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October 24, 2006

Mr. Jeffrey H. Overton
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, HI 96813

SUBJECT: Kapolei Harborside Center Traffic Impact Assessment Report, City of Kapolei, Hawaii

Mr. Overton:

Please note in our traffic study there are text and exhibits that make reference to a preserve area of 7.4 acres. Since conducting our studies, it is our understanding that this preserve area has been formally surveyed, to reveal an actual area of approximately 6.0 acres. We have not modified our text or exhibits to reflect this, and our analysis and conclusions have not changed.

WILBUR SMITH ASSOCIATES

Bryant T. Brothers
Senior Transportation Engineer
Hawaii P.E. 6755

Exhibit "20"

KAPOLEI HARBORSIDE CENTER
TRAFFIC IMPACT ASSESSMENT REPORT

CITY OF KAPOLEI

Prepared For:

KAPOLEI PROPERTY DEVELOPMENT LLC
1001 Kamokila Boulevard
Kapolei, Hawaii 96707

Prepared By:

WILBUR SMITH ASSOCIATES
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July 20, 2006

(WSA Project No. A31505)

CHAPTER **Page**

APPENDICES

Under Separate Cover
Existing Traffic Counts
Intersection Analysis Worksheets for Existing Conditions and Future Scenarios
Freeway Ramp Analysis Worksheets

ILLUSTRATIONS

TABULATIONS

Development and occupancy of the Project is planned to begin in 2008, with the initial development progressing from the eastern and mauka sections of the development area. Development of the Project is expected to extend over 10 years, with full development and occupancy by the end of 2018.

The traffic impact assessment for the Kapolei Harborside Center focuses on the key intersections located near the Project as well as the freeway ramps that would provide the primary Project access to the H-1 Freeway. The study proposes roadway improvements on the adjacent roadways to accommodate 2018 traffic needs with the Project. The overall street conditions and future roadway needs in the City of Kapolei area are being reassessed in a separate on-going traffic update study for the roadway master plan study conducted in the early 1990's.

PROJECT DESCRIPTION

The Project site would allow development of approximately 250 acres of light industrial, warehousing, and service business types of uses after reductions for the drainage channel, major roadways, and preservation areas.

The Project would include the construction of Opakapaka Street as well as provide land for other major regional roadways (portions of Hanua Street and Lauwiliwili Street Makai extension) that would serve both the Project and regional traffic. Opakapaka Street would be extended as a two-lane roadway from Hanua Street Extension to the western boundary of the Project site.

PROJECT TRIP GENERATION

At full build-out, the land uses within Kapolei Harborside Center development are estimated to generate a total of about 15,750 vehicle trips to and from the site on a typical weekday. The Project is estimated to generate 2,135 and 2,207 vehicle trips in the weekday morning and afternoon peak hours, respectively. The estimated numbers of peak hour trips by area are presented for the major segments of the Project site in Table S-1.

2018 TRAFFIC CONDITONS WITHOUT THE PROJECT

The 2018 forecasts without the Project included the build-out of the Kapolei Business Park Phases 1 and 2 areas; the completion of the Kapolei Commons mixed-use development as well as the Costco and Kapolei Spectrum retail developments; and completion of the 100-acre I-2 zoned area between Kalaeloa Boulevard and Hanua Street. The forecasts reflected build-out of the City of Kapolei area east of Kalaeloa Boulevard and the occupancy of 2,000 residential units within the Kapolei West development.

The major portion of the roadway projects planned for the area was assumed to be in place by yearend 2018. Key roadways relative to this study include:

Table S-1
VEHICLE TRIP GENERATION
FOR 2018 PROJECT BUILD-OUT

Area	Morning Peak Hour			Afternoon Peak Hour		
	Total	Enter	Exit	Total	Enter	Exit
Northeast (1,2,3)	203	168	34	210	44	165
Northwest (19)	202	168	34	209	44	165
West Central (16, 17, 18)	538	448	92	557	117	440
East Central (4, 5)	350	290	59	362	76	285
Southwest (6, 7, 12, 13 14, 15)	678	563	115	701	147	554
Southeast (8, 9)	164	136	28	170	36	134
Totals	**2,135**	**1,773**	**362**	**2,207**	**464**	**1,743**

Wilbur Smith Associates; March 24, 2006

- Completion of the Kapolei Parkway, to include the planned widening of the existing four-lane section between Kalaeloa and Kamokila Boulevards to six lanes

- Widening of Kalaeloa Boulevard to six lanes between the Palailai Interchange ramps and the OR&L track line

- Completion of the improvements at the Makakilo, Kapolei, and Palailai interchanges

- Construction of Hanua Street from the Palailai Interchange makai to Malakole Street

- Extension of Malakole Street eastward to connect to the Kalaeloa Redevelopment Area roadways

- Extension of Kamokila Boulevard and Wakea Street into the Kalaeloa Redevelopment Area.

Traffic along Kalaeloa Boulevard in the morning peak hour is projected to increase from the existing 1,900 vehicles to 2,600 in 2018; the increase in the afternoon peak hour is projected to increase from 1,850 to 2,650 vehicles. With the connection to the Kalaeloa Redevelopment Area roadway system, traffic volumes in each peak hour along Malakole Street east of Kalaeloa Boulevard are forecast to increase from about 400 vehicles at present to about 1,000 vehicles in 2018.

Analyses indicate that the planned roadways should accommodate the forecast 2018 peak hour traffic volumes without the Harborside Center project at acceptable levels of capacity usage and average vehicle delays at most intersections. Long delays were indicated for side street traffic at several of the intersections assumed to have STOP sign control in 2018:

- The Malakole Street approaches to Hanua Street, with LOS F conditions and extremely long delays due to inadequate gaps in Hanua Street traffic in both afternoon and morning peak hours

- The westbound approach of the mauka intersection of Lauwiliwili Street with Kalaeloa Boulevard in both peak hours, which would affect few vehicles

- The westbound approach of the Opakapaka Street connection to Hanua Street in the morning peak hour, which would affect few vehicles.

The Hanua Street-Malakole Street intersection would merit installation of traffic signal control, which would operate at acceptable conditions with the planned lanes. The traffic volumes and conditions at the other two intersections would not satisfy traffic warrants for consideration of traffic signal controls.

2018 TRAFFIC CONDITONS WITH PROJECT BUILDOUT

The full development of the Project, with the completion of the section of Hanua Street between Lauwiliwili Street Makai and Malakole Street is estimated to increase the traffic volumes along Hanua Street on the makai side of the Kapolei Parkway to about 3,000 vehicles in the morning peak hour, versus 1,160 without the Project. In the afternoon peak hour, the volumes on this section are projected to increase from 1,030 vehicles without the Project to 3,040 with the Project and completion of Hanua Street.

Traffic volumes along Kalaeloa Boulevard just makai of the Kapolei Parkway are estimated to decrease by about 200 and 400 vehicles in the morning peak hour and afternoon peak hours, respectively, from those without the Project and completion of Hanua Street.

Key Intersection Conditions

The peak hour traffic conditions at the key intersections in the vicinity of the Project are summarized in Table S-2. The Without (No) Project conditions in the table reflect the planned roadway projects by 2018 plus the installation of traffic signal controls at the Malakole street intersection with Hanua Street.

The addition of the Project traffic would adversely impact several of the key intersections as described in the following paragraphs:

- The projected traffic would exceed capacity of the Kapolei Parkway-Kalaeloa Boulevard intersection by 8% in the afternoon peak hour, with average traffic delays at LOS E.

- The increased Project traffic along Malakole Street would result in traffic congestion and delays at the Kalaeloa Boulevard-Malakole Street intersection with the traffic volumes in the afternoon peak hour exceeding the estimated intersection capacity.

- The forecast morning peak hour traffic would exceed estimated capacity at the Hanua Street intersection with the Kapolei Parkway by 14%.

- Traffic on the Opakapaka Street approaches to Hanua Street would experience extremely long delays with STOP sign controls. The estimated peak hour volumes and delays satisfy warrants to allow consideration for installation of a traffic signal. The intersection would operate at acceptable conditions with the installation of a traffic signal.

- Traffic on the westbound approach of Lauwiliwili Street at the mauka intersection with Kalaeloa Boulevard would experience extremely long delays with STOP sign controls. The estimated peak hour volumes and delays do not satisfy warrants to allow consideration for installation of a traffic signal.

Table S-2
EXISTING AND 2018 TRAFFIC CONDITIONS AT KEY INTERSECTIONS
KAPOLEI HARBORSIDE CENTER

Intersection	Scenario	Morning Peak Hour			Afternoon Peak Hour		
		V/C	ADPV	LOS	V/C	ADPV	LOS
Kalaeloa Blvd.- Farrington Hwy.	Existing	0.42	30.6	D	1.30	185.4	F
	No Project	0.49	8.7	A	0.62	16.5	B
	Project Buildout	0.49	8.8	A	0.63	16.8	B
Kalaeloa Blvd.- Kapolei Pkwy.	Existing	0.74	35.0	D	0.94	73.2	E
	No Project	0.85	39.0	D	0.93	33.5	C
	Project Buildout	0.93	53.8	D	1.08	63.7	E
	Mitigated	0.88	36.3	D	0.97	47.6	D
Kalaeloa Blvd.- Lauwiliwili St. Makai	No Project	0.47	7.6	A	0.61	10.3	B
	Project Buildout	0.53	9.2	A	0.62	16.2	B
Kalaeloa Blvd.- Malakole St.	Existing	0.48	9.2	A	0.71	15.9	B
	No Project	0.61	44.2	D	0.74	27.5	C
	Project Buildout	0.79	25.1	C	1.26	72.1	E
	Mitigated	0.67	28.0	C	0.92	46.1	D
Hanua St.- Kapolei Pkwy.	No Project	0.65	20.1	C	0.78	23.5	C
	Project Buildout	1.14	69.8	E	0.94	62.5	E
	Mitigated	0.83	44.5	D	0.93	45.3	D
Hanua St.- Opakapaka St.	No Project	0.08	53.2	F	0.29	47.9	E
	Project Buildout	*	*	F	*	*	F
	Mitigate	0.73	8.0	A	0.86	15.6	B
Hanua St.- Lauwiliwili Makai	No Project	0.03	23.9	C	0.22	24.1	C
	Project Buildout	0.67	17.3	B	0.81	21.0	C
Hanua St.- Malakole St.	Existing	0.05	16.5	C	0.01	11.3	B
	No Project	0.44	8.8	A	0.51	9.2	A
	Project Buildout	0.88	54.4	D	1.12	94.2	F
	Mitigated	0.79	40.9	D	0.92	49.1	D
Kapolei Pkwy.- Kamokila Blvd.	No Project	0.69	13.9	B	0.83	19.8	B
	Project Buildout	0.76	14.6	A	0.83	21.9	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
* = Delay not calculated since unreliable where traffic substantially exceeds capacity.

Wilbur Smith Associates; July 20, 2006.

(Future) and On-Ramp from Kalaeloa Boulevard – Traffic conditions were analyzed for the weaving section for the eastbound on/off-ramps that would be used by some of the traffic accessing the H-1 Freeway from the Kapolei Harborside Center development to assess the Project impact. Traffic conditions for this weaving section are summarized in Table S-3.

The traffic conditions on the weaving section are projected to operate at acceptable levels both without and with the Project.

Ramp Merge/Diverge with Freeway Through Lanes – The traffic conditions along the H-1 Freeway near the entry or exit points for the Palailai Interchange ramps are summarized in Table S-4. The analysis is based on no widening of the freeway through this area.

The projected conditions for the on-ramp from Hanua Street to the eastbound freeway are estimated to worsen from LOS C without the Project to LOS D with the increased Project traffic in the afternoon peak hour. For the westbound direction, the Project traffic is estimated to result in LOS D conditions on the loop off-ramp to Hanua Street, as compared to LOS C without the Project. The estimated increase in peak hour traffic volumes on the other ramps would not be expected to change the level of service from those without the Project.

The loop off-ramp for westbound traffic exiting from the H-1 Freeway to Hanua Street would have an estimated capacity of about 1,800 vehicles per hour. The estimated morning peak hour volume of 1,154 vehicles amounts to about 64% of the potential ramp capacity versus 30% without the Project.

Table S-3
TRAFFIC CONDITIONS AT
KEY FREEWAY RAMP WEAVING SECTIONS

Year and Development Scenarios	Morning Peak Hour			Afternoon Peak Hour		
	Density	Speed	LOS	Density	Speed	LOS
Existing Eastbound Weaving Section for Off-ramp to Farrington Hwy. (Wakea St. in future) and On-Ramp from Kalaeloa Blvd.						
2006	11.1	29.2	B	23.0	25.0	C
2018 No Project	14.0	27.7	B	27.3	24.5	C
2018 with Project Buildout	14.6	27.4	B	28.0	23.9	C

Density = Passenger car equivalents per mile per lane in analyses section.
Speed = Average speed in miles per hour through weaving area.
LOS = Level of service in weaving area.

Wilbur Smith Associates; May 5, 2006.

Table S-4
FREEWAY TRAFFIC CONDITIONS AT
KEY RAMP MERGE/DIVERGE SECTIONS

Freeway Section at Ramp	Scenario	Morning Peak Hour			Afternoon Peak Hour		
		Density	Speed	LOS	Density	Speed	LOS
Eastbound Freeway							
At Off-Ramp to Kalaeloa Blvd/Hanua St	Existing	20.4	50.8	C	20.3	50.9	C
	No Project	29.8	50.3	D	28.0	50.6	D
	With Project	31.1	50.1	D	28.3	50.6	D
At On-Ramp from Hanua St.	No Project	23.2	50.8	C	26.1	50.3	C
	With Project	24.0	50.7	C	30.0	49.3	D
Westbound Freeway							
At Loop Off-Ramp to Hanua St.	No Project	24.1	50.3	C	30.4	50.7	D
	With Project	28.9	49.6	D	31.4	50.6	D
At On-Ramp from Kalaeloa Blvd./Hanua St.	Existing	14.9	51.1	B	23.2	50.6	C
	No Project	18.4	51.2	B	33.4	47.9	D
	With Project	18.6	51.2	B	34.3	47.5	D

Density = Passenger car equivalents per mile per lane in analyses section.
Speed = Average speed in miles per hour through weaving area.
LOS = Level of service in weaving area.

Wilbur Smith Associates; May 5, 2006

The on-ramp from the Eastbound Weaving Roadway has an estimated potential capacity of about 2,100 vehicles per hour. The afternoon peak hour volumes with the Project would amount to about 55% of the capacity versus 53% without the Project.

PUBLIC TRANSIT AND BICYCLE TRAVEL

The Kapolei Parkway is planned to include bicycle lanes to encourage use of bicycles for transportation purposes as well as for recreation. Bicycle lanes or a bicycle path should also be included along either Kalaeloa Boulevard or Hanua Street.

A transit center is planned within the Parcel L mixed-use development located makai of the Kapolei Parkway on the east side of Hanua Street. Once Hanua Street is extended through to connect to Malakole Street, one or more TheBus routes will likely be added along Hanua Street which would provide public transportation access to the Project area.

Actions that could encourage use of these travel modes for access to the Project are included in the list on the following page.

Public Transit

- Coordinate the potential location of bus stops with the City DTS and TheBus staffs and provide bus shelters at the stop locations.

- The Project should be designed to provide convenient and safe pedestrian linkages to the bus stop locations through a system of raised sidewalks and walkways.

Bicycles

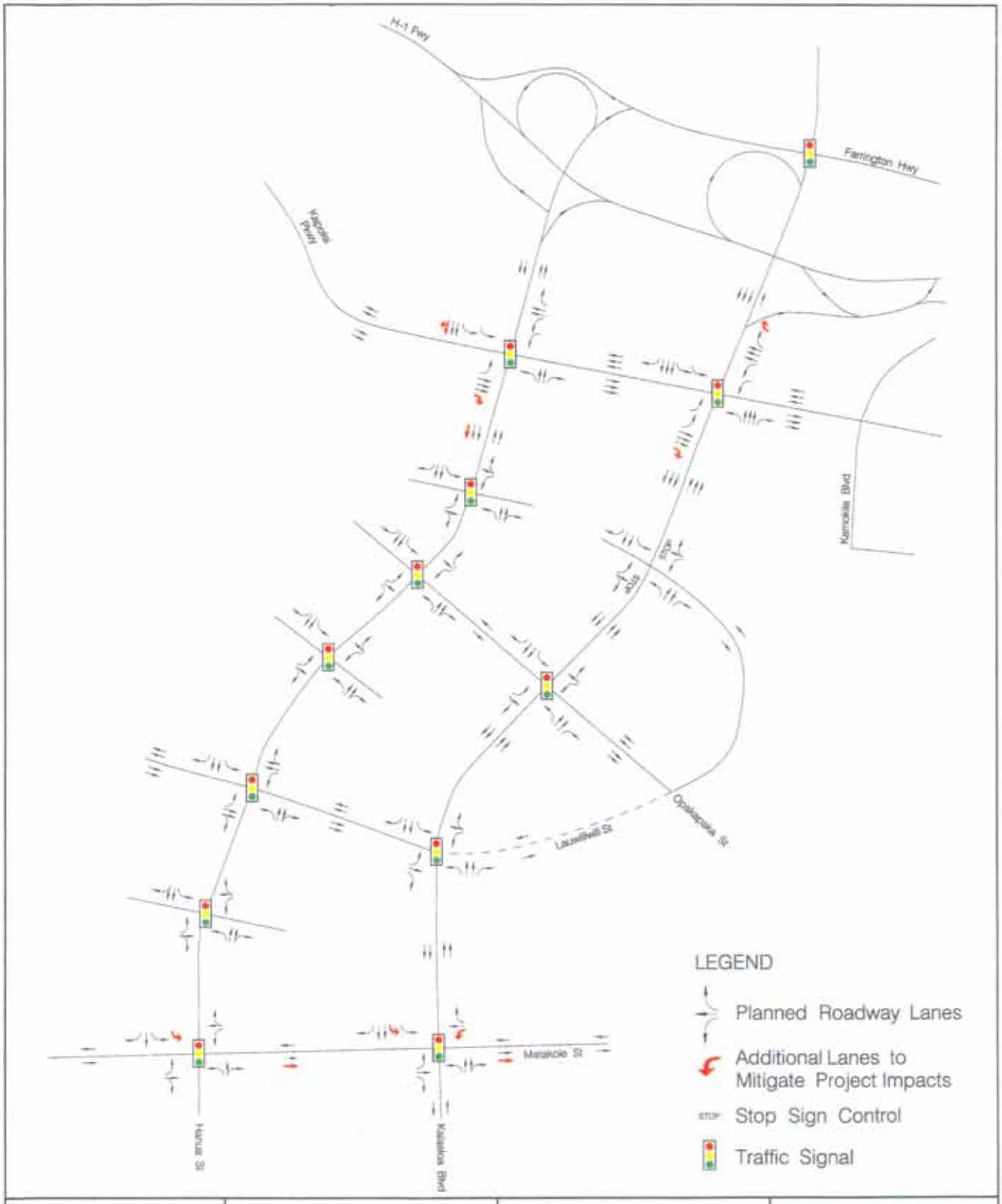
- The collector streets within the Project site should be planned to accommodate bicycle use, and should provide a network of continuous street connections to allow use for bicycle travel by those who prefer not to travel along the major streets.

PROPOSED MITIGATIVE ACTIONS

The following roadway improvements are proposed to mitigate the future traffic conditions within the study area.

Proposed to Mitigate Project Impacts

The actions proposed to mitigate Project impacts are highlighted in the Figure S-1 depiction of the roadway lanes and traffic controls in the Kalaeloa Boulevard corridor, which identified in the following listing.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	PROPOSED ROADWAY LANES AND TRAFFIC CONTROL	FIGURE S-1

Kalaeloa Boulevard-Kapolei Parkway Intersection

- Add a right-turn lane to eastbound approach
- Construct a second (double) right-turn lane if warranted by future traffic volumes and conditions

Kalaeloa Boulevard-Malakole Street Intersection

- Add westbound left-turn lane
- Add makai-bound second (double) left-turn lane
- Widen Malakole Street to provide two eastbound lanes for a distance of about 400 feet from Kalaeloa Boulevard intersection
- Modify signal phasing and timing to reflect geometric changes

Hanua Street-Kapolei Parkway Intersection

- Add right-turn lane on eastbound Kapolei Parkway approach
- Convert right-turn lane on makai-bound approach to shared through/right-turn lane to increase capacity for through traffic

Hanua Street-Malakole Street Intersection

- Provide second (double) left-turn lane on makai-bound approach
- Widen Malakole Street east of intersection for distance of about 400 feet to provide two eastbound lanes to receive double left-turn lanes

Signal Controls at Intersections

Install conduit and pull boxes for potential future signal control at

- Hanua Street and Areas 1 & 2 Access Roads
- Hanua Street and Opakapaka Street
- Hanua Street and Area 5 Access Road/I-2 Access Road
- Hanua Street and Lauwiliwili Street Makai
- Hanua Street and Area 6/7 Access Road
- Hanua Street and Malakole Street.

The conditions with these roadway improvements are indicated in Table S-2 as the "Mitigated" scenario.

The proposed mitigative actions at the Kalaeloa Boulevard-Malakole Street intersection would require widening of the east leg of Malakole Street, which is a owned by private groups unrelated to the Project developer of the Kapolei Harborside Center Project. If agreement cannot be reached with these private owners for the widening project, then the addition of a right-turn lane on the mauka-bound Kalaeloa Boulevard and a second (double) left-turn lane on eastbound Malakole Street approach are proposed as alternative mitigative actions.

Proposed Actions by Others

The following roadways and/or modifications would be needed to provide access at Project build-out and are planned as actions by others without the development of the Harborside Center Project:

- Construct Hanua Street Extension from Malakole street to Palailai Interchange
- Construct additional ramps at Palailai Interchange to accommodate Hanua Street connection to freeway
- Construct Kapolei Parkway as six-lane roadway from Hanua Street Extension to Kamokila Boulevard
- Extend Malakole Street eastward to connect to the roadway network within the Kalaeloa Redevelopment Area
- Construct the extension of the makai end of Lauwiliwili Street westward to access the Kalaeloa (Barbers Point) Harbor
- Construct Opakapaka Street between Kalaeloa Boulevard and Hanua Street.
- Install traffic signals at Kalaeloa Boulevard intersections with Opakapaka and Lauwiliwili (Makai) Streets, and at Hanua Street intersections with Malakole and Lauwiliwili (Makai) Streets.

Chapter 1
INTRODUCTION

Kapolei Property Development LLC is planning the development of approximately 345 acres of vacant lands on the Waianae side of Kalaeloa Boulevard near the City of Kapolei. This development, referred to as the Kapolei Harborside Center project, would include most of the land bounded by the future Hanua Street Extension, Malakole Street, the Barbers Point Harbor, and the Oahu Railway and Land Company (OR&L) track line. (See Figure 1-1.) The Project would also include small parcels located on the Honolulu side of the future Hanua Street Extension near Malakole Street and at the northeast corner of the site. The site is bordered by the planned Kapolei West golf course on the mauka end, by the undeveloped I-2 zoned lands (I-2 Parcel) to the east, by the Campbell Industrial Park on the makai end, and by the Harbor and related industrial lands to the west.

The Kapolei Harborside Center development, hereinafter referred to as the Project, is planned for light industrial, warehouse, and related business uses. A portion of the site is planned for use as a regional drainage way, with small areas also identified for preservation and for a wastewater facility.

Development and occupancy of the Project is planned to begin in 2008, with the initial development progressing from the eastern and mauka sections of the development area. Development of the Project is expected to extend over a 10-year period, with full development and occupancy of the area by the end of 2018.

The purpose of this study is to assess the traffic impacts of the planned development of Kapolei Harborside Center Project. The assessment addresses the following:

1. The numbers of vehicle trips that would be generated by the Project at build out.

2. Future traffic levels and traffic conditions at key intersections and freeway ramps in 2018 without the Project.

3. The traffic increases on area roadways and impact on traffic conditions at key intersections and freeway ramps as a result of the Project build out.

4. Identification of any actions that may be appropriate to mitigate Project traffic impacts.

The traffic impact assessment for the Kapolei Harborside Center development focuses primarily on the intersections located near the Project as well as the key intersections located between the Project site and the freeway access at the Palailai Interchange. The study proposes roadway improvements only where necessary to mitigate Project traffic impacts. The overall street conditions and future roadway needs in the City of Kapolei area are being reassessed in a

DOT to provide access to the Harbor Side right of way to the Kapolei Harborside Center Project.

- Opakapaka Street would be extended as a two-lane roadway from Hanua Street Extension to the western boundary of the Project site.

Traffic circulation and access would be provided by a network of local streets within the industrial site. These local roadways would connect primarily to Lauwiliwili Street, Opakapaka Street, and the planned Hanua Street extension, generally as depicted in Figure 1-1.

METHODOLOGY AND ASSUMPTIONS

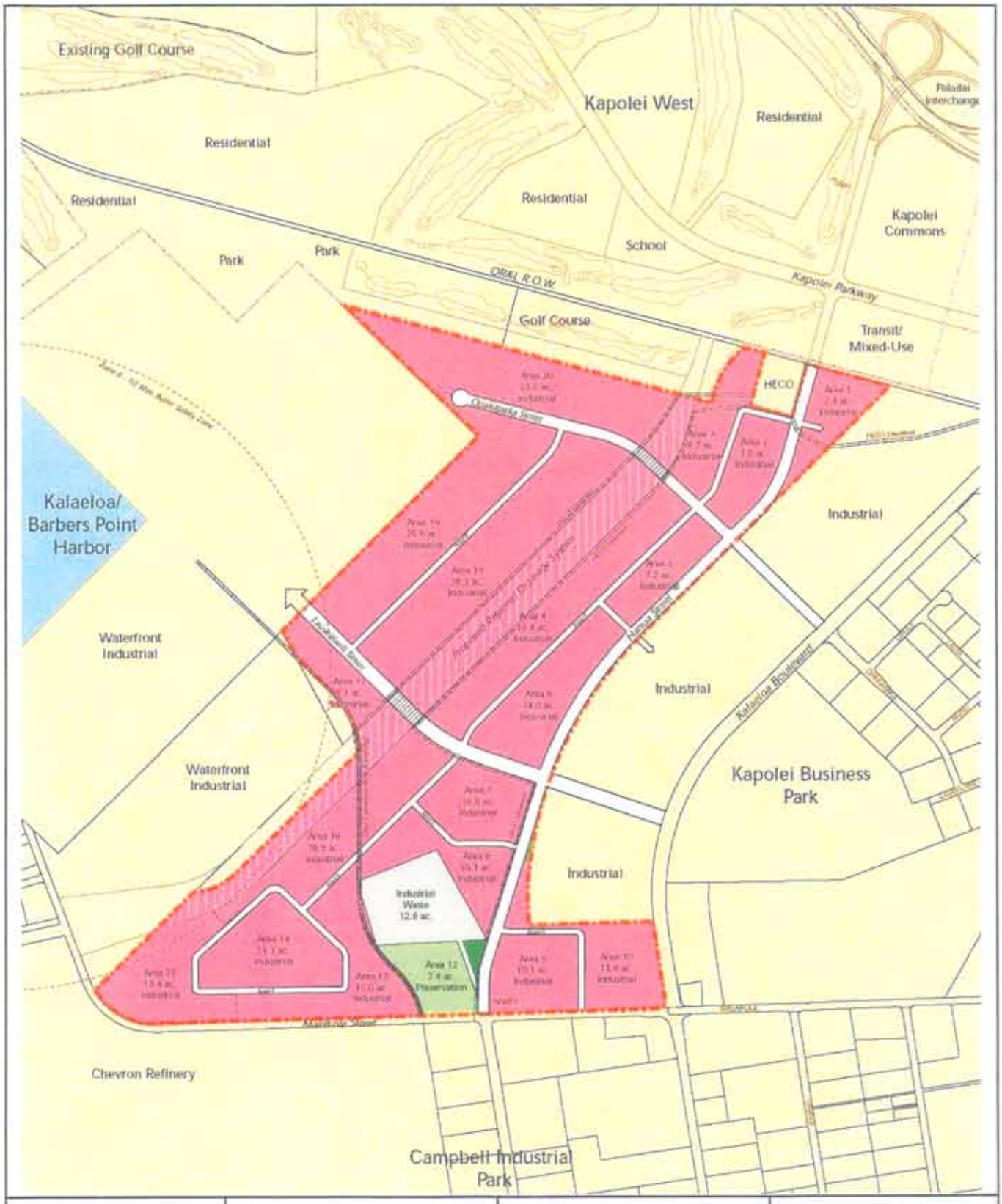
The general methodology and assumptions used in the forecasting and analysis of traffic impacts with the Project are outlined in the following sections.

Analysis Scenarios

The traffic analysis scenarios include the existing conditions and the future conditions without and with the Project.

- **Existing** – The composite traffic volumes from the 2005-2006 counts were analyzed to represent the existing traffic conditions.

- **Year 2018 Without Project** – The traffic volumes on area roadways and traffic conditions at key intersections were forecast for 2018 with the other planned development in the area but without any development within the Kapolei Harborside Center Project, with this scenario serving as a baseline to assess the Project impacts.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	PROJECT CONCEPT PLAN	FIGURE 1-1

- **Year 2018 Project Buildout Scenario** – The traffic conditions were analyzed for 2018 with full build-out and occupancy of the Kapolei Harborside Center development.

Forecast Methodology and Assumptions

The traffic growth *without* the Project was forecast for year 2018 through the use of a TRAFFIX trip generation and assignment model developed by Wilbur Smith Associates (WSA) for the City of Kapolei and the adjacent areas. The assumptions regarding the new development are outlined in the following sections. The numbers of new trips generated by new development within and near the City of Kapolei were based on standard trip generation rates compiled by the Institute of Transportation Engineers (ITE).[1] The origins and destinations of the new trips were based on the trip distribution percentages developed from the Oahu Metropolitan Planning Organization (OMPO) 2030 regional forecasts.

Non-Project Developments by 2018 – A substantial amount of new development is expected in the City of Kapolei area near the Project site between yearend 2006 and 2018. The additional development most directly affecting the roadways used for site access is expected to include the following areas:

- The build-out of the City of Kapolei commercial development east of Kalaeloa Boulevard.

- The completion of the Kapolei Commons mixed-use development mauka of the Kapolei Parkway between future Hanua Street and Kalaeloa Boulevard, as well as the Costco and Spectrum retail developments along the mauka section of Kalaeloa Boulevard.

- Development of about 110 acres of industrial park uses within the Kapolei Business Park Phases 1 and 2 areas.

- Full development of the 125-acre industrial area, referred to herein as the I-2 Parcel, located between Kalaeloa Boulevard and the future Hanua Street Extension makai of the OR&L track line, including a film studio.

- Development of about 2,000 of the planned residential units proposed for the Kapolei West area.

- Development of about 1,500 housing units, plus commercial uses, in the Makaiwa Hills development.

- Development of about one-half of the residential and commercial uses included within the OMPO 2030 regional forecasts for the Kalaeloa Redevelopment Area.

[1] *Trip Generation, Seventh Edition*, Institute of Transportation Engineers, 2003.

Roadway Improvements by 2018 Without the Project – The traffic assignments and intersection analyses for 2018 without the Project reflect the construction of a number of roadway projects that would affect traffic conditions on the study roadways. The new or improved roadways expected by 2018 that would most affect the Project area traffic conditions include:

- The widening of Kalaeloa Boulevard to a six-lane roadway from the Palailai Interchange to makai of the OR&L track line.
- Completion of the Kapolei Parkway through the City of Kapolei between Fort Barrette Road and Kamokila Boulevard, and from Kalaeloa Boulevard westward to connect to Aliinui Avenue in Ko Olina.
- Extension of Kamokila Boulevard to connect to Roosevelt Avenue.
- The construction of the Hanua Street Extension from the Palailai Interchange to Malakole Street.
- Construction of the new Kapolei Interchange and reconstruction of the ramps at the Palailai Interchange to connect the Hanua Street Extension to the freeway.
- The construction of a new interchange along Farrington Highway east of Honokai Hale to provide access to the Makaiwa Hills development, as well as the Kapolei West area.
- The extension of the Opakapaka Street westward to connect to Hanua Street Extension.
- The extension of Lauwiliwili Street (Makai) westward through the Kapolei Business Park Phase 2 and I-2 Parcel to connect to the Hanua Street Extension.
- The extension of Malakole Street eastward to connect to the planned roadway network within the Kalaeloa Redevelopment Area.

Traffic Forecasts With the Project – The numbers of new trips generated by the Project were based on standard trip generation rates for industrial parks as compiled by the Institute of Transportation Engineers (ITE).[2] The origins and destinations of the new trips were based on the trip distribution percentages developed from the OMPO 2030 regional forecasts.

Roadway Analysis Methodology

Traffic conditions at intersections controlled by traffic signals or STOP signs were analyzed using the methodology set forth in the *2000 Highway Capacity Manual*, as summarized in Appendix A. The analyses of traffic signal-controlled intersections were made using Synchro software and were based on the following operational assumptions:

[2] *Trip Generation, Seventh Edition*, Institute of Transportation Engineers, 2003.

- Use of 4-second yellow clearances and 1-second all-red intervals at most intersections.
- On major through roadways, left-turns allowed only with protected left-turn phases.

Traffic conditions on freeway ramps or weaving sections were analyzed using the methodology set forth in the *2000 Highway Capacity Manual*, as summarized in Appendix A. HCS software by McTrans was used for the analyses.

REPORT ORGANIZATION

This traffic impact analyses for the Kapolei Harborside Center Project has been organized into the following chapters:

1. Introduction
2. Existing Conditions – Describes the existing roadway facilities, public transportation services, traffic volumes, and traffic conditions in the study area.
3. 2018 Conditions without the Project – Describes the traffic increases on area roadways and traffic conditions at key intersections in year 2018 without the Project
4. 2018 With Project Buildout – Describes the traffic increases on area roadways and traffic conditions at key intersections in year 2018 with the full development of the entire Project site.

Chapter 2
EXISTING CONDITIONS

At the time of the traffic surveys in May 2005 and January 2006, the Honolulu Advertiser was the only development west of Kalaeloa Boulevard in the City of Kapolei area. East of Kalaeloa Boulevard, the Home Depot, Ace Hardware, and Outback Steakhouse facilities had each opened within the past year along Kamokila Boulevard near the Kalaeloa Boulevard intersection with the Kapolei Parkway. Construction was underway on three new facilities within the Kapolei Business Park Phase 1 development along Lauwiliwili and Opakapaka Streets.

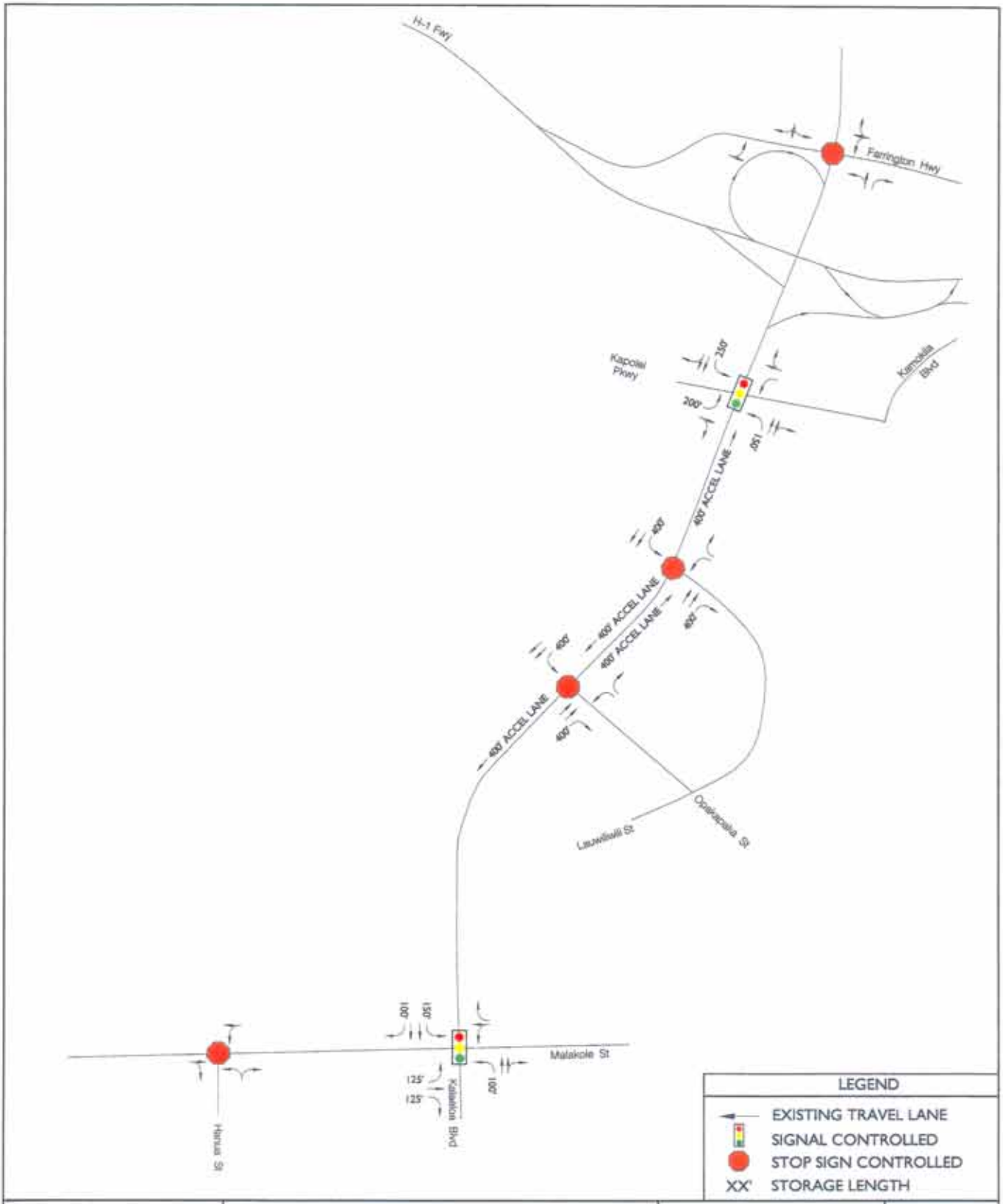
EXISTING ROADWAY SYSTEM

The major roadway system near the Kapolei Harborside Center development (the Project) area is depicted in Figure 2-1. The major roadways within the area are discussed in the following paragraphs.

- **H-1 Freeway** - This freeway is the major east-west roadway in the Ewa District and connects the Ewa area to central Honolulu and other areas of Oahu. City of Kapolei traffic access to the freeway is via the Makakilo (Makakilo Drive-Fort Barrette Road) and Palailai (Kalaeloa Boulevard) interchanges H-1 Freeway has six travel lanes east of the Palailai Interchange and four lanes west of the interchange.

- **Kalaeloa Boulevard** – This major roadway provides access from the H-1 Freeway at the Palailai Interchange to the Kapolei Business Park, Campbell Industrial Park, and Barbers Point Harbor. The roadway also provides access to the City of Kapolei area via the Kapolei Parkway connection to Kamokila Boulevard. Kalaeloa Boulevard is a four-lane divided roadway from the H-1 Freeway to Malakole Road, and is a two-lane street within the Campbell Industrial Park area makai of Malakole Street. Traffic signal controls are provided at the intersection with the Kapolei Parkway and with Malakole Street. This roadway is currently privately owned by the Estate of James Campbell.

- **Kapolei Parkway** - This major roadway is planned to be a major traffic artery connecting the City of Kapolei to the Ko Olina area to the west and to the Villages of Kapolei and other communities to the east. Within the Kapolei area, the only completed portions of the roadway are the one-block segment between Kalaeloa and Kamokila Boulevards and a short section on the Honolulu side of Fort Barrette Road that provides access to the Kapolei Middle and High Schools, as well as the Villages of Kapolei. These segments have a median-divided roadway with two or more traffic lanes and a bicycle lane in each direction.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	EXISTING LANE CONFIGURATIONS & TRAFFIC CONTROL	FIGURE 2-1

- **Malakole Street** – This two-lane major roadway provides access to the Barbers Point Harbor and the heavy industrial area west of Kalaeloa Boulevard. East of Kalaeloa Boulevard, the street provides access to mauka-makai streets serving the eastern portion of the James Campbell Industrial Park, as well as to the Hawaii Raceway Park along the mauka side of the street. Malakole Street presently ends west of the drainage channel separating the Campbell Industrial Park from the Kalaeloa Redevelopment Area (former Barbers Point NAS), although future plans are to extend Malakole Street across the existing unsurfaced and gated causeway across the drainage channel to connect to the roadway network within the Redevelopment Area.

- **Lauwiliwili Street** – The mauka half of this two-lane collector street has been constructed to serve the Phase 1 area of the Kapolei Business Park. The street will be extended makai through the Kapolei Business Park Phase 2 area to connect with and extend west of Kalaeloa Boulevard. Separate left- and right-turn lanes at provided at the STOP sign-controlled intersection with Kalaeloa Boulevard.

- **Opakapaka Street** – This four-lane collector street extends from Kalaeloa Boulevard to the Lauwiliwili Street loop roadway. The street has a landscaped median for the block adjacent to Kalaeloa Boulevard, with the two lanes marked as separated right- and left-turn lanes at the STOP sign controlled intersection.

- **Farrington Highway** - This State highway parallels the H-1 Freeway and serves east-west travel through the Ewa District from the Waipahu area to the Palailai Interchange. Farrington Highway also serves as the major regional route westward from the terminus of the H-1 Freeway just east of the Honokai Hale residential area. The section between Kamokila Boulevard and Kalaeloa Boulevard is a two-lane roadway. Farrington Highway continues west of the terminus of the H-1 Freeway as a four-lane divided highway to connect to the Ko Olina and Waianae coast areas.

- **Kamokila Boulevard** - This major roadway connects Farrington Highway to the Kapolei Parkway and Kalaeloa Boulevard and provides access to the center of the City of Kapolei. Kamokila Boulevard provides two through lanes in each direction. The roadway has a landscaped median area for most of its length and has left-turn lanes at the intersections with cross streets and driveways.

EXISTING TRAFFIC VOLUMES

Wilbur Smith Associates (WSA) conducted special turning movement counts at the key intersections in the western City of Kapolei and along Kalaeloa Boulevard area during the weekday morning and afternoon peak commute traffic periods from mid-2005 to early 2006. Traffic counts were made for each 15-minute period between 6:00 and 8:30 AM, and between 3:30 and 6:30 PM. The 15-minute counts were used to identify the peak one-hour volumes at the study intersections in the morning and afternoon commute periods. The peak one-hour volumes

generally started at 7:00 or 7:15 AM in the morning commute period, and 4:15 to 4:30 PM in the afternoon peak period.

The dates of the various traffic counts used in this study as follows:

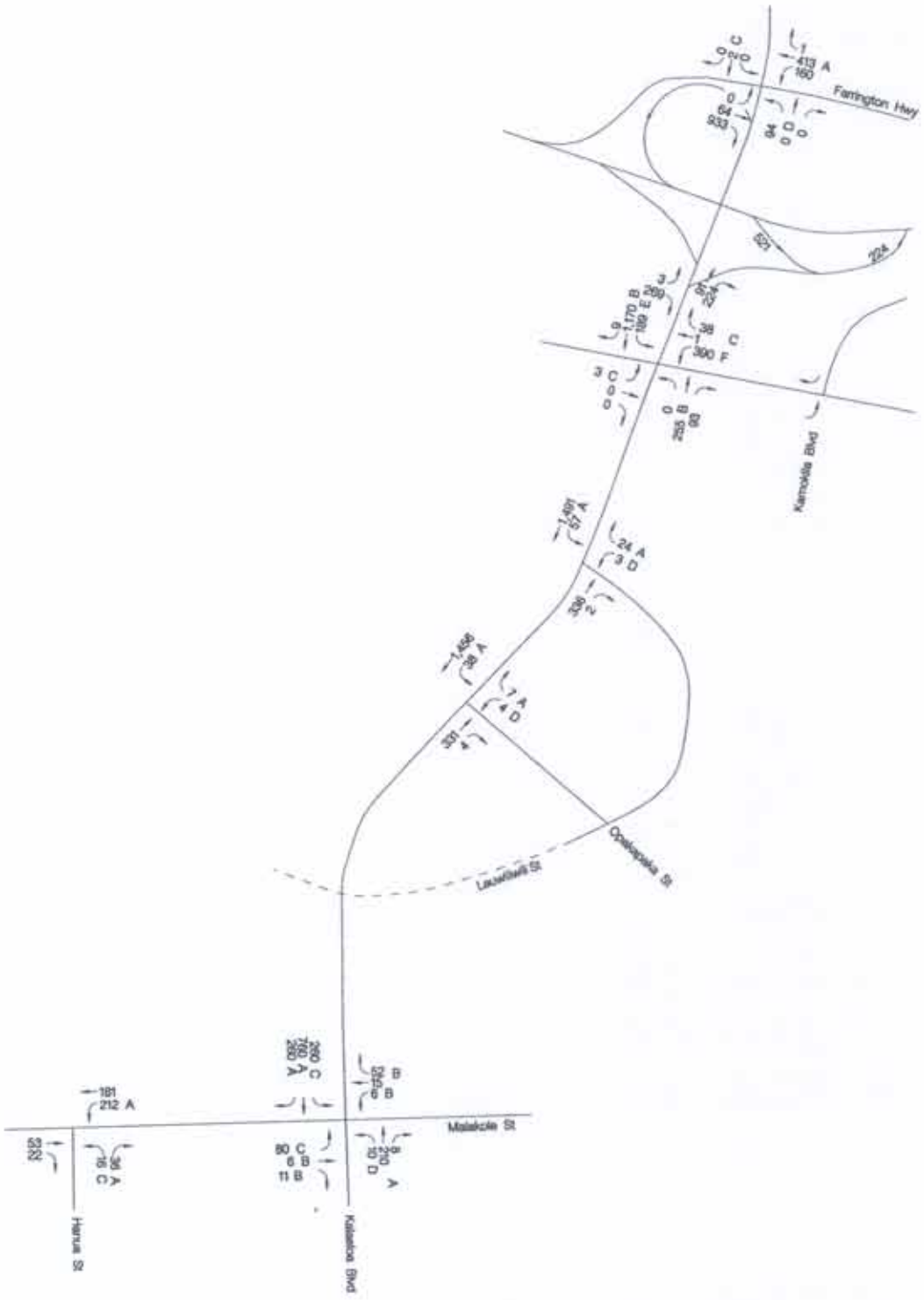
Kalaeloa Boulevard and Farrington Highway	5/24/2005
Kalaeloa Boulevard and Eastbound Off-ramp	
Kalaeloa Boulevard and Kapolei Parkway	5/24/2005
Kalaeloa Boulevard and Lauwiliwili Street (Mauka)	1/10/2006
Kalaeloa Boulevard and Opakapaka Street	1/11/2006
Kalaeloa Boulevard and Malakole Street	9/22/2005
Malakole Street and Hanua Street	10/5/05
Farrington Highway at Laaloa Street	2/3/2005

Peak hour traffic volumes on the H-1 Freeway were based on traffic counts made by WSA on Farrington Highway at the Laaloa Street intersection on February 3, 2005. The WSA May 2005 traffic survey included counts at the H-1 Freeway on- and off-ramps at the Palailai Interchanges. The Farrington Highway and H-1 Freeway ramp traffic counts were used to derive the traffic volumes along the Freeway through the City of Kapolei.

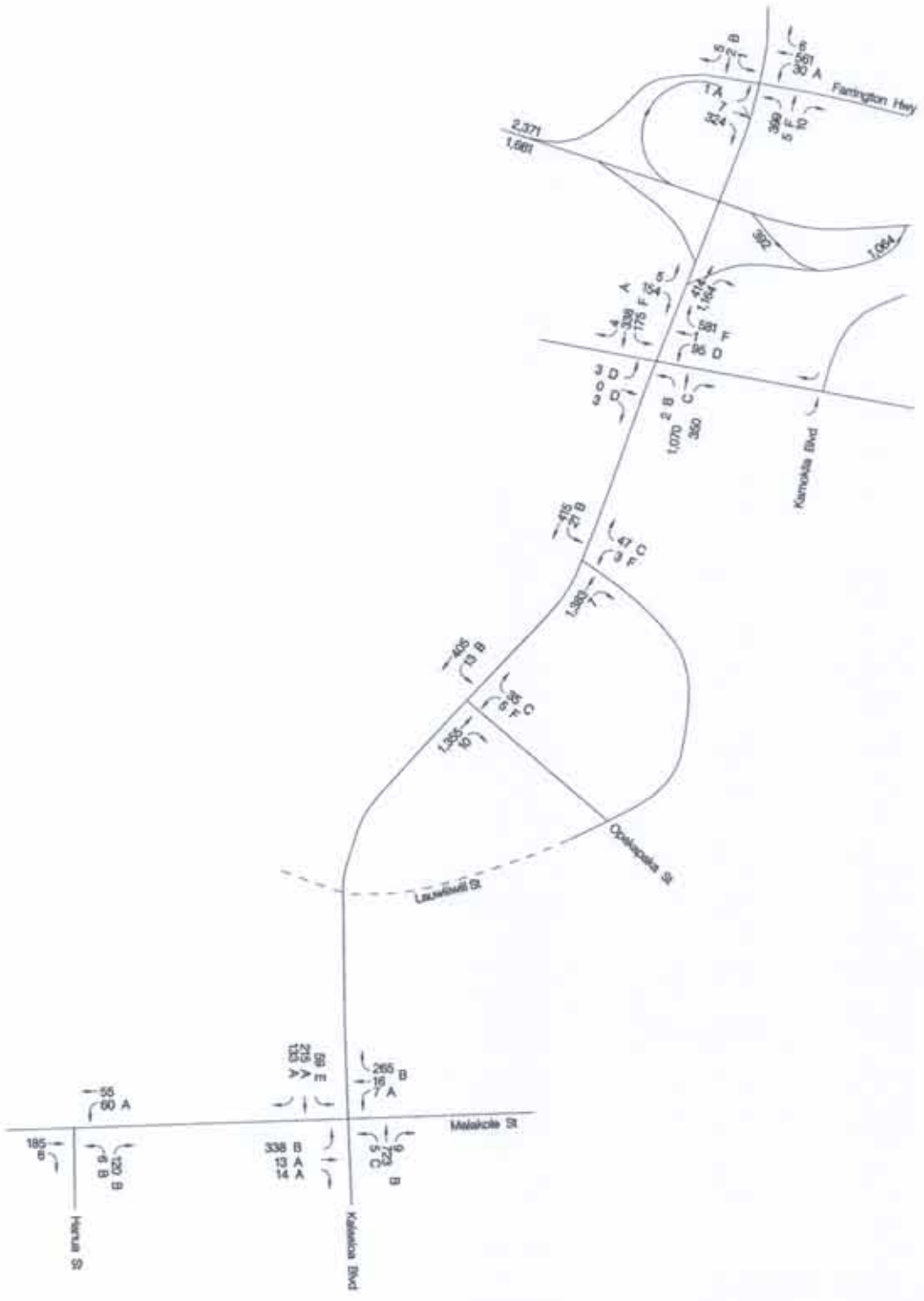
The existing weekday morning peak one-hour traffic volumes are depicted in Figure 2-2 and the peak weekday afternoon volumes are depicted in Figure 2-3. At most locations along Kapolei Parkway, the afternoon peak hour two-way traffic volumes are higher than those in the morning peak hour, while those along Kalaeloa Boulevard makai of the Kapolei Parkway are higher in the morning peak hour. The peak hour counts used in this study generally reflect the 6:30-7:30 AM and 3:30-4:30 PM periods, which are the peak hours for the traffic along most of Kalaeloa Boulevard.

Kalaeloa Boulevard accommodates high volumes of traffic in the makai-bound direction in the morning peak period and in the mauka-bound direction in the afternoon peak period. This reflects the major employment areas located along the makai section of the roadway.

Traffic for 6:30-7:30 AM is shown along Kalaeloa Boulevard for morning peak hour in Figure 2-2. This period included a high volume of left turns (189 vehicles) from makai-bound Kalaeloa Boulevard onto Kapolei Parkway. This turn volume is higher later in the morning peak (7:00-8:00 AM) when the high volume of vehicles turning left resulted in the queue of vehicles stacking from the turn lane to the H-1 Freeway eastbound off-ramp. The long queue lasted for about 20 minutes starting a little after 7:30 AM. The highest traffic volumes in the morning period were recorded from 6:15 to 7:15 AM due to the through traffic on makai-bound Kalaeloa Boulevard intersection enroute to the Campbell Industrial Park area. However, no traffic problems were observed during this period.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	EXISTING MORNING PEAK HOUR TRAFFIC	FIGURE 2-2



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	EXISTING AFTERNOON PEAK HOUR TRAFFIC	FIGURE 2-3

The highest one-hour traffic at the Kalaeloa Boulevard-Kapolei Parkway intersection in the afternoon period was recorded between 3:45 and 4:45 PM. Traffic volumes in this hour include both employees leaving work in both the Campbell Industrial Park and City of Kapolei areas as well as persons traveling to the City of Kapolei commercial area.

In the afternoon peak hour, approximately 400 vehicles turn left from mauka-bound Kalaeloa Boulevard onto the H-1 Freeway westbound on-ramp. This resulted in a long queue of vehicles waiting to turn left from this STOP sign-controlled approach to the intersection.

The traffic volumes at the Palailai Interchange are highest on the Westbound and Eastbound Off-ramps in the morning peak hour and higher for the Eastbound On-ramp in the afternoon peak hour. The highest volumes on the weaving section between the Eastbound Off-ramp to Farrington Highway and the Eastbound On-ramp from Kalaeloa Boulevard occur in the afternoon peak hour.

EXISTING TRAFFIC CONDITIONS

Traffic conditions were analyzed for the weekday morning and afternoon peak one-hour traffic volumes. The analyses were made for the key intersections near the Project site, and for the key H-1 Freeway ramps at the Palailai Interchange. The methodology and criteria used in analyzing the traffic conditions at the intersection and on the freeway are described in Appendix A.

Existing Intersection Conditions

The overall traffic conditions at each of the key intersections are summarized in Table 2-1 for the weekday morning and weekday afternoon peak traffic hours.

The traffic turning left from the STOP sign-controlled Kalaeloa Boulevard approach onto the Westbound On-Ramp at the Farrington Highway intersection experienced long delays in the weekday afternoon peak hour. The traffic analysis indicates an average delay of about 3 minutes per vehicle. Field observations noted the occasional formation of queues of up to 10-12 vehicles at times in the weekday afternoon peak hour. The average delays during the weekday morning and Saturday peak hours were at acceptable levels (LOS D).

The traffic turning left from the Eastbound Off-ramp onto mauka-bound Kalaeloa Boulevard turn into an additional lane that begins at this junction, with the median-divider makai of this intersection ending to allow room for the second mauka-bound lane from this intersection to Farrington Highway. The small number of vehicles turning left from the ramp experience only short delays (LOS B or C) while waiting for a gap in the makai-bound traffic.

Table 2-1
EXISTING TRAFFIC CONDITIONS AT KEY INTERSECTIONS

Intersections	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Kalaeloa Blvd.-Farrington Hwy Mauka-bound Left Turn	0.42	30.6	D	1.30	185.4	F
Kalaeloa Blvd.-EB Off-ramp Eastbound Left Turn	0.02	23.0	C	0.01	12.7	B
Kalaeloa Blvd.-Kapolei Pkwy	0.74	35.0	D	0.94	73.2	E
Kalaeloa Blvd.-Lauwiliwili St. (Mauka) WB Left-turn	0.02	29.4	D	0.05	58.8	F
Kalaeloa Blvd.-Opakapaka St. Westbound Left Turn	0.03	27.7	D	0.07	54.7	F
Kalaeloa Blvd.-Malakole St.	0.48	9.2	A	0.71	15.9	B
Hanua St.-Malakole St. Mauka-bound Left Turn	0.05	16.5	C	0.01	11.3	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.

Wilbur Smith Associates; March 27, 2006.

The overall traffic conditions at the signal-controlled Kalaeloa Boulevard intersection with Kapolei Parkway were at very acceptable overall levels in the weekday morning peak hour with the morning peak hour traffic approximating 74% of the intersection capacity and the average delay for all traffic passing through the intersection at an acceptable LOS D. The afternoon peak hour volumes approximated 94% of the estimated intersection capacity with the primary conflict between the high volume of mauka-bound traffic and the makai-bound left-turn along Kalaeloa Boulevard. Long queues of mauka-bound traffic were observed to form on Kalaeloa Boulevard for short periods just after 4:00 PM, with the queue extending to Opakapaka Street.

Traffic turning left from both Lauwiliwili and Opakapaka Streets experience long delay in waiting for a gap in the through traffic along Kalaeloa Boulevard. The average delay in the afternoon peak hour is at LOS F. even with the median refuge/acceleration lane that is provided for these turns. However, the low volume of vehicles turning left would not satisfy the warrants for consideration of a traffic signal at either location.

The intersection of Kalaeloa Boulevard and Malakole Street operates at very acceptable levels of capacity usage and average delays.

Palailai Interchange Ramp Conditions

Existing traffic conditions were assessed for the weaving section of the eastbound H-1 Freeway ramps on the east side of the Palailai Interchange and for the merge/diverge sections of the Palailai Interchange ramps with the H-1 Freeway through lanes.

Eastbound Weaving Roadway between Kalaeloa Boulevard and Wakea Street – The HCS weaving analysis has limited applicability for collector-distributor roadways. The assessment was made to indicate the relative level of change in the traffic conditions along the 1,200-foot long, three-lane weaving section for the single-lane exit from the freeway (Ramp PC) and the two-lane ramp from Kalaeloa Boulevard (Ramp PC-1). The off-ramp traffic must cross through the Kalaeloa Boulevard traffic to reach the lanes exiting to Wakea Street while almost all of the Kalaeloa Boulevard traffic must weave through the off-ramp traffic to access the lane exiting the weaving roadway onto the eastbound freeway.

The resulting traffic density indicates that the weaving section provides very acceptable LOS B conditions in the morning peak hour with the much higher weaving volumes in the afternoon period indicating acceptable LOS C conditions. The afternoon weaving volume amount to about 40% of the estimated capacity for the weaving section. The HCS 2000 warns that three-lane weaving sections with volume-to-capacity ratios of 0.45 or greater may encounter operational problems due to the limited usefulness of the third lane. Existing afternoon peak hour volumes are approaching this level.

Palailai Interchange Ramp Junctions with Freeway Lanes – Each on-ramp merge or off-ramp diverge area along the freeway was analyzed using HCS 2000, with the results summarized in Table 2-3. Eastbound On-ramp KC-1 from the Eastbound Weaving Roadway and westbound Off-ramp PD to Kalaeloa Boulevard are not included in the analysis since freeway through lanes are added or reduced via these ramps.

Table 2-2
2005 WEAVING SECTION TRAFFIC CONDITIONS

Peak Hour	Average Speed (mph)			Density (vplph)	Level of Service
	All Traffic	Non-Weave	Weaving		
Eastbound Separate Weaving Roadway Kalaeloa Blvd.-Wakea St. (Existing)					
Morning	29.5	42.5	29.2	11.1	B
Afternoon	25.5	37.6	25.0	23.0	C

vplph = vehicles per lane per hour

Wilbur Smith Associates; March 28, 2006

The HCS analysis estimates the average vehicle density and travel speeds along the 1,500-foot section of freeway through lanes affected by traffic entering or exiting the freeway, with the density also used to identify the level of service within this ramp influence area along the freeway mainline. The analysis is made for the two outside lanes that are most directly affected by the traffic entering/exiting the ramps and, for sections with three or more through freeway lanes, the conditions in the other lanes that are less affected by the ramp traffic.

LOS C or better conditions are estimated for each of the ramp merge/diverge areas for the Palailai Interchange for both peak hours. The merge or diverge of each of the ramps with the freeway through lanes presently operate at very acceptable densities and with little impact on traffic speeds. .

Traffic conditions are not presented for the junction of On-ramp KC-1 from Kalaeloa Boulevard since it joins the eastbound freeway as an added through lane and no merge maneuver is necessary. The on-ramp from the Eastbound Weaving Roadway has an estimated potential capacity of about 2,100 vehicles per hour. The afternoon peak hour volumes amount to about one-half of the capacity.

Table 2-3
TRAFFIC CONDITIONS ALONG FREEWAY
AT RAMP MERGE AND DIVERGE AREAS

Ramp Junction	Peak Hour	Average Speed (mph)		Traffic Density (vplph)	Level of Service
		Near Ramp	Other Lanes		
Eastbound Freeway					
Off-ramp PB to Kalaeloa Blvd.	AM	50.8	NA	20.4	C
	PM	50.9	NA	20.3	C
Off-ramp PC To EB Weaving Roadway	AM	50.4	NA	17.8	B
	PM	50.6	NA	18.8	B
Westbound Freeway					
On-ramp PA from Kalaeloa Blvd.	AM	51.1	NA	14.9	B
	PM	50.6	NA	23.2	C

Near Ramp is the 1,500-foot section of the 2 lanes closest to ramp.
Other lanes are lanes closest to median if 3 or more lanes on freeway.
Vplph = vehicles per lane per hour for 2 lanes near ramp.
Level of Service is for 2 lanes near ramp.

Wilbur Smith Associates; March 28, 2006

Similarly, the westbound freeway drops from three lanes to two lanes with the drop of the outside lane as the entry to the loop Off-ramp PD. This off-ramp for westbound traffic exiting from the H-1 Freeway to Kalaeloa Boulevard and Farrington Highway has an estimated capacity of about 1,800 vehicles per hour. The morning peak hour volume of just over 900 vehicles amounts to about half of the potential ramp capacity.

PUBLIC TRANSPORTATION

The City and County of Honolulu provides public transportation services to the areas adjacent to the Kapolei West development area. These include a number of TheBus fixed route bus service that pass near the project site. TheHandiVan provides door-to-door service for persons who have difficulty in accessing the fixed route service.

TheBus Routes – The existing bus routes that provide service near the Kapolei Harborside Center project site include the following:

Route C Country Express – Route C provides an express/limited stop service through the City of Kapolei area, with the route extending to the Honolulu Downtown area and Ala Moana Center to the east and along the Waianae Coast to Makaha to the west. The service operates seven days a week from about 4:30 AM to 11:00 PM. Route C uses Kalaeloa Boulevard between the H-1 Freeway and the Kapolei Parkway.

Route 40 Honolulu-Makaha – This trunk route provides regular bus service along the same general route as Route C. Within the City of Kapolei, it provides service along surface streets between the Makakilo and Palailai Interchanges, with the route using Makakilo Drive, Farrington Highway, Kamokila Boulevard, Kapolei Parkway, and Kalaeloa Boulevard. Service is provided seven days a week from about 5:00 AM to 9:30 PM.

Route 413 Campbell Industrial Park – This local route provides service from the Kapolei Transit Center to the Campbell Industrial Park and Barbers Point Harbor areas, with the route using the Kapolei Parkway and Kalaeloa Boulevard. The route operates from 5:30 AM to 8:00 AM and from 3:00 PM to 6:00 PM.

Kapolei Transit Center – The City and County of Honolulu has recently completed development of a Transit Center on the alignment of the future extension of Wakea Street mauka of Kamokila Boulevard. The Transit Center provides a transfer site for all of TheBus local and regional routes that serve the City of Kapolei and the surrounding communities.

BICYCLES AND PEDESTRIANS

Bicycle lanes are provided along the block of Kapolei Parkway between Kamokila and Kalaeloa Boulevards. Along the other major roadways, bicycles either use paved shoulder areas, wide outside lanes, or travel within the regular traffic lane.

Sidewalk facilities are provided along both sides of the Kapolei Parkway, and along Lauwiliwili and Opakapaka Streets. No sidewalks are provided along Kalaeloa Boulevard between Malakole Street and the freeway, nor the section of Malakole Street near the Kalaeloa Boulevard intersection.

Chapter 3
2018 CONDITIONS WITHOUT PROJECT

Future travel on the area roadways without the Kapolei Harborside Center development (the Project) was forecast by estimating traffic to/from new developments in the City of Kapolei and Kalaeloa Boulevard corridor, and then adding these new trips to the existing travel volumes. Traffic was also forecast to/from new development anticipated in the other areas near the study corridor that would travel through the Project area. The overall methodology used to estimate future traffic for years 2018 without the Project was as follows:

- Estate of James Campbell staff provided the location, type and general timing of future development in the City of Kapolei and Kalaeloa Boulevard corridor.
- The property owners and/or developers in the areas near the City of Kapolei were contacted to identify the general description and timing of additional development in those areas.
- Wilbur Smith Associates (WSA) staff estimated the peak hour vehicle trip generation for each of the potential developments.
- The origin/destination of trips for the new developments were based on the trip distribution for the Kapolei area as developed from the OMPO regional model.
- The traffic to/from each of the new developments was assigned to the area roadway system using a TRAFFIX traffic model.
- An annual growth factor was used to increase through traffic along the H-1 Freeway.

Traffic conditions were then analyzed for the key intersections and roadways that would be affected by traffic generated by the Kapolei Harborside Center Project.

FUTURE DEVELOPMENT ASSUMPTIONS

Most of the lands within the City of Kapolei and the zoned properties along Kalaeloa Boulevard are expected to be developed and fully occupied by 2018. Substantial additional development is also expected to occur in the areas near the City of Kapolei by 2018.

Additional Development Along the Kalaeloa Boulevard Corridor

Most of the vacant lands that have already received zoning approval from the City and County of Honolulu are expected to be fully developed by 2018. In addition, development was assumed to be underway on several planned projects that have not yet received full zoning approval, such as the planned Kapolei West and Makaiwa Hills developments. The additional development in the corridor between 2006 and 2018 reflected in the traffic forecasts include the following:

Kapolei Business Park – Full development is anticipated for both the Phase 1 and Phase 2 areas of the Kapolei Business Park by the end of 2018. The remaining developable area amounts to:

Approximately 67 acres in the Phase 1 area
About 46.4 acres in the Phase 2 area.

Traffic was estimated based on the trip rates for industrial parks, which includes a mix of light manufacturing, distribution, warehousing, and services businesses, with ancillary office space.

I-2 Zoned Lands West of Kalaeloa Boulevard – A 125-acre strip of vacant lands along the west side of Kalaeloa Boulevard have previously been zoned for I-2 types of land uses. This strip extends from existing Kalaeloa Boulevard west to the planned alignment of the Hanua Street Extension, and from the OR&L track line makai to about 1,000 feet south of the future alignment of the Lauwiliwili Street extension to the Barbers Point Harbor.

The I-2 lands should provide about 110 acres of development area after providing for major through roads and other infrastructure. Traffic for the area north of the makai extension of Lauwiliwili Street was estimated based on the trip rates for industrial parks, which includes a mix of light manufacturing, distribution, warehousing, and services businesses, with ancillary office space. A film studio has been proposed for the approximately 25-acre portion makai of Lauwiliwili Street, with the number of vehicles trips for that area being based on the proposed studio development.

Kapolei Commons – The full mixed-use commercial development is planned for full occupancy around 2010. Current plans are to include the following uses:

Retail uses, including a discount store	490,000 square feet of building space
Movie theater complex	2,000 seats
Office uses	50,000 square feet of building space
Residential condominiums	300 units

Primary access would be to the Kapolei Parkway with secondary access to Hanua Street and Kalaeloa Boulevard.

Kapolei West – The planned Kapolei West residential area extends along both sides of the future Kapolei Parkway from the Advertiser site to the Ko Olina area. The area is proposed to include development of about 1,253 residential units in lands that have been approved for urban development and 1,117 units in lands that have been petitioned for urban development. The Kapolei West project would also include a golf course and a middle school, as well as a transit mixed used development located just west of the Advertiser. The project is planned for build-out by 2020.

The 2018 traffic forecasts reflect the completion of 2,008 of the planned 2,370 residential units as well as the golf course, middle school, and all of the commercial development.

Makaiwa Hills Development - A representative of the potential developer for this area indicated that preliminary plans are to develop approximately 4,100 housing units with an emphasis on

single-family homes. The developer plans to begin occupancy of units in 2009, with completion of the development projected for 2020, for an average of about 350 housing units per year. For 2018, it was estimated that the development would include approximately 3,400 residential units as well as completion of about 370,000 square feet of commercial building floor area.

The potential developer has indicated it would like to rely on an extension of Kalaeloa Boulevard for initial access. The longer range plans indicate additional access points to Farrington Highway east and west of the existing Honokai Hale and Nanakai Gardens residential areas. The 2018 traffic forecasts were based on the connection to the mauka end of Kalaeloa Boulevard as well as the construction of a Makaiwa Hills interchange with Farrington Highway to the east of Honokai Hale.

Campbell Waterfront Industrial Area – There is approximately 80 acres of zoned industrial lands located along Malakole Street southeast of Barbers Point Harbor. Approximately 30 acres of the area was assumed to be developed for heavy industrial uses by 2018.

Barbers Point Harbor - The Harbors Division of the State DOT indicated that there is approximately 160 acres of undeveloped land at the Harbor. WSA assumed that the development of these areas would continue to produce the same rate of traffic growth as experienced along Malakole Street near the Harbor in recent years (about 2.2% per year). This uniform rate of development and traffic growth would result in the following numbers of new vehicle trips to/from the Barbers Point Harbor:

By Yearend of	Morning Peak Hour			Afternoon Peak Hour		
	To	From	Total	To	From	Total
2018	162	38	200	52	110	162

Development Within City of Kapolei

The entire central area of the City – between Fort Barrette Road and Kalaeloa Boulevard – is expected to be completed and occupied by the 2018 forecast year. Where there are no specific plans as yet, the Campbell Estate staff has identified the types of uses anticipated for the vacant properties. The anticipated developments are listed in the following:

- **Kapolei Public Library** – Completion of the book/periodical distribution and storage area.
- **Kapolei Park Square** – Development of the 2-acre vacant parcel at the south end of Kapowai Place with office space.
- **Kapolei Senior Village** – Full occupancy of the retirement village is planned for the 40-acre area along the west side of Fort Barrette Road between the future Kamaaha Avenue and Kapolei Parkway.
- **Island Pacific Academy** – The second phase of the private school is under construction on block on the southeast corner of Haumea and Wakea Streets. The

school is planned to expand from the present enrollment of 200 to 900 students by 2009.

- **Kamokila Blocks between Wakea and Uluohia Streets** – These two blocks on the makai side of Kamokila Boulevard are expected to be developed with a mix of restaurant, retail, and office uses in the next several years.
- **Kapolei Power Center** – The remaining portions of the site are expected to be developed with a mix of retail, restaurant, and office uses.
- **Costco** – A Costco store and service station is planned for the parcel on the southeast corner of the intersection of Kalaeloa Boulevard and the Kapolei Parkway.
- **Kapolei Mauka Residential Area** – A townhouse development is planned for the area just mauka of the H-1 Freeway on the west side of Makakilo Drive with about 350 townhouses. Access would be provided to the Mauka Frontage Road.
- **Kapolei Rezoning Parcel 1** – Full development of the other undeveloped areas along Kamokila Boulevard, Kamaaha Avenue and the Kapolei Parkway is anticipated to include a mix of office, commercial, and residential uses.
- **Kapolei Rezoning Parcel 2** – This retail development, located makai of the Hawaiian Water Adventures Park, is expected to include retail uses.
- **Kapolei Rezoning Parcel 3** – The commercial development located on the northeast corner of the intersection of Farrington Highway and Makakilo Drive is expected to be developed with a shopping center, potentially including a discount store.

Traffic to/from each of these developments is included in the forecast yearend 2018 volumes.

Developments Near the City of Kapolei

Additional development, or occupancy of previously completed development, is expected in several areas that would directly add traffic on the roadways and through the key intersections that are the subject of this study. The amount of development was estimated for most of these areas from telephone discussions with representatives of either the developer or property owner.

Makakilo Development - Contacts with Schuler Homes and GE Capital Hawaii indicated that most of the Makakilo area should be developed by 2010. The new development is expected to add:

- 674 single-family homes
- 236 apartments.

Villages of Kapolei and Kapolei Knolls – D. R. Horton Schuler Division and the Housing and Community Development Corporation Hawaii (HCDCH) indicated that Kapolei Knolls and most of the Villages areas should be developed by 2010, with some development possibly extending beyond 2010. All of the area is expected to be developed by the end of 2018. An estimate of the remaining housing units in Kapolei Knolls was provided by Schuler Homes. For the Villages of Kapolei, HCDCH provided the acreages and types of uses for the remaining undeveloped areas, while the numbers of housing units of each development were estimated by WSA.

Kalaeloa Redevelopment Area - Based on discussions with the Hawaii Community Development Authority (HCDA) and the Department of Hawaiian Home Lands (DHHL), very limited additional development was assumed to occur in the near term due to the availability and competition from other development areas, as well as the uncertainties regarding the potential return of Navy airfield uses.

WSA assumed that approximately one-half of the development included in the OMPO regional forecasts for year 2030 would occur by the end of 2018. This included partial development of the "downtown" commercial/residential area and other residential areas, as well as development of the regional park areas.

Ko Olina Development - Representatives of the Ko Olina Community Association and the Marriott Corporation were contacted regarding the planned general type and timing of development for the Ko Olina area. Based on available information and these discussions, WSA estimated the following levels of new development by 2018:

- 1,290 new hotel rooms
- 540 new timeshare units
- 60 additional single-family homes (Centex)
- 390 additional townhouses (Coconut Plantation and Centex)
- 174 additional low density houses (across from Fairways Villas)
- 110 additional medium density houses
- Aquarium

GROWTH OF H-1 FREEWAY THROUGH TRAFFIC

A growth factor was applied to existing traffic volumes on the H-1 Freeway to reflect increased travel to/from the Waianae Coast areas west of Ko Olina. The growth factor was determined from the traffic counts for the State DOT count station located on the H-1 Freeway west of Makakilo Drive (count station #H10-A). The historic counts indicated an average annual growth rate of 0.8% per year between January 1999 and January 2002.

The 0.8% annual growth rate was assumed to continue through the study period. With this rate, the 2005 freeway volumes are estimated to increase 10.9% by 2018. These volumes are further increased by the forecast trips to/from the new development within and near the City of Kapolei as identified in the preceding sections of this chapter.

PLANNED ROADWAYS

A number of transportation projects have been planned for the Ewa District that would affect travel to and within the City of Kapolei. Most of these projects have been identified and/or confirmed through the Oahu Metropolitan Planning Organization (OMPO) transportation

planning process[1], as well as the Ewa Highway Impact Fee Program studies and plans[2]. The OMPO process assesses the long-range transportation needs to serve forecast travel over the next 20 or more years, but also selects a high-priority short list of projects and programs for funding within the next three years as covered by the its adopted Transportation Improvement Program (TIP). The Ewa Highway Impact Fee Program (Ewa HIFP) addresses the travel needs through 2010 and establishes a developer-funded source to pay for 20% of the regional roadways needed in the Ewa District.

A number of roadway improvements are anticipated by the year 2018 analyses years, either as regional highway improvements are as part of area developments. The roadway improvements assumed to be in place *without* the Kapolei Harborside Center development are discussed in the following sections.

Roadway Improvements within the Study Corridor

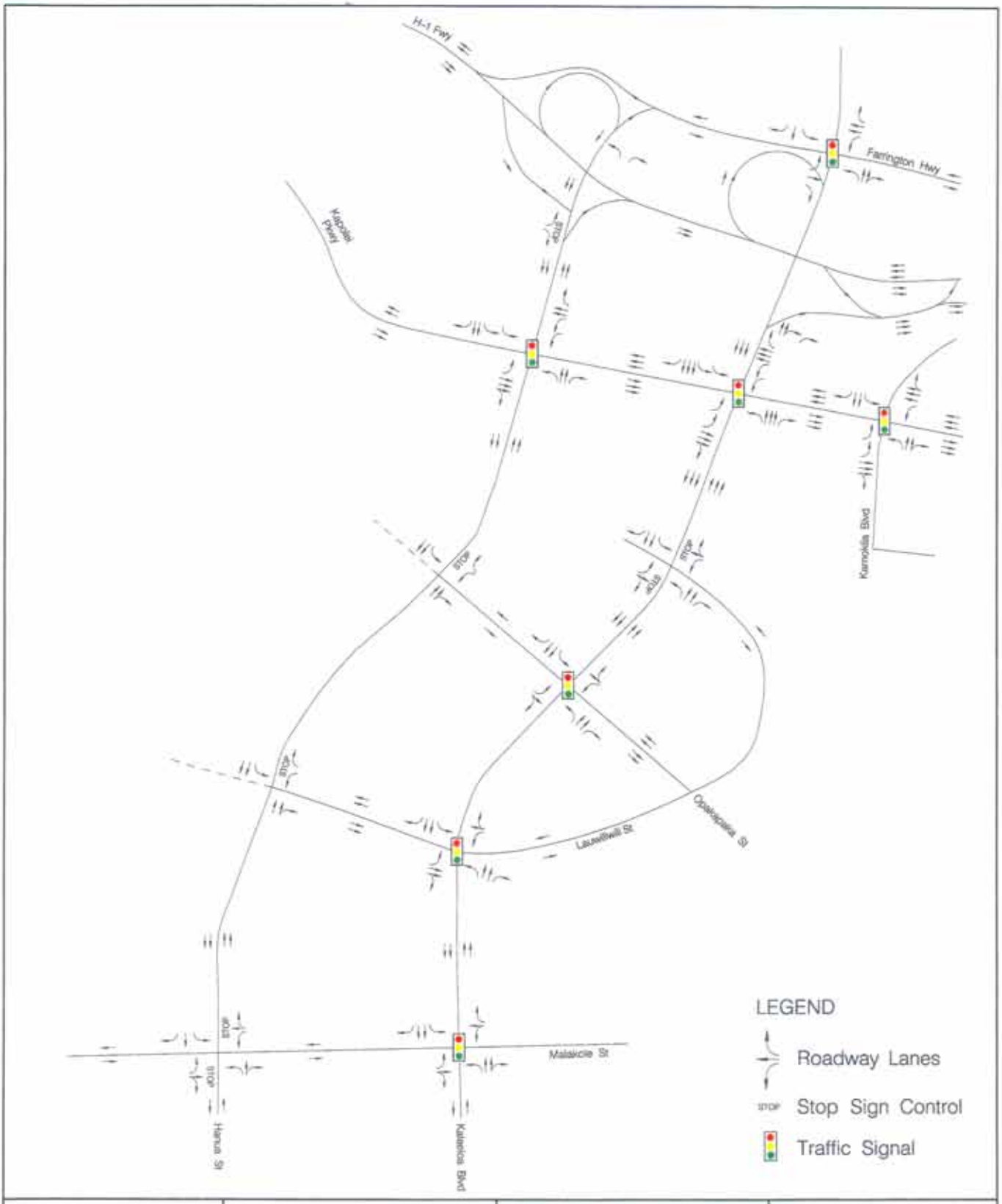
The planned changes to the Palailai Interchange, the widening of Kalaeloa Boulevard to a six-lane roadway, construction of the Hanua Street Extension, and the connection of the Kapolei Parkway between Fort Barrette Road and Kalaeloa Boulevard are the key area roadway improvements anticipated in the Kalaeloa Boulevard corridor during the 2006-2018 period. For the purposes of the Kapolei Harborside Center traffic analyses, it is assumed that the section of the Lauwiliwili Street Extension through the Project lands between Hanua Street Extension and the Harbor would not be completed by 2018 unless the Project is developed within this time frame.

The anticipated roadway network and numbers of traffic lanes near the Project site in 2018 are depicted in Figure 3-1. Descriptions of those roadway improvements that most directly affect the Kapolei Harborside Center area are included in the following paragraphs.

Kalaeloa Boulevard Improvements - The section of Kalaeloa Boulevard between the Palailai Interchange and Malakole Street is planned for improvements in the TOP 2025. This is expected to include the widening of a portion or all of this segment to a six-lane roadway with median and turn lanes, as well as the elimination of the grade differential between the northbound and southbound lanes between Opakapaka and Malakole Streets to allow full intersections to be constructed along this section.

The mauka section between the OR&L tracks and the Palailai Interchange ramps is planned for widening to six lanes in conjunction with the Kapolei Commons development. This would also include the provision of double left-turn lanes on both Kapolei Parkway approaches and on the southbound Kalaeloa Boulevard approach. A separate right-turn lane would be added to northbound Kalaeloa Boulevard at the intersection.

[1] *Transportation for Oahu Plan, TOP 2025*, prepared for OMPO by Carter-Burgess, April 6, 2001.
[2] *Ewa Highway Impact Fee Program*, prepared for State of Hawaii Department of Transportation by Kaku Associates, Inc. July, 2002.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 ROADWAY LANES AND TRAFFIC CONTROLS WITHOUT PROJECT	FIGURE 3-1

The section of Kalaeloa Boulevard between the OR&L track line and Malakole Street would be improved to City and/or State standards in conjunction with the development of the I-2 lands along the west side of this section. For the purpose of this study, it is assumed that the upgrade would not include widening to six lanes to assess whether this widening would be necessary within this time frame. The improvement is assumed to include the upgrade of pavement, elimination of the grade differential between the two travel directions to permit full intersections, and the provision of sidewalks.

Kapolei Parkway – The section of the Kapolei Parkway between Kalaeloa Boulevard and the Hanua Street Extension alignment is expected to be completed by 2009 in conjunction with the Kapolei Commons development. This section would be constructed as a six-lane divided roadway with separate turn lanes.

The Kapolei Parkway is planned for westward extension to connect to Aliinui Drive in Ko Olina as the Kapolei West project is developed, with completion expected before 2015. The connection is planned as a four-lane roadway with a landscaped median and turn lanes at cross streets and major driveways.

The existing one-block section between Kalaeloa and Kamokila Boulevards is planned for widening to six lanes which is assumed to occur by 2018.

Hanua Street Extension and Palailai Interchange Modifications – Hanua Street is an existing two-lane mauka-makai roadway within the Campbell Industrial Park parallel to and one block west of Kalaeloa Boulevard, with the present street ending at Malakole Street. The TOP 2025 plans include the extension of existing Hanua Street mauka to connect to the future Kapolei Parkway and to the Palailai Interchange. The Hanua Street Extension would likely be constructed as a four-lane roadway with landscaped median and separate turn lanes at the major cross streets.

The project would include the reconstruction of the Palailai Interchange to provide an eastbound on-ramp to the freeway, and provide an overpass to connect Hanua Street to the westbound on-ramp to the freeway and to a new loop off-ramp from the westbound freeway lanes. To provide adequate merging distance for the Hanua Street eastbound on-ramp traffic, the existing eastbound off-ramp connection to Kalaeloa Boulevard would be removed and this movement accommodated by the construction of a new eastbound off-ramp connection to the Hanua Street Extension.

The Palailai Interchange modifications and the construction of Hanua Street between the Interchange and Malakole Street are expected by the 2018 analysis year.

Malakole Street Connection – The master plan[3] for the Kalaeloa Redevelopment Area (former Barbers Point NAS lands) include the extension of the east end of Malakole Street into the redevelopment area to connect with the major roadways planned within that area. Telephone

[3] *Kalaeloa Master Plan*, prepared for Hawaii Community Development Authority by Belt Collins et al, March 1, 2006.

discussions with Stanton Enemoto of the Hawaii Community Development Authority (HCDA) staff[4] indicated this extension is one of the highest priority roadway improvements within the redevelopment area and should be completed early in the Phase 1 improvements, which are planned from 2007 to 2015. The extension would use the existing culvert crossing of the major drainage channel that forms the west boundary of the Redevelopment Area, but would require right-of-way from the private business located just west of the drainage channel. Mr. Enemoto indicated that Malakole Street would likely remain a two-lane roadway during this initial connection, with the existing roadway improved to standards and turn lanes added at key cross streets and driveway connections.

Lauwiliwili Street Extension – The existing 2-lane collector street within the Kapolei Business Park Phase 1 area will be extended makai through the Phase 2 area to connect to Kalaeloa Boulevard as part of the Phase 2 development.

As part of the I-2 area development, the makai end of Lauwiliwili Street will be extended west of Kalaeloa Boulevard to the Hanua Street Extension. This section would be constructed as a four-lane roadway with median divider and left-turn lanes at cross streets. Lauwiliwili Street is planned for extension westward to provide the primary access route to the Barbers Point Harbor, with this extension expected to be constructed by the State DOT. However, State DOT would expect right-of-way to be transferred from Kapolei Harborside Center Project lands for the roadway extension to the Harbor. Therefore, this extension is unlikely to be completed without the approval and development of the Kapolei Harborside Center lands that the roadway would be built upon, and thus the section of the Lauwiliwili Street Extension west of Hanua Street is not included within the roadway system without the Project.

Opakapaka Street Extension – This collector street is planned for extension to and westward from the Hanua Street Extension. The section between Kalaeloa Boulevard and the Hanua Street Extension would be constructed as a two-lane roadway as part of the I-2 development. The section west of Hanua Street would be constructed with the development of the Kapolei Harborside Center lands.

The City Department of Planning and Permitting (DPP) have required the developer of the Kapolei Business Park (KBP) Phase 1 area to construct a street within the Phase 2 area paralleling the existing section of Opakapaka Street. The City expects to have this new KBP 2 area street extended southward to connect to Malakole Street. Extension of Opakapaka Street southward would require the taking of the KBP 1 property between the south end of the street and the property line for the Hawaii Raceway Park. This new street, referred to as KBP Road C, may eventually be extended west in lieu of Opakapaka Street. For the purposes of this analysis, it is assumed that Opakapaka Street continues as the east-west collector street. If Road A is actually extended, then the traffic volumes forecast for Opakapaka Street would actually use Road C.

[4] Telephone conversation with Stanton Enemoto, March 16, 2006.

Other Roadway Improvements near the Study Corridor

Several other key roadway improvements are anticipated by 2018 that would affect area circulation. These are expected to include the extension of the Kapolei Parkway between Kalaeloa Boulevard and Ko Olina, a new Makaiwa Hills interchange with Farrington Highway to serve the Makaiwa Hills development, and the construction of new roadways within the Kalaeloa Redevelopment Area. Descriptions of the roadway improvements that most directly affect the Kalaeloa Boulevard corridor are included in the following paragraphs.

Kamokila Boulevard Extension – The extension of Kamokila Boulevard southward from the Kapolei Parkway to connect to Roosevelt Avenue within the Kalaeloa Redevelopment Area is planned for completion by 2010. The extension would provide a four-lane median-divided roadway similar to existing Kamokila Boulevard. This roadway would divert some of the traffic between the Fort Weaver Road and Kalaeloa Boulevard corridors from traveling through the City of Kapolei commercial area along Kamokila Boulevard, Farrington Highway, and Fort Barrette Road.

Saratoga Road – The existing roadway within the Kalaeloa Redevelopment Area is planned for extension to connect to Geiger Road east of the Redevelopment Area, and to Lauwiliwili Street. The section within the former base is planned for realignment and widening to create a continuous major four-lane roadway linking the Fort Weaver Road and Kalaeloa Boulevard corridors south of and parallel to the Kapolei Parkway.

HCDA staff indicates that the section from the Kamokila Boulevard Extension to Geiger Road will be a high priority improvement and should be completed by 2015. However, the section crossing the major drainage canal along the west boundary of the Redevelopment Area and the right-of-way acquisition necessary in the KBP 1 area would make the connection at the west end expensive. The high cost may delay this connection until after 2018 and thus it is not reflected in the routing of traffic for this study.

Wakea Street Extension – Wakea Street is being extended south through the Mehana at Kapolei residential development for possible connection to Roosevelt Avenue. The Kalaeloa Redevelopment Area master plan envisions the extension of Wakea Street through the area to connect to Malakole Street. HCDA staff expects that Wakea Street may be connected to Roosevelt Avenue as part of their Phase 1 roadway improvements (2015), but the section connecting through to Malakole Street may occur between 2016 and 2030. Therefore, the study reflects an indirect connection between Malakole and Wakea Streets using Roosevelt Avenue and other local collector streets.

Kapolei Interchange - A new interchange is planned for construction between the Makakilo and Palailai Interchanges to increase the access between the City of Kapolei and the H-1 Freeway. The interchange would initially connect to existing Wakea Street, but in the future it would also connect to the planned Mauka Frontage Road along the mauka side of the freeway. The new interchange is included in the Ewa HIFP for 2010. Funds are allocated to the project for the planning and environmental process in the current TIP.

The Kapolei Interchange is planned to provide additional on- and off-ramps for travel to/from the Honolulu direction of the H-1 Freeway. The existing Farrington Highway connection across the Freeway west of the Kamokila Boulevard intersection would be abandoned and access provided via the Wakea Street Extension to the existing Waianae side on- and off-ramps.

Makakilo Interchange Westbound On-Ramp - A westbound on-ramp and an eastbound off-ramp are planned for the Makakilo Interchange to reduce traffic circulation through the City of Kapolei. Traffic between the Villages of Kapolei and Makakilo areas must currently travel through the City of Kapolei on Farrington Highway to access the H-1 Freeway at the Palailai Interchange for travel to/from areas west of the City of Kapolei. The new ramps are included in the OMPO long-range plan and within the Ewa HIFP. The Aina Nui Corporation recently approved funding for the design and construction of a westbound on-ramp for this interchange, which is assumed to be completed and open to traffic by 2010. This ramp would reduce the volume of westbound traffic along Farrington Highway through the Kalaeloa Boulevard onto the westbound on-ramp at the Palailai Interchange.

Makaiwa Hills Interchange – This planned new interchange would be located east of the Honokai Hale community. It is planned as a diamond-type interchange that would connect to and serve the Makaiwa Hills community. Past plans for the new connecting roadway between the interchange and the Makaiwa Hills community did not include any extension of the roadway makai of Farrington Highway to the Kapolei Parkway. Road D in the Kapolei West Project is planned to connect to the Makaiwa Hills Interchange to provide access to Farrington Highway/ H-1 Freeway. The interchange and this Road D connection are reflected in this study.

Kapolei Parkway – The section of the Kapolei Parkway between Fort Barrette Road and Kamokila Boulevard is expected to be completed by 2015, which would both improve east-west traffic circulation through the City of Kapolei and provide improved access to the new development within the City of Kapolei. The connection is planned as a six-lane roadway with a landscape median and turn lanes at cross streets and major driveways.

PUBLIC TRANSPORTATION

The City and County of Honolulu provides public transportation services along Kalaeloa Boulevard near the Kapolei Harborside Center development area. These include a number of TheBus fixed route bus routes from the Palailai Interchange into the City of Kapolei and one community shuttle route (413) from the Kapolei Transit Center to the Campbell Industrial Park. TheHandiVan provides door-to-door service for persons who have difficulty in accessing the fixed route service.

TheBus Routes – The bus routes for the area are expected to be modified to increase coverage west of the Kapolei area as development occurs in new areas, and service increased as the employment and number of residents increase. Candidates for new TheBus fixed-route service would include:

- The section of Kapolei Parkway between Kalaeloa Boulevard and Ko Olina once this extension has been completed

- Malakole Street into the Kalaeloa Redevelopment Area to provide connections to the City of Kapolei via Wakea Street and/or Fort Barrette Road

- Malakole Street into the Kalaeloa Redevelopment Area to provide connections to the Fort Weaver Road corridor via Saratoga and Geiger Roads

- The completed section of the Hanua Street Extension and Lauwiliwili Street.

Kapolei Transit Center – The Transit Center will be relocated when the Kapolei Interchange is constructed, as the extension of Wakea Street will be used to connect the City of Kapolei to the new interchange. The new Transit Center is planned for a site along Kapolei Parkway near Kamaaha Avenue.

A second transit facility is planned for the area immediately west of the Advertised facility. This second facility would provide a transfer center between area routes and would be implemented in conjunction with the Kapolei West development.

2018 PEAK HOUR TRAFFIC FORECASTS

The weekday peak hour traffic volumes were forecast for 2018 without the Kapolei Harborside Center development based on the new developments and roadways described in the preceding sections.

Trip Generation

The numbers of vehicle trips generated by the new development within and near the City of Kapolei were based on standard trip rates compiled by the Institute of Transportation Engineers (ITE).[5] The vehicle trip generation rates and estimated vehicle trips for the various areas and types of developments are presented in Appendix B.

The numbers of vehicle trips entering or exiting a commercial development include both new vehicle trips and additional stops by vehicles that would be traveling through the area whether or not the Project is developed. These additional stops by traffic passing the site to use the retail and services uses are referred to as "pass-by trips," which do not represent additional trips on the adjacent roadway, but do result in additional turns into and out of the development driveways by vehicles that would be passing by that site. The ITE *Trip Generation Handbook*[6] provides a methodology and pass-by rates for estimating the proportion of the Project vehicle trip ends that are pass-by trips. Pass-by trip factors are usually applied only to the afternoon peak hour since

[5] *Trip Generation, Sixth Edition*, Institute of Transportation Engineers, 1997.
[6] *Trip Generation Handbook, An ITE Proposed Recommended Practice*, Institute of Transportation Engineers, October 1998.

many retail and service businesses are not open or have low rates of trip generation during the morning peak hour. For the commercial uses, Appendix A lists the total number of vehicles entering and exiting the land use and also lists the number of "new" vehicle trips on the area roadways generated by the land use in the afternoon peak hour, excluding the pass-by trips.

The anticipated growth within the City of Kapolei by 2018 would increase the morning peak hour trips by about 5,400 trips, and the afternoon peak hour by about 7,500 new trips on area roadways. With the predominantly commercial uses, the majority of the trips in the morning peak hour are traveling to the City of Kapolei land uses, and in the afternoon the majority of trips are departing these uses.

By 2018, the new development near the City of Kapolei (Ko Olina, Kapolei Business Park, Villages of Kapolei, etc.) is estimated to generate an increase of about 8,800 and 10,900 new vehicle trips in the morning and afternoon peak hours, respectively.

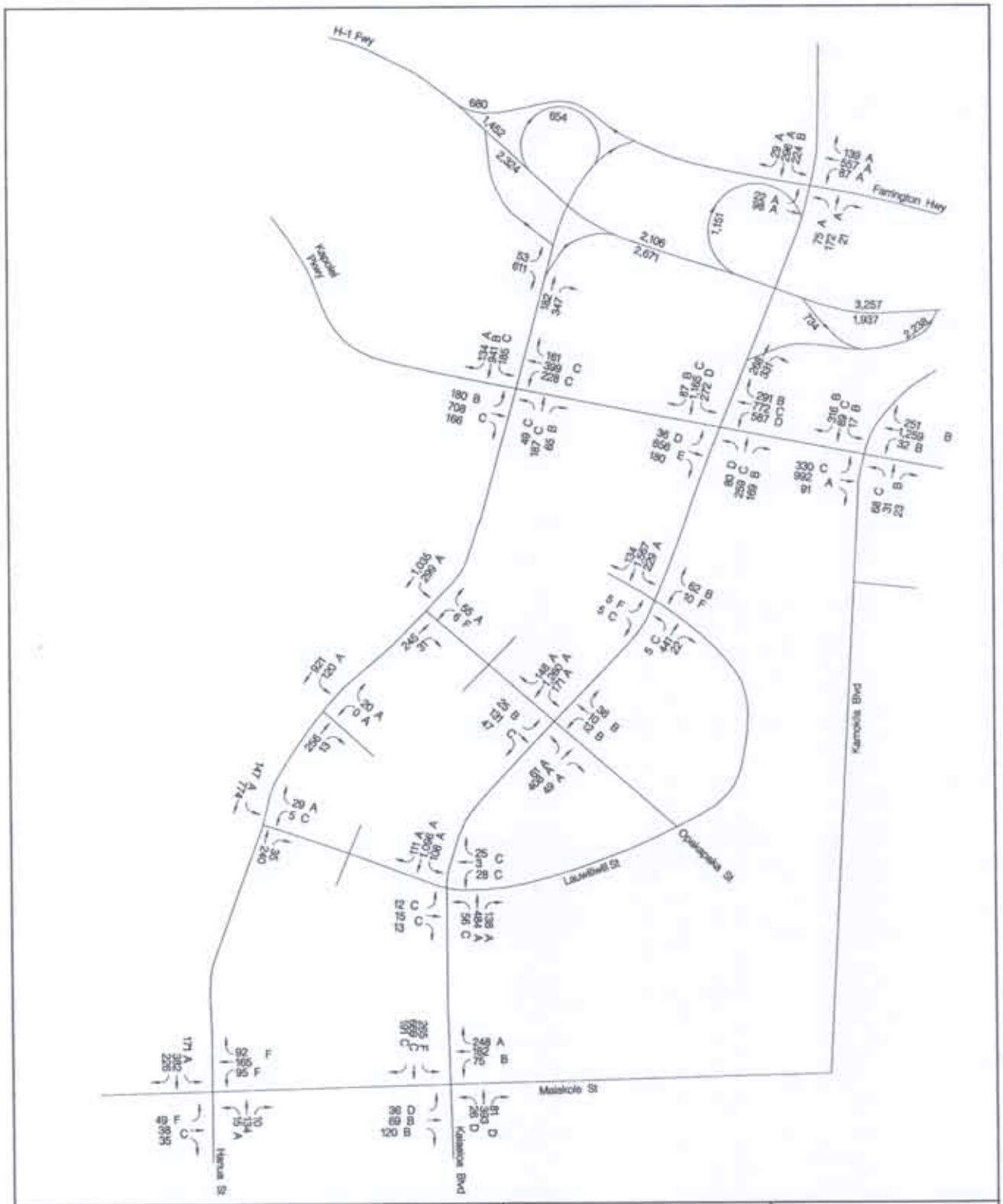
2018 Peak Hour Traffic Volumes

The origins and destinations of the additional vehicle trips were based on OMPO forecast data and assigned to the roadway system. The forecast 2018 weekday traffic volumes without the Kapolei Harborside Center development are depicted in Figures 3-2 and 3-3 for the morning and afternoon peak traffic hours, respectively. The forecasts are based on the Hanua Street Extension being open from Malakole Street to the Palailai Interchange, and the completion of the Palailai Interchange. The extension of Lauwiliwili Street Makai to the Harbor is not constructed without the development of the Kapolei Harborside Center project lands on which this section would be constructed, with Harbor trips continuing to use Malakole Street.

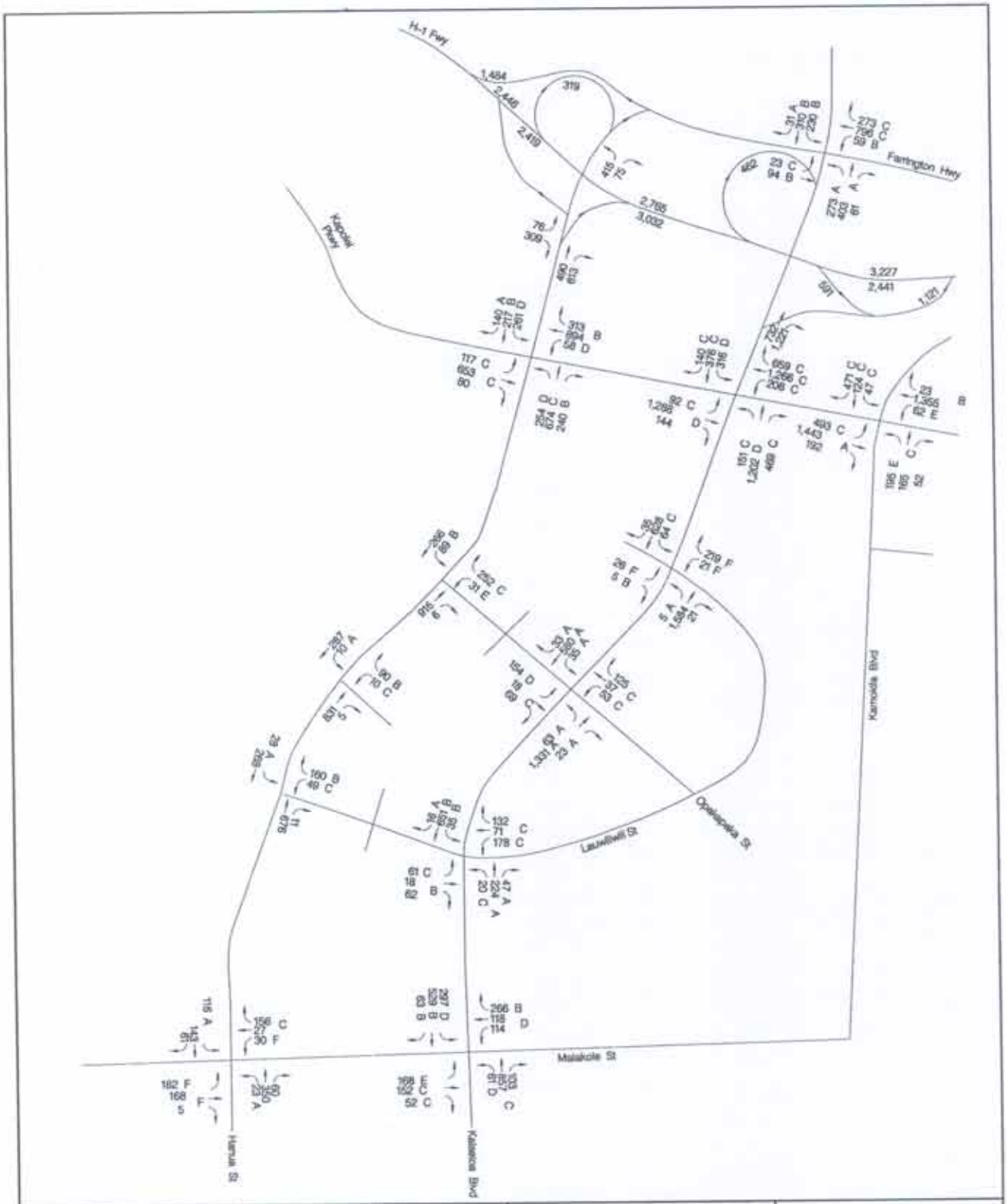
The forecast traffic volumes reflect several other roadway improvements that would change the present circulation patterns. The planned Kapolei Interchange will divert some traffic that currently uses the Palailai Interchange and Kalaeloa Boulevard to access the City of Kapolei. However, the eastward extension of the Kapolei Parkway to Fort Barrette Road and westward extension from Kalaeloa Boulevard to Ko Olina will increase traffic volumes along the Kapolei Parkway through the Kalaeloa Boulevard corridor. The connection of Malakole Street to the roadways within the Kalaeloa Redevelopment Area will allow some of the traffic to/from the Kalaeloa Boulevard corridor to travel through the Redevelopment Area to/from the Fort Weaver Road corridor, the City of Kapolei, and the Villages of Kapolei areas, thus reducing the traffic increases along the mauka section of Kalaeloa Boulevard.

The net result of the area growth and the roadway changes is projected to increase traffic volumes along the section of Kalaeloa Boulevard between the H-1 Freeway and the Kapolei Parkway by about 55% and 76% in the morning and afternoon peak hours, respectively, as compared to the 2006 traffic volumes. The volume of traffic on the parallel connection of the Hanua Street Extension to the freeway ramps would total approximately 1,790 and 1,720 vehicles in the morning and afternoon peak hours, respectively.

Traffic volumes along the section of Hanua Street just makai of the Kapolei Parkway would total approximately 1,630 and 1,520 vehicles in the morning and afternoon peak hours, respectively.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 MORNING PEAK HOUR TRAFFIC WITHOUT PROJECT	FIGURE 3-2



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 AFTERNOON PEAK HOUR TRAFFIC WITHOUT PROJECT	FIGURE 3-3

These volumes would approximate 67% and 60% of the peak hour volumes, respectively, on the parallel section of Kalaeloa Boulevard (2,440 morning and 2,550 afternoon peak hour volumes).

Traffic volumes along Malakole Street east of Kalaeloa Boulevard are expected to more than double between 2006 and 2018. Most of this increase would result from the diversion of traffic from Kalaeloa Boulevard to the new roadway connection from the Kalaeloa Boulevard corridor to the Fort Weaver Road, East Kapolei, and City of Kapolei areas through the Kalaeloa Redevelopment Area.

2018 PEAK HOUR TRAFFIC CONDITIONS

The peak hour traffic conditions were analyzed for the key locations and freeway ramps that would be affected by traffic traveling to/from the Kapolei Harborside Center development.

2018 Peak Hour Traffic Conditions at Key Intersections

Traffic conditions for the year 2018 weekday traffic peak hours without the Kapolei Harborside Center Project traffic are summarized for the key intersections in Table 3-1. Traffic conditions are given only for those key intersections that could be most directly affected by the Project traffic.

Farrington Highway-Kalaeloa Boulevard – The proposed Makaiwa Hills development would add a mauka leg to this intersection. That development and the Palailai-Makakilo Interchanges project would also add a traffic signal control and additional lanes to the intersection. With the traffic signal and additional turn lanes, the intersection would accommodate the estimated 2018 peak hour traffic volumes at very acceptable levels of capacity use and average delays per vehicle.

Kalaeloa Boulevard-Kapolei Parkway – With the increased turn lanes and widening on Kalaeloa Boulevard, the forecast 2018 traffic in the morning peak hour would approximate 85% of the estimated capacity of this intersection with overall average vehicle delay at LOS D based on optimized timing of the traffic signal. In the afternoon peak hour, the forecast traffic would amount to 93% of capacity, with overall intersection delays at LOS C.

Kalaeloa Boulevard Intersections with Kapolei Business Park Roadways – The intersections with Opakapaka Street and the makai end of Lauwiliwili Street are expected to be controlled by traffic signals with the development of the I-2 lands along the west side of Kalaeloa Boulevard. Each of these three intersections is projected to operate at acceptable levels of capacity use and average delays with Kalaeloa Boulevard as a four-lane divided roadway.

Table 3-1
2018 TRAFFIC CONDITIONS AT KEY INTERSECTIONS
WITHOUT PROJECT

Intersections	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Kalaeloa Blvd.-Farrington Hwy	0.49	8.7	A	0.62	16.5	B
Kalaeloa Blvd.-Kapolei Pkwy	0.85	39.0	D	0.93	33.5	C
Kalaeloa Blvd.-Lauwiliwili St. (Mauka) WB Left-turn	0.13	51.5	F	0.34	81.7	F
Kalaeloa Blvd.-Opakapaka St. Westbound Left Turn	0.58	6.7	A	0.65	12.1	B
Kalaeloa Blvd.-Lauwiliwili St. (Makai) WB Left-turn	0.47	7.6	A	0.61	10.3	B
Kalaeloa Blvd.-Malakole St.	0.61	44.2	D	0.74	27.5	C
Hanua St.-Kapolei Pkwy.	0.65	20.1	C	0.78	23.5	C
Hanua St. Ext.-Opakapaka St. Westbound Left Turn	0.08	53.2	F	0.29	47.9	E
Hanua St.-I-2 Parcel Access Rd. Westbound Left-turn	0.03	9.2	A	0.04	17.9	C
Hanua St.-Lauwiliwili St. Makai Westbound Left Turn	0.03	23.9	C	0.22	24.1	C
Hanua St.-Malakole St. WB AM/EB PM Left Turn	1.35	230.0	F	1.67	397.9	F
Kapolei Pkwy.-Kamokila Blvd.	0.69	13.9	B	0.83	19.8	B
Kapolei Pkwy.-Kamaaha Ave.	0.59	11.9	B	0.50	10.8	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
NA = Not Analyzed

Wilbur Smith Associates; July 20, 2006.

The mauka intersection of Lauwiliwili Street was assumed to retain STOP sign control. With STOP sign control, the side-street traffic would experience long delays (LOS F) in both peak hours. Federal and state highway officials have established a series of warrants for consideration of traffic signal control at an intersection, which are set forth in the MUTCD.[7] If conditions for an intersection do not satisfy one of the warrants, a signal is not appropriate for the location. If the conditions do satisfy one or more warrants, then a signal may be appropriate and could be considered based on further engineering studies.

Warrant #3, Peak Hour, is the primary criteria when considering forecast future traffic conditions at an intersection. The traffic conditions for the westbound two-lane approach of Lauwiliwili Street in the afternoon peak hour were compared to the MUTCD Warrant #3 criteria.

- **Warrant 3 Category A**

  All three conditions of these criteria must be satisfied by the same one-hour period: With the two-lane westbound approach, the requirements and forecast values for the afternoon peak hour period are as follows:

Peak Hour Criteria	Minimum Requirement	Forecast Amount	Satisfy Requirement
Minor Street Delay	5 hours	4.1 hours	No
Minor Street Volume	150 vehicles	240 vehicles	Yes
Total Intersection Volume	800 vehicles	2,610vehicles	Yes

  The forecast intersection vehicle delay in 2018 without the Project would not satisfy the requirements to allow consideration of a traffic signal at this location.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Kalaeloa Boulevard, this warrant would require a minimum of 150 vehicles exiting one of the two side street approaches in the peak hour.

  The westbound approach of Lauwiliwili Street, with a forecast 240 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Based on the forecast volumes and conditions in the afternoon peak hour, the intersection would not merit further consideration of a traffic signal.

Kalaeloa Boulevard-Malakole Street – Traffic conditions at this intersection are projected to remain at acceptable levels based on the existing numbers of lanes at the intersection. The

[7] *Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition*, Federal Highway Administration, 2003.

forecast volumes would approximate 74% of intersection capacity in the afternoon peak hour with average overall delays at LOS C based on optimum signal timing.

Hanua Street Extension-Kapolei Parkway – This intersection is projected to operate at very acceptable conditions with the anticipated lanes in 2018.

Hanua Street Extension-Opakapaka Street – The small numbers of left turns on the westbound approach at this intersection would experience long delays (LOS F) in the afternoon peak hour with STOP sign control of the side street. However, the side-street volumes are too low to merit consideration of a traffic signal.

Hanua Street Extension Intersections with I-2 Parcel Access Road and Lauwiliwili Street Makai – The low volumes of side street traffic turning left form these two intersections would result in only short delays, based on the forecast traffic volumes in 2018.

Hanua Street-Malakole Street – With the assumed STOP sign control on the Malakole Street approaches, the left-turn and through traffic along Malakole Street would experience long delay at this intersection.

The traffic volumes and estimated delay (23.1 hours versus 5-hour minimum) in the afternoon peak hour would greatly exceed the MUTCD Warrant #3 criteria for consideration of a traffic signal, therefore traffic signal control is assumed for the analysis of the With Project scenario. With traffic signal control, the peak hour traffic conditions for the Without Project scenario are:

Peak Hour Conditions Without Project	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.44	8.8	A
Afternoon	0.51	9.2	A

Kapolei Parkway-Kamokila Boulevard – This intersection would operate with acceptable levels of delay with the planned lanes and the installation of traffic signal control.

Kapolei Parkway-Kamaaha Avenue – This intersection would operate with acceptable levels of delay with the planned lanes and traffic signal control.

Palailai Interchange Ramp Conditions

The 2018 peak hour traffic conditions were assessed for the weaving section of the eastbound H-1 Freeway ramps on the east side of the Palailai Interchange as well as freeway merge/diverge sections for those Palailai Interchange ramps that would be used by the Project traffic. The analysis was made using the HCM procedures (Appendix A) and HCS software.

Eastbound Kalaeloa-Wakea Weaving Section – This weaving section would remain with the planned modifications to the Palailai Interchange. The 1,200-foot long weaving section has a

single-lane entry from the Freeway at the west end with this single-lane continuing through the weaving section to exit onto the Freeway at the east end. The entry ramp from Kalaeloa Boulevard would have two lanes with these lanes continuing through the weaving section to merge into a single lane before connecting to the southbound lanes of the planned Wakea Street extension along the east side of the Consolidated Theaters building.

The 2018 traffic volumes in this weaving section are estimated to operate at a very acceptable LOS B during the morning peak hour (Table 3-2). The afternoon peak hour volumes are estimated at an acceptable LOS C with the average speeds in the weaving lanes at about 24.5 mph.

Palailai Interchange Ramps – The estimated peak hour traffic conditions in the freeway lanes near the merge or diverge points for each of the Palailai Interchange ramps is summarized in Table 3-3. The analysis is based on no widening of the freeway through this area.

The new on-ramp from Hanua Street to the eastbound freeway is estimated to result in LOS C conditions in both peak hours for the freeway lanes. This ramp is projected with comparatively low volumes without the development of the Harborside Center lands.

The traffic conditions in the eastbound lanes approaching the new off-ramp to Hanua Street would result in average densities reflecting LOS D conditions. The other two westbound ramps are projected with LOS D conditions in the afternoon peak hour, with LOS B or C in the morning peak hour.

The loop off-ramp for westbound traffic exiting from the H-1 Freeway to Hanua Street would have an estimated capacity of about 1,800 vehicles per hour. The estimated morning peak hour volume of 529 vehicles amounts to about 30% of the potential ramp capacity.

Traffic conditions are not presented for the junction of eastbound On-ramp KC-1 from Kalaeloa Boulevard since it joins the eastbound freeway as an added through lane and no merge maneuver is necessary. The on-ramp from the Eastbound Weaving Roadway has an estimated potential capacity of about 2,100 vehicles per hour. The afternoon peak hour volumes amount to about 65% of the capacity.

Table 3-2
2018 WEAVING SECTION TRAFFIC CONDITIONS
WITHOUT PROJECT

Peak Hour	Average Speed (mph)			Density (vplph)	Level of Service
	All Traffic	Non-Weave	Weaving		
Eastbound Separate Weaving Roadway Kalaeloa Blvd.-Wakea St. (Existing)					
Morning	28.0	41.0	27.7	14.0	B
Afternoon	24.1	36.1	24.5	27.3	C

vplph = vehicles per lane per hour

Wilbur Smith Associates; May 3, 2006

Table 3-3
2018 TRAFFIC CONDITIONS ALONG FREEWAY
AT RAMP MERGE AND DIVERGE AREAS WITHOUT PROJECT

Ramp Junction	Peak Hour	Average Speed (mph)		Traffic Density (vplph)	Level of Service
		Near Ramp	Other Lanes		
Eastbound Freeway					
Off-ramp PH to Hanua St.	AM	50.3	NA	29.8	D
	PM	50.6	NA	28.0	D
On-ramp PI From Hanua St.	AM	50.8	NA	23.2	C
	PM	50.3	NA	26.1	C
Westbound Freeway					
Loop Off-ramp PE to Hanua St.	AM	50.3	NA	24.1	C
	PM	50.7	NA	30.4	D
On-ramp PA from Kalaeloa Blvd./Hanua St.	AM	51.2	NA	18.4	B
	PM	47.9	NA	33.4	D

Near Ramp is the 1,500-foot section of the 2 lanes closest to ramp.
Other lanes are lanes closest to median if 3 or more lanes on freeway.
Vplph = vehicles per lane per hour for 2 lanes near ramp.
Level of Service is for 2 lanes near ramp.
NA = Not Applicable

Wilbur Smith Associates; May 3, 2006

Chapter 4
2018 WITH PROJECT BUILD-OUT

The entire 345-acre Kapolei Harborside Center Project area is expected to be fully developed by the end of 2018. This chapter assesses the transportation impacts with the full development of the area. Most of the other areas within the Kalaeloa Boulevard corridor are also assumed to be built out by 2018 with the exception of the Hawaii Raceway Park site and the Campbell Waterfront Industrial area, both located along Malakole Street.

DESCRIPTION OF THE PROJECT

The Kapolei Harborside Center development would encompass most of the vacant lands located between the future alignment of the Hanua Street Extension and the Barbers Point Harbor, from Malakole Street mauka to the planned Kapolei West development. The Project also includes several small parcels located on the east side of the planned Hanua Street alignment, as depicted in Figure 1-1.

Land Uses

Most of the Project area is expected to be developed with the light industrial-type uses similar to those in the nearby Kapolei Business Park, which would likely include a mix of light manufacturing facilities, warehousing, base yards for service businesses, and ancillary office uses. Area is provided for a regional drainage channel which would bisect the Project area as depicted in Figure 1-1.

The Project area is divided into a number of smaller parcels reflecting the planned network of roadways and the drainage channel. These small areas have been grouped into several analysis zones for the purposes of the traffic study, with these analysis zones identified as follows:

Northeast	Includes areas 1, 2, and 3 with about 23.7 acres of development land, access provided by local street connections to Hanua Street and Opakapaka Street
Northwest	Includes area 19 with about 23.6 acres of development land, access provided by local street connections to Opakapaka Street
West Central	Includes areas 16, 17, and 18 with about 54.9 acres of development land, access provided by local street connections to Opakapaka Street and Lauwiliwili Street Makai
East Central	Includes areas 4 and 5 with about 40.9 acres of development land, access provided by local street connections to Hanua

The Project would include construction of Opakapaka Street and provide land for other major regional roads that would serve both Project and regional traffic (Hanua Street extension and Lauwiliwili Street makai extension).

Opakapaka Street Extension – Existing Opakapaka Street (or Road A in the Kapolei Business Park) would be extended westward from Hanua Street to or near the western boundary of the Project lands. Right-of-way would be preserved to allow the future connection of this street to the Kapolei West roadways to provide access to the Kapolei West and Makaiwa Hills areas via Kapolei West Road D if and when such a connection is desired by the City.

Lauwiliwili Street (Makai) – The makai section of Lauwiliwili Street would be extended westward to connect to the Barbers Point Harbor roadways, with this roadway intended to serve as the primary access route to the Harbor in the future. The extension would be constructed as a four-lane roadway with median divider and separate left-turn lanes at cross streets and major driveways. It is anticipated that this roadway will be constructed by State DOT to provide access to the Harbor once right-of-way is transferred by the Harborside Center Project.

Access to the individual development parcels would be provided by a network of collector and local roadways, with this network depicted conceptually in Figure 1-1. The configuration of the local roadways and access locations to the regional and collector roadways will be refined during the Project planning process.

Traffic signal controls are assumed to be installed at the intersection of the Hanua Street Extension with the Opakapaka, Lauwiliwili Makai, and Malakole Streets. All other intersections

of Project roadways are assumed to be controlled by STOP signs. The planned numbers of travel lanes and lanes at key intersections are depicted in Figure 4-1.

PROJECT TRIP GENERATION

The numbers of vehicle trips generated by the Project were based on standard trip rates compiled by the Institute of Transportation Engineers (ITE).[1] The trip rates for an industrial park (ITE Land Use Category #130) were used for each of the development areas. The industrial park vehicle trip generation rate is slightly higher than rates for light industrial or manufacturing uses as it reflects inclusion of warehouse operations and service businesses.

Full development of the Project Area is estimated to generate a total of 2,135 and 2,207 vehicle trips to or from the site in the morning and afternoon peak hours, respectively, as outlined in Table 4-1. The Project would generate an estimated 15,750 vehicle trips to or from the site on a typical weekday.

PEAK HOUR TRAFFIC VOLUMES

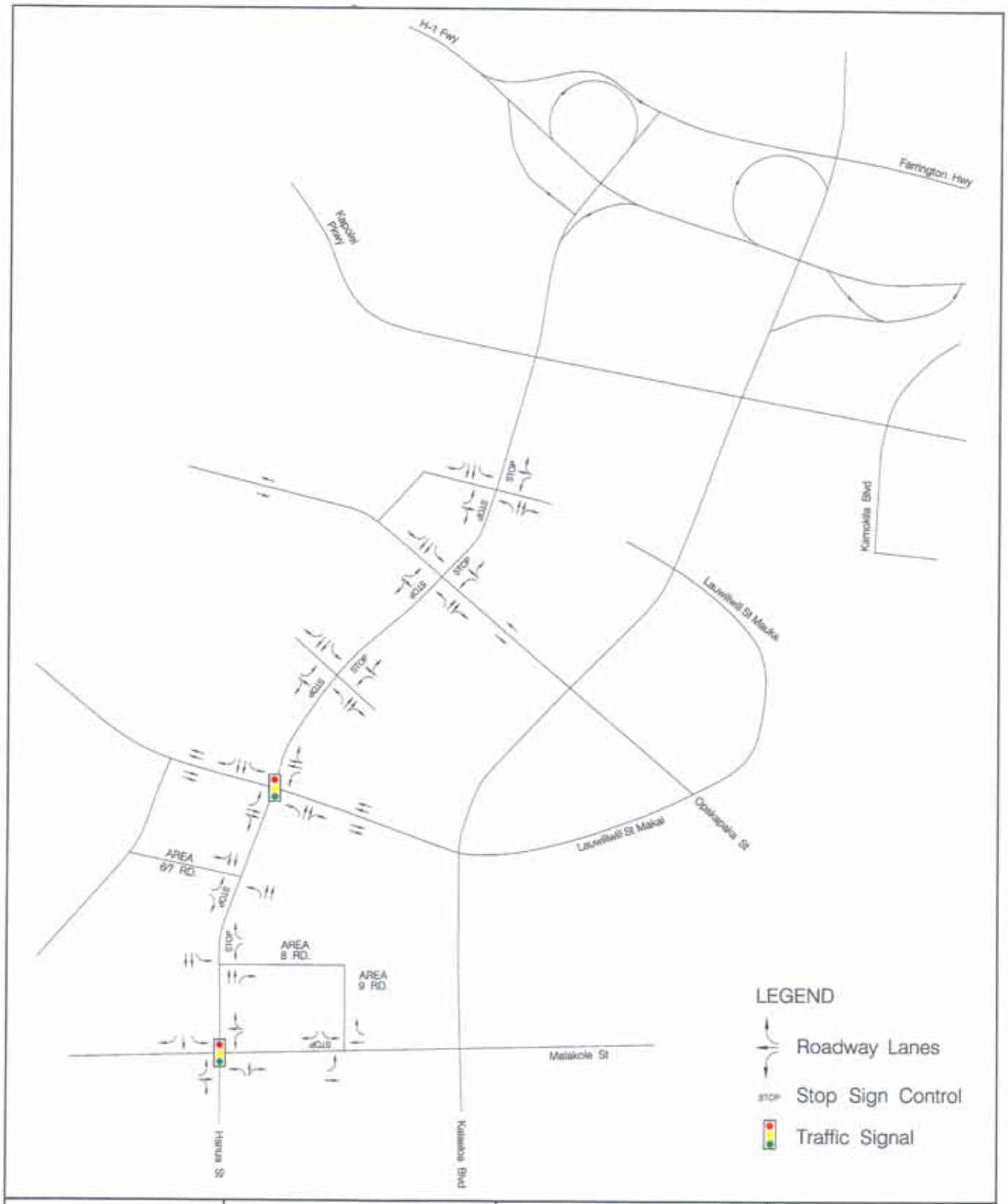
The vehicle trips to/from the Kapolei Harborside Center Project were distributed to surrounding areas based on the percentages presented in Appendix C. The resultant forecast of weekday peak hour traffic volumes on the area roadways are depicted in Figure 4-2 and 4-3 for the year 2018 morning and afternoon peak hours, respectively.

Table 4-1
VEHICLE TRIP GENERATION
FOR 2018 PROJECT BUILD-OUT

Area	Morning Peak Hour			Afternoon Peak Hour		
	Total	Enter	Exit	Total	Enter	Exit
Northeast (1,2,3)	203	168	34	210	44	165
Northwest (19)	202	168	34	209	44	165
West Central (16, 17, 18)	538	448	92	557	117	440
East Central (4, 5)	350	290	59	362	76	285
Southwest (6, 7, 12, 13 14, 15)	678	563	115	701	147	554
Southeast (8, 9)	164	136	28	170	36	134
Totals	**2,135**	**1,773**	**362**	**2,207**	**464**	**1,743**

Wilbur Smith Associates; March 24, 2006

[1] *Trip Generation, Seventh Edition,* Institute of Transportation Engineers, 2003.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 ROADWAY LANES AND TRAFFIC CONTROLS WITH PROJECT	FIGURE 4-1

Traffic volumes along Hanua Street just makai of the Kapolei Parkway would total about 2,970 vehicles in the morning peak hour, or about 1,330 more vehicles than for the 2018 Without Project scenario. In the afternoon peak hour, the Project Build-Out would result in an estimated 2,830 vehicles on Hanua Street just makai of the Kapolei Parkway, or about 1,300 more vehicles than with the Without Project Scenario

The Project is not expected to add many vehicle trips along Kalaeloa Boulevard. The volumes along the section of Kalaeloa Boulevard just makai of the Kapolei Parkway are forecast to decrease with the Project by about 140 (+ 0.5%) and 110 (+0.4%) in the morning and afternoon peak hours, respectively, as compared to the forecasts for 2018 without the Project.

The Project is estimated to add about 400 vehicle trips along the eastern section of Malakole Street in the morning peak hour, and about 320 trips in the afternoon peak hour. These volumes would represent about 18% of the Project trips.

The traffic forecasts do not reflect the extension of Opakapaka Street to connect to the Kapolei Parkway and Road D to provide access to the Kapolei West, Ko Olina, and Makaiwa Hills areas. The connection of Opakapaka Street to Road D and the Kapolei Parkway would be expected to attract use about 100 to 200 of those vehicles that would otherwise use Hanua Street to travel to the Kapolei Parkway to access the Kapolei West, Makaiwa Hills, and Ko Olina areas. There would likely also be a diversion of additional trips from the other areas along the Hanua Street and Kalaeloa Boulevard corridors to this route with this connection.

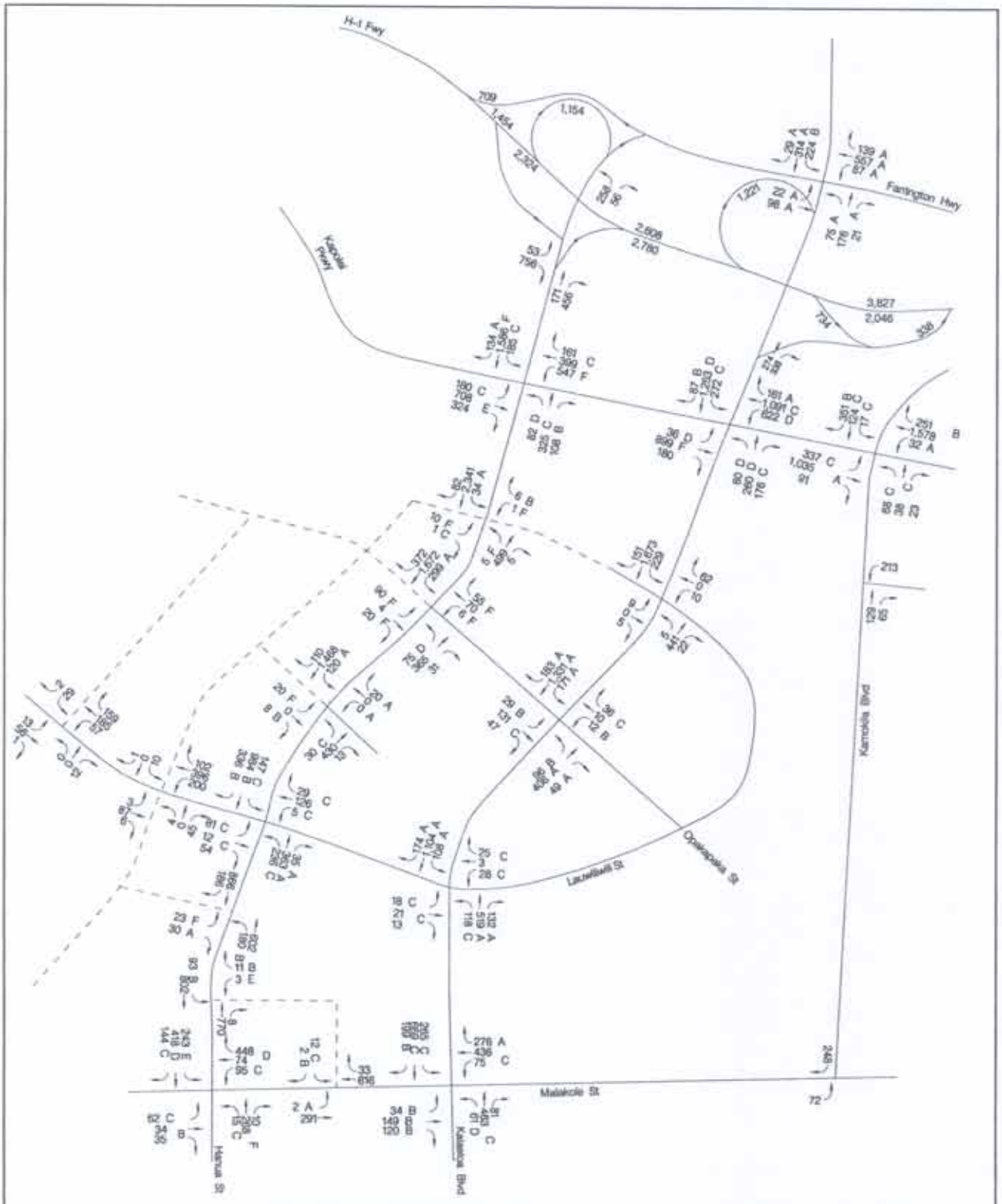
PEAK HOUR TRAFFIC CONDITIONS

Traffic conditions were analyzed for the 2018 weekday morning and afternoon peak one-hour traffic volumes with Project build-out. The analyses were made for the key intersections near the Project site, and for the key H-1 Freeway ramps at the Palailai Interchange. The methodology and criteria used in analyzing the traffic conditions at the intersection and on the freeway are described in Appendix A.

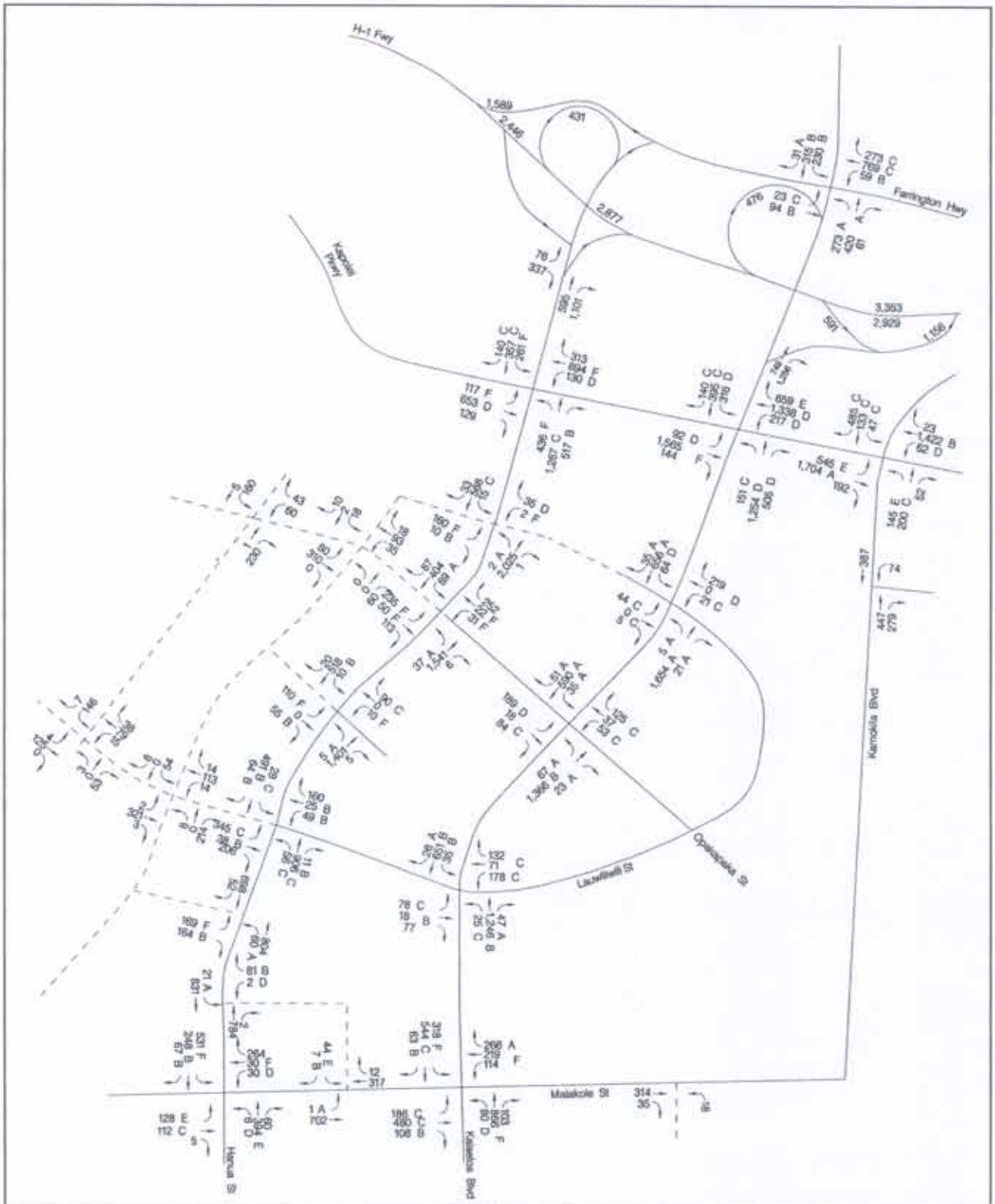
Key Intersection Conditions

Traffic conditions for the key intersections near the Project site, with the completion of the Project development, are summarized for the 2018 weekday morning and afternoon commute peak hours in Table 4-2. For comparison, year 2018 conditions without the Project are presented in Table 3-1.

Kalaeloa Boulevard-Farrington Highway – The Project would attract little additional traffic through this intersection and should not significantly affect traffic conditions.



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 MORNING PEAK HOUR TRAFFIC WITH PROJECT	FIGURE 4-2



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	2018 AFTERNOON PEAK HOUR TRAFFIC WITH PROJECT	FIGURE 4-3

Kapolei Parkway-Kalaeloa Boulevard – The increased Project traffic along Kapolei Parkway through this intersection would exceed the estimated capacity by about 8% in the afternoon peak hour, with average delay at LOS E. The forecast traffic in the morning peak hour would approximate 93% of the estimated intersection capacity with average delays at LOS D. Based on the planned lanes and forecast 2018 traffic at this intersection, mitigative actions would be needed to address the afternoon conditions.

Kalaeloa Boulevard Intersections with Kapolei Business Park Roadways – The analysis of the intersections with Opakapaka Street and both Lauwiliwili Street intersections reflected the two through lanes in each direction along this section of Kalaeloa Boulevard. The two intersections assumed to have traffic signal controls (Opakapaka and Lauwiliwili Makai Streets) would operate at very acceptable conditions with the planned lanes and estimated volumes.

Traffic turning left out of the side street approaches at the Lauwiliwili Street (Mauka) intersection is estimated to experience long waits (LOS F) for a gap to make their turn onto Kalaeloa Boulevard, based on STOP sign control. The delay would be higher in the afternoon peak hour with the higher volume of traffic exiting the side streets.

The afternoon peak hour traffic conditions at the Lauwiliwili Street Mauka intersection was compared to the MUTCD Warrant #3 criteria to assess whether a traffic signal would be appropriate for the intersection. The traffic conditions for the westbound approach of Lauwiliwili Street were compared to the Warrant #3 criteria since the estimated volumes on the eastbound approach (driveway access to the I-2 zoned development area) are too low to satisfy the volume portion of the warrant.

- **Warrant 3 Category A**

  All three conditions of these criteria must be satisfied by the same one-hour period: With the westbound approach providing a separate right-turn lane and a shared through/left-turn lanes, the requirements and forecast values for the afternoon peak hour period are as follows:

Peak Hour Criteria	Minimum Requirement	Forecast Amount	Satisfy Requirement
Minor Street Delay	5 hours	4.8 hours	No
Minor Street Volume	150 vehicles	240 vehicles	Yes
Total Intersection Volume	800 vehicles	2,720 vehicles	Yes

The forecast intersection delay in 2018 falls short of satisfying the Category A requirements to permit consideration of a traffic signal at this location.

Table 4-2
2018 TRAFFIC CONDITIONS AT KEY INTERSECTIONS
KAPOLEI HARBORSIDE CENTER

Intersection	Scenario	Morning Peak Hour			Afternoon Peak Hour		
		V/C	ADPV	LOS	V/C	ADPV	LOS
Kalaeloa Blvd.- Farrington Hwy.	Existing	0.42	30.6	D	1.30	185.4	F
	No Project	0.49	8.7	A	0.62	16.5	B
	Project Buildout	0.49	8.8	A	0.63	16.8	B
Kalaeloa Blvd.- Kapolei Pkwy.	Existing	0.74	35.0	D	0.94	73.2	E
	No Project	0.85	39.0	D	0.93	33.5	C
	Project Buildout	0.93	53.8	D	1.08	63.7	E
	Mitigated	0.88	36.3	D	0.97	47.6	D
Kalaeloa Blvd.- Lauwiliwili St. Makai	No Project	0.47	7.6	A	0.61	10.3	B
	Project Buildout	0.53	9.2	A	0.62	16.2	B
Kalaeloa Blvd.- Malakole St.	Existing	0.48	9.2	A	0.71	15.9	B
	No Project	0.61	44.2	D	0.74	27.5	C
	Project Buildout	0.79	25.1	C	1.26	72.1	E
	Mitigated	0.67	28.0	C	0.92	46.1	D
Hanua St.- Kapolei Pkwy.	No Project	0.65	20.1	C	0.78	23.5	C
	Project Buildout	1.14	69.8	E	0.94	62.5	E
	Mitigated	0.83	44.5	D	0.93	45.3	D
Hanua St.- Opakapaka St.	No Project	0.08	53.2	F	0.29	47.9	E
	Project Buildout	*	*	F	*	*	F
	Mitigate	0.73	8.0	A	0.86	15.6	B
Hanua St.- Lauwiliwili Makai	No Project	0.03	23.9	C	0.22	24.1	C
	Project Buildout	0.67	17.3	B	0.81	21.0	C
Hanua St.- Malakole St.	Existing	0.05	16.5	C	0.01	11.3	B
	No Project	0.44	8.8	A	0.51	9.2	A
	Project Buildout	0.88	54.4	D	1.12	94.2	F
	Mitigated	0.79	40.9	D	0.92	49.1	D
Kapolei Pkwy.- Kamokila Blvd.	No Project	0.69	13.9	B	0.83	19.8	B
	Project Buildout	0.76	14.6	A	0.83	21.9	B

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
* = Delay not calculated since unreliable where traffic substantially exceeds capacity.

Wilbur Smith Associates; July 20, 2006.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Hanua Street, this warrant would require a minimum of 150 vehicles exiting one of the two side street approaches in the peak hour.

  The westbound approach of Lauwiliwili Street, with a forecast 240 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Based on the forecast volumes and conditions in the afternoon peak hour, a traffic signal would not be appropriate at this intersection. However, the specific land uses and internal street configuration within the I-2 Parcel are not known at this time and the actual site plan could result in much higher volumes than those in this forecast. Therefore, conditions should be monitored after the development of the I-2 parcel to assess actual conditions.

Kalaeloa Boulevard-Malakole Street – The additional Project traffic traveling along Malakole Street to, from, or through the Kalaeloa Redevelopment Area would result in congested conditions in the afternoon peak hour. The increased traffic would exceed the intersection capacity by 26% and result in long traffic delays (LOS E). The Project impacts would merit mitigative actions at this intersection.

Kapolei Parkway-Hanua Street Extension – The increased traffic along Hanua Street as a result of the Project would slightly exceed the intersection capacity in the morning peak hour with the proposed lanes, with average overall delay calculated at LOS F. Afternoon peak hour traffic would approximate 94% of intersection capacity. Further improvements would be appropriate at this intersection to accommodate forecast 2018 peak hour traffic with the Project Build-out.

Hanua Street-Opakapaka Street – The use of STOP sign control on the Opakapaka Street approaches would result in extremely long delays for traffic traveling through or turning left from both Opakapaka Street approaches.

The traffic conditions for the eastbound approach of Opakapaka Street in the afternoon peak hour were compared to the MUTCD Warrant #3 criteria for consideration of a traffic signal at this location. If the conditions do not satisfy the warrant, a traffic signal is not appropriate to address the long delays; if the conditions satisfy the warrant, a traffic signal may be considered for the intersection.

- **Warrant 3 Category A**

  All three conditions of these criteria must be satisfied by the same one-hour period: With the eastbound approach striped to provide a separate left-turn lane and a shared through/right-turn lanes, the requirements and forecast values for the afternoon peak hour period are as follows:

Peak Hour Criteria	Minimum Requirement	Forecast Amount	Satisfy Requirement
Minor Street Delay	5 hours	494 hours	Yes
Minor Street Volume	150 vehicles	395 vehicles	Yes
Total Intersection Volume	800 vehicles	2,870 vehicles	Yes

The forecast intersection conditions in 2018 would satisfy the requirements to permit installation of a traffic signal at this location.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Hanua Street, this warrant would require a minimum of 150 vehicles exiting one of the side street approaches in the peak hour.

  The eastbound approach of Opakapaka Street, with a forecast 395 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Based on the forecast volumes and conditions in the afternoon peak hour, a traffic signal may be appropriate at this intersection. With the installation of a traffic signal and the existing lanes, the traffic conditions with the forecast 2018 traffic would be as follows:.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.73	8.0	A
Afternoon	0.91	20.8	C

Hanua Street-Lauwiliwili Street Makai – This intersection would provide access to the Harbor as well as to the Project site. With traffic signal control, the intersection would operate at very acceptable conditions with both streets planned as four-lane divided roadways

Hanua Street-Malakole Street – The assessment of the 2018 conditions without the Project indicated that the connection of Hanua Street to the H-1 Freeway would result in traffic volumes and conditions that would merit installation of traffic signal control at the Malakole Street intersection. With the signal control, the large volumes of vehicles turning left from the makai-bound approach of Hanua Street and from the eastbound Malakole Street approach would result in congested conditions during the afternoon peak hour. The makai-bound left-turn traffic would primarily consist of Project traffic traveling to or through the Kalaeloa Redevelopment Area via Malakole Street. Mitigative actions would be needed to address the long delays.

Kapolei Parkway Intersections with Kamokila Boulevard and Kamaaha Avenue – These intersections would operate at acceptable conditions with the planned lanes and the installation of traffic signal controls.

Project Access Road Intersection Conditions

Traffic conditions were analyzed for the proposed Project access road connections to the major regional roadways (Kalaeloa Boulevard, Hanua Street, and Malakole Street) with the Project build-out traffic. The conditions are summarized for the 2018 weekday morning and afternoon commute peak hours in Table 4-3.

Hanua Street-Areas 1 & 2 Access Road – The use of STOP sign control on the proposed Area 1 and 2 Access Road approaches would result in extremely long delays for traffic traveling through or turning left from both Lauwiliwili Street approaches.

The traffic conditions for the eastbound approach to Hanua Street (access road to Project Areas 2 and 3) in the afternoon peak hour were compared to the MUTCD Warrant #3 criteria for consideration of a traffic signal at this location. If the conditions do not satisfy the warrant, a traffic signal is not appropriate to address the long delays; if the conditions satisfy the warrant, a traffic signal may be considered for the intersection.

- **Warrant 3 Category A**

  All three conditions of these criteria must be satisfied by the same one-hour period: With the eastbound approach striped to provide a separate left-turn lane and a shared through/right-turn lanes, the requirements and forecast values for the afternoon peak hour period are as follows:

Peak Hour Criteria	Minimum Requirement	Forecast Amount	Satisfy Requirement
Minor Street Delay	5 hours	444 hours	Yes
Minor Street Volume	150 vehicles	170 vehicles	Yes
Total Intersection Volume	800 vehicles	2,850 vehicles	Yes

  The forecast intersection conditions in 2018 would satisfy the requirements to permit installation of a traffic signal at this location.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Hanua Street, this warrant would require a minimum of 150 vehicles exiting one of the two side street approaches in the peak hour.

  The eastbound approach (Area 2 Access Road), with a forecast 170 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Table 4-3
2018 TRAFFIC CONDITIONS AT INTERSECTIONS WITH PROJECT ACCESS ROADS

Intersections	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
	V/C	ADPV	LOS	V/C	ADPV	LOS
Hanua St.-Access Road Area 1 & 2 EB Left Turn	9.91	*	F	5.02	*	F
Hanua St.-Access Road Area 5 EB Left Turn	1.99	1129	F	2.07		F
Hanua St.-Access Road Areas 6/7 EB Left Turn	0.53	145.7	F	1.45	320	F
Hanua St.-Access Road Area 8 Westbound Left Turn	0.04	45.0	E	0.02	33.0	D
Malakole St.-Access Road Area 9 Makai-bound Left	0.01	9.9	A	0.30	36.3	E

V/C = Ratio of the traffic volume to the theoretical capacity of the intersection.
ADPV = Average delay per vehicle, in seconds.
LOS = Level of service.
All are based on STOP sign control of access road.
* = Delay not calculated since unreliable where traffic substantially exceeds capacity.
Wilbur Smith Associates; May 3, 2006.

Based on the forecast volumes and conditions in the afternoon peak hour, a traffic signal may be appropriate at this intersection. With the installation of a traffic signal and the existing lanes, the traffic conditions with the forecast 2018 traffic would be as follows:.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.84	8.6	A
Afternoon	0.90	30.7	C

Hanua Street-Area 5 Access Road – The use of STOP sign control on the Area 5 and 1-2 property access roads approaches would result in extremely long delays for traffic turning left from either of these approaches.

The traffic conditions for the eastbound approach of Area 5 Access Road in the afternoon peak hour were compared to the MUTCD Warrant #3 criteria for consideration of a traffic signal at

this location. If the conditions do not satisfy the warrant, a traffic signal is not appropriate to address the long delays; if the conditions satisfy the warrant, a traffic signal may be considered for the intersection.

- **Warrant 3 Category A**

  All three conditions of these criteria must be satisfied by the same one-hour period: With the eastbound approach striped to provide a separate left-turn lane and a shared through/right-turn lanes, the requirements and forecast values for the afternoon peak hour period are as follows:

Peak Hour Criteria	Minimum Requirement	Forecast Amount	Satisfy Requirement
Minor Street Delay	5 hours	20.0 hours	Yes
Minor Street Volume	150 vehicles	165 vehicles	Yes
Total Intersection Volume	800 vehicles	2,230vehicles	Yes

  The forecast intersection conditions in 2018 would satisfy the requirements to permit installation of a traffic signal at this location.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Hanua Street, this warrant would require a minimum of 150 vehicles exiting one of the two side street approaches in the peak hour.

  The eastbound approach of the Area 5 Access Road, with a forecast 165 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Based on the forecast volumes and conditions in the afternoon peak hour, a traffic signal may be appropriate at this intersection. With the installation of a traffic signal and the existing lanes, the traffic conditions with the forecast 2018 traffic would be as follows:.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.65	12.0	B
Afternoon	0.67	12.3	B

Hanua Street-Area 6/7 Access Road – The use of STOP sign control on the Area 6/7 Access Road approach would result in extremely long delays for traffic turning left from this approach.

The traffic conditions for the Area 6/7 Access Road in the afternoon peak hour were compared to the MUTCD Warrant #3 criteria for consideration of a traffic signal at this location. If the

permit installation of a traffic signal at this location.

- **Warrant 3 Category B**

  For the number of lanes at this intersection and the afternoon peak hour volumes along Hanua Street, this warrant would require a minimum of 150 vehicles exiting one of the two side street approaches in the peak hour.

  The eastbound approach of the Area 6/7 Access Road, with a forecast 333 vehicles in the afternoon peak hour, has more than the minimum volume requirement and satisfies this part of the warrant.

Based on the forecast volumes and conditions in the afternoon peak hour, a traffic signal may be appropriate at this intersection. With the installation of a traffic signal and the existing lanes, the traffic conditions with the forecast 2018 traffic would be as follows:.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.52	10.4	B
Afternoon	0.51	10.8	B

Hanua Street-Area 8 Access Road – The use of STOP sign control on the Area 8 Access Road approach would result in long (LOS D) delays, but neither the estimated delay nor the estimated volume of traffic would satisfy Warrant #3 for consideration of a traffic signal.

Alternatively, the Area 8 Access Road and the Area 5 Access Road could be aligned to create a single four-leg intersection with Hanua Street. This would minimize the number of access intersections along Hanua Street and would provide a potential signal-controlled exit from both

development areas. The access road could be aligned along the makai boundary of the proposed Kapolei Studios development within the existing I-2 zoned area to provide a secondary access route for that site.

Malakole Street-Area 9 Access Road – The use of STOP sign control on the Area 9 Access Road approach would result in long (LOS D) delays, but neither the estimated delay nor the estimated volume of traffic would satisfy Warrant #3 for consideration of a traffic signal.

Palailai Interchange Ramp Conditions

The 2018 peak hour traffic conditions were assessed for the weaving section of the eastbound H-1 Freeway ramps on the east side of the Palailai Interchange as well as freeway merge/diverge sections for those Palailai Interchange ramps that would be used by the Project traffic. The analysis was made using the HCM procedures (Appendix A) and HCS software.

Eastbound Kalaeloa-Wakea Weaving Section – In the morning peak hour, the 1,200-foot long weaving roadway is projected to operate at similar conditions during the morning peak hour with or without the addition of the Project traffic. The 2018 traffic volumes in this weaving section are estimated to operate at a very acceptable LOS B (Table 4-3).

In the afternoon peak hour, the small volume of Project trips using the weaving section would have minimal effect on traffic conditions. Traffic conditions in the weaving section are estimated at LOS C with or without the Project.

Palailai Interchange Ramps – The estimated peak hour traffic conditions in the freeway lanes near the merge or diverge points for each of the Palailai Interchange ramps is summarized in Table 4-4. The analysis is based on no widening of the freeway through this area.

In the morning peak hour, the addition of Project traffic to the loop off-ramp from the westbound freeway to Hanua Street would worsen traffic conditions from LOS C (Without Project) to LOS D. The projected conditions for the on-ramp from Hanua Street to the eastbound freeway are estimated to worsen from LOS C to LOS D with the increased traffic volume in the afternoon peak hour. The HCM procedures estimate that the Project traffic should reduce average speed on the adjacent section of freeway by 0.7 mph or less.

The estimated increase in peak hour traffic volumes on the other ramps would not be expected to change the level of service from those without the Project.

The loop off-ramp for westbound traffic exiting from the H-1 Freeway to Hanua Street would have an estimated capacity of about 1,800 vehicles per hour. The estimated morning peak hour volume of 1,154 vehicles amounts to about 64% of the potential ramp capacity versus 30% without the Project.

The on-ramp from the Eastbound Weaving Roadway has an estimated potential capacity of about 2,100 vehicles per hour. The afternoon peak hour volumes with the Project would amount to about 55% of the capacity versus 53% without the Project.

Table 4-3
2018 WEAVING SECTION TRAFFIC CONDITIONS
WITH PROJECT

Peak Hour	Average Speed (mph)			Density (vplph)	Level of Service
	All Traffic	Non-Weave	Weaving		
Eastbound Separate Weaving Roadway Kalaeloa Blvd.-Wakea St. (Existing)					
Morning	27.7	40.7	27.4	14.6	B
Afternoon	24.4	35.8	23.9	28.0	C

vplph = vehicles per lane per hour

Wilbur Smith Associates; May 3, 2006

Table 4-4
2018 TRAFFIC CONDITIONS ALONG FREEWAY
AT RAMP MERGE AND DIVERGE AREAS WITH PROJECT

Ramp Junction	Peak Hour	Average Speed (mph)		Traffic Density (vplph)	Level of Service
		Near Ramp	Other Lanes		
Eastbound Freeway					
Off-ramp PH to Hanua St.	AM	50.1	NA	31.1	D
	PM	50.6	NA	28.3	D
On-ramp PI From Hanua St.	AM	50.7	NA	24.0	C
	PM	49.3	NA	30.0	D
Westbound Freeway					
Loop Off-ramp PE to Hanua St.	AM	49.6	NA	28.9	D
	PM	50.6	NA	31.4	D
On-ramp PA from Kalaeloa Blvd./Hanua St.	AM	51.2	NA	18.6	B
	PM	47.5	NA	34.3	D

Near Ramp is the 1,500-foot section of the 2 lanes closest to ramp.
Other lanes are lanes closest to median if 3 or more lanes on freeway.
Vplph = vehicles per lane per hour for 2 lanes near ramp.
Level of Service is for 2 lanes near ramp.
NA = Not Applicable

Wilbur Smith Associates; May 3, 2006

PUBLIC TRANSIT AND BICYCLE TRAVEL

The Kapolei Parkway is planned to include bicycle lanes to encourage use of bicycles for transportation purposes as well as for recreation. Bicycle lanes or a bicycle path should also be included along either Kalaeloa Boulevard or Hanua Street.

A transit center is planned within the Parcel L mixed-use development located makai of the Kapolei Parkway on the east side of Hanua Street. Once Hanua Street is extended through to connect to Malakole Street, one or more TheBus routes will likely be added along Hanua Street which would provide public transportation access to the Project area.

Actions that could encourage use of these travel modes for access to the Project are included in the list on the following page.

Public Transit

- Coordinate the potential location of bus stops with the City DTS and TheBus staffs and provide bus shelters at the stop locations.

- The Project should be designed to provide convenient and safe pedestrian linkages to the bus stop locations through a system of raised sidewalks and walkways.

Bicycles

- The collector streets within the Project site should be planned to accommodate bicycle use, and should provide a network of continuous street connections to allow use for bicycle travel by those who prefer not to travel along the major streets.

POTENTIAL MITIGATIVE ACTIONS

The following paragraphs identify potential roadway improvements to mitigate the impacts at those intersections substantially affected by the projected Kapolei Harborside Center traffic in 2018.

Kalaeloa Boulevard-Kapolei Parkway – The Project would primarily add traffic to the eastbound and westbound approaches of the Kapolei Parkway at this intersection. The addition of a separate right-turn lane on the eastbound approach of the Kapolei Parkway would improve capacity use, but the forecast volumes would exceed the capacity by 4% in the afternoon peak hour. The average delays would be improved to acceptable conditions as summarized in the following table.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.88	37.2	D
Afternoon	1.04	51.1	D

The intersection capacity use could also be improved by the construction of a second (double) right-turn lane to accommodate the high volume of traffic projected to turn right from the westbound approach to access the H-1 Freeway and the Makaiwa Hills area. With the addition of the right-turn lanes on both approaches, the forecast afternoon peak hour traffic would amount to about 97% of capacity.

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.88	36.3	D
Afternoon	0.97	47.6	D

These mitigative actions may be unnecessary if additional capacity were to be provided from the Kalaeloa Boulevard corridor to and through the Kalaeloa Redevelopment area to provide alternative routes for corridor traffic use in traveling to/from the Villages of Kapolei, East Kapolei, and Fort Weaver Road areas. The increased capacity connections could be provided by either of the following:

1. Widen Malakole Street between Kalaeloa Boulevard and the Kalaeloa Redevelopment Area roadways to a four-lane roadway; or
2. Provide the planned new roadway connection between Lauwiliwili Street and the Kalaeloa Redevelopment Area roadways in the Kapolei Business Park area, which would require a new crossing of the drainage channel separating the two areas.

Either of the above improvements should allow and encourage more travel by Project and non-Project traffic through the Redevelopment Area roadways and reduce the traffic volumes passing through the Kapolei Parkway intersections with both Hanua Street and Kalaeloa Boulevard.

Kalaeloa Boulevard-Malakole Street – Traffic conditions at this intersection are projected to worsen in the afternoon peak hour with the addition of the Project traffic, based on the existing numbers of lanes at the intersection. The forecast volumes would exceed the intersection capacity by an estimated 26% with average overall delays at LOS E, as a result of the Project traffic using Malakole Street to travel through the Kalaeloa Redevelopment Area to/from the Fort Weaver Road corridor and the City of Kapolei/East Kapolei area.

Several alternative modifications were considered for the intersection, with the effect on 2018 afternoon peak hour conditions summarized in the following table.

Potential Modification	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
1. Add WB Left-turn lane	1.08	66.6	E
2. Item 1 + stripe second EB through lane	0.94	48.0	D
3. Item 1 + add EB (double) left-turn lane	1.01	65.5	E
4. Item 1 + add NB right-turn lane	0.98	56.2	E
5. Item 3 + Item 4	0.96	55.1	E
6. Item 1 + add SB second left turn lane	0.92	46.1	D

- Adding a left-turn lane on eastbound Malakole Street would offset much of the Project impacts, although the projected traffic would exceed the intersection capacity by 8% with average overall delay at LOS E.

- Adding a left-turn lane on eastbound Malakole Street plus re-striping the right-turn lane on eastbound Malakole Street as a second through lane (Item 2) would result in estimated traffic at 94% of capacity with average overall delay at LOS D. Malakole Street would have to be widened on the east side of the intersection to provide two eastbound lanes for at least 400 feet from the intersection to receive the two through lanes.

- The adding of either a second (double) left-turn lane on eastbound Malakole Street (Item 3) or a right-turn lane on mauka-bound Kalaeloa Boulevard (Item 4) at the intersection would increase capacity to approximate the estimated traffic volumes, but with average delay remaining at LOS E. The combination of these two lanes with the westbound left-turn lane would improve to 96% of capacity with traffic delay just above the borderline (55 seconds) between LOS D and E.

- Adding a left-turn lane on eastbound Malakole Street plus adding a second (double) left-turn lane on the makai-bound Kalaeloa Boulevard approach (Item 6) would improve the volume-to-capacity ratio to 0.92, with average overall delay at LOS D. Malakole Street would have to be widened on the east side of the intersection to provide two eastbound lanes for at least 400 feet from the intersection to receive the two lanes of traffic turning left.

The addition of a second (double) left-turn lane on the makai-bound Kalaeloa Boulevard approach (Option 6) would be the most effective improvement option, with the provision of two westbound through lanes on Malakole Street (Option 2) slightly less effective. However, the implementation of either of these is affected by right-of-way ownership at the intersection:

- A related party (The Estate of James Campbell) of the Kapolei Harborside Center property owner controls the section of Kalaeloa Boulevard north of the intersection, as well as the intersection area and a small parcel on the northeast corner.

- The City and County of Honolulu owns the south leg of Kalaeloa Boulevard and the west leg of Malakole Street.

- Private landowner groups unrelated to the Harborside Center owner own both the roadway right-of-way and the adjacent properties along the east leg of Malakole Street, with the exception of about the first 100 feet of property along the north side of the street at the intersection, owned by the Campbell Estate.

A short left-turn lane (75-foot storage) on the westbound approach of Malakole Street in Option 1 could be implemented using the Campbell property in the northeast corner. Options 3, 4, and 5 could be implemented using Campbell and/or City right-of-way. However, Options 2 and 6, the two most effective improvement approaches would require use of right-of-way owned by unrelated private parties.

Therefore, the preferred improvement approach would be Option 6 if the independent property owners of the east leg of Malakole Street would agree to the widening of this section to receive the two lanes of makai-bound traffic that would be turning left onto Malakole Street. This improvement would also likely be needed for access to any future redevelopment of the Hawaii Raceway property. If an agreement cannot be reached with the owners of the east leg of Malakole Street, then Option 5 is proposed as the mitigative action. This mitigative action would only be needed if and when Malakole Street is connected to the Kalaeloa Redevelopment Area roadway network, which would allow use by Project traffic as an alternative to the Kapolei Parkway.

Kapolei Parkway-Hanua Street Extension – The forecast Project traffic would exceed intersection capacity by 14% in the morning peak hour. The addition of a right-turn lane to the eastbound approach of the Kapolei Parkway and/or the conversion of the planned right-turn lane on makai-bound Kapolei Parkway to a shared through/right-turn lane in order to allow through traffic in three lanes were evaluated to mitigate the Project impacts during the morning peak hour.

Potential Modification	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
1. Add Right-turn lane to EB Kapolei Pkwy.	0.96	73.7	E
2. Convert Makai-bound Right-turn lane to shared Through Lane	0.96	59.7	E
3. Item 1 + Item 2	0.83	44.5	D

The analysis of the 2018 morning peak hour traffic with the potential mitigative modifications indicates:

- The increased capacity of the added right-turn lane on the eastbound approach would in the morning peak traffic at 96% of capacity, although the average overall delay per vehicle would be at LOS E.

- The projected morning peak hour traffic can also be accommodated by the conversion of the planned right-turn-only lane on the makai-bound approach to a shared through/right-turn lane, which also results in a volume-to-capacity ratio of 0.96 and LOS E conditions. The outside lane would have to be extended makai of the intersection for 500 feet or more to allow the outside lane traffic to merge into the two continuing through lanes.

- The combination of the two modifications would improve average delay to LOS D, with traffic amounting to 83% of capacity.

The afternoon traffic conditions would be improved to 93% of capacity with average delay at LOS D by the combined eastbound right-turn lane and the third makai-bound through lane.

Hanua Street-Malakole Street – The installation of traffic signal control at this intersection would require additional lanes to accommodate the forecast afternoon peak hour traffic with the Project. The critical movement contributing to the deficiency would be the left-turn from makai-bound Hanua Street which is estimated at over 500 vehicles in the afternoon peak hour, as well as about 240 in the morning peak hour. Double left-turn lanes are usually needed to efficiently accommodate traffic when left-turn volumes reach 250 to 300 vehicles per hour. The peak hour conditions with this modification would be as follows:

Peak Hour	Volume-to-Capacity Ratio	Ave. Delay Per Vehicle (sec.)	Level of Service
Morning	0.79	40.9	D
Afternoon	0.92	49.1	D

The provision of double left-turn lanes would require widening eastbound Malakole Street for about 400 or more feet east of the intersection to receive the two lanes of traffic turning left.

Provision for Traffic Signal Installation at Intersections – As indicated in the analyses of 2018 traffic conditions, several intersections along Hanua Street may merit the installation of traffic signals as traffic volumes increase. It is proposed that any underground detection loops, conduit, and pull-boxes be provided at the following intersections as part of the roadway construction to minimize any future disruption of traffic when the traffic signals are warranted by future conditions:

- Hanua Street and Areas 1 & 2 Access Roads

- Hanua Street and Opakapaka Street
- Hanua Street and Area 5 Access Road/I-2 Access Road
- Hanua Street and Lauwiliwili Street Makai
- Hanua Street and Area 6/7 Access Road
- Hanua Street and Malakole Street.

Traffic conditions should be monitored at these locations and traffic signals installed when warranted by future traffic conditions.

PROPOSED MITIGATIVE ACTIONS

The following roadway improvements are proposed to mitigate the future traffic conditions within the study area.

Proposed to Mitigate Project Impacts

The actions proposed to mitigate Project impacts are highlighted in the Figure 4-4 depiction of the roadway lanes and traffic controls in the Kalaeloa Boulevard corridor, which include the following:

Kalaeloa Boulevard-Kapolei Parkway Intersection

- Add a right-turn lane to eastbound approach
- Construct a second (double) right-turn lane if warranted by future traffic volumes and conditions

Kalaeloa Boulevard-Malakole Street Intersection

- Add westbound left-turn lane
- Add makai-bound second (double) left-turn lane
- Widen Malakole Street to provide two eastbound lanes for a distance of about 400 feet from Kalaeloa Boulevard intersection
- Modify signal phasing and timing to reflect geometric changes

Hanua Street-Kapolei Parkway Intersection

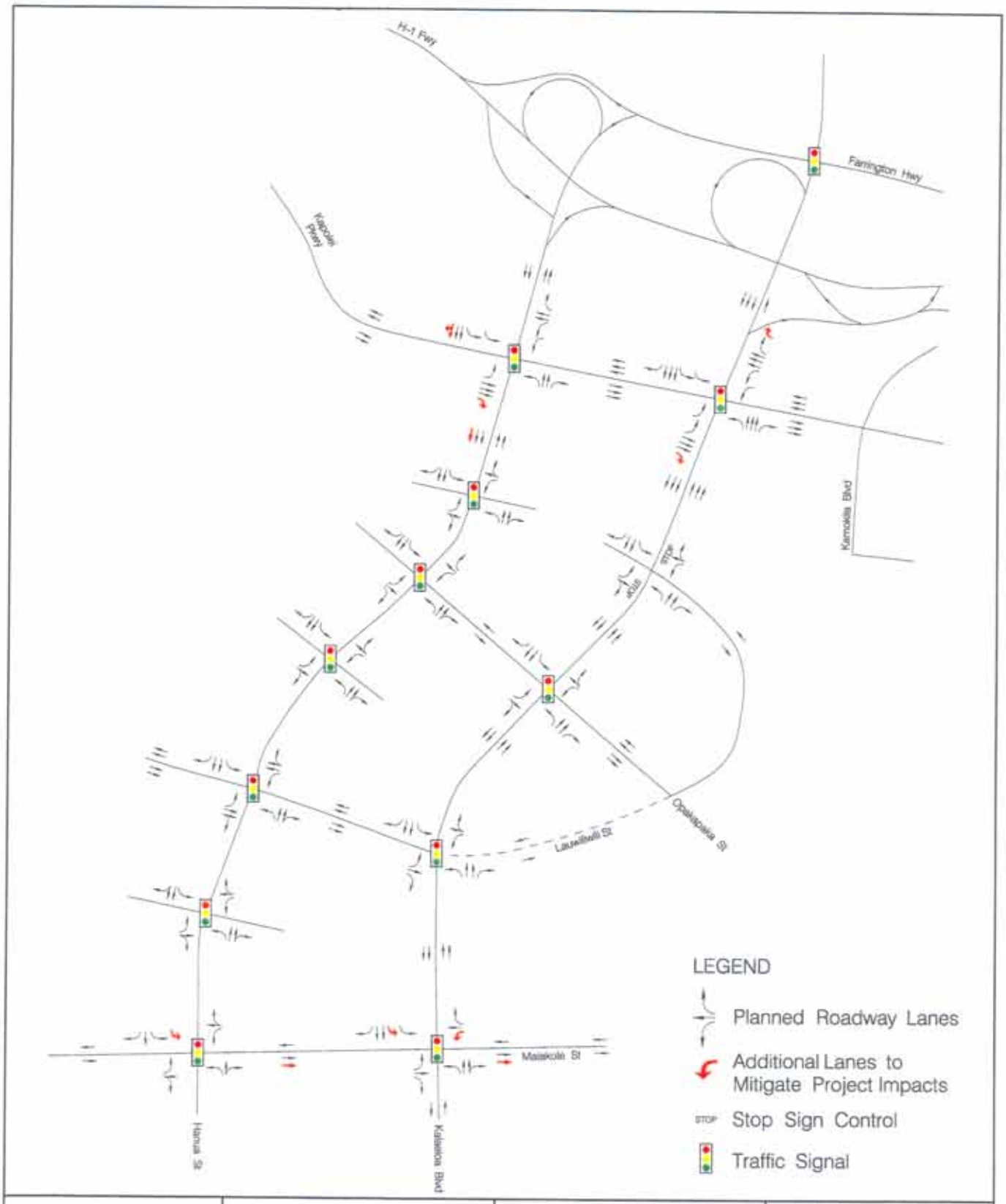
- Add right-turn lane to eastbound Kapolei Parkway approach
- Convert planned makai-bound right-turn lane on Hanua Street to shared through/right-turn lane through the intersection.

Hanua Street-Malakole Street Intersection

- Provide second (double) left-turn lane on makai-bound approach
- Widen Malakole Street east of intersection for distance of about 400 feet to provide two eastbound lanes to receive double left-turn lanes

Signal Controls at Intersections

Install conduit and pull boxes for potential future signal control at



Wilbur Smith Associates	KAPOLEI HARBORSIDE CENTER KAPOLEI, HAWAII	PROPOSED ROADWAY LANES AND TRAFFIC CONTROL	FIGURE 4-4

- Hanua Street and Areas 1 & 2 Access Roads
- Hanua Street and Opakapaka Street
- Hanua Street and Area 5 Access Road/I-2 Access Road
- Hanua Street and Lauwiliwili Street Makai
- Hanua Street and Area 6/7 Access Road
- Hanua Street and Malakole Street.

Proposed Actions by Others

The following roadways and/or modifications would be needed to access the Project and are planned as actions by others without the development of the Kapolei Harborside Center Project:

- Construct Hanua Street Extension from Malakole street to Palailai Interchange
- Construct additional ramps at Palailai Interchange to accommodate Hanua Street connection to the freeway
- Construct Kapolei Parkway as six-lane roadway from Hanua Street Extension to Kamokila Boulevard
- Extend Malakole Street eastward to connect to the roadway network within the Kalaeloa Redevelopment Area
- Construct the extension of the makai end of Lauwiliwili Street westward to access the Kalaeloa (Barbers Point) Harbor
- Construct Opakapaka Street between Kalaeloa Boulevard and Hanua Street.
- Install traffic signals at Kalaeloa Boulevard intersections with Opakapaka and Lauwiliwili (Makai) Streets, and at Hanua Street intersections with Malakole and Lauwiliwili (Makai) Streets.

APPENDICES

Appendix A
Methodology for Analyzing Traffic Conditions

The Transportation Research Board (TRB), a division of the National Science Foundation, has developed standardized methods for use in evaluating the effectiveness and quality of service for roadways and streets. Different methodologies are available for analyzing traffic signal-controlled intersections and other types of roadways.

The TRB evaluation methods use concepts referred to as volume-to-capacity ratio and level-of-service (LOS). The volume-to-capacity ratio (V/C) compares the existing or projected traffic volumes on a facility to the facility's theoretical capacity and, as such, indicates the relative adequacy of the facility to accommodate the traffic volumes. Capacity is estimated primarily from the facility's physical characteristics (e.g. number and widths of lanes), and to a lesser extent by the traffic characteristics (e.g. types of vehicles) and type of traffic controls. The level of service concept describes facility traffic conditions in terms of travel delays or travel speeds, with the service quality expressed on a letter basis from A to F, which signify excellent to unacceptable conditions, respectively.

Signal-Controlled Intersections--Traffic conditions at traffic signal-controlled intersections were evaluated using the Operations Analysis methodology described in the *2000 Highway Capacity Manual (HCM).*[1] The methodology calculates a ratio of actual or estimated peak hour traffic volumes to the theoretical capacity of the intersection. This volume-to-capacity ratio (V/C) reflects the physical characteristics of the intersection and the traffic characteristics, and is somewhat independent of the efficiency of the traffic signal phasing/timing. This ratio indicates the proportion of available capacity being used by traffic volumes and where there is unused capacity available for future traffic increases.

With the 2000 HCM method, the level-of-service is based on the average delay per vehicle for the various movements within the intersection as a result of the traffic signal control. This total delay is the difference between the travel time experienced with the traffic signal and the reference travel time that would result under ideal conditions, in the absence of the traffic control and geometric delay. This delay, referred to as control delay, includes initial deceleration delay, stop delay, queue move-up delay, and final acceleration delay. Average delay time and level-of-service is estimated for the entire intersection, for each roadway approach, and for each traffic movement or lane group. A description of the criteria associated with LOS A through LOS F is provided in Table A-1.

In the assessment of traffic signal-controlled intersections, it is usually most appropriate to relate the adequacy of the geometric design features (such as numbers and use of lanes, lane widths, etc.) to the V/C. Delay and LOS are most relevant to assessing modifications to the traffic signal controls, since these are most directly related to the signal design features, such as cycle length, number and arrangement of phases, and allocation of green time.

[1] *2000 Highway Capacity Manual.* Transportation Research Board, October 2000.

Table A-1
LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS WITH TRAFFIC SIGNAL CONTROL

Level of Service	Average Control Delay (seconds per vehicle)
A	10 or Less
B	10.1 – 20.0
C	20.1 – 35.0
D	35.1 – 55.0
E	55.1 – 80.0
F	More than 80.0

Source: Highway Capacity Manual 2000, Transportation Research Board, Chapter 16, 2000.

Unsignalized Intersections—At intersections with STOP sign controls, the level of service was calculated using the 2000 HCM procedures for intersections with STOP or YIELD signs. In this methodology, the six levels of service, A through F, are used to describe traffic conditions for those movements that must yield to other movements:

- Left-turn out of the side street or driveway;
- Through movement from the side street,
- Right-turn out of the side street or driveway; and
- Left-turn into the side street.

Through vehicles on the major streets are not required to yield to other movements at two-way STOP controlled intersections.

The general indicator of intersection delay is determined by calculating the one-hour capacity for each key movement, based on the conflicting traffic volumes, and then comparing the number of vehicles making that maneuver to the calculated capacity. The unused or "reserve" capacity for the movement is then used to identify a delay time and a level-of-service for that movement. Unlike analysis at signalized intersections, an overall intersection level-of-service is not calculated, but a level-of-service is calculated for each lane group subject to the STOP or YIELD condition.

The level-of-service criteria for unsignalized intersections with STOP or YIELD controls are defined in Table A-2.

Table A-2
LEVEL OF SERVICE CRITERIA
FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Average Stopped Delay (seconds per vehicle)
A	10 or Less
B	10.1 – 15.0
C	15.1 – 25.0
D	25.0 – 35.0
E	35.1 – 50.0
F	More than 50.0

Source: Highway Capacity Manual 2000, Transportation Research Board, Chapter 17, 2000.

Freeway Sections – Speed and the freedom to maneuver are primary indicators of operating conditions on freeway sections. Both of these are related to the density of vehicles in the traffic stream, which the 2000 HCM uses to define conditions on freeway sections. Table A-3 presents the maximum vehicle density, minimum speed, and maximum volume-to-capacity ratio for Level of Service A through F for freeways designed for free flow speeds of 65 mph. The criteria for the 65 mph free flow speed are used in this study since this represents the posted speed limit, even though the design speed is likely higher. The maximum capacity is considered to be 2,400 vehicles per lane per hour under average conditions for six- and eight-lane freeways.

With these guidelines and assumptions, the H-1 Freeway is assumed to provide capacities of 2,350 vehicles per hour for normal use lanes.

Roadway or Freeway Ramp Weaving Sections – Weaving sections are formed where a merge area is followed by a diverge area with the two joined by an auxiliary lane with intense lane-change maneuvers taking place. The conditions within a weaving section is a factor of the length of the weaving section, the number of lanes, and the configuration of the entry leg, weaving section, and exit leg, as well as the volumes of the various traffic movements. The HCM 2000 relates the level of service to the vehicle density within the weaving section as presented in Table A-4.

Table A-3
LEVEL OF SERVICE CRITERIA FOR BASIC FREEWAY SEGMENTS

Level of Service	Maximum Density (PC/Mi/Ln)	Minimum Speed (mph)	Maximum Service Flow Rate (PC/Hr/Ln)	Maximum Volume/Capacity Ratio
A	11.0	65.0	710	0.30
B	18.0	65.0	1,170	0.50
C	26.0	64.6	1,680	0.71
D	35.0	59.7	2,090	0.89
E	45.0	52.2	2,350	1.00
F	*	*	*	*

Criteria based on free flow speed of 65 miles per hour (mph)
PC/Mi/Ln = Passenger cars per mile per lane
PC/Hr/Ln = Passenger cars per hour per lane
* = An unstable operation, demand exceeds capacity.

Source: Highway Capacity Manual 2000, Transportation Research Board, Chapter 23, 2000.

Table A-4
LEVEL OF SERVICE CRITERIA FOR WEAVING SEGMENTS

Level of Service	Density (pc/mi/ln)	
	Freeway Weaving Segment	Multilane and Collector-Distributor Segments
A	10 or less	12 or less
B	10-20	12-24
C	20-28	24-32
D	28-35	32-36
E	35-43	36-40
F	Over 43	Over 40

PC/Mi/Ln = Passenger cars per mile per lane

Source: Highway Capacity Manual 2000, Transportation Research Board, Chapter 24, 2000.

Ramp Merge and Diverge Areas – Traffic conditions in the freeway through lanes are affected by vehicles entering from or exiting onto ramps. The influence area of a ramp junction with the freeway generally encompasses the two freeway through lanes closest to the ramp with the influence area extending for a length of about 1,500 feet along the ramp entry/exit point and slightly upstream of the exit or downstream of the entry. The impact of the ramp junction on traffic flow is based on the traffic density within this influence area. Table A-5 lists the range of traffic densities associated with each level of service within the ramp merge or diverge influence area.

Table A-5
LEVEL OF SERVICE CRITERIA
FOR RAMP MERGE AND DIVERGE AREAS

Level of Service	Density (pc/mi/ln)
A	10 or Less
B	10-20
C	20-28
D	28-35
E	35 or More
F	Demand Exceeds Capacity

PC/Mi/Ln = Passenger cars per mile per lane

Source: Highway Capacity Manual 2000, Transportation Research Board, Chapter 25, 2000.

Appendix Table B-1

VEHICLE TRIP GENERATION FOR 2018
NON-PROJECT LAND USES WITHIN CITY OF KAPOLEI

					Trip Generation Rates							Vehicle Trips To/From Area							Trips Less Passbys			
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				PM Peak Hour			
ZONE	Activity	Quantity	Units	ITE Use	Total	In	Out	Total	In	Out	Daily	Total	In	Out	Total	In	Out	Daily	%	Total	In	Out
4	Kapowai Place	17	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		27	23	3	25	4	21	0	1	25	4	21
10	Kalaeloa West Retail		TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		0	0	0	0	0	0	0	0.65	0	0	0
11	Advertiser Printing		Emp Trips		0.5	0.4	0.11	1	0.25	0.75		0	0	0	0	0	0	0	1	0	0	0
12	Kapolei Power Ctr Central	130	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		134	82	52	488	234	254	0	0.65	317	152	165
	FHB Branch Bank		TSF	911	4.07	2.28	1.79	33.14	16.57	16.6		0	0	0	0	0	0	0	0.53	0	0	0
	FHB Office	7	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		11	10	1	10	2	9	0	1			
15	Library																					
	Public Library		TSF	590	1	0.72	0.28	7.09	3.4	3.69		0	0	0	0	0	0	0	1	0	0	0
	Library Distribution	5	TSF	590	1	0.82	0.18	4.76	2.19	2.57		5	4	1	24	11	13	0	1	24	11	13
16	Civic Center	50	Emp	710	0.48	0.42	0.06	0.46	0.08	0.38		24	21	3	23	4	19	0	1	23	4	19
17	Ai / Chun Retail	25	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		18	11	7	65	28	37	0	0.35	23	10	13
18	Uluohia																					
	Retail	6	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		4	3	2	16	7	9	0	0.3	5	2	3
	Quality Resturant		TSF	931	0	0	0	7.49	5.02	2.47		0	0	0	0	0	0	0	0.56	0	0	0
	Lot 56 Restaurant	6	TSF	931	0	0	0	7.49	5.02	2.47		0	0	0	45	30	15	0	0.56	25	17	8
30	Sr Village Ph I/ Ph II	424	Veh. Trips		0.61	0.23	0.38	1	0.56	0.44		259	98	161	424	237	187	0	1	424	237	187
38	Generic A5 Office	36	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		56	49	7	54	9	45	0	1	54	9	45
41	Kamaaha N2 Office	39	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		61	53	7	58	10	48	0	1	58	10	48
42	Kamaaha N3																					
	Office	39	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		61	53	7	58	10	48	0	1	58	10	48
	Private School	700	Students	521	0.92	0.55	0.37	0.2	0.08	0.12		644	385	259	140	56	84	0	1	140	56	84
43	YMCA	40	TSF	495	1.32	0.87	0.45	1.75	0.6	1.15		53	35	18	70	24	46	0	0.9	63	22	41
44	Block 58 Road E Office	40	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		62	55	8	60	10	50	0	1	60	10	50
45	Block 59 Road E Ofice	48	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		75	66	9	72	12	60	0	1	72	12	60
46	Pad A Bank Drive-thru	3	TSF	912	12.63	7.07	5.56	54.78	27.39	27.4		38	21	17	164	82	82		0.53	87	44	44
48	Kapolei Power Ctr West																					
	Home Depot		TSF	862	1.48	0.8	0.68	2.87	1.35	1.52		0	0	0	0	0	0	0	0.52	0	0	0
	Ace Hardware		TSF	816	1.08	0.5	0.58	4.42	2.12	2.3		0	0	0	0	0	0	0	0.35	0	0	0
	Retail	15	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		11	6	4	39	17	22	0	0.35	14	6	8
	Theme Steak House		TSF	831	0	0	0	7.49	5.02	2.47		0	0	0	0	0	0	0	0.56	0	0	0
69	Kapolei Mauka Residential																					
	Low Density	350	DU	231	0.67	0.17	0.5	0.62	0.42	0.2		235	60	175	217	147	70	0	1	217	147	70
	Total											**1776**	**1034**	**742**	**2050**	**933**	**1117**	**0**		**1687**	**762**	**925**

3/23/2006

Appendix Table B-2

VEHICLE TRIP GENERATION FOR 2018
NON-PROJECT EAST AND SOUTH AREAS

ZONE	Activity	Quantity	Units	ITE Use	Trip Generation Rates: AM Peak Hour Total	AM In	AM Out	PM Peak Hour Total	PM In	PM Out	Daily	Vehicle Trips To/From Area: AM Peak Hour Total	AM In	AM Out	PM Peak Hour Total	PM In	PM Out	Daily	Trips Less Passbys: PM Peak Hour %	PM Total	PM In	PM Out
	Villages of Kapolei																						
23	Village Center																						
	Church	67	TSF	560	0.72	0.39	0.33	0.66	0.36	0.3		48	26	22	44	24	20	0	1	44	24	20
	Shopping Center	67	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		69	42	27	251	121	131	0	0.58	146	70	76
	Medium Density Apts	290	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		128	20	107	157	104	52	0	1	157	104	52
27	Kapolei Village																						
	Single Family	314	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		236	60	176	317	204	113	0	1	317	204	113
32	NW Commercial																						
	Shopping Center	199.5	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		205	126	80	748	359	389	0	0.68	509	244	265
	Medium Density Apts	200	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		88	14	74	108	72	36	0	1	108	72	36
33	Kapolei Knolls																						
	Single Family	50	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		38	10	28	51	33	18	0	1	51	33	18
	Total											811	297	514	1676	917	759	0		1331	751	580
	Kalaeloa Redevelopment Area																						
56	Central Saratoga Area																						
	Lt. Ind.	10	Acres	110	7.51	6.23	1.28	7.26	1.6	5.66		75	62	13	73	16	57	0	1	73	16	57
	Office	10	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		16	14	2	15	3	12	0	1	15	3	12
	Specialty Retail	15	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		11	6	4	39	17	22	0	0.55	21	9	12
	Mid Rise Apt. -	300	DU	223	0.3	0.09	0.21	0.39	0.23	0.16		90	27	63	117	69	48	0	1	117	69	48
58	Regional Park	250	Acres	417	0.12	0.07	0.05	0.2	0.09	0.11		30	18	13	50	23	28	0	1	50	23	28
	Mid Rise Apt.	100	DU	223	0.3	0.09	0.21	0.39	0.23	0.16		30	9	21	39	23	16	0	1	39	23	16
57	Enterprise Voc Sch	25	Emp	540	2.85	2.28	0.57	3.12	1.78	1.34		71	57	14	78	45	34	0	1	78	45	34
84	NW Lt Ind																						
	Lt Ind	0	Acres	110	7.51	6.23	1.28	7.26	1.6	5.66		0	0	0	0	0	0	0	1	0	0	0
	Total											323	193	130	410	194	216	0		393	187	206
24	**Makakilo**																						
	Condominiums	329	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		145	23	122	178	118	59	0	1	178	118	59
	Apartments	64	DU	220	0.51	0.1	0.41	0.62	0.4	0.22		33	6	26	40	26	14	0	1	40	26	14
	Single Family	746	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		560	142	418	753	485	269	0	1	753	485	269
	Easter Seals Office	20	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		31	27	4	30	5	25	0	1	30	5	25
	Total											768	199	570	1001	634	367	0		1001	634	367
	Mehana at Kapolei (Schuler)																						
52	Mehana West																						
	Low Density	344	DU	231	0.67	0.17	0.5	0.83	0.47	0.36		230	58	172	286	162	124	0	1	286	162	124
	Medium Density	282	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		124	20	104	152	102	51	0	1.00	152	102	51
	Neighborhood Commercial	10	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		7	4	3	26	11	15	0	0.30	8	3	4
	Apartments	30	DU	220	0.3	0.09	0.21	0.39	0.23	0.16		9	3	6	12	7	5	0	1	12	7	5
53	Mehana East																						
	Low Density	270	DU	231	0.67	0.17	0.5	0.83	0.47	0.36		181	46	135	224	127	97	0	1	224	127	97
	Medium Density	230	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		101	16	85	124	83	41	0	1	124	83	41
54	Elementary School	650	Studer	520	0.29	0.17	0.12	0.07	0.04	0.03		189	111	78	46	26	20	0	1	46	26	20
	Total											841	258	583.4	870	517	353	0		851.3	509	342
	Grand Total											2743	947	1796	3956	2262	1695	0		3576	2081	1494

2/28/2006

Appendix Table B-3

VEHICLE TRIP GENERATION FOR 2018
OTHER AREAS WEST OF KAPOLEI

				Trip Generation Rates							Vehicle Trips To/From Area							Trips Less Passbys				
				ITE	AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				PM Peak Hour			
ZONE	Activity	Quantity	Units	Use	Total	In	Out	Total	In	Out	Daily	Total	In	Out	Total	In	Out	Daily	%	Total	In	Out
	Kapolei Business Park																					
25	Ind. Park Phase 1	67	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	573	476	97	592	125	468	4228	1.00	592	125	468
91	Ind. Park Phase 2	46.4	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	397	329	67	410	86	324	2928	1.00	410	86	324
	Total											970	805	164	1002	211	792	7157	0	1002	211	792
	Barbers Pt. Harbor																					
28	Lt. Ind.	200	Veh Trips	110	1	0.81	0.19	0	0	0		200	162	38	0	0	0	0	1.00	0	0	0
		162	Veh Trips	110	0	0	0	1	0.32	0.68		0	0	0	162	52	110	0	1.00	162	52	110
	Kalaeloa Blvd West																					
92	Kalaeloa W Mauka I-2	33	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	282	234	48	292	61	230	2083	1.00	292	61	230
70	Studios	360	Employees		0.87	0.82	0.05	1.11	0.17	0.94		313	295	18	400	61	338	0	1.00	400	61	338
	Kalaeloa W Center I-2	27	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	231	192	39	239	50	188	1704	1.00	239	50	188
	Total											626	721	105	930	173	757	3787	0	930	173	757
	Kalaeloa West Ind Area																					
88	Northeast 1,2,3	23.7	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	203	168	34	210	44	165	1496	1.00	210	44	165
88	Northwest 19	23.6	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	202	168	34	209	44	165	1489	1.00	209	44	165
78	East Central 4,5	40.9	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	350	290	59	362	76	285	2581	1.00	362	76	285
78	West Central 17, 18	54.9	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	469	390	80	485	102	383	3465	1.00	485	102	383
89	Southwest 6, 7, 12-15	79.3	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	678	563	115	701	147	554	5005	1.00	701	147	554
89	West Central 16	8.1	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	69	58	12	72	15	57	511	1.00	72	15	57
90	Southeast 8, 9	19.2	Acres	130	8.55	7.1	1.45	8.84	1.86	6.98	63.1	164	136	28	170	36	134	1212	1.00	170	36	134
	Total	249.7										2135	1773	362	2207	464	1743	15759	0	7 2207	464	1743
83	Maritime Ind	30	Acres	120	1.98	1.64	0.34	2.16	0.48	1.68	6.75	59	49	10	65	14	50	203	1.00	65	14	50
	Total Kalaeloa Blvd Area											**4190**	**3510**	**680**	**4367**	**914**	**3452**	**26904**	**0**	**4367**	**914**	**3452**
	Ko Olina																					
61	Resort Beach Areas																					
	Hotel	990	Rooms	330	0.31	0.22	0.09	0.42	0.18	0.24		307	218	89	416	178	238	0	1.00	416	178	238
62	Olani St Hotel	300	Rooms	330	0.31	0.22	0.09	0.42	0.18	0.24		93	66	27	126	54	72	0	1.00	126	54	72
63	Coconut Plantation/Centex																					
	Single Family	60	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		45	11	34	61	39	22	0	1.00	61	39	22
	Medium Density	390	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		172	27	144	211	140	70	0	1.00	211	140	70
64	Medium Density	110	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		48	8	41	59	40	20	0	1.00	59	40	20
65	Marina Area																					
	Marriott Timeshares	540	DU	330	0.31	0.22	0.09	0.42	0.18	0.24		167	119	49	227	97	130	0	1.00	227	97	130
	Aquarium	25	Veh Trips		1	0.87	0.13	0	0	0		25	22	3	0	0	0	0	1.00	0	0	0
		180	Veh Trips		0	0	0	1	0.44	0.56		0	0	0	180	79	101	0	1.00	180	79	101
67	Hillside Villas Low D	174	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		77	12	64	94	63	31	0	1.00	94	63	31
	Total											**934**	**483**	**451**	**1373**	**690**	**683**	**0**	**0**	**1373**	**690**	**683**
	Grand Total											**5124**	**3993**	**1131**	**5740**	**1605**	**4135**	**26904**	**0**	**5740**	**1605**	**4135**

3/23/2006

Appendix Table B-4

VEHICLE TRIP GENERATION FOR 2016
KAPOLEI CCOMMONS AND WEST KAPOLEI AREAS

				ITE	Trip Generation Rates							Vehicle Trips To/From Area							Trips Less Passbys			
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				PM Peak Hour			
ZONE	Activity	Quantity	Units	Use	Total	In	Out	Total	In	Out	Daily	Total	In	Out	Total	In	Out	Daily	%	Total	In	Out
	Kapolei Commons																					
10	Kap Commons Zoned Area																					
	Shopping Center	207	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95	42.9	213	130	83	776	373	404	8884	0.72	559	268	291
	Office	0	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24	11	0	0	0	0	0	0	0	1.00	0	0	0
	Theater	0	Seats	445	0	0	0	0.08	0.03	0.05	1.76	0	0	0	0	0	0	0	1.00	0	0	0
	Subtotal Zoned Land											213	130	83	776	373	404	8884		559	268	291
66	Kapolei Commons Unzoned																					
	Shopping Center	159.4	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95	42.9	164	100	64	598	287	311	6841	0.72	430	207	224
	Discount Store	123.8	TSF	815	0.84	0.57	0.27	5.06	2.53	2.53	56	104	71	33	626	313	313	6935	0.72	451	226	226
	Office	50	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24	11	78	69	10	75	13	62	551	0.75	56	9	47
	Theater	2000	Seats	445	0	0	0	0.08	0.03	0.05	1.76	0	0	0	160	60	100	3520	1.00	160	60	100
	Med Density Condos	300	DU	230	0.44	0.07	0.37	0.54	0.36	0.18	5.86	132	21	111	162	108	54	1758	0.61	99	66	33
	Subtotal Unzoned Land											478	260	218	1621	781	840	19605		1196	567	629
	Totals Kapolei Commons											**691**	**391**	**300**	**2397**	**1153**	**1244**	**28490**		**1755**	**836**	**919**
	Kapolei West																					
71	"L" Transit/Mixed Use																					
	Med Density Resident	150	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		66	11	56	81	54	27	0	1.00	81	54	27
	Commercial	100	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		71	43	28	259	111	148	0	0.60	155	67	89
72	"A" Residential																					
	Primary Resident SF Homes	162	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		122	31	91	164	105	58	0	1.00	164	105	58
	Non-Resident Homes	29	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		9	4	4	9	4	5	0	1.00	9	4	5
73	"C" Residential																					
	Primary Resident SF Homes	113	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		85	21	63	114	73	41	0	1.00	114	73	41
	Non-Resident Homes	38	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		11	6	6	12	5	6	0	1.00	12	5	6
74	"B" Residential																					
	Primary Resident Med Density	208	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		92	15	77	112	75	37	0	1.00	112	75	37
	Non-Resident Homes	37	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		11	6	6	11	5	6	0	1.00	11	5	6
	Middle School	600	Student	522	0.53	0.29	0.24	0.15	0.08	0.07		318	174	144	90	48	42	0	0.75	68	36	32
75	Golf Course	18	Holes	430	3.01	1.41	1.6	3.56	1.53	2.03		54	25	29	64	28	37	0	1.00	64	28	37
76	"I,J,D" + Neighborhood Com.																					
	Primary Resident SF Homes	245	DU	210	0.75	0.19	0.56	1.01	0.65	0.36		184	47	137	247	159	88	0	1.00	247	159	88
	Non-Resident Homes	160	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		48	24	24	50	22	27	0	1.00	50	22	27
	Neighborhood Commercial	22	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		7	4	3	26	11	15	0	0.30	8	3	4
77	"E, F, G, H, K" Residential																					
	Med Density Primary Resident Hom	131	DU	230	0.44	0.07	0.37	0.54	0.36	0.18		58	9	48	71	47	24	0	1.00	71	47	24
	Med Density Non-Resident Homes	450	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		135	68	68	140	63	77	0	1.00	140	63	77
	Low Dens Primary Resident Homes	237	DU	231	0.67	0.17	0.5	0.83	0.47	0.36		159	40	119	197	111	85	0	1.00	197	111	85
	Low Dens Non-Resident Homes	48	DU	260	0.3	0.15	0.15	0.31	0.14	0.17		14	7	7	15	7	8	0	1.00	15	7	8
	Total											**1443**	**534**	**909**	**1661**	**930**	**732**	**0**		**1518**	**865**	**651**
	Grand Total											**2134**	**925**	**1209**	**4058**	**2083**	**1975**	**28490**		**3273**	**1701**	**1571**

2/27/2006

Appendix Table B-5

VEHICLE TRIP GENERATION FOR 2018
KAPOLEI REZONING PARCELS 1, 2 & 3

					Trip Generation Rates							Vehicle Trips To/From Area							Trips Less Passbys			
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				PM Peak Hour			
ZONE	Activity	Quantity	Units	ITE Use	Total	In	Out	Total	In	Out	Daily	Total	In	Out	Total	In	Out	Daily	%	Total	In	Out
	Parcel 1																					
8	Civic Center																					
	Office	205	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		320	281	39	305	51	254	0	1	305	51	254
20	South Kalaeloa Costco	160	TSF	815	0.84	0.57	0.27	5.06	2.53	2.53		134	91	43	810	405	405	0	0.65	526	263	263
34	Generic A1 Office	45	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		70	62	9	67	11	56	0	1	67	11	56
35	Generic A2 Office	39	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		61	53	7	58	10	48	0	1	58	10	48
36	Generic A3 Office	130	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		203	178	25	194	33	161	0	1	194	33	161
	Mid rise Apts	300	DU	223	0.3	0.09	0.21	0.39	0.23	0.16		90	27	63	117	69	48	0	1	117	69	48
37	Generic A4 Office	36	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		56	49	7	54	9	45	0	1	54	9	45
39	Generic A6 Office	36	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		56	49	7	54	9	45	0	1	54	9	45
40	Kamaaha N1 Office	39	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		61	53	7	58	10	48	0	1	58	10	48
49	Generic D3 Office	100	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		156	137	19	149	25	124	0	1	149	25	124
50	Generic B1 Retail	65	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		46	28	18	168	72	96	0	0.6	101	43	58
51	Generic B2 Retail	65	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		46	28	18	168	72	96	0	0.6	101	43	58
55	Generic B3 Retail	70	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48		50	30	20	181	78	104	0	0.6	109	47	62
60	Generic D1 Office	250	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24		390	343	48	373	63	310	0	1	373	63	310
	Total											**1739**	**1410**	**329.4**	**2756**	**916**	**1840**	**0**		**2265**	**685**	**1580**
	Parcel 2																					
21	North Kalaeloa Retail	120	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		124	76	48	450	216	234	0	0.62	279	134	145
	Total											**124**	**76**	**48**	**450**	**216**	**234**	**0**		**279**	**134**	**145**
	Parcel 3 Farrington																					
31	NE Discount Store	150	TSF	815	0.84	0.57	0.27	5.06	2.53	2.53		126	86	41	759	380	380	0	0.68	516	258	258
	Shopping Ctr Retail	68	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95		70	43	27	255	122	133	0	0.68	173	83	90
	Total											**196**	**128**	**68**	**1014**	**502**	**512**			**690**	**341**	**348**
	Grand Total											**2059**	**1614**	**445.1**	**4220**	**1634**	**2586**	**0**		**3234**	**1161**	**2073**

3/23/2005

Appendix Table B-6

VEHICLE TRIP GENERATION FOR 2018
MAKAIWA HILLS

					Trip Generation Rates							Vehicle Trips To/From Area							Trips Less Passbys			
					AM Peak Hour			PM Peak Hour				AM Peak Hour			PM Peak Hour				PM Peak Hour			
ZONE	Activity	Quantity	Units	ITE Use	Total	In	Out	Total	In	Out	Daily	Total	In	Out	Total	In	Out	Daily	%	Total	In	Out
	Makaiwa																					
68	**Makaiwa Central Res**																					
	Low Density	510	DU	231	0.67	0.17	0.5	0.83	0.47	0.36	7.9	342	87	255	423	240	184	4029	1	423	240	184
												342	**87**	**255**	**423**	**240**	**184**	**4029**		**423**	**240**	**184**
79	**Makaiwa E Mauka**																					
	Single Family	122	DU	210	0.75	0.19	0.56	1.01	0.65	0.36	9.57	92	23	68	123	79	44	1168	1	123	79	44
	Low Density	0	DU	231	0.67	0.17	0.5	0.83	0.47	0.36	7.9	0	0	0	0	0	0	0	1	0	0	0
	Total											**92**	**23**	**68**	**123**	**79**	**44**	**1168**		**123**	**79**	**44**
80	**Makaiwa Commercial**																					
	Offices	50	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24	11.01	78	69	10	75	13	62	551	1	75	13	62
	Shopping Center	220	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95	42.92	227	139	88	825	396	429	9442	0.70	578	277	300
	High Rise Condo	193	DU	232	0.34	0.07	0.27	0.38	0.25	0.13	4.18	66	14	52	73	48	25	807	1	73	48	25
	Elementary School	650	Student	520	0.29	0.17	0.12	0.07	0.04	0.03	1.29	189	111	78	46	26	20	839	1	46	26	20
	Total											**559**	**331**	**228**	**1018**	**483**	**536**	**11638**		**771**	**364**	**407**
81	**Makaiwa SE Res**																					
	Low Density	201	DU	231	0.67	0.17	0.5	0.83	0.47	0.36	7.9	135	34	101	167	94	72	1588	1	167	94	72
	Medium Density	247	DU	230	0.44	0.07	0.37	0.54	0.36	0.18	5.86	109	17	91	133	89	44	1447	1	133	88.92	44.5
	Total											**243**	**51**	**192**	**300**	**183**	**117**	**3035**		**300**	**183**	**117**
82	**Makaiwa SW Res**																					
	Medium Density	961	DU	230	0.44	0.07	0.37	0.54	0.36	0.18	5.86	423	67	356	519	346	173	5631	1	519	346	173
	Single Family	23	DU	210	0.75	0.19	0.56	1.01	0.65	0.36	9.57	17	4	13	23	15	8	220	1	23	15	8
	Quality Restaurants	10	TSF	931	0.81	0.66	0.15	7.49	5.02	2.47	89.95	8	7	2	75	50	25	900	1	75	50	25
	Neighborhood Commercia	10	TSF	814	0.71	0.43	0.28	2.59	1.11	1.48	44.32	7	4	3	26	11	15	443	0.25	6	3	4
	Total											**455**	**83**	**373**	**643**	**422**	**221**	**7194**		**624**	**414**	**210**
85	**Makaiwa E Midlevel Res**																					
	Low Density	223	DU	231	0.67	0.17	0.5	0.83	0.47	0.36	7.9	149	38	112	185	105	80	1762	1	185	105	80
	Medium Density	24	DU	230	0.44	0.07	0.37	0.54	0.36	0.18	5.86	11	2	9	13	9	4	141	1	13	9	4
	Total											**160**	**40**	**120**	**198**	**113**	**85**	**1902**		**198**	**113**	**85**
86	**Makaiwa Village Ctr**																					
	High Rise Condo	504	DU	232	0.34	0.07	0.27	0.38	0.25	0.13	4.18	171	35	136	192	126	66	2107	1	192	126	66
	Medium Density	412	DU	230	0.44	0.07	0.37	0.54	0.36	0.18	5.86	181	29	152	222	148	74	2414	1	222	148	74
	Village Offices	20	TSF	710	1.56	1.37	0.19	1.49	0.25	1.24	11.01	31	27	4	30	5	25	220	1	30	5	25
	Village Commercial	80	TSF	820	1.03	0.63	0.4	3.75	1.8	1.95	42.92	82	50	32	300	144	156	3434	0.5	150	72	78
	Total											**466**	**142**	**324**	**744**	**423**	**320**	**8175**		**594**	**351**	**242**
87	**Makaiwa W Mauka**																					
	Single Family	0	DU	210	0.75	0.19	0.56	1.01	0.65	0.36	9.57	0	0	0	0	0	0	0	1	0	0	0
	Low Density	0	DU	231	0.67	0.17	0.5	0.83	0.47	0.36	7.9	0	0	0	0	0	0	0	1	0	0	0
	Total											**0**	**0**	**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**
	Grand Total											**2317**	**757**	**1560**	**3450**	**1944**	**1506**	**37141**		**3033**	**1745**	**1288**

2/16/2006

Appendix Table C-1

DISTRIBUTION OF VEHICLE TRIPS
2020-2030

Location	Gate	Commercial		Residential		Recreation Facilities		Industrial/Harbor	
		AM	PM	AM	PM	Employees	Visitors	AM	PM
H-1 Fwy West	1	11.5	10.5	8.5	8.5	11.5	7.9	20.0	21.0
H-1 Fwy East	2	29.5	23.5	39.8	39.8	29.5	79.4	51.0	55.0
Makakilo Dr	3	11.0	14.0	4.0	4.0	11.0	2.0	5.5	5.0
Farrington Hwy East	5	2.0	2.0	3.5	3.5	2.0	1.6	1.0	1.0
Kapolei Pkwy East	6	10.0	9.0	3.9	3.9	10.0	0.0	5.5	3.5
Kalaeloa Blvd South	7	4.0	4.0	2.8	2.8	4.0	0.0	2.0	2.0
Kapolei West	9								
Villages of Kapolei	10	14.0	13.5	5.0	5.0	14.0	3.7	7.5	5.0
Kapolei Power Ctr	11								
Kapolei Shop Ctr	12								
Roosevelt East	14	3.5	3.0	3.0	3.0	3.5	0.9	2.0	1.0
Kalaeloa Redev.	15	1.0	3.5	2.0	2.0	1.0	0.0	0.5	1.0
Kapolei Office Core	16								
Ko Olina	17	4.5	3.5	3.5	3.5	4.5	2.0	0.0	0.0
Makaiwa Hills	20								
City of Kapolei		9.0	13.5	24.0	24.0	9.0	2.5	5.0	5.5
Totals		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

8/29/2005