TRAFFIC IMPACT ANALYSIS REPORT FOR

PIILANI PROMENADE

IN KIHEI, MAUI, HAWAII

Prepared For

ECLIPSE DEVELOPMENT GROUP

Phillip Rowell and Associates
47-273 'D' Hui Iwa Street
Kaneohe, Hawai'I 96744
Tel: 808-239-8206 Fax: 808-239-4175
Email: prowell@hawaii.rr.com

January 30, 2012
Revised May 7, 2012

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Phillip Rowell and Associates has been retained to update the Traffic Impact Analysis Report for the proposed Piilani Promenade project in Kihei, Maui, Hawaii. This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Project Location and Description

The following is a summary of the project:

1. The project is located along the mauka (east) side of Piilani Highway opposite Kaonoulu Street in the Kihei area of Maui. Figure 1 indicates the approximate location in the Kihei area.

2. Primary access to and egress from the project will be provided by extension of Kaonoulu Street mauka of Piilani Highway. This extension is referred to as East Kaonoulu Street. Initially, this extension will be through the project only. In the future, this road will be extended to Haleakala Highway at Haliiemaile Road, providing a connection between Kihei and Upcountry (Upcountry Highway).

3. The extension of Kaonoulu Street will divide the project into two parcels. The north parcel is referred to as the Maui Outlet Center and will consist of 290,000 leasable square feet of retail and commercial uses. The south parcel is referred to as the Maui Retail Center and will consist of 410,000 leasable square feet of retail floor area. This includes 38,000 square feet for an outdoor garden area.

4. It is understood that the objective of this project is to provide services for the tourist and residents of the Kihei area and that marketing efforts will be directed toward the South Maui area.

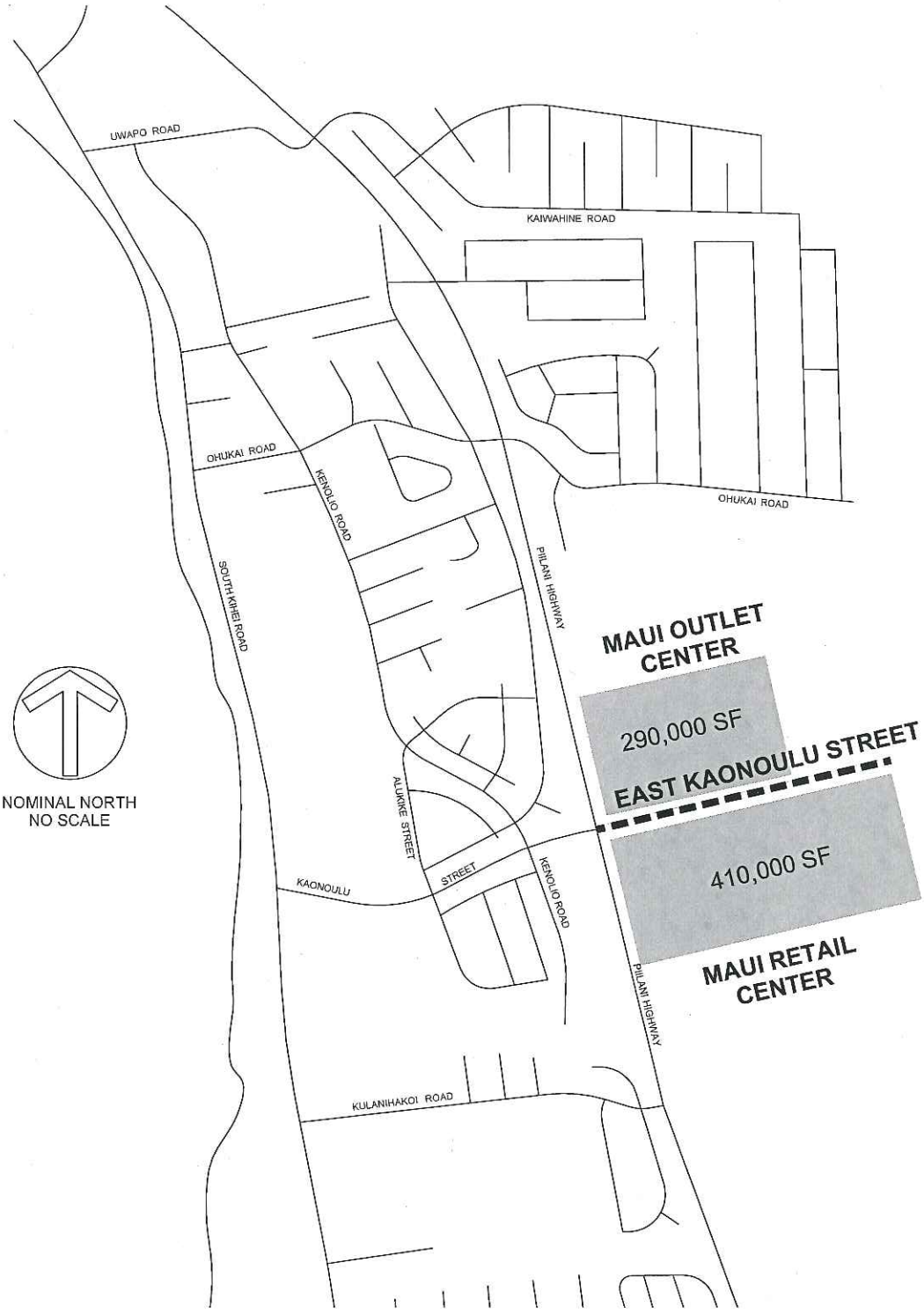


Figure 1
PROJECT LOCATION IN KIHEI

5. The intersection of Piilani Highway at Kaonoulu Street will be signalized and improved to accommodate additional left turn lanes, acceleration lanes and deceleration lanes. This study will determine the final lane configuration.

6. A preliminary site plan indicating the approximate locations of buildings and driveways is provided as Appendix A.

7. Estimated completion date for the project is 2015. The year 2015 is used as the design year to be consistent with other projects in the area and Institute of Transportation Engineers guidelines.

Study Methodology

The following is a summary list of the tasks performed:

1. State of Hawaii Department of Transportation officials were contacted to confirm the study area and the scope of work.

2. A field reconnaissance was performed to identify existing roadway cross-sections, intersection lane configurations, traffic control devices, and surrounding land uses.

3. Existing weekday and Saturday peak hour traffic volumes were obtained for the study intersections. Existing levels-of-service of the study intersections were determined using the methodology described in the *2000 Highway Capacity Manual*.

4. Existing traffic operating deficiencies were identified. Improvements to mitigate these deficiencies were identified and assessed.

5. A list of related development projects within and adjacent to the study area that will impact traffic conditions at the study intersections was compiled. This list included both development projects and anticipated highway improvement projects.

6. Future background traffic volumes at the study intersections without traffic generated by the study project were estimated. Intersections that are not expected to operate at acceptable levels-of-service were identified. Mitigation measures were identified and assessed.

7. Peak hour traffic that the proposed project will generate was estimated using trip generation analysis procedures recommended by the Institute of Transportation Engineers. Project generated traffic was distributed and assigned to the adjacent roadway network.

8. A level-of-service analysis for future traffic conditions with traffic generated by the study project was performed.

9. The impacts of traffic generated by the proposed project at the study intersections was quantified and summarized. Locations that project generated traffic significantly impacts traffic operating conditions were identified.

10. Improvements or modifications necessary to mitigate the traffic impacts of the project and to provide adequate access to and egress from the site were identified and analyzed.

11. Based on discussions with State of Hawaii Department of Transportation, it was concluded that construction of the Upcountry Highway is not likely until after 2015, the design year for this project. To insure that the intersection of Piilani Highway at Kaonoulu Street is designed to accommodate additional traffic associated with the extension of East Kaonoulu Street, a separate analysis of this intersection was performed to determine the ultimate intersection configuration.

12. A report documenting the conclusions of the analyses performed and recommendations was prepared.

Study Area

The study area for this study is consistent with the study area used in the preparation of traffic studies for other projects in the area. The study intersections are listed in Table 1.

Table 1 Study Intersections

Number	Intersection	Jurisdiction	Existing Right-of-Way Control
1	Piilani Highway at Ohukai Road	State	Signals
2	Piilani Highway at Kaiwahine Street & Uwapo Road	State	Signals
3	Piilani Highway at Mokulele Highway & North Kihei Road	State	Signals
4	North Kihei Road at South Kihei Road	State	Signals
5	Piilani Highway at Kaonoulu Street	State	Stop Sign
6	Kaonoulu Street at South Kihei Road	County	Stop Sign
7	Piilani Highway at Kulanihakoi Street	State	Stop Sign
8	Kaonoulu Street at Kenolio Road	County	Stop Sign
9	Kaonoulu Street at Alulike Street	County	Stop Sign

Order of Presentation

Chapter 2 describes existing traffic conditions, the Level-of-Service (LOS) concept and the results of the Level-of-Service analysis of existing conditions.

Chapter 3 describes the process used to estimate 2015 background traffic volumes and the resulting background traffic projections. Background conditions are defined as future background traffic conditions without traffic generation by the study project.

Chapter 4 describes the methodology used to estimate the traffic characteristics of the proposed project, including 2015 background plus project traffic projections.

Chapter 5 describes the traffic impacts of the proposed project, conclusions of the impact analysis and recommended mitigation measures.

Chapter 6 describes traffic projections to include traffic associated with the Upcountry Highway and the ultimate intersection configuration to accommodate these future traffic projections.

Chapter 7 summarizes the recommended traffic management strategies for the proposed project.

Chapter 8 summarizes our responses to comments from State of Hawaii Department of Transportation.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions on the roadways adjacent to the proposed project. The level-of-service (LOS) concept and the results of the LOS analysis for existing conditions are also presented. The purpose of this analysis is to identify existing deficiencies and to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Existing Streets and Intersection Controls

The primary streets and roadways serving the project are Piilani Highway, South Kihei Road and Kaonoulu Street. These streets and the lane configurations of the study intersections are shown as Figure 2. Also shown are the method of right-of-way control at the study intersections.

Piilani Highway is a four-lane, undivided highway with a north-south orientation connecting Mokulele Highway to the north with Wailea Resort to the south. The posted speed limit is 40 miles per hour. The intersections with Ohukai Street, Kaiwahine Street and North Kihei Road are signalized with separate left turn phases for the northbound and southbound approaches. The intersections with Kaonoulu Street and Kulanihakoi are unsignalized. All intersections have separate left turn lanes.

Ohukai Street is a basically a two-lane, two-way street, but widens to provide two approach lanes as it approaches Piilani Highway. The posted speed limit is 20 miles per hour. Both the eastbound and westbound approaches provide a through and left turn lane and a separate right turn lane. The eastbound and westbound approaches move concurrently, which means that left turns are permitted rather than protected.

Kaonoulu Street currently connects Piilani Highway with South Kihei Road. Currently, it is a two-lane, two-way street with separate left turn lanes at intersections. The posted speed limit is 20 miles per hour. The intersection with Piilani Highway is currently an unsignalized, T-intersection.

Kaiwahine Street is a two-lane, two-way residential collector street connecting the project with Piilani Highway. The posted speed limit is 20 miles per hour. Residential parking is allowed along both sides of the street.

Uwapo Road is an extension of Kaiwahine Street west of Piilani Highway to South Kihei Road. Uwapo Road is a two-lane, two-way roadway. There is no development along the north side and there are multi-family residential unit along the south side. No parking is allowed along either side. The assumed speed limit is 20 miles per hour.

Existing Peak Hour Traffic Volumes

The existing peak hour traffic volumes are shown in Figures 3, 4 and 5.

1. The traffic counts include buses, trucks, motorcycles, mopeds and other large vehicles. Bicycles and pedestrians were not counted.

2. All intersections were counted from 6:30 AM to 9:00 AM and from 3:00 PM to 6:00 PM on weekdays and from 10:00 AM to 2:00 PM on Saturdays.

3. The traffic volumes shown are the peak hourly volume of the total intersection.

4. The traffic volumes of adjacent intersections may not match the volumes shown for an adjacent intersection because the peak hours of the adjacent intersections may not coincide and there are driveways between the intersections.

5. Pedestrian activity was negligible during the traffic counts.

The traffic count summary worksheets are provided as Appendix B.

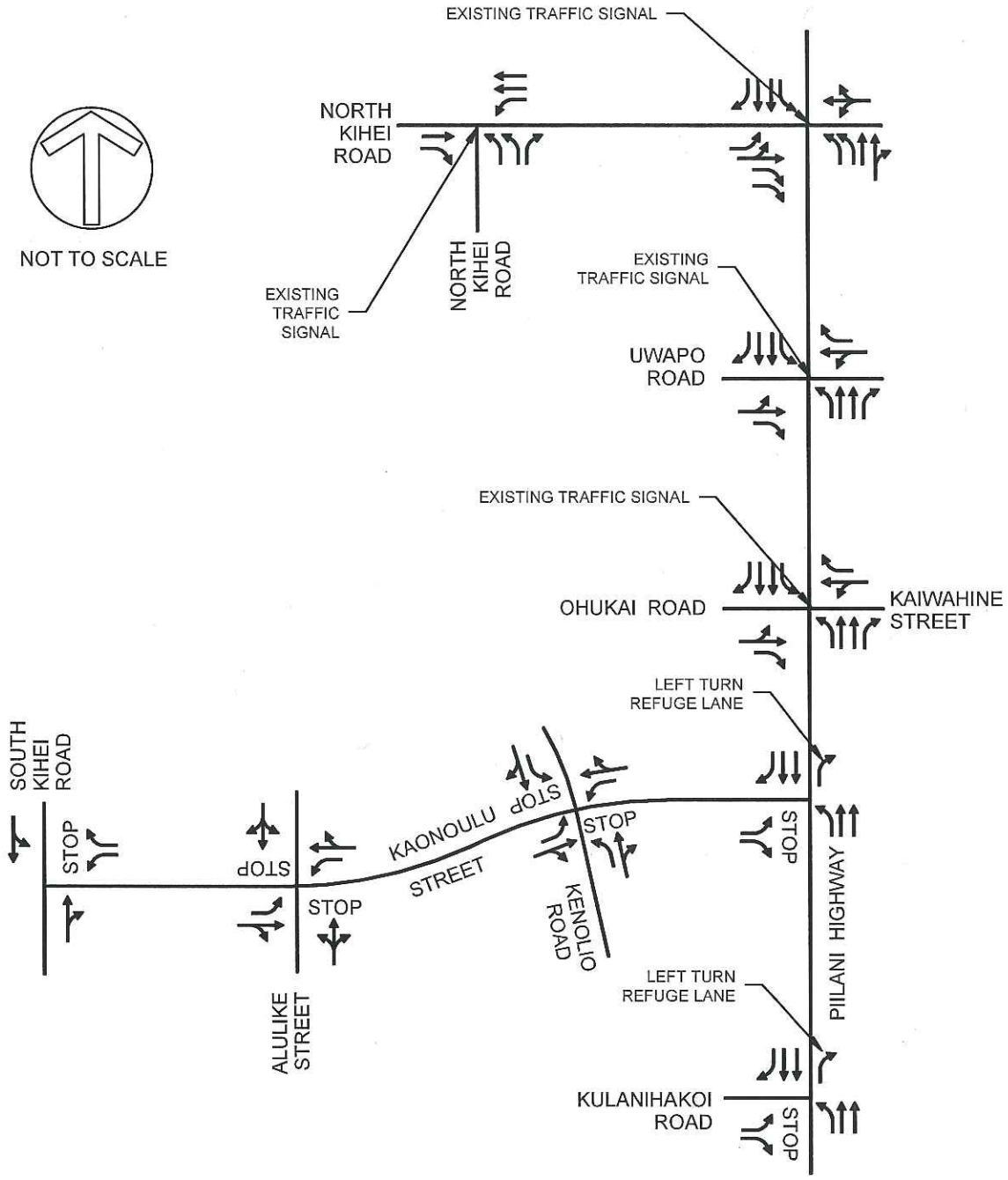


Figure 2
EXISTING LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS

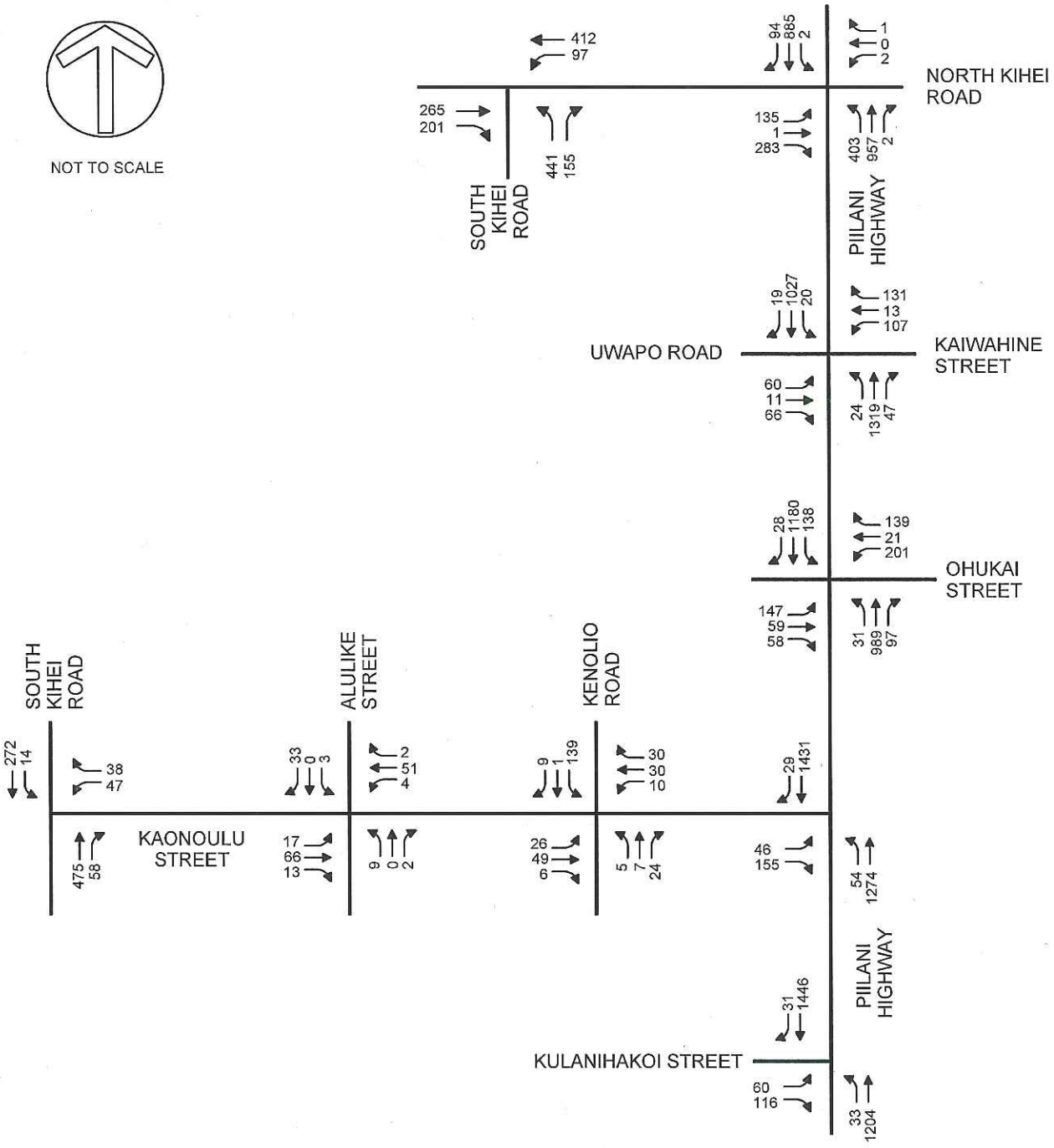


Figure 3
EXISTING (2010) AM PEAK HOUR TRAFFIC VOLUMES

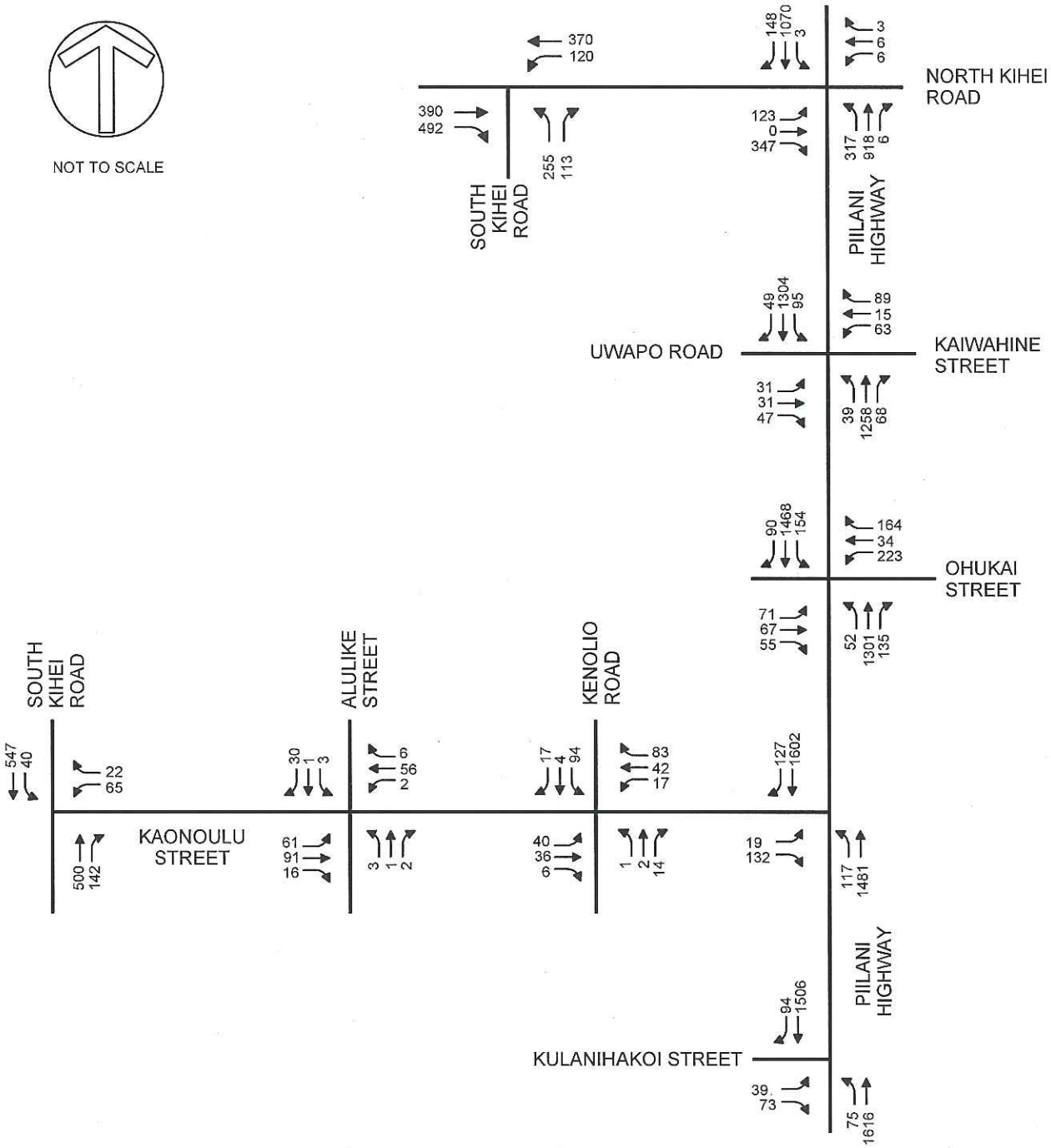


Figure 4
EXISTING (2010) PM PEAK HOUR TRAFFIC VOLUMES

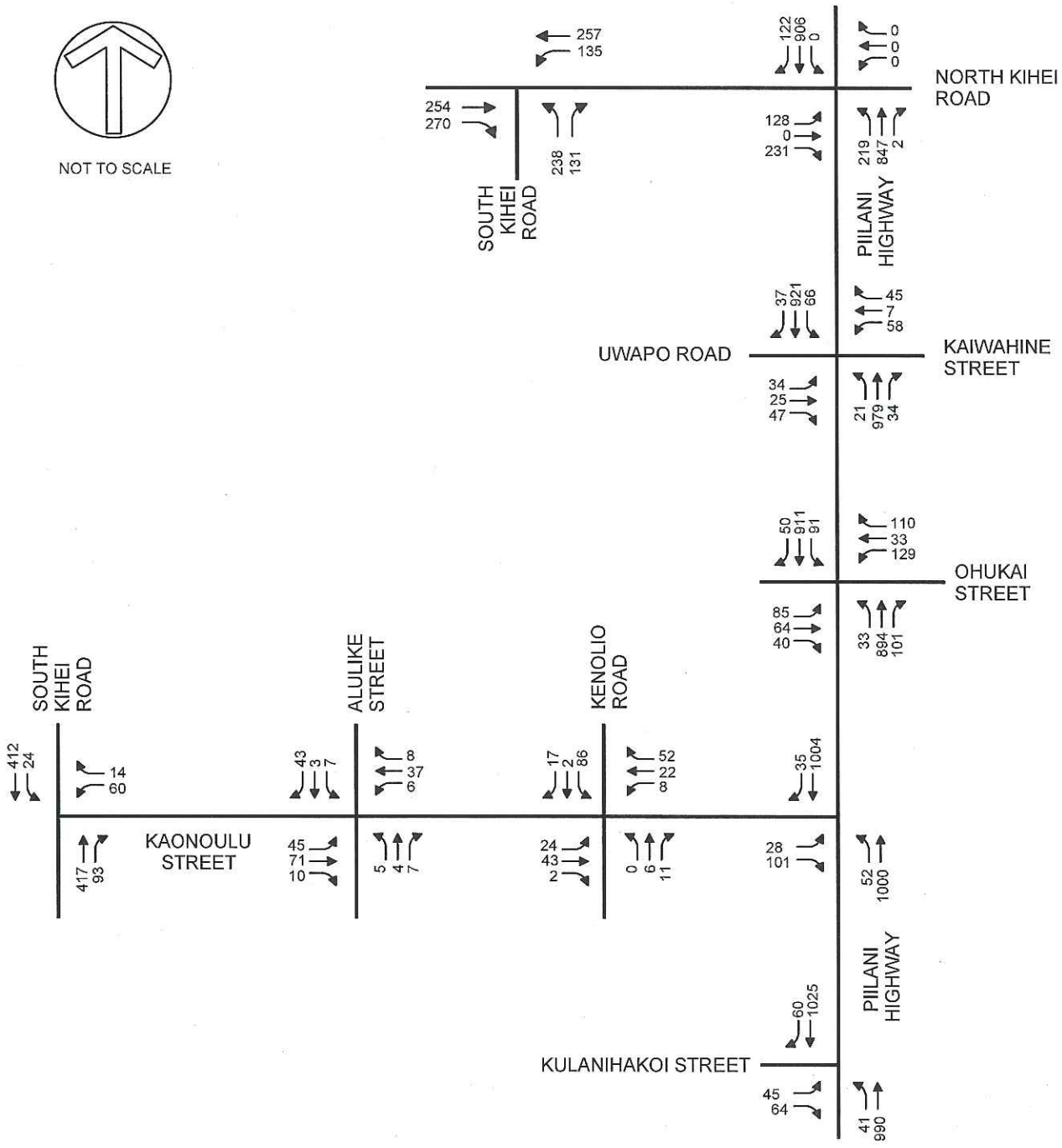


Figure 5
EXISTING (2010) SATURDAY PEAK HOUR TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 2. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.[1]

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 2 Level-of-Service Definitions for Signalized Intersections(1)

Level of Service	Interpretation	Volume-to-Capacity Ratio(2)	Stopped Delay (Seconds)
A	Uncongested operations; all vehicles clear in a single cycle.	0.000 - 0.700	< 10.0
B			10.1 - 20.0
C	Light congestion; occasional backups on critical approaches	0.701 - 0.800	20.1 - 35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801 - 0.900	35.1 - 55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901 - 1.000	55.1 - 80.0
F	Total breakdown with stop-and-go operation	> 1.001	> 80.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

[1] Institute of Transportation Engineers, *Transportation Impact Analyses for Site Development*, Washington, D.C., 2006, page 56 - 60

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 3 summarizes the definitions for level-of-service and the corresponding delay.

Table 3 Level-of-Service Definitions for Unsignalized Intersections(1)

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.0

Notes:
(1) Source: *Highway Capacity Manual*, 2000.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Methodology for Level-of-Service Analysis

1. Synchro 6 was used to analyze the study intersections, which is based on the *Highway Capacity Manual*.

2. The *Highway Capacity Manual* methodology does not report a volume-to-capacity ratio for unsignalized intersections or results for the overall unsignalized intersection. Synchro 6 reports an overall delay for unsignalized intersections. This overall intersection delay and the corresponding level-of-service from the table above is shown in the following tables for unsignalized intersections.

3. As the *Highway Capacity Manual* defines level-of-service by delay, we have used the same definitions.

Level-of-Service Analysis of Existing Conditions

The existing levels-of-service of the signalized study intersections are summarized in Table 4. The results shown in the table are the volume-to-capacity ratios, delays and levels-of-service of the overall intersections as reported by the *Highway Capacity Software*.

Table 4 2010 Levels-of-Service of Signalized Intersections

	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Highway at Ohukai Street	***0.85***	***48.8***	***D***	***0.94***	***53.8***	***D***	***0.71***	***36.2***	***D***
Eastbound Left & Thru	0.89	84.7	F	0.95	113.3	F	0.79	68.2	E
Eastbound Right	0.05	50.8	D	0.05	58.5	E	0.04	47.8	D
Westbound Left & Thru	0.91	81.0	F	0.97	95.9	F	0.80	68.9	E
Westbound Right	0.12	45.9	D	0.16	48.3	D	0.10	48.1	D
Northbound Left	0.84	134.4	F	0.70	88.0	F	0.55	68.6	E
Northbound Thru	0.80	43.2	D	0.92	47.6	D	0.66	29.9	C
Northbound Right	0.11	28.0	C	0.16	24.1	C	0.10	20.5	C
Southbound Left	0.83	85.5	F	0.99	131.1	F	0.68	68.5	E
Southbound Thru	0.71	31.9	C	0.85	37.8	D	0.54	23.4	C
Southbound Right	0.04	19.8	B	0.10	19.8	B	0.06	16.7	B
Piilani Highway at Kaiwahine Street	***0.81***	***30.7***	***C***	***0.64***	***21.9***	***C***	***0.49***	***16.5***	***B***
Eastbound Left & Thru	0.97	92.7	F	0.85	82.5	F	0.67	58.6	E
Eastbound Right	0.05	35.5	D	0.06	46.5	D	0.04	44.1	D
Westbound Left & Thru	0.84	72.1	E	0.88	96.3	F	0.76	68.7	E
Westbound Right	0.26	38.1	D	0.10	46.8	D	0.05	44.1	D
Northbound Left	0.62	82.5	F	0.54	60.9	E	0.49	58.4	E
Northbound Thru	0.72	22.6	C	0.59	13.4	B	0.46	9.1	A
Northbound Right	0.04	12.3	B	0.08	8.1	A	0.04	6.1	A
Southbound Left	0.64	73.8	E	0.63	59.1	E	0.60	57.7	E
Southbound Thru	0.56	17.0	B	0.56	10.5	B	0.44	7.3	A
Southbound Right	0.02	10.7	B	0.05	6.1	A	0.03	4.7	A
Piilani Highway at North Kihei Road	***0.63***	***23.1***	***C***	***0.73***	***24.8***	***C***	***0.53***	***16.4***	***B***
Eastbound Left	0.49	52.2	D	0.49	55.4	E	0.56	45.2	D
Eastbound Left & Thru	0.51	52.5	D	0.49	55.4	E	0.55	45.1	D
Eastbound Right	0.11	48.2	D	0.17	51.8	D	0.09	39.6	D
Westbound Left, Thru & Right	0.22	58.2	E	0.40	58.2	E	0.00	0.0	A
Northbound Left	0.78	51.6	D	0.73	55.5	E	0.63	43.5	D
Northbound Thru & Right	0.40	6.0	A	0.43	7.7	A	0.35	3.1	A
Southbound Left	0.44	73.0	E	0.24	66.9	E	0.00	0.0	A
Southbound Thru	0.50	15.7	B	0.58	17.3	B	0.47	10.9	B
Southbound Right	0.09	11.4	B	0.12	11.7	B	0.12	8.0	A
North Kihei Road at South Kihei Road	***0.49***	***24.3***	***C***	***0.62***	***23.3***	***C***	***0.43***	***20.5***	***C***
Eastbound Thru	0.77	41.2	D	0.77	33.2	C	0.67	30.1	C
Eastbound Right	0.16	28.5	C	0.35	23.3	C	0.18	23.3	C
Westbound Left	0.60	43.6	D	0.69	47.5	D	0.64	35.9	D
Westbound Thru	0.33	18.8	B	0.27	13.8	B	0.19	14.1	B
Northbound Left	0.32	15.1	B	0.23	16.9	B	0.16	10.7	B
Northbound Right	0.13	13.6	B	0.11	15.9	B	0.09	10.4	B

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix C for Level-of-Service Analysis Worksheets.

The results of the Level-of-Service analysis of the study intersections are summarized in Table 5. The methodology for unsignalized intersections does not calculate the volume-to-capacity ratio of the controlled movements or the overall intersection. Shown in the table are the average vehicle delays and levels-of-service of the controlled movements and the weighted delay and corresponding level-of-service of the overall intersection. The weighted delays consider traffic using the uncontrolled lane groups, which has no delay because these movements do not stop or yield, and therefore indicate a lower delay than the controlled movements, even though the controlled movement may have a delay implying Level-of-Service E to F.

Table 5 Existing Levels-of-Service of Unsignalized Intersections

	AM Peak Hour		PM Peak Hour		Saturday Peak Hour	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS
Piilani Highway at Kaonoulu Street	***3.3***	***A***	***3.2***	***A***	***1.7***	***A***
Eastbound Left	**41.3**	**E**	**68.1**	**F**	23.0	C
Eastbound Right	29.5	D	33.2	D	15.9	C
Northbound Left	14.6	B	**38.9**	**E**	12.0	B
South Kihei Road at Kaonoulu Street	***4.1***	***A***	***4.8***	***A***	***3.4***	***A***
Westbound Left	28.8	D	**62.6**	**F**	34.0	D
Westbound Right	12.6	B	12.7	B	12.7	B
Southbound Left	0.9	A	1.4	A	1.0	A
Piilani Highway at Kulanihakoi Street	***3.0***	***A***	***1.8***	***A***	***1.4***	***A***
Eastbound Left	**66.7**	**F**	**49.7**	**E**	23.3	C
Eastbound Right	25.4	D	21.1	C	13.9	B
Northbound Left	16.8	C	19.4	C	11.9	B
Kaonoulu Street at Kenolio Road	***7.3***	***A***	***5.4***	***A***	***5.7***	***A***
Eastbound Left	7.4	A	7.6	A	7.5	A
Westbound Left	7.4	A	7.4	A	7.4	A
Northbound Left	10.2	B	10.8	B	0.0	A
Northbound Thru & Right	9.3	A	9.4	A	9.6	A
Southbound Left	12.7	B	13.0	B	12.2	B
Southbound Thru & Right	9.1	A	9.6	A	9.1	A
Kaonoulu Street at Alulike Street	***3.8***	***A***	***3.4***	***A***	***5.0***	***A***
Eastbound Left	7.4	A	7.5	A	7.5	A
Westbound Left	7.4	A	7.5	A	7.5	A
Northbound Left, Thru & Right	10.2	B	11.3	B	10.9	B
Southbound Left, Thru & Right	9.0	A	9.5	A	10.2	B

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix C for Level-of-Service Analysis Worksheets.

Existing Deficiencies

We have used the Institute of Transportation Engineers standard that Level-of-Service D is the minimum acceptable Level-of-Service and that the criteria is applicable to the overall intersection rather than each controlled lane group. Minor movements, such as left turns, and minor side street approaches may operate at Level-of-Service E or F for short periods of time during the peak hours so that the overall intersection and major movements along the major highway will operate at Level-of-Service D, or better.

Using this standard, no deficiencies were identified at the signalized intersections.

Traffic signal warrant analyses were performed for the major unsignalized intersections. The analyses were performed using the warrants described in the latest edition of the *Manual of Uniform Traffic Control Devices (MUTCD)* and the following assumptions:

1. Urban, or 100%, conditions apply.

2. Only Warrant 2, Four-Hour Vehicular Warrant was assessed. Warrant 3, Peak Hour Vehicular Volume Warrant is not applicable to the study intersection under current conditions and traffic data for Warrant 1, Eight-Hour Vehicular Volume Warrant is not available.

3. The traffic count data was also input in the traffic signal warrant module of the *Highway Capacity Software* to verify the calculations and conclusions.

Piilani Highway at Kaonoulu Street

At the intersection of Piilani Highway at Kaonoulu Street, the eastbound left turn operates at Level-of-Service E during the weekday morning peak hour and Level-of-Service F during the weekday afternoon peak hour. The left turn from northbound Piilani Highway to westbound Kaonoulu Street operates at Level-of-Service E during the weekday afternoon peak hour.

The traffic signal warrant analysis is shown as Figure 6. The conclusion is that traffic signals ***are not*** warranted at this intersection under current conditions.

South Kihei Road at Kaonoulu Street

At the intersection of South Kihei Road at Kaonoulu Street, the westbound left turn operates at Level-of-Service D during the weekday morning peak hour and the Saturday peak hour and Level-of-Service E during the weekday afternoon peak hour.

The traffic signal warrant analysis is shown as Figure 7. The conclusion is that traffic signals ***are not*** warranted at this intersection under current conditions. It should be noted that this intersection will be signalized and a southbound left turn lane will be provided as part of the Maui Lu Resort redevelopment.

Piilani Highway at Kulanihakoi Street

At the intersection of Piilani Highway at Kulanihakoi Street, the left turns from eastbound Kaonoulu Street to northbound Piilani Highway operate at Level-of-Service F during the weekday morning and afternoon peak hours.

The traffic signal warrant analysis is shown as Figure 8. The conclusion is that traffic signals ***are not*** warranted at this intersection under current conditions.

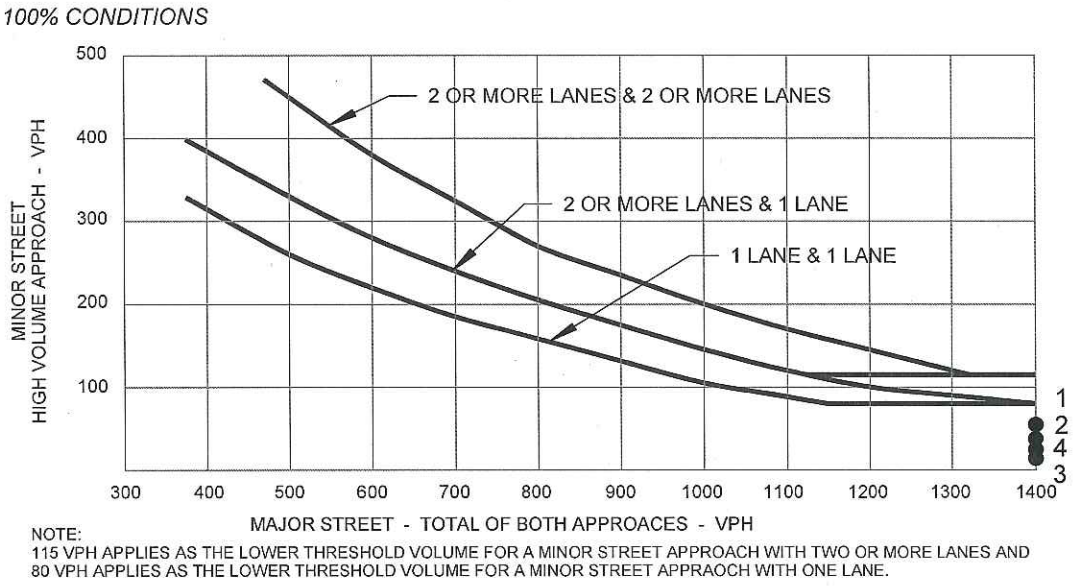
WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

Satisfied YES☐ NO☑

	APPROACH LANES		HOUR			
			1	2	3	4
	one	more	7 AM to 8 AM	8 AM to 9 AM	3 PM to 4 PM	4 PM to 5 PM
Both approaches - Major Street		✔	2632	2424	3126	3255
Highest approach - Minor Street	✔		45	28	19	22

(LEFT TURNS ONLY)

ASSUMPTIONS:
1. 100% (URBAN) CONDITIONS APPLY.



Source:
Federal Highway Adminstration, Manual of Uniform Traffic Control Devices

Figure 6
FOUR-HOUR VEHICULAR WARRANT FOR TRAFFIC SIGNALS
PIILANI HIGHWAY AT KAONOULU STREET

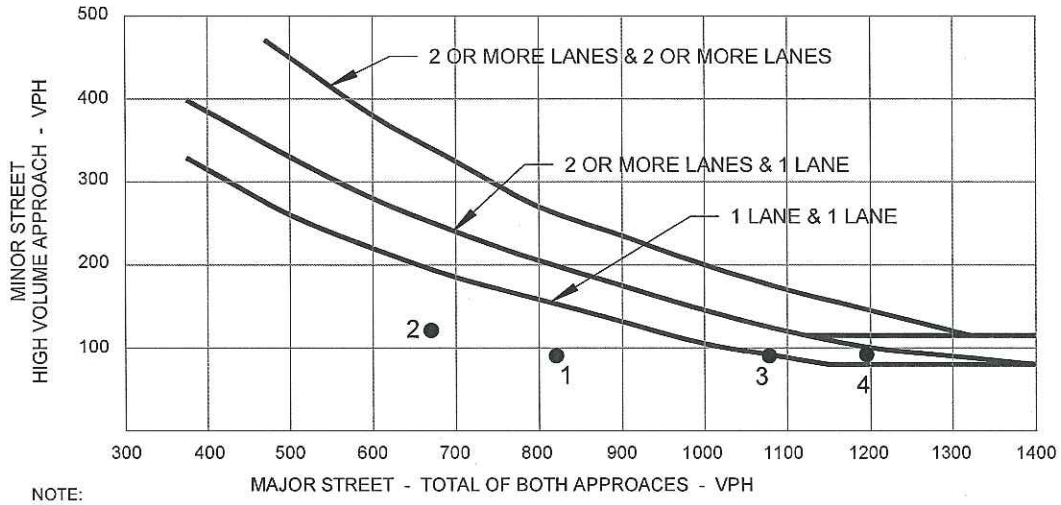
WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

Satisfied YES☐ NO☑

	APPROACH LANES		HOUR			
			1	2	3	4
	one	more	7 AM to 8 AM	8 AM to 9 AM	3 PM to 4 PM	4 PM to 5 PM
Both approaches - Major Street	✔		819	673	1071	1188
Highest approach - Minor Street		✔	86	123	92	96

ASSUMPTIONS:
1. 100% (URBAN) CONDITIONS APPLY.

100% CONDITIONS



NOTE:
115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPRAOCH WITH ONE LANE.

Source:
Federal Highway Adminstration, Manual of Uniform Traffic Control Devices

Figure 7
FOUR-HOUR VEHICULAR WARRANT FOR TRAFFIC SIGNALS
SOUTH KIHEI ROAD AT KAONOULU STREET

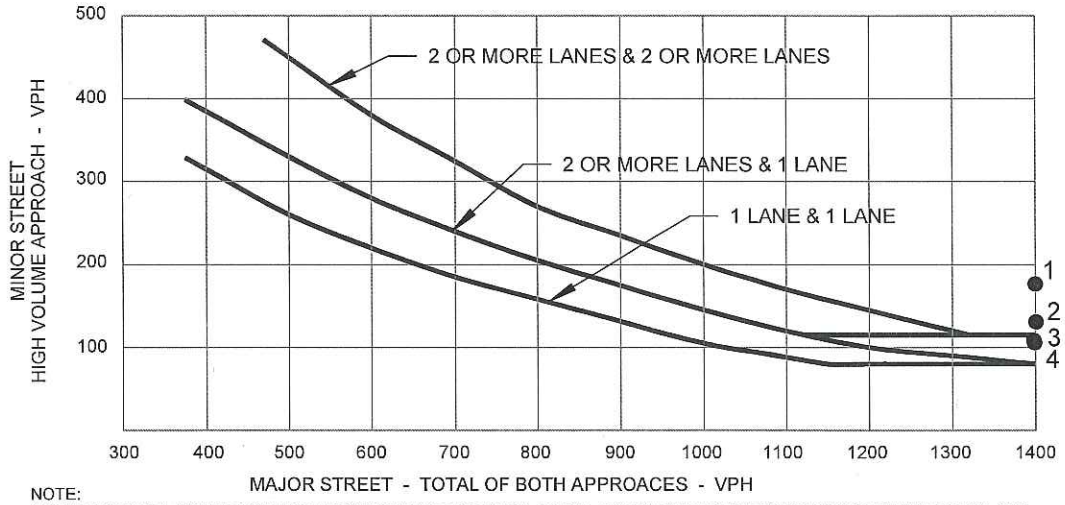
WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

Satisfied YES☐ NO☑

	APPROACH LANES		HOUR			
			1	2	3	4
	one	more	7 AM to 8 AM	8 AM to 9 AM	3 PM to 4 PM	4 PM to 5 PM
Both approaches - Major Street		✔	2714	2349	3291	3027
Highest approach - Minor Street		✔	176	136	112	111

ASSUMPTIONS:
1. 100% (URBAN) CONDITIONS APPLY.

100% CONDITIONS



NOTE:
115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPRAOCH WITH ONE LANE.

Source:
Federal Highway Adminstration, Manual of Uniform Traffic Control Devices

Figure 8
FOUR-HOUR VEHICULAR WARRANT FOR TRAFFIC SIGNALs
PIILANI HIGHWAY AT KULANIHAKOI ROAD

3. PROJECTED BACKGROUND TRAFFIC CONDITIONS

The purpose of this chapter is to discuss anticipated 2015 background conditions without project generated traffic. Background traffic conditions are defined as future traffic projections without traffic generated by the proposed project, Piilani Promenade.

Future traffic projections without project generated traffic are first estimated. Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. This growth also considers traffic associated with minor, or small, projects for which no traffic data, or traffic study, are available. The second component is estimated traffic that will be generated by other major development projects in the vicinity of the proposed project. Included in the assessment of future background conditions are roadway improvements that are part of the related projects.

A level-of-service of future (2015) background traffic conditions is then performed, existing deficiencies identified and appropriate mitigation measure identified and assessed where needed. The purposed of this process is the identify roadway improvements required to mitigate unacceptable conditions as a result of background traffic growth and traffic generated by related projects in the area so that improvements can be assessed against the appropriate project.

Design Year for Traffic Forecasts

The design, or horizon, year of a project is the future year for which background traffic conditions are estimated. The design year is typically several years after completion of the study project. The year 2015 is used in this study to be compatible with the traffic studies for other major projects within and adjacent to the study area.

Background Traffic Growth

The *Maui Long Range Transportation Plan*[2] concluded that traffic in Maui would increase an average of 1.6% per year from 1990 to 2020. This growth rate was used to estimate the background growth between 2010 and 2015, which is the design year for this project. The growth factor was calculated using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
i = Average annual growth rate, or 0.016
n = Growth period, or 5 years

It should be noted that some traffic studies for project in Kihei have used a growth factor of 2.0% rather that 1.6% used in the study. We have checked with the other consultants and verified that this is the result of rounding.

This growth factor was applied to the northbound and southbound through traffic movements at the study intersections along Piilani Highway and South Kihei Road. All increases of turning movement traffic volumes and side street approach volumes will be the result of traffic generated by related projects, not the result of regional traffic growth.

Related Projects

The second component in estimating background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are under construction or have been approved for construction and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements. The following related projects were identified.

Kaiwahine Village

The proposed Kaiwahine Subdivision is located at the east end of Kaiwahine Drive and will consist of 120 multi-family units. The traffic assignments for the subdivision were obtained from the traffic study for the project[3].

Maui Lu Resort

Maui Lu Resort is located in the northeast quadrant of the intersection of South Kihei Road at Kaonoulu Street. The existing resort will be demolished and a 400 unit timeshare will be constructed. Each timeshare unit will have one lock off unit which may be used as a separate hotel room. As part of the Maui Lu project, the intersection of South Kihei Road at Kaonoulu Street will be signalized. A separate southbound to eastbound left turn lane will also be constructed. The traffic assignments for the project were obtained from the traffic study for the project[4].

---

[2] Kaku Associates, *Maui Long Range Land Transportation Plan*, October 1996

[3] Phillip Rowell and Associates, *TIAR for Kaiwahine Village*, July 15, 2010

[4] Phillip Rowell and Associates, *TIAR for Maui Lu Resort*, March 7, 2007

Kihei Residential Subdivision

The Kihei Residential Subdivision will be located along the east side of Piilani Highway between Kaiwahine Street and North Kihei Road. The project will consist of 400 single family units, 200 multifamily units, 2,000 square feet of commercial floor area and 7,000 square feet of office floor area. The traffic assignments for the project were obtained from the traffic study for the project[5]. The TIAR provided weekday peak hour assignments. Saturday peak hour assignments were calculated using the project description provided in the TIAR.

Primary access to and egress from this project is via the intersection of Piilani Highway at Kaiwahine Street. The TIAR includes the improvements at this intersection to accommodate project generated traffic. These improvements are:

a. Modify the eastbound approach of Uwapo Road to provide separate left, through and right turn lanes.

b. Modify the westbound approach of Kaiwahine Street to provide two left turn lanes, one through lane and one right turn only lane.

c. Modify the southbound approach of Piilani Highway to provide two separate left turn lanes.

Kihei High School

The proposed Kihei High School will be located along the east side of Piilani Highway across from the Piilani Subdivision. According to the Environmental Impact Statement Preparation Notice (EISPN), the school will have a capacity of 1600 students for grades 9 through 12.

As described in the EISPN, access and egress will be via the intersection of Piilani Highway at Kulanihakoi Road, which will be modified with an extension of Kulanihakoi Road across Piilani Highway. Right turns only will be allowed into and out of the school site and the intersection will be unsignalized.

The number of trips that the high school will generate was estimated for 1600-student highway using Institute of Transportation Engineers trip generation data. These trips were assigned based on the circulation description provided in the EISPN.

Kenolio 6 Affordable Housing Project

The Kenolio 6 Affordable Housing Project is located between Piilani Highway and Kenolio Road in the southwest quadrant of the intersection of Kaonoulu Street at Piilani Highway. The project is a 124 unit multi-family affordable housing development. It is anticipated that the project will be completed in 2012.

Access to and egress from will be via two driveways along the east side of Kenolio Road. The first driveway, referred to as Drive A, is south of the intersection of Kenolio Road at Hoopili Akau Street. Drive B is south of Drive A along Kenolio Road.

The traffic assignments for the project were obtained from the traffic study for the project [6].

---

[5] Austin, Tsutsumi & Associates, *TIAR for Kihei Residential Project*, May 22, 2007

[6] Phillip Rowell and Associates, *TIAR for Kenolio 6 Affordable Housing Project*, May 27, 2010

The projects that were identified as related projects and the estimated number of peak hour trips generated by each are summarized in Table 6. The approximate locations of these projects is shown in Figure 9. Traffic assignments for the related projects are shown as Figures 10,11 and 12.

2015 Background Traffic Projections

2015 background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. The resulting 2015 background peak hour traffic projections are shown in Figures 13, 14 and 15.

Table 6 Trip Generation Summary of Related Projects

			AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	Related Project	Description	In	Out	Total	In	Out	Total	In	Out	Total
A	Kaiwahine Village	120 Multi-Family	19	47	66	49	31	80	26	26	52
B	Maui Lu Resort	400 Timeshares + 400 Lock Off Units (Maximum)	245	140	385	205	230	435	350	275	625
C	Kihei Residential	400 Single Family 200 Multi-Family 2,000 SF Commercial 7,000 SF Office	213	403	616	405	332	737	400	355	755
D	Kihei High School	1600 Students Grades 9 thru 12	455	200	655	105	120	225	0	0	0
E	Kenolio 6 Affordable Housing Project	124 Multi-Family	20	48	68	51	32	83	32	32	64
		TOTALS	952	838	1,790	815	745	1,560	808	688	1,496

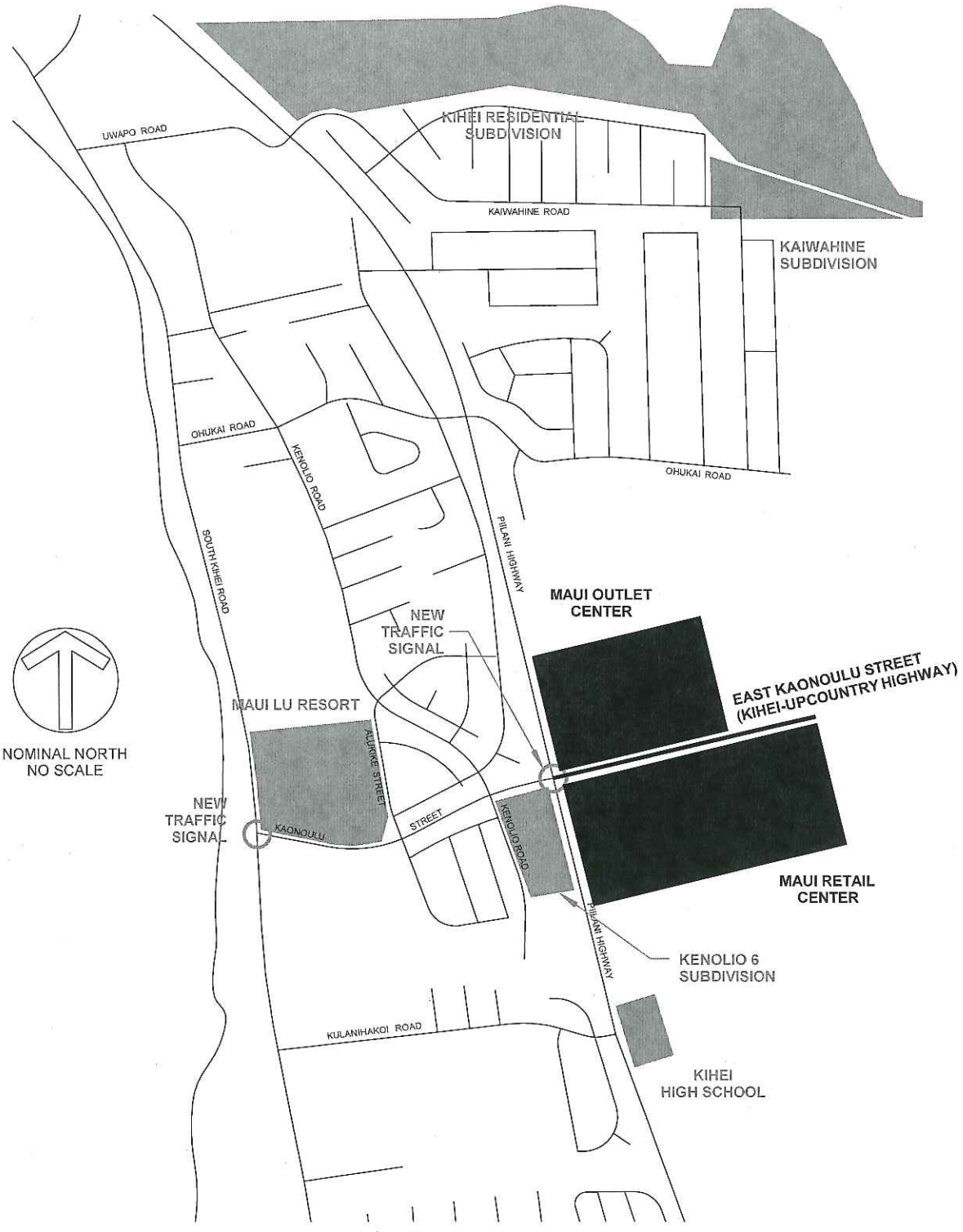


Figure 9
LOCATIONS OF RELATED PROJECTS

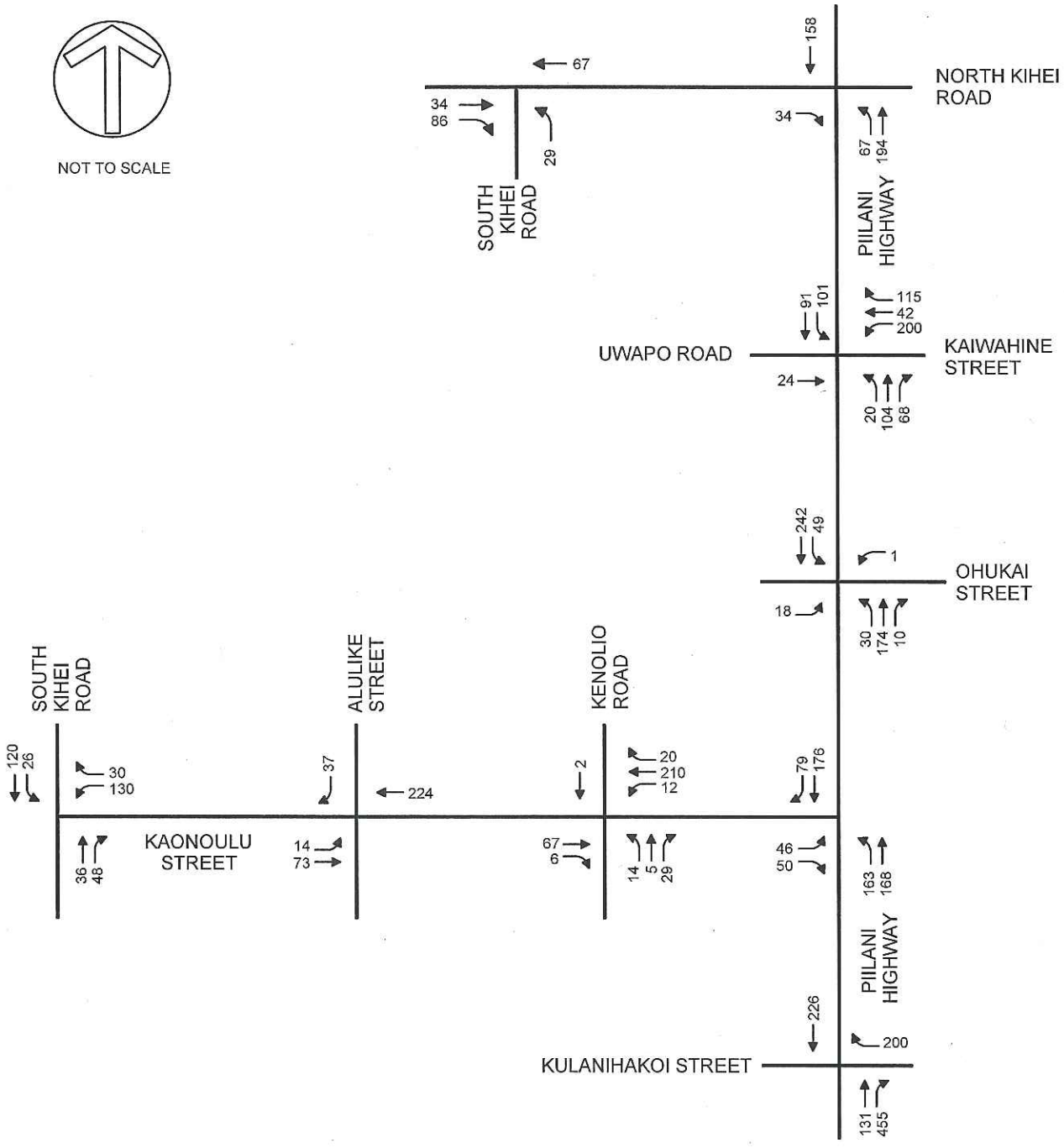


Figure 10
RELATED PROJECTS' TRIP ASSIGNMENTS - AM PEAK HOUR

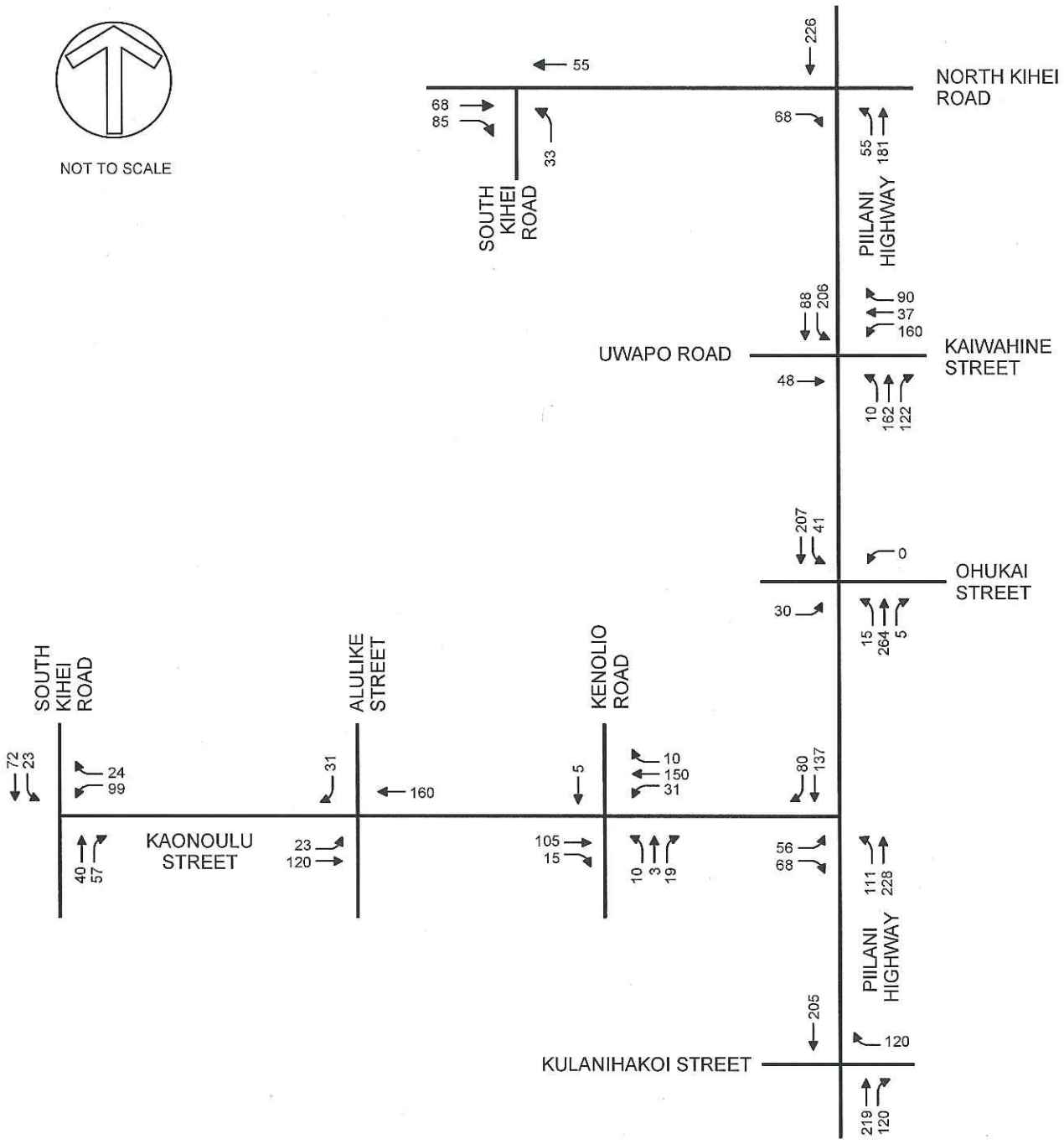


Figure 11
RELATED PROJECTS' TRIP ASSIGNMENTS - PM PEAK HOUR

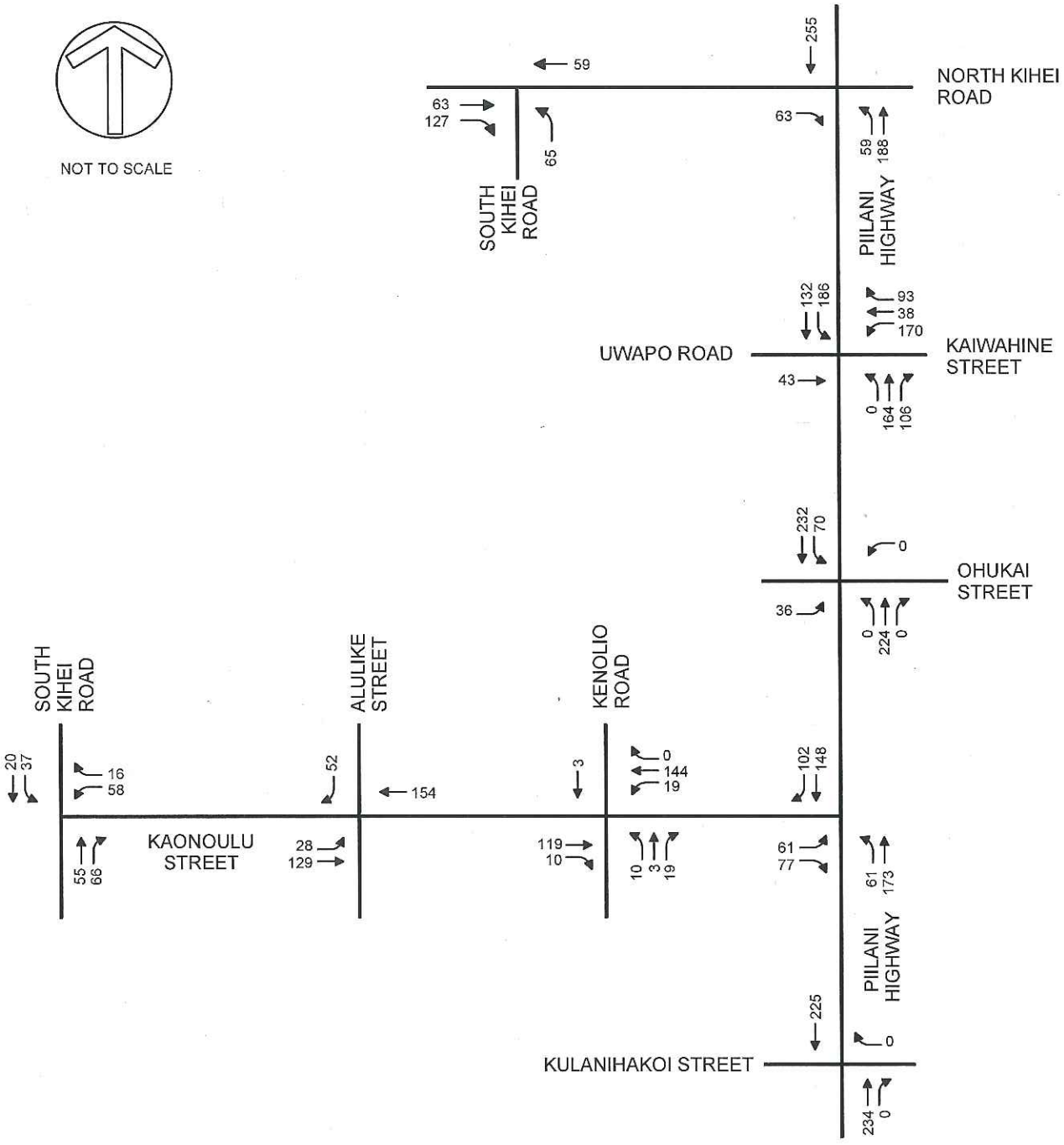


Figure 12
RELATED PROJECTS' TRIP ASSIGNMENTS - SATURDAY PEAK HOUR

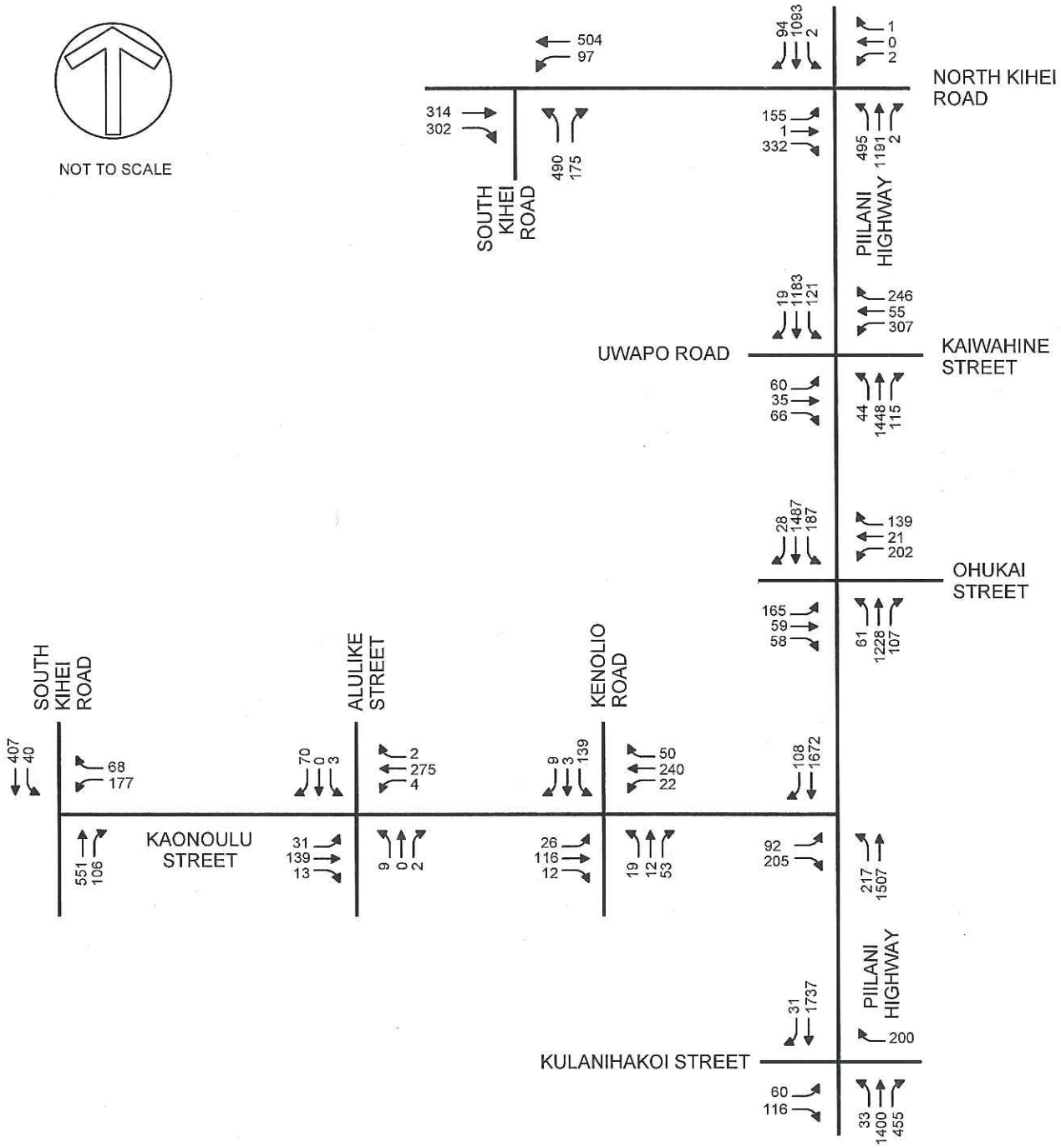


Figure 13
2015 BACKGROUND AM PEAK HOUR TRAFFIC PROJECTIONS

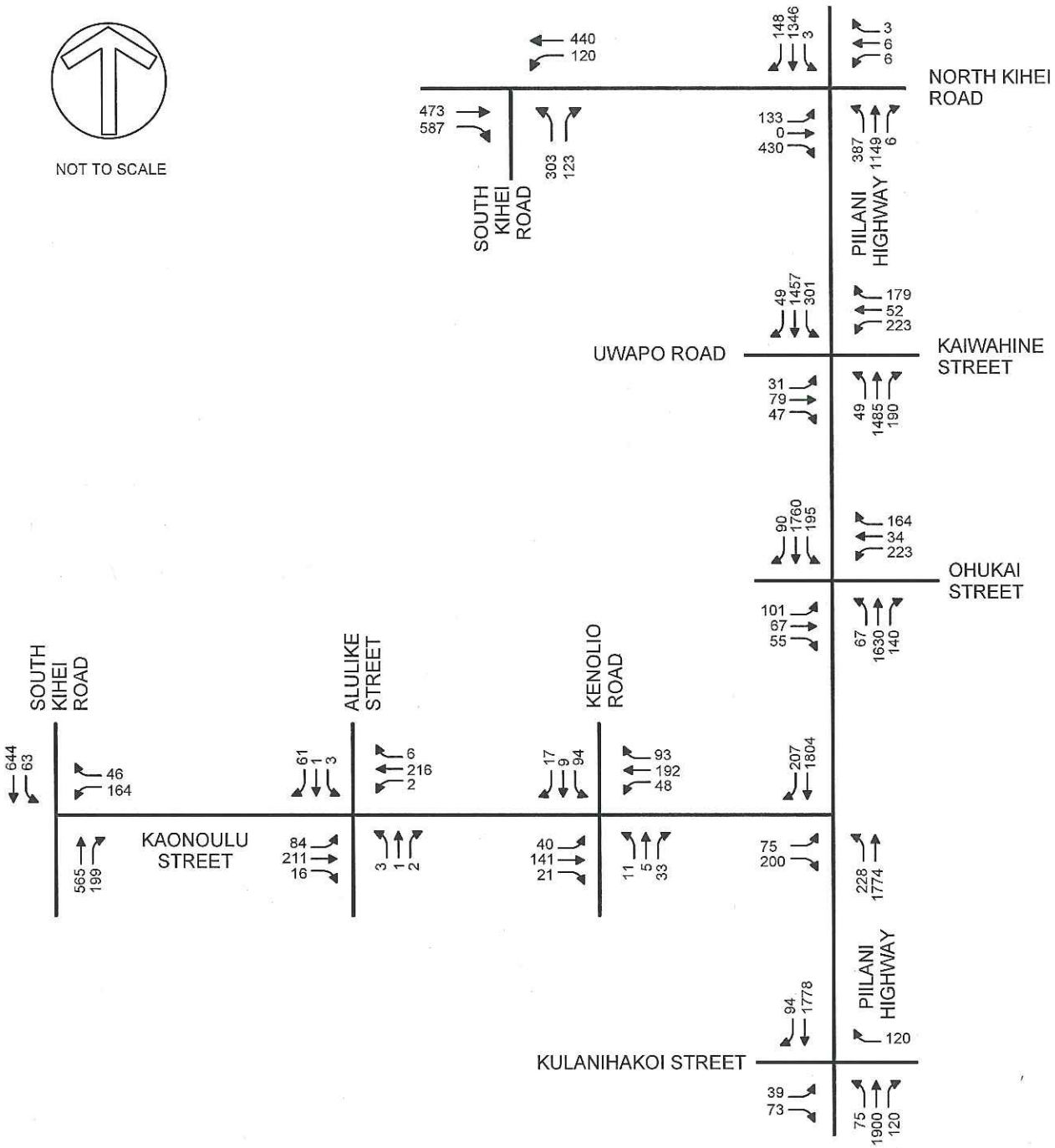


Figure 14
2015 BACKGROUND PM PEAK HOUR TRAFFIC PROJECTIONS

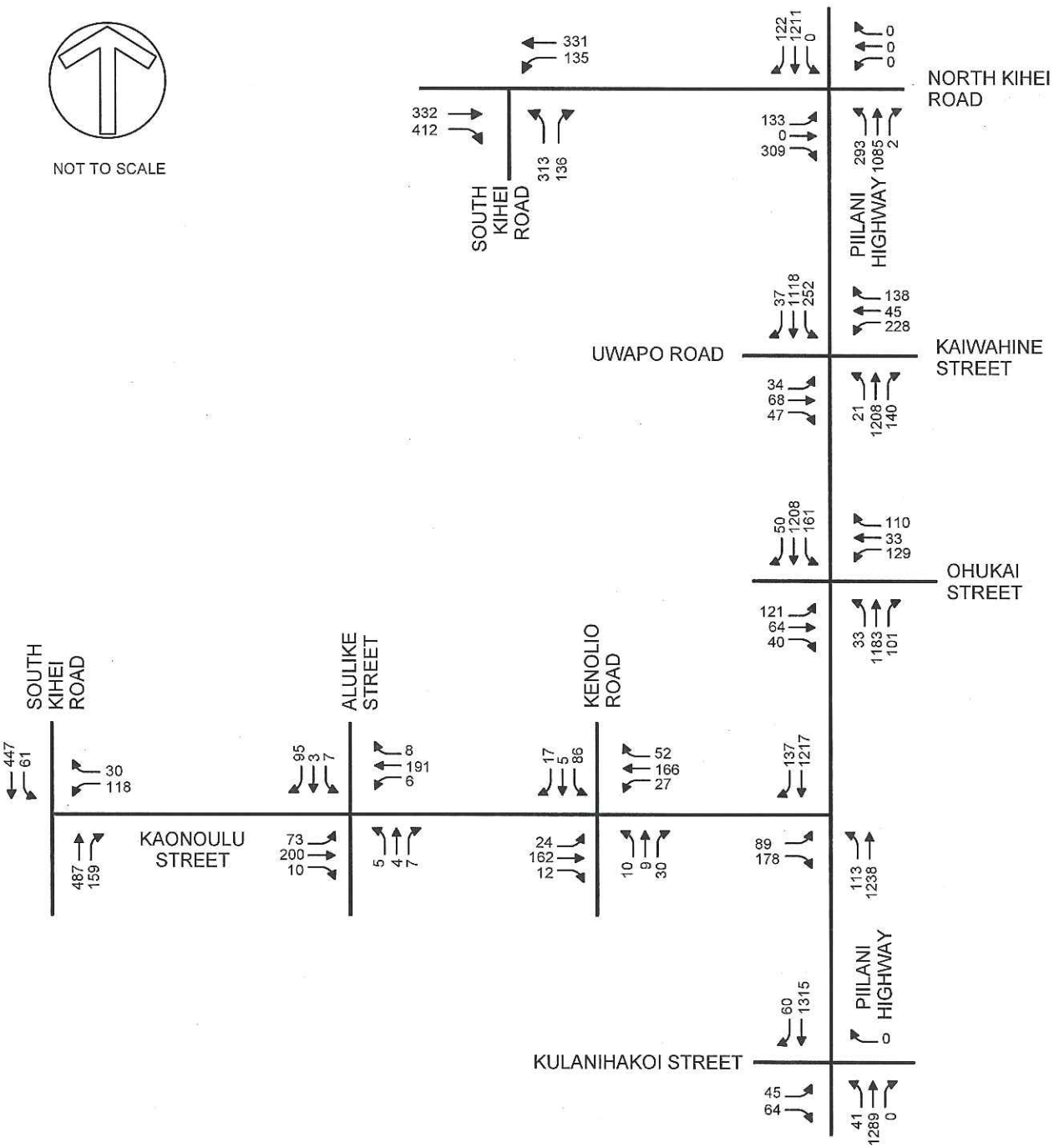


Figure 15
2015 BACKGROUND SATURDAY PEAK HOUR TRAFFIC PROJECTIONS

2015 Background Levels-of-Service

Table 7 summarizes the results of the level-of-service analysis of the signalized intersections for 2015 background without project generated traffic. Shown in the table are the volume-to-capacity ratios, average vehicle delays and levels-of-service of the overall intersection and all controlled lane groups.

Table 8 summarizes the results of the level-of-service analysis of the unsignalized intersections along Kaonoulu Street (Kaonoulu Street at Kenolio Road and Kaonoulu Street at Alulike Street) and the intersection of Piilani Highway at Kulanihakoi Street for 2015 background without project traffic conditions. Shown in the table are the average vehicle delays and levels-of-service of the controlled movements. Delays and levels-of-service are not calculated for uncontrolled movements.

Figure 16 illustrates the intersection configurations and right-of-way controls used for the level-of-service analysis of 2015 background conditions without project generated traffic. The roadway improvements that are proposed as part of the related projects are assumed to be in place for the level-of-service analysis since the project's traffic is included in the projections. These improvements include:

1. The intersection of Piilani Highway at Kaiwahine Street has been modified to provide separate left, through and right turn lanes along the eastbound approach, two left turn lanes, one through lane and one right turn only lane along the westbound approach and two separate left turn lanes along the southbound approach of Piilani Highway. *These improvements are recommended as part of the Kihei Residential project.*

2. The intersection of South Kihei Road at Kaonoulu Street has been signalized and the southbound approach has been modified to provide a separate left turn lane. *These improvements are recommended as part of the Maui Lu Resort Redevelopment project.*

3. The intersection of Piilani Highway at Kaonoulu Street has been signalized. This is recommended as part of the Piilani Promenade project. This improvement is included because Maui Lu Resort is to participate in this improvement.

Using the standards discussed in Chapter 2, additional improvements are required at the following intersections to provide acceptable levels-of-service for 2015 baseline (without project) conditions:

Piilani Highway at Ohukai Street

The overall intersection volume-to-capacity ratio is 1.12 during the afternoon peak. The eastbound left and through and the westbound left and through movements both have volume-to-capacity ratios greater than 1.00. The northbound through has a volume-to-capacity ratio of 1.09 and Level-of-Service F, which is below the minimum acceptable standard.

Piilani Highway at Kulanihakoi Street

Without mitigation, the intersection of Piilani Highway at Kulanihakoi Street will operate at Level-of-Service F during both weekday morning and afternoon peak hours and Saturday peak hour. The delays of the eastbound to northbound left turns are so long that they cause the overall intersection level-of-service to be Level-of-Service F. It should also be noted that the heavy northbound and southbound through volumes also cause long delays to the minor intersection movements.

Table 7 2015 Background Levels-of-Service

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Mitigation			With Mitigation			Without Mitigation			With Mitigation			Without Mitigation			With Mitigation		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at Ohukai St	***0.98***	***66.0***	***E***	***0.81***	***42.0***	***D***	***1.12***	***81.9***	***F***	***0.96***	***44.0***	***D***	***0.91***	***48.5***	***D***	***0.82***	***33.6***	***C***
Eastbound Left & Thru	0.98	109.5	F				1.17	179.1	F				0.92	92.5	F			
Eastbound Left				0.82	81.6	F				0.84	93.4	F				0.72	64.7	E
Eastbound Thru				0.35	58.4	E				0.52	65.8	E				0.43	53.7	D
Eastbound Right	0.05	53.4	D	0.16	56.3	E	0.05	58.5	E	0.06	60.4	E	0.04	51.8	D	0.04	49.9	D
Westbound Left & Thru	0.97	98.5	F				1.14	155.9	F				0.91	94.9	F			
Westbound Left				0.81	74.5	E				0.83	79.7	E				0.56	59.5	E
Westbound Thru				0.19	58.7	E				0.39	63.5	E				0.30	56.9	E
Westbound Right	0.13	49.5	D	0.11	58.1	E	0.20	52.6	D	0.17	61.2	E	0.10	55.5	E	0.10	55.2	E
Northbound Left	0.89	122.8	F	0.68	82.5	F	0.99	159.4	F	0.72	85.6	F	0.58	77.3	E	0.55	67.2	E
Northbound Thru	0.99	67.4	E	0.79	35.8	D	1.09	88.5	F	0.94	42.2	D	0.90	45.9	D	0.80	30.7	C
Northbound Right	0.14	29.7	C	0.11	21.1	C	0.18	22.1	C	0.15	16.7	B	0.12	23.7	C	0.11	17.1	B
Southbound Left	0.97	111.8	F	0.85	79.5	E	1.17	187.4	F	0.94	104.7	F	0.92	100.7	F	0.84	75.9	E
Southbound Thru	0.92	46.0	D	0.77	26.4	C	0.95	44.2	D	0.84	26.7	C	0.69	27.6	C	0.61	18.1	B
Southbound Right	0.05	21.4	C	0.04	13.5	B	0.10	17.1	B	0.09	11.9	B	0.07	16.9	B	0.06	11.2	B
Piilani Hwy at Kaiwahine St	***0.89***	***37.0***	***D***	***0.90***	***37.1***	***D***	***0.83***	***33.5***	***C***	***0.83***	***33.4***	***C***	***0.70***	***28.4***	***C***	***0.70***	***28.4***	***C***
Eastbound Left	0.89	81.9	F	0.88	79.2	E	0.33	49.8	D	0.32	49.7	D	0.36	47.5	D	0.36	47.5	D
Eastbound Thru	0.19	45.8	D	0.18	45.6	D	0.50	51.9	D	0.50	51.8	D	0.29	45.9	D	0.29	45.9	D
Eastbound Right	0.05	44.2	D	0.05	44.0	D	0.06	46.3	D	0.06	46.3	D	0.04	43.3	D	0.04	43.3	D
Westbound Left	0.77	59.0	E	0.82	62.2	E	0.91	84.0	F	0.92	86.0	F	0.79	59.7	E	0.79	59.7	E
Westbound Thru	0.21	46.0	D	0.21	45.9	D	0.30	49.1	D	0.30	49.1	D	0.49	48.5	D	0.49	48.5	D
Westbound Right	0.65	54.9	D	0.64	54.7	D	0.42	50.8	D	0.42	50.8	D	0.16	44.5	D	0.16	44.5	D
Northbound Left	0.62	76.3	E	0.49	72.1	E	0.70	81.7	F	0.65	79.5	E	0.43	64.2	E	0.43	64.2	E
Northbound Thru	0.81	28.6	C	0.83	30.2	C	0.79	26.2	C	0.79	26.4	C	0.67	21.2	C	0.67	21.1	C
Northbound Right	0.10	14.7	B	0.10	14.9	B	0.24	15.1	B	0.22	15.2	B	0.20	14.0	B	0.20	14.0	B
Southbound Left	0.84	72.6	E	0.84	72.9	E	0.82	70.3	E	0.82	70.2	E	0.72	60.6	E	0.72	60.6	E
Southbound Thru	0.61	16.4	B	0.60	15.3	B	0.67	16.7	B	0.66	16.1	B	0.58	13.7	B	0.58	13.7	B
Southbound Right	0.02	9.4	A	0.02	8.7	A	0.05	8.9	A	0.05	8.6	A	0.03	8.0	A	0.03	8.0	A

Table 7 2015 Background Levels-of-Service (Continued)

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Mitigation			With Mitigation			Without Mitigation			With Mitigation			Without Mitigation			With Mitigation		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at N. Kihei Rd	***0.66***	***24.8***	***C***	***0.67***	***24.9***	***C***	***0.75***	***28.0***	***C***	***0.75***	***28.1***	***C***	***0.64***	***19.0***	***B***	***0.64***	***19.0***	***B***
Eastbound Left	0.55	60.9	E	0.55	60.9	E	0.47	62.0	E	0.47	62.0	E	0.62	58.0	E	0.62	58.0	E
Eastbound Left & Thru	0.57	62.0	E	0.57	62.0	E	0.47	62.0	E	0.47	62.0	E	0.62	57.6	E	0.62	57.6	E
Eastbound Right	0.26	34.3	C	0.26	34.4	C	0.49	44.8	D	0.49	44.8	D	0.13	30.3	C	0.13	30.3	C
Westbound Left, Thru & Right	0.24	66.9	E	0.24	66.9	E	0.44	68.4	E	0.44	68.4	E	0.00	0.0	A	0.00	0.0	A
Northbound Left	0.80	54.8	D	0.80	54.8	D	0.79	64.3	E	0.79	64.3	E	0.71	52.1	D	0.71	52.1	D
Northbound Thru & Right	0.48	6.7	A	0.48	6.7	A	0.52	9.1	A	0.52	9.1	A	0.43	3.4	A	0.43	3.4	A
Southbound Left	0.20	71.1	E	0.20	71.1	E	0.44	101.3	F	0.44	101.3	F	0.00	0.0	A	0.00	0.0	A
Southbound Thru	0.64	22.0	C	0.64	22.2	C	0.74	24.7	C	0.74	24.8	C	0.63	15.3	B	0.63	15.3	B
Southbound Right	0.09	14.2	B	0.10	14.2	B	0.13	14.0	B	0.13	14.0	B	0.12	9.4	A	0.12	9.4	A
N. Kihei Rd at S. Kihei Rd	***0.56***	***25.3***	***C***	***0.56***	***25.3***	***C***	***0.70***	***23.9***	***C***	***0.70***	***23.9***	***C***	***0.54***	***23.2***	***C***	***0.54***	***23.2***	***C***
Eastbound Thru	0.79	41.3	D	0.79	41.3	D	0.79	32.3	C	0.79	32.3	C	0.74	34.0	C	0.74	34.0	C
Eastbound Right	0.24	27.9	C	0.24	27.9	C	0.48	22.9	C	0.48	22.9	C	0.28	25.1	C	0.28	25.1	C
Westbound Left	0.61	46.1	D	0.61	46.1	D	0.70	51.9	D	0.70	51.9	D	0.68	43.9	D	0.68	43.9	D
Westbound Thru	0.37	18.2	B	0.37	18.2	B	0.28	12.2	B	0.28	12.2	B	0.23	15.2	B	0.23	15.2	B
Northbound Left	0.37	18.2	B	0.37	18.2	B	0.31	21.7	C	0.31	21.7	C	0.21	13.3	B	0.21	13.3	B
Northbound Right	0.15	16.0	B	0.15	16.0	B	0.12	19.9	B	0.12	19.9	B	0.09	12.5	B	0.09	12.5	B
Piilani Hwy at Kaonoulu St	***0.90***	***23.6***	***C***	***0.95***	***28.2***	***C***	***0.95***	***23.5***	***C***	***0.95***	***21.8***	***C***	***0.70***	***18.7***	***B***	***0.70***	***18.7***	***B***
Eastbound Left	0.73	77.9	E	0.46	56.4	E	0.81	89.1	F	0.78	84.8	F	0.71	75.2	E	0.71	75.2	E
Eastbound Right	0.19	61.1	E	0.89	88.0	F	0.15	62.2	E	0.38	64.4	E	0.16	60.7	E	0.16	60.7	E
Northbound Left	0.86	79.5	E	0.81	83.9	F	0.88	85.2	F	0.85	84.6	F	0.77	76.8	E	0.77	76.8	E
Northbound Thru	0.55	4.5	A	0.58	8.1	A	0.64	4.8	A	0.63	4.9	A	0.48	4.0	A	0.48	4.0	A
Southbound Thru	0.77	22.6	C	0.82	25.2	C	0.88	26.7	C	0.86	23.4	C	0.57	13.9	B	0.57	13.9	B
Southbound Right	0.10	11.2	B	0.10	11.6	B	0.48	15.0	B	0.47	13.2	B	0.13	9.1	A	0.13	9.1	A
S. Kihei Rd at Kaonoulu St.	***0.88***	***18.4***	***B***	***0.78***	***12.8***	***B***	***0.80***	***16.6***	***B***	***0.76***	***15.2***	***B***	***0.78***	***18.3***	***B***	***0.78***	***18.3***	***B***
Westbound Left	0.84	24.9	C	0.66	19.6	B	0.66	26.3	C	0.57	26.2	C	0.62	28.1	C	0.62	28.1	C
Westbound Right	0.05	11.1	B	0.05	13.6	B	0.04	19.3	B	0.04	21.4	C	0.04	21.9	C	0.04	21.9	C
Northbound Thru & Right	0.88	21.3	C	0.81	13.3	B	0.82	17.1	B	0.79	14.4	B	0.81	15.3	B	0.81	15.3	B
Southbound Left	0.46	10.5	B	0.64	14.6	B	0.84	76.6	E	0.86	80.6	F	0.93	104.4	F	0.93	104.4	F
Southbound Thru	0.53	9.2	A	0.35	5.8	A	0.65	7.3	A	0.56	5.5	A	0.36	4.3	A	0.36	4.3	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix D for Level-of-Service Analysis Worksheets without Mitigation.
(4) See Appendix E for Level-of-Service Analysis Worksheets with Mitigation..

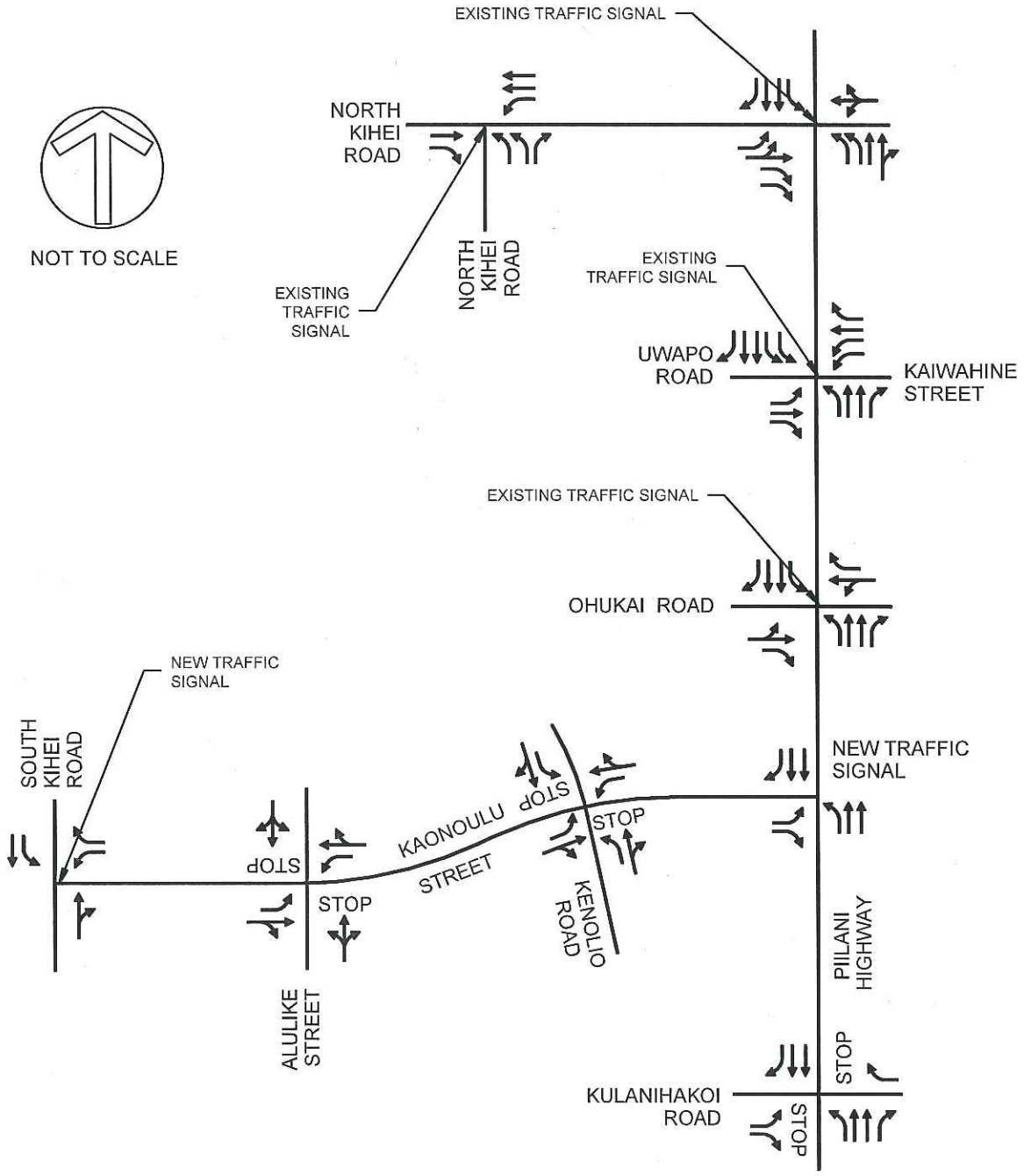


Figure 16
2015 LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS

Table 8 2015 Background Levels-of-Service - Unsignalized Intersection

	AM Peak Hour		PM Peak Hour		Saturday Peak Hour	
	Without Mitigation		Without Mitigation		Without Mitigation	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS
Piilani Hwy at Kulanihakoi St	***167.9***	***F***	***107.6***	***F***	***209.8***	***F***
Eastbound Left	**Error**	F	**Error**	F	**Error**	F
Eastbound Right	38.4	E	27.5	D	16.7	C
Westbound Right	34.6	D	37.2	E	0.0	A
Northbound Left	22.2	C	26.4	D	14.4	B
Kaonoulu St at Kenolio Road	***9.0***	***A***	***7.3***	***A***	***7.0***	***A***
Eastbound Left	8.1	A	8.3	A	8.3	A
Westbound Left	7.6	A	7.9	A	7.8	A
Northbound Left	15.9	C	20.5	C	21.3	C
Northbound Thru & Right	11.0	B	12.5	B	12.3	B
Southbound Left	32.6	D	38.2	E	37.4	E
Southbound Thru & Right	12.3	B	14.2	B	12.9	B
Kaonoulu St at Alulike St	***3.1***	***A***	***2.8***	***A***	***4.7***	***A***
Eastbound Left	8.0	A	8.2	A	8.1	A
Westbound Left	7.6	A	7.9	A	7.9	A
Northbound Left, Thru & Right	15.2	C	18.4	C	17.9	C
Southbound Left, Thru & Right	11.1	B	11.8	B	14.5	B

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix D for Level-of-Service Analysis Worksheets.

Mitigation Required for 2015 Baseline Conditions

The conclusion of the level-of-service of 2015 baseline conditions is that significant roadway improvements are required to accommodate traffic associated with the related projects. These improvements are required to mitigate the impacts of background growth and traffic generated by the related projects. The level-of-service resulting from the following improvements are summarized in Table 7. These improvements include the following:

Piilani Highway at Ohukai Street

The eastbound approach should be modified to provide two separate left turn only lanes, one through lane and one right turn lane. The westbound approach should be modified to provide one left turn lane, one thru lane and one right turn lane.

Piilani Highway at Kulanihakoi Road

The overall intersection level-of-service will be Level-of-Service F during morning, afternoon and Saturday peak periods under existing intersection conditions (unsignalized). A traffic signal warrant analysis was performed and is shown as Figure 17. The operating conditions of this intersection as a signalized intersection is compared to unsignalized operating conditions in Table 9 . As a signalized intersection, the intersection will operate at Level-of-Service B during the weekday morning and afternoon peak hours and Level-of-Service A during the Saturday peak hour.

Installation of a traffic signal will allow all traffic movements at the intersection rather than right in and right out for school traffic as described in the project EISPN. This results in a distribution of traffic generated by the proposed Kihei High School which affects the traffic projections for most of the other study intersections. The resulting 2015 background traffic projections are presented as Figures18, 19 and 20.

Table 9 2015 Background Mitigation Analysis - Piilani Highway at Kulanihakoi Street

Intersection and Movement	AM Peak Hour					PM Peak Hour					Saturday Peak Hour				
	Without Mitigation		With Mitigation			Without Mitigation		With Mitigation			Without Mitigation		With Mitigation		
	Delay [1]	LOS [2]	V/C	Delay	LOS	Delay	LOS	V/C	Delay	LOS	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at Kulanihakoi St	***167.9***	***F***	***0.83***	***17.8***	***B***	***107.6***	***F***	***0.80***	***19.9***	***B***	***209.8***	***F***	***0.49***	***4.2***	***A***
Eastbound Left	**Error**	F	0.49	63.5	E	**Error**	**F**	0.46	60.7	E	**Error**	**F**	0.36	33.7	C
Eastbound Thru			0.61	68.0	E			0.21	57.6	E			0.00	0.0	A
Eastbound Right	38.4	E	0.66	72.8	E	27.5	D	0.06	56.5	E	16.7	C	0.05	31.6	C
Westbound Left			0.88	117.2	F			0.56	64.2	E			0.00	0.0	A
Westbound Thru			0.30	62.5	E			0.21	56.5	E			0.00	0.0	A
Westbound Right	34.6	D	0.05	60.3	E	37.2	E	0.03	55.2	E	0.0	A	0.00	0.0	A
Northbound Left	22.2	C	0.79	46.9	D	26.4	D	0.80	85.1	F	14.4	B	0.28	2.7	A
Northbound Thru			0.60	8.3	A			0.78	12.3	B			0.49	2.8	A
Northbound Right			0.13	4.9	A			0.03	4.7	A			0.00	0.0	A
Southbound Left			0.62	11.7	B			0.81	116.9	F			0.00	0.0	A
Southbound Thru			0.74	10.9	B			0.81	17.0	B			0.49	2.8	A
Southbound Right			0.04	4.5	A			0.09	7.3	A			0.06	1.7	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix D for Level-of-Service Analysis Worksheets without mitigation.
(4) See Appendix E for Level-of-Service Analysis Worksheets with mitigation.

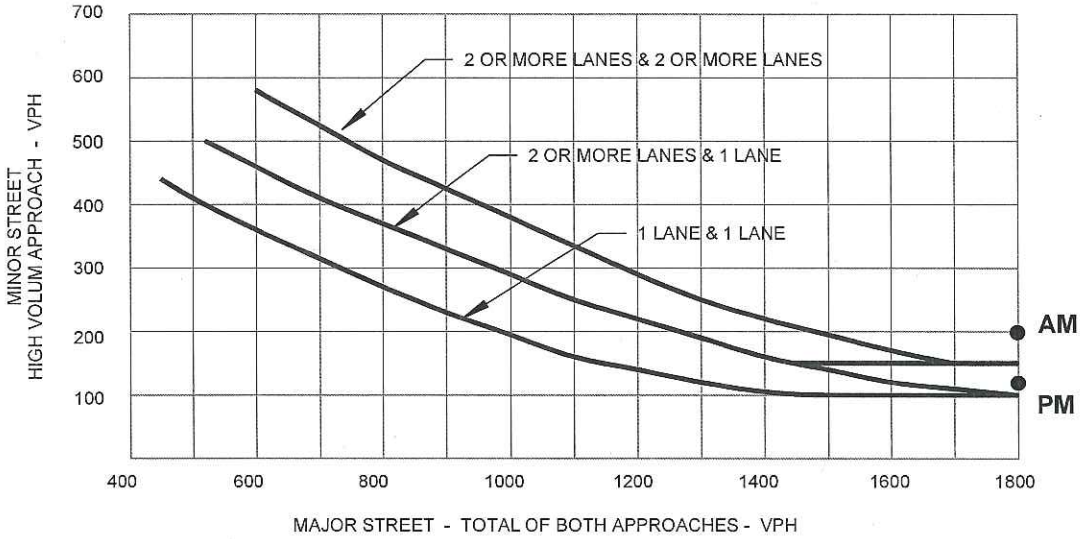
WARRANT 3 - PEAK HOUR
PART B, PEAK HOUR VOLUME

Satisfied YES☑ NO☐

	APPROACH LANES		HOUR HOUR AND VOLUME	
	one	more	AM	PM
Both approaches - Major Street		✔	3656	3967
Highest approach - Minor Street	✔		200	120

ASSUMPTIONS:
1. 100% (URBAN) CONDITIONS APPLY.
2. PEAK HOUR WARRANT APPLIES TO EXIT FROM SCHOOL ONLY.

100% CONDITIONS



NOTE:
150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPRAOCH WITH ONE LANE.

Source:
Federal Highway Adminstration, Manual of Uniform Traffic Control Devices

Figure 17
PEAK HOUR VEHICULAR WARRANT FOR TRAFFIC SIGNALS
PIILANI HIGHWAY AT KULANIHAKOI ROAD
2015 BACKGROUND WITHOUT PROJECT TRAFFIC CONDITIONS

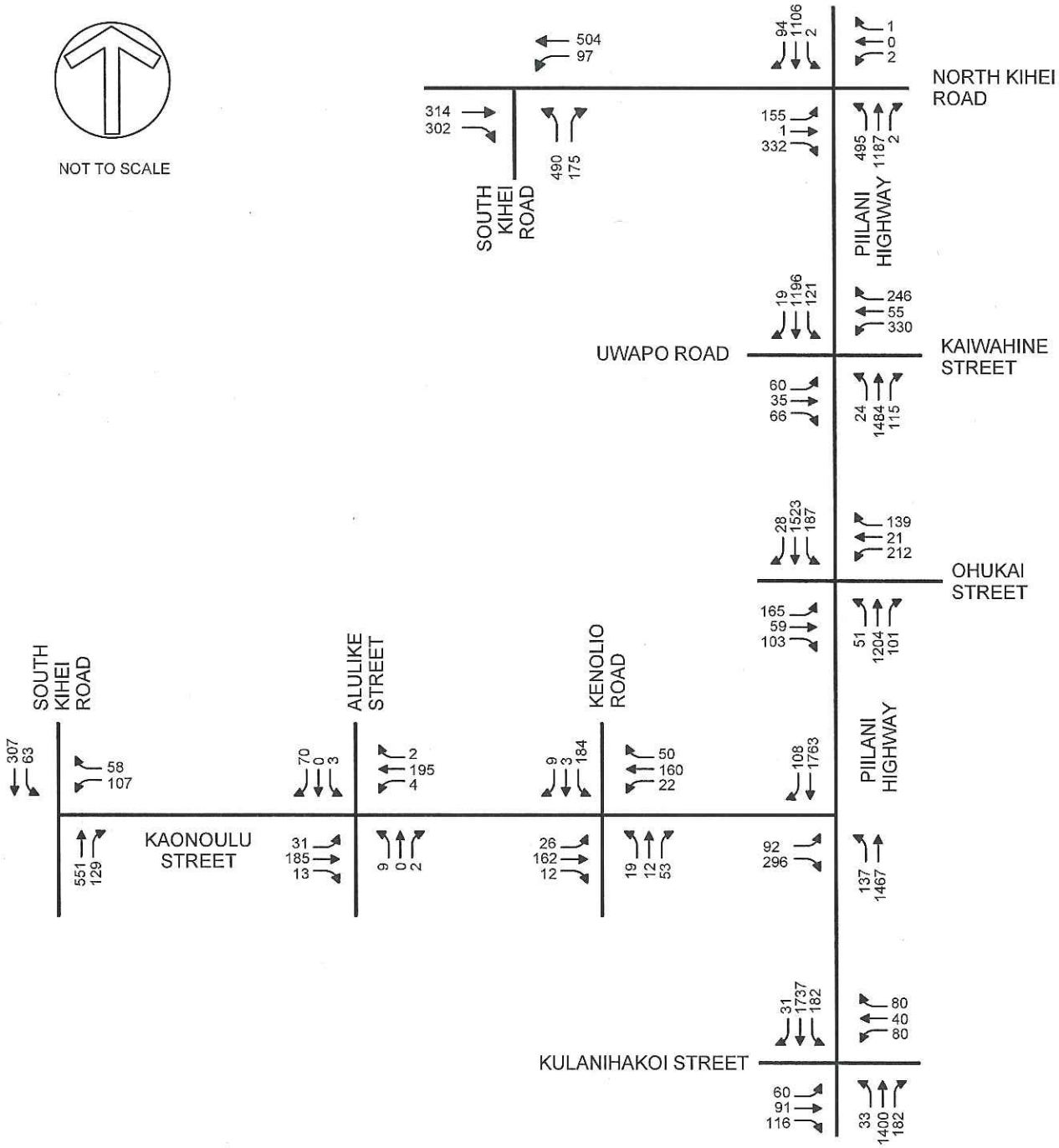


Figure 18
2015 BACKGROUND WITH MITIGATION
AM PEAK HOUR TRAFFIC PROJECTIONS

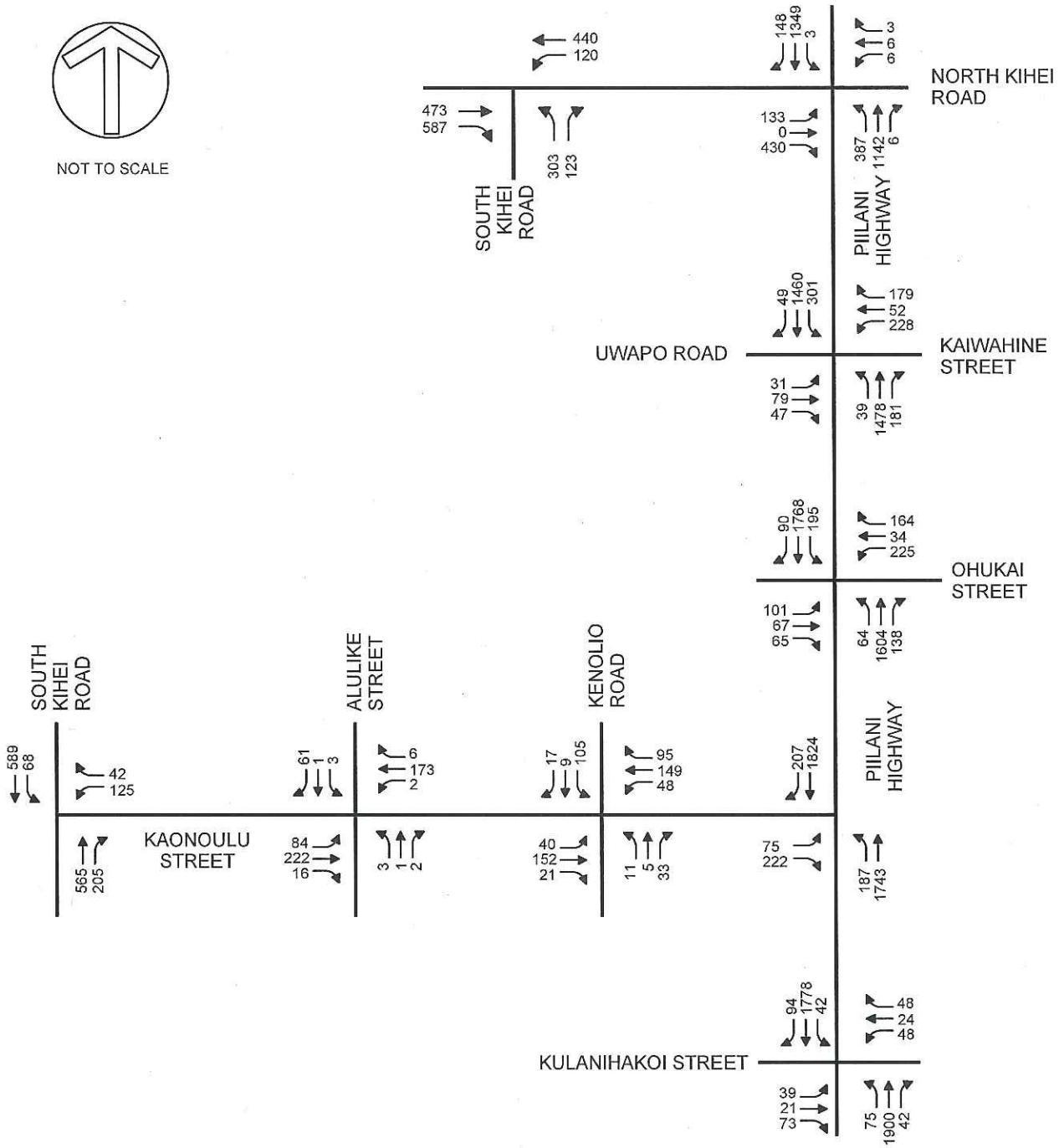


Figure 19
2015 BACKGROUND WITH MITIGATION
PM PEAK HOUR TRAFFIC PROJECTIONS

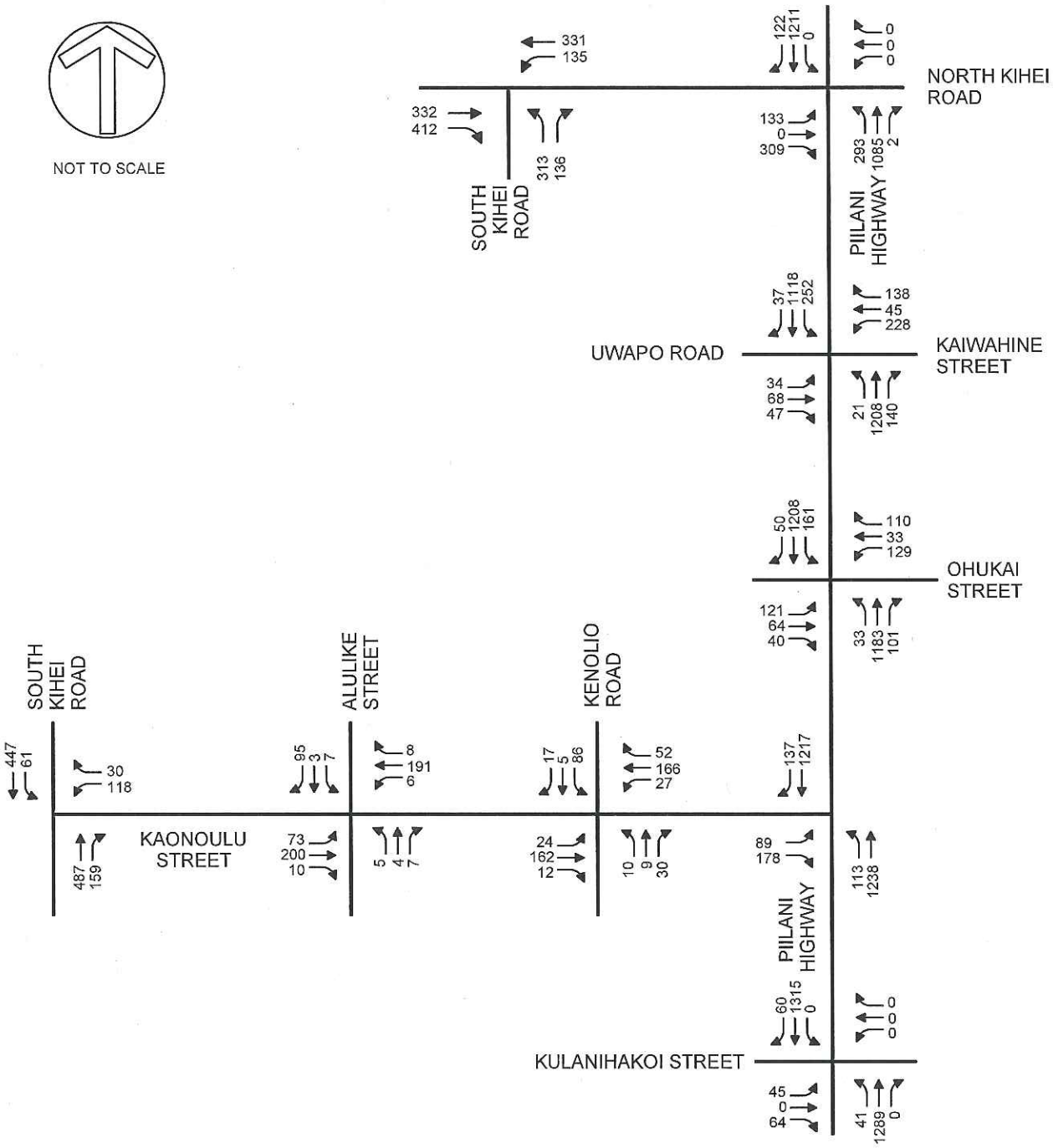


Figure 20
2015 BACKGROUND WITH MITIGATION
SATURDAY PEAK HOUR TRAFFIC PROJECTIONS

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter discusses the methodology used to identify the traffic-related impacts of the proposed project. This chapter presents the generation, distribution and assignment of project generated traffic and the background plus project traffic projections. The result of the level-of-service analysis of background plus project conditions is presented in the following chapter.

Methodology

Future traffic volumes generated by the project were estimated using the procedures described in the *Trip Generation Handbook*[7] and data provided in *Trip Generation*[8]. This method used trip generation rates or formulas to estimate the number of trips that the project will generate during the peak hours of the project and along the adjacent street.

Trip Generation of Proposed Development

The assumptions used for the trip generation analysis are:

1. Trip generation equations for shopping centers were used to estimate the number of peak hour trips generated by the project. These rates are based on the leasable floor area. The trip generation equations for shopping centers are summarized in Table 10.

[7] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

[8] Institute of Transportation Engineers, *Trip Generation*, Washington, D.C., 2003

Table 10 Trip Generation Formulas Used for the Trip Generation Analysis

	Weekday AM Peak Hour	Weekday PM Peal Hour	Saturday Peak Hour
Total	Ln (T) = 0.60Ln(A)+2.29	Ln (T) = 0.66Ln(A)+3.40	Ln (T) = 0.65Ln(A)+3.77
Inbound	61%	48%	52%
Outbound	39%	52%	48%

Notes: (1) Source: Institute of Transportation Engineers, *Trip Generation, 7th Edition*
(2) T = Trips, A = 1,000 gross leasable square feet
(3) Formulas shown are for the peak hour of the adjacent street.

2. The percentage of pass by trips generated by the retail uses were estimated using the data provided in the *Trip Generation Handbook*.[9] The equations for estimating the number of pass by trips are summarized in Table 11.

Table 11 Formulas For Pass By Trips

	Weekday AM Peak Hour	Weekday PM Peal Hour	Saturday Peak Hour
Total	No Formula Provided	Ln (T) = - 0.29 Ln(A)+5.00	T = -0.02 + 38.59
Inbound		50%	50%
Outbound		50%	50%

Notes: (1) Source: Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., June 2004, p 47 and 50
(2) T = Percent Pass By Trips, A = 1,000 gross leasable square feet
(3) Formulas shown are for the peak hour of the adjacent street.

3. Trip generation rates for nurseries were used to estimate the number of peak hour trips generated by the outdoor garden area. These rates are based on the leasable floor area. The trip generation equations for shopping centers are summarized in Table 12. *Trip Generation* did not provide directional distribution data (% inbound and % outbound). It was assumed that the directional distribution would the same as for the retail portion of the project.

Table 12 Trip Generation Rate Used for the Trip Generation Analysis of Outdoor Garden

	Weekday AM Peak Hour	Weekday PM Peal Hour	Saturday Peak Hour
Total	1.31	3.80	11.00
Inbound	61%	48%	52%
Outbound	39%	52%	48%

Notes: (1) Source: Institute of Transportation Engineers, *Trip Generation, 7th Edition*
(2) T = Trips, A = 1,000 gross leasable square feet
(3) Formulas shown are for the peak hour of the adjacent street.

The trip generation calculations are summarized in Table 13. The trips shown are the peak hourly trips generated by the project, which typically coincide with the peak hour of the adjacent street. As shown, the project will generate 560 trips during the morning peak hour, 2,375 during the afternoon peak hour and 3,253 during the Saturday peak hour. It should be noted that the Saturday peak hour is significantly higher than the weekday peak hours.

[9] Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., June 2004

Table 13 Summary of Trip Generation Analysis

Time Period	Direction	North Parcel (Maui Outlet Center)			South Parcel (Maui Retail Center)					Total Project		
					Retail			Outdoor Garden	Net New Trips South Parcel			
		Total Trips	Pass By Trips	Net New Trips	Total Trips	Pass By Trips	Net New Trips	Total Trips		Total Trips	Pass By Trips	New Trips
AM Peak Hour	Total	296	0	296	344	0	344	50	394	690	0	690
	In	181	0	181	210	0	210	31	241	422	0	422
	Out	115	0	115	134	0	134	19	153	268	0	268
PM Peak Hour	Total	1264	364	900	1490	396	1094	144	1238	2898	760	2138
	In	607	182	425	715	198	517	69	586	1391	380	1011
	Out	657	182	475	775	198	577	75	652	1507	380	1127
Saturday Peak Hour	Total	1729	568	1161	2033	634	1399	418	1817	4180	1202	2978
	In	899	284	615	1057	317	740	217	957	2173	601	1572
	Out	830	284	546	976	317	659	201	860	2007	601	1406

Trip Distribution and Assignments

The project-related trips were distributed along the anticipated approach routes to the project site based on following assumptions:

1. The purpose of the project is to provide services for the residents and tourist of South Maui. Thus marketing and advertising will be directed toward this area. Accordingly, it was assumed that 75% of the traffic to and from the project will be generated by Kihei and South Maui.

2. 25% of the project generate traffic will approach and depart via Mokulele Highway (10%) and North Kihei Road (15%). Of the 15% from North Kihei Road, 10% will use North Kihei Road to Piilani Highway at then Piilani Highway to the project. The remaining 5% will use South Kihei Road and Kaonoulu Street.

3. The traffic generated from within Kihei (75%) was distributed based on the distribution of residential units and hotel rooms (including timeshares and vacation rentals) using the data presented in the *Maui Long-Range Land Transportation Plan* with adjustments to reflect Maui Lu Resort Redevelopment, the Kihei Residential Development, Honoa Ula and additional Wailea Resort units. Using this distribution, 20% of the trips would be generated by the area north of Kaonoulu Street and 80% would be generated by the area south of Kaonoulu Street.

Trips were assigned based on the following assumptions:

1. Kaonoulu Street is extended mauka of Piilani Highway to provide access to the project and the intersection is signalized.

2. There will be four (4) driveways along East Kaonoulu Street to serve the project. Refer to Appendix A. Drive A is the major access and egress driveway. This driveway is located approximately 600 feet east of Piilani Highway. This will be a full access, signalized intersection.

3. Drive B is located approximately midway between Piilani Highway and Drive A. Drive B provides for right turns only into and out of the north parcel and the south parcel. This intersection is unsignalized.

4. Drive C is located approximately 500 feet east of Drive A. This driveway provides service to the south parcel (Maui Retail Center) and future affordable housing units to be located along the north side of East Kaonoulu Street and east of the Maui Outlet Center. All movements will be allowed and the intersection will be unsignalized.

5. Drive D is located approximately 300 feet east of Drive C near the eastern property line of the project. This driveway is behind the last building and will most likely be used be service and employee vehicles. Anticipated use of this driveway is minimal.

A schematic drawing indicating the approximate locations of the project driveways is presented as Figure 21.

The project morning peak hour, afternoon peak hour and Saturday peak hour trip assignments are shown in Figures 22, 23 and 24, respectively.

2015 Background Plus Project Projections

Background plus project traffic conditions are defined as 2015 background traffic conditions plus project related traffic. The incremental difference between background and background plus project is the traffic impact of the project under study.

2015 background plus project traffic projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the 2015 background peak hour traffic volumes presented in Chapter 3. The 2015 background plus the project traffic projections are shown on Figures 25, 26 and 27.

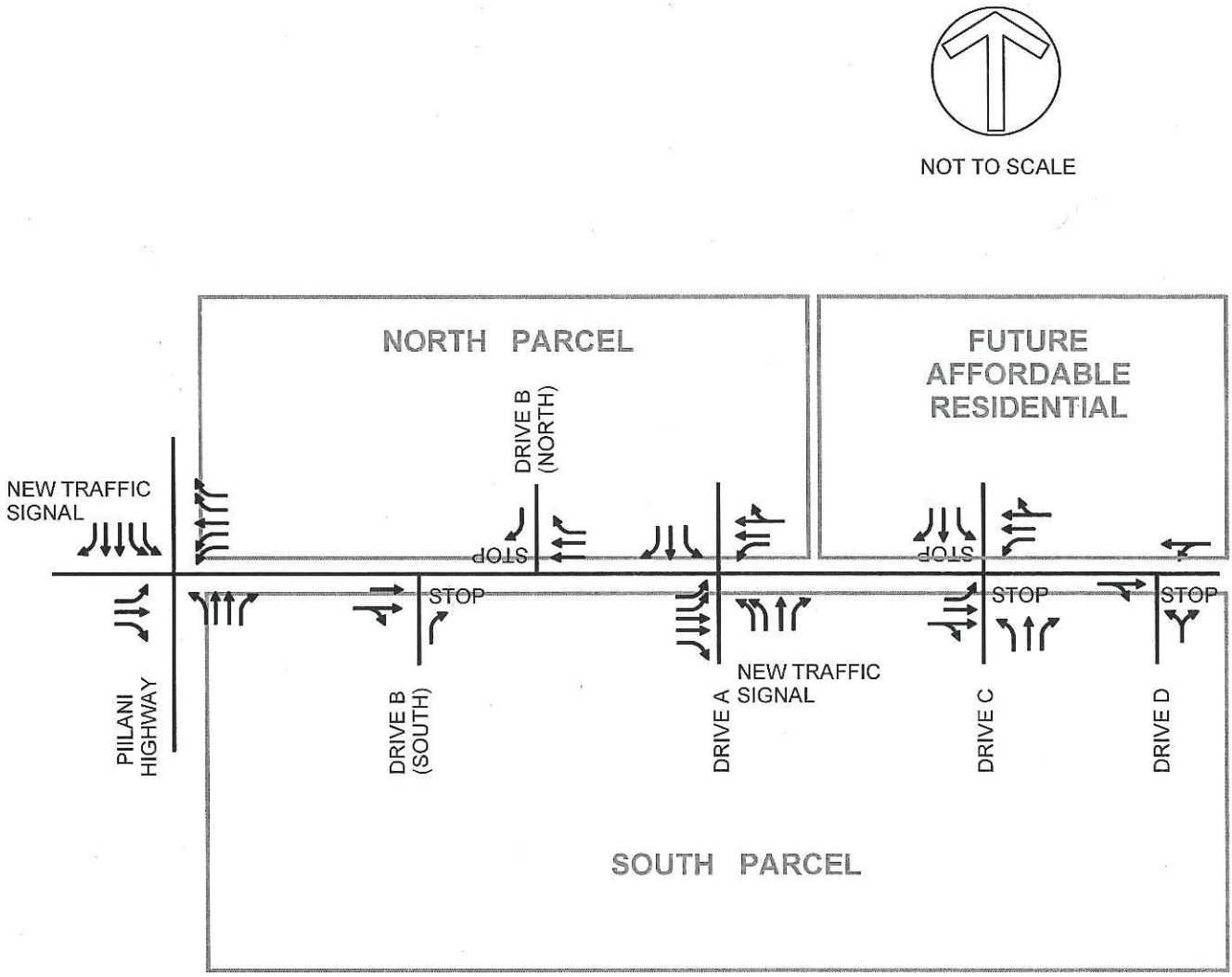


Figure 21
SCHEMATIC DRAWING OF LOCATIONS OF PROJECT DRIVEWAYS

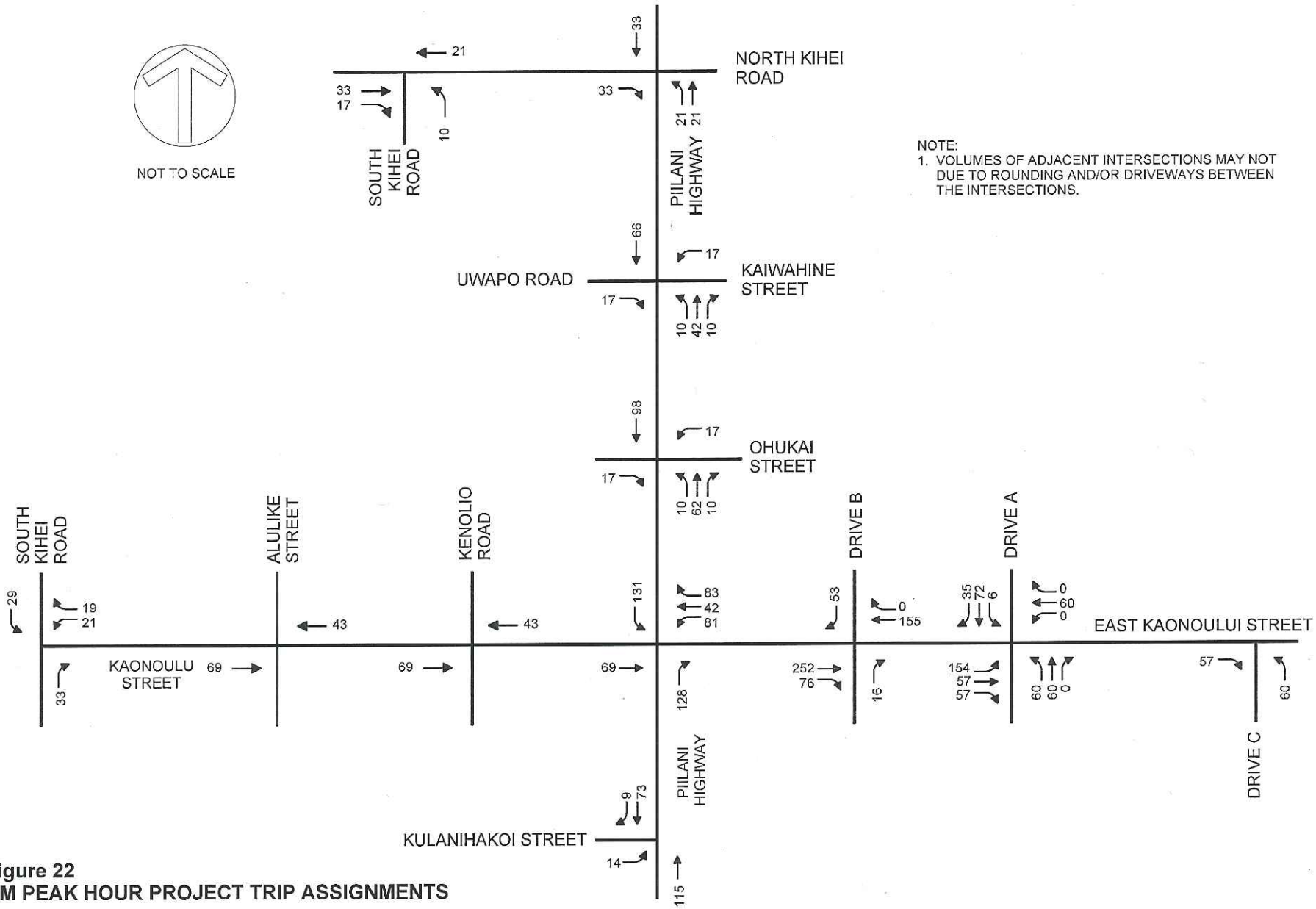


Figure 22
AM PEAK HOUR PROJECT TRIP ASSIGNMENTS

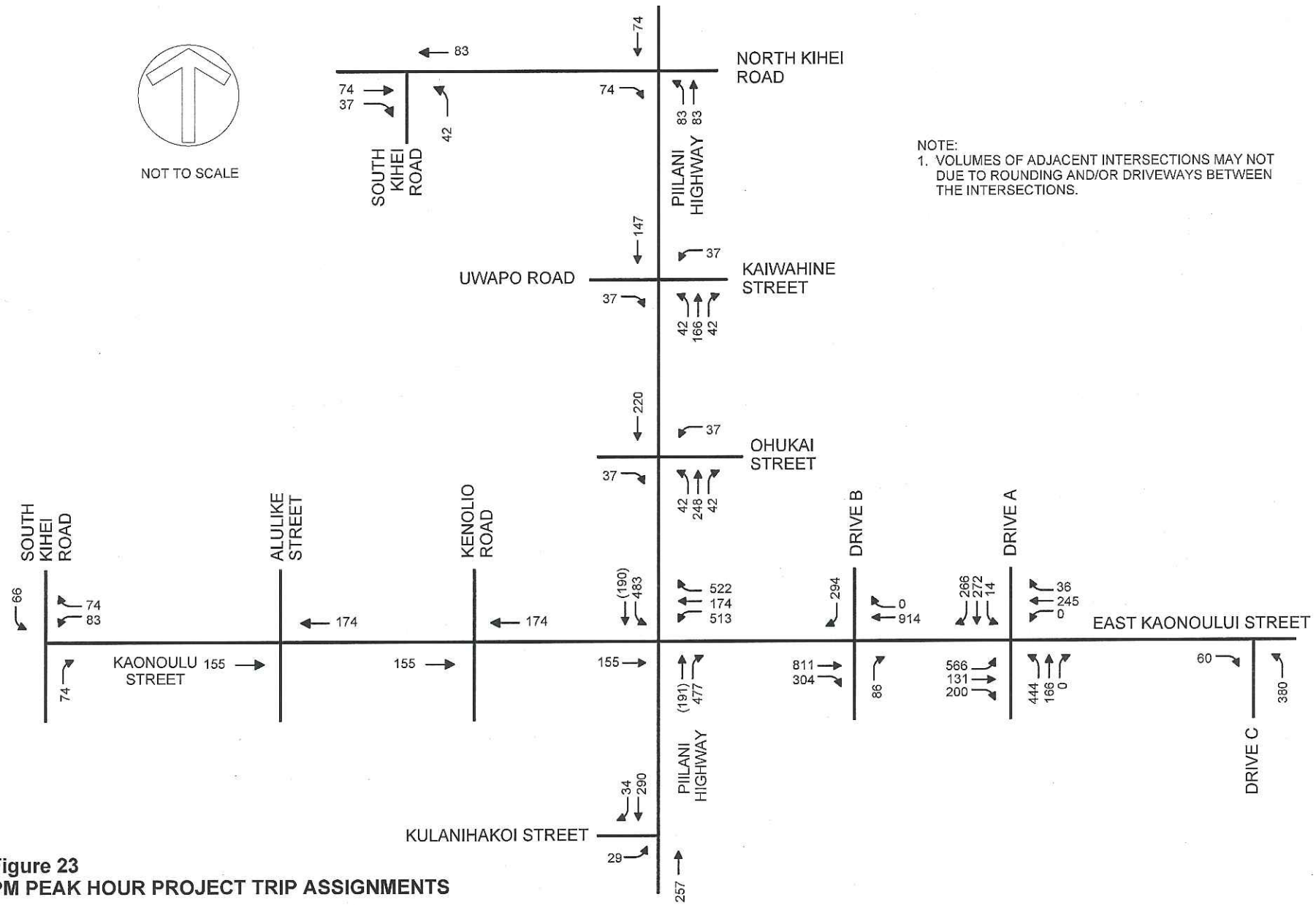


Figure 23
PM PEAK HOUR PROJECT TRIP ASSIGNMENTS

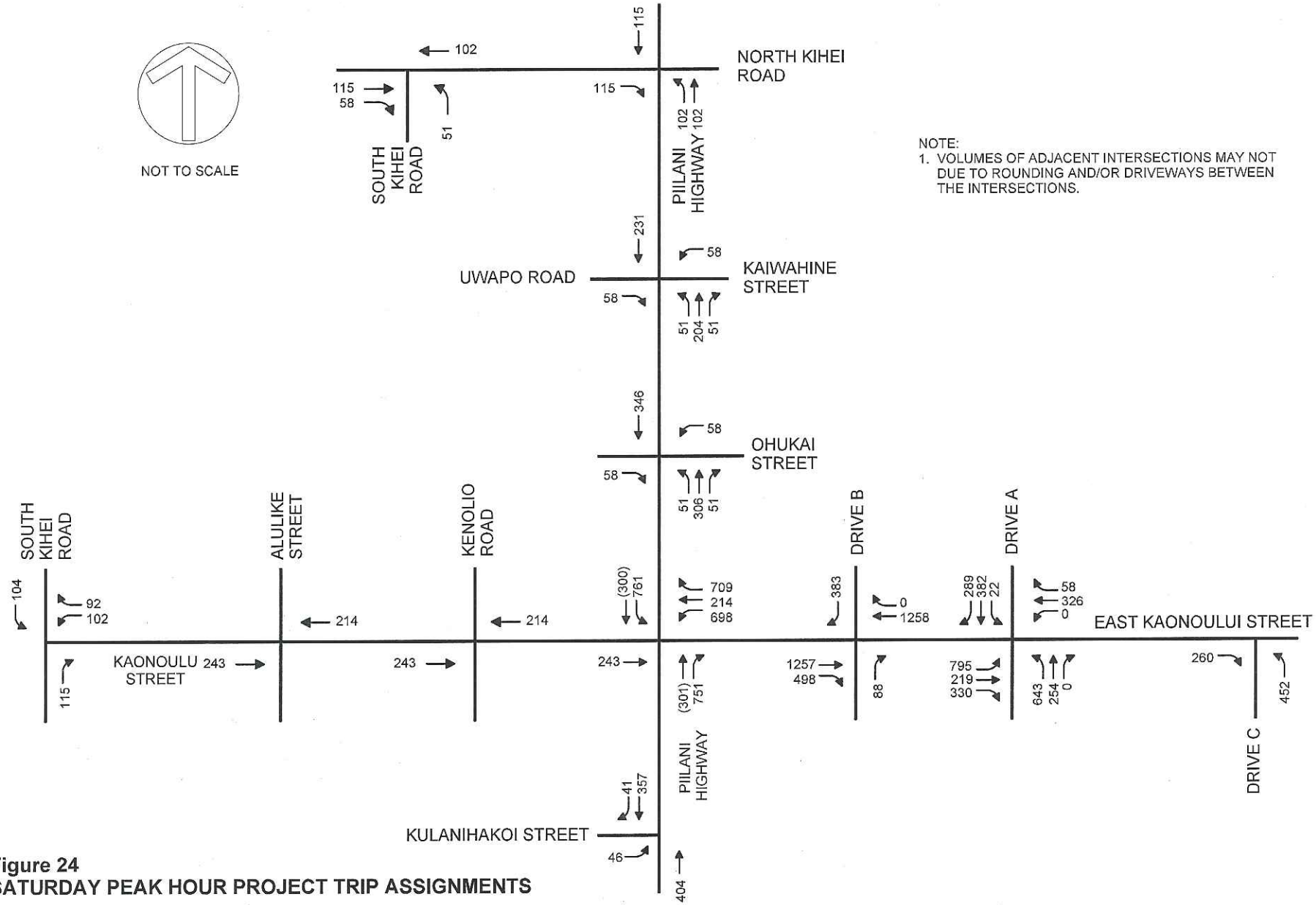


Figure 24
SATURDAY PEAK HOUR PROJECT TRIP ASSIGNMENTS

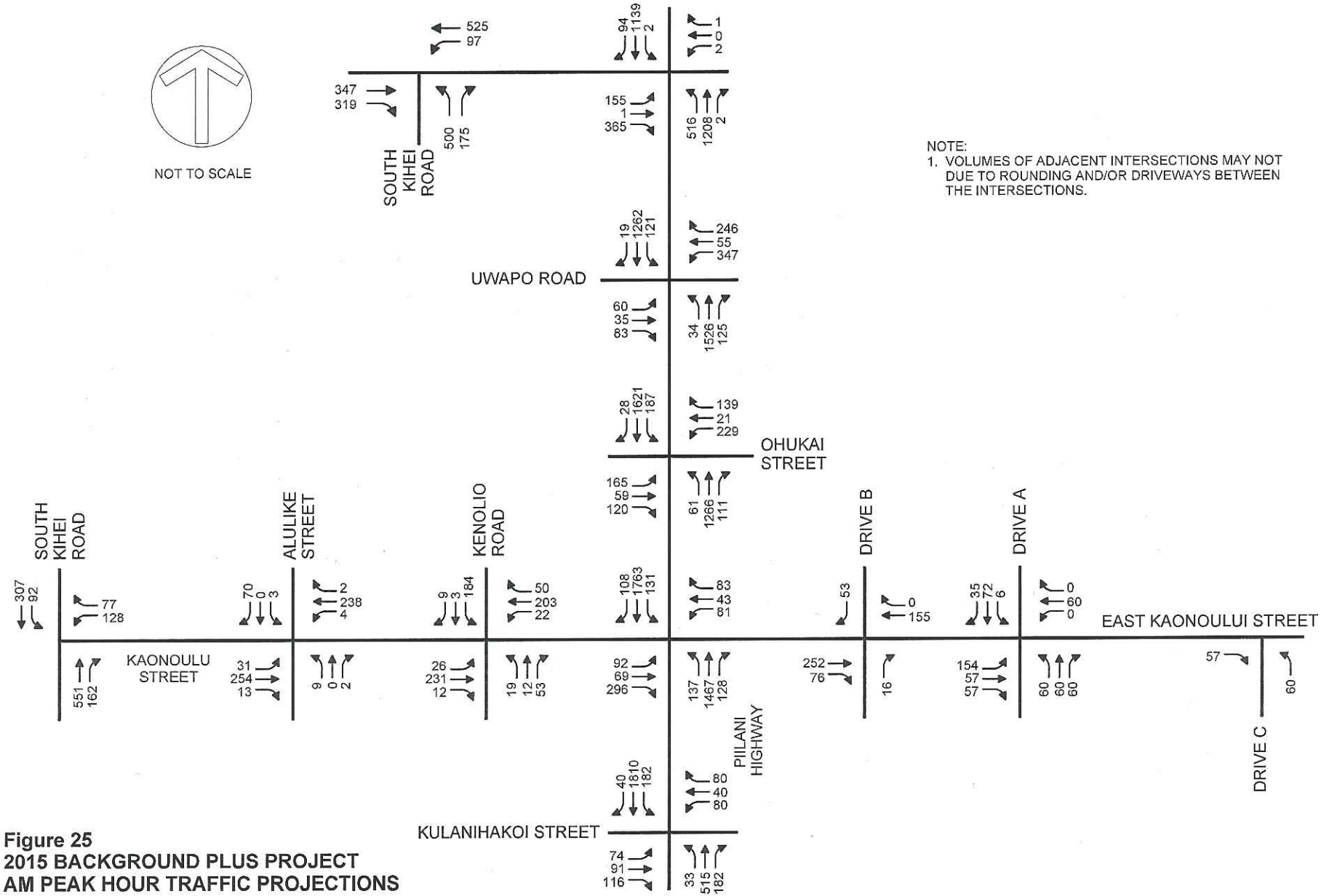


Figure 25
2015 BACKGROUND PLUS PROJECT
AM PEAK HOUR TRAFFIC PROJECTIONS

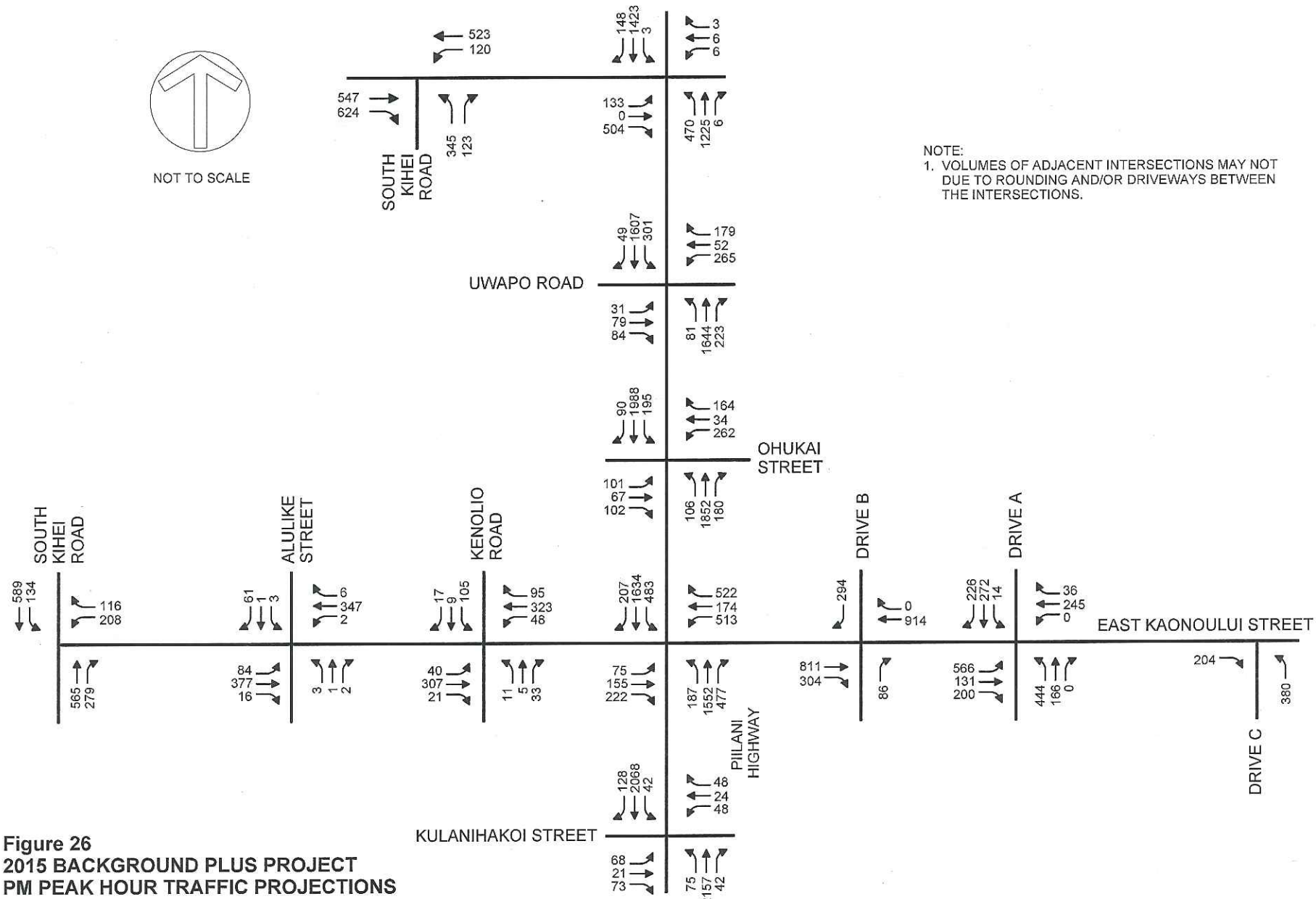


Figure 26
2015 BACKGROUND PLUS PROJECT
PM PEAK HOUR TRAFFIC PROJECTIONS

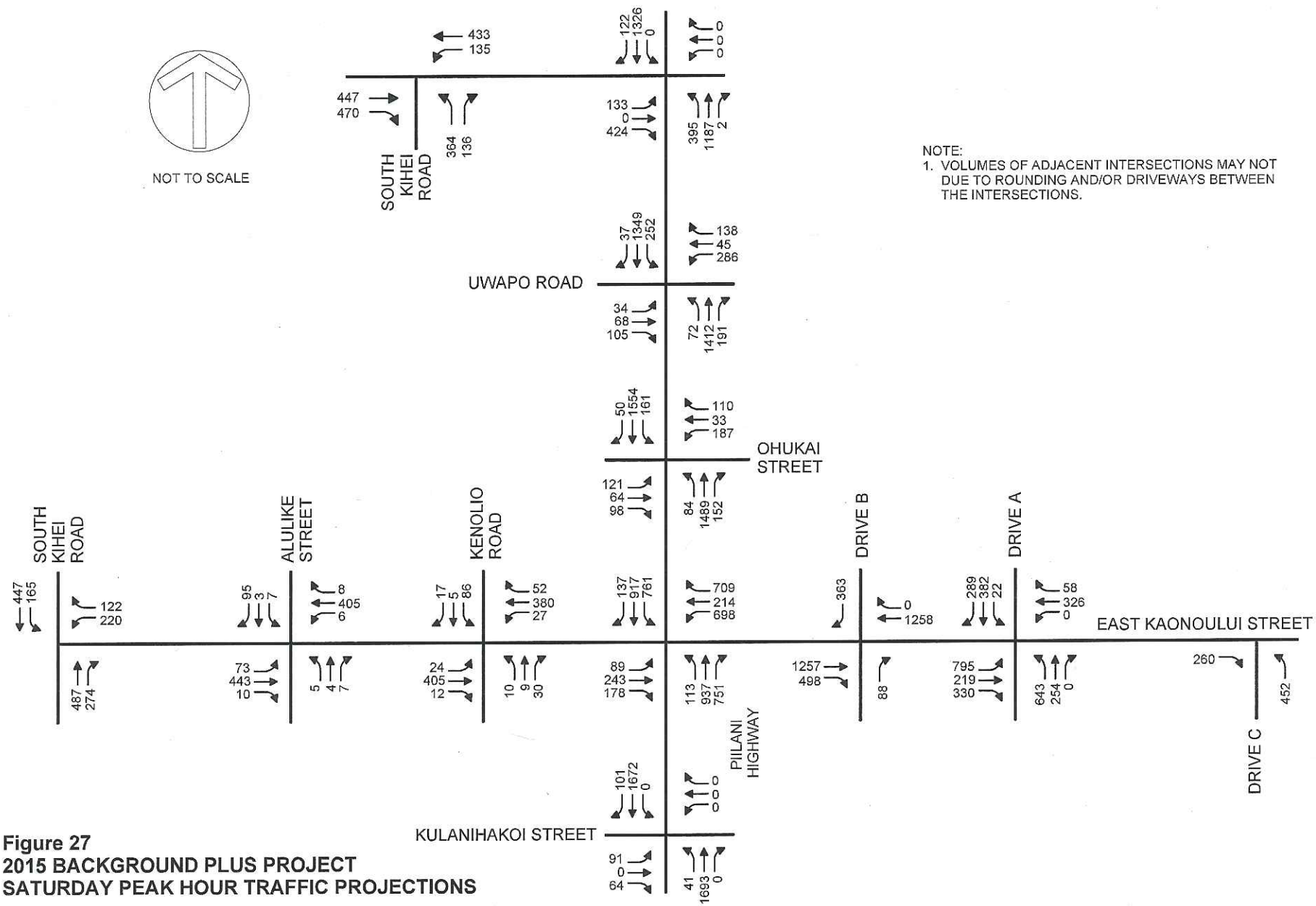


Figure 27
2015 BACKGROUND PLUS PROJECT
SATURDAY PEAK HOUR TRAFFIC PROJECTIONS

5. TRAFFIC IMPACT ANALYSIS

The traffic impacts of the project was assessed by analyzing the changes in traffic volumes and levels-of-service at the study intersections. These impacts are discussed in this chapter. Intersections with overall levels-of-service or traffic movements that do not meet the standard for acceptable levels-of-service are identified and improvements that will provide acceptable levels-of-service are identified and assessed.

This chapter also describes anticipated traffic operating conditions at the project's driveways along East Kaonoulu Street and the two new driveways along Piilani Highway that are required to mitigate the impacts of project generated traffic and provide acceptable operating conditions along Piilani Highway at Kaonoulu Street.

Changes in Total Intersection Volumes

An analysis of the project's share of 2015 background plus project intersection approach volumes at the study intersections is summarized in Table 14 The table summarizes the project's share of total 2015 peak hour approach volumes at each intersection. Also shown are the percentage of 2015 background plus project traffic that is the result of background growth and traffic generated by related projects.

Obviously, the project's traffic impacts are concentrated at the intersection of Piilani Highway at Kaonoulu Street where project generated traffic represents almost a third of the afternoon peak hour traffic and almost half of the Saturday peak hour traffic. Also, it should be noted that project generated traffic represents a larger percentage of Saturday peak hour traffic than weekday peak hour traffic because the project generates more traffic during the Saturday peak hour and background traffic is less during the Saturday peak hour than weekday peak hours.

Table 14 Analysis of Project's Share of Total Intersection Approach Volumes [1]

Intersection	Period	Existing	2015 Background	2015 Background Plus Project	Background Growth		Project Traffic	
					Trips	Percent of Total Traffic [2]	Trips	Percent of Total Traffic [3]
Piilani Hwy at Ohukai Drive	AM	3088	3793	4007	705	17.6%	214	5.3%
	PM	3834	4515	5141	681	13.2%	626	12.2%
	SAT	2541	3233	4103	692	16.9%	870	21.2%
Piilani Hwy at Uwapo Rd & Kaiwahine St	AM	2844	3751	3913	907	23.2%	162	4.1%
	PM	3089	4124	4595	1035	22.5%	471	10.3%
	SAT	2274	3336	3989	1062	26.6%	653	16.4%
Piilani Hwy at N. Kihei Rd & Mokulele Hwy	AM	2765	3377	3485	612	17.6%	108	3.1%
	PM	2947	3613	3927	666	17.0%	314	8.0%
	SAT	2455	3155	3589	700	19.5%	434	12.1%
S. Kihei Rd at N. Kihei Rd	AM	1571	1882	1963	311	15.8%	81	4.1%
	PM	1740	2046	2282	306	13.4%	236	10.3%
	SAT	1285	1659	1985	374	18.8%	326	16.4%
Piilani Hwy at Kaonoulu St	AM	2989	3863	4398	874	19.9%	535	12.2%
	PM	3478	4258	6201	780	12.6%	1943	31.3%
	SAT	2220	2972	5747	752	13.1%	2775	48.3%
S. Kihei Rd at Kaonoulu St	AM	904	1215	1317	311	23.6%	102	7.7%
	PM	1316	1594	1891	278	14.7%	297	15.7%
	SAT	1020	1302	1715	282	16.4%	413	24.1%
Piilani Hwy at Kulanihakoi St	AM	2890	4032	4243	1142	26.9%	211	5.0%
	PM	3405	4184	4794	779	16.2%	610	12.7%
	SAT	2225	2814	3662	589	16.1%	848	23.2%
Kaonoulu Street at Kenolio Drive	AM	336	712	824	376	45.6%	112	13.6%
	PM	356	685	1014	329	32.4%	329	32.4%
	SAT	273	600	1057	327	30.9%	457	43.2%
Kaonoulu Street at Alulike Drive	AM	200	514	626	314	50.2%	112	17.9%
	PM	272	574	903	302	33.4%	329	36.4%
	SAT	246	609	1066	363	34.1%	457	42.9%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Percentage of total 2015 background plus project traffic.

An analysis of the project's pro rata share of the increase of traffic volumes between 2010 and 2015 is summarized in Table 15. This table summarizes the growth between 2010 and 2015 and indicates the percentage of growth resulting from background growth and related projects, and the percentage growth resulting from project generated traffic.

Table 15 Analysis of Project's Share of Total Intersection Approach Volumes Growth [1]

Intersection	Period	Existing	2015 Background	Background Plus Project	Background Growth [2]		Project Trips [3]	
					Volume	% of 2010 to 2015 Growth	Volume [4]	% of 2010 to 2015 Growth
Piilani Hwy at Ohukai Drive	AM	3088	3793	4007	705	76.7%	214	23.3%
	PM	3834	4515	5141	681	52.1%	626	47.9%
	SAT	2541	3233	4103	692	44.3%	870	55.7%
Piilani Hwy at Uwapo Rd & Kaiwahine St	AM	2844	3751	3913	907	84.8%	162	15.2%
	PM	3089	4124	4595	1035	68.7%	471	31.3%
	SAT	2274	3336	3989	1062	61.9%	653	38.1%
Piilani Hwy at N. Kihei Rd & Mokulele Hwy	AM	2765	3377	3485	612	85.0%	108	15.0%
	PM	2947	3613	3927	666	68.0%	314	32.0%
	SAT	2455	3155	3589	700	61.7%	434	38.3%
S. Kihei Rd at N. Kihei Rd	AM	1571	1882	1963	311	79.3%	81	20.7%
	PM	1740	2046	2282	306	56.5%	236	43.5%
	SAT	1285	1659	1985	374	53.4%	326	46.6%
Piilani Hwy at Kaonoulu St	AM	2989	3863	4398	874	62.0%	535	38.0%
	PM	3478	4258	6201	780	28.6%	1943	71.4%
	SAT	2220	2972	5747	752	21.3%	2775	78.7%
S. Kihei Rd at Kaonoulu St	AM	904	1215	1317	311	75.3%	102	24.7%
	PM	1316	1594	1891	278	48.3%	297	51.7%
	SAT	1020	1302	1715	282	40.6%	413	59.4%
Piilani Hwy at Kulanihakoi St	AM	2890	4032	4243	1142	84.4%	211	15.6%
	PM	3405	4184	4794	779	56.1%	610	43.9%
	SAT	2225	2814	3662	589	41.0%	848	59.0%
Kaonoulu Street at Kenolio Drive	AM	336	712	824	376	77.0%	112	23.0%
	PM	356	685	1014	329	50.0%	329	50.0%
	SAT	273	600	1057	327	41.7%	457	58.3%
Kaonoulu Street at Alulike Drive	AM	200	514	626	314	73.7%	112	26.3%
	PM	272	574	903	302	47.9%	329	52.1%
	SAT	246	609	1066	363	44.3%	457	55.7%

Notes:
(1) Volumes shown are total intersection approach volumes or projections.
(2) Background versus existing.
(3) Background plus project versus background.
(4) Project generated traffic.

2015 Background Plus Project Level-of-Service Analysis

The level-of-service analysis was performed for background and background plus project conditions. The incremental difference between the two conditions quantifies the impact of the project. The assumptions used for the level-of-service analysis are:

1. The intersection of South Kihei Road at Kaonoulu Street is signalized.

2. The intersection of Piilani Highway at Kaonoulu Street is improved as follows as part of the proposed project:

    a. The intersection is signalized. Northbound and southbound left turns are protected.

    b. Two southbound to eastbound left turn lane are added.

    c. One northbound to eastbound right turn and deceleration lane is added.

    d. One eastbound through lane is added.

    e. A westbound with two left turn lanes, one through lane and two right turn lanes is added.

3. The mitigation measures to accommodate 2015 background traffic as described in the previous chapter are have been implemented.

The lane configurations and right-of-way controls used for the level-of-service analysis of 2015 background plus project conditions are summarized as Figure 28. The results of the Level-of-Service analysis of the signalized intersections are summarized in Table 16 and the results of the Level-of-Service analysis of the unsignalized intersections are summarized in Table 17.

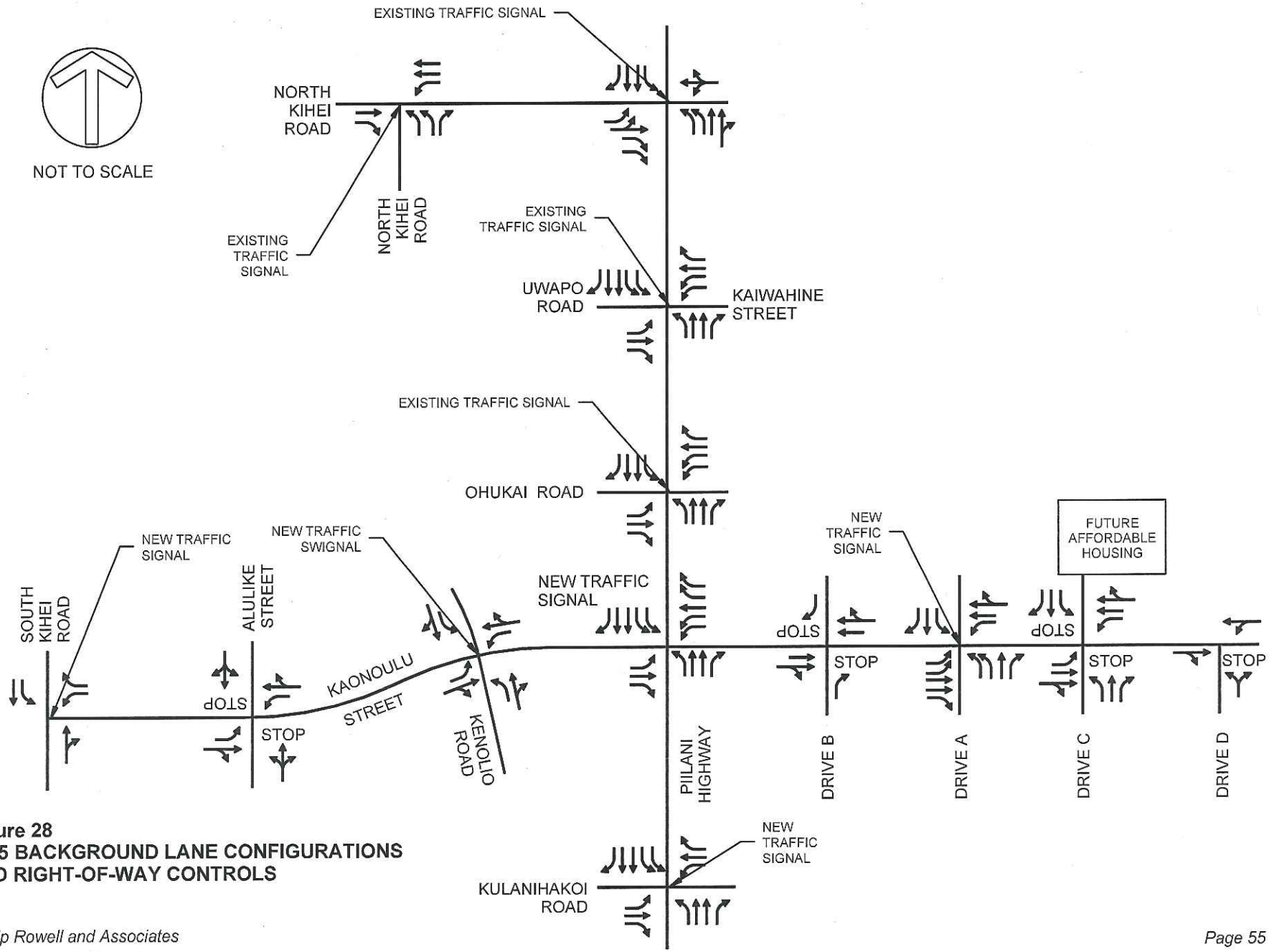


Figure 28
2015 BACKGROUND LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS

Table 16 2015 Background Plus Project Levels-of-Service - Signalized Intersections

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Project			With Project			Without Project			With Project			Without Project			With Project		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at Ohukai St	***0.81***	***35.3***	***D***	***0.85***	***39.4***	***D***	***0.96***	***44.0***	***D***	***0.94***	***46.7***	***D***	***0.82***	***33.6***	***C***	***0.91***	***41.3***	***D***
Eastbound Left	0.82	67.8	E	0.81	76.8	E	0.84	93.4	F	0.77	82.0	F	0.72	64.7	E	0.85	91.1	F
Eastbound Thru	0.35	68.0	E	0.55	65.9	E	0.52	65.8	E	0.58	70.1	E	0.43	53.7	D	0.64	71.6	E
Eastbound Right	0.16	60.6	E	0.29	61.6	E	0.06	60.4	E	0.23	63.6	E	0.04	49.9	D	0.10	60.7	E
Westbound Left	0.81	68.0	F	0.81	70.6	E	0.83	79.7	E	0.92	90.9	F	0.56	59.5	E	0.72	69.4	E
Westbound Thru	0.19	57.7	E	0.29	62.7	E	0.39	63.5	E	0.26	62.4	E	0.30	56.9	E	0.34	64.0	E
Westbound Right	0.11	58.4	E	0.11	61.2	E	0.17	61.2	E	0.20	62.0	E	0.10	55.2	E	0.10	61.7	E
Northbound Left	0.68	84.2	F	0.69	76.6	E	0.72	85.6	F	0.90	116.4	F	0.55	67.2	E	0.79	84.9	F
Northbound Thru	0.79	24.3	C	0.78	31.3	C	0.94	42.2	D	0.95	40.7	D	0.80	30.7	C	0.91	36.3	D
Northbound Right	0.11	14.3	B	0.12	18.1	B	0.15	16.7	B	0.19	15.7	B	0.11	17.1	B	0.16	15.6	B
Southbound Left	0.85	68.4	E	0.83	75.3	E	0.94	104.7	F	0.97	112.3	F	0.84	75.9	E	0.90	95.3	F
Southbound Thru	0.77	22.7	C	0.79	24.6	C	0.84	26.7	C	0.93	33.0	C	0.61	18.1	B	0.79	25.0	C
Southbound Right	0.04	11.8	B	0.04	11.7	B	0.09	11.9	B	0.09	11.2	B	0.06	11.2	B	0.07	12.2	B
Piilani Hwy at Kaiwahine St	***0.90***	***37.1***	***D***	***0.96***	***39.4***	***D***	***0.83***	***33.4***	***C***	***0.97***	***48.2***	***C***	***0.70***	***28.4***	***C***	***0.87***	***44.1***	***D***
Eastbound Left	0.88	79.2	E	0.54	65.4	E	0.32	49.7	D	0.73	97.6	F	0.36	47.5	D	0.65	85.1	F
Eastbound Thru	0.18	45.6	D	0.38	64.2	E	0.50	51.8	D	0.88	101.6	F	0.29	45.9	D	0.63	74.1	E
Eastbound Right	0.05	44.0	D	0.06	61.2	E	0.06	46.3	D	0.10	63.0	E	0.04	43.3	D	0.10	63.6	E
Westbound Left	0.82	62.2	E	0.85	68.5	E	0.92	86.0	F	0.91	94.5	F	0.79	59.7	E	0.85	75.3	E
Westbound Thru	0.21	45.9	D	0.27	53.9	D	0.30	49.1	D	0.36	59.2	E	0.49	48.5	D	0.51	56.8	E
Westbound Right	0.64	54.7	D	0.50	56.9	E	0.42	50.8	D	0.58	63.8	E	0.16	44.5	D	0.23	52.8	D
Northbound Left	0.49	72.1	E	0.52	70.4	E	0.65	79.5	E	0.83	98.1	F	0.43	64.2	E	0.78	86.2	F
Northbound Thru	0.83	30.2	C	0.85	33.3	C	0.79	26.4	C	0.91	39.5	D	0.67	21.2	C	0.84	34.7	C
Northbound Right	0.10	14.9	B	0.12	16.7	B	0.22	15.2	B	0.30	19.6	B	0.20	14.0	B	0.30	20.7	C
Southbound Left	0.84	72.9	E	0.88	78.3	E	0.82	70.2	E	0.91	90.5	F	0.72	60.6	E	0.81	77.0	E
Southbound Thru	0.60	15.3	B	0.61	18.2	B	0.66	16.1	B	0.82	29.6	C	0.58	13.7	B	0.84	32.6	C
Southbound Right	0.02	8.7	A	0.02	10.7	B	0.05	8.6	A	0.06	13.9	B	0.03	8.0	A	0.04	15.5	B

Table 16 2015 Background Plus Projects Levels-of-Service - Signalized Intersections (Continued)

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Project			With Project			Without Project			With Project			Without Project			With Project		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at N. Kihei Rd	***0.67***	***24.9***	***C***	***0.69***	***26.0***	***C***	***0.75***	***28.1***	***C***	***0.81***	***31.4***	***C***	***0.64***	***19.0***	***B***	***0.73***	***21.9***	***C***
Eastbound Left	0.55	60.9	E	0.53	61.2	E	0.47	62.0	E	0.44	61.6	E	0.62	58.0	E	0.65	61.7	E
Eastbound Left & Thru	0.57	62.0	E	0.55	62.0	E	0.47	62.0	E	0.44	61.6	E	0.62	57.6	E	0.64	61.5	E
Eastbound Right	0.26	34.4	C	0.31	35.3	D	0.49	44.8	D	0.59	44.9	D	0.13	30.3	C	0.25	29.9	C
Westbound Left, Thru & Right	0.24	66.9	E	0.26	69.8	E	0.44	68.4	E	0.44	69.2	E	0.00	0.0	A	0.00	0.0	A
Northbound Left	0.80	54.8	D	0.81	56.7	E	0.79	64.3	E	0.85	67.9	E	0.71	52.1	D	0.77	52.4	D
Northbound Thru & Right	0.48	6.7	A	0.49	6.9	A	0.52	9.1	A	0.56	10.1	B	0.43	3.4	A	0.47	3.5	A
Southbound Left	0.20	71.1	E	0.19	71.9	E	0.44	101.3	F	0.40	95.0	F	0.00	0.0	A	0.00	0.0	A
Southbound Thru	0.64	22.2	C	0.67	23.5	C	0.74	24.8	C	0.82	30.2	C	0.63	15.3	B	0.72	20.2	C
Southbound Right	0.10	14.2	B	0.10	14.7	B	0.13	14.0	B	0.13	15.9	B	0.12	9.4	A	0.13	11.4	B
N. Kihei Rd at S. Kihei Rd	***0.56***	***25.3***	***C***	***0.58***	***26.2***	***C***	***0.70***	***23.9***	***C***	***0.73***	***25.2***	***C***	***0.54***	***23.2***	***C***	***0.60***	***24.1***	***C***
Eastbound Thru	0.79	41.3	D	0.81	41.9	D	0.79	32.3	C	0.82	33.2	C	0.74	34.0	C	0.79	35.0	D
Eastbound Right	0.24	27.9	C	0.28	27.7	C	0.48	22.9	C	0.54	23.4	C	0.28	25.1	C	0.33	24.1	C
Westbound Left	0.61	46.1	D	0.62	48.3	D	0.70	51.9	D	0.62	49.9	D	0.68	43.9	D	0.60	42.4	D
Westbound Thru	0.37	18.2	B	0.37	17.7	B	0.28	12.2	B	0.31	10.8	B	0.23	15.2	B	0.26	13.0	B
Northbound Left	0.37	18.2	B	0.40	20.2	C	0.31	21.7	C	0.41	29.2	C	0.21	13.3	B	0.29	19.5	B
Northbound Right	0.15	16.0	B	0.15	17.6	B	0.12	19.9	B	0.12	25.8	C	0.09	12.5	B	0.09	17.8	B
Piilani Hwy at Kaonoulu St	***0.95***	***28.2***	***C***	***1.00***	***48.2***	***D***	***0.95***	***21.8***	***C***	***1.07***	***65.3***	***E***	***0.70***	***18.7***	***B***	***1.24***	***86.6***	***F***
Eastbound Left	0.46	56.4	E	0.77	95.1	F	0.78	84.8	F	0.70	90.1	F	0.71	75.2	E	0.77	104.6	F
Eastbound Thru				0.21	60.7	E				0.93	124.1	F				1.04	150.8	F
Eastbound Right	0.89	88.0	F	0.95	108.5	F	0.38	64.4	E	0.61	80.3	F	0.16	60.7	E	0.28	77.0	E
Westbound Left				0.66	96.1	F				0.96	97.3	F				**1.01**	**113.2**	**F**
Westbound Thru				0.20	70.2	E				0.56	65.7	E				0.49	63.5	E
Westbound Right				0.03	68.3	E				0.44	62.6	E				0.33	60.1	E
Northbound Left	0.81	83.9	F	0.86	105.6	F	0.85	84.6	F	0.95	117.9	F	0.77	76.8	E	0.82	104.7	F
Northbound Thru	0.58	8.1	A	0.72	25.9	C	0.63	4.9	A	0.96	56.0	E	0.48	4.0	A	0.94	79.6	E
Northbound Right				0.11	14.3	B				0.49	31.2	C				1.04	117.7	F
Southbound Left				0.65	88.2	F				0.96	100.6	F				**1.01**	**108.9**	**F**
Southbound Thru	0.82	25.2	C	0.90	41.4	D	0.86	23.4	C	0.97	55.8	E	0.57	13.9	B	0.66	46.1	D
Southbound Right	0.10	11.8	B	0.12	18.3	B	0.47	13.2	B	0.25	23.7	C	0.13	9.1	A	0.18	34.4	C
S. Kihei Rd at Kaonoulu St.	***0.78***	***12.8***	***B***	***0.88***	***26.8***	***C***	***0.76***	***15.2***	***B***	***0.93***	***27.7***	***C***	***0.78***	***18.3***	***B***	***1.01***	***55.5***	***E***
Westbound Left	0.66	19.6	B	0.68	26.8	C	0.57	26.2	C	0.83	41.9	D	0.62	28.1	C	**1.03**	**101.5**	**F**
Westbound Right	0.05	13.6	B	0.06	19.2	B	0.04	21.4	C	0.11	23.1	C	0.04	21.9	C	0.15	39.1	D
Northbound Thru & Right	0.81	13.3	B	0.94	32.1	C	0.79	14.4	B	0.95	35.5	D	0.81	15.3	B	**1.00**	**52.9**	**D**
Southbound Left	0.64	14.6	B	0.85	62.1	E	0.86	80.6	F	0.83	59.3	E	0.93	104.4	F	**1.00**	**111.4**	**F**
Southbound Thru	0.35	5.8	A	0.31	4.7	A	0.56	5.5	A	0.57	6.6	A	0.36	4.3	A	0.34	6.2	A

Table 16 2015 Background Plus Projects Levels-of-Service - Signalized Intersections (Continued)

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Project			With Project			Without Project			With Project			Without Project			With Project		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at Kulanihakoi St	***0.83***	***17.8***	***B***	***0.84***	***26.0***	***C***	***0.80***	***19.9***	***B***	***0.90***	***25.6***	***C***	***0.49***	***4.2***	***A***	***0.75***	***8.8***	***A***
Eastbound Left	0.49	64.4	E	0.71	72.4	E	0.46	60.7	E	0.65	72.9	E	0.36	33.7	C	0.85	64.9	E
Eastbound Thru	0.61	58.6	E	0.68	68.8	E	0.21	57.6	E	0.17	59.9	E	0.00	0.0	A	0.00	0.0	A
Eastbound Right	0.66	52.9	D	0.18	54.8	D	0.06	56.5	E	0.11	59.5	E	0.05	31.6	C	0.05	29.7	C
Westbound Left	0.88	71.9	F	0.71	74.1	E	0.56	64.2	E	0.56	70.4	E	0.00	0.0	A	0.00	0.0	A
Westbound Thru	0.30	53.5	D	0.32	56.6	E	0.21	56.5	E	0.26	63.4	E	0.00	0.0	A	0.00	0.0	A
Westbound Right	0.05	51.9	D	0.05	54.4	D	0.03	55.2	E	0.03	61.5	E	0.00	0.0	A	0.00	0.0	A
Northbound Left	0.79	87.1	F	0.80	97.1	F	0.80	85.1	F	0.94	127.6	F	0.28	2.7	A	0.69	49.5	D
Northbound Thru	0.60	8.1	A	0.77	18.3	B	0.78	12.3	B	0.88	17.8	B	0.49	2.8	A	0.64	3.4	A
Northbound Right	0.13	4.7	A	0.15	9.5	A	0.03	4.7	A	0.03	5.0	A	0.00	0.0	A	0.00	0.0	A
Southbound Left	0.62	17.0	B	0.61	58.1	E	0.81	116.9	F	0.59	77.1	E	0.00	0.0	A	0.00	0.0	A
Southbound Thru	0.74	19.7	B	0.85	18.8	B	0.81	17.0	B	0.91	23.3	C	0.49	2.8	A	0.73	8.1	A
Southbound Right	0.04	7.7	A	0.06	7.0	A	0.09	7.3	A	0.12	7.2	A	0.06	1.7	A	0.10	3.8	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix D for Level-of-Service Analysis Worksheets without Project.
(4) See Appendix E for Level-of-Service Analysis Worksheets with Project.

Table 17 2015 Background Plus Project Levels-of-Service - Unsignalized Intersections

	AM Peak Hour				PM Peak Hour				Saturday Peak Hour			
	Without Project		With Project		Without Project		With Project		Without Project		With Project	
Intersection and Movement	Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Kaonoulu St at Kenolio Rd	9.0	A	21.2	C	7.3	A	35.9	E	7.0	A	58.3	F
Eastbound Left	8.1	A	8.0	A	8.3	A	9.1	A	8.3	A	10.3	B
Westbound Left	7.6	A	8.0	A	7.9	A	8.6	A	7.8	A	8.8	A
Northbound Left	15.9	C	18.2	C	20.5	C	58.4	F	21.3	C	159.2	F
Northbound Thru & Right	11.0	B	12.3	B	12.5	B	20.2	C	12.3	B	27.9	D
Southbound Left	32.6	D	86.3	F	38.2	E	392.9	F	37.4	E	892.9	F
Southbound Thru & Right	12.3	B	12.9	B	14.2	B	24.0	C	12.9	B	29.3	D
Kaonoulu St at Alulike St	3.1	A	2.6	A	2.8	A	2.5	A	4.7	A	6.6	A
Eastbound Left	8.0	A	8.2	A	8.2	A	8.8	A	8.1	A	9.1	A
Westbound Left	7.6	A	7.9	A	7.9	A	8.4	A	7.9	A	8.8	A
Northbound Left, Thru & Right	15.2	B	18.8	C	18.4	C	32.7	D	17.9	C	46.8	E
Southbound Left, Thru & Right	11.1	B	12.0	B	11.8	B	15.2	C	14.5	B	40.6	E

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix E for Level-of-Service Analysis Worksheets for Without Project conditions.
(4) See Appendix F for Level-of-Service Analysis Worksheets for With Project conditions.

The level-of-service analysis concludes that the following intersections will have unacceptable operting conditions and mitigation should be assessed:

Piilani Highway at Kaonoulu Street

Even with the improvements planned as part of the project, this intersection will operate at Level-of-Service E during the afternoon peak hour and Level-of-Service F during the Saturday peak hour. The volume-to-capacity ratio will be 1.07 and 1.24, respectively. Since the overall intersection will operate at an level-of-service less than Level-of-Service D and the volume-to-capacity ratios are greater than 1.00, additional improvements are required.

South Kihei Road at Kaonoulu Street

The overall intersection level-of-service will decrease from Level-of-Service B without project traffic to Level-of-Service E with project traffic during the Saturday peak hour and the volume-to-capacity ratio will be greater than 1.00, which triggers the need for mitigation.

Kaonoulu Street at Kenolio Road

The northbound left turn will operate at Level-of-Service F during the weekday afternoon and Saturday peak hours and the southbound left turn will operate at Level-of-Service F during the morning, afternoon and Saturday peak hours. The delays during the afternoon and Saturday peak hours are long enough to reduce the overall intersection levels-of-service. With project generated traffic the afternoon level-of-service changes from Level-of-Service A to Level-of-Service E and the Saturday peak hour level-of-service from Level-of-Service A to Level-of-Service F.

Mitigation Measures

The following is a description of proposed mitigation improvements. The results of the level-of-service analysis of the intersections that require mitigation, without and with the improvements, are summarized in Table 18.

Piilani Highway at Kaonoulu Street

Without mitigation, this intersection will operate at Level-of-Service E during the afternoon peak hour and Level-of-Service F during the Saturday peak hour. With the improvements listed below, the afternoon peak hour volume-to-capacity ratio will decrease from 1.07 to 0.98 and the Saturday peak hour volume-to-capacity ratio will decrease from 1.24 to 0.99. Recommended improvements include:

1. Add a driveway, referred to as Drive E, south of Kaonoulu Street along the east side of Piilani Highway. Traffic movements should be restricted to right turns into the project only.

2. Add a driveway, referred to as Drive F, north of Kaonoulu Street along the east side of Piilani Highway. Traffic movements should be restricted to right turns out only.

3. Right turn arrows should be provided along the northbound and westbound approaches. These right turns should overlap with the appropriate left turn movements.

In response to comments from State of Hawaii Department of Transportation, an assessment to estimate the amount of development that could be accommodated without Drives E and F was performed. This assessment determined that 65% of the proposed development could be accommodated without these drives. Therefore, implementation of these improvements will be deferred pending the findings of an assessment of traffic conditions at 65% occupancy.

South Kihei Road at Kaonoulu Street

Without mitigation, this intersection will operate at Level-of-Service E during the Saturday peak hours. The volume-to-capacity ratio will be 1.01 and the level-of-service will be Level-of-Service E. The westbound left turn will have a volume-to-capacity ratio of 1.03. It is recommended that the northbound approach of South Kihei Road to Kaonoulu Street be modified to provide separate northbound through and right turn lanes. This is in addition to the traffic signals that will be installed as part of the Maui Lu Resort redevelopment. The resulting volume-to-capacity ratio will be 0.80 and the level-of-service will be Level-of-Service C.

Table 18 2015 Background Plus Project Mitigation Analysis

	AM Peak Hour						PM Peak Hour						Saturday Peak Hour					
	Without Mitigation			With Mitigation			Without Mitigation			With Mitigation			Without Mitigation			With Mitigation		
Intersection and Movement	V/C	Delay [1]	LOS [2]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Piilani Hwy at Kaonoulu St	***1.00***	***48.2***	***D***	***0.99***	***44.6***	***D***	***1.07***	***65.3***	***E***	***0.98***	***55.0***	***D***	***1.24***	***86.6***	***F***	***0.99***	***54.1***	***D***
Eastbound Left	0.77	95.1	F	0.58	67.5	E	0.70	90.1	F	0.39	63.1	E	0.77	104.6	F	0.73	77.7	E
Eastbound Thru	0.21	60.7	E	0.19	53.3	D	0.93	124.1	F	0.74	80.6	F	**1.04**	**150.8**	**F**	0.98	114.4	F
Eastbound Right	0.95	108.5	F	0.93	95.7	F	0.61	80.3	F	0.39	63.8	E	0.28	77.0	E	0.27	58.3	E
Westbound Left	0.66	96.1	F	0.70	88.7	F	0.96	97.3	F	0.97	90.8	F	**1.01**	**113.2**	**F**	0.96	69.4	E
Westbound Thru	0.20	70.2	E	0.25	84.9	E	0.56	65.7	E	0.61	64.2	E	0.49	63.5	E	0.48	28.6	C
Westbound Right	0.03	68.3	E	0.02	77.9	E	0.44	62.6	E	0.35	36.1	D	0.33	60.1	E	0.37	14.5	B
Northbound Left	0.86	105.6	F	0.79	88.9	F	0.95	117.9	F	0.95	112.1	F	0.82	104.7	F	0.70	76.7	E
Northbound Thru	0.72	25.9	C	0.73	25.2	C	0.96	56.0	E	0.96	51.5	D	0.94	79.6	E	0.94	68.8	E
Northbound Right	0.11	14.3	B	0.06	9.7	A	0.49	31.2	C	0.33	11.8	B	**1.04**	**117.7**	**F**	0.68	27.1	C
Southbound Left	0.65	88.2	F	0.62	77.9	E	0.96	100.6	F	0.96	89.4	F	**1.01**	**108.9**	**F**	0.97	81.0	F
Southbound Thru	0.90	41.4	D	0.92	40.3	D	0.97	55.8	E	0.94	44.5	D	0.66	46.1	D	0.63	35.2	D
Southbound Right	0.12	18.3	B	0.11	17.1	B	0.25	23.7	C	0.19	19.8	B	0.18	34.4	C	0.14	26.1	C
S. Kihei Rd at Kaonoulu St.	***0.88***	***26.8***	***C***	***0.68***	***14.4***	***B***	***0.93***	***27.7***	***C***	***0.71***	***15.8***	***B***	***1.01***	***55.5***	***E***	***0.80***	***24.9***	***C***
Westbound Left	0.68	26.8	C	0.76	30.0	C	0.83	41.9	D	0.74	29.4	C	**1.03**	**101.5**	**F**	0.76	33.8	C
Westbound Right	0.06	19.2	B	0.06	18.0	B	0.11	23.1	C	0.11	19.0	B	0.15	39.1	D	0.15	22.7	C
Northbound Thru & Right	0.94	32.1	C				0.95	36.5	D				**1.00**	**52.9**	**D**			
Northbound Thru				0.64	11.6	B				0.69	16.0	B				0.80	26.6	C
Northbound Right				0.19	7.8	A				0.21	10.4	B				0.26	15.6	B
Southbound Left	0.85	62.1	E	0.74	40.2	D	0.83	59.3	E	0.69	35.1	D	**1.00**	**111.4**	**F**	0.86	58.8	E
Southbound Thru	0.31	4.7	A	0.30	4.0	A	0.57	6.6	A	0.61	7.6	A	0.34	6.2	A	0.40	8.2	A

NOTES:
(1) Delay is in seconds per vehicle.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(3) See Appendix F for Level-of-Service Analysis Worksheets without Mitigation.
(4) See Appendix G for Level-of-Service Analysis Worksheets with Mitigation.

Kaonoulu Street at Kenolio Road

Without mitigation, the northbound and southbound left turns will operate at Level-of-Service F during the weekday afternoon and Saturday peak hour. The delays of these movements are long enough to reduce to afternoon peak hour level-of-service from Level-of-Service A to Level-of-Service E and the Saturday peak hour from Level-of-Service A to Level-of-Service F. Typically, when the overall level-of-service of an unsignalized intersection is Level-of-Service E or F, a traffic signal warrant analysis is performed to determine if the warrants for a traffic signal are satisfied and if a signal will improve the level-of-service to acceptable level.

A traffic signal warrant analysis was not performed in this case for the following reasons:

a. The traffic projections are for peak hours only. Therefore, the peak hour warrant is the only warrant that can be assessed at this time. However, the peak hour warrant is not applicable to conditions at this intersection. According to the *Manual on Uniform Traffic Control Devices*, "This warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large number of vehicles over a short time."

b. During past discussions with State of Hawaii Department of Transportation and other agencies, the proximity of this intersection to Piilani Highway has been a major concern. There is concern that the queues from a traffic signal at this intersection would back up onto Piilani Highway and therefore affect regional traffic flow along Piilani Highway.

In comparable cases, the intersection is monitored at periodic intervals. The traffic projections used in the level-of-service analysis may not be realized because one or more of the related projects may not be developed as currently anticipated or the related project may not generate the amount of traffic currently anticipated. Therefore, it is recommended that this intersection be reassessed at six-month intervals commencing upon initial occupancy of the project until the project is 90% occupied. A traffic signal warrant analysis should be included in this traffic assessment.

Project Driveways

The results of the Level-of-Service analysis of the project driveways are summarized in Table 19.

Table 19 2015 Levels-of-Service of Project Driveways

	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	With Project			With Project			With Project		
Intersection and Movement	V/C[1]	Delay [2]	LOS [3]	V/C	Delay	LOS	V/C	Delay	LOS
East Kaonoulu Street at Drive A	***0.16***	***22.4***	***C***	***0.63***	***51.4***	***D***	***0.84***	***54.0***	***D***
Eastbound Left	0.43	33.8	C	0.67	55.9	E	0.91	66.6	E
Eastbound Thru	0.08	24.9	C	0.11	33.4	C	0.14	25.7	C
Eastbound Right	0.04	17.6	B	0.14	13.0	B	0.24	9.5	A
Westbound Left	NO LEFT TURNS			NO LEFT TURNS			NO LEFT TURNS		
Westbound Thru & Right	0.33	37.4	D	0.55	66.3	E	0.74	70.2	E
Northbound Left	0.26	35.6	D	0.63	59.7	E	0.90	70.9	E
Northbound Thru	0.06	6.2	A	0.28	39.2	D	0.30	26.3	C
Northbound Right	NO RIGHT TURNS			NO RIGHT TURNS			NO RIGHT TURNS		
Southbound Left	0.24	43.2	D	0.06	61.4	E	0.55	86.2	F
Southbound Thru	0.07	8.3	A	0.64	60.0	E	0.77	61.5	E
Southbound Right	0.02	7.9	A	0.16	47.7	D	0.23	43.9	D
East Kaonoulu Street at Drive B	***nc***	***1.1***	***A***	***nc***	***3.2***	***A***	***nc***	***8.9***	***A***
Northbound Right	nc	9.1	A	nc	12.6	B	nc	17.1	C
Southbound Right	nc	9.0	A	nc	22.4	C	nc	80.7	F
East Kaonoulu Street at Drive C	***nc***	***4.6***	***A***	***nc***	***8.1***	***A***	***nc***	***9.3***	***A***
Northbound Left	nc	8.9	A	nc	12.5	B	nc	14.6	B
East Kaonoulu Street at Drive D	***nc***	***0.0***	***A***	***nc***	***0.0***	***A***	***nc***	***0.0***	***A***
Westbound Left	nc	0.0	A	nc	0.0	A	nc	0.0	A
Northbound Left & Right	nc	0.0	A	nc	0.0	A	nc	0.0	A

NOTES:
(1) Denotes volume-to-capacity ratio. Volume-to-capacity ratios are not calculated for the unsignalized intersections.
(2) Delay is in seconds per vehicle.
(3) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. Level-of-Service is based on delay.
(4) See Appendix F for Level-of-Service Analysis Worksheets.
(5) nc = not calculated.

Mitigation Measures

Table 20 is a summary of mitigation required at the study intersections. Mitigation required to accommodate 2015 background (without project) traffic conditions are shown and additional mitigation required to accommodate additional traffic generated by the project. A schematic drawing of the recommended lane configurations along East Kaonoulu Street between Piilani Highway and Drive D, including recommended mitigation improvements, is provided as Figure 29.

As noted earlier in this report, it was determined that 65% of the project generated traffic can be accommodated with the improvements required at the intersection of Piilani Highway at Kaonoulu Street. See Figure 30. Mitigation improvements to accommodate project generated traffic have been divided into the improvements required to accommodate 65% of project generated traffic and additional improvements to accommodate the remaining 35% of the project generated traffic. Prior to initiating the additional improvements, is has been agreed to update the project's TIAR when the project is 65% occupied to verify that the improvements are still warranted. When the project is 65% occupied, the project trip generation estimates can be verified, amount of pedestrian traffic into and out of the project can be estimated and the impacts of pedestrians on vehicular traffic can be verified.

Table 20 Summary of Recommended Mitigation Measures Conditions

Location	Mitigation Required to Mitigate 2015 Background Conditions	Improvements Recommended As Part of Piilani Promenade Project	Additional Mitigation Required to Mitigate 2015 Background Plus Project	
			At 65% Occupancy	At 100% Occupancy
Overall			Provide set backs along East Kaonoulu Street at all project driveways for future right turn decelerations lanes .	Update TIAR at 65% Occupancy to assess need for additional improvements listed below.
Piilani Highway at Ohukai Street	1. Modify the westbound approach to provide a two left turn lanes, one thru lane and one right turn lane.		No additional mitigation required	No additional mitigation required
Piilani Highway at Kaiwahine St and Uwapo Road	1. Modify the eastbound approach to provide separate left, through and right turn lanes 2. Modify the westbound approach to provide two left turn lanes, one through lane and one right turn lane. 3. Modify the southbound approach to provide a second left turn lane.		No additional mitigation required	No additional mitigation required.
Piilani Highway at Kaonoulu Street	1. Install traffic signals	1. Modify eastbound approach to provide one left turn lane, one through lane and one right turn lane 2. Provide two southbound to eastbound left turn lanes 3. Provide two left turn lanes, one through lane and one right turn lanes along the westbound approach	No additional mitigation required	1. Provide signalized right turns along the northbound and westbound approaches with overlaps 2. Provide driveway (Drive E) along east side of Piilani Highway south of Kaonoulu Street. Turning movements should be restricted to right turns into the project only. 3. Provide driveway (Drive F) along the east side of Piilani Highway north of Kaonoulu Street. Turning movements should be restricted to right turns out only. 4. Provide second westbound to northbound right turn lane.
South Kihei Road at Kaonoulu Street	1. Install traffic signals 2. Provide southbound to eastbound left turn lane		No additional mitigation required	1. Modify the northbound approach to provide separate through and right turn lanes.
Piilani Highway at Kulanihakoi Road	1. Install traffic signals 2. Provide two southbound left turn lanes 3. Provide separate left, through and right lanes along th eastbound approach 4. Provide separate northbound right turn and deceleration lane		No additional mitigation required	No additional mitigation required.
Kaonoulu Street at Kenolio Road			No additional mitigation required.	1. Monitor the intersection for operational problems at six month intervals until project is 90% occupied.
East Kaonoulu Street at Drive B			No additional mitigation required. Implementation of the outbound right turns to be deferred pending traffic assessment at 65% occupancy.	1. Add outbound right turn only lane.

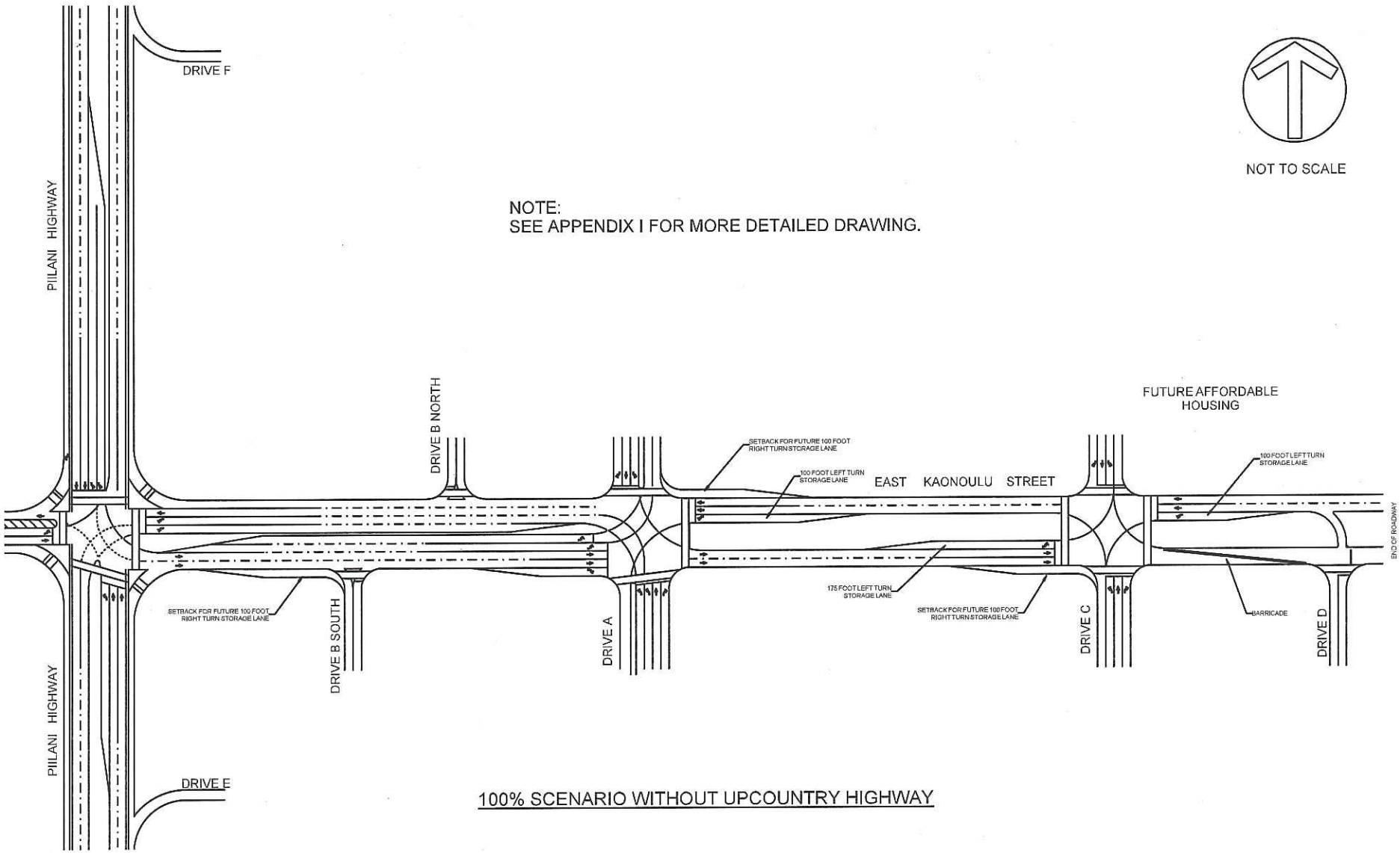


Figure 29
SCHEMATIC DRAWING OF EAST KAONOULU STREET AT 100% PROJECT OCCUPANCY

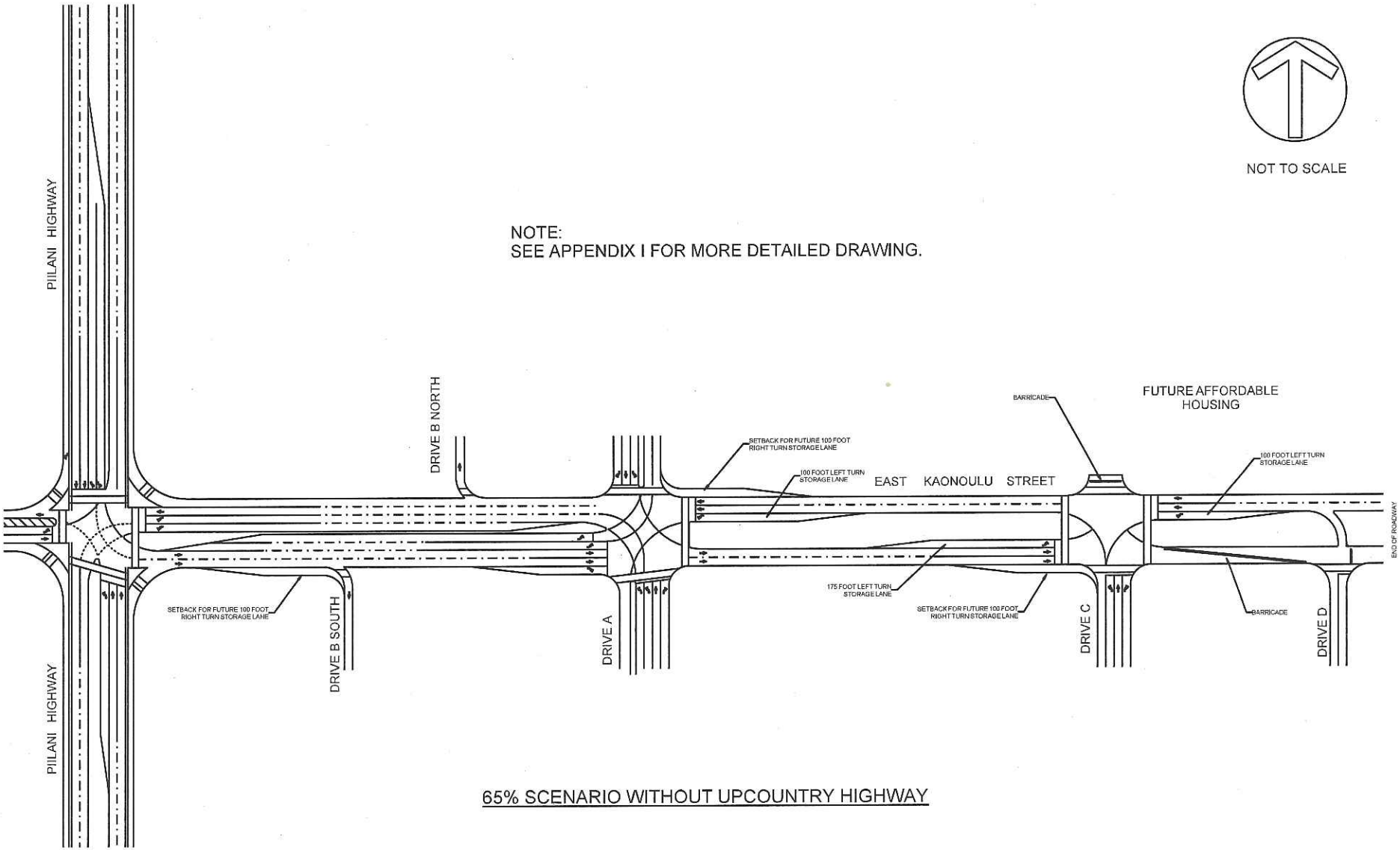


Figure 30
SCHEMATIC DRAWING OF EAST KAONOULU STREET AT 65% PROJECT OCCUPANCY

Required Left Turn Storage Lane Lengths

The left turn storage lengths required to accommodate estimated traffic volumes were calculated using guidelines in *A Policy on Geometric Design of Highways and Streets* published by the American Association of State Highway and Transportation Officials. There are separate policies for signalized and unsignalized intersections. Based on this policy, the assumptions used to determine the required lengths of the left turn storage lanes are:

1. For signalized intersections, the length of the left turn storage lane should be "1.5 to 2.0 times the average number of vehicles that would store per cycle, which is predicted on the design volume."

2. For unsignalized intersections, the length of the left turn storage lane is "based on the number of vehicles likely to arrive in an average 2-minute period within the peak hour. As a minimum requirements, space for at least two passenger cars should be provided; with over 10 percent truck traffic, provisions should be made for at least one car and one truck."

3. The average length required per vehicle is 25 feet.

4. A traffic signal cycle length of 160 seconds was used at the intersection of Piilani Highway at Kaonoulu Street. This is longer than the cycle length currently in use. Using a longer cycle length will insure that queues do not exceed the capacity of the storage lane if the traffic signal timing are revised at a future date.

Using the above criteria, the turn storage lane requirements were calculated and the results are summarized in Table 21. Also shown are the storage lane length recommended. In all cases, the desirable lengths for weekday peak hours can be accommodated.

Roundabout Analysis

The viability of providing a roundabout at the intersection of Piilani Highway at Kaonoulu Street was assessed and the results are summarized in Table 22. Shown are the high and low volume-to-capacity ratios. High and low volume-to-capacity ratios are reported since there is a learning process as drivers learn to drive a roundabout. The high volume-to-capacity ratio would be the condition expected after the roundabout has been in use sufficiently long for drivers to learn to drive the roundabout.

The roundabout analysis was performed to different scenarios of configuration. The number of lanes was varied from one to three lanes and the inside radius was varied from 25 to 80 feet. The data reported was the same for all scenarios.

Impacts of Pedestrians

An assessment of the potential impacts of pedestrians on traffic conditions at the intersection of Piilani Highway at Kaonoulu Street was performed. It is anticipated that there will be pedestrian traffic across Piilani Highway at this intersection. However, there are no pedestrian trip generation data to develop reliable estimates. In order to assess the impacts of pedestrian traffic across Piilani Highway, the level-of-service was rerun assuming that 100 pedestrians per hour would use the crosswalks across Piilani Highway. The addition of 100 pedestrians per hour increased the intersection volume-to-capacity ratios to over 1.00 and increased the overall intersection delays slightly but not enough to change the intersection level-of-service.

It has been recommended that traffic conditions at this intersection be assessed at 65% occupancy. Pedestrian traffic should be included in this assessment. Since the project will be 65% occupied. A reliable estimate of pedestrian traffic can be developed at that time.

Table 21 Left Turn Storage Lane Requirements

Intersection	Approach & Time Period		Design Volume	Cycle Length (Seconds)	Cycles per Hour	Average Vehicles per Cycle	Recommended Length (1)				Recommendation
							Minimum		Desirable		
							Veh	Ft	Veh	Ft	
Piilani Hwy at Kaonoulu Street	EB	AM	92	160	20	5	8	200	10	**250**	1 Lane at 250 ft
		PM	75	160	23	3	5	125	6	150	
		Sat	89	160	23	4	6	150	8	200	
	WB	AM	81	160	23	4	6	150	8	200	2 Lanes with 1125 ft Total
		PM	513	160	23	22	33	825	44	1100	
		Sat	698	160	23	30	45	**1125**	60	1500	
	NB	AM	137	160	23	6	9	225	12	300	1 Lane at 400 ft
		PM	187	160	23	8	12	300	16	**400**	
		Sat	113	160	23	5	8	200	10	250	
	SB	AM	131	160	23	6	9	225	12	300	2 Lanes with 1250 ft Total
		PM	483	160	23	21	32	800	42	1050	
		Sat	761	160	23	33	50	**1250**	66	1650	
East Kaonoulu Street at Drive A	EB	AM	154	120	30	5	8	200	10	250	2 Lanes with 1025 ft Total
		PM	566	120	30	19	29	725	38	950	
		Sat	795	120	30	27	41	**1025**	54	1350	
	WB	AM	0	120	30	0	0	0	0	0	1 lane at 60 ft.
		PM	0	120	30	0	0	0	0	0	
		Sat	0	120	30	0	0	0	0	0	

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.

Table 22 Roundabout Analysis of Piilani Highway at Kaonoulu Street

Approach	AM Peak Hour		PM Peak Hour		Saturday Peak Hour	
	High V/C	Low V/C	High V/C	Low V/C	High V/C	Low V/C
Eastbound	2.48	3.52	4.12	6.39	4.16	6.29
Westbound	0.77	1.08	4.78	6.77	3.95	5.28
Northbound	1.81	2.22	3.22	4.07	4.04	5.32
Southbound	1.91	2.33	3.94	5.05	3.78	4.95

6. INTERSECTION DESIGN REQUIREMENTS

Based on discussions with State of Hawaii Department of Transportation and familiarity with the area, it is understood that the Upcountry Highway will not be constructed until several years after Piilani Promenade has been completed. However, East Kaonoulu east of Piilani Highway should be constructed with capacity to accommodate Upcountry Highway traffic. The intersections along East Kaonoulu Street, including the intersection of Piilani Highway at East Kaonoulu Street, are to be constructed with capacity to accommodate traffic associated with the Upcountry Highway as well as traffic generated by the Piilani Promenade project.

This chapter describes the methodology used to estimate future design volumes of the intersections of Piilani Highway at East Kaonoulu Street and East Kaonoulu Street at Drive Ato determine the

Methodology

The *Kihei Master Traffic Plan Study*[10] contained traffic forecasts for the intersection of Piilani Highway at Kaonoulu Street that included traffic associated with Upcountry Highway. The report implies that the forecast include traffic associated with major South Maui projects known at the time, primarily Wailea, Makena and Honuaula. Therefore, the traffic forecasts in the Kihei Master Traffic Plan Study were adjusted as follows in order to bring the forecast up to date:

1. Traffic associated with Kaiwahine Village, Maui Lu Resort, Kenolio 6 Residential, Kihei Residential, and Kihei High School were added to the forecasts.

[10] Parsons Brinckerhoff Quade & Douglas, *Kihei Master Traffic Plan Study*, Honolulu, HI, September 2003

2. The traffic assignments for these projects were adjusted to reflect traffic assignments along the Upcountry Highway.

The resulting traffic projections for East Kaonoulu Street at summarized as Figure 31.

A level-of-service analysis was performed to determine additional roadway improvements needed to accommodate added traffic associated with the Upcountry Highway. The results of the level-of-service that concluded that the following improvements should be implemented:

1. The North-South Collector Road should be completed between Kaonoulu Street and Waipuilani Road.

2. The eastbound approach of Kaonoulu Street at Piilani Highway should be widened to accommodate a second through lane.

A schematic drawing of East Kaonoulu Street at 100% project occupancy and with the Upcountry Highway is provided as Figure 32.

Left Turn Storage Lane Requirements With Upcountry Highway

Using the AASHTO standards described in the previous chapter, the left turn storage lengths required to accommodate Upcountry Highway traffic plus Piilani Promenade traffic was estimated. The results are presented in Table 23.

The distance along East Kaonoulu Street between Piilani Highway and Drive A prohibits providing the minimum or desired lengths for left turns from westbound Kaonoulu Street to southbound Piilani Highway and left turns from eastbound Kaonoulu Street to northbound Drive A as calculated using AASHTO standards. It is also not feasible to provide the minimum or desirable length for left turns from southbound Piilani Highway ato eastbound Kaonoulu Street. To verify that the queues will not back up into the through lanes and imped traffic flow along the through lanes, the 95th percentile queues reported by Synchro are also provided. The Synchro outputs are provided as Appendix H.

The results of the Synchro queue analysis are as follows:

1. For left turns from westbound Kaonoulu Street to southbound Piilani Highway, the desirable left turn storage length per AASHTO method is 2,050 feet. The 95th percentile queue length per Synchro is 634 feet. The longest feasible length of 1,050 feet is provided.

2. For left turns from eastbound Kaonoulu Street to northbound Drive A, the desirable left turn storage length per AASHTO method is 1,300 feet. The 95th percentile queue length per Synchro is 435 feet. The longest feasible length of 840 feet is provided, almost twice the queue length required per Synchro.

3. For left turns from southbound Piilani Highway to eastbound Kaonoulu Street, the desirable left turn storage length per AASHTO method is 2,200 feet. The 95th percentile queue length per Synchro is 671 feet. The longest feasible length of 1,080 feet is provided.

A comparison of the required lengths without versus with the Upcountry Highway as calculated using the AASHTO standards is presented in Table 24.

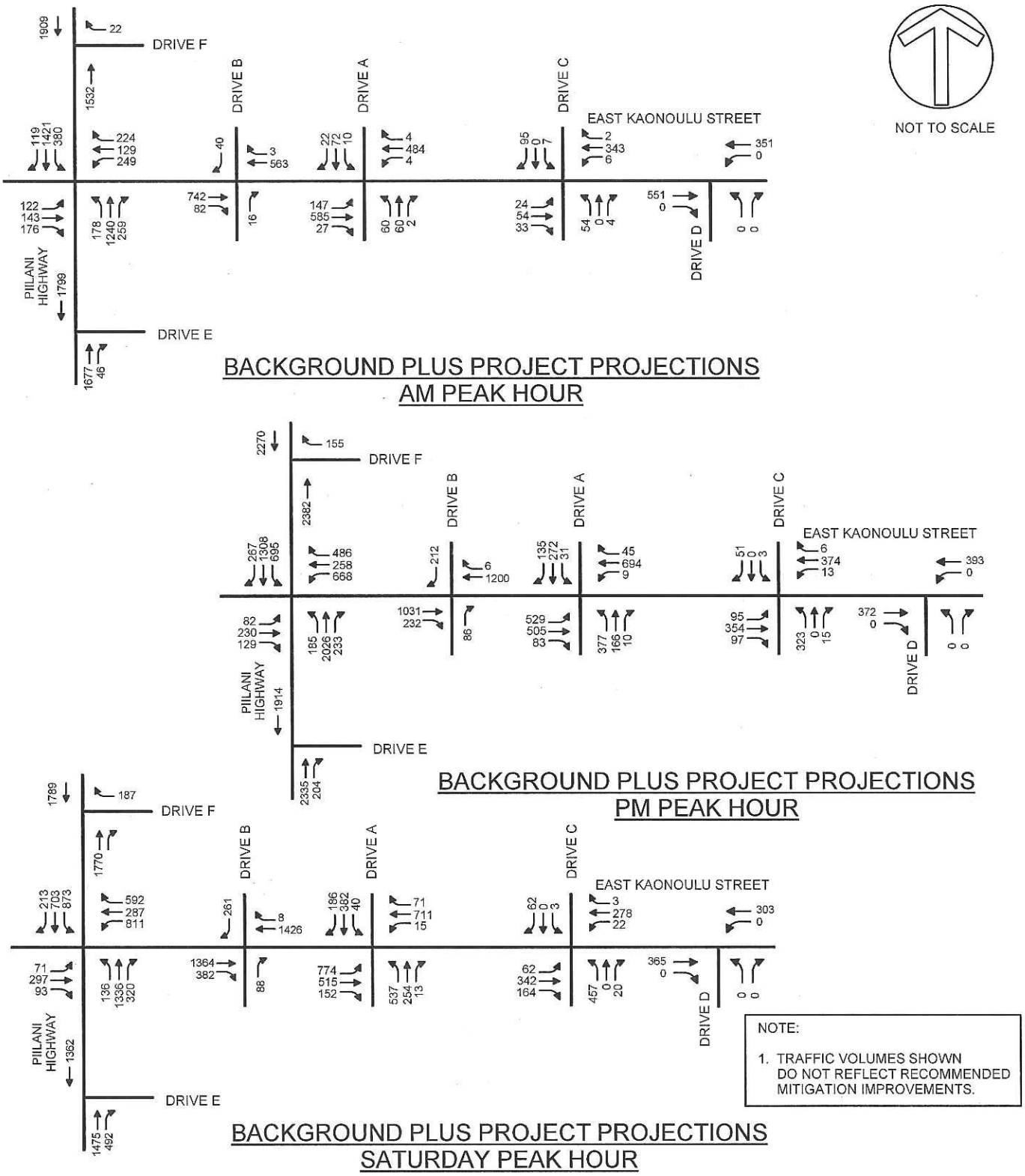


Figure 31
BACKGROUND PLUS PROJECT TRAFFIC PROJECTIONS WITH UPCOUNTRY HIGHWAY

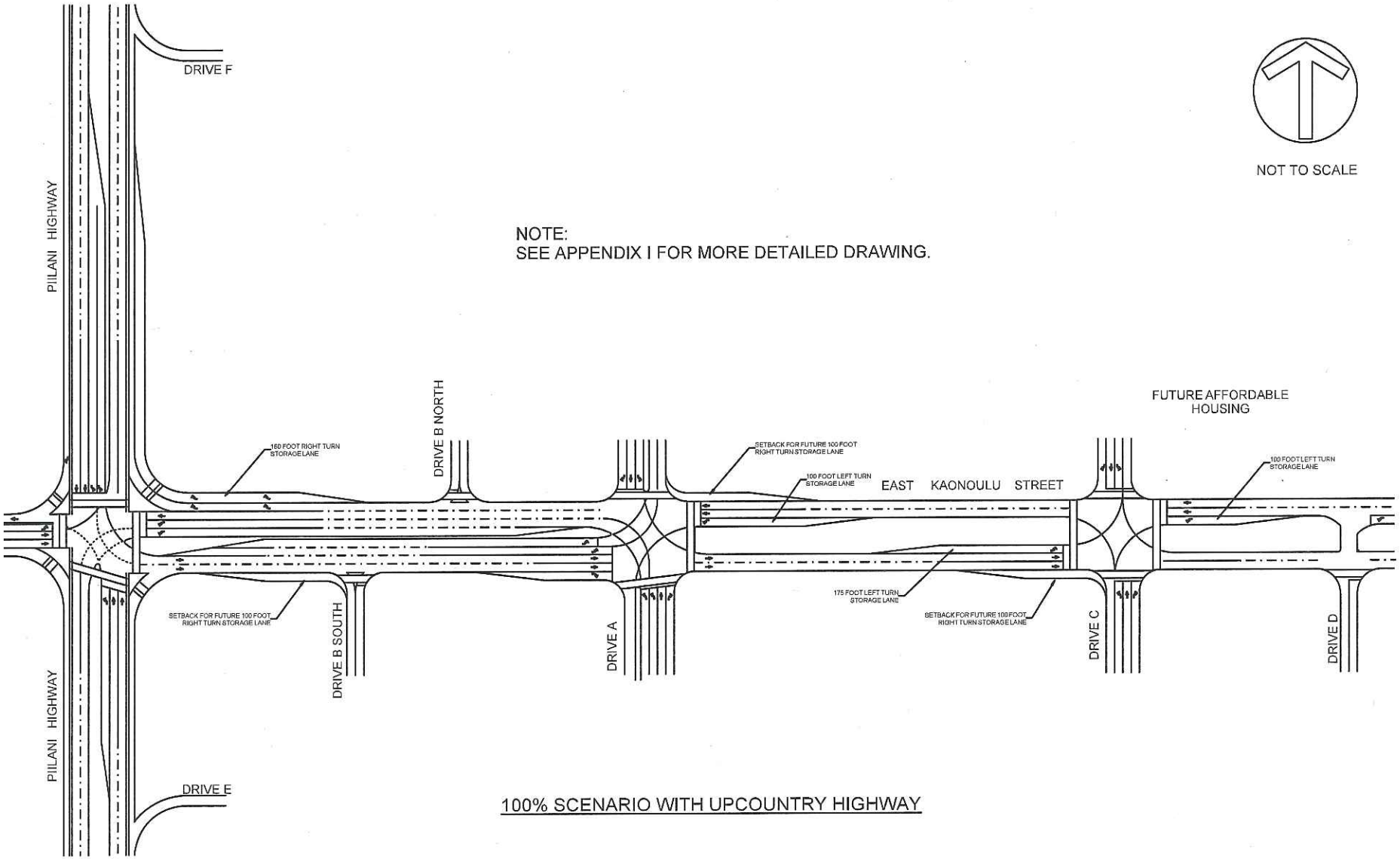


Figure 32
SCHEMATIC DRAWING OF EAST KAONOULU STREET WITH UPCOUNTRY HIGHWAY AT 100% PROJECT OCCUPANCY

Table 23 Left Turn Storage Lane Requirements With Upcountry Highway

Intersection	Approach & Time Period		Design Volume	Cycle Length (Seconds)	AASHTO Method						95th Percentile Queue (2)	Provided (3)
					Cycles per Hour	Average Vehicles per Cycle	Recommended Length (1)					
							Minimum		Desirable			
							Veh	Ft	Veh	Ft		
Piilani Hwy at Kaonoulu Street	EB	AM	122	180	20	6	9	225	12	300	213	1 Lane at 300 ft
		PM	82	180	20	4	6	150	8	200	166	
		Sat	71	180	20	4	6	150	8	200	139	
	WB	AM	249	180	20	12	18	450	24	600	209	2 Lanes with 1050 ft Total
		PM	668	180	20	33	50	1250	66	1650	478	
		Sat	811	180	20	41	62	1550	82	2050	634	
	NB	AM	178	180	20	9	14	350	18	450	315	1 Lane at 450 ft
		PM	185	180	20	9	14	350	18	450	306	
		Sat	136	180	20	7	11	275	14	350	252	
	SB	AM	380	180	20	19	29	725	38	950	297	2 Lanes with 1080 ft Total
		PM	695	180	24	29	44	1100	58	1450	493	
		Sat	873	180	20	44	66	1650	88	2200	671	
East Kaonoulu Street at Drive A	EB	AM	147	120	30	5	8	200	10	250	95	2 Lanes with 840 ft Total
		PM	529	120	30	18	27	675	36	900	286	
		Sat	774	120	30	26	39	975	52	1300	435	
	WB	AM	4	120	30	0	0	0	0	0	15	1 lane at 60 ft.
		PM	9	120	30	0	0	0	0	0	27	
		Sat	15	120	30	1	2	50	2	50	37	

NOTE:
(1) Minimum queue length is 1.5 time average number of vehicles. Desirable queue length is 2.0 time average number of vehicles.
(2) 95th percentile calculated by Synchro. See Appendix H.
(3) See Appendix I.

Table 24 Comparison of Left Turn Storage Lane Requirements Without versus With Upcountry Highway

Intersection	Approach	Left Turn Storage Left Required	
		Without Upcountry Highway	With Upcountry Highway
Piilani Hwy at Kaonoulu Street	EB	1 lane at 250 ft	1 lane at 300 ft
	WB	2 lanes with 1125 ft Total	2 lanes with 1650 ft Total
	NB	1 lane at 400 ft	1 lane at 450 ft
	SB	2 lanes with 1250 ft Total	2 lanes with 1650 ft Total
East Kaonoulu Street at Drive A	EB	2 lanes with 1025 ft Total	2 lanes with 975 ft Total
	WB	1 lane at 60 ft.	1 lane at 60 ft.

7. TRANSPORTATION MANAGEMENT PLAN

Purpose and Approach of the Transportation Management Plan

The purpose of the Transportation Management Plan (TMP) is typically to identify and describe transportation management strategies to reduce travel demand, primarily "single-occupancy private vehicles", or to redistribute demand in time. These strategies should accomplish the following:

1. Reduce the need for employees and customers of Piilani Promenade to use "single-occupancy private vehicles" by encouraging the use of alternative modes of transportation, such as walking, biking, and public transportation and ride sharing.

2. Provide alternative modes and facilities for these alternative modes.

3. Coordinate the establishment of programs, such as carpools and other ride sharing programs, that reduce the amount of traffic generated by the project.

Transportation Management Plan Strategies

1. A Transportation Coordinator should be designated by the developer or property manager. The Transportation Coordinator will be responsible for establishing, coordinating and managing the TMP strategies identified in the plan. The Transportation Coordinator should also document any traffic related complaints received from the surrounding community.

2. Employers should allow flexible work hours. Examples of flexible work hour are:

   A. Start the work day such that employees get to work before or after the weekday commute peak hours.

   B. Some employees have scheduled four 10-hour work days per week, with alternating Monday through Thursday and Tuesday through Friday work weeks. Every other week end is a four day weekend. Employees are divided into two groups so that offices are always covered with half the staff on the alternating Monday and Fridays.

3. The Transportation Coordinator should establish and coordinate a ride sharing program for employees. Since the Transportation Coordinator is employed by the developer or property manager, employees of various employers of Piilani Promenade can be brought into the program, not those from just a single major employer.

4. The Transportation Coordinator should coordinate with the Maui Department of Transportation to establish bus routes to provide service between the project, hotels and Kihei.

5. Bus passes should be provided to employees free or at a subsidized price.

6. Bus stops should be provided within the project that will minimize walking distances to the various businesses in the project.

7. The Transportation Coordinator should coordinate with the hotels, especially those in Kihei and adjacent area, to provide shuttle bus service between the hotels and Piilani Promenade.

8. A voucher program should be established for employees that participate in one of the ride sharing programs or bus pass programs and have to leave work for family emergencies.

9. Preferential parking spaces should be provided for employees participating it in ride sharing programs.

10. Secure bicycle storage facilities should be provided at several locations within the project. Showers for employees should also be considered.

11. Pedestrian walkways should be designated within the parking lot area to encourage pedestrian circulation and enhance safety of pedestrians between the roadways and buildings.

8. RESPONSES TO REVIEW COMMENTS

Two sets of comments were received for State of Hawaii Department of Transportation. These comments and responses are provided as Tables 24 and 25.

Table 25 Responses to Comments from State of Hawaii Department of Transportation (Received August 8, 2011 via email)

	Comment	Response
1.	General - Pedestrians and bicycles need to be considered in the study.	A section regarding the impacts of pedestrians on traffic has been added. See page 67.
2.	Signal warrant analysis for Piilani Hwy at Kaonoulu St. (p. 15) - Use of right turn vehicle counts on Kaonoulu St. to warrant signal under existing conditions is not justified. Existing and future configurations has a turning roadway with island (yield condition) for right turning traffic.	Acknowledged. Pages 15 and 16 (Figure 6) have been revised accordingly.
3.	Mitigation Measures for Pillani Hwy. at Keanoulu St. (p. 60)	
3a.	Assume Recommended improvement no. 2 is Drive F and needs to be revised to allow right out only as shown on Highway Access Plan.	Corrected.
3b.	Recommended improvement no. 3 adds little benefit over yield condition and could potential increase right turn delays depending on ped. phasing.	Right turn arrows will be deferred until 65% occupancy, when a reassessment will be performed. At that time, the project will have been open long enough for us to determine a reliable estimate of the amount of pedestrian use of the cross walks.
4.	Required Left Turn Storage Lengths (p. 65) - Assumption no. 3, average length required per vehicle should be 25 ft. instead of 20 ft.	Acknowledged. The vehicle length of 20 ft was being used because we were directed to use 20 rather than 25 ft on a previous project. The left turn storage lane lengths have been revised using a vehicle length of 25 feet.
5.	Synchro worksheets for signalized intersections (Appendices C to G) - Provide the following outputs to the worksheet: Cycle Length, Control Type, and 95% Queue (for comparison with AASHTO method).	Based on discussions with DOT, this information has been provided for the 100% build out of the project with the Upcountry Highway since this is the scenario that the left turn storage lanes are being designed for. The traffic signal timing, phasing and queue lengths for the signalized intersection is provided as Appendix H.
6.	Highway Access Plan	
6a.	North and South Drive B are not desirable due to location being within limits of left turn storage lanes. Vehicles will cross two lanes at once to access left turn lanes and could potentially block through lanes.	Based on our discussions, Drive B has been modified to eliminate right turns from the driveways onto East Kaonoulu Street. Both driveways will be designed so that vehicles will not be stopped until well into the project parking lot and away from East Kaonoulu Street. The need for the right turns out of the project will be reassessed at 65% occupancy of the project.

6b.	South Drive B location is too close from the intersection and has the potential to back up traffic onto the Piilani Hwy. Indication of this back up potential is the southbound left turn storage length on Piilani Hwy being greater than the distance Drive B is from the intersection (400' versus 300').	The driveway has been designed to minimize delays and potential backups onto East Kaonoulu Street. The driveway is designed such that vehicles from Kaonoulu Street will not have to stop at the first intersection in the parking lot.
6c.	If Drive E is allowed, a separate deceleration lane needs to be constructed. Concurrent use of the intersection's deceleration lane by Drive E traffic will affect right turn operations at the intersection.	Drives E and F will be deferred until at least 65% of the project is occupied. A reassessment of the need for Drives E and F should be performed that this time. Any deficiencies should be mitigated based on this reassessment.
6d.	Drive A should be designed without requiring directional split phasing of the traffic signal. Also, double left lanes from Drive A should not lead into the drop left turn lanes on Kaonoulu St.	Drive A configuration has been revised.
6e.	Drive C should be designed with no shared movement lanes.	The area served by the north leg of Drive C is to serve future residential development (apartments or condos). At Drive C, projected traffic is minimal or none. Therefore, it seems prudent to defer providing separate northbound and southbound thru lane at Drive C until the area along the north side of East Kaonoulu Street is developed. In the meantime, sufficient area for the additional lane will be reserved.

Table 26 **Responses to Comments from State of Hawaii Department of Transportation**
(Dated August 12, 2011, Received November 4, 2011 via email)

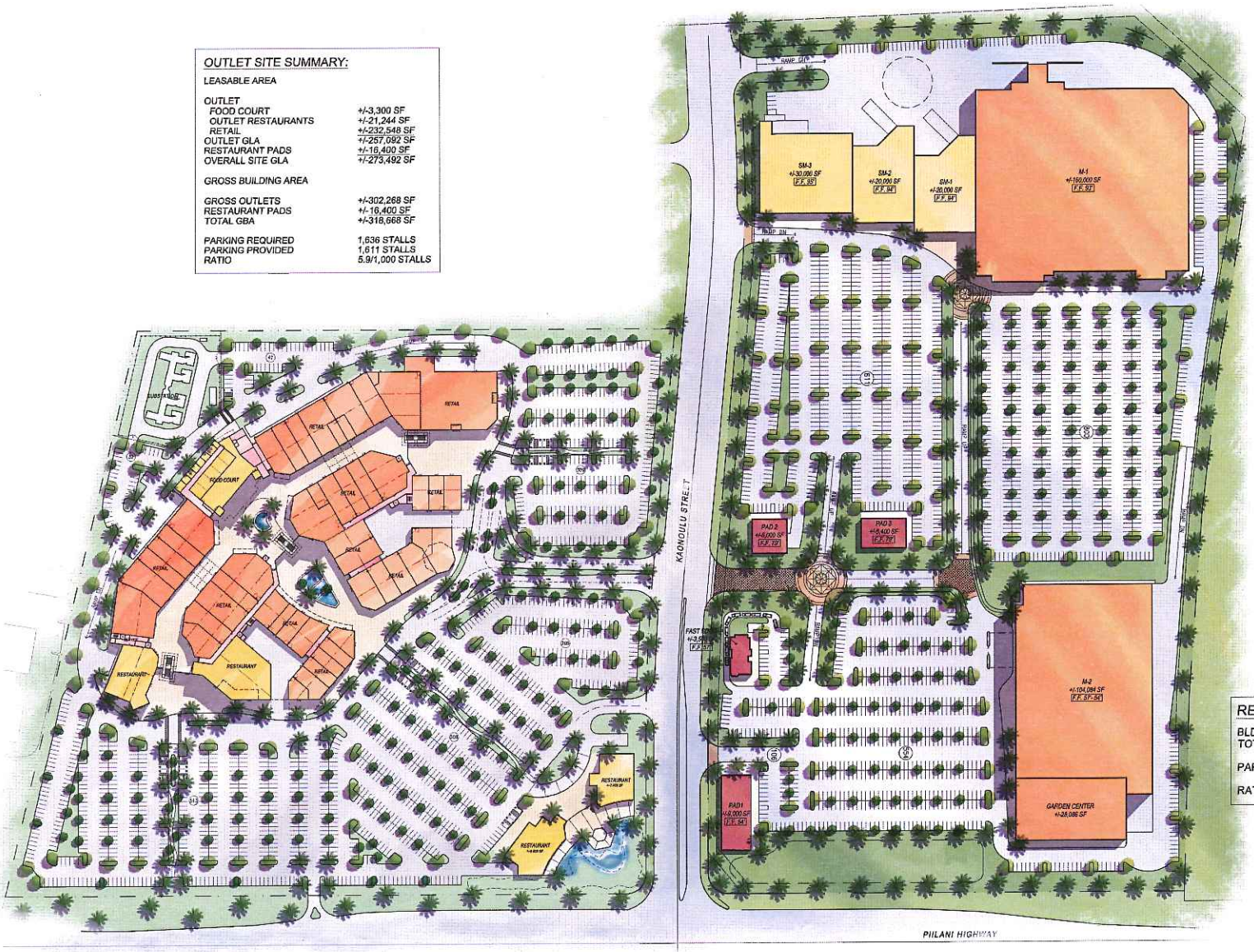
	Comment	Response
1.	The site plan in the project TIAR does not correspond to the project analysis for access onto Piilani Highway nor to the separate project plans that were provided in addition to the TIAR.	The TIAR has been revised in response to comments received from the Maui District office and the Traffic Branch in Honolulu.
2.	Clarify items 1 and 2 of the recommended improvements for year 2015, where reference is made to Drive E, as the paragraph following the recommended improvements refers to Drive E and F.	The TIAR has been revised.
3.	The Level-of-Service (LOS) analysis for the proposed mitigation measures for the intersection of Piilani Highway and Kaonoulu Street is unacceptable. Also, a volume-to-capacity ratio (v/c) of 0.99 for the intersection with the recommended mitigation improvements is not acceptable. In addition, an explanation should be provided on how the inclusion of the recommended right-turn only Drive E and Drive F affects the LOS of all movements at the intersection.	The Level-of-Service analysis has been revised in response to comments from the Traffic Branch. In response to comments, it was agreed that Drives E and F would be deferred until a re-assessment of their need is performed when the project reaches 65% occupancy.
4.	The TIAR should provide an analysis for and recommend mitigation measures for bicycle and pedestrian movements.	Acknowledged.
5.	Drive B should be removed because of its short distance to the intersection of Piilani Highway and Kaonoulu Street on the west and the intersection of Drive A and Kaonoulu Street on the east. The location of Drive B could also result in added congestion and safety issues due to the weaving maneuvers of motorists attempting to make left turns at the adjacent intersections.	In response to discussion with the Traffic Branch, Drive B has been modified to eliminate right turns from the project. This issue will also be reassessed at 65% occupancy of the project.
6.	A queue analysis should be provided for right turns from Piilani Highway onto Kaonoulu Street, from Kaonoulu Street onto Piilani Highway, from Kaonoulu Street onto Drive A, Drive C, and Drive D, and from Piilani Highway onto Drive E to determine the right turn deceleration/storage lane requirements.	Queue analysis worksheets have been added to the TIAR as Appendix H.
7.	The distance between the Piilani Highway/Drive E and the Piilani Highway/Kaonoulu Street intersections should be re-evaluated with the queuing requirements.	In response to discussion with the Maui District Office and the Traffic Branch, Drives E and F will be deferred pending a reassessment of their need at 65% occupancy of the project.

8.	Access to the development from our State facilities should be restricted to maintain the intended function of the roadway. Access locations should be under the condition that the developer is responsible for all mitigation necessary to assure safe and efficient traffic operations on our facilities as a result of project related impacts.	Acknowledged.
9.	The typical section of the Kihei-Upcountry Road fronting the proposed development should, at minimum, be in accordance with our Kihei-Upcountry Maui Highway Final Environmental Impact Statement (EIS) Report.	Acknowledged.
10.	In consideration of the continued growth of the region, the size and location of the subject project, and required traffic mitigation measures, an Environmental Assessment may be required to evaluate all cumulative and secondary impacts from the additional transportation actions pertaining to the safety and congestion in the Kihei-Wailea area. We are currently working with the Office of Environmental Quality Control (OEQC) on the type of HRS 343 action required.	With regard to the regulatory issues associated with any additional Environmental Assessment, this matter has been discussed with HDOT Planning Division and the Office of Environmental Quality Control. Pursuant to the provisions of Act 87 (attached), a letter from HDOT to the Maui County Director of Planning has been signed by the Director (attached) declaring there are no additional discretionary permits required for the subject project and pursuant to Act 87, the proposed Primary action (the project) involving a Secondary action (infrastructure improvements) is therefore exempt from HRS Chapter 343.

Appendix A

Preliminary Site Plan

OUTLET SITE SUMMARY:	
LEASABLE AREA	
OUTLET	
FOOD COURT	+/-3,300 SF
OUTLET RESTAURANTS	+/-21,244 SF
RETAIL	+/-232,548 SF
OUTLET GLA	+/-257,092 SF
RESTAURANT PADS	+/-16,400 SF
OVERALL SITE GLA	+/-273,492 SF
GROSS BUILDING AREA	
GROSS OUTLETS	+/-302,268 SF
RESTAURANT PADS	+/- 16,400 SF
TOTAL GBA	+/-318,668 SF
PARKING REQUIRED	1,636 STALLS
PARKING PROVIDED	1,611 STALLS
RATIO	5.9/1,000 STALLS



RETAIL SITE SUMMARY:	
BLDG AREA: TOTAL:	356,984 SF 385,070 SF
PARKING PROVIDED:	2,071 STALLS
RATIO:	5.8/ 1,000 SF

SCALE: 1" = 80'

0 80' 160' 240'

2010-152 -04 11.11.2010

COMBINED SITE PLAN

MAUI, HAWAII

SITE PLAN

ECLIPSE DEVELOPMENT GROUP
17802 Skypark Circle, Suite 200
Irvine, California 92614
Main: 949.251.8555
Facsimile: 949.251.9979