5.5	4.5	2.2	3.6
Green Ext Time (p_c), s	0.4	1.6	0.0	0.3	0.5	0.8	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	19.1
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	284	0	6	243	0	9
Future Vol, veh/h	284	0	6	243	0	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	309	0	7	264	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	309	0	-	309
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1252	-	0	731
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1252	-	-	731
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	731	-	1252	-
HCM Lane V/C Ratio	0.013	-	0.005	-
HCM Control Delay (s)	10	-	7.9	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0	-	0	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	284	855	0	0	1406	0	0	0	0	0	0	243
Future Vol, veh/h	284	855	0	0	1406	0	0	0	0	0	0	243
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	309	929	0	0	1528	0	0	0	0	0	0	264

Major/Minor	Major1		Major2				Minor2		
Conflicting Flow All	1528	0	-	-	-	0	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-	-	-	-
Pot Cap-1 Maneuver	432	-	0	0	-	0	0	0	0
Stage 1	-	-	0	0	-	0	0	0	0
Stage 2	-	-	0	0	-	0	0	0	0
Platoon blocked, %		-			-				
Mov Cap-1 Maneuver	432	-	-	-	-	-	-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	0	-
Stage 1	-	-	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	-	-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	7.9	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	432	-	-	-
HCM Lane V/C Ratio	0.715	-	-	-
HCM Control Delay (s)	31.6	-	-	0
HCM Lane LOS	D	-	-	A
HCM 95th %tile Q(veh)	5.5	-	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	1404	1	2	8	0	0	6	0
Future Vol, veh/h	0	0	0	0	1404	1	2	8	0	0	6	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	1526	1	2	9	0	0	7	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	-	-	0	767	1527	-	-	1527	-
Stage 1	-	-	-	0	0	-	-	1527	-
Stage 2	-	-	-	767	1527	-	-	0	-
Critical Hdwy	-	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	0	-	-	292	116	0	0	116	0
Stage 1	0	-	-	-	-	0	0	178	0
Stage 2	0	-	-	361	178	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	279	116	-	-	116	-
Mov Cap-2 Maneuver	-	-	-	279	116	-	-	116	-
Stage 1	-	-	-	-	-	-	-	178	-
Stage 2	-	-	-	348	178	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	35	37.9
HCM LOS		E	E

Minor Lane/Major Mvmt	NBLn1	WBT	WBR	SBLn1
Capacity (veh/h)	131	-	-	116
HCM Lane V/C Ratio	0.083	-	-	0.056
HCM Control Delay (s)	35	-	-	37.9
HCM Lane LOS	E	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	0.2

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	828	27	83	0	0	0	10	10	1	5	0
Future Vol, veh/h	0	828	27	83	0	0	0	10	10	1	5	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	-	-	-	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	0	900	29	90	0	0	0	11	11	1	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	929	0	0	-	1095	465	636	1109	-
Stage 1	-	-	-	-	-	-	-	915	-	180	180	-
Stage 2	-	-	-	-	-	-	-	180	-	456	929	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	-	-	-	734	-	0	0	213	545	376	209	0
Stage 1	-	-	-	-	-	0	0	351	-	821	750	0
Stage 2	-	-	-	-	-	0	0	750	-	554	345	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	734	-	-	-	187	545	319	183	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	187	-	319	183	-
Stage 1	-	-	-	-	-	-	-	351	-	821	658	-
Stage 2	-	-	-	-	-	-	-	658	-	526	345	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	10.6	19	23.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	278	-	-	-	734	-	197
HCM Lane V/C Ratio	0.078	-	-	-	0.123	-	0.033
HCM Control Delay (s)	19	0	-	-	10.6	-	23.9
HCM Lane LOS	C	A	-	-	B	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	0.4	-	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	5	2	31	39	9	10	63	133	46	15	194	16
Future Vol, veh/h	5	2	31	39	9	10	63	133	46	15	194	16
Conflicting Peds, #/hr	3	0	0	0	0	3	0	0	2	2	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	-	-	0	100	-	-	80	-	-
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	2	34	42	10	11	68	145	50	16	211	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	469	585	114	447	568	103	228	0	0	197	0	0
Stage 1	252	252	-	308	308	-	-	-	-	-	-	-
Stage 2	217	333	-	139	260	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	477	421	917	495	431	932	1337	-	-	1373	-	-
Stage 1	730	697	-	677	659	-	-	-	-	-	-	-
Stage 2	765	642	-	850	692	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	440	394	917	451	403	928	1337	-	-	1370	-	-
Mov Cap-2 Maneuver	440	394	-	451	403	-	-	-	-	-	-	-
Stage 1	693	689	-	641	624	-	-	-	-	-	-	-
Stage 2	704	608	-	807	684	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	13.4	2	0.5
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1337	-	-	917	441	928	1370	-	-
HCM Lane V/C Ratio	0.051	-	-	0.037	0.118	0.012	0.012	-	-
HCM Control Delay (s)	7.8	-	-	9.1	14.3	8.9	7.7	-	-
HCM Lane LOS	A	-	-	A	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	0.4	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	698	85	317	1314	100	50	101	115	40	189	38
Future Volume (veh/h)	44	698	85	317	1314	100	50	101	115	40	189	38
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	48	759	46	345	1428	66	54	110	0	43	205	28
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	62	2143	956	400	2431	1084	70	337		56	274	37
Arrive On Green	0.03	0.60	0.60	0.23	1.00	1.00	0.04	0.09	0.00	0.03	0.09	0.09
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3145	424
Grp Volume(v), veh/h	48	759	46	345	1428	66	54	110	0	43	115	118
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1792
Q Serve(g_s), s	4.1	16.7	1.8	14.9	0.0	0.0	4.7	4.5	0.0	3.7	9.8	10.0
Cycle Q Clear(g_c), s	4.1	16.7	1.8	14.9	0.0	0.0	4.7	4.5	0.0	3.7	9.8	10.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	62	2143	956	400	2431	1084	70	337		56	155	156
V/C Ratio(X)	0.77	0.35	0.05	0.86	0.59	0.06	0.77	0.33		0.77	0.74	0.76
Avail Cap(c_a), veh/h	218	2143	956	870	2431	1084	276	665		276	332	335
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.64	0.64	0.64	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	74.2	15.5	12.6	58.3	0.0	0.0	73.8	65.5	0.0	74.5	69.0	69.2
Incr Delay (d2), s/veh	18.0	0.5	0.1	3.7	0.7	0.1	16.3	0.6	0.0	19.4	6.8	7.4
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	2.2	6.6	0.7	5.8	0.2	0.0	2.5	2.1	0.0	2.0	4.8	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	92.2	16.0	12.7	62.0	0.7	0.1	90.1	66.1	0.0	93.9	75.8	76.5
LnGrp LOS	F	B	B	E	A	A	F	E		F	E	E
Approach Vol, veh/h		853			1839			164	A		276	
Approach Delay, s/veh		20.1			12.2			74.0			79.0	
Approach LOS		C			B			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.0	99.5	10.9	20.7	11.4	112.0	12.1	19.5				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	39.0	39.0	24.0	29.0	19.0	59.0	24.0	29.0				
Max Q Clear Time (g_c+I1), s	16.9	18.7	5.7	6.5	6.1	2.0	6.7	12.0				
Green Ext Time (p_c), s	1.1	4.7	0.1	0.6	0.1	14.3	0.1	1.1				
Intersection Summary												
HCM 6th Ctrl Delay			23.4									
HCM 6th LOS			C									

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	654	65	382	1557	114	77	217	278	38	87	53
Future Volume (veh/h)	110	654	65	382	1557	114	77	217	278	38	87	53
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	120	711	37	415	1692	77	84	236	11	41	95	1
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	164	3128	971	480	2501	1116	128	307	137	92	271	121
Arrive On Green	0.10	1.00	1.00	0.05	0.23	0.23	0.04	0.09	0.09	0.03	0.08	0.08
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	120	711	37	415	1692	77	84	236	11	41	95	1
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.2	0.0	0.0	18.5	67.2	5.9	3.7	10.1	1.0	1.8	3.9	0.1
Cycle Q Clear(g_c), s	5.2	0.0	0.0	18.5	67.2	5.9	3.7	10.1	1.0	1.8	3.9	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	164	3128	971	480	2501	1116	128	307	137	92	271	121
V/C Ratio(X)	0.73	0.23	0.04	0.87	0.68	0.07	0.66	0.77	0.08	0.44	0.35	0.01
Avail Cap(c_a), veh/h	334	3128	971	669	2501	1116	557	917	409	223	573	256
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	0.71	0.71	0.71	0.93	0.93	0.93	1.00	1.00	1.00
Uniform Delay (d), s/veh	69.2	0.0	0.0	72.5	43.4	19.9	73.6	69.3	65.1	74.3	68.0	66.2
Incr Delay (d2), s/veh	5.7	0.2	0.1	6.3	1.1	0.1	5.2	3.8	0.2	3.3	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	0.0	9.0	32.3	2.1	1.7	4.7	0.4	0.8	1.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.9	0.2	0.1	78.8	44.5	20.0	78.8	73.0	65.4	77.6	68.7	66.2
LnGrp LOS	E	A	A	E	D	B	E	E	E	E	E	E
Approach Vol, veh/h		868			2184			331			137	
Approach Delay, s/veh		10.5			50.1			74.3			71.4	
Approach LOS		B			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.4	115.1	10.7	16.8	26.5	100.9	9.1	18.4
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	15.0	69.0	25.0	25.0	30.0	54.0	10.0	40.0
Max Q Clear Time (g_c+I1), s	7.2	69.2	5.7	5.9	20.5	2.0	3.8	12.1
Green Ext Time (p_c), s	0.2	0.0	0.2	0.4	1.0	5.0	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	43.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Existing AM

13 Hookele St & Hana Hwy

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	155.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	155.0
HCM Control Delay(s)	18.1
HCM Intersection LOS	B
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	809	180	278	1822	166	171
Future Volume (vph)	809	180	278	1822	166	171
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	879	135	302	1980	180	89
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	56	—	—	—	89
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.94	0.94	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2611	1165	361	3097	243	488
HCM Volume/Capacity	0.337	0.116	0.835	0.639	0.741	0.182
HCM Lane Group Delay(s/veh)	16.7	12.4	73.2	3.9	75.1	54.7
HCM Lane Group LOS	B	B	E	A	E	D
HCM Approach Delay (s/veh)	16.1	—	—	13.1	68.3	—
HCM Approach LOS	B	—	—	B	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing PM Peak

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	108	306	232	61	102	54
Future Vol, veh/h	108	306	232	61	102	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	333	252	66	111	59

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	318	0	-	0	852	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	567	-
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	1242	-	-	-	330	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1242	-	-	-	292	754
Mov Cap-2 Maneuver	-	-	-	-	292	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	22.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1242	-	-	-	371
HCM Lane V/C Ratio	0.095	-	-	-	0.457
HCM Control Delay (s)	8.2	0	-	-	22.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	2.3

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	343	3	17	279	7	3	0	29	41	3	18
Future Vol, veh/h	3	343	3	17	279	7	3	0	29	41	3	18
Conflicting Peds, #/hr	0	0	2	2	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	-	-	100	-	-	-	-	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	3	373	3	18	303	8	3	0	32	45	3	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	311	0	0	378	0	0	738	730	377	740	727	307
Stage 1	-	-	-	-	-	-	383	383	-	343	343	-
Stage 2	-	-	-	-	-	-	355	347	-	397	384	-
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	1249	-	-	1180	-	-	334	349	670	333	351	733
Stage 1	-	-	-	-	-	-	640	612	-	672	637	-
Stage 2	-	-	-	-	-	-	662	635	-	629	611	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1249	-	-	1178	-	-	318	342	669	313	344	733
Mov Cap-2 Maneuver	-	-	-	-	-	-	318	342	-	313	344	-
Stage 1	-	-	-	-	-	-	637	610	-	671	627	-
Stage 2	-	-	-	-	-	-	631	625	-	598	609	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	11.1	16.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	669	1249	-	-	1178	-	-	377
HCM Lane V/C Ratio	0.01	0.047	0.003	-	-	0.016	-	-	0.179
HCM Control Delay (s)	16.4	10.6	7.9	-	-	8.1	-	-	16.6
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0	0.1	0	-	-	0	-	-	0.6

Intersection						
Int Delay, s/veh	8.9					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	196	103	123	193	247	180
Future Vol, veh/h	196	103	123	193	247	180
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	213	112	134	210	268	196

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	326	0	748	270
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	478	-
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	-	-	1234	-	380	769
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1233	-	338	768
Mov Cap-2 Maneuver	-	-	-	-	441	-
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	556	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	19.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	441	768	-	-	1233	-
HCM Lane V/C Ratio	0.609	0.255	-	-	0.108	-
HCM Control Delay (s)	25.1	11.3	-	-	8.3	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	3.9	1	-	-	0.4	-

Intersection	
Int Delay, s/veh	12.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	203	253	50	387	2	235	0	94	3	0	8
Future Vol, veh/h	1	203	253	50	387	2	235	0	94	3	0	8
Conflicting Peds, #/hr	0	0	7	7	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	-	0	100	-	-	-	-	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	1	221	275	54	421	2	255	0	102	3	0	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	423	0	0	503	0	0	765	761	228	942	1035	422
Stage 1	-	-	-	-	-	-	230	230	-	530	530	-
Stage 2	-	-	-	-	-	-	535	531	-	412	505	-
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	1136	-	-	1061	-	-	320	335	811	243	232	632
Stage 1	-	-	-	-	-	-	773	714	-	533	527	-
Stage 2	-	-	-	-	-	-	529	526	-	617	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1136	-	-	1054	-	-	301	315	806	204	218	632
Mov Cap-2 Maneuver	-	-	-	-	-	-	301	315	-	204	218	-
Stage 1	-	-	-	-	-	-	767	708	-	532	500	-
Stage 2	-	-	-	-	-	-	495	499	-	538	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1	44.7	14.2
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	301	806	1136	-	-	1054	-	-	402
HCM Lane V/C Ratio	0.849	0.127	0.001	-	-	0.052	-	-	0.03
HCM Control Delay (s)	58.6	10.1	8.2	-	-	8.6	-	-	14.2
HCM Lane LOS	F	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	7.3	0.4	0	-	-	0.2	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	305	20	387	269	0	61	47	109	23	78	164
Future Volume (veh/h)	84	305	20	387	269	0	61	47	109	23	78	164
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	91	332	21	421	292	0	66	51	9	25	85	7
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	122	423	27	489	840	712	86	315	54	40	146	123
Arrive On Green	0.07	0.24	0.24	0.27	0.45	0.00	0.05	0.10	0.10	0.02	0.08	0.08
Sat Flow, veh/h	1781	1740	110	1781	1870	1585	1781	3032	521	1781	1870	1585
Grp Volume(v), veh/h	91	0	353	421	292	0	66	29	31	25	85	7
Grp Sat Flow(s),veh/h/ln	1781	0	1851	1781	1870	1585	1781	1777	1777	1781	1870	1585
Q Serve(g_s), s	3.4	0.0	12.0	15.1	6.9	0.0	2.5	1.0	1.1	0.9	3.0	0.3
Cycle Q Clear(g_c), s	3.4	0.0	12.0	15.1	6.9	0.0	2.5	1.0	1.1	0.9	3.0	0.3
Prop In Lane	1.00		0.06	1.00		1.00	1.00		0.29	1.00		1.00
Lane Grp Cap(c), veh/h	122	0	450	489	840	712	86	185	185	40	146	123
V/C Ratio(X)	0.75	0.00	0.78	0.86	0.35	0.00	0.77	0.16	0.17	0.63	0.58	0.06
Avail Cap(c_a), veh/h	1428	0	1373	1428	1388	1176	635	1187	1187	635	1249	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	0.0	23.8	23.2	12.1	0.0	31.7	27.5	27.5	32.7	30.0	28.8
Incr Delay (d2), s/veh	8.8	0.0	3.1	4.6	0.2	0.0	13.2	0.4	0.4	15.5	3.7	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	1.7	0.0	5.3	6.5	2.6	0.0	1.3	0.4	0.5	0.6	1.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.6	0.0	26.9	27.8	12.4	0.0	44.9	27.9	27.9	48.2	33.7	29.0
LnGrp LOS	D	A	C	C	B	A	D	C	C	D	C	C
Approach Vol, veh/h		444			713			126			117	
Approach Delay, s/veh		29.5			21.5			36.8			36.5	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.6	36.3	7.5	13.0	24.5	22.4	9.3	11.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0				
Max Q Clear Time (g_c+I1), s	5.4	8.9	2.9	3.1	17.1	14.0	4.5	5.0				
Green Ext Time (p_c), s	0.3	1.9	0.0	0.3	1.4	2.4	0.1	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			26.7									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↰		↱
Traffic Vol, veh/h	422	0	7	271	0	23
Future Vol, veh/h	422	0	7	271	0	23
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	459	0	8	295	0	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	459	0	-	459
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1102	-	0	602
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1102	-	-	602
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	602	-	1102	-
HCM Lane V/C Ratio	0.042	-	0.007	-
HCM Control Delay (s)	11.2	-	8.3	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.1	-	0	-

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	422	1412	0	0	1018	0	0	0	0	0	0	271
Future Vol, veh/h	422	1412	0	0	1018	0	0	0	0	0	0	271
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	459	1535	0	0	1107	0	0	0	0	0	0	295

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1107	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	626	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	626	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	5.7	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	626	-	-	-
HCM Lane V/C Ratio	0.733	-	-	-
HCM Control Delay (s)	24.9	-	-	0
HCM Lane LOS	C	-	-	A
HCM 95th %tile Q(veh)	6.3	-	-	-

Intersection												
Int Delay, s/veh	0.5											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	1007	14	11	9	0	0	7	0
Future Vol, veh/h	0	0	0	0	1007	14	11	9	0	0	7	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	1095	15	12	10	0	0	8	0

Major/Minor				Major2			Minor1			Minor2		
Conflicting Flow All				-	-	0	552	1110	-	-	1103	-
Stage 1				-	-	-	0	0	-	-	1103	-
Stage 2				-	-	-	552	1110	-	-	0	-
Critical Hdwy				-	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1				-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2				-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy				-	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver				0	-	-	416	208	0	0	210	0
Stage 1				0	-	-	-	-	0	0	285	0
Stage 2				0	-	-	486	283	0	0	-	0
Platoon blocked, %					-	-						
Mov Cap-1 Maneuver				-	-	-	404	208	-	-	210	-
Mov Cap-2 Maneuver				-	-	-	404	208	-	-	210	-
Stage 1				-	-	-	-	-	-	-	285	-
Stage 2				-	-	-	473	283	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	18.7	22.8
HCM LOS		C	C

Minor Lane/Major Mvmt	NBLn1	WBT	WBR	SBLn1
Capacity (veh/h)	284	-	-	210
HCM Lane V/C Ratio	0.077	-	-	0.036
HCM Control Delay (s)	18.7	-	-	22.8
HCM Lane LOS	C	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	0.1

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	0	1394	18	36	0	0	0	20	43	2	5	0
Future Vol, veh/h	0	1394	18	36	0	0	0	20	43	2	5	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	-	-	-	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	0	1515	20	39	0	0	0	22	47	2	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1535	0	0	-	1603	768	847	1613	-
Stage 1	-	-	-	-	-	-	-	1525	-	78	78	-
Stage 2	-	-	-	-	-	-	-	78	-	769	1535	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	-	-	-	431	-	0	0	105	345	268	104	0
Stage 1	-	-	-	-	-	0	0	179	-	930	830	0
Stage 2	-	-	-	-	-	0	0	830	-	361	177	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	431	-	-	-	96	345	178	95	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	96	-	178	95	-
Stage 1	-	-	-	-	-	-	-	179	-	930	755	-
Stage 2	-	-	-	-	-	-	-	755	-	274	177	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	14.2	34.5	40.1
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	189	-	-	-	431	-	110
HCM Lane V/C Ratio	0.362	-	-	-	0.091	-	0.069
HCM Control Delay (s)	34.5	0	-	-	14.2	-	40.1
HCM Lane LOS	D	A	-	-	B	-	E
HCM 95th %tile Q(veh)	1.5	-	-	-	0.3	-	0.2

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	0	3	61	104	20	32	54	329	100	24	441	33
Future Vol, veh/h	0	3	61	104	20	32	54	329	100	24	441	33
Conflicting Peds, #/hr	3	0	0	0	0	3	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	100	-	-	80	-	-
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	3	66	113	22	35	59	358	109	26	479	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	1137	261	824	1101	237	518	0	0	467	0	0
Stage 1	-	552	-	531	531	-	-	-	-	-	-	-
Stage 2	-	585	-	293	570	-	-	-	-	-	-	-
Critical Hdwy	-	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	200	738	265	211	764	1044	-	-	1091	-	-
Stage 1	0	513	-	500	524	-	-	-	-	-	-	-
Stage 2	0	496	-	691	504	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	184	736	223	194	762	1041	-	-	1091	-	-
Mov Cap-2 Maneuver	-	184	-	223	194	-	-	-	-	-	-	-
Stage 1	-	499	-	472	494	-	-	-	-	-	-	-
Stage 2	-	468	-	610	490	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	37.8	1	0.4
HCM LOS	B	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1041	-	-	736	218	762	1091	-	-
HCM Lane V/C Ratio	0.056	-	-	0.09	0.618	0.046	0.024	-	-
HCM Control Delay (s)	8.7	-	-	10.4	45	10	8.4	-	-
HCM Lane LOS	A	-	-	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	3.6	0.1	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	1216	168	243	910	147	103	196	274	123	389	15
Future Volume (veh/h)	115	1216	168	243	910	147	103	196	274	123	389	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	125	1322	98	264	989	84	112	213	0	134	423	14
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	146	1941	866	318	1977	882	132	460		154	498	16
Arrive On Green	0.08	0.55	0.55	0.06	0.37	0.37	0.07	0.13	0.00	0.09	0.14	0.14
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3510	116
Grp Volume(v), veh/h	125	1322	98	264	989	84	112	213	0	134	214	223
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1849
Q Serve(g_s), s	11.4	44.3	4.9	12.5	35.4	5.7	10.2	9.2	0.0	12.3	19.4	19.4
Cycle Q Clear(g_c), s	11.4	44.3	4.9	12.5	35.4	5.7	10.2	9.2	0.0	12.3	19.4	19.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.06
Lane Grp Cap(c), veh/h	146	1941	866	318	1977	882	132	460		154	252	262
V/C Ratio(X)	0.86	0.68	0.11	0.83	0.50	0.10	0.85	0.46		0.87	0.85	0.85
Avail Cap(c_a), veh/h	205	1941	866	607	1977	882	184	711		184	355	370
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.87	0.87	0.87	0.95	0.95	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	74.8	27.0	18.1	76.1	34.1	24.7	75.4	66.5	0.0	74.4	69.1	69.1
Incr Delay (d2), s/veh	21.5	2.0	0.3	4.9	0.8	0.2	21.1	0.7	0.0	29.5	12.6	12.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	18.4	1.9	5.8	16.1	2.3	5.5	4.2	0.0	6.9	9.7	10.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.3	29.0	18.4	81.0	34.8	24.9	96.5	67.2	0.0	103.9	81.7	81.6
LnGrp LOS	F	C	B	F	C	C	F	E		F	F	F
Approach Vol, veh/h		1545			1337			325	A		571	
Approach Delay, s/veh		33.8			43.3			77.3			86.9	
Approach LOS		C			D			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.2	96.1	20.3	27.4	19.5	97.8	18.3	29.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	29.0	62.0	17.0	33.0	19.0	72.0	17.0	33.0
Max Q Clear Time (g_c+I1), s	14.5	46.3	14.3	11.2	13.4	37.4	12.2	21.4
Green Ext Time (p_c), s	0.7	8.0	0.1	1.3	0.1	7.6	0.1	2.0

Intersection Summary		
HCM 6th Ctrl Delay		48.9
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑	↱	↰↰	↑↑	↱	↰↰	↑↑	↱	↰↰	↑↑	↱
Traffic Volume (veh/h)	103	1427	97	356	988	138	95	171	313	119	316	140
Future Volume (veh/h)	103	1427	97	356	988	138	95	171	313	119	316	140
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	112	1551	52	387	1074	114	103	186	20	129	343	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	157	3005	933	435	2377	1060	147	383	171	175	411	183
Arrive On Green	0.03	0.39	0.39	0.25	1.00	1.00	0.04	0.11	0.11	0.05	0.12	0.12
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	112	1551	52	387	1074	114	103	186	20	129	343	9
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.3	38.1	3.4	17.8	0.0	0.0	4.9	8.1	1.9	6.1	15.6	0.8
Cycle Q Clear(g_c), s	5.3	38.1	3.4	17.8	0.0	0.0	4.9	8.1	1.9	6.1	15.6	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	3005	933	435	2377	1060	147	383	171	175	411	183
V/C Ratio(X)	0.71	0.52	0.06	0.89	0.45	0.11	0.70	0.49	0.12	0.74	0.83	0.05
Avail Cap(c_a), veh/h	524	3005	933	628	2377	1060	524	646	288	524	646	288
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.61	0.61	0.87	0.87	0.87	0.70	0.70	0.70	1.00	1.00	1.00
Uniform Delay (d), s/veh	78.9	32.1	21.6	60.6	0.0	0.0	77.9	69.3	66.5	77.2	71.4	64.9
Incr Delay (d2), s/veh	3.6	0.4	0.1	9.6	0.5	0.2	4.2	0.7	0.2	5.9	5.4	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	2.4	16.5	1.2	7.2	0.2	0.1	2.2	3.7	0.8	2.8	7.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.5	32.5	21.7	70.2	0.5	0.2	82.1	70.0	66.7	83.1	76.8	65.0
LnGrp LOS	F	C	C	E	A	A	F	E	E	F	E	E
Approach Vol, veh/h		1715			1575			309			481	
Approach Delay, s/veh		35.4			17.6			73.8			78.3	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	116.4	12.0	24.1	25.8	103.1	13.4	22.8
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	64.0	25.0	30.0	30.0	59.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	7.3	2.0	6.9	17.6	19.8	40.1	8.1	10.1
Green Ext Time (p_c), s	0.3	9.3	0.2	1.5	1.0	10.1	0.3	0.9

Intersection Summary	
HCM 6th Ctrl Delay	36.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Existing PM

13 Hookele St & Hana Hwy

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	165.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	165.0
HCM Control Delay(s)	20.2
HCM Intersection LOS	C
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1643	224	287	1193	260	497
Future Volume (vph)	1643	224	287	1193	260	497
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	1786	177	312	1297	283	504
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	61	—	—	—	33
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.78	0.78	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2369	1056	357	2843	503	694
HCM Volume/Capacity	0.754	0.168	0.875	0.456	0.563	0.727
HCM Lane Group Delay(s/veh)	1.8	0.3	89.3	5.7	67.1	60.7
HCM Lane Group LOS	A	A	F	A	E	E
HCM Approach Delay (s/veh)	1.7	—	—	21.9	63.0	—
HCM Approach LOS	A	—	—	C	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing SAT MD Peak

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	166	216	251	67	46	60
Future Vol, veh/h	166	216	251	67	46	60
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	180	235	273	73	50	65

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	905	310
Stage 1	-	-	-	-	310	-
Stage 2	-	-	-	-	595	-
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	1213	-	-	-	307	730
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	551	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1213	-	-	-	255	730
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	551	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	17.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1213	-	-	-	404
HCM Lane V/C Ratio	0.149	-	-	-	0.285
HCM Control Delay (s)	8.5	0	-	-	17.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	1.2

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	331	4	11	299	1	4	0	47	4	0	4
Future Vol, veh/h	1	331	4	11	299	1	4	0	47	4	0	4
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	-	-	100	-	-	-	-	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	1	360	4	12	325	1	4	0	51	4	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	326	0	0	364	0	0	716	714	362	740	716	326
Stage 1	-	-	-	-	-	-	364	364	-	350	350	-
Stage 2	-	-	-	-	-	-	352	350	-	390	366	-
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	-	-	1195	-	-	345	357	683	333	356	715
Stage 1	-	-	-	-	-	-	655	624	-	666	633	-
Stage 2	-	-	-	-	-	-	665	633	-	634	623	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1234	-	-	1195	-	-	340	353	683	306	352	715
Mov Cap-2 Maneuver	-	-	-	-	-	-	340	353	-	306	352	-
Stage 1	-	-	-	-	-	-	654	623	-	665	627	-
Stage 2	-	-	-	-	-	-	654	627	-	586	622	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	11.1	13.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	340	683	1234	-	-	1195	-	-	429
HCM Lane V/C Ratio	0.013	0.075	0.001	-	-	0.01	-	-	0.02
HCM Control Delay (s)	15.7	10.7	7.9	-	-	8	-	-	13.6
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.2	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	9.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	189	102	155	181	242	188
Future Vol, veh/h	189	102	155	181	242	188
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	111	168	197	263	204

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	316	0	794	261
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	533	-
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	-	-	1244	-	357	778
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	588	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1244	-	309	778
Mov Cap-2 Maneuver	-	-	-	-	410	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.9	20.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	410	778	-	-	1244	-
HCM Lane V/C Ratio	0.642	0.263	-	-	0.135	-
HCM Control Delay (s)	28.2	11.3	-	-	8.3	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	4.3	1.1	-	-	0.5	-

Intersection	
Int Delay, s/veh	12.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	172	329	51	410	2	248	0	110	2	1	6
Future Vol, veh/h	2	172	329	51	410	2	248	0	110	2	1	6
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	-	0	100	-	-	-	-	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	2	187	358	55	446	2	270	0	120	2	1	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	448	0	0	545	0	0	752	749	187	987	1106	447
Stage 1	-	-	-	-	-	-	191	191	-	557	557	-
Stage 2	-	-	-	-	-	-	561	558	-	430	549	-
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	1112	-	-	1024	-	-	327	341	855	226	210	612
Stage 1	-	-	-	-	-	-	811	742	-	515	512	-
Stage 2	-	-	-	-	-	-	512	512	-	603	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1112	-	-	1024	-	-	309	322	855	186	198	612
Mov Cap-2 Maneuver	-	-	-	-	-	-	309	322	-	186	198	-
Stage 1	-	-	-	-	-	-	809	741	-	514	484	-
Stage 2	-	-	-	-	-	-	478	484	-	518	515	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	1	45.6	15.6
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	309	855	1112	-	-	1024	-	-	351
HCM Lane V/C Ratio	0.872	0.14	0.002	-	-	0.054	-	-	0.028
HCM Control Delay (s)	61.4	9.9	8.2	-	-	8.7	-	-	15.6
HCM Lane LOS	F	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	7.9	0.5	0	-	-	0.2	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	96	286	24	407	280	0	60	57	128	27	55	99
Future Volume (veh/h)	96	286	24	407	280	0	60	57	128	27	55	99
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	104	311	25	442	304	0	65	62	9	29	60	3
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	139	401	32	513	831	704	85	267	38	45	118	100
Arrive On Green	0.08	0.23	0.23	0.29	0.44	0.00	0.05	0.09	0.09	0.03	0.06	0.06
Sat Flow, veh/h	1781	1708	137	1781	1870	1585	1781	3123	444	1781	1870	1585
Grp Volume(v), veh/h	104	0	336	442	304	0	65	35	36	29	60	3
Grp Sat Flow(s),veh/h/ln	1781	0	1846	1781	1870	1585	1781	1777	1790	1781	1870	1585
Q Serve(g_s), s	3.7	0.0	11.1	15.4	7.1	0.0	2.4	1.2	1.2	1.1	2.0	0.1
Cycle Q Clear(g_c), s	3.7	0.0	11.1	15.4	7.1	0.0	2.4	1.2	1.2	1.1	2.0	0.1
Prop In Lane	1.00		0.07	1.00		1.00	1.00		0.25	1.00		1.00
Lane Grp Cap(c), veh/h	139	0	434	513	831	704	85	152	153	45	118	100
V/C Ratio(X)	0.75	0.00	0.77	0.86	0.37	0.00	0.77	0.23	0.24	0.65	0.51	0.03
Avail Cap(c_a), veh/h	1470	0	1410	1470	1429	1211	653	1222	1231	653	1286	1090
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.5	0.0	23.4	22.1	12.1	0.0	30.8	27.9	27.9	31.6	29.7	28.8
Incr Delay (d2), s/veh	7.7	0.0	3.0	4.4	0.3	0.0	13.5	0.8	0.8	14.8	3.4	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	1.8	0.0	4.9	6.5	2.7	0.0	1.3	0.5	0.5	0.6	1.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.2	0.0	26.4	26.5	12.3	0.0	44.3	28.7	28.7	46.4	33.0	28.9
LnGrp LOS	D	A	C	C	B	A	D	C	C	D	C	C
Approach Vol, veh/h		440			746			136			92	
Approach Delay, s/veh		29.0			20.7			36.2			37.1	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	35.1	7.6	11.6	24.8	21.4	9.1	10.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	5.7	9.1	3.1	3.2	17.4	13.1	4.4	4.0
Green Ext Time (p_c), s	0.3	2.0	0.0	0.4	1.5	2.2	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	25.8
HCM 6th LOS	C

Intersection						
Int Delay, s/veh	0.6					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	418	0	17	265	0	28
Future Vol, veh/h	418	0	17	265	0	28
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	454	0	18	288	0	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	454	0	-	454
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1107	-	0	606
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1107	-	-	606
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	606	-	1107	-
HCM Lane V/C Ratio	0.05	-	0.017	-
HCM Control Delay (s)	11.3	-	8.3	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.2	-	0.1	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	418	1214	0	0	939	0	0	0	0	0	0	265
Future Vol, veh/h	418	1214	0	0	939	0	0	0	0	0	0	265
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	454	1320	0	0	1021	0	0	0	0	0	0	288

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1021	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	675	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	675	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	5.3	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	675	-	-	-
HCM Lane V/C Ratio	0.673	-	-	-
HCM Control Delay (s)	20.6	-	-	0
HCM Lane LOS	C	-	-	A
HCM 95th %tile Q(veh)	5.2	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	929	16	10	12	0	0	17	0
Future Vol, veh/h	0	0	0	0	929	16	10	12	0	0	17	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	1010	17	11	13	0	0	18	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	-	-	0	514	1027	-	-	1019	-
Stage 1	-	-	-	0	0	-	-	1019	-
Stage 2	-	-	-	514	1027	-	-	0	-
Critical Hdwy	-	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	0	-	-	443	233	0	0	236	0
Stage 1	0	-	-	-	-	0	0	313	0
Stage 2	0	-	-	511	310	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	416	233	-	-	236	-
Mov Cap-2 Maneuver	-	-	-	416	233	-	-	236	-
Stage 1	-	-	-	-	-	-	-	313	-
Stage 2	-	-	-	481	310	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	18.5	21.5
HCM LOS		C	C

Minor Lane/Major Mvmt	NBLn1	WBT	WBR	SBLn1
Capacity (veh/h)	291	-	-	236
HCM Lane V/C Ratio	0.082	-	-	0.078
HCM Control Delay (s)	18.5	-	-	21.5
HCM Lane LOS	C	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	0.3

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	0	1186	28	65	0	0	0	22	0	0	17	0
Future Vol, veh/h	0	1186	28	65	0	0	0	22	0	0	17	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	-	-	-	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	0	1289	30	71	0	0	0	24	0	0	18	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1319	0	0	-	1446	660	799	1461	-
Stage 1	-	-	-	-	-	-	-	1304	-	142	142	-
Stage 2	-	-	-	-	-	-	-	142	-	657	1319	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	-	-	-	522	-	0	0	131	406	290	128	0
Stage 1	-	-	-	-	-	0	0	229	-	860	779	0
Stage 2	-	-	-	-	-	0	0	779	-	421	226	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	522	-	-	-	113	406	218	111	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	113	-	218	111	-
Stage 1	-	-	-	-	-	-	-	229	-	860	673	-
Stage 2	-	-	-	-	-	-	-	673	-	377	226	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	13	45.2	43.8
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	113	-	-	-	522	-	111
HCM Lane V/C Ratio	0.212	-	-	-	0.135	-	0.166
HCM Control Delay (s)	45.2	0	-	-	13	-	43.8
HCM Lane LOS	E	A	-	-	B	-	E
HCM 95th %tile Q(veh)	0.8	-	-	-	0.5	-	0.6

Intersection	
Int Delay, s/veh	12.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	4	97	115	21	76	57	383	200	46	423	34
Future Vol, veh/h	1	4	97	115	21	76	57	383	200	46	423	34
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	-	-	0	100	-	-	80	-	-
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	1	4	105	125	23	83	62	416	217	50	460	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	923	1336	249	981	1246	317	497	0	0	633	0	0
Stage 1	579	579	-	649	649	-	-	-	-	-	-	-
Stage 2	344	757	-	332	597	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	225	152	751	204	172	679	1063	-	-	946	-	-
Stage 1	468	499	-	425	464	-	-	-	-	-	-	-
Stage 2	645	414	-	655	490	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	161	136	751	157	153	679	1063	-	-	946	-	-
Mov Cap-2 Maneuver	161	136	-	157	153	-	-	-	-	-	-	-
Stage 1	441	473	-	400	437	-	-	-	-	-	-	-
Stage 2	506	390	-	528	464	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	78.5	0.8	0.8
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1063	-	-	751	156	679	946	-	-
HCM Lane V/C Ratio	0.058	-	-	0.14	0.948	0.122	0.053	-	-
HCM Control Delay (s)	8.6	-	-	10.6	116.2	11	9	-	-
HCM Lane LOS	A	-	-	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	7	0.4	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	892	212	242	789	235	103	255	273	120	479	55
Future Volume (veh/h)	141	892	212	242	789	235	103	255	273	120	479	55
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	153	970	67	263	858	96	112	277	0	130	521	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	191	1233	550	361	1224	546	145	697		166	674	71
Arrive On Green	0.11	0.35	0.35	0.10	0.34	0.34	0.08	0.20	0.00	0.09	0.21	0.21
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3243	341
Grp Volume(v), veh/h	153	970	67	263	858	96	112	277	0	130	285	291
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1808
Q Serve(g_s), s	7.8	22.7	2.7	6.8	19.3	3.9	5.7	6.3	0.0	6.6	14.0	14.1
Cycle Q Clear(g_c), s	7.8	22.7	2.7	6.8	19.3	3.9	5.7	6.3	0.0	6.6	14.0	14.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	191	1233	550	361	1224	546	145	697		166	369	376
V/C Ratio(X)	0.80	0.79	0.12	0.73	0.70	0.18	0.77	0.40		0.79	0.77	0.78
Avail Cap(c_a), veh/h	578	2344	1045	1494	2344	1045	558	1114		558	557	567
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.3	27.1	20.6	40.1	26.2	21.2	41.7	32.4	0.0	41.0	34.6	34.6
Incr Delay (d2), s/veh	7.6	1.2	0.1	2.8	0.7	0.2	8.5	0.4	0.0	7.9	3.7	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	8.9	1.0	2.9	7.5	1.4	2.8	2.7	0.0	3.2	6.3	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.9	28.3	20.7	42.9	27.0	21.3	50.2	32.8	0.0	49.0	38.3	38.4
LnGrp LOS	D	C	C	D	C	C	D	C		D	D	D
Approach Vol, veh/h		1190			1217			389	A		706	
Approach Delay, s/veh		30.4			30.0			37.8			40.3	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.7	38.1	14.6	24.1	15.9	37.9	13.5	25.2
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	40.0	61.0	29.0	29.0	30.0	61.0	29.0	29.0
Max Q Clear Time (g_c+I1), s	8.8	24.7	8.6	8.3	9.8	21.3	7.7	16.1
Green Ext Time (p_c), s	0.9	7.4	0.3	1.7	0.3	6.5	0.3	2.9

Intersection Summary	
HCM 6th Ctrl Delay	33.1
HCM 6th LOS	C

Notes
User approved pedestrian interval to be less than phase max green.
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	988	95	225	1047	181	83	336	274	127	238	122
Future Volume (veh/h)	134	988	95	225	1047	181	83	336	274	127	238	122
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	146	1074	35	245	1138	146	90	365	64	138	259	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	2022	628	362	1532	683	194	550	246	230	588	262
Arrive On Green	0.07	0.40	0.40	0.10	0.43	0.43	0.06	0.15	0.15	0.07	0.17	0.17
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	146	1074	35	245	1138	146	90	365	64	138	259	18
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.1	12.2	1.0	5.2	20.3	4.4	1.9	7.3	2.7	2.9	5.0	0.7
Cycle Q Clear(g_c), s	3.1	12.2	1.0	5.2	20.3	4.4	1.9	7.3	2.7	2.9	5.0	0.7
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	241	2022	628	362	1532	683	194	550	246	230	588	262
V/C Ratio(X)	0.61	0.53	0.06	0.68	0.74	0.21	0.46	0.66	0.26	0.60	0.44	0.07
Avail Cap(c_a), veh/h	1416	6140	1906	2146	4274	1906	1416	2207	984	1416	2207	984
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	34.2	17.5	14.1	32.6	18.0	13.5	34.6	30.1	28.2	34.3	28.4	26.7
Incr Delay (d2), s/veh	2.4	0.2	0.0	2.2	0.7	0.2	1.7	1.4	0.6	2.5	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	4.1	0.3	2.1	7.0	1.3	0.8	2.9	1.0	1.2	2.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.6	17.7	14.2	34.8	18.7	13.6	36.3	31.5	28.7	36.8	28.9	26.8
LnGrp LOS	D	B	B	C	B	B	D	C	C	D	C	C
Approach Vol, veh/h		1255			1529			519			415	
Approach Delay, s/veh		19.8			20.8			32.0			31.5	
Approach LOS		B			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.3	38.6	9.2	17.5	12.9	36.0	10.0	16.7				
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	31.0	91.0	31.0	47.0	47.0	91.0	31.0	47.0				
Max Q Clear Time (g_c+I1), s	5.1	22.3	3.9	7.0	7.2	14.2	4.9	9.3				
Green Ext Time (p_c), s	0.4	10.4	0.2	1.6	0.8	8.7	0.4	2.4				

Intersection Summary			
HCM 6th Ctrl Delay			23.2
HCM 6th LOS			C

Existing SAT MD

13 Hookele St & Hana Hwy

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Uncrd
Cycle Length (s)	193.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	67.3
HCM Control Delay(s)	14.8
HCM Intersection LOS	B
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1034	432	386	1137	393	331
Future Volume (vph)	1034	432	386	1137	393	331
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	Min	Min	None	Min	None	—
+ Adjusted Flow Rate (veh/h)	1124	213	420	1236	427	248
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	236	—	—	—	103
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	1581	705	568	2429	632	968
HCM Volume/Capacity	0.711	0.302	0.740	0.509	0.676	0.256
HCM Lane Group Delay(s/veh)	15.8	12.2	28.7	5.3	26.9	15.9
HCM Lane Group LOS	B	B	C	A	C	B
HCM Approach Delay (s/veh)	15.2	—	—	11.3	22.9	—
HCM Approach LOS	B	—	—	B	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2025 AM Peak

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	101	322	71	23	22
Future Vol, veh/h	75	101	322	71	23	22
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	82	110	350	77	25	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	427	0	-	0	663	389
Stage 1	-	-	-	-	389	-
Stage 2	-	-	-	-	274	-
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	1132	-	-	-	426	659
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	772	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1132	-	-	-	393	659
Mov Cap-2 Maneuver	-	-	-	-	393	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	772	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1132	-	-	-	490
HCM Lane V/C Ratio	0.072	-	-	-	0.1
HCM Control Delay (s)	8.4	0	-	-	13.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	146	23	20	308	15	7	0	13	19	0	13
Future Vol, veh/h	4	146	23	20	308	15	7	0	13	19	0	13
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	-	-	100	-	-	-	-	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	4	159	25	22	335	16	8	0	14	21	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	351	0	0	184	0	0	574	575	172	574	579	343
Stage 1	-	-	-	-	-	-	180	180	-	387	387	-
Stage 2	-	-	-	-	-	-	394	395	-	187	192	-
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	1208	-	-	1391	-	-	430	429	872	430	426	700
Stage 1	-	-	-	-	-	-	822	750	-	637	610	-
Stage 2	-	-	-	-	-	-	631	605	-	815	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1208	-	-	1391	-	-	415	421	872	417	418	700
Mov Cap-2 Maneuver	-	-	-	-	-	-	415	421	-	417	418	-
Stage 1	-	-	-	-	-	-	820	748	-	635	600	-
Stage 2	-	-	-	-	-	-	608	595	-	799	740	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.4	10.8	12.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	415	872	1208	-	-	1391	-	-	499
HCM Lane V/C Ratio	0.018	0.016	0.004	-	-	0.016	-	-	0.07
HCM Control Delay (s)	13.8	9.2	8	-	-	7.6	-	-	12.8
HCM Lane LOS	B	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0	0	-	-	0	-	-	0.2

Intersection						
Int Delay, s/veh	6.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	57	137	187	182	62
Future Vol, veh/h	114	57	137	187	182	62
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	124	62	149	203	198	67

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	187	0	657	156
Stage 1	-	-	-	-	156	-
Stage 2	-	-	-	-	501	-
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	-	-	1387	-	430	890
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	609	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1386	-	383	889
Mov Cap-2 Maneuver	-	-	-	-	460	-
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	460	889	-	-	1386	-
HCM Lane V/C Ratio	0.43	0.076	-	-	0.107	-
HCM Control Delay (s)	18.6	9.4	-	-	7.9	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	2.1	0.2	-	-	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	162	66	6	368	4	12	0	2	5	0	7
Future Volume (veh/h)	5	162	66	6	368	4	12	0	2	5	0	7
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	5	176	36	7	400	4	13	0	1	5	0	1
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	680	1206	1021	856	1196	12	167	0	38	138	0	4
Arrive On Green	0.01	0.64	0.64	0.01	0.65	0.65	0.02	0.00	0.02	0.02	0.00	0.02
Sat Flow, veh/h	1781	1870	1584	1781	1849	18	1589	0	1585	840	0	168
Grp Volume(v), veh/h	5	176	36	7	0	404	13	0	1	6	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1584	1781	0	1867	1589	0	1585	1009	0	0
Q Serve(g_s), s	0.1	2.1	0.5	0.1	0.0	5.4	0.0	0.0	0.0	0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.1	2.1	0.5	0.1	0.0	5.4	0.4	0.0	0.0	0.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.83		0.17
Lane Grp Cap(c), veh/h	680	1206	1021	856	0	1208	167	0	38	142	0	0
V/C Ratio(X)	0.01	0.15	0.04	0.01	0.00	0.33	0.08	0.00	0.03	0.04	0.00	0.00
Avail Cap(c_a), veh/h	828	1206	1021	999	0	1208	666	0	596	650	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.7	3.9	3.6	3.4	0.0	4.4	26.8	0.0	26.6	27.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.1	0.0	0.0	0.7	0.2	0.0	0.3	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.6	0.1	0.0	0.0	1.6	0.2	0.0	0.0	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.7	4.1	3.7	3.4	0.0	5.2	27.0	0.0	26.9	27.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	C	A	C	C	A	A
Approach Vol, veh/h		217			411			14			6	
Approach Delay, s/veh		4.1			5.2			27.0			27.2	
Approach LOS		A			A			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	42.0		7.3	6.4	42.1		7.3				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0				
Max Q Clear Time (g_c+I1), s	2.1	4.1		2.6	2.1	7.4		2.4				
Green Ext Time (p_c), s	0.0	1.1		0.0	0.0	2.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			5.5									
HCM 6th LOS			A									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	145	5	168	275	1	6	57	62	9	70	103
Future Volume (veh/h)	134	145	5	168	275	1	6	57	62	9	70	103
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	146	158	4	183	299	1	7	62	8	10	76	8
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	200	380	10	249	444	376	13	253	32	19	155	131
Arrive On Green	0.11	0.21	0.21	0.14	0.24	0.24	0.01	0.08	0.08	0.01	0.08	0.08
Sat Flow, veh/h	1781	1816	46	1781	1870	1585	1781	3173	402	1781	1870	1585
Grp Volume(v), veh/h	146	0	162	183	299	1	7	34	36	10	76	8
Grp Sat Flow(s),veh/h/ln	1781	0	1862	1781	1870	1585	1781	1777	1798	1781	1870	1585
Q Serve(g_s), s	3.4	0.0	3.2	4.2	6.2	0.0	0.2	0.8	0.8	0.2	1.7	0.2
Cycle Q Clear(g_c), s	3.4	0.0	3.2	4.2	6.2	0.0	0.2	0.8	0.8	0.2	1.7	0.2
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	200	0	390	249	444	376	13	142	143	19	155	131
V/C Ratio(X)	0.73	0.00	0.42	0.73	0.67	0.00	0.53	0.24	0.25	0.54	0.49	0.06
Avail Cap(c_a), veh/h	2247	0	2175	2247	2184	1851	998	1867	1890	998	1966	1666
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.4	0.0	14.7	17.6	14.8	12.5	21.2	18.5	18.5	21.1	18.8	18.1
Incr Delay (d2), s/veh	5.1	0.0	0.7	4.2	1.8	0.0	28.7	0.9	0.9	21.8	2.4	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	1.5	0.0	1.2	1.8	2.4	0.0	0.2	0.3	0.3	0.2	0.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.5	0.0	15.4	21.8	16.6	12.5	49.9	19.4	19.4	42.9	21.2	18.3
LnGrp LOS	C	A	B	C	B	B	D	B	B	D	C	B
Approach Vol, veh/h		308			483			77			94	
Approach Delay, s/veh		19.2			18.6			22.2			23.2	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	16.2	6.4	9.4	12.0	15.0	6.3	9.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	5.4	8.2	2.2	2.8	6.2	5.2	2.2	3.7
Green Ext Time (p_c), s	0.4	2.0	0.0	0.4	0.5	1.0	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	19.5
HCM 6th LOS	B

Intersection						
Int Delay, s/veh	0.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	333	0	6	287	0	9
Future Vol, veh/h	333	0	6	287	0	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	362	0	7	312	0	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	362	0	-	362
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1197	-	0	683
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1197	-	-	683
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	683	-	1197	-
HCM Lane V/C Ratio	0.014	-	0.005	-
HCM Control Delay (s)	10.3	-	8	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0	-	0	-

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	328	968	0	0	1517	0	0	0	0	0	0	287
Future Vol, veh/h	328	968	0	0	1517	0	0	0	0	0	0	287
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	357	1052	0	0	1649	0	0	0	0	0	0	312

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1649	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	388	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	388	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	15.3	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	388	-	-	-
HCM Lane V/C Ratio	0.919	-	-	-
HCM Control Delay (s)	60.6	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	9.8	-	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	83	1514	1	2	8	0	0	6	0
Future Vol, veh/h	0	0	0	83	1514	1	2	8	0	0	6	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	90	1646	1	2	9	0	0	7	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1007	1827	-	-	1827	-
Stage 1	-	-	-	0	0	-	-	1827	-
Stage 2	-	-	-	1007	1827	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	-	-	-	195	76	0	0	76	0
Stage 1	-	-	-	-	-	0	0	126	0
Stage 2	-	-	-	258	126	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	182	76	-	-	76	-
Mov Cap-2 Maneuver	-	-	-	182	76	-	-	76	-
Stage 1	-	-	-	-	-	-	-	126	-
Stage 2	-	-	-	245	126	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		52.8	56.8
HCM LOS		F	F

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	86	-	-	-	76
HCM Lane V/C Ratio	0.126	-	-	-	0.086
HCM Control Delay (s)	52.8	-	-	-	56.8
HCM Lane LOS	F	-	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	939	27	0	0	0	0	10	10	1	5	0
Future Vol, veh/h	0	939	27	0	0	0	0	10	10	1	5	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	-	-	-	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	0	1021	29	0	0	0	0	11	11	1	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1050	0	0	-	1037	525	517	1051	-
Stage 1	-	-	-	-	-	-	-	1036	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	516	1050	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	661	-	0	0	231	498	455	226	0
Stage 1	-	-	-	-	-	0	0	308	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	511	303	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	661	-	-	-	231	498	429	226	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	231	-	429	226	-
Stage 1	-	-	-	-	-	-	-	308	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	482	303	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.2	20.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	316	1621	-	-	661	-	245
HCM Lane V/C Ratio	0.069	-	-	-	-	-	0.027
HCM Control Delay (s)	17.2	0	-	-	0	-	20.1
HCM Lane LOS	C	A	-	-	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	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	5	2	31	39	9	10	63	161	46	15	215	16
Future Vol, veh/h	5	2	31	39	9	10	63	161	46	15	215	16
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	-	-	0	100	-	-	80	-	-
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	2	34	42	10	11	68	175	50	16	234	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	504	636	126	486	619	113	251	0	0	225	0	0
Stage 1	275	275	-	336	336	-	-	-	-	-	-	-
Stage 2	229	361	-	150	283	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	451	394	901	464	403	918	1311	-	-	1341	-	-
Stage 1	708	681	-	652	640	-	-	-	-	-	-	-
Stage 2	753	624	-	837	676	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	416	369	901	423	378	918	1311	-	-	1341	-	-
Mov Cap-2 Maneuver	416	369	-	423	378	-	-	-	-	-	-	-
Stage 1	671	673	-	618	607	-	-	-	-	-	-	-
Stage 2	694	592	-	794	668	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	13.9	1.8	0.5
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1311	-	-	901	414	918	1341	-	-
HCM Lane V/C Ratio	0.052	-	-	0.037	0.126	0.012	0.012	-	-
HCM Control Delay (s)	7.9	-	-	9.2	14.9	9	7.7	-	-
HCM Lane LOS	A	-	-	A	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	0.4	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	790	86	317	1413	106	50	113	115	42	200	47
Future Volume (veh/h)	54	790	86	317	1413	106	50	113	115	42	200	47
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	59	859	46	345	1536	70	54	123	0	46	217	37
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	76	2119	945	400	2380	1061	70	353		60	285	48
Arrive On Green	0.04	0.60	0.60	0.23	1.00	1.00	0.04	0.10	0.00	0.03	0.09	0.09
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3043	511
Grp Volume(v), veh/h	59	859	46	345	1536	70	54	123	0	46	125	129
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1777
Q Serve(g_s), s	5.1	19.9	1.9	14.9	0.0	0.0	4.7	5.0	0.0	4.0	10.7	11.0
Cycle Q Clear(g_c), s	5.1	19.9	1.9	14.9	0.0	0.0	4.7	5.0	0.0	4.0	10.7	11.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	76	2119	945	400	2380	1061	70	353		60	167	167
V/C Ratio(X)	0.78	0.41	0.05	0.86	0.65	0.07	0.77	0.35		0.77	0.75	0.77
Avail Cap(c_a), veh/h	218	2119	945	870	2380	1061	276	665		276	332	332
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.55	0.55	0.55	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.5	16.7	13.0	58.3	0.0	0.0	73.8	65.1	0.0	74.3	68.5	68.6
Incr Delay (d2), s/veh	15.6	0.6	0.1	3.2	0.8	0.1	16.3	0.6	0.0	18.4	6.7	7.4
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	2.6	7.9	0.7	5.8	0.2	0.0	2.5	2.3	0.0	2.1	5.2	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.1	17.2	13.1	61.5	0.8	0.1	90.1	65.7	0.0	92.7	75.2	76.0
LnGrp LOS	F	B	B	E	A	A	F	E		F	E	E
Approach Vol, veh/h		964			1951			177	A		300	
Approach Delay, s/veh		21.4			11.5			73.1			78.2	
Approach LOS		C			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	98.4	11.2	21.4	12.6	109.8	12.1	20.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	39.0	39.0	24.0	29.0	19.0	59.0	24.0	29.0
Max Q Clear Time (g_c+I1), s	16.9	21.9	6.0	7.0	7.1	2.0	6.7	13.0
Green Ext Time (p_c), s	1.1	5.1	0.1	0.7	0.1	16.4	0.1	1.2

Intersection Summary			
HCM 6th Ctrl Delay			23.4
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	737	68	398	1671	121	79	237	289	49	96	60
Future Volume (veh/h)	120	737	68	398	1671	121	79	237	289	49	96	60
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	130	801	38	433	1816	84	86	258	15	53	104	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	3059	949	495	2458	1096	130	332	148	100	301	134
Arrive On Green	0.10	1.00	1.00	0.10	0.46	0.46	0.04	0.09	0.09	0.03	0.08	0.08
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	130	801	38	433	1816	84	86	258	15	53	104	4
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.7	0.0	0.0	19.2	64.6	4.6	3.8	11.0	1.3	2.3	4.3	0.4
Cycle Q Clear(g_c), s	5.7	0.0	0.0	19.2	64.6	4.6	3.8	11.0	1.3	2.3	4.3	0.4
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	174	3059	949	495	2458	1096	130	332	148	100	301	134
V/C Ratio(X)	0.75	0.26	0.04	0.88	0.74	0.08	0.66	0.78	0.10	0.53	0.35	0.03
Avail Cap(c_a), veh/h	334	3059	949	669	2458	1096	557	917	409	223	573	256
HCM Platoon Ratio	2.00	2.00	2.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.90	0.90	0.90	0.65	0.65	0.65	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	68.7	0.0	0.0	68.7	30.2	14.0	73.6	68.7	64.3	74.2	66.9	65.1
Incr Delay (d2), s/veh	5.6	0.2	0.1	6.6	1.3	0.1	5.2	3.7	0.3	4.3	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.1	0.0	9.1	28.9	1.5	1.8	5.1	0.5	1.1	1.9	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.3	0.2	0.1	75.3	31.5	14.1	78.8	72.4	64.6	78.5	67.6	65.2
LnGrp LOS	E	A	A	E	C	B	E	E	E	E	E	E
Approach Vol, veh/h		969			2333			359			161	
Approach Delay, s/veh		10.1			39.0			73.6			71.1	
Approach LOS		B			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	113.2	10.9	18.1	27.2	98.8	9.5	19.5
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	69.0	25.0	25.0	30.0	54.0	10.0	40.0
Max Q Clear Time (g_c+I1), s	7.7	66.6	5.8	6.3	21.2	2.0	4.3	13.0
Green Ext Time (p_c), s	0.2	2.1	0.2	0.4	1.0	5.8	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	36.3
HCM 6th LOS	D

Notes
User approved pedestrian interval to be less than phase max green.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	869	237	330	1950	187	198
Future Volume (veh/h)	869	237	330	1950	187	198
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	945	175	359	2120	203	135
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	2892	1290	421	3439	0	0
Arrive On Green	0.27	0.27	0.12	0.97	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	945	175	359	2120	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	33.0	13.0	15.8	7.4		
Cycle Q Clear(g_c), s	33.0	13.0	15.8	7.4		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2892	1290	421	3439		
V/C Ratio(X)	0.33	0.14	0.85	0.62		
Avail Cap(c_a), veh/h	2892	1290	780	3439		
HCM Platoon Ratio	0.33	0.33	1.00	1.00		
Upstream Filter(I)	0.93	0.93	1.00	1.00		
Uniform Delay (d), s/veh	22.6	15.3	66.7	0.2		
Incr Delay (d2), s/veh	0.3	0.2	5.0	0.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	15.8	5.2	7.1	0.4		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.9	15.5	71.7	1.0		
LnGrp LOS	C	B	E	A		
Approach Vol, veh/h	1120			2479		
Approach Delay, s/veh	21.8			11.3		
Approach LOS	C			B		

Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		155.0			23.9	131.1
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		105.0			35.0	65.0
Max Q Clear Time (g_c+I1), s		9.4			17.8	35.0
Green Ext Time (p_c), s		36.2			1.1	7.4

Intersection Summary				
HCM 6th Ctrl Delay			14.5	
HCM 6th LOS			B	

BY 2025 AM

BING | SCENARIO MANAGER

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	155.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	155.0
HCM Control Delay(s)	23.2
HCM Intersection LOS	C
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	869	237	330	1950	187	198
Future Volume (vph)	869	237	330	1950	187	198
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	945	175	359	2120	203	135
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	76	—	—	—	74
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.93	0.93	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2521	1124	421	3068	271	559
HCM Volume/Capacity	0.375	0.156	0.853	0.691	0.748	0.242
HCM Lane Group Delay(s/veh)	30.9	22.7	71.7	4.9	74.0	52.3
HCM Lane Group LOS	C	C	E	A	E	D
HCM Approach Delay (s/veh)	29.6	—	—	14.6	65.4	—
HCM Approach LOS	C	—	—	B	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2025 PM Peak

Intersection						
Int Delay, s/veh	6.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	124	371	290	61	102	55
Future Vol, veh/h	124	371	290	61	102	55
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	135	403	315	66	111	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	381	0	-	0	1021	348
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	673	-
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	1177	-	-	-	262	695
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	507	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1177	-	-	-	223	695
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	507	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	33.1
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1177	-	-	-	293
HCM Lane V/C Ratio	0.115	-	-	-	0.582
HCM Control Delay (s)	8.5	0	-	-	33.1
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	3.4

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	409	11	22	336	7	25	0	46	41	3	18
Future Vol, veh/h	3	409	11	22	336	7	25	0	46	41	3	18
Conflicting Peds, #/hr	0	0	2	2	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	-	-	100	-	-	-	-	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	3	445	12	24	365	8	27	0	50	45	3	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	373	0	0	459	0	0	888	880	453	899	882	369
Stage 1	-	-	-	-	-	-	459	459	-	417	417	-
Stage 2	-	-	-	-	-	-	429	421	-	482	465	-
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	1185	-	-	1102	-	-	264	286	607	260	285	677
Stage 1	-	-	-	-	-	-	582	566	-	613	591	-
Stage 2	-	-	-	-	-	-	604	589	-	565	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1185	-	-	1100	-	-	249	278	606	234	277	677
Mov Cap-2 Maneuver	-	-	-	-	-	-	249	278	-	234	277	-
Stage 1	-	-	-	-	-	-	580	563	-	611	578	-
Stage 2	-	-	-	-	-	-	571	576	-	517	560	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.5	14.9	21
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	249	606	1185	-	-	1100	-	-	292
HCM Lane V/C Ratio	0.109	0.083	0.003	-	-	0.022	-	-	0.231
HCM Control Delay (s)	21.2	11.5	8	-	-	8.3	-	-	21
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.4	0.3	0	-	-	0.1	-	-	0.9

Intersection	
Int Delay, s/veh	11.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	240	123	140	250	264	200
Future Vol, veh/h	240	123	140	250	264	200
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	261	134	152	272	287	217

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	396	0	905	329
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	576	-
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	-	-	1163	-	307	712
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	562	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1162	-	~ 266	711
Mov Cap-2 Maneuver	-	-	-	-	380	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	488	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.1	27.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	380	711	-	-	1162	-
HCM Lane V/C Ratio	0.755	0.306	-	-	0.131	-
HCM Control Delay (s)	38.5	12.3	-	-	8.6	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	6.1	1.3	-	-	0.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	267	253	50	473	2	235	0	94	3	0	8
Future Volume (veh/h)	1	267	253	50	473	2	235	0	94	3	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1	290	88	54	514	2	255	0	20	3	0	1
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	279	589	493	450	685	3	492	0	353	211	20	30
Arrive On Green	0.00	0.31	0.31	0.05	0.37	0.37	0.22	0.00	0.22	0.22	0.00	0.22
Sat Flow, veh/h	1781	1870	1567	1781	1862	7	1478	0	1585	309	91	133
Grp Volume(v), veh/h	1	290	88	54	0	516	255	0	20	4	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1567	1781	0	1869	1478	0	1585	533	0	0
Q Serve(g_s), s	0.0	5.6	1.8	0.9	0.0	10.6	0.0	0.0	0.4	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	5.6	1.8	0.9	0.0	10.6	7.0	0.0	0.4	7.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.75		0.25
Lane Grp Cap(c), veh/h	279	589	493	450	0	688	492	0	353	261	0	0
V/C Ratio(X)	0.00	0.49	0.18	0.12	0.00	0.75	0.52	0.00	0.06	0.02	0.00	0.00
Avail Cap(c_a), veh/h	477	1526	1279	554	0	1525	851	0	754	625	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.1	12.3	11.0	9.4	0.0	12.2	16.1	0.0	13.5	13.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.2	0.1	0.0	1.7	0.8	0.0	0.1	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.0	0.5	0.3	0.0	3.8	2.2	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.1	12.9	11.2	9.5	0.0	13.8	16.9	0.0	13.6	13.8	0.0	0.0
LnGrp LOS	B	B	B	A	A	B	B	A	B	B	A	A
Approach Vol, veh/h		379			570			275			4	
Approach Delay, s/veh		12.5			13.4			16.7			13.8	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	19.9		15.8	6.1	22.2		15.8				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0				
Max Q Clear Time (g_c+I1), s	2.9	7.6		9.0	2.0	12.6		9.0				
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	3.5		1.1				
Intersection Summary												
HCM 6th Ctrl Delay			13.9									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	96	345	20	415	327	1	61	57	127	26	78	164
Future Volume (veh/h)	96	345	20	415	327	1	61	57	127	26	78	164
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	104	375	21	451	355	1	66	62	18	28	85	6
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	139	462	26	514	886	751	86	277	77	42	142	121
Arrive On Green	0.08	0.26	0.26	0.29	0.47	0.47	0.05	0.10	0.10	0.02	0.08	0.08
Sat Flow, veh/h	1781	1754	98	1781	1870	1585	1781	2745	765	1781	1870	1585
Grp Volume(v), veh/h	104	0	396	451	355	1	66	39	41	28	85	6
Grp Sat Flow(s),veh/h/ln	1781	0	1853	1781	1870	1585	1781	1777	1733	1781	1870	1585
Q Serve(g_s), s	4.2	0.0	14.8	17.9	9.1	0.0	2.7	1.5	1.6	1.2	3.3	0.3
Cycle Q Clear(g_c), s	4.2	0.0	14.8	17.9	9.1	0.0	2.7	1.5	1.6	1.2	3.3	0.3
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	139	0	488	514	886	751	86	179	175	42	142	121
V/C Ratio(X)	0.75	0.00	0.81	0.88	0.40	0.00	0.76	0.22	0.23	0.66	0.60	0.05
Avail Cap(c_a), veh/h	1298	0	1250	1298	1261	1069	577	1079	1052	577	1135	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.5	0.0	25.6	25.1	12.7	10.3	34.9	30.6	30.7	35.9	33.1	31.8
Incr Delay (d2), s/veh	7.9	0.0	3.3	5.0	0.3	0.0	13.0	0.6	0.7	16.5	4.0	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	2.1	0.0	6.6	7.8	3.6	0.0	1.5	0.7	0.7	0.7	1.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.4	0.0	28.9	30.1	13.0	10.3	47.9	31.2	31.4	52.4	37.1	31.9
LnGrp LOS	D	A	C	C	B	B	D	C	C	D	D	C
Approach Vol, veh/h		500			807			146			119	
Approach Delay, s/veh		31.5			22.6			38.8			40.4	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	41.1	7.8	13.5	27.4	25.5	9.6	11.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	6.2	11.1	3.2	3.6	19.9	16.8	4.7	5.3
Green Ext Time (p_c), s	0.3	2.4	0.0	0.4	1.5	2.7	0.1	0.5

Intersection Summary	
HCM 6th Ctrl Delay	28.3
HCM 6th LOS	C

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	481	0	7	329	0	23
Future Vol, veh/h	481	0	7	329	0	23
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	523	0	8	358	0	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	523	0	-	523
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1043	-	0	554
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1043	-	-	554
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	554	-	1043	-
HCM Lane V/C Ratio	0.045	-	0.007	-
HCM Control Delay (s)	11.8	-	8.5	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.1	-	0	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	481	1555	0	0	1143	0	0	0	0	0	0	329
Future Vol, veh/h	481	1555	0	0	1143	0	0	0	0	0	0	329
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	523	1690	0	0	1242	0	0	0	0	0	0	358

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1242	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	556	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	556	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	12.3	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	556	-	-	-
HCM Lane V/C Ratio	0.94	-	-	-
HCM Control Delay (s)	52.1	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	12.1	-	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	36	1131	14	11	9	0	0	7	0
Future Vol, veh/h	0	0	0	36	1131	14	11	9	0	0	7	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	39	1229	15	12	10	0	0	8	0

Major/Minor				Major2			Minor1			Minor2		
Conflicting Flow All				0	0	0	697	1322	-	-	1315	-
Stage 1				-	-	-	0	0	-	-	1315	-
Stage 2				-	-	-	697	1322	-	-	0	-
Critical Hdwy				4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1				-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2				-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy				2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver				-	-	-	328	155	0	0	157	0
Stage 1				-	-	-	-	-	0	0	226	0
Stage 2				-	-	-	398	224	0	0	-	0
Platoon blocked, %					-	-						
Mov Cap-1 Maneuver				-	-	-	316	155	-	-	157	-
Mov Cap-2 Maneuver				-	-	-	316	155	-	-	157	-
Stage 1				-	-	-	-	-	-	-	226	-
Stage 2				-	-	-	385	224	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		23.6	29.1
HCM LOS		C	D

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	215	-	-	-	157
HCM Lane V/C Ratio	0.101	-	-	-	0.048
HCM Control Delay (s)	23.6	-	-	-	29.1
HCM Lane LOS	C	-	-	-	D
HCM 95th %tile Q(veh)	0.3	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1536	18	0	0	0	0	20	43	2	5	0
Future Vol, veh/h	0	1536	18	0	0	0	0	20	43	2	5	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	-	-	-	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	0	1670	20	0	0	0	0	22	47	2	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1690	0	0	-	1681	845	847	1691	-
Stage 1	-	-	-	-	-	-	-	1680	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	846	1690	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	376	-	0	0	94	307	268	93	0
Stage 1	-	-	-	-	-	0	0	150	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	324	149	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	376	-	-	-	94	307	187	93	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	94	-	187	93	-
Stage 1	-	-	-	-	-	-	-	150	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	235	149	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	37.1	40.5
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	179	1621	-	-	376	-	109
HCM Lane V/C Ratio	0.383	-	-	-	-	-	0.07
HCM Control Delay (s)	37.1	0	-	-	0	-	40.5
HCM Lane LOS	E	A	-	-	A	-	E
HCM 95th %tile Q(veh)	1.7	0	-	-	0	-	0.2

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	3	61	104	20	32	54	357	100	24	469	33
Future Vol, veh/h	0	3	61	104	20	32	54	357	100	24	469	33
Conflicting Peds, #/hr	3	0	0	0	0	3	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	100	-	-	80	-	-
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	3	66	113	22	35	59	388	109	26	510	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	1198	276	870	1162	252	549	0	0	497	0	0
Stage 1	-	583	-	561	561	-	-	-	-	-	-	-
Stage 2	-	615	-	309	601	-	-	-	-	-	-	-
Critical Hdwy	-	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	184	721	246	194	748	1017	-	-	1063	-	-
Stage 1	0	497	-	480	508	-	-	-	-	-	-	-
Stage 2	0	480	-	676	488	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	169	719	206	178	746	1014	-	-	1063	-	-
Mov Cap-2 Maneuver	-	169	-	206	178	-	-	-	-	-	-	-
Stage 1	-	484	-	452	479	-	-	-	-	-	-	-
Stage 2	-	452	-	595	475	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	44.4	0.9	0.4
HCM LOS	B	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1014	-	-	719	201	746	1063	-	-
HCM Lane V/C Ratio	0.058	-	-	0.092	0.671	0.047	0.025	-	-
HCM Control Delay (s)	8.8	-	-	10.5	53.2	10.1	8.5	-	-
HCM Lane LOS	A	-	-	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	4.1	0.1	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	1336	169	243	1019	152	105	208	274	127	403	26
Future Volume (veh/h)	126	1336	169	243	1019	152	105	208	274	127	403	26
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	137	1452	104	264	1108	92	114	226	0	138	438	25
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	158	1910	852	318	1922	857	134	484		158	511	29
Arrive On Green	0.09	0.54	0.54	0.06	0.36	0.36	0.08	0.14	0.00	0.09	0.15	0.15
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3418	195
Grp Volume(v), veh/h	137	1452	104	264	1108	92	114	226	0	138	227	236
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	12.5	52.7	5.4	12.5	41.5	6.4	10.4	9.7	0.0	12.6	20.6	20.7
Cycle Q Clear(g_c), s	12.5	52.7	5.4	12.5	41.5	6.4	10.4	9.7	0.0	12.6	20.6	20.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	158	1910	852	318	1922	857	134	484		158	266	274
V/C Ratio(X)	0.87	0.76	0.12	0.83	0.58	0.11	0.85	0.47		0.87	0.85	0.86
Avail Cap(c_a), veh/h	205	1910	852	607	1922	857	184	711		184	355	367
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.75	0.75	0.75	0.95	0.95	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	74.2	29.8	18.9	76.1	37.4	26.2	75.3	65.8	0.0	74.2	68.4	68.5
Incr Delay (d2), s/veh	25.2	2.9	0.3	4.3	1.0	0.2	21.8	0.7	0.0	30.7	14.2	14.4
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	6.7	22.1	2.1	5.8	18.9	2.6	5.6	4.5	0.0	7.2	10.5	10.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	99.5	32.7	19.2	80.4	38.3	26.4	97.1	66.4	0.0	105.0	82.7	82.8
LnGrp LOS	F	C	B	F	D	C	F	E		F	F	F
Approach Vol, veh/h		1693			1464			340	A		601	
Approach Delay, s/veh		37.3			45.2			76.7			87.8	
Approach LOS		D			D			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.2	94.7	20.7	28.5	20.6	95.3	18.5	30.7
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	29.0	62.0	17.0	33.0	19.0	72.0	17.0	33.0
Max Q Clear Time (g_c+I1), s	14.5	54.7	14.6	11.7	14.5	43.5	12.4	22.7
Green Ext Time (p_c), s	0.7	5.0	0.1	1.3	0.1	8.5	0.1	2.0

Intersection Summary	
HCM 6th Ctrl Delay	50.8
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	113	1555	100	371	1099	151	98	189	326	132	337	151
Future Volume (veh/h)	113	1555	100	371	1099	151	98	189	326	132	337	151
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	123	1690	52	403	1195	121	107	205	45	143	366	13
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	2941	913	451	1972	880	152	396	176	190	435	194
Arrive On Green	0.10	0.39	0.39	0.26	1.00	1.00	0.04	0.11	0.11	0.05	0.12	0.12
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	123	1690	52	403	1195	121	107	205	45	143	366	13
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.4	43.1	3.4	18.5	0.0	0.0	5.0	9.0	4.3	6.7	16.6	1.2
Cycle Q Clear(g_c), s	5.4	43.1	3.4	18.5	0.0	0.0	5.0	9.0	4.3	6.7	16.6	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	524	2941	913	451	1972	880	152	396	176	190	435	194
V/C Ratio(X)	0.23	0.57	0.06	0.89	0.61	0.14	0.71	0.52	0.26	0.75	0.84	0.07
Avail Cap(c_a), veh/h	524	2941	913	628	1972	880	524	646	288	524	646	288
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.50	0.50	0.50	0.83	0.83	0.83	0.70	0.70	0.70	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.3	34.7	22.5	59.9	0.0	0.0	77.8	69.1	67.1	76.9	70.8	64.1
Incr Delay (d2), s/veh	0.5	0.4	0.1	10.1	1.2	0.3	4.2	0.7	0.5	5.9	6.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	18.7	1.3	7.5	0.3	0.1	2.3	4.1	1.7	3.1	7.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.8	35.1	22.6	70.0	1.2	0.3	82.0	69.9	67.6	82.8	77.3	64.2
LnGrp LOS	E	D	C	E	A	A	F	E	E	F	E	E
Approach Vol, veh/h		1865			1719			357			522	
Approach Delay, s/veh		36.8			17.2			73.2			78.5	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	97.6	12.2	25.2	26.5	101.0	14.1	23.4
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	64.0	25.0	30.0	30.0	59.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	7.4	2.0	7.0	18.6	20.5	45.1	8.7	11.0
Green Ext Time (p_c), s	0.3	11.0	0.3	1.6	1.0	9.0	0.3	1.1

Intersection Summary	
HCM 6th Ctrl Delay	37.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1758	279	333	1281	327	593
Future Volume (veh/h)	1758	279	333	1281	327	593
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	1911	223	362	1392	355	616
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	2925	1305	402	3446	0	0
Arrive On Green	1.00	1.00	0.12	0.97	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	1911	223	362	1392	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	0.0	0.0	17.1	3.2		
Cycle Q Clear(g_c), s	0.0	0.0	17.1	3.2		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2925	1305	402	3446		
V/C Ratio(X)	0.65	0.17	0.90	0.40		
Avail Cap(c_a), veh/h	2925	1305	419	3446		
HCM Platoon Ratio	2.00	2.00	1.00	1.00		
Upstream Filter(I)	0.72	0.72	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	72.0	0.1		
Incr Delay (d2), s/veh	0.8	0.2	21.5	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.3	0.1	8.6	0.2		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.8	0.2	93.5	0.5		
LnGrp LOS	A	A	F	A		
Approach Vol, veh/h	2134			1754		
Approach Delay, s/veh	0.8			19.7		
Approach LOS	A			B		

Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		165.0			24.2	140.8
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		132.0			20.0	107.0
Max Q Clear Time (g_c+I1), s		5.2			19.1	2.0
Green Ext Time (p_c), s		13.8			0.1	31.4

Intersection Summary						
HCM 6th Ctrl Delay			9.3			
HCM 6th LOS			A			

BY 2025 PM

BING

SCENARIO MANAGER

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	165.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	165.0
HCM Control Delay(s)	23.4
HCM Intersection LOS	C
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1758	279	333	1281	327	593
Future Volume (vph)	1758	279	333	1281	327	593
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	1911	223	362	1392	355	616
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	74	—	—	—	27
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.72	0.72	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2322	1036	402	2843	503	730
HCM Volume/Capacity	0.823	0.215	0.900	0.490	0.706	0.843
HCM Lane Group Delay(s/veh)	2.5	0.3	93.5	6.0	71.6	66.6
HCM Lane Group LOS	A	A	F	A	E	E
HCM Approach Delay (s/veh)	2.3	—	—	24.1	68.4	—
HCM Approach LOS	A	—	—	C	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2025 SAT MD Peak

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	187	281	328	67	46	62
Future Vol, veh/h	187	281	328	67	46	62
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	203	305	357	73	50	67

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	430	0	-	0	1105	394
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	711	-
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	1129	-	-	-	233	655
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	487	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	182	655
Mov Cap-2 Maneuver	-	-	-	-	182	-
Stage 1	-	-	-	-	533	-
Stage 2	-	-	-	-	487	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	23.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1129	-	-	-	311
HCM Lane V/C Ratio	0.18	-	-	-	0.377
HCM Control Delay (s)	8.9	0	-	-	23.4
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	1.7

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	414	4	16	376	1	16	0	57	4	0	4
Future Vol, veh/h	1	414	4	16	376	1	16	0	57	4	0	4
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	-	-	100	-	-	-	-	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	1	450	4	17	409	1	17	0	62	4	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	410	0	0	454	0	0	900	898	452	929	900	410
Stage 1	-	-	-	-	-	-	454	454	-	444	444	-
Stage 2	-	-	-	-	-	-	446	444	-	485	456	-
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	1149	-	-	1107	-	-	259	279	608	248	278	642
Stage 1	-	-	-	-	-	-	586	569	-	593	575	-
Stage 2	-	-	-	-	-	-	591	575	-	563	568	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1149	-	-	1107	-	-	254	275	608	220	274	642
Mov Cap-2 Maneuver	-	-	-	-	-	-	254	275	-	220	274	-
Stage 1	-	-	-	-	-	-	585	568	-	592	566	-
Stage 2	-	-	-	-	-	-	578	566	-	505	567	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	13.5	16.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	254	608	1149	-	-	1107	-	-	328
HCM Lane V/C Ratio	0.068	0.102	0.001	-	-	0.016	-	-	0.027
HCM Control Delay (s)	20.2	11.6	8.1	-	-	8.3	-	-	16.3
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0.3	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	13.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	243	122	172	246	259	208
Future Vol, veh/h	243	122	172	246	259	208
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	264	133	187	267	282	226

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	397	0	972	331
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	641	-
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	-	-	1162	-	~ 280	711
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1162	-	~ 235	711
Mov Cap-2 Maneuver	-	-	-	-	347	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	440	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.6	32
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	347	711	-	-	1162	-
HCM Lane V/C Ratio	0.811	0.318	-	-	0.161	-
HCM Control Delay (s)	47.7	12.4	-	-	8.7	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	7	1.4	-	-	0.6	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	245	329	51	506	2	248	0	110	2	1	6
Future Volume (veh/h)	2	245	329	51	506	2	248	0	110	2	1	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	266	111	55	550	2	270	0	25	2	1	2
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	199	582	493	404	667	2	395	0	546	87	53	38
Arrive On Green	0.00	0.31	0.31	0.05	0.36	0.36	0.34	0.00	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1781	1870	1585	1781	1862	7	804	0	1585	12	155	111
Grp Volume(v), veh/h	2	266	111	55	0	552	270	0	25	5	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1869	804	0	1585	279	0	0
Q Serve(g_s), s	0.0	7.0	3.2	1.2	0.0	16.4	0.1	0.0	0.6	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	7.0	3.2	1.2	0.0	16.4	20.6	0.0	0.6	20.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	0.40		0.40
Lane Grp Cap(c), veh/h	199	582	493	404	0	669	395	0	546	178	0	0
V/C Ratio(X)	0.01	0.46	0.23	0.14	0.00	0.82	0.68	0.00	0.05	0.03	0.00	0.00
Avail Cap(c_a), veh/h	340	1104	935	462	0	1103	395	0	546	178	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.9	16.9	15.6	13.3	0.0	17.8	19.9	0.0	13.3	15.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.2	0.2	0.0	2.7	4.8	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.8	1.1	0.5	0.0	6.8	3.9	0.0	0.2	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.9	17.4	15.8	13.4	0.0	20.5	24.7	0.0	13.4	15.8	0.0	0.0
LnGrp LOS	B	B	B	B	A	C	C	A	B	B	A	A
Approach Vol, veh/h		379			607			295			5	
Approach Delay, s/veh		17.0			19.9			23.8			15.8	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.0	25.0		27.0	6.2	27.8		27.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0
Max Q Clear Time (g_c+I1), s	3.2	9.0		22.6	2.0	18.4		22.6
Green Ext Time (p_c), s	0.0	2.0		0.0	0.0	3.4		0.0

Intersection Summary			
HCM 6th Ctrl Delay			19.9
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	324	24	439	344	0	60	73	147	31	55	99
Future Volume (veh/h)	117	324	24	439	344	0	60	73	147	31	55	99
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	127	352	25	477	374	0	65	79	12	34	60	1
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	168	438	31	542	868	735	85	254	38	49	115	98
Arrive On Green	0.09	0.25	0.25	0.30	0.46	0.00	0.05	0.08	0.08	0.03	0.06	0.06
Sat Flow, veh/h	1781	1726	123	1781	1870	1585	1781	3103	461	1781	1870	1585
Grp Volume(v), veh/h	127	0	377	477	374	0	65	45	46	34	60	1
Grp Sat Flow(s),veh/h/ln	1781	0	1848	1781	1870	1585	1781	1777	1787	1781	1870	1585
Q Serve(g_s), s	5.0	0.0	13.8	18.4	9.7	0.0	2.6	1.7	1.8	1.4	2.2	0.0
Cycle Q Clear(g_c), s	5.0	0.0	13.8	18.4	9.7	0.0	2.6	1.7	1.8	1.4	2.2	0.0
Prop In Lane	1.00		0.07	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	168	0	469	542	868	735	85	145	146	49	115	98
V/C Ratio(X)	0.76	0.00	0.80	0.88	0.43	0.00	0.77	0.31	0.32	0.70	0.52	0.01
Avail Cap(c_a), veh/h	1333	0	1281	1333	1296	1098	592	1108	1115	592	1166	988
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	25.2	23.9	13.0	0.0	34.0	31.2	31.2	34.8	32.8	31.8
Incr Delay (d2), s/veh	6.8	0.0	3.3	4.8	0.3	0.0	13.3	1.2	1.2	16.4	3.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	6.1	7.9	3.7	0.0	1.4	0.8	0.8	0.8	1.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.6	0.0	28.5	28.7	13.3	0.0	47.3	32.4	32.5	51.2	36.4	31.8
LnGrp LOS	D	A	C	C	B	A	D	C	C	D	D	C
Approach Vol, veh/h		504			851			156			95	
Approach Delay, s/veh		31.0			21.9			38.6			41.7	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	39.5	8.0	11.9	28.0	24.3	9.4	10.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	7.0	11.7	3.4	3.8	20.4	15.8	4.6	4.2
Green Ext Time (p_c), s	0.4	2.5	0.0	0.5	1.6	2.5	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	27.6
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	485	0	17	328	0	28
Future Vol, veh/h	485	0	17	328	0	28
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	527	0	18	357	0	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	527	0	-	527
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1040	-	0	551
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1040	-	-	551
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	551	-	1040	-
HCM Lane V/C Ratio	0.055	-	0.018	-
HCM Control Delay (s)	11.9	-	8.5	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.2	-	0.1	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	485	1347	0	0	1051	0	0	0	0	0	0	328
Future Vol, veh/h	485	1347	0	0	1051	0	0	0	0	0	0	328
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	527	1464	0	0	1142	0	0	0	0	0	0	357

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1142	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	608	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	608	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	10	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	608	-	-	-
HCM Lane V/C Ratio	0.867	-	-	-
HCM Control Delay (s)	37.6	-	-	0
HCM Lane LOS	E	-	-	A
HCM 95th %tile Q(veh)	9.9	-	-	-

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	0	0	0	65	1041	16	10	12	0	0	17	0
Future Vol, veh/h	0	0	0	65	1041	16	10	12	0	0	17	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	71	1132	17	11	13	0	0	18	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	717	1291	-	-	1283	-
Stage 1	-	-	-	0	0	-	-	1283	-
Stage 2	-	-	-	717	1291	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	-	-	-	317	162	0	0	164	0
Stage 1	-	-	-	-	-	0	0	234	0
Stage 2	-	-	-	387	232	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	290	162	-	-	164	-
Mov Cap-2 Maneuver	-	-	-	290	162	-	-	164	-
Stage 1	-	-	-	-	-	-	-	234	-
Stage 2	-	-	-	356	232	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		25.1	29.7
HCM LOS		D	D

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	203	-	-	-	164
HCM Lane V/C Ratio	0.118	-	-	-	0.113
HCM Control Delay (s)	25.1	-	-	-	29.7
HCM Lane LOS	D	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1317	28	0	0	0	0	22	0	0	17	0
Future Vol, veh/h	0	1317	28	0	0	0	0	22	0	0	17	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	-	-	-	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	0	1432	30	0	0	0	0	24	0	0	18	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1462	0	0	-	1448	731	729	1463	-
Stage 1	-	-	-	-	-	-	-	1447	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	728	1462	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	460	-	0	0	131	365	324	128	0
Stage 1	-	-	-	-	-	0	0	196	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	382	192	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	460	-	-	-	131	365	279	128	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	131	-	279	128	-
Stage 1	-	-	-	-	-	-	-	196	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	335	192	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	38.5	37.8
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	131	1621	-	-	460	-	128
HCM Lane V/C Ratio	0.183	-	-	-	-	-	0.144
HCM Control Delay (s)	38.5	0	-	-	0	-	37.8
HCM Lane LOS	E	A	-	-	A	-	E
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	0.5

Intersection	
Int Delay, s/veh	15.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	4	97	115	21	76	57	417	200	46	455	34
Future Vol, veh/h	1	4	97	115	21	76	57	417	200	46	455	34
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	-	-	0	100	-	-	80	-	-
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	1	4	105	125	23	83	62	453	217	50	495	37

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	976	1408	266	1036	1318	335	532	0	0	670	0	0
Stage 1	614	614	-	686	686	-	-	-	-	-	-	-
Stage 2	362	794	-	350	632	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	206	138	732	186	156	661	1032	-	-	916	-	-
Stage 1	446	481	-	404	446	-	-	-	-	-	-	-
Stage 2	629	398	-	639	472	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	144	123	732	142	139	661	1032	-	-	916	-	-
Mov Cap-2 Maneuver	144	123	-	142	139	-	-	-	-	-	-	-
Stage 1	419	455	-	380	419	-	-	-	-	-	-	-
Stage 2	489	374	-	512	446	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	99.6	0.7	0.8
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1032	-	-	732	142	661	916	-	-
HCM Lane V/C Ratio	0.06	-	-	0.144	1.041	0.125	0.055	-	-
HCM Control Delay (s)	8.7	-	-	10.7	149	11.2	9.2	-	-
HCM Lane LOS	A	-	-	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	7.8	0.4	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	991	213	242	882	240	104	270	273	123	495	68
Future Volume (veh/h)	156	991	213	242	882	240	104	270	273	123	495	68
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	170	1077	90	263	959	119	113	293	0	134	538	69
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	205	1321	589	350	1271	567	143	725		167	690	88
Arrive On Green	0.12	0.37	0.37	0.10	0.36	0.36	0.08	0.20	0.00	0.09	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3168	405
Grp Volume(v), veh/h	170	1077	90	263	959	119	113	293	0	134	301	306
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1796
Q Serve(g_s), s	9.8	28.6	4.0	7.8	24.9	5.5	6.5	7.5	0.0	7.7	16.7	16.8
Cycle Q Clear(g_c), s	9.8	28.6	4.0	7.8	24.9	5.5	6.5	7.5	0.0	7.7	16.7	16.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	205	1321	589	350	1271	567	143	725		167	387	391
V/C Ratio(X)	0.83	0.82	0.15	0.75	0.75	0.21	0.79	0.40		0.80	0.78	0.78
Avail Cap(c_a), veh/h	510	2069	923	1319	2408	1074	357	983		493	627	634
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.3	29.7	21.9	45.8	29.6	23.4	47.3	36.2	0.0	46.5	38.6	38.6
Incr Delay (d2), s/veh	8.2	1.5	0.1	3.3	0.9	0.2	9.4	0.4	0.0	8.6	3.4	3.4
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	4.6	11.5	1.5	3.3	10.0	2.1	3.3	3.3	0.0	3.8	7.6	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	31.1	22.0	49.1	30.5	23.5	56.7	36.5	0.0	55.1	42.0	42.1
LnGrp LOS	D	C	C	D	C	C	E	D		E	D	D
Approach Vol, veh/h		1337			1341			406	A		741	
Approach Delay, s/veh		33.4			33.5			42.1			44.4	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.6	45.0	15.8	27.4	18.1	43.5	14.4	28.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	40.0	61.0	29.0	29.0	30.0	71.0	21.0	37.0
Max Q Clear Time (g_c+I1), s	9.8	30.6	9.7	9.5	11.8	26.9	8.5	18.8
Green Ext Time (p_c), s	0.9	8.3	0.3	1.8	0.4	7.7	0.2	3.6

Intersection Summary	
HCM 6th Ctrl Delay	36.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	146	1086	98	234	1152	196	86	362	285	143	257	133
Future Volume (veh/h)	146	1086	98	234	1152	196	86	362	285	143	257	133
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	159	1180	39	254	1252	164	93	393	83	155	279	23
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	248	2175	675	358	1628	726	178	562	251	243	629	280
Arrive On Green	0.07	0.43	0.43	0.10	0.46	0.46	0.05	0.16	0.16	0.07	0.18	0.18
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	159	1180	39	254	1252	164	93	393	83	155	279	23
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.9	15.0	1.3	6.2	25.6	5.4	2.3	9.1	4.0	3.8	6.1	1.1
Cycle Q Clear(g_c), s	3.9	15.0	1.3	6.2	25.6	5.4	2.3	9.1	4.0	3.8	6.1	1.1
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	248	2175	675	358	1628	726	178	562	251	243	629	280
V/C Ratio(X)	0.64	0.54	0.06	0.71	0.77	0.23	0.52	0.70	0.33	0.64	0.44	0.08
Avail Cap(c_a), veh/h	1234	5354	1662	1871	3726	1662	1234	1924	858	1234	1924	858
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	39.2	18.6	14.7	37.6	19.7	14.2	40.1	34.6	32.5	39.3	31.9	29.8
Incr Delay (d2), s/veh	2.8	0.2	0.0	2.6	0.8	0.2	2.4	1.6	0.8	2.8	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	5.2	0.4	2.6	9.2	1.7	1.0	3.8	1.5	1.6	2.5	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.0	18.8	14.7	40.2	20.5	14.4	42.5	36.2	33.2	42.1	32.4	30.0
LnGrp LOS	D	B	B	D	C	B	D	D	C	D	C	C
Approach Vol, veh/h		1378			1670			569			457	
Approach Delay, s/veh		21.4			22.9			36.8			35.5	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	45.7	9.5	20.4	14.0	43.0	11.1	18.7
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	31.0	91.0	31.0	47.0	47.0	91.0	31.0	47.0
Max Q Clear Time (g_c+I1), s	5.9	27.6	4.3	8.1	8.2	17.0	5.8	11.1
Green Ext Time (p_c), s	0.5	12.2	0.3	1.7	0.8	10.0	0.5	2.6

Intersection Summary	
HCM 6th Ctrl Delay	25.7
HCM 6th LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1113	499	451	1224	458	386
Future Volume (veh/h)	1113	499	451	1224	458	386
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	1210	252	490	1330	498	328
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	1982	884	733	3145	0	0
Arrive On Green	0.56	0.56	0.21	0.88	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	1210	252	490	1330	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	9.9	3.6	5.7	3.0		
Cycle Q Clear(g_c), s	9.9	3.6	5.7	3.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1982	884	733	3145		
V/C Ratio(X)	0.61	0.28	0.67	0.42		
Avail Cap(c_a), veh/h	9977	4450	2068	9977		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	6.4	5.1	15.7	0.5		
Incr Delay (d2), s/veh	0.3	0.2	1.1	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.5	0.5	1.7	0.0		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	6.7	5.2	16.8	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1462			1820		
Approach Delay, s/veh	6.5			4.9		
Approach LOS	A			A		
Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		43.5			14.2	29.2
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		122.0			26.0	122.0
Max Q Clear Time (g_c+I1), s		5.0			7.7	11.9
Green Ext Time (p_c), s		12.6			1.6	12.3
Intersection Summary						
HCM 6th Ctrl Delay			5.6			
HCM 6th LOS			A			

BY 2025 SAT MD

BING

SCENARIO MANAGER

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Uncrd
Cycle Length (s)	193.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	82.2
HCM Control Delay(s)	18.2
HCM Intersection LOS	B
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1113	499	451	1224	458	386
Future Volume (vph)	1113	499	451	1224	458	386
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	Min	Min	None	Min	None	—
+ Adjusted Flow Rate (veh/h)	1210	252	490	1330	498	328
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	267	—	—	—	85
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	1618	722	613	2464	681	1045
HCM Volume/Capacity	0.748	0.349	0.799	0.540	0.731	0.314
HCM Lane Group Delay(s/veh)	19.2	14.8	34.9	6.4	32.5	18.4
HCM Lane Group LOS	B	B	C	A	C	B
HCM Approach Delay (s/veh)	18.5	—	—	14.0	26.9	—
HCM Approach LOS	B	—	—	B	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2025 AM Peak

Intersection						
Int Delay, s/veh	2.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	115	350	75	25	25
Future Vol, veh/h	85	115	350	75	25	25
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	92	125	380	82	27	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	462	0	-	0	730	421
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	309	-
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	1099	-	-	-	389	632
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	745	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1099	-	-	-	354	632
Mov Cap-2 Maneuver	-	-	-	-	354	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	745	-

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1099	-	-	-	454
HCM Lane V/C Ratio	0.084	-	-	-	0.12
HCM Control Delay (s)	8.6	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	150	65	50	310	15	35	0	35	20	0	15
Future Vol, veh/h	5	150	65	50	310	15	35	0	35	20	0	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	-	-	100	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	163	71	54	337	16	38	0	38	22	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	353	0	0	234	0	0	670	670	199	681	697	345
Stage 1	-	-	-	-	-	-	209	209	-	453	453	-
Stage 2	-	-	-	-	-	-	461	461	-	228	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	1206	-	-	1333	-	-	371	378	842	364	365	698
Stage 1	-	-	-	-	-	-	793	729	-	586	570	-
Stage 2	-	-	-	-	-	-	581	565	-	775	704	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1206	-	-	1333	-	-	350	361	842	336	349	698
Mov Cap-2 Maneuver	-	-	-	-	-	-	350	361	-	336	349	-
Stage 1	-	-	-	-	-	-	790	726	-	584	547	-
Stage 2	-	-	-	-	-	-	544	542	-	737	701	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	13	14.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	350	842	1206	-	-	1333	-	-	432
HCM Lane V/C Ratio	0.109	0.045	0.005	-	-	0.041	-	-	0.088
HCM Control Delay (s)	16.5	9.5	8	-	-	7.8	-	-	14.1
HCM Lane LOS	C	A	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0.1	0	-	-	0.1	-	-	0.3

Intersection						
Int Delay, s/veh	6.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	155	60	140	215	185	65
Future Vol, veh/h	155	60	140	215	185	65
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	65	152	234	201	71

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	234	0	740	202
Stage 1	-	-	-	-	202	-
Stage 2	-	-	-	-	538	-
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	-	-	1333	-	384	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	585	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1332	-	340	838
Mov Cap-2 Maneuver	-	-	-	-	430	-
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	17.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	430	838	-	-	1332	-
HCM Lane V/C Ratio	0.468	0.084	-	-	0.114	-
HCM Control Delay (s)	20.5	9.7	-	-	8.1	-
HCM Lane LOS	C	A	-	-	A	-
HCM 95th %tile Q(veh)	2.4	0.3	-	-	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	200	70	10	395	5	15	0	5	5	0	10
Future Volume (veh/h)	5	200	70	10	395	5	15	0	5	5	0	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	5	217	39	11	429	5	16	0	1	5	0	1
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	412	659	558	568	665	8	287	0	46	246	0	5
Arrive On Green	0.01	0.35	0.35	0.01	0.36	0.36	0.03	0.00	0.03	0.03	0.00	0.03
Sat Flow, veh/h	1781	1870	1583	1781	1845	22	1578	0	1585	838	0	168
Grp Volume(v), veh/h	5	217	39	11	0	434	16	0	1	6	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1781	0	1866	1578	0	1585	1006	0	0
Q Serve(g_s), s	0.1	2.5	0.5	0.1	0.0	5.8	0.0	0.0	0.0	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.1	2.5	0.5	0.1	0.0	5.8	0.3	0.0	0.0	0.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.83		0.17
Lane Grp Cap(c), veh/h	412	659	558	568	0	672	287	0	46	251	0	0
V/C Ratio(X)	0.01	0.33	0.07	0.02	0.00	0.65	0.06	0.00	0.02	0.02	0.00	0.00
Avail Cap(c_a), veh/h	699	2259	1912	841	0	2254	1244	0	1117	1225	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.7	7.1	6.4	6.1	0.0	7.9	14.2	0.0	14.1	14.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.3	0.1	0.0	0.0	1.0	0.1	0.0	0.2	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.7	0.1	0.0	0.0	1.6	0.1	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.7	7.4	6.5	6.1	0.0	9.0	14.3	0.0	14.2	14.4	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	B	B	A	A
Approach Vol, veh/h		261			445			17			6	
Approach Delay, s/veh		7.2			8.9			14.3			14.4	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.4	16.5		6.9	6.2	16.7		6.9
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0
Max Q Clear Time (g_c+I1), s	2.1	4.5		2.4	2.1	7.8		2.3
Green Ext Time (p_c), s	0.0	1.4		0.0	0.0	2.9		0.0

Intersection Summary			
HCM 6th Ctrl Delay			8.5
HCM 6th LOS			A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	165	5	180	295	5	10	60	80	15	70	105
Future Volume (veh/h)	135	165	5	180	295	5	10	60	80	15	70	105
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	147	179	4	196	321	1	11	65	11	16	76	7
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	201	387	9	265	465	394	20	242	40	29	157	133
Arrive On Green	0.11	0.21	0.21	0.15	0.25	0.25	0.01	0.08	0.08	0.02	0.08	0.08
Sat Flow, veh/h	1781	1822	41	1781	1870	1585	1781	3052	504	1781	1870	1585
Grp Volume(v), veh/h	147	0	183	196	321	1	11	37	39	16	76	7
Grp Sat Flow(s),veh/h/ln	1781	0	1863	1781	1870	1585	1781	1777	1780	1781	1870	1585
Q Serve(g_s), s	3.5	0.0	3.8	4.6	6.9	0.0	0.3	0.9	0.9	0.4	1.7	0.2
Cycle Q Clear(g_c), s	3.5	0.0	3.8	4.6	6.9	0.0	0.3	0.9	0.9	0.4	1.7	0.2
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	201	0	396	265	465	394	20	141	141	29	157	133
V/C Ratio(X)	0.73	0.00	0.46	0.74	0.69	0.00	0.54	0.26	0.28	0.56	0.48	0.05
Avail Cap(c_a), veh/h	2177	0	2108	2177	2116	1794	968	1810	1812	968	1905	1614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	15.2	18.0	15.1	12.5	21.7	19.1	19.1	21.6	19.3	18.6
Incr Delay (d2), s/veh	5.1	0.0	0.8	4.0	1.8	0.0	20.4	1.0	1.0	15.7	2.3	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	1.6	0.0	1.5	2.0	2.7	0.0	0.2	0.4	0.4	0.3	0.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.1	0.0	16.0	22.0	16.9	12.5	42.1	20.1	20.2	37.3	21.6	18.8
LnGrp LOS	C	A	B	C	B	B	D	C	C	D	C	B
Approach Vol, veh/h		330			518			87			99	
Approach Delay, s/veh		19.6			18.8			22.9			24.0	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	17.0	6.7	9.5	12.6	15.4	6.5	9.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0				
Max Q Clear Time (g_c+I1), s	5.5	8.9	2.4	2.9	6.6	5.8	2.3	3.7				
Green Ext Time (p_c), s	0.4	2.1	0.0	0.4	0.6	1.1	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay			19.9									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↰		↱
Traffic Vol, veh/h	355	0	10	305	0	10
Future Vol, veh/h	355	0	10	305	0	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	386	0	11	332	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	386	0	-	386
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1172	-	0	662
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1172	-	-	662
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	662	-	1172	-
HCM Lane V/C Ratio	0.016	-	0.009	-
HCM Control Delay (s)	10.5	-	8.1	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.1	-	0	-

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	350	975	0	0	1520	0	0	0	0	0	0	305
Future Vol, veh/h	350	975	0	0	1520	0	0	0	0	0	0	305
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	380	1060	0	0	1652	0	0	0	0	0	0	332

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1652	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	387	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	387	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	19.7	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	387	-	-	-
HCM Lane V/C Ratio	0.983	-	-	-
HCM Control Delay (s)	74.7	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	11.5	-	-	-

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	0	0	0	85	1520	5	5	10	0	0	10	0
Future Vol, veh/h	0	0	0	85	1520	5	5	10	0	0	10	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	92	1652	5	5	11	0	0	11	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1016	1841	-	-	1839	-
Stage 1	-	-	-	0	0	-	-	1839	-
Stage 2	-	-	-	1016	1841	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	-	-	-	192	74	0	0	75	0
Stage 1	-	-	-	-	-	0	0	124	0
Stage 2	-	-	-	255	124	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	171	74	-	-	75	-
Mov Cap-2 Maneuver	-	-	-	171	74	-	-	75	-
Stage 1	-	-	-	-	-	-	-	124	-
Stage 2	-	-	-	233	124	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		53	61
HCM LOS		F	F

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	91	-	-	-	75
HCM Lane V/C Ratio	0.179	-	-	-	0.145
HCM Control Delay (s)	53	-	-	-	61
HCM Lane LOS	F	-	-	-	F
HCM 95th %tile Q(veh)	0.6	-	-	-	0.5

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	950	30	0	0	0	0	10	10	5	5	0
Future Vol, veh/h	0	950	30	0	0	0	0	10	10	5	5	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	-	-	-	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	0	1033	33	0	0	0	0	11	11	5	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1066	0	0	-	1051	533	523	1067	-
Stage 1	-	-	-	-	-	-	-	1050	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	522	1066	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	652	-	0	0	226	492	451	221	0
Stage 1	-	-	-	-	-	0	0	303	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	507	298	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	652	-	-	-	226	492	425	221	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	226	-	425	221	-
Stage 1	-	-	-	-	-	-	-	303	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	478	298	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.5	17.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	310	1621	-	-	652	-	291
HCM Lane V/C Ratio	0.07	-	-	-	-	-	0.037
HCM Control Delay (s)	17.5	0	-	-	0	-	17.9
HCM Lane LOS	C	A	-	-	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	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	5	5	35	40	10	10	65	180	50	15	225	20
Future Vol, veh/h	5	5	35	40	10	10	65	180	50	15	225	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	-	-	0	-	-	0	100	-	-	80	-	-
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	5	38	43	11	11	71	196	54	16	245	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	534	680	134	522	664	125	267	0	0	250	0	0
Stage 1	288	288	-	365	365	-	-	-	-	-	-	-
Stage 2	246	392	-	157	299	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	429	372	890	438	380	902	1294	-	-	1313	-	-
Stage 1	695	672	-	627	622	-	-	-	-	-	-	-
Stage 2	736	605	-	829	665	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	393	347	890	393	355	902	1294	-	-	1313	-	-
Mov Cap-2 Maneuver	393	347	-	393	355	-	-	-	-	-	-	-
Stage 1	657	664	-	593	588	-	-	-	-	-	-	-
Stage 2	675	572	-	777	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	14.8	1.8	0.4
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1294	-	-	890	385	902	1313	-	-
HCM Lane V/C Ratio	0.055	-	-	0.043	0.141	0.012	0.012	-	-
HCM Control Delay (s)	7.9	-	-	9.2	15.9	9	7.8	-	-
HCM Lane LOS	A	-	-	A	C	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	0.5	0	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	795	90	320	1415	115	55	120	120	45	205	50
Future Volume (veh/h)	60	795	90	320	1415	115	55	120	120	45	205	50
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	65	864	48	348	1538	79	60	130	0	49	223	40
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	2092	933	403	2341	1044	77	370		64	291	51
Arrive On Green	0.05	0.59	0.59	0.23	1.00	1.00	0.04	0.10	0.00	0.04	0.10	0.10
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3017	532
Grp Volume(v), veh/h	65	864	48	348	1538	79	60	130	0	49	130	133
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1773
Q Serve(g_s), s	5.6	20.5	2.0	15.0	0.0	0.0	5.2	5.3	0.0	4.2	11.0	11.4
Cycle Q Clear(g_c), s	5.6	20.5	2.0	15.0	0.0	0.0	5.2	5.3	0.0	4.2	11.0	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.30
Lane Grp Cap(c), veh/h	83	2092	933	403	2341	1044	77	370		64	171	171
V/C Ratio(X)	0.78	0.41	0.05	0.86	0.66	0.08	0.78	0.35		0.77	0.76	0.78
Avail Cap(c_a), veh/h	218	2092	933	870	2341	1044	276	665		276	332	332
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.53	0.53	0.53	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.1	17.3	13.5	58.2	0.0	0.0	73.4	64.6	0.0	74.1	68.2	68.4
Incr Delay (d2), s/veh	14.8	0.6	0.1	3.1	0.8	0.1	15.2	0.6	0.0	17.5	6.7	7.4
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	2.9	8.1	0.8	5.8	0.3	0.0	2.7	2.4	0.0	2.3	5.4	5.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	88.0	17.9	13.6	61.3	0.8	0.1	88.6	65.1	0.0	91.6	74.9	75.8
LnGrp LOS	F	B	B	E	A	A	F	E		F	E	E
Approach Vol, veh/h		977			1965			190	A		312	
Approach Delay, s/veh		22.4			11.5			72.6			77.9	
Approach LOS		C			B			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.1	97.2	11.5	22.1	13.2	108.1	12.7	21.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	39.0	39.0	24.0	29.0	19.0	59.0	24.0	29.0				
Max Q Clear Time (g_c+I1), s	17.0	22.5	6.2	7.3	7.6	2.0	7.2	13.4				
Green Ext Time (p_c), s	1.1	5.1	0.1	0.7	0.1	16.5	0.1	1.3				

Intersection Summary			
HCM 6th Ctrl Delay			24.0
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	740	70	400	1675	125	85	245	290	55	100	65
Future Volume (veh/h)	125	740	70	400	1675	125	85	245	290	55	100	65
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	136	804	38	435	1821	87	92	266	14	60	109	8
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	181	3039	943	497	2440	1088	137	341	152	103	305	136
Arrive On Green	0.10	1.00	1.00	0.10	0.46	0.46	0.04	0.10	0.10	0.03	0.09	0.09
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	136	804	38	435	1821	87	92	266	14	60	109	8
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.9	0.0	0.0	19.3	65.3	4.8	4.1	11.3	1.2	2.7	4.5	0.7
Cycle Q Clear(g_c), s	5.9	0.0	0.0	19.3	65.3	4.8	4.1	11.3	1.2	2.7	4.5	0.7
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	181	3039	943	497	2440	1088	137	341	152	103	305	136
V/C Ratio(X)	0.75	0.26	0.04	0.88	0.75	0.08	0.67	0.78	0.09	0.58	0.36	0.06
Avail Cap(c_a), veh/h	334	3039	943	669	2440	1088	557	917	409	223	573	256
HCM Platoon Ratio	2.00	2.00	2.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.89	0.89	0.89	0.64	0.64	0.64	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	68.4	0.0	0.0	68.7	30.7	14.4	73.4	68.5	63.9	74.2	66.8	65.1
Incr Delay (d2), s/veh	5.6	0.2	0.1	6.6	1.4	0.1	5.2	3.7	0.2	5.1	0.7	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	2.6	0.1	0.0	9.1	29.2	1.6	1.9	5.2	0.5	1.2	2.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.0	0.2	0.1	75.3	32.1	14.5	78.6	72.2	64.2	79.4	67.5	65.3
LnGrp LOS	E	A	A	E	C	B	E	E	E	E	E	E
Approach Vol, veh/h		978			2343			372			177	
Approach Delay, s/veh		10.4			39.5			73.5			71.4	
Approach LOS		B			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.1	112.4	11.2	18.3	27.3	98.2	9.6	19.9
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	15.0	69.0	25.0	25.0	30.0	54.0	10.0	40.0
Max Q Clear Time (g_c+I1), s	7.9	67.3	6.1	6.5	21.3	2.0	4.7	13.3
Green Ext Time (p_c), s	0.2	1.5	0.2	0.5	1.0	5.9	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	36.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	875	240	330	1960	190	200
Future Volume (veh/h)	875	240	330	1960	190	200
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	951	178	359	2130	207	138
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	2892	1290	421	3439	0	0
Arrive On Green	0.27	0.27	0.12	0.97	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	951	178	359	2130	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	33.3	13.2	15.8	7.5		
Cycle Q Clear(g_c), s	33.3	13.2	15.8	7.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2892	1290	421	3439		
V/C Ratio(X)	0.33	0.14	0.85	0.62		
Avail Cap(c_a), veh/h	2892	1290	780	3439		
HCM Platoon Ratio	0.33	0.33	1.00	1.00		
Upstream Filter(I)	0.92	0.92	1.00	1.00		
Uniform Delay (d), s/veh	22.7	15.4	66.7	0.2		
Incr Delay (d2), s/veh	0.3	0.2	5.0	0.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	15.9	5.4	7.1	0.4		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.0	15.6	71.7	1.0		
LnGrp LOS	C	B	E	A		
Approach Vol, veh/h	1129			2489		
Approach Delay, s/veh	21.8			11.2		
Approach LOS	C			B		

Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		155.0			23.9	131.1
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		105.0			35.0	65.0
Max Q Clear Time (g_c+I1), s		9.5			17.8	35.3
Green Ext Time (p_c), s		36.6			1.1	7.4

Intersection Summary	
HCM 6th Ctrl Delay	14.5
HCM 6th LOS	B

FY 2025 AM

BING

SCENARIO MANAGER

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	155.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	155.0
HCM Control Delay(s)	23.4
HCM Intersection LOS	C
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	875	240	330	1960	190	200
Future Volume (vph)	875	240	330	1960	190	200
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	951	178	359	2130	207	138
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	76	—	—	—	73
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.92	0.92	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2516	1122	421	3064	276	562
HCM Volume/Capacity	0.378	0.159	0.853	0.695	0.750	0.245
HCM Lane Group Delay(s/veh)	31.1	22.9	71.7	5.0	73.9	52.2
HCM Lane Group LOS	C	C	E	A	E	D
HCM Approach Delay (s/veh)	29.8	—	—	14.6	65.2	—
HCM Approach LOS	C	—	—	B	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2025 PM Peak

Intersection						
Int Delay, s/veh	7.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	135	390	315	65	105	60
Future Vol, veh/h	135	390	315	65	105	60
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	147	424	342	71	114	65

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	413	0	-	0	1096	378
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	718	-
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	1146	-	-	-	236	669
Stage 1	-	-	-	-	693	-
Stage 2	-	-	-	-	483	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1146	-	-	-	196	669
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	483	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	43.3
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1146	-	-	-	264
HCM Lane V/C Ratio	0.128	-	-	-	0.679
HCM Control Delay (s)	8.6	0	-	-	43.3
HCM Lane LOS	A	A	-	-	E
HCM 95th %tile Q(veh)	0.4	-	-	-	4.5

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	410	50	50	340	10	60	0	75	45	5	20
Future Vol, veh/h	5	410	50	50	340	10	60	0	75	45	5	20
Conflicting Peds, #/hr	0	0	2	2	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	-	-	100	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	446	54	54	370	11	65	0	82	49	5	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	381	0	0	502	0	0	982	974	475	1008	996	376
Stage 1	-	-	-	-	-	-	485	485	-	484	484	-
Stage 2	-	-	-	-	-	-	497	489	-	524	512	-
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	1177	-	-	1062	-	-	228	252	590	219	244	670
Stage 1	-	-	-	-	-	-	563	552	-	564	552	-
Stage 2	-	-	-	-	-	-	555	549	-	537	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1177	-	-	1060	-	-	207	238	589	181	230	670
Mov Cap-2 Maneuver	-	-	-	-	-	-	207	238	-	181	230	-
Stage 1	-	-	-	-	-	-	560	549	-	562	524	-
Stage 2	-	-	-	-	-	-	504	521	-	461	533	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	20.1	27.8
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	207	589	1177	-	-	1060	-	-	233
HCM Lane V/C Ratio	0.315	0.138	0.005	-	-	0.051	-	-	0.327
HCM Control Delay (s)	30.2	12.1	8.1	-	-	8.6	-	-	27.8
HCM Lane LOS	D	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.3	0.5	0	-	-	0.2	-	-	1.4

Intersection	
Int Delay, s/veh	12.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	280	125	140	285	265	200
Future Vol, veh/h	280	125	140	285	265	200
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	304	136	152	310	288	217

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	441	0	987	373
Stage 1	-	-	-	-	373	-
Stage 2	-	-	-	-	614	-
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	-	-	1119	-	~ 274	673
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	540	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1118	-	~ 236	672
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	467	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	32
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	356	672	-	-	1118	-
HCM Lane V/C Ratio	0.809	0.323	-	-	0.136	-
HCM Control Delay (s)	46.5	12.9	-	-	8.7	-
HCM Lane LOS	E	B	-	-	A	-
HCM 95th %tile Q(veh)	7	1.4	-	-	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	305	255	50	510	5	235	0	95	5	0	10
Future Volume (veh/h)	5	305	255	50	510	5	235	0	95	5	0	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	5	332	92	54	554	4	255	0	20	5	0	1
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	277	636	534	444	719	5	486	0	335	219	13	18
Arrive On Green	0.01	0.34	0.34	0.05	0.39	0.39	0.21	0.00	0.21	0.21	0.00	0.21
Sat Flow, veh/h	1781	1870	1569	1781	1854	13	1555	0	1585	354	63	83
Grp Volume(v), veh/h	5	332	92	54	0	558	255	0	20	6	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1569	1781	0	1868	1555	0	1585	500	0	0
Q Serve(g_s), s	0.1	6.5	1.9	0.9	0.0	11.9	0.0	0.0	0.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	6.5	1.9	0.9	0.0	11.9	6.8	0.0	0.5	6.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.83		0.17
Lane Grp Cap(c), veh/h	277	636	534	444	0	724	486	0	335	250	0	0
V/C Ratio(X)	0.02	0.52	0.17	0.12	0.00	0.77	0.52	0.00	0.06	0.02	0.00	0.00
Avail Cap(c_a), veh/h	461	1475	1237	543	0	1473	839	0	729	604	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.8	12.1	10.6	9.1	0.0	12.2	16.9	0.0	14.4	14.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.2	0.1	0.0	1.8	0.9	0.0	0.1	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.3	0.6	0.3	0.0	4.2	2.3	0.0	0.2	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.8	12.7	10.7	9.2	0.0	14.0	17.7	0.0	14.5	14.7	0.0	0.0
LnGrp LOS	B	B	B	A	A	B	B	A	B	B	A	A
Approach Vol, veh/h		429			612			275			6	
Approach Delay, s/veh		12.3			13.6			17.5			14.7	
Approach LOS		B			B			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.5	21.5		15.6	6.3	23.7		15.6				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0				
Max Q Clear Time (g_c+I1), s	2.9	8.5		8.8	2.1	13.9		8.8				
Green Ext Time (p_c), s	0.0	2.4		0.0	0.0	3.8		1.2				
Intersection Summary												
HCM 6th Ctrl Delay			14.0									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	365	20	430	350	5	65	60	145	30	80	165
Future Volume (veh/h)	100	365	20	430	350	5	65	60	145	30	80	165
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	109	397	21	467	380	3	71	65	21	33	87	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	144	480	25	526	911	772	93	273	84	46	142	120
Arrive On Green	0.08	0.27	0.27	0.30	0.49	0.49	0.05	0.10	0.10	0.03	0.08	0.08
Sat Flow, veh/h	1781	1760	93	1781	1870	1585	1781	2673	826	1781	1870	1585
Grp Volume(v), veh/h	109	0	418	467	380	3	71	42	44	33	87	5
Grp Sat Flow(s),veh/h/ln	1781	0	1854	1781	1870	1585	1781	1777	1722	1781	1870	1585
Q Serve(g_s), s	4.7	0.0	16.7	19.8	10.3	0.1	3.1	1.7	1.9	1.5	3.6	0.2
Cycle Q Clear(g_c), s	4.7	0.0	16.7	19.8	10.3	0.1	3.1	1.7	1.9	1.5	3.6	0.2
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.48	1.00		1.00
Lane Grp Cap(c), veh/h	144	0	506	526	911	772	93	181	176	46	142	120
V/C Ratio(X)	0.76	0.00	0.83	0.89	0.42	0.00	0.76	0.23	0.25	0.71	0.61	0.04
Avail Cap(c_a), veh/h	1217	0	1173	1217	1183	1003	541	1012	980	541	1065	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.6	0.0	27.0	26.6	13.0	10.4	37.0	32.6	32.7	38.2	35.4	33.9
Incr Delay (d2), s/veh	7.8	0.0	3.5	5.3	0.3	0.0	11.9	0.6	0.7	18.0	4.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	7.6	8.7	4.1	0.0	1.6	0.8	0.8	0.9	1.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.3	0.0	30.5	31.9	13.3	10.4	48.9	33.3	33.4	56.2	39.6	34.0
LnGrp LOS	D	A	C	C	B	B	D	C	C	E	D	C
Approach Vol, veh/h		527			850			157			125	
Approach Delay, s/veh		33.1			23.5			40.4			43.8	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.4	44.5	8.1	14.1	29.3	27.6	10.1	12.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	6.7	12.3	3.5	3.9	21.8	18.7	5.1	5.6
Green Ext Time (p_c), s	0.3	2.6	0.0	0.5	1.5	2.8	0.1	0.5

Intersection Summary			
HCM 6th Ctrl Delay			29.7
HCM 6th LOS			C

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	500	0	10	355	0	25
Future Vol, veh/h	500	0	10	355	0	25
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	543	0	11	386	0	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	543	0	-	543
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1026	-	0	540
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1026	-	-	540
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	540	-	1026	-
HCM Lane V/C Ratio	0.05	-	0.011	-
HCM Control Delay (s)	12	-	8.5	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.2	-	0	-

Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	500	1565	0	0	1150	0	0	0	0	0	0	355
Future Vol, veh/h	500	1565	0	0	1150	0	0	0	0	0	0	355
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	543	1701	0	0	1250	0	0	0	0	0	0	386

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1250	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	553	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	553	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	14.9	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	553	-	-	-
HCM Lane V/C Ratio	0.983	-	-	-
HCM Control Delay (s)	61.4	-	-	0
HCM Lane LOS	F	-	-	A
HCM 95th %tile Q(veh)	13.7	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	40	1135	15	15	10	0	0	10	0
Future Vol, veh/h	0	0	0	40	1135	15	15	10	0	0	10	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	43	1234	16	16	11	0	0	11	0

Major/Minor				Major2			Minor1			Minor2		
Conflicting Flow All				0	0	0	709	1336	-	-	1328	-
Stage 1				-	-	-	0	0	-	-	1328	-
Stage 2				-	-	-	709	1336	-	-	0	-
Critical Hdwy				4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1				-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2				-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy				2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver				-	-	-	321	152	0	0	154	0
Stage 1				-	-	-	-	-	0	0	223	0
Stage 2				-	-	-	391	221	0	0	-	0
Platoon blocked, %					-	-						
Mov Cap-1 Maneuver				-	-	-	304	152	-	-	154	-
Mov Cap-2 Maneuver				-	-	-	304	152	-	-	154	-
Stage 1				-	-	-	-	-	-	-	223	-
Stage 2				-	-	-	372	221	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		24	30.1
HCM LOS		C	D

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	217	-	-	-	154
HCM Lane V/C Ratio	0.125	-	-	-	0.071
HCM Control Delay (s)	24	-	-	-	30.1
HCM Lane LOS	C	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	0.2

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	0	1545	20	0	0	0	0	20	45	5	5	0
Future Vol, veh/h	0	1545	20	0	0	0	0	20	45	5	5	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	-	-	-	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	0	1679	22	0	0	0	0	22	49	5	5	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1701	0	0	-	1691	851	852	1702	-
Stage 1	-	-	-	-	-	-	-	1690	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	851	1701	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	372	-	0	0	93	304	266	91	0
Stage 1	-	-	-	-	-	0	0	149	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	322	147	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	372	-	-	-	93	304	183	91	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	93	-	183	91	-
Stage 1	-	-	-	-	-	-	-	149	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	231	147	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	37.6	37.4
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	179	1621	-	-	372	-	122
HCM Lane V/C Ratio	0.395	-	-	-	-	-	0.089
HCM Control Delay (s)	37.6	0	-	-	0	-	37.4
HCM Lane LOS	E	A	-	-	A	-	E
HCM 95th %tile Q(veh)	1.7	0	-	-	0	-	0.3

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	5	65	105	20	35	55	375	100	25	485	35
Future Vol, veh/h	0	5	65	105	20	35	55	375	100	25	485	35
Conflicting Peds, #/hr	3	0	0	0	0	3	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	100	-	-	80	-	-
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	5	71	114	22	38	60	408	109	27	527	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	1240	286	903	1205	262	568	0	0	517	0	0
Stage 1	-	603	-	583	583	-	-	-	-	-	-	-
Stage 2	-	637	-	320	622	-	-	-	-	-	-	-
Critical Hdwy	-	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	-	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	0	174	711	232	183	737	1000	-	-	1045	-	-
Stage 1	0	487	-	465	497	-	-	-	-	-	-	-
Stage 2	0	470	-	666	477	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	159	709	190	167	735	997	-	-	1045	-	-
Mov Cap-2 Maneuver	-	159	-	190	167	-	-	-	-	-	-	-
Stage 1	-	473	-	437	467	-	-	-	-	-	-	-
Stage 2	-	442	-	577	463	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	52.2	0.9	0.4
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	997	-	-	709	186	735	1045	-	-
HCM Lane V/C Ratio	0.06	-	-	0.1	0.73	0.052	0.026	-	-
HCM Control Delay (s)	8.8	-	-	10.6	63.9	10.2	8.5	-	-
HCM Lane LOS	A	-	-	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	4.7	0.2	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	1340	170	245	1020	160	105	215	275	130	410	30
Future Volume (veh/h)	135	1340	170	245	1020	160	105	215	275	130	410	30
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	147	1457	103	266	1109	97	114	234	0	141	446	31
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	168	1894	845	320	1888	842	134	492		161	518	36
Arrive On Green	0.09	0.53	0.53	0.06	0.36	0.36	0.08	0.14	0.00	0.09	0.15	0.15
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3372	234
Grp Volume(v), veh/h	147	1457	103	266	1109	97	114	234	0	141	234	243
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1828
Q Serve(g_s), s	13.4	53.6	5.4	12.6	41.9	6.8	10.4	10.0	0.0	12.9	21.2	21.4
Cycle Q Clear(g_c), s	13.4	53.6	5.4	12.6	41.9	6.8	10.4	10.0	0.0	12.9	21.2	21.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	168	1894	845	320	1888	842	134	492		161	273	281
V/C Ratio(X)	0.88	0.77	0.12	0.83	0.59	0.12	0.85	0.48		0.87	0.86	0.86
Avail Cap(c_a), veh/h	205	1894	845	607	1888	842	184	711		184	355	366
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.74	0.74	0.74	0.95	0.95	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.8	30.5	19.3	76.1	38.4	27.1	75.3	65.5	0.0	74.1	68.1	68.1
Incr Delay (d2), s/veh	28.1	3.1	0.3	4.2	1.0	0.2	21.8	0.7	0.0	31.6	15.1	15.4
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	7.4	22.6	2.1	5.8	19.2	2.8	5.6	4.6	0.0	7.4	10.8	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	101.9	33.6	19.5	80.3	39.4	27.3	97.1	66.2	0.0	105.7	83.2	83.5
LnGrp LOS	F	C	B	F	D	C	F	E		F	F	F
Approach Vol, veh/h		1707			1472			348	A		618	
Approach Delay, s/veh		38.6			46.0			76.3			88.5	
Approach LOS		D			D			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	93.9	20.9	28.9	21.5	93.7	18.5	31.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	29.0	62.0	17.0	33.0	19.0	72.0	17.0	33.0
Max Q Clear Time (g_c+I1), s	14.6	55.6	14.9	12.0	15.4	43.9	12.4	23.4
Green Ext Time (p_c), s	0.7	4.6	0.1	1.4	0.1	8.5	0.1	2.0

Intersection Summary	
HCM 6th Ctrl Delay	51.8
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	1560	105	375	1105	155	100	195	330	140	345	155
Future Volume (veh/h)	115	1560	105	375	1105	155	100	195	330	140	345	155
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	125	1696	54	408	1201	122	109	212	56	152	375	16
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	2918	906	456	1961	875	154	397	177	199	444	198
Arrive On Green	0.10	0.38	0.38	0.26	1.00	1.00	0.04	0.11	0.11	0.06	0.12	0.12
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	125	1696	54	408	1201	122	109	212	56	152	375	16
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	5.5	43.5	3.6	18.8	0.0	0.0	5.1	9.3	5.4	7.2	17.0	1.5
Cycle Q Clear(g_c), s	5.5	43.5	3.6	18.8	0.0	0.0	5.1	9.3	5.4	7.2	17.0	1.5
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	524	2918	906	456	1961	875	154	397	177	199	444	198
V/C Ratio(X)	0.24	0.58	0.06	0.90	0.61	0.14	0.71	0.53	0.32	0.76	0.84	0.08
Avail Cap(c_a), veh/h	524	2918	906	628	1961	875	524	646	288	524	646	288
HCM Platoon Ratio	0.67	0.67	0.67	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.49	0.49	0.49	0.82	0.82	0.82	0.70	0.70	0.70	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.4	35.2	22.9	59.6	0.0	0.0	77.8	69.2	67.5	76.6	70.6	63.8
Incr Delay (d2), s/veh	0.5	0.4	0.1	10.3	1.2	0.3	4.2	0.8	0.7	5.9	6.9	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	2.5	18.8	1.3	7.6	0.3	0.1	2.3	4.2	2.2	3.3	8.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.9	35.7	23.0	69.9	1.2	0.3	82.0	70.0	68.2	82.6	77.5	64.0
LnGrp LOS	E	D	C	E	A	A	F	E	E	F	E	E
Approach Vol, veh/h		1875			1731			377			543	
Approach Delay, s/veh		37.3			17.3			73.2			78.5	
Approach LOS		D			B			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.0	97.0	12.3	25.6	26.8	100.3	14.5	23.4
Change Period (Y+Rc), s	5.0	6.0	5.0	5.0	5.0	6.0	5.0	5.0
Max Green Setting (Gmax), s	25.0	64.0	25.0	30.0	30.0	59.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	7.5	2.0	7.1	19.0	20.8	45.5	9.2	11.3
Green Ext Time (p_c), s	0.3	11.1	0.3	1.6	1.0	8.9	0.4	1.2

Intersection Summary	
HCM 6th Ctrl Delay	37.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1765	280	335	1290	330	595
Future Volume (veh/h)	1765	280	335	1290	330	595
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	1918	224	364	1402	359	619
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	2923	1304	404	3446	0	0
Arrive On Green	1.00	1.00	0.12	0.97	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	1918	224	364	1402	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	0.0	0.0	17.2	3.3		
Cycle Q Clear(g_c), s	0.0	0.0	17.2	3.3		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2923	1304	404	3446		
V/C Ratio(X)	0.66	0.17	0.90	0.41		
Avail Cap(c_a), veh/h	2923	1304	419	3446		
HCM Platoon Ratio	2.00	2.00	1.00	1.00		
Upstream Filter(I)	0.71	0.71	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	71.9	0.1		
Incr Delay (d2), s/veh	0.8	0.2	21.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.3	0.1	8.7	0.2		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.8	0.2	93.7	0.5		
LnGrp LOS	A	A	F	A		
Approach Vol, veh/h	2142			1766		
Approach Delay, s/veh	0.8			19.7		
Approach LOS	A			B		

Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		165.0			24.3	140.7
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		132.0			20.0	107.0
Max Q Clear Time (g_c+I1), s		5.3			19.2	2.0
Green Ext Time (p_c), s		14.0			0.1	31.7

Intersection Summary						
HCM 6th Ctrl Delay			9.3			
HCM 6th LOS			A			

FY 2025 PM

BING | SCENARIO MANAGER

Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Coord
Cycle Length (s)	165.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	165.0
HCM Control Delay(s)	23.5
HCM Intersection LOS	C
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1765	280	335	1290	330	595
Future Volume (vph)	1765	280	335	1290	330	595
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	C-Max	C-Max	None	C-Max	None	—
+ Adjusted Flow Rate (veh/h)	1918	224	364	1402	359	619
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	74	—	—	—	26
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	0.71	0.71	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	2320	1035	404	2843	503	732
HCM Volume/Capacity	0.827	0.216	0.901	0.493	0.714	0.846
HCM Lane Group Delay(s/veh)	2.5	0.3	93.7	6.1	72.0	66.8
HCM Lane Group LOS	A	A	F	A	E	E
HCM Approach Delay (s/veh)	2.3	—	—	24.1	68.7	—
HCM Approach LOS	A	—	—	C	A	—

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2025 SAT MD Peak

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	200	300	365	70	50	65
Future Vol, veh/h	200	300	365	70	50	65
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	217	326	397	76	54	71

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	473	0	-	0	1195	435
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	760	-
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	1089	-	-	-	206	621
Stage 1	-	-	-	-	653	-
Stage 2	-	-	-	-	462	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1089	-	-	-	156	621
Mov Cap-2 Maneuver	-	-	-	-	156	-
Stage 1	-	-	-	-	494	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	29.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1089	-	-	-	270
HCM Lane V/C Ratio	0.2	-	-	-	0.463
HCM Control Delay (s)	9.1	0	-	-	29.3
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.7	-	-	-	2.3

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	5	415	50	55	380	5	50	0	90	5	0	5
Future Vol, veh/h	5	415	50	55	380	5	50	0	90	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	451	54	60	413	5	54	0	98	5	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	418	0	0	505	0	0	1026	1026	478	1073	1051	416
Stage 1	-	-	-	-	-	-	488	488	-	536	536	-
Stage 2	-	-	-	-	-	-	538	538	-	537	515	-
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	1141	-	-	1060	-	-	213	235	587	198	227	637
Stage 1	-	-	-	-	-	-	561	550	-	529	523	-
Stage 2	-	-	-	-	-	-	527	522	-	528	535	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1141	-	-	1060	-	-	201	221	587	157	213	637
Mov Cap-2 Maneuver	-	-	-	-	-	-	201	221	-	157	213	-
Stage 1	-	-	-	-	-	-	559	548	-	527	493	-
Stage 2	-	-	-	-	-	-	493	492	-	438	533	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.1	18.5	19.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	201	587	1141	-	-	1060	-	-	252
HCM Lane V/C Ratio	0.27	0.167	0.005	-	-	0.056	-	-	0.043
HCM Control Delay (s)	29.4	12.4	8.2	-	-	8.6	-	-	19.9
HCM Lane LOS	D	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.1	0.6	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	15.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	290	125	175	280	260	210
Future Vol, veh/h	290	125	175	280	260	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	315	136	190	304	283	228

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	451	0	1067	383
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	684	-
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	-	-	1109	-	~ 246	664
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	501	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1109	-	~ 204	664
Mov Cap-2 Maneuver	-	-	-	-	320	-
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	415	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.4	40.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	320	664	-	-	1109	-
HCM Lane V/C Ratio	0.883	0.344	-	-	0.172	-
HCM Control Delay (s)	61.8	13.2	-	-	8.9	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	8.2	1.5	-	-	0.6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	295	330	55	540	5	250	0	110	5	5	10
Future Volume (veh/h)	5	295	330	55	540	5	250	0	110	5	5	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	5	321	118	60	587	4	272	0	25	5	5	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	621	526	389	699	5	384	0	526	81	67	13
Arrive On Green	0.01	0.33	0.33	0.05	0.38	0.38	0.33	0.00	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1781	1870	1585	1781	1855	13	814	0	1585	0	201	40
Grp Volume(v), veh/h	5	321	118	60	0	591	272	0	25	12	0	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1868	814	0	1585	241	0	0
Q Serve(g_s), s	0.1	8.8	3.4	1.4	0.0	18.2	0.0	0.0	0.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	8.8	3.4	1.4	0.0	18.2	21.0	0.0	0.7	21.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		1.00	0.42		0.17
Lane Grp Cap(c), veh/h	198	621	526	389	0	704	384	0	526	161	0	0
V/C Ratio(X)	0.03	0.52	0.22	0.15	0.00	0.84	0.71	0.00	0.05	0.07	0.00	0.00
Avail Cap(c_a), veh/h	327	1065	902	438	0	1063	384	0	526	161	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.8	17.0	15.3	13.1	0.0	18.0	21.2	0.0	14.3	16.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.7	0.2	0.2	0.0	3.9	5.9	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	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.5	1.2	0.5	0.0	7.7	4.2	0.0	0.2	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.8	17.7	15.5	13.3	0.0	21.8	27.1	0.0	14.4	17.0	0.0	0.0
LnGrp LOS	B	B	B	B	A	C	C	A	B	B	A	A
Approach Vol, veh/h		444			651			297			12	
Approach Delay, s/veh		17.1			21.1			26.0			17.0	
Approach LOS		B			C			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.3	27.0		27.0	6.4	29.8		27.0				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	36.0		21.0	5.0	36.0		21.0				
Max Q Clear Time (g_c+I1), s	3.4	10.8		23.0	2.1	20.2		23.0				
Green Ext Time (p_c), s	0.0	2.4		0.0	0.0	3.6		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			20.8									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	345	25	450	370	5	60	75	175	35	55	100
Future Volume (veh/h)	120	345	25	450	370	5	60	75	175	35	55	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	130	375	26	489	402	3	65	82	14	38	60	1
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	171	459	32	551	896	759	85	241	40	52	113	96
Arrive On Green	0.10	0.27	0.27	0.31	0.48	0.48	0.05	0.08	0.08	0.03	0.06	0.06
Sat Flow, veh/h	1781	1729	120	1781	1870	1585	1781	3047	508	1781	1870	1585
Grp Volume(v), veh/h	130	0	401	489	402	3	65	47	49	38	60	1
Grp Sat Flow(s),veh/h/ln	1781	0	1849	1781	1870	1585	1781	1777	1779	1781	1870	1585
Q Serve(g_s), s	5.4	0.0	15.4	19.8	10.8	0.1	2.7	1.9	2.0	1.6	2.4	0.0
Cycle Q Clear(g_c), s	5.4	0.0	15.4	19.8	10.8	0.1	2.7	1.9	2.0	1.6	2.4	0.0
Prop In Lane	1.00		0.06	1.00		1.00	1.00		0.29	1.00		1.00
Lane Grp Cap(c), veh/h	171	0	491	551	896	759	85	141	141	52	113	96
V/C Ratio(X)	0.76	0.00	0.82	0.89	0.45	0.00	0.76	0.33	0.35	0.73	0.53	0.01
Avail Cap(c_a), veh/h	1269	0	1220	1269	1234	1046	564	1055	1056	564	1111	941
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	26.1	24.9	13.1	10.3	35.7	33.0	33.0	36.5	34.5	33.5
Incr Delay (d2), s/veh	6.8	0.0	3.4	5.1	0.4	0.0	13.2	1.4	1.5	18.0	3.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	6.9	8.6	4.2	0.0	1.5	0.9	0.9	0.9	1.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.2	0.0	29.5	30.0	13.4	10.3	48.9	34.4	34.5	54.5	38.3	33.5
LnGrp LOS	D	A	C	C	B	B	D	C	C	D	D	C
Approach Vol, veh/h		531			894			161			99	
Approach Delay, s/veh		32.1			22.5			40.3			44.5	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	42.3	8.2	12.0	29.4	26.1	9.6	10.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	54.0	50.0	24.0	45.0	54.0	50.0	24.0	45.0
Max Q Clear Time (g_c+I1), s	7.4	12.8	3.6	4.0	21.8	17.4	4.7	4.4
Green Ext Time (p_c), s	0.4	2.8	0.1	0.5	1.6	2.7	0.1	0.3

Intersection Summary		
HCM 6th Ctrl Delay		28.5
HCM 6th LOS		C

Intersection						
Int Delay, s/veh	0.6					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↰↑		↱
Traffic Vol, veh/h	510	0	20	355	0	30
Future Vol, veh/h	510	0	20	355	0	30
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	554	0	22	386	0	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	554	0	-	554
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	0	1016	-	0	532
Stage 1	-	0	-	-	0	-
Stage 2	-	0	-	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	1016	-	-	532
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBL	WBT
Capacity (veh/h)	532	-	1016	-
HCM Lane V/C Ratio	0.061	-	0.021	-
HCM Control Delay (s)	12.2	-	8.6	0
HCM Lane LOS	B	-	A	A
HCM 95th %tile Q(veh)	0.2	-	0.1	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↑↑							↱
Traffic Vol, veh/h	510	1360	0	0	1055	0	0	0	0	0	0	355
Future Vol, veh/h	510	1360	0	0	1055	0	0	0	0	0	0	355
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	-	-	Free
Storage Length	500	-	-	-	-	-	-	-	-	-	-	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	554	1478	0	0	1147	0	0	0	0	0	0	386

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	1147	0	-	-	-	0				-	-	-
Stage 1	-	-	-	-	-	-				-	-	-
Stage 2	-	-	-	-	-	-				-	-	-
Critical Hdwy	4.14	-	-	-	-	-				-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-				-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-				-	-	-
Follow-up Hdwy	2.22	-	-	-	-	-				-	-	-
Pot Cap-1 Maneuver	605	-	0	0	-	0				0	0	0
Stage 1	-	-	0	0	-	0				0	0	0
Stage 2	-	-	0	0	-	0				0	0	0
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	605	-	-	-	-	-				-	0	-
Mov Cap-2 Maneuver	-	-	-	-	-	-				-	0	-
Stage 1	-	-	-	-	-	-				-	0	-
Stage 2	-	-	-	-	-	-				-	0	-

Approach	EB	WB	SB
HCM Control Delay, s	12.3	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	605	-	-	-
HCM Lane V/C Ratio	0.916	-	-	-
HCM Control Delay (s)	45.1	-	-	0
HCM Lane LOS	E	-	-	A
HCM 95th %tile Q(veh)	11.6	-	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	65	1045	20	10	15	0	0	20	0
Future Vol, veh/h	0	0	0	65	1045	20	10	15	0	0	20	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	1	-	-	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	71	1136	22	11	16	0	0	22	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	721	1300	-	-	1289	-
Stage 1	-	-	-	0	0	-	-	1289	-
Stage 2	-	-	-	721	1300	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	-
Pot Cap-1 Maneuver	-	-	-	315	160	0	0	162	0
Stage 1	-	-	-	-	-	0	0	232	0
Stage 2	-	-	-	385	230	0	0	-	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	283	160	-	-	162	-
Mov Cap-2 Maneuver	-	-	-	283	160	-	-	162	-
Stage 1	-	-	-	-	-	-	-	232	-
Stage 2	-	-	-	349	230	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		26.6	30.6
HCM LOS		D	D

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	194	-	-	-	162
HCM Lane V/C Ratio	0.14	-	-	-	0.134
HCM Control Delay (s)	26.6	-	-	-	30.6
HCM Lane LOS	D	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	0.5

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	0	1335	30	0	0	0	0	25	0	0	20	0
Future Vol, veh/h	0	1335	30	0	0	0	0	25	0	0	20	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	-	-	-	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	0	1451	33	0	0	0	0	27	0	0	22	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1	0	0	1484	0	0	-	1469	742	740	1485	-
Stage 1	-	-	-	-	-	-	-	1468	-	1	1	-
Stage 2	-	-	-	-	-	-	-	1	-	739	1484	-
Critical Hdwy	4.13	-	-	4.13	-	-	-	6.53	6.93	7.33	6.53	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	-	4.019	3.319	3.519	4.019	-
Pot Cap-1 Maneuver	1621	-	-	451	-	0	0	127	359	319	124	0
Stage 1	-	-	-	-	-	0	0	191	-	1022	895	0
Stage 2	-	-	-	-	-	0	0	895	-	376	188	0
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	1621	-	-	451	-	-	-	127	359	266	124	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	127	-	266	124	-
Stage 1	-	-	-	-	-	-	-	191	-	1022	895	-
Stage 2	-	-	-	-	-	-	-	895	-	323	188	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	40.9	40.1
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	127	1621	-	-	451	-	124
HCM Lane V/C Ratio	0.214	-	-	-	-	-	0.175
HCM Control Delay (s)	40.9	0	-	-	0	-	40.1
HCM Lane LOS	E	A	-	-	A	-	E
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	0.6

Intersection	
Int Delay, s/veh	20.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	5	100	115	25	80	60	445	200	50	465	35
Future Vol, veh/h	5	5	100	115	25	80	60	445	200	50	465	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	-	-	0	-	-	0	100	-	-	80	-	-
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	5	109	125	27	87	65	484	217	54	505	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1018	1463	272	1086	1374	351	543	0	0	701	0	0
Stage 1	632	632	-	723	723	-	-	-	-	-	-	-
Stage 2	386	831	-	363	651	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	191	127	726	171	144	645	1022	-	-	892	-	-
Stage 1	435	472	-	384	429	-	-	-	-	-	-	-
Stage 2	609	383	-	628	463	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	126	112	726	127	127	645	1022	-	-	892	-	-
Mov Cap-2 Maneuver	126	112	-	127	127	-	-	-	-	-	-	-
Stage 1	407	443	-	359	402	-	-	-	-	-	-	-
Stage 2	460	358	-	495	435	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	137.4	0.7	0.8
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1022	-	-	726	127	645	892	-	-
HCM Lane V/C Ratio	0.064	-	-	0.15	1.198	0.135	0.061	-	-
HCM Control Delay (s)	8.8	-	-	10.8	209.4	11.4	9.3	-	-
HCM Lane LOS	A	-	-	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	9.3	0.5	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	995	215	245	885	245	105	280	275	125	505	70
Future Volume (veh/h)	170	995	215	245	885	245	105	280	275	125	505	70
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	185	1082	89	266	962	120	114	304	0	136	549	71
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	220	1321	589	352	1243	555	144	734		169	698	90
Arrive On Green	0.12	0.37	0.37	0.10	0.35	0.35	0.08	0.21	0.00	0.09	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	3456	3554	1585	1781	3554	1585	1781	3164	408
Grp Volume(v), veh/h	185	1082	89	266	962	120	114	304	0	136	308	312
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1728	1777	1585	1781	1777	1585	1781	1777	1796
Q Serve(g_s), s	10.8	29.3	4.0	8.0	25.7	5.7	6.7	7.9	0.0	8.0	17.4	17.5
Cycle Q Clear(g_c), s	10.8	29.3	4.0	8.0	25.7	5.7	6.7	7.9	0.0	8.0	17.4	17.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	220	1321	589	352	1243	555	144	734		169	392	396
V/C Ratio(X)	0.84	0.82	0.15	0.76	0.77	0.22	0.79	0.41		0.81	0.78	0.79
Avail Cap(c_a), veh/h	501	2034	907	1297	2367	1056	351	967		485	617	623
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.7	30.2	22.3	46.6	30.9	24.4	48.1	36.7	0.0	47.3	39.2	39.2
Incr Delay (d2), s/veh	8.3	1.6	0.1	3.3	1.1	0.2	9.4	0.4	0.0	8.7	3.5	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	5.1	11.8	1.5	3.5	10.4	2.2	3.3	3.5	0.0	3.9	7.9	8.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.0	31.8	22.4	49.9	31.9	24.6	57.6	37.1	0.0	55.9	42.6	42.8
LnGrp LOS	D	C	C	D	C	C	E	D		E	D	D
Approach Vol, veh/h		1356			1348			418	A		756	
Approach Delay, s/veh		34.2			34.8			42.7			45.1	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.8	45.6	16.1	28.0	19.2	43.3	14.6	29.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	40.0	61.0	29.0	29.0	30.0	71.0	21.0	37.0
Max Q Clear Time (g_c+I1), s	10.0	31.3	10.0	9.9	12.8	27.7	8.7	19.5
Green Ext Time (p_c), s	0.9	8.3	0.3	1.8	0.4	7.7	0.2	3.6

Intersection Summary	
HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

Notes
User approved pedestrian interval to be less than phase max green.
Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	1090	100	235	1155	200	90	370	290	150	265	135
Future Volume (veh/h)	150	1090	100	235	1155	200	90	370	290	150	265	135
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	163	1185	39	255	1255	167	98	402	88	163	288	21
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	251	2177	676	357	1624	725	178	570	254	251	645	288
Arrive On Green	0.07	0.43	0.43	0.10	0.46	0.46	0.05	0.16	0.16	0.07	0.18	0.18
Sat Flow, veh/h	3456	5106	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	163	1185	39	255	1255	167	98	402	88	163	288	21
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	4.1	15.3	1.3	6.3	26.2	5.7	2.5	9.5	4.4	4.1	6.4	1.0
Cycle Q Clear(g_c), s	4.1	15.3	1.3	6.3	26.2	5.7	2.5	9.5	4.4	4.1	6.4	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	251	2177	676	357	1624	725	178	570	254	251	645	288
V/C Ratio(X)	0.65	0.54	0.06	0.71	0.77	0.23	0.55	0.71	0.35	0.65	0.45	0.07
Avail Cap(c_a), veh/h	1210	5250	1630	1835	3654	1630	1210	1887	842	1210	1887	842
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	39.9	19.0	14.9	38.4	20.2	14.6	41.0	35.2	33.0	39.9	32.3	30.0
Incr Delay (d2), s/veh	2.8	0.2	0.0	2.7	0.8	0.2	2.7	1.6	0.8	2.8	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	5.4	0.4	2.6	9.5	1.8	1.1	4.0	1.6	1.7	2.6	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.8	19.2	15.0	41.1	21.0	14.7	43.6	36.8	33.8	42.8	32.7	30.1
LnGrp LOS	D	B	B	D	C	B	D	D	C	D	C	C
Approach Vol, veh/h		1387			1677			588			472	
Approach Delay, s/veh		21.8			23.4			37.5			36.1	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	46.5	9.6	21.1	14.2	43.7	11.4	19.2
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	31.0	91.0	31.0	47.0	47.0	91.0	31.0	47.0
Max Q Clear Time (g_c+I1), s	6.1	28.2	4.5	8.4	8.3	17.3	6.1	11.5
Green Ext Time (p_c), s	0.5	12.2	0.3	1.8	0.8	10.0	0.5	2.7

Intersection Summary	
HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1120	500	455	1235	460	390
Future Volume (veh/h)	1120	500	455	1235	460	390
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	1217	257	495	1342	500	334
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	1988	887	736	3149	0	0
Arrive On Green	0.56	0.56	0.21	0.89	0.00	0.00
Sat Flow, veh/h	3647	1585	3456	3647	0	
Grp Volume(v), veh/h	1217	257	495	1342	0.0	
Grp Sat Flow(s),veh/h/ln	1777	1585	1728	1777		
Q Serve(g_s), s	10.1	3.7	5.8	3.0		
Cycle Q Clear(g_c), s	10.1	3.7	5.8	3.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1988	887	736	3149		
V/C Ratio(X)	0.61	0.29	0.67	0.43		
Avail Cap(c_a), veh/h	9873	4404	2046	9873		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	6.5	5.1	15.9	0.5		
Incr Delay (d2), s/veh	0.3	0.2	1.1	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.6	0.5	1.8	0.0		
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	6.8	5.3	17.0	0.5		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1474			1837		
Approach Delay, s/veh	6.5			5.0		
Approach LOS	A			A		

Timer - Assigned Phs		2			5	6
Phs Duration (G+Y+Rc), s		43.9			14.4	29.6
Change Period (Y+Rc), s		5.0			5.0	5.0
Max Green Setting (Gmax), s		122.0			26.0	122.0
Max Q Clear Time (g_c+I1), s		5.0			7.8	12.1
Green Ext Time (p_c), s		12.8			1.6	12.5

Intersection Summary				
HCM 6th Ctrl Delay			5.7	
HCM 6th LOS			A	

FY 2025 SAT MD

BING SCENARIO MANAGER

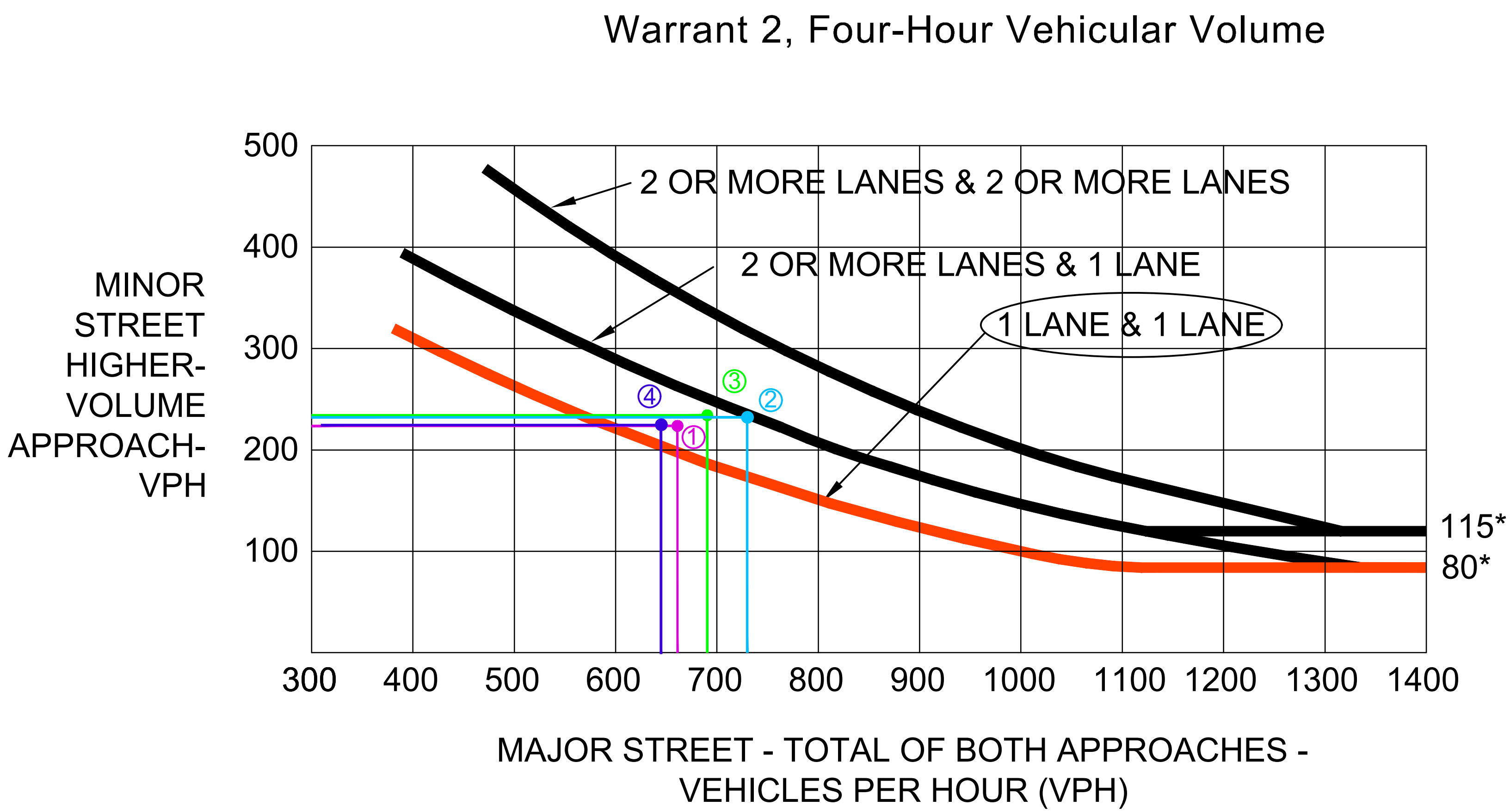
Auto Mode | Pedestrian Mode | Bicycle Mode

HCM 6th INTERSECTION	
Node #	13
Description	
Control Type	Actd-Uncrd
Cycle Length (s)	193.0
Lock Timings	☐
HCM Equilibrium Cycle(s)	83.4
HCM Control Delay(s)	18.4
HCM Intersection LOS	B
Analysis Time Period (h)	0.25
Saturation Flow Rate (pc/h/ln)	—
Use Saturation Flow Rate	☐
Sneakers Per Cycle (veh)	2.0
Number of Calc.Iterations	35
Stored Passenger Car Length (ft)	25
Stored Heavy Vehicle Length (ft)	45
Probability Peds. Pushing Button	0.51
Deceleration Rate (ft/s/s)	4.00
Acceleration Rate (ft/s/s)	3.50
Distance Between Stored Cars (ft)	8.00
Queue Length Percentile	50
Left-Turn Equivalency Factor	1.05
Right-Turn Equivalency Factor	1.18
Heavy Veh Equivalency Factor	2.00
Critical Gap for Perm. Left Turn (s)	4.5
Follow-up Time Perm Excl Left(s)	2.5
Follow-up Time Perm Shrd Left(s)	4.5
Stop Threshold Speed (mph)	5.0
Critical Merge Gap (s)	3.7

HCM 6th Settings	EBT	EBR	WBL	WBT	NBL	NBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	1120	500	455	1235	460	390
Future Volume (vph)	1120	500	455	1235	460	390
Turn Type	—	Perm	Prot	—	Prot	pt+ov
Protected Phases	6		5	2	4	4 5
Permitted Phases		6				
Lagging Phase?	☑	☑	☐	☑	☑	—
Opposing right-turn lane influence	—	—	—	—	—	—
+ Signal Timing Details						
Recall Mode	Min	Min	None	Min	None	—
+ Adjusted Flow Rate (veh/h)	1217	257	495	1342	500	334
Adjusted No of Lanes	2	1	2	2	2	2
Pedestrian volume (p/h)	—	0	—	—	—	0
Bicycle volume (bicycles/h)	—	0	—	—	—	0
Right Turn on Red Volume (vph)	—	263	—	—	—	83
+ Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900
Work zone on approach?	☐	—	—	☐	☐	—
Total Approach Width	—	—	—	—	—	—
Lanes open during work zone	—	—	—	—	—	—
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
HCM Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
Initial Queue (veh)	0	0	0	0	0	0
Include Unsignalized Delay?	—	—	—	—	—	—
Unsig. Movement Delay (s/veh)	—	—	—	—	—	—
Right Turn Channelized	—	None	—	None	—	Signal
HCM 6th Capacity (veh/h)	1622	724	616	2469	681	1048
HCM Volume/Capacity	0.750	0.355	0.803	0.543	0.734	0.319
HCM Lane Group Delay(s/veh)	19.4	15.0	35.4	6.4	33.0	18.6
HCM Lane Group LOS	B	B	D	A	C	B
HCM Approach Delay (s/veh)	18.7	—	—	14.2	27.2	—
HCM Approach LOS	B	—	—	B	A	—

APPENDIX D

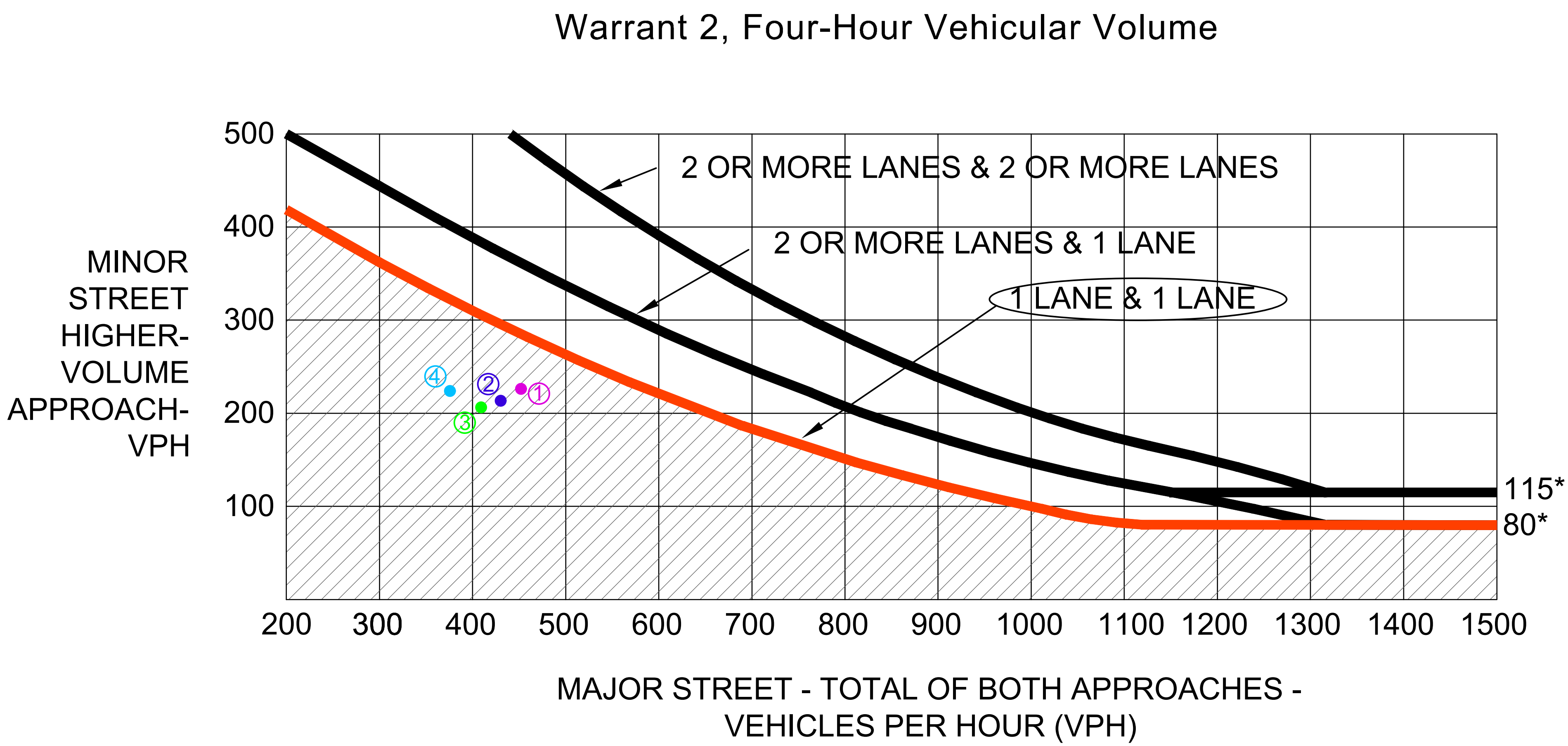
FOUR-HOUR VEHICLE VOLUME SIGNAL WARRANTS



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

① (11:15 AM to 12:15 PM), (665, 222)
② (12:15 PM to 1:15 PM), (721, 234)
③ (1:15 PM to 2:15 PM), (693, 235)
④ (2:15 PM to 3:15 PM), (642, 223)

KANAHA HOTEL TIAR	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE
	FOUR HOUR TRAFFIC SIGNAL WARRANT FOR EXISTING CONDITIONS HALEAKALA HWY/COSTCO MAIN ACCESS/COURTYARD BY MARRIOTT DWY	D1



1 10:45 AM - 11:45 AM, (451, 225)
2 11:45 AM - 12:45 PM, (431, 210)
3 1:45 PM - 2:45 PM, (410, 204)
4 2:45 PM - 3:45 PM, (375, 222)

*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

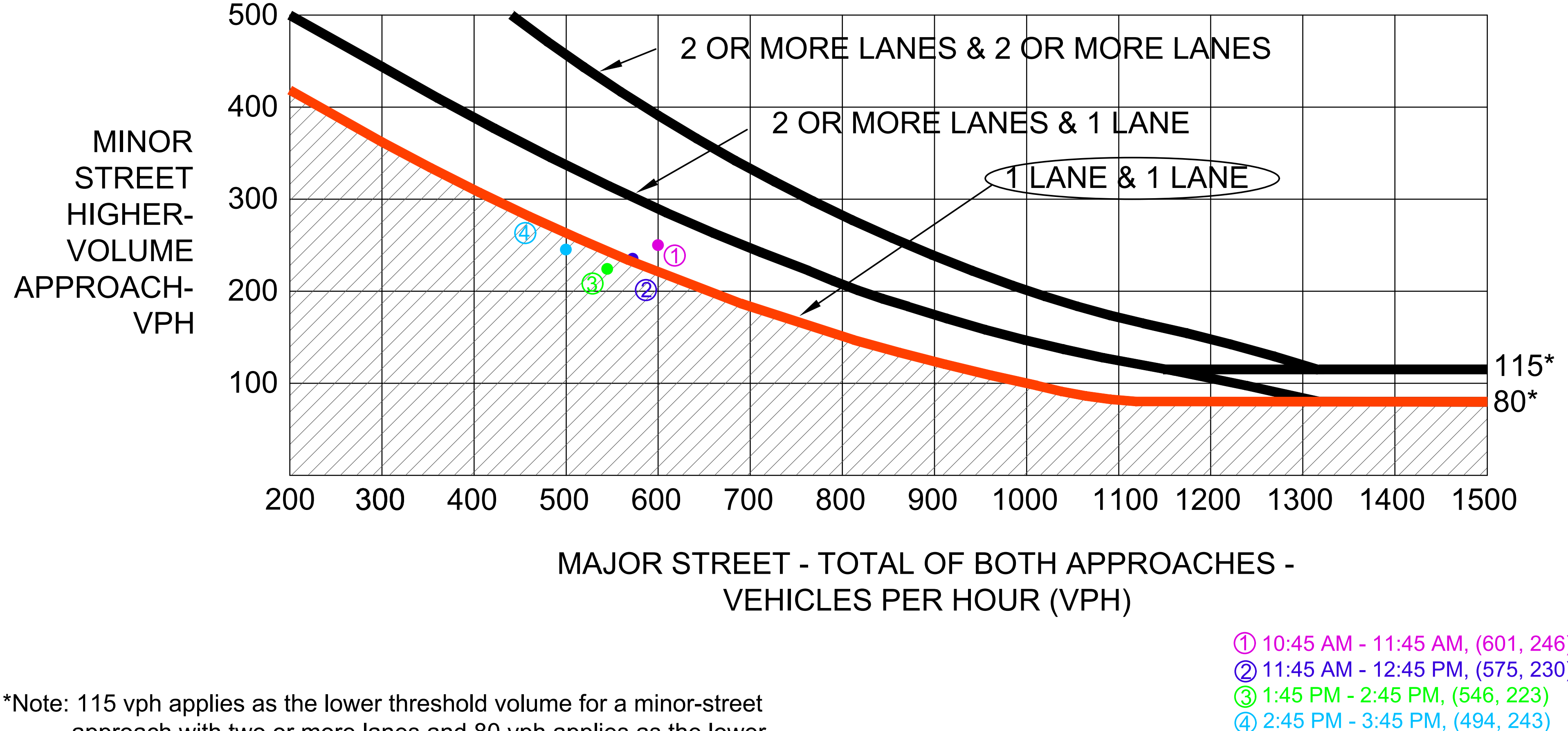
KANAHA HOTEL TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

FOUR HOUR TRAFFIC SIGNAL WARRANT FOR EXISTING CONDITIONS
HALEAKALA HWY/LAUO LOOP WEST

FIGURE D2

Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

KANAHA HOTEL
TIAR

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

FOUR HOUR TRAFFIC SIGNAL WARRANT FOR FUTURE YEAR 2025
HALEAKALA HWY/LAUO LOOP WEST

FIGURE
D3

APPENDIX E

CUMULATIVE MBP NPA IMPACTS WITH KANAHA HOTEL

Appendix E: Cumulative MBP NPA Impacts with Kanaha Hotel

The State of Hawaii Department of Transportation (HDOT) provided a comment letter dated January 31, 2019, addressing the Kanaha Hotel EISPN (reference STP 19-003, STP 8.2588) and provided the following comment No. 2c.

> *2c. The TIAR should discuss any traffic impacts generated by the cumulative development of the MBPII as identified in its TIAR and whether there will be consistency in the conclusions of the TIAR for the proposed hotel.*

The Maui Business Park Phase II North Project Area and South Project Area (MBP NPA & SPA) was approved by HDOT in 2012. Infill and occupancy of various parcels are currently ongoing in the MBP SPA, but there are currently no tenants that occupy MBP NPA. As a result, the cumulative impacts and development of MBP NPA is as of yet, unknown.

ATA completed the Maui Business Park Phase II North and South Project Area TIAR dated June 16, 2010 (hereinafter referred to as "2010 MBP NPA & SPA TIAR"), which studied the following approved land use allocation for the MBP NPA development:

- Approved MBP NPA site = 33.5 acres (assumed 50/50 split light industrial vs. commercial)
    - Light Industrial = 16.8 acres
    - Commercial = 183,000 SF building space (assumed 0.25 FAR for 16.8 acres)

With the proposed Kanaha Hotel, the following would be the new modified land use allocation:

- Proposed MBP NPA site With Kanaha Hotel = 33.5 acres (assumed 5.2-acre Kanaha Hotel with remaining lands 50/50 split light industrial vs. commercial)
    - Kanaha Hotel = 5.2 acres
    - Light Industrial = 14.2 acres
    - Commercial = 155,000 SF building space (assumed 0.25 FAR for 14.2 acres)

Table E.1 summarizes the cumulative trip generation impacts with inclusion of Kanaha Hotel. Based on the cumulative trip generation impact to MBP NPA, inclusion of Kanaha Hotel will increase traffic by 63 trips in the AM peak hour and only 43 trips in the PM peak hour. Since forecast traffic in the study area is significantly lower in the AM peak hour than in the PM peak hour, the 63 AM trip increase should not result in any major issues to nearby study intersections. The PM peak hour increase of 43 vehicles should also have minimal impacts to the roadway network. These 17 vehicles would result in an increase of only 6-12 vehicles per direction along Haleakala Highway. Traffic increases will be even lower as vehicles disburse towards Hana Highway, Puunene Avenue, Airport Access Road and Maui Veterans Highway. As a result, conclusions made in the 2010 MBP NPA & SPA TIAR should still be generally consistent with current plans.

Table E.1: Trip Generation Comparison Table

Approved MBP NPA land use vs. modified MBP NPA land use with Kanaha Hotel

Parcel	Total Size (acres)	Land Use	Quantity	Units	AM			PM		
					In	Out	Total	In	Out	Total
MBP NPA Without Kanaha Hotel Scenario [1]	33.50	Shopping Center (ITE 820)	183,000	1000 SF GLA	140	86	226	432	467	899
		Light Industrial (ITE 110)	16.8	acres	104	21	126	39	140	179
		MBP NPA Subtotal			245	107	352	471	607	1,078
		Less Shopping Center Pass-By Trips		*20%*	-	-	-	*-86*	*-86*	*-173*
		MBP NPA Total Trips			**245**	**107**	**352**	**385**	**521**	**905**
MBP NPA With Kanaha Hotel Scenario [2]	33.50	Shopping Center (ITE 820)	155,000	1000 SF GLA	126	78	204	386	418	804
		Light Industrial (ITE 110)	14.2	acres	88	18	106	37	132	169
		Kanaha Hotel (ITE 310)	5.2	acres	63	43	106	61	59	120
		MBP NPA Subtotal			277	139	416	484	609	1,093
		Less Shopping Center Pass-By Trips		*20%*	-	-	-	*-77*	*-77*	*-154*
		MBP NPA Total Trips			**277**	**139**	**416**	**407**	**532**	**939**
Overall MBP NPA Traffic Increases with Kanaha Hotel					**33**	**32**	**64**	**23**	**11**	**33**

Notes:

- MBP NPA = Maui Business Park North Project Area

1. MBP NPA Without Kanaha Hotel Scenario reflects approved land use allocation in Maui Business Park Ph II - N and S Project Area TIAR dated June 16, 2010.
   - 2010 MBP Ph II - N & S Project Area TIAR assumed total 33.5 acre NPA with 50% light industrial and 50% commercial. Commercial square footage assumed 0.25 Floor-Area-Ratio (FAR).
   - Total trips slightly differ from 2010 MBP Ph II - N & S Project Area TIAR since trips are based on latest ITE Trip Generation 9th Edition.
2. MBP NPA With Kanaha Hotel Scenario reflects modified land use with 5.2-acre Kanaha Hotel and remaining 28.3 acres split 50/50 commercial vs. light industrial.