Appendix G

Traffic Impact Report-Kīhei High School and Traffic Signal Warrant Study-Piʻilani Highway and Kūlanihākoʻi Street

Wilson Okamoto Corporation – September 2011 and May 2010

Traffic Impact Report

Kihei High School

Prepared for:
Group 70 International, Inc.

Prepared by:
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September 2011

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I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed Kihei High School in Kihei on the island of Maui. High school students who reside in Kihei currently attend Maui High School in Kahului or Baldwin High School in Wailuku. The proposed school will allow these and future high school students from Kihei to attend a school within their region.

B. Scope of Study

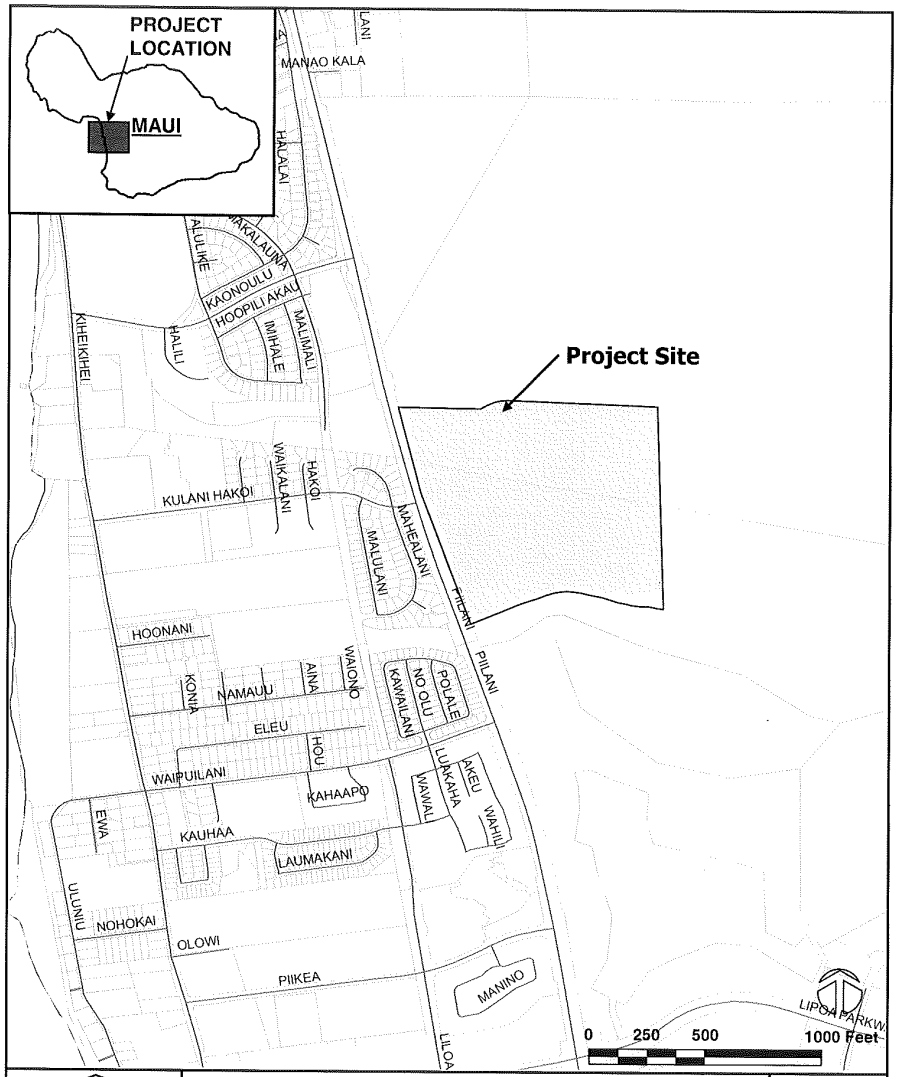
This report presents the findings and conclusions of the traffic study, the scope of which includes:

1. Description of the proposed project.
2. Evaluation of existing roadway and traffic operations in the vicinity.
3. Analysis of future roadway and traffic conditions without the proposed project.
4. Analysis and development of trip generation characteristics for the proposed project.
5. Superimposing site-generated traffic over future traffic conditions.
6. The identification and analysis of traffic impacts resulting from the proposed project.
7. Recommendations of improvements, if appropriate, that would mitigate the traffic impacts resulting from the proposed project.

II. PROJECT DESCRIPTION

A. Location

The Kihei High School will be located on an over 70-acre site adjacent to Piilani Highway in Kihei on the island of Maui (see Figure 1). The proposed project site is further identified as Tax Map Keys (TMKs): 2-2-002: 15 (por) and 54 (por). The site is bounded by Piilani Highway to the west and agricultural lands to the north, east, and south. Vehicular access to the proposed school will be provided via a new access roadway off Piilani Highway at the intersection with Kulanihakoi Street.



B. Project Characteristics

The State of Hawaii Department of Education (DOE) has plans to construct a new high school in Kihei adjacent to Piilani Highway. The proposed high school will include the following:

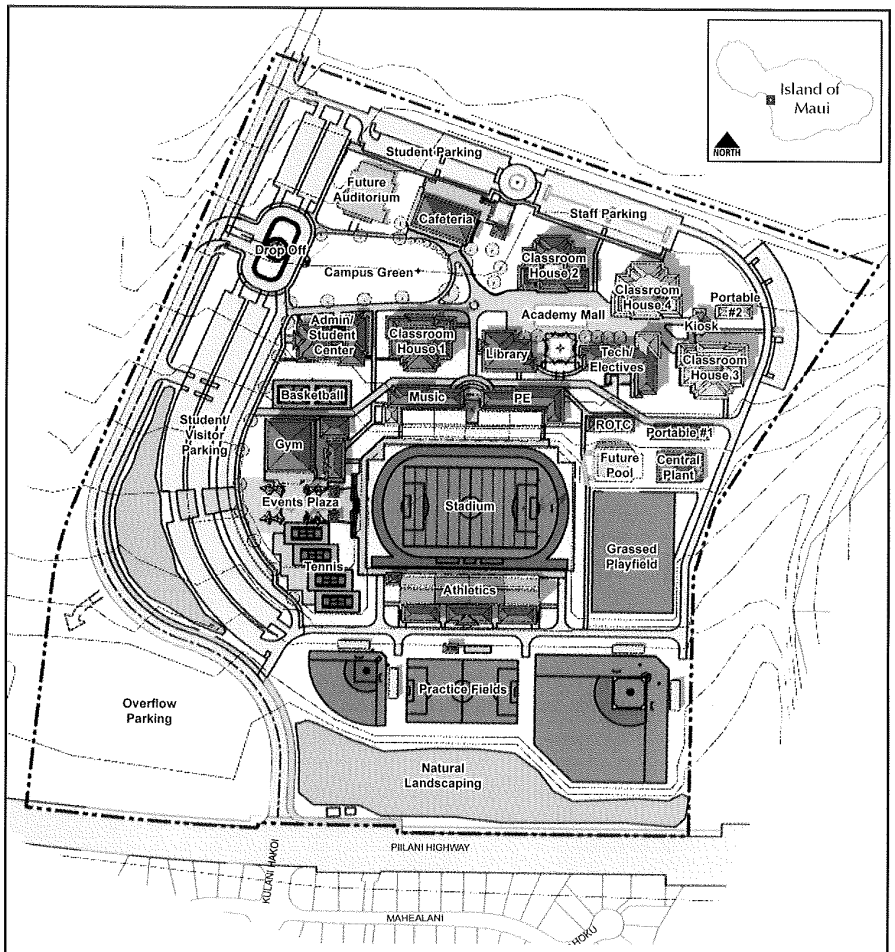
- Classrooms
- Library
- Auditorium
- Cafeteria
- Administration building
- Industrial arts building
- ROTC facility
- PE and athletic buildings
- Gymnasium
- Swimming pool
- Football/track stadium
- Tennis courts
- Grassed playfields
- Track and field appurtenances
- Softball and baseball fields
- Parking areas

Access to the new high school will be provided via a new access roadway off Piilani Highway at the intersection with Kulanihakoi Street. The majority of the facilities at the high school are expected to be completed when the school opens in the Year 2015. The school is initially expected to accommodate approximately 800 students with a full enrollment of 1,650 students expected by the Year 2025. Figure 2 shows the proposed project site plan.

III. EXISTING TRAFFIC CONDITIONS

A. Area Roadway System

In the vicinity of the project, Piilani Highway is a predominantly four-lane, two-way roadway generally oriented in the north-south direction that provides access through Kihei. North of the project site, Piilani Highway intersects Kaonoulu Street. At this unsignalized T-intersection, the northbound approach of the highway has an exclusive left-turn lane and two through lanes while the southbound approach has two through lanes and an exclusive right-turn lane. Kaonoulu Street is generally oriented



WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS	KIHEI HIGH SCHOOL	FIGURE
	PROJECT SITE PLAN	2

in the east-west direction and serves as a connector roadway between South Kihei Road and Piilani Highway. At the intersection with Piilani Highway, the Kaonoulu Street approach has two stop-controlled lanes that serve left-turn and right-turn traffic movements. In addition, a refuge lane is provided within the median along the highway to assist vehicles turning left from Kaonoulu Street.

South of the intersection with Kaonoulu Street, Piilani Highway intersects Kulanihakoi Street. At this unsignalized T-intersection, the northbound approach of the highway has an exclusive left-turn lane and two through lanes while the southbound approach has two through lanes and an exclusive right-turn lane. Kulanihakoi Street is generally oriented in the east-west direction and serves as a connector roadway between South Kihei Road and Piilani Highway. At the intersection with Piilani Highway, the Kulanihakoi Street approach has two stop-controlled lanes that serve left-turn and right-turn traffic movements. In addition, a refuge lane is provided within the median along the highway to assist vehicles turning left from Kulanihakoi Street.

Further south, Piilani Highway intersects E. Waipuilani Road. At this unsignalized T-intersection, the northbound approach of the highway has two through lanes while the southbound approach has two through lanes and an exclusive right-turn lane. E. Waipuilani Road is generally oriented in the east-west direction and serves as a connector roadway between South Kihei Road and Piilani Highway. At the intersection with Piilani Highway, the E. Waipuilani Road approach has one stop-controlled lane that serves right-turn traffic movements only.

At the southern end of the study area, Piilani Highway intersects Piikea Avenue. At this signalized intersection, the northbound approach of the highway has an exclusive left-turn lane and two through lanes while the southbound approach has two through lanes and an exclusive right-turn lane. Piikea Avenue is generally oriented in the east-west direction and serves as a connector roadway between South Kihei Road and Piilani Highway. At the intersection with Piilani Highway, the Piikea Avenue approach has exclusive left-turn and right-turn lanes.

West of the intersection with Piilani Highway, Kulanihakoi Street intersects South Kihei Road. At this unsignalized T-intersection, the Kulanihakoi Street approach has two stop-controlled lanes that serve left-turn and right-turn traffic movements. South Kihei Road runs parallel to Piilani Highway and serves as an alternate north-south route through Kihei. At the intersection with Kulanihakoi Street, the northbound approach of South Kihei Road has a shared through and right-turn lane while the southbound approach has an exclusive left-turn lane and one through lane.

B. Traffic Volumes and Conditions

1. General

a. Field Investigation

Field investigations were conducted on January 26-27, 2011, and consisted of manual turning movement count surveys in the project vicinity. The manual turning movement count surveys were conducted between the morning peak hours of 6:00 AM and 9:00 AM, and the afternoon peak hours of 3:00 PM and 6:00 PM at the following intersections:

- Piilani Highway and Kaonoulu Street
- Piilani Highway and Kulanihakoi Street
- Piilani Highway and E. Waipuilani Road
- Piilani Highway and Piikea Avenue
- Kulanihakoi Street and South Kihei Road

Appendix A includes the existing traffic count data.

b. Capacity Analysis Methodology

The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Transportation Research Board, 2000, and the "Synchro" software, developed by Trafficware. The analysis is based on the concept of Level of Service (LOS).

LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F";

LOS "A" representing ideal or free-flow traffic operating conditions and LOS "F" unacceptable or potentially congested traffic operating conditions.

"Volume-to-Capacity" (v/c) ratio is another measure indicating the relative traffic demand to the road carrying capacity. A v/c ratio of one (1.00) indicates that the roadway is operating at or near capacity. A v/c ratio of greater than 1.00 indicates that the traffic demand exceeds the road's carrying capacity. The LOS definitions are included in Appendix B.

2. Existing Peak Hour Traffic

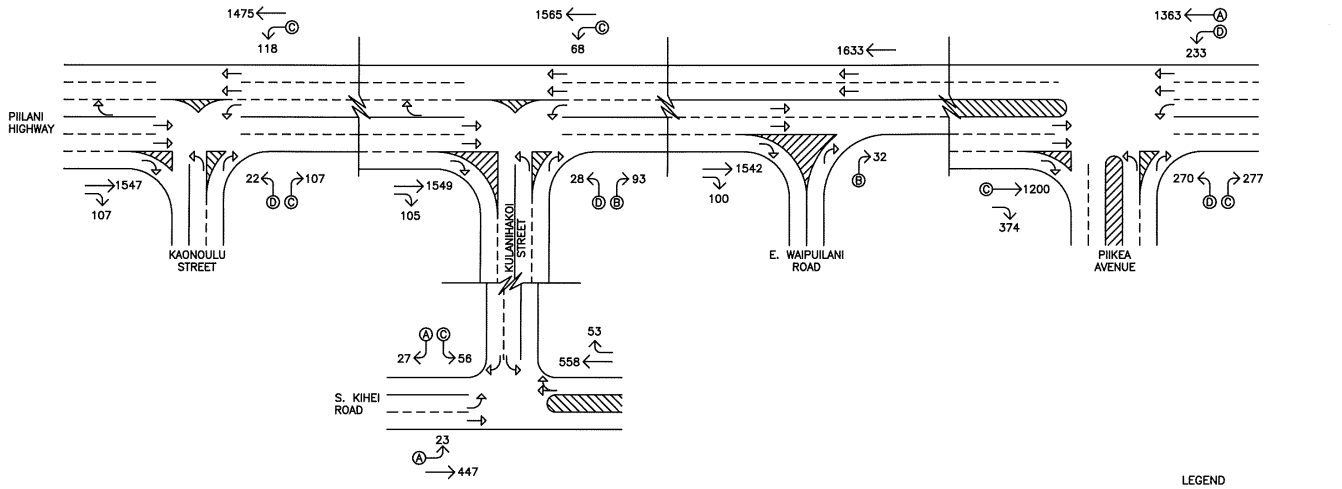
a. General

Figures 3 and 4 show the existing AM and PM peak hour traffic volumes and operating traffic conditions. The AM peak hour of traffic generally occurs between the hours of 7:15 AM and 8:15 AM while the PM peak hour of traffic generally occurs between the hours of 3:45 PM and 4:45 PM. The analysis is based on these peak hour time periods for each intersection to identify the traffic impacts resulting from the proposed project. LOS calculations are included in Appendix C.

b. Piilani Highway and Kaonoulu Street

At the intersection with Kaonoulu Street, Piilani Highway carries 1,367 vehicles northbound and 1,474 vehicles southbound during the AM peak hour of traffic. During the PM peak period, traffic volumes are higher with 1,593 vehicles traveling northbound and 1,654 vehicles traveling southbound. The critical movement on the highway approaches of the intersection is the northbound left-turn traffic movement which operates at LOS "C" during both peak periods.

The Kaonoulu Street approach of the intersection carries 237 vehicles and 129 vehicles eastbound during the AM and PM peak



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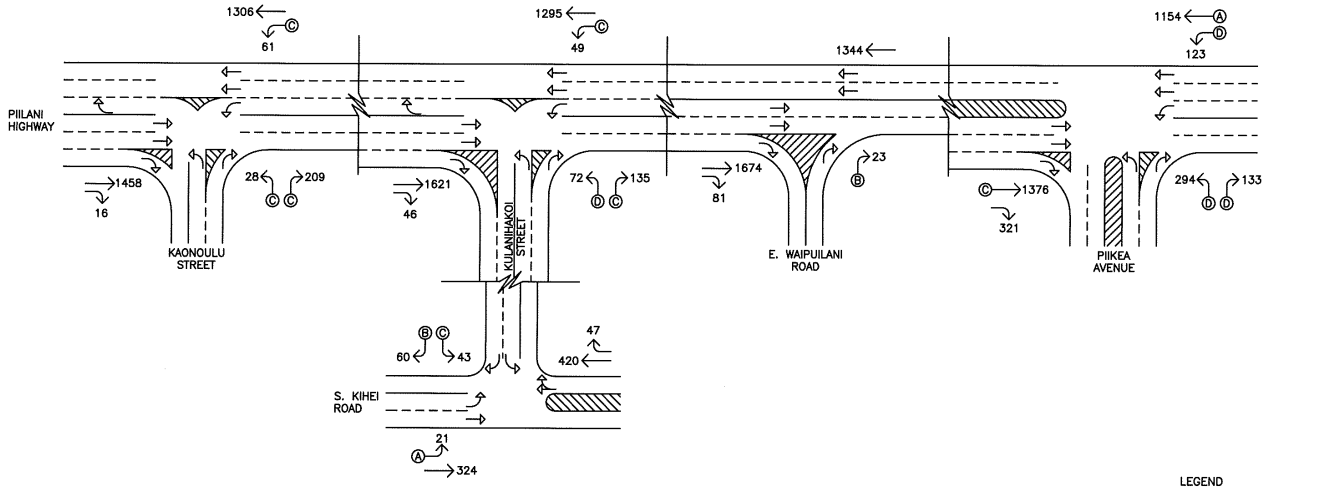
KIHEI HIGH SCHOOL

EXISTING PM PEAK HOUR OF TRAFFIC

FIGURE 4



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KIHEI HIGH SCHOOL

EXISTING AM PEAK HOUR OF TRAFFIC

FIGURE 3

periods, respectively. The left-turn traffic movement on this approach operates at LOS "D" and LOS "C" during the AM and PM peak periods, respectively, while the right-turn traffic movement operates at LOS "C" during both peak periods. Traffic queues periodically formed on this approach with the average queue lengths of 2-3 vehicles observed during both peak periods.

c. Piilani Highway and Kulanihakoi Street

At the intersection with Kulanihakoi Street, Piilani Highway carries 1,344 vehicles northbound and 1,667 vehicles southbound during the AM peak hour of traffic. During the PM peak period, the overall traffic volume is higher with 1,633 vehicles traveling northbound and 1,654 vehicles traveling southbound. The critical movement on the highway approaches of the intersection is the northbound left-turn traffic movement which operates at LOS "C" during both peak periods.

The Kulanihakoi Street approach of the intersection carries 207 vehicles and 121 vehicles eastbound during the AM and PM peak periods, respectively. The left-turn traffic movement on this approach operates at LOS "C" during both peak periods while the right-turn traffic movement operates at LOS "C" and LOS "B" during the AM and PM peak periods, respectively. Traffic queues periodically formed on this approach with the average queue lengths of 2-4 vehicles observed during both peak periods.

d. Piilani Highway and E. Waipuilani Road

At the intersection with E. Waipuilani Road, Piilani Highway carries 1,344 vehicles northbound and 1,755 vehicles southbound during the AM peak hour of traffic. During the PM peak period, the overall traffic volume is higher with 1,633 vehicles traveling northbound and 1,642 vehicles traveling southbound.

The E. Waipuilani Road approach of the intersection carries 23 vehicles and 32 vehicles eastbound during the AM and PM peak periods, respectively. This approach operates at LOS "B" during both peak periods.

e. Piilani Highway and Piikea Avenue

At the intersection with Piikea Avenue, Piilani Highway carries 1,277 vehicles northbound and 1,697 vehicles southbound. During the PM peak period, the overall traffic volume is higher with 1,596 vehicles traveling northbound and 1,574 vehicles traveling southbound. The critical movements on the highway approaches of the intersection are the northbound left-turn traffic movement which operates at LOS "D" during both peak periods and the southbound through traffic movement which operates at LOS "C" during both peak periods. Traffic queues periodically formed on the highway approaches of the intersection with the most significant queuing occurring during the PM peak periods. During this period, average queue lengths of 7-9 vehicles were observed on both approaches. These queues were observed to clear the intersection after each traffic signal cycle change.

The Piikea Avenue approach of the intersection carries 427 vehicles and 547 vehicles eastbound during the AM and PM peak periods, respectively. The left-turn traffic movement on this approach operates at LOS "D" during both peak periods while the right-turn traffic movement operates at LOS "D" and LOS "C" during the AM and PM peak periods, respectively. Traffic queues periodically formed on the Piikea Avenue approach of the intersection with average queue lengths of 7-9 vehicles observed during both peak periods. Occasionally, queues extended through the upstream intersection with the Piilani Village Shopping Center, but most of these queues were observed to clear the intersection after each traffic signal cycle change.

f. Kulanihakoi Street and South Kihei Road

At the intersection with South Kihei Road, the Kulanihakoi Street approach of the intersection carries 103 vehicles and 83 vehicles westbound during the AM and PM peak periods, respectively. The critical movement on the Kulanihakoi Street approach is the left-turn traffic movement which operates at LOS "C" during both peak periods.

The South Kihei Road approaches of the intersection carry 467vehicles northbound and 342 vehicles southbound during the AM peak hour of traffic. During the PM peak period, traffic volumes are higher with 611 vehicles traveling northbound and 470 vehicles traveling southbound. The critical movement on the South Kihei Road approaches of the intersection is the southbound left-turn traffic movement which operates at LOS "A" during both peak periods.

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. The ITE trip generation rates are developed empirically by correlating the vehicle trip generation data with various land use characteristics such as the number of vehicle trips generated per student. As previously stated, high school students from Kihei currently attend high schools in Kahului and Wailuku and these students are expected to transfer to the new high school once it is opened. As provided by the Department of Education (DOE), there are currently 704 students from Kihei attending high schools in other regions. Table 1 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic to measure the impact resulting from the proposed Kihei High School.

Table 1: Peak Hour Trip Generation

YEAR 2015		
HIGH SCHOOL (EXISTING STUDENTS)		
INDEPENDENT VARIABLE:		Students = 704 (Existing)
		PROJECTED TRIP ENDS
AM PEAK	ENTER	201
	EXIT	95
	TOTAL	296
PM PEAK	ENTER	43
	EXIT	49
	TOTAL	92
HIGH SCHOOL (NEW STUDENTS)		
INDEPENDENT VARIABLE:		Students = 96 (New)
		PROJECTED TRIP ENDS
AM PEAK	ENTER	27
	EXIT	13
	TOTAL	40
PM PEAK	ENTER	6
	EXIT	6
	TOTAL	12
TOTALS		
INDEPENDENT VARIABLE:		Students = 800
		PROJECTED TRIP ENDS
AM PEAK	ENTER	228
	EXIT	108
	TOTAL	336
PM PEAK	ENTER	49
	EXIT	55
	TOTAL	104
YEAR 2025		
HIGH SCHOOL (NEW STUDENTS)		
INDEPENDENT VARIABLE:		Students = 850 (New)
AM PEAK	ENTER	243
	EXIT	114
	TOTAL	357
PM PEAK	ENTER	52
	EXIT	59
	TOTAL	111

2. Trip Distribution

Figures 5 to 8 show the distribution of site-generated vehicular trips at the study intersections during the Year 2015 and Year 2025 AM and PM peak periods. Access to Kihei High School will be provided via new access road off Piilani Highway at the intersection with Kulanihakoi Street. High School students from Kihei currently attending other schools in Kahului and Wailuku are assumed to already be utilizing Piilani Highway to travel to/from Kihei. As such, trips associated with existing students were reassigned from Piilani Highway to the new high school access. The directional distribution of existing and new trips to/from the high school was based upon the relative distribution of households within the Kihei and Wailea areas and the available routes to/from the new school.

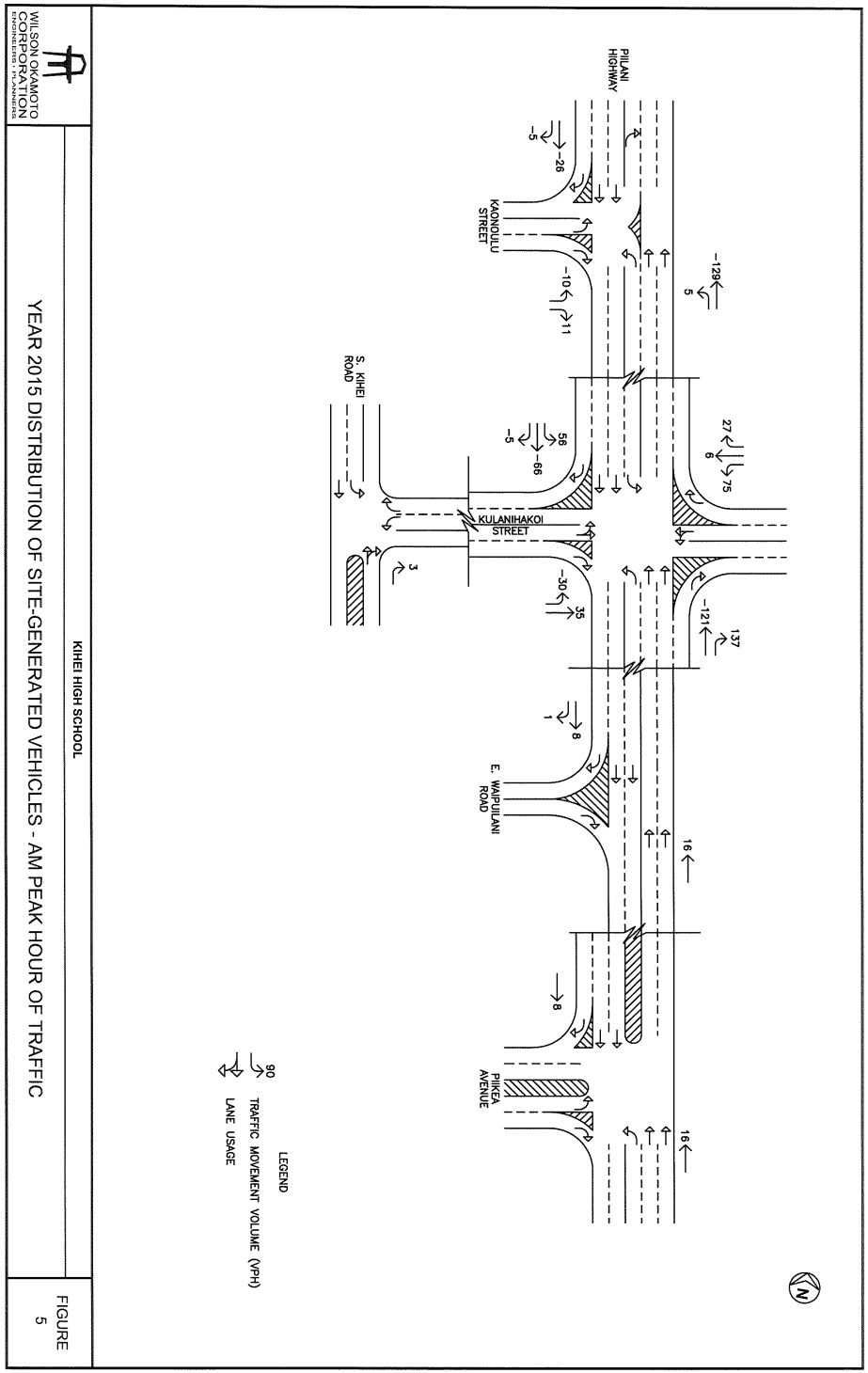
B. Through Traffic Forecasting Methodology

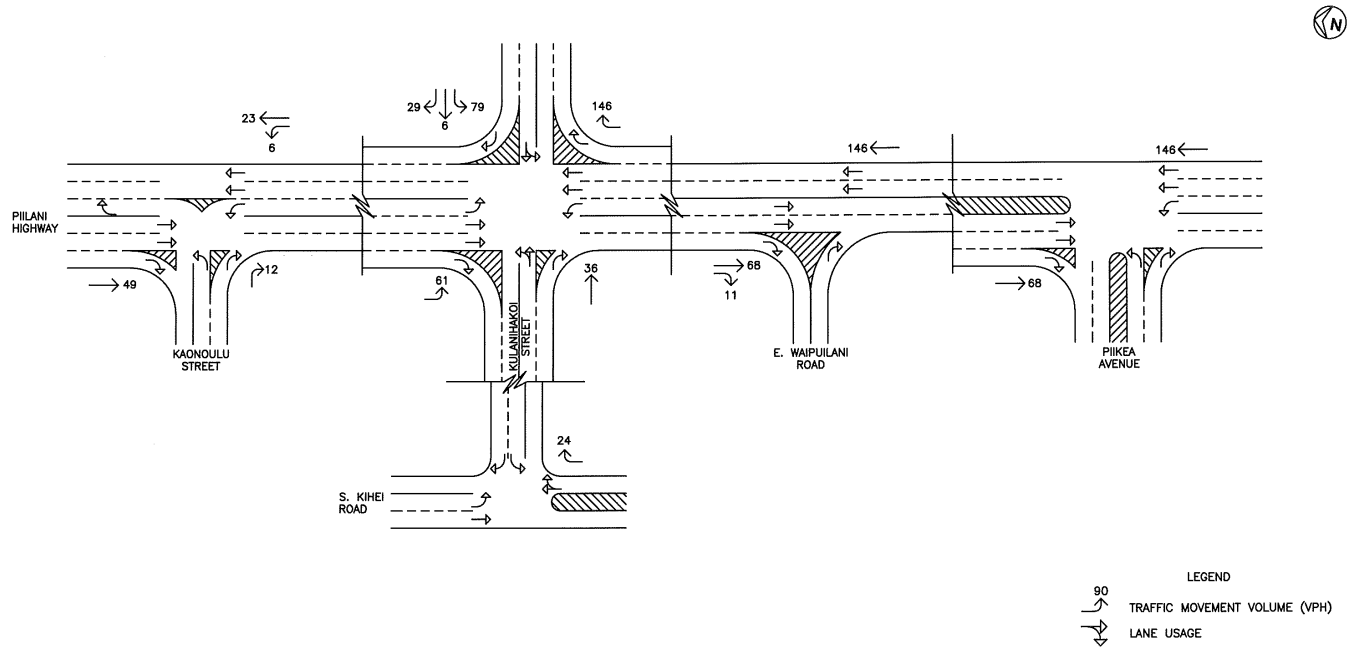
Historical traffic count data obtained from the State Department of Transportation (SDOT), Highway Division survey stations in the vicinity of the project site indicates traffic volumes have remained relatively stable and, as such, an annual traffic growth rate of approximately 1.0% per year was conservatively assumed along Piilani Highway and South Kihei Road in the project vicinity. Using 2011 as the Base Year, growth factors of 1.04 and 1.14 were applied to the existing through traffic demands along those roadways to achieve the projected Year 2015 and Year 2025, respectively traffic demands.

C. Other Considerations

1. Kihei Mauka

The agricultural lands surrounding the project site for the proposed high school are owned by Kaonoulu Ranch and Haleakala Ranch. The ranches have future plans to develop these lands (currently referred to as "Kihei Mauka") that will include residential, commercial, and industrial uses. The project development plan and implementation schedule for this project are not known at this time and, as such, the Kihei Mauka development is not incorporated into projected conditions. It should be noted that the ranches





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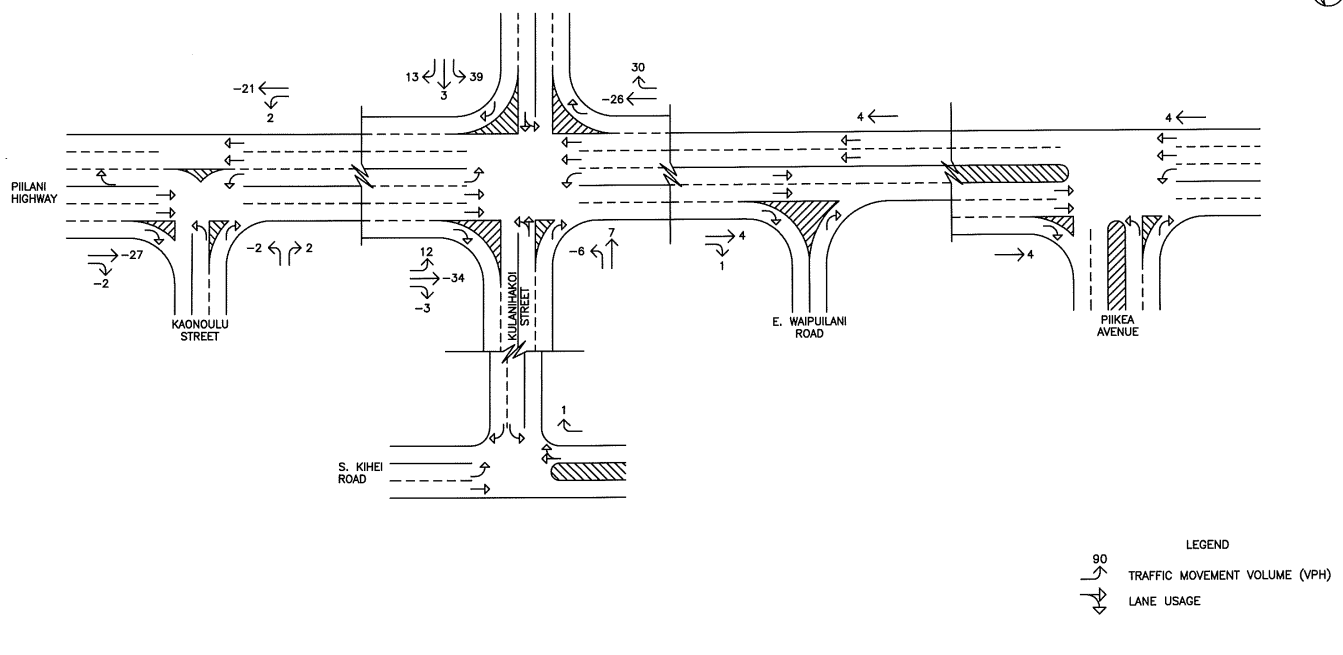
KIHEI HIGH SCHOOL

YEAR 2025 DISTRIBUTION OF SITE-GENERATED VEHICLES - AM PEAK HOUR OF TRAFFIC (FROM YEAR 2015)

FIGURE 7



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KIHEI HIGH SCHOOL

YEAR 2015 DISTRIBUTION OF SITE-GENERATED VEHICLES - PM PEAK HOUR OF TRAFFIC

FIGURE 6

plans currently include connection to the access roadway for the high school. However, once the details of the Kihei Mauka development are known, the ranches should be undertaking a traffic study to assess the development's impact on the surrounding roadways.

2. Piilani Promenade and Maui Outlets Center

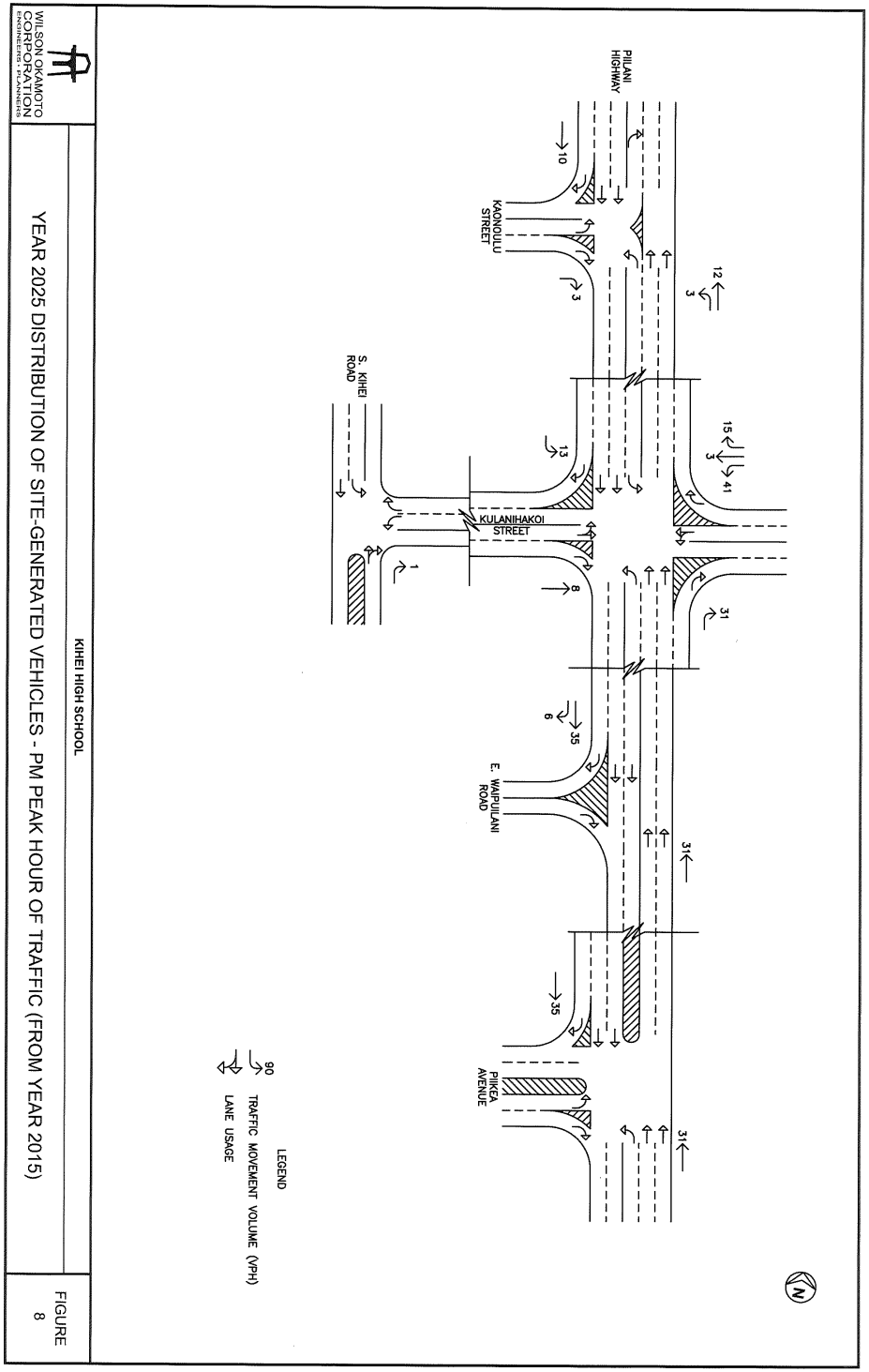
The Piilani Promenade and Maui Outlets Center will be located adjacent to Piilani Highway north of the proposed Kihei High School. The two projects are expected to include over 703,000 square feet of retail and restaurant space and include the extension of Kaonoulu Street further east. The project development plan and implementation schedule for these projects are not known at this time and, as such, the Piilani Promenade and Maui Outlets Center are not incorporated into projected conditions. It should be noted once the project details are known, the project developers should be undertaking traffic studies to assess the impact of the projects on the surrounding roadways.

3. Maui Research and Tech Park

The existing Maui Research and Tech Park is located east of Piilani Highway near the intersection with Lipoa Street. The proposed project entails the expansion of the existing tech park, as well as, development of other residential and commercial uses in the surrounding areas. The project development plan and implementation schedule for this project are not known at this time and, as such, the Maui Research and Tech Park expansion is not incorporated into projected conditions. It should be noted once the project details are known, the project developers should be undertaking traffic studies to assess the impact of the projects on the surrounding roadways.

4. Honua'ula Development

The Honua'ula development will be located on an approximately 670 acre parcel near the end of Piilani Highway. The proposed development will include a maximum of 1,400 residential units (mix of single- and multi-family units), mixed use areas, two golf courses, and a variety of public and private



amenities. The project development plan and implementation schedule for this development are not known at this time and, as such, the Honua'ula development is not incorporated into projected conditions.

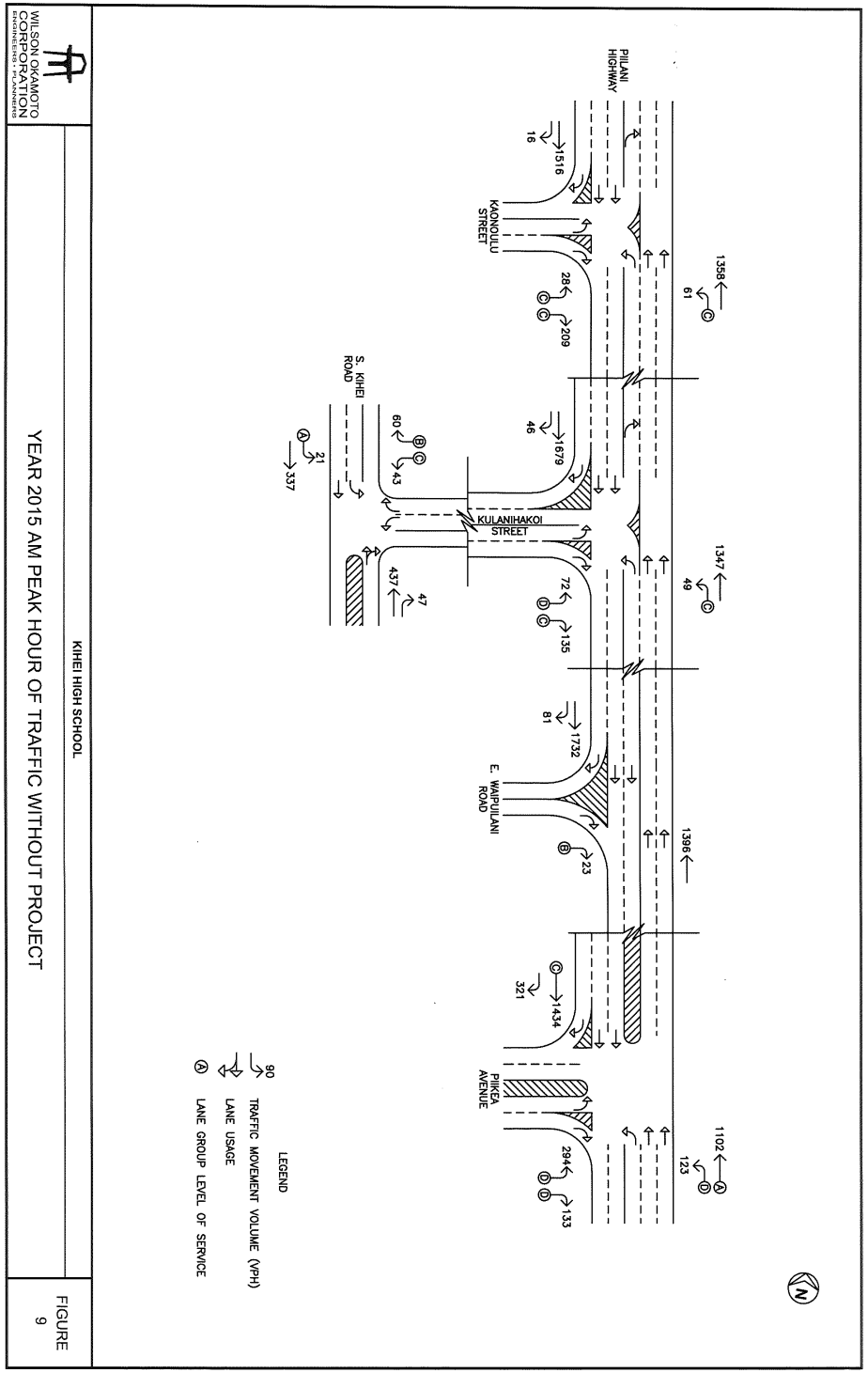
D. Year 2015 Total Traffic Volumes

1. Without Project

The projected Year 2015 peak hour traffic volumes and operating conditions in the project vicinity without the proposed Kihei High School are shown on Figures 9 and 10, and summarized in Table 2. The existing levels of service are provided for comparison purposes. LOS calculations are included in Appendix D.

Table 2: Existing and Projected Year 2015 (Without Project) LOS Traffic Operating Conditions

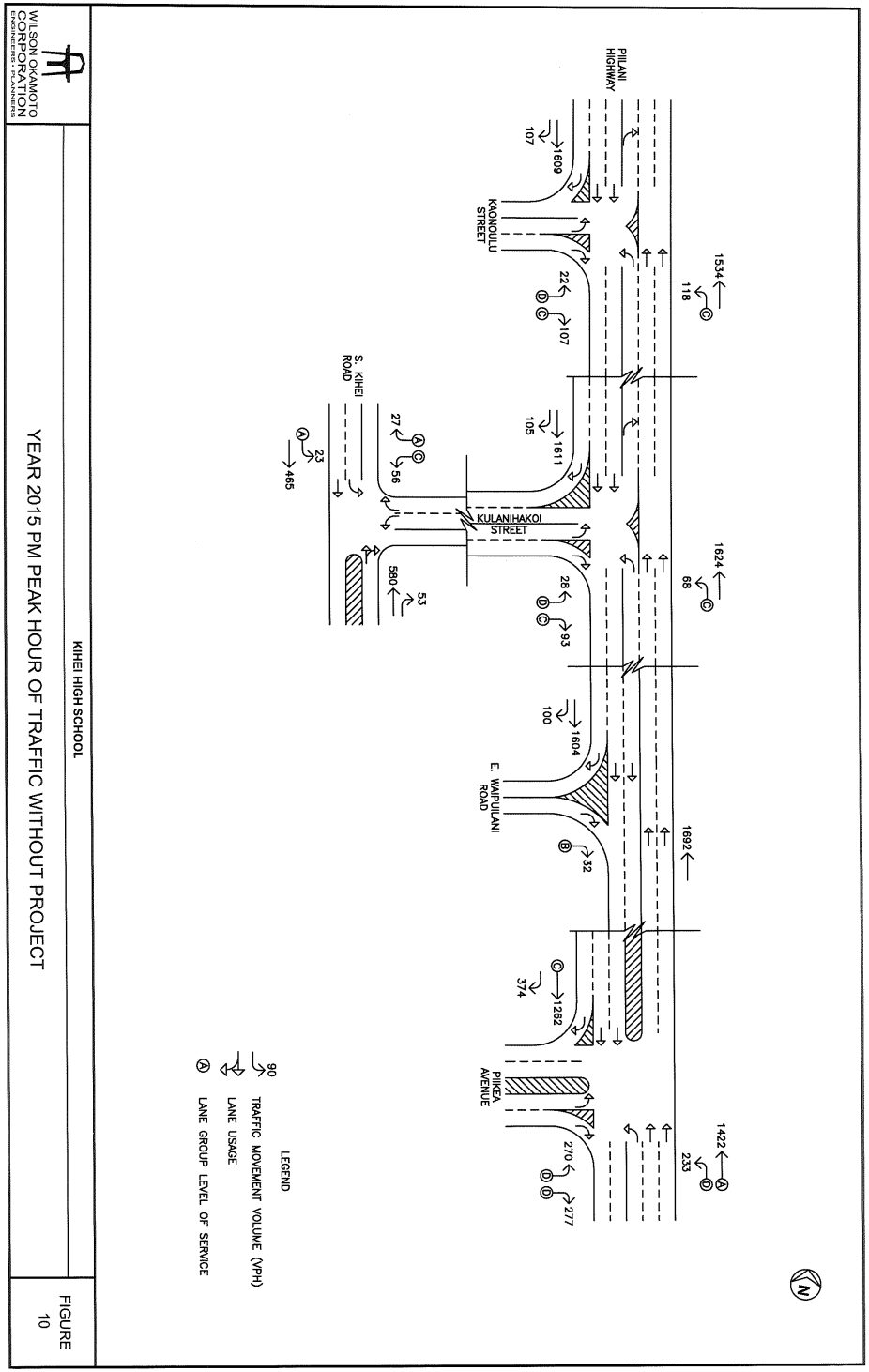
Intersection	Critical Traffic Movement/ Approach		AM		PM	
			Exist	Year 2015 w/out Proj	Exist	Year 2015 w/out Proj
Piilani Hwy/ Kaonoulu St	Eastbound	LT	C	C	D	D
		RT	C	C	C	C
	Northbound	LT	C	C	C	C
Piilani Hwy/ Kulanihakoi St	Eastbound	LT	D	D	D	D
		RT	C	C	B	C
	Northbound	LT	C	C	C	C
Piilani Hwy/ E. Waipuilani Rd	Eastbound	RT	B	B	B	B
Piilani Hwy/ Piikea Ave	Eastbound	LT	D	D	D	D
		RT	D	D	C	D
	Northbound	LT	D	D	D	D
	Southbound	TH	C	C	C	C
Kulanihakoi St/ South Kihei Rd	Westbound	LT	C	C	C	C
	Southbound	LT	B	B	A	A

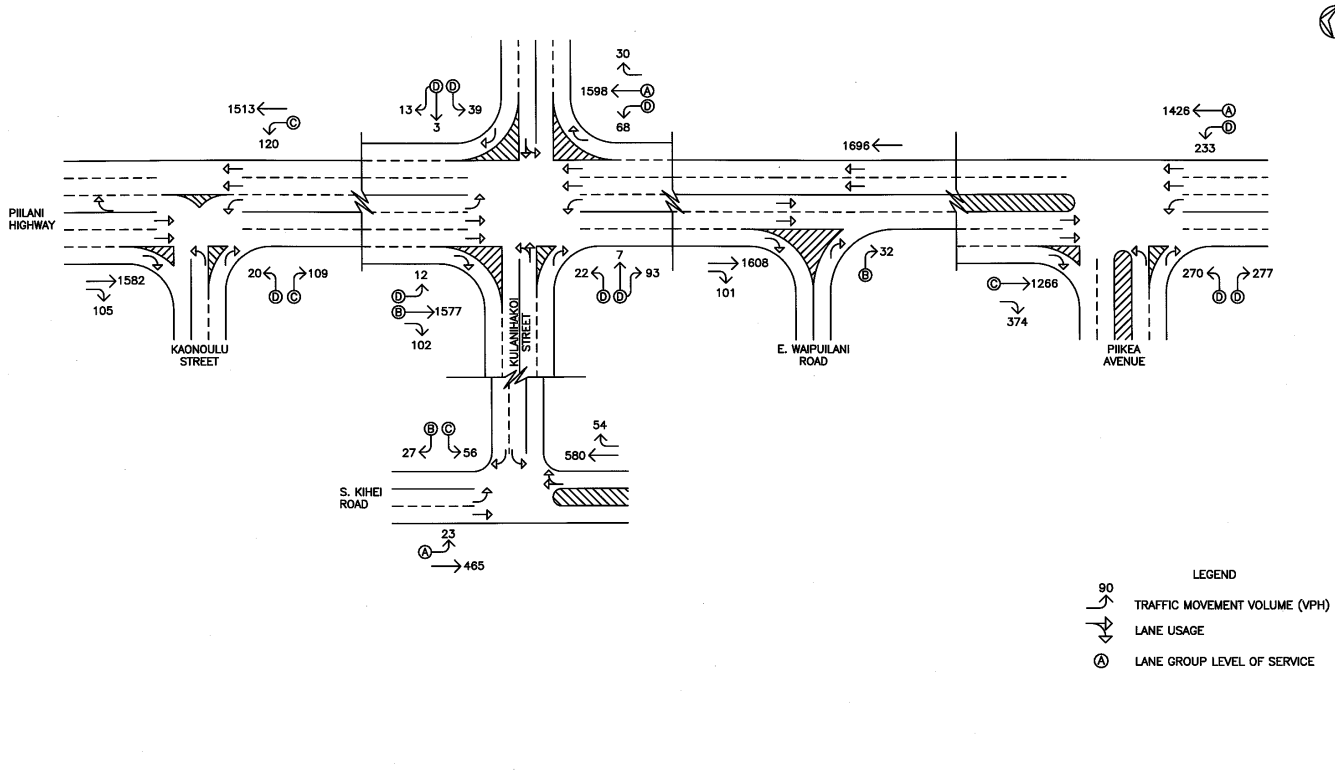


Under Year 2015 without project conditions, traffic operations in the project vicinity are expected to deteriorate slightly from existing conditions due to ambient growth in traffic along the surrounding roadways. The eastbound right-turn traffic movement at the intersection of Piilani Highway and Kulanihakoi Street is expected to deteriorate from LOS "B" to LOS "C" during the PM peak period while the eastbound right-turn traffic movement at the intersection of Piilani Highway and Piikea Avenue is expected to deteriorate from LOS "C" to LOS "D" during the PM peak period. The remaining critical movements at these intersections, as well as, the other study intersections are expected to continue operating at levels of service similar to existing conditions.

2. With Project

The Year 2015 cumulative peak hour traffic conditions with the proposed Kihei High School are shown in Figures 11 and 12, and summarized in Table 3. The cumulative volumes consist of site-generated traffic superimposed over Year 2015 projected traffic demands. Due to the anticipated increases in traffic at the intersection of Piilani Highway and Kulanihakoi Street due to ambient growth in traffic and the inclusion of the proposed access for the Kihei High School, a Traffic Signal Warrant Study was undertaken for that intersection (see Appendix E) to determine if a traffic signal system was warranted. Based on existing and projected traffic volumes, the study recommends the installation of a traffic signal system at that intersection. As such, a traffic signal system is assumed to be installed in conjunction with the Kihei High School project by the Year 2015. The projected Year 2015 (Without Project) operating conditions are provided for comparison purposes. LOS calculations are included in Appendix F.





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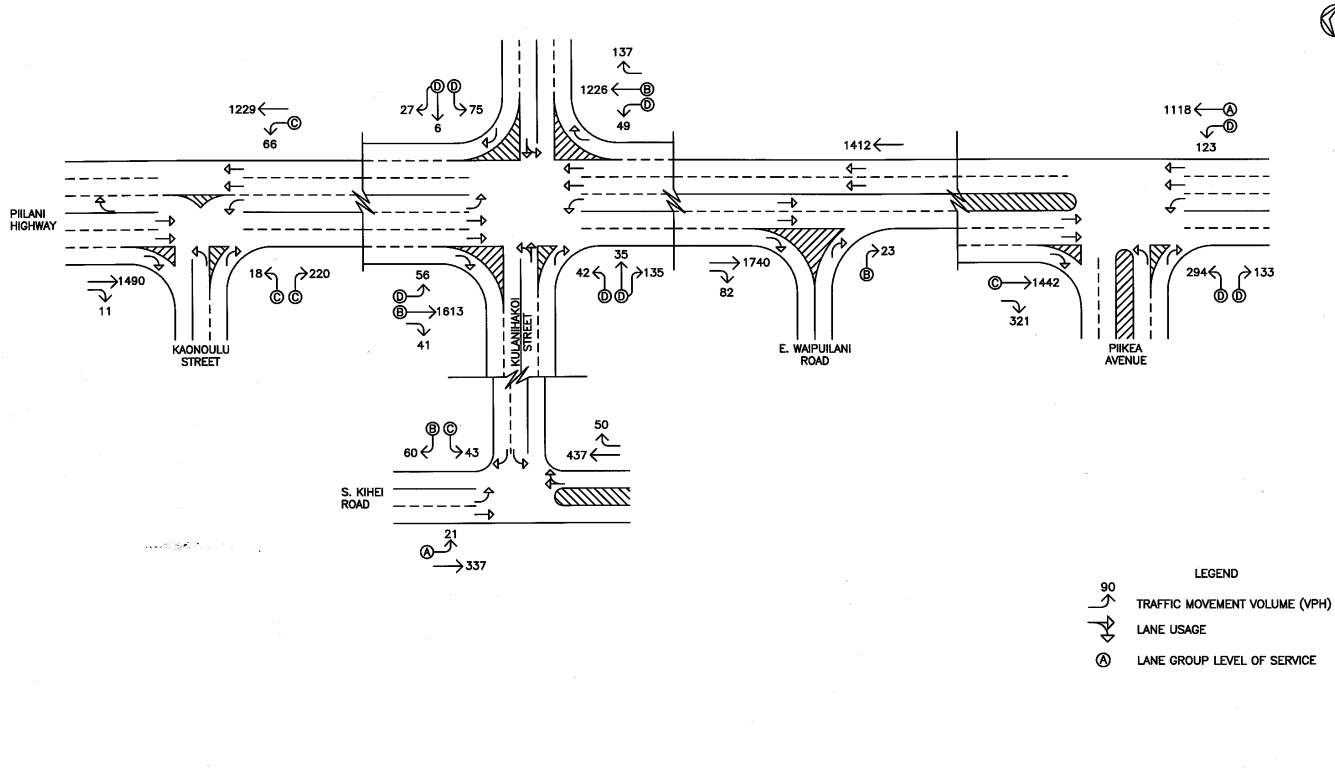
KIHEI HIGH SCHOOL

YEAR 2015 PM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 12



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KIHEI HIGH SCHOOL

YEAR 2015 AM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 11

Table 3: Projected Year 2015 (Without and With Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement/ Approach		AM		PM	
			Year 2015 w/out Proj	Year 2015 w/ Proj	Year 2015 w/out Proj	Year 2015 w/ Proj
Piilani Hwy/ Kaonoulu St	Eastbound	LT	C	C	D	D
		RT	C	C	C	C
	Northbound	LT	C	C	C	C
Piilani Hwy/ Kulanihakoi St*	Eastbound	LT	D	D	D	D
		TH	-		-	
		RT	C	D	C	D
	Westbound	LT-TH	-	D	-	D
		RT	-	D	-	D
	Northbound	LT	C	D	C	D
		TH	-	B	-	A
	Southbound	LT	-	D	-	D
		TH	-	B	-	B
Piilani Hwy/ E. Waipuilani Rd	Eastbound	RT	B	B	B	B
Piilani Hwy/ Piikea Ave	Eastbound	LT	D	D	D	D
		RT	D	D	D	D
	Northbound	LT	D	D	D	D
	Southbound	TH	C	C	C	C
Kulanihakoi St/ South Kihei Rd	Westbound	LT	C	C	C	C
	Southbound	LT	B	B	A	B

*Traffic signal system installed in conjunction with the proposed high school.

Under Year 2015 with project conditions, traffic operations in the project vicinity are generally expected to remain similar to without project conditions despite the addition of site-generated vehicles to the surrounding roadways. Along Piilani Highway, the critical movements at the intersection with Kaonoulu Street are expected to continue operating at LOS "C" or better

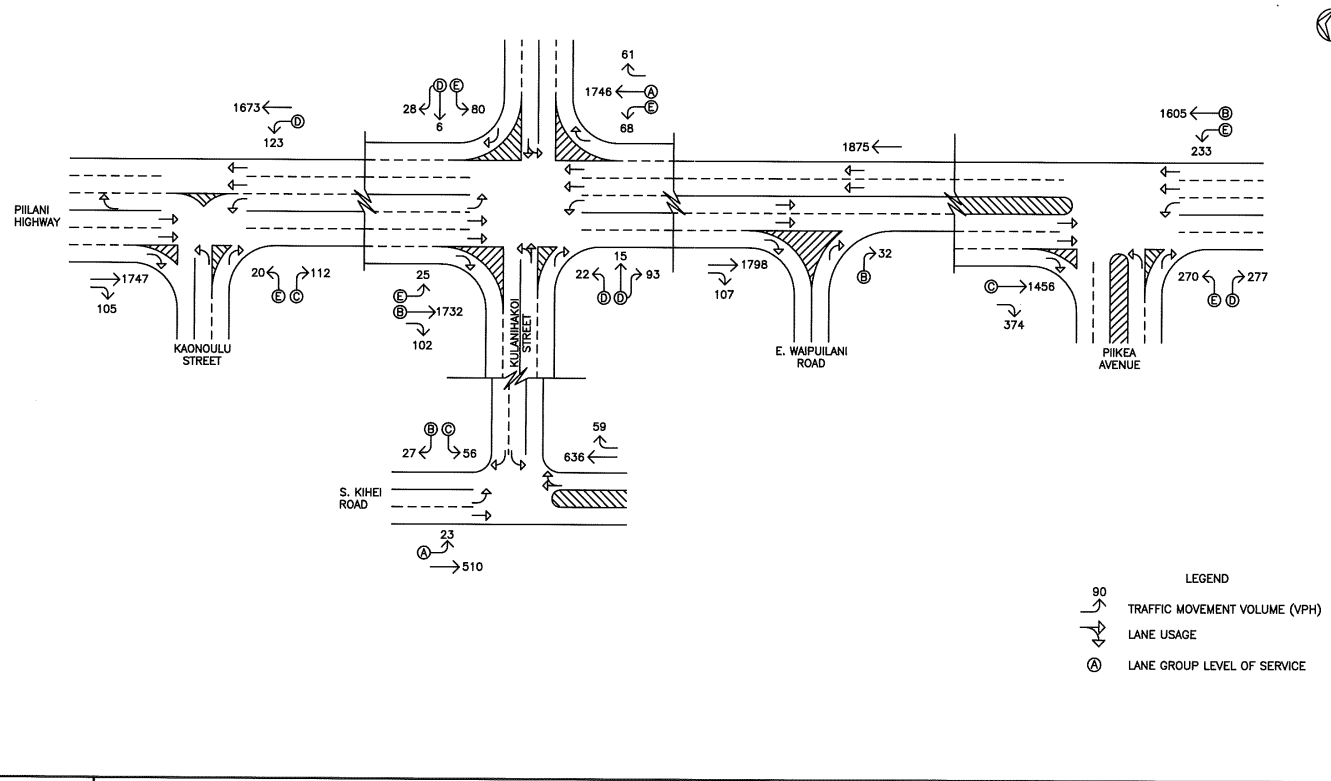
during the AM peak period and LOS "D" or better during the PM peak period while those at the intersection and Piikea Avenue are expected to continue operating at LOS "D" during both peak periods. At the intersection of the highway with E. Waipuilani Road, the eastbound approach is expected to continue operating at LOS "B" during both peak periods while the critical movements at the intersection of Kulanihakoi Street and South Kihei Road area expected to continue operating at LOS "C" or better during both peak periods. At the intersection of Piilani Highway and Kulanihakoi Street, the critical movements are expected to operate at LOS "D" or better during both peak periods primarily due to the installation of a traffic signal system at that intersection.

E. Year 2025 Total Traffic Volumes

The Year 2025 cumulative peak hour traffic conditions with the proposed Kihei High School are shown in Figures 13 and 14, and summarized in Table 4. The cumulative volumes consist of site-generated traffic superimposed over Year 2025 projected traffic demands. The projected Year 2015 (With Project) operating conditions are provided for comparison purposes. LOS calculations are included in Appendix G.

Table 4: Projected Year 2015 (With Project) and Year 2025 (With Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement/ Approach		AM		PM	
			Year 2015 w/ Proj	Year 2025 w/ Proj	Year 2015 w/ Proj	Year 2025 w/ Proj
Piilani Hwy/ Kaonoulu St	Eastbound	LT	C	D	D	E
		RT	C	C	C	C
	Northbound	LT	C	C	C	D



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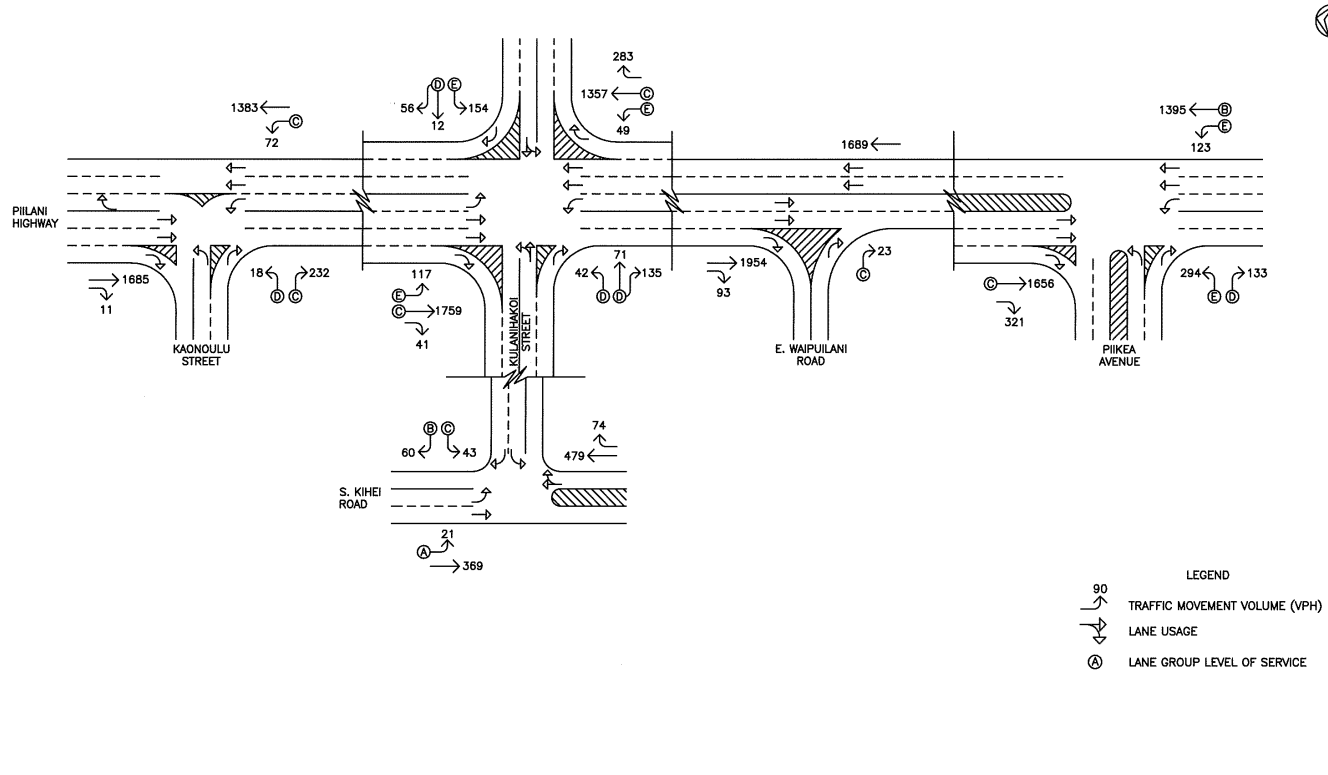
KIHEI HIGH SCHOOL

YEAR 2025 PM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 14



WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KIHEI HIGH SCHOOL

YEAR 2025 AM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 13

Table 4: Projected Year 2015 (With Project) and Year 2025 (With Project) LOS Traffic Operating Conditions (Cont'd)

Intersection	Critical Traffic Movement/ Approach		AM		PM	
			Year 2015 w/ Proj	Year 2025 w/ Proj	Year 2015 w/ Proj	Year 2025 w/ Proj
Piilani Hwy/ Kulanihakoi St*	Eastbound	LT-TH	D	D	D	D
		RT	D	D	D	D
	Westbound	LT-TH	D	E	D	E
		RT	D	D	D	D
	Northbound	LT	D	E	D	E
		TH	B	C	A	A
	Southbound	LT	D	E	D	E
		TH	B	C	B	B
Piilani Hwy/ E. Waipuilani Rd	Eastbound	RT	B	C	B	B
Piilani Hwy/ Piikea Ave	Eastbound	LT	D	E	D	E
		RT	D	D	D	D
	Northbound	LT	D	E	D	E
	Southbound	TH	C	C	C	C
Kulanihakoi St/ South Kihei Rd	Westbound	LT	C	C	C	C
	Southbound	LT	B	B	B	B

*Traffic signal system installed in conjunction with the proposed high school.

Under Year 2025 with project conditions, traffic operations in the project vicinity are expected to deteriorate slightly from Year 2015 with project conditions primarily due to ambient growth in traffic along the surrounding roadways. Along Piilani Highway, the critical movements at the intersection with Kaonoulu Street are expected to operate at LOS "D" or better during the AM peak period and LOS "E" or better during the PM peak period while those at the intersections with Kulanihakoi Street and Piikei Avenue are expected to operate at LOS "E" or better during both peak periods. At the intersection of the highway with E. Waipuilani Road, the eastbound approach is expected to operate at LOS "C" and LOS "B" during the AM

and PM peak periods, respectively. Along South Kihei Road, the critical movements at the intersection with Kulanihakoi Street are expected to operate at LOS "C" or better during both peak periods.

V. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study to be implemented prior to the opening of Kihei High School in the Year 2015:

1. Maintain sufficient sight distance for motorists to safely enter and exit all project roadways.

2. Provide adequate on-site loading and off-loading service areas and prohibit off-site loading operations.

3. Provide adequate turn-around area for service, delivery, and refuse collection vehicles to maneuver on the project site to avoid vehicle-reversing maneuvers onto public roadways.

4. Provide sufficient turning radii at all project roadways to avoid or minimize vehicle encroachments to oncoming traffic lanes.

5. Provide an exclusive right-turn lane and shared left-turn and through lane on the access road approach from the high school at the intersection with Piilani Highway. The layout and dimension of these lanes should be determined during the design phase of the project.

6. Provide a channelized northbound deceleration lane along Piilani Highway at the intersection with the access road for the high school. The layout and dimension of these lanes should be determined during the design phase of the project.

7. Provide a channelized northbound acceleration lane along Piilani Highway at the intersection with the access road for the high school. The layout and dimension of these lanes should be determined during the design phase of the project.

8. Provide an exclusive southbound left-turn lane along Piilani Highway at the intersection with the access road for the high school. The layout and dimension of these lanes should be determined during the design phase of the project.

9. Provide two eastbound departure lanes along the access road for the high school from the intersection with Piilani Highway. The layout and dimension of these lanes should be determined during the design phase of the project.

10. Modify the eastbound approach of Kulanihakoi Street at the intersection with Piilani Highway and the access road for the high school to provide an exclusive right-turn lane and a shared left-turn and through lane. The layout and dimension of these lanes should be determined during the design phase of the project.

11. Install at traffic signal system at the intersection of Piilani Highway with Kulanihakoi Street and the access road for the high school. The layout, phasing, and timing of this signal system should be determined during the design phase of the project.

12. Prepare a Traffic Management Plan for the high school to minimize the impact of school related vehicles on the surrounding roadways. This plan should address daily school and special event traffic.

13. Consider preparing Traffic Assessment Reports periodically (every 5 years at a minimum) once the high school is opened to verify projected traffic conditions in the vicinity and assess the effectiveness of traffic management strategies implemented by the high school.

VI. CONCLUSION

High school students that reside in Kihei currently have to attend Maui High School in Kahului or Baldwin High School in Wailuku. The proposed Kihei High School will allow these students to attend a high school in their district. The proposed high school will include classrooms, support facilities, and athletic facilities to support an initial enrollment of 800 students with an ultimate enrollment of 1,650 students expected within 10 years. With the development of the proposed high school, traffic operations upon opening are expected to remain similar to without project conditions primarily due to the provision of turning lanes and a traffic signal system at the intersection of Piilani Highway with Kulanihakoi Street and the access road for the high school. By the Year 2025, traffic operations in the vicinity are expected to deteriorate slightly primarily due to ambient growth in traffic along the surrounding roadways. As such, the preparation of a Traffic Management Plan for the high school is recommended to minimize the impact of school related traffic on the surrounding roadways.

APPENDIX A

EXISTING TRAFFIC COUNT DATA

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:5671/5674
Counted By:DB and DF
Weather:Clear

File Name : KaopiiAM
Site Code : 00000006
Start Date : 1/26/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					Kainoulu Street Westbound					Piilani Highway Northbound					Kainoulu Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	114	2	0	116	0	0	0	0	0	4	106	0	0	110	3	0	5	0	8	234
06:15 AM	0	180	5	0	185	0	0	0	0	0	1	131	0	0	132	9	0	16	0	25	342
06:30 AM	0	209	0	0	209	0	0	0	0	0	5	222	0	0	227	3	0	17	0	20	456
06:45 AM	0	235	7	0	242	0	0	0	0	0	8	282	0	0	290	6	0	33	0	39	571
Total	0	738	14	0	752	0	0	0	0	0	18	741	0	0	759	21	0	71	0	92	1603
07:00 AM	0	268	0	0	268	0	0	0	0	0	11	292	0	0	303	7	0	29	0	36	607
07:15 AM	0	393	6	0	399	0	0	0	0	0	11	328	0	0	339	6	0	63	0	69	807
07:30 AM	0	403	4	0	407	0	0	0	0	0	18	341	0	0	359	10	0	61	0	71	837
07:45 AM	0	327	4	0	331	0	0	0	0	0	21	335	0	0	356	5	0	42	0	47	734
Total	0	1391	14	0	1405	0	0	0	0	0	61	1296	0	0	1357	28	0	195	0	223	2985
08:00 AM	0	345	2	0	347	0	0	0	0	0	11	299	0	0	310	7	0	45	0	52	709
08:15 AM	0	286	5	0	291	0	0	0	0	0	13	258	0	0	271	8	0	37	0	45	607
08:30 AM	0	270	6	0	276	0	0	0	0	0	13	329	0	0	342	4	0	31	0	35	653
08:45 AM	0	267	7	0	274	0	0	0	0	0	11	296	0	0	307	7	0	40	0	47	628
Total	0	1168	20	0	1188	0	0	0	0	0	48	1182	0	0	1230	26	0	153	0	179	2597
Grand Total	0	3297	48	0	3345	0	0	0	0	0	127	3219	0	0	3346	75	0	419	0	494	7185
Apprch %	0	98.6	1.4	0		0	0	0	0		3.8	96.2	0	0		15.2	0	84.8	0		
Total %	0	45.9	0.7	0	46.6	0	0	0	0	0	1.8	44.8	0	0	46.6	1	0	5.8	0	6.9	

	Piilani Highway Southbound					Kainoulu Street Westbound					Piilani Highway Northbound					Kainoulu Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	393	**6**	0	399	0	0	0	0	0	11	328	0	0	339	6	0	**63**	0	69	807
07:30 AM	0	**403**	4	0	**407**	0	0	0	0	0	18	**341**	0	0	**359**	**10**	0	61	0	**71**	**837**
07:45 AM	0	327	4	0	331	0	0	0	0	0	**21**	335	0	0	356	5	0	42	0	47	734
08:00 AM	0	345	2	0	347	0	0	0	0	0	11	299	0	0	310	7	0	45	0	52	709
Total Volume	0	1468	16	0	1484	0	0	0	0	0	61	1303	0	0	1364	28	0	211	0	239	3087
% App. Total	0	98.9	1.1	0		0	0	0	0		4.5	95.5	0	0		11.7	0	88.3	0		
PHF	.000	.911	.667	.000	.912	.000	.000	.000	.000	.000	.726	.955	.000	.000	.950	.700	.000	.837	.000	.842	.922

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
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Counter:5671, 5674
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Weather:Clear

File Name : KaopiiPM
Site Code : 00000006
Start Date : 1/26/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					Westboun d	Piilani Highway Northbound					Kaonoulu Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	340	13	0	353	0	23	328	0	0	351	6	0	31	0	37	741
02:15 PM	0	312	11	0	323	0	22	438	0	0	460	7	0	25	0	32	815
02:30 PM	0	306	10	0	316	0	28	471	0	0	499	3	0	37	0	40	855
02:45 PM	0	352	9	0	361	0	38	393	0	0	431	1	0	67	0	68	860
Total	0	1310	43	0	1353	0	111	1630	0	0	1741	17	0	160	0	177	3271
03:00 PM	0	414	9	0	423	0	17	351	0	0	368	3	0	27	0	30	821
03:15 PM	0	388	12	0	400	0	19	387	0	0	406	4	0	30	0	34	840
03:30 PM	0	393	12	0	405	0	27	433	0	0	460	7	0	29	0	36	901
03:45 PM	0	401	4	0	405	0	36	335	0	0	371	5	0	33	0	38	814
Total	0	1596	37	0	1633	0	99	1506	0	0	1605	19	0	119	0	138	3376
04:00 PM	0	456	16	0	472	0	23	346	0	0	369	3	0	23	0	26	867
04:15 PM	0	367	8	0	375	0	28	431	0	0	459	8	0	19	0	27	861
04:30 PM	0	379	11	0	390	0	32	371	0	0	403	6	0	36	0	42	835
04:45 PM	0	395	13	0	408	0	22	265	0	0	287	3	0	30	0	33	728
Total	0	1597	48	0	1645	0	105	1413	0	0	1518	20	0	108	0	128	3291
05:00 PM	0	363	12	0	375	0	30	320	0	0	350	4	0	22	0	26	751
05:15 PM	0	369	11	0	380	0	18	328	0	0	346	5	0	26	0	31	757
05:30 PM	0	305	13	0	318	0	22	294	0	0	316	7	0	30	0	37	671
05:45 PM	0	318	10	0	328	0	18	223	0	0	241	4	0	32	0	36	605
Total	0	1355	46	0	1401	0	88	1165	0	0	1253	20	0	110	0	130	2784
Grand Total	0	5858	174	0	6032	0	403	5714	0	0	6117	76	0	497	0	573	12722
Apprch %	0	97.1	2.9	0			6.6	93.4	0	0		13.3	0	86.7	0		
Total %	0	46	1.4	0	47.4	0	3.2	44.9	0	0	48.1	0.6	0	3.9	0	4.5	

	Piilani Highway Southbound					Westboun d	Piilani Highway Northbound					Kaonoulu Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	0	393	12	0	405	0	27	**433**	0	0	**460**	7	0	29	0	36	**901**
03:45 PM	0	401	4	0	405	0	**36**	335	0	0	371	5	0	**33**	0	**38**	814
04:00 PM	0	**456**	**16**	0	**472**	0	23	346	0	0	369	3	0	23	0	26	867
04:15 PM	0	367	8	0	375	0	28	431	0	0	459	**8**	0	19	0	27	861
Total Volume	0	1617	40	0	1657	0	114	1545	0	0	1659	23	0	104	0	127	3443
% App. Total	0	97.6	2.4	0			6.9	93.1	0	0		18.1	0	81.9	0		
PHF	.000	.887	.625	.000	.878	.000	.792	.892	.000	.000	.902	.719	.000	.788	.000	.836	.955

Wilson Okamoto Corporation
1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:3890/5675
Counted By:SH and NH
Weather:Clear

File Name : KulpiiAM
Site Code : 00000007
Start Date : 1/26/2011
Page No : 1

Groups Printed- Unshifted

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Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	104	2	0	106	0	0	0	0	0	3	100	0	0	103	11	0	9	0	20	229
06:15 AM	0	176	4	0	180	0	0	0	0	0	2	125	0	0	127	8	0	14	0	22	329
06:30 AM	0	236	3	0	239	0	0	0	0	0	1	214	0	0	215	14	0	10	0	24	478
06:45 AM	0	239	8	0	247	0	0	0	0	0	5	263	0	0	268	19	0	12	0	31	546
Total	0	755	17	0	772	0	0	0	0	0	11	702	0	0	713	52	0	45	0	97	1582
07:00 AM	0	264	6	0	270	0	0	0	0	0	7	296	0	0	303	10	0	27	0	37	610
07:15 AM	0	443	6	0	449	0	0	0	0	0	8	323	0	0	331	19	0	38	0	57	837
07:30 AM	0	437	12	0	449	0	0	0	0	0	8	334	0	0	342	21	0	40	0	61	852
07:45 AM	0	390	7	0	397	0	0	0	0	0	21	330	0	0	351	16	0	31	0	47	795
Total	0	1534	31	0	1565	0	0	0	0	0	44	1283	0	0	1327	66	0	136	0	202	3094
08:00 AM	0	355	21	0	376	0	0	0	0	0	12	284	0	0	296	16	0	26	0	42	714
08:15 AM	0	344	13	0	357	0	0	0	0	0	16	250	0	0	266	9	0	38	0	47	670
08:30 AM	0	285	11	0	296	0	0	0	0	0	11	297	0	0	308	22	0	28	0	50	654
08:45 AM	0	299	19	0	318	0	0	0	0	0	11	235	0	0	246	39	0	26	0	65	629
Total	0	1283	64	0	1347	0	0	0	0	0	50	1066	0	0	1116	86	0	118	0	204	2667
Grand Total	0	3572	112	0	3684	0	0	0	0	0	105	3051	0	0	3156	204	0	299	0	503	7343
Apprch %	0	97	3	0		0	0	0	0		3.3	96.7	0	0		40.6	0	59.4	0		
Total %	0	48.6	1.5	0	50.2	0	0	0	0	0	1.4	41.5	0	0	43	2.8	0	4.1	0	6.9	

	Piilani Highway Southbound					Kulanihakoi Street Westbound					Piilani Highway Northbound					Kulanihakoi Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	**443**	6	0	**449**	0	0	0	0	0	8	323	0	0	331	19	0	38	0	57	837
07:30 AM	0	437	12	0	449	0	0	0	0	0	8	**334**	0	0	342	**21**	0	**40**	0	**61**	**852**
07:45 AM	0	390	7	0	397	0	0	0	0	0	**21**	330	0	0	**351**	16	0	31	0	47	795
08:00 AM	0	355	**21**	0	376	0	0	0	0	0	12	284	0	0	296	16	0	26	0	42	714
Total Volume	0	1625	46	0	1671	0	0	0	0	0	49	1271	0	0	1320	72	0	135	0	207	3198
% App. Total	0	97.2	2.8	0		0	0	0	0		3.7	96.3	0	0		34.8	0	65.2	0		
PHF	.000	.917	.548	.000	.930	.000	.000	.000	.000	.000	.583	.951	.000	.000	.940	.857	.000	.844	.000	.848	.938

Wilson Okamoto Corporation
1907 S. Beretania Street Suite 400
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Counter:3890/5675
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Groups Printed- Unshifted

	Piilani Highway Southbound					Kulanihakoi Street Westbound					Piilani Highway Northbound					Kulanihakoi Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	328	24	0	352	0	0	0	0	0	11	311	0	0	322	30	0	21	0	51	725
02:15 PM	0	387	24	0	411	0	0	0	0	0	13	403	0	0	416	29	0	14	0	43	870
02:30 PM	0	365	29	0	394	0	0	0	0	0	16	392	0	0	408	36	0	16	0	52	854
02:45 PM	0	416	30	0	446	0	0	0	0	0	10	405	0	0	415	39	0	37	0	76	937
Total	0	1496	107	0	1603	0	0	0	0	0	50	1511	0	0	1561	134	0	88	0	222	3386
03:00 PM	0	414	29	0	443	0	0	0	0	0	12	325	0	0	337	23	0	19	0	42	822
03:15 PM	0	408	20	0	428	0	0	0	0	0	16	398	0	0	414	7	0	19	0	26	868
03:30 PM	0	393	18	0	411	0	0	0	0	0	17	413	0	0	430	7	0	31	0	38	879
03:45 PM	0	403	29	0	432	0	0	0	0	0	13	418	0	0	431	9	0	31	0	40	903
Total	0	1618	96	0	1714	0	0	0	0	0	58	1554	0	0	1612	46	0	100	0	146	3472
04:00 PM	0	469	23	0	492	0	0	0	0	0	19	344	0	0	363	7	0	18	0	25	880
04:15 PM	0	347	28	0	375	0	0	0	0	0	19	438	0	0	457	6	0	23	0	29	861
04:30 PM	0	404	25	0	429	0	0	0	0	0	17	448	0	0	465	6	0	21	0	27	921
04:45 PM	0	376	25	0	401	0	0	0	0	0	20	310	0	0	330	9	0	27	0	36	767
Total	0	1596	101	0	1697	0	0	0	0	0	75	1540	0	0	1615	28	0	89	0	117	3429
05:00 PM	0	386	22	0	408	0	0	0	0	0	10	311	0	0	321	9	0	18	0	27	756
05:15 PM	0	390	26	0	416	0	0	0	0	0	17	363	0	0	380	8	0	33	0	41	837
05:30 PM	0	317	18	0	335	0	0	0	0	0	23	291	0	0	314	12	0	22	0	34	683
05:45 PM	0	330	27	0	357	0	0	0	0	0	27	271	0	0	298	7	0	23	0	30	685
Total	0	1423	93	0	1516	0	0	0	0	0	77	1236	0	0	1313	36	0	96	0	132	2961
06:00 PM	0	0	0	0	0	0	0	0	0	0	5	65	0	0	70	0	0	0	0	0	70
Grand Total	0	6133	397	0	6530	0	0	0	0	0	265	5906	0	0	6171	244	0	373	0	617	13318
Apprch %	0	93.9	6.1	0		0	0	0	0		4.3	95.7	0	0		39.5	0	60.5	0		
Total %	0	46.1	3	0	49	0	0	0	0	0	2	44.3	0	0	46.3	1.8	0	2.8	0	4.6	

	Piilani Highway Southbound					Kulanihakoi Street Westbound					Piilani Highway Northbound					Kulanihakoi Street Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	0	403	**29**	0	432	0	0	0	0	0	13	418	0	0	431	**9**	0	**31**	0	**40**	903
04:00 PM	0	**469**	23	0	**492**	0	0	0	0	0	**19**	344	0	0	363	7	0	18	0	25	880
04:15 PM	0	347	28	0	375	0	0	0	0	0	19	438	0	0	457	6	0	23	0	29	861
04:30 PM	0	404	25	0	429	0	0	0	0	0	17	**448**	0	0	**465**	6	0	21	0	27	**921**
Total Volume	0	1623	105	0	1728	0	0	0	0	0	68	1648	0	0	1716	28	0	93	0	121	3565
% App. Total	0	93.9	6.1	0		0	0	0	0		4	96	0	0		23.1	0	76.9	0		
PHF	.000	.865	.905	.000	.878	.000	.000	.000	.000	.000	.895	.920	.000	.000	.923	.778	.000	.750	.000	.756	.968

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:D4-5671, D4-5672
Counted By:JS, TT
Weather:Clear

File Name : WaipiiAM
Site Code : 00000009
Start Date : 1/27/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					Westbound	Northbound	E. Waipuilani Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	115	2	0	117	0	0	0	0	4	0	4	121
06:15 AM	0	170	2	0	172	0	0	0	0	3	0	3	175
06:30 AM	0	173	5	0	178	0	0	0	0	6	0	6	184
06:45 AM	0	223	5	0	228	0	0	0	0	5	0	5	233
Total	0	681	14	0	695	0	0	0	0	18	0	18	713
07:00 AM	0	295	11	0	306	0	0	0	0	4	0	4	310
07:15 AM	0	427	21	0	448	0	0	0	0	7	0	7	455
07:30 AM	0	418	23	0	441	0	0	0	0	5	0	5	446
07:45 AM	0	390	21	0	411	0	0	0	0	1	0	1	412
Total	0	1530	76	0	1606	0	0	0	0	17	0	17	1623
08:00 AM	0	347	16	0	363	0	0	0	0	10	0	10	373
08:15 AM	0	320	18	0	338	0	0	0	0	5	0	5	343
08:30 AM	0	259	9	0	268	0	0	0	0	15	0	15	283
08:45 AM	0	297	18	0	315	0	0	0	0	9	0	9	324
Total	0	1223	61	0	1284	0	0	0	0	39	0	39	1323
Grand Total	0	3434	151	0	3585	0	0	0	0	74	0	74	3659
Apprch %	0	95.8	4.2	0				0	0	100	0		
Total %	0	93.9	4.1	0	98	0	0	0	0	2	0	2	

	Piilani Highway Southbound				Westbound	Northbound	E. Waipuilani Road Eastbound				
Start Time	Left	Thru	Right	App. Total	App. Total	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 07:15 AM											
07:15 AM	0	**427**	21	**448**	0	0	0	0	7	7	**455**
07:30 AM	0	418	**23**	441	0	0	0	0	5	5	446
07:45 AM	0	390	21	411	0	0	0	0	1	1	412
08:00 AM	0	347	16	363	0	0	0	0	**10**	**10**	373
Total Volume	0	1582	81	1663	0	0	0	0	23	23	1686
% App. Total	0	95.1	4.9				0	0	100		
PHF	.000	.926	.880	.928	.000	.000	.000	.000	.575	.575	.926

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:5671/5672
Counted By:JS, TT
Weather:Clear

File Name : WaipiiPM
Site Code : 00000009
Start Date : 1/27/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					E. Waipuilani Road Westbound					Piilani Highway Northbound					E. Waipuilani Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	314	21	0	335	0	0	0	0	0	0	381	0	0	381	0	0	6	0	6	722
02:15 PM	0	355	21	0	376	0	0	0	0	0	0	547	0	0	547	0	0	6	0	6	929
02:30 PM	0	363	27	0	390	0	0	0	0	0	0	697	0	0	697	0	0	14	0	14	1101
02:45 PM	0	369	34	0	403	0	0	0	0	0	0	931	0	0	931	0	0	7	0	7	1341
Total	0	1401	103	0	1504	0	0	0	0	0	0	2556	0	0	2556	0	0	33	0	33	4093
03:00 PM	0	422	29	0	451	0	0	0	0	0	0	655	0	0	655	0	0	6	0	6	1112
03:15 PM	0	385	23	0	408	0	0	0	0	0	0	515	0	0	515	0	0	9	0	9	932
03:30 PM	0	403	27	0	430	0	0	0	0	0	0	616	0	0	616	0	0	11	0	11	1057
03:45 PM	0	395	24	0	419	0	0	0	0	0	0	426	0	0	426	0	0	7	0	7	852
Total	0	1605	103	0	1708	0	0	0	0	0	0	2212	0	0	2212	0	0	33	0	33	3953
04:00 PM	0	360	28	0	388	0	0	0	0	0	0	587	0	0	587	0	0	15	0	15	990
04:15 PM	0	357	18	0	375	0	0	0	0	0	0	481	0	0	481	0	0	7	0	7	863
04:30 PM	0	368	30	0	398	0	0	0	0	0	0	481	0	0	481	0	0	3	0	3	882
04:45 PM	0	374	37	0	411	0	0	0	0	0	0	397	0	0	397	0	0	6	0	6	814
Total	0	1459	113	0	1572	0	0	0	0	0	0	1946	0	0	1946	0	0	31	0	31	3549
05:00 PM	0	396	36	0	432	0	0	0	0	0	0	383	0	0	383	0	0	5	0	5	820
05:15 PM	0	395	28	0	423	0	0	0	0	0	0	348	0	0	348	0	0	10	0	10	781
05:30 PM	0	321	33	0	354	0	0	0	0	0	0	397	0	0	397	0	0	3	0	3	754
05:45 PM	0	363	32	0	395	0	0	0	0	0	0	0	0	0	0	0	0	15	0	15	410
Total	0	1475	129	0	1604	0	0	0	0	0	0	1128	0	0	1128	0	0	33	0	33	2765
Grand Total	0	5940	448	0	6388	0	0	0	0	0	0	7842	0	0	7842	0	0	130	0	130	14360
Apprch %	0	93	7	0		0	0	0	0		0	100	0	0		0	0	100	0		
Total %	0	41.4	3.1	0	44.5	0	0	0	0	0	0	54.6	0	0	54.6	0	0	0.9	0	0.9	

	Piilani Highway Southbound					E. Waipuilani Road Westbound					Piilani Highway Northbound					E. Waipuilani Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:30 PM																					
02:30 PM	0	363	27	0	390	0	0	0	0	0	0	697	0	0	697	0	0	**14**	0	**14**	1101
02:45 PM	0	369	**34**	0	403	0	0	0	0	0	0	**931**	0	0	**931**	0	0	7	0	7	**1341**
03:00 PM	0	**422**	29	0	**451**	0	0	0	0	0	0	655	0	0	655	0	0	6	0	6	1112
03:15 PM	0	385	23	0	408	0	0	0	0	0	0	515	0	0	515	0	0	9	0	9	932
Total Volume	0	1539	113	0	1652	0	0	0	0	0	0	2798	0	0	2798	0	0	36	0	36	4486
% App. Total	0	93.2	6.8	0		0	0	0	0		0	100	0	0		0	0	100	0		
PHF	.000	.912	.831	.000	.916	.000	.000	.000	.000	.000	.000	.751	.000	.000	.751	.000	.000	.643	.000	.643	.836

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:3889/5674
Counted By:DF and BB
Weather:Clear

File Name : PiipiiAM
Site Code : 00000010
Start Date : 1/27/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					Westboun d	Piilani Highway Northbound					Piikea Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 AM	0	80	24	0	104	0	4	81	0	0	85	20	0	13	0	33	222
06:15 AM	0	164	27	0	191	0	14	105	0	0	119	26	0	5	0	31	341
06:30 AM	0	194	29	0	223	0	10	167	0	0	177	28	0	20	0	48	448
06:45 AM	0	210	45	0	255	0	19	213	0	0	232	48	0	15	0	63	550
Total	0	648	125	0	773	0	47	566	0	0	613	122	0	53	0	175	1561
07:00 AM	0	240	61	0	301	0	19	251	0	0	270	43	0	19	0	62	633
07:15 AM	0	359	72	0	431	0	20	314	0	0	334	67	0	22	0	89	854
07:30 AM	0	365	98	0	407	0	33	270	0	0	303	66	0	40	0	106	872
07:45 AM	0	328	79	0	407	0	33	249	0	0	282	89	0	30	0	119	808
Total	0	1292	310	0	1602	0	105	1084	0	0	1189	265	0	111	0	376	3167
08:00 AM	0	310	68	0	378	0	37	220	0	0	257	72	0	41	0	113	748
08:15 AM	0	285	70	0	355	0	34	196	0	0	230	68	0	40	0	108	693
08:30 AM	0	226	65	0	291	0	50	218	0	0	268	62	0	33	0	95	654
08:45 AM	0	238	76	0	314	0	43	208	0	0	251	62	0	40	0	102	667
Total	0	1059	279	0	1338	0	164	842	0	0	1006	264	0	154	0	418	2762
Grand Total	0	2999	714	0	3713	0	316	2492	0	0	2808	651	0	318	0	969	7490
Apprch %	0	80.8	19.2	0			11.3	88.7	0	0		67.2	0	32.8	0		
Total %	0	40	9.5	0	49.6	0	4.2	33.3	0	0	37.5	8.7	0	4.2	0	12.9	

	Piilani Highway Southbound					Westboun d	Piilani Highway Northbound					Piikea Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	359	72	0	431	0	20	**314**	0	0	**334**	67	0	22	0	89	854
07:30 AM	0	**365**	**98**	0	**463**	0	33	270	0	0	303	66	0	40	0	106	**872**
07:45 AM	0	328	79	0	407	0	33	249	0	0	282	**89**	0	30	0	**119**	808
08:00 AM	0	310	68	0	378	0	**37**	220	0	0	257	72	0	**41**	0	113	748
Total Volume	0	1362	317	0	1679	0	123	1053	0	0	1176	294	0	133	0	427	3282
% App. Total	0	81.1	18.9	0			10.5	89.5	0	0		68.9	0	31.1	0		
PHF	.000	.933	.809	.000	.907	.000	.831	.838	.000	.000	.880	.826	.000	.811	.000	.897	.941

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:D4-3889, D4-5674
Counted By:DF, BB
Weather:Clear

File Name : PiipiiPM
Site Code : 00000010
Start Date : 1/27/2011
Page No : 1

Groups Printed- Unshifted

	Piilani Highway Southbound					Westboun d	Piilani Highway Northbound					Piikea Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
02:00 PM	0	218	80	0	298	0	65	317	0	0	382	83	0	68	0	151	831
02:15 PM	0	279	103	0	382	0	60	342	0	0	402	82	0	69	0	151	935
02:30 PM	0	325	99	0	424	0	68	315	0	0	383	88	0	79	0	167	974
02:45 PM	0	282	106	0	388	0	85	327	0	0	412	87	0	69	0	156	956
Total	0	1104	388	0	1492	0	278	1301	0	0	1579	340	0	285	0	625	3696
03:00 PM	0	330	83	0	413	0	51	332	0	0	383	55	0	70	0	125	921
03:15 PM	0	305	104	0	409	0	64	358	0	0	422	76	0	75	0	151	982
03:30 PM	0	321	90	0	411	0	59	355	0	0	414	69	0	91	0	160	985
03:45 PM	0	299	96	0	395	0	62	316	0	0	378	75	0	79	0	154	927
Total	0	1255	373	0	1628	0	236	1361	0	0	1597	275	0	315	0	590	3815
04:00 PM	0	268	97	0	365	0	55	354	0	0	409	60	0	76	0	136	910
04:15 PM	0	308	79	0	387	0	68	349	0	0	417	69	0	57	0	126	930
04:30 PM	0	279	88	0	367	0	48	336	0	0	384	65	0	65	0	130	881
04:45 PM	0	284	94	0	378	0	55	232	0	0	287	58	0	67	0	125	790
Total	0	1139	358	0	1497	0	226	1271	0	0	1497	252	0	265	0	517	3511
05:00 PM	0	240	75	0	315	0	46	326	0	0	372	55	0	78	0	133	820
05:15 PM	0	276	124	0	400	0	57	256	0	0	313	70	0	74	0	144	857
05:30 PM	0	244	91	0	335	0	42	232	0	0	274	66	0	63	0	129	738
05:45 PM	0	196	104	0	300	0	0	0	0	0	0	60	0	66	0	126	426
Total	0	956	394	0	1350	0	145	814	0	0	959	251	0	281	0	532	2841
Grand Total	0	4454	1513	0	5967	0	885	4747	0	0	5632	1118	0	1146	0	2264	13863
Apprch %	0	74.6	25.4	0			15.7	84.3	0	0		49.4	0	50.6	0		
Total %	0	32.1	10.9	0	43	0	6.4	34.2	0	0	40.6	8.1	0	8.3	0	16.3	

	Piilani Highway Southbound					Westbound	Piilani Highway Northbound					Piikea Avenue Eastbound					
Start Time	Left	Thru	Right		App. Total	App. Total	Left	Thru	Right		App. Total	Left	Thru	Right		App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:45 PM																	
02:45 PM	0	282	**106**		388	0	**85**	327	0		412	**87**	0	69		156	956
03:00 PM	0	**330**	83		**413**	0	51	332	0		383	55	0	70		125	921
03:15 PM	0	305	104		409	0	64	**358**	0		**422**	76	0	75		151	982
03:30 PM	0	321	90		411	0	59	355	0		414	69	0	**91**		**160**	**985**
Total Volume	0	1238	383		1621	0	259	1372	0		1631	287	0	305		592	3844
% App. Total	0	76.4	23.6				15.9	84.1	0			48.5	0	51.5			
PHF	.000	.938	.903		.981	.000	.762	.958	.000		.966	.825	.000	.838		.925	.976

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:5676/5672
Counted By:BB and LM
Weather:Clear

File Name : KulkieAM
Site Code : 00000000
Start Date : 1/26/2011
Page No : 1

Groups Printed- Unshifted

	S. Kihei Road Southbound					Kulanihakoi Street Westbound					S. Kihei Road Northbound					Eastbound	
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	App. Total	Int. Total
06:00 AM	0	17	0	1	18	0	0	5	0	5	0	38	0	0	38	0	61
06:15 AM	1	33	0	1	35	3	0	8	0	11	0	47	0	0	47	0	93
06:30 AM	1	47	0	4	52	3	0	5	3	11	0	69	5	0	74	0	137
06:45 AM	2	66	0	0	68	8	0	13	1	22	0	89	6	0	95	0	185
Total	4	163	0	6	173	14	0	31	4	49	0	243	11	0	254	0	476
07:00 AM	1	46	0	1	48	10	0	16	3	29	0	98	6	0	104	0	181
07:15 AM	4	84	0	0	88	10	0	12	4	26	0	93	9	0	102	0	216
07:30 AM	4	81	0	0	85	11	0	18	4	33	0	104	10	0	114	0	232
07:45 AM	2	83	0	0	85	8	0	13	8	29	0	111	14	0	125	0	239
Total	11	294	0	1	306	39	0	59	19	117	0	406	39	0	445	0	868
08:00 AM	11	76	0	1	88	14	0	17	4	35	0	112	14	0	126	0	249
08:15 AM	5	80	0	0	85	13	0	15	6	34	0	85	7	2	94	0	213
08:30 AM	13	64	0	0	77	10	0	15	4	29	0	83	13	2	98	0	204
08:45 AM	12	60	0	2	74	13	0	5	8	26	0	70	34	1	105	0	205
Total	41	280	0	3	324	50	0	52	22	124	0	350	68	5	423	0	871
Grand Total	56	737	0	10	803	103	0	142	45	290	0	999	118	5	1122	0	2215
Apprch %	7	91.8	0	1.2		35.5	0	49	15.5		0	89	10.5	0.4			
Total %	2.5	33.3	0	0.5	36.3	4.7	0	6.4	2	13.1	0	45.1	5.3	0.2	50.7	0	

	S. Kihei Road Southbound					Kulanihakoi Street Westbound					S. Kihei Road Northbound					Eastbound	
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	4	**84**	0	0	**88**	10	0	12	4	26	0	93	9	0	102	0	216
07:30 AM	4	81	0	0	85	11	0	**18**	4	33	0	104	10	0	114	0	232
07:45 AM	2	83	0	0	85	8	0	13	**8**	29	0	111	**14**	0	125	0	239
08:00 AM	**11**	76	0	**1**	88	**14**	0	17	4	**35**	0	**112**	14	0	**126**	0	**249**
Total Volume	21	324	0	1	346	43	0	60	20	123	0	420	47	0	467	0	936
% App. Total	6.1	93.6	0	0.3		35	0	48.8	16.3		0	89.9	10.1	0			
PHF	.477	.964	.000	.250	.983	.768	.000	.833	.625	.879	.000	.938	.839	.000	.927	.000	.940

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counmter:5676/5672
Counted By:BB and LM
Weather:Clear

File Name : KulkiePM
Site Code : 00000000
Start Date : 1/26/2011
Page No : 1

Groups Printed- Unshifted

	S. Kihei Road Southbound					Kulanihakoi Street Westbound					S. Kihei Road Northbound					Eastbound	
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	App. Total	Int. Total
02:00 PM	3	49	0	0	52	11	0	14	4	29	0	88	28	3	119	0	200
02:15 PM	8	89	0	0	97	12	0	10	3	25	0	78	21	0	99	0	221
02:30 PM	6	78	0	0	84	20	0	8	3	31	0	100	34	2	136	0	251
02:45 PM	20	108	0	0	128	15	0	12	1	28	0	75	35	3	113	0	269
Total	37	324	0	0	361	58	0	44	11	113	0	341	118	8	467	0	941
03:00 PM	5	105	0	0	110	10	0	10	7	27	0	130	17	3	150	0	287
03:15 PM	6	99	0	0	105	7	0	15	4	26	0	135	10	0	145	0	276
03:30 PM	11	108	0	0	119	11	0	13	2	26	0	158	21	3	182	0	327
03:45 PM	5	136	0	0	141	20	0	7	2	29	0	147	11	0	158	0	328
Total	27	448	0	0	475	48	0	45	15	108	0	570	59	6	635	0	1218
04:00 PM	7	114	0	0	121	7	0	4	1	12	0	126	12	0	138	0	271
04:15 PM	5	89	0	0	94	14	0	7	2	23	0	142	14	1	157	0	274
04:30 PM	6	108	0	0	114	15	0	9	2	26	0	143	16	1	160	0	300
04:45 PM	7	132	0	0	139	13	0	14	4	31	0	133	17	2	152	0	322
Total	25	443	0	0	468	49	0	34	9	92	0	544	59	4	607	0	1167
05:00 PM	8	125	0	0	133	5	0	15	2	22	0	145	15	1	161	0	316
05:15 PM	6	106	0	0	112	11	0	6	9	26	0	134	22	8	164	0	302
05:30 PM	10	109	0	0	119	13	0	8	5	26	0	117	20	0	137	0	282
05:45 PM	4	94	0	0	98	17	0	12	2	31	0	128	14	2	144	0	273
Total	28	434	0	0	462	46	0	41	18	105	0	524	71	11	606	0	1173
Grand Total	117	1649	0	0	1766	201	0	164	53	418	0	1979	307	29	2315	0	4499
Apprch %	6.6	93.4	0	0		48.1	0	39.2	12.7		0	85.5	13.3	1.3			
Total %	2.6	36.7	0	0	39.3	4.5	0	3.6	1.2	9.3	0	44	6.8	0.6	51.5	0	

	S. Kihei Road Southbound					Kulanihakoi Street Westbound					S. Kihei Road Northbound					Eastbound	
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	6	108	0	0	114	**15**	0	9	2	26	0	143	16	1	160	0	300
04:45 PM	7	**132**	0	0	**139**	13	0	14	4	**31**	0	133	17	2	152	0	**322**
05:00 PM	**8**	125	0	0	133	5	0	**15**	2	22	0	**145**	15	1	161	0	316
05:15 PM	6	106	0	0	112	11	0	6	**9**	26	0	134	**22**	**8**	**164**	0	302
Total Volume	27	471	0	0	498	44	0	44	17	105	0	555	70	12	637	0	1240
% App. Total	5.4	94.6	0	0		41.9	0	41.9	16.2		0	87.1	11	1.9			
PHF	.844	.892	.000	.000	.896	.733	.000	.733	.472	.847	.000	.957	.795	.375	.971	.000	.963

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS) for signalized intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically a 15-min analysis period. The criteria are given in the following table.

Table 1: Level-of-Service Criteria for Signalized Intersections

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

Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group.

Level of Service A describes operations with low control delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.

Level of Service B describes operations with control delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.

Level of Service C describes operations with control delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

Level of Service D describes operations with control delay greater than 35 and up to 55 sec per vehicle. At level of service D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

"Highway Capacity Manual," Transportation Research Board, 2000.

Level of Service E describes operation with control delay greater than 55 and up to 80 sec per vehicle. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

Level of Service F describes operations with control delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service (LOS) criteria are given in Table 1. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in the queue.

The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. If the degree of saturation is greater than about 0.9, average control delay is significantly affected by the length of the analysis period.

Table 1: Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (Sec/Veh)
A	≤10.0
B	>10.0 and ≤15.0
C	>15.0 and ≤25.0
D	>25.0 and ≤35.0
E	>35.0 and ≤50.0
F	>50.0

"Highway Capacity Manual," Transportation Research Board, 2000.

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	28	209	61	1306	1458	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	33	249	64	1375	1602	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2418	801	1602			
vC1, stage 1 conf vol	1602					
vC2, stage 2 conf vol	816					
vCu, unblocked vol	2418	801	1602			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	86	54	84			
cM capacity (veh/h)	245	538	404			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	33	249	64	687	687	801	801	18
Volume Left	33	0	64	0	0	0	0	0
Volume Right	0	249	0	0	0	0	0	18
cSH	245	538	404	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.46	0.16	0.40	0.40	0.47	0.47	0.01
Queue Length 95th (ft)	12	60	14	0	0	0	0	0
Control Delay (s)	22.0	17.3	15.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	C	C					
Approach Delay (s)	17.9		0.7			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	22	107	118	1475	1547	107
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	28	135	136	1695	1778	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2897	889	1778			
vC1, stage 1 conf vol	1778					
vC2, stage 2 conf vol	1119					
vCu, unblocked vol	2897	889	1778			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	84	72	61			
cM capacity (veh/h)	172	478	345			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	135	136	848	848	889	889	123
Volume Left	28	0	136	0	0	0	0	0
Volume Right	0	135	0	0	0	0	0	123
cSH	172	478	345	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.28	0.39	0.50	0.50	0.52	0.52	0.07
Queue Length 95th (ft)	14	29	45	0	0	0	0	0
Control Delay (s)	29.9	15.5	22.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	17.9		1.6			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	72	135	49	1295	1621	46
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.94	0.94	0.93	0.93
Hourly flow rate (vph)	85	159	52	1378	1743	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2536	872	1743			
vC1, stage 1 conf vol	1743					
vC2, stage 2 conf vol	793					
vCu, unblocked vol	2536	872	1743			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	61	68	85			
cM capacity (veh/h)	218	489	357			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	159	52	689	689	872	872	49
Volume Left	85	0	52	0	0	0	0	0
Volume Right	0	159	0	0	0	0	0	49
cSH	218	489	357	1700	1700	1700	1700	1700
Volume to Capacity	0.39	0.32	0.15	0.41	0.41	0.51	0.51	0.03
Queue Length 95th (ft)	43	35	13	0	0	0	0	0
Control Delay (s)	31.6	15.9	16.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	21.3		0.6			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	28	93	68	1565	1549	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.76	0.76	0.92	0.92	0.88	0.88
Hourly flow rate (vph)	37	122	74	1701	1760	119
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2759	880	1760			
vC1, stage 1 conf vol	1760					
vC2, stage 2 conf vol	998					
vCu, unblocked vol	2759	880	1760			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	82	75	79			
cM capacity (veh/h)	201	484	351			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	37	122	74	851	851	880	880	119
Volume Left	37	0	74	0	0	0	0	0
Volume Right	0	122	0	0	0	0	0	119
cSH	201	484	351	1700	1700	1700	1700	1700
Volume to Capacity	0.18	0.25	0.21	0.50	0.50	0.52	0.52	0.07
Queue Length 95th (ft)	16	25	20	0	0	0	0	0
Control Delay (s)	26.9	14.9	18.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	B	C					
Approach Delay (s)	17.7		0.7			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
7: E. Waipuilani & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	23	0	1344	1674	81
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.58	0.58	0.88	0.88	0.91	0.91
Hourly flow rate (vph)	0	40	0	1527	1840	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2603	920	1840			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2603	920	1840			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	91	100			
cM capacity (veh/h)	20	458	327			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	40	764	764	920	920	89
Volume Left	0	0	0	0	0	0
Volume Right	40	0	0	0	0	89
cSH	458	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.45	0.45	0.54	0.54	0.05
Queue Length 95th (ft)	7	0	0	0	0	0
Control Delay (s)	13.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	13.6	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
7: E. Waipuilani & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	32	0	1633	1542	100
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.57	0.57	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	0	56	0	1719	1606	104
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2466	803	1606			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2466	803	1606			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	90	100			
cM capacity (veh/h)	25	537	403			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	56	859	859	803	803	104
Volume Left	0	0	0	0	0	0
Volume Right	56	0	0	0	0	104
cSH	537	1700	1700	1700	1700	1700
Volume to Capacity	0.10	0.51	0.51	0.47	0.47	0.06
Queue Length 95th (ft)	9	0	0	0	0	0
Control Delay (s)	12.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.5	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	50.5%	ICU Level of Service		A
Analysis Period (min)	15			

* User Entered Value

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	133	123	1050	1376	321
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.90	0.90	0.88	0.88	0.91	0.91
Adj. Flow (vph)	327	148	140	1193	1512	353
RTOR Reduction (vph)	0	113	0	0	0	0
Lane Group Flow (vph)	327	35	140	1193	1512	353
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	28.3	28.3	14.5	80.1	60.6	118.4
Effective Green, g (s)	28.3	28.3	14.5	80.1	60.6	118.4
Actuated g/C Ratio	0.24	0.24	0.12	0.68	0.51	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	423	378	228	2520	1907	1667
v/s Ratio Prot	c0.18		c0.08	0.32	c0.41	
v/s Ratio Perm		0.02				0.21
v/c Ratio	0.77	0.09	0.61	0.47	0.79	0.21
Uniform Delay, d1	42.1	35.1	49.3	9.1	23.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.5	0.1	4.8	0.1	2.3	0.3
Delay (s)	50.6	35.2	54.1	9.3	26.1	0.3
Level of Service	D	D	D	A	C	A
Approach Delay (s)	45.8			14.0	21.2	
Approach LOS	D			B	C	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	118.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/3/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	270	277	233	1363	1200	374
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.89	0.89	0.95	0.95	0.96	0.96
Adj. Flow (vph)	303	311	245	1435	1250	390
RTOR Reduction (vph)	0	239	0	0	0	0
Lane Group Flow (vph)	303	72	245	1435	1250	390
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	25.7	25.7	20.9	75.1	49.2	110.8
Effective Green, g (s)	25.7	25.7	20.9	75.1	49.2	110.8
Actuated g/C Ratio	0.23	0.23	0.19	0.68	0.44	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	411	367	351	2525	1654	1667
v/s Ratio Prot	c0.17		c0.13	0.39	c0.34	
v/s Ratio Perm		0.05				0.23
v/c Ratio	0.74	0.20	0.70	0.57	0.76	0.23
Uniform Delay, d1	39.4	34.2	42.0	9.4	25.8	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	0.3	6.0	0.3	2.0	0.3
Delay (s)	46.2	34.5	48.0	9.7	27.8	0.3
Level of Service	D	C	D	A	C	A
Approach Delay (s)	40.3			15.2	21.3	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	21.7	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	110.8	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	71.2%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
13: Kulanihakoi &

5/3/2011

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	43	60	420	47	21	324
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.93	0.93	0.98	0.98
Hourly flow rate (vph)	52	72	452	51	21	331
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	850	477			502	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	850	477			502	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	88			98	
cM capacity (veh/h)	324	588			1062	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	52	72	502	21	331
Volume Left	52	0	0	21	0
Volume Right	0	72	51	0	0
cSH	324	588	1700	1062	1700
Volume to Capacity	0.16	0.12	0.30	0.02	0.19
Queue Length 95th (ft)	14	10	0	2	0
Control Delay (s)	18.2	12.0	0.0	8.5	0.0
Lane LOS	C	B		A	
Approach Delay (s)	14.6		0.0	0.5	
Approach LOS	B				

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	56	27	558	53	23	447
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.96	0.96	0.84	0.84
Hourly flow rate (vph)	72	35	581	55	27	532
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1196	609			636	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1196	609			636	
tC, single (s)	*5.4	*5.2			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	79	96			97	
cM capacity (veh/h)	342	784			947	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	72	35	636	27	532
Volume Left	72	0	0	27	0
Volume Right	0	35	55	0	0
cSH	342	784	1700	947	1700
Volume to Capacity	0.21	0.04	0.37	0.03	0.31
Queue Length 95th (ft)	19	3	0	2	0
Control Delay (s)	18.3	9.8	0.0	8.9	0.0
Lane LOS	C	A		A	
Approach Delay (s)	15.5		0.0	0.4	
Approach LOS	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2015 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	28	209	61	1358	1516	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	33	249	64	1429	1666	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2509	833	1666			
vC1, stage 1 conf vol	1666					
vC2, stage 2 conf vol	843					
vCu, unblocked vol	2509	833	1666			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	85	52	83			
cM capacity (veh/h)	230	515	382			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	33	249	64	715	715	833	833	18
Volume Left	33	0	64	0	0	0	0	0
Volume Right	0	249	0	0	0	0	0	18
cSH	230	515	382	1700	1700	1700	1700	1700
Volume to Capacity	0.15	0.48	0.17	0.42	0.42	0.49	0.49	0.01
Queue Length 95th (ft)	12	65	15	0	0	0	0	0
Control Delay (s)	23.3	18.3	16.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	C	C					
Approach Delay (s)	18.9		0.7			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	22	107	118	1534	1609	107
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	28	135	136	1763	1849	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	3002	925	1849			
vC1, stage 1 conf vol	1849					
vC2, stage 2 conf vol	1153					
vCu, unblocked vol	3002	925	1849			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	82	70	58			
cM capacity (veh/h)	159	455	324			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	28	135	136	882	882	925	925	123
Volume Left	28	0	136	0	0	0	0	0
Volume Right	0	135	0	0	0	0	0	123
cSH	159	455	324	1700	1700	1700	1700	1700
Volume to Capacity	0.18	0.30	0.42	0.52	0.52	0.54	0.54	0.07
Queue Length 95th (ft)	15	31	50	0	0	0	0	0
Control Delay (s)	32.4	16.2	23.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	19.0		1.7			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	72	135	49	1347	1679	46
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.94	0.94	0.93	0.93
Hourly flow rate (vph)	85	159	52	1433	1805	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2626	903	1805			
vC1, stage 1 conf vol	1805					
vC2, stage 2 conf vol	821					
vCu, unblocked vol	2626	903	1805			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	59	66	85			
cM capacity (veh/h)	205	469	337			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	159	52	716	716	903	903	49
Volume Left	85	0	52	0	0	0	0	0
Volume Right	0	159	0	0	0	0	0	49
cSH	205	469	337	1700	1700	1700	1700	1700
Volume to Capacity	0.41	0.34	0.15	0.42	0.42	0.53	0.53	0.03
Queue Length 95th (ft)	47	37	14	0	0	0	0	0
Control Delay (s)	34.5	16.6	17.6	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	22.8		0.6			0.0		
Approach LOS	C							

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	59.1%	ICU Level of Service		B
Analysis Period (min)	15			

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	28	93	68	1624	1611	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.76	0.76	0.92	0.92	0.88	0.88
Hourly flow rate (vph)	37	122	74	1765	1831	119
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2861	915	1831			
vC1, stage 1 conf vol	1831					
vC2, stage 2 conf vol	1030					
vCu, unblocked vol	2861	915	1831			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	80	73	78			
cM capacity (veh/h)	187	461	330			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	37	122	74	883	883	915	915	119
Volume Left	37	0	74	0	0	0	0	0
Volume Right	0	122	0	0	0	0	0	119
cSH	187	461	330	1700	1700	1700	1700	1700
Volume to Capacity	0.20	0.27	0.22	0.52	0.52	0.54	0.54	0.07
Queue Length 95th (ft)	18	26	21	0	0	0	0	0
Control Delay (s)	29.0	15.6	19.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	18.7		0.8			0.0		
Approach LOS	C							

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	59.2%	ICU Level of Service		B
Analysis Period (min)	15			

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	23	0	1396	1732	81
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.58	0.58	0.88	0.88	0.91	0.91
Hourly flow rate (vph)	0	40	0	1586	1903	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2696	952	1903			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2696	952	1903			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	91	100			
cM capacity (veh/h)	17	439	309			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	40	793	793	952	952	89
Volume Left	0	0	0	0	0	0
Volume Right	40	0	0	0	0	89
cSH	439	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.47	0.47	0.56	0.56	0.05
Queue Length 95th (ft)	7	0	0	0	0	0
Control Delay (s)	14.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	14.0	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		55.5%	ICU Level of Service	B
Analysis Period (min)		15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	32	0	1692	1604	100
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.57	0.57	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	0	56	0	1781	1671	104
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2561	835	1671			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2561	835	1671			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	89	100			
cM capacity (veh/h)	21	514	380			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	56	891	891	835	835	104
Volume Left	0	0	0	0	0	0
Volume Right	56	0	0	0	0	104
cSH	514	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.52	0.52	0.49	0.49	0.06
Queue Length 95th (ft)	9	0	0	0	0	0
Control Delay (s)	12.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.9	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization		52.1%	ICU Level of Service	A
Analysis Period (min)		15		

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	133	123	1102	1434	321
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.90	0.90	0.88	0.88	0.91	0.91
Adj. Flow (vph)	327	148	140	1252	1576	353
RTOR Reduction (vph)	0	113	0	0	0	0
Lane Group Flow (vph)	327	35	140	1252	1576	353
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	28.6	28.6	15.0	82.8	62.8	121.4
Effective Green, g (s)	28.6	28.6	15.0	82.8	62.8	121.4
Actuated g/C Ratio	0.24	0.24	0.12	0.68	0.52	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	417	373	230	2541	1927	1667
v/s Ratio Prot	c0.18		c0.08	0.34	c0.42	
v/s Ratio Perm		0.02				0.21
v/c Ratio	0.78	0.09	0.61	0.49	0.82	0.21
Uniform Delay, d1	43.5	36.3	50.4	9.2	24.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.3	0.1	4.5	0.2	2.8	0.3
Delay (s)	52.8	36.4	54.9	9.4	27.3	0.3
Level of Service	D	D	D	A	C	A
Approach Delay (s)	47.7			14.0	22.4	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	22.5	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	121.4	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	72.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	270	277	233	1422	1262	374
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.89	0.89	0.95	0.95	0.96	0.96
Adj. Flow (vph)	303	311	245	1497	1315	390
RTOR Reduction (vph)	0	240	0	0	0	0
Lane Group Flow (vph)	303	71	245	1497	1315	390
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	26.3	26.3	21.4	78.3	51.9	114.6
Effective Green, g (s)	26.3	26.3	21.4	78.3	51.9	114.6
Actuated g/C Ratio	0.23	0.23	0.19	0.68	0.45	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	406	363	348	2545	1687	1667
v/s Ratio Prot	c0.17		c0.13	0.40	c0.35	
v/s Ratio Perm		0.05				0.23
v/c Ratio	0.75	0.20	0.70	0.59	0.78	0.23
Uniform Delay, d1	41.0	35.6	43.6	9.6	26.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	0.3	6.3	0.4	2.4	0.3
Delay (s)	48.4	35.9	50.0	10.0	28.9	0.3
Level of Service	D	D	D	A	C	A
Approach Delay (s)	42.0			15.6	22.3	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	22.4	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.75			
Actuated Cycle Length (s)	114.6	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	72.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	43	60	437	47	21	337
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.93	0.93	0.98	0.98
Hourly flow rate (vph)	52	72	470	51	21	344
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	882	495			520	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	882	495			520	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	87			98	
cM capacity (veh/h)	310	574			1046	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	52	72	520	21	344
Volume Left	52	0	0	21	0
Volume Right	0	72	51	0	0
cSH	310	574	1700	1046	1700
Volume to Capacity	0.17	0.13	0.31	0.02	0.20
Queue Length 95th (ft)	15	11	0	2	0
Control Delay (s)	18.9	12.2	0.0	8.5	0.0
Lane LOS	C	B		A	
Approach Delay (s)	15.0		0.0	0.5	
Approach LOS	B				

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	56	27	580	53	23	465
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.96	0.96	0.84	0.84
Hourly flow rate (vph)	72	35	604	55	27	554
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1240	632			659	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1240	632			659	
tC, single (s)	*5.4	*5.2			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	78	95			97	
cM capacity (veh/h)	324	764			929	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	72	35	659	27	554
Volume Left	72	0	0	27	0
Volume Right	0	35	55	0	0
cSH	324	764	1700	929	1700
Volume to Capacity	0.22	0.05	0.39	0.03	0.33
Queue Length 95th (ft)	21	4	0	2	0
Control Delay (s)	19.2	9.9	0.0	9.0	0.0
Lane LOS	C	A		A	
Approach Delay (s)	16.2		0.0	0.4	
Approach LOS	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

APPENDIX E

**TRAFFIC SIGNAL WARRANT STUDY
FOR THE INTERSECTION OF PIILANI HIGHWAY
AND KULANIHAKOI STREET**

Traffic Signal Warrant Study

Piilani Highway and Kulanihakoi Street

Prepared for:
Group 70 International, Inc.

Prepared by:
Wilson Okamoto Corporation

May 2010

TRAFFIC SIGNAL WARRANT STUDY

FOR THE INTERSECTION OF

PIILANI HIGHWAY AND KULANIHAKOI STREET

Prepared for:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Prepared by:

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826
WOC Ref. #7854-02

May 2011

TABLE OF CONTENTS

I. INTRODUCTION

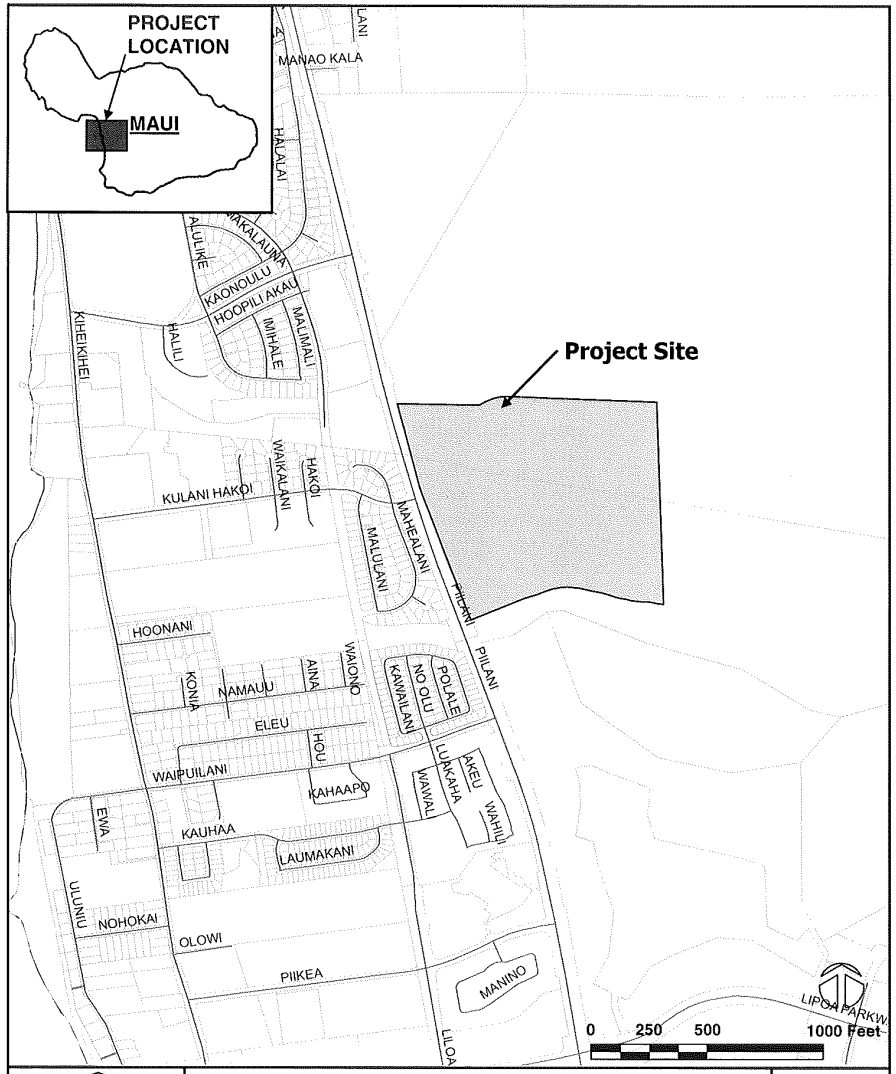
The purpose of this study is to determine if a traffic signal system is warranted at the intersection of Piilani Highway and Kulanihakoi Street in Kihei on the island of Maui (see Figure 1). The proposed Kihei High School will be located adjacent to the highway in the vicinity with access provided via a new roadway at this intersection. The traffic volumes at this intersection may warrant the installation of a traffic signal system and the provision of a traffic signal system at this intersection could provide additional safety for turning vehicles and pedestrians at the intersection.

II. EXISTING TRAFFIC CONDITIONS

A. Area Roadway System

In the vicinity of the intersection with Kulanihakoi Street, Piilani Highway is a predominantly four-lane, two-way roadway generally oriented in the north-south direction that provides access through Kihei. At the intersection with Kulanihakoi Street, the northbound approach of the highway has an exclusive left-turn lane and two through lanes while the southbound approach has two through lanes and an exclusive right-turn lane. Kulanihakoi Street is generally oriented in the east-west direction and serves as a connector roadway between South Kihei Road and Piilani Highway. At the intersection with Piilani Highway, the Kulanihakoi Street approach has two stop-controlled lanes that serve left-turn and right-turn traffic movements.

The access roadway for the proposed Kihei High School will connect to the east side of the intersection creating a four-way intersection. After the connection is completed, the westbound approach of the access road is expected to have two westbound lanes that serve left-turn, through, and right-turn traffic movements. In addition, northbound deceleration and acceleration lanes are expected to be constructed along Piilani Highway to facilitate entering and exiting traffic at the school's access.



B. Traffic Volumes and Conditions

Field investigations were conducted on January 24-27, 2011 at the intersection of Piilani Highway and Kulanihakoi Street. The investigations consisted of manual turning movement count surveys conducted during the morning peak hours of 6:00 AM to 9:00 AM and the afternoon peak hours of 3:00 PM and 6:00 PM. In addition, 24-hour mechanical count surveys were conducted along Piilani Highway and Kulanihakoi Street for all approaches of the intersection. Appendix A includes the existing traffic count data.

III. TRAFFIC SIGNAL WARRANTS

A. General

The installation of a traffic signal at an intersection may be justified by one or more of the nine warrants outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways," 2009 Edition (MUTCD). These warrants take into account factors such as eight-hour vehicular volumes (Warrant 1), four-hour vehicular volumes (Warrant 2), peak hour volumes (Warrant 3), pedestrian volumes (Warrant 4), the presence of a school crossing or coordinated signal system (Warrants 5 and 6), crash experience (Warrant 7), other characteristics of the roadway network (Warrant 8), and the presence of railroad crossings (Warrant 9). The applicable Warrants 1, 2, and 3 are assessed in this study to determine if a traffic signal system is warranted at the intersection of Piilani Highway and Kulanihakoi Street.

B. Warrant 1

Warrant 1, the "Eight-Hour Volume Warrant," consists of two conditions that may justify the installation of a traffic signal at an intersection where vehicles experience high traffic delay due to large volumes of intersecting traffic during any eight hours of an average day. The first condition is the "Minimum Vehicular Volume Condition" and the second is the "Interruption of Continuous Traffic Condition." Warrant 1 can be satisfied either by meeting the thresholds shown in the 100% columns of either condition of Table 4C-1of the MUTCD or by meeting the thresholds shown in the 80% columns for both conditions of Table 4C-1 of the

MUTCD. Under existing conditions, the traffic volumes entering the intersection of Piilani Highway and Kulanihakoi Street meet the thresholds during any eight hours of the day and, as such, satisfy Warrant 1 for minor street approaches with two lanes for high traffic volumes on the major street (see Appendix B). It should also be noted that after the proposed Kihei High School is constructed traffic volumes at this intersection are expected to increase thereby more than adequately satisfying the conditions for Warrant 1.

C. Warrant 2

Warrant 2, the "Four-Hour Volume Warrant," consists of several conditions that may justify the installation of a traffic signal at an intersection where vehicles experience high traffic delay due to large volumes of intersecting traffic during any four hours of an average day. One of the conditions is based upon the relationship between the traffic volumes along the major and minor street. If the traffic volumes along the minor street exceed the thresholds shown in Figure 4C-1 of the MUTCD, a traffic signal system may be warranted. Under existing conditions, the traffic volumes entering the intersection of Piilani Highway and Kulanihakoi Street meet the thresholds during any four hours of the day and, as such, satisfy Warrant 2 for minor street approaches with two lanes for high traffic volumes on the major street (see Appendix C). It should also be noted that after the proposed Kihei High School is constructed traffic volumes at this intersection are expected to increase thereby more than adequately satisfying the conditions for Warrant 2.

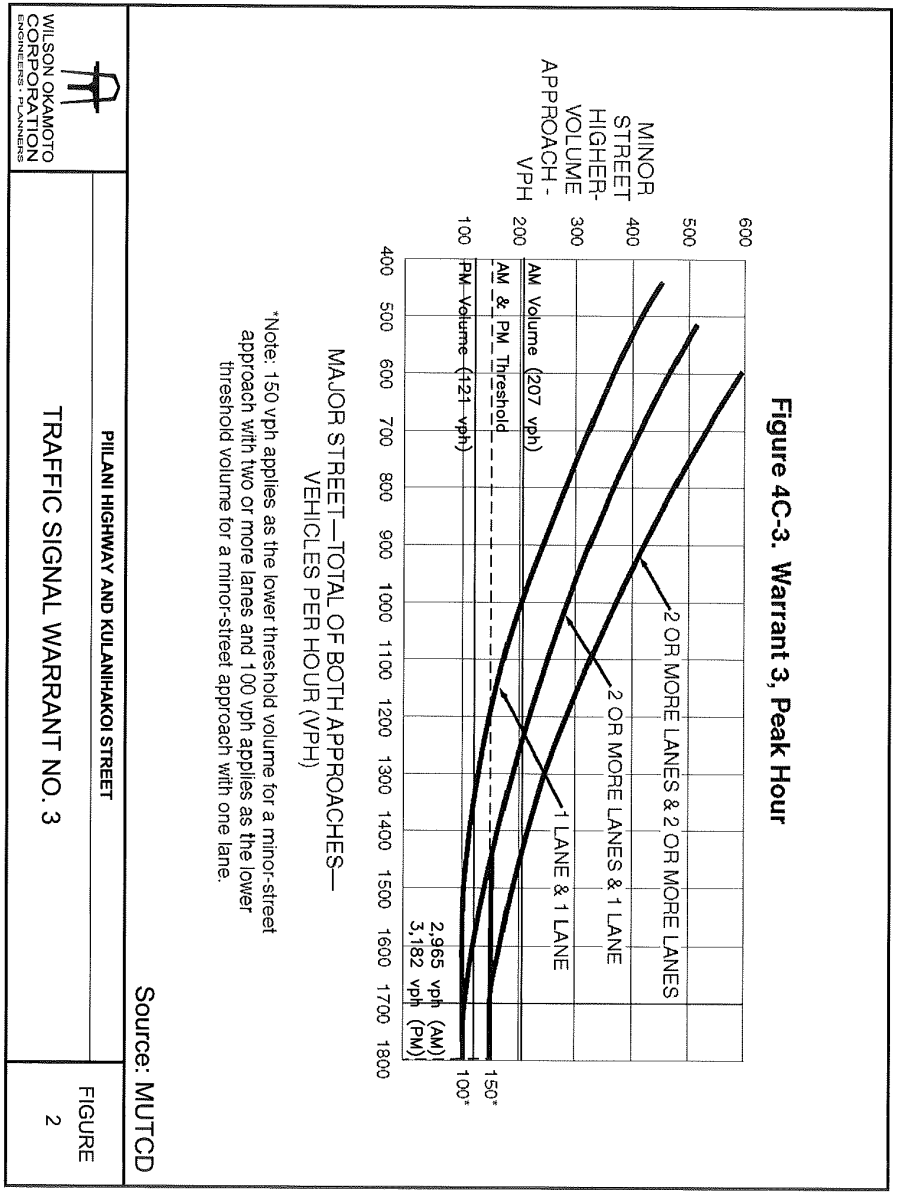
D. Warrant 3

Warrant 3, the "Peak Hour Warrant," consists of several conditions that may justify the installation of a traffic signal at an intersection where vehicles experience high traffic delay due to large volumes of intersecting traffic during the peak hour periods. One of the conditions is based upon the relationship between the traffic volumes along the major and minor streets. If the traffic volumes along the minor street exceed the thresholds shown in Figure 4C-3 of the MUTCD, a traffic signal system may be warranted. Under existing conditions, the traffic volumes entering the

intersection of Piilani Highway and Kulanihakoi Street meet the thresholds during the AM peak hour of traffic and, as such, satisfy Warrant 3 for minor street approaches with two lanes for high traffic volumes on the major street (see Figure 2). It should also be noted that after the proposed Kihei High School is constructed traffic volumes at this intersection are expected to increase thereby more than adequately satisfying the conditions for Warrant 3.

IV. CONCLUSION

The proposed Kihei High School will be located adjacent to Piilani Highway with access provided at the intersection with Kulanihakoi Street. As such, existing traffic conditions at the intersection of Piilani Highway and Kulanihakoi Street were assessed to determine if a traffic signal system is warranted at that intersection as outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways," 2009 Edition (MUTCD). The existing traffic volumes at the that intersection are currently high enough to satisfy the Eight-Hour Volume Warrant (Warrant 1), Four-Hour Volume Warrant (Warrant 2), and the Peak Hour Warrant (Warrant 3). In addition, the construction of the proposed Kihei High School, as well as, other projects in the vicinity is expected to increase traffic volumes at this intersection thereby more than adequately satisfying the warrant conditions. As such, a traffic signal system is recommended at the intersection of Piilani Highway and Kulanihakoi Street.



APPENDIX A

EXISTING TRAFFIC COUNT DATA

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy, South of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	24-Jan-11 Mon	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		*	*			*	*				
12:15		*	*			*	*				
12:30		*	*			*	*				
12:45		*	*	0	0	*	*	0	0	0	0
01:00		*	*			*	*				
01:15		*	*			*	*				
01:30		*	*			*	*				
01:45		*	*	0	0	*	*	0	0	0	0
02:00		*	*			*	*				
02:15		*	*			*	*				
02:30		*	*			*	*				
02:45		*	*	0	0	*	*	0	0	0	0
03:00		*	263			*	54				
03:15		*	262			*	61				
03:30		*	256			*	53				
03:45		*	292	0	1073	*	58	0	226	0	1299
04:00		*	275			*	58				
04:15		*	296			*	57				
04:30		*	291			*	56				
04:45		*	252	0	1114	*	56	0	227	0	1341
05:00		*	242			*	53				
05:15		*	243			*	54				
05:30		*	270			*	49				
05:45		*	248	0	1003	*	37	0	193	0	1196
06:00		*	223			*	42				
06:15		*	212			*	29				
06:30		*	220			*	31				
06:45		*	195	0	850	*	32	0	134	0	984
07:00		*	187			*	21				
07:15		*	196			*	32				
07:30		*	169			*	18				
07:45		*	168	0	720	*	9	0	80	0	800
08:00		*	171			*	20				
08:15		*	156			*	16				
08:30		*	154			*	7				
08:45		*	157	0	638	*	19	0	62	0	700
09:00		*	176			*	12				
09:15		*	173			*	31				
09:30		*	157			*	11				
09:45		*	147	0	653	*	6	0	60	0	713
10:00		*	131			*	9				
10:15		*	126			*	17				
10:30		*	102			*	6				
10:45		*	96	0	455	*	2	0	34	0	489
11:00		*	84			*	4				
11:15		*	84			*	3				
11:30		*	68			*	3				
11:45		*	56	0	292	*	1	0	11	0	303
Total		0	6798			0	1027			0	7825
Percent		0.0%	100.0%			0.0%	100.0%			0.0%	100.0%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. South of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	25-Jan-11 Tue	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		52	209			3	55				
12:15		52	221			1	53				
12:30		24	225			2	44				
12:45		23	218	151	873	0	63	6	215	157	1088
01:00		20	236			0	47				
01:15		17	210			0	61				
01:30		20	229			2	40				
01:45		16	230	73	905	0	46	2	194	75	1099
02:00		25	239			0	49				
02:15		9	263			1	61				
02:30		17	247			0	57				
02:45		16	227	67	976	0	57	1	224	68	1200
03:00		14	238			0	51				
03:15		20	234			1	67				
03:30		29	255			0	66				
03:45		26	274	89	1001	1	58	2	242	91	1243
04:00		51	246			3	66				
04:15		39	263			2	67				
04:30		54	226			3	74				
04:45		52	224	196	959	2	60	10	267	206	1226
05:00		74	240			8	59				
05:15		74	211			5	57				
05:30		108	204			8	65				
05:45		113	206	369	861	4	65	25	246	394	1107
06:00		129	208			13	39				
06:15		193	199			20	59				
06:30		215	207			23	45				
06:45		246	223	783	837	39	43	95	186	878	1023
07:00		253	176			39	30				
07:15		245	179			54	28				
07:30		238	178			59	27				
07:45		268	172	1004	705	41	21	193	106	1197	811
08:00		242	176			44	23				
08:15		252	184			45	18				
08:30		245	148			47	16				
08:45		202	146	941	654	34	16	170	73	1111	727
09:00		206	158			47	19				
09:15		214	150			35	19				
09:30		212	159			51	27				
09:45		211	151	843	618	59	20	192	85	1035	703
10:00		213	162			58	17				
10:15		223	157			53	18				
10:30		228	120			42	8				
10:45		227	102	891	541	46	6	199	49	1090	590
11:00		223	98			50	9				
11:15		239	99			46	13				
11:30		215	66			51	5				
11:45		223	65	900	328	59	4	206	31	1106	359
Total		6307	9258			1101	1918			7408	11176
Percent		40.5%	59.5%			36.5%	63.5%			39.9%	60.1%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. South of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	26-Jan-11 Wed	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		46	203			1	66				
12:15		60	220			1	94				
12:30		31	240			1	65				
12:45		35	225	172	888	1	82	4	307	176	1195
01:00		34	264			0	69				
01:15		29	226			3	78				
01:30		17	249			0	65				
01:45		15	238	95	977	0	65	3	277	98	1254
02:00		24	227			0	69				
02:15		13	241			0	64				
02:30		22	244			0	74				
02:45		15	248	74	960	1	71	1	278	75	1238
03:00		19	238			1	60				
03:15		22	236			1	82				
03:30		22	218			0	80				
03:45		27	208	90	900	2	97	4	319	94	1219
04:00		42	218			2	88				
04:15		39	223			4	97				
04:30		82	212			7	108				
04:45		80	216	203	869	0	79	13	372	216	1241
05:00		68	219			5	80				
05:15		86	205			5	97				
05:30		106	195			22	98				
05:45		105	185	365	804	20	96	52	371	417	1175
06:00		138	159			11	77				
06:15		157	190			27	92				
06:30		195	181			36	56				
06:45		223	175	713	705	44	74	118	299	831	1004
07:00		190	176			74	58				
07:15		189	158			56	56				
07:30		212	157			47	38				
07:45		221	167	812	658	75	47	252	199	1064	857
08:00		219	149			62	42				
08:15		236	143			63	32				
08:30		218	137			57	53				
08:45		245	134	918	563	52	42	234	169	1152	732
09:00		204	150			66	35				
09:15		181	151			75	68				
09:30		191	147			61	18				
09:45		222	137	798	585	55	24	257	145	1055	730
10:00		211	129			63	24				
10:15		219	124			66	30				
10:30		227	111			60	18				
10:45		211	90	868	454	42	11	230	83	1098	537
11:00		218	74			57	5				
11:15		217	110			63	9				
11:30		222	65			66	8				
11:45		226	69	883	318	62	8	248	30	1131	348
Total		5991	8681			1416	2849			7407	11530
Percent		40.8%	59.2%			33.2%	66.8%			39.1%	60.9%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. South of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	27-Jan-11 Thu	NB		Hour Totals		SB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		48	*			5	*				
12:15		36	*			0	*				
12:30		19	*			0	*				
12:45		21	*	124	0	2	*	7	0	131	0
01:00		16	*			1	*				
01:15		20	*			2	*				
01:30		14	*			4	*				
01:45		23	*	73	0	1	*	8	0	81	0
02:00		25	*			2	*				
02:15		24	*			6	*				
02:30		18	*			3	*				
02:45		11	*	78	0	3	*	14	0	92	0
03:00		18	*			7	*				
03:15		17	*			9	*				
03:30		20	*			9	*				
03:45		25	*	80	0	8	*	33	0	113	0
04:00		36	*			13	*				
04:15		35	*			14	*				
04:30		64	*			17	*				
04:45		50	*	185	0	15	*	59	0	244	0
05:00		63	*			13	*				
05:15		78	*			27	*				
05:30		108	*			27	*				
05:45		124	*	373	0	15	*	82	0	455	0
06:00		136	*			15	*				
06:15		165	*			23	*				
06:30		174	*			60	*				
06:45		171	*	646	0	66	*	164	0	810	0
07:00		207	*			70	*				
07:15		196	*			80	*				
07:30		168	*			83	*				
07:45		205	*	776	0	70	*	303	0	1079	0
08:00		191	*			99	*				
08:15		212	*			56	*				
08:30		196	*			52	*				
08:45		238	*	837	0	48	*	255	0	1092	0
09:00		209	*			84	*				
09:15		211	*			55	*				
09:30		221	*			77	*				
09:45		220	*	861	0	62	*	278	0	1139	0
10:00		196	*			56	*				
10:15		*	*	*	*	*	*	*	*	*	*
10:30		*	*	*	*	*	*	*	*	*	*
10:45		*	*	*	*	*	*	*	*	*	*
11:00		*	*	*	*	*	*	*	*	*	*
11:15		*	*	*	*	*	*	*	*	*	*
11:30		*	*	*	*	*	*	*	*	*	*
11:45		*	*	*	*	*	*	*	*	*	*
Total		4229	0			1259	0			5236	0
Percent		100.0%	0.0%			100.0%	0.0%			100.0%	0.0%
Grand Total		16527	24737			3776	5794			20051	30531
Percent		40.1%	59.9%			39.5%	60.5%			39.6%	60.4%

ADT ADT 18,760 AADT 18,760

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. North of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	24-Jan-11 Mon	SB		Hour Totals		NB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		*	*			*	*				
12:15		*	*			*	*				
12:30		*	*			*	*				
12:45		*	*	0	0	*	*	0	0	0	0
01:00		*	*			*	*				
01:15		*	*			*	*				
01:30		*	*			*	*				
01:45		*	*	0	0	*	*	0	0	0	0
02:00		*	*			*	*				
02:15		*	*			*	*				
02:30		*	309			*	120				
02:45		*	310	0	619	*	152	0	272	0	891
03:00		*	337			*	123				
03:15		*	285			*	159				
03:30		*	310			*	140				
03:45		*	320	0	1252	*	128	0	550	0	1802
04:00		*	367			*	107				
04:15		*	296			*	150				
04:30		*	390			*	132				
04:45		*	375	0	1428	*	112	0	501	0	1929
05:00		*	364			*	98				
05:15		*	353			*	127				
05:30		*	310			*	101				
05:45		*	292	0	1319	*	126	0	452	0	1771
06:00		*	289			*	85				
06:15		*	288			*	86				
06:30		*	260			*	85				
06:45		*	221	0	1058	*	79	0	335	0	1393
07:00		*	212			*	80				
07:15		*	212			*	74				
07:30		*	175			*	63				
07:45		*	173	0	772	*	57	0	274	0	1046
08:00		*	141			*	57				
08:15		*	146			*	70				
08:30		*	146			*	53				
08:45		*	164	0	597	*	55	0	235	0	832
09:00		*	151			*	76				
09:15		*	122			*	74				
09:30		*	141			*	58				
09:45		*	92	0	506	*	69	0	277	0	783
10:00		*	104			*	58				
10:15		*	86			*	62				
10:30		*	87			*	41				
10:45		*	68	0	345	*	35	0	196	0	541
11:00		*	56			*	37				
11:15		*	48			*	39				
11:30		*	41			*	30				
11:45		*	40	0	185	*	25	0	131	0	316
Total		0	8081			0	3223			0	11304
Percent		0.0%	100.0%			0.0%	100.0%			0.0%	100.0%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. North of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	25-Jan-11 Tue	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		37	199			17	230				
12:15		25	244			26	155				
12:30		27	276			7	163				
12:45		18	263	107	982	5	175	55	723	162	1705
01:00		10	267			8	196				
01:15		9	311			5	183				
01:30		12	293			7	202				
01:45		10	306	41	1177	7	189	27	770	68	1947
02:00		10	300			14	168				
02:15		11	316			4	184				
02:30		10	299			6	188				
02:45		14	318	45	1233	5	163	29	703	74	1936
03:00		10	305			5	197				
03:15		17	362			8	164				
03:30		29	351			6	202				
03:45		24	323	80	1341	14	201	33	764	113	2105
04:00		51	337			9	158				
04:15		43	341			15	209				
04:30		63	284			18	169				
04:45		49	306	206	1268	16	173	58	709	264	1977
05:00		61	317			31	180				
05:15		79	313			28	181				
05:30		96	286			46	164				
05:45		99	310	335	1226	51	131	156	656	491	1882
06:00		114	276			62	142				
06:15		154	264			102	142				
06:30		216	238			124	185				
06:45		217	210	701	988	153	155	441	624	1142	1612
07:00		288	216			150	130				
07:15		352	208			187	115				
07:30		366	175			158	117				
07:45		324	207	1330	806	146	95	641	457	1971	1263
08:00		259	168			152	103				
08:15		281	160			133	112				
08:30		232	155			166	89				
08:45		261	150	1033	633	119	85	570	389	1603	1022
09:00		258	161			115	77				
09:15		248	166			162	111				
09:30		223	177			147	97				
09:45		229	172	958	676	185	93	609	378	1567	1054
10:00		181	148			184	88				
10:15		217	116			188	98				
10:30		233	92			178	82				
10:45		238	63	869	419	166	64	716	332	1585	751
11:00		208	68			204	72				
11:15		234	54			183	66				
11:30		268	48			190	40				
11:45		273	39	983	209	161	40	738	218	1721	427
Total		6688	10958			4073	6723			10761	17681
Percent		37.9%	62.1%			37.7%	62.3%			37.8%	62.2%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Piilani Hwy. North of Kulanihakoi Street
Site Code:
Station ID:

Latitude: 0° 0.000 Undefined

Start Time	26-Jan-11 Wed	SB Morning	SB Afternoon	Hour Totals Morning	Hour Totals Afternoon	NB Morning	NB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		29	315			27	181				
12:15		21	339			37	237				
12:30		17	325			22	221				
12:45		9	295	76	1274	31	251	117	890	193	2164
01:00		14	313			23	289				
01:15		19	329			19	218				
01:30		13	317			9	248				
01:45		15	312	61	1271	12	228	63	983	124	2254
02:00		5	282			21	224				
02:15		8	347			8	219				
02:30		10	322			11	229				
02:45		18	361	41	1312	4	249	44	921	85	2233
03:00		15	342			4	196				
03:15		17	343			9	217				
03:30		17	341			11	223				
03:45		28	345	77	1371	14	190	38	826	115	2197
04:00		43	368			19	186				
04:15		44	311			12	253				
04:30		71	325			29	176				
04:45		42	347	200	1351	30	195	90	810	290	2161
05:00		54	320			37	198				
05:15		84	350			39	192				
05:30		100	299			56	183				
05:45		105	303	343	1272	65	141	197	714	540	1986
06:00		108	290			91	141				
06:15		174	286			100	163				
06:30		189	232			169	141				
06:45		219	271	690	1079	167	128	527	573	1217	1652
07:00		253	218			171	140				
07:15		320	195			153	126				
07:30		347	197			146	117				
07:45		273	198	1193	808	191	121	661	504	1854	1312
08:00		346	167			152	105				
08:15		295	164			159	110				
08:30		259	153			167	117				
08:45		272	170	1172	654	175	102	653	434	1825	1088
09:00		238	162			181	99				
09:15		233	173			177	128				
09:30		221	148			192	96				
09:45		228	141	920	624	202	97	752	420	1672	1044
10:00		235	112			198	85				
10:15		251	102			200	90				
10:30		224	108			198	68				
10:45		277	70	987	392	188	61	784	304	1771	696
11:00		255	38			221	56				
11:15		251	37			240	78				
11:30		301	41			215	45				
11:45		335	41	1142	157	106	48	782	227	1924	384
Total		6902	11565			4708	7606			11610	19171
Percent		37.4%	62.6%			38.2%	61.8%			37.7%	62.3%

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Description 1: Kihei High School
Description 2: Kulanihakoi Street
Description 3:

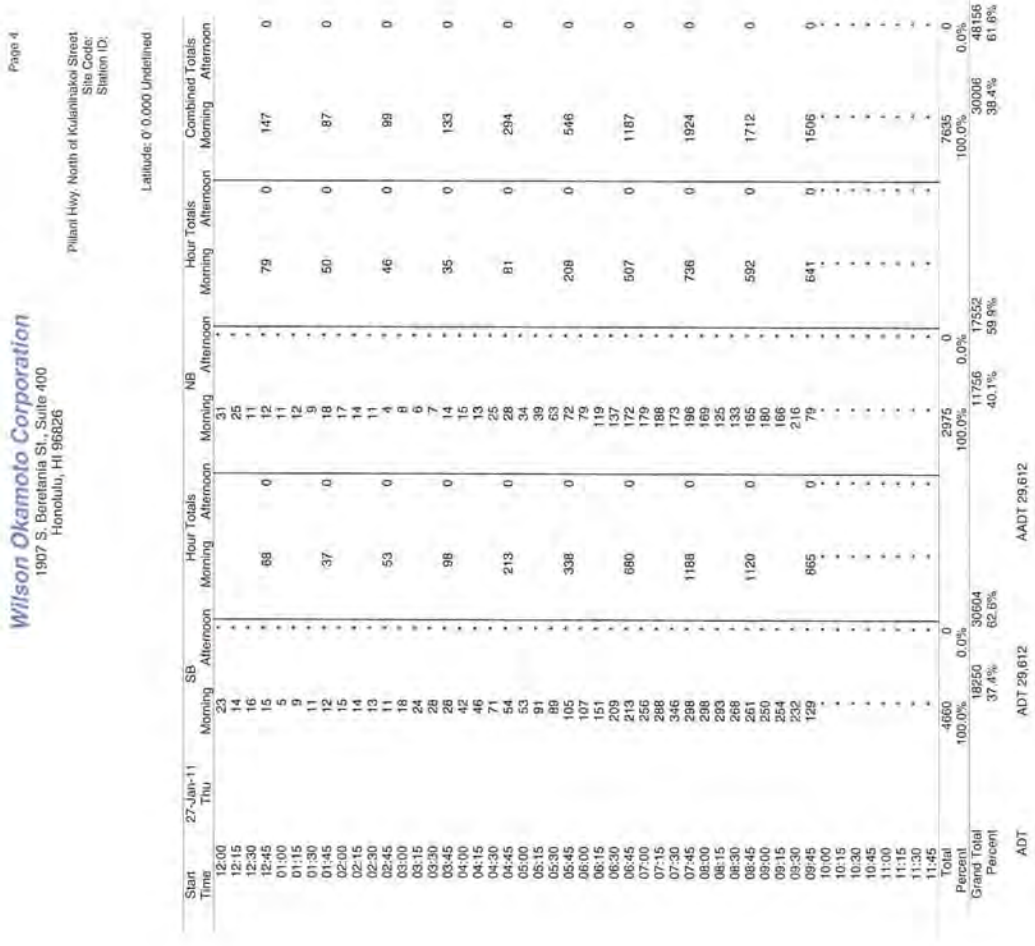
Date: 1/24/2011
Monday

Daily Volume

Begin	EB		WB		Combined		Begin	EB		WB		Combined	
12:00 AM	-	-	-	-	-	-	12:00 PM	-	-	-	-	-	-
12:15 AM	-		-		-		12:15 PM	-		-		-	
12:30 AM	-		-		-		12:30 PM	-		-		-	
12:45 AM	-		-		-		12:45 PM	-		-		-	
1:00 AM	-	-	-	-	-	-	1:00 PM	-	-	-	-	-	-
1:15 AM	-		-		-		1:15 PM	-		-		-	
1:30 AM	-		-		-		1:30 PM	-		-		-	
1:45 AM	-		-		-		1:45 PM	-		-		-	
2:00 AM	-	-	-	-	-	-	2:00 PM	-	-	-	-	-	-
2:15 AM	-		-		-		2:15 PM	-		-		-	
2:30 AM	-		-		-		2:30 PM	-		-		-	
2:45 AM	-		-		-		2:45 PM	-		-		-	
3:00 AM	-	-	-	-	-	-	3:00 PM	-	102	-	88	-	190
3:15 AM	-		-		-		3:15 PM	11		12		23	
3:30 AM	-		-		-		3:30 PM	46		42		88	
3:45 AM	-		-		-		3:45 PM	45		34		79	
4:00 AM	-	-	-	-	-	-	4:00 PM	36	171	39	165	75	336
4:15 AM	-		-		-		4:15 PM	47		44		91	
4:30 AM	-		-		-		4:30 PM	37		49		86	
4:45 AM	-		-		-		4:45 PM	51		33		84	
5:00 AM	-	-	-	-	-	-	5:00 PM	28	143	39	184	67	327
5:15 AM	-		-		-		5:15 PM	46		45		91	
5:30 AM	-		-		-		5:30 PM	42		50		92	
5:45 AM	-		-		-		5:45 PM	27		50		77	
6:00 AM	-	-	-	-	-	-	6:00 PM	21	143	45	166	66	309
6:15 AM	-		-		-		6:15 PM	26		46		72	
6:30 AM	-		-		-		6:30 PM	50		47		97	
6:45 AM	-		-		-		6:45 PM	46		28		74	
7:00 AM	-	-	-	-	-	-	7:00 PM	17	84	35	133	52	217
7:15 AM	-		-		-		7:15 PM	29		40		69	
7:30 AM	-		-		-		7:30 PM	18		22		40	
7:45 AM	-		-		-		7:45 PM	20		36		56	
8:00 AM	-	-	-	-	-	-	8:00 PM	14	55	26	94	40	149
8:15 AM	-		-		-		8:15 PM	9		29		38	
8:30 AM	-		-		-		8:30 PM	18		19		37	
8:45 AM	-		-		-		8:45 PM	14		20		34	
9:00 AM	-	-	-	-	-	-	9:00 PM	24	71	17	82	41	153
9:15 AM	-		-		-		9:15 PM	19		16		35	
9:30 AM	-		-		-		9:30 PM	9		28		37	
9:45 AM	-		-		-		9:45 PM	19		21		40	
10:00 AM	-	-	-	-	-	-	10:00 PM	19	46	10	52	29	98
10:15 AM	-		-		-		10:15 PM	16		13		29	
10:30 AM	-		-		-		10:30 PM	7		14		21	
10:45 AM	-		-		-		10:45 PM	4		15		19	
11:00 AM	-	-	-	-	-	-	11:00 PM	5	15	15	36	20	51
11:15 AM	-		-		-		11:15 PM	2		6		8	
11:30 AM	-		-		-		11:30 PM	5		9		14	
11:45 AM	-		-		-		11:45 PM	3		6		9	

	EB	WB	Combined
24 Hour Volume	830 (45.4%)	1000 (54.6%)	1830

	12:00 AM - 12:00 PM			12:00 PM - 12:00 AM		
	EB	WB	Combined	EB	WB	Combined
Count	0	0	0	830	1000	1830
	-	-		45.4 %	54.6 %	
Peak Hour	-	-	-	3:30 PM	5:30 PM	4:00 PM
Volume	-	-	-	174	191	336
Factor	-	-	-	0.93	0.95	0.92



Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Description 1: Kihei High School
Description 2: Kulanihakoi Street
Description 3:

Date: 1/26/2011
Wednesday

Daily Volume

Begin	EB		WB		Combined		Begin	EB		WB		Combined	
12:00 AM	3	25	6	26	9	51	12:00 PM	68	370	49	142	117	512
12:15 AM	4		11		15		12:15 PM	98		35		133	
12:30 AM	3		6		9		12:30 PM	111		35		146	
12:45 AM	15		3		18		12:45 PM	93		23		116	
1:00 AM	2	4	5	21	7	25	1:00 PM	106	289	24	155	130	444
1:15 AM	0		4		4		1:15 PM	71		39		110	
1:30 AM	0		3		3		1:30 PM	54		41		95	
1:45 AM	2		9		11		1:45 PM	58		51		109	
2:00 AM	4	12	2	5	6	17	2:00 PM	60	288	25	142	85	430
2:15 AM	3		1		4		2:15 PM	71		47		118	
2:30 AM	5		2		7		2:30 PM	63		42		105	
2:45 AM	0		0		0		2:45 PM	94		28		122	
3:00 AM	0	13	0	8	0	21	3:00 PM	75	204	36	160	111	364
3:15 AM	2		4		6		3:15 PM	35		45		80	
3:30 AM	1		1		2		3:30 PM	37		38		75	
3:45 AM	10		3		13		3:45 PM	57		41		98	
4:00 AM	2	23	0	10	2	33	4:00 PM	41	173	41	190	82	363
4:15 AM	3		1		4		4:15 PM	32		54		86	
4:30 AM	9		4		13		4:30 PM	38		41		79	
4:45 AM	9		5		14		4:45 PM	62		54		116	
5:00 AM	6	55	5	28	11	83	5:00 PM	32	168	41	203	73	371
5:15 AM	6		4		10		5:15 PM	44		49		93	
5:30 AM	21		8		29		5:30 PM	54		53		107	
5:45 AM	22		11		33		5:45 PM	38		60		98	
6:00 AM	30	134	10	57	40	191	6:00 PM	39	172	51	186	90	358
6:15 AM	36		10		46		6:15 PM	62		59		121	
6:30 AM	31		9		40		6:30 PM	34		41		75	
6:45 AM	37		28		65		6:45 PM	37		35		72	
7:00 AM	56	291	20	115	76	406	7:00 PM	27	101	33	125	60	226
7:15 AM	73		29		102		7:15 PM	25		26		51	
7:30 AM	92		29		121		7:30 PM	27		36		63	
7:45 AM	70		37		107		7:45 PM	22		30		52	
8:00 AM	50	256	37	174	87	430	8:00 PM	19	95	23	119	42	214
8:15 AM	56		45		101		8:15 PM	23		32		55	
8:30 AM	74		38		112		8:30 PM	24		32		56	
8:45 AM	76		54		130		8:45 PM	29		32		61	
9:00 AM	97	286	18	133	115	419	9:00 PM	12	73	33	117	45	190
9:15 AM	47		44		91		9:15 PM	19		25		44	
9:30 AM	83		30		113		9:30 PM	23		42		65	
9:45 AM	59		41		100		9:45 PM	19		17		36	
10:00 AM	67	222	33	131	100	353	10:00 PM	17	47	21	73	38	120
10:15 AM	56		30		86		10:15 PM	14		15		29	
10:30 AM	38		29		67		10:30 PM	10		18		28	
10:45 AM	61		39		100		10:45 PM	6		19		25	
11:00 AM	44	180	44	170	88	350	11:00 PM	9	27	8	35	17	62
11:15 AM	38		46		84		11:15 PM	3		9		12	
11:30 AM	49		37		86		11:30 PM	9		13		22	
11:45 AM	49		43		92		11:45 PM	6		5		11	

	EB	WB	Combined
24 Hour Volume	3508 (58.1%)	2525 (41.9%)	6033

	12:00 AM - 12:00 PM			**12:00 PM - 12:00 AM**		
	EB	WB	Combined	EB	WB	Combined
Count	1501	878	2379	2007	1647	3654
	63.1 %	36.9 %		54.9 %	45.1 %	
Peak Hour	8:15 AM	8:00 AM	8:15 AM	12:15 PM	5:30 PM	12:15 PM
Volume	303	174	458	408	223	525
Factor	0.78	0.81	0.88	0.92	0.93	0.90

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Description 1: Kihei High School
Description 2: Kulanihakoi Street
Description 3:

Date: 1/25/2011
Tuesday

Daily Volume

Begin	EB		WB		Combined		Begin	EB		WB		Combined	
12:00 AM	3	15	5	23	8	38	12:00 PM	32	142	33	120	65	262
12:15 AM	4		8		12		12:15 PM	33		27		60	
12:30 AM	6		7		13		12:30 PM	45		34		79	
12:45 AM	2		3		5		12:45 PM	32		26		58	
1:00 AM	6	9	4	13	10	22	1:00 PM	23	147	20	107	43	254
1:15 AM	1		3		4		1:15 PM	27		30		57	
1:30 AM	1		1		2		1:30 PM	37		22		59	
1:45 AM	1		5		6		1:45 PM	60		35		95	
2:00 AM	2	12	4	11	6	23	2:00 PM	48	193	32	141	80	334
2:15 AM	3		6		9		2:15 PM	21		34		55	
2:30 AM	6		0		6		2:30 PM	65		33		98	
2:45 AM	1		1		2		2:45 PM	59		42		101	
3:00 AM	2	22	2	7	4	29	3:00 PM	40	159	42	169	82	328
3:15 AM	9		3		12		3:15 PM	34		52		86	
3:30 AM	1		1		2		3:30 PM	47		34		81	
3:45 AM	10		1		11		3:45 PM	38		41		79	
4:00 AM	5	27	4	13	9	40	4:00 PM	34	145	35	146	69	291
4:15 AM	4		4		8		4:15 PM	30		42		72	
4:30 AM	11		2		13		4:30 PM	44		33		77	
4:45 AM	7		3		10		4:45 PM	37		36		73	
5:00 AM	10	71	4	11	14	82	5:00 PM	37	156	41	152	78	308
5:15 AM	23		1		24		5:15 PM	36		27		63	
5:30 AM	15		2		17		5:30 PM	48		43		91	
5:45 AM	23		4		27		5:45 PM	35		41		76	
6:00 AM	29	134	3	52	32	186	6:00 PM	39	137	48	171	87	308
6:15 AM	23		9		32		6:15 PM	32		48		80	
6:30 AM	41		23		64		6:30 PM	40		44		84	
6:45 AM	41		17		58		6:45 PM	26		31		57	
7:00 AM	52	266	24	87	76	353	7:00 PM	29	87	37	115	66	202
7:15 AM	73		23		96		7:15 PM	22		32		54	
7:30 AM	76		14		90		7:30 PM	19		21		40	
7:45 AM	65		26		91		7:45 PM	17		25		42	
8:00 AM	54	192	29	119	83	311	8:00 PM	23	74	30	102	53	176
8:15 AM	52		37		89		8:15 PM	9		24		33	
8:30 AM	56		28		84		8:30 PM	19		30		49	
8:45 AM	30		25		55		8:45 PM	23		18		41	
9:00 AM	39	187	22	80	61	267	9:00 PM	19	65	20	87	39	152
9:15 AM	40		15		55		9:15 PM	16		26		42	
9:30 AM	46		16		62		9:30 PM	18		24		42	
9:45 AM	62		27		89		9:45 PM	12		17		29	
10:00 AM	60	186	21	115	81	301	10:00 PM	11	50	22	72	33	122
10:15 AM	46		37		83		10:15 PM	22		24		46	
10:30 AM	44		24		68		10:30 PM	7		10		17	
10:45 AM	36		33		69		10:45 PM	10		16		26	
11:00 AM	47	184	30	122	77	306	11:00 PM	12	20	8	28	20	48
11:15 AM	43		20		63		11:15 PM	1		9		10	
11:30 AM	59		45		104		11:30 PM	5		9		14	
11:45 AM	35		27		62		11:45 PM	2		2		4	

	EB	WB	Combined
24 Hour Volume	2680 (56.5%)	2063 (43.5%)	4743

	12:00 AM - 12:00 PM			**12:00 PM - 12:00 AM**		
	EB	WB	Combined	EB	WB	Combined
Count	1305	653	1958	1375	1410	2785
	66.6 %	33.4 %		49.4 %	50.6 %	
Peak Hour	7:15 AM	10:45 AM	7:15 AM	2:30 PM	5:45 PM	2:30 PM
Volume	268	128	360	198	181	367
Factor	0.88	0.71	0.94	0.76	0.94	0.91

APPENDIX B

WARRANT 1

EIGHT HOUR VOLUME WARRANT

Wilson Okamoto Corporation
1907 S. Beretania St., Suite 400
Honolulu, HI 96826

Description 1: Kihei High School
Description 2: Kulanihakoi Street
Description 3:

Date: 1/27/2011
Thursday

Daily Volume

Begin	EB		WB		Combined		Begin	EB	WB	Combined
12:00 AM	4	18	5	17	9	35				
12:15 AM	13		5		18					
12:30 AM	1		3		4					
12:45 AM	0		4		4					
1:00 AM	1	5	2	9	3	14				
1:15 AM	0		3		3					
1:30 AM	0		0		0					
1:45 AM	4		4		8					
2:00 AM	5	19	5	22	10	41				
2:15 AM	3		10		13					
2:30 AM	8		4		12					
2:45 AM	3		3		6					
3:00 AM	1	5	2	5	3	10				
3:15 AM	0		0		0					
3:30 AM	0		2		2					
3:45 AM	4		1		5					
4:00 AM	3	20	3	9	6	29				
4:15 AM	3		0		3					
4:30 AM	5		2		7					
4:45 AM	9		4		13					
5:00 AM	13	70	4	30	17	100				
5:15 AM	8		5		13					
5:30 AM	22		11		33					
5:45 AM	27		10		37					
6:00 AM	29	128	10	64	39	192				
6:15 AM	40		12		52					
6:30 AM	19		13		32					
6:45 AM	40		29		69					
7:00 AM	53	309	19	104	72	413				
7:15 AM	106		23		129					
7:30 AM	77		29		106					
7:45 AM	73		33		106					
8:00 AM	53	220	55	183	108	403				
8:15 AM	53		45		98					
8:30 AM	52		50		102					
8:45 AM	62		33		95					
9:00 AM	59	182	27	127	86	309				
9:15 AM	52		40		92					
9:30 AM	36		27		63					
9:45 AM	35		33		68					
10:00 AM	27	27	38	38	65	65				

		EB	WB	Combined
	24 Hour Volume	1003 (62.3%)	608 (37.7%)	1611

	12:00 AM - 12:00 PM			12:00 PM - 12:00 AM		
	EB	WB	Combined	EB	WB	Combined
Count	1003	608	1611	0	0	0
	62.3 %	37.7 %		-	-	
Peak Hour	7:00 AM	7:45 AM	7:15 AM	-	-	-
Volume	309	183	449	-	-	-
Factor	0.73	0.83	0.87	-	-	-

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
8:00	488	1922	54	192	0	1	1	1
8:15	519	1885	52	177				
8:30	465	1816	56	165				
8:45	450	1775	30	155				
9:00	451	1754	39	187	0	1	1	1
9:15	450	1688	40	208				
9:30	424	1667	46	214				
9:45	429	1692	62	212				
10:00	385	1716	60	186	0	1	1	1
10:15	429	1752	46	173				
10:30	449	1784	44	170				
10:45	453	1805	36	185				
11:00	421	1837	47	184	0	1	1	1
11:15	461	1814	43	169				
11:30	470	1806	59	159				
11:45	485	1823	35	145				
12:00	398	1806	32	142	0	1	0	1
12:15	453	1898	33	133				
12:30	487	1950	45	127				
12:45	468	1970	32	119				
13:00	490	2023	23	147	0	1	0	1
13:15	505	2057	27	172				
13:30	507	2115	37	166				
13:45	521	2139	60	194				
14:00	524	2147	48	193	0	1	1	1
14:15	563	2151	21	185				
14:30	531	2166	65	198				
14:45	529	2223	59	180				
15:00	528	2275	40	159	0	1	0	1
15:15	578	2313	34	153				
15:30	588	2322	47	149				
15:45	581	2230	38	146				
16:00	566	2164	34	145	0	1	0	1
16:15	587	2139	30	148				
16:30	496	2060	44	154				

Warrant 1
8-Hour Volumes (:00)

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
0:00	87	253	3	15	0	0	0	0
0:15	76	196	4	18				
0:30	50	146	6	15				
0:45	40	127	2	10				
1:00	30	113	6	9	0	0	0	0
1:15	26	118	1	5				
1:30	31	111	1	7				
1:45	26	107	1	12				
2:00	35	110	2	12	0	0	0	0
2:15	19	99	3	12				
2:30	27	116	6	18				
2:45	29	146	1	13				
3:00	24	166	2	22	0	0	0	0
3:15	36	241	9	25				
3:30	57	285	1	20				
3:45	49	342	10	30				
4:00	99	392	5	27	0	0	0	0
4:15	80	425	4	32				
4:30	114	494	11	51				
4:45	99	579	7	55				
5:00	132	687	10	71	0	0	0	0
5:15	149	792	23	90				
5:30	199	982	15	90				
5:45	207	1203	23	116				
6:00	237	1448	29	134	0	1	0	1
6:15	339	1738	23	157				
6:30	420	1978	41	207				
6:45	452	2144	41	242				
7:00	527	2268	52	266	1	1	1	1
7:15	579	2229	73	268				
7:30	586	2169	76	247				
7:45	576	2048	65	227				

Warrant 1
8-Hour Volumes (:15)

Time	Piilani Hwy		Kulanihakoi St		100%		80%	
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
0:00	87	253	3	15				
0:15	76	196	4	18	0	0	0	0
0:30	50	146	6	15				
0:45	40	127	2	10				
1:00	30	113	6	9				
1:15	26	118	1	5	0	0	0	0
1:30	31	111	1	7				
1:45	26	107	1	12				
2:00	35	110	2	12				
2:15	19	99	3	12	0	0	0	0
2:30	27	116	6	18				
2:45	29	146	1	13				
3:00	24	166	2	22				
3:15	36	241	9	25	0	0	0	0
3:30	57	285	1	20				
3:45	49	342	10	30				
4:00	99	392	5	27				
4:15	80	425	4	32	0	0	0	0
4:30	114	494	11	51				
4:45	99	579	7	55				
5:00	132	687	10	71				
5:15	149	792	23	90	0	0	0	1
5:30	199	982	15	90				
5:45	207	1203	23	116				
6:00	237	1448	29	134				
6:15	339	1738	23	157	0	1	0	1
6:30	420	1978	41	207				
6:45	452	2144	41	242				
7:00	527	2268	52	266				
7:15	579	2229	73	268	1	1	1	1
7:30	586	2169	76	247				
7:45	576	2048	65	227				

Time	Piilani Hwy		Kulanihakoi St		100%		80%	
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
16:45	515	2040	37	158				
17:00	541	2026	37	156	0	1	0	1
17:15	508	1955	36	158				
17:30	476	1897	48	154				
17:45	501	1854	35	146				
18:00	470	1776	39	137	0	1	0	1
18:15	450	1687	32	127				
18:30	433	1614	40	117				
18:45	423	1525	26	96				
19:00	381	1471	29	87	0	0	0	1
19:15	377	1426	22	81				
19:30	344	1385	19	68				
19:45	369	1336	17	68				
20:00	336	1256	23	74	0	0	0	0
20:15	336	1231	9	70				
20:30	295	1203	19	77				
20:45	289	1235	23	76				
21:00	311	1260	19	65	0	0	0	0
21:15	308	1252	16	57				
21:30	327	1211	18	63				
21:45	314	1091	12	52				
22:00	303	939	11	50	0	0	0	0
22:15	267	799	22	51				
22:30	207	682	7	30				
22:45	162	587	10	28				
23:00	163	527	12	20	0	0	0	0
23:15	150	364	1	8				
23:30	112	214	5	7				
23:45	102	102	2	2				
			# of Periods Warrant Satisfied		**1**	**13**	**6**	**14**

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
16:45	515	2040	37	158				
17:00	541	2026	37	156				
17:15	508	1955	36	158	0	1	0	1
17:30	476	1897	48	154				
17:45	501	1854	35	146				
18:00	470	1776	39	137				
18:15	450	1687	32	127	0	1	0	1
18:30	433	1614	40	117				
18:45	423	1525	26	96				
19:00	381	1471	29	87				
19:15	377	1426	22	81	0	0	0	1
19:30	344	1385	19	68				
19:45	369	1336	17	68				
20:00	336	1256	23	74				
20:15	336	1231	9	70	0	0	0	0
20:30	295	1203	19	77				
20:45	289	1235	23	76				
21:00	311	1260	19	65				
21:15	308	1252	16	57	0	0	0	0
21:30	327	1211	18	63				
21:45	314	1091	12	52				
22:00	303	939	11	50				
22:15	267	799	22	51	0	0	0	0
22:30	207	682	7	30				
22:45	162	587	10	28				
23:00	163	527	12	20				
23:15	150	364	1	8				
23:30	112	214	5	7				
23:45	102	102	2	2				
			# of Periods Warrant Satisfied		**2**	**13**	**7**	**15**

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
8:00	488	1922	54	192				
8:15	519	1885	52	177	0	1	1	1
8:30	465	1816	56	165				
8:45	450	1775	30	155				
9:00	451	1754	39	187				
9:15	450	1688	40	208	1	1	1	1
9:30	424	1667	46	214				
9:45	429	1692	62	212				
10:00	385	1716	60	186				
10:15	429	1752	46	173	0	1	1	1
10:30	449	1784	44	170				
10:45	453	1805	36	185				
11:00	421	1837	47	184				
11:15	461	1814	43	169	0	1	1	1
11:30	470	1806	59	159				
11:45	485	1823	35	145				
12:00	398	1806	32	142				
12:15	453	1898	33	133	0	1	0	1
12:30	487	1950	45	127				
12:45	468	1970	32	119				
13:00	490	2023	23	147				
13:15	505	2057	27	172	0	1	1	1
13:30	507	2115	37	166				
13:45	521	2139	60	194				
14:00	524	2147	48	193				
14:15	563	2151	21	185	0	1	1	1
14:30	531	2166	65	198				
14:45	529	2223	59	180				
15:00	528	2275	40	159				
15:15	578	2313	34	153	0	1	0	1
15:30	588	2322	47	149				
15:45	581	2230	38	146				
16:00	566	2164	34	145				
16:15	587	2139	30	148	0	1	0	1
16:30	496	2060	44	154				

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
8:00	488	1922	54	192				
8:15	519	1885	52	177				
8:30	465	1816	56	165	0	1	1	1
8:45	450	1775	30	155				
9:00	451	1754	39	187				
9:15	450	1688	40	208				
9:30	424	1667	46	214	1	1	1	1
9:45	429	1692	62	212				
10:00	385	1716	60	186				
10:15	429	1752	46	173				
10:30	449	1784	44	170	0	1	1	1
10:45	453	1805	36	185				
11:00	421	1837	47	184				
11:15	461	1814	43	169				
11:30	470	1806	59	159	0	1	0	1
11:45	485	1823	35	145				
12:00	398	1806	32	142				
12:15	453	1898	33	133				
12:30	487	1950	45	127	0	1	0	1
12:45	468	1970	32	119				
13:00	490	2023	23	147				
13:15	505	2057	27	172				
13:30	507	2115	37	166	0	1	1	1
13:45	521	2139	60	194				
14:00	524	2147	48	193				
14:15	563	2151	21	185				
14:30	531	2166	65	198	0	1	1	1
14:45	529	2223	59	180				
15:00	528	2275	40	159				
15:15	578	2313	34	153				
15:30	588	2322	47	149	0	1	0	1
15:45	581	2230	38	146				
16:00	566	2164	34	145				
16:15	587	2139	30	148				
16:30	496	2060	44	154	0	1	0	1

Warrant 1
8-Hour Volumes (:30)

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
0:00	87	253	3	15				
0:15	76	196	4	18				
0:30	50	146	6	15	0	0	0	0
0:45	40	127	2	10				
1:00	30	113	6	9				
1:15	26	118	1	5				
1:30	31	111	1	7	0	0	0	0
1:45	26	107	1	12				
2:00	35	110	2	12				
2:15	19	99	3	12				
2:30	27	116	6	18	0	0	0	0
2:45	29	146	1	13				
3:00	24	166	2	22				
3:15	36	241	9	25				
3:30	57	285	1	20	0	0	0	0
3:45	49	342	10	30				
4:00	99	392	5	27				
4:15	80	425	4	32				
4:30	114	494	11	51	0	0	0	0
4:45	99	579	7	55				
5:00	132	687	10	71				
5:15	149	792	23	90				
5:30	199	982	15	90	0	0	0	1
5:45	207	1203	23	116				
6:00	237	1448	29	134				
6:15	339	1738	23	157				
6:30	420	1978	41	207	1	1	1	1
6:45	452	2144	41	242				
7:00	527	2268	52	266				
7:15	579	2229	73	268				
7:30	586	2169	76	247	1	1	1	1
7:45	576	2048	65	227				

Warrant 1
8-Hour Volumes (:45)

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
0:00	87	253	3	15				
0:15	76	196	4	18				
0:30	50	146	6	15				
0:45	40	127	2	10	0	0	0	0
1:00	30	113	6	9				
1:15	26	118	1	5				
1:30	31	111	1	7				
1:45	26	107	1	12	0	0	0	0
2:00	35	110	2	12				
2:15	19	99	3	12				
2:30	27	116	6	18				
2:45	29	146	1	13	0	0	0	0
3:00	24	166	2	22				
3:15	36	241	9	25				
3:30	57	285	1	20				
3:45	49	342	10	30	0	0	0	0
4:00	99	392	5	27				
4:15	80	425	4	32				
4:30	114	494	11	51				
4:45	99	579	7	55	0	0	0	0
5:00	132	687	10	71				
5:15	149	792	23	90				
5:30	199	982	15	90				
5:45	207	1203	23	116	0	1	0	1
6:00	237	1448	29	134				
6:15	339	1738	23	157				
6:30	420	1978	41	207				
6:45	452	2144	41	242	1	1	1	1
7:00	527	2268	52	266				
7:15	579	2229	73	268				
7:30	586	2169	76	247				
7:45	576	2048	65	227	1	1	1	1

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
16:45	515	2040	37	158				
17:00	541	2026	37	156				
17:15	508	1955	36	158				
17:30	476	1897	48	154	0	1	0	1
17:45	501	1854	35	146				
18:00	470	1776	39	137				
18:15	450	1687	32	127				
18:30	433	1614	40	117	0	1	0	1
18:45	423	1525	26	96				
19:00	381	1471	29	87				
19:15	377	1426	22	81				
19:30	344	1385	19	68	0	0	0	0
19:45	369	1336	17	68				
20:00	336	1256	23	74				
20:15	336	1231	9	70				
20:30	295	1203	19	77	0	0	0	0
20:45	289	1235	23	76				
21:00	311	1260	19	65				
21:15	308	1252	16	57				
21:30	327	1211	18	63	0	0	0	0
21:45	314	1091	12	52				
22:00	303	939	11	50				
22:15	267	799	22	51				
22:30	207	682	7	30	0	0	0	0
22:45	162	587	10	28				
23:00	163	527	12	20				
23:15	150	364	1	8				
23:30	112	214	5	7				
23:45	102	102	2	2				
			# of Periods Warrant Satisfied		**3**	**13**	**7**	**14**

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
16:45	515	2040	37	158	0	1	0	1
17:00	541	2026	37	156				
17:15	508	1955	36	158				
17:30	476	1897	48	154				
17:45	501	1854	35	146	0	1	0	1
18:00	470	1776	39	137				
18:15	450	1687	32	127				
18:30	433	1614	40	117				
18:45	423	1525	26	96	0	0	0	1
19:00	381	1471	29	87				
19:15	377	1426	22	81				
19:30	344	1385	19	68				
19:45	369	1336	17	68	0	0	0	0
20:00	336	1256	23	74				
20:15	336	1231	9	70				
20:30	295	1203	19	77				
20:45	289	1235	23	76	0	0	0	0
21:00	311	1260	19	65				
21:15	308	1252	16	57				
21:30	327	1211	18	63				
21:45	314	1091	12	52	0	0	0	0
22:00	303	939	11	50				
22:15	267	799	22	51				
22:30	207	682	7	30				
22:45	162	587	10	28	0	0	0	0
23:00	163	527	12	20				
23:15	150	364	1	8				
23:30	112	214	5	7				
23:45	102	102	2	2				
			# of Periods Warrant Satisfied		**3**	**13**	**6**	**14**

	Piilani Hwy		Kulanihakoi St		100%		80%	
Time	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Condition A	Condition B	Condition A	Condition B
8:00	488	1922	54	192				
8:15	519	1885	52	177				
8:30	465	1816	56	165				
8:45	450	1775	30	155	0	1	0	1
9:00	451	1754	39	187				
9:15	450	1688	40	208				
9:30	424	1667	46	214				
9:45	429	1692	62	212	1	1	1	1
10:00	385	1716	60	186				
10:15	429	1752	46	173				
10:30	449	1784	44	170				
10:45	453	1805	36	185	0	1	1	1
11:00	421	1837	47	184				
11:15	461	1814	43	169				
11:30	470	1806	59	159				
11:45	485	1823	35	145	0	1	0	1
12:00	398	1806	32	142				
12:15	453	1898	33	133				
12:30	487	1950	45	127				
12:45	468	1970	32	119	0	1	0	1
13:00	490	2023	23	147				
13:15	505	2057	27	172				
13:30	507	2115	37	166				
13:45	521	2139	60	194	0	1	1	1
14:00	524	2147	48	193				
14:15	563	2151	21	185				
14:30	531	2166	65	198				
14:45	529	2223	59	180	0	1	1	1
15:00	528	2275	40	159				
15:15	578	2313	34	153				
15:30	588	2322	47	149				
15:45	581	2230	38	146	0	1	0	1
16:00	566	2164	34	145				
16:15	587	2139	30	148				
16:30	496	2060	44	154				

APPENDIX C

WARRANT 2
FOUR HOUR VOLUME WARRANT

Warrant 2
4-Hour Volumes (:00)

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
0:00	87	253	3	15	0	
0:15	76	196	4	18	0	
0:30	50	146	6	15	0	
0:45	40	127	2	10	0	
1:00	30	113	6	9	0	
1:15	26	118	1	5	0	
1:30	31	111	1	7	0	
1:45	26	107	1	12	0	
2:00	35	110	2	12	0	
2:15	19	99	3	12	0	
2:30	27	116	6	18	0	
2:45	29	146	1	13	0	
3:00	24	166	2	22	0	
3:15	36	241	9	25	0	
3:30	57	285	1	20	0	
3:45	49	342	10	30	0	
4:00	99	392	5	27	0	
4:15	80	425	4	32	0	
4:30	114	494	11	51	0	
4:45	99	579	7	55	0	
5:00	132	687	10	71	0	
5:15	149	792	23	90	0	
5:30	199	982	15	90	0	
5:45	207	1203	23	116	1	
6:00	237	1448	29	134	1	1
6:15	339	1738	23	157	1	
6:30	420	1978	41	207	1	
6:45	452	2144	41	242	1	
7:00	527	2268	52	266	1	1
7:15	579	2229	73	268	1	
7:30	586	2169	76	247	1	
7:45	576	2048	65	227	1	
8:00	488	1922	54	192	1	1
8:15	519	1885	52	177	1	
8:30	465	1816	56	165	1	
8:45	450	1775	30	155	1	
9:00	451	1754	39	187	1	1
9:15	450	1688	40	208	1	
9:30	424	1667	46	214	1	
9:45	429	1692	62	212	1	
10:00	385	1716	60	186	1	1
10:15	429	1752	46	173	1	
10:30	449	1784	44	170	1	
10:45	453	1805	36	185	1	
11:00	421	1837	47	184	1	1
11:15	461	1814	43	169	1	
11:30	470	1806	59	159	1	

Warrant 2
4-Hour Volumes (:15)

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
0:00	87	253	3	15	0	
0:15	76	196	4	18	0	
0:30	50	146	6	15	0	
0:45	40	127	2	10	0	
1:00	30	113	6	9	0	
1:15	26	118	1	5	0	
1:30	31	111	1	7	0	
1:45	26	107	1	12	0	
2:00	35	110	2	12	0	
2:15	19	99	3	12	0	
2:30	27	116	6	18	0	
2:45	29	146	1	13	0	
3:00	24	166	2	22	0	
3:15	36	241	9	25	0	
3:30	57	285	1	20	0	
3:45	49	342	10	30	0	
4:00	99	392	5	27	0	
4:15	80	425	4	32	0	
4:30	114	494	11	51	0	
4:45	99	579	7	55	0	
5:00	132	687	10	71	0	
5:15	149	792	23	90	0	
5:30	199	982	15	90	0	
5:45	207	1203	23	116	1	
6:00	237	1448	29	134	1	
6:15	339	1738	23	157	1	1
6:30	420	1978	41	207	1	
6:45	452	2144	41	242	1	
7:00	527	2268	52	266	1	
7:15	579	2229	73	268	1	1
7:30	586	2169	76	247	1	
7:45	576	2048	65	227	1	
8:00	488	1922	54	192	1	
8:15	519	1885	52	177	1	1
8:30	465	1816	56	165	1	
8:45	450	1775	30	155	1	
9:00	451	1754	39	187	1	
9:15	450	1688	40	208	1	1
9:30	424	1667	46	214	1	
9:45	429	1692	62	212	1	
10:00	385	1716	60	186	1	
10:15	429	1752	46	173	1	1
10:30	449	1784	44	170	1	
10:45	453	1805	36	185	1	
11:00	421	1837	47	184	1	
11:15	461	1814	43	169	1	1
11:30	470	1806	59	159	1	
11:45	485	1823	35	145	1	
12:00	398	1806	32	142	1	1
12:15	453	1898	33	133	1	
12:30	487	1950	45	127	1	
12:45	468	1970	32	119	1	
13:00	490	2023	23	147	1	1
13:15	505	2057	27	172	1	
13:30	507	2115	37	166	1	
13:45	521	2139	60	194	1	
14:00	524	2147	48	193	1	1
14:15	563	2151	21	185	1	
14:30	531	2166	65	198	1	
14:45	529	2223	59	180	1	
15:00	528	2275	40	159	1	1
15:15	578	2313	34	153	1	
15:30	588	2322	47	149	1	
15:45	581	2230	38	146	1	
16:00	566	2164	34	145	1	1
16:15	587	2139	30	148	1	
16:30	496	2060	44	154	1	
16:45	515	2040	37	158	1	
17:00	541	2026	37	156	1	1
17:15	508	1955	36	158	1	
17:30	476	1897	48	154	1	
17:45	501	1854	35	146	1	
18:00	470	1776	39	137	1	1
18:15	450	1687	32	127	1	
18:30	433	1614	40	117	1	
18:45	423	1525	26	96	0	
19:00	381	1471	29	87	0	
19:15	377	1426	22	81	0	
19:30	344	1385	19	68	0	
19:45	369	1336	17	68	0	
20:00	336	1256	23	74	0	
20:15	336	1231	9	70	0	
20:30	295	1203	19	77	0	
20:45	289	1235	23	76	0	
21:00	311	1260	19	65	0	
21:15	308	1252	16	57	0	
21:30	327	1211	18	63	0	
21:45	314	1091	12	52	0	
22:00	303	939	11	50	0	
22:15	267	799	22	51	0	
22:30	207	682	7	30	0	
22:45	162	587	10	28	0	
23:00	163	527	12	20	0	
23:15	150	364	1	8	0	
23:30	112	214	5	7	0	
23:45	102	102	2	2	0	
				# of Periods Warrant Satisfied		**13**

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
11:45	485	1823	35	145	1	
12:00	398	1806	32	142	1	
12:15	453	1898	33	133	1	1
12:30	487	1950	45	127	1	
12:45	468	1970	32	119	1	
13:00	490	2023	23	147	1	
13:15	505	2057	27	172	1	1
13:30	507	2115	37	166	1	
13:45	521	2139	60	194	1	
14:00	524	2147	48	193	1	
14:15	563	2151	21	185	1	1
14:30	531	2166	65	198	1	
14:45	529	2223	59	180	1	
15:00	528	2275	40	159	1	
15:15	578	2313	34	153	1	1
15:30	588	2322	47	149	1	
15:45	581	2230	38	146	1	
16:00	566	2164	34	145	1	
16:15	587	2139	30	148	1	1
16:30	496	2060	44	154	1	
16:45	515	2040	37	158	1	
17:00	541	2026	37	156	1	
17:15	508	1955	36	158	1	1
17:30	476	1897	48	154	1	
17:45	501	1854	35	146	1	
18:00	470	1776	39	137	1	
18:15	450	1687	32	127	1	1
18:30	433	1614	40	117	1	
18:45	423	1525	26	96	0	
19:00	381	1471	29	87	0	
19:15	377	1426	22	81	0	
19:30	344	1385	19	68	0	
19:45	369	1336	17	68	0	
20:00	336	1256	23	74	0	
20:15	336	1231	9	70	0	
20:30	295	1203	19	77	0	
20:45	289	1235	23	76	0	
21:00	311	1260	19	65	0	
21:15	308	1252	16	57	0	
21:30	327	1211	18	63	0	
21:45	314	1091	12	52	0	
22:00	303	939	11	50	0	
22:15	267	799	22	51	0	
22:30	207	682	7	30	0	
22:45	162	587	10	28	0	
23:00	163	527	12	20	0	
23:15	150	364	1	8	0	
23:30	112	214	5	7	0	
23:45	102	102	2	2	0	
				# of Periods Warrant Satisfied		**13**

Warrant 2
4-Hour Volumes (:30)

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
0:00	87	253	3	15	0	
0:15	76	196	4	18	0	
0:30	50	146	6	15	0	
0:45	40	127	2	10	0	
1:00	30	113	6	9	0	
1:15	26	118	1	5	0	
1:30	31	111	1	7	0	
1:45	26	107	1	12	0	
2:00	35	110	2	12	0	
2:15	19	99	3	12	0	
2:30	27	116	6	18	0	
2:45	29	146	1	13	0	
3:00	24	166	2	22	0	
3:15	36	241	9	25	0	
3:30	57	285	1	20	0	
3:45	49	342	10	30	0	
4:00	99	392	5	27	0	
4:15	80	425	4	32	0	
4:30	114	494	11	51	0	
4:45	99	579	7	55	0	
5:00	132	687	10	71	0	
5:15	149	792	23	90	0	
5:30	199	982	15	90	0	
5:45	207	1203	23	116	1	
6:00	237	1448	29	134	1	
6:15	339	1738	23	157	1	
6:30	420	1978	41	207	1	1
6:45	452	2144	41	242	1	
7:00	527	2268	52	266	1	
7:15	579	2229	73	268	1	
7:30	586	2169	76	247	1	1
7:45	576	2048	65	227	1	
8:00	488	1922	54	192	1	
8:15	519	1885	52	177	1	
8:30	465	1816	56	165	1	1
8:45	450	1775	30	155	1	
9:00	451	1754	39	187	1	
9:15	450	1688	40	208	1	
9:30	424	1667	46	214	1	1
9:45	429	1692	62	212	1	
10:00	385	1716	60	186	1	
10:15	429	1752	46	173	1	
10:30	449	1784	44	170	1	1
10:45	453	1805	36	185	1	
11:00	421	1837	47	184	1	
11:15	461	1814	43	169	1	
11:30	470	1806	59	159	1	1

Warrant 2
4-Hour Volumes (:45)

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
0:00	87	253	3	15	0	
0:15	76	196	4	18	0	
0:30	50	146	6	15	0	
0:45	40	127	2	10	0	
1:00	30	113	6	9	0	
1:15	26	118	1	5	0	
1:30	31	111	1	7	0	
1:45	26	107	1	12	0	
2:00	35	110	2	12	0	
2:15	19	99	3	12	0	
2:30	27	116	6	18	0	
2:45	29	146	1	13	0	
3:00	24	166	2	22	0	
3:15	36	241	9	25	0	
3:30	57	285	1	20	0	
3:45	49	342	10	30	0	
4:00	99	392	5	27	0	
4:15	80	425	4	32	0	
4:30	114	494	11	51	0	
4:45	99	579	7	55	0	
5:00	132	687	10	71	0	
5:15	149	792	23	90	0	
5:30	199	982	15	90	0	
5:45	207	1203	23	116	1	
6:00	237	1448	29	134	1	
6:15	339	1738	23	157	1	
6:30	420	1978	41	207	1	
6:45	452	2144	41	242	1	1
7:00	527	2268	52	266	1	
7:15	579	2229	73	268	1	
7:30	586	2169	76	247	1	
7:45	576	2048	65	227	1	1
8:00	488	1922	54	192	1	
8:15	519	1885	52	177	1	
8:30	465	1816	56	165	1	
8:45	450	1775	30	155	1	1
9:00	451	1754	39	187	1	
9:15	450	1688	40	208	1	
9:30	424	1667	46	214	1	
9:45	429	1692	62	212	1	1
10:00	385	1716	60	186	1	
10:15	429	1752	46	173	1	
10:30	449	1784	44	170	1	
10:45	453	1805	36	185	1	1
11:00	421	1837	47	184	1	
11:15	461	1814	43	169	1	
11:30	470	1806	59	159	1	

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
11:45	485	1823	35	145	1	
12:00	398	1806	32	142	1	
12:15	453	1898	33	133	1	
12:30	487	1950	45	127	1	1
12:45	468	1970	32	119	1	
13:00	490	2023	23	147	1	
13:15	505	2057	27	172	1	
13:30	507	2115	37	166	1	1
13:45	521	2139	60	194	1	
14:00	524	2147	48	193	1	
14:15	563	2151	21	185	1	
14:30	531	2166	65	198	1	1
14:45	529	2223	59	180	1	
15:00	528	2275	40	159	1	
15:15	578	2313	34	153	1	
15:30	588	2322	47	149	1	1
15:45	581	2230	38	146	1	
16:00	566	2164	34	145	1	
16:15	587	2139	30	148	1	
16:30	496	2060	44	154	1	1
16:45	515	2040	37	158	1	
17:00	541	2026	37	156	1	
17:15	508	1955	36	158	1	
17:30	476	1897	48	154	1	1
17:45	501	1854	35	146	1	
18:00	470	1776	39	137	1	
18:15	450	1687	32	127	1	
18:30	433	1614	40	117	1	1
18:45	423	1525	26	96	0	
19:00	381	1471	29	87	0	
19:15	377	1426	22	81	0	
19:30	344	1385	19	68	0	
19:45	369	1336	17	68	0	
20:00	336	1256	23	74	0	
20:15	336	1231	9	70	0	
20:30	295	1203	19	77	0	
20:45	289	1235	23	76	0	
21:00	311	1260	19	65	0	
21:15	308	1252	16	57	0	
21:30	327	1211	18	63	0	
21:45	314	1091	12	52	0	
22:00	303	939	11	50	0	
22:15	267	799	22	51	0	
22:30	207	682	7	30	0	
22:45	162	587	10	28	0	
23:00	163	527	12	20	0	
23:15	150	364	1	8	0	
23:30	112	214	5	7	0	
23:45	102	102	2	2	0	
				# of Periods Warrant Satisfied		**13**

Time	Piilani Hwy		Kulanihakoi St			Warrant Satisfied
	15 Min Count	Hourly Total	15 Min Count	Hourly Total	Above Min	
11:45	485	1823	35	145	1	1
12:00	398	1806	32	142	1	
12:15	453	1898	33	133	1	
12:30	487	1950	45	127	1	
12:45	468	1970	32	119	1	1
13:00	490	2023	23	147	1	
13:15	505	2057	27	172	1	
13:30	507	2115	37	166	1	
13:45	521	2139	60	194	1	1
14:00	524	2147	48	193	1	
14:15	563	2151	21	185	1	
14:30	531	2166	65	198	1	
14:45	529	2223	59	180	1	1
15:00	528	2275	40	159	1	
15:15	578	2313	34	153	1	
15:30	588	2322	47	149	1	
15:45	581	2230	38	146	1	1
16:00	566	2164	34	145	1	
16:15	587	2139	30	148	1	
16:30	496	2060	44	154	1	
16:45	515	2040	37	158	1	1
17:00	541	2026	37	156	1	
17:15	508	1955	36	158	1	
17:30	476	1897	48	154	1	
17:45	501	1854	35	146	1	1
18:00	470	1776	39	137	1	
18:15	450	1687	32	127	1	
18:30	433	1614	40	117	1	
18:45	423	1525	26	96	0	
19:00	381	1471	29	87	0	
19:15	377	1426	22	81	0	
19:30	344	1385	19	68	0	
19:45	369	1336	17	68	0	
20:00	336	1256	23	74	0	
20:15	336	1231	9	70	0	
20:30	295	1203	19	77	0	
20:45	289	1235	23	76	0	
21:00	311	1260	19	65	0	
21:15	308	1252	16	57	0	
21:30	327	1211	18	63	0	
21:45	314	1091	12	52	0	
22:00	303	939	11	50	0	
22:15	267	799	22	51	0	
22:30	207	682	7	30	0	
22:45	162	587	10	28	0	
23:00	163	527	12	20	0	
23:15	150	364	1	8	0	
23:30	112	214	5	7	0	
23:45	102	102	2	2	0	
				# of Periods Warrant Satisfied		**12**

APPENDIX F

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2015 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	220	66	1229	1490	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	21	262	69	1294	1637	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2423	819	1637			
vC1, stage 1 conf vol	1637					
vC2, stage 2 conf vol	786					
vCu, unblocked vol	2423	819	1637			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	91	50	82			
cM capacity (veh/h)	238	525	392			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	21	262	69	647	647	819	819	12
Volume Left	21	0	69	0	0	0	0	0
Volume Right	0	262	0	0	0	0	0	12
cSH	238	525	392	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.50	0.18	0.38	0.38	0.48	0.48	0.01
Queue Length 95th (ft)	7	69	16	0	0	0	0	0
Control Delay (s)	21.6	18.5	16.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	C	C					
Approach Delay (s)	18.7		0.8			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	109	120	1513	1582	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	25	138	138	1739	1818	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2964	909	1818			
vC1, stage 1 conf vol	1818					
vC2, stage 2 conf vol	1145					
vCu, unblocked vol	2964	909	1818			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	85	70	59			
cM capacity (veh/h)	163	465	333			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	25	138	138	870	870	909	909	121
Volume Left	25	0	138	0	0	0	0	0
Volume Right	0	138	0	0	0	0	0	121
cSH	163	465	333	1700	1700	1700	1700	1700
Volume to Capacity	0.15	0.30	0.41	0.51	0.51	0.53	0.53	0.07
Queue Length 95th (ft)	13	31	49	0	0	0	0	0
Control Delay (s)	31.0	16.0	23.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	18.3		1.7			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Signalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/4/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	35	135	75	6	27	49	1226	137	56	1613	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1813	1583		1781	1583	1863	3725	1667	1863	3725	1667
Flt Permitted		0.78	1.00		0.68	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1457	1583		1264	1583	1863	3725	1667	1863	3725	1667
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	49	41	159	82	7	29	52	1304	146	60	1734	44
RTOR Reduction (vph)	0	0	119	0	0	25	0	0	0	0	0	0
Lane Group Flow (vph)	0	90	40	0	89	4	52	1304	146	60	1734	44
Turn Type	Perm		Perm	Perm		Perm	Prot		Free	Prot		Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			Free			Free
Actuated Green, G (s)		13.9	13.9		13.9	13.9	6.6	62.1	98.2	7.2	62.7	98.2
Effective Green, g (s)		13.9	13.9		13.9	13.9	6.6	62.1	98.2	7.2	62.7	98.2
Actuated g/C Ratio		0.14	0.14		0.14	0.14	0.07	0.63	1.00	0.07	0.64	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		206	224		179	224	125	2356	1667	137	2378	1667
v/s Ratio Prot							0.03	0.35		c0.03	c0.47	
v/s Ratio Perm		0.06	0.03		c0.07	0.00			c0.09			0.03
v/c Ratio		0.44	0.18		0.50	0.02	0.42	0.55	0.09	0.44	0.73	0.03
Uniform Delay, d1		38.6	37.1		38.9	36.3	44.0	10.2	0.0	43.6	12.0	0.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.5	0.4		2.2	0.0	2.2	0.3	0.1	2.2	1.1	0.0
Delay (s)		40.1	37.5		41.1	36.3	46.2	10.5	0.1	45.8	13.2	0.0
Level of Service		D	D		D	D	D	B	A	D	B	A
Approach Delay (s)		38.4			39.9			10.7			13.9	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM Average Control Delay	15.1	HCM Level of Service		B
HCM Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	98.2	Sum of lost time (s)		10.0
Intersection Capacity Utilization	67.7%	ICU Level of Service		C
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/4/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	7	93	39	3	13	68	1598	30	12	1577	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1794	1583		1780	1583	1863	3725	1667	1863	3725	1667
Flt Permitted		0.75	1.00		0.71	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1392	1583		1327	1583	1863	3725	1667	1863	3725	1667
Peak-hour factor, PHF	0.76	0.76	0.76	0.92	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	29	9	122	42	3	14	74	1737	33	14	1792	116
RTOR Reduction (vph)	0	0	106	0	0	13	0	0	0	0	0	0
Lane Group Flow (vph)	0	38	16	0	45	1	74	1737	33	14	1792	116
Turn Type	Perm		Perm	Perm		Perm	Prot		Free	Prot		Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			Free			Free
Actuated Green, G (s)		9.3	9.3		9.3	9.3	8.0	74.7	101.3	2.3	69.0	101.3
Effective Green, g (s)		9.3	9.3		9.3	9.3	8.0	74.7	101.3	2.3	69.0	101.3
Actuated g/C Ratio		0.09	0.09		0.09	0.09	0.08	0.74	1.00	0.02	0.68	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		128	145		122	145	147	2747	1667	42	2537	1667
v/s Ratio Prot							c0.04	c0.47		0.01	c0.48	
v/s Ratio Perm		0.03	0.01		c0.03	0.00			0.02			0.07
v/c Ratio		0.30	0.11		0.37	0.01	0.50	0.63	0.02	0.33	0.71	0.07
Uniform Delay, d1		42.9	42.2		43.2	41.8	44.7	6.5	0.0	48.7	9.9	0.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.3	0.3		1.9	0.0	2.7	0.5	0.0	4.6	0.9	0.1
Delay (s)		44.2	42.5		45.1	41.8	47.4	7.0	0.0	53.4	10.8	0.1
Level of Service		D	D		D	D	D	A	A	D	B	A
Approach Delay (s)		42.9			44.3			8.5			10.5	
Approach LOS		D			D			A			B	

Intersection Summary				
HCM Average Control Delay	11.4	HCM Level of Service		B
HCM Volume to Capacity ratio	0.70			
Actuated Cycle Length (s)	101.3	Sum of lost time (s)		20.0
Intersection Capacity Utilization	66.8%	ICU Level of Service		C
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	23	0	1412	1740	82
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.58	0.58	0.88	0.88	0.91	0.91
Hourly flow rate (vph)	0	40	0	1605	1912	90
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2714	956	1912			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2714	956	1912			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	91	100			
cM capacity (veh/h)	17	437	306			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	40	802	802	956	956	90
Volume Left	0	0	0	0	0	0
Volume Right	40	0	0	0	0	90
cSH	437	1700	1700	1700	1700	1700
Volume to Capacity	0.09	0.47	0.47	0.56	0.56	0.05
Queue Length 95th (ft)	7	0	0	0	0	0
Control Delay (s)	14.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	14.1	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization	55.7%	ICU Level of Service		B
Analysis Period (min)	15			

* User Entered Value

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	32	0	1696	1608	101
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.57	0.57	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	0	56	0	1785	1675	105
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2568	838	1675			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2568	838	1675			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	89	100			
cM capacity (veh/h)	21	512	379			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	56	893	893	838	838	105
Volume Left	0	0	0	0	0	0
Volume Right	56	0	0	0	0	105
cSH	512	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.53	0.53	0.49	0.49	0.06
Queue Length 95th (ft)	9	0	0	0	0	0
Control Delay (s)	12.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.9	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay		0.2		
Intersection Capacity Utilization	52.2%	ICU Level of Service		A
Analysis Period (min)	15			

* User Entered Value

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	133	123	1118	1442	321
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.90	0.90	0.88	0.88	0.91	0.91
Adj. Flow (vph)	327	148	140	1270	1585	353
RTOR Reduction (vph)	0	113	0	0	0	0
Lane Group Flow (vph)	327	35	140	1270	1585	353
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	28.6	28.6	15.2	83.0	62.8	121.6
Effective Green, g (s)	28.6	28.6	15.2	83.0	62.8	121.6
Actuated g/C Ratio	0.24	0.24	0.12	0.68	0.52	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	416	372	233	2543	1924	1667
v/s Ratio Prot	c0.18		c0.08	0.34	c0.43	
v/s Ratio Perm		0.02				0.21
v/c Ratio	0.79	0.09	0.60	0.50	0.82	0.21
Uniform Delay, d1	43.6	36.4	50.3	9.3	24.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.4	0.1	4.3	0.2	3.0	0.3
Delay (s)	53.1	36.5	54.6	9.5	27.7	0.3
Level of Service	D	D	D	A	C	A
Approach Delay (s)	47.9			13.9	22.7	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	22.6	HCM Level of Service		C
HCM Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	121.6	Sum of lost time (s)		15.0
Intersection Capacity Utilization	73.1%	ICU Level of Service		D
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	270	277	233	1426	1266	374
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.89	0.89	0.95	0.95	0.96	0.96
Adj. Flow (vph)	303	311	245	1501	1319	390
RTOR Reduction (vph)	0	240	0	0	0	0
Lane Group Flow (vph)	303	71	245	1501	1319	390
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	26.3	26.3	21.4	78.7	52.3	115.0
Effective Green, g (s)	26.3	26.3	21.4	78.7	52.3	115.0
Actuated g/C Ratio	0.23	0.23	0.19	0.68	0.45	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	405	362	347	2549	1694	1667
v/s Ratio Prot	c0.17		c0.13	0.40	c0.35	
v/s Ratio Perm		0.04				0.23
v/c Ratio	0.75	0.20	0.71	0.59	0.78	0.23
Uniform Delay, d1	41.3	35.8	43.9	9.6	26.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	0.3	6.4	0.4	2.3	0.3
Delay (s)	48.7	36.1	50.3	9.9	28.8	0.3
Level of Service	D	D	D	A	C	A
Approach Delay (s)	42.3			15.6	22.3	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	22.4	HCM Level of Service		C
HCM Volume to Capacity ratio	0.76			
Actuated Cycle Length (s)	115.0	Sum of lost time (s)		15.0
Intersection Capacity Utilization	73.0%	ICU Level of Service		C
Analysis Period (min)	15			
c Critical Lane Group				

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	43	60	437	50	21	337
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.93	0.93	0.98	0.98
Hourly flow rate (vph)	52	72	470	54	21	344
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	884	497			524	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884	497			524	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	83	87			98	
cM capacity (veh/h)	310	573			1043	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	52	72	524	21	344
Volume Left	52	0	0	21	0
Volume Right	0	72	54	0	0
cSH	310	573	1700	1043	1700
Volume to Capacity	0.17	0.13	0.31	0.02	0.20
Queue Length 95th (ft)	15	11	0	2	0
Control Delay (s)	19.0	12.2	0.0	8.5	0.0
Lane LOS	C	B		A	
Approach Delay (s)	15.0		0.0	0.5	
Approach LOS	C				

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	56	27	603	54	23	483
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.96	0.96	0.84	0.84
Hourly flow rate (vph)	72	35	628	56	27	575
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1286	656			684	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1286	656			684	
tC, single (s)	*5.4	*5.2			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	77	95			97	
cM capacity (veh/h)	307	743			909	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	72	35	684	27	575
Volume Left	72	0	0	27	0
Volume Right	0	35	56	0	0
cSH	307	743	1700	909	1700
Volume to Capacity	0.23	0.05	0.40	0.03	0.34
Queue Length 95th (ft)	22	4	0	2	0
Control Delay (s)	20.3	10.1	0.0	9.1	0.0
Lane LOS	C	B		A	
Approach Delay (s)	17.0		0.0	0.4	
Approach LOS	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

APPENDIX G

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2025 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani 5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	232	72	1383	1685	11
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.95	0.95	0.91	0.91
Hourly flow rate (vph)	21	276	76	1456	1852	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2731	926	1852			
vC1, stage 1 conf vol	1852					
vC2, stage 2 conf vol	879					
vCu, unblocked vol	2731	926	1852			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	89	39	77			
cM capacity (veh/h)	190	455	323			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	21	276	76	728	728	926	926	12
Volume Left	21	0	76	0	0	0	0	0
Volume Right	0	276	0	0	0	0	0	12
cSH	190	455	323	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.61	0.23	0.43	0.43	0.54	0.54	0.01
Queue Length 95th (ft)	9	99	22	0	0	0	0	0
Control Delay (s)	26.3	24.4	19.5	0.0	0.0	0.0	0.0	0.0
Lane LOS	D	C	C					
Approach Delay (s)	24.6		1.0			0.0		
Approach LOS	C							

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
3: Kaonoulu & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	112	123	1673	1747	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	25	142	141	1923	2008	121
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	3252	1004	2008			
vC1, stage 1 conf vol	2008					
vC2, stage 2 conf vol	1244					
vCu, unblocked vol	3252	1004	2008			
tC, single (s)	*5.8	*5.9	4.1			
tC, 2 stage (s)	4.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	80	65	50			
cM capacity (veh/h)	129	409	281			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	25	142	141	961	961	1004	1004	121
Volume Left	25	0	141	0	0	0	0	0
Volume Right	0	142	0	0	0	0	0	121
cSH	129	409	281	1700	1700	1700	1700	1700
Volume to Capacity	0.20	0.35	0.50	0.57	0.57	0.59	0.59	0.07
Queue Length 95th (ft)	17	38	66	0	0	0	0	0
Control Delay (s)	39.8	18.4	30.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	E	C	D					
Approach Delay (s)	21.6		2.1			0.0		
Approach LOS	C							

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	65.7%	ICU Level of Service		C
Analysis Period (min)	15			

* User Entered Value

HCM Signalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/4/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	71	135	154	12	56	49	1357	283	117	1759	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1829	1583		1780	1583	1863	3725	1667	1863	3725	1667
Flt Permitted		0.74	1.00		0.58	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1386	1583		1084	1583	1863	3725	1667	1863	3725	1667
Peak-hour factor, PHF	0.85	0.85	0.85	0.92	0.92	0.92	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	49	84	159	167	13	61	52	1444	301	126	1891	44
RTOR Reduction (vph)	0	0	75	0	0	48	0	0	0	0	0	0
Lane Group Flow (vph)	0	133	84	0	180	13	52	1444	301	126	1891	44
Turn Type	Perm		Perm	Perm		Perm	Prot		Free	Prot		Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			Free			Free
Actuated Green, G (s)		26.4	26.4		26.4	26.4	5.1	67.6	123.0	14.0	76.5	123.0
Effective Green, g (s)		26.4	26.4		26.4	26.4	5.1	67.6	123.0	14.0	76.5	123.0
Actuated g/C Ratio		0.21	0.21		0.21	0.21	0.04	0.55	1.00	0.11	0.62	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		297	340		233	340	77	2047	1667	212	2317	1667
v/s Ratio Prot							0.03	0.39		c0.07	c0.51	
v/s Ratio Perm		0.10	0.05		c0.17	0.01			0.18			0.03
v/c Ratio		0.45	0.25		0.77	0.04	0.68	0.71	0.18	0.59	0.82	0.03
Uniform Delay, d1		42.0	40.0		45.5	38.2	58.1	20.4	0.0	51.8	17.9	0.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1	0.4		14.6	0.0	20.9	1.1	0.2	4.4	2.3	0.0
Delay (s)		43.0	40.4		60.1	38.3	79.1	21.5	0.2	56.2	20.2	0.0
Level of Service		D	D		E	D	E	C	A	E	C	A
Approach Delay (s)		41.6			54.6			19.6			22.0	
Approach LOS		D			D			B			C	

Intersection Summary				
HCM Average Control Delay	24.1	HCM Level of Service		C
HCM Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	123.0	Sum of lost time (s)		15.0
Intersection Capacity Utilization	77.9%	ICU Level of Service		D
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Kulanihakoi & Piilani

5/4/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	15	93	80	6	28	68	1746	61	25	1732	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	2000	2000	2000	2000	2000	2000
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0	4.0	5.0	5.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1809	1583		1780	1583	1863	3725	1667	1863	3725	1667
Flt Permitted		0.78	1.00		0.71	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1453	1583		1316	1583	1863	3725	1667	1863	3725	1667
Peak-hour factor, PHF	0.76	0.76	0.76	0.92	0.92	0.92	0.92	0.92	0.92	0.88	0.88	0.88
Adj. Flow (vph)	29	20	122	87	7	30	74	1898	66	28	1968	116
RTOR Reduction (vph)	0	0	80	0	0	27	0	0	0	0	0	0
Lane Group Flow (vph)	0	49	42	0	94	3	74	1898	66	28	1968	116
Turn Type	Perm		Perm	Perm		Perm	Prot		Free	Prot		Free
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			Free			Free
Actuated Green, G (s)		13.8	13.8		13.8	13.8	8.0	89.2	121.1	3.1	84.3	121.1
Effective Green, g (s)		13.8	13.8		13.8	13.8	8.0	89.2	121.1	3.1	84.3	121.1
Actuated g/C Ratio		0.11	0.11		0.11	0.11	0.07	0.74	1.00	0.03	0.70	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		166	180		150	180	123	2744	1667	48	2593	1667
v/s Ratio Prot							c0.04	c0.51		0.02	c0.53	
v/s Ratio Perm		0.03	0.03		c0.07	0.00			0.04			0.07
v/c Ratio		0.30	0.23		0.63	0.02	0.60	0.69	0.04	0.58	0.76	0.07
Uniform Delay, d1		49.2	48.8		51.2	47.6	55.0	8.6	0.0	58.4	11.9	0.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.0	0.7		7.9	0.0	8.0	0.8	0.0	16.8	1.3	0.1
Delay (s)		50.2	49.5		59.1	47.7	63.0	9.3	0.0	75.1	13.2	0.1
Level of Service		D	D		E	D	E	A	A	E	B	A
Approach Delay (s)		49.7			56.4			11.0			13.3	
Approach LOS		D			E			B			B	

Intersection Summary				
HCM Average Control Delay	14.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.77			
Actuated Cycle Length (s)	121.1	Sum of lost time (s)	20.0	
Intersection Capacity Utilization	73.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
7: E. Waipuilani & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	23	0	1689	1954	93
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.58	0.58	0.88	0.88	0.91	0.91
Hourly flow rate (vph)	0	40	0	1919	2147	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	3107	1074	2147			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3107	1074	2147			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	89	100			
cM capacity (veh/h)	9	372	248			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	40	960	960	1074	1074	102
Volume Left	0	0	0	0	0	0
Volume Right	40	0	0	0	0	102
cSH	372	1700	1700	1700	1700	1700
Volume to Capacity	0.11	0.56	0.56	0.63	0.63	0.06
Queue Length 95th (ft)	9	0	0	0	0	0
Control Delay (s)	15.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	15.8	0.0		0.0		
Approach LOS	C					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
7: E. Waipuilani & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	32	0	1875	1798	107
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.57	0.57	0.95	0.95	0.96	0.96
Hourly flow rate (vph)	0	56	0	1974	1873	111
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2860	936	1873			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2860	936	1873			
tC, single (s)	6.8	*5.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	*2.3	2.2			
p0 queue free %	100	87	100			
cM capacity (veh/h)	13	448	317			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	56	987	987	936	936	111
Volume Left	0	0	0	0	0	0
Volume Right	56	0	0	0	0	111
cSH	448	1700	1700	1700	1700	1700
Volume to Capacity	0.13	0.58	0.58	0.55	0.55	0.07
Queue Length 95th (ft)	11	0	0	0	0	0
Control Delay (s)	14.2	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	14.2	0.0		0.0		
Approach LOS	B					

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	57.2%	ICU Level of Service		B
Analysis Period (min)	15			

* User Entered Value

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	294	133	123	1395	1656	321
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.90	0.90	0.88	0.88	0.91	0.91
Adj. Flow (vph)	327	148	140	1585	1820	353
RTOR Reduction (vph)	0	116	0	0	0	0
Lane Group Flow (vph)	327	32	140	1585	1820	353
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	29.6	29.6	14.2	95.3	76.1	134.9
Effective Green, g (s)	29.6	29.6	14.2	95.3	76.1	134.9
Actuated g/C Ratio	0.22	0.22	0.11	0.71	0.56	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	388	347	196	2632	2101	1667
v/s Ratio Prot	c0.18		c0.08	0.43	c0.49	
v/s Ratio Perm		0.02				0.21
v/c Ratio	0.84	0.09	0.71	0.60	0.87	0.21
Uniform Delay, d1	50.4	42.0	58.4	10.1	25.1	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.2	0.1	11.7	0.4	4.0	0.3
Delay (s)	65.6	42.1	70.0	10.5	29.1	0.3
Level of Service	E	D	E	B	C	A
Approach Delay (s)	58.3			15.3	24.4	
Approach LOS	E			B	C	

Intersection Summary			
HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	134.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Piikea & Piilani

5/4/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	270	277	233	1605	1456	374
Ideal Flow (vphpl)	1900	1900	2000	2000	2000	2000
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1863	3725	3725	1667
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1863	3725	3725	1667
Peak-hour factor, PHF	0.89	0.89	0.95	0.95	0.96	0.96
Adj. Flow (vph)	303	311	245	1689	1517	390
RTOR Reduction (vph)	0	244	0	0	0	0
Lane Group Flow (vph)	303	67	245	1689	1517	390
Turn Type		Perm	Prot			Free
Protected Phases	4		5	2	6	
Permitted Phases		4				Free
Actuated Green, G (s)	27.2	27.2	22.0	88.5	61.5	125.7
Effective Green, g (s)	27.2	27.2	22.0	88.5	61.5	125.7
Actuated g/C Ratio	0.22	0.22	0.18	0.70	0.49	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	383	343	326	2623	1822	1667
v/s Ratio Prot	c0.17		c0.13	0.45	c0.41	
v/s Ratio Perm		0.04				0.23
v/c Ratio	0.79	0.20	0.75	0.64	0.83	0.23
Uniform Delay, d1	46.6	40.3	49.3	10.1	27.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.6	0.3	9.4	0.5	3.4	0.3
Delay (s)	57.2	40.6	58.7	10.6	31.1	0.3
Level of Service	E	D	E	B	C	A
Approach Delay (s)	48.8			16.7	24.8	
Approach LOS	D			B	C	

Intersection Summary				
HCM Average Control Delay	24.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	125.7	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	78.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
13: Kulanihakoi &

5/4/2011

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	43	60	479	74	21	369
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.93	0.93	0.98	0.98
Hourly flow rate (vph)	52	72	515	80	21	377
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	974	555			595	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	974	555			595	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	86			98	
cM capacity (veh/h)	273	531			982	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	52	72	595	21	377
Volume Left	52	0	0	21	0
Volume Right	0	72	80	0	0
cSH	273	531	1700	982	1700
Volume to Capacity	0.19	0.14	0.35	0.02	0.22
Queue Length 95th (ft)	17	12	0	2	0
Control Delay (s)	21.2	12.8	0.0	8.7	0.0
Lane LOS	C	B		A	
Approach Delay (s)	16.3		0.0	0.5	
Approach LOS	C				

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	56	27	636	59	23	510
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.96	0.96	0.84	0.84
Hourly flow rate (vph)	72	35	662	61	27	607
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1355	693			724	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1355	693			724	
tC, single (s)	*5.4	*5.2			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	75	95			97	
cM capacity (veh/h)	282	712			879	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	72	35	724	27	607
Volume Left	72	0	0	27	0
Volume Right	0	35	61	0	0
cSH	282	712	1700	879	1700
Volume to Capacity	0.25	0.05	0.43	0.03	0.36
Queue Length 95th (ft)	25	4	0	2	0
Control Delay (s)	22.1	10.3	0.0	9.2	0.0
Lane LOS	C	B		A	
Approach Delay (s)	18.2		0.0	0.4	
Approach LOS	C				

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value