

Figure 16. Portion of the Alanui Aupuni crossing the kula kai lands of 'O'oma 2nd; view toward Kohanaiki.

The primary routes of travel through the 1960s, descended from upland Kohanaiki and Kaloko, or came out of Kailua. In the 1950s, Hu'ehu'e Ranch bulldozed a jeep road to the shore at Kaloko. The ranch, and some individuals who went to the shore either as a part of their ranch duties, or for leisure fishing along the coast, used this jeep road. The *Alanui Aupuni* was modified from Kailua, to at least as far as Honokōhau and Kaloko, and remained in use through the 1970s. It was not until the Queen Ka'ahumanu Highway was opened (ca. 1973) that travel across the *kula kai* (shoreward plains) of 'O'oma was once again made possible for the general public.

ORAL HISTORY INTERVIEWS

Information is presented from six oral history interviews that had been previously conducted by Kepā Maly of Kumu Pono Associates. One of these interviews was conducted in 1996 and the others between 2000 and 2003. Rechtman Consulting, LLC conducted five additional interviews, two in 2005, one in 2006, and two in 2007. Transcripts of the recorded interviews are available upon request and are archived with Rechtman Consulting, LLC. A more socially oriented, community—based public analysis was also conducted for the current proposed development (Preister 2007); the informal and formal interviews conducted for that analysis were conducted independently of the present study.

Interview Method

The oral-historical information was collected using a standard interview format that included the following process. Personal and demographic information about each interviewee was obtained, as well as the details about how she or he came to know the lands of 'O'oma and the larger Kekaha region. Information was obtained from the interviewee concerning the time and/or place of specific events they recalled The formal interviews were recorded, transcribed, and returned to the interviewees for review, correction, and release-approval. Copies of the final interview transcripts, along with the historical background and summary information were provided to each of the interviewees or their families. The informal interviews were conducted both in person on the land and over the telephone.

All of the interviewees had genealogical ties to early residents of lands within or adjoining the study area. Each is recognized within the community as being someone possessing specific knowledge of lore or historical wisdom pertaining to the lands, families, practices, and land use and subsistence activities in the region, and the older the informant, the greater the likelihood that the individual had personal communications or first-hand experiences with even older, now deceased Hawaiians and area residents.

Readers are asked to keep in mind that while this component of the study records a depth of cultural and historical knowledge of 'O'oma and the Kekaha region, by nature, the documentation is incomplete. In the process of conducting oral history interviews, it is impossible to record all the knowledge or information that the interviewees possess. Thus, the records provide only glimpses into the stories being told, and of the lives of the interview participants. Every effort has been made to accurately relay the recollections, thoughts and recommendations of the people who so openly shared their personal histories.

Interview Participants

All of the individuals that participated in the oral history interviews cited in this sudy are directly descended from traditional residents of 'O'oma and adjoining lands, and many of the personal recollections date back to the 1920s. The interviewees also benefited from the words of their own elders and extended family members, whose personal recollections dated back to the middle 1800s. Following is a summary of the interviewees.

Valentine K. Ako is of Hawaiian ancestry and was born at Hōlualoa in 1926. He currently resides on Kaua'i. Interviewed in 1996, *kupuna* Ako visited families and fished at 'O'oma and neighboring lands of Kekaha (ca. 1930s-1940s). He is well known for his knowledge of Hawaiian fishing customs and fisheries, and is a member of several cultural committees.

George Kinoulu Kahananui Sr. is of Hawaiian ancestry and was born at Hōlualoa in 1925. Raised from infancy at 'O'oma 2nd, he continues to reside on old family land in 'O'oma. Uncle Kino regularly traveled the uplands and coastal lands of 'O'oma and Kekaha, learned of traditions and practices; and later managed the lands under Hu'ehu'e Ranch. He continues to fish on the coastal lands of 'O'oma and Kohanaiki. As a child he farmed the family lands that make up a portion of the current project area, a portion of which he retained ownership of until recently. Uncle Kino is well respected and known for his knowledge of the land, and is a valued resource on a number of cultural committees.

Elizabeth Maluihi Ako Lee is of Hawaiian ancestry and is the sister of Uncle Kino. Auntie Elizabeth was born in 1929 and was raised by her *hanai* family, Kahananui, in upland 'O'oma. As a child she walked the upland trails and cultivated sweet potatoes on her family land in 'O'oma 2nd Ahupua'a, which are now part of the current project area. She is a well-respected *lauhala* weaver and retains valuable cultural knowledge.

Samuel Keanaaina is of Hawaiian ancestry and was born at Kolaoa in 1926, where he remains resident. Descendant of families with generational ties to various lands of the Kekaha region, including 'O'oma, *kupuna* Keanaaina regularly traveled the uplands and coastal lands of 'O'oma and Kekaha. He learned of traditions and practices of the families of the land, and was a fisherman in his youth.

Malaea Agnes Keanaaina-Tolentino (with daughter Cynthia Torres) is of Hawaiian ancestry and was born at Kolaoa in 1928. She currently resides in Kealakehe and is the Sister of Samuel Keanaaina, who shared in similar experiences as her brother. She was raised by her grandparents in Honokōhau Nui and as a youth she regularly traveled between the uplands and coastal lands of Honokōhau-Kaloko, Kalaoa-'O'oma and Kohanaiki. Kupuna Malaea has served on several cultural committees and is known for her knowledge of the land.

Ruby Keanaaina McDonald was born at Kalihi on Oʻahu in 1942 and moved to Kona when she was about six years old. *Kūpuna* Keanaaina and Malaea are her uncle and auntie. Ruby grew up with her aunties and uncles in Kona (*mauka* Kalaoa and Hōlualoa) and spent a lot of time with her *kūpuna* listening to their stories and later documenting the family geneology. As a child her experiences on the land in 'Oʻoma included stopovers at the family's *kula* house (Kamaka homestead) on the way to the shore to gather and process *lauhala*. She currently works as the Office of Hawaiian Affairs liason for west Hawai'i.

Peter Keka is of Hawaiian ancestry and was born at Waiki'i in 1940. His family resided for years in the Kalaoa-Kohanaiki-Honokōhau vicinity, and he currently resides in Kohanaiki. Peter traveled the Kekaha region and fished at 'O'oma and neighboring lands. He has been employed by the National Park Service and was responsible for the restoration of the Kaloko-Honokōhau fishponds and other cultural sites in the park.

Peter Keikua'ana Park was born at 'O'oma 2nd in 1918. He currently resides in Kalaoa 5th. He was also raised there from infancy by his maternal grandparents, Peter Kaawa and Kahanawale Kamaka. Until *kupuna* Park's recent passing, he resided nearby in Kalaoa 5th. Although he grew up on his grandparents 10 acre homestead in the upland section of 'O'oma 2nd he regularly traveled with his grandparents to the coastal lands of 'O'oma. *Kupuna* Park described life on the lands and identified the elder families of 'O'oma and neighboring lands. He noted that there was much more eveidence of house sites and other features, some quite large, on the shores of 'O'oma when he was younger. He also shared important documentation pertaining to traditions associated with fishing and cultivation of the land. Kupuna Park's elders were noted *lauhala* weavers, a craft that was passed on to him and his sisters, and was an activity that sustained their family. They collected *lauhala* from 'Ohikapua on the *kula* lands of Kalaoa 5th. Kupuna Park was a noted weaver and resource for several cultural programs and his loss will be greatly felt. A summary of a recent informal interview conducted with *kupuna* Park on July 24, 2007 is attached as Appendix A to this report..

Summary of Oral-Historical Information

Elder *kama'āina* of the Kekaha region, tell much the same story as that described in the communications from the period of homestead development, and in the accounts given by J. Puuokupa in 1875 and J.W.H. Isaac Kihe in 1924. By the late 1800s, only a few permanent residence remained along the 'O'oma (and Kekaha) coastline. Primary residences were in the uplands, in the vicinity of the old Māmalahoa Highway. In that region, people were able to cultivate a wide range of crops—both native staples and new introductions—with which to sustain themselves, and in some case even as cash crops.

By the middle to late 1800s, the *kula* lands, from around the 900-foot elevation to shore, were primarily used for goat, cattle, and donkey pasturage. The families of the uplands regularly traveled to the coast via trails. This was usually done to go fishing, or to round up cattle, goats, or donkeys. During periods of extreme dry weather, when water resources dried up, the families relied on the brackish water ponds in the near-shore lands. In 'O'oma, near Wawaloli, the area marked on J.S. Emerson's Register Maps 1280 (see Figure 7), as Kama's or Keoki Mao's house, families still took shelter, and drank the water from the spring, through the 1940s. Such was the case at various locations of the coast, between Kohanaiki, 'O'oma, Kalaoa, Ho'onā, Kaulana, and lands further north to Kapalaoa.

Near the coastline several sites were described and, during field visits, pointed out by $k\bar{u}puna$ Peter Kaikuaana Park and George Kinoulu Kahananui. These are also described by other elder $kama'\bar{a}ina$. The features included old goat and cattle corrals, old $kahua\ hale$ (house sites), shelters, springs, burial sites, and fishery resources. Except for the old mauka/makai trail, the $Alanui\ Aupuni$ (makai Government Road – "Old Māmalahoa Trail"), and walls, few other features were known by the interviewees on the lower kula lands (the area of the current proposed development). This is not surprising as the interviewees observed, when they were young, they were instructed not to wander around, and maha'oi (poke their noses) into caves and such. Their primary interest while traveling makai was to get to the fishing ground, and in reverse, to get back home. In the region of the lower homestead lots (the area of the current project) and above, interviewees have described the occurrence of caves, walls, and various features, including burials. Occasionally, when working the range, rounding up cattle, $huaka'i\ p\bar{o}$ or night marchers have been heard, or even seen. The explanation being that the people of old, who once lived on the land, were traveling the trails in one direction or the other to attend to some ceremony or to venture out on fishing journeys, or other such activities. Both Auntie Elizabeth Maluihi Ako Lee and George Kinoulu Kahananui described their family's agricultural practices within portion of the current project area, and their father's use of the mauka/makai trails to access the shore for fishing.

When asked about proposed development on the 'O'oma lands and in other locations of Kekaha, the interviewees all speak with hesitancy. It is difficult for them to see the landscape that they have known all their lives, and for which traditions were handed down, change. None of the interviewees shared any specific knowledge about traditional cultural resources and associated practices within the boundaries of the current project area. All interviewees believe that *ilina* (burial sites) should be preserved in place; likewise, should any *heiau*, or other important sites be located, they should be protected. Whenever possible all sites, such as house sites, petroglyphs, walls, and other features should be protected.

IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are nature features of the landscape and historic sites, including traditional cultural properties. In the Hawai'i Revised Statutes—Chapter 6E a definition of traditional cultural property is provided.

"Traditional cultural property" means any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community's history and contribute to maintaining the ethnic community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. "Traditional" as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. "Cultural" refers to the beliefs, practices, lifeways, and social institutions of a given community. The use of the term "Property" defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, they must have some kind of boundary; and are subject to the same kind of evaluation as any other historic resource, with one very important exception. By definition, the significance of traditional cultural properties should be determined by the community that values them.

It is however with the definition of "Property" wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often times cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. However offensive the concept of boundaries may be, it is nonetheless the regulatory benchmark for defining and assessing traditional cultural properties. As the OEQC guidelines do not contain criteria for assessing the significance for traditional cultural properties, this study will adopt the state criteria for evaluating the significance of historic properties, of which traditional cultural property must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

- A Be associated with events that have made an important contribution to the broad patterns of our history;
- B Be associated with the lives of persons important in our past;
- C Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- D Have yielded, or is likely to yield, information important for research on prehistory or history;
- E Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

While it is the practice of the DLNR-SHPD to consider most historic properties significant under Criterion D at a minimum, it is clear that traditional cultural properties by definition would also be significant under

Criterion E. A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa'akai O Ka'āina* v Land Use Commission court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigative actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

As a result of the several archaeological studies (Barrera 1985, 1989, 1992; Cordy 1985, 1986; Donham 1987; Rechtman 2002, 2007; Rosendahl 1989; Walker and Rosendahl 1990) that have been conducted within the current project area, fifteen historic properties or portions thereof (Table 1) are recognized by DLNR-SHPD to retain the potential to be impacted by the proposed development activities. These impacts could be direct, as the result of development activities; or indirect, resulting from increased access and site visitation traffic. Preservation is the DLNR-SHPD approved treatment for all of these.

Table 1. Historic properties within the proposed development area.

SIHP No.	Function	Temporal	Significance	Treatment
		Association		
2	Trail	Precontact	A, C, D, E	Preservation
1910	Habitation	Precontact	C, D, E	Preservation
1911	Habitation	Precontact/Historic	D	Preservation
1912	Habitation	Precontact	D, E	Preservation
1913*	Неіаи	Precontact	D, E	Preservation
10181	Shrine	Precontact	D, E	Preservation
10155	Habitation	Precontact	D	Preservation
18027*	Habitation	Precontact	D, E	Preservation
18775	Habitation	Precontact/Historic	D	Preservation
18808	Habitation	Precontact	D	Preservation
18821	Habitation	Precontact	D	Preservation
18822	Habitation	Precontact	D	Preservation
18773	Burial	Precontact	D, E	Preservation
25932	Burial	Preconatct	D, E	Preservation
26678	Burial	Precontact	D, E	Preservation

^{*} portions of both of these sites are included in the archaeological preservation area established on the NELHA property to the north.

The three sites containing burials (SIHP Site 18773, 25932, and 26678), which are significant under both Criterion D and Criterion E, will be preserved pursuant to a burial treatment plan prepared in consultation with recognized descedants and the Hawai'i Island Burial Council. The twelve other preservation sites, considered significant under multiple criteria, will be treated in accordance with a preservation plan submitted to and approved by DLNR-SHPD prior to final subdivision approval. Development activities will not commence until the site protection measures and stewardship aspects of these preservation plans are implemented. Two of these sites (SIHP Sites 1913 and 18027) are direct extensions of sites that exist to the north on state (NELHA) land, and the several others are part of the larger continuous archaeological landscape that remains for coastal 'O'oma. NELHA has committed to preserving a significant portion of this landscape (15 acres), and the developers of the current project area are committed to spatially extending that preservation commitment. In a effort to reduce direct impacts to significant cultural resources, as part of the NELHA preservation plan the coastal jeep road may in the near future be closed to vehicular traffic, as a more direct public access route for the "Pine Trees" recreational area is developed in neighboring Kohanaiki. The developers of the current project area will support this road closure, if and when it occurs.

While there were no specific ongoing traditional cultural practices identified relative to the land within the proposed development area, there are potential cultural impacts, both specific and nonspecific, related to coastal and near-shore subsistence and recreational activities, primarily among beachgoers, fisherman, and surfers. As these activities could be characterized as traditional and customary practices, the locations of these activities could thus be considered traditional cultural properties and as such would be significant under Criterion E. As the proposed development will in no way inhibit coastal access, and as most of the proposed development elements are significantly setback a minimum of 1,100 feet from the shoreline, it is envisioned that the

protection and preservation of the 'O'oma shoreline will be enhanced; and that no traditional and customary practices will be impacted. One additional resource deserves consideration, as it is associated with traditional practices. During their botanical survey of the study area Terry and Hart (2006) identified stands of *pilo* (*Capparis sandwichiana*), which is used in traditional Hawaiian medicine. While there is no evidence that this plant is currently being collected within the study area, *pilo* habitat could be conserved and the plants made available to cultutral practitioners.

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APPENDIX A

Summary of talk story with Uncle Peter Park of Kailua-Kona, Hawai'i with interviewers Coochie Cayan and Shane Peters of Communications-Pacific, Inc. conducted on July 26, 2007 at Uncle Peter Park's residence.

Mālama 'Āina i 'O'oma

Uncle Peter Park expressed concern that the shoreline be cared for according to existing preservation laws. He cautioned that the new landowner for 'O'oma II not dig up the sand or allow any ATVs or anything that will destroy the land. Uncle Peter emphasized that "…people need to have pride and respect…no destroy things." This place was known for good fishing.

Uncle Peter Park was born in 'O'oma at the tree line, up mauka where his grandfather had 10 acres. His grandmother Kahanawale Kamaka was the midwife. His 'ohana – the Keana'aina's – often camped there at the 'O'oma shoreline. He recalled that "my father-in-law teach me fishing, make nets. We use suji, need double knot as it slides...All the old nets are illegal, now you make 2" eye..."

There were many families who had a hale (house) from the point to Honokōhau and through today's National Park at Kaloko. Everyone would go fishing and camping for a week or so at the shoreline. They usually would ride a donkey down on the small trail to the camp site.

He remembers that "...there was plenty 'ōpihi, crab and fishes you don't see much today. At low tide, they go out to the fish trap and on the papa to get limu....or go fishing out to the lighthouse and up to the Pine Trees area to catch moi, manini, 'ohu, āholehole with their throw net. Now the golf courses pesticides are killing the reef and the fishes – not just here but all along the shoreline..."

Uncle Peter said that when food was scarce all the families would gather wana and hā'uke'uke. He said some people didn't want others to know that times were hard and shared this mana'o.

"...Before the area of Kalauao, no light is on, but people eating. You can hear chewing when someone passes, yet they no offer food to others. They are ashamed...gather the hā'uke'uke to make gravy, dip with raw fish. Salt 'em. Eat the wana too..."

Protecting Cultural Resources

Uncle Peter Park talked about the need to protect cultural resources. His family are known lauhala (pandanus) weavers. One sister, now deceased was Esther Makanaloa, a weaver who lived on Kaua'i till she was 92 years old. His other sister, Virgie Shim lives in Pearl City, O'ahu. His two sisters inherited the family's weaving implements, so he made his own ko'i and ipu to do his lauhala weaving.

Uncle explained that gathering and preparing the lauhala was the hardest work, especially when you are young. The weaving was easier and more enjoyable. In the old days, they would sell a fine lauhala hat for 30 cents or 50 cents per hat if you sold to the plantation workers. He added that everyone picked from the same trees in the area because no one cultivated their own grove. Now Uncle Peter has his own trees for ease in gathering and also ensuring the leaves are "clean" of mold and insects.

He noted that other native plants like the makaloa, an indigenous reed, are coming back along the pond as well as the native birds that live in those ponds. Uncle Peter added that they had dry land taro and cautioned "...no change the taro with GMO...less you lose the real one, the real kind taro...we had 'uala, 'ulu – different types like lehua, wai, mana – black, white, yellow kinds...my Grandfather planted taro mauka..."

We ended the talk story with Uncle Peter sharing his plans to visit his sons in Seattle, Washington. Not long after his return to Hawai'i, Uncle Peter Park died (ua hala) on October 9, 2007.

Traffic Impact Assessment Report

Traffic Impact Analysis Report 'O'oma Beachside Village

Kaloko, North Kona, Island of Hawai'i, Hawai'i

Tax Map Key Number (3)7-3-009: 004 & 022

MAY 2008

Prepared for:

'O'oma Beachside Village, LLC

Prepared by:

M&E Pacific, Inc.

METCALF & EDDY | AECOM

Davies Pacific Center, 841 Bishop Street Suite 1900, Honolulu, Hawai'i 96813

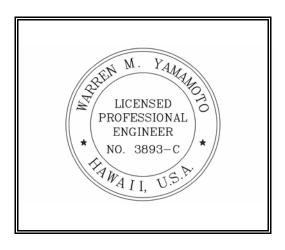
'O'OMA BEACHSIDE VILLAGE

'O'oma, North Kona, Hawai'i

Traffic Impact Analysis Report

TMK: (3)7-3-9: 004 and 022

May 2008



Expiration Date: April 30, 2010

This Traffic Impact Analysis Report has been conducted and prepared by the undersigned professional engineer licensed in the State of Hawai'i in accordance with the best practices of the industry.

Signature
M & E Pacific, Inc.

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May 7, 2008

Date

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TRAFFIC IMPACT ANALYSIS REPORT for the 'O'OMA BEACHSIDE VILLAGE

'O'oma Beachside Village, a 302.38-acre residential and commercial mixed use community, is being planned at 'O'oma, North Kona, Hawai'i. This report documents a study that was conducted to identify the traffic impacts of the proposed community and to recommend any mitigating measures.

PROJECT DESCRIPTION

'O'oma Beachside Village LLC intends to develop a 302.38-acre property (the Property) at 'O'oma, North Kona, Hawai'i. The Property is comprised of a:

- 217.566-acre parcel identified by TMK (3)7-3-009:004 (Parcel 4);
- 83-acre parcel identified by TMK (3)7-3-009:022 (Parcel 22); and
- 1.814-acre portion of the State-owned Right-of-Way (ROW) located on by TMK (3)7-3-009: (State ROW).

The Property is on the *makai* side of Queen Ka'ahumanu Highway about two miles south of the Kona International Airport at Keahole. Other major cross streets in the vicinity include Ka'iminani Drive and the entrance to the Natural Energy Laboratory of Hawai'i Authority (NELHA) to the north, and Huliko'a Drive (the entrance to the Kohanaiki Business Park) and Hina Lani Street to the south. The Property's location relative to these other roadway facilities is shown on **Figure 1**.

'O'oma Beachside Village is planned to include the following:

- Approximately 950 to 1,200 homes, including:
 - Single family units,
 - o Multi-family units, and
 - "Live-work" units with commercial uses on the ground floor and residential uses above.
- Approximately 200,000 square feet of commercial space, including:
 - Space for a small grocery store,
 - Restaurants, and
 - Retail and office space.
- A private or charter school site.
- A public beach park, including a community pavilion.

Construction of 'O'oma Beachside Village is expected to begin in 2011 (with first occupancy projected in 2012) and will continue through approximately 2029. For the purpose of this analysis 'O'oma Beachside Village is roughly divided into three areas: Area A, Area B, and Area C, as shown on **Figure 2**. The development of each area could overlap into other areas at any one time. For the purpose of this analysis, the projection is to deliver about 20-40 single family residential units, 30-50 multi-family residential units, and 10-25,000 square feet of commercial space per year.

The study analyzed three forecast years to comply with the Concurrency Conditions of County of Hawai'i Ordinance 07-99 which requires analyses for 5, 10, and 20 year forecasts. This study analyzed years 2015, 2020, and 2029 corresponding to 7, 12, and 21 year forecasts. The number of project components which were assumed to be occupied by each analysis year for purposes of conducting the traffic impact analysis is summarized on **Table 1**. The actual development schedule for the 'O'oma Beachside Village could deviate from the schedule shown on **Table 1**.

The State of Hawai'i Department of Transportation (HDOT) is currently preparing for the second phase of widening of the Queen Ka'ahumanu Highway to four lanes from Honokohau Harbor to the Kona International Airport at Keahole, with completion of

construction currently scheduled for 2011. HDOT intends to restrict access to the widened highway and permit fully accessible signalized intersections only at Kealakehe Parkway (the harbor access road), Hina Lani Street, Hulikoʻa Drive (Kohanaiki), Kaʻiminani Drive, and Keahole Airport Road. The developments on the *makai* side of the highway may be permitted right turn in, right turn out movements onto the highway. For this study, it was assumed that 'Oʻoma Beachside Village would have such an access.

'O'oma Beachside Village would also be serviced by a frontage road that would have connections to fully accessible signalized intersections. This frontage road would extend from Huliko'a Drive at Kohanaiki Industrial subdivision (crossing Queen Ka'ahumanu Highway into the Shores of Kohanaiki and resulting in a full, four-way intersection) to the Keahole Airport Road, and would allow vehicles from connecting makai projects direct access to the airport without having to enter the highway. The frontage road alignment has not been determined but it is not expected to be a high speed design roadway. Within 'O'oma Beachside Village there would be urban land uses and several intersecting streets along the roadway as traffic calming measures. 'O'oma Beachside Village would also be served by a transit stop.

EXISTING CONDITIONS

A survey of the existing roadway and traffic conditions was made in September 2006.

Existing Roadways

The main roadways currently in the study area include Queen Ka'ahumanu Highway, Ka'iminani Drive, the NELHA access road, Huliko'a Drive, and Hina Lani Street.

Queen Ka'ahumanu Highway is the primary arterial highway on the west side of the island of Hawai'i. The highway passes through the North Kona and South Kohala districts and connects Kailua Village with the Kona International Airport, the Kohala resort areas, and Kawaihae. It is a two-lane Class I State Highway with limited access and a design speed of 70 miles per hour. Intersections on this highway are fully

channelized and signalized where warranted, including the Ka'iminani Drive and Hina Lani Street intersections.

Ka'iminani Drive is a collector road within a 60-foot right-of-way that provides *mauka-makai* access between Queen Ka'ahumanu Highway and Mamalahoa Highway and provides access to the Kona Palisades subdivision.

The NELHA access road and Huliko'a Drive provide access to two separate industrial parks and their intersections with the highway are channelized but not signalized.

Hina Lani Street is a two-lane County secondary arterial road within an 80-foot right-of-way. It provides *mauka-makai* access between Queen Kaʻahumanu Highway and Mamalahoa Highway and serves the Kaloko Light Industrial Subdivision at its *makai* end.

<u>Traffic Volumes</u>

Traffic turning movement counts were taken at the Hina Lani Street and Ka'iminani Drive intersections on Queen Ka'ahumanu Highway during the morning and afternoon peak periods on September 12 and 14, 2006. Traffic turning movement counts require a traffic surveyor to observe traffic flow and record the movements of each vehicle crossing the intersection as through or turning movements by 15 minute intervals. The worksheets from these traffic counts are included in **Appendix A**.

The resultant morning and afternoon peak hour traffic volumes are shown on **Figure 3**, with volumes for two consecutive morning and afternoon peak hours shown. The volumes are rounded to the nearest five vehicles per hour (vph). The northbound direction of traffic on Queen Kaʻahumanu Highway south of Hina Lani Street is higher in the first hour of the morning peak, then about equal to the southbound flow in the second hour. The northbound volumes north of Kaʻiminani Drive are higher for both peak hours. This reflects the commute of workers from Kona to the Kohala resort area in the early morning, followed by the commute of workers to Kailua later in the morning. During the afternoon peak, the southbound volumes south of Hina Lani Street are about equal to the northbound volumes in the first hour while the northbound volumes are

much higher in the second hour. The southbound volumes north of Ka'iminani Drive are higher during both afternoon peak hours. Long traffic queues in the southbound lane were observed for short periods in the early afternoon period due to backup of traffic from Kailua Village. The existing traffic operations at the study intersections are discussed in the **Level of Service Analysis** section of this report.

The HDOT took metered traffic counts at selected locations on Hawai'i Island roadways in even numbered years. Station T-8-M is located on Queen Ka'ahumanu Highway 850 feet north of the NELHA access roadway. HDOT has converted this station to a telemetry station that provides continuous traffic data. The data from the previous counts and the average weekday daily traffic volumes for 2006 provides the historic trend in daily traffic volumes on the highway over a 14 year period ending in 2006. The biannual change in two way daily traffic volumes on Queen Ka'ahumanu Highway is shown in tabular and graph form on **Figure 4**. Queen Ka'ahumanu Highway shows a 94% increase in traffic volumes over the 14 year period, which corresponds to a 4.8% compounded annual growth rate.

The pattern of hourly traffic volumes on Queen Ka'ahumanu Highway on June 1, 2004, is shown in tabular and graph form on **Figure 5**. Separate curves are shown for the northbound and southbound traffic volumes. The northbound traffic volumes are higher than the southbound volumes for the first two hours of the morning. The southbound traffic volumes are higher for most of the afternoon hours except the last two hours.

PROPOSED ROADWAY IMPROVEMENTS

The HDOT and County of Hawai'i have many roadway improvements planned to meet the expected growth in the area. The "Keahole to Honaunau Regional Circulation Plan County Action Plan" (August 2006) prepared by the County of Hawai'i Planning Department identifies several specific improvements pertinent to this study. Those improvements include the widening of Queen Ka'ahumanu Highway from Henry Street to the airport and the development of an extensive roadway network *mauka* of the highway.

The HDOT is currently widening the highway from two to four lanes from Henry Street to Kealakehe Parkway under Phase 1 of the widening project which is expected to be completed in 2008. The second phase is expected to be completed by 2011 and would extend the four lane design past the airport access roadway. The project would also add a northbound bicycle lane and a southbound bicycle route/paved shoulder lane.

The new roadway network mauka of the highway would create more *mauka-makai* roadways between Queen Ka'ahumanu Highway and Mamalahoa Highway and create more north-south roadways between and parallel to these two existing highways. The three important north-south roadways include the Kealaka'a Street Extension, Ane Keohokalole Highway Extension, and Main Street (Kamanu Street) Extension. Their net effect would be the diversion of trips from the existing highways.

A timetable for the development of these new roadways has not been established but would be tied in to new projects being built along the roadway alignments. The draft Kona Community Development Plan has developed a list of roadway projects in this area:

- Keanalehu Street-Manawale'a Street connection
- Ane Keohokalole Highway Extension (Mid-level road) in stages from Palani Road to Ka'iminani Drive
- Kamanu Street Extension
- Kealakaa Street Extension
- Hienaloli Street Extension
- University Drive
- Frontage Road
- Queen Ka'ahumanu Highway widening, Phase II

TRAFFIC FORECASTS

The three forecast years for the 'O'oma Beachside Village are 2015, 2020, and 2029. During the three periods, the ambient or background traffic on Queen Ka'ahumanu Highway can be expected to increase due to regional growth and new projects in the area. The traffic patterns in the study area would also change as new roadways are placed in operation. The traffic that would be generated from the 'O'oma Beachside Village was added to the ambient traffic forecast to obtain the total with project traffic forecast.

Ambient Traffic Forecast

The results of several traffic impact analysis reports for proposed projects in the area were analyzed to develop ambient traffic forecasts on Queen Ka'ahumanu Highway at Ka'iminani Drive, the NELHA access roadway, Huliko'a Drive, and Hina Lani Street for the three forecast years. The forecast procedures and summary results for each study intersection are described below.

Kaʻiminani Drive - The traffic forecasts prepared by Rowell for UH Center at West Hawaiʻi Main Street Collector Road (June 2006) were used for the 2015 forecast. Other projects included in the forecast were the Makalei Estates, Palamanui and Lokahi Subdivision. Very large traffic increases were forecast for the two intersecting roadways since the mauka network of roadways were not assumed to be well developed by 2015. Also, traffic flows became significantly northbound in the AM and southbound in the PM. For the 2020 ambient traffic forecast, the 2015 traffic volumes at Kaʻiminani Drive were increased by 1.3% for the five year period. This represents a 4.83% annual growth but with 20% of the growth being routed to the by then more defined mauka roadway network. Then for 2029, the 2020 volumes were increased by 5% over the nine year period. This represents a 4.83% annual growth with 28% being routed to the mauka roadways. For each planning year, the through volumes were continued to the NELHA access road intersection. The current and ambient forecast inbound and outbound traffic volumes are summarized as follows.

YEAR	AM PEAK HOUR		PM PEAK HOUR	
ILAK	INBOUND	OUTBOUND	INBOUND	OUTBOUND
2006	155	720	595	145
2015	440	1,015	1,290	445
2020	445	1,025	1,305	450
2029	470	1,070	1,375	470

NELHA Roadway – Traffic counts were taken on the NELHA access road in 2002 by HDOT. There is a sharp peak inbound peak in the morning and a sharp outbound peak in the afternoon with less than 100 vph in the peak direction. Most of the volumes in the other hours were low. Entering and exiting peak hour volumes were increased by 3% annually as follows:

YEAR	AM PEAK HOUR		PM PEAK HOUR	
ILAK	INBOUND	OUTBOUND	INBOUND	OUTBOUND
2002	86	28	41	87
2006	96	31	46	97
2015	120	39	57	121
2020	132	43	63	134
2029	153	50	73	155

These volumes were then distributed as shown below reflecting the increasing urbanization of the area north of the Property:

YEAR	PERCENT DISTRIBUTION BY DIRECTION OF TRAVEL			
	INBOUND	OUTBOUND		
2015	45%	55%		
2020	48%	52%		
2029	50%	50%		

<u>Hulikoʻa Drive</u> – Two separate projects are planned on the mauka and makai sides of the highway at this intersection. Only inbound and outbound traffic forecasts were made for these two projects.

The existing Kohanaiki Business Park is accessed by Hulikoʻa Drive on the mauka side of the highway. This intersection is currently unsignalized but there are plans to make this a fully accessible signalized intersection with the highway widening project. In lieu of traffic counts, the traffic forecast prepared by Pacific Planning and Engineering, Inc., in 1991 for the Kohanaiki Mauka project was updated for the current land use classifications and trip generation rates. The business park project was assumed to be fully occupied by 2015 and the results of this analysis were assumed to be constant for the three forecast years as follows:

		AM PEAK HOUR				PM PEA	K HOUR	
	INBC	UND	OUTB	OUND	INBC	UND	OUTB	OUND
YEAR	North	South	North	South	North	South	North	South
2006	65	95	95	65	35	50	90	135
2015	125	190	130	195	65	100	180	270
2020	125	170	130	175	65	90	170	240
2029	125	170	130	175	65	90	170	240

For the purposes of this study, the existing 2006 volumes were assumed to be half of the 2015 forecasts. The south inbound and outbound volumes were reduced slightly for 2020 and 2029 since the Kamanu Street Extension would intersect the northern terminus of Hulikoʻa Drive and provide an alternate route to the south, thereby diverting some trips.

The Shores of Kohanaiki is planned for the makai side of the highway. Its access road would intersect the highway across from Hulikoʻa Drive and form the west leg of the fully accessible, signalized intersection. The access road would also serve as the southern terminus for the makai frontage road. A letter report prepared by Julian Ng, Inc., in 2003 discussed the trip generation characteristics of the Shores of Kohanaiki project with proposed new land uses (500 dwelling units, an 18-hole golf course, and

120 parking stalls for public beach access). The Shores of Kohanaiki has been approved and is expected to be in place by 2015. Only entering and exiting volumes were forecast for each analysis year:

PEAK	VEHICLE T	RIPS/HOUR
HOUR	INBOUND	OUTBOUND
AM	125	290
PM	465	235

The trips were distributed north and south on the highway and a small portion of trips was assumed to use the makai frontage road to access the airport. The through volumes on the highway were forecast at the Hina Lani Street intersection and continued to Hulikoʻa Drive.

<u>Hina Lani Street</u> – For 2015, the existing 2006 through and turning volumes were increased by 1.529, which is the 4.83% annual growth rate compounded for 9 years. For 2020, the through volumes were increased by 1.3% similar to Ka'iminani Drive, however turning volumes for 2020 from the TIAR prepared by Fehr & Peers/Kaku Associates for the Kula Nei Residential Development were used. This forecast also included the traffic which would be generated by the proposed Kaloko Heights subdivision. For 2029, the 5% growth factor used at Ka'iminani Drive was also used here. The through traffic forecasts were carried to the Huliko'a Drive intersection. The current and ambient forecast inbound and outbound traffic volumes are summarized below:

YEAR	AM PEAK HOUR		PM PEAK HOUR	
ILAK	INBOUND	OUTBOUND	INBOUND	OUTBOUND
2006	490	560	620	580
2015	740	860	960	975
2020	900	1,205	1,130	935
2029	930	1,050	1,215	995

The results of the ambient traffic forecasts are shown on **Figure 6** with the frontage road assumed in place. The AM peak hour forecasts for the three forecast years are shown on the first page of the figure, while the PM peak hour forecasts are shown on the second page. The NELHA access road was assumed to provide right turn in, right turn out access to the highway.

Project Generated Traffic

The traditional three-step process of trip generation, trip distribution, and trip assignment was used to forecast future traffic that would be generated by 'O'oma Beachside Village. The trip generation step forecasts the number of new trips that would be produced during each of the two study periods. The trip distribution step allocates these new trips by direction of travel. Finally, the trip assignment step assigns the trips to the specific turning movements at the study intersections.

The trip generation step forecasts the volume of vehicle trips that would be generated by 'O'oma Beachside Village during the morning and afternoon peak periods. The Institute of Transportation Engineers' <u>Trip Generation Report</u> (Seventh Edition, 2003) has rates to calculate the number of morning and afternoon peak hour trips that would be generated by various land uses.

An initial step was to correlate the land uses proposed in 'O'oma Beachside Village with the land uses included in the <u>Trip Generation Report</u> that would have similar trip generation characteristics. The results of this analysis are summarized on Table 1 and are discussed below:

- The single family residential units utilized the equations/rates for single family detached housing (ITE land use 210).
- All multi-family residential units including the mixed use and live-work units
 were assumed to be low-rise condominiums/town houses (ITE land use
 231) that are described as residential units that have at least one other
 unit located in the same building that has one or two levels.

- The makai mixed use village commercial area was assumed to be retail-oriented and was classified as a shopping center (ITE land use 820). The mauka mixed use/live-work village was assumed to be an office park (ITE land use 750). The ITE report describes the latter as suburban subdivisions or planned unit developments containing general office buildings and support services such as banks, restaurants, and service stations, arranged in a park-like setting. This was the closest land use to the suburban neighborhood commercial center envisioned for this proposed project.
- The charter school was assumed to have the trip generation characteristics of a private school with grades K-8 (ITE land use 534) and having 225 students.
- The grocery store was assumed to be a 15,000 sf supermarket (ITE land use 850).
- The restaurant and private canoe club was assumed to be a 20,000 sf quality restaurant (ITE land use 931) with turnover rates usually of one hour or longer.
- There are no trip generation rates for a public beach use. Based on the previously referenced letter report by Ng, the following number of beach use trips were forecast:

	HOURLY TRIPS				
YEAR	AM PEAK HOUR		PM PEA	K HOUR	
ILAK	INBOUND	OUTBOUND	INBOUND	OUTBOUND	
2015	50	10	20	50	
2020	60	15	25	60	
2029	70	20	25	70	

The trip generation analysis for each land use in each analysis year is detailed on **Table 2**, including the trip generation equations and rates from the ITE report.

The <u>Trip Generation Report</u> also provides the percentage of inbound and outbound trips in each peak hour. The number of generated trips was divided into inbound and outbound trips based on the information from the report, as shown on **Table 2**.

The first forecast year (2015) of 'O'oma Beachside Village is summarized on the first page of **Table 2**, and it would generate 187 outbound and 131 inbound trips in the morning peak hour, and 310 inbound and 243 outbound trips in the afternoon peak hour. The second analysis year (2020) is summarized on the second page and it would generate 445 outbound and 421 inbound trips in the morning peak hour and 656 inbound and 701 outbound trips in the afternoon peak hour. The third analysis year (2029) is summarized on the third and fourth pages and it would generate 884 outbound and 906 inbound trips in the morning peak hour and 1,023 inbound and 1,128 outbound trips in the afternoon peak hour.

The project generated trips were then distributed by three primary direction of travel to and from the Property: north and south of the Property, and internal to the Property. The distribution of external trips was determined from the current distribution of population and employment in West Hawai'i. The districts closer to the Property were weighted higher due to the propensity for shorter trips to be made more frequently. This analysis indicated that the current weighted population and employment distributions are 55% south and 45% north. These proportions were assumed for the employment distribution in all three forecast years. The proportion of population to the north was assumed to be 45% in 2015, 48% in 2020, and 50% in 2029, reflecting the trend of urbanization to the north. The morning outbound residential trips and the afternoon inbound trips were distributed based on the employment distribution. The distribution of population was used for all other trips. The percentage of internal trips were initially calculated for the non-residential land uses, and made to balance the corresponding resident-generated trips. The trip distribution rates also considered that a portion of the trips from the live-work units and to a smaller extent, the mixed use units, would not be

made outside of 'O'oma Beachside Village and the proportion of internal trips were increased accordingly.

The results of the trip distribution analysis are shown on **Table 3** with the 2015 results on the first page, the 2020 results on the second page, and the 2029 results on the third page. The residential land uses were combined into a single land use for this calculation. Similarly, the two mixed-use village commercial uses and the live-work commercial use were combined together.

The project generated traffic volumes were assigned to the highway and frontage road network with movements as permitted. The results of the traffic assignment analysis are shown on **Figure 7** with the volumes not rounded.

A unique aspect of trips attracted by commercial centers is that a number of these trips are pass-by trips. Pass-by trips are attracted from traffic passing the site on an adjacent roadway having direct access to the commercial center. Therefore, these trips do not add to the through volumes on the roadway. They are added to the turning movements but are subtracted from the through movements where they turn off to access the commercial center. The commercial areas of 'O'oma Beachside Village are not expected to draw pass-by trips in the morning peak hour but would attract some pass-by trips in the afternoon peak hour, especially trips stopping for shopping purposes. These trips are shown as negative volumes on the trip assignments (Figure 7).

Total Forecast Volumes

The project generated traffic assignment volumes from **Figure 7** were added to their corresponding ambient traffic forecasts from **Figure 6** to obtain the total with project traffic forecasts shown on **Figure 8** for each forecast year. The traffic volumes are rounded to the nearest five vph.

LEVEL OF SERVICE ANALYSIS

The traffic forecast volumes in themselves do not indicate the quality of traffic operations. The concept of level of service is used to quantify the quality of traffic flow on roadway facilities. The Transportation Research Board (TRB) has developed procedures to calculate level of service value(s) by measuring traffic volumes against the capacities of different types of roadway facilities. Their <u>Highway Capacity Manual 2000</u> (HCM2000) describes the various procedures developed for freeways, highways, signalized and unsignalized intersections, etc.

A variety of methodologies was used to analysis existing and forecast traffic conditions. The methodology for analyzing signalized intersections was used for the Ka'iminani Drive, Huliko'a Drive, and Hina Lani Street intersections. The methodology for analyzing unsignalized intersections was used for the existing NELHA access road and Huliko'a Drive intersections. The methodology for analyzing highway on-ramps was used for the future right turn out movement at the NELHA and 'O'oma Beachside Village access roads. Finally, separate methodologies for analyzing two-lane and multi-lane highways were used for the current and forecast highway conditions fronting the Property.

Signalized Intersection Analysis

The Ka'iminani Drive, Huliko'a Drive and Hina Lani Street study intersections are/will be signalized. The methodology for analyzing signalized intersections calculates the levels of service for individual movements, approaches, and the intersection as a whole based on the average stopped delay per vehicle. The results range from level of service A (best with average delays less than ten seconds) to F (worst with average delays longer than 80 seconds, described as follows.

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (Seconds/Vehicle)
А	< 10.0
В	10.1 to 20.0
С	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	> 80.1

The County of Hawai'i considers levels of service A to D as acceptable by ordinance with levels of service E and F indicating the need for mitigating measures. As a matter of practice, the major streets of signalized intersections can be designed to have a higher level of service than the side streets or turning lanes with the latter having unacceptable levels of service in order to maintain an acceptable level of service on the main road. These unacceptable levels of service are often times caused by long waits for the green traffic signal phase rather than by capacity problems and are indicated by low values of the volume/capacity (V/C) ratio as described below.

The results of the signalized intersection level of service analysis for the Queen Ka'ahumanu Highway intersections with Ka'iminani Drive, Huliko'a Drive, and Hina Lani Street are shown on **Tables 4**, **5**, and **6**, respectively. Each table is for a single intersection and includes the results for the AM (morning) and PM (afternoon) peak hours for the intersection as a whole, each approach of the intersection, and the left turn, through and right turn movements of each approach. The results are shown for the 2006 existing conditions (for Ka'iminani Drive on **Table 4** and for Hina Lani Street on **Table 6**) and the years 2015, 2020, and 2029 forecasts, with ambient without project and total with project results for each forecast year. The specific results data shown for each year includes the level of service (LOS), average stopped delay (DEL) and volume/capacity ratio (V/C), which is a percentage utilization of the traffic signal green time given the entire intersection and each movement. The level of service calculation worksheets are provided in **Appendix B**.

Queen Ka'ahumanu Highway/Ka'iminani Drive — The results of the signalized intersection level of service analysis for the Queen Ka'ahumanu Highway/Ka'iminani Drive intersection are shown on **Table 4**. The intersection is currently operating at an acceptable level of service B in the AM peak hour. With the large increases in traffic volumes forecast for 2015 ambient conditions, the Ka'iminani Drive westbound approach would require two left turn lanes to maintain the acceptable levels of service. The frontage road approach is forecast to operate at level of service F due to the long wait for the green phase and not capacity problems, as evidenced by the low V/C ratio. The additional traffic generated by 'O'oma Beachside Village would cause the Ka'iminani Drive approach to change from level of service D to E, but the intersection would continue to operate at level of service D. Similarly, the intersection levels of service would remain at acceptable levels for the 2020 and 2029 forecast years, although individual and approach levels could be at unacceptable levels.

The intersection is currently operating at an acceptable level of service B in the PM peak hour. As with the AM peak hour, the Ka'iminani Drive westbound approach would require two left turn lanes by 2015 to maintain the acceptable levels of service for the ambient traffic forecast. The large traffic increases forecast for 2020 and 2029 would require additional mitigation in the form of two southbound left turn lanes and two northbound right turn lanes to maintain the intersection level of service D for both ambient and total with project conditions. The AM peak hour forecasts would not require these additional improvements but the AM peak hour results shown on **Table 4** do include these mitigating measures. As with the AM peak hour, several approaches/individual movements may have to operate at unacceptable levels of service to maintain an acceptable intersection level of service.

The analysis for the Queen Ka'ahumanu Highway/Ka'iminani Drive intersection indicates that this intersection could operate at acceptable levels of service with mitigation measures for the ambient traffic forecasts. These include having double left turn lanes on the Ka'iminani Drive westbound approach by 2015, and double left turn lanes on the highway southbound approach and double right turn lanes on the highway northbound approach by 2020. Additional mitigating measures would not be required to

accommodate traffic generated from 'O'oma Beachside Village.

Queen Ka'ahumanu Highway/Huliko'a Drive – The results for the Queen Ka'ahumanu Highway/Huliko'a Drive intersection are shown on **Table 5.** There is no existing analysis since the intersection is not currently signalized. The intersection is forecast to operate at an acceptable level of service C for the three ambient forecast years in the AM peak hour, although several individual movements would be at unacceptable levels. The AM peak hour 2029 ambient traffic forecast shows a double left turn lane for the northbound highway approach since it would be required for the PM peak hour condition.

The AM peak hour 2015 and 2020 total with project traffic forecasts shows a double left turn lane for the northbound highway approach since it would be required for the PM peak hour condition. With the additional traffic generated by 'O'oma Beachside Village in 2020 the intersection level of service would change from C to D, which is considered an acceptable level of service. The additional project generated traffic in 2029 would require a double left turn lane on the northbound highway approach to maintain the intersection level of service D. The long delays on the Huliko'a Drive approaches are due to the long cycle lengths and not capacity problems, as noted by the low V/C ratios.

The PM peak hour has higher volumes and worse levels of service as a result. The intersection is forecast to operate at an acceptable level of service D for the three forecast year ambient conditions, although the 2029 forecast would require a double left turn lane on the northbound highway approach as a mitigating measure to maintain the intersection level of service D. The intersection levels of service for the 2015 and 2020 total with project forecasts could be maintained at D with a double left turn lane on the northbound highway approach. Additional mitigation in the form of double left turn lanes on the Hulikoʻa Drive westbound approach would be needed to accommodate the 2029 total with project forecast.

The analysis for the Queen Ka'ahumanu Highway/Huliko'a Drive intersection indicates that this intersection would be impacted by traffic generated from 'O'oma Beachside

Village and would require mitigation to operate at acceptable levels of service. These measures include having double left turn lanes on the Queen Ka'ahumanu Highway northbound approach by 2015, and double left turn lanes on Huliko'a Drive westbound approach by 2029.

The level of service analysis indicated that the Huliko'a Drive intersection would operate at an acceptable level D for the volumes forecast with the large conflicting volumes of southbound through traffic and northbound left turns. This assumes that sufficient traffic would be diverted to the mauka roadway network. If the highway volumes are higher than forecast due to insufficient traffic being diverted to the mauka roadway network or other unforeseen reasons, then the intersection could operate at unacceptable levels of service. As a contingency measure for this possibility, the "Michigan U-turn" should be considered as a supplemental mitigating measure to divert turning traffic movements from the intersection and reduce the conflicting movements.

The Michigan U-turn requires a U-turn facility in the highway median in concert with a right turn in, right turn out access roadway so that left turns are not made. Exiting left turns from the access roadway would make a right turn onto the highway, merge across highway traffic into the left-most lane, then make a U-turn on the highway median facility, and then proceed in the opposite direction from which they started. Similarly, incoming left turns would proceed on the opposite side of the median past the access road, make a U-turn on the highway median facility, then merge across highway traffic into the right-most lane, and then make a right turn into the access roadway. A Michigan U-turn on Queen Ka'ahumanu Highway for the 'O'oma Beachside Village would eliminate some of the crossing and turning movements at the Ka'iminani Drive and Huliko'a Drive intersections and make them work more efficiently. The two median U-turn facilities would be located between the 'O'oma Beachside Village and Huliko'a Drive and between the 'O'oma Beachside Village and NELHA access road. The second facility could be located further north between the NELHA access road and Ka'iminani Drive to include NELHA in the Michigan U-turn.

Queen Ka'ahumanu Highway/Hina Lani Street — The results of the signalized intersection level of service analysis for the Queen Ka'ahumanu Highway/Hina Lani Street intersection are shown on **Table 6**. The intersection is currently operating at an acceptable level of service C in both peak hours, and is forecast to operate at a still acceptable level of service D for the 2015 ambient without project and total with project forecasts. The development of the mauka residential projects would generate the need for a double left turn lane on the westbound approach of Hina Lani Street by 2020. The additional traffic generated by the 'O'oma Beachside Village would not require any additional mitigation. Hence, the 'O'oma Beachside Village is not expected to contribute to adverse traffic impacts at the Hina Lani Street intersection until after 2020. However, the additional project generated traffic would require mitigation in 2029 to maintain acceptable level of service for the intersection. A double left turn lane on the southbound highway approach would improve the intersection level of service to C.

<u>Signalized Intersection Conclusions</u> – The preceding level of service analysis indicated the need for mitigating measures to accommodate the project generated traffic by 2029. This need should be considered as speculative due to the uncertainties associated with such a long forecast period, including regional development projects and *mauka* roadway plans that may or may not be actually accomplished. Contingencies should be made to implement these measures while recognizing that their needs may not actually occur.

Unsignalized Intersection Analysis

The NELHA access road and Hulikoʻa Drive intersections are currently unsignalized. The procedure used for analyzing unsignalized intersections calculates vehicle delays and levels of service based on the distribution of gaps in traffic on the major street and driver judgment in selecting gaps through which to execute turns. For two-way stop intersections where only the minor street traffic is controlled by a stop sign, levels of service are calculated for the critical turning movements, including outbound movements from the stop-controlled approach and left turns from the major street to the minor street. The procedure does not calculate an overall intersection level of service.

The <u>Highway Capacity Manual</u> defines the relationship between level of service and delay (in seconds/vehicle) for unsignalized intersections as shown below:

LEVEL OF SERVICE	DELAY (Seconds/Vehicle)
А	< 10.0
В	10.1 to 15.0
С	15.1 to 25.0
D	25.1 to 35.0
Е	35.1 to 50.0
F	> 50.1

The County of Hawai'i considers levels of service A to D as acceptable for unsignalized intersections. Level of service F (with average delays longer than 50 seconds) is considered undesirable for unsignalized intersections and indicates the possible need for mitigation at that intersection.

The results of current operations at the two current unsignalized intersections are shown on **Table 7**. The critical movement at each intersection is the outbound left turn. Based on the estimated current volumes at each intersection, this movement at the NELHA access road intersection is at level of service F in the AM and E in the PM peak hour. Similarly, this movement at the Huliko'a Drive intersection is at level of service F in both peak hours. These results indicate the current need for mitigating measures at both intersections. The level of service calculation worksheets are provided in **Appendix C**.

No future study intersections were analyzed as unsignalized intersections since none are expected to operate as unsignalized intersections.

Highway On-Ramp Analysis

The access roadways serving 'O'oma Beachside Village and NELHA are expected to be unsignalized and limited to right turn in, right turn out movements. The methodology for analyzing highway on-ramps was used instead of an unsignalized intersection analysis

since the right turn lane would have adequate acceleration and taper lengths to perform like a highway on-ramp. The methodology for analyzing on-ramps calculates maximum flow rates in passenger cars/hour/lane based on the volumes of highway/roadway and merging traffic, and roadway capacities, and then calculates levels of service based on density as follows:

LEVEL OF SERVICE	DENSITY (passenger car/mile/lane)
А	<u><</u> 10
В	> 10 - 20
С	> 20 - 28
D	> 28 - 35
E	> 35
F	Demand > Supply

The results of the on-ramp analysis are summarized on **Table 8** for the total with project forecasts only. For each of the three forecast years, both access roads (for 'O'oma Beachside Village and NELHA) are calculated to operate at levels of service B in the AM peak hour and C in the PM peak hours, indicating acceptable levels of service in both analysis periods. This indicates that the traffic generated by 'O'oma Beachside Village would not have an adverse traffic impact on this aspect of the highway operations. The level of service calculation worksheets are provided in **Appendix D**.

Highway Analysis

Queen Ka'ahumanu Highway is currently a two-lane highway that the HDOT is currently widening to a four multi-lane highway. Separate methodologies and criteria are used for calculating levels of service for these two distinct highway types.

The ideal (maximum) capacity of a two-way, two-lane highway is 1,700 passenger car equivalents per hour per lane, and 3,200 passenger car equivalents per hour for both directions of travel. This is lower than the capacity of a multi-lane highway that can range from 2,000 to 2,200 passenger car equivalents per hour per lane. The analysis procedure for two-way, two-lane highways takes into account the more restrictive

aspects of its operations relative to wider multi-lane highways. The procedure considers the impact of geometric data: lane width, shoulder width, type of terrain, free flow speed, percent no passing zones; and demand characteristics: volumes, percent of heavy vehicles; as some of the inputs. For Class I highways like Queen Ka'ahumanu Highway where efficient mobility is important and drivers expect to drive at relatively high speeds, level of service is defined in terms of both percent time spent following other vehicles and average travel speeds. The level of service criteria for Class I two-lane highways are shown below:

LEVEL OF SERVICE	PERCENT TIME SPENT FOLLOWING	AVE. TRAVEL SPEED (Miles/Hour)
А	< 35	> 55
В	>35 to 50	>50 to 55
С	>50 to 65	>45 to 50
D	>65 to 80	>40 to 45
E	> 80.0	<40

The methodology for analyzing multi-lane highways calculates several criteria based on the capacity and design characteristics of the highway and traffic volumes. There are several sets of criteria for levels of service based on the free flow speed of the highway. The criteria for a 55 mph free flow speed (FFS) are summarized as follows.

	LOS CRITERIA FOR 55 MPH FFS						
CRITERIA	Α	В	С	D	E		
Maximum Density (passenger car /mile/lane)	11	18	26	35	41		
Average speed (mph)	55.0	55.0	54.9	52.9	51.2		
Max. Volume/Capacity Ratio (V/C)	0.29	0.47	0.68	0.88	1.00		
Max. Service Volume Flow Rate (passenger car/hour/lane)	600	990	1,430	1,850	2,100		

The results of the highway analysis are shown on **Table 9**. The first line shows that the existing two-lane highway is currently operating at level of service E in both peak periods, primarily due to the high percentage of time spent following other cars and the

lack of opportunity to pass slower vehicles. The remaining lines show the results for the ambient without project and total with project forecasts for southbound traffic fronting the Property. With the highway widening, the highway is calculated to operate at levels of service B in the AM peak hours and C in the PM peak hours, indicating acceptable levels of service in both analysis periods. There is no difference between the ambient without project and the total with project results, indicating that the traffic generated by 'O'oma Beachside Village would not have an adverse traffic impact on this aspect of the highway operations. The level of service calculation worksheets are provided in **Appendix E**.

CONCLUSIONS

The widening of Queen Ka'ahumanu Highway and the development of the mauka roadway network would accommodate much of the anticipated growth in the North Kona region. The highway system is expected to operate at acceptable levels of service in the forecast future.

The 'O'oma Beachside Village is not expected to have a fully accessible intersection connection with the widened Queen Ka'ahumanu Highway; however, the right turn in, right turn out access roadway intersection is expected to operate at acceptable levels of service in the forecast future.

The 'O'oma Beachside Village is planned to include a frontage road makai of and parallel to Queen Ka'ahumanu Highway. This frontage road would allow access to fully accessible intersections at Ka'iminani Drive and Huliko'a Drive, where vehicles traveling from and to 'O'oma would be able to make left turns onto and from the highway, respectively. These intersections would require mitigating actions to accommodate the ambient forecast traffic. The additional traffic generated by the 'O'oma Beachside Village would require further mitigating measures to maintain acceptable levels of service at the Huliko'a Drive and Hina Lani Street intersections including the following:

 Hulikoʻa Drive - a double left turn lane on the northbound highway approach by 2015.

- Hulikoʻa Drive a double left turn lane on the westbound approach by 2029.
- Hina Lani Street a double left turn lane on the southbound highway approach by 2029.

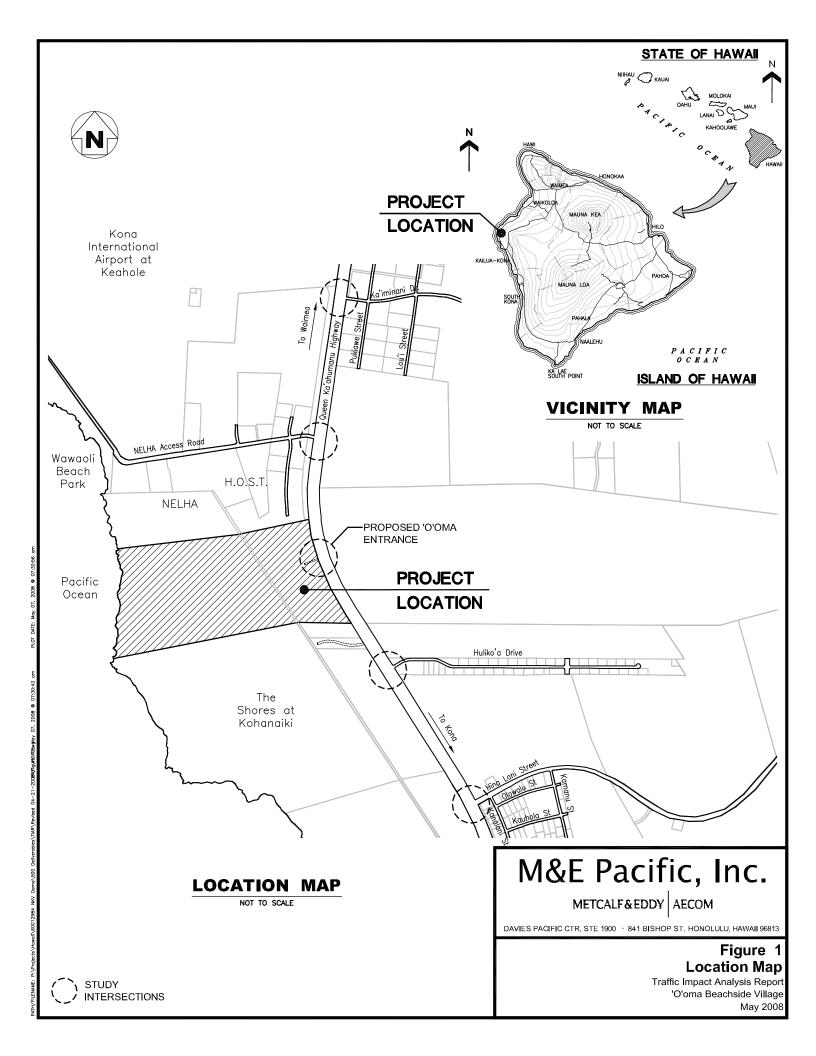
However, the need for mitigating measures to accommodate the project generated traffic by 2029 should be considered as speculative due to the uncertainties associated with such a long forecast period, including: 1) whether or not other development projects in the region are built or are built with as many units as currently anticipated; 2) the implementation of the mauka roadway network as currently planned and how much turning movement traffic is diverted to the mauka roadway system as it is completed; and 3) the level of mitigating measures that would be imposed on other development projects that could mitigate the impact of ambient traffic. Contingencies should be made to implement these measures while recognizing that their needs may not actually occur. The right turn in, right turn out access roadway intersection and highway system are expected to operate at acceptable levels of service in the forecast future.

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Figures





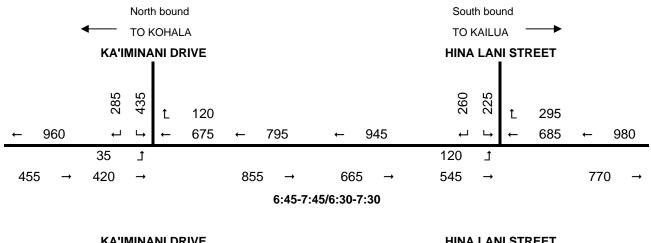
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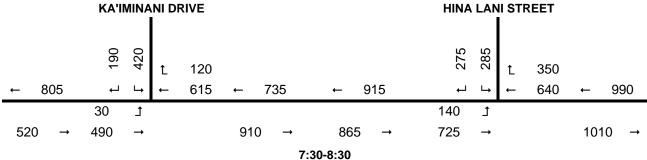
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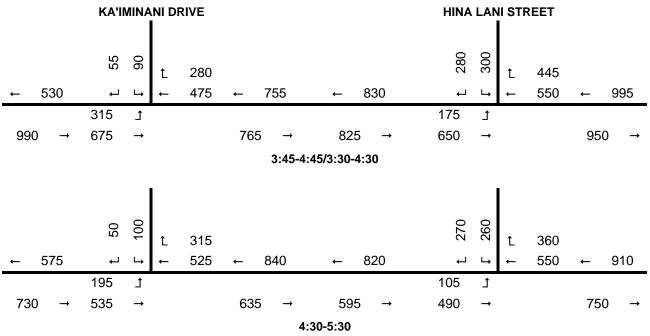
Figure 2 Conceptual Master Plan

Traffic Impact Analysis Report 'O'oma Beachside Village May 2008





AM PEAK HOUR



PM PEAK HOUR

Not to Scale

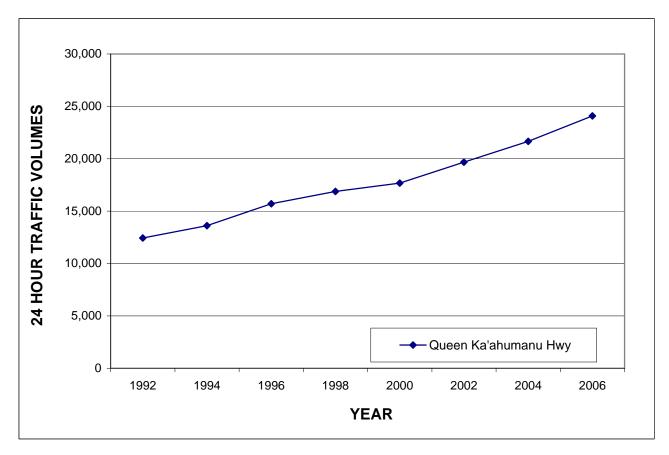
2006 EXISTING TRAFFIC VOLUMES FIGURE 3

TWO-W	AY DAILY
TRAFFIC	VOLUMES
	QUEEN
	KA'AHUMANU
YEAR	HWY
1992	12,432
1994	13,610
1996	15,709
1998	16,882
2000	17,670
2002	19,678
2004	21,654
2006	24 085

*Average Weekday Daily Traffic

Source: State of Hawai'i Department of Transportation

Station T-8-M, June 1, 2004



HISTORICAL TREND IN DAILY TRAFFIC VOLUMES
ON QUEEN KA'AHUMANU HIGHWAY AT NELHA ACCESS ROAD
FIGURE 4

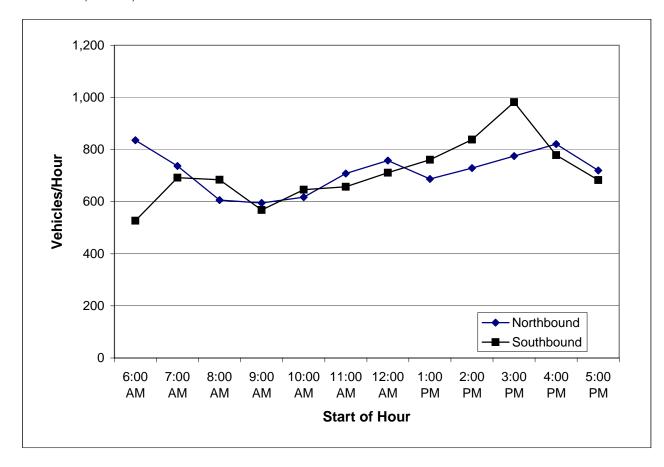
HOURLY TRAFFIC VOLUMES ON QUEEN KA'AHUMANU HIGHWAY

AT STATION T-8-M, North of NELHA access road, June 1, 2004

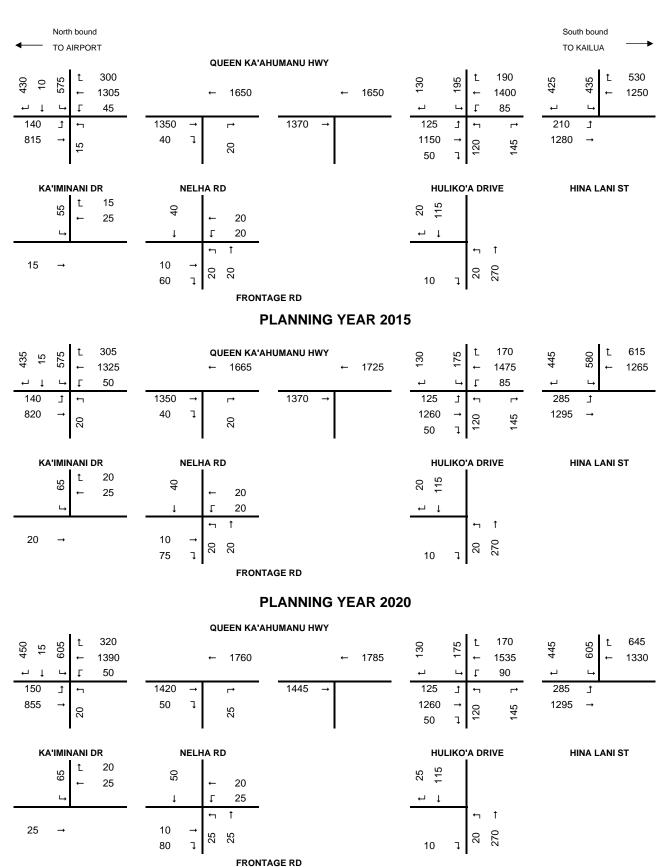
V	ehicles/Ho	ur
Start	North-	South-
of Hour	Bound	Bound
6:00 AM	836	527
7:00 AM	737	692
8:00 AM	606	684
9:00 AM	595	568
10:00 AM	617	646
11:00 AM	708	657
12:00 AM	758	711
1:00 PM	687	761
2:00 PM	729	838
3:00 PM	775	982
4:00 PM	821	779
5:00 PM	720	683

Source: State of Hawaii

Department of Transportation



HOURLY TRAFFIC VOLUMES ON QUEEN KA'AHUMANU HIGHWAY AT NELHA ACCESS ROAD FIGURE 5



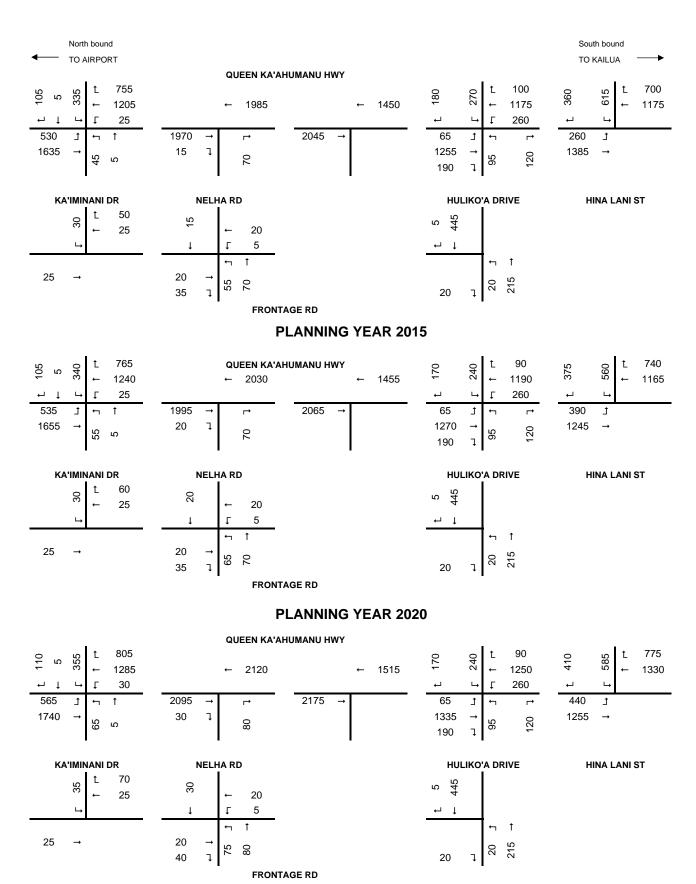
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PLANNING YEAR 2029

AM PEAK HOUR

Not To Scale

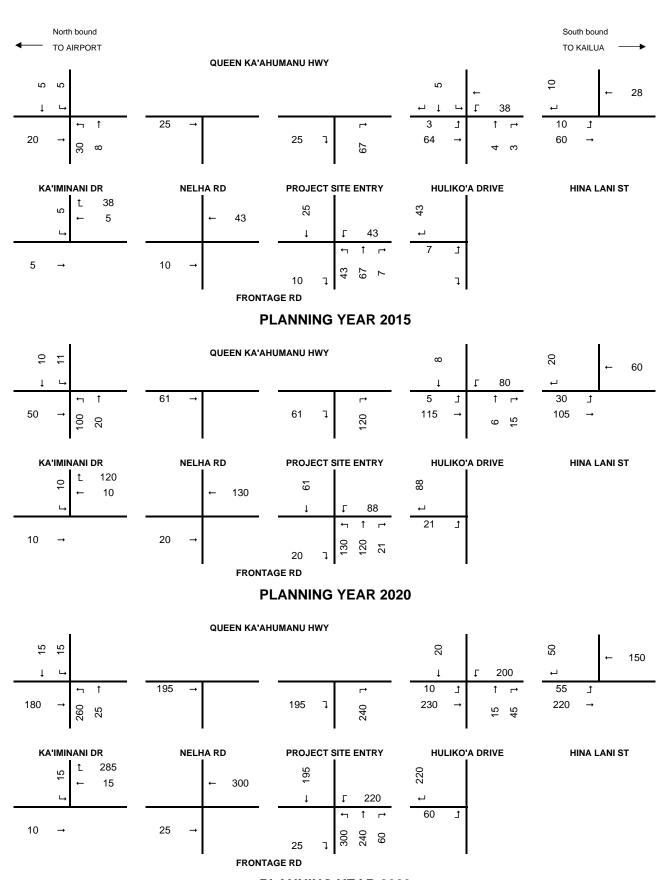
AMBIENT TRAFFIC FORECAST FIGURE 6



PM PEAK HOUR

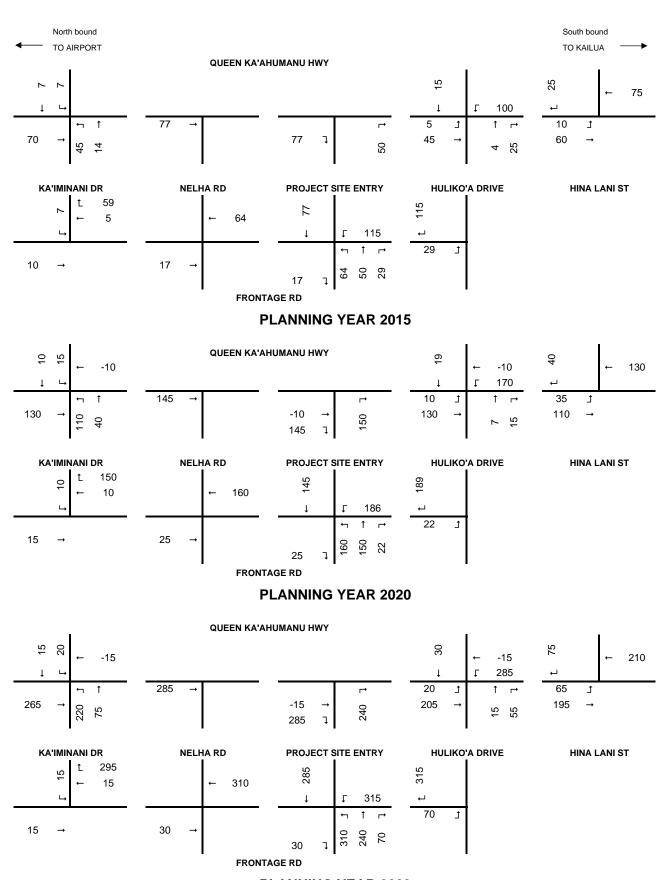
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AMBIENT TRAFFIC FORECAST FIGURE 6



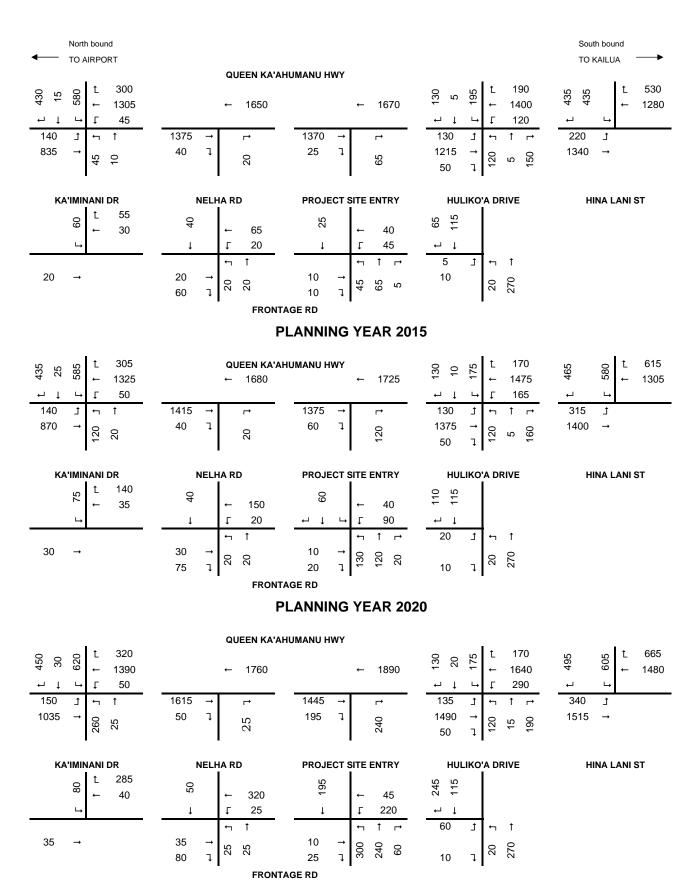
AM PEAK HOUR

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PM PEAK HOUR

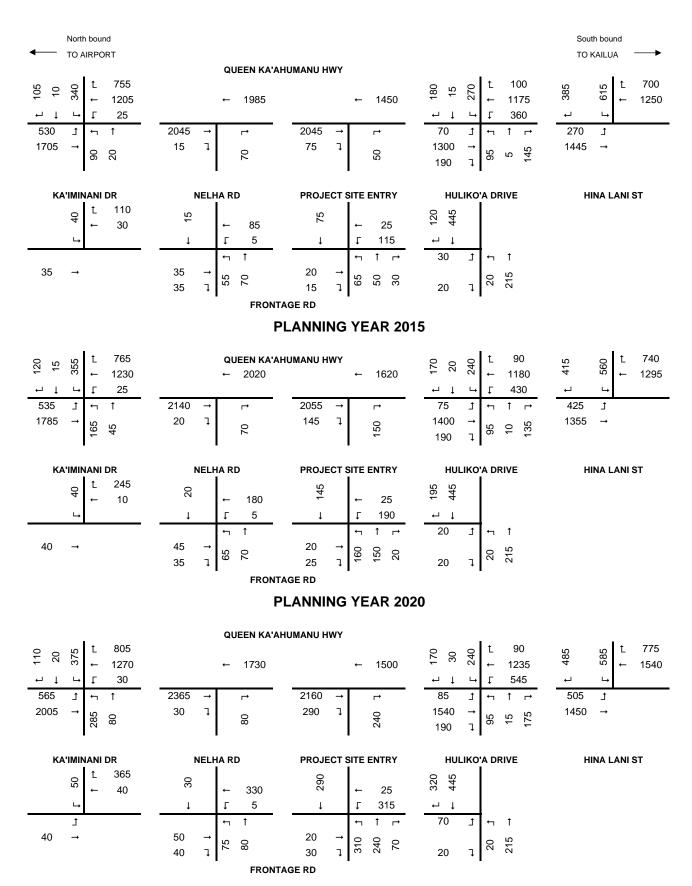
Not To Scale



AM PEAK HOUR

Not To Scale

TOTAL WITH PROJECT FORECAST FIGURE 8



PM PEAK HOUR

Not To Scale

Tables

TABLE 1 PROJECT MILESTONE SCHEDULE

	PLANNING	G YEAR MIL	TG REPORT	
LAND USE	2015	2020 ve Number	2029	LAND USE
	_,			
O'cole Feedle BU Beedle god	400	075	475	OFDIT (040)
Single Family DU Residential	120	275	4/5	SFDU (210)
Multi-family DU Residential	115	355	715	Low-rise Townhome (231)
TOTAL RESIDENTIAL	235	630	1,190	
TOTAL REGIDERTIAL	200	000	1,100	
Makai Village - MU Commercial (sf)	30,000	30,000	30,000	Shopping Center (820)
Restaurant & Canoe Club (sf)	20,000	20,000	20,000	Quality Restaurant (931)
TOTAL COMMERCIAL - Area A (sf)	50,000	50,000	50,000	
Mauka Village - MU&LW Commercial (sf)	0	35,000	135,000	Office Park (750)
		4=000	4= 000	2 (272)
Grocery Store (sf)		15000	15,000	Supermarket (850)
TOTAL COMMERCIAL - Area B (sf)	0	50,000	150,000	
Charter School (students)			225	Private School (534)
Public Beach Clubhouse (ac)	1	1	1	Constant assumed
		•	·	222.3

Proposed development schedule assumed for forecasting project generated traffic. This schedule does not reflect the actual project development schedule.

TABLE 2
TRIP GENERATION ANALYSIS

TIME PERIOD	Cumulative	Trip Generation	Ln(T)	T = Number	Direction	Percent	Number
Land Use	Units	Equation	LII(1)	of Trips	of Travel	1 CICCIII	of Trips
PLANNING YEAR 2015							
WEEKDAY AM PEAK HOUR							
Single Family Residential	120 units	T = 0.7(x) + 12.05		96	Enter	26%	25
					Leave	74%	71
MF & Mixed Use Vill Residential	115 units	T = 0.88(x) - 49.7		115	Enter	25%	29
					Leave	75%	86
Mixed Use Commercial (Area A)	30 ksf GLA	T = 1.03(X)		31	Enter	61%	19
					Leave	39%	12
Restaurant	20 ksf GLA	T = 0.81(X)		16	Enter	50%	8
					Leave	50%	8
Public Beach Clubhouse					Enter		50
					Leave		10
TOTAL					Enter		131
					Leave		187
WEEKDAY PM PEAK HOUR							
Single Family Residential	120 units	Ln(T)=0.89Ln(X)+0.61	4.87	130	Enter	64%	83
					Leave	36%	47
MF & Mixed Use Vill Residential	115 units	T = 0.78(X)		90	Enter	58%	52
					Leave	42%	38
Mixed Use Commercial (Area A)	30 ksf GLA	T = 3.75(X)		113	Enter	48%	54
					Leave	52%	59
Restaurant	20 ksf GLA	T = 7.49(X)		150	Enter	67%	100
					Leave	33%	49
Public Beach Clubhouse					Enter		20
					Leave		50
TOTAL					Enter		310
					Leave		243

TABLE 2 (continued) TRIP GENERATION ANALYSIS

TIME PERIOD	Cumulative	Trip Generation	Ln(T)	T = Number	Direction	Percent	Number
Land Use	Units	Equation	LII(1)	of Trips	of Travel	reiceill	of Trips
PLANNING YEAR 2020							
WEEKDAY AM PEAK HOUR							
Single Family Residential	275 units	T = 0.7(x) + 12.05		205	Enter	26%	53
					Leave	74%	151
MF, M/U, L/W Residential	355 units	T = 0.88(x) - 49.7		263		25%	66
	· / - - ·				Leave	75%	197
Mixed Use Commercial (Area A)	30 ksf GLA	T = 1.03(X)		31		61%	19
		(T) 0.041 ()() 4.74			Leave	39%	12
M/U, L/W Commercial (Area B)	35 ksf GLA	Ln(T)=0.84Ln(X)+1.51	4.50	90		89%	80
					Leave	11%	10
Grocery Store	15 ksf GLA	Ln(T)=01.70Ln(X)-1.42	3.18	24		61%	15
					Leave	39%	9
Restaurant	20 ksf GLA	T = 0.81(X)		16		50%	8
					Leave	50%	8
Public Beach Clubhouse					Enter		60
					Leave		15
TOTAL					Enter		300
WEEKDAY DM DEAK HOUD					Leave		403
WEEKDAY PM PEAK HOUR	075	I - (T) 0 00I - ()() - 0 04	5.04	070		0.40/	475
Single Family Resident	275 units	Ln(T)=0.89Ln(X)+0.61	5.61	273		64%	175
ME MULLIAN Desidential	055	T 0.70(V)		077	Leave	36%	98
MF, M/U, L/W Residential	355 units	T = 0.78(X)		277		58%	161
Mi a IIIa a Oa a a a a aist (A a a a A)	00 1 - (0) 4	T 0.75()()		440	Leave	42%	116
Mixed Use Commercial (Area A)	30 ksf GLA	T = 3.75(X)		113		48%	54
MALL LANGO CONTROL (Augo D)	05 l-+4 OL A	T 4.04(v) + 400.00		4.40	Leave	52%	59
M/U, L/W Commercial (Area B)	35 ksf GLA	T = 1.21(x) + 106.22		149		14%	21 128
Cracery Steve	45 kat OL A		5 24	208	Leave	86%	128
Grocery Store	15 ksf GLA	Ln(T)=0.79Ln(X)+3.20	5.34	208		51%	
Destaurent	20 104 01 4	T 7.40(V)		450	Leave	49%	102
Restaurant	20 ksf GLA	T = 7.49(X)		150		67%	100
Public Beach Clubhouse					Leave	33%	49 25
Fublic Deach Clubhouse					Enter Leave		25 60
TOTAL					Enter		642
IOIAL							642 612
					Leave		012

TABLE 2 (continued) TRIP GENERATION ANALYSIS

TIME PERIOD	Cumulative	Trip Generation	Ln/T)	T = Number	Direction	Percent	Number
Land Use	Units	Equation	Equation Ln(T)		of Travel	Percent	of Trips
PLANNING YEAR 2029							
WEEKDAY AM PEAK HOUR							
Single Family Residential	475 units	T = 0.7(x) + 12.05		345	Enter	26%	90
					Leave	74%	255
MF, M/U, L/W Residential	715 units	T = 0.88(x) - 49.7		580	Enter	25%	145
					Leave	75%	435
Mixed Use Commercial (Area A)	30 ksf GLA	T = 1.03(X)		31	Enter	61%	19
					Leave	39%	12
M/U, L/W Commercial (Area B)	135 ksf GLA	Ln(T)=0.84Ln(X)+1.51	5.63	279	Enter	89%	248
					Leave	11%	31
Grocery Store	15 ksf GLA	Ln(T)=01.70Ln(X)-1.42	3.18	24	Enter	61%	15
					Leave	39%	9
Restaurant	20 ksf GLA	T = 0.81(X)		16	Enter	50%	8
					Leave	50%	8
Charter School (K-8)	225 students	Ln(T)=Ln(X)-0.13	5.29	198	Enter	55%	109
					Leave	45%	89
Public Beach Clubhouse					Enter		70
					Leave		20
TOTAL					Enter		703
					Leave		859

TABLE 2 (continued) TRIP GENERATION ANALYSIS

TIME PERIOD	Cumulative	Trip Generation	Trip Generation Ln(T)		Direction	Percent	Number
Land Use	Units	Equation	LII(1)	of Trips	of Travel	Percent	of Trips
PLANNING YEAR 2029							
WEEKDAY PM PEAK HOUR							
Single Family Residential	475 units	Ln(T)=0.89Ln(X)+0.61	6.10	444	Enter	64%	284
					Leave	36%	160
MF, M/U, L/W Residential	715 units	T = 0.78(X)		558	Enter	58%	323
					Leave	42%	234
Mixed Use Commercial (Area A)	30 ksf GLA	T = 3.75(X)		113	Enter	48%	54
					Leave	52%	59
M/U, L/W Commercial (Area B)	135 ksf GLA	T = 1.21(x) + 106.22		270	Enter	14%	38
					Leave	86%	232
Grocery Store	15 ksf GLA	Ln(T)=0.79Ln(X)+3.20	5.34	208	Enter	51%	106
					Leave	49%	102
Restaurant	20 ksf GLA	T = 7.49(X)		150	Enter	67%	100
					Leave	33%	49
Charter School (K-8)	225 students	T = 0.58(x) + 14.03		145	Enter	47%	68
					Leave	53%	77
Public Beach Clubhouse					Enter		25
					Leave		70
TOTAL					Enter		999
					Leave		982

TABLE 3 TRIP DISTRIBUTION ANALYSIS

			NORTH		SOUTH		INTERNAL	
TIME PERIOD	Direction	No. of		No. of		No. of		No. of
Land Use	of Travel	Trips	%	Trips	%	Trips	%	Trips
PLANNING YEAR 2015								
WEEKDAY AM PEAK HOUR								
Single Family Residential	Enter	25						
	Leave	71						
MF & Mixed Use Vill Residential	Enter	29						
	Leave	86						
COMBINED RESIDENTIAL	Enter	54	17%	9	20%	11	61%	33
	Leave	157	34%	53	41%	64	25%	40
Mixed Use Commercial (Area A)	Enter	19	32%	6	42%	8	26%	5
	Leave	12	25%	3	33%	4	42%	5
Restaurant	Enter	8	25%	2	25%	2	50%	4
	Leave	8	25%	2	25%	2	50%	4
Public Beach Clubhouse	Enter	50	36%	18	44%	22	20%	10
	Leave	10	30%	3	40%	4	30%	3
TOTAL	Enter	131	27%	35	33%	43	40%	52
TOTAL	Leave	187	33%	61	40%	74	28%	52 52
	Leave	107	33 /6	01	40 /0	/4	20 /0	52
WEEKDAY PM PEAK HOUR								
Single Family Residential	Enter	83						
	Leave	47						
MF & Mixed Use Vill Residential	Enter	52						
	Leave	38						
COMBINED RESIDENTIAL	Enter	135	32%	43	39%	52	30%	40
	Leave	85	18%	15	21%	18	61%	52
Mixed Use Commercial (Area A)	Enter	54	33%	18	41%	22	26%	14
	Leave	59	36%	21	42%	25	24%	14
Restaurant	Enter	100	27%	27	33%	33	40%	40
	Leave	49	27%	13	33%	16	41%	20
Public Beach Clubhouse	Enter	20	30%	6	40%	8	30%	6
	Leave	50	30%	15	40%	20	30%	15
TOTAL		200	200/	0.4	270/	445	200/	400
TOTAL	Enter	309	30%	94	37%	115	32%	100
	Leave	243	26%	64	33%	79	42%	101

TABLE 3 (continued) TRIP DISTRIBUTION ANALYSIS

			NORTH		SOUTH		INTERNAL	
TIME PERIOD	Direction	No. of		No. of		No. of		No. of
Land Use	of Travel	Trips	%	Trips	%	Trips	%	Trips
PLANNING YEAR 2020								
WEEKDAY AM PEAK HOUR								
Single Family Residential	Enter	53						
	Leave	151						
MF, M/U, L/W Residential	Enter	66						
	Leave	197						
COMBINED RESIDENTIAL	Enter	119	38%	45	42%	50	20%	24
	Leave	348	33%	115	36%	125	31%	108
Mixed Use Commercial (Area A)	Enter	19						
	Leave	12						
M/U, L/W Commercial (Area B)	Enter	80						
	Leave	10						
COMBINED COMMERCIAL	Enter	99	10%	10	11%	11	79%	78
0 0	Leave	22	26%	6	29%	6	45%	10
Grocery Store	Enter	15	0%	0	0%	0	100%	15
Destaurant	Leave	9	0%	0	0%	0	100%	9
Restaurant	Enter	8	48%	4	52%	4	0%	0
Dublic Booch Clubbours	Leave	8	48%	4	52%	4	0%	0
Public Beach Clubhouse	Enter	60 15	36%	22 5	39%	23 5	25%	15 5
	Leave	15	33%	5	33%	5	33%	5
TOTAL	Enter	301	27%	81	29%	88	44%	132
	Leave	402	32%	130	35%	141	33%	132
WEEKDAY DIA DEAK HOUD								
WEEKDAY PM PEAK HOUR		475						
Single Family Resident	Enter	175						
NAT NAVILLANA Decidential	Leave	98						
MF, M/U, L/W Residential	Enter Leave	161 116						
COMBINED RESIDENTIAL	Enter	336	23%	77	25%	84	52%	174
COMBINED RESIDENTIAL	Leave	214	24%	51	26%	56	50%	108
Mixed Use Commercial (Area A)	Enter	54	24 /0	JI	20 /0	30	30 /6	100
Winked Ode Commercial (Allea A)	Leave	59						
M/U, L/W Commercial (Area B)	Enter	21						
ivio, by volumerolar (x tod b)	Leave	128						
COMBINED COMMERCIAL	Enter	75	36%	27	44%	33	20%	15
	Leave	187	32%	60	34%	64	34%	64
Grocery Store	Enter	106	28%	30	31%	33	41%	43
ĺ	Leave	102	15%	15	16%	16	69%	70
Restaurant	Enter	100	29%	29	31%	31	40%	40
	Leave	49	29%	14	31%	15	41%	20
Public Beach Clubhouse	Enter	25	29%	7	31%	8	40%	10
	Leave	60	32%	19	35%	21	33%	20
	F	0.10	0007	470	000/	400	4.407	000
TOTAL	Enter	642	26%	170	29%	189	44%	282
	Leave	612	26%	160	28%	172	46%	282
	<u> </u>							

TABLE 3 (continued) TRIP DISTRIBUTION ANALYSIS

			NO	RTH	SO	UTH	INTE	RNAL
TIME PERIOD	Direction	No. of		No. of		No. of		No. of
Land Use	of Travel	Trips	%	Trips	%	Trips	%	Trips
PLANNING YEAR 2029								
WEEKDAY AM PEAK HOUR								
Single Family Residential	Enter	90						
	Leave	255						
MF, M/U, L/W Residential	Enter	145						
	Leave	435						
COMBINED RESIDENTIAL	Enter	235	41%	96	41%	96	18%	43
Missad Has Communical (Area A)	Leave	690	34%	235	34%	235	32%	220
Mixed Use Commercial (Area A)	Enter	19						
M/LL L /// Commoraid (Area D)	Leave Enter	12 248						
M/U, L/W Commercial (Area B)	Leave	246 31						
COMBINED RESIDENTIAL	Enter	267	18%	47	18%	47	65%	174
COMBINED RESIDENTIAL	Leave	43	33%	14	33%	14	35%	174
Grocery Store	Enter	43 15	0%	0	0%	0	100%	15
Grocery Store	Leave	9	0%	0	0%	0	100%	9
Restaurant	Enter	8	50%	4	50%	4	0%	0
Restaurant	Leave	8	50%	4	50%	4	0%	0
Public Beach Clubhouse	Enter	70	36%	25	36%	25	29%	20
Fublic Beach Clubilouse	Leave	20	30%	6	30%	6	40%	8
Charter School (K-8)	Enter	109	45%	49	45%	49	10%	11
Charter School (K-6)	Leave	89	44%	39	43%	39	12%	11
	Leave	09	44 /0	39	44 /0	39	12/0	- 11
TOTAL	Enter	704	31%	221	31%	221	37%	263
	Leave	859	35%	298	35%	298	31%	263
WEEKDAY DM DEAK HOUD								
WEEKDAY PM PEAK HOUR	Enter	284						
Single Family Resident	Leave	26 4 160						
MF, M/U, L/W Residential	Enter	323						
IVII , IVI/O, L/VV IXESIGERIIAI	Leave	234						
COMBINED RESIDENTIAL	Enter	607	30%	179	30%	179	41%	247
COMBINED RESIDEIVIAE	Leave	394	35%	138	35%	138	30%	120
Mixed Use Commercial (Area A)	Enter	54	0070	100	0070	100	0070	120
imixed dee demineralal (vilou / l)	Leave	59						
M/U, L/W Commercial (Area B)	Enter	38						
	Leave	232						
COMBINED COMMERCIAL	Enter	92	39%	36	39%	36	22%	20
	Leave	291	28%	81	28%	81	44%	129
Grocery Store	Enter	106	30%	31	30%	31	41%	43
,	Leave	102	16%	16	16%	16	69%	70
Restaurant	Enter	100	30%	30	30%	30	40%	40
	Leave	49	30%	14	30%	15	41%	20
Public Beach Clubhouse	Enter	25	30%	8	30%	7	40%	10
	Leave	70	36%	25	36%	25	29%	20
Charter School (K-8)	Enter	68	45%	30	45%	31	10%	7
	Leave	77	45%	34	45%	35	10%	8
TOTAL	Ente:	000	240/	24.4	240/	24.4	270/	267
TOTAL	Enter	998	31%	314	31%	314	37%	367
	Leave	983	31%	308	32%	310	37%	367

TABLE 4
LEVEL OF SERVICE ANALYSIS (SIGNALIZED)
QUEEN KA'AHUMANU HIGHWAY AT KAI'MINANI DRIVE

		2006				20)15					20)20					20)29		
		EXISTIN	G		AMBIEN	Γ ¹		TOTAL ¹			AMBIEN	Γ ²		TOTAL ²			AMBIENT	r ²		TOTAL ²	!
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
AM PEAK HOUR	В	17.3	0.79	D	41.8	0.70	D	45.2	0.72	D	40.1	0.7	D	45.2	0.77	D	41.6	0.74	D	41.6	0.95
Frontage Rd Eastbound	NA	-	-	F	86.9	-	F	86.8	0.57	Е	78.7	-	F	82.0	-	F	88.7	-	Е	71.2	-
Left		-	-	F	86.9	0.34	F	87.1	0.57	Е	78.7	0.19	F	82.8	0.90	F	88.7	0.46	Е	69.9	0.99
Through/Right	ı	•	-	F	86.1	0.00	F	85.1	0.1	Е	77.8	0	Е	77.7	0.16	F	87.6	0	Е	77.8	0.55
Ka'iminani Dr WB	С	25.7	-	D	54.8	-	Е	57.4	-	Е	55.4	-	Е	59.3	-	Е	59.4	-	Е	70.5	-
Left	С	26.8	0.98	Е	63.9	0.75	Е	67	0.78	Е	60.0	0.73	Е	64.8	0.80	Е	66.5	0.81	Е	70.0	1.17
Through	NA	-	-	D	52.6	0.02	Е	55.2	0.04	D	49.5	0.04	D	53.4	0.08	D	54.2	0.04	Е	78.3	0.64
Right	C	23.8	0.65	D	39.8	0.57	D	41.7	0.58	D	48.2	0.69	D	50.5	0.69	D	47.8	0.67	Е	70.0	1.43
Queen Ka'ahumanu Hwy NB	В	14.9	-	D	42.5	-	D	45.6	-	D	35.9	-	D	40.1	-	D	37.4	-	С	28.7	-
Left	NA	-	-	F	86.6	0.74	F	85.2	0.48	F	83.2	0.77	F	84.8	0.62	F	83.5	0.47	Е	78.7	0.58
Through	В	16.9	0.83	D	43.1	0.86	D	46.4	0.88	D	36.4	0.81	D	40.9	0.84	D	38.1	0.83	С	28.8	0.76
Right	Α	1.2	0.83	С	30.9	0.35	С	33.3	0.36	С	23.9	0.19	С	26.8	0.20	С	24.3	0.2	В	18.4	0.18
Queen Ka'ahumanu Hwy SB	Α	8.6	-	С	27.1	-	С	30.7	-	С	31.2	-	С	34.6	-	С	30.3	-	С	25.8	-
Left	Α	8.6	0.13	Е	71.3	0.56	Е	73	0.56	Е	78.5	0.6	F	80.2	0.55	Е	76.3	0.42	Е	74.2	0.54
Through	Α	8.6	0.42	В	19.5	0.42	С	23.6	0.45	С	23.2	0.45	С	27.5	0.52	С	22.3	0.45	В	19.1	0.54
Right	NA	-	-	С	25.9	0.00	С	27.9	0.01	С	21.7	0.01	С	24.3	0.01	С	21.9	0.01	В	16.6	0.01

		2006				20)15					20)20					20)29		
		EXISTIN	G		AMBIEN	Γ ¹		TOTAL ¹			AMBIEN	Γ ²		TOTAL ²	!		AMBIENT	Γ ²		TOTAL ²	2
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
PM PEAK HOUR	В	11.5	0.67	D	38.6	0.97	D	39.2	1.00	D	42.7	0.71	D	42.0	0.93	D	48.2	0.75	D	51.5	1.00
Frontage Rd Eastbound	NA	-	-	Е	73.6	-	Е	75.5	-	F	82.2	0.71	F	115	-	F	100	-	F	84.4	-
Left	-	-	-	Е	73.8	0.44	Е	76	0.89	F	82.5	0.46	F	123	0.92	F	101	0.63	F	82.9	0.79
Through/Right	•	-	-	Е	72	0.05	Е	72.4	0.13	Е	78.2	0.04	F	87.0	0.48	F	87.2	0.05	F	89.8	0.57
Ka'iminani Dr WB	С	26	-	Е	62.9	-	Е	63	-	Е	75.5	-	F	91.8	-	Е	78.6	-	F	85.0	-
Left	С	26.3	0.24	Е	65.3	0.69	Е	65.5	0.71	F	83.4	0.78	F	98.7	0.89	F	86.6	0.75	F	84.3	0.77
Through	NA	-	-	Е	58.6	0.02	Е	58.8	0.05	Е	67.4	0.02	Е	76.7	0.10	Е	72.0	0.02	F	96.60	0.67
Right	C	25.5	0.12	С	31.1	0.04	С	31.1	0.04	D	40.5	0.15	Е	67.3	0.37	D	43.5	0.16	F	85.7	0.54
Queen Ka'ahumanu Hwy NB	В	12	-	D	40.5	-	D	40.5	-	D	36.9	-	С	30.4	-	D	41.6	-	D	36.1	-
Left	NA	-	-	Е	75.9	0.37	Е	75.9	0.37	F	87.1	0.43	F	83.9	0.34	F	156	0.78	F	90.8	0.42
Through	В	16.4	0.59	D	37.7	0.80	D	37.7	0.8	D	39.0	0.76	D	37.9	0.75	D	42.9	0.78	D	46.2	0.82
Right	Α	2.5	0.20	D	44	1.04	D	44	1.04	С	31.0	0.51	В	14.0	0.38	С	34.1	0.54	В	14.9	0.41
Queen Ka'ahumanu Hwy SB	Α	9.2	-	С	32.1	-	С	32.5	-	D	40.5	-	D	35.2	-	D	46.4	-	D	52.6	-
Left	Α	8.9	0.67	Е	65	0.20	Е	65	1.61	F	93.7	0.93	Е	76.3	0.82	F	114	0.99	F	91.1	0.9
Through	Α	9.3	0.62	С	21.4	0.79	С	22.4	0.82	С	23.3	0.77	С	22.9	0.81	С	24.6	0.79	D	41.9	0.95
Right	NA	-	-	С	23.8	0.01	С	23.8	0.01	С	22.9	0.01	Α	3.0	0.01	С	24.7	0.01	Α	1.2	0.01

¹ With 2 left turn lanes on westbound approach

² With 2 northbound right turn, 2 southbound left turn lanes and 2 westbound left turn lanes

TABLE 5
LEVEL OF SERVICE ANALYSIS (SIGNALIZED)
QUEEN KA'AHUMANU HIGHWAY AT HULIKO'A DRIVE

		2006				20)15					20	20					20	29		
		EXISTING	3		AMBIEN	Т		TOTAL ¹			AMBIEN	Т		TOTAL ¹			AMBIEN1	Γ ¹		TOTAL	
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
AM PEAK HOUR				С	29.2	0.74	С	29.7	0.71	С	29.6	0.72	D	37.0	0.72	С	30.2	0.74	D	46.4	0.77
Frontage Road Eastbound				D	47.7	-	D	47.7	-	D	47.7	-	D	45.0	-	D	47.7	-	Е	59.7	-
Left				D	48.3	0.44	D	48.3	0.44	D	48.3	0.44	D	45.1	0.36	D	48.3	0.44	Е	59.3	0.40
Through				D	43.2	0.01	D	43.3	0.01	D	43.2	0.01	D	40.8	0.01	D	43.2	0.01	D	54.0	0.04
Right				D	47.1	0.38	D	47.2	0.38	D	47.1	0.38	D	45.0	0.36	D	47.1	0.38	Е	60.6	0.45
Huliko'a Drive Westbound				D	54.6	-	D	54.7	-	D	51.6	-	D	46.6	-	D	51.6	-	Е	61.5	-
Left				Е	59.0	0.72	Е	59.3	0.72	D	54.8	0.64	D	48.6	0.52	D	54.8	0.64	Е	64.6	0.58
Through				D	43.3	0.01	D	43.3	0.01	D	43.3	0.04	D	41.2	0.04	D	43.3	0.01	D	54.1	0.05
Right				D	46.5	0.33	D	46.5	0.33	D	46.5	0.33	D	43.9	0.26	D	46.5	0.33	Е	57.5	0.29
Queen Ka'ahumanu Hwy NB				С	25.0	-	С	25.7	-	С	26.4	-	D	36.8	-	С	27.7	-	D	38.9	-
Left				Е	60.5	0.48	Е	58.0	0.36	Е	60.5	0.48	Е	62.7	0.55	Е	57.4	0.26	Е	72.2	0.55
Through				С	24.1	0.75	С	24.1	0.75	С	25.7	0.79	С	34.5	0.85	С	27.2	0.82	С	34.8	0.85
Right				В	14.4	0.19	В	14.4	0.19	В	14.2	0.17	В	18.5	0.18	В	14.2	0.17	В	17.2	0.16
Queen Ka'ahumanu Hwy SB				С	25.3	-	С	26.0	-	С	26.1	-	С	34.2	-	С	26.1	-	D	50.7	-
Left				Е	73.2	0.72	Е	74.9	0.74	Е	73.2	0.72	Е	67.4	0.63	Е	73.2	0.72	F	98.3	0.77
Through				С	20.5	0.62	С	21.3	0.65	С	21.9	0.68	С	31.4	0.80	С	21.9	0.68	D	47.2	0.89
Right				В	13.2	0.05	В	13.2	0.05	В	13.2	0.05	В	17.2	0.05	В	13.2	0.05	С	22.9	0.05

		2006				20)15					20	20					20	29		
		EXISTING	3		AMBIEN	Т		TOTAL ¹			AMBIEN	Т		TOTAL ¹			AMBIEN1	-1		TOTAL ²	
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
PM PEAK HOUR				D	45.3	0.80	D	43.6	0.77	D	41.6	0.78	D	50.3	0.79	D	36.1	0.73	D	45.7	0.85
Frontage Road Eastbound				D	53.4	-	D	53.5	-	D	51.3	-	Е	63.7	-	D	45.5	-	Е	75.9	-
Left				D	53.6	0.27	D	53.3	0.28	D	51.6	0.28	Е	64.3	0.29	D	46.1	0.27	F	105.0	0.74
Through				D	49.7	0.01	D	49.4	0.01	D	47.8	0.01	Е	59.7	0.01	D	42.7	0.01	F	86.5	0.17
Right				D	53.2	0.24	D	53.7	0.31	D	51.1	0.25	Е	63.2	0.23	D	44.8	0.17	D	52.2	0.29
Huliko'a Drive Westbound				Е	67.6	-	Е	67.7	-	Е	61.8	-	Е	75.6	-	D	54.2	-	Е	77.0	-
Left				Е	74.2	0.79	Е	75.6	0.81	Е	66.9	0.74	F	82.1	0.75	Е	58.1	0.69	F	82.0	0.62
Through				D	49.8	0.01	D	49.8	0.03	D	47.8	0.01	Е	60.3	0.05	D	42.7	0.01	Е	78.9	0.18
Right				Е	55.7	0.39	Е	55.3	0.40	D	53.2	0.38	Е	65.1	0.33	D	46.7	0.31	Е	66.5	0.42
Queen Ka'ahumanu Hwy NB				D	35.1	-	С	34.4	-	D	35.8	-	D	44.2	-	С	32.4	-	С	33.7	-
Left				F	87.1	0.83	Е	72.2	0.65	F	113	0.96	F	97.8	0.84	Е	78.1	0.75	Е	77.6	0.8
Through				С	24.8	0.61	С	24	0.61	С	20.1	0.59	С	26.1	0.59	С	23.8	0.66	В	16.0	0.56
Right				В	16.3	0.09	В	15.8	0.08	В	13.1	0.07	В	17.2	0.07	В	14.8	0.07	Α	2.8	0.05
Queen Ka'ahumanu Hwy SB	-			D	48.4	-	D	44.9	-	D	41.1	-	D	49.2	-	С	34.6	-	D	47.4	-
Left				F	84.7	0.50	F	83.7	0.53	F	100	0.71	F	99.3	0.56	Е	77.8	0.55	F	97.6	0.67
Through				D	48.8	0.84	D	44.9	0.83	D	40.0	0.8	D	48.6	0.84	С	33.9	0.79	D	47.6	0.9
Right				С	30.8	0.24	С	27.9	0.23	С	25.6	0.23	С	28.4	0.19	С	20.6	0.18	В	14.8	0.15

¹ With 2 left turn lanes on northbound approach

² With 2 left turn lanes on westbound approach

TABLE 6
LEVEL OF SERVICE ANALYSIS (SIGNALIZED)
QUEEN KA'AHUMANU HIGHWAY AT HINA LANI STREET

		2006				20	015					20	20					20	29		
		EXISTING	3		AMBIEN'	Т		TOTAL			AMBIEN	Γ ¹		TOTAL ¹			AMBIEN	Γ ¹		TOTAL ²	!
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
AM PEAK HOUR	С	27.5	0.75	D	36.9	0.92	D	36.9	0.93	С	33.2	1.04	D	38.4	1.06	D	35.5	1.09	С	30.9	1.07
Hina Lani St WB	С	29.5	-	D	38.6	-	D	41.1	-	D	46.1	-	D	52.1	-	D	47.4	-	D	52.1	-
Left	С	29.0	0.47	D	50.0	0.77	D	53.5	0.8	Е	57.6	0.74	Е	65.9	0.75	Е	59.2	0.78	Е	62.8	0.84
Right	С	30.0	0.52	С	24.1	0.47	С	25.9	0.49	С	27.7	0.52	С	31.5	0.54	С	27.7	0.52	D	36.5	0.67
Queen Ka'ahumanu Hwy NB	D	37.3	-	D	41.2	-	D	39.6	-	D	36.6	-	D	43.3	-	D	40.7	-	С	33.9	-
Through	D	43.2	0.93	D	54.0	0.93	D	51.7	0.93	D	47.7	0.89	Е	56.1	0.92	D	53.5	0.94	D	44.0	0.93
Right	В	18.5	0.34	Α	3.9	0.37	Α	3.9	0.37	Α	9.1	0.459	В	10.8	0.50	Α	9.5	0.52	Α	6.6	0.50
Queen Ka'ahumanu Hwy SB	В	13.0	-	С	31.1	-	С	31.7	-	С	21.8	-	С	25.5	-	С	21.8	-	В	15.9	-
Left	В	13.0	0.38	Е	71.1	0.85	Е	78.9	0.89	Е	56.1	0.76	Е	67.5	0.81	Е	56.5	0.76	С	23.6	0.21
Through	В	13.0	0.55	С	24.5	0.70	С	23.9	0.71	В	14.2	0.60	В	16.1	0.64	В	14.2	0.60	В	14.2	0.68

		2006				20)15					20)20					20	29		
		EXISTIN	G		AMBIEN			TOTAL			AMBIEN	Γ ¹		TOTAL ¹			AMBIENT	Γ ¹		TOTAL ²	
APPROACH & MOVEMENTS	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
PM PEAK HOUR	С	27.9	0.69	D	49.3	0.60	D	53.5	1.11	С	33.8	0.74	D	39.7	0.76	D	41.3	0.77	С	33.0	1.16
Hina Lani St WB	D	42.6	-	Е	76.4	-	Е	75.1	-	D	52.7	-	D	54.6	-	D	54.8	-	Е	60.8	-
Left	D	44.1	0.74	F	100.8	1.04	F	100.8	1.04	Е	67.2	0.83	Е	72.1	0.85	Е	70.9	0.87	Е	66.5	0.72
Right	D	40.8	0.66	С	22.7	0.36	С	23.3	0.39	С	25.2	0.41	С	25.6	0.46	С	26.3	0.46	D	52.7	0.72
Queen Ka'ahumanu Hwy NB	С	33.6	-	D	41.6	-	D	49.7	-	С	33.7	-	D	46.2	-	D	42.9	-	С	30.3	-
Through	D	36.8	0.82	Е	59.7	0.92	Е	70.5	0.98	D	44.0	0.83	Е	60.2	0.96	Е	56.4	0.95	D	41.4	0.87
Right	С	28.8	0.64	Α	6.2	0.52	Α	6.2	0.52	В	15.0	0.65	В	17.7	0.67	В	16.2	0.69	Α	4.8	0.56
Queen Ka'ahumanu Hwy SB	В	11.9	-	D	42.9	-	D	46.0	-	С	24.0	-	С	25.2	-	С	32.3	-	С	21.8	-
Left	В	11.3	0.36	F	107.3	0.98	F	118.6	1.02	Е	65.2	0.88	Е	68.8	0.89	F	92.8	0.99	С	31.1	0.34
Through	В	12	0.60	С	30.8	0.77	С	32.4	0.80	В	11.1	0.55	В	11.5	0.59	В	11.2	0.55	В	18.6	0.67

¹ With 2 left turn lanes on westbound approach

² With 2 southbound left turn lanes and 2 westbound left turn lanes

TABLE 7 LEVEL OF SERVICE ANALYSIS (UNSIGNALIZED) QUEEN KA'AHUMANU HIGHWAY AT EXISTING (2006) INTERSECTIONS

		AM PEA	K HOUR	PM PEA	K HOUR
		LOS	DELAY	LOS	DELAY
NELHA ACCESS RD INTERSE	CTION				
NELHA Access Rd	EB Approach	D	34.9	D	35
	EB RT	С	17.6	В	14.4
	EB LT	F	64.2	Е	47.3
Queen Ka'ahumanu Hwy	NB LT	В	10.6	Α	9.1
HULIKOA DRIVE INTERSECTION	DN				
Hulikoa Drive	WB Approach	F	107.3	F	104
	WB RT	С	21.1	С	19
	WB LT	F	237	F	161
Queen Ka'ahumanu Hwy	SB LT	В	10.9	Α	9.8

TABLE 8 LEVEL OF SERVICE ANALYSIS (ON-RAMP) QUEEN KA'AHUMANU HIGHWAY AT 'O'OMA BEACHSIDE VILLAGE AND NELHA ACCESS ROADS

PEAK	20	15	20	20	20	29
HOUR	LOS	DENSITY	LOS	DENSITY	LOS	DENSITY
At 'O'oma I	Beachside \	/illage Acce	ss Road			
AM	В	17.3	В	17.9	В	19.5
PM	С	23.2	С	24.1	С	25.8
At NELHA	Access Roa	ad				
AM	В	16.9	В	17.3	В	19.2
PM	С	23.3	С	24.2	С	26.3

Legend:

LOS = Level of Service for vehicles entering Queen Ka'ahumanu Highway from access road

DENSITY = Passenger Cars/Mile/Lane

TABLE 9
LEVEL OF SERVICE ANALYSIS (HIGHWAY)
QUEEN KA'AHUMANU HIGHWAY SOUTHBOUND AT
'O'OMA BEACHSIDE VILLAGE ACCESS ROAD

		AN	I PEAK HO	UR	PN	I PEAK HO	UR
2-L	ANE HIGH	WAY ANAL	YSIS				
		LOS	% PASS	ATS	LOS	% PASS	ATS
	2006	Е	91.4	46	Е	91.1	47.2
I	Existing						
		LOS	DENSITY	VOLUME	LOS	DENSITY	VOLUME
MU	LTI-LANE I	HIGHWAY A	ANALYSIS				
15	Ambient	В	14.24	783	С	21.26	1,169
201	Total	В	14.5	797	С	22.04	1,212
2020	Ambient	В	14.24	783	С	21.46	1,180
20	Total	В	14.92	820	С	22.87	1,258
29	Ambient	В	15.02	826	С	22.61	1,243
203	Total	В	17.05	938	С	25.47	1,401

Legend:

LOS = Level of Service

% PASS = Percent Time Spent Following

ATS = Average Travel Speed (mi/hr)

DENSITY = Passenger Cars/Mile/Lane

VOLUME = Hourly Passenger Cars/Hour/Lane

Appendix A

Traffic Turning Movement Counts

TRAFFIC TURNING MOVEMENT COUNT O'OMA TIAR

To Waimea

2

Queen K'aahumanu Highway/

LOCATION: Hina Lani Street

DATE: September 14, 2006

TIME: 6:30a-8:30a / 11:00a-1:00p / 3:30p-5:30p

WEATHER: Clear
RECORDER: C. Darby

QUEEN KA'AHUMANU HIGHWAY

To Kailua-Kona

£ 5

6

TIME		МС	VEMENT	NUME	BER		
PERIOD	1	2	3	4	5	6	TOTAL
6:30-6:45a	120	17	79	58	50	207	531
6:45-7:00a	130	35	68	72	90	177	572
7:00-7:15a	134	24	49	44	70	154	475
7:15-7:30a	162	42	64	53	86	147	554
7:30-7:45a	184	36	65	62	106	180	633
7:45-8:00a	171	34	88	82	72	133	580
8:00-8:15a	182	33	63	66	88	170	602
8:15-8:30a	186	35	61	74	82	156	594
6:30-8:30a	1269	256	537	511	644	1324	4541
7:30-8:30a	723	138	277	284	348	639	2409
PHF	0.98				0.86		
11:00-11:15a	149	33	47	109	116	139	593
11:15-11:30a	173	49	59	97	126	138	642
11:30-11:45a	147	43	64	89	94	105	542
11:45-12:00n	174	45	65	107	121	124	636
12:00n-12:15p	130	31	58	91	113	133	556
12:15-12:30p	109	32	58	110	104	113	526
12:30-12:45p	144	28	58	85	123	147	585
12:45-1:00p	145	15	67	96	141	136	600
11:00a-1:00p	1171	276	476	784	938	1035	4680
11:00a-12:00p	643	170	235	402	457	506	2413
3:30-3:45p	150	33	65	64	118	141	571
3:45-4:00p	193	60	90	89	138	155	725
4:00-4:15p	210	52	89	106	128	175	760
4:15-4:30p	95	31	36	42	61	79	344
4:30-4:45p	150	30	63	57	114	141	555
4:45-5:00p	137	36	63	82	119	146	583
5:00-5:15p	122	26	58	73	65	151	495
5:15-5:30p	80	14	84	50	63	110	401
3:30-5:30p	1137	282	548	563	806	1098	4434
3:30-4:30p	648	176	280	301	445	550	2400
PHF	0.79				0.82		

Traffic accident from 5:15-5:30 pm, affected movements 1 & 6 Long traffic queues on movements 1 & 4 from 3:35 to 4:10 pm

TRAFFIC TURNING MOVEMENT COUNT O'OMA TIAR

Queen Ka'ahumanu Highway/

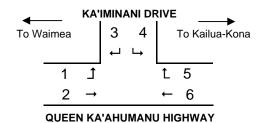
LOCATION: Ka'iminani Drive

DATE: September 12, 2006

TIME: 6:30a-8:30a / 11:00a-1:00p / 3:30p-5:30p

WEATHER: Clear

RECORDER: C. Darby, R. Miguel



TIME		MO	VEMEN	T NUMB	BER		
PERIOD	1	2	3	4	5	6	TOTAL
6:30-6:45a	7	54	92	86	29	184	452
6:45-7:00a	7	89	83	95	36	180	490
7:00-7:15a	13	92	84	114	37	181	521
7:15-7:30a	9	113	73	96	22	152	465
7:30-7:45a	6	124	46	130	26	162	494
7:45-8:00a	6	100	62	126	34	144	472
8:00-8:15a	7	129	37	89	37	135	434
8:15-8:30a	12	139	44	74	23	176	468
6:30-8:30a	67	840	521	810	244	1314	3796
6:45-7:45a	35	418	286	435	121	675	1970
PHF	0.87				0.91		
11:00-11:15a	13	141	21	42	34	141	392
11:15-11:30a	16	147	27	39	35	117	381
11:30-11:45a	13	157	13	26	22	123	354
11:45-12:00n	12	124	20	35	33	143	367
12:00n-12:15p	26	154	16	39	37	141	413
12:15-12:30p	12	130	11	17	35	126	331
12:30-12:45p	9	130	25	32	32	125	353
12:45-1:00p	29	136	17	28	41	143	394
11:00a-1:00p	130	1119	150	258	269	1059	2985
11:15a-12:15p	67	582	76	139	127	524	1515
3:30-3:45p	49	133	15	33	59	122	411
3:45-4:00p	102	171	13	21	69	128	504
4:00-4:15p	99	197	10	21	70	101	498
4:15-4:30p	64	153	19	23	73	115	447
4:30-4:45p	48	155	14	24	69	133	443
4:45-5:00p	44	115	13	25	80	134	411
5:00-5:15p	52	147	13	17	72	122	423
5:15-5:30p	51	117	12	33	92	134	439
3:30-5:30p	509	1188	109	197	584	989	3576
3:45-4:45p	313	676	56	89	281	477	1892
PHF	0.84				0.96		

Appendix B

Signalized Intersection
Level of Service (LOS) Calculations

1 ' '	The second secon							Contract of the last of the la			
or Company				luricdir	Inciediction/Date					3/26/2008	800
				EB/WB Street	Street		KAIMINANI	ANI			
Analysis Period/Year EX AIM #1		2006		NB/SB Street	Street	19	QUEEN KAAH	KAAH			
(T)	:30-7:30 AM	7									
Intersection Data											
Area type Other Ar	Analysis period	.25	h	Sign	Signal type	Actuated-Field	d-Field	% Bac	Back of queue	e 95	
	EB			WB			8			æ	
1	E 5	RI	נו	Ξ	E	בו	₽	₩	5	Ŧ	₽
Volume (veh/h)			435		285		675	120	35	420	-
RTOR volume (veh/h)					30			20		1	0
Peak-hour factor			.92		.92		.92	76.	77.	27.	
Heavy vehicles (%)			2		7		2	~1	7	7	l
Start-up lost time, I ₁ (s)			2		2		2	71 0	7 (-1 0	
Extension of effective green, e (s)		_	7		7 6		7 6	1 "	7 "	1 "	
Arrival type, A1	-	_	2		2				,		
Approach pedestrian volume (p/h)			-	9			0			0	
Approach bicycle volume (bic/n)			1		;	1	,	2	2	,	2
Signal Phasing Plan											
d.	Peds										
Phase	1 Phase 2	-	Phase 3	Phase	4	Phase 5	Phase	9	Phase 7	Ph	Phase 8
WB										-	1
NB R			TR		+			1			
SB	LT		LT		-						
Green (s) 20	4		35		-			1			
Vellow + All red (s) 5.1	4		5.8	8 6			Critical	Critical v/r Ratio		787	
Cycle (s) (3.9	LOSt time per	ne her ch	rycie (s)				1000				
Intersection Performance	85			WB			88			SB	
Lane group configuration		_			~		۲	~	IJ	Ţ	
No. of lanes			-		-		-	-	-	-	
Flow rate (veh/h)			473		277		734	20	38	457	
Capacity (veh/h)			479		429		882	1303	301	1084	
Adjusted saturation flow (veh/h)			1770		1583		1863	1583	0/1/2	1863	
v/c ratio			786		.647		.832	.083	.126	.421	
q/C ratio			.271		.271		474	.823	909.	.582	-
Average back of queue (veh)			14.1		5.7		15.6	٠.	4.	5.7	
Uniform delay (s)			26.8		23.8		16.9	7:2	8.6	8.6	
Incremental delay (s)											
Initial queue delay (s)			0		0		0	-	٥		
Delay (s)		-	26.8		23.8		6.9	7	ç.	φ,	
108		_	0	_	٥		8	A	<	∢	_
Approach delay (s)/LOS	,		25.7	1 6	ပ	14.9		В	8.6	-	4
Interconding delay (c)/100		-	173			_			മ		

⋖ Phase 6 Phase 7 Phase 8 3/26/2008 ₽ z 95 1 88 533 1084 1863 .491 .582 2 2 2 2 2 88 ≅ 490 Signal type Actuated-Field % Back of queue 1770 909. 328 3.3 0 8.2 6 z ⋖ .92 2 2 2 33 CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET KAIMINANI QUEEN KAAH .823 109 1583 5. 2. 0 7 Critical v/c Ratio ٧ ~ В z 882 1863 .758 .474 12.9 В 0 91 ₩ H H2 Phase 5 13.9 z Site Information Jurisdiction/Date EB/WB Street NB/SB Street 0 22.1 174 429 1583 .406 .271 3.2 190 30 2 2 2 2 ~ Ç C z Phase 4 88 器工 0 25.3 0 26.5 457 479 1770 .953 .271 12.8 26.5 ပ z LT 420 2 2 2 P: Peds
Phase 1 Phase 3 16.1 25 2006 ₽ Comment 2006 EXISTING 7:30-8:30 AM 田王 8 Analysis period = Agency or Company M&E PAC Analysis Period/Year EX AM #2 Heavy vehicles (%)
Start-up fost time, I₁ (s)
Extension of effective green, e (s)
Arriad type, A. Arriad type, A. Approach beckestian volume (ph)
Approach bicycle volume (pich)
Lettright parking (Y or N) 5.1 当님 Intersection Performance Capacity (veh/h) Adjusted saturation flow (veh/h) T: TH R: RT Average back of queue (veh) Approach delay (s)/LOS Intersection delay (s)/ LOS ≩ Signal Phasing Plan General Information Lane group configuration Incremental delay (s) Initial queue delay (s) Intersection Data Volume (veh/h)
RTOR volume (veh/h)
Peak-hour factor Area type Other Yellow + All red (s) Uniform delay (s) Flow rate (veh/h) Cycle (s) No. of lanes Delay (s) g/C ratio Green (s) v/c ratio L: LT 88 88 88

CHAPTER	16 - OP	- OPERATIONAL ANALYSIS - SUMMARY WORKSHEET	ONAL	ANAL	YSIS -	SUMIN	IARY	WOR	SHEE	Ь		
General Information					Site In	Site Information	ion					
Analyer					lurisdic	Iurisdiction/Date					3/26/2008	2008
or Company					EB/WB Street	Street	, ,	KAIMINANI	IANI			
Analysis Period/Year AMB AM	A		2015		NB/SB Street	Street	19	UEEN	QUEEN KAAH			
Comment 2015 AMBIENT	AM											
Intersection Data												
Area tune Other	Analysis period	period	25	-	Sign	Signal type	Actuated-Field	d-Field		% Back of queue		95
with States	Ariany Sus	E E			E S			92			#	
	17	F	R	5	₽	R	5	E	RT	-	E	RI
Volume (veh/h)	15	0	0	575	01	430	46	1307	300	140	815	3
RTOR volume (veh/h)			0			08			99			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	7	2	7	7	2	2	2	7	2	2	7	7
Start-up lost time, I ₁ (s)	2	7	2	7	2	7	7	2	7	7	7	2
Extension of effective green, e (s)	2	2	7	7	7	2	2	2	7 .	7	7 ,	7
Arrival type, AT	3	3	~	3	3	5	3	7	n	c ·	2	2
Approach pedestrian volume (p/h)	1	٥			٥							
Approach bicycle volume (btc/h)		0			0		,	0	17	7	-	1
Left/right parking (Y or N)	z	1	z	z	-	z	z	1	z	z	-	z
Signal Phasing Plan												
L LT T. TH R. RT	P: Peds	č	Ž	c	- C	-	A condi	Dhara 6	9 9	Ohaca 7	á	Dhaca R
CD T TD	r TrD	ruase z	Ĕ	ruase 3	Ligse	-	ב מקוון	Z .	2	1 1830 1	_	0 200
	4	LTR	L		8	-						
NB				L			TR					
SB	<u> </u>		_	J	LT		TR					
Green (s) 5		44		7	20		85					
Vellow + All red (s) 5.1		5.1 1	ar rurle	1 (c)	5.8		8.8	Critical	Critical v/c Ratio			
Cycle (s)	1	allin reg	and and									
mersection Penolinalice	_				97			G.	The same of the sa		9	
		9 8		,	g .	٥	-	9 €	٥	-	3 6	a
Lane group configuration	-	=		1 2		<u> </u>	4 -	,	4	4 -	2	4 -
Flow rate (veh/h)	19	0		625	=	380	20	1421	261	152	988	3
Capacity (veh/h)	49	52		831	450	671	89	1656	739	272	2124	739
Adjusted saturation flow (veh/h)	1770	1885		3437	1863	1583	1770	3547	1583	1770	3547	1583
v/c ratio	.335			.752	.024	.567	.735	.858	.353	.559	.417	.00
o/C ratio	.027	.027		.242	.242	424	.038	.467	.467	.154	.599	.467
Average back of queue (veh)	6:			16.8	4.	15.6	3	38.1	6.8	7.7	13.4	
Uniform delay (s)	86.9	86.1		63.9	52.6	39.8	9.98	43.1	30.9	71.3	19.5	25.9
Incremental delay (s)												ľ
Initial queue delay (s)	0			0	0	0	0	0	0	0	0	0
Delay (s)	86.9	∞		63.9	52.6	39.8	86.6	43.1	30.9	71.3	19.5	25.9
S01	124	124		Э			<u>-</u>		<u>ی</u> ا	ш	В	ပါ
Approach delay (s)/LOS	86.9	_	ت.	54.8	-	۵	42.5	-		27.1	-	اد
Intersection delay (s)/ LOS			41.8				_			۵		
HIC AD 2000 TM												10

Name							•						
March Marc	General Information					Site Inf	ormati	ا ا				9	000
Station Stat					- 1	Jurisdict	ion/Date	ļ				3/26/2	8
TOT AM	or Company					EB/WB S	treet	3	AIMIN,	NNI			
Sulta Total Amayes period 25 h Signal type Acturated-Field % Back of queue 95	TOT	M.		2015	ļ	NB/SB S	treet	허	JEEN	CAAH			1
Citize Data Citize Cit	2015 TOTAL	AM											\prod
Cittle C	Intersection Data						LOCAL DESIGNATION OF THE PERSON OF THE PERSO						
Interest Fig. Fig	1	Analysis	period	.25	ء ا	Signa	l type A	ctuated	-Field	% Bac	k of queu	- 1	
Interpretation Inte	1		EB			WB			8		-	88	
45		ה	£	FE	5	E	R	-	王	ES.	5	E	₩.
Signature (pth) Signature	Volume (veh/h)	45	∞	0	280	15	430	\dashv	1307	300	140	835	m (
Signature (pulh) Signature (RTOR volume (veh/h)			0			08			8	1	5	0 8
2 2 2 2 2 2 2 2 2 2	Peak-hour factor	.92	.92	55	.92	.92	.92	.92	22	26.	27,	26:	77.
F. Peds N. I. N. N. N. I. N. N. I. N. N. I. N. I. N. I. N. II. F. Peds N. I. T.R. R. R. R. I. I. I. S. I. I. S. I. I. S. I. I. I. S. I. I. I. I. S. I. I. I. I. I. S. I.	Heavy vehicles (%)	2	2	7	2	7	7	2	7	~	-10	7 0	7 0
Product Product N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N <	Start-up lost time, I ₁ (s)	2	7	7	2	7	7	7	7	7 0	1 0	4 0	4 6
S S S S S S S S S S	Extension of effective green, e (s		61	7	2	7	7	2	7	-1 (-1 0	7 0	٦ ,
Production	Arrival type, AT		3	3	3	3	6	~	m	~	5	2 0	2
N	Approach pedestrian volume (p.	Œ	0			٥						, -	
N	Approach bicycle volume (bic/h	-	0			0				1	7	-	2
Preses P	Left/right parking (Y or N)	z	-	z	z	-	z	z	-	z	Z	-	z
Prince	Signal Phasing Plan												
Phiase 1 Phiase 2 Phiase 3 Phiase 5 Phiase 6 Phiase 7 Phiase 6 Phiase 7 Phiase 7 Phiase 1 LTR R R TR TR TR TR TR	I IT THE REST	P. Peds											1
Intervent Inte		hase 1	Phase 2		ase 3	Phase 4	+	hase 5	Phase	9	Phase 7	Ĕ.	Se B
Note		LTR		_	~		+			+		1	
Mitrod (s) S.1 Lost time per cycle (s) S.8 Critical V/c Ratio T.	WB		LTR	-	~	4		G G		T		1	
State Stat	NB				7		-	¥		+			
Continue	SB			_	L		1	Y.		-		1	
Age of particle (s) 5.1 4 5.8 Critical v/c Ratio 7/2 ction Performance KB NB NB SB SB p configuration L TR L T R L T R use (verh/n) 49 9 630 16 380 50 142 26 1 2 (verh/n) 85 89 809 438 661 104 1612 720 274 2010 (verh/n) 85 89 809 438 661 104 1612 720 274 2010 (verh/n) 85 89 809 438 661 104 1612 720 274 2010 vertical properties 85 89 809 438 661 104 1612 720 274 2010 vertical properties 85 89 809 438 661 104 1612 720	Green (s)	6	44	-	=	-	-	\$2		+		_	
tetion Performance State Performance Company Co	All red (s)	5.1	-2	-	_3	4	-	2.8	Critical	/c Ratio		.72	
TR TR TR T TR T T T T	Cycle (s)		LOSt tittle	net cycle	6			-					
Feb	Intersection Performan	eo.										1	
Properting configuration L TR L T R L T T L T R L T T T T T T T T T			EB			WB			9			28	1
(verhit) 49 9 630 16 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 <t< td=""><td>Lane group configuration</td><td>긔</td><td>TR</td><td></td><td>-1</td><td>L</td><td>≃ .</td><td>ارـ</td><td>-</td><td>≃ -</td><td><u> </u></td><td>- (</td><td>∠ -</td></t<>	Lane group configuration	긔	TR		-1	L	≃ .	ارـ	-	≃ -	<u> </u>	- (∠ -
(venth) 49 9 630 16 380 30 142 201 132 300 (venth) 85 89 438 661 104 1662 20 274 2010 saturation flow (venth) 574 098 78 037 575 48 881 362 555 451 nock of queue (vent) 28 5 78 037 575 48 881 362 555 451 nock of queue (vent) 28 .5 177 .7 16.2 2.8 40.4 9.3 7.9 15.3 nock of queue (vent) 87.1 85.1 67 55.2 41.7 85.2 46.4 33.3 73 23.6 nock of queue (vent) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <	No. of lanes	-	-		2	- :	- :	- 3	7	- 5	- 5	7 000	
(verbh) 85 89 438 661 104 10.1 720 274 200 saturation flow (verbh) 770 1848 347 1863 1770 3547 1873 1770 3547 1873 1770 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547 3547	Flow rate (veh/h)	49	6		630	9	380	20	1471	107	777	2010	002
saturation flow (verbr) 1770 1848 3437 1865 1583 1770 3547 1585 1770 3547 1585 1574 3547 1865 1575 48 181 362 555 457 181 357 418 037 575 48 181 362 555 457 155 557 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 181 357 1	Capacity (veh/h)	85	-		809	438	199	104	7101	07/	17.70	2547	1503
STA 1098 778 1037 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 215 21	Adjusted saturation flow (veh/f		-		3437	1863	1583	2/2	324/	283	277	147	200
ack of queue (veh) 2.8	v/c ratio	.574			.78	.037	575	.48	88.	705.	CC.	104.	35
nack of quasic (veit) 2.8 .5 17.7 .7 16.2 2.8 40.4 9.3 7.9 15.3 letay (s) 87.1 85.1 67 55.2 41.7 85.2 46.4 33.3 73 23.6 nue delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 nue delay (s) 87.1 85.1 67 55.2 41.7 85.2 46.4 33.3 73 23.6 relay (s)/LOS 86.8 F F F B B D C B C B C B C B C B C B C C B C C C C C C C C C C C C C C C C C C C C C C C C C C	o/C ratio	.048			.235	.235	.418	050.	.455	.455	3	790.	£.
87.1 85.1 67 55.2 41.7 85.2 46.4 33.3 73 23.6	Average back of queue (veh)	2.8			17.7	7.	16.2	2.8	40.4	9.3	7.9	15.3	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Uniform delay (s)	87.1	 		29	55.2	41.7	85.2	46.4	33.3	23	23.6	27.9
0 0 0 0 0 0 0 0 0 0	Incremental delay (s)		\vdash								1	1	-
S71 S51 G7 S52 H17 S52 H6.4 33.3 73 23.6	Initial mone delay (s)	0	0		0	0	0	0	0	0	0	0	0
F F E E B D F D C E C 86.8 I F 57.4 I E 45.6 I D 30.7 I 45.5 I F 57.4 I E 45.6 I D D	Delay (s)	87.1	+		19	55.2	41.7	85.2	46.4	33.3	73	23.6	27.9
86.8 F 57.4 E 45.6 D 30.7	100	1.	ш		ш	ш	Ω	т.	Ω	ပ	ш		
45.7	SO II/O) velob docored	98	/ 8	Ľ.			ъ	45.6		Ω	30.7	,	ပ
	Appludent ucialy (3) 200					-	1999				¢		

Intersection delay (s)/ LOS
HICAP 2000 TM
©Catalina Engineering, Inc.

VWV					Site	Site Information	<u>.</u>					
					Luciani	And a state of the state of	-				4/13/2008	800
					JUNISCICTION/L	tion/Date Street	,	KAIMINANI	ANI			
Agency or Company Analysis Period/Year AMB AM	1 AM 2		2020		NB/SB Street	Street	19	QUEEN KAAH	KAAH			
\ Z	וי	W/3 DOI	BLE	DOUBLE TURNS	- 1							
Intersection Data												
Area type Other	Analysis	Analysis period	.25	=	Sign	Signal type 1	Actuated-Field	J-Field	% Bac	% Back of queue	e 95	
1		EB			WB			8			83	
	ב	E	R	ב	≢	RI	5	Ξ	E	5	±	2
Volume (veh/h)	18	0	0	577	15	435	20	1324	305	140	820	3
RTOR volume (veh/h)			0			98			99			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	7	2	۲2	2	2	2	2	2	7	2	2	7
Start-up lost time, I ₁ (s)	7	2	2	2	7	7	2	2	7	2	7	7
Extension of effective green, e (s)	(s) 2	2	7	2	7	7	2	7	7	2	2	7
Arrival lype, AT	m	3	3	٣	3	3	3	3	6	3	3	2
Approach pedestrian volume (p/h)	(h/d	0			0			0				
Approach bicycle volume (bic/h)	Œ	0			0			0				
Left/right parking (Y or N)	z	-	z	z	-	z	z	-	z	z	-	z
LI RIM RR	P: Peds		1 -					i	-	1	É	0
	Phase 1	Phase 2	-	Phase 3	Phase 4	4	Phase 5	Phase	_	Phase /	H.	Phase 8
EB	LTR	-	+	۱ سے	ſ	+			+			
WB		LIK	1	¥ ,	2	+	9		T		+	
NB			4	7		-	¥		1		-	
SB			1	2	5	-	XX		\dagger			
Green (s)	10	44	-	7	S	+	88		1		_	
All red (s)	5.1	5.1	-		4	-	2.8	- California C	oition to Datio		704	
Cycle (s) 1/2		Lost time per cycle (s)	per cycle	(5)				Cinca	Ne vano			
Intersection Performance	nce											
		æ			WB			B			88	
Lane group configuration	-1	TR		L	F	~	L	Ŀ	۷.	7		~
No. of lanes		-		2	-	-	-	2	7	2	2	- -
Flow rate (veh/h)	20	0		627	91	386	22	1439	266	152	168	2
Capacity (veh/h)	101	108		864	468	562	71	1783	1409	255	1966	5
Adjusted saturation flow (veh/h)	Jh) 1770	1885		3437	1863	1583	1770	3547	2803	3437	3547	1583
v/c ratio	.193	0		.726	.035	.687	.768	807	.189	.596	.453	.004
o/C ratio	750.	7 .057		251	.251	355	20.	.503	.503	.074	.554	.503
Average back of puene (veh)	-			15.9	9.	17.5	3.2	34,3	4.2	4.1	14.4	-:
Uniform delay (s)	78.7	77.8		99	49.5	48.2	83.2	36.4	23.9	78.5	23.2	21.7
Incremental delay (s)		┼										
Initial migns delay (s)	0			0	0	0	0	0	0	0	0	0
Delay (s)	78.7	77.8		09	49.5	48.2	83.2	36.4	23.9	78.5	23.2	21.7
(5) (50)	田田	<u>m</u>		Œ	۵	۵	ഥ	Ω	ပ	ш	၁	ပ
Annroach delay (s)/I OS	78.7	1 1	T.	55.4	,	ш	35.9	_	D	31.2	_	ပ
				,		1						-

24.3 C 1 of 1 .004 .1 992 4/13/2008 92 0 Phase 8 0 O 7 z 95 0 27.5 1890 .533 18.1 27.5 3547 989 910 ပ æ ± Phase 7 Signal type Actuated-Field % Back of queue 34.6 3437 .545 .082 80.2 4.2 2 154 283 142 z .92 Ω CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET KAIMINANI QUEEN KAAH 0 26.8 1355 2803 .484 4.6 305 Critical v/c Ratio .197 Phase 6 1439 266 Ω 92 9 71 71 z 50.5 84.8 40.9 D F D .484 3547 3547 .839 37.4 NB TH 1324 ۲ 0 92 40.1 Phase 5 1770 .621 .049 3.1 54 0 88 50 .92 2 2 2 Z **张 张 黎** 5.8 Site Information Jurisdiction/Date EB/WB Street 558 1583 18.3 386 .692 .352 0 ш z 435 80 .92 NB/SB Street ₽ 10.9 Phase 4 1.5 .084 64.8 53.4 5 38 1863 Q 0 59.3 景王 35 92 64.8 831 3437 .798 .242 18.3 [1] 610 .92 Z Phase 3 \Box Comment 2020 TOTAL AM W/3 DOUBLE TURNS 44 9
5.1 1
Lost time per cycle (s) ~ ~ 45.2 .25 3 2 2 2 8 Œ, ₽ 0 0 z Phase 2 1 1 132 25 146 152 1770 1848 .902 .164 77.7 77.7 TR 1.2 0 ш .92 Analysis period 23 田王 m 0 P: Peds
Phase 1
LTR 0 82.8 8.2 82.8 82 (T. 121 2 2 2 2 z = TOT AM 2 1.5 Approach pedestrian volume (p/h) Intersection Performance Extension of effective green, e (s) Adjusted saturation flow (veh/h) Approach bicycle volume (bic/h) L. LT T. TH R: RT Average back of queue (veh) Signal Phasing Plan Intersection delay (s)/ LOS X Left/right parking (Y or N) 182 General Information Peak-hour factor
Heavy vehicles (%)
Start-up lost time, 1, (s) Lane group configuration Approach delay (s)/LOS Volume (veh/h) RTOR volume (veh/h) Intersection Data Initial queue detay (s) Incremental delay (s) Agency or Company Analysis Period/Year Area type Other Yellow + All red (s) Uniform delay (s) Flow rate (veh/h) Capacity (veh/h) Arrival type, AT No. of lanes Green (s) Cycle (s) g/C ratio Delay (s) v/c ratio Analyst S NB WB

All State All						Cito In	hormati	5					
Company AMB AM	General Information					Site in	orman	5				0/61/1	900
Company Comp	·				1	Jurisdic	tion/Date					4/13/2	nns
Chical Pairs Chical Mark Chica Mark Chical Mark Chica Mark Chical Mark Chica Mark Chica Mark Chica Mark Chica Mark Chica	Agency or Company				1	EB/WB	Street	3	AIMIN	ANI			
Collect Mary Supral type Actualized-Field % Back of quare 95 Supral type Actualized-Field % Back of quare 96 Supral type	AMB	M 2 W/3 DC	UBLE	2029 I'URN	S	NB/SB	Street	레	CEEN	KAAH			
Cortice	Intersection Data												
Fig. With RT LT TH RT TH TH RT TH TH T	Area type Other	Analysis	period	.25	٩	Sign	il type ∠	ctuatec	-Field	% Bat	ck of queu	- II	
International Plane			89			WB			NB NB			SS	
Signature Sign		בו	Ĕ	RI	5	∓	R	1		R	5	王	2
Signature Sign	Volume (veh/h)	20	0	0	209	15	450	一	1390	320	120	855	6
Signature Sign	RTOR volume (veh/h)			0			98			9		1	0
Fig.	Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	25.	.92	.92	25.
2 2 2 2 2 2 2 2 2 2	Heavy vehicles (%)	2	2	C1	2	71	7	7	7	7	2	7	7
1	Start-up lost time, I ₁ (s)	61	7	7	CI	2	61	71	2	2	2	7	7
3 3 3 3 3 3 3 3 3 3	Extension of effective green, e (s)	2	7	2	2	7	2	2	7	7	2	7	7
N	Arrival type, AT	3	6	м	3	3	т	3	3	3	3	3	3
N	Approach pedestrian volume (p/h)		0			0			0			۰	
N	Approach bicycle volume (bic/h)		0			0	Ì		0			0	
F. TH R. RT P. Peds Phase 3 Phase 4 Phase 5 Phase 6 Phase 7 Phase 1 Phase 1 Phase 1 Phase 1 Phase 1 LTR R R R R R R R R R	Left/right parking (Y or N)	z	-	z	z	,	z	z	-	z	z	_	z
First Room Fir	al Phasing F	d											
Place Plac	7. TH K. K.	Z Legs		-		í	-	7	D. Land	-	Ohoro 7	90	8 036
Image Imag		- es	Luase 7	Ē	2 2 2 2 2 2	SPIL	+	r acpir		0	1 1000		
Hitred (s) 5.1 1.2 LT TR TR 7.8 S.8 S.1.4 S.1.4 S.1.			LTR		2	~							
S	NB NB				L			TR					
Hut red (s)	SB			L		17	-	T.R					
Hired (s) 5.1 1.1 4 5.8 Critical v/c Ratio 736 ction Performance EB WB RB NB SB sp configuration L TR L T R L T web/h) 2 0 6 16 40.2 54 1511 283 158 (weh/h) 1770 85 34.7 86.3 158.3 1770 354.7 280 26.1 subminion (weh/h) 1770 85 34.7 86.3 158.3 1770 354.7 280.3 357.7 subminion (weh/h) 1770 88.7 87.0 18.6 7 47.3 83.1 18.4 43.3 354.7 28.3 18.4 45.3 web (squeue (well) 1.2 2.0 18.6 7 18.7 2.9 38.7 4.7 4.3 15.2 sack (squeue (well) 1.2 2.0 18.6 7 18.7 2.9 38.7 <td></td> <td>4</td> <td>44</td> <td></td> <td>12</td> <td>~</td> <td></td> <td>95</td> <td></td> <td></td> <td></td> <td></td> <td></td>		4	44		12	~		95					
tion Performance EB	All rad (c)	-	- 4	1	1	4	-	×					
tion Performance EB NB	185	١.	Lost time	er cycle	(S)	10.	6		Critical 1	//c Ratio		.736	
TR TR TR TR TR TR TR TR	Intersection Performance	a)											
L TR L T R L T R L T R L T R L T R L T T R L T T T T T T T T T	The second secon	L	EB			WB.			æ			SS	
1 1 2 1 1 2 2 2 2 2	Lane group configuration	-	TR		-1	Т	~	-1	[~	٦	۲	~
(veh/h) 22 0 660 16 402 54 1511 283 163 929 veh/h) 48 51 817 443 600 115 1821 1439 390 2051 saturation flow (veh/h) 1770 1885 3437 1863 1583 1770 5547 2803 3437 3547 ack of queue (veh/h) 1770 1885 347 1863 1770 5547 2803 347 3547 ack of queue (veh/h) 1.2 87 238 238 196 418 453 leigh (s) 0 186 7 18.7 2.9 38.7 4.7 4.3 15.2 leigh (s) 0 66.5 54.2 47.8 83.5 38.1 24.3 76.3 2.3 leigh (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <	No of lanes	-	-		7	-	-	_	7	7	7	2	-
Verify (verify) 48 51 817 443 600 115 1821 1439 390 2051 Saturation flow (verify) 1770 1885 3437 1863 1583 1770 3547 2803 3437 3547 ack of queue (verify) 1770 887 238 238 1770 3547 2803 349 3547 lelay (s) 0.27 0.27 2.38 2.38 2.9 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 <td< td=""><td>Flow rate (veh/h)</td><td>22</td><td>0</td><td></td><td>099</td><td>91</td><td>402</td><td>54</td><td>1511</td><td>283</td><td>163</td><td>929</td><td>3</td></td<>	Flow rate (veh/h)	22	0		099	91	402	54	1511	283	163	929	3
saturation flow (verhit) 1770 1885 3437 1863 1583 1770 3547 2803 3437 3547 ack of queue (verh) .455 0 .807 .037 .67 .473 .83 .106 .418 .453 ack of queue (verh) 1.2 .238 .238 .379 .065 .514 .514 .114 .578 lelay (s) 1.2 .238 .238 .379 .065 .514 .514 .114 .578 lelay (s) .2 .2 .2 .3 .4 .4 .4 .5 .5 lelay (s) .2 .2 .4 .7 .4 .4 .5 .5 .4 .7 .4 .3 .1 .5 lelay (s) .2 .2 .4 .8 .3 .2 .3 .4 .7 .3 .2 .3 .2 .3 .4 .7 .3 .1 .3 .3	Canacity (veh/h)	48	51		817	443	009	115	1821	1439	390	2051	813
ack of queue (veh) 1.2	Adjusted saturation flow (veh/h)	1770	┼		3437	1863	1583	1770	3547	2803	3437	3547	1583
ack of queue (velt) 1.2 . 238 . 238 . 379 . 065 . 514 . 514 . 1.14 . 578 letay (s)	v/c ratio	.455	-		708.	.037	19.	.473	.83	.196	.418	.453	.004
ack of queue (vel1) 1.2 1.8 7 18.7 2.9 38.7 4.7 4.3 15.2 letay (s) 88.7 87.6 66.5 54.2 47.8 83.5 38.1 24.3 76.3 22.3 nat delay (s) 0 66.5 54.2 47.8 83.5 38.1 24.3 76.3 22.3 nue delay (s) 0 0 0 0 0 0 0 0 cleday (s) 88.7 87.6 66.5 54.2 47.8 83.5 38.1 24.3 76.3 22.3 cleday (s)/LOS 88.7 F F 59.4 F B 37.4 P B 30.3 I	a/C ratio	.027	.027		.238	.238	.379	990.	514	.514	.114	.578	.514
lady (s) 88.7 87.6 66.5 54.2 47.8 83.5 38.1 24.3 76.3 22.3 all delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Average hack of gueue (veh)	1.2			18.6	7.	18.7	2.9	38.7	4.7	4.3	15.2	-:
aut cleary (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Uniform delay (s)	88.7	1		66.5	54.2	47.8	83.5	38.1	24.3	76.3	22.3	21.9
up delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <t< td=""><td>Incremental delay (s)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Incremental delay (s)												
S8.7 S7.6 G6.5 S4.2 47.8 S3.5 S8.1 24.3 76.3 22.3 S4.1 S4.2 F. B. B. D. B.	Initial mene delay (s)	0			0	0	0	0	0	0	0	0	0
F F F E D D F D C E C delay (s)/LOS 88.7 I F 59.4 I E 37.4 I D 30.3 I nn delay (s)/LOS 41.6 I D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D D <td>Delay (S)</td> <td>88.7</td> <td>-</td> <td></td> <td>66.5</td> <td>1</td> <td>47.8</td> <td>83.5</td> <td>38.1</td> <td>24.3</td> <td>76.3</td> <td>22.3</td> <td>21.9</td>	Delay (S)	88.7	-		66.5	1	47.8	83.5	38.1	24.3	76.3	22.3	21.9
oach delay (s)/LOS 88.7 / F 59.4 / E 37.4 / D 30.3 / A 1.6 / LOS / D D	105	н	н		ш	Ω	Ω	Ľ	Ω	၁	ш		ပ
41.6	Approach delay (s)/I OS	88.	7 1	Œ	59.4	-	ш	37.4	-	Ω	30.3	-	ပ
	- /- Commander	-		-	-	A							

Assisted				-	hrisdic	hirisdiction/Date					4/13/2008	800
Analyst Company					FB/WB Street	Street	1	KAIMINANI	ANI			
Agency of Company Applicit Dariod/Vear TOT AM 2	2		2029		NB/SB Street	Street	10	QUEEN KAAH	KAAH			
TOTAL	4 W/3	AM W/3 DOUBLE TURN L	ETUR	IN LANE	日日		1					
Intersection Data												
Area Ivne Other	Analysis period	period	.25	-	Sign	Signal type	Actuated-Field	d-Field	% Ba	% Back of queue	le 95	
		E			WB			99			88	
	ב	E	B	5	±	₽	5	E	R	בו	F	₽
Volume (veh/h)	285	55	0	655	65	450	20	1390	320	150	1075	
RTOR volume (veh/h)			0			80			09			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	7	2	7	2	7	2	7	7	2	2	7	C1
Start-up lost time, I ₁ (s)	2	2	2	2	۲,	7	7	7	2	2	7	7
Extension of effective green, e (s)	7	2	2	2	7	C1	2	2	7	7	7	7
Arrival type, AT	3	3	3	3	3	٣	3	3	m	3	3	3
Approach pedestrian volume (p/h)		0			0			0			0	
Approach bicycle volume (bic/h)		0			0			0			0	
Left/right parking (Y or N)	z	_	z	z	-	z	z	_	z	z	-	z
Signal Phasing Plan												
L. LT T. TH R: RT P.	: Peds		ŀ		i	-		d		Dhace 7	á	Ohoro B
Phase 1	-	Mase 2	2	rnase 3	rnase 4	+	Lilase 3	O DESCRIPTION OF THE PROPERTY	0	1 11036 7		2
MB T		ř		R	~							
	H			1			T.					
SB				1	LT		T					
Green (s) 30		10		6	5		95					
Yellow + All red (s) 5.1		5.1			4		5.8				- 0	
170		Lost time per	er cycle (s)	(s)	10.9	6	***************************************	Critical	Critical v/c Ratio		.748	
Intersection Performance												
		89			WB			2			8	
Lane group configuration	٦.	TR		Г	⊢	~		₽	~	٦	ы	~
No. of lanes	-	-		2	-	-	-	2	7	2	7	-
Flow rate (veh/ħ)	310	09		712	17	402	72	1511	283	163	1168	~
Capacity (veh/h)	312	109		909	0=	280	92	1982	1566	303	2170	885
Adjusted saturation flow (veh/h)	1770	1848		3437	1863	1583	_	3547	2803	3437	3547	1583
v/c ratio	.992	.55		1.174	.645	1.435	.58	.762	∞.	.538	539	8
a/C ratio	176	050.		.176	.059	.177	.053	.559	.559	880.	.612	.559
Average back of guene (veh)	18.9	3.1		26.6	3.7	35.6	2.8	31.8	3.9	4.2	82	-:
Hoiform delay (S)	6.69	Ļ.		70	78.3	70	78.7	28.8	18.4	74.2	19,1	16.6
Incremental riplay (s)	_											
Initial quene delay (s)	0	0		0	0	0	0	0	0	0	0	9
Dalay (c)	6.69	7		70	78.3	70	78.7	28.8	18.4	74.2	19.1	16.6
501	ш	П		m	ш	ш	Э	၁	В	Э	В	В
Annroach delay (s)/LOS		2 /	E	70.5	-	(T)	28.7	_	ပ	25.8	-	ပ
Intersection delay (sl/ LOS			41.6				_			Ω		
וצווכן זרחווחוו חחום להלי	_					-						-

Site Information Profession/Date EBMB Sinest CALIMINANI RIT LIT RIT RIT LIT RIT	CHAPTER 16		PERAT	IONAL	ANAL	- OPERATIONAL ANALYSIS - SUMMARY WORKSHEET	SUMM	ARY V	VORK	SHEE	_		
Name	General Information					Site Inf	ormatic	F6					000
Particle	-	-				Jurisdict	ion/Date					3/26/2008	2008
State Colored Colore	or Company	AC				EB/WB	Street	3	IMIN.	ANI			
Collection Col	Analysis Period/Year EX PN Comment 2006 EXISTIN	1#1 1G 3:30-4	1:30 PM	2006		NB/SB S	Street	8	JEEN	KAAH			
Other	- 1				***************************************							-	
Other Othe	Intersection Data						-						
FEB		Analysi	s period	.25	-	Signa	I type A	ctuated	-Field	% Bac	k of que	- :	3
Interpretation Inte			83			WB			SB BB	T		SB	
Signature (principle) Sign		5	Ŧ	R	Ľ	E	RI	5	Į.	E S	5	≢ ξ	2
Signature Sign	Volume (veh/h)				90		55		475	780	313	6/3	6
State Color Colo	RTOR volume (veh/h)						15		-	99	8	8	٥
1 1 2 2 2 2 2 2 2 2	Peak-hour factor				.92		.92		26.	26.	76.	76.	
P. Peds P.	Heavy vehicles (%)				2		7		7	71	71	77 (
P: Peds ase 1	Start-up lost time, I ₁ (s)				2		7	1	2	7	7 0	-1 0	
Street volume (pth) Street volume (pth) N	Extension of effective green, e (:	(\$			2		77		7 6	1 0	7 6	7 6	
P. Peds. P. Peds. R. T.R. T.R.	Arrival type, AT		\downarrow		3		7		2	1		7	
P. Peds LAR R. LT LAS Itine per cycle (s) LOSI time per cycle (s)	Approach pedestrian volume (p.	(E)											
Phase 2 Phase 3 Phase 5 Phase 6 Phase 7 Phase 7	Approach bicycle volume (bic/h				1	١.	1	14	-	2	Z	,	Z
Name of the proof of the proo	Left/right parking (Y or N)		_		z	-	z	z	,	Z	2	-	
T. TH R. RT P. Peds Phase 2 Phase 3 Phase 4 Phase 5 Phase 6 Phase 7	Signal Phasing Plan							-					
Phrase 1 Phrase 2 Phrase 3 Phrase 4 Phrase 1 Phrase 1 Phrase 2 Phrase 3 Phrase 3 Phrase 3 Phrase 4 Phrase 3 Phrase 4 Phrase 3 Phrase 4 Phrase 3 Phrase 4 Phrase 5	T: TH R: RI	P: Peds		-		i	ŀ	2	Ohac	9	Dhaca 7	+	Phace 8
LR	Management of the Control of the Con	hase 1	Phase	+	lase 3	L III		2001				Н	
R	WB	LR								+		-	
Illined (s) 20 10 40 15.6 Critical vic Ratio Lost time per cycle (s) 15.6 Critical vic Ratio Lost time per cycle (s) 15.6 Critical vic Ratio Lost time per cycle (s) 15.6 Critical vic Ratio Lost time per cycle (s) Lost	NB	2			TR		-					-	
All red (s) 5.1 4.0 5.8 15.6 Critical viz Ratio Critical v	SB		LT		LT		+			\dagger			
All red (s) 5.1 4 5.8 15.6 Critical v/c Ratio Action Performance ction Performance fB NB T R L R L L R L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L <	Green (s)	20	10		40		-			1			
ction Performance WB NB	All red (s)	5.1	4	nor end	5.8	15	9		Critical	u/c Ratio		699.	
FB	Cycle (s)		TOST THE	o hat che	(2)								
FB	Intersection Performar	100										5	
(veh/h) L R 1 K L (veh/h) 1 417 373 878 127 508 (veh/h) 1770 1583 1863 1583 1770 (veh/h) 1770 1583 1783 1770 (veh/h) 1770 1583 1783 1770 (veh/h) 236 236 471 775 657 (veh/h) 2 9 164 2.5 89 (veh/h) 2 9 164 2.5 89 (veh/h) 2 9 164 2.5 89 (veh/h) 2 0 0 0 0 (veh/h) <			83			WB			2	6		3 5	_
(veht/h) 98 43 516 239 342 veht/h) 417 373 878 127 508 saturation flow (veht/h) 1770 1583 1770 588 197 573 ack of queue (veht) 236 .236 .471 .775 .657 leiay (s) 2 .9 9.8 1.7 5.5 leiay (s) 2 .9 9.8 1.7 5.5 leiay (s) 2 .9 9.8 1.7 5.5 leiay (s) 0 0 0 0 0 nue delay (s) 0 0 0 0 0 0 chelay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <	Lane group configuration						≃ .		- -	∠ -	- اد	- -	
(welfu) 98 43 510 20 514 515 517 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 <td>No. of lanes</td> <td>1</td> <td>-</td> <td>_</td> <td>- ;</td> <td></td> <td>- ;</td> <td></td> <td>1 2 1 2</td> <td>230</td> <td>1 572</td> <td>727</td> <td></td>	No. of lanes	1	-	_	- ;		- ;		1 2 1 2	230	1 572	727	
veh(h) 417 373 8 / 8 / 122 300 saturation flow (veh(h)) 1770 1583 1863 178 177 ack of queue (veh) 23 .117 .588 198 177 ack of queue (veh) 2 .9 .98 1.7 5.5 ald delay (s) 0 0 0 0 0 0 aue delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0 delay (s) 0 0 0 0 0 0 0	Flow rate (veh/h)			-	86		45		010	607	24.5	1105	_
ack of queue (verbh) 1770 1583 1803 1705 1770 and delay (s) 236 1.17 2.88 1.195 673 278 278 278 278 278 278 278 278 278 278	Capacity (veh/h)			4	417		373	William Common	8/8	1771	-		_
ack of queue (veh) 2.35 1.17 5.88 1.19 5.67 ack of queue (veh) 2.36 2.36 4.71 7.75 6.57 letay (s) 2.63 2.5.5 1.64 2.5 8.9 ack of queue (veh) 2.63 2.5.5 1.64 2.5 8.9 ack of queue (veh) 2.63 2.5.5 1.64 2.5 8.9 ack of queue (veh) 2.63 2.5.5 1.64 2.5 8.9 ack of queue (veh) 2.63 2.5.5 1.64 2.5 8.9 ack of queue (veh) 2.63 2.5 1.64 2.5 8.9 ack of queue (veh) 2.64 2.5 1.64 2.5 8.9 ack of queue (veh) 2.64 2.5 1.64 2.5 8.9 ack of queue (veh) 2.64 2.5 2.5 1.64 2.5 8.9 ack of queue (veh) 2.64 2.5 2.5 1.64 2.5 8.9 ack of queue (veh) 2.64 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	Adjusted saturation flow (veh/l	Œ			1770		1583		1863	1583			1
ack of queue (veh) 236 236 471 775 657 letay (s) 2 9 98 1.7 5.5 letay (s) 26.3 25.5 16.4 2.5 8.9 use delay (s) 0 0 0 0 0 0 use delay (s) C C B A A A delay (s)/LOS I 26 C 12 B A A	v/c ratio				.235		.117		288	3	5/0.		
ack of queue (veh) 2 9 9.8 1.7 5.5 lelay (s) 26.3 26.3 16.4 2.5 8.9 at delay (s) 0 0 0 0 0 attendelay (s) C C C B A A delay (s) 7 26.3 25.5 16.4 2.5 8.9 delay (s)/LOS 7 C C B A A B A C C B A B	q/C ratio				.236		.236		.471	2775	.e.	959	1
26.3 25.5 16.4 2.5 8.9 0 0 0 0 0 0 0 26.3 25.5 16.4 2.5 8.9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Average back of gueue (veh)				2		6:		8.6	1.7	5.5	1.6	1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Uniform delay (s)				26.3		25.5		16.4	2.5	8.9	9.3	_
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Incremental delay (s)								·	ŀ	-	-	1
26.3 25.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16.4 2.5 16	Initial queue delay (s)				0		0		0	0) s	1
/ C C B A /	Delay (s)				26.3	_	25.5		16.4	2.5	8.9	9.3	_
/ 26 / C 12 / B	707				C		0		m	4	4		╝.
A COLUMN TO THE PARTY OF THE PA	Anproach delay (s)/LOS		_		26	, ,	ပ	17	-	В	9.2	-	4
11.5	Intersection delay (s)/ LOS			Ξ	٠ċ			,			В		
	MT 0000 EV C 17												

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Interpretation Fig. 20 Fig. 20	inte (veh/h) Interpretation (veh/h) Interpret	RT 81	 	WB TH RT		BB			SB	- 11
Interpretation Inte	(s) green, e (s) green, e (s) ordume (p/h) mme (bic/h) ord N) Plan	RI I I I I I I I I I I I I I I I I I I		-				The same is not a local division of the local division in the loca	200	1
100 50 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515 515	(s) green, e (s) column (p/h) mne (bic/h) rr N) Plan R: RT		2 2 2		IJ	E	R	5	丰	æ
15 15 15 15 15 15 15 15	(s) green, e (s) wolume (p/h) me (bic/h) Plan R: RT		2 2 2	50		525	315	195	535	
State Stat	ve green, e (s) n volume (p/h) olume (bic/h) g Plan R: RT		2 2 2	15			99			0
1 1 1 1 1 1 1 1 1 1	1, (s) no green, e (s) n volume (p/h) olume (bic/h) g Plan R: RT		777	.92		.92	.92	.92	.92	
Proposition 1,0 2 2 2 2 2 2 2 2 2	p lost time, I, (s) on of effective green, e (s) type, AT ch pedestrian volume (ph) ph parking (Y or N) ph parking (Y or N) T: TH R: RT		2	7		2	2	2	2	
State Color of effective green, e (s) 2 2 2 2 2 2 2 2 2	ion of effective green, e (s) type, AT tch pedestrian volume (phh) tch bicycle volume (pic/h) ph parking (Y or N) al Phasing Plan T: TH R: RT		c	2		2	7	2	7	
tch pedestrian volume (p/h) cc bit bicycle volume (bic/h) data phasing N or N in phase I in phase	tch pedestrian volume (p/h) tch pedestrian volume (p/h) tch bisycle volume (pic/h) jht parking (Y or N) al Phasing Plan T: TH R: RT		7	2		2	2	2	2	
Compact Comp	tch pedestrian volume (ph/h) tch bicycle volume (bic/h) jth parking (Y or N) al Phasing Plan T: TH R: RT		3	3		3	3	3	3	
Fig. 19 Fig.	uch bicycle volume (bic/h) jht parking (Y or N) al Phasing Plan T: TH R: RT			0		0			0	
Fig. 19 Fig.	ph parking (Y or N) al Phasing Plan E. TH R: RT			0		0			0	
Tith R: RT P: Peds Phase 2 Phase 3 Phase 4 Phase 5 Phase 6 Phase 7	T: TH R: RT		z	z	z	-	z	Z	-	z
Fig. 17 P. Peds Phase 2 Phase 3 Phase 4 Phase 5 Phase 7 Phase 7 Phase 7 Phase 7 Phase 7 Phase 7 Phase 6 Phase 7 Phase 7 Phase 7 Phase 6 Phase 7 Phase 7 Phase 6 Phase 7 Phas	TH R: RT	\mathbb{H}								
Trigger Trig		\vdash	-	Phase 4	Phase 5	Phas	9	Phase 7	Pha	Se 8
TR TR TR TR TR TR TR TR			╁	1 1036 1						
R										
All red (s) 20 5 40 Fig. 17 Caton Performance EB WB WB WB WB WB WB WB WB WB			2							
All red (s) 2.0 5.1 4.0 Critical v/c Railo ction Performance EB WB R T R up configuration EB L R T R iveh(h) Chitical v(eb/h) 109 38 571 277 212 saturation flow (veh/h) 1770 1583 1863 1883 1770 back of queue (veh/h) 2.245 .096 .612 .213 .306 inal delay (s) 2.1 .7 10.1 1.5 8.3 inal delay (s) 2.2 .25 .201 824 .636 inal delay (s) 0 0 0 0 0 0 inal delay (s) 0 0 0 0 0 0 0 in delay (s)/LOS 1 23.7 C B A A		+	E							
All red (s) 5.1 4 5.8 Critical V/c Railo		-	40							
ction Performance EB WB NB Ratio p. configuration LOST time per cycle (s) 15.6 Critical v/c Ratio p. configuration L R T R test (veh/h) 109 38 571 277 212 (veh/h) 1770 1583 1863 183 1770 saturation flow (veh/h) 1770 1583 1863 183 1770 saturation flow (veh/h) 2.1 .7 10,1 1.5 2.7 saturation flow (veh/h) 2.2 2.5 .501 8.24 .656 saturation flow (veh/h) 2.3 2.3 1.44 1.5 8.3	All and (c)		0 4			-				
tip configuration FR VB NB L R T R L II I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I	70.07	l oct time ner cycle	9	15.6		Critical	v/c Ratio		9/9	
R	tersection Performance	TOT WILL be oben								
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test 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ne group configuration		1	-		Н	~	u	Ţ	
wealth) 109 38 571 277 212 wealth) 443 396 933 1304 419 saturation flow (verhit) 1770 1583 1863 1883 1770 act of queue (verh) 245 .096 .612 213 .506 act of queue (verh) 2.1 .7 10.1 1.5 .2 leiby (s) 2.1 .7 10.1 1.5 8.3 leiby (s) 0 0 0 0 0 0 use delay (s) 0 0 0 0 0 0 0 c color 0 0 0 0 0 0 0 0 0 0 c color 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0<	of lanes		-	_		-	-	_	-	
vehin) 443 396 933 1304 419 saturation flow (vehin) 1770 1583 1863 1863 1870 ack of queue (vehi) 245 .096 6.12 213 170 eleby (s) 25 .25 .501 824 .636 eleby (s) 2.1 .7 10.1 1.5 2.7 eleby (s) 23.9 23.9 14.4 1.5 8.3 ue delay (s) 0 0 0 0 0 0 c C C C B A A delay (s)/LOS 1 C 10.2 B 8.6	ow rate (veh/h)		109	38		571	277	212	582	1
ack of queue (veh) 245 206 245 207 245 208 215 213 236 216 217 218 218 219 218 219 219 210 210 210 210 210 210	pacity (veh/h)		443	39	9	933	1304	419	1142	
ack of queue (veh) 2.35 0.96 6.12 2.13 5.06 ack of queue (veh) 2.1 7.7 10.1 1.5 2.7 aldelay (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	liusted saturation flow (veh/h)		1770	158	33	1863	1583	1770	1863	1
ack of queue (veh) 2.1 7.7 10.1 1.5 2.7 and of queue (veh) 2.1 7.7 10.1 1.5 2.7 and edeay (s) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	cratio		.245	00.	9	.612	.213	.506	.509	
and of queue (veh) 2.1 7.7 10.1 1.5 2.7 lelay (s) 23.9 23 14.4 1.5 8.3 lelay (s) 0 0 0 0 0 0 0 lelay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C ratio		25	.2:	2	.50	.824	9636	.613	ļ
23.9 23 14,4 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 8.3 1.5 1.5 8.3 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	erade back of queue (veh)		2.1	7.		10.1	1.5	2.7	œ	
0 0 0 0 0 0 0 0 0 0	niform delay (s)		23.9	23		14.4	1.5	8.3	8.7	- 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	premental delay (s)									Ì
23.9 23 14.4 1.5 8.3	itial queue delav (s)		0	0		0	0	0	0	
C C B A A 1	alav (S)		23.9	2.3	~	14.4	1.5	8.3	8.7	1
1 23.7 1 C 10.2 1 B 8.	35		U	٥		В	٧	V	4	
y U I	oproach delay (s)/LOS	1	23.7) C		7 2	В	8.6	-	4
0.01	Interception delay (s)/10S	10.	2		-			В		

3/26/2008

KAIMINANI QUEEN KAAH

Analyst MY
Agercy or Company M&E PAC
Analysis Period/Year EX PM #2 2006
Comment 2006 EXISTING 4:30-5:30 PM

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

Site Information Jurisdiction/Date EB/WB Street NB/SB Street

General Information

General Information						4010		5					
						2010	Site Information	uo.				9,00	900
						Jurisdict	Jurisdiction/Date					3/26/2008	800
Annuaysı					İ	EB/WB Street	Street	'	KAIMINANI	ANI			
Agency of company AMB PM	Md			2015	l	NB/SB Street	Treet	0	UEEN	QUEEN KAAH			
Comment 2015 AMBIENT PM	NT PM												ı
Intersection Data													
						1	,		LIGIE L	6	de de	95	\ \
Area type Other	Analysis period	is peri	b d	3	-	Signa	Signal type	Actuated-Fleid	lei	% Da	pack or queue	8	
		ш	89			WB			9			25	
	ב	_	_ =	Æ	5	E	F	5	<u>ب</u>	æ	5	₽Ì	=
Volume (veh/h)	4	_	5	0	335	S	105	56	1205	755	530	1635	6
RTOR volume (veh/h)		-	<u> </u>	0			80			99			0
Peak-hour factor	.92	-	92	.92	.92	.92	.92	.92	.92	.92	.92	.92	25.
Hearn rehicles (%)	2	H	2	2	2	7	7	7	2	2	2	7	7
Chart-up fost time 1. (s)	2	-	2	2	2	2	7	2	2	2	7	7	7
	5) 2	H	2	2	7	2	2	2	2	61	7	7	7
Arrival tune AT	H	ł	~	3	3	3	3		3	3	3	3	3
Approach nedectrian violence (n/h)	1	-				0			0			0	
Approach bicucte volume (hic/h)	1					0			0			0	
Left/right parking (Y or N)	Z		, ,	z	z	-	z	z	-	z	z	-	z
Signal Phasing Plan													
L LT T: TH R: RT	P. Peds				ŀ		+		č		Chang 7	40	Dhaco Q
0.0	Phase 1	െ	Phase 2	품	Phase 3	Phase 4	-	ruase 3	Lilase o	0	1 11000 1		2
		-	LTR		~	~							
NB								ĭ		Total Vision I		_	
SB						7		TR					
Green (s)	10		25		7	25		75		1			
W red (s)	5.1	ľ	5.1			4	-	5.8		- :		- 0	
Cycle (s) 163		Los	Lost time per cycle (s)	ar cycle	(S)	Ž.	×		Critical	Critical v/c Katto		16:	
Intersection Performance	e).					!	-		9			9	
			22			MB			2		ŀ	8	ŀ
Lane group configuration	٦		TR		٦	<u>-</u>	~	اد	-	× .	اد	-	×.
No. of lanes	-		_		۲2	-	-	_	7	- 1	-	7	- •
Flow rate (veh/h)	48	~	'n		364	5	27	28	320	25	576		
Capacity (veh/h)	109	6	113		527	286	613		1632	-	358	2263	729
Adjusted saturation flow (veh/h)	н) 1770	<u> </u>	1848		3437	1863	1583	1770	3547			_	1583
v/c ratio	4.	⊢	.048		169.	610.	.044	.372	.803	1.037	-		90.
off. ratio	190'	<u> </u>	.061		.153	.153	.387	.043	.46	.46	.202	.638	.46
Average hack of citeme (veh)	2.3	+-	2		6	ci	œ.	4.	29.8	44.8	54.7	34.3	
Uniform dalay (c)	73.8	oc	72		65.3	58.6	31.1	75.9	37.7	4	65	21.4	23.8
	2	+	:										
Incremental delay (s)	C	\dagger	-		0	0	0	0	0	0	0	0	0
Initial queue uciay (5)	73	73.8	77		65.3	58.6	31.1	75.9	37.7	_	65	21.4	23.8
Delay (S)	E		1 (1)		Ξ	ш	O	Ξ	۵	۵	ш	ပ	ပ
LU3	-	73.6	-	LT.		, 6	Ξ	40.5	- 2	۵	32.1	-	ပ
Approach delay (s)/LUS			-	306							۵		
Intersection delay (s)/ LUS				20.0									101

3/26/2008

KAIMINANI QUEEN KAAH

2015

Comment 2015 TOTAL PM Agency or Company
Analysis Period/Year TOT PM

Intersection Data Area type Other

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

Site Information Jurisdiction/Date EB/WB Street NB/SB Street

General Information

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Analyst

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7 7

2 2 2 2

Volume (vet/h)
RTOR volume (vet/h)
Peak-hour factor
Haavy vethicles (%)
Sart-up lost time, I, (\$)
Extension of effective green, e (\$)
Arrival type, AT
Approach pedestrian volume (p/h)
Approach bicycle volume (b/h)
Letr/right parking (Y or N)

26.

26.

0 0 6 Z

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Phase 8

Phase 6 Phase 7

Phase 5

Phase 4

Phase 3

Phase 2 LTR

f P: Peds
Phase 1
LTR

L. LT T. TH R. RT Signal Phasing Plan

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1705 88 E

LT 530

RT 755

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95

% Back of queue

Signal type Actuated-Field

.25

Analysis period

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WB		7	LTR	~		~				+			T
NB								TR					
88				-1		Ľ		TR		1		1	
Green (s)	10	2	25	7		25		75				1	
Velton + All red (s)	5.1	5	5.1	-		4		5.8		-		100	
Cycle (s) 163		Lost	time per	Lost time per cycle (s)		5.8		-	Critical	Critical v/c Ratio		180.	
Intersection Performance	ance												
			8			WB.			물			SB	
Incitation and a second			2 2	T	7	į-	~	J	F	~		۲	R
Latte group conniguration		+	-	T	2	-	-	-	7	_	-	7	-
No. of lanes	0	. 60	. 2	T	372	13	27	28	1310	755	576	1853	3
Flow rate (ventry)		+	E		527	286	613	2/	1632	729	358	2263	729
Capacity (ventri)	$^{+}$	+-	1848	Ī	3437	1863	1583	1770	3547	1583	1770	3547	1583
Adjusted saturation flow (ventri)	Ť		134		705	046	044	.372	.803	1.037	1.608	618.	.00
v/c ralio	5 0	-1-		Ī	152	153	787	043	46	.46	.202	.638	,46
g/C ratio	O.	.001	100.			501.			0	940	643	777	-
Average back of queue (veh)		5.5	7.		9.2	.5	∞.	4.	29.8	44.8	7.	7.7	-
Uniform delay (s)		92	72.4		65.5	58.8	31.1	75.9	37.7	44	65	22.4	23.8
Incremental delay (s)		_											
Initial mene delay (s)		0	0		0	0	0	0	0	0	0		0
D-1- (c)		76	72.4		65.5	58.8	31.1	75.9	37.7	44	9	22.4	23.8
Delay (3)		╁	Э		ы	ш	ပ	Ð	Δ		ш	ပ	ပ
Approach delay (s)/i 0S		75.5	-	8	63	~	ш	40.5	-		32.5	-	اں
Intersection defay (s)/ LOS	8			39.2				_					
MT 0000 TAC													0

					Site in	Site Information	non					
						0					8006/96/8	2008
Analyst W Y					Jurisdic	Jurisdiction/Date	•	V A INTIN A MI	IMAI		1000	900
Agency or Company	6.4		0000	***************************************	EB/WB Street	Street	4 C	OI IFFN KAAH	KAAF			
Analysis Period/Year AMBIENT PM W/2LT SB	PM W	/2LT SI	3 5020		NB/3B	orreer	7	S C C C C C C C C C C C C C C C C C C C	3	1		
Intersection Data												
Area type Other	Analysis period	period	.25	ء	Sign	Signal type	Actuated-Field	d-Field		% Back of queue		95
		æ			88			88			SB	
	11	Ξ	RT	בי	E	E	5	E	R	5	E	₩.
Volume (veh/h)	54	5	0	340	S	901	27	1240	765	537	1656	3
RTOR volume (veh/h)			0			30			110			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehictes (%)	2	2	2	2	2	2	7	7	7	7	7	7
Start-up fost time, 1 ₁ (s)	7	2	2	2	2	2	7	2	2	2	2	7
Extension of effective green, e (s)	7	2	7 0	7 (7	2 5	C1 C	7 ,	7 (7 ,	7 ,	7 7
Arrival lype, Al	1	2	2	2	2	2	2	2	n	0	2	2
Approach pedestrian volume (p/n)								0				
Applicate marking (V or N)	z	,	z	z	, -	z	z	, -	z	z	_	z
Signal Phasing Plan												
L: LT T: TH R: RT	P. Peds	Ohnon 3	đ	Ohaco 2	Dhara		Dhaca 5	Phace 6	9	Phace 7	H	Phase 8
du l	2 6	1 11830 2		200	200	+	2 7501					
MATERIAL PROPERTY AND ADDRESS OF THE PARTY AND	1	LTR		2 2	2				-			
N8				L			TR		-			
SB				7	Ľ		T.					
Green (s)	13	25		7	25		06					
Yellow + All red (s) 5.		5.1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ser Cycle	1 (5	5.8	_	5.8	Critical	Critical v/c Ratio		.713	
ction Perf	1											
		FR			WB			SE SE			æ	
Tana aroun configuration	-	i i		-	[2	7	٤	~	П	Ţ	2
No. of lanes	-	_		7	-	-	-	2	2	2	2	
Flow rate (veh/h)	59	5		370	5	83	29	1348	712	584	1800	3
Capacity (veh/h)	127	133		475	257	552	89	1764	1394	627	2332	787
Adjusted saturation flow (veh/h)	1770	1848		3437	1863	1583	1770	3547	2803	3437	3547	1583
v/c ratio	.462	.041		677.	.021	.15	.429	764	.511	.932	.772	.004
g/C ratio	.072	.072		.138	.138	.349	.039	.497	.497	.182	.657	.497
Average back of queue (veh)	3.1	Е.		10.6	.2		1.6	31.8	14.6	18.2	36.7	
Uniform delay (s)	9.08	78.2		75.3	67.4	40.5	85	36.9	30.7	72.9	21.6	22.9
Incremental delay (s)	1.9	0		 	0	0	2.1	2.1	.3	20.8	7.7	0
Initial queue delay (s)	0	0		0	0	0	0	0	0	0	0	0
Delay (s)	82.5	78.2		83.4	67.4	40.5	87.1	39	3.	93.7	23.3	22.9
108	ш	ш		<u>(</u> -,	m	Ω	(E.	۵	ပ	ш.	၁	ပ
Approach delay (s)/LOS	82.2	,	۲۲.	75.5	-	ഠ	36.9	-	Ω	40.5	,	۵
						TAXABLE SALES OF TAXABLE SALES	-					

VWV					luricdio	Inriediction/Date	1				4/13/2008	8003
Analyst					FB/WB Street	Street	ı	KAIMINANI	IANI			
Agelicy of Colliparity Agelicis Derind/Near TOT PM	PM 2		2020		NB/SB Street	Street	l O	QUEEN KAAH	KAAH			
ĭ	. PM W/2	LTSB		1								
Intersection Data	***************************************	AND THE PROPERTY.										
	Amelian	Amplication moving	20	-	Cion	Sional tumo	Actuated-Field	d-Field	8	Back of gueue	95 al	5
Area type Curci	Alitalysi	n a			MR A			NB.			83	
	5	E	RI	5	E	RI	בו	Ŧ	RT	5	E	₽
Volume (veh/h)	164	45	0	355	15	120	27	1230	765	537	1790	3
RTOR volume (veh/h)			0			30		Ì	0 = 1			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	2	2	7	2	7	2	7	7	7	2	7	7
Start-up lost time, 1, (s)	2	2	2	7	2	2	2	2	2	2	7	7
Extension of effective green, e (s)		7	7	2	2	7	7	7	7	7	7	62
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	~	m
Approach pedestrian volume (p/h)	(h/h)	0			0			0			0	
Approach bicycle volume (bic/h)	1	0			0			0	1	2	- اد	=
Left/right parking (Y or N)	z	-	z	z	-	z	z	-	z	z	-	z
al Phasing r				-								
L: LT T: TH R: RT	P: Peds	Coscal	-	Dhaca 3	Dhace	4	Phase 5	Phase 6	g e	Phase 7	£	Phase 8
FB	1 2001	7 0000	+-	T E	~							
WB	ı	LTR		TR	~							
NB	R	æ			ᆜ			TR	ایہ		-	
SB	2				긔		LTR	TR	~			
Green (s)	20	2		10	6	***************************************	28	92	7		-	
Yellow + All red (s)		4		5.8	-	\dashv	4	5.	5.8		- 500	
Cycle (s) 182.6		Lost time per	per cycle (s)	(S)		0,0			V/C Kano			
Intersection Performance	ınce							9			8	
		e			SAR I			8	1	ŀ	6	-
Lane group configuration	7	¥.		اد	1	≼ .	ار.	- -	۷ د	۽ اد	- 6	4 -
No. of lanes	-	_		7	- :	- 8	- 8	7	7 512	7	7001	7
Flow rate (veh/h)	178	-	1	386	0	<u>بر</u>	67	/ 551	717	100	2400	000
Capacity (veh/h)	+	-+	1	433	163	/97	-	-+	1004	2437	25.67	1503
Adjusted saturation flow (veh/h)	-	-		3437	1863	1583		+	5007	7640	1+00	200
v/c ratio	.92	-		168.	-	200	055.	04/	100	010	000	3 3
g/C ratio	Ξ.	-		.126	.088	691.	.049	40C.	700.	007.	6/0.	20.
Average back of queue (veh)	==			12	∞.	4.7	1.6	31.1	6.6	16.6	41.3	9
Uniform delay (s)	80.5	83.8		78.6	7.97	67.3	83.9	36.1	4	69	20.8	2
incremental delay (s)	42.7	7 3.2		20.1	0	0	0	œ.	0	7.3	2.1	
Initial queue delay (s)	0	0		0	0	0	0		0	0	0	0
Delay (s)	123.2	2 87		98.7	7.97	67.3	83.9	37.9	14	76.3	22.9	3
105	12.	_		4	Œ	ıп	Œ,	Ω	В	ы	ပ	٧
Annroach delay (s)/LOS	115.4	5.4	1	91.8	~	Œ	30.4	4	၁	35.2	_	۵
Intercontion delay (s)/ 10S			42							D		
ווופן שהתוחו ההוהל לאלי							ALL PARTY OF THE P	-	-	-		

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General Information					Site In	Site Information	uo					
Analust					hrisdic	Jurisdiction/Date					3/26/2008	8007
Agency or Company					EB/WB Street	Street		KAIMINANI	ANI			
Period/Year	AMB PM 2 AMBIENT PM W/2LT SB	S T.101	2029 B		NB/SB Street	Street	q	UEEN	QUEEN KAAH			
Comment 2022 Automate	1 1 1 1 1											
Intersection Data					-							
Area type Other	Analysis period	period	.25	ے	Sign	Signal type 🕹	Actuated-Field	1-Field		% Back of queue		95
		83			WB			æ			SB	
	5	Ξ	RT	ב	E	E	ы	₽	F	-+	E	₽
Volume (veh/h)	29	'n	0	355	5	Ξ	32	1283	803	564	1740	6
RTOR volume (veh/h)			0			30			9			0
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	2	2	2	CI	7	7	7	7	7	7	7	7
Start-up lost time, 1, (s)	7	2	7	2	2	2	2	2	7	2	2	۲2
Extension of effective green, e (s)) 2	7	7	7	7	7	7	2	77	7 ,	7	7
Arrival type, AT		3	3	3	3	3	3	2	~	3	7	7
Approach pedestrian volume (p/h)	2	0			0			٥			0	
Approach bicycle volume (bic/h)	+	0		;	٠.	7	7	٠	7	Z	-	2
Left/right parking (Y or N)	Z.	~	z	z	-	z	z	/	z	z	-	z
1- 17 T- TH R- RI	P. Peds							****				
	Phase 1	Phase 2	-	Phase 3	Phase 4	H	Phase 5	Phase 6	e 6	Phase 7	돈	Phase 8
E8	LTR			~						***************************************	-	
WB		LTR		R	R	-			+		_	
NB				7		-	TR		1		1	
SB				r	L		T _K					
Green (s)	13	30	-	5	30	-	100		1			
All red (s)	5.1	5.1			4	_	5.8	in it	oited also Datio		747	
Cycle (s) 199		Lost time	Lost time per cycle (s)	(S)	5		-	CINCA	W.C. Natio			
Intersection Performance	93											
		83			WB			8			8	
Lane group configuration	J	THE		<u>ب</u>	-	≃ .	. اد	-	≥ .	7		× -
No. of lanes	-	-	_	7	- -	- 8	- ;	7	7 525	7	7 1001	
Flow rate (veh/h)	73			386	^	88	ક	5,55	6	613	1891	٠ أ
Capacity (veh/h)	116			518	281	999	44	1782	1408	779	2388	8/ 5
Adjusted saturation flow (veh/h)	-			3437	1863	1583	1770	3547	2803	3437	3547	1383
v/c ratio	.63	-		.745	610.	.156	787.	78/	csc	986.	76/:	3 3
g/C ratio	.065	٠.		151.	.151	.357	.025	.503	.503	181	673	<u> </u>
Average back of queue (veh)	4.4	.3		1.8	e.	3.5	2.4	36.6	17.1	21.8	42.7	
Uniform delay (s)	90.7	87.2		80.8	72	43.5	96.5	40.6	33.7	81.3	22.7	24.7
Incremental delay (s)	10.5	0		5.8	0	0	59.7	2.3	4.	32.5	6:	의
Initial queue delay (s)	0	0		0	0	0	0		0	0		
Delay (s)	101,2	2 87.2		9.98	72	43.5	156.2	4	34.1	113.8	7	24.7
105	1	Ŀ		í.	ш	Ω	Œ.,	Δ	ပ	ц	ပ	0
Annroach delay (s)/LOS	100.2	1 7.	Œ.	78.6	-	ш	41.6	_	D	46.4	-	
Intersection delay (s)/ LOS	-		48.2	2			/			Ω		-
MT 0000 G A CH												1 of 1

General Information Analyst WY					Commence of the late of the la		The state of the s						
						Site Information	ormati	ion					600
•	>					Jurisdict	Jurisdiction/Date	٠				4/13/2008	800
					1	FRAMR Street	Proof		KAIMINANI	ANI			
Agency or Company	TOT PM 2			2029		NB/SB Street	Street	10	QUEEN KAAH	KAAH			
· 🗐	AL PM	W/2L7	SB										
Intersection Data													
Area type Other	Ā	Analysis period	eriod	.25	ء	Signa	Signal type A	Actuated-Field	L-Field	% Bac	Back of queue	le 95	
1	F	,	EB		Mary and a second	SE SE			NB			SS	
	1	5	E	Ε	5	Ĕ	RI	ב	Ħ	E.	-	E	₽
Volume (veh/h)		275	08	0	375	20	Ξ	32	1270	803	564	2005	3
RTOR volume (veh/h)				0			30			9		-	0 8
Peak-hour factor		.92	.92	.92	.92	.92	.92	.92	26.	.92	26.	2, 6	77.
Heavy vehicles (%)		7	7	7	7	2	7	2	7	7	7 0	~ (7 0
Start-up tost time, I ₁ (s)		2	2	2	7	2	7	7	7	7 0	7 (7 (7 0
Extension of effective green, e (s)	n, e (5)	7	7	2	7	7	77	7 0	7 (7 (7 (7 6	7 6
Arrival type, AT		3	3	6	3	3	~	3	2	2	2	2	٦
Approach pedestrian volume (p/h)	ne (p/h)		0										
Approach bicycle volume (bic/h)	(bic/h)		0			٠	;	,	-	7	2	-	2
Left/right parking (Y or N)		z	-	z	z	-	z	z	-	Z	2	-	2
al Phasing Pla		O. O. O.											
	2	S	Diago 2	Oh	Dhaca 2	Dhaca 4	F	Phace 5	Phase 6	H	Phase 7	H	Phase 8
EB	L lase	-	LTR		TR	2				\vdash			
WB	J				TR	~	+					-	
NB	~					اد			I.K	-			
SB	ĸ		~			u	1	LIL	TR	 		-	
Green (s)	30		2	_	5	6	-	28	92				
Yellow + All red (s)	-	-	-	2	5.8	- -	-	4	5.8	2		1 006	
Cycle (s) 192.6	9	1	Lost time per cycle (s)	er cycle	(S)	10.8	0		Culica	Criffcal V/C Katio			
Intersection Performance	mance								-				
			æ			WB			BB			SB	
Lane group configuration		L	TR		٦	Т	~	٦	Т	2	7	H	~
No. of lanes		-	-		7	-	-	-	7	7	7	7	- -
Flow rate (veh/h)		299	87		408	22	88	35	1380	52	613	6/17	٠ ا
Capacity (veh/h)		377	154		535	48	163		1694	1860	8/9	5877	404
Adjusted saturation flow (veh/h)	(veh/h)	1770	1848		3437	1863	1583	_	3547	2803	3437	5547	5851
v/c ratio		.793	.566		.761	.45	.541	175	CIX.	C04.	5 5	5	200.
g/C ratio		.213	.083		.156	.026	.103	.047	.478	.664	/d.	54.0	100.
Average back of queue (veh)	eh)	17.1	4.9		12.1	1.3	4.9	2	36.9	11.2	19.6	00.0)
Uniform delay (s)		71.8	85		77.9	92.4	82.1	89.3	43	14.9	75.5	31.7	21
Incremental delay (s)		=	4.8		6.4	4.2	3.6	1.5	3.2	0	15.6	10.7	۰
Initial queue delay (s)		0	0		0		0			0	0 :	0 5	2 0
Delay (s)		82.9	8.68		84.3	٥	85.7	0	4	14.9	71.7	3	?! <
100	-	대	(IL		<u>.</u>	-	-	<u>.</u> .	ם י		2 63		٥
Approach delay (s)/LOS		84.4	-	-	85	-	-	30.1	-	a	27.0		۱
Intersection delay (s)/ LOS	S			51.5	10			_					

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WY WY M&EPAC AMBIENT AMBIENT ata	FIC				Site In	Site Information	ion					
Company M&E PAG eriod/Year AMB EMB 2015 AMBIENT tition Data Other Other me (veh/h) lactor	FIC					The same of the sa						
Company M&EPAC 2015 AMBIENT 2015 AMBIENT titon Data Other Other me (veh/h) factor	FIC				Jurisdic	Jurisdiction/Date					4/13/2008	8007
eriod/Year AMB AM 2015 AMBIENT titon Data Other Other me (veb/h) factor	Σ				EB/WB Street	Street		KOHANA IKI	A IKI			
tion Data Other eh/h) me (veh/h) factor			2015		NB/SB Street	Street	5	QUEEN KAAH	KAAI			
Other etht) me (vetrh) lactor												
eh/h) me (veh/h) lactor	Analysis period	eriod	.25	4	Signe	Signal type	Actuated-Field	d-Field	1	% Back of queue		95
		83			WB			BB			SB	
	נו	Ħ	R	5	E	RT	5	Ξ	RI	5	E	RI
RTOR volume (veh/h) Peak-hour factor	122	-	147	193	5	129	84	1400	190	126	1150	20
Peak-hour factor			30			30			30			2
	.92	.92	.92	.92	.92	.92	.92	26.	25.	.92	26:	.92
Heavy vehicles (%)	2	2	2	2	2	5	2	7	2	2	7	7
Start-up lost time, I ₁ (s)	2	2	7	7	2	7	7	7	7	2	2	2
Extension of effective green, e (s)	7 ,	7 7	۲ ر	7 6	7 (7 5	7 "	7 "	7 6	71 6	71 6	71 "
Annough podestrian volume (p/h)	7	10	1			1	,			,		
Approach bicycle volume (bic/h)		0			0			0			0	
Left/right parking (Y or N)	z	-	z	z	-	z	z	-	z	z	-	z
Signal Phasing Plan												
L: LT T: TH R: RT P: Peds	Spac											
Pha	1	Phase 2	Pha	Phase 3	Phase 4		Phase 5	Phase	9 e	Phase 7	+	Phase 8
E3	-		5	LTR		1	La company	_	\dagger			
	-	1		LTR		+		-			-	
	+	×		Ì		+			T			
	Name of Street	ž.		1		+					+	
(4)	-	80		30		-						
Cycle (s) 140	٦	Lost time per cycle (s)	er cycle ((S)	10			Critical	Critical v/c Ratio		.71	
Intersection Performance												
		EB			WB			BB			SB	
Lane group configuration	7	ī	~	٦.	T	R	7	Ŀ	2		⊢	2
No. of lanes	_	-	-	-	-	-	-	2	-	-	2	-
Flow rate (veh/h)	133		127	210	5	108	16	1522	174	137	1250	43
Capacity (veh/h)	301	399	339	294	388	330	190	2027	905	190	2027	905
Adjusted saturation flow (veh/h)	1405	1863	1583	1370	1810	1538	1770	3547	1583	1770	3547	1583
v/c ratio	.441	.003	.375	.715	.014	.326	.482	.751	5. 25.	.722	.617	.048
g/C ratio	214	.214	.214	.214	.214	214	.107	.571	.571	.107	.571	.571
Average back of queue (veh)	8.4	0	4.5	9.8	.2	3,8	3.6	25.9	3.5	5.9	18.4	∞.
	47.7	43.2	47	51	43.3	46.5	58.8	22.5	14.4	60.5	19.9	13.2
Incremental delay (s)	9.	0	-:	œ	0	0	7.7	1.6	0	12.7	9.	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
	48.3	43.2	47.1	59	43.3	46.5	60.5	24.1	14.4	73.2	20.5	13.2
703	Ω	Ω	۵	m	Δ		ш	ပ	В	ш	ပ	<u>в</u>
Approach delay (s)/LOS	47.7	_	Ω	54.6	-	۵	25	-	U	25.3	-	ပ
Intersection delay (s)/ LOS			29.2				,			ပ		

Intersection delay (s)/ LOS
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,	TEIC			ļ	FRAMB Street	Street	1	KOHANA IKI	IA IKI			
Analysis Period/Year TOT AM	2		2015		NB/SB Street	Street		QUEEN KAAH	KAAF	_		
' ≃ا	4 W/2L	TNB										
يد ا												
Area tuna Other	Analysis nerind	nerind	.25	_	Sign	Signal type	Actuate	Actuated-Field		% Back of queue		95
	200	2			MA MA			1 2		-	85	
	17	= =	Æ	5	Į.	R	ם	¥	RT	LI	Ħ	R
Volume (veh/h)	122	4	150	193	5	129	122	1400	190	129	1214	20
RTOR volume (veh/h)			30			30			30			2
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	7	2	2	5	S	5	7	2	2	2	7	2
Start-up lost time, 1, (s)	2	2	2	7	7	2	2	7	7	7	7	7
Extension of effective green, e (s)	2	2	2	2	۲٦	7	7	7	2	7	7	2
Arrival type, AT	3	3	3	3	3	33	3	3	3	3		3
Approach pedestrian volume (p/h)		0			0			0			0	
Approach bicycle volume (bic/h)		0			0			0			0	
Left/right parking (Y or N)	z	-	z	z	1	z	z	-	z	z	-	z
Signal Phasing Plan												
LI TH R. R. P	P: Peds										1	
Pha	- J	Phase 2	Pha .	Phase 3	Phase 4	+	Phase 5	Phase 6	9 99	Phase 7	-	Phase 8
EB	1			X Z		+			-		1	
		-	- I	LTR		-			1			
The second secon		ĭ	1	1		+					-	
		TR	1	1		+					-	
	+	80		30		+			1		+	
All red (s)	1	٠		2	01	_		Critical	Oritical Nat Batis		713	
Cycle (s) 140	1	Lost time per cycle (s)	ser cycle	(S)			-	CIRICO	W/L Name			
Intersection Performance											8	
		83			WB			2			3	1
Lane group configuration	J	ī	2	L	۳	~	٦	Ы	~	٦		~
No. of lanes	-	-		-	-	-	2	2	-	-	2	- :
Flow rate (veh/h)	133	4	130	210	5	80-	133	1522	174	140	1320	43
Capacity (veh/h)	301		339	293	388	330		2027	905	190	2027	506
Adjusted saturation flow (veh/h)	1405	1863	1583	1366	1810	1538	3437	3547	1583	1//0	3547	1583
v/c ratio	.441	.011	.384	717.	.014	.326	.36	.751	192	.74	169.	.048
o/C ratio	.214	.214	.214	214	214	214	.107	.571	.571	.107	.571	.571
Average back of guene (veh)	4.8	-	4.6	9.8	7	3.8	2.7	25.9	3.5	6.1	20.1	∞.
Uniform delay (s)	47.7	43.3	47.1	51.1	43.3	46.5	28	22.5	14.4	9.09	20.5	13.2
incremental delay (s)	9.	0	-:	8.2	0	0	0	1.6	0	14.3	∞.	0
Initial mene delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delav (s)	48.3	43.3	47.2	59.3	43.3	46.5	28	24.1	14.4	74.9	21.3	13.2
108	۵	D	Ω	E	Ω	۵	ŒΪ	ပ	В	ш	ပ	В
Annroach delay (s)/LOS	47.7		Q	54.7	-	۵	25.7	- 1	၁	26	-	ပ
Interroction delaw (e)/ LOS			207				/			ပ		
Illelations aciay (a)r co-								***************************************		-		

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				-	all of	site information	LOI					
Analyst W Y					Jurisdic	Jurisdiction/Date	'				4/13/2008	2008
or Company	CIFIC				EB/WB Street	Street	'	KOHANA IKI	A IKI			
Analysis Period/Year AMB AM Comment 2020 AMBIENT AM	AM		2020		NB/SB Street	Street	5	QUEEN KAAH	KAAF			
Intersection Data												
Area type Other	Analysis period	period	.25	=	Sign	Signal type	Actuate	Actuated-Field		% Back of queue		95
		89			WB			g B			SB	
	ב	Ξ	Æ	נו	Ĕ	R	ב	Ξ	R	5	≓	R
Volume (veh/h)	122		147	173	5	129	84	1475	170	126	1261	20
RTOR volume (veh/h)			30			30			30			10
Peak-hour factor	.92	.92	.92	.92	.92	26.	.92	.92	.92	.92	.92	26.
Heavy vehicles (%)	7	2	2	'n	5	2	7	2	2	2	2	71
Start-up lost time, I ₁ (s)	2	2	2	2	2	2	2	2	2	2	7	7
Extension of effective green, e (s)	2	2	2	7	7	2	7	7	C1 (۲۱ (7	7
Arrival type, Al	2	6	~	2	m	2	-	2	2	2	2	٦
Approach pedestrian volume (p/h)								0				
1 eff/right parking (Y or N)	z	, -	z	z	, -	z	z	-	z	z	-	z
Signal Phasing Plan			-									
L	P: Peds											
Pha	e1	Phase 2	H	Phase 3	Phase 4	H	Phase 5	Phase 6	e 6	Phase 7		Phase 8
£8			7	LTR		+					_	
	+	0.00		ZI Y		+					+	
		¥	+	İ					\dagger			
		TK				-					-	
		80		30		+			-			
Cycle (s) 140	-	Lost time per cycle (s)	per cycle	(S)	10	-		Critical	Critical v/c Ratio		.718	
Intersection Performance			AND DESCRIPTION OF THE PERSON									
		EB			WB			NB			SB	
Lane group configuration	٦	E	~	1	£	<u>بر</u>	בו	-	A.	٦	T	~
No. of lanes	-		-	-	-	-	-	2	-	-	7	-
Flow rate (veh/h)	133	-	127	188	2	108	5	1603	152	137	1371	43
Capacity (veh/h)	301	399	339	294	388	330	190	2027	905	190	2027	505
Adjusted saturation flow (veh/h)	1405	1863	1583	1370	1810	1538	1770	3547	1583	1770	3547	1583
v/c ratio	.441	.003	375	2 6.	.014	.326	.482	.791	.168	.722	929.	.048
g/C ratio	214	214	214	214	.214	.214	.107	.571	.571	.107	.571	.571
Average back of queue (veh)	4.8	0	4.5	7.4	2.	3.8	3.6	28.8	3	5.9	21.4	∞.
Uniform delay (s)	47.7	43.2	47	50.1	43.3	46.5	58.8	23.5	14.2	60.5	21	13.2
Incremental delay (s)	9:	0	-:	4.7	0	0	1.7	2.2	0	12.7	6'	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	48.3	43.2	47.1	54.8	43.3	46.5	60.5	25.7	14.2	73.2	21.9	13.2
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ack of queue (vet) 36 .002 .355 .518 .036 .264 .349 .853 .381 .362 .265 .265 .265 .132 .53 .347 .348 .0 5.4 7.3 .6 3.8 5.5 34.7 .348 .0 5.4 7.3 .6 3.8 5.5 34.7 .348 .0 0 0 0 0 1.3 0 0 0 1.4 4 .4 .4 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2 .4 .2	1390 1863 1583	_	-				3547	1583
ack of quene (veh) 4.8 0 5.4 7.3 5.6 2.65 132 5.3 4.7 lbtay (s) 0 0 0 0 0 1.3 0 0 0 0 1.4 4.8 1.0 2.4 7.3 5.6 3.8 5.5 34.7 lbtay (s) 0 0 0 0 0 1.3 0 0 0 1.4 4.8 4.5 1.2 47.3 41.2 43.9 61.3 30.5 and edelay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	.36 .002 .355					.631	962.	.052
ack of queue (veh) 4.8 0 5.4 7.3 .6 3.8 5.5 34.7 leby (s) 6.1 40.8 45 47.3 41.2 43.9 61.3 30.5 leby (s) 0 0 0 0 1.3 0 0 1.4 4 and edelay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	.265 .265					.132	.53	.53
lelay (s) 45.1 40.8 45 47.3 41.2 43.9 61.3 30.5 and delay (s) 0 0 0 1.3 0 0 1.4 4 4 and delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.8 0 5.4	_	<u> </u>		_	6.5	30	6.
al delay (s) 0 0 0 0 1.3 0 0 1.4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	45,1 40.8 45	-				-	28.9	17.2
Lee delay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 (s)					5.4	2.5	0
45.1 40.8 45 48.6 41.2 43.9 62.7 34.5 D D D D D B E C	0 0		0				0	0
	45.1 40.8 45	-		-	!	9	31.4	17.2
	Q		D			ш	ပ	m
/ D 46.6 / D 36.8 /	delay (s)/LOS 45 / D	46.6 /	D	36.8	D	34.2	_	0
Intersection delay (s)/ LOS 37 /			1			Q		

CHAPTER 1	16 - OP	- OPERATIONAL ANALYSIS - SUMMARY WORKSHEET	ONAL	ANAL	YSIS -	SUMIN	MARY	WOR	KSHE	h		
General Information					Site In	Site Information	ion					
Analyst WY					lurisdic	Iurisdiction/Date					4/13/	4/13/2008
or Company	HIC				EB/WB Street	Street		KOHANA IKI	AA IKI			
Analysis Period/Year AMB AM	1.2		2029		NB/SB Street	Street	9	NEEN	QUEEN KAAH			
Comment 2029 AMB AM W/2LT NB	V/2LT	(B			-							
Intersection Data									- Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction of the Contraction			
Area type Other	Analysis period	period	.25	ָּ ֓֞֞֜֞֜֜֝	Sign	Signal type	Actuated-Field	d-Field	1	% Back of queue	-	95
		83			WB			BB			SS	
	5	F	E	ij	Ħ	RI	17	Ħ	R	5	Ħ	E
Volume (veh/h)	122	-	147	173	S	129	68	1535	170	126	1261	50
RTOR volume (veh/h)			30			30			30			2
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	26.	.92	.92
Heavy vehicles (%)	2	7	2	5	2	S	2	2	7	7	2	2
Start-up lost time, I ₁ (s)	2	2	2	2	2	7	7	7	7	7	2	2
Extension of effective green, e (s)	2	7	2	2	2	2	2	2	2	7	7	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian votume (p/h)		0			0			0			0	
Approach bicycle volume (bic/h)		0			0			0			0	
Left/right parking (Y or N)	z	_	z	z	-	z	z	1	z	Z	-	z
Signal Phasing Plan												
L. UT T. TH R. RT P	P: Peds											
Phase	-	Phase 2	Pha	Phase 3	Phase 4		Phase 5	Phase 6	9 e 6	Phase 7	-	Phase 8
E8	+			LTR		-			THE PERSON NAMED IN			
WB			5	LTR		1			1			
NB L		T				-			-		-	
		TR				+			1		+	
		80	8	30							+	
All red (s)		20		5 3	01	-		- Jacier C	- John Ori		738	
Cycle (s) 140	_	Lost time per cycle (s)	er cycle	(s)	7			CIRCO	Critical V/C Kallo		2	
Intersection Performance												
		æ			WB			9			æ	
Lane group configuration		[~	J	Ţ	2	T	۱	~	اد	[-	~
No. of lanes	-	-	-	-	-	-	2	2	-	-	2	-
Flow rate (veh/h)	133	-	127	188	S	108	97	1668	152	137	1371	43
Capacity (veh/h)	301	399	339	294	388	330	368	2027	905	061	2027	905
Adjusted saturation flow (veh/h)	1405	1863	1583	1370	1810	1538	3437	3547	1583	1770	3547	1583
v/c ratio	.441	.003	375	49.	.014	.326	.263	.823	.168	.722	929.	.048
g/C ratio	.214	.214	.214	.214	.214	.214	.107	.571	172.	.107	.571	172.
Average back of queue (veh)	4.8	0	4.5	7.4	2.	3.8	6:1	31.3	3	5.9	21.4	∞.
Uniform delay (s)	47.7	43.2	47	50.1	43.3	46.5	57.4	24.3	14.2	60.5	21	13.2
Incremental delay (s)	9.	0	-:	4.7	0	0	0	2.9	0	12.7	e:	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	48.3	43.2	47.3	54.8	43.3	46.5	57.4	27.2	14.2	73.2	21.9	13.2
501		Ω	۵		۵		ш	ပ	В	ш	၁	В
Approach delay (s)/LOS	47.7	_	Ω	51.6	-	۵	27.7	-	ပ	26.1	-	ပ
Intersection delay (s)/ LOS			30.2				_			ပ		
HICAP 2000 TM					1							101

1770 3547 1583 .771 .894 .054 .108 .511 .511 0 22.9 C 8.5 45.5 1.2 80.8 41 22.9 190 1811 809 4/13/2008 3 2 2 2 3 3 3 Phase 4 Phase 5 Phase 6 Phase 7 Phase 8 Ω Signal type Actuated-Field % Back of queue 95 1490 1620 Ω H SB .766 50.7 17.5 135 z 6 222 Ω CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET KOHANA IKI QUEEN KAAH Critical v/c Ratio
 1538
 3437
 3547
 1583

 .289
 .55
 .85
 .163
 72.2 34.8 17.2 RT 170
 .9
 4.8
 8.3
 44.9
 3.8

 54.1
 57.5
 71.1
 31.2
 17.2
 936 165. В 00 z Ω 2097 1641 2 1784 .591 3.6 ن – E 22 읟 38.9 = .167 Э 290 315 372 573 Z Site Information Jurisdiction/Date EB/WB Street 57.5 .242 ₽ z 108 Э 0 0 m NB/SB Street E E 438 .242 45 Е D 60.6 64.6 54.1 器王 .05 20 5 2 2 61.5 335 451 383 326 1384 1863 1583 1349 .576 62.1 Phase 3 188 9.3 = 173 z 5 5 Lost time per cycle (s) FT FT 20 .25 .242 46.4 2029 454 9 30 30 32 田 ₽ 2121 z Phase 2 81 .242 52 Comment 2029 TOTAL AM W/2 LT NB LTR .041 0 54 0 10 Analysis period 田戸 12 .92 59.3 E 59.7 Analyst WY
Agency or Company M&E PACIFIC 133 1384 242 59.1 .2 0 6.1 Phase 1 z 172 2 2 2 2 Analysis Period/Year TOT AM 2 Approach pedestrian volume (p/h)
Approach bicycle volume (bic/h)
Let/right parking (Y or N) 20 Intersection Performance Extension of effective green, e (s) Adjusted saturation flow (veh/h) L. UT T. TH R. RT Average back of queue (veh) General Information Signal Phasing Plan Intersection delay (s)/ LOS 186 Lane group configuration Approach delay (s)/LOS Start-up fost time, 1₁ (s) Intersection Data Volume (veh/h) RTOR volume (veh/h) Initial queue delay (s) Area type Other Green (s)
Yellow + All red (s)
Cycle (s) Incremental delay (s) Heavy vehicles (%) Uniform delay (s) Flow rate (veh/h) Peak-hour factor Capacity (veh/h) Arrival type, AT No. of lanes g/C ratio Delay (s) v/c ratio 8 8 B SB

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1 of 1

WY	ACIFIC A				Site In	Site Information	ion					
Company eriod/Year 2015 A titon Data	CIFIC 4					-	-	-				-
Company 2015 A 2015 A ction Data	ACIFIC A				Inisdic	Inisdiction/Date					4/13/2008	2008
2015 2015 tion Da	Ŋ				EB/WB Street	Street	, ,	KOHANA IKI	A IKI			
Intersection Data Area type Other	, PM		2015		NB/SB Street	Street	9	QUEEN KAAH	KAAI			
1												
	Analysis period	period	.25	ء	Signa	Signal type	Actuated-Field	d-Field		% Back of queue		95
		89			WB.			NB NB			83	
	5	=	22	5	Ŧ	R	ם	E	₽	5	E	RI
Volume (veh/h)	95	-	119	268	-	179	260	1175	86	99	1255	190
RTOR volume (veh/h)			25			30			25			30
Peak-hour factor	.92	.92	.92	26.	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	2	2	2	5	5	S	2	7	7	2	2	7
Start-up fost time, I ₁ (s)	2	2	2	7	2	7	2	2	2	7	2	7
Extension of effective green, e (s)	2	7	7	2	7	~1	7	2	7	7	7	2 0
Arrival type, AT	3	3	3	3	3	3	3		٠,	2	7	2
Approach pedestrian volume (p/h)		0			0			٥			٥	
Approach bicycle volume (Dic/n)	;	0	;	1		7	1	-	¥	Z	1	2
Letungnt parking († of iv)	2	,	z	Z	-	2	×.	-		:	-	
al ruasing r						MANAGEMENT AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS						
L: LI II K: KI	Phase 1	Phase 2	Pha	Phase 3	Phase 4	-	Phase 5	Phase 6	9 e 6	Phase 7	-	Phase 8
FB					LTR							
WB					LTR							
NB	L	LTR		TR		-						
SB	_		-	TR							1	
Green (s)	15	20	∞	85	20				1			
Vellow + All red (s)		5 5 5	alor orch	5	5 10	_		Critical	Critical v/c Ratio		—∞:	
cycle (s)		100	2000									
Intersection Performance	6											
		83			RB RB			8			SB	
Lane group configuration	٦.	£ .	≅.	٦ -	-	≃ -	٦.	E - C	<u>~</u> -	<u> </u>		≃ -
No. of lanes	- 6	- -	- 0	- 6	- -	- 5	100	1,077	- 6	- 62	1361	- 22
Flow rate (veh/h)	103	501	701	167	486	413	343	2097	936	143	1621	724
Capacity (veitif)	1410	1863	1583	1370	1810	1538	1770	3547	1583	1770	3547	1583
vic ratio	272	.002	.24	.791	.002	392	.825	609	.085	.503	.842	.24
a/C ratio	.269	269	.269	.269	.269	269	194	165.	.591	180.	.457	.457
Average back of queue (veh)	4.4	0	4.3	15.8	0	7.2	16.1	23.8	1.9	3.9	36.8	5.8
Uniform delay (s)	53.6	49.7	53.2	63.1	49.8	55.6	72	24.3	16.3	81.9	44.6	30.8
Incremental delay (s)	0	0	0	==	0		15.1	٠.	0	2.8	4.2	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	-+	0	0
Delay (s)	53.6	49.7	53.2	74.2	49.8	55.7	87.1	24.8	16.3	œ	48.8	30.8
\$01	۵	а	Ω	Э	۵	Э	Œ,	0	В			ال
Approach delay (s)/LOS	53.4	-	۵	67.6	-	Э	35.1	-		48.4	-	
Intersection delay (s)/ LOS			45.3				,			Ω		

					Site In	Site Information	ion					
VWV					hiricdia	Inriediction/Date					4/13/2008	2008
Analyst W. I Agency or Company M&E PACIFIC	CIFIC				EB/WB Street	Street		KOHANA IKI	A IKI			
Analysis Period/Year TOT PM 2 Comment 2015 TOTAL PM W/2LT NB	2 I W/2L'	L NB	2015		NB/SB Street	Street	9	QUEEN KAAH	KAAI			
Intersection Data												
Area type Other	Analysis period	period	.25	ء	Sign	Signal type 4	Actuate	Actuated-Field		% Back of queue		95
AND THE RESERVE OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERT		83			WB			8			83	
	1	ĭ	E	ב	Ŧ	R	5	E	₽	5	E	₽
Volume (veh/h)	95	4	4	268	15	179	360	1175	86	71	1300	190
RTOR volume (veh/h)			25			30			25	8		8
Peak-hour factor	.92	.92	25	.92	26.	.92	.92	.92	.92	26.	-92	25.
Heavy vehicles (%)	2	2	77	v,	2	5	77	(1)	C1 C	7 0	7 (71 (
	7 (71	71 0	7 (.7 (7 0	7 0	4 0	7 (7 0	7 (7 0
Arrival tune AT	7 6	1 "	1 "	4 6	1 ~	1 6	1 (0	1 m	3 6	m	3	m
Annroach nedestrian volume (n/h)		0			0			0			0	
Approach bicycle volume (bic/h)		0			0			0			0	
effright narking (Y or N)	z	-	z	Z	-	z	z		z	z	-	z
Signal Phasing Plan												
L. LT T. TH R. RT P	P: Peds		i		ā	-		2	9	Popular 7	-	Dhace 0
Phase 1	e 1	Phase 2	Phase	Se 3	Fhase 4	$^{+}$	rnase o	Lugae	0	Litase /	+	0
EB	-		-		A E							
NB I		LTR		TR								
			L	TR								
Green (s) 15		16		87	48						_	
		5		S	5						_	
Cycle (s) 182		Lost time per cycle (s)	oer cycle	(S)	2			Critical	Critical v/c Ratio		./68	
Intersection Performance												
		83			WB			爰			æ	
Lane group configuration	L	Т	R	긔	£	~	1	Т	~	7	Т	~
No. of lanes	-	_	-	-	-	-	7	2	-	-	2	-
Flow rate (veh/h)	103	4	129	291	16	162	391	1277	79	77	1413	174
Capacity (veh/h)	367	491	418	360	477	406	604	2105	940	146	1695	757
Adjusted saturation flow (veh/h)	1391	1863	1583	1366	1810	1538	3437	3547	1583	1770	3547	1583
v/c ratio	.281	600.	.3	608.	.034	.399	.648	.607	.084	.529	.833	:23
q/C ratio	264	.264	.264	.264	.264	.264	.176	.593	.593	.082	.478	.478
Average back of queue (veh)	4.4	2.	5.5	15.7	9'	7.1	10.4	23.2	1.8	4.1	36,6	5.4
Uniform delay (s)	53.3	46.4	53.7	62.7	49.8	55.1	8.69	23.5	15.8	80.1	41.2	27.9
Incremental delay (s)	0	0	0	12.9	0	2:	2.4	Z.	0	3.6	3.7	٥
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	53.3	49.4	53.7	75.6	49.8	55.3	72.2	24	15.8	83.7	44.9	27.9
105	Ω	Ω	Ω	ш	۵	Э	Э	ပ	æ	Œ,	Δ	ပ
Approach delay (s)/LOS	53.5	-	۵	67.7	-	ΞI	34.4	1	ပ	44.9	-	۵
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State Continue (Park) Co	٠.	Z		2020		NR/SR	Street	10	OUEEN	KAAI	+		
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P. Peds. P. Peds. P. LTR	Peak-hour factor	.92	.92	.92	.92	.92	.92	26.	.92	.92	.92	.92	.92
Product of the following part of the followi	Heavy vehicles (%)	2	2	2	S	S	5	7	2	7	7	7	7
Peds Sea I	- 1	2	7	2	2	2	2	7	2	7	2	7	7
N	a	2 0	7 0	~1 (7 (7 (71 (7	7 0	7 0	7 6	7 (7 6
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Phase 1 Phase 2 Phase 3 Phase 4 Phase 5 Phase 6 Phase 7	T: TH R: RT	P: Peds											
Hil red (s) L L TTR LTR LTR LTR LTR LTR LTR	Ph	ase 1	Phase 2	-	se 3	Phase 4	4	hase 5	Phas	9 e 6	Phase 7	+	Phase 8
L	£8			_		LIR	+					-	-
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Citical Professional Performance EB WB I T R L T R L T R L T R L T R L T R L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L L		0	18	4	25	45	+			-		-	
totion Performance EB NB	All red (s)	1	2	- Jones	5	^	-		Critical	oile Daio		784	
Hance FB			ost time	per cycle	(s)				CILICA	WC Kano			I
L	Intersection Performance	ø											
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1 1 1 1 1 1 1 1 1 2 1 1	Lane group configuration		<u>-</u> -	~	그	H	~	-1	۲.	2	٦	T	~
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365 482 409 354 468 398 295 2201 983 102 1410 1865 1883 1370 1810 1538 1770 3547 1583 1770 2.83 0.02 2.5 736 0.02 383 358 588 07 7765 4.2 0. 2.5 2.59 2.59 2.59 167 621 621 0.57 5.16 47.8 51.1 59.1 47.8 53.1 71.9 19.7 13.1 80.6 0	Flow rate (veh/h)	103	-	102	261	-	152	283	1293	89	72	1380	174
Jahn 1410 1863 1373 1810 1538 1770 3347 1583 1770 283 .002 .25 .736 .002 .383 .958 .588 .07 .705 9 .259 .259 .259 .259 .259 .167 .621 .621 .057 9 .4.2 0 4.1 1.2.9 0 6.4 .17 .21.2 .14 .39 9 .0 0 0 .14.8 .53.1 .19.2 .14 .39 9 .0 0 .1 .41.1 .4 .0 .19.0 9 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	Capacity (veh/h)	365	482	409	354	468	398	295	2201	983	102	1733	773
283 .002 .25 .736 .002 .383 .958 .588 .07 .705 9 .259 .259 .259 .259 .167 .621 .621 .057 9 .4.2 .0 .4.1 .12.9 .0 .6.4 .17 .12.1 .14 .39 9 .0 .0 .1 .1.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 <td< td=""><td>Adjusted saturation flow (veh/h)</td><td>1410</td><td>1863</td><td>1583</td><td>1370</td><td>1810</td><td>1538</td><td>1770</td><td>3547</td><td>1583</td><td>1770</td><td>3547</td><td>1583</td></td<>	Adjusted saturation flow (veh/h)	1410	1863	1583	1370	1810	1538	1770	3547	1583	1770	3547	1583
0.259 2.59 2.59 2.59 2.59 1.56 1.67 1.61 1.61 0.61 1.61 0.61 0.61 1.61 0.61 0.61 1.61 0.61 0.61 1.61 0.61 0.61 0.61 0.61 0.61 0.61 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 <t< td=""><td>v/c ratio</td><td>.283</td><td>.002</td><td>.25</td><td>.736</td><td>.002</td><td>.383</td><td>958</td><td>.588</td><td>.07</td><td>.705</td><td>767.</td><td>.225</td></t<>	v/c ratio	.283	.002	.25	.736	.002	.383	958	.588	.07	.705	767.	.225
0 4.2 0 4.1 12.9 0 6.4 17 21.2 1.4 3.9 51.6 47.8 51.1 59.1 47.8 53.1 71.9 19.7 13.1 80.6 0 0 0 7.8 0 1 41.1 4 0 19.9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	q/C ratio	.259	259	.259	.259	259	.259	.167	.621	.621	.057	.489	.489
51.6 47.8 51.1 59.1 47.8 53.1 71.9 19.7 13.1 80.6 0 0 0 7.8 0 1 41.1 4 0 19.9 0 0 0 0 0 0 0 0 0 19.9 51.6 47.8 51.1 66.9 47.8 53.2 113 20.1 13.1 100.5 D D E D F C B F 51.3 7 61.8 7 F C B 41.1	ack of queue	4.2	0	4.1	12.9	0	6.4	17	21.2	1.4	3.9	32.7	5.1
0 0 0 7.8 0 1 41.1 4 0 19.9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Uniform delay (s)	51.6	47.8	51.1	59.1	47.8	53.1	71.9	19.7	13.1	80.6	37.3	25.6
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Incremental delay (s)	0	0	0	7.8	0	-:	41.1	4.	0	19.9	2.7	0
51.6 47.8 51.1 66.9 47.8 53.2 113 20.1 13.1 100.5 D D D E D F C B F 51.3 I D 61.8 I E 35.8 I D 41.1	Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
D D D E D F C B F 51.3 1 D 61.8 1 E 35.8 1 D 41.1	Delay (s)	51.6	47.8	51.1	6.99	47.8	53.2	113	20.1	13.1	100.5	40	25.6
51.3 1 D 61.8 1 E 35.8 1 D	F03	۵	Ω	۵	ш	۵	Ω	[2.	၁	В	í.	Ω	ပ
A L L	Approach delay (s)/LOS	51.3		Ω	61.8	_	ш	35.8	_	Ω	41.1	_	Ω
41.0	Interception delay (c)/ 105			110				-			۵		

Analyst WY Agency or Company M&E PACIFIC Analysis Period/Year TOT PM 2 Comment 2020 TOTAL PM W 2LT NB Intersection Data Analysis period Area type Other Rea type Other					Site In	Site Information	ion					
3 5 1 4 1					hrisdic	hrisdiction/Date					4/13/2008	2008
E # 1	IFIC				EB/WB Street	Street		KOHANA IKI	A IKI			
tion Data Other	W 2L7	NB	2020		NB/SB Street	Street		QUEEN KAAH	KAAF			
Other												
AND AND ADDRESS OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERT	Analysis period	period	.25	ų	Sign	Signal type	Actuate	Actuated-Field		% Back of queue		95
		83			WB			8			SS	
L	5	≢	E	=	⊭	RT	П	₽	RI	1	Ξ	RI
Volume (veh/h)	95	4	135	240	20	170	430	1180	88	9/	1400	190
RTOR volume (veh/h)			50			20			25			50
Peak-hour factor	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92	.92
Heavy vehicles (%)	2	2	7	S	5	5	2	2	2	2	2	2
Start-up lost time, 1, (s)	7	2	2	2	7	2	2	7	51	7	2	2
Extension of effective green, e (s)	7	2	7	2	7	7	7	2	2	7	7	2
Arrival type, AT	3	3	3	3	м	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)		0			0			0			0	
Approach bicycle volume (bic/h)		0			0			0			0	
Left/right parking (Y or N)	z	,	z	z	-	z	z	/	z	z	_	z
Signal Phasing Plan												
L. LT TH R. RT P.	eds		i		ā	-				L. Control	-	O speed
Phase	+	Phase 2	2	Phase 3	Phase 4	+	rnase o	Luase	0	LIIRSE /	+	926 0
EB WB	1		ļ.		A E	-						
NB L	<u> </u>	LTR	Ţ	TR		_						
SB				TR								
Green (s) 18		16	_	110	55							
Yellow + All red (s)		S		5	5						-	
Cycle (s) 215	ت	Lost time per cycle (s)	er cycle	(s)	10		***************************************	Critical	Critical v/c Ratio		567.	
Intersection Performance												
		EB			88			88			SB	
Lane group configuration	ப	Т	~		⊢	~	긔	<u>F-</u>	ч	7	Ŧ	~
No. of lanes	-	-	-	-	_	-	2	2	-	-	2	-
Flow rate (veh/h)	103	4	92	261	22	130	467	1283	89	83	1522	152
Capacity (veh/h)	354	477	405	349	463	393	559	2161	965	148	1815	810
Adjusted saturation flow (veh/h)	1384	1863	1583	1366	1810	1538	3437	3547	1583	1770	3547	1583
v/c ratio	.292	600.	.228	747	.047	.332	.835	.594	170.	.558	.839	.188
o/C ratio	.256	.256	.256	.256	.256	,256	.163	609.	609'	.084	.512	.512
Average back of gueue (veh)	5.2	5	4.6	15.9	-	6.7	16	26.4	1.8	5.2	45.5	5.1
Uniform delay (s)	64.3	59.7	63.2	73.6	60.3	65.1	87.2	25.7	17.2	94.7	44.9	28.4
Incremental delay (5)	0	0	0	8.5	0	0	9.01	4.	0	4.6	3.7	0
Initial queue delay (s)	0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)	64.3	59.7	63.2	82.1	60.3	65.1	97.8	26.1	17.2	99.3	48.6	28.4
\$01	E	ш	Э	Œ	ы	ш	<u></u>	ပ	В	ĹĽ	Ω	ပ
Approach delay (s)/LOS	63.7	_	ш	75.6	_	ш	44.2	_	Ω	49.2	1	Ω
Intersection delay (s)/ LOS			50.3				,			Ω		

General Information	Ę					Site Information	format	lon					
Manhot	WY			-		hrisdic	hrisdiction/Date					4/13/2008	2008
or Company	M&E PACIFIC	IFIC				EB/WB Street	Street		KOHANA IKI	A IKI			
	AMB PM 2	7		2029		NB/SB Street	Street	9	UEEN	QUEEN KAAH			
Comment 2029 AM	AMBIENT PM W/2LT	M W/	LTNB										
Intersection Data													
Area lype Other	4	Analysis period	eriod	.25	=	Signi	Signal type	Actuated-Field	1-Field	%	Back of queue		95
			83			WB			2			SB	
		5	王	2	Ы	E	₽	ה	E	RI	IJ	픋	₽
Volume (veh/h)		95	-	611	240	_	170	260	1250	88	99	1335	190
RTOR volume (veh/h)				20			50			25			20
Peak-hour factor		.92	.92	.92	.92	.92	.92	26.	.92	.92	25.	26.	.92
Heavy vehicles (%)		2	2	7	S	5	5	7	7	7	7	7	را ر
Start-up lost time, I ₁ (s)		7	5	2	7	2	2	7	۲۱	2	2	7	7
Extension of effective green, e (s)	en, e (s)	7	7	7	2	7	7	7 0	7	7	7 ,	C1 (7 ,
Arrival type, AT		3	3	6	3	3	2	3	5	5	2	2	2
Approach pedestrian volume (p/h)	ume (p/h)					0			٥			9	
Approach picycle volume (pic/m)	(DICALL)	Z		7	7	-	2	2	, -	z	z	, -	2
Signal Phasing Plan	, ue	:	-		;								A CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR OF THE CONTRACTOR
i i i	TO.	Pade							The same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the sa				
	r. r.i	- 1	Phase 2	Pha	Phase 3	Phase 4	\vdash	Phase 5	Phase 6	e 6	Phase 7	표	Phase 8
EB						LTR				1		4	
WB						LTR							
æ	L		LTR		TR		-						
SB	L			-	TR							-	
Green (s)	12	-	5	∞	85	45							-
All red (s)		-	S	_ -	5	5	-		Californ	Oritinal sule Datio		776	
Cycle (s)	03		Lost time per cycle (s)	er cycle	(5)	2			CILICE	A C MIGO			
Intersection Performance	rmance												
			EB			WB			2			8	
Lane group configuration	E	7	L	×	T	F	۳.	_	-	≃ -		<u>-</u>	ط
No. of lanes		-	-	-	-	- -	- 3	7	7	-	- 6	7	- 3
Flow rate (veh/h)		103	-	75	797	-	95	587	1339	8 8	7/	1671	201
Capacity (veh/h)		389	514	437	3/8	000	472	6/5	7007	67%	130	25.47	070
Adjusted saturation flow (veh/h)	(veh/h)	1410	1863	1583	13/0	0181	1538	345/	3547	283	2//1	795	190
v/c ratio		597	700.	7/1.	60.	200.	oc.	3:	70.	1/0.		9	
g/C ratio		.276	.276	.276	.276	.276	.276	=	583	585	4/0.	175.	122.
Average back of queue (veh)	(veh)	3.9	0	2.7	11.7	0	4.9	7.3	23.8	4.	3,5	-	3.8
Uniform delay (s)		46.1	42.7	44.8	52.8	42.7	46.7	70.3	23	14.8	72.9	31.6	20.6
Incremental detay (s)		0	0	0	5.3	0	0	7.8	∞.	0	4.9	2.3	
Initial queue delay (s)		0	0	0	0	0	0	0	0	0	0	0	0
Delay (s)		46.1	42.7	44.8	58.1	42.7	46.7	78.1	23.8	14.8	77.8	33.9	20.6
707		۵	D	Ω	н	Ω	۵	ш	ပ	В	ш	ပ	O
Approach delay (s)/LOS		45.5	~	Ω	54.2	-	Ω	32.4	-	၁	34.6	-	ပ
Intersection delay (s)/ LOS	0.5			36.1				_			Ω		
						The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s		***************************************	The same of the same of the same of			-	

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995 .153 1 of 1 .524 .628 14.6 14.6 B FE 09 Phase 8 50 2 2 1674 152 0 0 4/13/2008 Ω z 95 48.5 1540 3547 1857 6.5 .90 SB ∓ 0 92 853 % Back of queue Phase 7 47.4 9.76 0 22 .673 620. 92 z 139 93 98 Ω CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET KOHANA IKI QUEEN KAAH 1318 .832 Critical v/c Ratio 1583 7. .052 2.8 89 0 .92 z 0 ပ 88 25 ∢ R Phase 6 TR 01 Signal type Actuated-Field TR .556 1342 3547 NB TH 1235 .681 20.8 15.7 16 .92 33.7 592 3437 17.4 Phase 5 738 803 .215 66.1 71.2 6.4 77.6 545 92 z 5 LTR Site Information \simeq ∞ Jurisdiction/Date 1538 EB/WB Street NB/SB Street 130 .415 .204 66.5 314 6.4 170 .92 0 Œ 20 z ш ₽ 2 2 2 6 Phase 4 1810 78.9 2 181. 660. 78.9 180 \simeq 33 30 92 0 (T) MB MB 픋 3338 -.126 79.2 11 .293 .622 261 419 LT 240 2.8 82 F .92 Z Phase 3 0 AT T 00 Lost time per cycle (s) 6.2 3 86.1 86.5 52.2 0 0 2029 1583 45.7 .25 136 .293 52.2 D 464 175 50 .92 5.9 (II) Έ z 0 Phase 2 1863 .052 86.5 Agency or Company M&E PACIFIC
Analysis Period/Year TOT PM 8PH
Comment 2029 TOTAL PM W 8 PH SIG LTR 6; 91 86 83 Ξ 15 52 0 Analysis period 25 75.9 105.3 F z 1770 19.2 079 139 6.2 103 = 95 .92 P: Peds Phase 1 Heavy vehicles (%)
Start-up tost time, I₁ (s)
Extension of effective green, e (s) 15 Intersection Performance Approach pedestrian volume (p/h) Approach bicycle volume (bic/h) Adjusted saturation flow (veh/h) L: LT T: TH R: RT WY Average back of queue (veh) General Information Left/right parking (Y or N) Signal Phasing Plan Intersection delay (s)/ LOS 191 Lane group configuration Approach delay (s)/LOS Intersection Data Initial queue delay (s) RTOR volume (veh/h) Incremental delay (s) Area type Other Yellow + All red (s) Uniform detay (s) Peak-hour factor Flow rate (veh/h) Capacity (veh/h) Arrival type, AT No. of lanes Delay (s) g/C ratio Green (s) v/c ratio Cycle (s) F0S 8 8 8 88

CHAPTER 16	ER 16 - (DPER4	TION	ALAI	NALY	SIS.	SUMA	- OPERATIONAL ANALYSIS - SUMMARY WORKSHEET	NORK	SHEE	۲		
General Information					v)	ite In	Site Information	ion					
Applicat WV						Jurisdic	Jurisdiction/Date					3/26/2008	800
Analyst Agency or Company M&E	M&E PAC					EB/WB Street	Street		HINALANI D	O IN			
	1 -1	1		2006	1	NB/SB Street	Street	d	CEEN	QUEEN KAAH			ļ
Comment 2006 EXIST	6:30-7:30AM	OAM											
Intersection Data													
Area type Other	Analy	Analysis period		.25	ų l	Signi	Signal type	Actuated-Field	1-Field	% Вас	% Back of queue		95
1		æ				WB			9			SS	
	15			- W	5	E	띪	ם	E	2	5	E	₽
Volume (veh/h)				2	225		260		685	295	120	545	
RTOR volume (veh/h)							40		ŀ	200	,	4	0
Peak-hour factor			-		6.	6.	6.	6.	2.	٤.	٤. ا	ه زد	y.
Heavy vehicles (%)			1	+	7		7		2	71	7	~1 6	
Start-up lost time, 1 ₁ (s)			_	-	2		2		7	7	7	7 0	
Extension of effective green, e (s)	e (s)		-	+	7	Ī	C1 (7 ,	7 6	7 6	7 6	
Arrival type, AT		-	\dashv	+	3		~		2	٦	2	ماد	
Approach pedestrian volume (p/h)	(h/d)		ALL PROPERTY OF THE PARTY OF TH	\dagger									
Approach bicycle volume (bic/h)	c(h)			+	2	-	7	2	-	z	z	, -	z
Left/right parking (Y or N)	-			4	z	-	z	Z			:	-	:
al Phasing P	1	١				144							
H		-	Dhoen 2	Phace 3	-	Phase 4	-	Phase 5	Phase 6	9 9	Phase 7	E	Phase 8
F8	2001		4	200	\vdash		\vdash						
WB	LR						-			1		+	
NB				T,						1		+	
SB		_	LT	디	+		+			Ť		+	
Green (s)	30		=	44	+		+		1			+	
Yellow + All red (s)	5.1	4.	4.1 5.8	5.8 mrle (s)	_	15			Critical	Critical v/c Ratio		.751	
Cycle (s)		1601	mic per	cycle (a									
Intersection Performance	ance			ŀ					!			5	
		u	ea	+	Ī	g g	,		2	4	-	8 -	L
Lane group configuration		+	+	\dagger	_ -		∠ -		- -	¥ -	- اد	- -	
No. of lanes		+	+	Ť	250		244		761	239	133	909	
Flow rate (veh/h)			+	\dagger	103		376		820	697	352	101	
Capacity (veh/h)		_	-	1	1270		1583		1863	1583	1770	1863	
Adjusted saturation flow (veh/h)	n/u)	-	+	+	471		515		929	.343	.378	55.	
v/c ratio		+	-	-	-		٤.		44.	4	809.	.591	
g/C ratto	-	+	\parallel		6.1		6.1		25	4.7	2.1	=	
Uniform delay (s)					28.5		29		26.5	18.5	12.9	12.4	
Incremental delay (s)			-		٠.		-		16.7	0	-:	9	
Initial queue delay (s)			-		0		0		0	0	1	0	
Delay (s)					29		30		43.2	18.5	_	2	
108					၁		ပ			В	m		
Approach delay (s)/LOS			,		29.5	-	ပ	37.3	-		2	-	m
Intersection delay (s)/ LOS				27.5				,			اد		-
MI occuración													0

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WY MAE PAC BNMS Street EBMMS Street EBMMS Street CULEEN KAAH D 2006 EXIST 7:30-6:30AM EBMMS Street CULEEN KAAH D 2006 EXIST 7:30-6:30AM EBMMS Street CULEEN KAAH EBMMS Street CULEEN KAAH D 2006 EXIST 7:30-6:30AM EBMMS Street CULEEN KAAH EBMMS Street CULEEN KAAH EBMMS Street CULEEN KAAH EBMMS STREET THE RT	Analysis period 25 h Signal type Actuated-Field HINALAN	k of queu	3/26/2008 Se Se Se Se Se Se Se Se Se Se Se Se Se S
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Pends	leavy vehicles (%)					7		2		2	71	7	2	
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saturation flow (verhit) 3437 1583 3547 1583 1770 ack of queue (verb) .748 .54 .92 495 .875 ack of queue (verb) .25 .501 .444 .727 .699 all delay (s) .62.3 30.8 .47 10.5 .659 aue delay (s) .7 .7 .91 .3 .10.6 aue delay (s) .65.9 .31.5 .56.1 10.8 .67.5 aue delay (s) .65.9 .31.5 .56.1 10.8 .67.5 adata (elli) (s) .65.9 .7 .0 .0 .0 .0 adata (elli) (s) .65.9 .31.5 .56.1 10.8 .67.5 .67.5 adata (elli) (s) .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6 .6	Canacity (veh/h)					859		793		1576	1151	435	2445	
active (vert)	Adinstad saturation fl	ow (weh/h)				3437		1583		3547	1583	1770	3547	
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ack of queue (veh) 16.9 15.7 41.9 13.3 1 16.9 15.7 41.9 13.3 1 16.9 15.7 41.9 13.3 1 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5 1 10.5 5	all ratio					.25		.501		444	727.	669.	689.	
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and detay (s) 3.67 9.13 1 and detay (s) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Uniform dolar (c)					603		30.8		47	10.5	56.9	15.5	
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Votume (veh/h)				209		443		1330	644	285	1296	
RTOR volume (veh/h)						80			90			0
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Green (s)	40	33		70			-				_	
All red (s)	5.1	1,1		5.8		_		_			900	
Cycle (s) 158		Lost time	Lost time per cycle (s)	(S)	15.7			Critical	Critical v/c Ratio		000.1	
Intersection Performance	ø											
		æ			WB			2			8	
Lane group configuration				اد		~		٢	~	긔	٢	
No. of lanes				C1	-	-		7	-	-	~1	
Flow rate (veh/h)				674		403		1478	6	317	1440	
Capacity (veh/h)				870		783		1571	0911	417	2404	
Adjusted saturation flow (veh/h)				3437		1583		3547	1583	1770	3547	
v/c ratio				277.		.515		95	.521	97.	.599	
o/C ratio				.253		494		.443	.733	689	.678	
Average back of guene (veh)				91		12.9		39.1	12.6	10.6	19.6	
Uniform delay (s)		_		54.8		27.1		42	9.1	48.5	13.8	
Incremental delay (s)				4,4		9.		11.5	4.	∞	4.	
Initial group delay (s)				0		0		0	0	0	0	
Delay (c)		_		59.2		27.7		53.5	9.5	56.5	14.2	
501		_	_	ш		ပ		Ω	٧	ш	В	
Annroach delay (s)/LOS	-	_		47.4	-	Q	40.7	1 1	۵	21.8	,	ပ
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Analysis Periou/rear Comment 2029	2029 TOT AM W/2	LT WB&SB										
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Volume (veh/h)		-		209		495		1480	644	340	1515	
RTOR volume (veh/h)						80			8			0
Peak-hour factor				6.	6.	6.	6.	6.	e:	6.	6.	5.
Heavy vehicles (%)				2		2		7	7	7	7	
Start-up lost time, 11 (s)	(s)			7		2		7	7	7	7	
Extension of effective green, e (s)	green, e (s)			2		2		-1	71 (7 (7 (
Arrival type, AT				3		3		2	2	2	2	
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Approach bicycle volume (bic/h)	lume (bic/h)				٥];	1	-	1.
Left/right parking (Y or N)	or N)	_		z	-	z	z	1	z	z	,	z
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EB			-			-			t		_	
WB	E E	~	1			+			\dagger			
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SB		5	1	5		+			+		1	
Green (s)	35	25	-	75				1			-	
Vellow + All red (s)	150	Lost time per cycle (s)	per cycle	8.5	15	7.1		Critical	Critical v/c Ratio		1.067	
Interception Porformance	rformance											
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Lane group conniguration	Idioli	-		2 6		-		2	-	2	2	
NO. UI Idries				674		461		1644	604	378	1683	
Flow rate (ventry)				208		687		1773	1222	1833	2461	
Capacity (ven/n)	1 1 1			3437		1583		3547	1583	3437	3547	
Adjusted saturation flow (veh/h)	How (veh/h)		-	148		129		927	495	206	.684	
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Average back of queue (ven)	ene (ven)		1			2000	L	35	6.3	23.6	13.4	L
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Phase 1 Phase 2 Phase 3 Phase 4 Phase 5 Phase 6 Phase 7 Phase 1 Phase 1 Phase 1 Phase 2 Phase 3 Phase 4 Phase 5 Phase 6 Phase 7 Phase 6 Phase 7 Phase 6 Phase 7 Phase 6 Phase 7 Phase 7 Phase 6 Phase 7 Phas	Approach bicycle volume (b	Dic/h)		,		2	-	Z	Z	-	z	z	-	z
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ack of queue (veh)	Adjusted saturation flow (v	veh/h)				2 2		367		919	522	978	765	
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49,3 / D	Annroach delay (s)/LOS			_		7.97	~	(2)	41.0	1 9	Δ	42.9	-	۵
	Intersection delay (s)/ LOS	S			49.3				_			Ω		

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WY	/				hrisdic	Inrisdiction/Date					4/17/2008	2008
Analyst Company M&	M&E PAC				EB/WB Street	Street	1	HINALANI D	NID			
٠.	TOT PM		2015		NB/SB Street	Street	0	QUEEN KAAH	KAAH			
, EI	PM W/ I	LT WB LANE	Ä									
Intersection Data	-											
Area type Other	Ana	Analysis period	.25	-	Sign	Signal type 🚣	Actuated-Field	1-Field	% Ba	% Back of queue	ar 95	<u>.</u>
		£B			WB			BB			SB	
	-	H H	RI	בו	F	₽	5	丰	₽ 5	5		₩.
Volume (veh/h)				615		385		1249	669	270	1443	
RTOR volume (veh/h)						08	-	Ī,	8	(1	9
Peak-hour factor				6.	6:	6:	e:	و: ا	ر د	رة و	J. (ان
Heavy vehicles (%)				2		7		71	7	7 6	7 0	
Start-up lost time, I ₁ (s)				C1		C1		7	.7	~ (-1 0	
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Arrival type, AT				2		2		1	2	2		
Approach pedestrian volume (p/h)	(h/h)				9			٥				
Approach bicycle volume (bic/h)	bic/h)				0			ا ا	:	;		
Lett/right parking (Y or N)	-	_		z	-	z	z	-	z	z	-	z
Signal Phasing Plan	_									-		
LU TITH R. RT	RT P: Peds	1 1							-		-	•
	Phase 1	Phase 2	듄	Phase 3	Phase 4	4	Phase 5	Phase 6	e 0	Phase /	₹	rnase 8
WR	2	~				-						
WB.	~		<u> </u>	TR								
CB		L		17								
Green (s)	65	25		92		-						
Yellow + All red (s)	5.1	4.1		5.8								
Cycle (s) 175		Lost time per cycle (s)	per cycle	(s)	6.6			Critical	Critical v/c Ratio		1.106	
Intersection Performance	nance											
		89			WB			9			8	-
Lane group configuration				긔		~		-	~	r	£-	
No. of lanes				-		-		2	-	-	C4	
Flow rate (veh/h)				683		339		1388	999	300	1603	
Capacity (veh/h)				657		860		1419	1274	295	2008	
Adjusted saturation flow (veh/h)	(h/ha/			1770		1583		3547	1583	1770	3547	
v/c ratio				1.04		.394		.978	.522	1.016	.798	
o/C ratio				.371		.543		4.	.805	.576	.566	
Average back of queue (veh)	3			43.3		10.2		42.8	12.2	61	36.1	
Uniform delay (s)				55		23.2		51.7	5.8	62.2	30	
Incremental delay (s)				45.8		-:		18.8	4.	56.4	2.4	
Initial queue delay (s)				0		0		0	0	0		
Dolay (c)				100.8		23.3		70.5	6.2	118.6	32.4	
(c) (a)				Ŀ		ပ		ш	٧	ഥ	ပ	
Approach delay (s)/LOS		-		75.1	_	ш	49.7	-	۵	46	-	
Political delay (s) 105			53.5	2			_			۵		
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33.8	S01	Ì	-	-	1 5	7.0		33.	1	ပ	24	-	0
	Approach delay (s/r.c.)				_			-			o		

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Agency or Company	TOT PM 2		2020	ĺ	NB/SB Street	Street		QUEEN KAAH	KAAH			
Comment 2020 T	2020 TOT PM W/ 2LT WB LANE	LT WB LA	NE									
Intersection Data												
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Alea type		EB EB			S S			NB NB			æ	
		LT TH	RI	Ħ	E	E.	בו	Ħ	R	בו	픋	2
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Heavy vehicles (%)				2		2		7	7	4 0	1 0	
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Extension of effective green,	green, e (s)			7 -		7 6		1 ~	1 (*	1 ("	. ~	
Arrival type, A1	1, 4, 0, 1			2		3		٥			0	
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Signal Phasing Plan	lan											
HI TH	R. RT P. Peds	eds										
	품	Phase 2		Phase 3	Phase	4	Phase 5	Phase 6	9 e	Phase 7	£	Phase 8
EB	27	2	-									
S S	8			TR								
SB		13		1.7					1			
Green (s)	35	45		70					\dagger		_	
Yellow + All red (s)	5.1	4.1	-	5.8	00	- 0		Critical	Critical vie Batio		.761	
Cycle (s)	Col	COSt time per cycle (s)	ne cycl	(2)				5				
Intersection Performance	formance	1			9			9			ä	
		93		-	04	a		9 -	2	-	£	L
Lane group configuration	ton			م د		-		,	-	-	,	
No. of lanes				1 69		374		1439	710	472	1506	
Flow rate (ven/n)		-		7.00		817		1505	1063	528	2560	
Capacity (ven/n)	(H) (top)		_	3437	_	1583		3547	1583	1770	3547	L
Adjusted saturation now (vering	OW (Ven/H)		-	.852		.459		956	899.	368.	.588	
WC ratio				212		.516		424	.672	.732	.722	
Guerrage hack of custons (neh)	(hah) a		_	16.5		11.6		40.7	21.4	20.4	19.2	
Heiserm datas (c)	ic (very			62.5		25.3		46	16.1	51.1	Ξ	
Dimonin delay (s)				9.6		3		14.2	9.1	17.7	4.	
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Delay (s)				72.1		25.6		60.2	17.7	8.89	11.5	
(5) (3)27				ш		ပ		ш	В	Э	ш	
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	MAREDAC				İ	FB/WB Street	Street		HINALANI D	NID			
Analysis Period/Year	AMB PM 2			2029		NB/SB Street	Street	9	UEEN	QUEEN KAAH			1
Comment 2029 A	2029 AMB PM W/ 2LT WB LANE	LTV	VB LA	NE E									
Intersection Data													
Area type Other	An	Analysis period	eriod	.25	=	Sign	Signal type	Actuated-Field	d-Field	1	% Back of queue		95
.1			88			WB			æ			æ	
		17	E	RI	13	Æ	R	ב	Ξ	₩.	5	E	E
Volume (veh/h)					587		412		1328	776	438	1256	
RTOR volume (veh/h)		Ī					80			8	-	1	0
Peak-hour factor					6.	e:	e:	6.	6.	2.	2) 0	٠, ١	ان
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Extension of effective green, e (s)	reen, e (s)				7		7		7	-1 (1 6	7 6	
Arrival type, AT					3	•			2	0	5	7	
Approach pedestrian volume (p/h)	olume (p/h)												
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Left/right parking (Y or N)	í (ž	-	-	-	Z	-	z		-				
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L [] T:]]	FS - FS	Sg	2	-	6	Dhare A	+	Phace 5	Pha	Phase 6	Phase 7	-	Phase 8
FB	Phase 1	+-	ruase 2	+	11103C 3	2001	+					\vdash	
WR	LR	_	~	_			-			1		+	
NB NB	2	-			TR							+	
SB			LT		1		1			1		+	
Green (s)	35		9	_	20		-		-			+	
Yellow + All red (s)	5.1	-	1.1	-	5.8		- 60		Critical	Critical w/c Ratio		.772	
Cycle (s)	160		Lost time per cycle (s)	per cycl	(5) 2				5				
Intersection Performance	formance											1	
			83			BB.		1	9		ŀ	2	L
Lane group configuration	lion						~	-		≃ -	- إد	- 0	1
No. of lanes					7	1	- :	-	7 .	- 35	107	7061	1
Flow rate (veh/h)					652	1	369	_	14/0	1		2520	L
Capacity (veh/h)					752	_	793	1	1337		+	+	1
Adjusted saturation flow (veh/h)	low (veh/h)				3437		1583	m .	3547	1383			_
v/c ratio				_	898.	1	.405			+	+	+	1
g/C ratio					.219	-	.501	_	.438	-+	+	C1/.	1
Average back of queue (veh)	(veh) ar				-	_	4.		40.7		5.12	+	_
Uniform delay (s)				_	60.3	_	756	-	43.3	4			-
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Intersection delay (s)/ LOS	3011			7	2.7						-		

General Information Analyst Agency or Company Analysis Perfod/Year TOT PM 2						:						
or Co s Peri					Site In	Site Information	5				4/17/2008	8008
or Co s Peri				-	Jurisdic	Jurisdiction/Date	1	O LINA LANIL D	0 17			
nalysis Period/Year TOT	PAC			İ	EB/WB Street	Street	= <	NALA	HINALANI D			
Comment 2029 TOT PN	2029 TOT PM 2 2029 TOT PM W/ 2LT WB &SB LANES	WB &S	2029 B LAN	SS	NB/SB Street	Street	7	OBEN	200			
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100000000000000000000000000000000000000			26	-	Sign	Signal type	Actuated-Field	1-Field	% Bac	Back of queue	1	95
Area type Other	Analysi	Analysis period .	3	=	WR WR			2			SB	
	5	a E	RI	5	E	FE	ב	Ŧ	₩.		E	2
Volume (veh/h)				587		487		1540	776	205	1450	4
RTOR volume (veh/h)						08		-	3 0	c	a	
Peak-hour factor				6.	6.	6.	ن. إ	٤. (2 0	, ,		:
Heavy vehicles (%)				7		7		7 (4 0	4 C	1 0	
Start-up lost time, I ₁ (s)		1		-1		4 (1 0	, ,	, ,	,	
Extension of effective green, e (s)	(s)			71		7 (4 6	1 6	, ~	1 6	
Arrival type, AT		_		~]	2						
Approach pedestrian volume (p/h)	(h/d)										0	
Approach bicycle volume (bic/h)	(H)						7	, -	z	z	-	z
Left/right parking (Y or N)		-		Z			:					
al Phasing Pla												
L LT T: TH R: RT		Dhaca 2	-	Phase 3	Phase	4	Phase 5	Pha	Phase 6	Phase 7	H	Phase 8
F8	agail L	1 2001	-								+	
WB	LR	ĸ				+					+	
NB	×			T)				-			- -	
SB		LT		5				1			-	
Green (s)	50	20		105		+		1	Ī		Ŧ	
Yellow + Alf red (s)	5.1	4.1	4.1 5.8	5.8	15	5.7		Critical	Critical v/c Ratio		1.158	
Cycle (s)		EO3t Will	200									
Intersection Performance	ance			ļ	1			div			87	
		æ			WB			2	9	-	F	L
Lane group configuration		_	1	،اد	_	<u>-</u>		- 6	1-	3 6	, ,	L
No. of lanes		+	1	7		- 5		7 -	15/	195	1 19	
Flow rate (veh/h)				652		704		1000	+			_
Capacity (veh/h)		-	-	904	_	070		2647	+	+-	+	-
Adjusted saturation flow (veh/h)	h/h)		-	3437		1583	_	27.0		+	+	-
v/c ratio				.721		:/23		0.			+	1
a/C ratio		_		.263		395		.553	-		+	4
Average hack of gueue (veh)				17.7		22.2		46.6	-		+	4
Holform delay (s)				63.7	_	48.6		36.7	4	31.1	+	4
Incremental delay (s)				2.8		4.1		4.7		0		-
Indical cusus delay (s)				0		0		٥	-	+	÷	-
Dolar (c)			_	66.5	10	52.7		41.4	1	-	1	
(c) (ga)				Ξ		۵			≺	ပ	m e	-
Acceptable dollar (c)/I OS		_		09	/ 8.09	ш	30.3	3 /	ပ	-	- 8:	٥
Approach using (5)/ CO	-			-		-	,			ζ		

Appendix C

Unsignalized Intersection Level of Service (LOS) Calculations

CHAF	CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET	ÄL,	5 5 5	NSIGN	ALIZE		RSEC	SNOL	WOR	KSHE	ш		
Analysis Summary	5												
General Information						Site In	Site Information	ou					
Analyst	WY					Jurisdicti	Jurisdiction/Date					4/1	4/16/2008
or Company	M&E PACIFIC	CIFIC				Major Street	reet	QUEE	QUEEN KAAHUMANU HWY	HUM,	AND F	ΙWΥ	
	EXIST AM	M		2006		Minor Street	reet	NELHA RD	A RD				
	2006 EXIST AM	ST AN	-										
Input Data													
Lane Configuration			SB			NB			EB			WB	
Lane 1 (curb)			~			Н			~				
Lane 2			Е		-	٦			٦				
Lane 3													
			SB			NB			EB			MB	
Movement		1(5)	2 (TH)	3 (RT)	4 (LT)	4 (LT) 5 (TH) 6 (RT)	6 (RT)	7 (LT)	8 (TH) 9 (RT) 10 (LT) 11 (TH) 12 (RT)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)			870	40	09	675		12		20			
PHF			6.	6.	6.	6.		6.		6.			
Proportion of heavy vehicles, HV	cles, HV		3	3	3	ю		3		3			
Flow rate			296	44	29	750		13		22			
Flare storane (# of vehs)										0			

Sig	dn Jeuf	Signal upstream of Movement 2		lt lt	Mover	Movement 5	=		
<u> </u>	igth o	Length of study period (h)		67					
ಠ	utput	Output Data							
	Lane	Lane Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	507	Approach Delay and LOS
	-	2	22	307	.072	- -	17.6	C	34.9
EB	2	L	13	74	771.		64.2	ír.	
	m								Q
	-								
WB	2								
	m								
	-	-							

Median storage (# of vehs)

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Analys General Analyst Agency or Analysis P Comment Input D Lane Cont	Analysis & General Inf General Inf Mualysis Pario Comment Comment Input Data Lane Cortigur Lane Tourib 1 Lane 1 Lane 2 Lane 3	Analysis Summary General Information Analysi Megency or Company Medency or Company	ary	and the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of th										-	
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Analys Agenc Analys Comn Inpu Lane Lane	si y or C y or C sis Pe nent nt Da or Confi Confi 3 3	Company riod/Year	5					Site Inf	Site Information	u.					
Analys Agenc Analys Comm Inpt Lane Lane Lane	y or C y or C sis Pe nent at Da t Da 1 (cur	Company riod/Year	14/10					Inrisdiction/Date	Date.					4/16	4/16/2008
Analy: Comn Inpu Lane Lane Lane	y or C sis Pe nent nent Confi	Company riod/Year	7 60 7 0 7 7	Otalic			. - 	Major Chagt		OLIEE	OUEEN KAAHUMANU HWY	HUM	NU H	WΥ	
Analy Comm Inpu Lane Lane	nent nent Confin 1 (cur	riod/Year	M&E PACIFIC	EFE.		7000		Major Sur	•	NET HA RD	A RD				
Comin Inpu Lane Lane	nent it Da Confin 2 2 3 3		EXIST PM	~		7000	1	Minor Street		1455					
Inpu Lane	Confi		2006 EXIST PM	ST PM											
Lane	Config 2 3	ta													
Lane	1 (cur	Lane Configuration			SB			NB			EB			WB	-
Lane	3	æ			R			E			×				
	m				П			٦			اد				
Lane 3											4			d/n	
					SB			8		12.7	EB		40.01	-	13 /DT
Move	Movement			1(1)	2 (TH)	3 (RT)	4 (E)	5 (TH)	6 (RT)	7(E)	EL)	-1	10 (L1)		(W) 71
Volus	Volume (veh/h)	eh/h)			615	81	28	840		39		8 .			
불					6.	6.	6:	6:		6.		6.			
Prop	ortion	Proportion of heavy vehicles, HV	shicles, HV		3	3	3	3		3		2			
Flow	Flow rate				683	20	31	933		43		26			
Flare	stora	Flare storage (# of vehs)	(SI									0			
Med	ian st	Median storage (# of vehs)	vehs)								0				
Sign	dn le	Signal upstream of Movement 2	ovement 2		=		Mov	Movement 5			æ				
Ĕ	gh of	Length of study period (h)	(u) p	.25											
ō	tput	Output Data	A CONTRACTOR OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF TH											L	
	Lane	Lane Movement	Flow Rate (veh/h)		Capacity (veh/h)		v/c	Onen	Queue Length (veh)		Control Delay (s)		SO 1	Delay Page App	Approach Delay and LOS
	-	2	42	_	447		.143		⊽	İ	14.4		В		35
EB	2	Т	107		187		.572		3	4	47.3		E		_
	3									1					
	-							-							
WB	2					-		-		-		1		- 1	
	ო							1		1		_		_	
		Θ										1			
		⊕	31		905		.034		⊽	_	9.1		A	_	10,1

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CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET	2 17 - TW	sc - un	ISIGN/	ALIZE	D INTE	RSEC	SNOIL	WORK	SHE	Ε		
Analysis Summary												
General Information					Site Information	ormati	u					
Analyst					Jurisdiction/Date	on/Date					4/16	4/16/2008
or Company	M&E PACIFIC				Major Street	ee	QUEEN KAAHUMANU HWY	KAAF	1UM/	NO H	WY	
	EXIST AM		2006		Minor Street	eet	HULIKOA DR	OA DR				
	2006 EXISTING AM	3 AM										
Input Data												
Lane Configuration		SB			NB			EB			WB	
Lane 1 (curb)		₽			~						~	-
Lane 2		'n			н						_	
Lane 3												
		SB			RB			EB			×Β	
Movement	1(E)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	9 (RT) 10 (LT) 11 (TH) 12 (RT)	12 (RT)
Volume (veh/h)	63	770			820	95				65		76
PHF	ę.	6.			6.	6.				6.		6.
Proportion of heavy vehicles, HV	HV 3	3			3	3				3		3
Flow rate	70	856			911	106				72		108
Flare storage (# of vehs)												0
Median storage (# of vehs)											0	
Signal upstream of Movement 2	12	=		Mo	Movement 5		-					
Length of study period (h)		25										

O BB BB WB	tput Lane 1 1 2 2 3 3 3 3 3	Output Data Lane Movement 1	Flow Rate (veh/h) 108 72	Capacity (velvh) 331	w/c .326 1.073	(vert) (vert) 1	Control Delay (s) (s) 21.1 236.8	LOS C
		Θ	70	829	.103	7	10.9	В
		9						

107.3 [I.

Approach Delay and LOS

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-		CH/	CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET	- TWS	ير- د ا	SIGN	ALIZEC	INTE	RSECT	N SNOI	/ORKS	HEE	 		
Anal	lysis	Analysis Summary	ıary								***************************************				
Gene	erall	General Information	ion					Site Inf	Site Information	_					
Amothe	١.		WY					Jurisdiction/Date	n/Date					4/16	4/16/2008
Allaysi	, ,		MARE DACIEIO	CIBIC			_	Major Street		OUEEN KAAHUMANU HWY	KAAHI	JMA	NU H	ΜY	
Agenc	yor.	Agency or Company	EXICT DM	Z I		2006		Minor Street		HULIKOA DR	A DR				
Analy	sis Per	Analysis Pertod/Year	1 1 1 1 1	IM			-	Nelon S							
Comment	nent		2006 EXISTING PM	ISTINC	PM										
ndul	Input Data	ta										-			
Lane	Confic	Lane Configuration			SB			NB		Н	EB	-		MB	
Lane	Lane 1 (curb)	th.			L			×						×	
Lane 2	2				L			Į				+		اد	
Lane 3												1			
	,				SB			Æ		i +	-			₩B	
Move	Movement			1 (E1)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT) 8	8 (TH) 9	9 (RT) 10 (LT)		11 (H)	12
Volue	Volume (veh/h)	h/h)		33	460			770	20				134		8
꿆				6.	6.			6.	6.				6:		6.
Propt	ortion	of heavy v	Proportion of heavy vehicles, HV	3	3			3	ъ				3		3
Flow rate	rate			37	511			856	99				149		100
Flare	stora	Flare storage (# of vehs)	hs)												0
Medi	ian stc	Median storage (# of vehs)	vehs)								-		0		
Sign	sdn las	tream of M	Signal upstream of Movement 2				Mov	Movement 5		=					
Leng	jo ufi	Length of study period (h)	(h) bd	.25											
O	tout	Output Data													
	Lane	Lane Movement	Flow Rate (veh/h)	_	Capacity (veh/h)		v/c	Onen	Queue Length (veh)	Control Delay (s)	Delay	F0S		App Delay	Approach Delay and LOS
Ì_	-												-		
EB	2														
	m										1	-			
	-	2	100		356		.281		-	19		0			104
WB	2	רי	149		139		1.075		8	161.1	-	14			į,
		Θ	37		780		.047		⊽	9.8	_	4	V		
		(4													

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Appendix D

On-Ramp
Level of Service (LOS) Calculations

General Information	200							
	lation							4/14/2008
Analyst Agency or Company Analysis Period/Year	WY M&E PACIFIC TOT AM		2029	Jurisdiction/Date Freeway/Directio Junction	Jurisdiction/Date Freeway/Direction of Travel Junction		QKH SOUTHBOUND OOMA ACCESS	14/14/2008
Operational (LOS)	(Design (L _A , L _D , or N)), or N)	Qf Pla	Planning (LOS)		☐ Planning	Planning (L _A , L _D , or N)
Inputs	-		ALL PROPERTY OF THE PERSON NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAMED IN COLUMN NAM					
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Upstream Adjacent Ramp	dwe	Ramp Type	ec .	Diverse	9		Downstream Adjacent Kantu	Jacent Kanip
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N.	EZ 011	Name of free	Marcher of framew lanes] [SON CONTRACTOR		ed No	Ji0 🗀
L _{up} = 450	ft veh/h	Number o Length o	Number of ramp lanes Length of ramp roadway	140	#		L _{down} =	ft veh/h
	OOD THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF THE STATE OF T	S _{fF} = 70	mi/h	SFR =	35	mi/h		
Conversion to	pc/h Unde	Conversion to pc/h Under Base Conditions	ons					
(pc/h) AADT	×	a	, v	뀲	% HV	AH _J	ď	V = V
-	9	-	(ven/n) 1449	6	5	976.	-	1650
00101	_		243	6.	5	976.	-	277
+-	-		270	6.	5	976.	-	307
νo							-	
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Estimation of V ₁₂	F V ₁₂			Estima	Estimation of v ₁₂			
	V12 = VF * PFM	Р _{FM}			, Y	$v_{12} = v_R + (v_F - v_R)^P_{FD}$	/R)Pro	
Leo =	(Equation 2	(Equation 25-2 or 25-3)		_ Leo =	-	(Equation 25-8 or 25-9)		(d)
P _{FM} = 1	using Equation		(Exhibit 25-5)	P _{FD} =		using Equation		(Exhibit 25-12)
v ₁₂ = 1650	hc/h	10 ab 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		¹ √12 =		bc/h		-
Capacity Checks	ecks			Capac	Capacity Checks			2 20 70
	Actual	Maximum	LOS F?			Actual	Coe Evhihit 25-14	1100 1
νFO	1927	See Exhibit 25-7	<i>L</i> -	VFI = VF			4400: All	
	1000	AGOD: All		VFO = VF	- VR		See Exhibit 25-14	5-14
VR12	1927	4000. All		ν,			See Exhibit 25-3	5-3
Level-of-Ser	vice Determ	Level-of-Service Determination (if not F)	F)	Level-	of-Service	Determina	Level-of-Service Determination (if not F))
D _R = 5.475 +	0.00734 vR + C	DR = 5.475 + 0.00734 vR + 0.0078 v12 - 0.00627 LA	7 LA		D _R = 4.252 +	$D_R = 4.252 + 0.0086 \text{ v}_{12} - 0.009 \text{ L}_D$;
D _R =	19.5 B	pc/mi/ln (Exhibit 24	pc/mi/In (Exhibit 25-4)	D _R = 1			pc/mi/in (Exhibit	pc/mi/In (Exhibit 25-4)
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. W =	.338	(Exhibit 25-19)		D _s =			(Exhibit 25-19)	19)
S _R =	60.5	mi/h (Exhibit 25-19) mi/h (Exhibit 25-19)	i-19)	% % " 00			mi/h (Exhibit 25-19)	1 25-19)
100							mi/h (Equation 25-15)	ion 25-15)

	General Information				SITE INTO	Site information			
Analyst Agency or Company Analysis Period/Year	,	WY M&E PACIFIC OT PM		2015	Jurisdiction/Date Freeway/Direction Junction	Jurisdiction/Date Freeway/Direction of Travel Junction		QKH SOUTHBOUND OOMA ACCESS	4/9/2008 D
Comment 201	5 TOTA	L PM C	2015 TOTAL PM ON-RAMP						
Operational (LOS)	10S)		Design (L _A , L _D , or N)	D, or N)	EQ.	Planning (LOS)		□ Planning	(LA, LD, or N)
Inputs									The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s
		Freewa	Freeway terrain <u>Level</u>		Ramp terrain	rrain <u>Level</u>			
Upstream Adjacent Ramp	nt Ramp		Ramp Type	ье	(Downstream Adjacent Ramp	ijacent Ramp
Z Vec	8		Merge	2	n Diverge	<u>e</u> ,		□ Yes	5 0
3	; ; ; ;		Ed Right side	t side	☐ Left side	side		, Mo	Ē
% O	5 5		Number	Number of freeway lanes	2	1		011	5 1
$L_{\rm up} = 450$ $V_{\rm u} = 77$	ft veh/h		Number Length o	Number of ramp lanes Length of ramp roadway	140	=		L _{down} =	ft veh/h
		Š	S _{FF} = 70	mi/h	S _{FR} =	35	mi/h	THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY O	100000
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-	5	60:		50	6.	5	976.	-	57
N _U		60.		77	6.	5	976.	-	87
νD								-	
	_	Merge Areas	Areas				Diverge Areas	reas	
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Leo =	(Equi	ation 25-2	(Equation 25-2 or 25-3)		Leg =		(Equation 25-8 or 25-9)		
P _{FM} =	usin	using Equation	-	(Exhibit 25-5)	P _{FD} =	-	using Equation	-	(Exhibit 25-12)
v ₁₂ = 2327	27 pc/h	_			V ₁₂ =		н/ра		- AND STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET, STREET,
Capacity C	Checks				Capaci	Capacity Checks			***************************************
	Actual		Maximum	LOS F?			Actual	Maximum	LOS F?
V _{FO}	2384	4	See Exhibit 25-7	7.	VFI = VF			See Exhibit 25-14 4400: All	-14
			4000. Att		- A-	- VR		See Exhibit 25-14	-14
VR12	2384	4	4000; All		۸۲			See Exhibit 25-3	۳-
Level-of-St	ervice De	termin	Level-of-Service Determination (if not F)	Œ	Level	of-Service	Determina	Level-of-Service Determination (if not F)	
D _R = 5.475	+ 0.00734	v _R + 0.00	= 5.475 + 0.00734 v _R + 0.0078 v ₁₂ - 0.00627 L _A	7 LA		D _R = 4.252 +	$D_R = 4.252 + 0.0086 \text{ v}_{12} - 0.009 \text{ L}_D$		
D _R =	**	23.2	pc/mi/ln	£	D _R = .			pc/mi/ln	<u>.</u>
L0S =		اا _ت	(Exhibit 25-4)	25-4)	F002 =			(Exhib	(Exhibit 25-4)
Speed Estimation	mation				Speed	Speed Estimation	-		
M _s =	.353	-	(Exhibit 25-19) mi/h (Exhibit 25-	19)	ر د م			(Exhibit 25-19) mi/h (Exhibit 25-19)	9) 25-19)
- No = 05	-		mi/h (Exhibit 25-19)	19)	S ₀ =			mi/h (Exhibit 25-19)	25-19) in 25-15)
	ē			-C	-			1000	6.04

							- Committee		
Gener	General Information	ion			Site Infc	Site Information			
Anahet		WY			Jurisdiction/Date	/Date			4/9/2008
liaryst	•	CIDIO VO D'AVA	JIBIL		Erronion/Di	Crossias/Direction of Trasal		OKH SOUTHBOUND	Q
gency or	Agency or Company	TOT PM		2020	hinction			OOMA ACCESS	
Comment	2020 TO	TAL PM	2020 TOTAL PM ON-RAMP						
Opera	Operational (LOS)		☐ Design (L _A , L _D , or N)	or N)	EQ Pile	Planning (LOS)		☐ Planninç	Planning (L _A , L _D , or N)
Inputs									
		Freew	Freeway terrain Level	ALL LAND AND AND AND AND AND AND AND AND AND	Ramp te	Ramp terrain Level	-		
pstream	Upstream Adjacent Ramp		Ramp Type	as				Downstream A	Downstream Adjacent Ramp
Š	C		Merge		□ Diverge	side		□ Yes	0
<u> </u>	וֹ נ		区 Right side	side		Left side		No.	
2	3	5	Number ol	Number of freeway lanes	2	-		<u> </u>	3
- - -	i		Number of	Number of ramp lanes	140	9		Ldown =	=
	153	veh/h	randin n	Leigh of faith todowny				= Q _n	
			S _{FF} = 70	mi/h	S _{FR} =	35	mi/h	CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CHARLES AND A CH	
Conv	ersion to p	c/h Under	Conversion to pc/h Under Base Conditions	SUS					
(hc/h)	AADT	¥	G	V (veh/h)	뀲	% HV	.¥		V = PHF (HV fp
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- A	0/91	60.		150	6.	S	976.	-	171
N.		60.		153	6.	5	926.	-	174
ړ.								-	
		Merge	Merge Areas				Diverge Areas	Areas	
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		V12 = VF * PFM	PFM			V ₁₂	V ₁₂ = VR + (VF VR) ^{IP} FD	/R/PFD	
Leg =		(Equation 25-2 or 25-3)			Leg =	-	(Equation 25-8 or 25-9)		() () () () () () () () () ()
P∰	-	using Equation		(Exhibit 25-5)	Pro=		using Equation		(Exhibit 25-12)
V ₁₂ ≖	2342	pc/h			V ₁₂ =		h/)d	Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Contro	
Capa	Capacity Checks	S.			Capacity	ity Checks			
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٧FO		2513	See Exhibit 25-7		VFI = VF			4400: All	
					۳ ۸د	- VR		See Exhibit 25-14	5-14
VR12		2513	4600; All		VR.			See Exhibit 25-3	5-3
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CHAPTER 25 - RAMPS AND RAMP JUNCTIONS WORKSHEET

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Conditions 1		S _{FR} = 35	mi/h		
(veh/day)				***************************************	
1530009 1 1373 140009 1 122 140009 1 123 140009 1 123 140009 1 123 150009 1 112 150009 1 112 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 1 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 113 150009 11		PHF % HV	AH _J		V = V PHF f _{HV} f _p
### 1400 .09 121 1400 .09 .09 .11 Merge Areas .09 .11 War .09 .11 War .09 .11 War .09 .11 War .09 .11 Waximum .09 .11 Waximum .09 .11 Waximum .09 .11 Waximum .09 .11 Waximum .00 .11 Waximum .00 .11 Waximum .00 .11 Waximum .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00		9 5	976.	-	1568
### Merge Areas ### Merge Areas ### ### ############################		9 5	976.	-	143
### Merge Areas ### ### ############################		5 6.	976.	-	133
Merge Areas				-	
V12 V12 V13 V14 V14 V14 V15 V14 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15			Diverge Areas	Areas	
V ₁₂ = V _F · P _{FM} (Equation 25-2 or 25-3) (Equation 25-2 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 25-3) (Exhibit 25-10 or 2		Estimation of v ₁₂	V ₁₂	5	
Cequation 25-2 or 25-3 1568			$v_{12} = v_R + (v_F - v_R)^F FD$	VRJFFD	
1 using Equation (Exhibit 25 1568 pc/h		Leo =	(Equation 25-8 or 25-9)		70 70 77 77
city Checks Actual Maximum 1712 See Exhibit 25-7 1712 4600: All 1-of-Service Determination (if not F) = 5.475 + 0.00734 \(v_{\rm th} + 0.0078 v_{\rm th} - 0.00627 L_{\rm th} \)	6	P _{7D} = 014	using Equation		(EXNIBIT 23-12)
Actual		V12 =	bc/n		
Actual Maximum 1712 See Exhibit 25-7 1712 4600. All 1712 4600. All 1715 Actual 1715 Actual 1716 Actual 1717 Actual 1718 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1719 Actual 1710 Actual 1710 Actual 1711 Actual 1711 Actual 1712 Actual 1712 Actual 1713 Actual 1714 Actual 1715 Actual 1716 Actual 1717 Actual 1717 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Actual 1718 Ac		Capacity Checks	- 1		
VFO 1712 See Exhibit 25-7 VR12 1712 4600: All Level-of-Service Determination (if not F) D _R = 5.475 + 0.00134 ¼ _F + 0.0078 ¼ _F - 0.00627 L _A D _R = 5.475 + 0.00134 ¼ _F + 0.0078 ¼ _F - 0.00627 L _A p. p. p. p. p. p. p. p. p. p. p. p. p. p	LOS F?		Actual	Maximum See Exhibit 25-14	14 103 F7
VRIZ 1712 4600: All Level-of-Service Determination (if not F) DR = 5.475 + 0.00734 V _R + 0.0078 V ₁₂ - 0.00627 L _A D. = 17.9 pc/mi/ln	- -	VFI VF		4400: All	
Level-of-Service Determination (if not F) $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ $D_R = 17.9 \qquad pc/miln$		VFO = VF - VR		See Exhibit 25-14	-14
EVEL-01-Service Determination (1) 152.7 $p_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$		VR Level-of-Serv	ice Determin	I evel-of-Service Determination (if not F)	2
$D_R = 5.473 + 0.00734 \text{ VR T 0.0070 V}_{2} - 0.0027 \text{ C}_{2}$		D ₀ = 4.7	Do = 4.252 + 0.0086 v ₁₂ - 0.009 L _D	- 0.009 L _D	
		D _P =			든
В		= S01		(Exhib	(Exhibit 25-4)
d Estimation		Speed Estimation	ation		
M = .333 (Exhibit 25-19)		D _s =		(Exhibit 25-19)	6
60.7		, S		mi/h (Exhibit 25-19)	25-19)
S ₀ = mi/h (Exhibit 25-19)		- So =		MIVII (EXHIBIT 23-13)	23-1-7