

September 19, 2011

Incremental Development Plan Koa Ridge Makai and Castle & Cooke Waiawa

This Incremental Development Plan for Koa Ridge Makai and Castle & Cooke Waiawa is prepared pursuant to Sections 15-15-50(c)(19) and 15-15-78, Hawaii Administrative Rules of the Land Use Commission (LUC) regarding incremental districting since it is anticipated that full project development will extend beyond 10 years.

Castle & Cooke Homes Hawaii seeks reclassification of the 768-acre Petition Area into the Urban District. This Incremental Plan is being provided to satisfy the petition requirements of HAR Section 15-15-50(c)(1). Petitioner's Incremental Plan proposes that Koa Ridge Makai be developed as Increment I and that Castle & Cooke Waiawa be developed as Increment II. The development timetable for the two projects is presented in Table 1 and on Figures 1 - 5 and is discussed below.

Koa Ridge Makai - Increment I

Development of Koa Ridge Makai is expected to begin in 2013 and be fully built out by 2022. Infrastructure construction for Koa Ridge Makai is expected to proceed as follows:

- Sewer System - sewer line extending to the Waipahu Wastewater Pump Station. The 3.5-mile gravity sewer line is expected to start construction in 2013 and be completed in 2014. Without available capacity in the existing sewer infrastructure, the entire line is required to be in place at the delivery of the first residential unit or commercial use.
- Electrical Line - undergrounding the 46kV and 12kV lines on Ka Uka Boulevard (2014) and relocating the 138kV line to and along the H-2 freeway (2016 to 2018).
- Water System - the 595-foot elevation source, storage and transmission facilities to service the initial two to three years of residential and commercial development (2014 to 2016). The 825-foot elevation source would service the balance of the development (by 2017).
- Drainage System - the off-site drainage system in Kipapa Gulch is phased to correlate with the residential-commercial construction – Drainline, Storm water quality and Detention Basin 1 (2014 to 2016), and Storm water quality and Detention Basin 2 and Drainline 2 (2017 to 2019).
- Roadway System: A separate traffic study was undertaken to assess the scenario of Koa Ridge Makai being fully developed in advance of both the Castle & Cooke Waiawa and the Waiawa Ridge Development. This traffic impact

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assessment for Koa Ridge Makai only is contained in the consolidated *Traffic Impact Analysis Report, Koa Ridge Makai and Waiawa Developments* (Revised May 2010). The major roadway improvements needed for Koa Ridge Makai include the following (see Figure 3):

1. Additional left turn lane from Ka Uka to Moaniani; widen Moaniani Street and add one lane on the northbound approach (2014)
 2. At the northbound on-ramp to H-2, provide for two left turn lanes from eastbound Ka Uka Boulevard and widen the on-ramp to allow for the additional merge lane (2014).
 3. Construct Koa Ridge Parkway and secondary entry roadways at their intersection with Ka Uka Boulevard (2014).
 4. Widen Ka Uka Boulevard to add one lane in each direction between the Parkway and the Southbound On and Off-Ramps (2014 to 2018).
 5. Construct the Pineapple Interchange (2019 to 2022).
- On-site roadways, sewer, water and drainlines within project sites will be constructed concurrently with the phasing of residential and commercial construction.

Residential construction of approximately 200 to 425 units per year is projected from 2014 to 2022, with the phasing of development starting from the southern end of the project site near Kamehameha Highway and proceeding northward. The actual pace of Koa Ridge Makai residential development will be dependent on real estate market conditions and the general economy.

Commercial development is planned to begin with a big box retail facility at Koa Ridge Makai's Gateway, projected to be constructed by 2014. Village Center mixed uses including office, additional retail and light industrial development are projected to be developed and absorbed gradually through 2022. The hotel/lodging facility is projected to be operational by 2019. The healthcare facilities are expected to be developed by the Wahiawa Hospital Association (WHA) in several phases from 2017 through 2025.

The elementary school is planned for construction by 2018 but, as noted in the agreement executed with the Department of Education (DOE), this is dependent on the pace of residential construction and the students generated. The DOE will ultimately determine the timing of new school construction. In the interim, Koa Ridge elementary school-age students will be accommodated at neighboring schools in the area based on the enrollments and facility capacities of these schools. Should the Waiawa Ridge Development be held up, delaying the opening of a middle school and high school planned at Waiawa Ridge, existing

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schools would need to accommodate students from the area. The DOE does not anticipate that the development of Koa Ridge alone would trigger the need for a new middle or high school facility (DOE Letter dated October 1, 2009).

The community park to be dedicated to the City is expected to be fully improved by 2019. A community center (for the master association) is planned to be constructed by 2019.

The LUC rules reference the need for full development of the property to “substantially be completed” within 10 years from the approval date. The Incremental Plan schedule shows that the significant infrastructure systems and residential construction for Koa Ridge Makai are expected to be 100% complete by 2022.

Castle & Cooke Waiawa – Increment II

The Incremental Plan shows the proposed 1,500-unit Castle & Cooke Waiawa being developed as Increment II, with the delivery of the first residential units in 2023.

Implementation of Castle & Cooke’s Waiawa is dependent on the progress of infrastructure construction by the neighboring Waiawa Ridge Development. In order for Castle & Cooke Waiawa to proceed, several major off-site infrastructure improvements are required to be constructed by the Waiawa Ridge Development, including:

- Roadway extension of Ka Uka Boulevard to the east across Panakauahi Gulch. The development of this roadway crossing is to be funded entirely by the Waiawa Ridge Development.
- Sewer line extending from Waiawa Ridge to the Pearl City Wastewater Pump Station. The sewer line is similarly to be developed and funded entirely by the Waiawa Ridge Development.
- Water system source, storage and transmission improvements (785-foot elevation) which could be undertaken either by the Waiawa Ridge Development or by Castle & Cooke with cost-sharing with the Waiawa Ridge Development.

Based on the traffic impact studies prepared by the Petitioner, substantial improvements are also needed to the Waipio Interchange to accommodate the additional Waiawa developments, including (see Figure 4):

- New Southbound Loop On-Ramp
- New Northbound Loop Off-Ramp
- Widening of Ka Uka Bridge from 4 lanes to 7 lanes
- Northbound Off-Ramp Widening and Modification

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To fund and implement these improvements to the Waipio Interchange, discussions have been initiated between Castle & Cooke and the Waiawa Ridge Development to enter into a cost-sharing agreement. Although public and other sources of funding will still be pursued should they become available, the interchange improvements are expected to be privately funded. It is also anticipated that the interchange improvements would not be undertaken until the Waiawa Ridge Development is ready to proceed.

In the event the Commission orders incremental districting, Castle & Cooke would propose conditions that would allow reclassification of Castle & Cooke Waiawa prior to 2022 if the above infrastructure improvements which are prerequisite to the Waiawa development are undertaken sooner than depicted in the schedule. The Petitioner would be amenable to conditions based on the initiation of specific off-site infrastructure to redistrict Increment II and enable the earlier commencement of the Waiawa development. A Supplemental Traffic Study can be undertaken at that time to determine the timing and improvements needed for the Waipio Interchange.

Attachments

1. Table 1 – Incremental Development Plan Schedule
2. Figure 1 – Infrastructure Phasing Plan Map
3. Figure 2 – Waipio Interchange Improvements Aerial (at build-out)
4. Figure 3 – Waipio Interchange Improvements w/Koa Ridge Makai
5. Figure 4 – Waipio Interchange Improvements Schematic (at build-out)
6. Figure 5 – Koa Ridge/Waiawa Community Amenities

KOA RIDGE MAKAI (Increment I)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Infrastructure															
Sewer System															
Electrical Relocation															
Water System															
595 Water System															
825 Water System															
Drainage System															
DLine, WQ & Detention Basin 1															
DLine, WQ & Detention Basin 2															
Off-Site Roads															
Ka Uka Blvd Improvements															
Waipio Interchange Improvements															
Pineapple Interchange															
Infrastructure % Complete															100%
Residential Units															
Single and Multi-Family Units															
Residential units (cumulative)															
1st Increment % units completed															
Commercial Sq. Ft.															
Big Box Retail															
Retail															
Office															
Light Industrial															
Hotel															
Other Acres															
Healthcare															
Elementary School															
Community Park															
Community Center															
Church															
WAIAWA (Increment II)															
Infrastructure															
Panakauahi Gulch Crossing*															
Off-site Sewer*															
Water System - 795 System**															
Waipio Interchange Improvements**															
Residential															
Single and Multi-Family Units															
Other															
Area															
Commercial															
Elementary School															12
Commercial															30,000 sf
Elementary School															12 acres

* Assumes WRD construction of improvements

** Assumes agreement and WRD proceeding with its Waiawa development

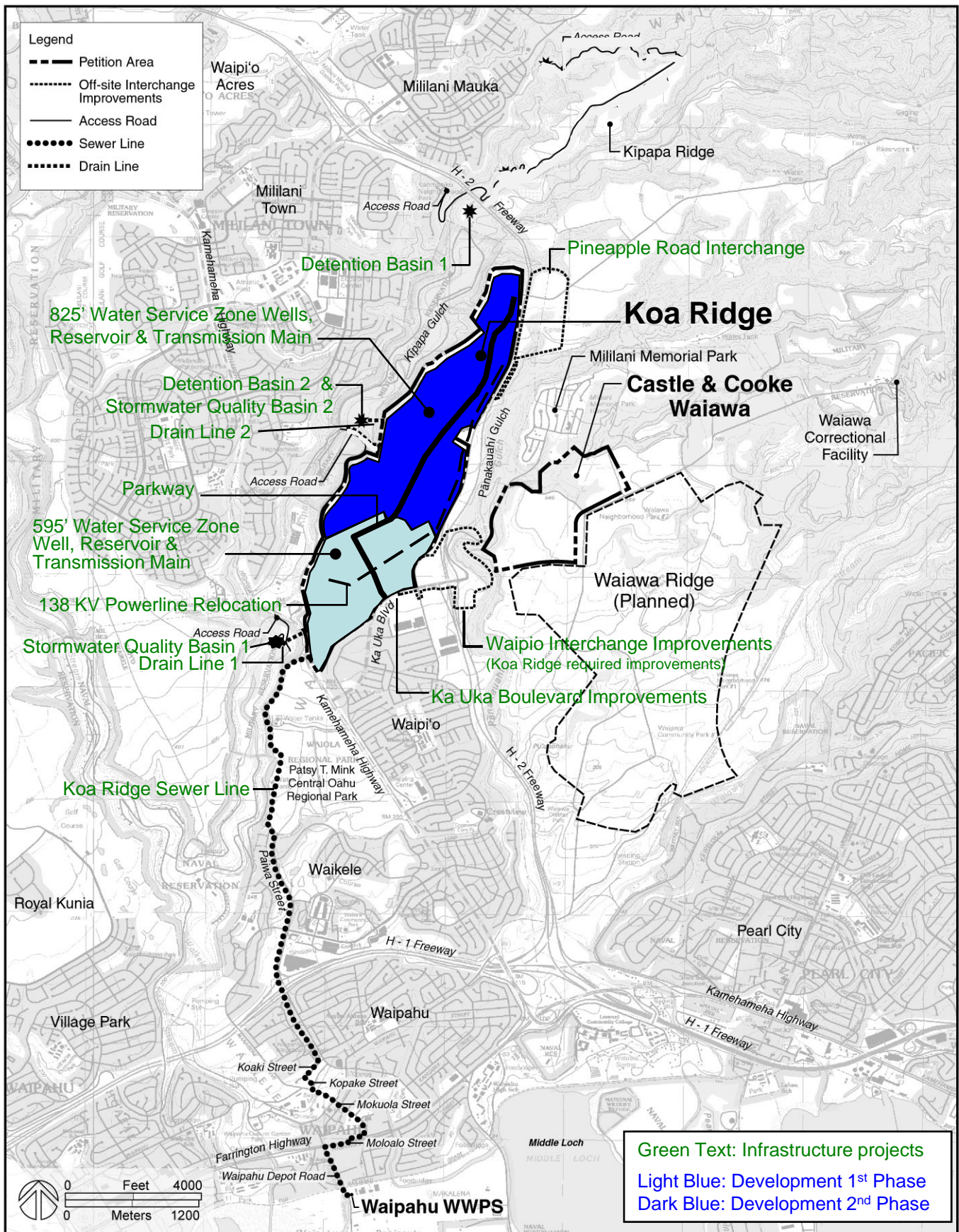
KOA RIDGE MAKAI/WAIAWA INCREMENTAL DEVELOPMENT PLAN

08-18-11

KOA RIDGE MAKAI (Increment I)		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Infrastructure																
Sewer System																
Electrical Relocation																
Water System																
595 Water System																
825 Water System																
Drainage System																
DLine, WQ & Detention Basin 1																
DLine, WQ & Detention Basin 2																
Off-Site Roads																
Ka Uka Blvd Improvements																
Waipio Interchange Improvements																
Pineapple Interchange																
<i>Infrastructure % Complete</i>												100%				
Residential	Units															
Single and Multi-Family Units	3,500			200	375	400	400	425	425	425	425	425				
<i>Residential units (cumulative)</i>				200	575	975	1,375	1,800	2,225	2,650	3,075	3,500				
<i>1st Increment % units completed</i>				6%	16%	28%	39%	51%	64%	76%	88%	100%				
Commercial	Sq. Ft.															
Big Box Retail	150,000				150,000											
Retail	200,000					30,000	20,000	75,000	25,000			50,000				
Office	30,000			10,000						20,000						
Light Industrial	83,000							43,000				40,000				
Hotel									150 rooms							
Other	Acres															
Healthcare	28						10					8				10
Elementary School	12							12								
Community Park	19								19							
Community Center	2								1							
Church	4							2				2				
WAIAWA (Increment II)																
Infrastructure																
Panakaui Gulch Crossing*																
Off-site Sewer*																
Water System - 795 System**																
Waipio Interchange Improvements**																
Residential																
Single and Multi-Family Units	1,500												300	400	400	400
Other	Area															
Commercial	30,000 sf													30,000		
Elementary School	12 acres														12	

* Assumes WRD construction of improvements

** Assumes agreement and WRD proceeding with its Waiawa development



Koa Ridge Phasing and Major Infrastructure Improvements

Figure 1

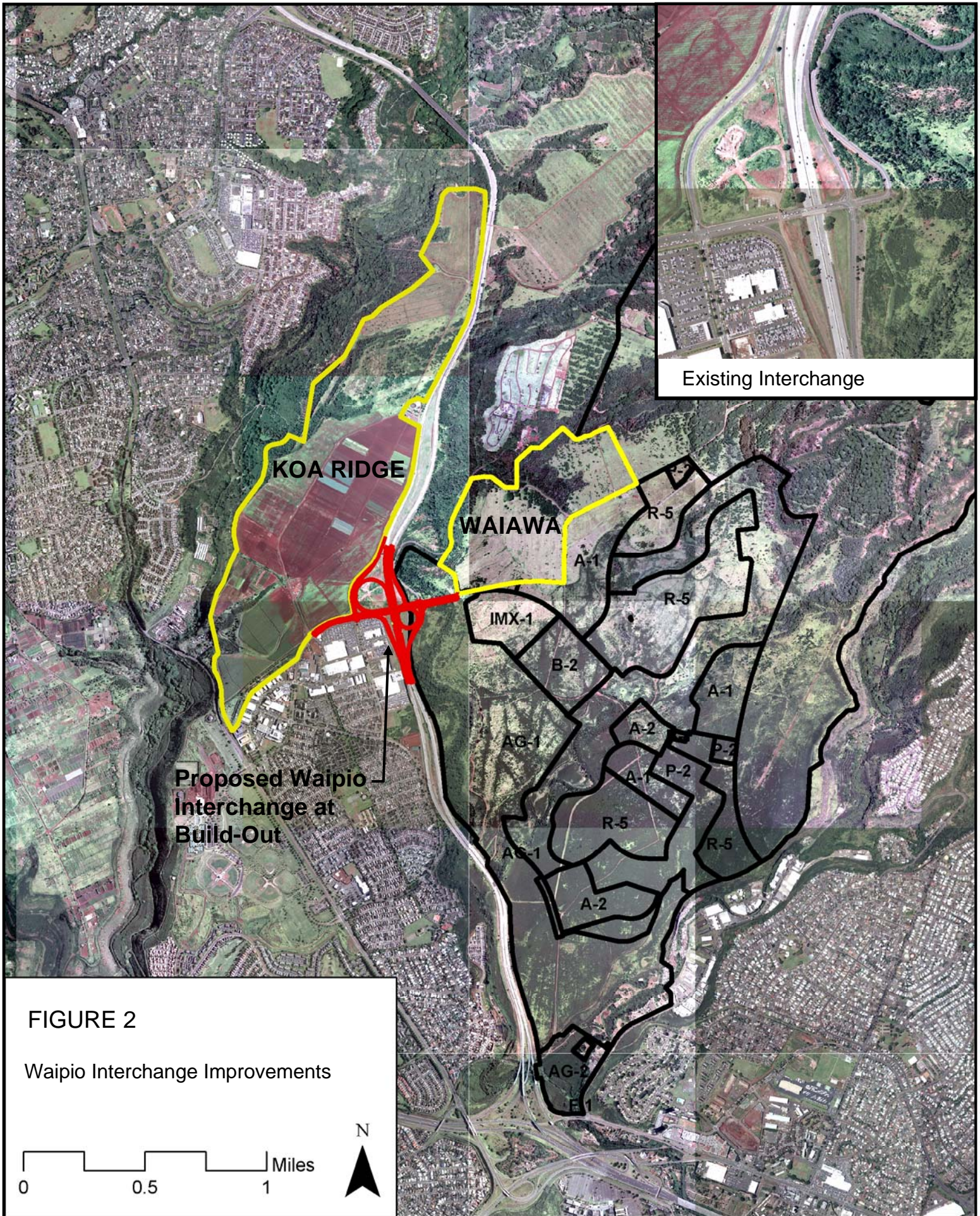


FIGURE 2

Waipio Interchange Improvements

0 0.5 1 Miles



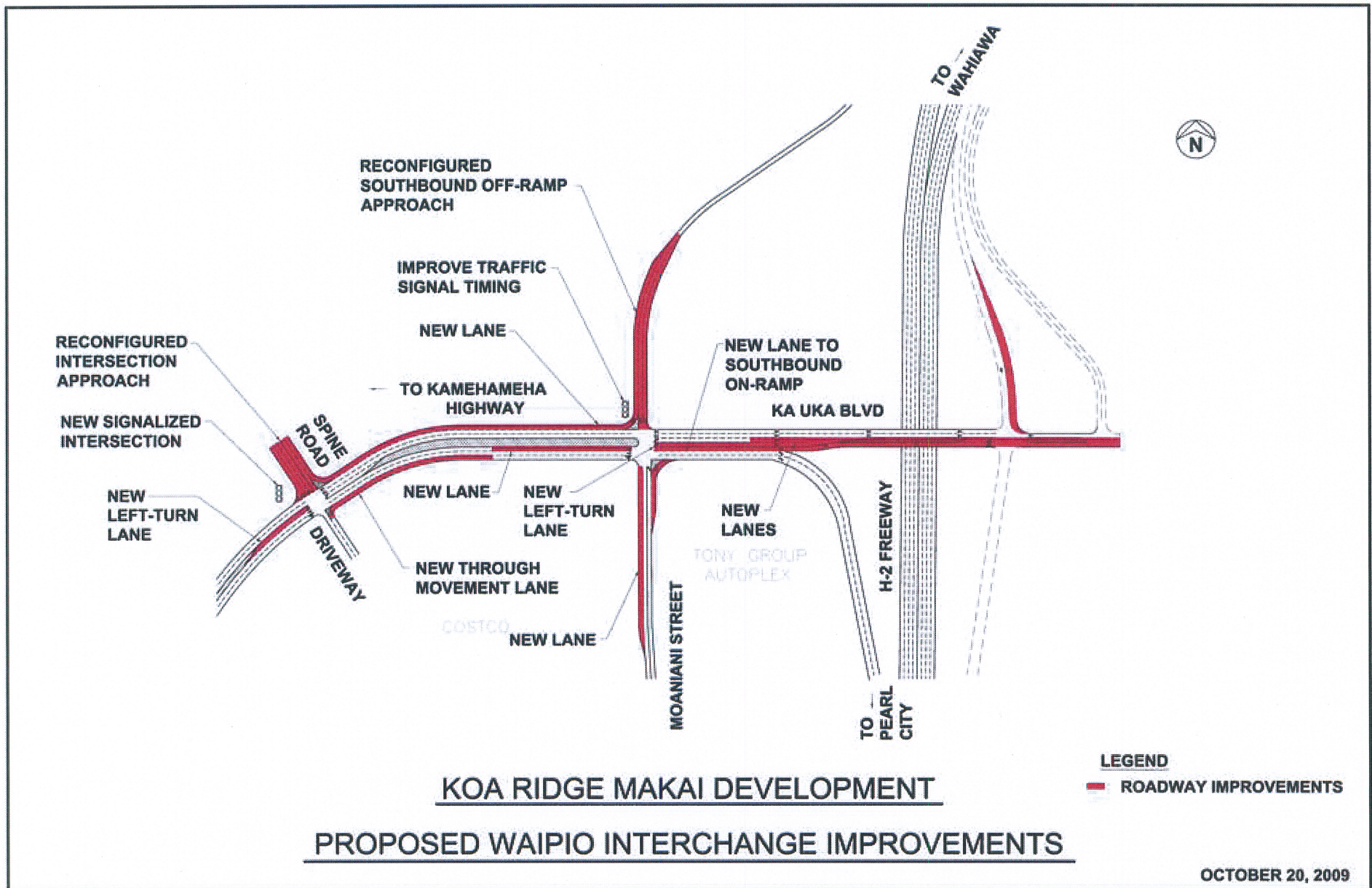


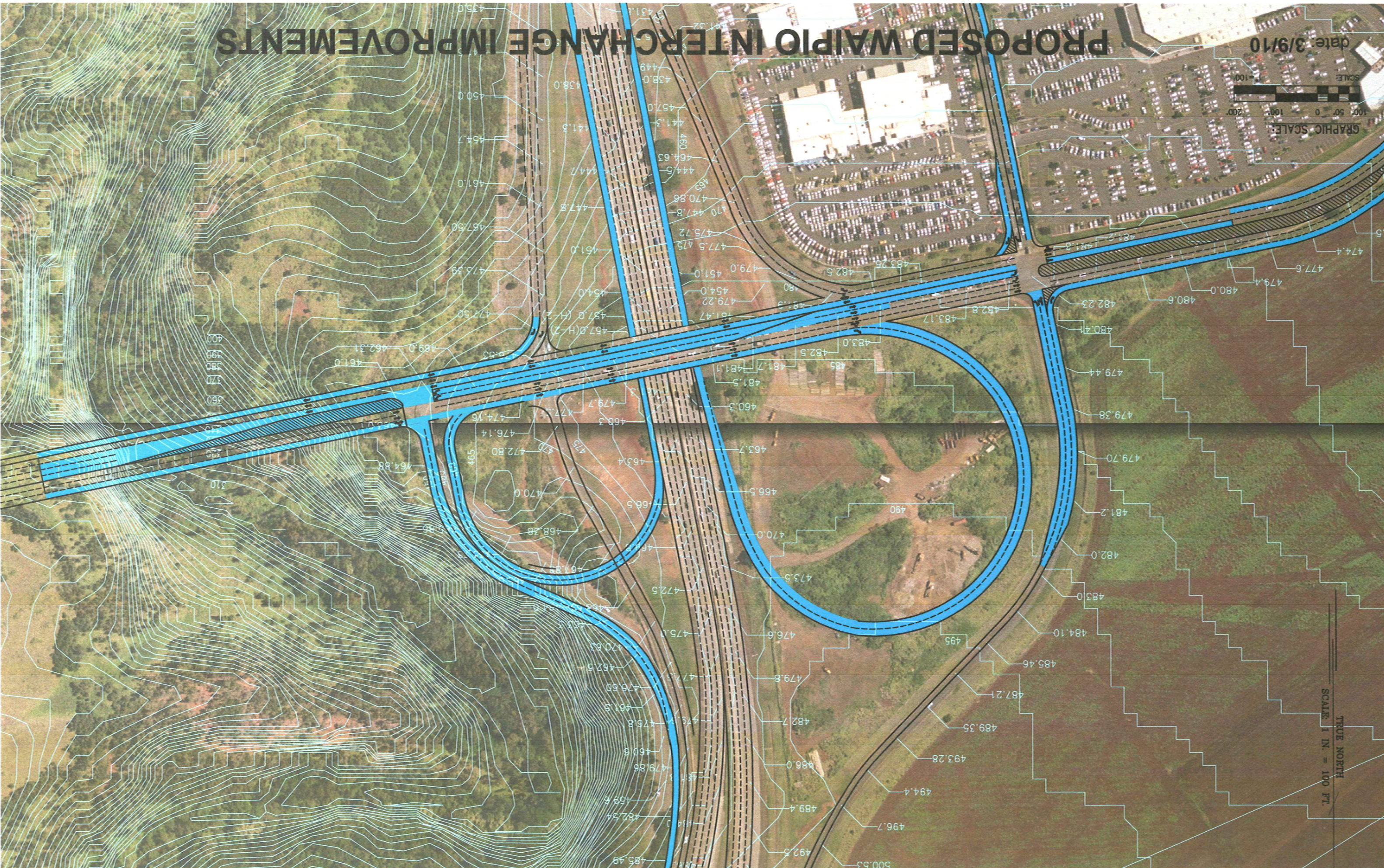
Figure 3

PROPOSED WAIPIO INTERCHANGE IMPROVEMENTS

date: 3/9/10

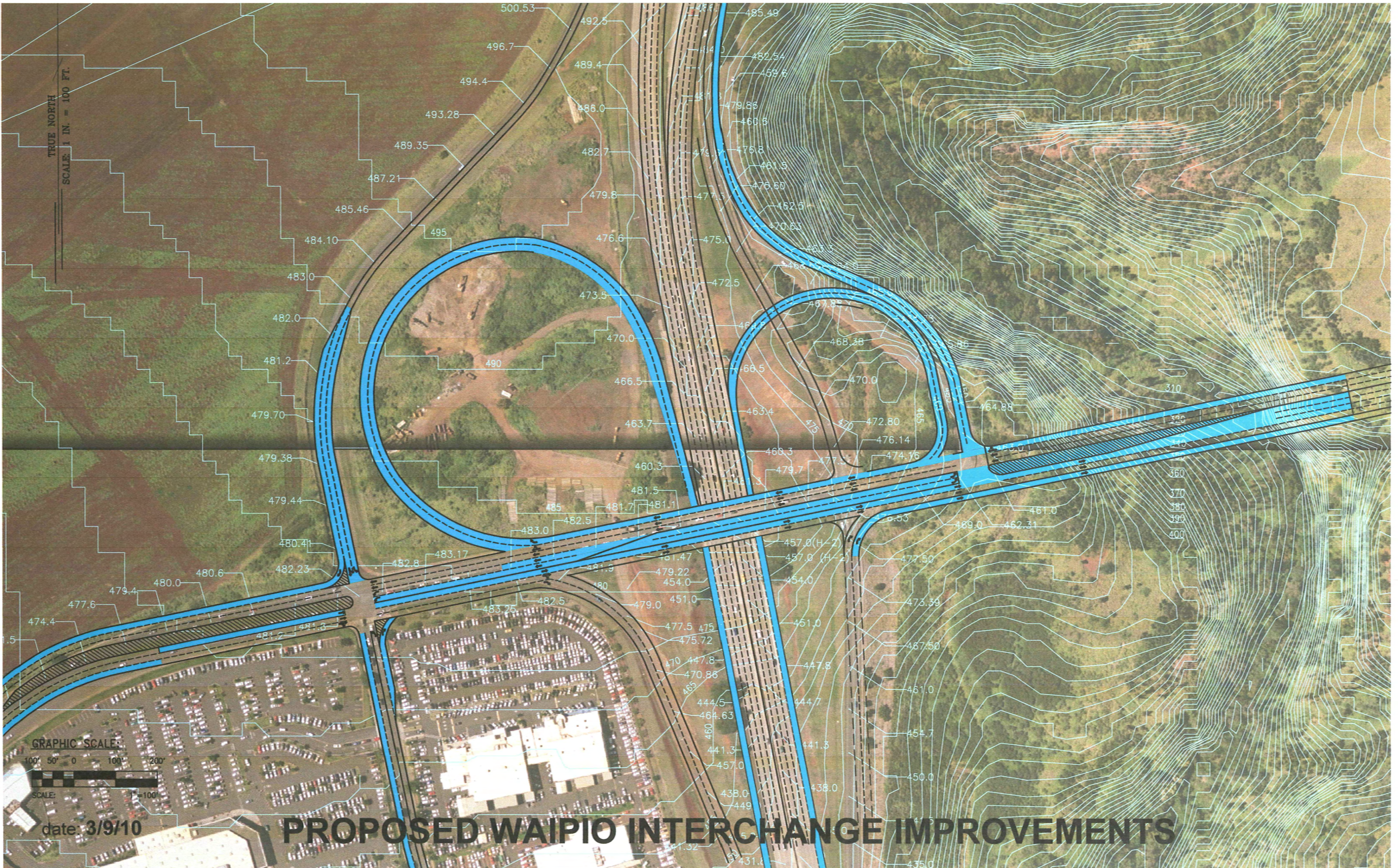
SCALE: 1" = 100'

GRAPHIC SCALE: 0 50 100 200



TRUE NORTH
SCALE: 1 IN. = 100 FT.

TRUE NORTH
SCALE: 1 IN. = 100 FT.

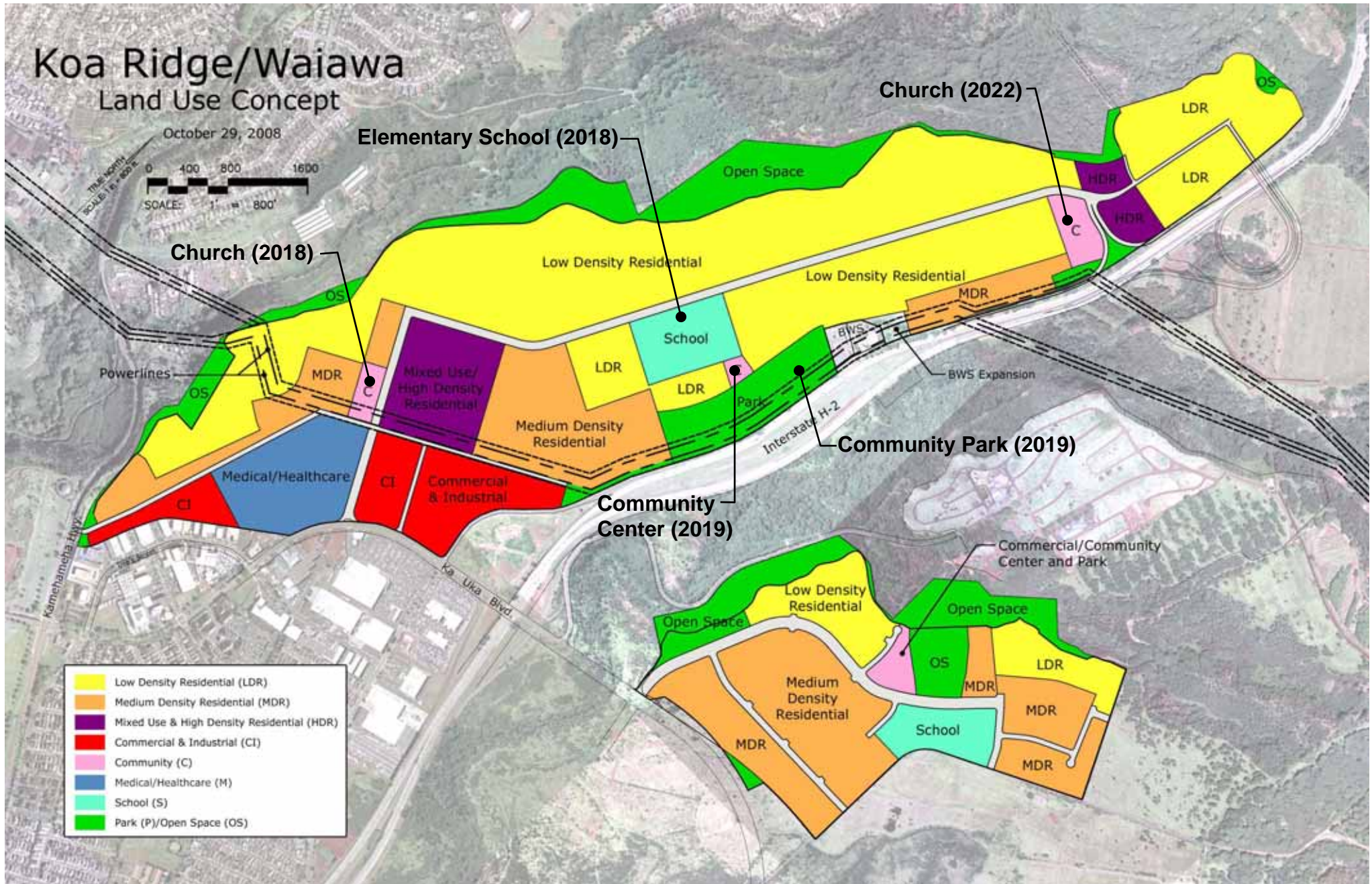
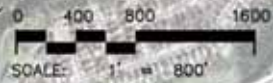


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PROPOSED WAIPIO INTERCHANGE IMPROVEMENTS

Koa Ridge/Waiawa Land Use Concept

October 29, 2008



 Low Density Residential (LDR)
 Medium Density Residential (MDR)
 Mixed Use & High Density Residential (HDR)
 Commercial & Industrial (CI)
 Community (C)
 Medical/Healthcare (M)
 School (S)
 Park (P)/Open Space (OS)

Figure 5

KOA RIDGE MEDICAL CENTER
Facilities Planning Forecast
2015 - 2025

Cattaneo & Stroud, Inc.
January 2009

Project Overview

The Koa Ridge Medical Center is being proposed to provide comprehensive primary and secondary care medical services to residents of central and northern Oahu. The conceptual idea is to incorporate and build upon the acute care services at Wahiawa General Hospital at a site that is more central to major traffic arteries, population and employment centers. The planning for Koa Ridge health care services have been based on industry tested population-based planning principles, incorporating Hawaii-specific and national/industry trends and standards. Methodologies and assumptions are summarized below.

The service area for the Koa Ridge health services is projected to reach from the North Shore through central Oahu. Current resident civilian population of the defined primary service area (PSA) is approximately 147,761 in 2008, growing to an estimated 170,744 by 2025, an estimated 15% increase. Koa Ridge health care services are designed to support the primary and secondary needs for an estimated 20-30% of the area's population, with other services provided in large Honolulu medical centers, the military health system and Kaiser facilities.

The planning horizon for the health services forecast is 2015 for initial opening, with growth forecast through 2025. Long range growth forecasts indicated a continuing growth in the North Shore/Central Oahu planning zones, hence it is important that the new medical center maintain capacity for future growth as the health services mature and the population continues to grow and age.

The forecast estimates a need for the following services:

- 100 bed acute care hospital, with site capacity to expand to 120+ beds to accommodate future growth through 2025
- Outpatient hospital and ambulatory care services to include:
 - Emergency services
 - Diagnostic imaging
 - Ambulatory surgery
 - Endoscopy and minor procedures
 - Other diagnostic and treatment services required for a full service hospital, including lab, rehabilitation, pulmonary function, cardiac testing, etc.
- Medical office building to house 40-60 physicians, with the site capacity to expand as demand grows
- Skilled nursing facility with 100 to 150 beds.

Koa Ridge Medical Center

Koa Ridge Primary Service Area

The primary service area (PSA) for the proposed Koa Ridge Medical Center is expected to consist primarily of residents of central and the North Shore of Oahu in the following zip codes:

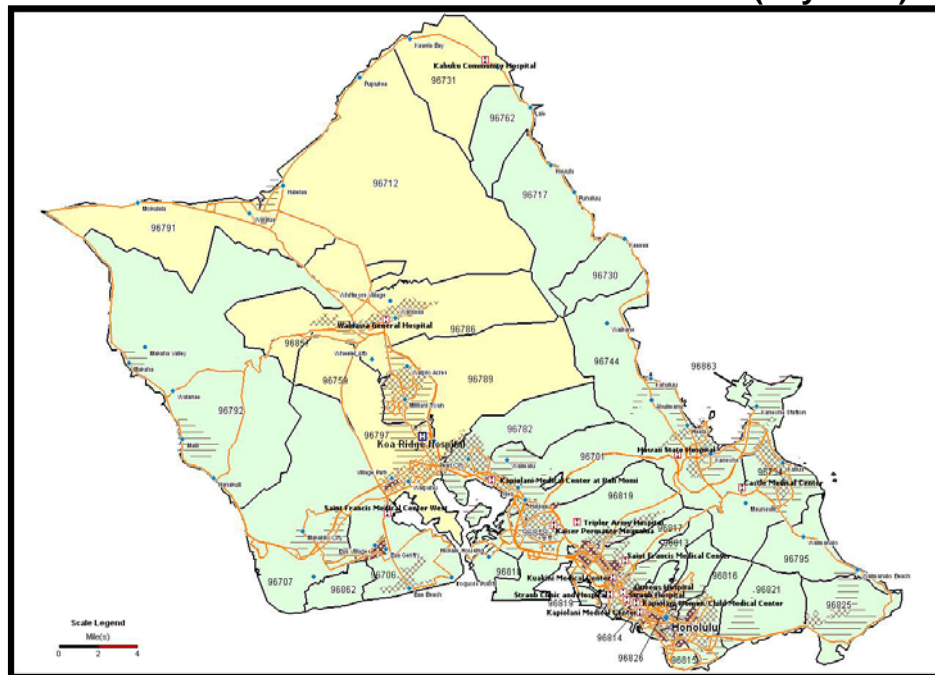
Current & Forecast Primary Service Area Population by Zip Code

Area	Zip Code	2008	2010	2015	2020	2025	%+/-
Kahuku	96731	2,715	2,732	2,769	2,813	2,889	6%
Kunia	96759	340	388	609	889	1,096	222%
Waipahu	96797	65,062	65,639	67,394	67,721	68,619	5%
Wahiawa	96786	24,739	24,757	24,297	23,922	23,710	-4%
Mililani	96789	43,395	43,690	48,505	55,058	61,052	41%
Haleiwa	96712	5,119	5,200	5,558	5,877	6,150	20%
Waiialua	96791	7,383	7,364	7,326	7,276	7,229	-2%
		148,753	149,769	156,458	163,555	170,744	15%

See Appendix A for sources & details

The region is based on patient origin for Wahiawa General and other Oahu hospitals. The central location of Koa Ridge should facilitate access to health services for area residents, reducing transport time and cost compared to current dependence on facilities in Honolulu or Wahiawa General Hospital. The site is adjacent to the H2 Freeway near the junction of State Highway 99.

KOA RIDGE SITE & PRIMARY SERVICE AREA (in yellow)



Population Forecast

Moderate growth is forecast for the seven zip codes comprising the primary service area through 2025, the planning horizon for full development of pending residential developments in the region. Population forecasts for the area are based on the official State of Hawaii demographic forecasts, with zip code-specific demographic characteristics and growth derived from the State's planning zones that are contained in the identified zip codes. (See Appendix A for a more detailed description of the planning zone to zip code translation and forecast methodology).

The total Oahu and PSA forecast population was refined to exclude military population and dependents who use the military health system, based on estimates by region from Hawaii State Department of Business, Economic Development and Tourism. Approximately 11,000 military personnel are stationed in the PSA. This number was held constant in the forecast.

The age profile of the targeted service area was estimated based on State of Hawaii estimates of Oahu growth by age group and the most recent (2007) age profiles of the Oahu planning zones that comprise the targeted zip codes. The 65+ age segment is forecast to grow the most in the forecast period from 12% in 2010 to 16% in 2025 of the primary service area population.

TOTAL PRIMARY SERVICE AREA POPULATION BY AGE GROUP

Age Cohort	2008	2010	2015	2020	2025	%+/-
0-14	32,347	32,514	33,778	35,176	36,343	12%
15-64	97,464	98,807	101,855	104,148	106,641	9%
15-44F	30,998	31,186	31,634	32,463	33,485	8%
65+	17,956	18,448	20,826	24,231	27,761	55%
Total	147,767	149,769	156,458	163,555	170,744	15%
Pct 65+	12%	12%	13%	15%	16%	34%

Hospital Forecast

The primary service area population of the Koa Ridge Medical Center will support a hospital with approximately 100 beds when it opens in approximately 2015. Population growth results in an estimated need for 120 acute care beds by the year 2025. The potential hospital component of the Koa Ridge Medical Center would include acute hospital beds to meet primary and secondary hospital

Koa Ridge Medical Center

demand for an estimated 20-30% of the population. Other potential services include diagnostic and treatment services typical of a small, full service general acute care hospital, such as imaging, outpatient surgery, laboratory, outpatient rehabilitation, etc.

Wahiawa General Hospital would continue to provide acute psychiatric services with a senior care focus, as well as long term care services to serve the growing number of elderly in the central and North Shore regions. The potential hospital size and scope of services is based on forecast population and market share of hospital discharges, as summarized below.

Forecast Methodology

The bed and service forecast is based on an analysis of historical age-specific use rates for services in Hawaii. The analysis incorporated the following assumptions and methodologies:

Service Area

The proposed Koa Ridge Medical Center site is located in Waiawa, Central Oahu at the junction of the H2 Freeway and State Highway 99. The site is central to both commercial and residential developments and should reduce traffic into Oahu for health services and provide easier access to residents of Central Oahu and North Shore.

Historical and forecast civilian population by zip code and age groups were used to derive use rates for the new hospital. State forecasts by planning zone were converted into zip code population to provide population for the zip code-based hospital discharge data. The PSA was defined following analysis of market share by hospital and patient migration patterns throughout Oahu. It is comprised of Haleiwa and Waialua in North Shore, Kahuku in Koolauloa, Wahiawa, Mililani, Waialua, Waipahu, Kunia and Schofield. The corresponding zip codes are 96712, 96731, 96786, 96789, 96791, 96797, 96759, and 96857.

From the population forecast, the 65 and over population will increase from an estimated 18,000 in 2008 to almost 28,000 in 2025, i.e. more than 50%, with the percent elderly increasing from 12% to 16% of the population. The need for local and more accessible health services will be critical to maintaining health in the region's population.

Use Rates

Age-adjusted use rates were developed based on zip code of residence and hospital discharge data from the Hawaii Health Information Corporation (HHIC) from 2000 to 2007. A forecast for overall Oahu hospital demand was calculated based on trends from 2000 to 2007. Modest increases in population combined

Koa Ridge Medical Center

with significant aging result in a forecast 29% increase in acute hospital cases in Oahu between 2007 and 2025.

Scope of Services

Koa Ridge Medical Center is planned to provide a range of medical and surgical services typical of a community hospital. Tertiary services such as cardiovascular surgery and neurosurgery will continue to be provided by larger medical centers in Honolulu.

Market Share

Utilization for the Koa Ridge Medical Center is based on market share assumptions for the forecast utilization by zip code, with variation by medical diagnostic category. Market share assumptions were estimated based on historical use of Wahiawa General Hospital, the location of the new hospital, and current and historical utilization, market share and patient migration patterns to Oahu hospitals.

The forecast results in the following estimated utilization and market share for the new hospital and other providers on Oahu:

2007 & FORECAST POPULATION, CASES & HOSPITAL MARKET SHARE BY AREA

Zone	Area	Zip Code	2007 Civilian Pop	2007 All Cases	2007 Wahiawa Cases	2007 Wahiawa Market Share	2015-25 Est. Koa Ridge Market Share
Central Oahu	Kunia	96759	272	274	6	2%	8%
	Wahiawa	96786	24,703	3,921	762	19%	24%
	Mililani	96789	42,812	3,670	298	8%	18%
	Waipahu	96797	63,926	6,303	66	1%	15%
North Shore	Kahuku	96731	2,681	247	13	5%	13%
	Haleiwa	96712	4,963	541	124	23%	27%
	Waialua	96791	7,420	635	201	32%	36%
Other Oahu	Aiea	96701	39,390	3,420	18	1%	5%
	Ewa Beach	96706	56,791	4,649	32	1%	4%
	Kapolei	96707	34,401	2,473	6	0%	1%
	Hauula	96717	4,964	564	5	1%	1%
	Kailua	96734	40,134	4,752	2	0%	0%
	Kaneohe	96744	51,907	5,071	26	1%	0%
	Laie	96762	4,958	451	3	1%	1%
	Pearl City	96782	32,573	3,443	31	1%	3%
	Waianae	96792	44,208	5,138	27	1%	4%
Waimanalo	96795	10,007	1,222	1	0%	0%	
Honolulu	Honolulu	Honolulu	395,346	33,907	102	0%	0%
Other		Other		10,093	56	1%	0%

Koa Ridge Medical Center

HISTORICAL & FORECAST CASES BY HOSPITAL 2000-2025

HOSPITAL	2000	2001	2002	2003	2004	2005	2006	2007	2015	2020	2025	%-/-
HOSPITAL DISCHARGES												
New Hospital									3,893	4,292	4,695	100%
Wahiawa General	2,454	2,568	2,414	1,794	2,288	2,484	2,216	1,778	334	370	406	-77%
Castle MC	5,673	6,025	5,995	6,345	6,491	6,410	6,697	6,507	7,217	7,806	8,345	28%
Hawaii MC - East	5,418	5,104	4,868	4,206	4,973	4,857	4,482	4,032	4,383	4,797	5,234	30%
Hawaii MC- West	3,893	3,660	3,863	4,069	4,352	4,137	3,769	3,709	3,672	4,038	4,393	18%
Kahuku	365	505	514	422	422	358	169	40	41	44	47	18%
Kaiser Moanalua	10,478	10,969	12,049	12,249	11,814	11,257	11,015	10,786	12,048	13,073	14,093	31%
Kapiolani (all)	17,782	18,266	19,602	19,895	19,663	19,166	18,782	18,965	19,728	20,742	21,673	14%
Kuakini MC	5,800	5,843	5,810	5,870	5,757	5,338	5,433	5,784	6,512	7,319	8,174	41%
Straub	5,932	5,788	6,370	6,066	5,989	6,246	6,254	6,142	6,914	7,685	8,494	38%
The Queens MC	18,901	18,577	19,130	19,342	20,400	21,051	20,617	21,471	23,396	25,143	26,965	26%
All Oahu	76,696	77,305	80,615	80,258	82,149	81,304	79,434	79,214	88,138	95,309	102,518	29%

These forecasts result in the following average daily census (ADC) and bed need estimates for Koa Ridge:

HISTORICAL & FORECAST AVERAGE DAILY CENSUS & BED NEED WAHIAWA GENERAL & NEW KOA RIDGE HOSPITALS

Data	2000	2001	2002	2003	2004	2005	2006	2007	2015	2020	2025
	Wahiawa General						New Hospital				
ADC	37	39	35	24	37	35	37	32	71	78	85
Beds Needed	53	56	50	34	52	50	52	46	101	111	122

Note: Bed need based on target occupancy of 70%

Emergency Department

The Koa Ridge Medical Center could include a full service emergency department that would receive an estimated 28,000 visits by 2025. In 2007, Wahiawa Hospital saw just over 15,000 emergency visits. The new hospital is forecasted to attract a larger market share due to its more central location, the broader scope of services and a larger local medical staff.

Hospital emergency visits are a function of service area population growth, proximity to other hospital emergency departments, incidence rates of accidents and emergent medical conditions, availability of and access to primary care physicians and ambulance protocols. Forecast population growth and aging of the population is expected to increase demand for services at the Koa Ridge Medical Center. In addition, proximity to the freeway and a broader scope of services will yield higher emergency visit volume.

Koa Ridge Medical Center

Across Hawaii, emergency visit rates have increased in recent years, though data quality issues prevent analysis of long term trends. The forecast model assumes growth based on population and a slower rate of increase than previous years. An additional factor that could drive growth at the new facility is gas prices and traffic congestion, which could encourage greater use of local facilities and less intra-island commuting.

Regional Emergency Medical Service patient transport guidelines and policies also impact emergency department usage. The new facility will be central to a major freeway intersection and in close proximity to residential areas. In general, ambulance destinations are selected based on three criteria: 1) the facility closest to the accident site, patient origin and medical need; 2) patient preference, weighed against medical need if there is a conflict; and 3) interaction between ambulance drivers, their dispatcher and the hospital physician on duty. The Koa Ridge Medical Center will be in closer proximity to major transportation arteries, residential areas and businesses than the current Wahiawa General Hospital (WGH) Emergency Department. In addition, the scope of services and affiliated physicians are anticipated to be greater than at WGH, hence an increase in the percentage of regional ambulance patients directed to the new facility is anticipated.

The forecast demand for emergency visits at the new hospital is as follows:

HISTORICAL & FORECAST EMERGENCY VISITS BY HOSPITAL

Hospital	2004	2005	2006	2007	2015	2020	2025
New Hospital					25,500	26,946	28,348
Wahiawa General	13,553	13,913	14,376	14,059	-	-	-
Castle MC	22,150	20,430	20,803	21,676	23,595	24,900	25,933
Hawaii MC - East	5,746	6,063	7,184	6,194	6,565	6,916	7,308
Hawaii MC - West	22,978	24,278	25,647	25,766	25,672	27,057	28,259
Kahuku	<i>Did Not Report</i>						
Kaiser Moanalua	15,181	29,639	29,994	26,918	27,793	29,466	31,075
Kapiolani MC	6,256	5,930	5,792	6,027	6,233	6,767	7,283
Kapiolani Pali Momi	22,107	23,110	25,953	28,239	28,003	29,432	30,680
Kapiolani WomChil	24,333	24,791	26,274	25,580	25,995	26,619	27,192
Kuakini MC	11,393	11,485	11,944	12,757	13,950	15,237	16,624
Straub	2,436	20,895	20,883	21,017	22,640	24,048	25,572
The Queens MC	44,861	46,144	44,021	45,825	48,206	50,145	52,292

Ambulatory Services Profile

A forecast of major outpatient services was undertaken in order to develop site plans for the Koa Ridge Medical Center. Forecasts were based on population growth, hospital size and census and standardized ratios of acute care services to outpatient services from other hospitals of similar size. The services forecast are as follows:

ESTIMATED MAJOR HOSPITAL ANCILLARY SERVICES

Ancillary Service	2015	2020	2025
Surgeries			
In patient	1,132	1,248	1,365
Outpatient	1,436	1,583	1,732
TOTAL	2,568	2,831	3,097
ED Visits	25,500	26,946	28,348
Other-Inpatient¹			
Echo Exams	1,194	1,318	1,442
EKG Procedures	9,583	10,575	11,575
Endoscopy	364	402	440
EEG Procedures	247	273	299
Radiology	5,453	6,017	6,587
Other-Outpatient			
Echo Exams	609	672	736
EKG Procedures	6,167	6,805	7,449
Endoscopy	793	875	958
EEG Procedures	149	164	179
Radiology	4,222	4,659	5,100
Total Outpatient+Ancillary	56,850	61,538	66,211

1. Ancillary service forecast is an approximation based on a standard mix of hospital services, including both inpatient and outpatient; a final projection should reflect the service mix of the specific facility and arrangements with any outpatient facilities.

Physician Offices

Hawaii is experiencing a crisis in physician workforce due to a number of factors: high cost of living, uncontrolled and high malpractice costs, high labor costs and low reimbursement rates. In 2007, the Hawaii Medical Association held a series of forums about the issue across the state that drew more than 175 participants. Also in 2007, the Hawaii Health Workforce Collaborative undertook an initial assessment aimed at “improving access to and quality of healthcare in Hawaii by identifying unmet health workforces needs and developing solutions.” The group

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began with a study of the Island of Hawaii, defining a serious shortage of physicians with numerous recommendations to increase supply. In 2008, the House of Representatives of the State of Hawaii enacted H.B. No. 2291 that began:

Hawaii has a shortage of physicians, and patients are unable to obtain the medical care that they need. This crisis is most acute on our neighbor islands, which are more rural and have a smaller physician workforce. However, symptoms of the crisis are beginning to emerge on Oahu. The Queen's Trauma Center on Oahu has an alarming shortage of doctors willing to volunteer for emergency and trauma call...

Immediate action is necessary to reverse this trend. Hawaii's high malpractice insurance premiums, coupled with its high cost of living and low reimbursement rates have made it difficult to effectively recruit and retain physicians.

The bill provided tort reform that should help to resolve the crisis by reducing the economic costs of practice in Hawaii. It did not address the low number of medical school graduates (only 56 in 2005; equivalent to 4.4 per 100,000 residents compared to 6.4 nationally), or the low number of physician assistants practicing in the state (4.6 per 100,000 compared to 14.4 nationally).

The proposed medical office building will provide an attractive incentive for attracting and retaining physicians on the island through development of a regional, state-of-the-art practice setting on an integrated health care site that is close to desirable housing communities for physicians and their families.

Forecast need for physicians in the Koa Ridge Medical Center planning is based on the civilian population of the service area in the targeted service area described earlier, the estimated number of persons who may need physician services in the area and the current and future supply of physicians. A preliminary inventory of physicians currently practicing in the primary service area identified a total estimate of 138.2 full time equivalent physicians, of which 13.7 are hospital-based and 12.8 are either psychiatrists or ophthalmologists. Additional observations include:

- A large number of specialists only practice part-time in the primary service area, with primary practice locations in Honolulu.
- Many subspecialties, such as anesthesia, general surgery, orthopedics, ENT and dermatology have a disproportionate percentage of physicians who are currently over the age of 60.
- Over the next ten years, the elderly population is forecast to increase significantly, which will drive the need for physicians higher. Access will be enhanced by a more even distribution of physicians to population centers outside of Honolulu, such as the proposed Koa Ridge Medical Center.

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Calculations project a significant shortage of physicians in the targeted area in all forecast years, particularly in the medical and surgical subspecialties. These types of physicians are often reluctant to locate in less developed medical markets with less sophisticated hospitals. The potential hospital and medical facilities would provide attractive facilities with easy access and commutes for newly recruited physicians.

The need for physicians at the new medical center was calculated as a range since it is assumed that many of the individuals in the service area will continue to commute to Honolulu for medical care. Standardized physician to population ratios for the United States and Hawaii were used to estimate the demand for medical office space. Current supply of licensed physicians in Hawaii is close to the median for the U.S.

RANGE OF SUPPLY OF U.S. PHYSICIANS

TYPE OF MD	LOW	MID	HIGH
Primary Care	61.5	72.7	95.7
Medical Specialties	34.1	44.3	64.3
Surgeons	37.4	43.2	53.4
Hospital-Based	23.8	26.1	28.7
ALL	169.4	204.8	271.8

Source: NEJM - Physician Workforce Crisis? 358:1658-1661, 4-172008

As noted above, population of the primary service area is estimated to be 149,769 in 2010, rising to 170,744 by 2025. Estimated physician need to serve this population ranges from a low of 265 to a high of 464, compared to the existing 138 physicians identified as practicing in the area. Based on the current physician ages, expected supply and demand is forecast to be as follows, assuming no influx of new physicians:

ESTIMATED SUPPLY & FORECAST DEMAND FOR PHYSICIANS IN PRIMARY SERVICE AREA

TYPE OF MD	SUPPLY			ESTIMATED DEMAND - 2015			ESTIMATED DEMAND - 2025		
	2015	2020	2025	LOW	MID	HIGH	LOW	MID	HIGH
PRIMARY CARE	98	82.8	64.1	96	114	150	105	124	163
MEDICAL SPEC.	8.9	6.2	1.8	53	69	101	58	76	110
SURGICAL SPEC.	8.4	7.4	6	59	68	84	64	74	91
HOSPITAL-BASED	22.9	16.8	11.6	37	41	45	41	45	49
TOTAL	138.2	113.2	83.5	265	320	425	289	350	464

This forecast need applies to the total population residing in the primary service area, not all of which will seek care for all services at the new Koa Ridge Medical Center, and not all of whom would require office space on the new medical

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center. For example, Kaiser serves approximately 15% of the population in the region and has 24 mostly primary care physicians located in its Waipio office building. As a hospital-affiliated office building, the Koa Ridge building would house a broader range of specialists, which should enhance access to residents of central and north Oahu.

Based on the hospital size and scope of services, the forecast physician need and shortages in Hawaii and the primary service area, it is proposed that a medical office building with space to accommodate 35 to 50 physicians is appropriate for the area initially, with potential space to expand in future years based on growth of the area and the hospital.

It is anticipated that many of the tertiary service physicians will not practice at the Koa Ridge Medical Center since the hospital would likely focus on primary and secondary level services. Tertiary services such as cardiac surgery, neurosurgery and high risk neonatal services will continue to be provided at major hospitals in Honolulu. Certain other specialties with more limited demand may have part-time offices in the new facility to facilitate access for residents of the region.

Skilled Nursing Services

“Long term care capacity in Hawaii is insufficient to meet current and future demand. The waitlist situation will worsen unless action to build long term care capacity is taken.” This statement from the January 2008 ***Report to the Twenty-Fourth Hawaii State Legislature*** summarizes the critical need for additional skilled nursing bed capacity in Hawaii that will be addressed by the proposed project. The shortage exacerbates access to hospitals and prevents the growing elderly population from receiving appropriate medical care.

On average, there are 200, and as many as 275 complex patients waitlisted daily for long term care in acute care hospital settings across our State...Discharge timeframes for waitlisted patients range from days to over a year. This represents a poor quality of life option for the patient, presents an often insurmountable dilemma for providers and patients, and creates a serious financial drain on acute care hospitals with ripple effects felt throughout other health care service sectors.

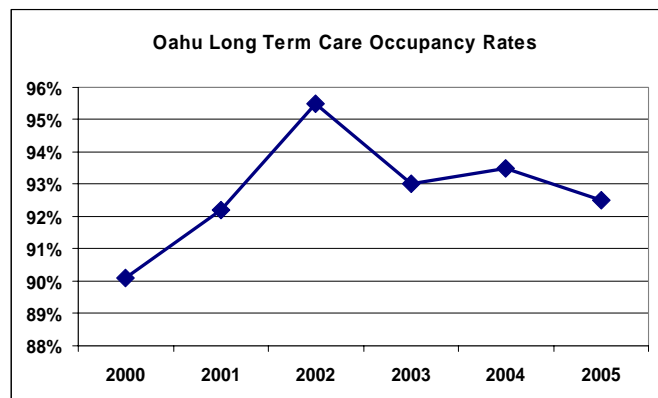
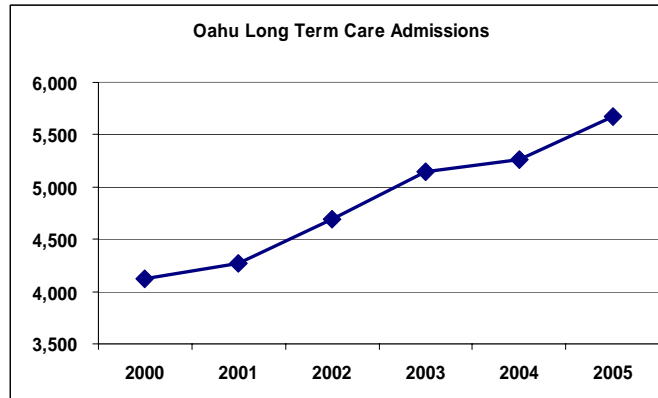
The waitlist dilemma as described above is unique to Hawaii. Hawaii has one of the lowest ratios of long term care beds for its population in the United States. Based on the 2006 AARP Public Policy Institute “Across the States” report, Hawaii ranks 48th. Where the US average is 47 beds per 1000 over age 65, Hawaii averages 23 (half of the US average).

Source: Report to the Twenty-Fourth Hawaii State Legislature. January 2008

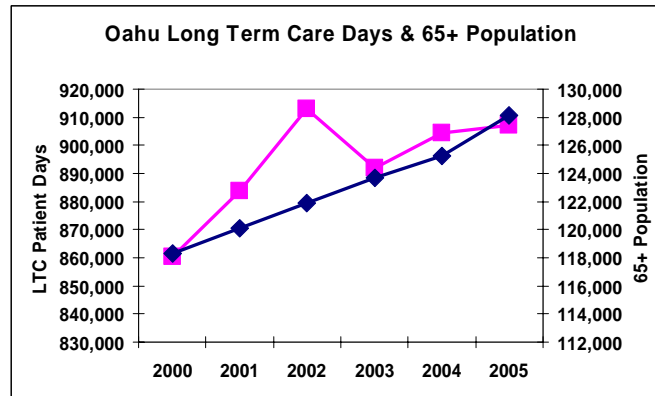
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A review of historical utilization and forecast demand further illustrates the shortage of beds in Oahu. Most existing skilled and intermediate care beds are located in Honolulu; however the barriers to access are evident across the island. 2008 Hospital Waitlist Surveys conducted by the Healthcare Association of Hawaii indicate that Wahiawa Hospital had six patients waiting for a skilled nursing bed and one waiting for an intermediate care bed on May 31, 2008, double the number waiting at the end of February 2008. Also, Oahu has the lowest number of long term care beds per resident of any Hawaiian island. At 21 beds per 1,000 65+ population, it is 43% lower than Kauai's 37 beds per 1,000 65+ and 55% lower than the national average of 47 beds per 1,000 65+ population.

Admissions and patient days have risen significantly over the past five years.



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The need for additional skilled nursing beds in Hawaii is well documented:

- The January 2008 report to the legislature on waitlisted patients recommends construction of additional beds.
- The 2003 SHPDA report on “Forecast Acute Care and Long-Term Care Bed Days in Hawaii: Projections to 2025” indicate increasing demand and high occupancy rates.
- The Hawaii Healthcare Association’s *Trends for Action 2002* forecast growing demand and inadequate capacity.

The increasing demand is fueled by the current shortage in beds and the forecast increase in the elderly population, which significantly outpaces growth in all other segments of the population in Hawaii. A 94% increase in the number of 65+ residents masks the impact of the even faster-growing 85+ population that are even more likely to require long term care.

Historical trends and forecast growth were incorporated into a bed need formula to estimate the need for beds in the Koa Ridge service area. The forecast is conservative since historical data do not include patients in acute care hospitals waiting for placement, and do not take into account the greater increase in the very elderly 85+ population. Of the 32 facilities with long term care beds on Oahu, only three are in the proposed service area. These facilities contain only 271, 9.5% of all LTC beds on Oahu, whereas the elderly population in the area comprises an estimated 10.9% of the 65+ Oahu population.

The unmet need for long term care beds in Hawaii is larger than the capacity of the Koa Ridge Medical Center site, which will support a facility of 50 to 250 beds, depending on the size and configuration of other facilities on the site. The community will benefit from the proposed addition of a 100-bed skilled nursing facility on the Koa Ridge Medical Center site, providing residents with a local option for care as they and their families age. The proposed sizing is based on the available land and financial feasibility estimates.

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HISTORICAL & FORECAST LONG TERM CARE NEED KOA RIDGE SERVICE AREA

Statistics	2005	2010	2015	2020	2025	% Chg 2005-2025
POPULATION 65+	17,241	18,448	22,387	27,704	31,582	83%
Estimated Patient Days	122,061	133,199	157,966	200,356	228,420	87%
ADC	334	365	433	549	626	87%
Beds Req'd @ 95% Occ.	352	384	456	578	659	87%
Lic. LTC Beds in PSA	183	183	183	183	183	
Estimated Excess/Need	(169)	(201)	(273)	(395)	(476)	181%

Medical Center Employee & Visitor Estimates

Employee and visitor estimates are based on a combination of local, regional and national benchmarks applied to the forecast medical center services. 2007 data for Hawaii hospitals from the American Hospital Association indicate the following estimates of employees (staff) and outpatient visits per patient:

HAWAII ACUTE CARE HOSPITAL STAFFING RATIOS

Name	Location	Type	Beds	Census	OP Visits	Births	Staff	Staff/ Patient	OP Visits/ Patient	
Kapiolani	Pali Momi	Acute	116	103	76,624	0	598	5.8	744	
St. Francis West	Ewa Beach	Acute	102	80	36,052	0	429	5.4	451	
Kaiser	Honolulu	Acute	275	196	60,935	1,875	1,541	7.9	311	
Kapiolani	Honolulu	Acute	225	No Information Reported						
Kuakini	Honolulu	Acute	105	117	65,028	0	965	8.2	556	
Queen's	Honolulu	Acute	450	373	239,853	2,035	2,919	7.8	643	
St Francis	Honolulu	Acute	240	140	199,230	0	789	5.6	1,423	
Straub Clinic*	Honolulu	Acute	143	101	575,094	0	1,282	12.7	5,694	
Castle	Kailua	Acute	157	93	152,068	0	NA		1,635	
Kona Community	Kona	Acute	88	67	23,172	441	405	6.0	346	
Wilcox	Lihue	Acute	71	52	66,215	617	455	8.8	1,273	
Maui Medical	Wailuku	Acute	183	146	41,112	1,673	988	6.8	282	
Average								7.5	1,214	
Average excluding Outliers*								6.9	766	

Source: 2007 AHA Guide

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The skilled nursing facility will have fewer employees per bed. This ratio was estimated based on data reported by two facilities in Hawaii, noted below (these are the only reporting facilities in the AHA data):

HAWAII LONG TERM CARE HOSPITAL STAFFING RATIOS

Name	Location	Type	Beds	Census	Staff	Staff/ Patient
Leahi	Honolulu	LTC	190	178	277	1.6
Maluhia Hospital	Honolulu	LTC	158	148	257	1.7

Source: 2007 AHA Guide

Based on these ratios, the Koa Ridge Medical Center could expect an employee base as follows:

NEW KOA RIDGE MEDICAL OCCUPANTS & EMPLOYEE ESTIMATES

TYPE OF FACILITY ON CAMPUS	2015	2020	2025
ESTIMATED AVERAGE DAILY CENSUS OF PATIENTS			
Hospital - Inpatients per Day	71	78	85
Skilled Nursing - Inpatients per Day	90	110	135
Medical Offices - # MDs in Offices	40	50	60
ESTIMATED EMPLOYEES			
Hospital Employees (All Types)	489	540	591
Skilled Nursing Employees (All Types)	156	191	234
Medical Office Employees (All Types)	200	250	300
ESTIMATED EMPLOYEES	846	981	1,125

Application of current 2008 employee salary plus benefit costs at Wahiawa General results in the following estimated payroll and benefits for the Koa Ridge Medical Center:

FORECAST AVERAGE & TOTAL COST FOR KOA RIDGE MEDICAL CENTER EMPLOYEES

VARIABLE	2015	2020	2025
Salary+Benefits/FTE	\$ 84,501	\$ 102,809	\$ 125,082
Total Staff Costs	\$ 71,456,856	\$ 100,853,903	\$ 140,776,618

Note: Costs are based on 2008 actual employee costs at Wahiawa General Hospital inflated at the rate of 4% per year (less than historical rate of inflation for salaries & benefits)

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It is anticipated that some of the current Wahiawa General Hospital staff associated with the general acute care hospital services will relocate to the new center. However, because health care services will remain at the current site, not all staff will relocate. Some of the physicians currently located in Wahiawa may also relocate to the new center. However, the increased scope of services and square footage will result in a need for additional staff that will likely reside in the residential areas proximate to the new medical center site.

SUMMARY

The Koa Ridge Medical Center will address the future health care needs of many Central Oahu and North Shore residents in a modern, primary and secondary comprehensive hospital. The medical center complex should benefit the region through employment opportunities, improved access to health care services and development of an integrated model of health care that should be attractive to physicians and residents. This facilities forecast employs standard methodologies and realistic market share assumptions that result in an estimated market need for:

- 100-120 Bed General Acute Care Hospital
- Outpatient Diagnostic and Treatment Services
- 30-50 Physician Medical Office Building
- 100-150 Bed Skilled Nursing Facility

The 28-acre site will allow development of a comprehensive array of health care services that will address the growing health care needs of Oahu.

Appendix A: Population Forecast

Appendix A describes the quantitative approach Cattaneo & Stroud, Inc. employed to forecast population growth in Oahu, Hawaii and the Koa Ridge Medical Center Primary Service Area. The following factors were taken into consideration:

- Estimated Koa Ridge Medical Center primary service area defined by zip code
- State of Hawaii estimates of current and forecast population from 2000 to 2025
- Hawaii State Department of Business, Economic Development , and Tourism estimates of military population and their dependents

Base Population (See Tables A-1 and A-2)

The foundation of the population forecasts used in this analysis is population data and forecasts published by the City and County of Honolulu Department of Planning and Permitting in November 2007. These forecasts incorporate historical population data from the 2000 U.S. Census Bureau. Population from the regional planning zones were translated into zip code estimates based on alignment of census tracts so that hospital discharge data could be translated into use rates and market share by geographic region. This translation was accomplished by matching U.S. census tract with U.S. postal service maps. Age distribution by zip code is based on the 2000 Census by the U.S. Census Bureau.

Military Population (See Table A-3)

Estimates of the military population and their dependents stationed on Oahu were obtained from the Hawaii State Department of Business, Economic Development and Tourism. This population was excluded from the state population used in the bed need forecast since the military population primarily uses military hospitals and physicians for health services. Military and dependents' use of local hospitals, physicians and related facilities are limited to emergency and selected tertiary services. No growth was applied to the military population using services in the civilian health sector. Age distribution of the military population is based on military population estimates were based on 2000 U.S. Census Bureau special tabulation calculated in 2003, which was later compiled by the Hawaii State Department of Business, Economic Development and Tourism. The military population was subtracted from the appropriate age groups in the state population forecasts to obtain civilian population by age group.

Incremental Housing (See Table A-4)

Cattaneo & Stroud, Inc. obtained information housing developments that are both approved and unapproved in the defined primary service area by local planning agencies. These data are based on an August 2007 report by Mikiko Corporation and new housing components of the Koa Ridge and Waiawa proposed developments. The developer assumes that residents of the new housing will be derived from migration within Oahu rather than from outside the island. Based on discussions with the state and the developer, it is assumed that the population to be accommodated in the new projects is incorporated in the official state forecasts.

Age Distribution & Summary (See Table A-5)

Population by zip code was distributed into age categories based on data from the 2000 Census by the U.S. Census Bureau. Age groupings used in the forecast for health care services include:

- 0-14
- 15-44 Female
- 15-64
- 65 and over

In sum, state population forecasts served as the basis for geographic, age and population growth in Oahu, with subtractions of the military and their dependents. The resulting estimates of population by zip code were used to develop health care services use rates as the basis for the proposed Koa Ridge Medical Center. Military population was used to forecast use of health care facilities by military personnel and their dependents.

The following pages contain the population data used in these analyses.

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**Table A-1: State of Hawaii Official Oahu Population by Planning Zones
Including Civilian and Military**

Development Plan Area	Development Plan Subarea	2000	2005	2010	2015	2020	2025
Primary Urban Center	Honolulu Core	419,333	423,621	440,981	452,048	463,335	475,700
East Honolulu Subtotal		46,735	49,748	52,387	53,436	52,642	51,952
Ewa	Ewa Villages	4,741	5,192	6,106	6,319	6629	6,983
	Ewa Gentry/West Loch	19,058	23,093	24,859	26,055	26,723	27,408
	Ewa Beach/Iroquois Pt	18,424	18,600	18,412	18,294	18,141	18,004
	Ocean Pointe	810	4,237	5,973	7,977	8,755	9,630
	Kalaeloa/Campbell Ind. Park	1,311	1,324	1,712	1,946	3,853	6,542
	Ko Olina/West Kapolei	1,680	2,920	4,505	7,273	10,784	12,624
	City of Kapolei	0	0	1,877	4,635	6,698	8,398
	Villages of Kapolei	8,638	12,276	13,729	14,174	14,442	14,759
	East Kapolei	712	717	2,215	8,325	15,517	24,085
	Makakilo/MakaiwaHills/Kunia	13,322	15,710	17,723	21,185	25,583	27,869
Subtotal	Ewa	68,696	84,015	97,111	116,183	137,125	156,302
Central Oahu	Village Park/ Kunia	12,178	14,482	15,687	17,073	17,403	17,932
	Waipahu	33,665	35,250	36,098	35,985	35,892	36,014
	Waikele	6,895	7,557	7,449	7,353	7,248	7,158
	Waipio	12013	12164	12252	12138	12057	12021
	Waiaawa	0	31	627	6,243	13,401	21,207
	Mililani	33,906	34,187	33,766	35,298	37,628	38,348
	Mililani Mauka/Launani	11,181	16,652	18,562	18,458	18,455	18,562
	Wahiawa/Whitmore	20,814	21,043	21,088	20,858	20,670	20,564
	Schofield/Wheeler	17556	17652	17444	17264	17079	16913
Subtotal	Central Oahu	148,208	159,018	163,153	170,643	179,833	188,719
Koolaupoko	Kahaluu	14,391	14,446	15,017	15,374	15,146	14,947
	Kaneohe	40,013	40,363	40,422	40,361	39,763	39,244
	Kailua	41,607	41,622	41,970	42,291	41,670	41,126
	Waimanalo	10,161	10,506	10,769	11,702	11,531	11,382
	Mokapu	11,827	11,826	11,678	11,564	11,457	11,363
Subtotal	Koolaupoko	117,999	118,763	119,856	121,292	119,567	118,062
Koolauloa	Kahuku/Kawela	3,134	3,264	3,362	3,404	3,455	3,543
	Laie	6,100	6,111	6,217	6,620	6,945	7,148
	Hauula/Punaluu	3,857	3,864	3,971	3,952	3,985	4,052
	Kaaawa	1,455	1,458	1,464	1,446	1,439	1,445
Subtotal	Koolauloa	14,546	14,697	15,014	15,422	15,824	16,188
North Shore	Mokuleia	2,345	2,364	2,336	2,335	2,327	2,322
	Waialua	3,386	3,389	3,350	3,323	3,295	3,266
	Haleiwa	4,366	4,369	4,434	4,496	4,544	4,590
	Kawailoa	3,930	3,934	3,910	3,901	3,887	3,874
	Sunset Beach/Pupukea	4,353	4,357	4,957	5,492	5,982	6,398
Subtotal	North Shore	18,380	18,395	18,987	19,547	20,035	20,450
Waianae Subtotal		42,259	44,656	45,172	46,991	48,891	50,685
Oahu Total		876,156	912,913	952,661	995,562	1,037,252	1,078,058

Source: Socioeconomic projections, November 2007 from Department of Planning and Permitting, City and County of Honolulu.

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**Table A-2: Total Oahu Population by Zip Code Based on Official Forecast
Including Civilian and Military**

Development Plan Area	Zip Code	2000	2005	2010	2015	2020	2025
Honolulu Core	Multiple	419,333	423,621	440,981	452,048	463,335	475,700
East Honolulu Total	Multiple	46,735	49,748	52,387	53,436	52,642	51,952
Central Oahu	96786	20,814	21,043	21,088	20,858	20,670	20,564
	96789	63,995	70,591	72,656	79,490	88,789	97,296
	96797	45,843	49,732	51,785	53,058	53,295	53,946
	96857	17,556	17,652	17,444	17,264	17,079	16,913
Central Oahu Subtotal		148,208	159,018	162,973	170,670	179,833	188,719
Ewa	96706	39,004	46,647	51,459	60,651	69,136	79,127
	96707	29,692	37,422	45,652	55,532	67,989	77,175
Subtotal	Ewa	68,696	84,069	97,111	116,183	137,125	156,302
Koolauloa	96717	3,857	3,864	3,971	3,952	3,985	4,052
	96730	1,455	1,458	1,464	1,446	1,439	1,445
	96731	3,134	3,264	3,362	3,404	3,455	3,543
	96762	6,100	6,111	6,217	6,620	6,945	7,148
Subtotal	Koolauloa	14,546	14,697	15,014	15,422	15,824	16,188
Koolaupoko	96477	14,391	14,446	15,017	15,374	15,146	14,947
	96734	41,607	41,622	41,970	42,291	41,670	41,126
	96744	40,013	40,363	40,422	40,361	39,763	39,244
	96795	10,161	10,506	10,769	11,702	11,531	11,382
	96863	11,827	11,826	11,678	11,564	11,457	11,363
Subtotal	Koolaupoko	117,999	118,763	119,856	121,292	119,567	118,062
North Shore	96712	12,649	12,660	13,301	13,889	14,413	14,862
	96791	5,731	5,753	5,686	5,658	5,622	5,588
Subtotal	North Shore	18,380	18,413	18,987	19,547	20,035	20,450
Waianae Subtotal	96792	42,259	44,656	45,172	46,991	48,891	50,685
Grand Total		876,156	912,985	952,481	995,589	1,037,252	1,078,058

Source: Socioeconomic projections, November 2007 from Department of Planning and Permitting, City and County of Honolulu.

Table A-3: Estimated Military Population and Dependents by Zip Code

Region	Area	Zip Code	2000	2005	2010	2015	2020	2025
Koolauloa	Kahuku	96731	145	181	181	181	181	181
Central Oahu	Kunia	96759	510	638	638	638	638	638
Central Oahu	Waipahu	96797	4,624	5,785	5,785	5,785	5,785	5,785
North Shore	Haleiwa	96712	2,315	2,896	2,896	2,896	2,896	2,896
Central Oahu	Wahiawa	96786	13,905	17,395	17,395	17,395	17,395	17,395
Central Oahu	Mililani	96789	6,000	7,506	7,506	7,506	7,506	7,506
North Shore	Waialua	96791	385	482	482	482	482	482
Total			27,884	34,884	34,884	34,884	34,884	34,884

Source: Department of Business, Economic Development, and Tourism, 2003

Table A-4: Unapproved Housing Units by Zip Code in Koa Ridge Service Area

Region	Zip Codes	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Koa Ridge	96789	350	350	350	350	350	350	350	350	350	350
Cumulative Units		350	700	1,050	1,400	1,750	2,100	2,450	2,800	3,150	3,500
Waiawa	96789	150	150	150	150	150	150	150	150	150	150
Cumulative Units		150	300	450	600	750	900	1,050	1,200	1,350	1,500
Other Waiawa Development	96789	500	500	500	500	500	500	500	500	500	500
Cumulative Units		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
Total		1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000

Source: Architect Hawaii Memorandum, May 1st, 2008.

Koa Ridge Medical Center

Table A-5: Civilian Oahu Population by Age & Zip Code

Region	Area	Zip Code	Age Cohort	2000	2005	2010	2015	2020	2025
Koolauloa	Kahuku	96731	0-14	618	624	633	638	645	656
		96731	15-64	1,632	1,666	1,717	1,709	1,686	1,685
		96731	15-44F	515	504	512	506	505	513
		96731	65+	321	357	382	422	482	548
	Kahuku	96731	Total	2,571	2,647	2,732	2,769	2,813	2,889
Central Oahu	Kunia	96759	0-14	25	30	70	122	187	232
		96759	15-64	79	101	221	355	514	622
		96759	15-44F	39	41	78	119	173	212
		96759	65+	53	72	96	133	189	241
	Kunia	96759	Total	157	203	388	609	889	1,096
	Waipahu	96797	0-14	12,996	13,632	14,001	14,299	14,299	14,339
		96797	15-64	38,839	41,337	43,157	43,615	42,697	42,239
		96797	15-44F	13,099	13,351	13,726	13,721	13,544	13,560
		96797	65+	6,770	7,838	8,481	9,480	10,725	12,041
		96797	Total	58,604	62,807	65,639	67,394	67,721	68,619
	Wahiawa	96786	0-14	7,132	6,113	5,957	5,784	5,642	5,489
	Wahiawa	96786	15-64	17,213	14,991	15,076	14,468	13,721	13,152
		96786	15-44F	6,371	5,262	5,143	4,827	4,608	4,471
		96786	65+	3,355	3,563	3,724	4,046	4,558	5,068
	Wahiawa	96786	Total	27,700	24,667	24,757	24,297	23,922	23,710
	Mililani	96789	0-14	9,027	9,520	9,664	10,698	12,127	13,337
		96789	15-64	27,032	29,149	30,205	33,217	37,117	40,618
		96789	15-44F	9,007	9,225	9,375	10,121	11,289	12,375
		96789	65+	3,034	3,565	3,822	4,590	5,814	7,097
	Mililani	96789	Total	39,093	42,235	43,690	48,505	55,058	61,052
North Shore	Haleiwa	96712	0-14	953	769	821	884	939	976
		96712	15-64	3,802	3,379	3,650	3,835	3,946	4,031
		96712	15-44F	1,159	955	1,011	1,042	1,078	1,112
		96712	65+	629	662	729	839	991	1,143
	Haleiwa	96712	Total	5,384	4,810	5,200	5,558	5,877	6,150
	Waialua	96791	0-14	1,457	1,411	1,368	1,353	1,337	1,314
		96791	15-64	4,961	4,862	4,782	4,656	4,467	4,293
		96791	15-44F	1,465	1,379	1,340	1,297	1,266	1,243
		96791	65+	1,105	1,184	1,214	1,317	1,473	1,622
	Waialua	96791	Total	7,523	7,457	7,364	7,326	7,276	7,229
Total Primary Service Area			0-14	32,209	32,099	32,514	33,778	35,176	36,343
			15-64	93,557	95,484	98,807	101,855	104,148	106,641
			15-44F	31,655	30,718	31,186	31,634	32,463	33,485
			65+	15,266	17,242	18,448	20,826	24,231	27,761
Total Primary Service Area				141,032	144,825	149,769	156,458	163,555	170,744
Other Oahu	Other Oahu		0-14	50,066	47,834	48,022	51,546	54,324	56,076
			15-64	188,556	188,183	192,790	204,637	209,874	212,149
			15-44F	66,559	62,599	62,947	65,748	68,178	70,155
			65+	45,883	49,271	52,258	60,720	71,981	83,070
	Other Oahu Total			284,505	285,289	293,069	316,903	336,180	351,295
Honolulu	Honolulu		0-14	70,462	67,789	69,486	70,698	71,961	73,413
			15-64	243,705	243,551	254,609	257,324	255,874	256,526
			15-44F	85,010	80,183	82,208	81,735	82,003	83,439
			65+	53,921	58,614	63,219	70,359	80,833	92,094
	Honolulu Total			368,089	369,954	387,314	398,381	408,668	422,033
Oahu Total				793,626	800,068	830,153	871,743	908,403	944,073
Other Hawaii Islands			0-14	71,485	71,214	76,849	83,699	91,719	97,649
			15-64	222,075	247,551	270,139	288,159	298,769	309,669
			15-44F	52,650	57,324	64,001	68,215	72,438	75,894
			65+	42,890	46,779	53,779	65,109	81,529	98,679
	Other Hawaii Islands			336,450	365,543	400,767	436,967	472,017	505,997
Hawaii Total				1,271,108	1,310,436	1,380,689	1,465,168	1,543,975	1,620,814

Source: Cattaneo & Stroud, Inc. derived from prior tables.

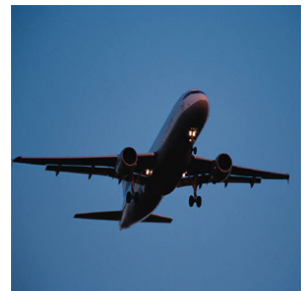
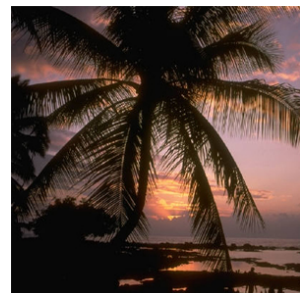
Potential Hotel Concept and Market Range Estimates

for the

Koa Ridge Master Plan

Final Report

April 2, 2008



HOSPITALITY ADVISORS LLC
745 Fort Street Mall, Suite 2124 ♦ Honolulu, Hawaii 96813 ♦ (808) 550-8955

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Appendix

Phase I: Overview of Potential Hotel Demand for the Koa Ridge Master Plan - July 16, 2007

Introduction

Located in Central O'ahu, the Koa Ridge Master Plan is a 763-acre project owned by Castle & Cooke Homes, Inc. ("Castle & Cooke"). Currently, Castle & Cooke is undertaking plans to develop a master plan community project featuring new residential homes, retail, offices, medical facilities, recreational centers, community parks, and school sites. As part of the Master Plan concept, Castle & Cooke is considering the prospect of a hotel component as part of the project.

Background and Objectives

Wilson Okamoto Corporation ("Wilson Okamoto") and Castle & Cooke have engaged Hospitality Advisors LLC ("Hospitality Advisors") to provide an overview analysis of hotel demand in the Central O'ahu region for the Koa Ridge project. A market study was conducted during Phase I of the engagement with a final report provided to Wilson Okamoto and Castle & Cooke on July 24, 2007 (see Appendix). As Phase II of the market analysis, Wilson Okamoto and Castle & Cooke have asked Hospitality Advisors to develop a preliminary hotel concept and market performance estimates, including hotel occupancy, average daily rate ("ADR"), and revenue per available room ("RevPAR"). Phase II of this study was also to provide an executive-level overview briefing in PowerPoint format of a potential hotel concept with market range estimates for occupancy, average daily rate ("ADR") and revenue per available room ("RevPAR"). However, as a courtesy to Wilson Okamoto and Castle & Cooke, we have expanded Phase II to provide a brief narrative report rather than PowerPoint format.

The proposed development concept and performance estimates presented in this report are based on the findings and conclusions presented in Phase I report (see Appendix), our knowledge of current hotel market trends and conditions, and analysis of secondary research compiled from sources such as the State of Hawaii Department of Business, Economic Development, and Tourism ("DBEDT") and Smith Travel Research ("STR"). The objective is to provide Wilson Okamoto and Castle & Cooke recommendations for a hotel concept, including class of property, property size, branding and affiliation, and amenities, along with the corresponding market performance estimates for the recommended concept.

Phase I Analysis Findings & Conclusions

Based on the overview market demand analysis prepared during the first phase of this engagement, it was found that the outlook for hotel demand in the Central O'ahu region appears marginal in the short term, but potentially improving over the medium to long term with the maturation of the Central O'ahu Regional Park ("CORP") and Waipio Soccer Complex ("WSC"). The primary demand sources for Central O'ahu include the military market, sporting teams, friends and family, and business travelers. The immediate to short term outlook for Central O'ahu hotel demand appears limited due to the following:

- Demand from the military sector appears to be seasonal and subject to the lease agreement between the Inn at Schofield and the Department of Defense, and limitations regarding per diem rates on military travel. Improved accommodations at Schofield Barracks also appear to be relieving pressure on the extent and term of temporary lodging accommodation (“TLA”).
- Sports demand appears to be highly seasonal and event specific. Additionally, this segment appears to be highly price sensitive, particularly for local and inter-island events. The potential for dorm facilities to be added to CORP may also impact demand in the future.
- The prospects for expanded commercial demand appears limited at least for the short and medium term given the anticipated type of business expansion for Central Oahu, which appears more community based rather than corporate based.
- Planned renovations at the airport hotels and new hotels at Kapolei will likely provide substantial competitive pressure on hotel demand in Central Oahu, and will likely be absorbed first.

Although the immediate outlook for hotel demand in Central O‘ahu appears minimal, it may be advantageous for Castle & Cooke to preserve its hotel use, but physically develop the hotel as a second or later phase should demand develop sufficiently in the future. It should also be noted that considering the economic expansion at Kapolei and planned pipeline hotel development of 300+ rooms, demand for hotel supply will likely be absorbed first in West O‘ahu prior to any such expansion into Central O‘ahu. The primary consideration of any hotel development should also be based on the cost of construction and the continuing annual operating and financing costs, which have made new hotel development in the mid-market generally cost prohibitive. This is particularly relevant for new market development.

Executive Summary

The relevant market for the proposed hotel is likely to be comprised of primarily military, sports, friends and family travel, and, to a lesser extent, business travelers. Unlike leisure visitors, the relevant market tends to be more price sensitive and show a longer length of stay. Based on such demand characteristics, a midprice or economy extended stay hotel product may be best suited for the relevant market. The proposed property can likely support 125 to 150 studios and/or one bedroom suites. Castle & Cooke may wish to determine whether sufficient demand exists for a potential 125 to 150-unit first phase, with additional units of up to, say 200 units for a complete hotel project build out as part of a Phase II expansion. Given the site and market specific nature of the hotel, brand and/or franchise management may have less impact than for hotels located in higher demand areas, such as Waikīkī. Therefore, the hotel concept could potentially be operated as an independent hotel with access to major global distribution systems (“GDS”) and other travel booking engines.

In addition to accommodating market demand, the extended stay concept can also provide conversion potential to rentals and/or sell the units for residential use as downstream exit strategy.

Based on the Phase I demand analysis and mid-market performance trends, the estimated market performance for the proposed hotel concept is as follows:

Stabilized Year Range Estimates

	High	Low
Occupancy:	75.0%	72.0%
ADR:	\$150.00	\$125.00
RevPAR:	\$112.50	\$90.00

Note: estimates in 2008 dollars

Five Year Estimates – High Range

	Year 1	Year 2	Year 3	Year 4	Year 5
Occupancy:	65.0%	69.0%	72.0%	75.0%	75.0%
ADR:	\$127.50	\$135.00	\$142.50	\$150.00	\$150.00
RevPAR:	\$82.88	\$93.15	\$102.60	\$112.50	\$112.50

Note: estimates in 2008 dollars

Five Year Estimates – Low Range

	Year 1	Year 2	Year 3	Year 4	Year 5
Occupancy:	62.0%	67.0%	70.0%	72.0%	72.0%
ADR:	\$106.25	\$112.50	\$118.75	\$125.00	\$125.00
RevPAR:	\$65.88	\$75.38	\$83.13	\$90.00	\$90.00

Note: estimates in 2008 dollars

Section I: Product Concept Overview

One of the most important factors in developing a product concept is the anticipated demand composition for the proposed property. Based on the findings of our Phase I market analysis, the demand source for the proposed hotel primarily consist of military and family on TLA, sports teams, friends and family, and limited business travelers. There does not appear to be a significant leisure demand for the proposed property. In order to develop a product concept best suited for the relevant market, we have identified the following components for analysis:

1. Type of property
2. Property size
3. Class of property
4. Branding and affiliation
5. Amenities

Below outlines our analysis for each of the product components:

Type of property

There are various aspects to consider when evaluating a property type. Some of the distinguishing elements include service level (full service vs. limited service), room type, and ancillary services. Full service hotels generally offer on-site restaurants, meeting space, bell service, and room service, whereas limited service hotels primarily are rooms-only operations with very few services or amenities. Based on interviews conducted during our Phase I market report, the relevant market tends to show a longer length of stay, especially with the military market staying for as long as 90 days on military per diem. In addition, industry trends show that the sports and business markets are more likely to prefer in-room kitchen facilities over full-service on-site restaurants that may be typical for leisure resort properties. As such, a limited service extended stay or all-suite product may be best suited for the proposed hotel.

It is also noted that that there are plans to develop two hotels in Kapolei with one property expected to be similar to an extended-stay product. The pending Kapolei development further illustrates the potential demand for such a product, although it may also present additional competition for the proposed Central O'ahu hotel.

Property Size

As indicated in our previous report, the Inn at Schofield Barracks has estimated an average "turn-away" demand of 10,000 nights per year, or 27 room nights per day not accounting for seasonality. With the recent announcement of military realignment and potential for 1,000 additional military officers at Schofield, the proposed hotel may be able to absorb some of the demand generated from the expansion. However, the additional demand is not expected

to be significant as the military is currently undergoing plans to improve temporary and single family housing units at Schofield Barracks, which will likely absorb any temporary accommodation needs first before using off-base accommodations.

In addition to the military/government market, other potential demand segments include the other business market (excluding meetings, convention, and incentive travelers), the friends and family market, and the sports market. Room demand for these markets is currently satisfied by existing West O'ahu, Airport, and Waikiki supply. Furthermore, demand for rooms outside of Waikiki has consistently under-penetrated the market. While there is potential demand growth with the maturation of nearby sporting facilities and commercial activities, it is unlikely that there will be sufficient demand to support a large scale hotel. Given the existing supply and anticipated demand trends, the proposed hotel will likely be able to support 125 to 150 rooms.

With respect to physical configuration, a two-to-three story property with a mix of studios and one-bedroom suites may be advantageous for the owner/developer as an alternative exit strategy to rent or sell as residential units.

Class of Property

Based on our research and industry knowledge, full service properties in Hawaii are generally luxury and upscale hotels, while limited service hotels range between the midprice and budget categories. Furthermore, the military/government, friends and family, and other business travelers tend to be more price sensitive than leisure travelers. Given the service level, property size, and the elasticity of market demand, it is likely that the proposed hotel will be a limited service midprice or economy efficiency hotel.

Branding and Affiliation

The demand for the proposed hotel is likely driven by specific market groups and location convenience rather than a dynamic reservation system or brand loyalty. Added value that can be generated through branded management or franchise appears minimal when compared to the cost of branding. Therefore, it is recommended for the proposed property to operate independently. However, should the owner/developer consider franchising or branding, some of the chains that could be considered include Residence Inn by Marriott, Homewood Suites by Hilton, and Candlewood Suites.

Amenities

Standard amenities for an extended stay or efficiency hotel include a full kitchen, in-room laundry, swimming pool, and/or fitness center. A small business center and/or hi-speed wireless internet access is also recommended. Food and beverage outlets are not recommended unless operated on lease by a third party. Retail and meeting space and other minor operations are unlikely to be economical for a small limited service property.

Product Concept Summary

Based on the analyses presented above, the proposed hotel concept represents a 125 to 150-room extended stay hotel featuring studios and one bedroom suites. Convenience amenities such as in-room kitchen and laundry facilities are recommended. It may be operated independently. Due to the price-sensitive nature of the relevant market, the proposed concept will likely be a low rise midprice or economy property with simple wood frame construction.

As stated earlier in the Phase I report, the construction and operating costs associated with new hotel development can be prohibitive, especially for a mid-market property. One of the advantages to an extended-stay concept is that it could provide the owner/developer with a smoother transition to convert the units for residential use as an alternative exit strategy.

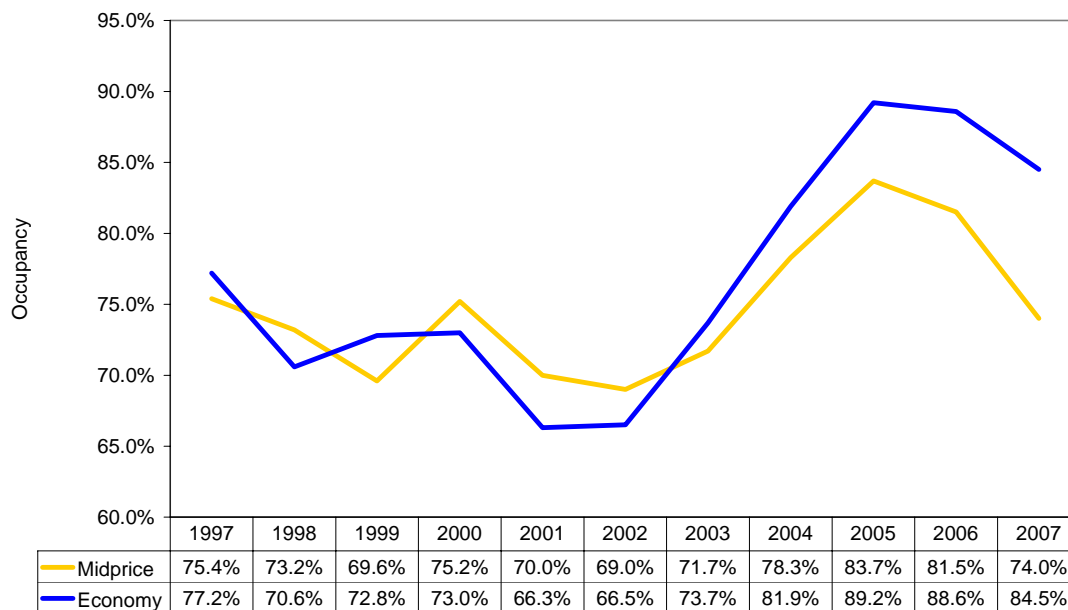
Section II: Property Performance Estimates

Based on the proposed development concept, this section provides the performance estimates and market comparisons for the proposed hotel. We note that the room rate estimates are provided in this section are based on 2008 dollars without consideration for inflation or any market fluctuations that may occur after the date of this report.

O'ahu Mid-Market Overview

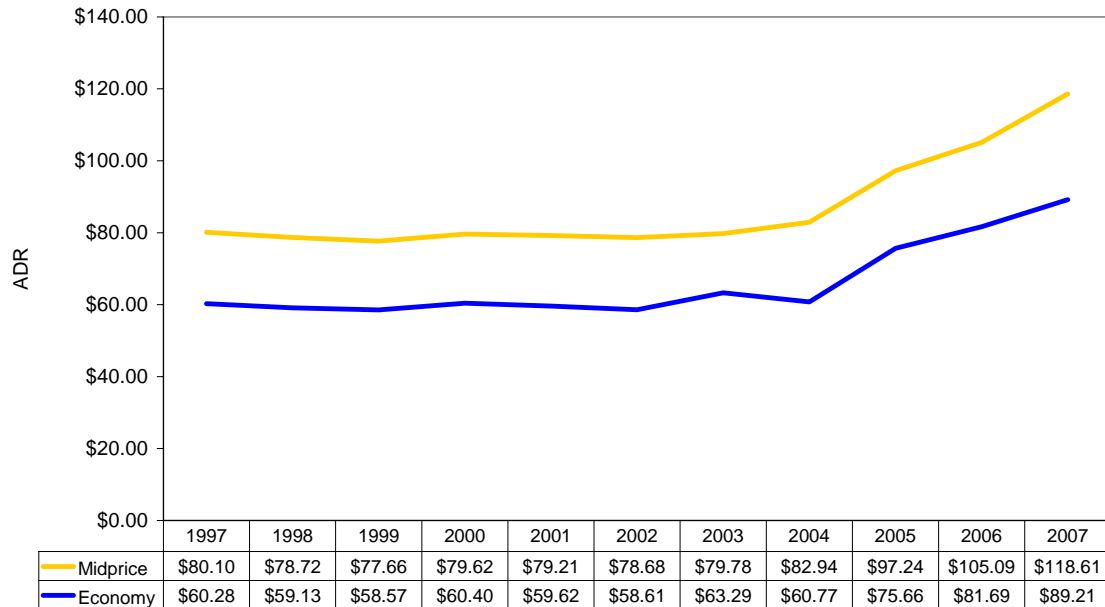
The development concept for the proposed hotel is a midprice or economy extended-stay hotel. In recent years, O'ahu's midprice and economy properties have enjoyed strong occupancy and ADR gains due in part to declines in room supply and growth in domestic visitor arrivals. Although the market began to soften in 2007, O'ahu midprice hotels reported an occupancy of 74.0 percent and showed an impressive 12.9 percent ADR increase to \$118.61. O'ahu economy hotels achieved an 84.5 percent occupancy and \$89.21 average room rate for 2007.

Exhibit 1: Hotel Occupancy for Midprice and Economy Segments



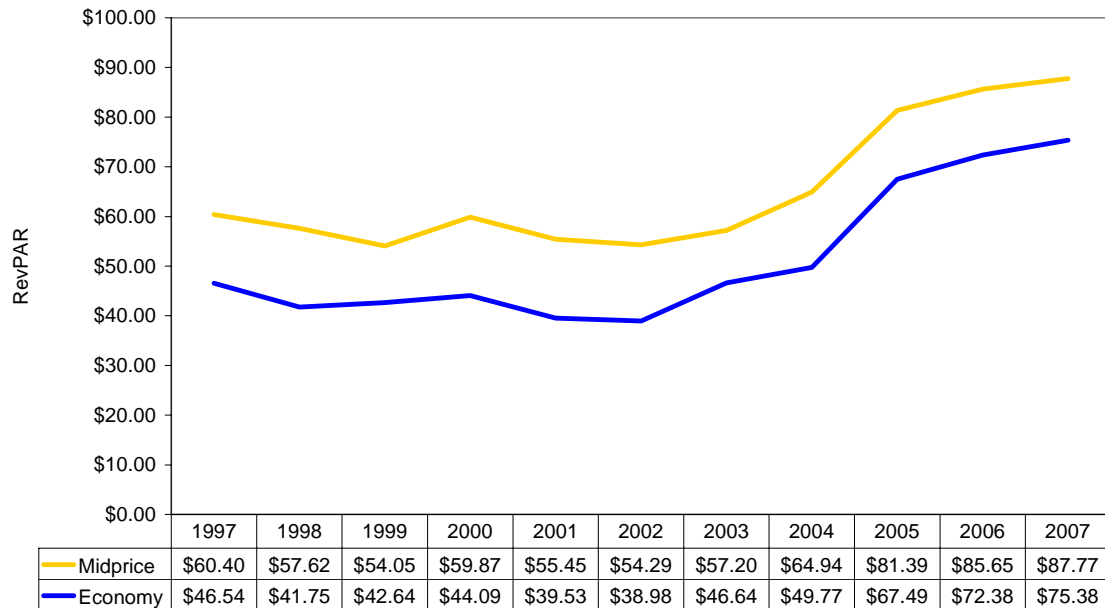
Source: Smith Travel Research, Hospitality Advisors LLC

After a prolonged period of relatively flat room rates, O'ahu midprice and economy ADR improved substantially since 2003. O'ahu midprice properties achieved a 48.7 percent ADR growth between 2003 and 2007. O'ahu economy hotels enjoyed a 41.0 percent increase in the same period.

Exhibit 2: Hotel ADR for Midprice and Economy Segments

Source: Smith Travel Research, Hospitality Advisors LLC

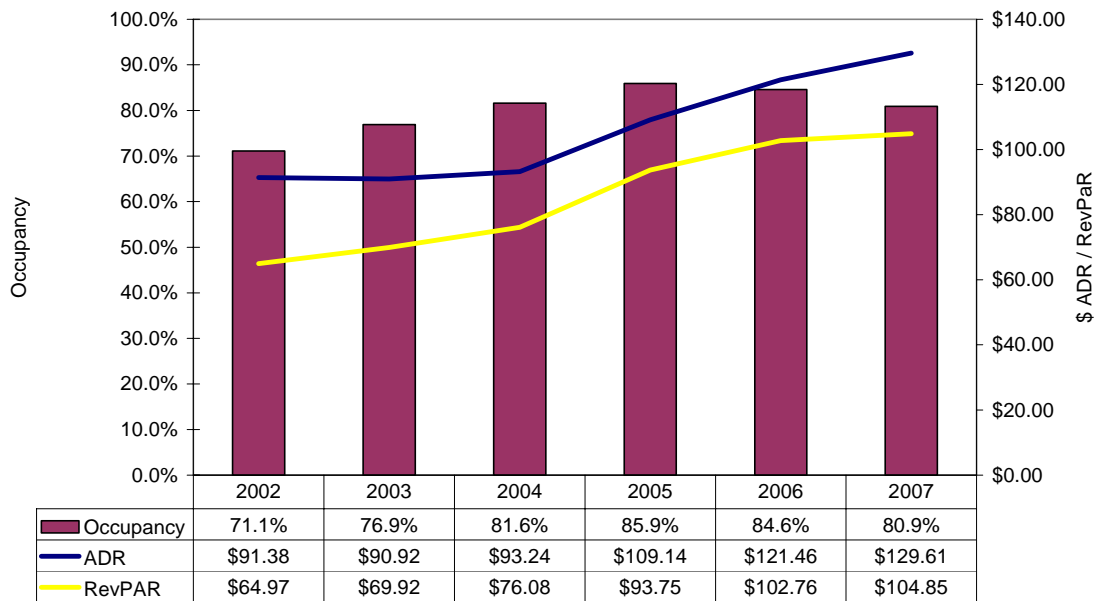
Despite the strong growth in room rates, O'ahu RevPAR began to soften in 2007 due to occupancy declines. O'ahu midprice hotels showed a modest 2.5 percent RevPAR growth to \$87.77 in 2007, while O'ahu economy hotels reported 4.1 RevPAR increase to \$75.38.

Exhibit 3: Hotel RevPAR for Midprice, Economy, and Budget Segments

Source: Smith Travel Research, Hospitality Advisors LLC

On a property size basis, O'ahu hotels with 75-149 rooms showed similar trends of room rate gains in recent years. For 2007, properties with 75-149 rooms showed an occupancy decline of 3.7 percentage points to 80.9 percent, while room rates grow by 6.7 percent to \$129.61. Midprice hotels represent approximately 35.9 percent of the 75-149 rooms segment, and more than 69.1 percent of total rooms rank within the midprice to budget categories.

Exhibit 4: Market Performance for Hotels with 75-149 Rooms



Source: Smith Travel Research, Hospitality Advisors LLC

Below outlines a comparison of market performance by class of property and property size:

Exhibit 5: 2007 Market Performance Comparison

	75-149 Rooms	Midprice	Economy
Occupancy	80.9%	74.0%	84.5%
ADR	\$129.61	\$118.61	\$89.21
RevPAR	\$104.85	\$87.77	\$75.38

Source: Smith Travel Research, Hospitality Advisors LLC

In comparison to the midprice and economy segments, properties with 75-149 rooms show a higher room rate due in part to a higher composition of condominium and efficiency hotels. Condominium hotels tend to generate a higher room rate than traditional hotel rooms in the same category due to added convenience amenities, such as kitchen and laundry facilities.

Estimated Market Performance

Given the limited seasonal demand, the proposed hotel will likely post a slightly lower occupancy than other O'ahu midprice properties. However, the proposed property will likely be able to support a premium on the room rates with the extended-stay concept and added in-room amenities. Therefore, the estimated market performance for the proposed hotel is shown as follows in 2008 constant dollars:

Stabilized Year Range Estimates

	High	Low
Occupancy:	75.0%	72.0%
ADR:	\$150.00	\$125.00
RevPAR:	\$112.50	\$90.00

Note: estimates in 2008 dollars

Five Year Estimates – High Range

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Five Year Estimates – Low Range

	Year 1	Year 2	Year 3	Year 4	Year 5
Occupancy:	62.0%	67.0%	70.0%	72.0%	72.0%
ADR:	\$106.25	\$112.50	\$118.75	\$125.00	\$125.00
RevPAR:	\$65.88	\$75.38	\$83.13	\$90.00	\$90.00

Note: estimates in 2008 dollars

Appendix

Phase I: Overview of Potential Hotel Demand for the Koa Ridge Master Plan



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**Overview of Potential Hotel Demand
for the
Koa Ridge Master Plan**

**Castle & Cooke Homes Hawaii, Inc.
Wilson Okamoto Corporation**

July 24, 2007

Final Report



HOSPITALITY ADVISORS LLC



HOSPITALITY ADVISORS LLC
HOTEL TOURISM & REAL ESTATE CONSULTING

July 24, 2007

Mr. Alan Suwa
Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Suwa:

Hospitality Advisors LLC ("Hospitality Advisors") is pleased to submit this report to provide Wilson Okamoto Corporation and Castle & Cooke Homes Hawaii, Inc. consulting services in regards to a potential lodging establishment to be located in Central Oahu (the "Hotel") as part of the Koa Ridge Master Plan.

TERMS AND CONDITIONS

Our work and written product is based on information provided by secondary research sources, industry interviews, our extensive database and knowledge of the Hawaii market as well as other sources as appropriate. Information provided to us was not audited nor verified by us and is assumed to be correct for the purposes of this engagement. Where appropriate, the source of information provided to us was stated. We have no responsibility to update any report, presentation or analyses prepared by us for changes in any economic or market factors or

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receipt of new information after the date of our field work completed on July 13, 2007. Recognizing that the war and ensuing aftermath in Iraq will likely not be resolved prior to the completion of this study, and that these events continue to evolve as of the date of this report, Hospitality Advisors will not be responsible nor liable for any direct and indirect impacts that the war may have on the results of this analysis or assumptions used, whether considered or not in the preparation of this report.

Information, estimates and opinions furnished to us are assumed obtained from sources considered reliable and is considered to be true and correct. However, no representation, liability or warranty for the accuracy for such items, as well as any information, estimates or opinions prepared by Hospitality Advisors, are assumed by or imposed on us, and may be subject to corrections, errors, omissions and withdrawals without notice.

All information and analysis provided to Wilson Okamoto and Castle & Cooke in this report is solely for your internal information and use. The information and analyses should not be relied upon for any other purpose or by any other entity. Neither our report nor any reference to our firm may be included or quoted in any offering circular or registration statement, prospectus, sales brochure, appraisal, loan or other agreement or document.

Wilson Okamoto and Castle & Cooke agrees to hold harmless Hospitality Advisors from any and all third party claims, liabilities, costs and expenses relating to services Hospitality Advisors renders under the Engagement Letter, except to the extent finally determined to have resulted from the willful misconduct or fraudulent behavior of Hospitality Advisors relating to such services.

Thank-you again for the opportunity to provide consulting services to Wilson Okamoto and Castle & Cooke. Should you have any questions concerning this report, please do not hesitate to contact me at (808) 550-8955.

Very truly yours,



Joseph M. Toy
President & CEO
Hospitality Advisors LLC

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Executive Summary

Project Overview

- Hospitality Advisors LLC (“Hospitality Advisors”) was engaged by Wilson Okamoto Corporation (“WOC”) and Castle & Cooke Homes Hawaii, Inc. (Castle & Cooke”) to provide assistance in assessing the viability of a hotel development as part of the Koa Ridge Master Plan. The analysis included preparing overview analyses of:
 - Oahu’s visitor market
 - Oahu hotel market supply and demand
 - Analysis of potential Central Oahu hotel market demand

Executive Summary

- Central Oahu is primarily a residential community with approximately 150,000 residents in the region. In addition to the residential surroundings it is also the home to the second largest military base in the State of Hawaii with approximately 11,600 Department of Defense military and civilian personnel at Schofield Barracks.
- Currently, the 192 room Inn at Schofield Barracks is the only hotel establishment in Central Oahu serving primarily military and government visitors.
- However, planning is underway for two new hotel developments in Kapolei totaling approximately 300+ rooms as part of a larger 300,000 square foot commercial complex.

Executive Summary

- Based on the overview analyses prepared for this study, it appears that the outlook for hotel demand in Central Oahu is likely to be marginal in the short term, but potentially improving over the medium to long term with the maturation of CORP, WSC, Koa Ridge and Kapolei.
- The immediate and short term outlook, however, is less favorable due to the following:
 - Demand from the military sector appears to be seasonal and subject to the lease agreement between the Inn at Schofield and the Department of Defense, and limitations regarding per diem rates on military travel. Improved accommodations at Schofield Barracks also appear to be relieving pressure on the extent and term of temporary lodging accommodation (“TLA”).

Executive Summary

- Sports demand appears to be highly seasonal and event specific. Additionally, this segment appears to be highly price sensitive, particularly for local and interisland events. The potential for dorm facilities to be added to CORP may also impact demand in the future.
- The prospects for expanded commercial demand appears limited at least for the short and medium term given the anticipated type of business expansion for Central Oahu, which appears more community based rather than corporate based.
- Planned renovations at the airport hotels and new hotels at Kapolei will likely provide substantial competitive pressure on hotel demand in Central Oahu, and will likely be absorbed first.

Executive Summary

- It may be advantageous for Castle & Cooke to preserve its hotel use, but physically develop the hotel as a second or later phase should demand develop sufficiently in the future.
- The primary concern is the uncertainty and uneven nature of Central Oahu hotel demand over the next five years. This is of particular concern when considering the economic expansion of Kapolei, which likely will need to be absorbed prior to any such expansion into Central Oahu.
- The hotel product at Koa Ridge will likely be in the economy to midrange market segment with consideration for an extended stay product.
- The primary consideration of any hotel development should also be based on the cost of construction and the continuing annual operating and financing costs, which have made new hotel development in the mid-market generally cost prohibitive. This is particularly relevant for new market development.

Oahu Visitor Industry Overview

Hawaii Visitor Industry Overview

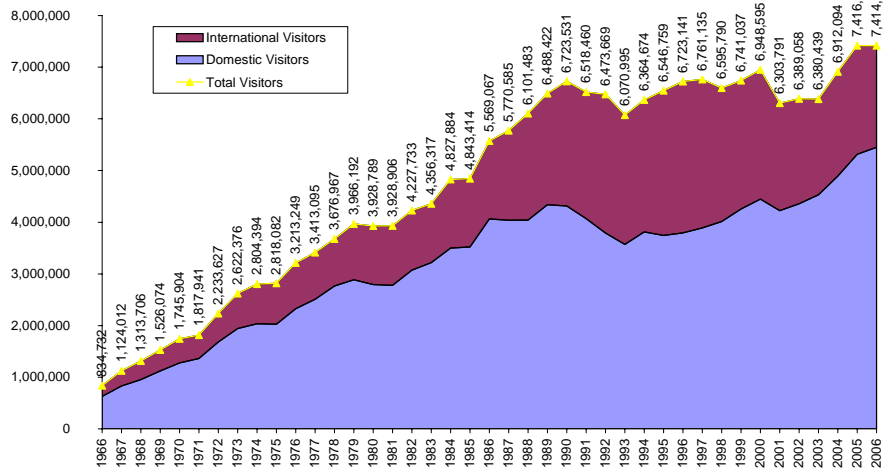
- After several years of recovery from the 9/11 attack, Iraq war and global economic slowdown, Hawaii's visitor industry set a record 7.4 million in visitor arrivals to the State in 2005, with an additional 7.4 million arrivals in 2006.
- Strong growth in the U.S. leisure market drove Hawaii's recovery during 2002-2006, with most market demand segments experiencing gains.
- Honolulu continues to serve as Hawaii's gateway city with over 71.2 percent of total Statewide scheduled air seats designated for Honolulu. However, domestic visitors are beginning to bypass Honolulu in recent years as a growing number of domestic direct flights into Maui and the island of Hawaii become available.

Oahu Visitor Industry Overview

- Oahu hosts the majority of inbound visitors to Hawaii at approximately 62.1 percent in 2006.
- Oahu has enjoyed a strong domestic market, primarily from the U.S. West, but has experienced a sharp 9.4 percent drop in Japanese visitor arrivals in 2006.
- Oahu primarily serves the leisure market with over 79.2 percent of Oahu visitors arrive for wedding, honeymoon, or vacation.
- Partly driving the leisure market growth is the increase in friends and family group travel. Hawaii has seen a growing trend of family and multi-generational travel since 9/11. Growing alongside the increasing multi-generational travel is the number of friends and family visitors to Hawaii. Friends and family visitors account for approximately 10.0 percent of total Oahu visitors in 2006, up from 6.9 percent in 2000.

Statewide Visitor Arrivals

Visitor arrivals to Hawaii in 2006 reached 7.41 million visitors, on par with the record level set in 2005.

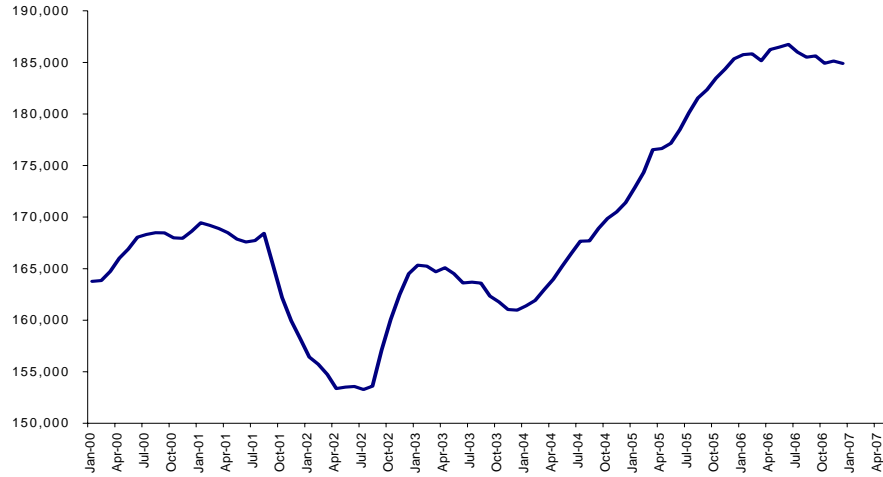


Source: State of Hawaii DBEDT

Statewide Average Daily Census: 12-month Moving Average

15

The average number of visitors in Hawaii on a daily basis has risen significantly since mid-2004, but began to retreat in 2006.

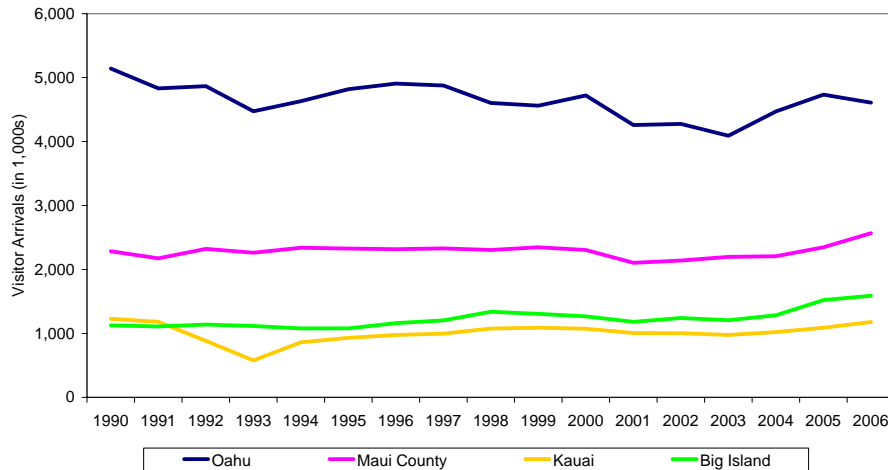


Source: State of Hawaii DBEDT

Visitor Arrivals by Island

16

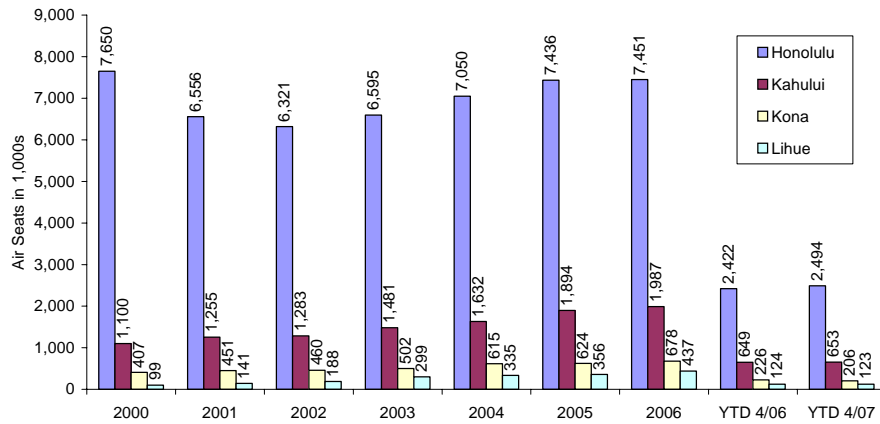
Despite strong growth from the U.S. market, Oahu visitor arrivals began to soften in 2006 due primarily to the declining Japanese market. The neighbor islands continued to show growth that was driven by the strong U.S. West market.



Source: State of Hawaii DBEDT

Scheduled Air Seats by Island

Direct flights into Kahului have nearly doubled while flights into Kona and Lihue have also increased to accommodate non-stop flights into the Neighbor Islands.



Source: State of Hawaii DBEDT

2006 Visitor Profile by Major Market Source

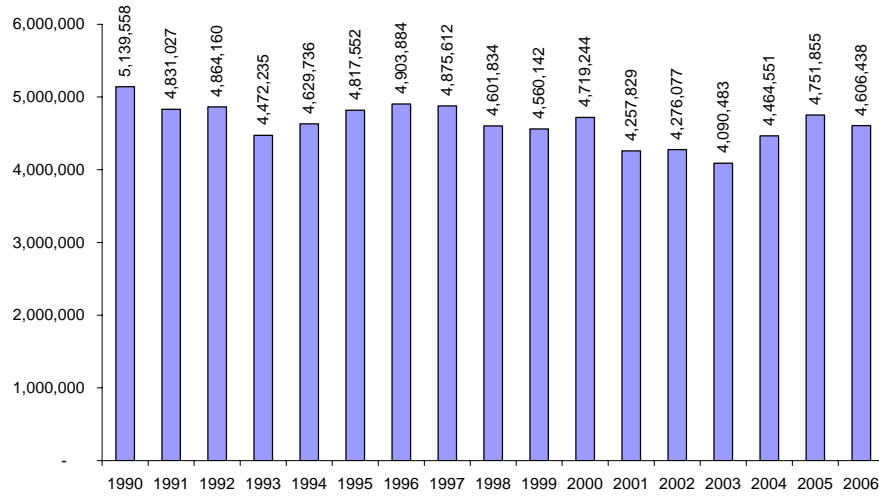
U.S. West visitors represent Hawaii's largest market segment and are typically repeat visitors.

Statewide	U.S. West	Δ%	U.S. East	Δ%	Japan	Δ%	Canada	Δ%
Arrivals	3,158,526	0.0	1,917,919	-0.6%	1,374,454	-9.4%	273,167	9.9%
Average Daily Census	81,232	2.7%	54,004	-1.0%	21,222	-10.7%	9,698	7.5%
Length of stay	9.39	-1.4	10.28	-0.4	5.64	-1.4	12.96	-2.1
% 1st time	21.5%	-0.5%	46.6%	-1.1%	44.7%	0.3%	39.6%	-4.5%
% Repeat	78.5%	0.5%	53.4%	1.1%	55.3%	-0.3%	60.4%	4.5%
Daily expenditure (PPPD)	\$157.70	6.1%	\$182.70	2.4%	\$267.40	4.7%	\$137.80	0.6%
Trip expenditure	\$1,480.00	4.6%	\$1,877.40	2.0%	\$1,506.90	3.3%	\$1,786.20	-1.5%

Source: State of Hawaii DBEDT

Oahu Visitor Arrivals

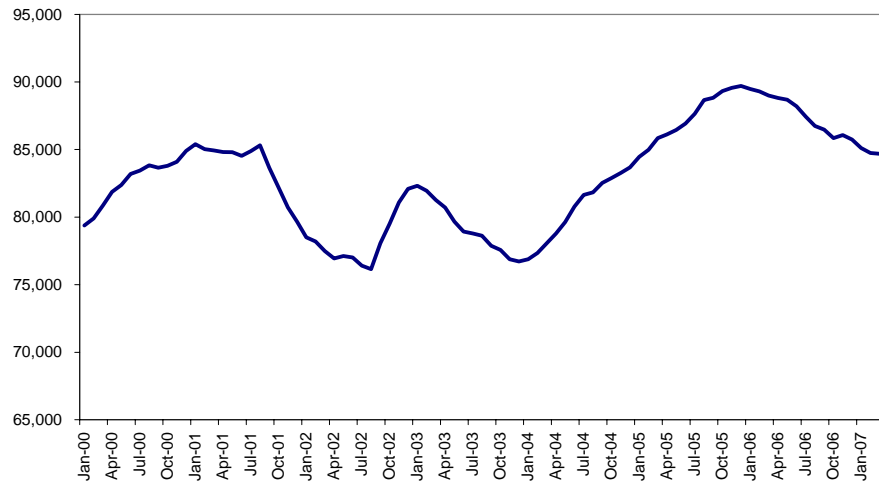
Oahu visitor arrivals topped 4.7 million visitors in 2005, but began to decline in 2006.



Source: State of Hawaii DBEDT

Oahu Average Daily Census: 12-month Moving Average

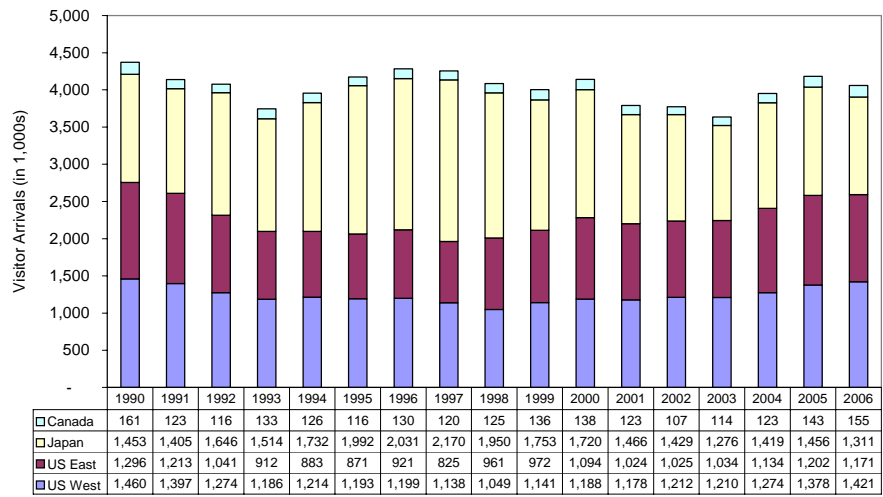
Oahu average daily census reached its peak in 2006. Though daily visitor census began to retreat in 2007, it is still above the levels reached in 2000.



Source: State of Hawaii DBEDT

Oahu Visitor Arrivals by MMA

Japanese arrivals to Oahu has declined by nearly 40.0 percent since 1997, while the U.S. domestic market gained by 32.0 percent during the same period.



Source: State of Hawaii DBEDT

2006 Oahu Visitor Profile

Oahu attracts a higher share of international and first time visitors in comparison to other islands.

	2006	% Share
Visitor Arrivals	4,606,438	
Domestic	2,827,042	61.4%
International	1,779,396	38.6%
Visitor Days	31,299,398	
Average Daily Census	85,752	
Average Length of Stay	6.79	
% First Timers	1,982,597	43.0%
% Repeaters	2,623,841	57.0%
Average # of Trips	4.17	
Net True Independent	2,169,820	47.1%

Source: State of Hawaii DBEDT

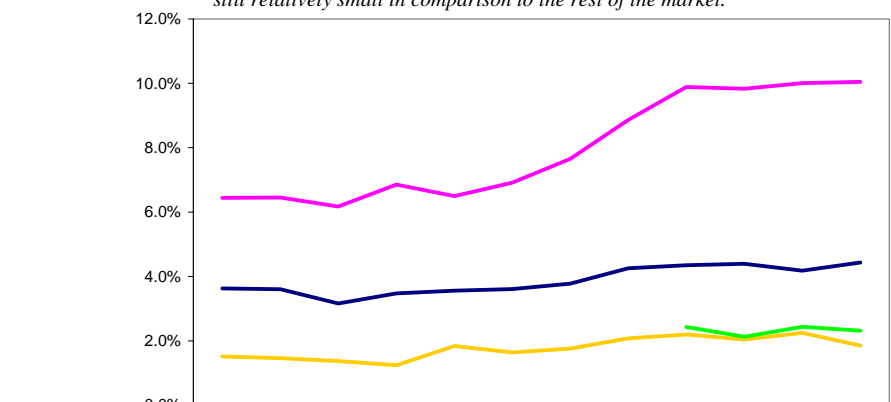
2006 Oahu Visitor Arrivals by Purpose of Trip

Purpose of Trip	2006	% Share
Pleasure	3,648,198	79.2%
Honeymoon	334,079	7.3%
Get Married	107,371	2.3%
Pleasure/Vacation	3,293,859	71.5%
Meetings/Conventions/Incentive	317,017	6.9%
Conventions	186,248	4.0%
Corporate Meetings	57,345	1.2%
Incentive	82,986	1.8%
Other Business	204,088	4.4%
Visit Friends/Rel.	462,583	10.0%
Government/Military	85,373	1.9%
Attend School	16,342	0.4%
Sport Events	106,556	2.3%

Source: State of Hawaii DBEDT

Oahu Arrivals by Purpose of Trip

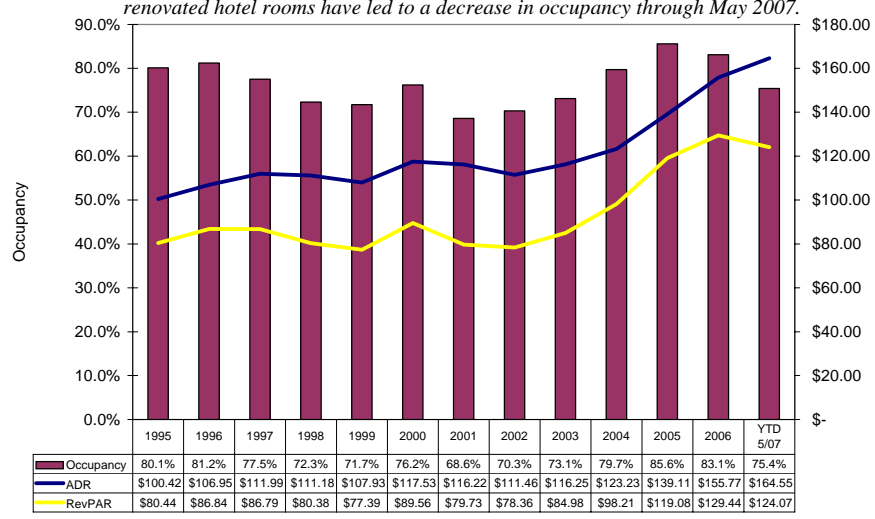
The percentage of friends/relatives arrivals has grown by 3.5 percentage points in the past ten years. Other business and government/military arrivals have also increased slightly, but still relatively small in comparison to the rest of the market.



Source: State of Hawaii DBEDT

Oahu Hotel Performance

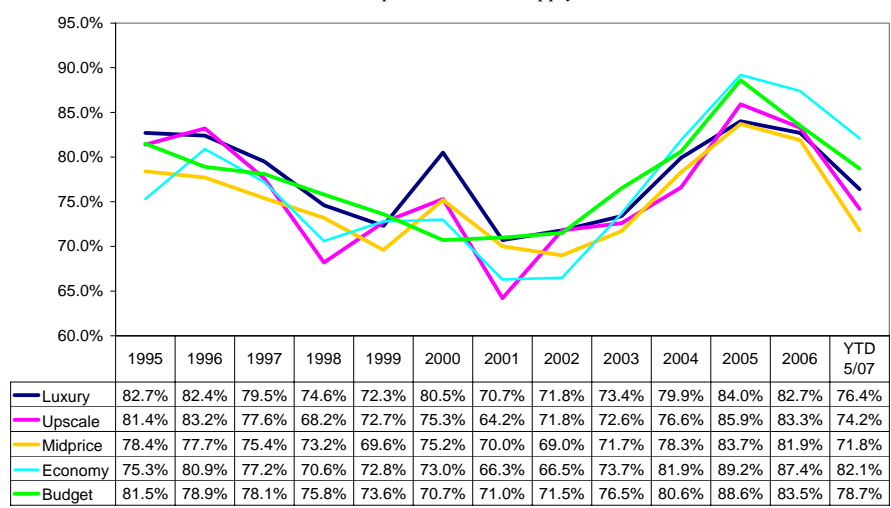
Oahu occupancy peaked in 2005 due to record visitor arrivals combined with falling supply due to renovations and conversions. However, a softening in the market, combined with reintroduction of renovated hotel rooms have led to a decrease in occupancy through May 2007.



Source: Smith Travel Research, Hospitality Advisors LLC

Oahu Occupancy by Classification

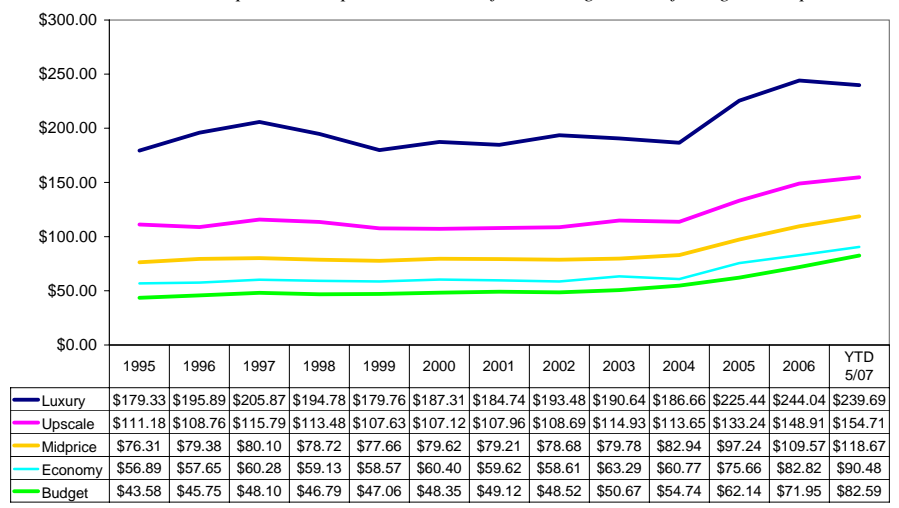
Economy and budget properties have enjoyed higher occupancy in the last several years due in part to reduced supply.



Source: Smith Travel Research, Hospitality Advisors LLC

Oahu ADR by Classification

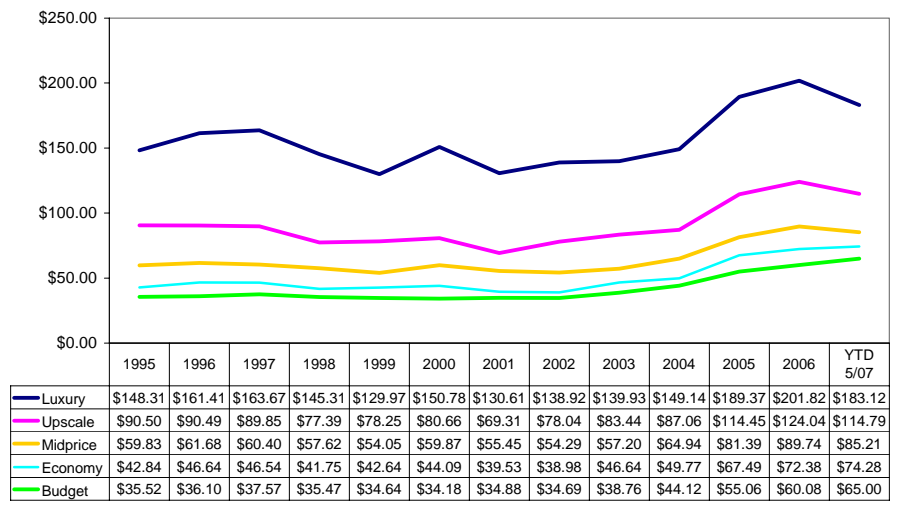
Oahu luxury ADR grew at a faster pace than the other segments as a number of hotels were renovated and/or repositioned upward at a time of increasing demand for higher end product.



Source: Smith Travel Research, Hospitality Advisors LLC

Oahu RevPAR by Classification

Oahu RevPAR began to dip across all property classes in 2007 as the fall in occupancy outpaced the increases in room rate



Source: Smith Travel Research, Hospitality Advisors LLC

Trends in Accommodations Demand

- Since the mid-1990s, there have been notable trends in accommodation demand for both the Mainland and Hawaii markets.
- Partly driving this change has been the growing market demand segmentation that reflects the increasingly divergent interests of a more experienced travel market.
- The result of such market segmentation has been the expansion of lodging brands and product types, including extended stay, all-suites properties, timeshares, resort condominium projects and cruise products.
- As a result of these changes, there has been a definite shift in demand for alternative accommodations away from more traditional hotels, with a portion of hotel guests shifting into timeshares, hotel condos and cruise lines.

Trends in Oahu Accommodation Supply

- No new hotel supply has been added to Oahu's inventory since 2001. However, timeshare and condominium hotel inventory on Oahu has expanded through new development and property conversion.
- Since 2002, Oahu has continued to experience new timeshare and resort condominiums developments in Waikiki and Ko Olina.
- The market is starting to see plans for potential new hotel development, including the expansion of the Kuilima/Turtle Bay Resort and proposed developments in West Oahu.

Oahu Visitor Accommodations Inventory

Oahu's hotel supply has diminished significantly due to renovations and conversions, while condominium hotel and timeshare inventory has generally increased.

	2002		2003		2004		2005		2006	
Hotel	31,178	85.5%	29,932	83.9%	30,088	83.6%	27,542	80.6%	26,261	77.2%
Condo/Hotel	3,088	8.5%	3,425	9.6%	3,407	9.5%	3,782	11.1%	4,728	13.9%
Timeshare	981	2.7%	985	2.8%	1,135	3.2%	1,429	4.2%	1,655	4.9%
Other	1,210	3.3%	1,322	3.7%	1,357	3.8%	1,414	4.1%	1,364	4.0%
Total	36,457	100.0%	35,664	100.0%	35,987	100.0%	34,167	100.0%	34,008	100.0%

Source: State of Hawaii DBEDT

2006 Oahu Visitor Accommodation Choice

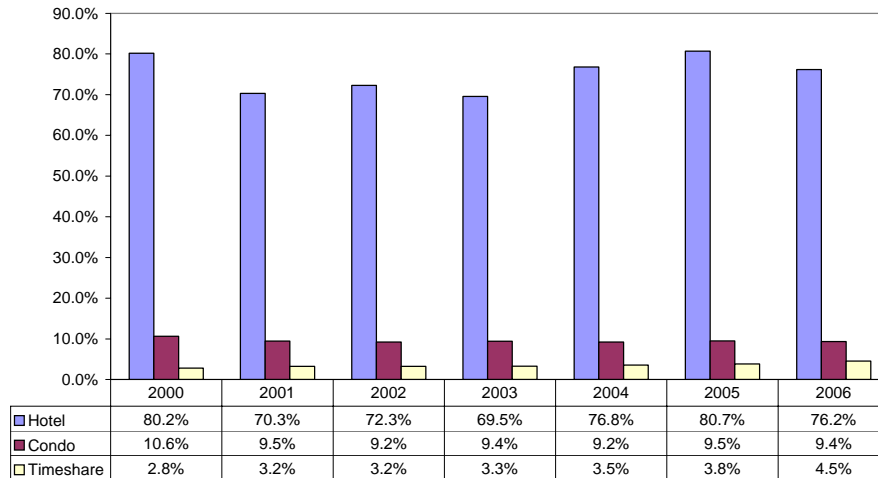
While the majority of Oahu visitors continues to use hotel accommodations, a growing number of visitors are starting to explore alternative accommodations such as condominium, timeshare, and cruise ship.

Accommodations	2006	% Share
Plan to stay in Hotel	3,473,792	75.4%
Hotel only	3,014,893	65.4%
Plan to stay in Condo	427,196	9.3%
Condo only	259,989	5.6%
Plan to stay in Timeshare	206,162	4.5%
Timeshare only	121,866	2.6%
Cruise Ship	293,021	6.4%
Friends/Relatives	474,198	10.3%
Bed & Breakfast	40,004	0.9%
Other	81,274	1.8%

Source: State of Hawaii DBEDT

Oahu Visitor Arrivals by Accommodation

The majority of Oahu's visitors continued to select hotel as its accommodation of choice, though timeshare use has increased during the past several years.



Source: State of Hawaii DBEDT

Waikiki vs. Other Oahu

- Hotels in Waikiki accounts for 86.9 percent of total available hotel inventory on Oahu, while Other Oahu area, which is defined as all other areas outside of Waikiki, including Ala Moana, Downtown, Airport, Windward, West Oahu, Central Oahu, and North Shore, comprises of 13.1 percent Oahu's inventory in 2006.
- Hotels available in Other Oahu are either luxury properties in resort regions such as Ko Olina and Turtle Bay, or midprice properties located in Downtown, Airport, or the Ala Moana area.

Oahu Hotel Supply by Classification

Both Waikiki and Other Oahu hold over 30 percent of luxury rooms. Luxury and midprice properties make up for the majority of Other Oahu inventory, while Waikiki offers a more diverse range of products across all classifications.

	Waikiki		Other Oahu		Oahu total	
	Properties	Rooms	Properties	Rooms	Properties	Rooms
Luxury	13	8,896	3	1,175	16	10,071
Upscale	13	6,920	1	90	14	7,010
Midprice	22	4,788	5	2,135	27	6,923
Economy	12	1,639	5	430	17	2,069
Budget	16	3,312	1	22	17	3,334
Total*	76	25,555	15	3,852	91	29,407

*Supply census based on year-end 2006 survey. Actual available supply may fluctuate slightly from month-to-month.

Source: Smith Travel Research, Hospitality Advisors LLC

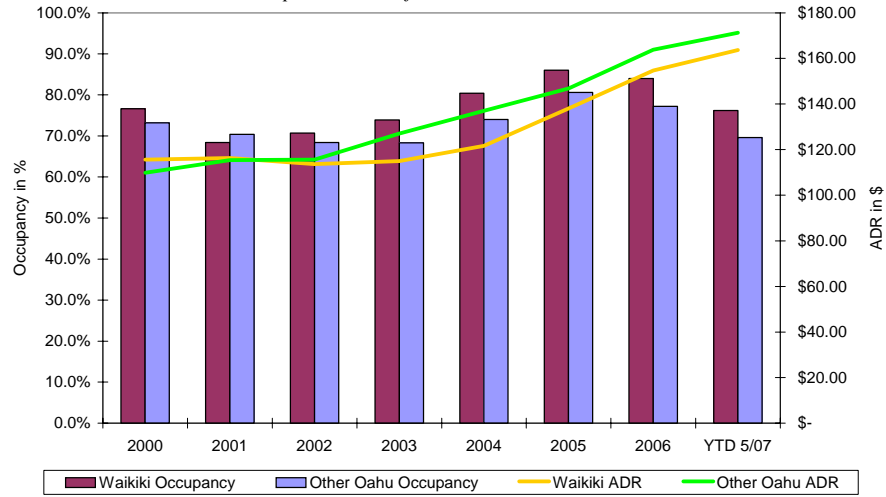
“Other Oahu” Hotel Supply

Property	Location	# Rooms	Classification
Ala Moana Hotel	Ala Moana	1,169	Midprice
Best Western The Plaza Hotel	Airport	274	Midprice
Harbor Arms Apartment Hotel	Aiea	30	Economy
Harbor Shores Apartment Hotel	Aiea	42	Economy
Honolulu Airport Hotel	Airport	307	Midprice
Inn @ Schofield Barracks	Wahiawa	192	Economy
Laie Oahu Inn	Laie	48	Economy
Marriott JW Ihilani Resort	Kapolei	387	Luxury
Pacific Marina Inn	Airport	118	Economy
Pagoda Hotel	Ala Moana	360	Midprice
Turtle Bay Resort	Kahuku	443	Luxury
ResortQuest Executive Centre Hotel	Downtown	90	Upscale
The Kahala Hotel & Resort	Kahala	345	Luxury
Windward Country Inn	Kaneohe	25	Midprice

Source: Smith Travel Research, Hospitality Advisors LLC

Waikiki vs. Other Oahu Hotel Performance

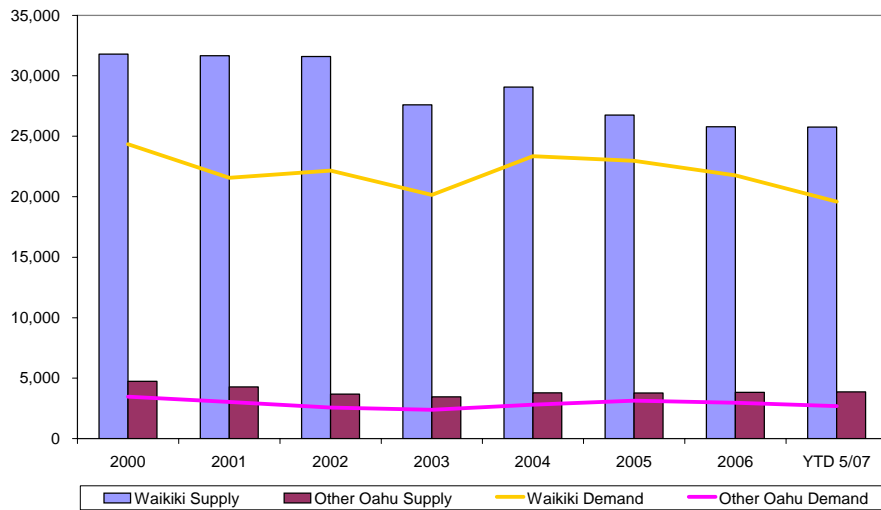
Waikiki tends to report higher occupancy partly due to its beach location, infrastructure and product diversification, while Other Oahu tend to achieve higher room rates due to an over-representation of Ko Olina in the data set.



Source: Smith Travel Research, Hospitality Advisors LLC

Waikiki vs. Other Oahu Daily Room Supply and Demand

Other Oahu area accounts for a very small portion of total Oahu room supply and room demand.



Source: Smith Travel Research, Hospitality Advisors LLC

Waikiki vs. Other Oahu Demand Penetration

	Fair Share of Supply		Market Share Demand		Penetration	
	Waikiki	Other Oahu	Waikiki	Other Oahu	Waikiki	Other Oahu
2000	87.1%	12.9%	87.5%	12.5%	100.6%	96.2%
2001	88.1%	11.9%	87.7%	12.3%	99.5%	103.4%
2002	89.6%	10.4%	89.6%	10.4%	100.1%	99.4%
2003	88.9%	11.1%	89.5%	10.5%	100.6%	94.9%
2004	88.5%	11.5%	89.3%	10.7%	100.9%	93.0%
2005	87.6%	12.4%	88.0%	12.0%	100.4%	97.3%
2006	87.1%	12.9%	88.0%	12.0%	101.0%	93.0%
YTD 5/07	87.0%	13.0%	87.9%	12.1%	101.1%	92.6%

Source: Smith Travel Research, Hospitality Advisors LLC

Central Oahu Region Overview

Central Oahu Region Overview

- The Central Oahu area is comprised of primarily residential communities and agricultural land. Based on 2000 census data (latest data available), there are approximately 150,000 residents in Central Oahu, with approximately 85,000 in resident population in the Mililani, Waipio, Schofield, and Wahiawa area. Based on existing development plans, the City and County of Honolulu is expecting the Central Oahu region to increase in population by 16.0 percent to over 173,000 in 2025.
- There are several master planned residential developments in Central Oahu. Master planned communities include Mililani Mauka, Royal Kunia, Koa Ridge, Wahiawa, and Waikele. The City and County of Honolulu estimates an additional 10,720 housing units to be added in Central Oahu between 2000 and 2025.

Proposed Central Oahu Development

Plans for an additional 10,720 housing units and a medical park have been proposed for the Central Oahu area.

Project Area	Housing Units	Land Area (Gross Acres)	
		Residential	Tech/Med Park
Koa Ridge Makai	3,500	572	
Mililani Mauka	720	100	
Wahiawa Hospital Medical Park	--		100
Wahiawa Castle & Cooke	1,500	191	
Wahiawa Gentry	5,000	500	
Total Proposed	10,720	1,363	100

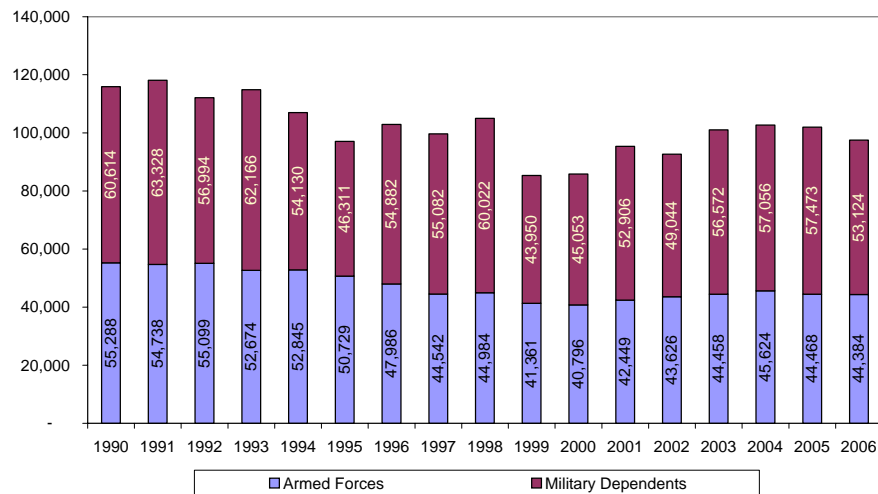
Source: City and County of Honolulu Department of Planning and Permitting

Central Oahu Region Overview

- Schofield Barracks and Wheeler Air Force Base are both located in central Oahu. Specifically, the 2000 census reported 14,428 people, 2,965 households, and 2,902 families residing in Schofield Barracks.
- State of Hawaii data reported 11,574 Department of Defense (“DoD”) military and civilian personnel working at Schofield Barracks, representing the second largest DoD operation in Hawaii next to Pearl Harbor. The data suggests, however, that the military presence in Hawaii has been somewhat declining over the past ten years.

Statewide Military and Dependents Population

Over 90% of Statewide military personnel resides on Oahu. Statewide military personnel and dependent population has increased from 2000, but still not as high as it was in the early-1990s.



Source: State of Hawaii Data Book

Department of Defense Personnel

Schofield Barracks is the largest army installation in Hawaii, accommodating over 11,000 military and civilian personnel on base.

	Kunia	Schofield Barracks	Wahiawa	Wheeler AFB	Total
2000	1,590	11,821	n/a	1,752	15,163
2001	n/a	n/a	n/a	n/a	n/a
2002	2,000	12,310	n/a	1,537	15,847
2003	2,111	12,286	520	1,602	16,519
2004	2,172	12,789	419	1,736	17,116
2005	1,770	11,574	453	1,664	15,461

Source: State of Hawaii Data Book

Central Oahu Business

- Business activities in the Mililani, Waipio, Schofield, and Wahiawa area are mostly retail and service establishments primarily serving the surrounding residential communities.
- Based on the latest data available, total business receipts generated in the Mililani, Waipio, Schofield, and Wahiawa area reached over \$917 million.

Central Oahu Business Establishments

Business establishments between Waipio and Wahiawa total over 256 outlets. Major retail and wholesale outlets include Mililani Wal-Mart, Costco Waipio, and Tony Autoplex.

	Wholesale	Retail	Accommodation & Food Service	Total
Mililani Town	10	41	35	86
Schofield Barracks	n/a	3	n/a	3+
Wahiawa	36	37	40	113
Waipio	27	14	13	54
Total	73	95	88	256+

Note: Based on latest 2002 data available provided in the 2005 State of Hawaii Data Book.

Source: State of Hawaii Data Book

Central Oahu Business Receipts

Business receipts totaled nearly \$1 billion in 2002, with a majority of the sales generated from wholesale and retail activities.

(Sales in \$1,000)	Wholesale	Retail	Accommodation & Food Service	Total
Mililani Town	\$4,179	\$221,123	\$28,049	\$253,351
Schofield Barracks	n/a	\$1,547	n/a	\$1,547+
Wahiawa	\$178,479	\$94,355	\$31,160	\$303,994
Waipio	\$309,712	\$29,882	\$18,980	\$358,574
Total	\$492,370	\$346,907	\$78,189	\$917,466+

Note: Based on latest 2002 data available provided in the 2005 State of Hawaii Data Book.

Source: State of Hawaii Data Book

Overview of Central Oahu Hotel Demand and Supply

Overview of Demand

Central Oahu Demand Overview

- The demand analysis primarily focused on the following segments as defined by the State of Hawaii Department of business, Economic Development & Tourism (“DBEDT”):
 - Military/Government
 - Friends & Relatives
 - Other business visitors, excluding meetings, convention or incentive trips.
- In addition, potential evolving demand segments have also been considered, including demand potentially arising from business and military expansion in Central Oahu, as well as sports demand generated from the Central Oahu Regional Park and the Waipio Soccer Complex

Oahu Military/Government Market Overview

- DBEDT defines military and government visitors to Hawaii as military personnel on temporary assignment to Hawaii or government contractors and employees working on various work assignments in the State.
- Based on DBEDT classifications, the military and government visitor market includes, but not limited to, military personnel and federal contractors visiting on temporary duty/projects, medical care, and/or vacation and includes travel with family members.
- Oahu Military/Government visitor arrivals accounts for 1.9 percent of total visitor arrivals. Military/Government visitors stay primarily in hotels, with an average length of stay of 8.3 days per visit, although the Inn at Schofield Barracks likely has an average stay of 15+ nights

Oahu Military/Government Market Overview

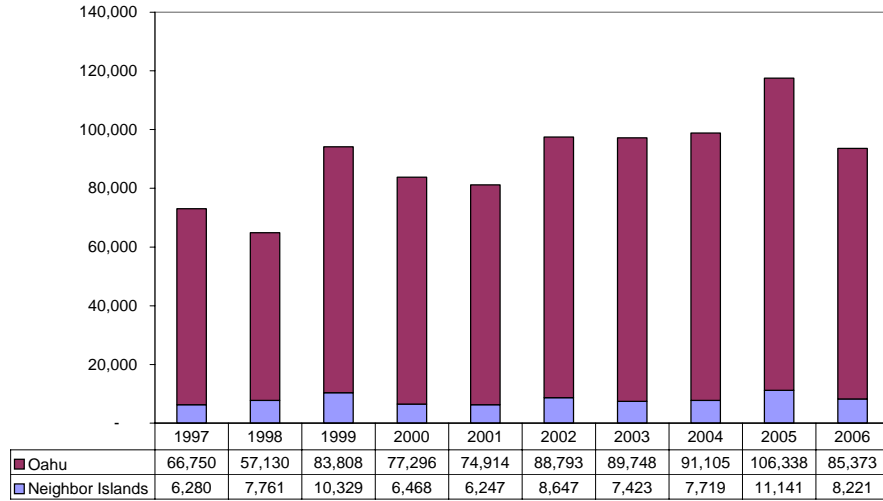
- Almost all hotels on Oahu are approved as military approved temporary lodging accommodation (“TLA”) establishments. Currently, the military lodging per diem rate is between \$125 to \$177 and higher per night depending on rank and staff classification. Officers relocated to Oahu have 90 days to find housing, during which the military will subsidize the temporary housing cost at the per diem rate.
- The Inn at Schofield Barracks has a long-term lease with the Department of Defense. As part of the lease agreement, military TLA personnel are required to use the Inn at Schofield and can only choose accommodations other than the Inn if there is no vacancy. Industry sources indicate periods at the Inn during summer months, but low vacancy during mid-fall through spring. “Turn-away” demand is estimated to be in the 10,000 nights per year range.

Oahu Military/Government Market Overview

- Assuming the turn-away estimate is reasonable, this would indicate an average of 27 room nights per day; however, when taking seasonality into account, the turn-away nights are likely concentrated in high season months.
- Aside from the Inn and the housing units on base at Schofield, the military does not have any other temporary lodging accommodations in Central Oahu. However, industry and military interviews indicate that other TLA military visitors often seek accommodations in Pearl Harbor, and at hotels at the airport, downtown Honolulu and Waikiki.
- We also note that substantial improvements have and are currently underway for the approximate 7,700 single family housing units and additional bachelor quarters at Schofield Barracks, which we understand has helped shorten the gap in TLA periods.

Military Visitor Arrivals

Oahu comprises of over 90.0 percent of military visitor arrivals.



Source: State of Hawaii DBEDT

Statewide Military/Government Visitors Accommodation Use

	# Arrivals	% Share
Total Arrivals	97,063	100.0%
Accommodation Use:		
Hotel	73,603	75.8%
Hotel Only	69,535	71.6%
Condo	4,901	5.0%
Condo Only	3,612	3.7%
Timeshare	893	0.9%
Timeshare Only	469	0.5%
Rental house	1,650	1.7%
Bed and Breakfast	525	0.5%
Cruise ship	1,001	1.0%
Friends, relatives	4,435	4.6%

Source: State of Hawaii DBEDT

Temporary Military Lodging Supply

The military has a number of temporary lodging establishments both on-base and off-base.

Property	Location	# Rooms
Inn at Schofield Barracks	Wahiawa	192
Navy Lodge	Pearl Harbor	150
Navy Bachelor Housing	Pear Harbor	3,168
Barbers Point Cottages	Barbers Point	24
The Lodge at Kaneohe Bay	Kaneohe	74
Cottages at Kaneohe Bay	Kaneohe	14
Hale Koa Hotel	Waikiki	817
Bellows AFS Cottage	Bellows	102
Waianae Army Recreation Center	Waianae	35

Note: The above list excludes military single-family replacement housing units.

2006 Military/Government Room Demand Estimates

Based on Oahu's military/government visitor market size, there is an existing demand for approximately 892 rooms per night. We note that while the data suggests sufficient accommodations for the military, the data reflects only arrivals on commercial airlines

2006 Annual Oahu Military/Government Visitor Arrivals	88,799
Average Length of Stay	8.3 days
Average Nightly Census (average # visitors per night)	1,781
% Stay at Hotel Only	60.3%
% Stay at Condo Only	3.7%
Estimated Oahu Daily Hotel Room Demand	1,073
Estimated Oahu Daily Condo Room Demand	65
Double Occupancy Factor (average party size)	1.28
Estimated Daily Hotel and Condo Room Demand	892

Statewide Friends and Relatives Visitor Profile

- Oahu accounted for 70.6 percent of total Statewide friends and relatives (“F&R”) visitor arrivals in 2006. Only 29.9 percent of the friends and relatives visitors stay at a hotel as part of their trip, while 61.8 percent of the visitors stay with their friends and relatives.
- F&R visitors tend to stay long than an average visitor. Average length of stay for friends and relatives visitors is 10.35 days in comparison to the average Oahu visitor length of stay of 6.79 days.
- F&R visitor spending is the lowest among all visitor segments. On average, F&R visitors spend \$77.40 per person per day.

Statewide Friends and Relatives Visitors:	681,274
Oahu Friends and Relatives Visitors:	480,947
% F&R Visitors to Oahu:	70.6%
Average Party Size:	1.73 persons
Average Length of Stay on Oahu:	10.35 days

Statewide Friends and Relatives Visitor Profile

	# Arrivals	% Share
Total Arrivals	681,274	100.0%
Accommodation Use:		
Hotel	203,595	29.9%
Hotel Only	130,571	19.2%
Condo	75,193	11.0%
Condo Only	46,327	6.8%
Timeshare	25,659	3.8%
Timeshare Only	12,401	1.8%
Rental house	32,012	4.7%
Bed and Breakfast	8,645	1.3%
Cruise ship	7,030	1.0%
Friends, relatives	421,024	61.8%

Source: State of Hawaii DBEDT

2006 Friends & Relatives Visitor Room Demand Estimates 61

Friends and relatives visitors generated approximately 1,844 hotel and condo room nights in 2006. The per day visitor expenditure suggests that the friends and relative visitor segment is more likely to seek lower priced hotel products in Waikiki rather than resort properties in West Oahu or North Oahu.

2006 Annual Oahu Friends & Relatives Visitors Arrivals	480,947
Average Length of Stay	10.35
Average Nightly Census (average # visitors per night)	12,315
% Stay at Hotel Only	19.2%
% Stay at Condo Only	6.8%
2006 Estimated Oahu Daily Hotel Room Demand	2,360
2006 Estimated Oahu Daily Condo Room Demand	837
Double Occupancy Factor (average party size)	1.73
2006 Estimated Daily Hotel and Condo Room Demand	1,844

Statewide Other Business Visitor Profile 62

- Other business visitors are visitors arriving for business purposes, excluding corporate meetings, convention events, or incentive trips. Approximately 70.7 percent of Statewide other business travelers visit Oahu. Other business travelers are more likely to use hotels and condominiums than other forms of accommodations.

Statewide Other Business Visitors:	283,456
Oahu Other Business Visitors:	200,526
% Other Business Visitors to Oahu:	70.7%
Average Party Size:	1.46
Average Length of Stay:	10.61

Statewide Other Business Visitor Profile

	# Arrivals	% Share
Total Arrivals	283,456	100.0%
Accommodation Use:		
Hotel	202,396	71.4%
Hotel Only	183,126	64.6%
Condo	36,292	12.8%
Condo Only	26,966	9.5%
Timeshare	8,964	3.2%
Timeshare Only	5,586	2.0%
Rental house	13,069	4.6%
Bed and Breakfast	3,401	1.2%
Cruise ship	5,550	2.0%
Friends, relatives	27,543	9.7%

Source: State of Hawaii DBEDT

2006 Other Business Visitor Room Demand Estimates

Other business visitors generated an estimated 2,689 rooms in 2006. However, demand for hotel rooms are likely to remain in Downtown and Waikiki as the majority of corporate businesses are located in metro Honolulu.

2006 Annual Oahu Friends & Relatives Visitors Arrivals	200,526
Average Length of Stay	10.61
Average Nightly Census (average # visitors per night)	5,282
% Stay at Hotel Only	64.6%
% Stay at Condo Only	9.5%
Estimated Oahu Daily Hotel Room Demand	3,413
Estimated Oahu Daily Condo Room Demand	503
Double Occupancy Factor (average party size)	1.46
Estimated Daily Hotel and Condo Room Demand	2,689

2006 Existing Military/Government, Friends & Relatives, and Other Business Room Demand

- Military/Government, Friends & Relatives, and Other Business visitor arrivals comprised of approximately 16.3 percent of total Oahu visitor arrivals in 2006. Based on our analyses, the same segments accounted for approximately 18.4 percent of total Oahu room demand due in part to a longer length of stay. Analysis of historical data suggests similar magnitudes of demand in prior years, with slight increases during the past three to five years.

Military/Government Hotel Room Demand	841
Friends & Relatives Hotel Room Demand	1,361
Other Business Hotel Room Demand	+ 2,344
Total Estimated 2006 Daily Hotel Room Demand	4,546
2006 Average Daily Oahu Hotel Room Demand	÷ 24,730
Percentage of Hotel Room Demand	18.4%

Potential Expansion of Military Demand

- In general, unlike the Pearl Harbor Naval Base, which supports Pacific-wide command and control centers in addition to fleet operations, Schofield Barracks is home to the 25th Infantry Division with comparatively less intensive infrastructure and support demands.
- Some opportunities for expanded demand include a \$31 million federal appropriation for a vehicle maintenance facility. In addition, The Schofield Barracks is currently undergoing a 10-year, \$98 million housing renewal project to reconstruct more than 7,500 housing units, including 4,300 barrack space for single enlisted soldiers. However, it is anticipated that much of the contracting will be satisfied from Oahu-based companies and labor force.
- A major Navy communications center is planned for the Whitmore Village area, but public details regarding this facility are not known.

Potential Expansion of Commercial Demand

- The housing expansion in Other Oahu is projected create an additional 2,600 jobs by 2025 according to the City and County of Honolulu. However, industry interviews suggest that much of the business and job creation will be for community and regionally based retail and service industries, rather than expansion into major corporate and manufacturing sites that will generate substantial hotel demand.
- Commercial hotel demand is likely to continue to be generated from the Central Business District in Honolulu, and increasingly from business expansion in Kapolei and the Ewa industrial district. More likely, it appears that opportunities for expansion in West Oahu will occur first in the shorter term, with subsequent acceleration of the current expansion in Central Oahu over a much longer time horizon.

Potential Expansion of Sports Center Demand

- One of the growing travel sectors in Hawaii is the sports market. The Central Oahu Regional Park (“CORP”) and Waipio Soccer Complex (“WSC”) have the potential to generate sports travel through major tournaments and training camps.
- Both facilities are increasingly hosting major events with participating teams from both the mainland and internationally as well and throughout the State. The CORP is host to a collegiate baseball winter league, as well as spring training for a Korean professional baseball team.
- While hotel demand from sports events hold promise, both CORP and WSC continue to evolve. In particular, although CORP has recently completed an impressive tennis and aquatic facility, other infrastructure limitations and incomplete implementation of its master plan has restricted further market expansion to a certain degree.

Potential Expansion of Sports Center Demand

- We note that discussions with industry professionals indicate a need for accommodations, but at low, affordable cost. Such discussions also indicate the need to high double occupancy factors to accommodate team and family travel to such events and include such amenities as washer/dryer and kitchen facilities.
- Our assessment also indicates that, while this segment is interesting, it also appears to be seasonal with variable demand.
- More likely, the demand for this segment will become more viable as the CORP and WSC evolves, but pricing may be a factor in development and positioning of any hotel.

Other Potential Demand

- Demand from other potential sources appear to be limited. The economic base in Wahiawa is expected to remain fairly stable and any major expansion of its economic base is not expected in the near to moderate term.
- Demand generated from Wahiawa General Hospital is probably unlikely. Similar to other hospitals on Oahu, the facility serves the community, and patients are likely to come from nearby residential areas, which should make an easy commute for most friends and relatives of the patient. The hospital is also not a major teaching or research center and unlikely to generate meaningful hotel demand in this respect.

Supply Analysis

Competitive Hotel Market/Supply for Central Oahu

- The likely competitive hotel supply to Koa ridge would be primarily hotels in the downtown/airport district. We do note that some interviewees suggest that based on rank or staff level of contractors, Waikiki and Ko Olina still would remain a preference for a certain part of Koa Ridge's potential target market.
- Although the only hotel in Central Oahu is currently the 192 room Inn at Schofield, based on the completion timeline for Koa Ridge, competition will likely arise from planned renovations for at least two of the airport hotels and the development of two hotels and 300+ rooms in Kapolei.
- The hotel renovations and new development are intended to be mid-upscale in nature and targeted for the military/government sector and local business market in West Oahu.

Competitive Hotel Market/Supply for Central Oahu

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- The airport and downtown hotels collectively were estimated to achieve room rates in the \$110 to \$135 range and upper 70 percent occupancy level during 2006.
- Industry interviews expect the two hotels in Kapolei to perform in the \$135-\$150 range for ADRs with similar or higher occupancy.
- The renovation of the airport hotels is expected to lift room rates and provide stronger appeal for military, government and local business from the Pearl Harbor and West Oahu.

Hotel Pipeline Outlook

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- While not competitive with any potential hotel demand at Koa Ridge, there are several additional planned hotel developments on Oahu over the next ten years:
 - Ko Olina Resort – Negotiations are underway for an unspecified number of hotel units for the Ko Olina Resort and Marina expansion. According to the City and County of Honolulu Planning and Permitting Department, over 4,000 hotel, timeshare, and resort condominium units are planned for completion for the Ko Olina Resort area by 2015.
 - Kuilima/Turtle Bay Resort – Up to 2,500 hotel units are planned for the Kuilima/Turtle Bay Resort expansion. In addition, there are also plans to build up to 1,000 condominium units. However, the project has encountered many challenges, and the current owners are searching for a major capital partner.

Hotel Pipeline Outlook

- Laie Marriott Courtyard – A 220-unit hotel is planned to replace the current Laie Inn.
- Hoakalei Resort at Ocean Pointe – Up to 950 hotel units are planned for Ocean Pointe. Construction is expected to begin around 2010 after the completion of the adjacent marina.

West and Central Oahu Hotel Performance

West and Central Oahu Hotel Overview

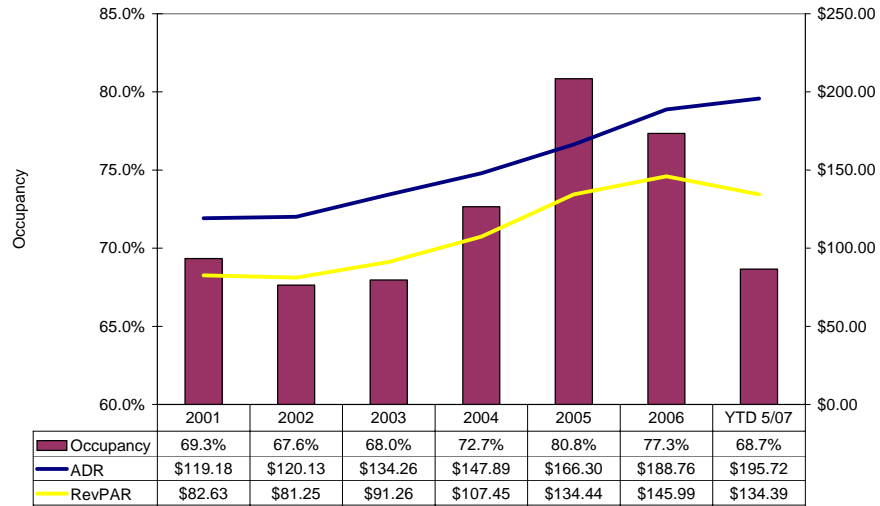
- In general, there are six hotels that currently serve the West Oahu market. Other hotels in Waikiki also provide accommodations for West Oahu demand, but for the purposes of this report, we limit the analysis to the six hotels identified in this section.
- This analysis is not meant to be a competitive analysis per se; rather it is intended to provide some specific market data of hotels potentially serving West and Central Oahu. The Inn at Schofield was not included due to lack of specific property data.

Other Oahu Competitive Set

Property	Location	# Rooms
Marriott JW Ihilani Resort	Kapolei - Ko Olina	387
Preferred Turtle Bay Resort	Kahuku	443
ResortQuest Hawaii Executive Centre Hotel	Downtown	90
Ohana Hotels Honolulu Airport	Airport	307
Best Western The Plaza Hotel	Airport	274
Pacific Marina Inn	Airport	118

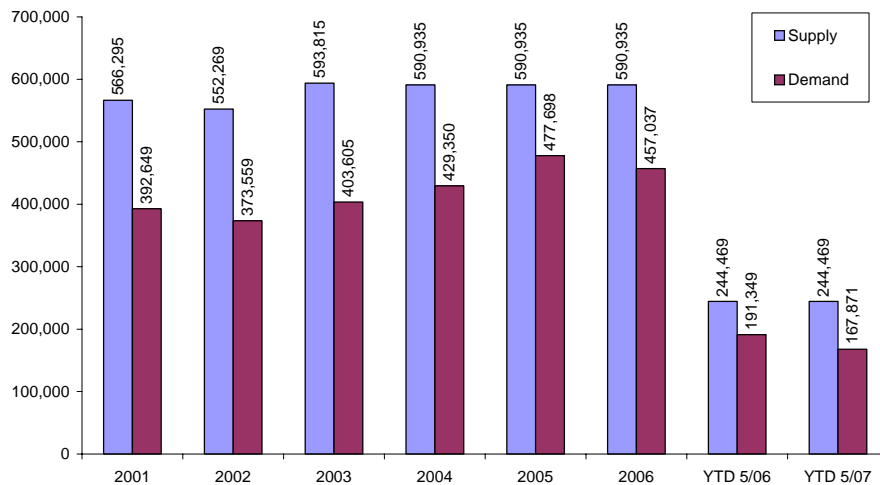
Competitive Performance

The competitive set occupancy generally fell short of hotel occupancy achieved island-wide.



Source: Smith Travel Research, Hospitality Advisors LLC

Competitive Set Supply and Demand in Annual Room Nights



Source: Smith Travel Research, Hospitality Advisors LLC

Demand Penetration Analysis

Based on the competitive set's percentage share of room supply in comparison to Other Oahu supply, demand for lodging is on par with the its fair share of supply, penetrating at nearly 100%. However, when taking Waikiki into consideration, demand penetration falls short of its fair share, showing a penetration level in the low-90.0 percent.

	Comp Set vs. Oahu Total (including Waikiki)		Comp Set vs. Other Oahu Only	
	Market Share	Penetration	Market Share	Penetration
2001	4.4%	101.4%	35.6%	98.0%
2002	4.1%	96.5%	39.9%	97.1%
2003	4.9%	93.7%	46.6%	98.7%
2004	4.5%	91.2%	42.0%	98.1%
2005	5.0%	94.5%	41.7%	97.1%
2006	5.1%	92.6%	42.2%	99.6%
YTD 5/07	5.0%	91.3%	41.3%	98.5%

Source: Hospitality Advisors LLC

Summary Assessment

Summary Assessment

- Based on the overview analyses prepared for this study, it appears that the outlook for hotel demand in Central Oahu is likely to be marginal in the short term, but potentially improving over the medium to long term with the maturation of CORP, WSC, Koa Ridge and Kapolei.
- The immediate and short term outlook, however, is less favorable due to the following:
 - Demand from the military sector appears to be seasonal and subject to the lease agreement between the Inn at Schofield and the Department of Defense, and limitations regarding per diem rates on military travel. Improved accommodations at Schofield Barracks also appear to be relieving pressure on the extent and term of TLAs

Summary Assessment

- Sports demand appears to be highly seasonal and event specific. Additionally, this segment appears to be highly price sensitive, particularly for local and interisland events. The potential for dorm facilities to be added to CORP may also impact demand in the future.
- The prospects for expanded commercial demand appears limited at least for the short and medium term given the anticipated type of business expansion for Central Oahu, which appears more community based rather than corporate based.
- Planned renovations at the airport hotels and new hotels at Kapolei will likely provide substantial competitive pressure on hotel demand in Central Oahu, and will likely be absorbed first.

Summary Assessment

- Depending on the strategy of Castle & Cooke, it may be advantageous to preserve the hotel use but phase in the hotel as a second or later phase should demand develop sufficiently in the future.
- The primary concern is the uncertainty and uneven nature of Central Oahu hotel demand over the next five years. This is of particular concern when considering the economic expansion of Kapolei, which likely will need to be absorbed prior to any such expansion into Central Oahu.
- The hotel product at Koa ridge will likely be in the economy to midrange market segment with consideration to an extended stay product.
- The primary consideration of any hotel development should also be based on the cost of construction and the continuing annual operating and financing costs, which have made new hotel development in the mid-market generally cost prohibitive. This is particularly relevant for new market development.



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

October 1, 2009

Ms. Laura M. Kodama
Director of Planning & Development
Castle & Cooke Homes Hawaii, Inc.
P.O. Box 898900
Mililani, Hawaii 96789-8900

Dear Ms. Kodama:

I would like to address some of the concerns you and your colleagues raised with Department of Education staff at a meeting on September 11, 2009.

I understand that you had questions about the schools that would serve Castle & Cooke's Koa Ridge and Waiawa projects. Decisions about which school will service a new residential area are made closer to the time the first occupancies take place, with input from existing school communities. That decision making group will look at the enrollments and facility capacities of neighboring schools and future area schools.

A similar set of decisions must be made to determine the service areas for the two new elementary schools planned for Castle & Cooke's Koa Ridge and Waiawa. Again, these decisions would be made closer to the time the schools are ready to open. The same factors, such as enrollment, enrollment projections and facility capacity would be taken into account.

I believe you have a specific question as to what will happen if the Waiawa Ridge Development (WRD) project, adjacent to your Waiawa project, is held up, delaying the opening of a middle school and high school to be built in the WRD project but expected to serve your projects as well. Under such a scenario, existing schools would need to accommodate students from the area. Temporary facilities may be needed to accommodate the increased number of students.

We do not anticipate that the development of Koa Ridge alone would trigger the need for a new middle or high school facility. The decision making process outlined above would again apply. We note that the middle school planned in WRD's project is located in an earlier phase of their development so the site could be available for school facilities early on.

Ms. Laura Kodama

Page 2

October 1, 2009

In general, the availability of schools to serve new developments will depend on the timing of the residential growth and adequate funding. It would be difficult to address different scenarios specifically.

If you have any questions, please call Heidi Meeker of the Facilities Development Branch at 377-8301.

Very truly yours,

A handwritten signature in black ink, appearing to read "Patricia Hamamoto". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

Patricia Hamamoto

Superintendent

PH:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
Patricia Ann Park, CAS, Leilehua/Mililani/Waialua Complex Areas
Abbey Seth Mayer, Director, Office of Planning

Traffic Impact Analysis Report

Koa Ridge Makai and Waiawa Developments



Prepared For
**Castle & Cooke Homes
Hawaii**

Prepared By
**Wilson Okamoto
Corporation**

**November 2008
Revised February 2009
Revised May 2010**

Volume 1

TRAFFIC IMPACT ANALYSIS REPORT

FOR

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENTS

Prepared for:

Castle & Cooke Homes Hawaii
100 Kahelu Avenue, 2nd Floor
Mililani, Hawaii 96789

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I. INTRODUCTION

A. Background

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed Castle & Cooke Koa Ridge Makai and Waiawa Developments located in Central Oahu. The project will entail the development of mixed uses to include residential single-family and multi-family units, commercial areas, community land uses, and a variety of parks and other open spaces. Proposed access to the Koa Ridge development would be through new roadway connections at Ka Uka Boulevard west of the Waipio Interchange, and a proposed new freeway interchange along the Interstate H-2 Freeway at the existing Pineapple Road Overpass. Initial project plans identified a proposed project access point along Kamehameha Highway, just north of the intersection with Ka Uka Boulevard to improve project access and traffic circulation in the vicinity. However, due to concerns expressed by the State Department of Transportation regarding the separation distance between the Ka Uka Boulevard intersection and the proposed Kamehameha Highway project access connection, the traffic analysis contained herein is based on the aforementioned two proposed project access connections at Ka Uka Boulevard and the proposed new interchange at the Pineapple Road Overpass. Proposed primary access to the Waiawa development would be through a new eastward extension of Ka Uka Boulevard east of the Waipio Interchange along the Interstate H-2 Freeway.

In addition, previous studies conducted for this project were based on anticipated project internal trip capture during the peak periods of traffic, reflecting trip interactions between the various uses within the proposed development, availability of multiple travel mode choices, and other potential incentives to reduce project-related vehicular traffic generation on the external roadways in the vicinity. The factors and strategies to reduce project traffic generation are described and evaluated in a separate document prepared for the developments titled, *Castle & Cooke Koa Ridge Makai and Waiawa Project, Alternative Transportation Components*, dated November 2008, prepared by Weslin Consulting Services, Inc. (See Appendix F). That study notes that project trip generation, based on vehicle-oriented, single land use developments, may be reduced for multi-land use developments with supporting pedestrian and bicycle facilities, and access to public transportation. Based on the development's progressive land use plan and characteristics, the Weslin study resulted in a 24% to 28% reduction during peak periods as a result of the interaction between individual specific land uses, 1% to 4% reduction during the peak hours for trips that are assumed as pass-by or diverted trips to and from commercial uses such as restaurants or retail stores, 8% reduction as a result of bus transit use, 3% reduction as a result of pedestrians and bicycle trips, and 16% reduction for Transportation Demand Management (TDM) techniques that include subsidized transit passes, flexible work schedules, and car-sharing or carpooling programs. Based on the analysis and evaluation, the Weslin study determined that total potential trip reductions amount to approximately 56% during peak commuter periods. The Traffic Impact Analysis Report (TIAR) initially assumed a less aggressive and more conservative assumption of project internal trip

capture at 30%. However, following discussions with the State Department of Transportation, a 15% internal capture during the peak periods of traffic by the developments is incorporated herein to represent a reasonable and practical lower limit of the assumption. This study also evaluates traffic conditions of several development scenarios including the concurrent development of both projects, as well as the initial development of the Koa Ridge Makai without the development of the Waiawa portion until later in the future.

Another item that is incorporated in this study is the consideration of a northbound loop off-ramp as a key roadway improvement at the Waipio Interchange to mitigate projected adverse traffic impacts as a result of the projects in the vicinity. Although other alternatives including several interchange configurations were investigated for the Waipio Interchange to address projected traffic demands, Castle & Cooke Homes Hawaii and the State Department of Transportation have agreed in concept to the northbound loop off-ramp alternative as one of the mitigating measures in the vicinity of the project. An assessment of interchange ramp alternatives considered is provided in Appendix M. This study therefore incorporates this key improvement in the analysis.

In addition, this traffic impact assessment is prepared in conjunction with an Incremental Development Plan proposed by Castle & Cooke Homes Hawaii for the Koa Ridge development. The Incremental Development Plan outlines a phased schedule of development with Koa Ridge Makai to be developed as the First Increment and Castle & Cooke Waiawa as the Second Increment. In order for the Castle & Cooke Waiawa development to proceed, the adjacent Waiawa Ridge Development must first construct a roadway extension of Ka Uka Boulevard to the east and across Panakauahi Gulch. The development of this roadway crossing is entirely dependent on the Waiawa Ridge Development. Given the uncertainty of the Waiawa Ridge Development's schedule for the construction of this roadway crossing, Castle & Cooke Homes Hawaii may plan to proceed with its proposed Koa Ridge Makai development and therefore be completed in advance of the start of the Waiawa developments. Castle & Cooke Homes Hawaii projects that a deferred start of the Castle & Cooke Homes Hawaii Waiawa development may result in planned development units being shifted to Koa Ridge Makai, such that the development of planned residential units may therefore be completed by Year 2020. Accordingly, this TIAR assesses the Koa Ridge Makai Only development scenario for the associated traffic impacts and necessary traffic mitigation measures for Koa Ridge Makai development proceeding independently and being completed in advance of both the Castle & Cooke Waiawa development and the Waiawa Ridge Development.

B. Scope of Study

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

1. Description of the proposed project and proposed development plan.
2. Evaluation of existing roadway and traffic operations in the vicinity.
3. Analysis and development of trip generation characteristics for the proposed project.

4. Development of traffic projections and future traffic conditions.
5. Superimposition of site-generated traffic over future traffic conditions.
6. The identification and analysis of traffic impacts resulting from the proposed project.
7. Development of recommended roadway or intersection improvements, as appropriate, to alleviate anticipated adverse future roadway and traffic conditions with the proposed project.

The report also incorporates additional discussion and analyses undertaken to respond to comments provided by the Mililani/Waipio/Melemanu Neighborhood Board No. 25 in a resolution adopted at its regular meeting on November 28, 2007 (see Appendix A). These additional assessments addressed the following:

- More definitive discussion of the potential indirect and cumulative impacts of development in the region relative to traffic;
- Analysis of commuter travel time;
- Discussion of the impacts of the rapid transit system; and
- Impacts of the proposed improvements from the Oahu Metropolitan Planning Organization's 2030 Oahu Regional Transportation Plan.

II. PROJECT DESCRIPTION

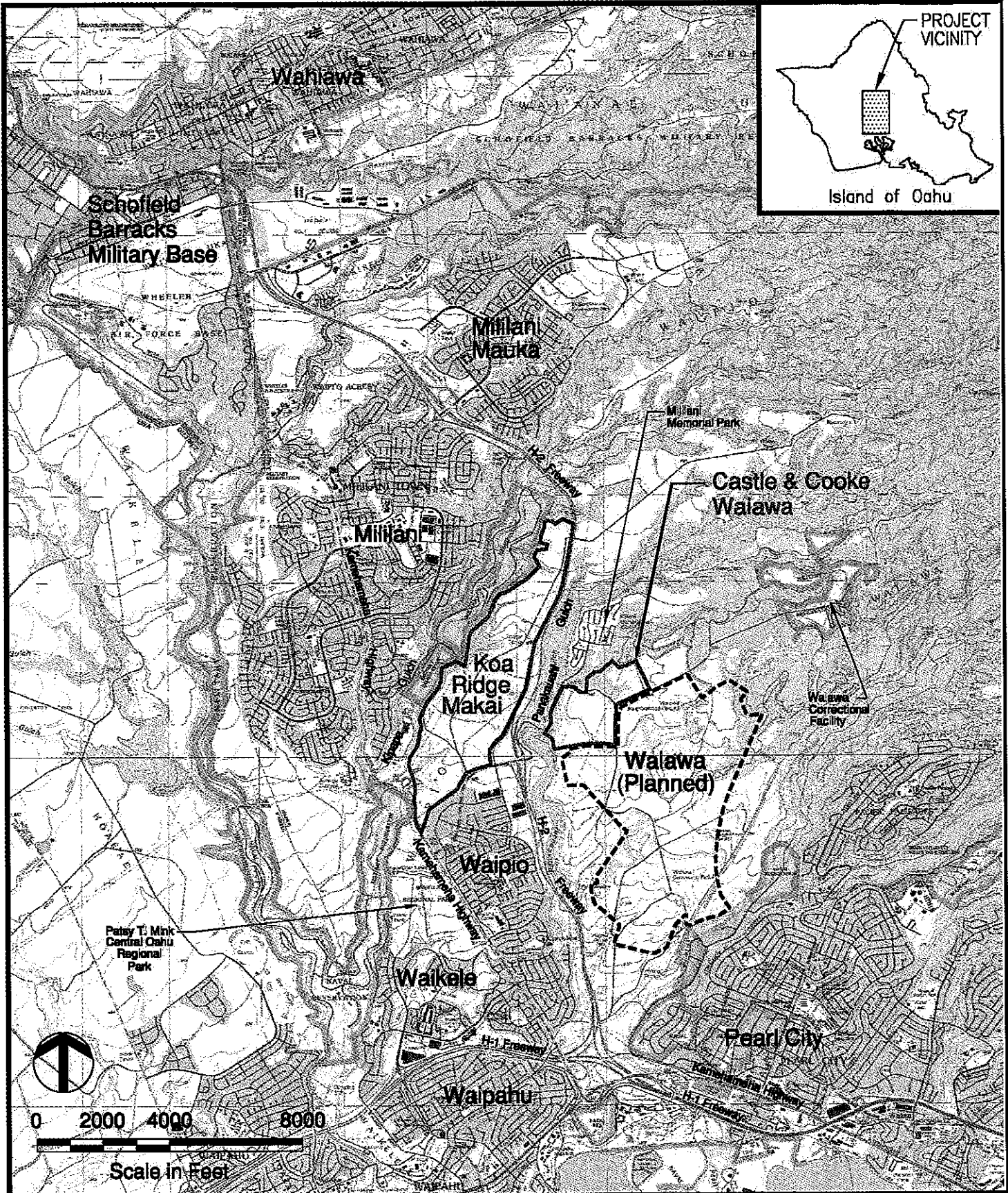
A. Location

The proposed Koa Ridge Makai development will be located in Central Oahu, west of the Interstate H-2 Freeway, immediately north of Ka Uka Boulevard, and east of Kamehameha Highway. The Koa Ridge Makai development site is further identified as Tax Map Keys: 9-4-06: 38, 9-4-06: por 2, 9-4-06: 14, 9-4-06: 15, and 9-5-03: 4, and encompasses about 575 acres of land. Primary access points to the proposed Koa Ridge Makai development will be provided via a road connection to Ka Uka Boulevard and a proposed new freeway interchange along the Interstate H-2 Freeway at the existing Pineapple Road Overpass.

The proposed Waiawa Development will also be included in Central Oahu east of the Interstate H-2 Freeway, immediately north of the Waipio Interchange, and adjacent to the proposed Waiawa Ridge Development, also in Central Oahu. The project site is further identified as Tax Map Keys: 9-6-04: 21, 9-4-06: por. 29, and 9-4-06: por 31, and encompasses about 191 acres of land. Primary access to the project site will be provided via an eastward extension of Ka Uka Boulevard from the Waipio Interchange along the Interstate H-2 Freeway. Figure 1 shows the location and vicinity maps of both the proposed Koa Ridge Makai and Waiawa developments.

B. Project Characteristics

The proposed Koa Ridge Makai and Waiawa developments will be mixed-use master planned communities providing a variety of housing types, retail and commercial uses, schools, employment opportunities, health care, and community amenities and other services that emphasize walking, bicycling, and transit as alternate travel modes. The Koa Ridge Makai development will include a Village Center that supports higher density residential housing and mixed-use buildings. The




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KOA RIDGE MAKAI AND WAIAWA
LOCATION MAP AND VICINITY MAP

FIGURE
1

Village Center is the central core of the Koa Ridge Makai community providing opportunities for a multitude of daily activities within the localized region. Surrounding the central core are less dense residential uses, medical facilities, specialized retail areas, industrial uses, and open spaces. This development will include connections to regional roadway systems surrounding the project site that include Ka Uka Boulevard and the Interstate H-2 Freeway.

The proposed Waiawa Development will be located adjacent to the future extension of Ka Uka Boulevard immediately adjacent to the proposed Waiawa Ridge Development and will include residential single- and multi-family units, commercial areas, an elementary school, parks, and open spaces. Both the Koa Ridge Makai and Waiawa developments are expected to proceed concurrently in two major development phases, the first of which is expected to be completed and occupied by the Year 2016, with build-out in the second phase at Year 2025. Should the Koa Ridge Makai portion of the project proceed in advance of the Waiawa portion, it is expected that Koa Ridge Makai may be completed by 2020.

Phase 1 of the proposed Koa Ridge Makai development entails the approximate development of the following within each project site:

- 275,000 square feet floor area of commercial/retail uses
- Approximately 912 multi-family residential homes
- Approximately 479 single-family residential homes
- Elementary School to service the area residential developments
- Approximately 10 acres for healthcare uses
- 43,000 square feet floor area of light industrial uses
- 10,000 square feet floor area of office uses
- Approximately 1 acres for community center
- Approximately 2 acres for church use

Should the Waiawa portion of the project proceed concurrently with Koa Ridge Makai, the first phase of the proposed Waiawa development shall include 200 multi-family residential units by the Year 2016. Beyond Year 2016 to the ultimate build-out of the proposed Koa Ridge Makai and Waiawa developments in Year 2025, Phase 2 of the project would entail the approximate additional development of the following within each project site:

Koa Ridge Makai

- 75,000 square feet floor area of commercial/retail uses
- Approximately 1,534 multi-family residential homes
- Approximately 575 single-family residential homes
- 150 room extended-stay hotel
- Approximately 18 acres for healthcare uses
- Approximately 17 acres for park use
- 40,000 square feet of light industrial uses
- 20,000 square feet of office uses
- Approximately 2 acres for community center
- Approximately 2 acres for church use

Waiawa

- 30,000 square feet floor area of commercial/retail uses
- Approximately 1,045 multi-family residential homes
- Approximately 255 single-family residential homes
- Elementary School to service the area residential developments

Should the development of Koa Ridge Makai proceed well in advance of the Waiawa development, the construction schedule of Koa Ridge Makai may be accelerated based on the following schedule identifying Phase 1 of Koa Ridge Makai to occur at Year 2016 with ultimate buildout of Koa Ridge Makai in Year 2020.

Under this scenario, Phase 1 of the proposed Koa Ridge Makai development entails the development of approximately the following by Year 2016:

- 275,000 square feet floor area of commercial/retail uses
- Approximately 1,202 multi-family residential homes
- Approximately 598 single-family residential homes
- Approximately 10 acres for healthcare uses
- 43,000 square feet floor area of light industrial uses
- 10,000 square feet floor area of office uses
- Approximately 1 acres for community center
- Approximately 2 acres for church use

Beyond Year 2016 to the ultimate build-out of the proposed Koa Ridge Makai development in Year 2020, Phase 2 of the project would entail the approximate additional development of the following:

- 75,000 square feet floor area of commercial/retail uses
- Approximately 1,2444 multi-family residential homes
- Approximately 456 single-family residential homes
- Elementary School
- 150 room extended-stay hotel
- Approximately 18 acres for healthcare uses
- Approximately 17 acres for park use
- 40,000 square feet of light industrial uses
- 20,000 square feet of office uses
- Approximately 2 acres for community center
- Approximately 2 acres for church use

For the purpose of the traffic analyses contained in this report, the proposed development absorption schedules for both Koa Ridge Makai and Castle & Cooke Waiawa Developments are shown in Figure 2. Should the Koa Ridge Makai portion proceed well in advance of the Waiawa development, the proposed development absorption schedule for Koa Ridge Makai would be accelerated as shown in Figure 3. However, as with all market driven commercial and residential developments, the anticipated development schedule may change due to market conditions throughout the development planning as well as at the time of construction. Nevertheless, the incremental development assumptions contained in this report represent a realistic and

KOA RIDGE MAKAI/WAIAWA TRAFFIC ABSORPTION															
KOA RIDGE MAKAI															
	Total Units	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential															
Single Family	1,054	88	135	86	83	87	71	80	72	71	71	63	53	42	52
Multi-Family	1,162	114	168	131	81	81	84	80	89	84	84	77	70	21	0
High Density Multi-Family	1,284	0	0	135	103	101	115	115	109	103	104	107	103	103	86
Total	3,500	202	301	352	267	269	270	270	270	258	259	247	226	166	138
Commercial															
Big Box Retail	150,000		150,000												
Retail	200,000			30,000	20,000	75,000	25,000			50,000					
Office	30,000	10,000					20,000								
Light Industrial	83,000					43,000				40,000					
Hotel							150 rooms								
Other															
Healthcare	28				10					8					10
Elementary School	12				12										
District Park	17						17								
Community Center	3					1				2					
Church	4					2				2					
WAIAWA															
Residential															
Single Family	255	0	0	0	0	0	13	13	18	20	20	23	46	51	51
Multi-Family	1,245	0	0	0	100	100	87	87	87	100	100	113	117	180	174
Total	1,500	0	0	0	100	100	100	100	105	121	121	136	163	231	225
Other															
Commercial	30,000 sq.ft.								30,000						
Elementary School	12 acres									12					

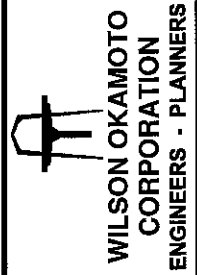
Source: Castle & Cooke Homes Hawaii



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT
 KOA RIDGE MAKAI AND WAIAWA
 DEVELOPMENT SCHEDULE

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
KOA RIDGE MAKAI															
Residential	Total Units														
Single Family	1,054	95	177	95	95	136	111	100	100	145	0	0	0	0	0
Multi-Family	1,162	105	198	103	103	103	128	144	139	139	0	0	0	0	0
High Density Multi Family	1,284	0	0	202	202	186	186	181	186	141	0	0	0	0	0
Total	3,500	200	375	400	400	425	425	425	425	425	0	0	0	0	0
Land Sales (acres)															
Big Box Retail	150,000														
Retail	200,000			30,000	20,000	75,000			25,000	50,000					
Office	30,000		10,000					20,000							
Light Industrial	83,000					43,000				40,000					
Hotel							150 rooms								
Other	Acres														
Healthcare	28				10					8					10
Elementary School	12						12								
District Park	17						17								
Community Center	3					1				2					

Source: Castle & Cooke Homes Hawaii



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT
KOA RIDGE MAKAI AND WAIAWA
DEVELOPMENT SCHEDULE

practical development schedule for planning and traffic analysis purposes. Figures 4 and 5 show the Koa Ridge Makai and Waiawa development site plans, respectively.

III. EXISTING CONDITIONS

A. General

The proposed Koa Ridge Makai development will be located west of the Waipio Interchange between the Interstate H-2 Freeway and Kamehameha Highway, immediately north of Ka Uka Boulevard. The primary access to the proposed Koa Ridge Makai development will be via Ka Uka Boulevard between Moaniani Street and Ukee Street (east). Other access points to the Koa Ridge Makai development include secondary roadway connections on Ka Uka Boulevard and future connections at a new interstate freeway interchange at the northern portion of the site at the existing Pineapple Road overpass.

The proposed Waiawa development will be located east of the Waipio Interchange near the northbound on- and off-ramps to the Interstate H-2 Freeway. The Waipio Interchange serves as a junction between the Interstate H-2 Freeway and Ka Uka Boulevard and is configured as a traditional "diamond interchange". The area is well serviced by regional transportation facilities that include the interstate freeway systems, Kamehameha Highway, and other major collector roadways. Traffic volumes along the freeway, Kamehameha Highway, and Ka Uka Boulevard in the project vicinity have been increasing slightly over the years due to on-going development within Central Oahu.

B. Area Roadway System

In the vicinity of the Koa Ridge Makai and Waiawa projects, Ka Uka Boulevard is predominantly a two-way, four-lane, divided City and County of Honolulu collector roadway providing east-west mobility between the Interstate H-2 Freeway and Kamehameha Highway. Exclusive turning lanes are provided at selected major intersections along its alignment. The posted speed limit of Ka Uka Boulevard is 25 miles per hour.

Immediately west of the access roadway to both the Waiawa Ridge Development and Waiawa Development, Ka Uka Boulevard intersects with the northbound on- and off-ramp junction of the Waipio Interchange providing east-west mobility and access to areas west of the Interstate H-2 Freeway, Mililani Memorial Park, and the Waiawa Correctional Facility to the east. At this signalized intersection, the northbound off-ramp approach services an exclusive left-turn lane and a shared left-turn, through, and right-turn lane. The westbound Ka Uka Boulevard intersection approach provides a through lane, and an exclusive right-turn lane. The eastbound Ka Uka Boulevard approach provides an exclusive left-turn lane and an exclusive through movement lane. The intersection services traffic demands utilizing a two-phase traffic signal system operation.

West of the northbound on- and off-ramps intersection, Ka Uka Boulevard intersects the southbound off-ramp of the Waipio Interchange and Moaniani Street.

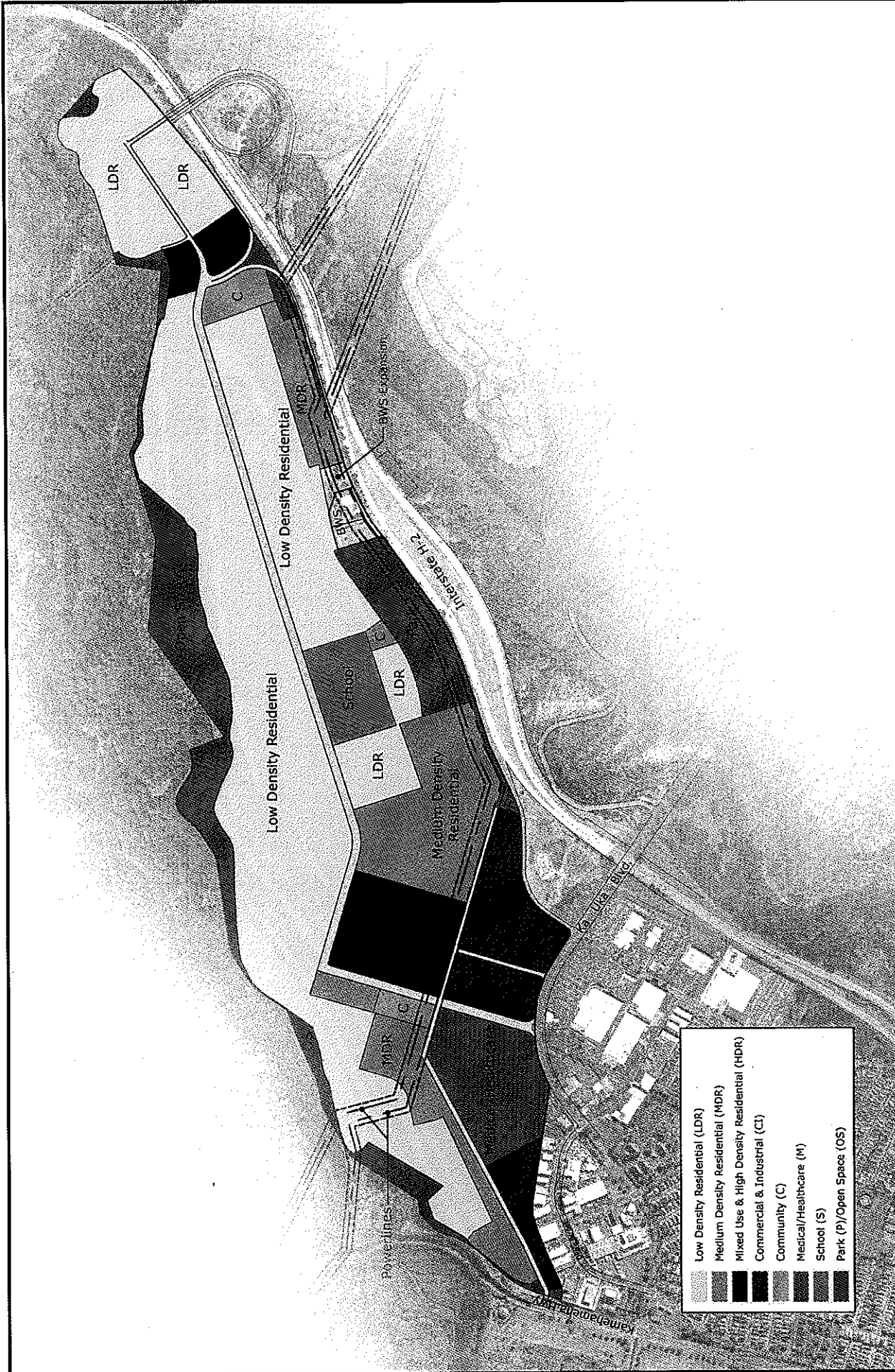


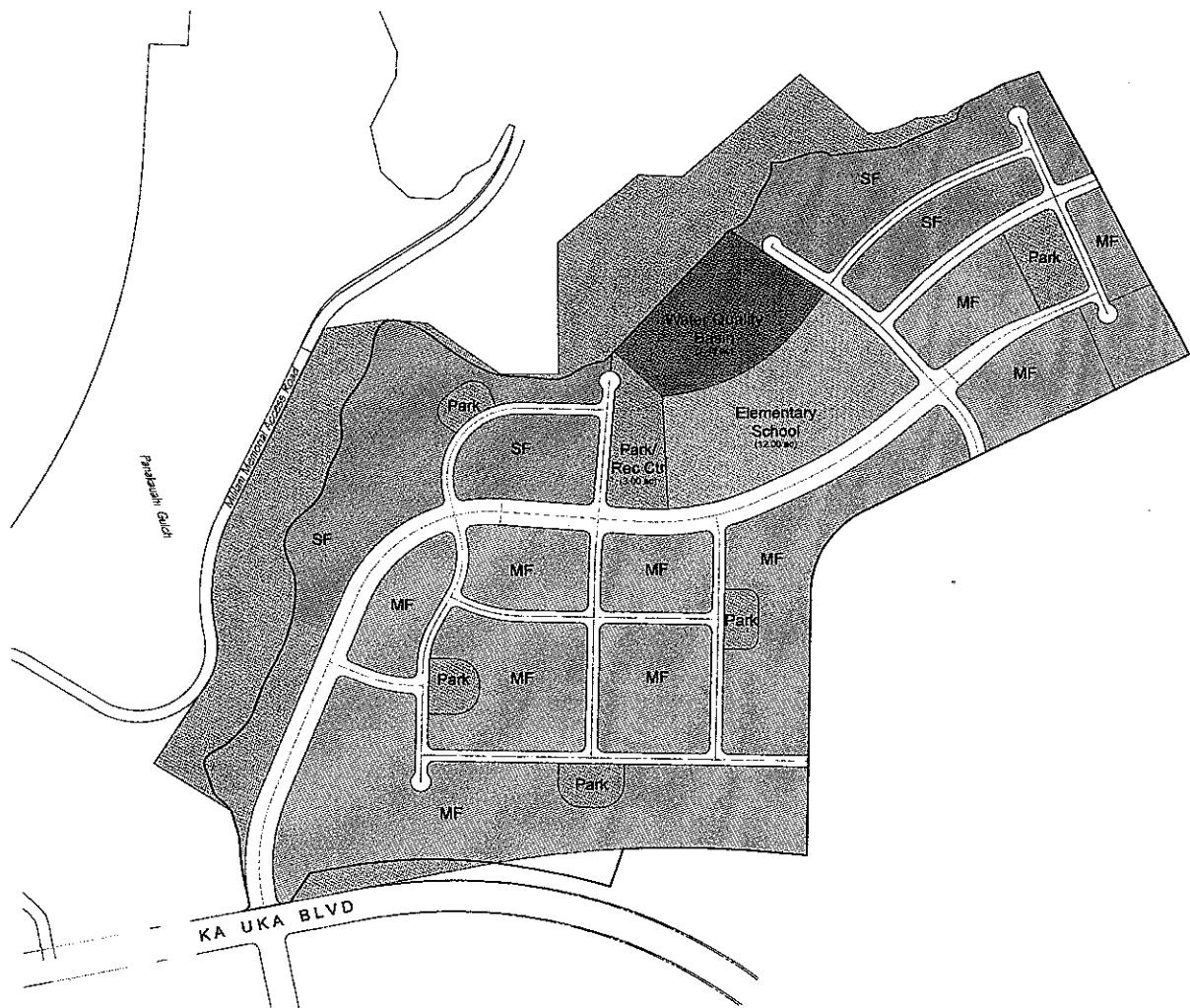
FIGURE
4






KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

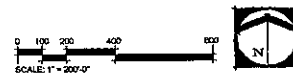
PROJECT SITE PLAN



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-  Single Family
-  Multi-Family
-  Community Center/Commercial
-  Elementary School
-  Park/Open Space



CASTLE & COOKE WAIAWA

Scheme 1

February 15, 2008



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

PROJECT SITE PLAN - WAIAWA

FIGURE

5

Moaniani Street provides access to residential and commercial uses such as Costco, Tony Auto Dealership and other uses to the south of Ka Uka Boulevard. At this signalized intersection, the westbound intersection approach of Ka Uka Boulevard provides an exclusive left-turn lane and two through movement lanes, while the eastbound approach provides an exclusive through movement lane and a shared through and right-turn lane. The northbound approach of Moaniani Street provides exclusive left-turn and right-turn lanes, while the H-2 southbound off-ramp provides one shared left-turn, through, and right-turn lane. The State Department of Transportation recently completed improvements on the southbound off-ramp approach to Ka Uka Boulevard to provide an additional lane to service right-turn movements onto Ka Uka Boulevard. The intersection services traffic demands utilizing a four-phase traffic signal system operation providing split phasing between the off-ramp and Moaniani Street, with an exclusive left-turn signal phase for westbound left-turn movements from Ka Uka Boulevard to southbound Moaniani Street.

Further west along Ka Uka Boulevard, the roadway intersects with a driveway servicing commercial uses on the south side of the roadway forming an unsignalized T-intersection providing access to commercial entities such as Starbuck's and Seattle's Best Coffee, as well as serve as a secondary access to the Costco commercial establishment. The Ka Uka Boulevard westbound approach of the intersection provides an exclusive left-turn lane and two through movement lanes while the eastbound approach provides an exclusive through lane and a shared through and right-turn lane. The permitted movement on the northbound approach of the driveway services right-turn movements only.

Continuing west, Ka Uka Boulevard intersects with Ukee Street (east) providing access to residential and commercial uses such as Aloha Petroleum, The Lock-up Self Storage establishment, West Oahu Federal Credit Union, as well as other uses in the residential and industrial areas in the vicinity. At this signalized intersection, the eastbound and westbound approaches provide an exclusive left-turn lane, an exclusive through movement lane, and a shared through movement and right-turn lane. The northbound and southbound approaches of Ukee Street (east) each provide one shared lane serving left-turn, through, and right-turn movements. During the collection of traffic data, this intersection operated under unsignalized conditions. Since then, a traffic signal system has been installed at the intersection. The intersection services traffic demands utilizing a two-phase traffic signal system operation.

West of Ukee Street (east), Ka Uka Boulevard intersects with Waipio Uka Street providing access to residential and commercial uses such as Zippy's Restaurant, Tesoro Gas Station, and other uses in the residential and industrial areas. At this signalized intersection, the eastbound and westbound approaches provide an exclusive left-turn lane, an exclusive through movement lane, and a shared through movement and right-turn lane. The northbound and southbound approaches of Waipio Uka Street each provide one shared lane serving left-turn, through, and right-turn movements. The intersection services traffic demands utilizing a two-phase traffic signal system operation.

Continuing further west, Ka Uka Boulevard intersects with Ukee Street (west) providing access to residential and commercial uses such as Shell Gas Station, McDonalds Restaurant, the Hawaii Okinawa Center, as well as other uses in the Gentry Business Park area. At this signalized intersection, the eastbound and westbound approaches provide an exclusive left-turn lane, an exclusive through movement lane, and a shared through movement and right-turn lane. The northbound and southbound approaches of Ukee Street each provide one shared lane serving left-turn, through, and right-turn movements. The intersection services traffic demands utilizing a three-phase traffic signal system operation.

At the western terminus of Ka Uka Boulevard, the roadway intersects with Kamehameha Highway providing access to the Central Oahu Regional Park and other uses located north and south of the intersection. At this signalized intersection, the westbound approach provides an exclusive left-turn lane, a through movement lane, and an exclusive right-turn lane, while the eastbound approach provides an exclusive left-turn lane, two through movement lanes, and an exclusive right-turn lane. The northbound approach of Kamehameha Highway provides an exclusive left-turn lane, two through movement lanes, and an exclusive right-turn lane, while the southbound approach of the highway provides two exclusive left-turn lanes, two through movement lanes, and an exclusive right-turn lane. The traffic signal system at the intersection services traffic demands utilizing a four-phase traffic signal operation.

South of Ka Uka Boulevard, Kamehameha Highway intersects Waipio Uka Street, also providing access to the Oahu Central Regional Park as well as other commercial uses in the immediate vicinity such as Jack-In-The-Box Restaurant and the Waipio Shopping Center. At this signalized intersection, the westbound approach provides two exclusive left-turn lanes, a through movement lane, and an exclusive right-turn lane, while the eastbound approach provides an exclusive left-turn lane, a through movement lane, and an exclusive right-turn lane. The northbound and southbound approaches of Kamehameha Highway each provide an exclusive left-turn lane, two through movement lanes, and an exclusive right-turn lane. The traffic signal system at the intersection services traffic demands utilizing a four-phase traffic signal operation.

Further south, Kamehameha Highway intersects with Lumiaina Street providing access to Waikele Shopping Center and Waikele residential communities to the west, and communities of Crestview and Sea View to the east. At this signalized intersection, the northbound and southbound approaches of Kamehameha Highway provide exclusive left-turn lanes, two through movement lanes, and exclusive right-turn lanes. The eastbound approach of Lumiaina Street provides a shared left-turn/through movement lane and an exclusive right-turn lane while the westbound approach provides an exclusive left-turn lane and a shared through movement/right-turn lane. The traffic signal system at the intersection services traffic demands utilizing a three-phase traffic signal operation.

South of the intersection with Lumiaina Street, Kamehameha Highway intersects with Lumiauau Street also providing access to the communities of Waikele, Crestview and Sea View. At this signalized intersection, the northbound and southbound approaches of Kamehameha Highway provide exclusive left-turn lanes,

two through movement lanes, and exclusive right-turn lanes. The eastbound approach of Lumiauau Street provide a shared left-turn/through movement lane and an exclusive right-turn lane while the westbound approach provides an exclusive left-turn lane and a shared through movement lane with a channelized right-turn lane. The traffic signal system at the intersection services traffic demands utilizing a three-phase traffic signal operation.

South of the intersection with Lumiauau Street, Kamehameha Highway intersects with Waipahu Street providing access to the residential and other uses in Waipahu Town. At this signalized T-intersection, the northbound approach of Kamehameha Highway provides an exclusive left-turn lane and two through movement lanes while the southbound approach provides two through movement lanes and an exclusive right-turn lane. The eastbound approach of Waipahu Street provides one lane serving left-turn movements and channelized right-turn movements. The traffic signal system at the intersection services traffic demands utilizing a three-phase traffic signal operation.

C. Traffic Volumes and Conditions

1. General

a. Field Investigation

To ensure adequate sampling of traffic data reflecting current traffic conditions, traffic count surveys were conducted during several periods throughout the years spanning from 2007 to 2008. The most current traffic data available were collected in September 2008 that consisted of manual turning movement count surveys and traffic flow assessments in the vicinity of the project. In consultation with the State Department of Transportation, the manual turning movement counts were conducted between the morning peak hours of 6:00 AM and 9:00 AM, and between the afternoon peak hours of 3:00 PM and 6:00 PM at the following intersections:

- Ka Uka Boulevard and the Interstate H-2 Freeway northbound on- and off-ramps at the Waipio Interchange
- Ka Uka Boulevard and the Interstate H-2 Freeway southbound on-ramp at the Waipio Interchange
- Ka Uka Boulevard and the Interstate H-2 southbound off-ramp/Moaniani Street
- Ka Uka Boulevard and the commercial driveway just west of Moaniani Street
- Ka Uka Boulevard and Ukee Street (east)
- Ka Uka Boulevard and Waipio Uka Street
- Ka Uka Boulevard and Ukee Street (west)
- Kamehameha Highway and Ka Uka Boulevard
- Kamehameha Highway and Waipio Uka Street
- Kamehameha Highway and Lumiauau Street

- Kamehameha Highway and Lumiauau Street
- Kamehameha Highway and Waipahu Street

In addition, a 24-hour traffic volume surveys were collected or reviewed along the Interstate H-2 Freeway, Waipio Interchange freeway ramps, and Kamehameha Highway in the project vicinity. Appendix B includes the existing traffic count data under separate cover.

b. Capacity Analysis Methodology

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

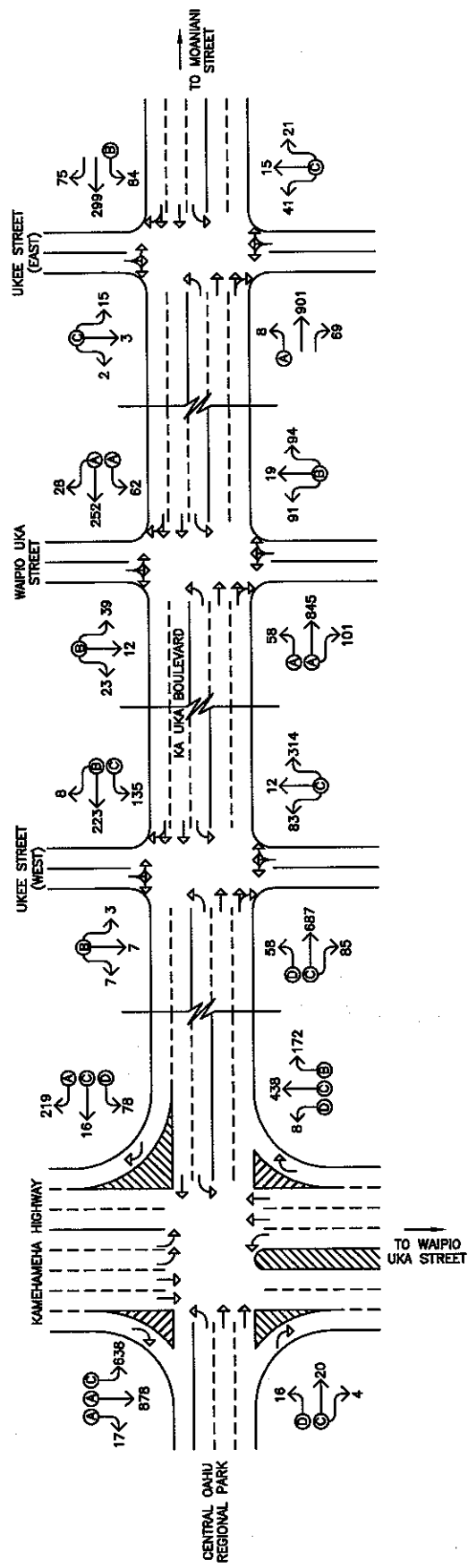
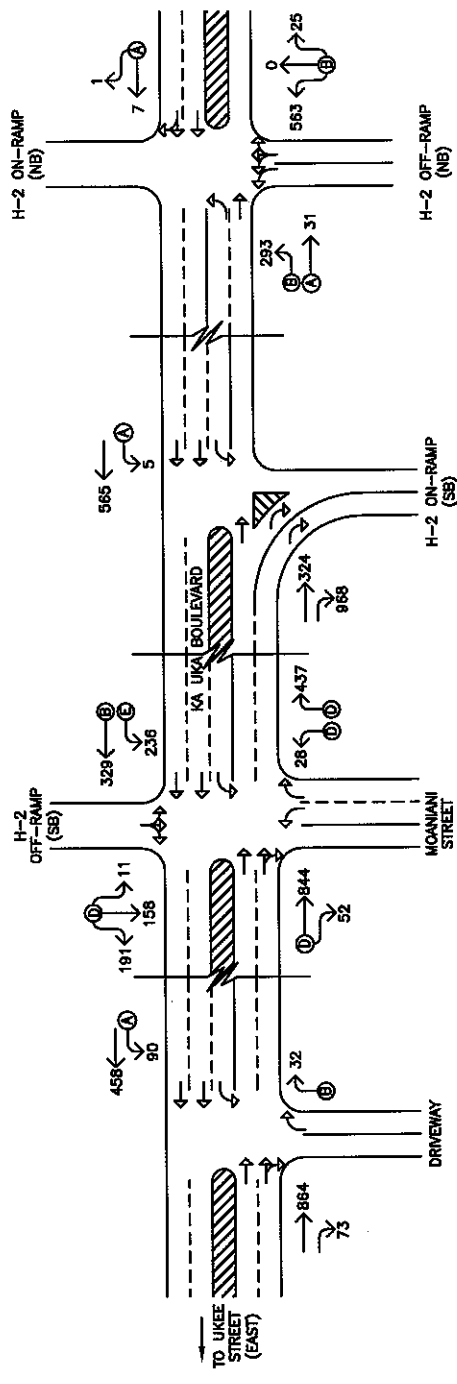
LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F". LOS "A" represents ideal or free-flow traffic operating conditions and LOS "F" represents unacceptable or potentially congested traffic operating conditions. LOS "B", "C", "D", and "E" represent the intermediate traffic operational characteristics between the two extremes of LOS "A" and LOS "F". The LOS definitions are included in Appendix C under separate cover.

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

2. Existing Peak Hour Traffic

a. General

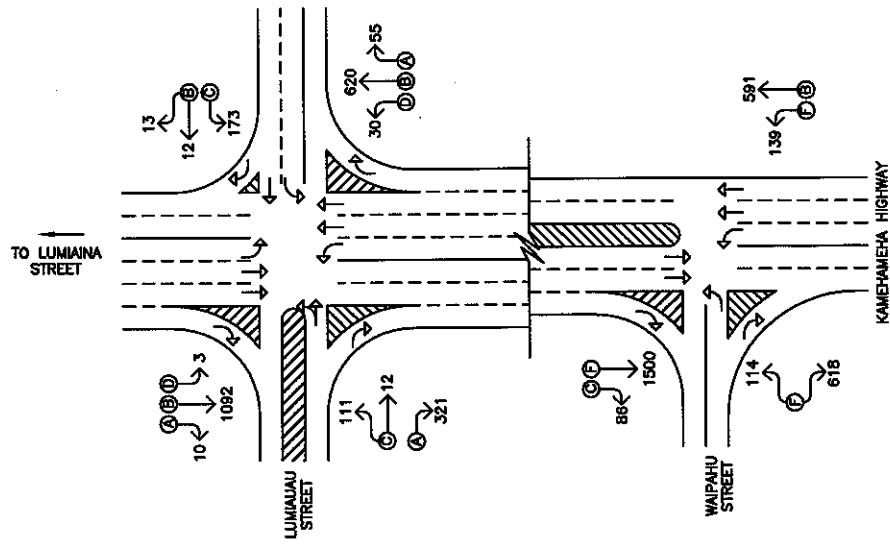
Figures 6 through 9 show the existing AM and PM peak hour traffic volumes and traffic operating conditions within the vicinity of the proposed project. The morning peak hour of traffic generally occurs between 7:00 AM and 8:00 AM in the project vicinity. In the afternoon, the peak hour of traffic generally occurs between the hours of 4:00 PM and 5:00 PM. Although the peak hours of traffic generally occur around the same time periods at each of the study intersections, the absolute commuter peak hour time periods for each intersection may differ slightly as shown in Table 1.



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

EXISTING AM PEAK HOUR OF TRAFFIC - KA UKA BOULEVARD

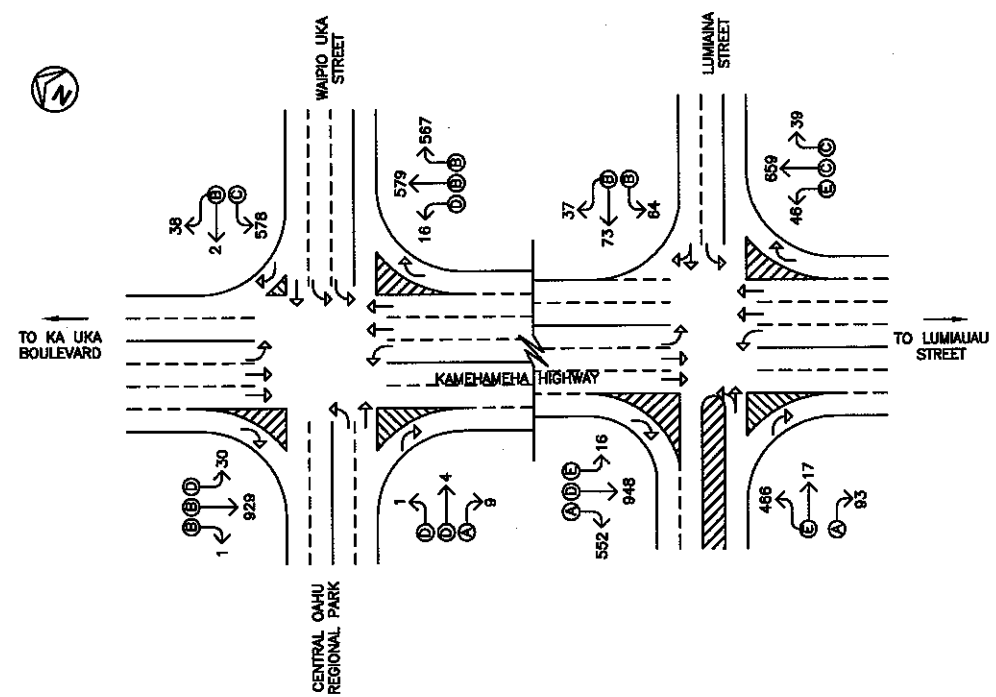




LEGEND

- 90 ↗ TRAFFIC MOVEMENT VOLUME (VPH)
- ⊙ LANE GROUP LEVEL OF SERVICE
- ↔ LANE USAGE

DATE OF COUNT: September 9-11, 2008



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

EXISTING AM PEAK HOUR OF TRAFFIC - KAMEHAMEHA HIGHWAY

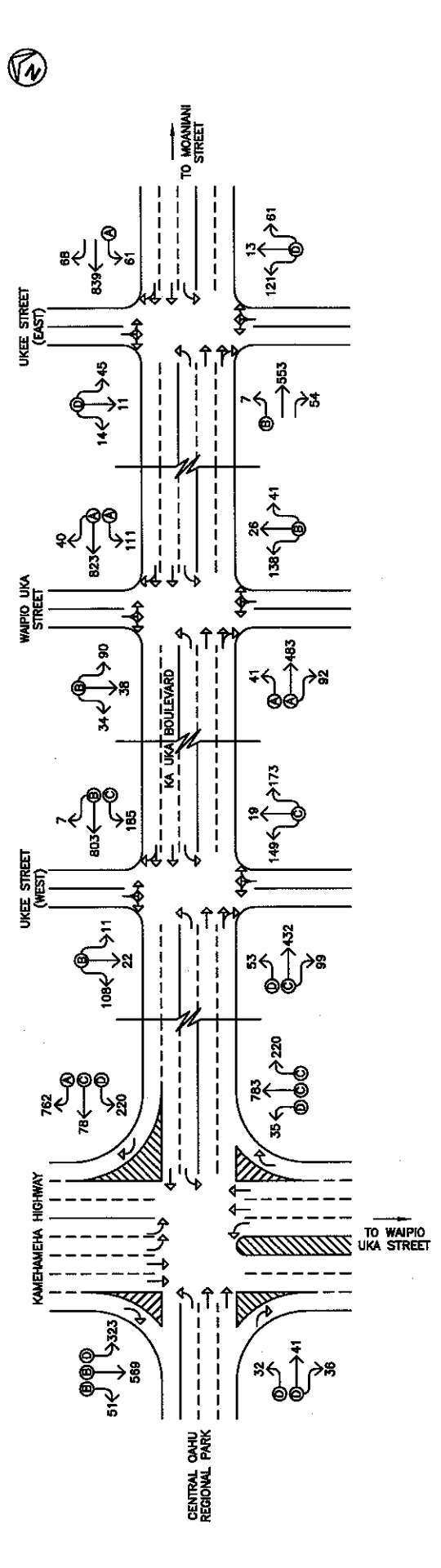
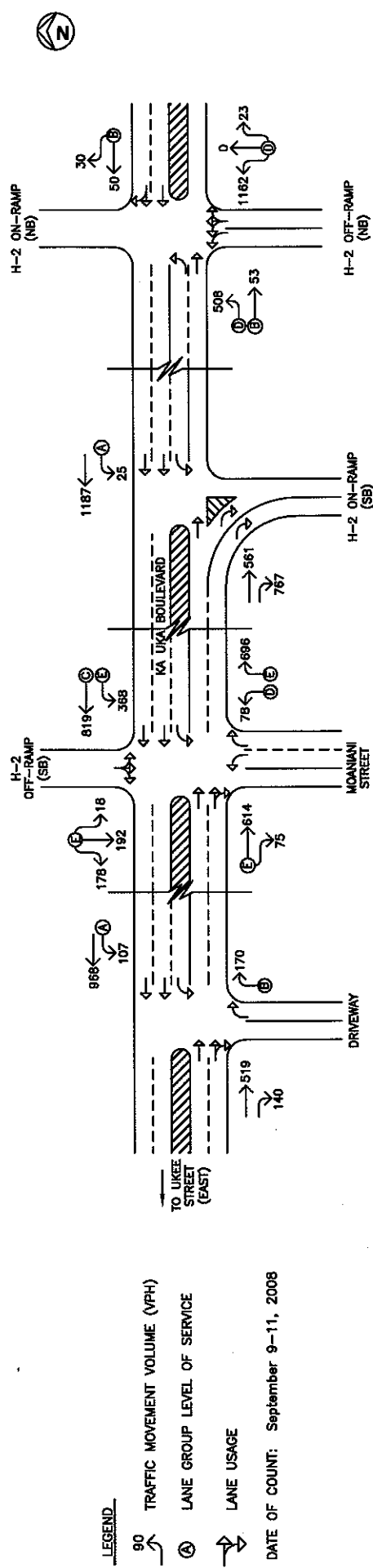
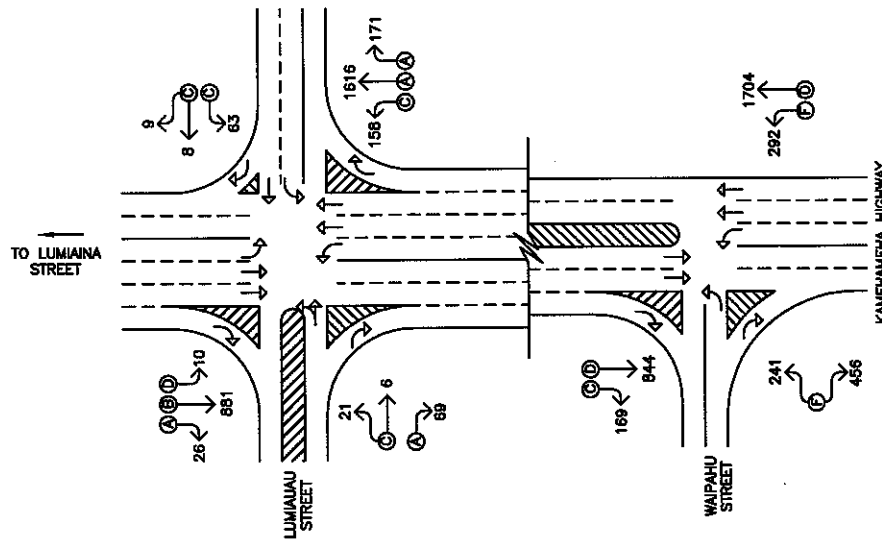


FIGURE 8

EXISTING PM PEAK HOUR OF TRAFFIC - KA UKA BOULEVARD

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

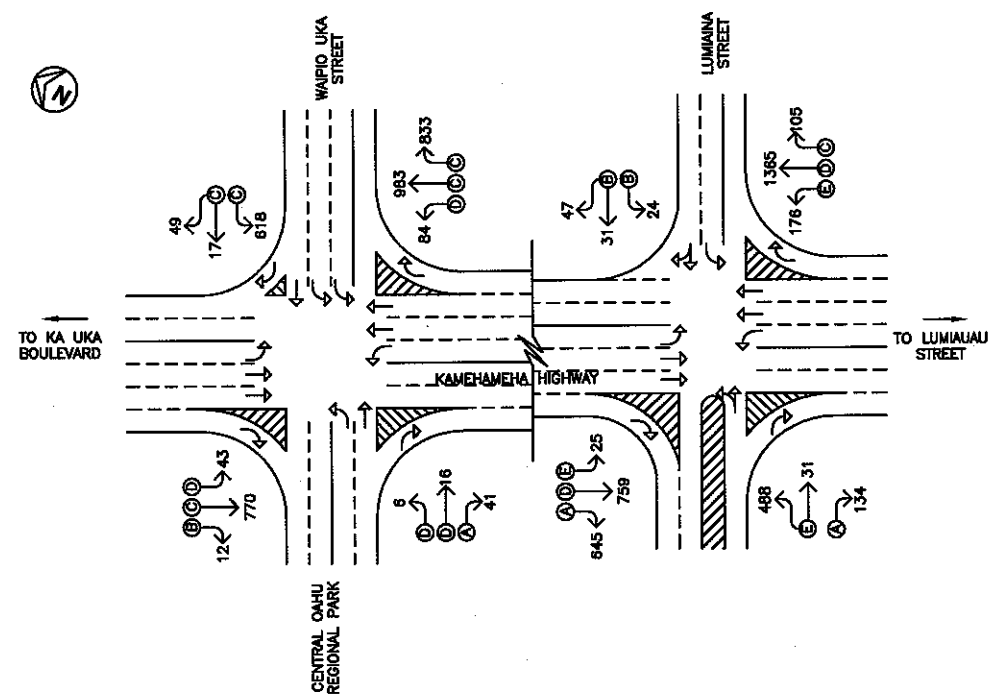




LEGEND

- 90 (with arrow) TRAFFIC MOVEMENT VOLUME (VPH)
- (A) LANE GROUP LEVEL OF SERVICE
- (with arrow) LANE USAGE

DATE OF COUNT: September 9-11, 2008



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

EXISTING PM PEAK HOUR OF TRAFFIC - KAMEHAMEHA HIGHWAY

Table 1: Peak Hours of Traffic

Intersection	AM Peak	PM Peak
Ka Uka Blvd/Waipio IC NB ramps	7:15 AM – 8:15 AM	4:45 PM – 5:45 PM
Ka Uka Blvd/Waipio IC SB on-ramp	6:45 AM – 7:45 AM	4:00 PM – 5:00 PM
Ka Uka Blvd/Moaniani St/SB off-ramp	7:00 AM – 8:00 AM	3:00 PM – 4:00 PM
Ka Uka Blvd/ Commercial Dwy	7:15 AM – 8:15 AM	4:45 PM – 5:45 PM
Ka Uka Blvd/ Ukee St (east)	7:00 AM – 8:00 AM	3:00 PM – 4:00 PM
Ka Uka Blvd/ Waipio Uka St	7:15 AM – 8:15 AM	4:00 PM – 5:00 PM
Ka Uka Blvd/ Ukee St (west)	7:00 AM – 8:00 AM	4:15 PM – 5:15 PM
Ka Uka Blvd/ Kamehameha Hwy	7:00 AM – 8:00 AM	4:00 PM – 5:00 PM
Kamehameha Hwy/ Waipio Uka St	7:15 AM – 8:15 AM	4:00 PM – 5:00 PM
Kamehameha Hwy/ Lumiaina St	7:00 AM – 8:00 AM	4:00 PM – 5:00 PM
Kamehameha Hwy/ Lumiauau St	7:00 AM – 8:00 AM	4:15 PM – 5:15 PM
Kamehameha Hwy/ Waipahu St	7:15 AM – 8:15 AM	4:00 PM – 5:00 PM

The analysis is based on the above absolute commuter peak hour time periods for each intersection to identify the traffic impacts resulting from the proposed project. LOS calculations are included in Appendix D under separate cover.

b. Ka Uka Boulevard at Waipio Interchange Northbound Ramps Intersection

At the intersection with the Waipio Interchange northbound on- and off-ramps, the eastbound approach of Ka Uka Boulevard carries 324 with the eastbound left-turn and through movements operating at LOS “B” and LOS “A”, respectively, during the AM peak period. During the PM peak period, the traffic volume is greater with 561 vehicles traveling eastbound with the left-turn movement operating at LOS “D” and the through movement operating at LOS “B”. Vehicular

queues periodically formed on the northbound off-ramp approach of this intersection with the most significant queuing occurring during the PM peak period. During this period, queues in the eastbound left-turn lane of the intersection would oftentimes extend beyond the capacity of the turning lane and encroach into the eastbound through traffic movement lane.

The westbound approach of the intersection carries relatively very little traffic with 8 vehicles and 80 vehicles during the AM and PM peak periods, respectively. The westbound approach operates at LOS "B" or better during both the AM and PM peak hours of traffic. No significant vehicular queuing was observed on this approach to the intersection.

The northbound off-ramp intersection approach carries 588 vehicles during the AM peak hour of traffic and operates at LOS "B" with a significant portion of the approach volume executing left-turn maneuvers. During the PM peak hour, the northbound intersection approach carries significantly more traffic with 1,188 vehicles, and operates at LOS "D". Average maximum queue lengths range from 15 to 20 vehicles during the PM peak hour of traffic with minimal queue lengths of approximately seven vehicles occurring during the AM peak hours.

c. Ka Uka Boulevard at Waipio Interchange Southbound On-Ramp Intersection

At the intersection with the Waipio Interchange southbound on-ramp, the westbound approach of Ka Uka Boulevard carries a total of 570 vehicles during the AM peak hour of traffic with the westbound left-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound approach of Ka Uka Boulevard at the southbound on-ramp carries a total of 1,212 vehicles with the westbound left-turn movement also operating at LOS "A" conditions.

The eastbound Ka Uka Boulevard right-turn movement onto the southbound on-ramp of the Waipio Interchange flow unimpeded with 968 vehicles and 767 vehicles during the AM and PM peak hours of traffic, respectively. The eastbound through movement on Ka Uka Boulevard through the intersection also flow unimpeded with 324 vehicles and 561 vehicles during the AM and PM peak hours of traffic, respectively. No significant vehicular queuing was observed at this intersection.

d. Ka Uka Boulevard at Moaniani Street/Waipio Interchange Southbound Off-Ramp Intersection

At the intersection with Moaniani Street and the Waipio Interchange southbound off-ramp, the westbound approach of Ka Uka

Boulevard carries 565 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "E" and the through movement operating at LOS "B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach carries a total of 1,187 vehicles with the left-turn movement operating at LOS "E" and the through movement operating at LOS "C" conditions. Oftentimes, vehicles queues associated with the westbound left-turn movement would extend beyond the capacity of the left-turn lane and spillback to adjacent intersections impeding both the westbound through traffic movement as well as the adjacent intersection operations.

The eastbound approach of Ka Uka Boulevard at the intersection with Moaniani Street and the southbound off-ramp carries a total of 896 vehicles during the AM peak hour of traffic and operates at LOS "D". During the PM peak hour of traffic, the eastbound approach carries 689 vehicles and operates at LOS "E" conditions. The LOS "D" and LOS "E" conditions during both the AM and PM peak periods, respectively, are primarily due to the high conflicting traffic volumes at the intersection resulting in extensive delays associated with the traffic signal phasing that are necessary to accommodate the relatively high traffic volumes.

The northbound approach of Moaniani Street at the Ka Uka Boulevard intersection carries a total 465 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements operating at LOS "D" conditions. Similarly, during the PM peak hour of traffic, the northbound approach of Moaniani Street at the Ka Uka Boulevard intersection carries 774 vehicles with the left-turn and right-turn movements operating at LOS "E" and LOS "D" conditions, respectively.

The southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection carries 360 vehicles during the AM peak hour of traffic with observed average maximum queue lengths in the range of 5 to 7 vehicles. During the PM peak hour of traffic, the southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection carries 388 vehicles with maximum queue lengths of 6 to 8 vehicles, and operates at LOS "C" conditions. The State Department of Transportation has completed the construction of roadway improvements that include an exclusive right-turn lane on the southbound off-ramp approach to the intersection. With the completion of the exclusive right-turn lane, queues were significantly reduced, improving the operating levels of service for the intersection approach. The relatively high conflicting traffic volumes at the intersection affect the resulting operating levels of service for the southbound approach, for both periods.

e. Ka Uka Boulevard at Commercial Driveway

The westbound and eastbound approaches of Ka Uka Boulevard at the intersection with the commercial driveway carries a total of 548 vehicles and 937 vehicles during the AM peak hour of traffic, respectively. The westbound left-turn movement operates at LOS "A". During the PM peak hour of traffic, the westbound approach carries 1,075 vehicles while the eastbound approach carries 659 vehicles. The westbound left-turn movement operates at LOS "A".

The northbound approach of the driveway at the Ka Uka Boulevard intersection carries 32 vehicles and 170 vehicles during the AM and PM peak hours of traffic, respectively, and operates at LOS "B" conditions during both peak hours.

f. Ka Uka Boulevard at Ukee Street (east)

At the intersection with Ukee Street (east), the westbound approach of Ka Uka Boulevard carries 458 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach carries a total of 968 vehicles with the left-turn movement operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (east) carries a total of 978 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C". During the PM peak hour of traffic, the eastbound approach carries a total of 614 vehicles with the left-turn movement operating at LOS "B" conditions.

The northbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection carries a total 77 vehicles during the AM peak hour of traffic and operates at LOS "A". During the PM peak hour of traffic, the northbound approach of Ukee Street (east) at Ka Uka Boulevard carries 195 vehicles and operates at LOS "D". The southbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection carries 20 vehicles during the AM peak hour and operates at LOS "B", while the southbound approach carries 70 vehicles during the PM peak hour of traffic and operates at LOS "D".

g. Ka Uka Boulevard at Waipio Uka Street

At the intersection with Waipio Uka Street, the westbound approach of Ka Uka Boulevard carries 342 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements all operating at LOS "A". During the PM peak hour of

traffic, the westbound Ka Uka Boulevard approach carries a total of 974 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Waipio Uka Street carries a total of 1,004 vehicles and 616 vehicles during the AM and PM peak hour of traffic, respectively. During both peak periods, all traffic movement on the eastbound approach of Ka Uka Boulevard at the Waipio Uka Street intersection operates at LOS "A" conditions.

The northbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection carries a total 202 vehicles during the AM peak hour of traffic and operates at LOS "B". During the PM peak hour of traffic, the northbound approach of Waipio Uka Street at Ka Uka Boulevard carries 205 vehicles and also operates at LOS "B" conditions. The southbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection carries 74 vehicles during the AM peak hour and operates at LOS "B", while the southbound approach carries 162 vehicles during the PM peak hour of traffic and also operates at LOS "B" conditions.

h. Ka Uka Boulevard at Ukee Street (west)

At the intersection with Ukee Street (west), the westbound approach of Ka Uka Boulevard carries 366 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movements operating at LOS "B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach carries a total of 995 vehicles with the left-turn movement operating at LOS "C" and the shared through and right-turn movements operate at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (west) carries a total of 830 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D" and the shared through/right-turn movement operating at LOS "C" conditions. During the PM peak hour of traffic, the eastbound approach carries a total of 584 vehicles with the left-turn movement operating at LOS "D" conditions while the shared through/right-turn movements operate at LOS "C".

The northbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection carries a total 409 vehicles during the AM peak hour of traffic and operates at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (west) at Ka Uka Boulevard carries 341 vehicles and operates at LOS "C". The southbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection carries 17 vehicles during the AM peak hour and operates

at LOS "B", while the southbound approach carries 141 vehicles during the PM peak hour of traffic and also operates at LOS "B".

i. Ka Uka Boulevard at Kamehameha Highway

At the intersection with Ka Uka Boulevard and Kamehameha Highway, the westbound approach of Ka Uka Boulevard carries 313 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D" and the through movement operating at LOS "C". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach carries a total of 1,060 vehicles with the left-turn movement operating at LOS "D" and the through movement operating at LOS "C" conditions. Vehicles queues associated with the westbound left-turn movement would extend beyond the capacity of the left-turn lane and impede the westbound through traffic movement.

The eastbound approach of Ka Uka Boulevard at the intersection with Kamehameha Highway carries relatively low traffic volumes with a total of 40 vehicles during the AM peak hour of traffic resulting in LOS "D" and "C" conditions for the individual eastbound left-turn and shared through/right-turn traffic movements, respectively. During the PM peak hour of traffic, the eastbound approach carries 109 vehicles with all of the individual movements generally operating at LOS "D" conditions. The LOS "D" conditions during both peak periods are primarily due to the high conflicting traffic volumes at the intersection resulting in delays associated with the traffic signal phasing necessary to accommodate the high traffic volumes of the conflicting traffic movements.

The northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection carries a total 618 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" and LOS "B" conditions, respectively. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection carries a total of 1,038 vehicles with the left-turn movement operating at LOS "D", and the through movement and right-turn movement operating at LOS "C" conditions.

The southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection carries 1,533 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" conditions while the through and right-turn movements both operate at LOS "A". During the PM peak hour of traffic, the southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection carries 943 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "B" conditions.

j. Kamehameha Highway at Waipio Uka Street

At the intersection with Kamehameha Highway, the westbound approach of Waipio Uka Street carries 618 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" while the shared through/right-turn traffic movements operate at LOS "B" conditions. During the PM peak hour of traffic, the westbound Waipio Uka Street approach carries a total of 684 vehicles with the left-turn movement operating at LOS "C" and the through and right-turn movements also operate at LOS "C" conditions. Vehicles queues associated with the westbound left-turn movement would oftentimes extend beyond the capacity of the leftmost left-turn lane and affect intersection movements at the adjacent intersection of Waipio Uka Street and Ukee Street located immediately east.

The eastbound approach of Waipio Uka Street at the intersection with Kamehameha Highway carries relatively low traffic volumes with a total of 14 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements. During the PM peak hour of traffic, the eastbound approach carries 63 vehicles with the left-turn and through movements also operating at LOS "D" conditions. Although relatively low traffic demands on the eastbound approach to the intersection, the low levels of service during both peak periods are primarily due to the high conflicting traffic volumes at the intersection resulting in delays associated with the traffic signal phasing necessary to accommodate the high traffic volumes of the conflicting traffic movements.

The northbound approach of Kamehameha Highway at the Waipio Uka Street intersection carries a total 1,162 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection carries a relatively high traffic volume of 1,900 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C".

The southbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection carries 960 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and the through and right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipio Uka Street intersection carries 825 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

k. Kamehameha Highway at Lumiaina Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiaina Street carries 174 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operate at LOS "B". During the PM peak hour of traffic, the westbound Lumiaina Street approach carries a total of 102 vehicles with the left-turn, through, and right-turn movements also operating at LOS "B" conditions.

The eastbound approach of Lumiaina Street at the intersection with Kamehameha Highway carries 576 vehicles during the AM peak hour of traffic resulting in LOS "E" conditions for the left-turn movements, and LOS "A" conditions for the shared through/right-turn movements. During the PM peak hour of traffic, the eastbound approach carries 653 vehicles with the left-turn movement continuing to operate at LOS "E" while the through movement operates at LOS "A". Vehicles queue lengths associated with the eastbound left-turn movement would oftentimes extend westward beyond the capacity of the left-turn lane and affect intersection movements at the adjacent intersection located immediately west.

The northbound approach of Kamehameha Highway at the Lumiaina Street intersection carries a total 744 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "E", and both the through and right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaina Street intersection carries a relatively high traffic volume of 1,646 vehicles with the left-turn movement operating at LOS "E", the through movement operating at LOS "D", and the right-turn movement operating at LOS "C".

The southbound approach of Kamehameha Highway at the Lumiaina Street intersection carries 1,516 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "E", the through movement operating at LOS "D", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaina Street intersection carries 1,429 vehicles with the left-turn movement operating at LOS "E", the through movement operating at LOS "D", and the right-turn movement operating at LOS "A" conditions.

l. Kamehameha Highway at Lumiauau Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiauau Street carries 198 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operate at LOS "C" and LOS "B", respectively. During

the PM peak hour of traffic, the westbound Lumiaina Street approach carries a total of 80 vehicles with the left-turn, through, and right-turn movements also operating at LOS "C" conditions.

The eastbound approach of Lumiaua Street at the intersection with Kamehameha Highway carries 444 vehicles during the AM peak hour of traffic resulting in LOS "C" conditions for the shared left-turn/through movements, and LOS "A" conditions for the right-turn movement. During the PM peak hour of traffic, the eastbound approach carries 96 vehicles with the shared left-turn/through movements operating at LOS "C" while the right-turn movement operates at LOS "A". The northbound approach of Kamehameha Highway at the Lumiaua Street intersection carries a total 705 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "B", and both the through and right-turn movements operating at LOS "B" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaua Street intersection carries 1,945 vehicles with the left-turn movement operating at LOS "C", and the through and right-turn movements operating at LOS "A".

The southbound approach of Kamehameha Highway at the Lumiaua Street intersection carries 1,105 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "E", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaua Street intersection carries 917 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions.

m. Kamehameha Highway at Waipahu Street

At the intersection with Kamehameha Highway, the eastbound approach of Waipahu Street carries 732 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements operating at LOS "F" conditions. During the PM peak hour of traffic, the eastbound Waipahu Street approach carries a total of 697 vehicles with the left-turn and right-turn movements also operating at LOS "F" conditions.

The northbound approach of Kamehameha Highway at the Waipahu Street intersection carries a total 730 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "F", and both the through movement operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipahu Street intersection carries

1,996 vehicles with the left-turn movement also operating at LOS "F" and the through movement operating at LOS "D".

The southbound approach of Kamehameha Highway at the Waipahu Street intersection carries 1,586 vehicles during the AM peak hour of traffic with the through movement operating at LOS "F" and the right-turn movement operating at LOS "C" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipahu Street intersection carries 1,013 vehicles with the through movement operating at LOS "D" and the right-turn movement operating at LOS "C" conditions.

n. Interstate H-2 Freeway Segments

During the AM peak hour of traffic, the Interstate H-2 Freeway just south of the Waipio Interchange carries 2,768 vehicles northbound and 4,373 vehicles southbound. The northbound and southbound freeway segments along H-2 just south of the Waipio Interchange operate at LOS "B" and LOS "C" during the existing AM peak hour of traffic. Vehicle queues as a result of spillback conditions from the Waiawa Interchange located further south extend to about one-third the distance to the Waipio Interchange, or approximately 4,300 feet. No vehicular queues would occur in the northbound direction during the AM peak hours of traffic.

North of the Waipio Interchange, the Interstate H-2 Freeway carries approximately 2,474 vehicles northbound and 3,760 vehicles southbound during the morning peak hours of traffic and operates at LOS "A" and LOS "B", respectively. No visible queuing was observed along the freeway segment during the morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway just south of the Waipio Interchange carries 4,412 vehicles northbound and 3,099 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments just south of the Waipio Interchange both operate at LOS "B" conditions during the PM peak hours of traffic. No visible queuing was observed along this freeway segment during the PM peak hours of traffic.

North of the Waipio Interchange, the Interstate H-2 Freeway carries approximately 3,765 vehicles northbound and 2,695 vehicles during the PM peak hours of traffic. This freeway segment operates at LOS "B" for both the northbound and southbound directions during the PM peak hours of traffic. No visible vehicular queuing was observed along this freeway segment during the PM peak hours of traffic.

Further discussions on freeway segment operations and travel times during the morning and afternoon commute periods are presented in Section V of this report.

o. Waipio Interchange Ramp Merge/Diverge Operations

During existing AM peak hour traffic operations, the Interstate H-2 Freeway northbound off-ramp on northbound on-ramp at the Waipio Interchange operate at LOS "B". The southbound on- and off-ramps both operate at LOS "C" conditions during the AM peak hours of traffic. Merge and diverge conditions at all of the ramps operate well with no visible queuing at the ramp and freeway interfaces.

During the existing PM peak hour of traffic, the northbound off-ramp at the Waipio Interchange operates at LOS "C" with occasional queuing at the ramp junction. However, diverge conditions operate well with no queuing as a result of diverge maneuvers. The northbound on-ramp also operates well at LOS "B" during the PM peak hour of traffic. The traffic demand on the northbound on-ramp is controlled primarily by the upstream traffic signal system at the ramp junction. As a result, with traffic signal operations to accommodate the heavier left-turn movements from the northbound off-ramp, vehicle queues associated with the eastbound left-turn movement entering the northbound on-ramp generally extend beyond the existing left-turn lane capacity resulting in spillback conditions on the bridge overpass of the interchange.

The southbound on- and off-ramps both operate at LOS "B" during the PM peak hours of traffic with visible queuing as a result of diverge and merge operations at the ramp and freeway interfaces.

Table 2 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway and at the Waipio Interchange.

Table 2: Summary of Existing Interstate H-2 Freeway Segment and Ramp LOS Operations

Freeway Segment/ Interchange Ramp	AM Peak	PM Peak
NB segment south of Waipio Interchange	B	C
NB segment north of Waipio Interchange	A	B
SB segment south of Waipio Interchange	C	B
SB segment north of Waipio Interchange	B	B
NB Off-ramp	B	C
NB On-ramp	B	B
SB On-ramp	C	B
SB Off-ramp	C	B

IV. PROJECTED TRAFFIC CONDITIONS

A. Through Traffic Forecasting Methodology

The travel forecast is based upon the average annual traffic growth rate as described in the Oahu Regional Transportation Plan (ORTP). The ORTP, prepared for the Oahu Metropolitan Planning Organization (OMPO), serves as a guide for the development of the major surface transportation facilities and programs to be implemented on Oahu. The ORTP identifies strategies and actions that will lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods. Use of the ORTP for traffic forecasting more accurately reflects the anticipated impacts of traffic growth in the region than the use of historical traffic count data that can sometimes result in extremely unrealistic projections for long-range forecasts. Based upon statewide population, employment, and visitor forecasts to the Year 2020, interpolation and interpretation of the ORTP yields average annual growth rate factors of 1.04 and 1.085 for projected Year 2016, 2020, and 2025 analysis scenarios, using Year 2008 as the base year. The rates are supported by the anticipated minimal future growth in areas further north of the project site. These rates were subsequently applied to the existing baseline through traffic demands along the Interstate H-2 Freeway, Ka Uka Boulevard, and Kamehameha Highway to achieve the projected Year 2016, 2020, and 2025 traffic demands. The trips as a result of the Koa Ridge Makai and Waiawa developments were incorporated in analyses of project-related impacts as appropriate and covered in later sections of this report.

B. Adjacent Waiawa Ridge Development

The proposed Waiawa Ridge development is planned for Central Oahu, east of the Interstate H-2 Freeway and immediately south of the proposed Castle & Cooke Waiawa development in Waipio. Access to the Waiawa Ridge development will be provided via an extension of Ka Uka Boulevard, east of the Interstate H-2 northbound on- and off-ramp junction. Based on discussion with Waiawa Ridge Development representatives, the proposed project may be completed and occupied by the Year 2020 and is assumed to include a mix of single-family and multi-family residential units (total of approximately 5,000 units), as well as, ~770,000 square feet of commercial uses representing the primary trip generating components of the project. In conjunction with this development, the roadway and intersection improvements in the project vicinity that are identified in the "Waiawa Gentry Phase 2 Traffic Study" dated December 2001, and its supplemental report dated February 2002 are assumed to be implemented as traffic mitigating measures for the region. Discussions between Castle & Cooke Homes Hawaii and Waiawa Ridge Development to formulate an Agreement to fund and implement improvements are anticipated to continue in the future. These improvements are therefore considered to be implemented by Castle & Cooke Homes Hawaii and/or Waiawa Ridge Development.

Based on the trip generation rates and procedures identified in the Institute of Transportation Engineers publication on trip generation for specific land use types, and based on the assumed development components identified above, the Waiawa Ridge development is anticipated to generate an external total of approximately 3,489 trips and 5,661 trips during the AM and PM peak hours of traffic, respectively. Accommodations were made for internal capture of site-generated trips during the PM peak period in accordance with guidelines identified in the Institute of Transportation Engineers publication on trip generation. These resulting external trips were assigned to the street network in the project vicinity to account for trips generated by the proposed Waiawa Ridge development.

C. Projected Year 2016 Traffic Conditions

1. Roadway Improvements Without Project

The *Without Project* scenario analysis incorporates projected Year 2016 traffic demands over existing roadway facilities. The necessary roadway and intersection improvements to mitigate traffic operational deficiencies under the *Without Project* scenario include the following:

Ka Uka Boulevard/Interstate H-2 Northbound On-Ramp

- Modify eastbound approach of Ka Uka Boulevard at the northbound on-ramp to provide an exclusive left-turn lane and a share left-turn/through lane. Widen the northbound on-ramp to accept two left-turn lanes.
- Modify traffic signal system to accommodate lane changes.

Ka Uka Boulevard/Interstate H-2 Southbound Off-Ramp/Moaniani Street

- Two exclusive left-turn lanes and two through lanes on the westbound approach of Ka Uka Boulevard.
- Two southbound departure lanes along Moaniani Street to accept the double left-turn lanes from westbound Ka Uka Boulevard.

Kamehameha Highway/Lumiaina Street

- Provide an additional eastbound left-turn lane that results in an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane on Lumiaina Street.
- Modify traffic signal system to permit split phases for the eastbound and westbound approaches of Lumiaina Street.

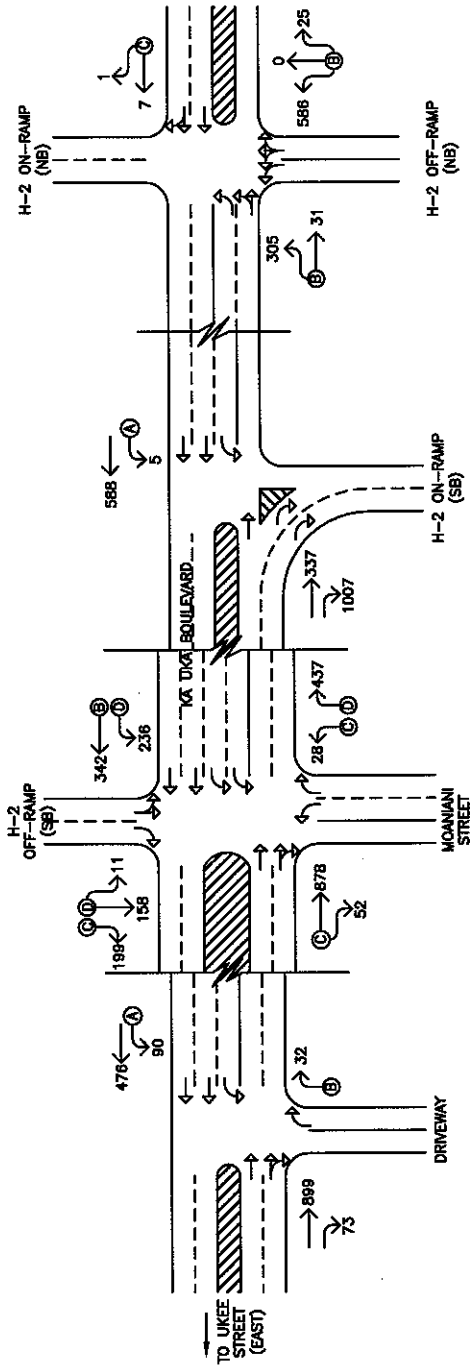
Kamehameha Highway/Waipahu Street

- Provide an additional lane on the eastbound approach of Waipahu Street that results in separate left-turn and right-turn lanes with a southbound intersection departure lane on Kamehameha Highway to accommodate the new eastbound right-turn lane.
- Modify traffic signal timing to permit overlap phasing for eastbound right-turn movements.

2. Projected Year 2016 Traffic Volumes Without Koa Ridge Makai and Waiawa Developments

a. General

The Year 2016 AM and PM peak hour traffic volumes and operating conditions at the study intersections without the proposed Koa Ridge Makai development are shown in Figures 10 to 13, and summarized in Table 3. The necessary improvements identified above to mitigate existing deficiencies are assumed to be implemented in the analysis. As previously discussed, since the commencement of the traffic data collection program for this project, a traffic signal system has been installed at the intersection of Ka Uka Boulevard and Ukee Street (east). As such, this intersection is analyzed under signalized conditions for Year 2016.

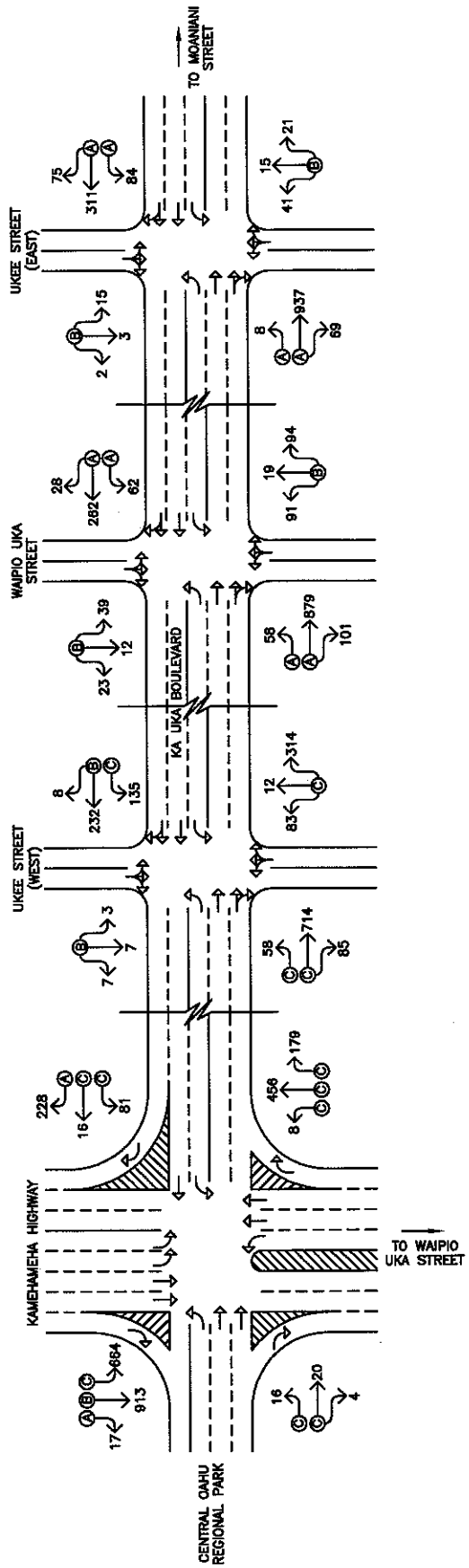


LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

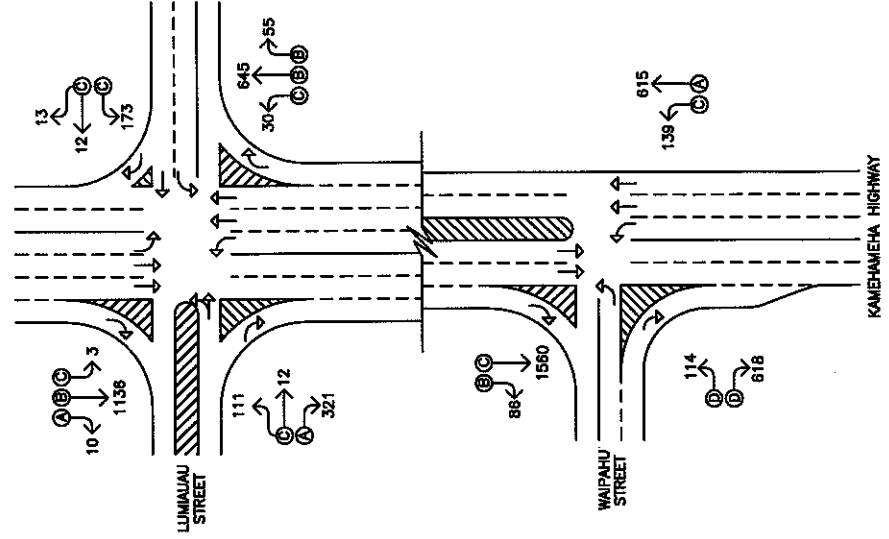
LANE GROUP LEVEL OF SERVICE

LANE USAGE





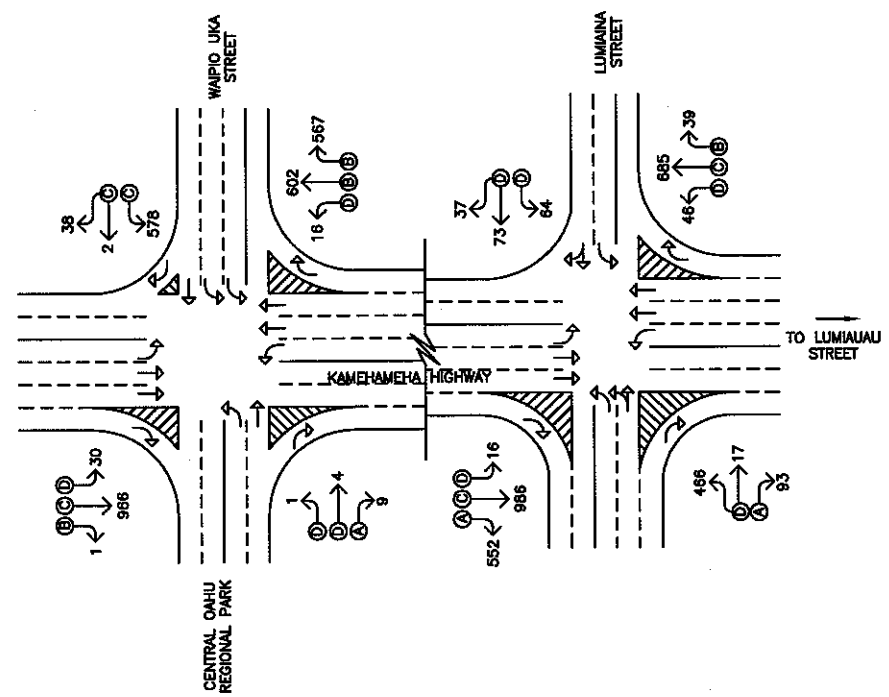
TO LUMIAINA STREET



- LEGEND**
- 90 TRAFFIC MOVEMENT VOLUME (VPH)
 - LANE GROUP LEVEL OF SERVICE
 - LANE USAGE

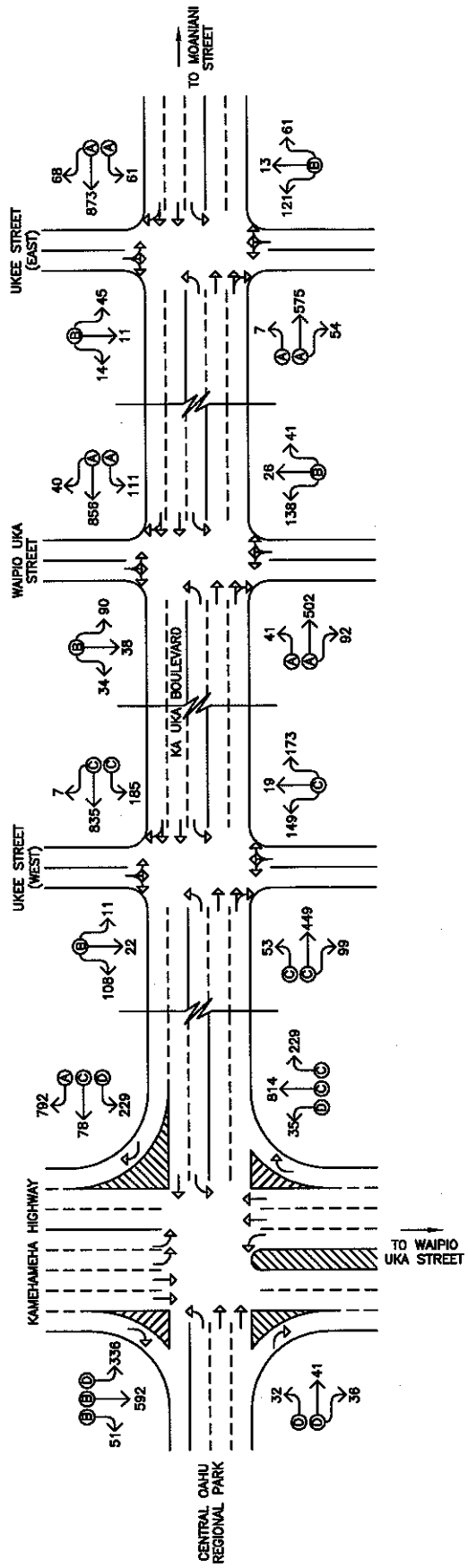
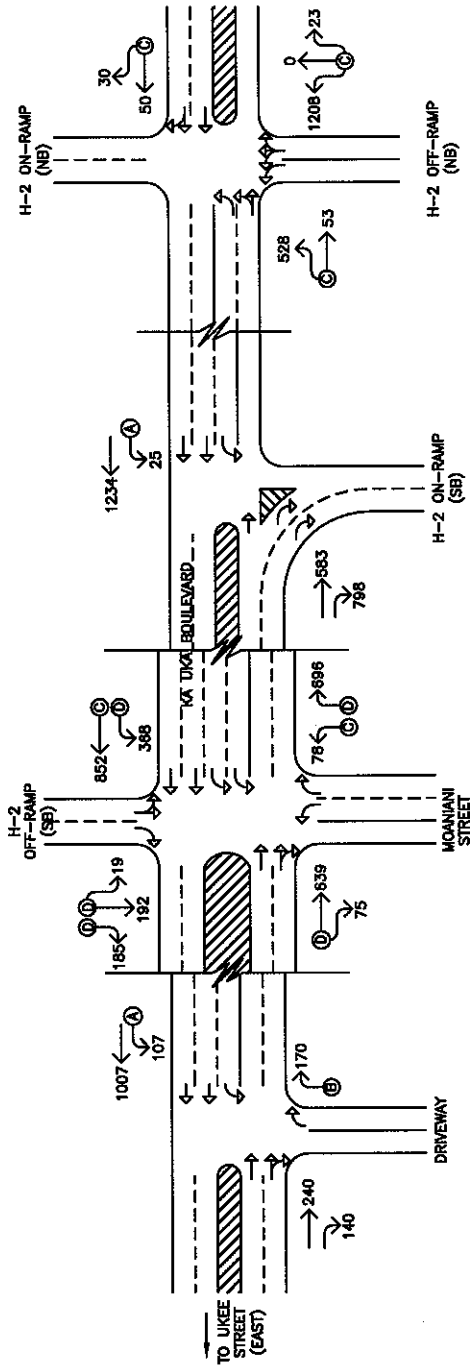


TO KA UKA BOULEVARD

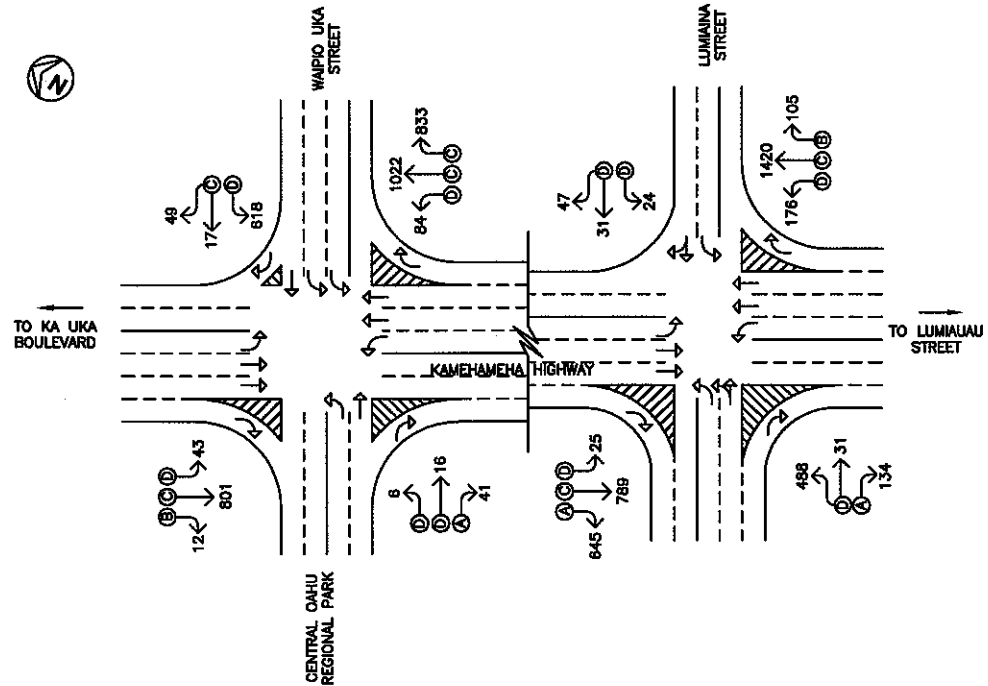
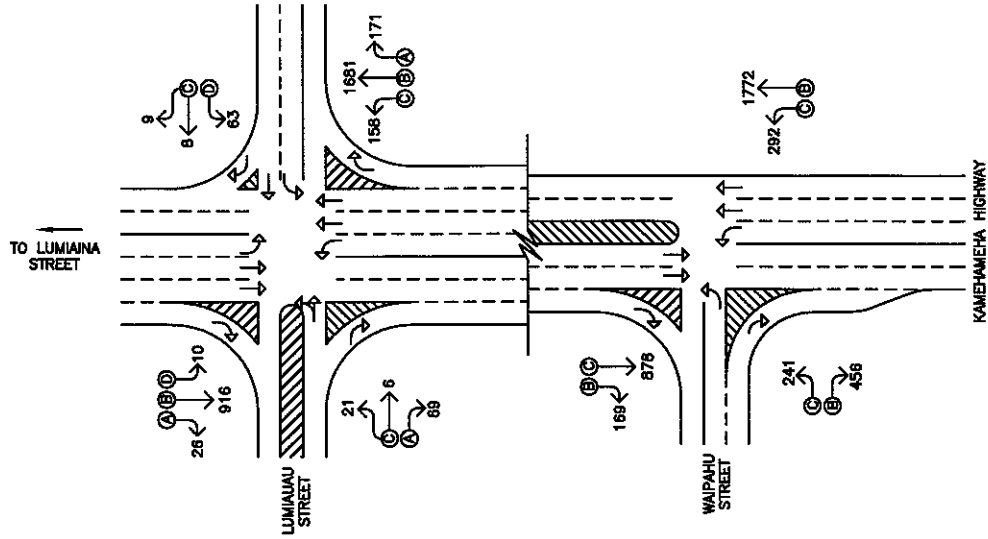


KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2016 AM PEAK HOUR OF TRAFFIC WITHOUT PROJECT
KAMEHAMEHA HIGHWAY



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT
 YEAR 2016 PM PEAK HOUR OF TRAFFIC WITHOUT PROJECT
 KA UKA BOULEVARD



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2016 PM PEAK HOUR OF TRAFFIC WITHOUT PROJECT
KAMEHAMEHA HIGHWAY

Table 3: Existing and Projected (Year 2016 Without Project) Levels of Service

Intersection	Traffic Movement		AM		PM	
			Exist	Year 2016 w/out Proj	Exist	Year 2016 w/out Proj
Ka Uka Blvd/ Waipio IC NB Ramps*	EB	LT	B	B	D	C
		TH	A		B	
	WB	TH-RT	A	C	B	C
		LT-TH	B	B	D	C
	SB	RT	-	-	-	-
Ka Uka Blvd/ Waipio IC SB On-Ramp	WB	LT	A	A	A	A
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp*	EB	TH-RT	D	C	E	D
		LT	E	D	E	D
	NB	TH	B	B	C	C
		LT	D	C	D	C
	SB	RT	D	D	E	D
		LT-TH	D	D	E	D
Ka Uka Blvd/ Driveway	WB	LT	A	A	A	A
	NB	RT	B	B	B	B
Ka Uka Blvd/ Ukee St (East)*	EB	LT	A	A	B	A
		TH-RT	-	A	-	A
	WB	LT	B	A	A	A
		TH-RT	-	A	-	A
	NB	LT-TH-RT	C	B	D	B
	SB	LT-TH-RT	C	B	D	B

*Intersection modifications implemented.

Table 3: Existing and Projected (Year 2016 Without Project) Levels of Service (Cont'd)

Intersection	Traffic Movement		AM		PM	
			Exist	Year 2016 w/out Proj	Exist	Year 2016 w/out Proj
Ka Uka Blvd/ Waipio Uka St	EB	LT	A	A	A	A
		TH-RT	A	A	A	A
	WB	LT	A	A	A	A
		TH-RT	A	A	A	A
	NB	LT-TH-RT	B	B	B	B
SB	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Ukee St (West)	EB	LT	D	C	D	C
		TH-RT	C	C	C	C
	WB	LT	C	C	C	C
		TH-RT	B	B	B	C
	NB	LT-TH-RT	C	C	C	C
SB	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Kamehameha Hwy	EB	LT	D	C	D	D
		TH	C	C	D	D
		RT				
	WB	LT	D	C	D	D
		TH	C	C	C	C
		RT	A	A	A	A
	NB	LT	D	C	D	D
		TH	C	C	C	C
		RT	B	C	C	C
	SB	LT	C	C	D	D
		TH	A	B	B	B
RT		A	A	B	B	

*Intersection modifications implemented.

Table 3: Existing and Projected (Year 2016 Without Project) Levels of Service (Cont'd)

Intersection	Traffic Movement		AM		PM		
			Exist	Year 2016 w/out Proj	Exist	Year 2016 w/out Proj	
Kamehameha Hwy/ Waipio Uka St	EB	LT	D	D	D	D	
		TH	D	D	D	D	
		RT	A	A	A	A	
	WB	LT	C	C	C	D	
		TH-RT	B	C	C	C	
	NB	LT	D	D	D	D	
		TH	B	B	C	C	
		RT	B	B	C	C	
	SB	LT	D	D	D	D	
		TH	B	C	C	C	
		RT	B	B	B	B	
	Kamehameha Hwy/ Lumiaina St*	EB	LT-TH	E	D	E	D
RT			A	A	A	A	
WB		LT	B	D	B	D	
		TH-RT	B	D	B	D	
NB		LT	E	D	E	D	
		TH	C	C	D	C	
		RT	C	B	C	B	
SB		LT	E	D	E	D	
		TH	D	C	D	C	
		RT	A	A	A	A	
Kamehameha Hwy/ Lumiauau St		EB	LT-TH	C	C	C	C
			RT	A	A	A	A
	WB	LT	C	C	C	D	
		TH-RT	B	C	C	C	
	NB	LT	D	C	C	C	
		TH	B	B	A	B	
		RT	A	B	A	A	
	SB	LT	D	C	D	D	
		TH	B	B	B	B	
		RT	A	A	A	A	

*Intersection modifications implemented.

Table 3: Existing and Projected (Year 2016 Without Project) Levels of Service (Cont'd)

Intersection	Traffic Movement		AM		PM	
			Exist	Year 2016 w/out Proj	Exist	Year 2016 w/out Proj
Kamehameha Hwy/ Waipahu St*	EB	LT	F	D	F	C
		RT		D		B
	NB	LT	F	C	F	C
		TH	B	A	D	B
	SB	TH	F	C	D	C
		RT	C	B	C	B

*Intersection modifications implemented.

The existing levels of service are included in the table for comparison purposes. LOS calculations are included in Appendix E under separate cover.

b. Ka Uka Boulevard at Waipio Interchange Northbound Off-Ramp Intersection

At the intersection with the Waipio Interchange northbound on- and off-ramps, the eastbound approach of Ka Uka Boulevard is expected to service 336 vehicles with the eastbound approach operating at LOS “B” during the projected Year 2016 AM peak period without the project, and incorporating intersection improvements. During the PM peak period, the traffic volume would be greater with 581 vehicles traveling eastbound with the left-turn and through movements operating at LOS “C”.

The westbound approach of the intersection is expected to service 8 vehicles and 80 vehicles during the AM and PM peak periods, respectively. The westbound approach would operate at LOS “C” during the both the projected Year 2016 AM peak hours of traffic without the proposed project.

The northbound off-ramp intersection approach is expected to service 611 vehicles during the AM peak hour of traffic and would operate at LOS “B”. During the PM peak hour, the northbound intersection approach is expected to service 1,231 vehicles, and is expected to operate at LOS “C”.

c. Ka Uka Boulevard at Waipio Interchange Southbound On-Ramp Intersection (From East)

At the intersection with the Waipio Interchange southbound on-ramp and Ka Uka Boulevard, the westbound approach of Ka Uka Boulevard is expected to service a total of 593 vehicles while the westbound left-turn movement operate at LOS "A" during the projected AM peak hour of traffic. The eastbound traffic flow on Ka Uka Boulevard is expected to service 1,344 vehicles during the AM peak hour. During the PM peak hour of traffic, the westbound approach of Ka Uka Boulevard at the southbound on-ramp is expected to service a total of 1,259 vehicles with the westbound left-turn movement operating at LOS "A". The eastbound traffic flow on Ka Uka Boulevard is expected to service 1,381 vehicles during the projected PM peak hour of traffic.

d. Ka Uka Boulevard at Moaniani Street/Waipio Interchange Southbound Off-Ramp Intersection

At the intersection with Moaniani Street and the Waipio Interchange southbound off-ramp, the westbound approach of Ka Uka Boulevard is expected to service 578 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D" and the through movement operating at LOS "B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to carry a total of 1,220 vehicles with the left-turn movement operating at LOS "D" and the through movement operating at LOS "C" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Moaniani Street and the southbound off-ramp is expected to service a total of 930 vehicles during the AM peak hour of traffic and operate at LOS "C". During the PM peak hour of traffic, the eastbound approach is expected to service 714 vehicles and also operate at LOS "D" conditions.

The northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service a total 465 vehicles during the AM peak hour of traffic with the left-turn and right-turn movements operating at LOS "C and LOS "D", respectively. Similarly, during the PM peak hour of traffic, the northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service 774 vehicles with the left-turn and right-turn movements operating at LOS "C" and LOS "D" conditions, respectively.

The southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 368 vehicles during the AM peak hour of traffic with the approach generally operating at

LOS "D". During the PM peak hour of traffic, the southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 396 vehicles with the left-turn, through, and right-turn movements operating at LOS "D".

e. Ka Uka Boulevard at Commercial Driveway

The westbound and eastbound approaches of Ka Uka Boulevard at the intersection with the commercial driveway is expected to service a total of 566 vehicles and 972 vehicles during the AM peak hour of traffic, respectively. The westbound left-turn movement is expected to operate at LOS "A". During the PM peak hour of traffic, the westbound approach is expected to service 1,114 vehicles while the eastbound approach services 680 vehicles. The westbound left-turn movement would operate at LOS "A".

The northbound approach of the driveway at the Ka Uka Boulevard intersection is expected to service 32 vehicles and 170 vehicles during the AM and PM peak hours of traffic, respectively, and operate at LOS "B" conditions during both projected peak hour periods.

f. Ka Uka Boulevard at Ukee Street (east)

At the intersection with Ukee Street (east), the westbound approach of Ka Uka Boulevard is expected to service 470 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,002 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (east) is expected to service a total of 1,014 vehicles during the AM peak hour of traffic with all movements operating at LOS "A". During the PM peak hour of traffic, the eastbound approach would service a total of 636 vehicles with all movements also operating at LOS "A" conditions.

The northbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection is expected to service a total 77 vehicles during the AM peak hour of traffic and operate at LOS "B". During the PM peak hour of traffic, the northbound approach of Ukee Street (east) at Ka Uka Boulevard is expected to service 195 vehicles and operate at LOS "B". The southbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection would service 20 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach services 70 vehicles during the PM peak hour of traffic and also operate at LOS "B".

g. Ka Uka Boulevard at Waipio Uka Street

At the intersection with Waipio Uka Street, the westbound approach of Ka Uka Boulevard is expected to service 352 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements all operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach would service a total of 1,007 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Waipio Uka Street is expected to service a total of 1,038 vehicles and 635 vehicles during the projected AM and PM peak hour of traffic, respectively. During both peak periods, all traffic movements on the eastbound approach of Ka Uka Boulevard at the Waipio Uka Street intersection would operate at LOS "A" conditions.

The northbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service a total of 204 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour of traffic, the northbound approach of Waipio Uka Street at Ka Uka Boulevard is expected to service 205 vehicles and also would operate at LOS "B" conditions. The southbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service 74 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach is expected to service 162 vehicles during the PM peak hour of traffic and would also operate at LOS "B" conditions.

h. Ka Uka Boulevard at Ukee Street (west)

At the intersection with Ukee Street (west), the westbound approach of Ka Uka Boulevard is expected to service 375 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movements operating at LOS B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,027 vehicles with the left-turn movement and shared through/right-turn movements operating at LOS "C" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (west) is expected to service a total of 857 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the eastbound approach is expected to service a total of 601 vehicles with the left-turn movement operating at LOS "C" conditions while the shared through/right-turn movements also operating at LOS "C".

The northbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service a total 409 vehicles during the AM peak hour of traffic and would operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (west) at Ka Uka Boulevard is expected to service 341 vehicles and would operate at LOS "C". The southbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service 17 vehicles during the AM peak hour and operates at LOS "B", while the southbound approach is expected to service 141 vehicles during the PM peak hour of traffic and also would operate at LOS "B".

i. Ka Uka Boulevard at Kamehameha Highway

At the intersection with Ka Uka Boulevard and Kamehameha Highway, the westbound approach of Ka Uka Boulevard is expected to service 325 vehicles during the AM peak hour of traffic with the left-turn and through movements operating at LOS "C", and the right-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,099 vehicles with the left-turn and through movements operating at LOS "D" and LOS "C", respectively, and the right-turn movement operating at LOS "A" conditions. The eastbound approach of Ka Uka Boulevard at the intersection with Kamehameha Highway is expected to service a total of 40 vehicles during the AM peak hour of traffic resulting in LOS "C" conditions for both the individual eastbound left-turn and shared through/right-turn traffic movements. During the PM peak hour of traffic, the eastbound approach is expected to service 109 vehicles with all of the individual movements generally operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total 643 vehicles during the AM peak hour of traffic with the left-turn movement, the through and right-turn movements, all operating at LOS "C" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total of 1,078 vehicles with the left-turn movement operating at LOS "D", and the through movement and right-turn movements operating at LOS "C" conditions.

The southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,594 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" conditions while the through and right-turn movements both would operate at LOS "B" or better. During the PM peak hour of traffic, the southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service

979 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "B" conditions.

j. Kamehameha Highway at Waipio Uka Street

At the intersection with Kamehameha Highway, the westbound approach of Waipio Uka Street is expected to service 618 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" while the shared through/right-turn traffic movements also operate at LOS "C" conditions. During the PM peak hour of traffic, the westbound Waipio Uka Street approach is expected to service a total of 684 vehicles with the left-turn movement operating at LOS "D" and the through and right-turn movements operating at LOS "C" conditions.

The eastbound approach of Waipio Uka Street at the intersection with Kamehameha Highway is expected to service a total of 14 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements. During the PM peak hour of traffic, the eastbound approach is expected to service 63 vehicles with the left-turn and through movements also operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Waipio Uka Street intersection is expected to service a total 1,185 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 1,939 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C".

The southbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 997 vehicles during the AM peak hour of traffic with the left-turn and the through movement operating at LOS "D" and LOS "C", respectively, and right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipio Uka Street intersection is expected to service 856 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

k. Kamehameha Highway at Lumiaina Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiaina Street is expected to service 174 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-

turn movements operating at LOS "D". During the PM peak hour of traffic, the westbound Lumiaina Street approach is expected to service a total of 102 vehicles with the left-turn, through, and right-turn movements also operating at LOS "D" conditions.

The eastbound approach of Lumiaina Street at the intersection with Kamehameha Highway is expected to service 576 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn/through movements, and LOS "A" conditions for the right-turn movements. During the PM peak hour of traffic, the eastbound approach is expected to service 653 vehicles with the left-turn/through movement operating at LOS "D" while the right-turn movement operate at LOS "A".

The northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service a total 770 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "C" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,701 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,524 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,459 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions.

I. Kamehameha Highway at Lumiauau Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiauau Street is expected to service 198 vehicles during the AM peak hour of traffic with both the left-turn and shared through/right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Lumiaina Street approach is expected to service a total of 80 vehicles with the left-turn operating at LOS "D", and the shared through/right-turn movements also operating at LOS "C", conditions.

The eastbound approach of Lumiauau Street at the intersection with Kamehameha Highway is expected to service 444 vehicles during

the AM peak hour of traffic resulting in LOS "C" conditions for the shared left-turn/through movements, and LOS "A" conditions for the right-turn movement. During the PM peak hour of traffic, the eastbound approach is expected to service 96 vehicles with the shared left-turn/through movements operating at LOS "C" while the right-turn movement operating at LOS "A". The northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service a total 730 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 2,010 vehicles with the left-turn movement operating at LOS "C", and the through and right-turn movements operating at LOS "B" or better.

The southbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,149 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiauau Street intersection is expected to service 952 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions.

m. Kamehameha Highway at Waipahu Street

At the intersection with Kamehameha Highway, the eastbound approach of Waipahu Street is expected to service 732 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements operating at LOS "D". During the PM peak hour of traffic, the eastbound Waipahu Street approach is expected to service a total of 697 vehicles with the left-turn and right-turn movements operating at LOS "C" and LOS "B", respectively.

The northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service a total 754 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and the through movement operating at LOS "A" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 2,064 vehicles with the left-turn movement also operating at LOS "C" and the through movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 1,646 vehicles during the AM peak hour of traffic with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipahu Street intersection is expected to service 1,047 vehicles with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions.

n. Interstate H-2 Freeway Segments

During the projected Year 2016 AM peak hour of traffic without the proposed project, the Interstate H-2 Freeway south of the Waipio Interchange would carry 2,978 vehicles northbound and 4,548 vehicles southbound. The northbound and southbound freeway segments along H-2 south of the Waipio Interchange would operate at LOS "B" and LOS "C" during the projected Year 2016 AM peak hour of traffic without the proposed project. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing. However, queuing further south as a result of spillback conditions from the Waiawa Interchange is expected to continue. No vehicular queuing is expected in the northbound direction during the projected Year 2016 AM peak hour of traffic.

North of the Waipio Interchange, the Interstate H-2 Freeway would carry approximately 2,573 vehicles northbound and 3,904 vehicles southbound during the projected morning peak hours of traffic and would operate at LOS "A" and LOS "B", respectively. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing during the projected morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway south of the Waipio Interchange would carry 4,588 vehicles northbound and 3,222 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments south of the Waipio Interchange would operate at LOS "C" and LOS "B" during the projected Year 2016 PM peak hours of traffic without the project. No significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic without the proposed project.

North of the Waipio Interchange, the Interstate H-2 Freeway is expected to carry approximately 3,914 vehicles northbound and 2,795 vehicles during the PM peak hours of traffic. This freeway segment is expected to operate at LOS "B" for the northbound and southbound directions during the PM peak hours of traffic. No significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic.

o. Waipio Interchange Ramp Merge/Diverge Operations

During projected Year 2016 AM peak hour traffic operations, the Interstate H-2 Freeway northbound off-ramp at the Waipio Interchange would operate at LOS “B”. The northbound on-ramp would also continue to operate at LOS “B”. The southbound on-ramp would operate at LOS “C” during the projected Year 2016 AM peak hours of traffic without the project while the southbound off-ramp also continue to operating at LOS “C” conditions.

During the projected Year 2016 PM peak hour of traffic, the northbound off-ramp at the Waipio Interchange would operate at LOS “D” with occasional queuing anticipated at the ramp junction. The northbound on-ramp would continue to operate well at LOS “B” during the projected Year 2016 PM peak hour of traffic. The southbound on-ramp and off-ramps would operate at LOS “B” during the projected Year 2016 PM peak hour of traffic without the proposed project. Table 4 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway and at the Waipio Interchange for Year 2016 without project conditions.

Table 4: Summary of Year 2016 (without project) Interstate H-2 Freeway Segment and Ramp LOS Operations

Freeway Segment/ Interchange Ramp	AM Peak		PM Peak	
	Exist	2016 w/o proj	Exist	2016 w/o proj
NB segment south of Waipio Interchange	B	B	C	C
NB segment north of Waipio Interchange	A	A	B	B
SB segment south of Waipio Interchange	C	C	B	B
SB segment north of Waipio Interchange	B	B	B	B
NB Off-ramp	B	B	C	D
NB On-ramp	B	B	B	B
SB On-ramp	C	C	B	B
SB Off-ramp	C	C	B	B

D. Koa Ridge Makai and Waiawa Year 2016 Site-Generated Traffic

1. General

The trip generation section of this report is generally separated into three primary sections to identify the trip generating characteristics of Koa Ridge Makai, Castle & Cooke Waiawa, and Koa Ridge Makai with an accelerated development schedule without the Castle & Cooke Waiawa component. Each of these potential development plans is evaluated individually to account for traffic conditions should both project components proceed concurrently, or should only the proposed Koa Ridge Makai development proceed with an accelerated development schedule.

2. Trip Generation Methodology

The trip generation methodology used for this development scenario is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. The ITE trip generation rates are developed empirically by correlating the vehicle trip generation data with various land use characteristics such as the number of vehicle trips generated per dwelling unit or 1,000 square feet of development.

In consideration of the Koa Ridge Makai and Waiawa project's plans which advocate mixed use, compact development, and a pedestrian/transit emphasis, a separate assessment was undertaken to evaluate potential reductions in vehicle trip generation (*Castle & Cooke Koa Ridge Makai and Waiawa Project, Alternative Transportation Components*, prepared by Weslin Consulting Services, Inc., November 2008). The study notes that the ITE trip generation rates, based on vehicle-oriented, single land use projects, can be reduced for multi-land use projects and those projects with pedestrian-bicycle facilities and access to public transportation. Accordingly, based on the Koa Ridge Makai and Waiawa project's more progressive land use plan and characteristics, adjustments were made to the ITE rates. Internal capture refers to trips that have both their origin and destination within the project. The Weslin study notes that the Koa Ridge and Waiawa projects have a balanced mix of land uses, resulting in a calculated 24% to 28% reduction during peak periods. Pass-by trips (1% to 4% during the peak hour) are for those trips that are assumed to pass-by or be diverted into and out of a commercial use such as a restaurant or retail store. Bus transit trip reductions are estimated at 8%. Pedestrian and bicycle trips are 3%. Transportation Demand Management (TDM) techniques which may include subsidized transit passes, flexible work schedules, car sharing and carpooling programs are estimated to yield a 16% reduction in trips. The total trip reductions amount to 56% during peak periods.

Although the Weslin study provides a rationale for the reductions, some of the specific components, such as bus transit routes and TDM

strategies, have yet to be specifically determined for the project. The methodology, analysis, and supporting justification are included in the Weslin report as Appendix F and contained under separate cover. Based on the Weslin study, the previous analyses documented in prior traffic studies for this project incorporated a conservative internal trip capture for Koa Ridge Makai and Waiawa of 30%. However, as recommended by the State Department of Transportation, an assumption of 15% for internal trip capture to represent the lower limit of the range for potential internal trip capture should be evaluated. As such, the analysis contained herein assumes a conservative internal trip capture of 15% for the Koa Ridge Makai and Waiawa developments. Table 5 and 5.1 summarizes the net project site trip generation characteristics applied to the Year 2016 AM and PM peak hours of traffic.

**Table 5: Koa Ridge Makai Peak Hour Trip Generation
(External Trips Only)**

YEAR 2016		
SINGLE-FAMILY DETACHED HOUSING		
INDEPENDENT VARIABLE:		# of Dwelling Units = 598
		PROJECTED TRIP ENDS
AM PEAK	ENTER	95
	EXIT	286
	TOTAL	381
PM PEAK	ENTER	324
	EXIT	190
	TOTAL	514
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 612
		PROJECTED TRIP ENDS
AM PEAK	ENTER	39
	EXIT	190
	TOTAL	229
PM PEAK	ENTER	181
	EXIT	89
	TOTAL	270
MULTI-FAMILY HOUSING (APARTMENT)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 590
		PROJECTED TRIP ENDS
AM PEAK	ENTER	51
	EXIT	205
	TOTAL	256
PM PEAK	ENTER	202
	EXIT	109
	TOTAL	311
FREE STANDING DISCOUNT STORE		
INDEPENDENT VARIABLE:		1,000 sf of development = 150
		PROJECTED TRIP ENDS
AM PEAK	ENTER	73
	EXIT	34
	TOTAL	107
PM PEAK	ENTER	242
	EXIT	252
	TOTAL	494

**Table 5: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2016 (Cont'd)		
RETAIL (SHOPPING CENTER)		
INDEPENDENT VARIABLE:		1,000 sf of development = 125
		PROJECTED TRIP ENDS
AM PEAK	ENTER	67
	EXIT	43
	TOTAL	110
PM PEAK	ENTER	191
	EXIT	207
	TOTAL	398
HOSPITAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 109
		PROJECTED TRIP ENDS
AM PEAK	ENTER	74
	EXIT	37
	TOTAL	111
PM PEAK	ENTER	36
	EXIT	73
	TOTAL	109
GENERAL OFFICE BUILDING		
INDEPENDENT VARIABLE:		1,000 sf of development = 10
		PROJECTED TRIP ENDS
AM PEAK	ENTER	12
	EXIT	1
	TOTAL	13
PM PEAK	ENTER	2
	EXIT	11
	TOTAL	13

**Table 5: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2016 (Cont'd)		
GENERAL LIGHT INDUSTRIAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 43
		PROJECTED TRIP ENDS
AM PEAK	ENTER	30
	EXIT	4
	TOTAL	34
PM PEAK	ENTER	4
	EXIT	31
	TOTAL	35
YEAR 2016 TOTALS		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	441
	EXIT	800
	TOTAL	1241
PM PEAK	ENTER	1182
	EXIT	962
	TOTAL	2144

**Table 5.1: Waiawa Peak Hour Trip Generation
(External Trips Only)**

YEAR 2016		
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 200
		PROJECTED TRIP ENDS
AM PEAK	ENTER	10
	EXIT	51
	TOTAL	61
PM PEAK	ENTER	49
	EXIT	24
	TOTAL	73

2. Trip Distribution

a. General

The distribution of population and activity centers based on state census information is used for project trip distribution in this report. For trips generated by the proposed Koa Ridge Makai and Waiawa developments, the north-south distribution is based on the relative distribution of traffic demands between the two major arterials of Kamehameha Highway and the Interstate H-2 Freeway located within the north-south corridor of the region, and the localized distribution is based on traffic distribution along the collector road of Ka Uka Boulevard linking the two primary roadway facilities.

b. Koa Ridge Makai and Waiawa Development

During the first phase of development, vehicular access to the proposed Koa Ridge Makai development will be provided via an existing access road (referred to as Spine Road) off Ka Uka Boulevard. The Waiawa development access will be provided via an eastward extension of Ka Uka Boulevard, east of the Waipio Interchange. As indicated, the directional distribution of all site-generated vehicles for both projects is based upon the distribution of population and activity centers on the island of Oahu. As such, approximately 13% of the vehicles are assumed to be traveling to/from areas to the north, approximately 85% are assumed to be traveling to/from areas to the south, and approximately 2% are assumed to be internal trips traveling to/from areas within Waipio. For those vehicles traveling to/from areas outside of Waipio, the distribution of these vehicles is based on the relative distribution between the two north-south roadways in the vicinity, the Interstate H-2 Freeway and Kamehameha Highway. For internal trips within Waipio, all vehicle trips were assumed to utilize the Spine Road and Ka Uka Boulevard intersection to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West). Likewise, trips to and from the proposed Waiawa development are expected to utilize the Ka Uka Boulevard extension. The distribution of traffic between these local roadways was based upon the relative distribution of prevailing turning movement traffic at each of these roadways.

E. Year 2016 Traffic Projections With Koa Ridge Makai Development Only

1. General

As discussed in the Introduction, this TIAR includes a Koa Ridge Makai Development Only scenario given uncertainty in Waiawa Ridge

Development's development schedule, with the possibility that Koa Ridge Makai could proceed independently and be completed in advance of both the Castle & Cooke Waiawa development and Waiawa Ridge Development.

The cumulative Year 2016 AM and PM peak hour traffic conditions resulting from the projected external traffic, ambient growth, and the Koa Ridge Makai development only are shown in Figures 14 to 17, and summarized in Table 6. The projected Year 2016 operating conditions without the proposed development are provided for comparison purposes. The LOS calculations are included in Appendix G under separate cover.

Under the *Year 2016 With Project* scenario, Castle & Cooke Homes Hawaii has committed to fund and construct the following additional improvements to mitigate potential roadway deficiencies as a result of the project.

Koa Ridge Makai Only

Ka Uka Boulevard/Interstate H-2 Northbound Off-ramp

- Widen the northbound off-ramp to provide two diverge lanes including off-ramp auxiliary lane.

Ka Uka Boulevard/Interstate H-2 Southbound On-ramp

- Provide additional eastbound lane to result in a through lane, and two exclusive on-ramp lanes

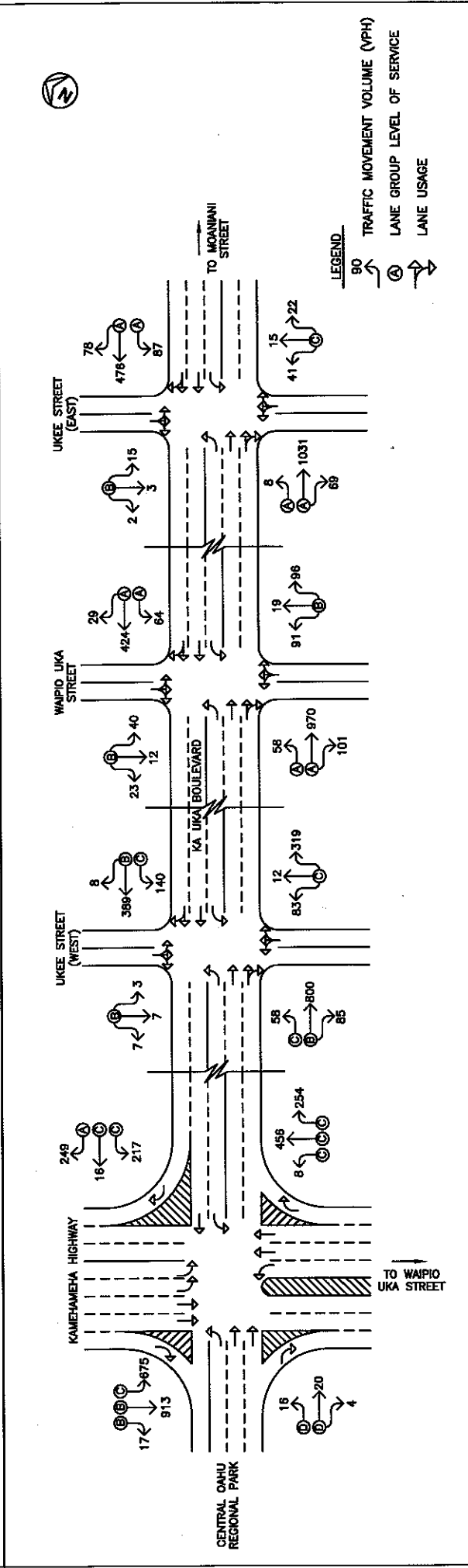
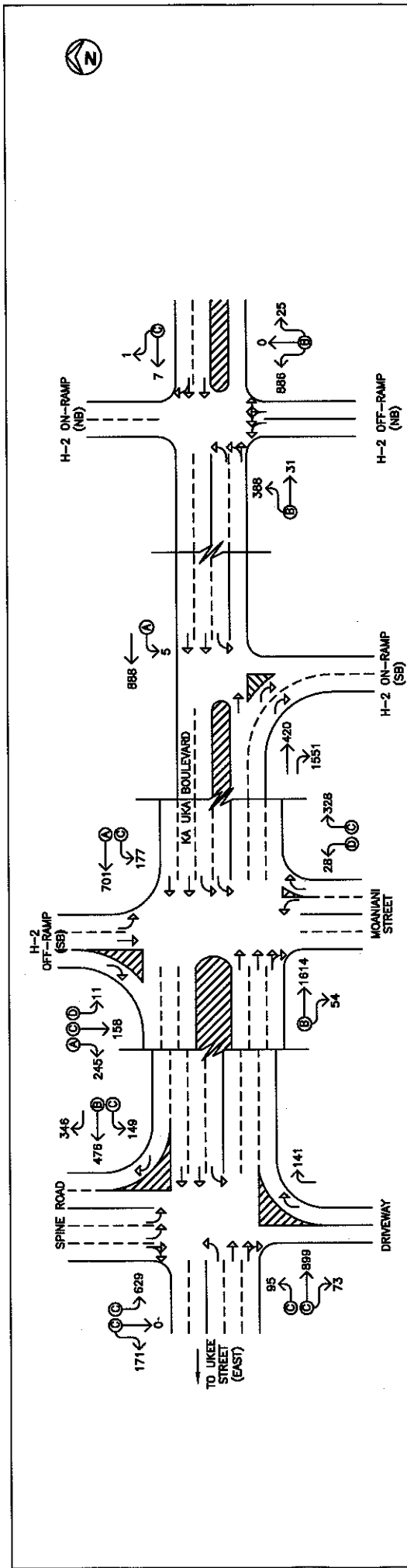
Ka Uka Boulevard/Interstate H-2 Southbound Off-Ramp/Moaniani Street

- Provide an additional lane on Ka Uka Boulevard on the eastbound approach that result in two exclusive through movement lanes and a shared through/right-turn lane.
- Provide two northbound lanes on the Moaniani Street approach that result in an exclusive left-turn lane and exclusive right-turn lane.
- Provide additional lane on the southbound approach that result in an exclusive left-turn lane, an exclusive through movement lane, and an exclusive right-turn lane.
- Modify traffic signal timing to provide simultaneous left-turn movements for the northbound and southbound approaches.

Ka Uka Boulevard/Commercial Driveway/Spine Road

- Provide additional three lanes on the southbound approach of Spine Road that result in two exclusive left-turn lanes, and a shared through/right-turn lane.
- Provide additional westbound lane between the southbound off-ramp and Spine Road
- Provide exclusive left-turn lane on Ka Uka Boulevard eastbound approach.
- Provide an additional eastbound lane on Ka Uka Boulevard between the Commercial Driveway/Spine Road and the southbound on-ramp

- Channelize northbound right-turn movements from the Commercial Dirveway to eastbound Ka Uka Boulevard.
- Signalize Intersection and provide protected left-turn movements from southbound Spine Road to eastbound Ka Uka Boulevard.



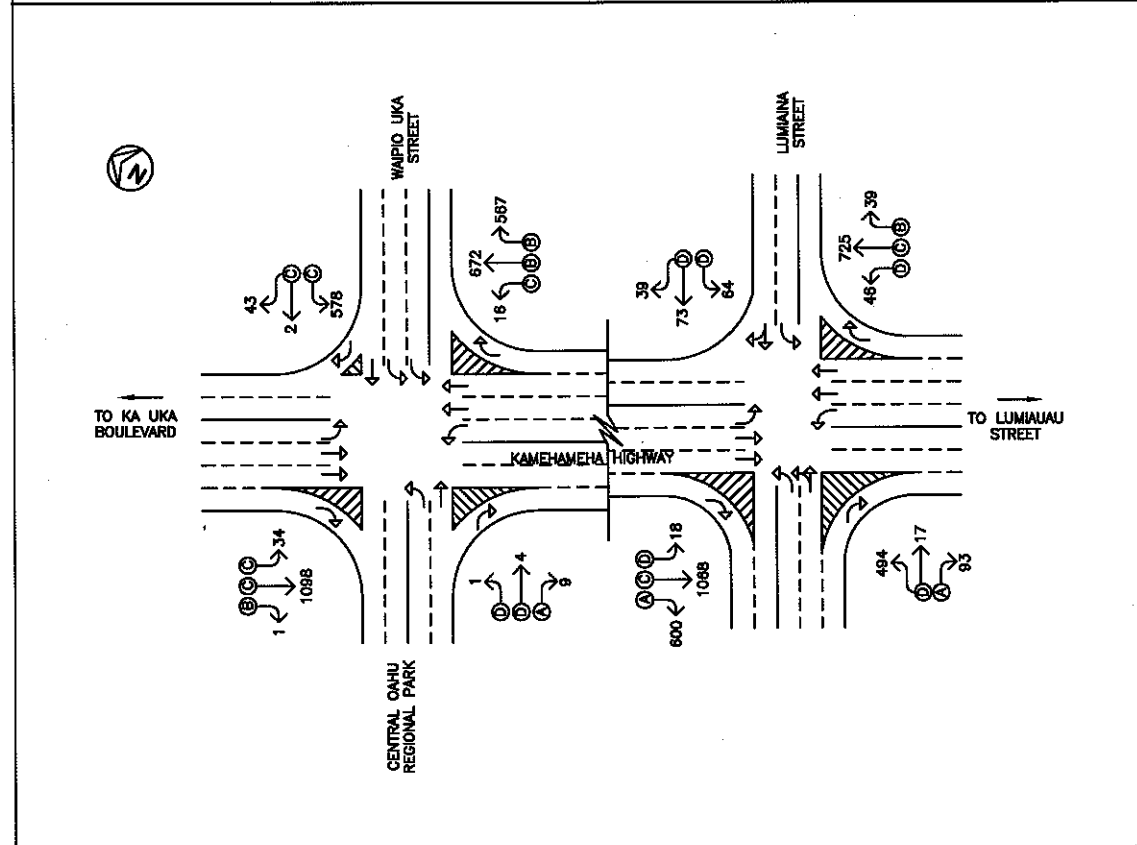
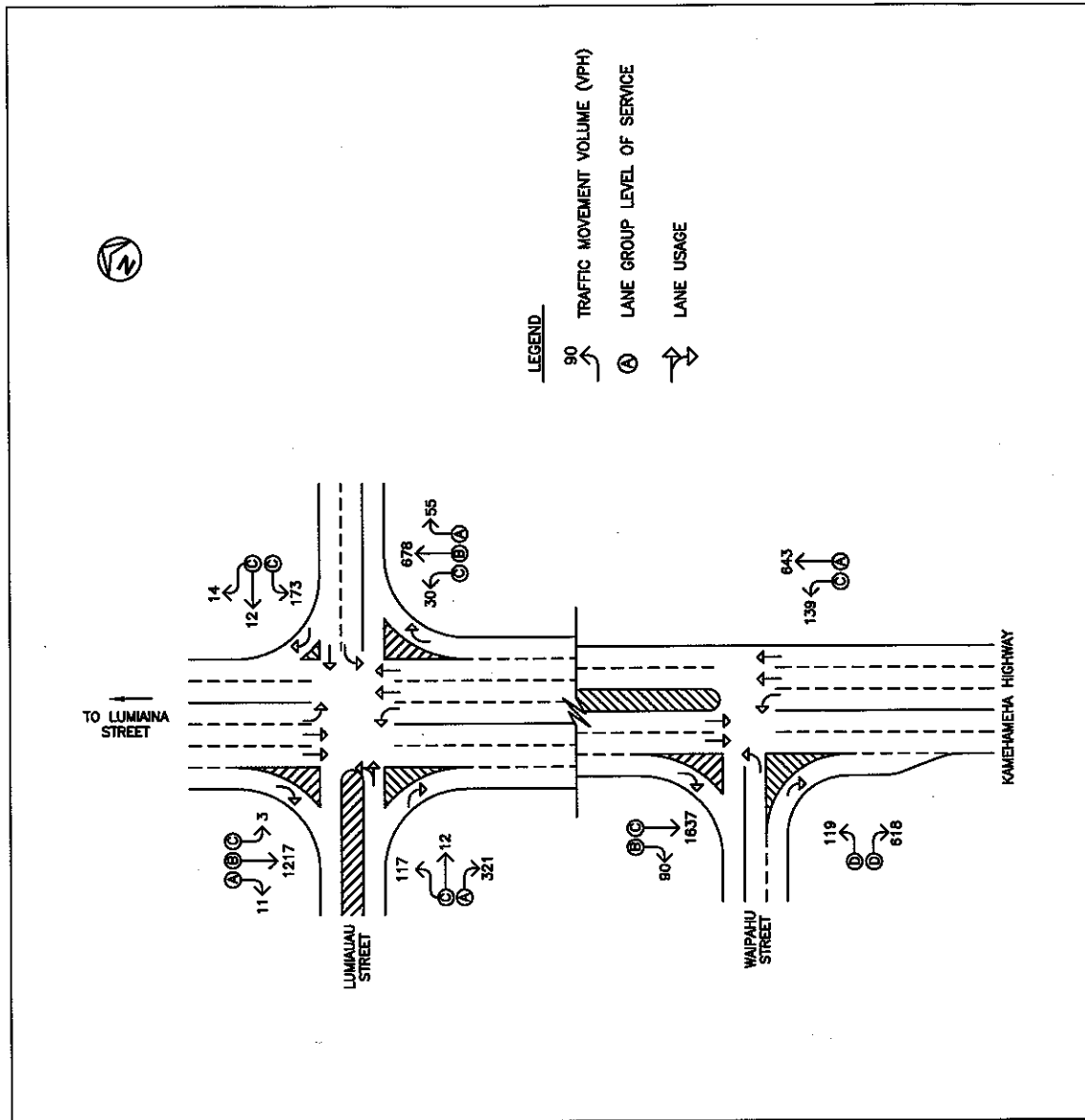
WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS

KA UKA BOULEVARD

YEAR 2016 AM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

FIGURE 14

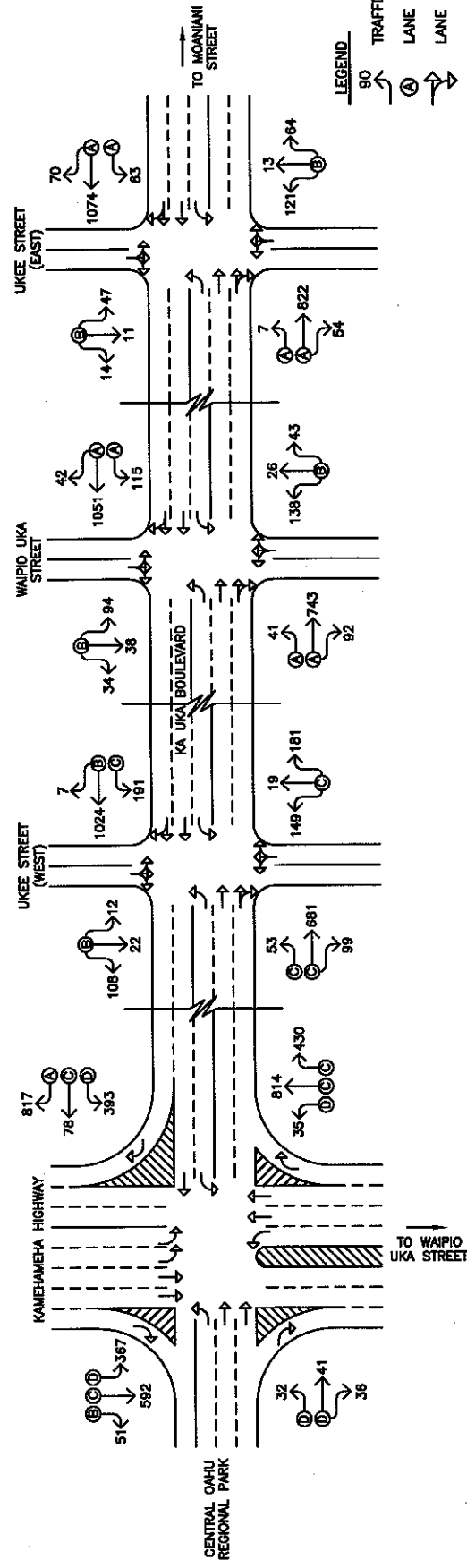
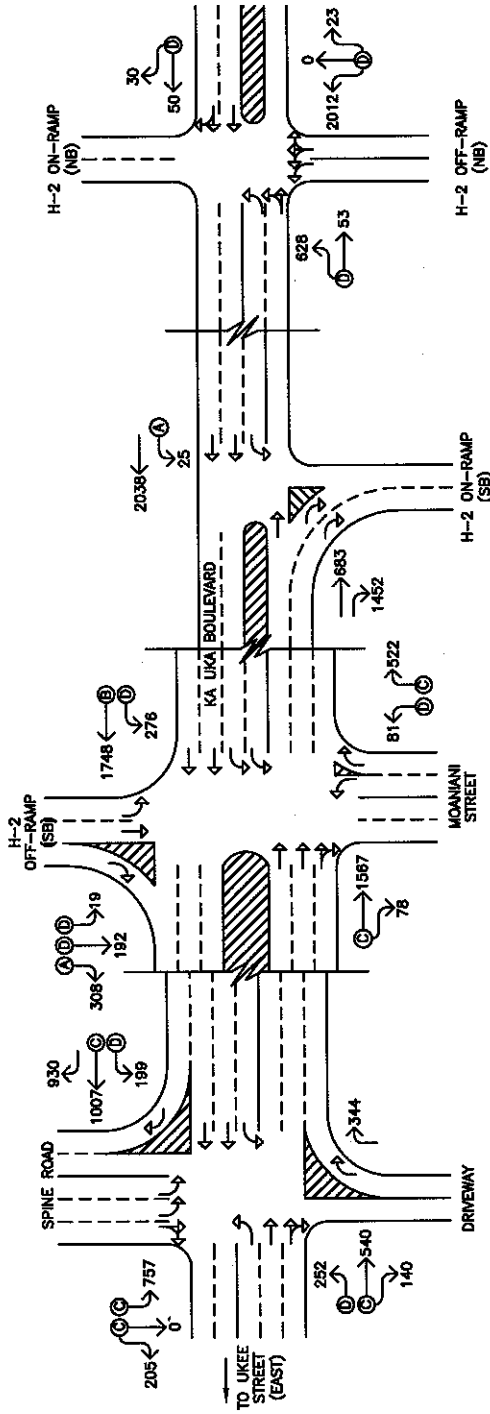


KOA RIDGE MAKAI AND WAIWAIA DEVELOPMENT

YEAR 2016 AM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)

KAMEHAMEHA HIGHWAY

FIGURE 15



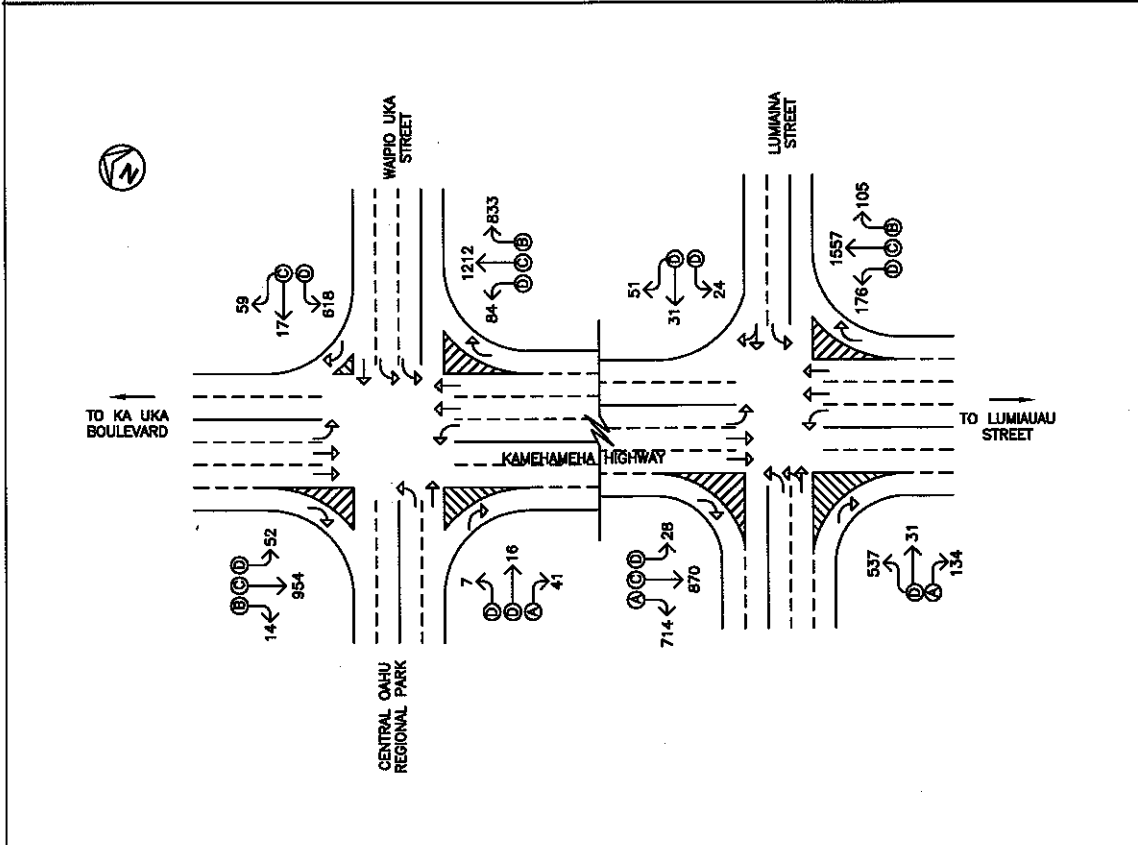
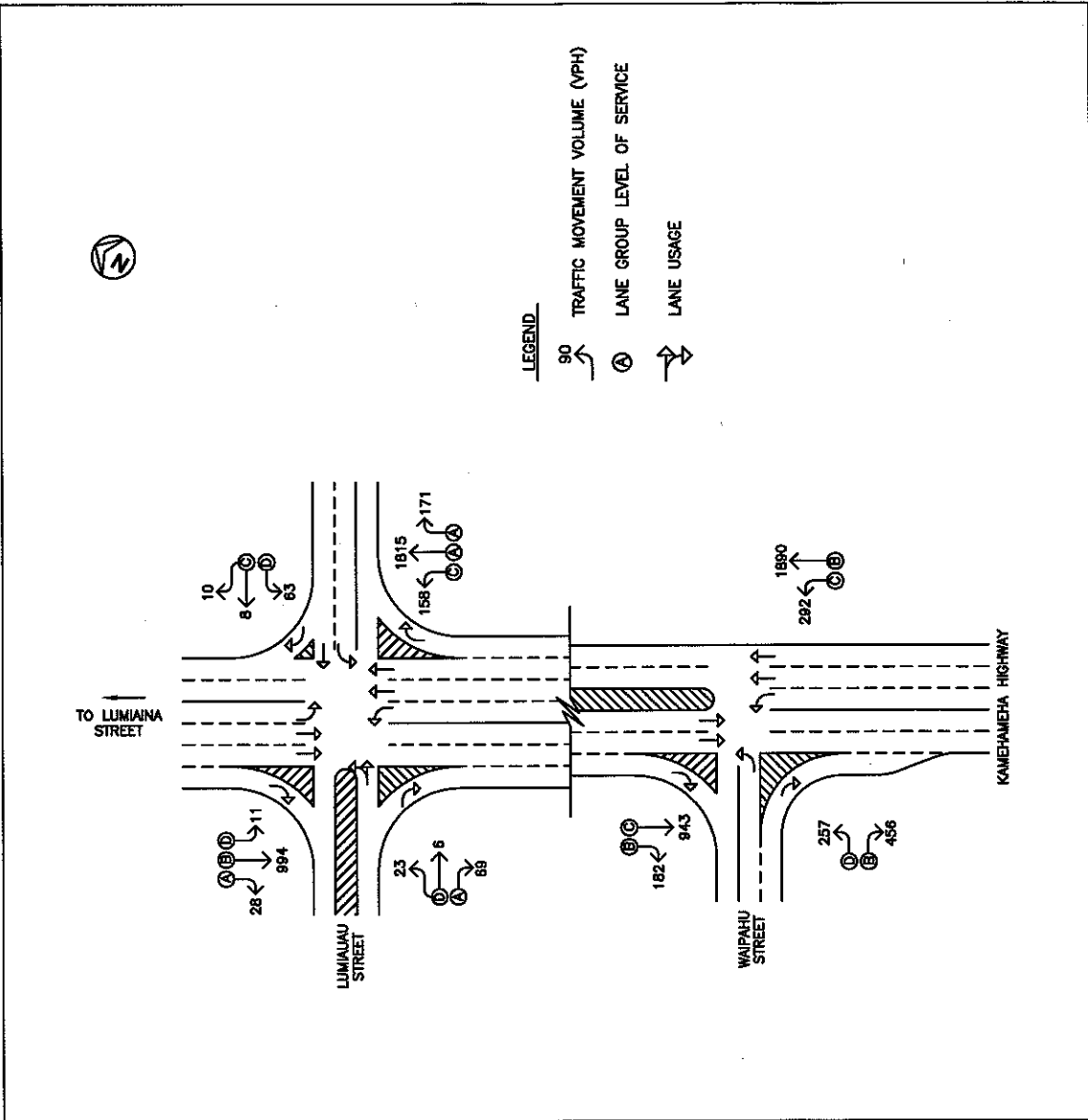
LEGEND
 90 TRAFFIC MOVEMENT VOLUME (NPH)
 LANE GROUP LEVEL OF SERVICE
 LANE USAGE



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 ENGINEERS & PLANNERS

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)
 KA UKA BOULEVARD



YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)

KAMEHAMEHA HIGHWAY

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

FIGURE 17

**Table 6: Projected Year 2016 (Without and With Koa Ridge Makai Only)
Levels of Service**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ KRM	Year 2016 w/out Proj	Year 2016 w/ KRM
Ka Uka Blvd/ Waipio IC NB Ramps	Eastbound	LT-TH	B	B	C	D
	Westbound	TH-RT	C	C	C	D
	Northbound	LT-TH-RT	B	B	C	D
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	C	B	D	C
	Westbound	LT	D	C	D	D
		TH	B	A	C	B
	Northbound	LT	C	D	C	D
		RT	D	C	D	C
	Southbound	LT	D	D	D	D
		TH		C		D
RT		C	A	D	A	
Ka Uka Blvd/ Driveway	Eastbound	LT	-	C	-	D
		TH-RT	-	C	-	C
	Westbound	LT	A	C	A	D
		TH	-	B	-	C
		RT	-	-	-	-
	Northbound	RT	B	-	B	-
	Southbound	LT	-	C	-	C
TH-RT		-	C	-	C	
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	C	B	B
	Southbound	LT-TH-RT	B	B	B	B
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	B	B
	Southbound	LT-TH-RT	B	B	B	B

1. KRM=Koa Ridge Makai

2. w/KRM analysis incorporates additional intersection improvements identified above.

**Table 6: Projected Year 2016 (Without and With Koa Ridge Makai Only)
Levels of Service**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ KRM	Year 2016 w/out Proj	Year 2016 w/ KRM
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	C	C
		TH-RT	C	B	C	C
	Westbound	LT	C	C	C	C
		TH-RT	B	B	C	B
	Northbound	LT-TH-RT	C	C	C	C
Southbound	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	C	D	D	D
		TH-RT	C	D	D	D
	Westbound	LT	C	C	D	D
		TH	C	C	C	C
		RT	A	A	A	A
	Northbound	LT	C	C	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
TH		B	B	B	C	
RT		A	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	D	C	D	D
		TH	B	B	C	C
		RT	B	B	C	B
	Southbound	LT	D	C	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

1. KRM=Koa Ridge Makai
2. w/KRM analysis incorporates additional intersection improvements identified above.

**Table 6: Projected Year 2016 (Without and With Koa Ridge Makai Only)
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ KRM	Year 2016 w/out Proj	Year 2016 w/ KRM
Kamehameha Hwy/ Lumiaina St	Northbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	C	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	C	C	C	C
		TH	B	B	B	A
		RT	B	A	A	A
	Southbound	LT	C	C	D	D
		TH	B	B	B	B
RT		A	A	A	A	
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	C	D
		RT	D	D	B	B
	Northbound	LT	C	C	C	C
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

1. KRM=Koa Ridge Makai
2. w/KRM analysis incorporates additional intersection improvements identified above.

2. Ka Uka Boulevard at Waipio Interchange Northbound On- and Off-Ramp Junction

At the intersection with the Waipio Interchange northbound on- and off-ramps, the eastbound approach of Ka Uka Boulevard is expected to service 419 vehicles with the eastbound approach operating at LOS "B" during the projected Year 2016 AM peak period with the proposed project. During the PM peak period, the traffic volume would be greater with 681 vehicles traveling eastbound with the approach operating at LOS "D".

The westbound approach of the intersection is expected to service 8 vehicles and 80 vehicles during the AM and PM peak periods, respectively. The westbound approach would operate at LOS "C" during the projected AM peak hours of traffic and LOS "D" during PM peak hours of traffic.

The northbound off-ramp intersection approach is expected to service 911 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour, the northbound intersection approach is expected to service 2,035 vehicles, and is expected to operate at LOS "D".

3. Ka Uka Boulevard at Waipio Interchange Southbound On-Ramp (From East)

At the intersection with the Waipio Interchange southbound on-ramp, the westbound approach of Ka Uka Boulevard to service vehicles from the east is expected to carry a total of 893 vehicles during the Year 2016 AM peak hour of traffic with the proposed project, with the left-turn movement to the southbound on-ramp operating at LOS "A". The eastbound approach is expected to service a total of 1,971 vehicles.

During the Year 2016 PM peak hour of traffic with the proposed project, the westbound approach is expected to service 2,063 vehicles with the left-turn movement to the southbound on-ramp operating at LOS "A". During the same period, eastbound Ka Uka Boulevard is expected to carry 2,135 vehicles.

4. Ka Uka Boulevard at Moaniani Street/Waipio Interchange Southbound Off-Ramp

At the intersection with Moaniani Street and the Waipio Interchange southbound off-ramp, the westbound approach of Ka Uka Boulevard is expected to service 878 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the through movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to carry a total of 2,024 vehicles with the left-turn movement operating at LOS "D" and the through movement operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Moaniani Street and the southbound off-ramp is expected to service a total of 1,668 vehicles during the AM peak hour of traffic and operate at LOS "B". During the PM peak hour of traffic, the eastbound approach is expected to service 1,645 vehicles and operate at LOS "C" conditions.

The northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service a total 356 vehicles during the AM peak hour of traffic with the left-turn and right-turn movements operating at LOS "D" and LOS "C", respectively. Similarly, during the PM peak hour of traffic, the northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service 603 vehicles with the left-turn and right-turn movements operating at LOS "D" and LOS "C" conditions, respectively.

The southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 414 vehicles during the AM peak hour of traffic with the right-turn and through movements operating at LOS "C" or better conditions, and the left-turn movement operating at LOS "D". During the PM peak hour of traffic, the southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 519 vehicles with the approach generally operating at LOS "D".

5. Ka Uka Boulevard at Commercial Driveway/Spine Road

The westbound and eastbound approaches of Ka Uka Boulevard at the intersection with the commercial driveway is expected to service a total of 971 vehicles and 1,067 vehicles during the AM peak hour of traffic, respectively. The westbound left-turn movement is expected to operate at LOS "C" while the through movement operate at LOS "B". The eastbound left-turn movement on Ka Uka Boulevard is expected to operate at LOS "C" while the eastbound through movement also operate at LOS "C" during the projected Year 2016 AM peak hours of traffic with the proposed project.

During the PM peak hour of traffic, the westbound approach is expected to service 2,136 vehicles while the eastbound approach services 932 vehicles. The westbound left-turn movement would operate at LOS "D" with the through movement operating at LOS "C". On the eastbound approach of Ka Uka Boulevard, the left-turn movement is expected to operate at LOS "D" while the shared through/right-turn movement operate at LOS "C".

The northbound approach of the driveway at the Ka Uka Boulevard intersection is expected to service 141 vehicles and 344 vehicles during the AM and PM peak hours of traffic, respectively, and operate as a channelized right-turn movement with the proposed additional eastbound lane on Ka Uka Boulevard between the driveway and the freeway southbound on-ramp.

6. Ka Uka Boulevard at Ukee Street (east)

At the intersection with Ukee Street (east), the westbound approach of Ka Uka Boulevard is expected to service 641 vehicles during the AM peak

hour of traffic with the left-turn, through, and right-turn movements operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,207 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (east) is expected to service a total of 1,108 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements operating at LOS "A". During the PM peak hour of traffic, the eastbound approach would service a total of 883 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions during the projected Year 2016 with the proposed project.

The northbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection is expected to service a total 78 vehicles during the AM peak hour of traffic and operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (east) at Ka Uka Boulevard is expected to service 198 vehicles and operate at LOS "C". The southbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection would service 20 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach services 72 vehicles during the PM peak hour of traffic and also operate at LOS "B".

7. Ka Uka Boulevard at Waipio Uka Street

At the intersection with Waipio Uka Street, the westbound approach of Ka Uka Boulevard is expected to service 517 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements all operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach would service a total of 1,208 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Waipio Uka Street is expected to service a total of 1,129 vehicles and 876 vehicles during the projected AM and PM peak hour of traffic, respectively. During both peak periods, all traffic movement on the eastbound approach of Ka Uka Boulevard at the Waipio Uka Street intersection would operate at LOS "A" conditions.

The northbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service a total of 206 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour of traffic, the northbound approach of Waipio Uka Street at Ka Uka Boulevard is expected to service 207 vehicles and also would operate at LOS "B" conditions. The southbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service 75 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach is expected

to service 166 vehicles during the PM peak hour of traffic and would also operate at LOS "B" conditions.

8. Ka Uka Boulevard at Ukee Street (west)

At the intersection with Ukee Street (west), the westbound approach of Ka Uka Boulevard is expected to service 531 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movements operating at LOS B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,222 vehicles with the left-turn movement operating at LOS "C" and the shared through and right-turn movements operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (west) is expected to service a total of 943 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, the eastbound approach is expected to service a total of 833 vehicles with the left-turn movement operating at LOS "C" conditions while the shared through/right-turn movements would also operate at LOS "C" conditions.

The northbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service a total 414 vehicles during the AM peak hour of traffic and would operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (west) at Ka Uka Boulevard is expected to service 349 vehicles and would operate at LOS "C". The southbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service 17 vehicles during the AM peak hour and operates at LOS "B", while the southbound approach is expected to service 142 vehicles during the PM peak hour of traffic and also would operate at LOS "B".

9. Ka Uka Boulevard at Kamehameha Highway

At the intersection with Ka Uka Boulevard and the Kamehameha Highway, the westbound approach of Ka Uka Boulevard is expected to service 482 vehicles during the AM peak hour of traffic with the shared left-turn/through movements operating at LOS "C" and the right-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,288 vehicles with the left-turn and through movements operating at LOS "D" and LOS "C", respectively, and the right-turn movement operating at LOS "A" conditions. The eastbound approach of Ka Uka Boulevard at the intersection with Kamehameha Highway is expected to service a total of 40 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for both the eastbound left-turn and shared through/right-turn traffic movements. During

the PM peak hour of traffic, the eastbound approach is expected to service 109 vehicles with all of the individual movements generally operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total 718 vehicles during the AM peak hour of traffic with the left-turn movement, and the through and right-turn movements all operating at LOS "C" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total of 1,279 vehicles with the left-turn movement operating at LOS "D", and the through movement and right-turn movement operating at LOS "C" conditions.

The southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,613 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" conditions while the through and right-turn movements both would operate at LOS "B". During the PM peak hour of traffic, the southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,036 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "B" conditions.

10. Kamehameha Highway at Waipio Uka Street

At the intersection with Kamehameha Highway, the westbound approach of Waipio Uka Street is expected to service 623 vehicles during the AM peak hour of traffic with the left-turn and through movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Waipio Uka Street approach is expected to service a total of 694 vehicles with the left-turn movement operating at LOS "D" and the through and right-turn movements also operate at LOS "C" conditions.

The eastbound approach of Waipio Uka Street at the intersection with Kamehameha Highway is expected to service a total of 14 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements. During the PM peak hour of traffic, the eastbound approach is expected to service 64 vehicles with the left-turn and through movements also operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Waipio Uka Street intersection is expected to service a total 1,255 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 2,129 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" and LOS "B", respectively.

The southbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 1,133 vehicles during the AM peak hour of traffic with the left-turn movement and the through movement operating at LOS "C" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipio Uka Street intersection is expected to service 1,020 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

11. Kamehameha Highway at Lumiaina Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiaina Street is expected to service 176 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operating at LOS "D". During the PM peak hour of traffic, the westbound Lumiaina Street approach is expected to service a total of 106 vehicles with the left-turn, through, and right-turn movements also operating at LOS "D" conditions.

The eastbound approach of Lumiaina Street at the intersection with Kamehameha Highway is expected to service 604 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements, and LOS "A" conditions for the right-turn movements. During the PM peak hour of traffic, the eastbound approach is expected to service 702 vehicles with the left-turn/through movements operating at LOS "D" while the right-turn movement operate at LOS "A".

The northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service a total 810 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "C" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,838 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,686 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,612 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions.

12. Kamehameha Highway at Lumiauau Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiauau Street is expected to service 199 vehicles during the AM peak hour of traffic with both the left-turn and shared through/right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Lumiauau Street approach is expected to service a total of 81 vehicles with the left-turn operating at LOS "D", and the shared through/right-turn movements also operating at LOS "C", conditions.

The eastbound approach of Lumiauau Street at the intersection with Kamehameha Highway is expected to service 450 vehicles during the AM peak hour of traffic resulting in LOS "C" conditions for the shared left-turn/through movements, and LOS "A" conditions for the right-turn movement. During the PM peak hour of traffic, the eastbound approach is expected to service 98 vehicles with the shared left-turn/through movements operating at LOS "D" while the right-turn movement operating at LOS "A". The northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service a total 763 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 2,144 vehicles with the left-turn movement operating at LOS "C", and the through and right-turn movements operating at LOS "A" conditions.

The southbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,231 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,033 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions.

13. Kamehameha Highway at Waipahu Street

At the intersection with Kamehameha Highway, the eastbound approach of Waipahu Street is expected to service 737 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements both operating at LOS "D". During the PM peak hour of traffic, the eastbound Waipahu Street approach is expected to service a total of 713 vehicles with the left-turn and right-turn movements operating at LOS "D" and LOS "B", respectively.

The northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service a total 782 vehicles during the AM

peak hour of traffic with the left-turn movement operating at LOS "C", and the through movement operating at LOS "A" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 2,182 vehicles with the left-turn movement also operating at LOS "C" and the through movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 1,727 vehicles during the AM peak hour of traffic with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipahu Street intersection is expected to service 1,125 vehicles with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions.

14. Interstate H-2 Freeway Segments

During the projected Year 2016 AM peak hour of traffic with the Koa Ridge Makai Only project and additional improvements, the Interstate H-2 Freeway south of the Waipio Interchange would carry 3,178 vehicles northbound and 5,092 vehicles southbound. The northbound and southbound freeway segments along H-2 south of the Waipio Interchange would operate at LOS "B" and LOS "C", respectively, during the projected Year 2016 AM peak hour of traffic with the proposed project. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing. However, queuing further south as a result of spillback conditions from the Waiawa Interchange is expected to continue. No vehicular queuing is expected in the northbound direction during the projected Year 2016 AM peak hour of traffic.

North of the Waipio Interchange, the Interstate H-2 Freeway would carry approximately 2,656 vehicles northbound and 3,950 vehicles southbound during the projected morning peak hours of traffic and would operate at LOS "A" and LOS "B", respectively. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing during the projected morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway south of the Waipio Interchange would carry 5,392 vehicles northbound and 3,876 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments south of the Waipio Interchange would operate at LOS "C" and LOS "B", respectively, during the projected Year 2016 PM peak hours of traffic with the project. No significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic with the proposed project.

North of the Waipio Interchange, the Interstate H-2 Freeway is expected to carry approximately 4,014 vehicles northbound and 2,918 vehicles southbound during the projected PM peak hours of traffic. This freeway

segment is expected to operate at LOS "B" for both directions during the PM peak hours of traffic with the proposed project. Based on simulation modeling, no significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic with the project.

15. Waipio Interchange Ramp Merge/Diverge Operations

During projected Year 2016 AM peak hour traffic operations with the Koa Ridge Makai Only project, the Interstate H-2 Freeway northbound off-ramp at the Waipio Interchange would operate at LOS "A" conditions. The northbound on-ramp would continue to operate at LOS "B" conditions. The southbound off- and on ramps would operate at LOS "C" during the projected Year 2016 AM peak hour with the project.

During the projected Year 2016 PM peak hour of traffic, the northbound on-ramp at the Waipio Interchange would operate at LOS "B". To accommodate ramp diverge operations, and to accommodate the ramp 95th percentile projected queue, the northbound on-ramp should be extended by a total of 800 feet upstream from the ramp gore, and providing a two-lane off-ramp beyond the diverge point. The off-ramp traffic operations with the improvement would result in LOS "B" conditions, an improvement over existing conditions and Year 2016 conditions without the proposed project. Based on simulation modeling, no queuing effects would be anticipated on the freeway due to the proposed improvements.

The southbound on-ramp would both operate at LOS "C", while the southbound off-ramp operate at LOS "B" during the projected Year 2016 PM peak hour of traffic with the proposed project. Based on modeling and traffic simulations, the merge and diverge operations are not expected to result in queuing on the freeway.

Table 7 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway and at the Waipio Interchange for Year 2016 with Koa Ridge Makai Only project conditions. The Year 2016 Without Project conditions are provided for comparison.

**Table 7. Summary of Year 2016 (With Koa Ridge Makai Only)
Interstate H-2 Freeway Segment and Ramp LOS Operations**

Freeway Segment/ Interchange Ramp	2016 AM Peak		2016 PM Peak	
	Without Proj	With KRM Only	Without Proj	With KRM Only
NB segment south of Waipio Interchange	B	B	C	C
NB segment north of Waipio Interchange	A	A	B	B
SB segment south of Waipio Interchange	C	C	B	B
SB segment north of Waipio Interchange	B	B	B	B
NB Off-ramp	B	A	D	B
NB On-ramp	B	B	B	B
SB On-ramp	C	C	B	C
SB Off-ramp	C	C	B	B

1. KRM=Koa Ridge Makai
2. w/KRM analysis incorporates additional intersection improvements.

F. Year 2020 Site-Generated Traffic with Koa Ridge Makai Only

1. Trip Generation Methodology

The trip generation methodology used in this phase of the project is also based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. For the purpose of this analysis, and as indicated in the Year 2016 project traffic projections contained herein, as well as based on recommendation by SDOT, 15% of site-generated trips were conservatively assumed as internal trips. Table 8 summarizes the net project site trip generation characteristics applied to the Year 2020 AM and PM peak hours of traffic.

**Table 8: Koa Ridge Makai Only Peak Hour Trip Generation
(External Trips Only)**

YEAR 2020 (additional to Year 2016 projections)		
SINGLE-FAMILY DETACHED HOUSING		
INDEPENDENT VARIABLE: # of Dwelling Units = 456		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	73
	EXIT	218
	TOTAL	291
PM PEAK	ENTER	247
	EXIT	145
	TOTAL	392
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE: # of Dwelling Units = 550		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	35
	EXIT	171
	TOTAL	206
PM PEAK	ENTER	163
	EXIT	80
	TOTAL	243
MULTI-FAMILY HOUSING (APARTMENT)		
INDEPENDENT VARIABLE: # of Dwelling Units = 694		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	60
	EXIT	241
	TOTAL	301
PM PEAK	ENTER	237
	EXIT	128
	TOTAL	365
RETAIL (SHOPPING CENTER)		
INDEPENDENT VARIABLE: 1,000 sf of development = 75		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	40
	EXIT	25
	TOTAL	65
PM PEAK	ENTER	115
	EXIT	124
	TOTAL	239

**Table 8: Koa Ridge Makai Only Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2020 (additional to Year 2016 projections)		
HOTEL		
INDEPENDENT VARIABLE:		# of Rooms = 150
		PROJECTED TRIP ENDS
AM PEAK	ENTER	44
	EXIT	28
	TOTAL	72
PM PEAK	ENTER	40
	EXIT	36
	TOTAL	76
HOSPITAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 196
		PROJECTED TRIP ENDS
AM PEAK	ENTER	134
	EXIT	66
	TOTAL	200
PM PEAK	ENTER	65
	EXIT	132
	TOTAL	197
GENERAL OFFICE BUILDING		
INDEPENDENT VARIABLE:		1,000 sf of development = 20
		PROJECTED TRIP ENDS
AM PEAK	ENTER	23
	EXIT	3
	TOTAL	26
PM PEAK	ENTER	4
	EXIT	21
	TOTAL	25

**Table 8: Koa Ridge Makai Only Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2020 (additional to Year 2016 projections)		
GENERAL LIGHT INDUSTRIAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 40
		PROJECTED TRIP ENDS
AM PEAK	ENTER	28
	EXIT	4
	TOTAL	32
PM PEAK	ENTER	4
	EXIT	29
	TOTAL	33
ELEMENTARY SCHOOL		
INDEPENDENT VARIABLE:		Students = 875
		PROJECTED TRIP ENDS
AM PEAK	ENTER	40
	EXIT	33
	TOTAL	73
PM PEAK	ENTER	15
	EXIT	19
	TOTAL	34
YEAR 2020 Totals (additional to Year 2016 projections)		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	477
	EXIT	789
	TOTAL	1266
PM PEAK	ENTER	890
	EXIT	714
	TOTAL	1604

G. Year 2020 Traffic Projections With Koa Ridge Makai Development Only

1. General

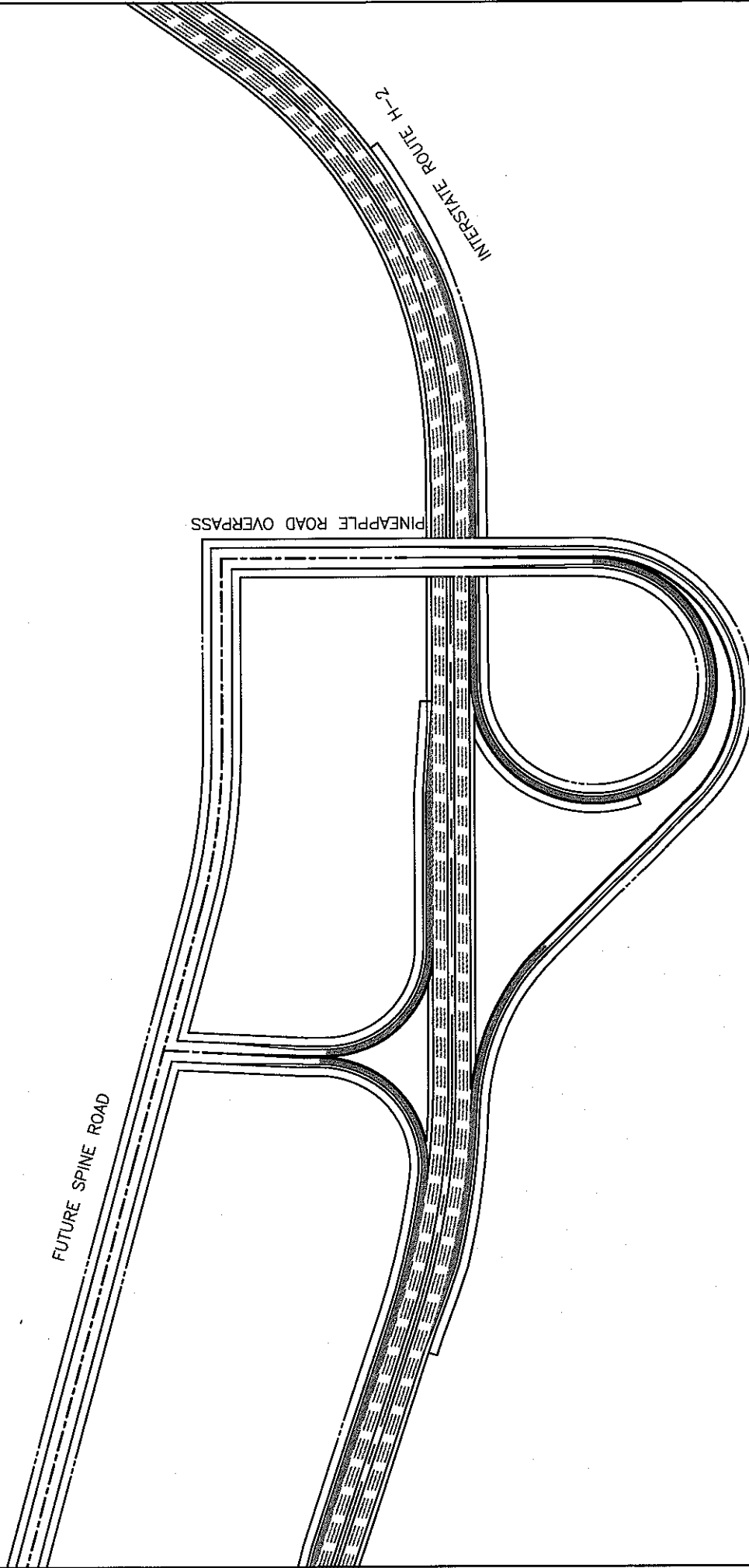
The cumulative volumes consist of site-generated traffic superimposed over Year 2020 projected traffic demands. The implementation of intersection and roadway improvements identified above for the *Year 2016 With and Without the Koa Ridge Makai Development* analysis scenario are also assumed since these improvements are expected to be funded and implemented by Castle & Cooke Homes Hawaii. The additional intersection and roadway improvements for the Year 2020 cumulative analysis include a proposed new Interstate H-2 Freeway Interchange at the existing Pineapple Road Overpass located north of the existing Waipio Interchange. The operational and design analyses of the interchange shall be included in an Interstate Access Modifications Request report for consideration by the Federal Highway Administration. The request for modifications to the interstate system would be prepared by Castle & Cooke Homes Hawaii and administered through the State Department of Transportation (SDOT). Such a document should be identified in a Memorandum of Agreement (MOA) between SDOT and Castle & Cooke Homes Hawaii. Figure 18 shows a conceptual layout of the proposed interchange based on prior discussions with SDOT during the land planning stage of the project.

2. Year 2020 Traffic Assignment

The second phase of development is expected to be built-out in Year 2020. To service this second development phase, a new freeway interchange along the Interstate H-2 Freeway is proposed at the existing Pineapple Road Overpass located north of the existing Waipio Interchange. This proposed connection will serve as the development's second access point, and is expected to accommodate the northern portion of the project that is planned for construction in this second phase. Given this area's proximity to the initial access point at Ka Uka Boulevard, the associated traffic generation as a result of the second phase is assigned to the proposed new interchange. In lieu of this interchange, project access via the Waipio Interchange would result in the circuitous routing of project-related trips for these areas. As such, all site-generated vehicles associated with the Year 2020, or the second phase of the project, are assumed to utilize the new interchange to access the Interstate H-2 Freeway with the exception of internal trips within the Waipio region. Similar to those generated by the first phase of development, trips within the Waipio region were assumed to utilize the proposed Spine Road and Ka Uka Boulevard intersection to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West) since they provide a direct access to areas within Waipio. The distribution of traffic between these local roadways was



Not to Scale



KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

PINEAPPLE ROAD INTERCHANGE CONCEPTUAL LAYOUT

FIGURE

18



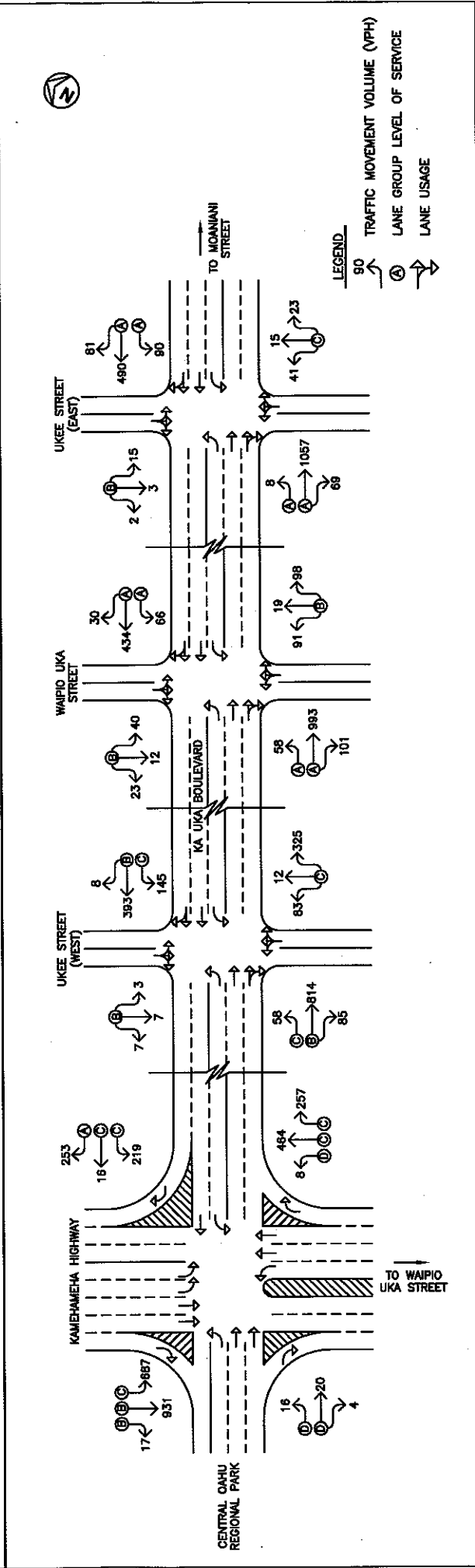
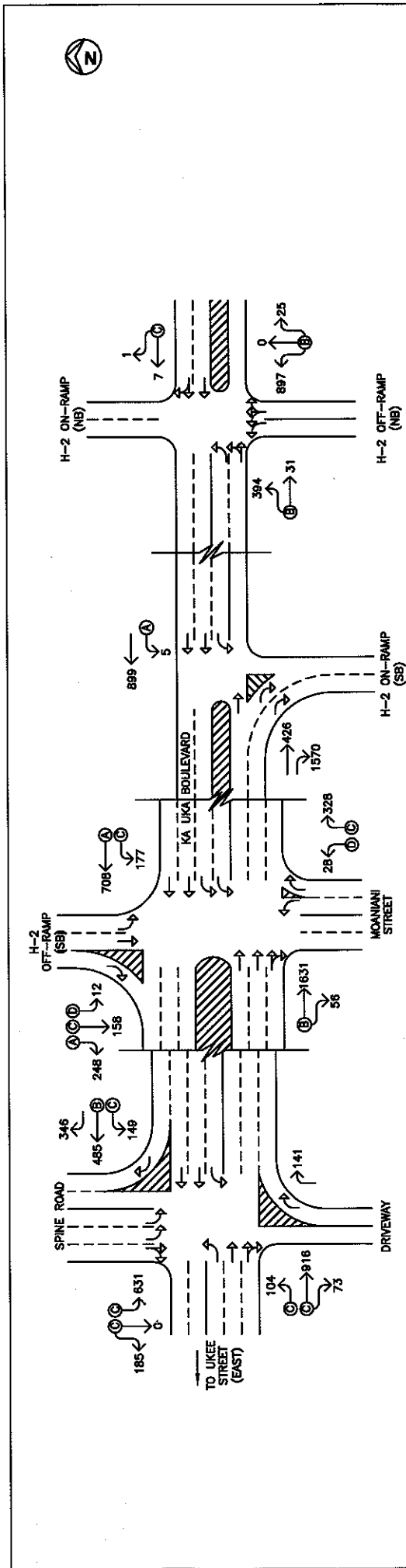
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based upon the relative distribution of turning traffic at each of these roadways as mentioned in previous section of this report.

3. Year 2020 Traffic Operations

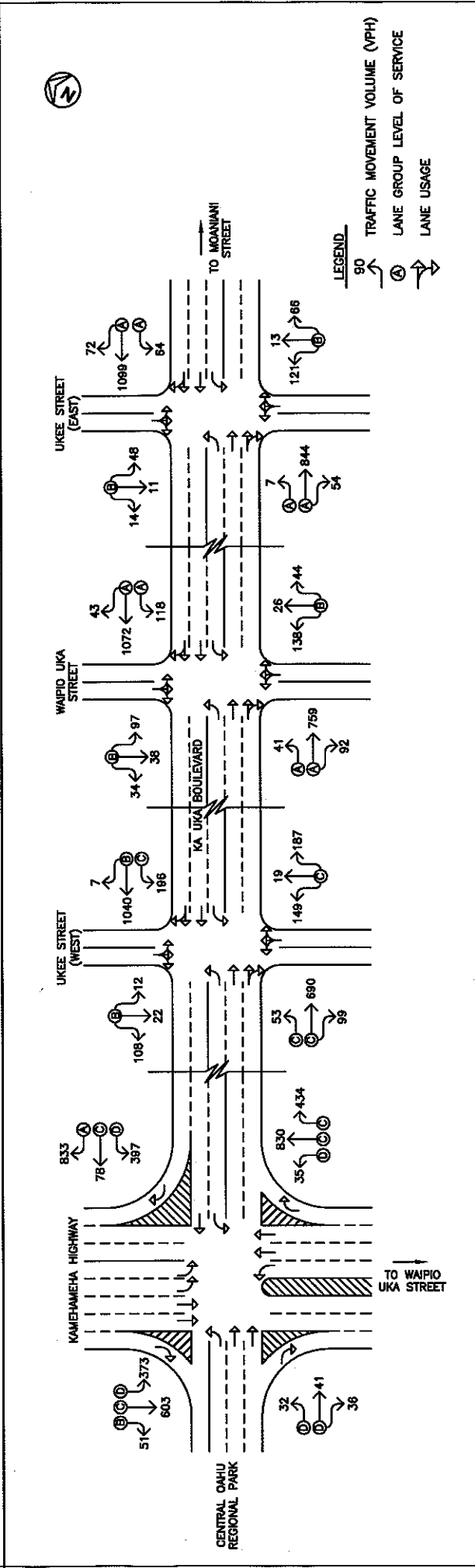
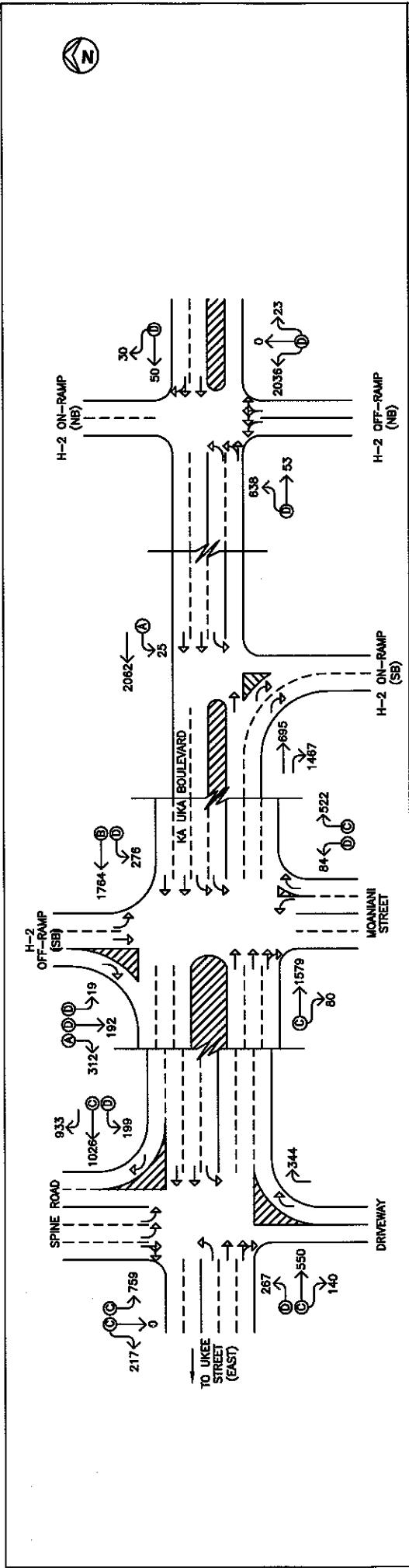
a. General

Figures 19 to 22 show *Year 2020 With Project* (Koa Ridge Makai Only) traffic operations incorporating Year 2016 necessary improvements as well as additional improvements to mitigate Year 2020 traffic demands. Table 9 summarizes the resulting Year 2020 traffic operations at the study intersections. The Year 2016 With Project (Koa Ridge Makai Only) conditions are provided for comparison. The LOS calculations are provided in Appendix H under separate cover.



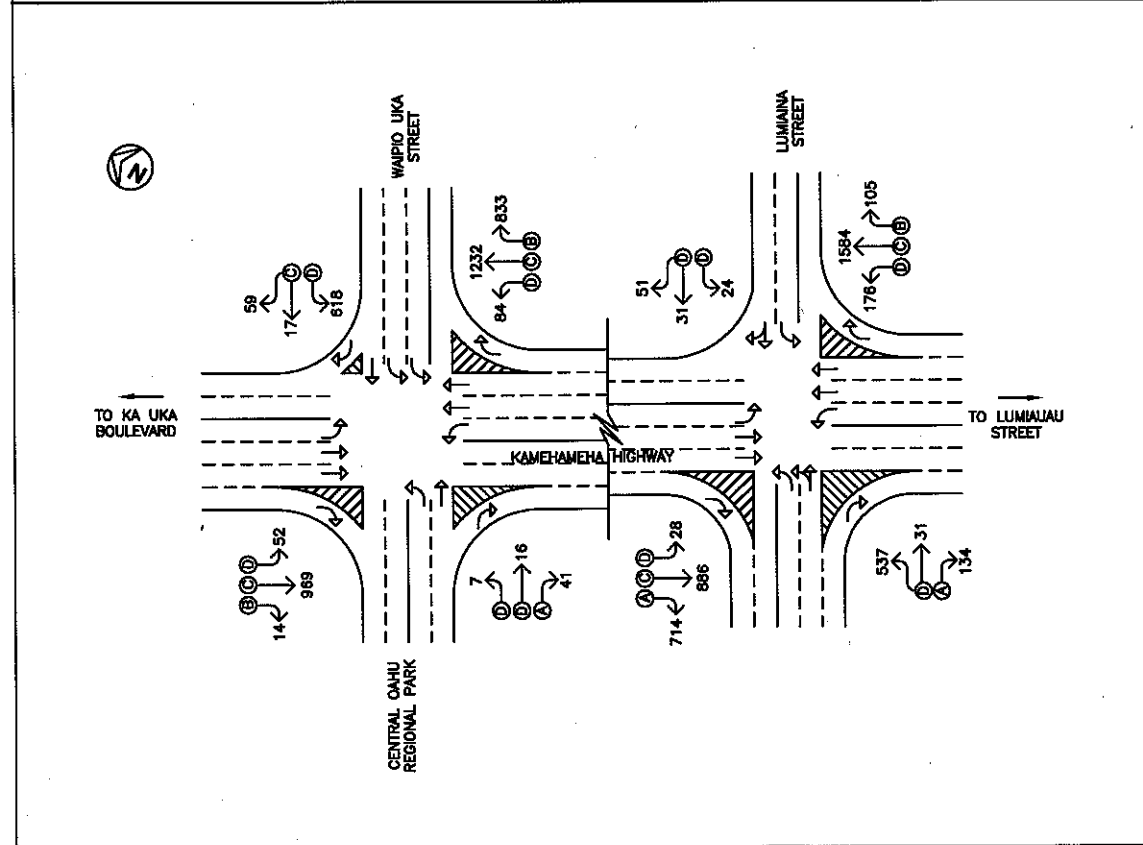
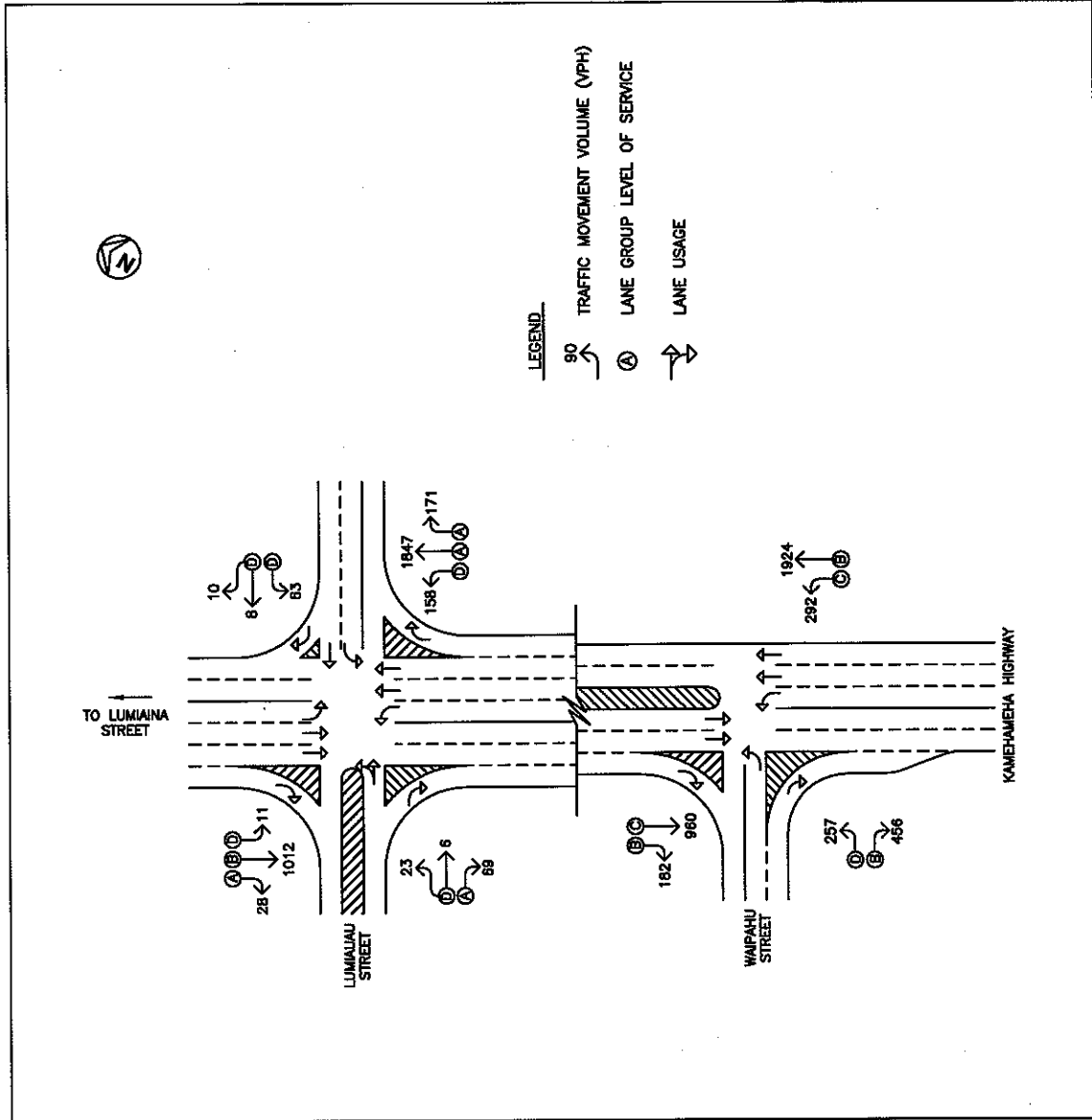
LEGEND
 90 TRAFFIC MOVEMENT VOLUME (NPH)
 ⓐ LANE GROUP LEVEL OF SERVICE
 → LANE USAGE

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 KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT
 YEAR 2020 AM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)
 KA UKA BOULEVARD
 FIGURE 19



LEGEND
 90 TRAFFIC MOVEMENT VOLUME (VPH)
 (A) LANE GROUP LEVEL OF SERVICE
 (B) LANE USAGE

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 KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT
 YEAR 2020 PM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)
 KA UKA BOULEVARD
 FIGURE 21



YEAR 2020 PM PEAK HOUR OF TRAFFIC WITH PROJECT (KOA RIDGE MAKAI ONLY)
KAMEHAMEHA HIGHWAY

**Table 9: Projected Year 2016 and Year 2020 With Koa Ridge Makai Only
Levels of Service**

Intersection	Traffic Movement		AM		PM	
			Year 2016	Year 2020	Year 2016	Year 2020
Ka Uka Blvd/ Waipio IC NB Ramps	Eastbound	LT-TH	B	B	D	D
	Westbound	TH-RT	C	C	D	D
	Northbound	LT-TH-RT	B	B	D	D
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	B	B	C	C
	Westbound	LT	C	C	D	D
		TH	A	A	B	B
	Northbound	LT	D	D	D	D
		RT	C	C	C	C
	Southbound	LT	D	D	D	D
		TH	C	C	D	D
RT		A	A	A	A	
Ka Uka Blvd/ Driveway/Spine Rd	Eastbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Westbound	LT	C	C	D	D
		TH	B	B	C	C
		RT	-	-	-	-
	Northbound	RT	-	-	-	-
	Southbound	LT	C	C	C	C
TH-RT		C	C	C	C	
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	C	C	B	B
	Southbound	LT-TH-RT	B	B	B	B
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	B	B
	Southbound	LT-TH-RT	B	B	B	B

**Table 9: Projected Year 2016 and Year 2020 With Koa Ridge Makai Only
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016	Year 2020	Year 2016	Year 2020
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	C	C
		TH-RT	B	B	C	C
	Westbound	LT	C	C	C	C
		TH-RT	B	B	B	B
	Northbound	LT-TH-RT	C	C	C	C
Southbound	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	D	D	D	D
		TH-RT	D	D	D	D
	Westbound	LT	C	C	D	D
		TH	C	C	C	C
		RT	A	A	A	A
	Northbound	LT	C	D	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
		TH	B	B	C	C
RT		B	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	C	C	D	D
		TH	B	B	C	C
		RT	B	B	B	B
	Southbound	LT	C	C	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

**Table 9: Projected Year 2016 and Year 2020 With Koa Ridge Makai Only
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016	Year 2020	Year 2016	Year 2020
Kamehameha Hwy/ Lumiaina St (Cont'd)	Northbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	D
	Northbound	LT	C	C	C	D
		TH	B	B	A	A
		RT	A	A	A	A
	Southbound	LT	C	C	D	D
		TH	B	B	B	B
		RT	A	A	A	A
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	D	D
		RT	D	D	B	B
	Northbound	LT	C	C	C	C
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

Traffic operations at the study intersections are expected to deteriorate to Year 2020 projected conditions with the development of the proposed project due to the anticipated increase in traffic in the vicinity. However, implementing additional intersection and roadway improvements identified above and in previous sections of the report should alleviate traffic operational deficiencies. As a result, all movements at the study intersections including movements at the Waipio Interchange and the proposed interchange at the existing Pineapple Road Overpass would operate at LOS "D" or better conditions.

b. Ka Uka Boulevard at Waipio Interchange Northbound On- and Off-Ramp Junction

At the intersection with the Waipio Interchange northbound on- and off-ramps, the eastbound approach of Ka Uka Boulevard is expected to service 425 vehicles with the eastbound approach operating at LOS "B" during the projected Year 2020 AM peak period with the proposed project. During the PM peak period, the traffic volume would be greater with 691 vehicles traveling eastbound with the approach operating at LOS "D".

The westbound approach of the intersection is expected to service 8 vehicles and 80 vehicles during the AM and PM peak periods, respectively. The westbound approach would operate at LOS "C" during the projected AM peak hours of traffic and LOS "D" during PM peak hours of traffic.

The northbound off-ramp intersection approach is expected to service 922 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour, the northbound intersection approach is expected to service 2,059 vehicles, and is expected to operate at LOS "D".

c. Ka Uka Boulevard at Waipio Interchange Southbound On-Ramp (From East)

At the intersection with the Waipio Interchange southbound on-ramp, the westbound approach of Ka Uka Boulevard to service vehicles from the east is expected to carry a total of 904 vehicles during the Year 2020 AM peak hour of traffic with the proposed project, with the left-turn movement to the southbound on-ramp operating at LOS "A". The eastbound approach is expected to service a total of 1,996 vehicles.

During the Year 2020 PM peak hour of traffic with the proposed project, the westbound approach is expected to service 2,087 vehicles with the left-turn movement to the southbound on-ramp operating at LOS "A". During the same period, eastbound Ka Uka Boulevard is expected to carry 2,162 vehicles.

d. Ka Uka Boulevard at Moaniani Street/Waipio Interchange Southbound Off-Ramp

At the intersection with Moaniani Street and the Waipio Interchange southbound off-ramp, the westbound approach of Ka Uka Boulevard is expected to service 885 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the through movement operating at LOS "A". During the PM peak hour

of traffic, the westbound Ka Uka Boulevard approach is expected to carry a total of 2,040 vehicles with the left-turn movement operating at LOS "D" and the through movement operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Moaniani Street and the southbound off-ramp is expected to service a total of 1,687 vehicles during the AM peak hour of traffic and operate at LOS "B". During the PM peak hour of traffic, the eastbound approach is expected to service 1,659 vehicles and operate at LOS "C" conditions.

The northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service a total 356 vehicles during the AM peak hour of traffic with the left-turn and right-turn movements operating at LOS "D" and LOS "C", respectively. Similarly, during the PM peak hour of traffic, the northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service 606 vehicles with the left-turn and right-turn movements operating at LOS "D" and LOS "C" conditions, respectively.

The southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 418 vehicles during the AM peak hour of traffic with the right-turn and through movements operating at LOS "C" or better conditions, and the left-turn movement operating at LOS "D". During the PM peak hour of traffic, the southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 523 vehicles with the approach generally operating at LOS "D".

e. Ka Uka Boulevard at Commercial Driveway/Spine Road

The westbound and eastbound approaches of Ka Uka Boulevard at the intersection with the commercial driveway is expected to service a total of 980 vehicles and 1,093 vehicles during the AM peak hour of traffic, respectively. The westbound left-turn movement is expected to operate at LOS "C" while the through movement operate at LOS "B". The eastbound left-turn movement on Ka Uka Boulevard is expected to operate at LOS "C" while the eastbound through movement also operate at LOS "C" during the projected Year 2020 AM peak hours of traffic with the proposed project.

During the PM peak hour of traffic, the westbound approach is expected to service 2,158 vehicles while the eastbound approach services 957 vehicles. The westbound left-turn movement would operate at LOS "D" with the through movement operating at LOS "C". On the eastbound approach of Ka Uka Boulevard, the left-turn movement is expected to operate at LOS "D" while the shared through/right-turn movement operate at LOS "C".

The northbound approach of the driveway at the Ka Uka Boulevard intersection is expected to service 141 vehicles and 344 vehicles during the AM and PM peak hours of traffic, respectively, and operate as a channelized right-turn movement with the proposed additional eastbound lane on Ka Uka Boulevard between the driveway and the freeway southbound on-ramp.

f. Ka Uka Boulevard at Ukee Street (east)

At the intersection with Ukee Street (east), the westbound approach of Ka Uka Boulevard is expected to service 661 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,223 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (east) is expected to service a total of 1,134 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements operating at LOS "A". During the PM peak hour of traffic, the eastbound approach would service a total of 905 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions during the projected Year 2020 PM peak hour conditions with the proposed project.

The northbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection is expected to service a total 79 vehicles during the AM peak hour of traffic and operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (east) at Ka Uka Boulevard is expected to service 200 vehicles and operate at LOS "B". The southbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection would service 20 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach services 73 vehicles during the PM peak hour of traffic and also operate at LOS "B".

g. Ka Uka Boulevard at Waipio Uka Street

At the intersection with Waipio Uka Street, the westbound approach of Ka Uka Boulevard is expected to service 530 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements all operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach would service a total of 1,233 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Waipio Uka Street is expected to service a total of

1,152 vehicles and 892 vehicles during the projected AM and PM peak hour of traffic, respectively. During both peak periods, all traffic movement on the eastbound approach of Ka Uka Boulevard at the Waipio Uka Street intersection would operate at LOS "A" conditions.

The northbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service a total of 208 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour of traffic, the northbound approach of Waipio Uka Street at Ka Uka Boulevard is expected to service 208 vehicles and also would operate at LOS "B" conditions. The southbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service 75 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach is expected to service 169 vehicles during the PM peak hour of traffic and would also operate at LOS "B" conditions.

h. Ka Uka Boulevard at Ukee Street (west)

At the intersection with Ukee Street (west), the westbound approach of Ka Uka Boulevard is expected to service 546 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movements operating at LOS "B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,243 vehicles with the left-turn movement operating at LOS "C" and the shared through and right-turn movements operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (west) is expected to service a total of 957 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, the eastbound approach is expected to service a total of 842 vehicles with the left-turn movement operating at LOS "C" conditions while the shared through/right-turn movements would also operate at LOS "C" conditions.

The northbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service a total 420 vehicles during the AM peak hour of traffic and would operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (west) at Ka Uka Boulevard is expected to service 355 vehicles and would operate at LOS "C". The southbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service 17 vehicles during the AM peak hour and operates at LOS "B",

while the southbound approach is expected to service 142 vehicles during the PM peak hour of traffic and also would operate at LOS "B".

i. Ka Uka Boulevard at Kamehameha Highway

At the intersection with Ka Uka Boulevard and the Kamehameha Highway, the westbound approach of Ka Uka Boulevard is expected to service 488 vehicles during the AM peak hour of traffic with the left-turn and through movements operating at LOS "C", and the right-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,308 vehicles with the left-turn and through movements operating at LOS "D" and LOS "C", respectively, and the right-turn movement operating at LOS "A" conditions. The eastbound approach of Ka Uka Boulevard at the intersection with Kamehameha Highway is expected to service a total of 40 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for both the eastbound left-turn and shared through/right-turn traffic movements. During the PM peak hour of traffic, the eastbound approach is expected to service 109 vehicles with all of the individual movements generally operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total 729 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total of 1,299 vehicles with the left-turn movement operating at LOS "D", and the through movement and right-turn movement operating at LOS "C" conditions.

The southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,635 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" conditions while the through and right-turn movements both would operate at LOS "B". During the PM peak hour of traffic, the southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,027 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

j. Kamehameha Highway at Waipio Uka Street

At the intersection with Kamehameha Highway, the westbound approach of Waipio Uka Street is expected to service 623 vehicles during the AM peak hour of traffic with the left-turn and through movements operating at LOS "C" conditions. During the PM peak

hour of traffic, the westbound Waipio Uka Street approach is expected to service a total of 694 vehicles with the left-turn movement operating at LOS "D" and the through and right-turn movements also operate at LOS "C" conditions.

The eastbound approach of Waipio Uka Street at the intersection with Kamehameha Highway is expected to service a total of 14 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements. During the PM peak hour of traffic, the eastbound approach is expected to service 64 vehicles with the left-turn and through movements also operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Waipio Uka Street intersection is expected to service a total 1,267 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 2,149 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" and LOS "B", respectively.

The southbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 1,152 vehicles during the AM peak hour of traffic with the left-turn movement and the through movement operating at LOS "C" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipio Uka Street intersection is expected to service 1,035 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

k. Kamehameha Highway at Lumiaina Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiaina Street is expected to service 176 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operating at LOS "D". During the PM peak hour of traffic, the westbound Lumiaina Street approach is expected to service a total of 106 vehicles with the left-turn, through, and right-turn movements also operating at LOS "D" conditions.

The eastbound approach of Lumiaina Street at the intersection with Kamehameha Highway is expected to service 604 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements, and LOS "A" conditions for the right-turn movements. During the PM peak hour of traffic, the

eastbound approach is expected to service 702 vehicles with the left-turn/through movements operating at LOS "D" while the right-turn movement operate at LOS "A".

The northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service a total 824 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "C" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,865 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,705 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,628 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "A" conditions.

I. Kamehameha Highway at Lumiauau Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiauau Street is expected to service 199 vehicles during the AM peak hour of traffic with both the left-turn and shared through/right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Lumiauau Street approach is expected to service a total of 81 vehicles with the left-turn and the shared through/right-turn movements operating at LOS "D", conditions.

The eastbound approach of Lumiauau Street at the intersection with Kamehameha Highway is expected to service 450 vehicles during the AM peak hour of traffic resulting in LOS "C" conditions for the shared left-turn/through movements, and LOS "A" conditions for the right-turn movement. During the PM peak hour of traffic, the eastbound approach is expected to service 98 vehicles with the shared left-turn/through movements operating at LOS "D" while the right-turn movement operating at LOS "A". The northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service a total 775 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through

and right-turn movements operating at LOS "B" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 2,176 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "A" conditions.

The southbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,253 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,051 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions.

m. Kamehameha Highway at Waipahu Street

At the intersection with Kamehameha Highway, the eastbound approach of Waipahu Street is expected to service 737 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements both operating at LOS "D". During the PM peak hour of traffic, the eastbound Waipahu Street approach is expected to service a total of 713 vehicles with the left-turn and right-turn movements operating at LOS "D" and LOS "B", respectively.

The northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service a total 793 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and the through movement operating at LOS "A" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 2,216 vehicles with the left-turn movement also operating at LOS "C" and the through movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 1,775 vehicles during the AM peak hour of traffic with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipahu Street intersection is expected to service 1,142 vehicles with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions.

n. Interstate H-2 Freeway Segments

During the projected Year 2020 AM peak hour of traffic with the proposed project, the Interstate H-2 Freeway south of the Waipio Interchange would carry 3,639 vehicles northbound and 5,849 vehicles southbound. The northbound and southbound freeway segments along H-2 south of the Waipio Interchange would operate at LOS "B" and LOS "C" during the projected Year 2020 AM peak hour of traffic with the proposed project. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing.

North of the Waipio Interchange, the Interstate H-2 Freeway would carry approximately 3,111 vehicles northbound and 4,692 vehicles southbound during the projected morning peak hours of traffic and would operate at LOS "B". Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing during the projected Year 2020 morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway south of the Waipio Interchange would carry 6,236 vehicles northbound and 4,544 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments south of the Waipio Interchange would operate at LOS "C" and LOS "B", respectively, during the projected Year 2020 PM peak hours of traffic with the project.

North of the Waipio Interchange, the Interstate H-2 Freeway is expected to carry approximately 4,846 vehicles northbound and 3,575 vehicles during the PM peak hours of traffic. This freeway segment is expected to operate at LOS "C" and LOS "B" for the northbound and southbound directions, respectively, during the PM peak hours of traffic. No significant queuing is expected along this freeway segment during the projected Year 2020 PM peak hours of traffic with the proposed project.

The proposed Pineapple Road Overpass northbound on- and off-ramps providing access to northern areas of the proposed Koa Ridge Makai development are both expected to operate at LOS "B" during the AM peak hour during *Year 2020 With Project* conditions. During the PM peak hour, the northbound on- and off-ramp at the proposed interchange at the Pineapple Road Overpass would operate at LOS "B" and LOS "C", respectively, during the projected *Year 2020 With Project* conditions. The southbound on- and off-ramps at the proposed interchange would operate at LOS "C" and LOS "B", respectively, during the *Year 2020 AM With Project* peak hour conditions, and both at LOS "B" during *Year 2020 PM With Project* PM peak hour conditions. Figures 23 and 24 show the Year 2020 AM and PM peak hours of traffic, respectively, for the freeway ramps at the



Not to Scale

↙ KOA RIDGE MAKAI ↘

FUTURE SPINE ROAD

PINEAPPLE ROAD OVERPASS

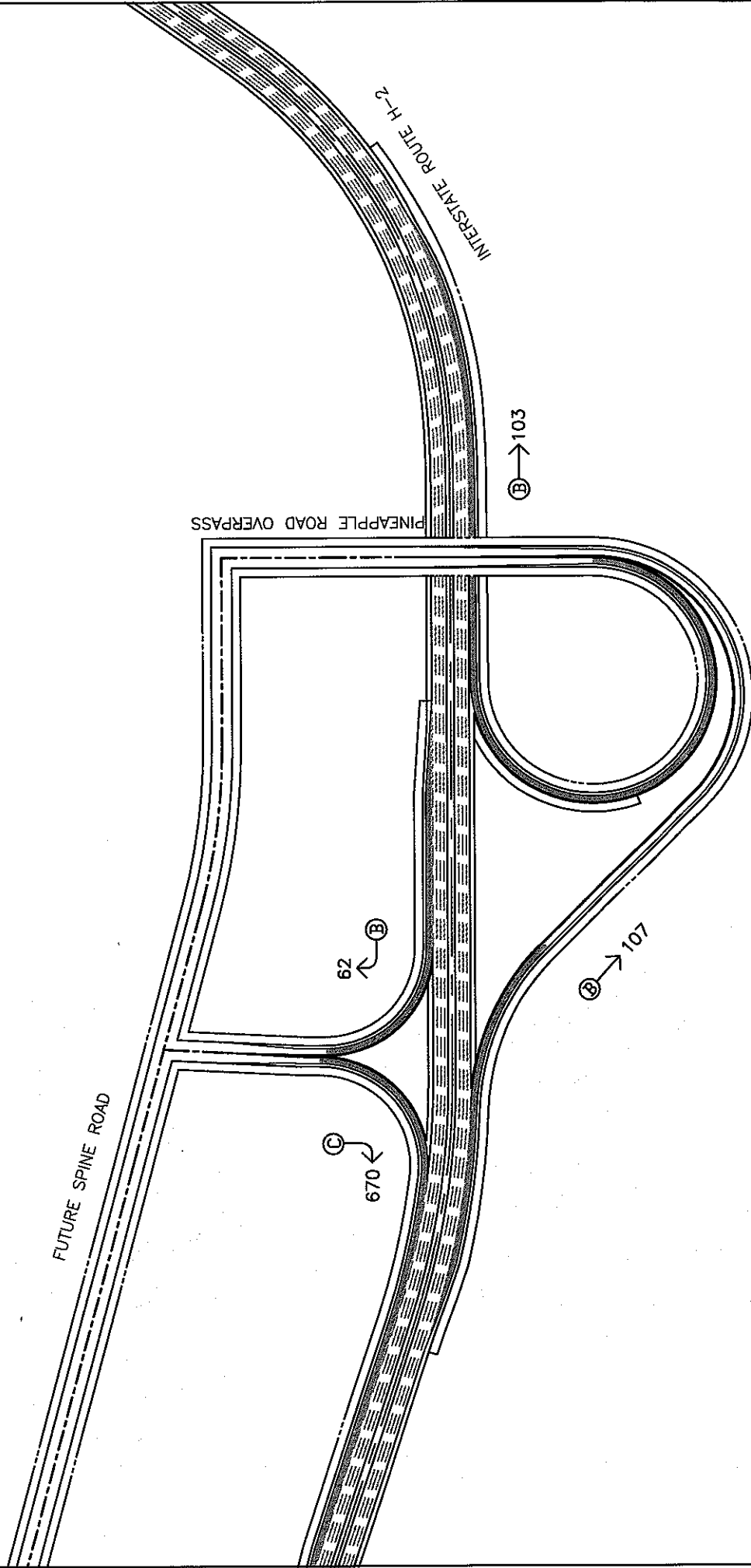
INTERSTATE ROUTE H-2

670 ← (C)

62 ← (B)

107 → (B)

103 → (B)



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KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2020 AM PEAK HOUR OF TRAFFIC WITH PROJECT AND IMPROVEMENTS
PINEAPPLE ROAD INTERCHANGE RAMP

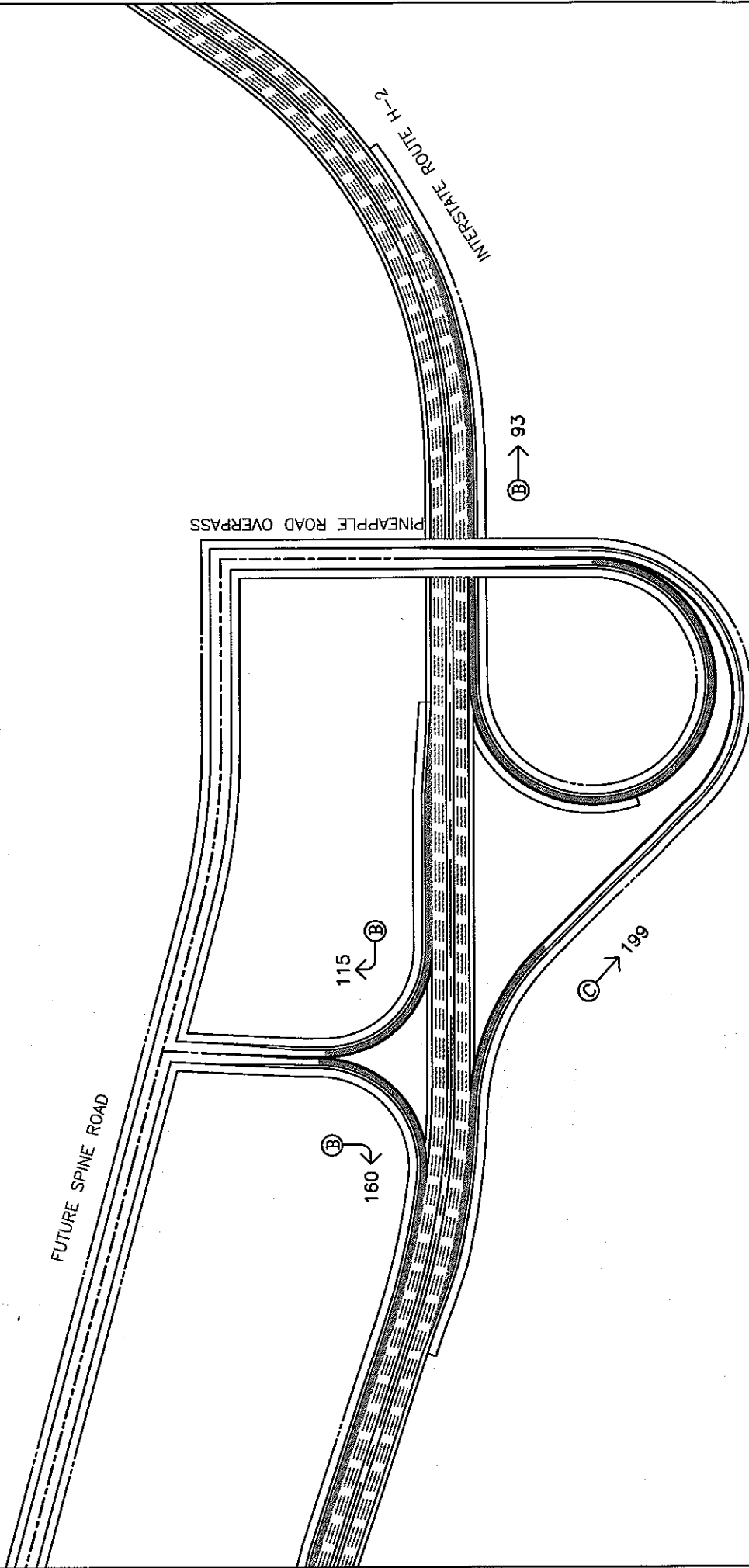
FIGURE

23



Not to Scale

↙ KOA RIDGE MAKAI ↘



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KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2020 PM PEAK HOUR OF TRAFFIC WITH PROJECT AND IMPROVEMENTS

PINEAPPLE ROAD INTERCHANGE RAMP

FIGURE

24

proposed Interstate H-2 interchange near the existing Pineapple Road Overpass.

o. Waipio Interchange Ramp Merge/Diverge Operations

During the projected Year 2020 AM peak hour traffic operations, the Interstate H-2 Freeway northbound off-ramp at the Waipio Interchange would operate at LOS "A", an improvement from existing conditions with improvements at this intersection. The northbound on-ramp would continue to operate at LOS "B" conditions. The southbound on-ramp would operate at LOS "C" during the projected Year 2020 with the project while the southbound off-ramp would also continue to operate at LOS "C" conditions during the same period.

During the projected Year 2020 PM peak hour of traffic, the northbound off-ramp at the Waipio Interchange would operate at LOS "B". Based on simulation modeling, no resulting queuing effects would be anticipated on the freeway due to the proposed improvement to extend the off-ramp, including the improvement to provide a two-lane off-ramp at the freeway interface. The northbound on-ramp would operate at LOS "C" during the same period.

The southbound on- and off-ramps would both operate at LOS "C" during the projected Year 2020 PM peak hours of traffic. Based on modeling and traffic simulations, the merge and diverge operations are not expected to result in queuing onto the freeway.

With the improvement to extend the northbound off-ramp capacity, merge and diverge conditions, and all of the freeway on- and off-ramps would operate at LOS "D" or better with no significant queuing on the ramps and at the freeway interfaces for the projected Year 2020 AM and PM peak hours of traffic with the proposed project.

Table 10 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway, Waipio Interchange, and proposed interchange at the Pineapple Road Overpass for Year 2020 conditions with the proposed project. The levels of service under Year 2016 conditions with the proposed project are provided for comparison purposes.

**Table 10. Summary of Year 2016 and Year 2020
(with Koa Ridge Makai Only)
Interstate H-2 Freeway Segments and Ramps Operations**

Freeway Segment/ Interchange Ramp	AM Peak		PM Peak	
	2016	2020	2016	2020
NB segment south of Waipio Interchange	B	B	C	C
NB segment north of Waipio Interchange	A	B	B	C
SB segment south of Waipio Interchange	C	C	B	B
SB segment north of Waipio Interchange	B	B	B	B
NB Off-ramp	A	A	B	B
NB On-ramp	B	B	B	C
SB On-ramp	C	C	C	C
SB Off-ramp	C	C	B	C
NB Off-ramp (Pineapple Rd OP)	-	B	-	C
NB On-ramp (Pineapple Rd OP)	-	B	-	B
SB Off-ramp (Pineapple Rd OP)	-	B	-	B
SB On-ramp (Pineapple Rd OP)	-	C	-	B

H. Year 2016 Site-Generated Traffic With Both Koa Ridge Makai and Waiawa

1. Trip Generation Methodology

The trip generation methodology used in this study is also based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. As indicated previously, and for the purposes of this report, a conservative assumption of 15% total reduction of site-generated trips was assumed for the

traffic analysis. Tables 11 and 12 summarize the net project site trip generation characteristics applied to the Year 2016 AM and PM peak hours of traffic.

**Table 11: Koa Ridge Makai Peak Hour Trip Generation
(External Trips Only)**

YEAR 2016		
SINGLE-FAMILY DETACHED HOUSING		
INDEPENDENT VARIABLE: # of Dwelling Units = 479		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	76
	EXIT	229
	TOTAL	305
PM PEAK	ENTER	259
	EXIT	152
	TOTAL	411
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE: # of Dwelling Units = 573		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	36
	EXIT	178
	TOTAL	214
PM PEAK	ENTER	170
	EXIT	84
	TOTAL	254
MULTI-FAMILY HOUSING (APARTMENT)		
INDEPENDENT VARIABLE: # of Dwelling Units = 339		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	29
	EXIT	117
	TOTAL	147
PM PEAK	ENTER	116
	EXIT	62
	TOTAL	178
FREE STANDING DISCOUNT STORE		
INDEPENDENT VARIABLE: 1,000 sf of development = 150		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	73
	EXIT	34
	TOTAL	107
PM PEAK	ENTER	242
	EXIT	252
	TOTAL	494

**Table 11: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2016 (Cont'd)		
RETAIL (SHOPPING CENTER)		
INDEPENDENT VARIABLE:		1,000 sf of development = 125
		PROJECTED TRIP ENDS
AM PEAK	ENTER	67
	EXIT	43
	TOTAL	110
PM PEAK	ENTER	192
	EXIT	207
	TOTAL	399
ELEMENTARY SCHOOL		
INDEPENDENT VARIABLE:		Students = 875
		PROJECTED TRIP ENDS
AM PEAK	ENTER	40
	EXIT	34
	TOTAL	74
PM PEAK	ENTER	15
	EXIT	19
	TOTAL	34
HOSPITAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 109
		PROJECTED TRIP ENDS
AM PEAK	ENTER	75
	EXIT	36
	TOTAL	111
PM PEAK	ENTER	36
	EXIT	73
	TOTAL	109
GENERAL OFFICE BUILDING		
INDEPENDENT VARIABLE:		1,000 sf of development = 10
		PROJECTED TRIP ENDS
AM PEAK	ENTER	12
	EXIT	2
	TOTAL	14
PM PEAK	ENTER	2
	EXIT	11
	TOTAL	13

**Table 11: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2016 (Cont'd)		
GENERAL LIGHT INDUSTRIAL		
INDEPENDENT VARIABLE: 1,000 sf of development = 43		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	30
	EXIT	4
	TOTAL	34
PM PEAK	ENTER	4
	EXIT	31
	TOTAL	35
YEAR 2016 TOTALS		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	438
	EXIT	677
	TOTAL	1115
PM PEAK	ENTER	1036
	EXIT	891
	TOTAL	1927

**Table 12: Waiawa Peak Hour Trip Generation
(External Trips Only)**

YEAR 2016		
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE: # of Dwelling Units = 200		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	13
	EXIT	62
	TOTAL	75
PM PEAK	ENTER	59
	EXIT	29
	TOTAL	88

2. Koa Ridge Makai

As with previous analysis scenarios presented earlier in this report, during the first phase of development, primary vehicular access to the proposed Koa Ridge Makai development will be provided via an existing access road (referred to as the Spine Road) off Ka Uka Boulevard. The directional distribution of all site-generated vehicles is based upon the distribution of population and activity centers on the island of Oahu. As such,

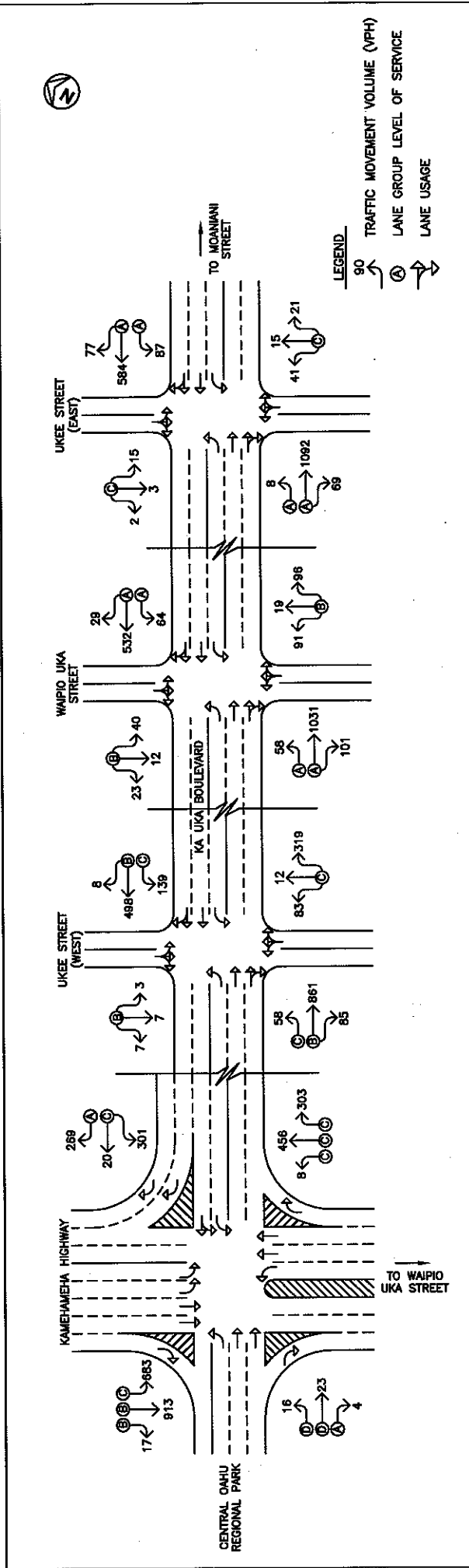
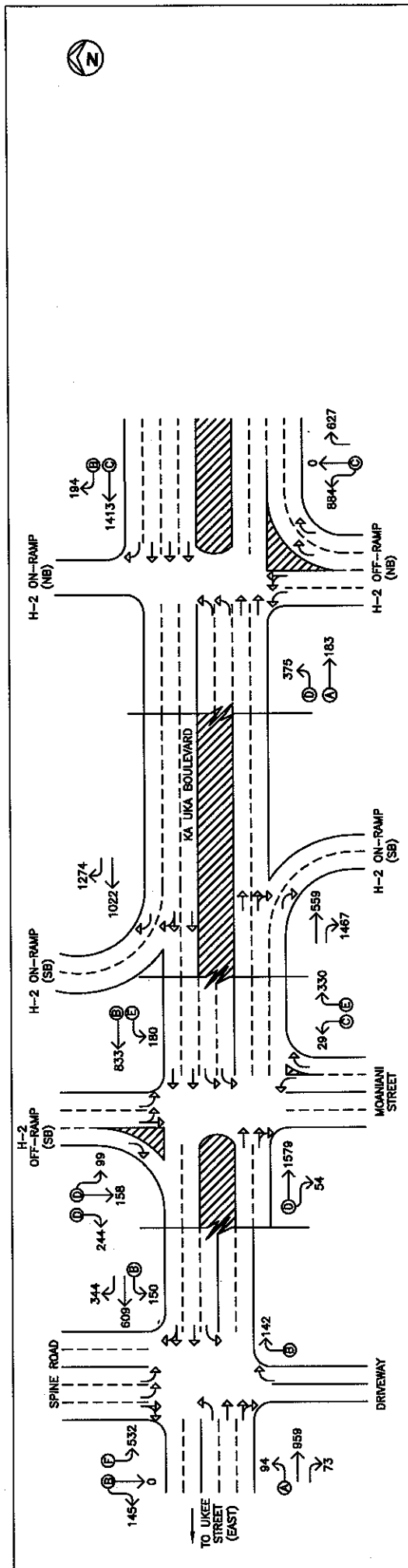
approximately 13% of the vehicles are assumed to be traveling to/from areas to the north, approximately 85% are assumed to be traveling to/from areas to the south, and approximately 2% are assumed to be internal trips traveling to/from areas within Waipio. For those vehicles traveling to/from areas outside of Waipio, the distribution of these vehicles at the access connection is based on the relative distribution between the two north-south roadways in the vicinity, the Interstate H-2 Freeway and Kamehameha Highway. For internal trips within Waipio, all vehicle trips were assumed to utilize the Spine Road and Ka Uka Boulevard to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West). The distribution of traffic between these local roadways was based upon the relative distribution of prevailing turning traffic movements at each of these roadways.

3. Waiawa

As indicated earlier, vehicular access to the proposed Waiawa development will be provided off a Ka Uka Boulevard eastward extension. The directional distribution of all site-generated vehicles is based upon the distribution of population and activity centers on the island of Oahu. As such, approximately 13% of the vehicles are assumed to be traveling to/from areas to the north, approximately 85% are assumed to be traveling to/from areas to the south, and approximately 2% are assumed to be internal trips traveling to/from areas within Waipio. All vehicles traveling to/from areas outside of Waipio were distributed between the two north-south roadways in the vicinity, the Interstate H-2 Freeway and Kamehameha Highway, based upon the relative distribution of traffic between those two roadways. As such, approximately 80% of the vehicles were assumed to utilize the Interstate H-2 Freeway while approximately 20% of the vehicles were assumed to access Kamehameha Highway via Ka Uka Boulevard. For internal trips within Waipio, all vehicles were assumed to utilize Ka Uka Boulevard to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West). The distribution of traffic between these local roadways was based upon the relative distribution of turning traffic at each of these roadways.

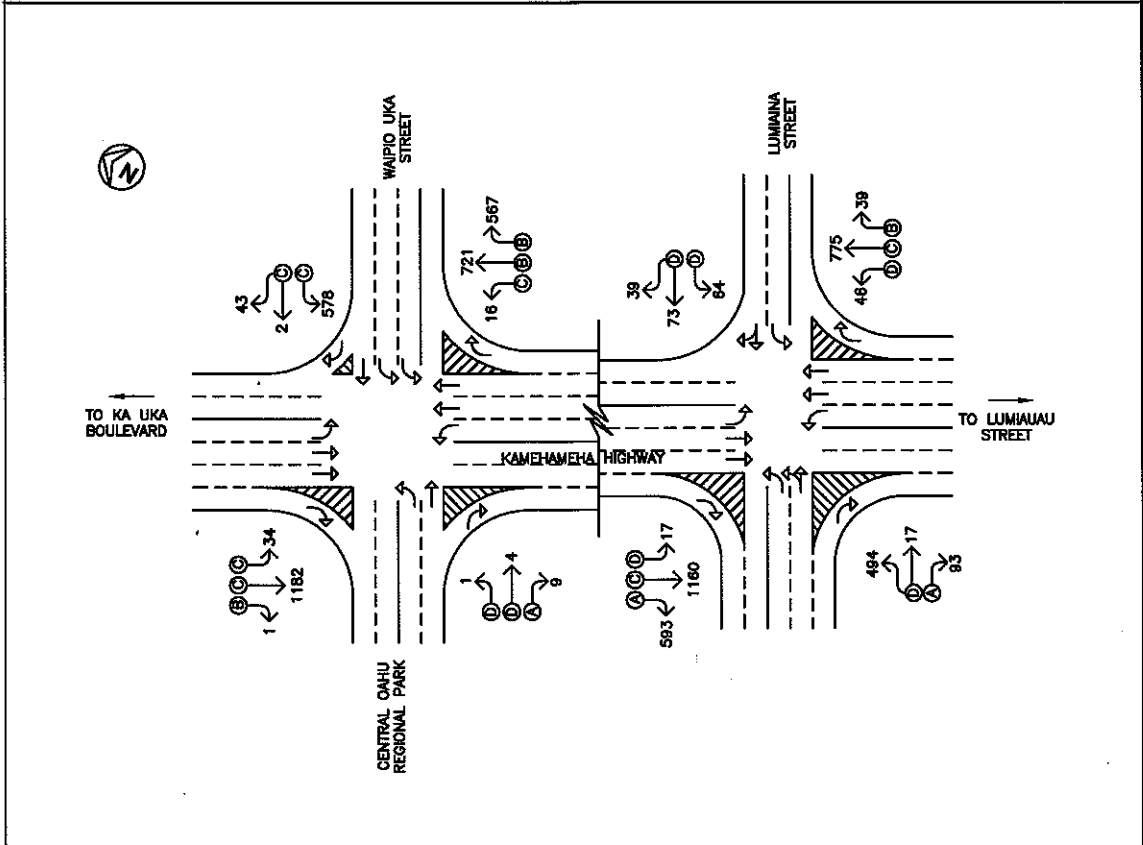
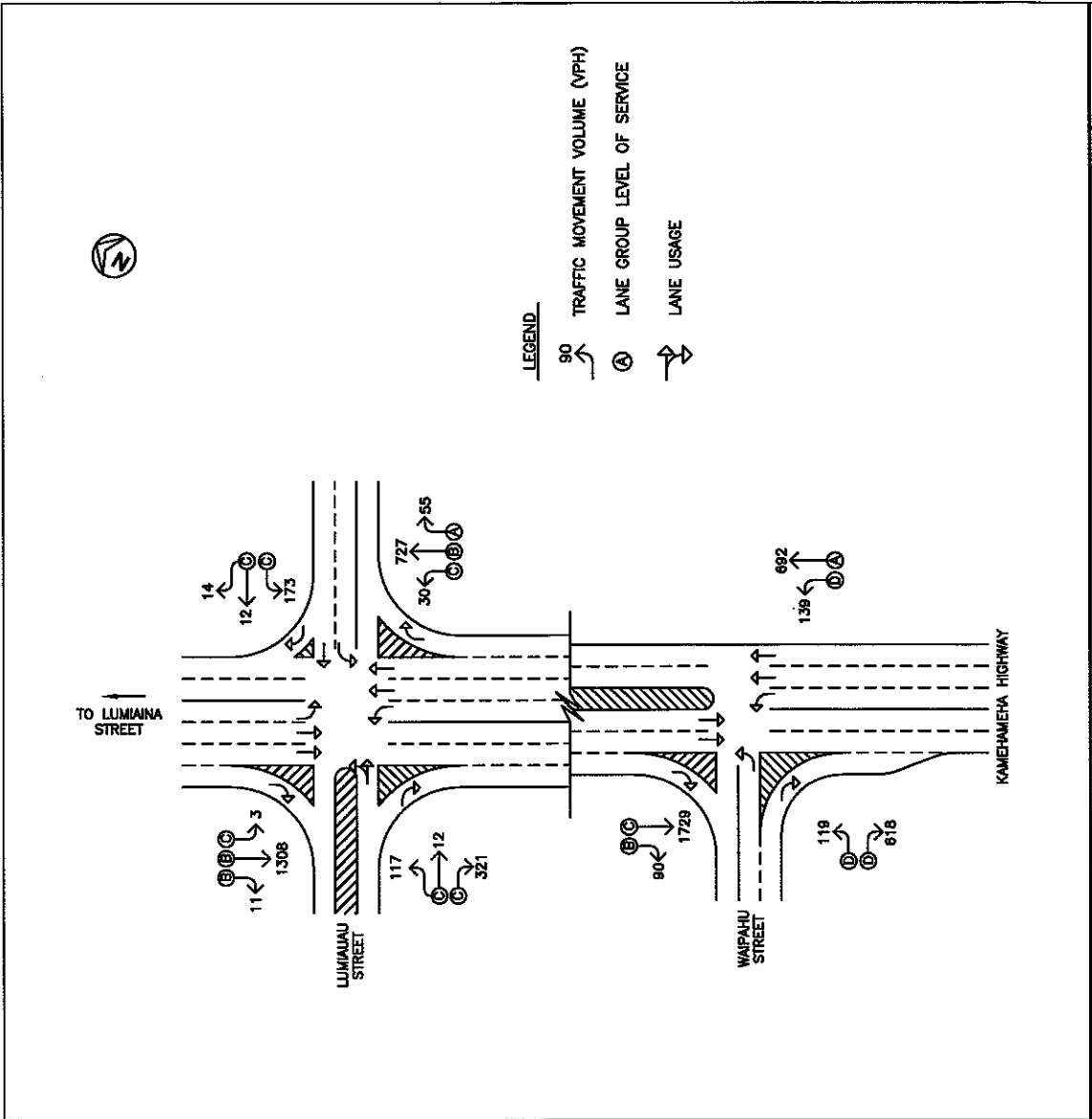
I. Year 2016 Traffic Projections With Koa Ridge Makai and Waiawa Developments

The cumulative Year 2016 AM and PM peak hour traffic conditions resulting from the projected external traffic, ambient growth, other developments in the region, and the Koa Ridge Makai and Waiawa developments are shown in Figures 25 to 28, and summarized in Table 12. The *Year 2016 With Project* scenario assumes no additional transportation improvement is constructed as assumed under *Year 2016 Without Project* scenario. Therefore, the decrease in levels of service is a result of additional traffic generated by Koa Ridge Makai and Castle and Cooke Waiawa Developments. The projected Year 2016 operating conditions without the proposed



LEGEND
 90 TRAFFIC MOVEMENT VOLUME (VPH)
 LANE GROUP LEVEL OF SERVICE
 LANE USAGE

YEAR 2016 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS
KA UKA BOULEVARD



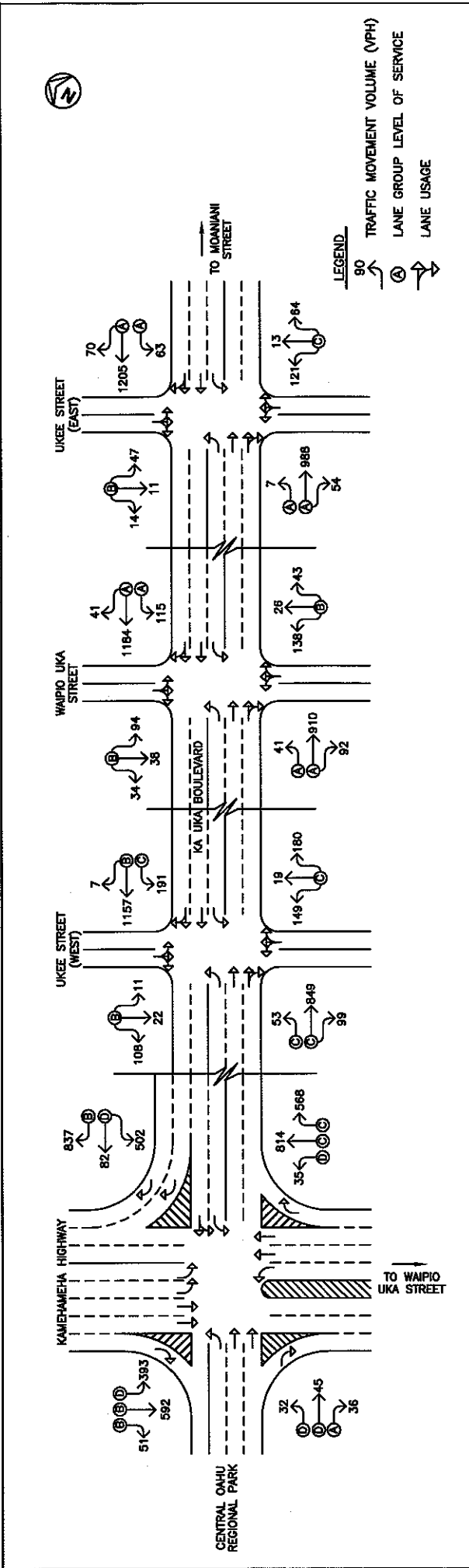
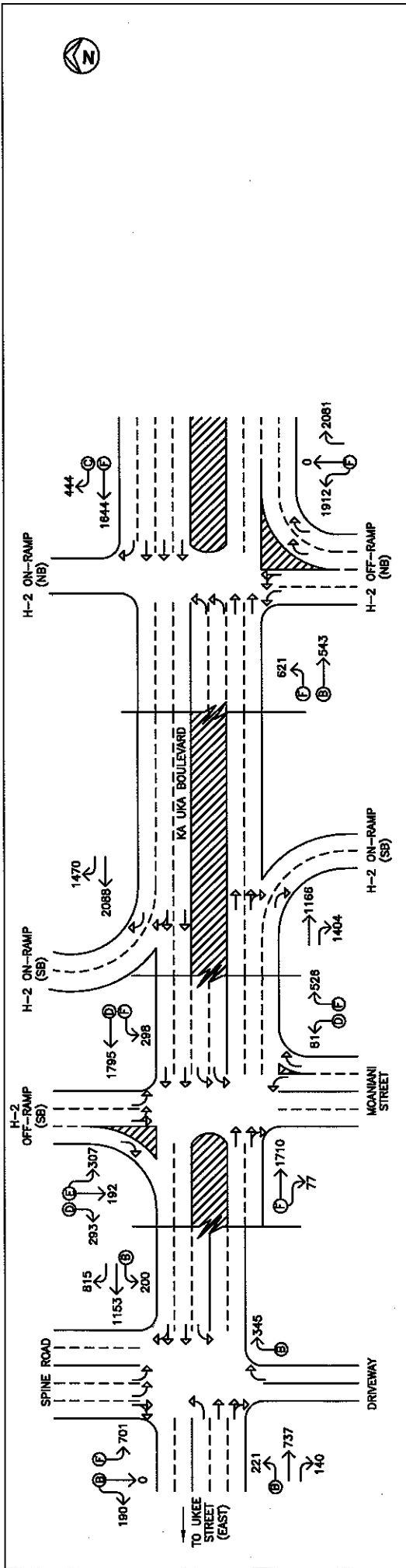
COA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2016 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS

KAMEHAMEHA HIGHWAY

FIGURE 26

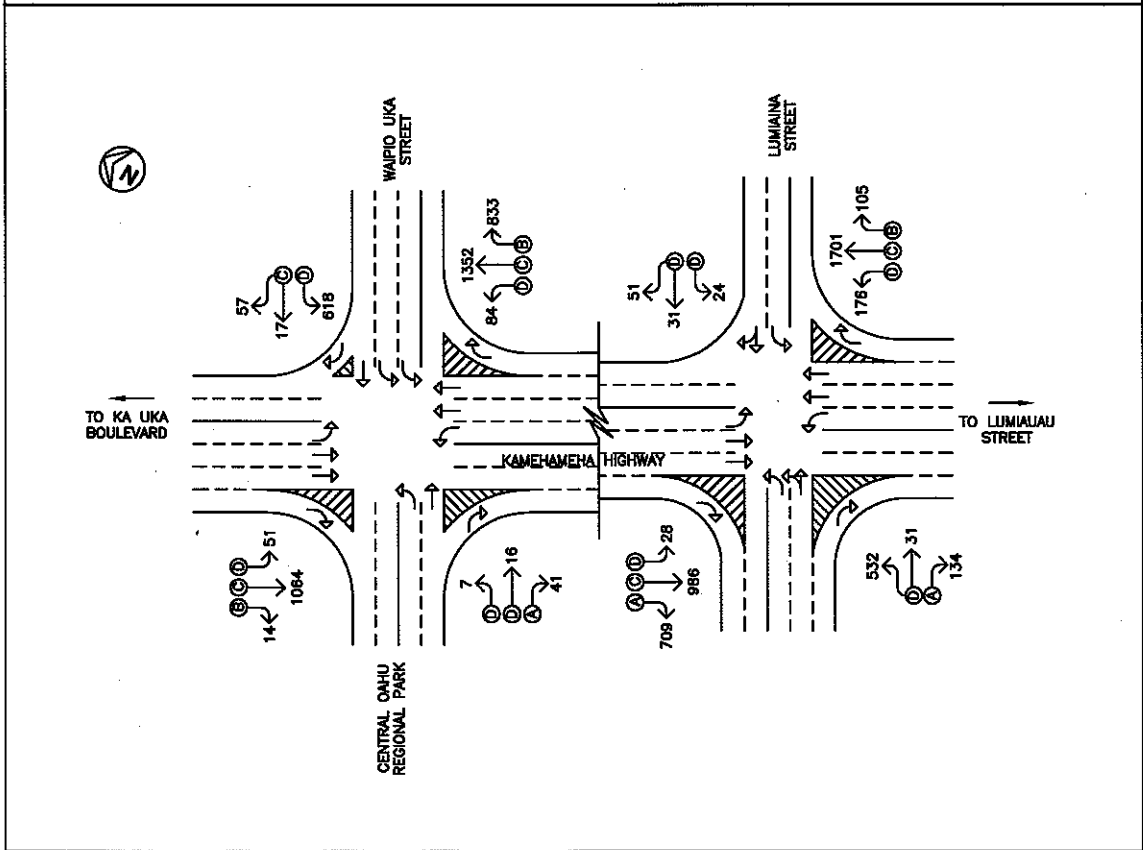
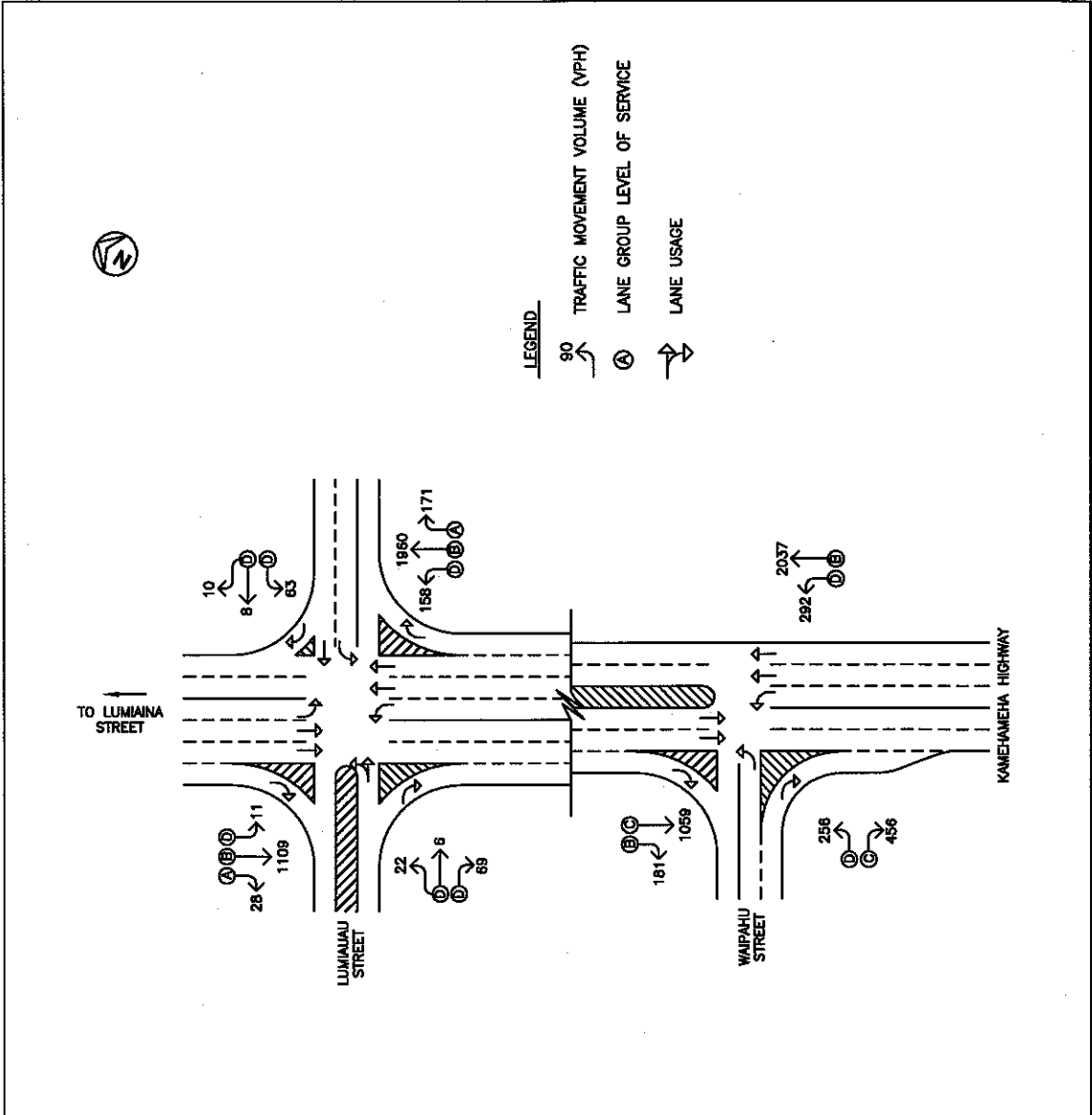




LEGEND

- 90
- TRAFFIC MOVEMENT VOLUME (VPH)
- LANE GROUP LEVEL OF SERVICE
- LANE USAGE

YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS
KA UKA BOULEVARD



YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS
KAMEHAMEHA HIGHWAY

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

FIGURE 28

developments are provided for comparison purposes. The LOS calculations are included in Appendix I under separate cover.

**Table 12: Projected Year 2016
(Without and With Koa Ridge Makai and Waiawa Projects LOS)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ Proj*	Year 2016 w/out Proj	Year 2016 w/ Proj*
Ka Uka Blvd/ Waipio IC NB Ramps/	Eastbound	LT	B	D	C	F
		TH	B	A	C	B
	Westbound	TH	C	C	C	F
		RT	C	B	C	B
Northbound	LT-TH	B	B	C	F	
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	C	D	D	F
	Westbound	LT	D	E	D	F
		TH	B	B	C	D
	Northbound	LT	C	C	C	D
		RT	D	E	D	F
	Southbound	LT-TH	D	D	D	E
RT	C	D	D	D		
Ka Uka Blvd/ Driveway	Eastbound	LT	-	A	-	B
		TH-RT	-	-	-	-
	Westbound	LT	A	B	A	B
		TH	-	-	-	-
		RT	-	-	-	-
	Northbound	RT	B	B	B	B
Southbound	LT	-	F	-	F	
	TH-RT	-	B	-	B	
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	B	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	C	B	C
Southbound	LT-TH-RT	B	C	B	B	
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	B	B
	Southbound	LT-TH-RT	B	B	B	B

* Assumes no additional intersection or roadway improvements.

**Table 12: Projected Year 2016
(Without and With Koa Ridge Makai and Waiawa Projects)
Levels of Service**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ Proj*	Year 2016 w/out Proj	Year 2016 w/ Proj*
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	C	C
		TH-RT	C	B	C	C
	Westbound	LT	C	C	C	C
		TH-RT	B	B	C	B
	Northbound	LT-TH-RT	C	C	C	C
Southbound	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	C	D	D	D
		TH	C	D	D	D
		RT	A	A	A	A
	Westbound	LT-TH	C	C	C	D
		RT	A	A	A	B
	Northbound	LT	C	C	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
TH		B	B	B	B	
RT		A	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	D	C	D	D
		TH	B	B	C	C
		RT	B	B	C	B
	Southbound	LT	D	C	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

* Assumes no additional intersection or roadway improvements.

**Table 12: Projected Year 2016
(Without and With Koa Ridge Makai and Waiawa Projects)
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Proj	Year 2016 w/ Proj*	Year 2016 w/out Proj	Year 2016 w/ Proj*
Kamehameha Hwy/ Lumiaina St	Northbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	C	D
		RT	A	C	A	D
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	D
	Northbound	LT	C	C	C	D
		TH	B	B	B	B
		RT	A	A	A	A
	Southbound	LT	C	C	D	D
		TH	B	B	B	B
		RT	A	B	A	A
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	C	D
		RT	D	D	B	C
	Northbound	LT	C	D	C	D
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

* Assumes no additional intersection or roadway improvements.

The cumulative volumes shown consist of site-generated traffic superimposed over Year 2016 without project traffic demands. The implementation of intersection and roadway improvements identified above for the *Year 2016 Without Castle & Cooke Project* analysis scenario is also assumed. Castle & Cooke Homes Hawaii has indicated a commitment to fund and construct identified improvements. Waipio Interchange improvements may be part of a cost-sharing agreement between Castle & Cooke Homes Hawaii and Waiawa Ridge Development.

Improvement to the northbound off-ramp at the Waipio Interchange as a result of increased traffic demands include an Interstate H-2 northbound off-

ramp to westbound Ka Uka Boulevard located in the northeast quadrant of the Waipio Interchange. Among other proposed improvements to the interchange, several other alternatives were considered to mitigate adverse traffic impacts at the Waipio Interchange northbound off-ramp. These alternatives include: a loop on-ramp located in the southeast quadrant of the interchange, and several flyover alignments from the northbound off-ramp to westbound Ka Uka Boulevard. However, Castle & Cooke Homes Hawaii and the State Department of Transportation have agreed in concept to pursue the northbound off-ramp alternative as one of the traffic mitigating measures for the interchange.

The following are additional improvements needed by Year 2016 as a result of additional trips generated by Koa Ridge Makai and Waiawa Developments for Year 2016:

Ka Uka Boulevard/Interstate H-2 Northbound Off-Ramp

- Provide an auxiliary lane for the northbound off-ramp resulting in two off-ramp lanes to eastbound Ka Uka Boulevard.
- Provide a northbound loop off-ramp located in the northeast quadrant of the Waipio Interchange. Relocate the existing northbound on-ramp to accommodate the new loop ramp.

Ka Uka Boulevard/Interstate H-2 Southbound Off-Ramp/Moaniani Street

- Modify westbound approach to include an additional through movement lane, resulting in two-left turn lanes and three through movement lanes.
- Modify the traffic signal phasing at the intersection to allow for simultaneous left-turn movements on the northbound and southbound approaches. Intersection geometry may need to be adjusted to provide adequate vehicle spacing to accommodate turning maneuvers.

Ka Uka Boulevard/Commercial Use Driveway/New Spine Road

- Three lanes on the southbound approach of the Spine Road (Koa Ridge Makai Access) to accommodate two exclusive left-turn lanes and a shared through and right-turn lane.
- Provide an exclusive right-turn lane on the westbound approach of Ka Uka Boulevard between the H-2 southbound off-ramp and Spine Road.
- Install a traffic signal system with protected left-turn movements along Ka Uka Boulevard.
- Provide an additional eastbound lanes between the Commercial Use Driveway and Moaniani Street.

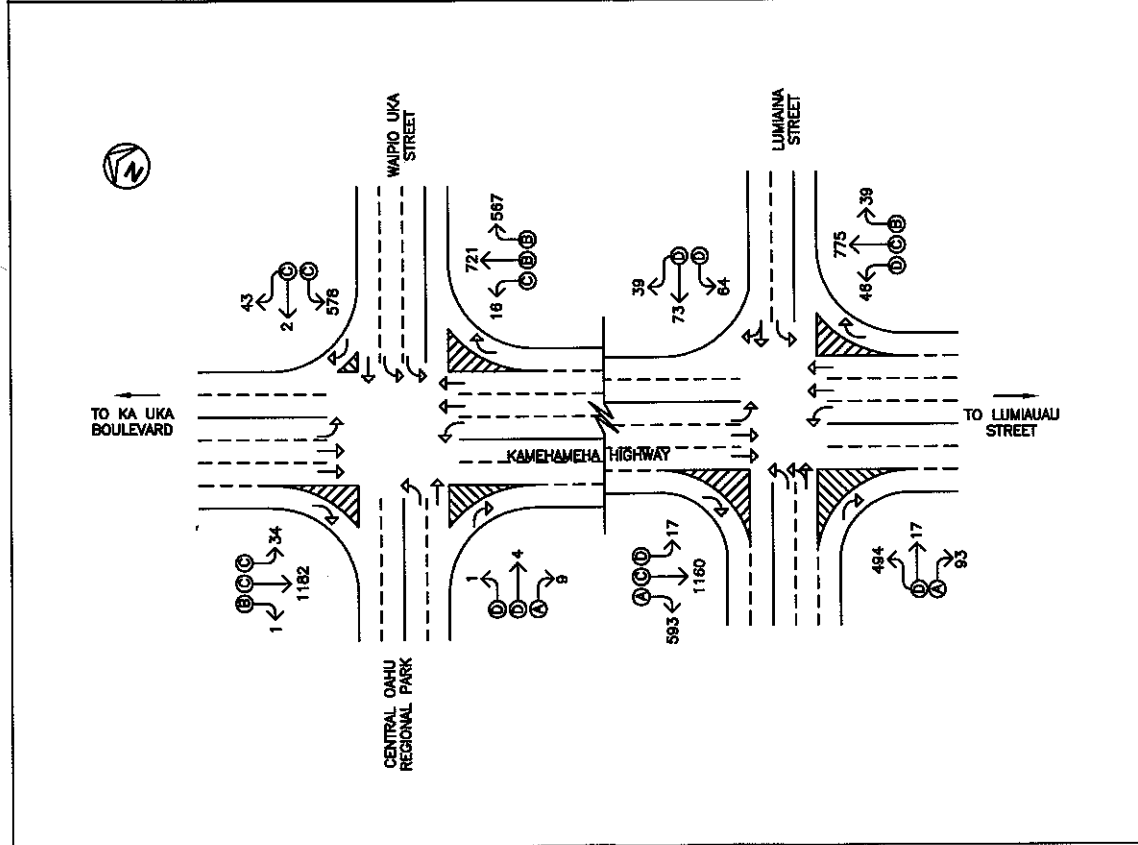
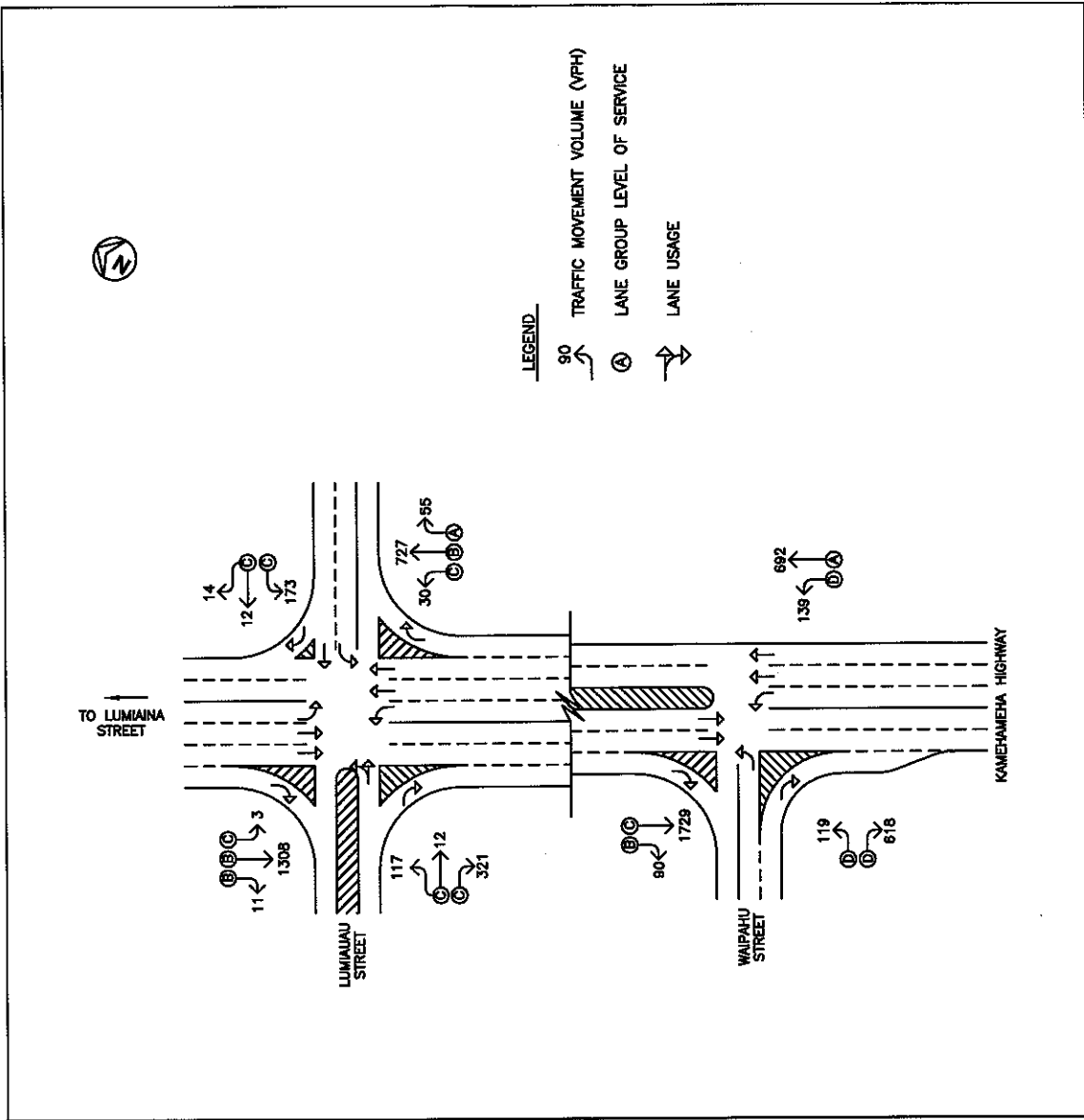
Miscellaneous Improvements

- Coordinate the traffic signal systems along the entire length of Ka Uka Boulevard to improve traffic flow progression along the roadway.

J. Year 2016 Traffic Projections With Koa Ridge Makai and Waiawa Developments (With Additional Improvements)

1. General

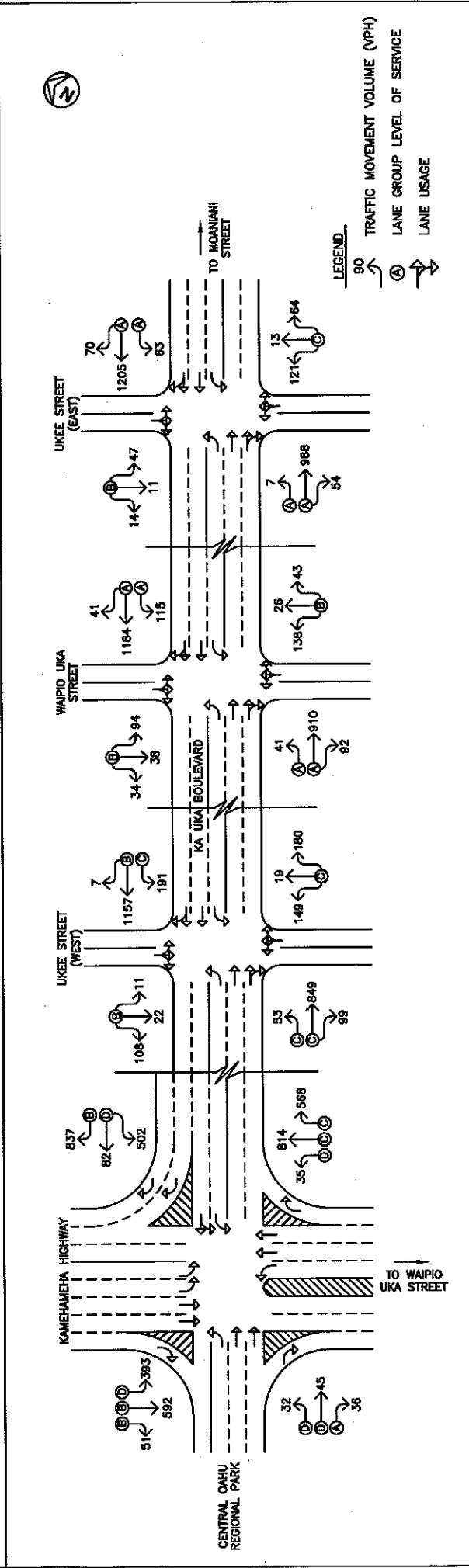
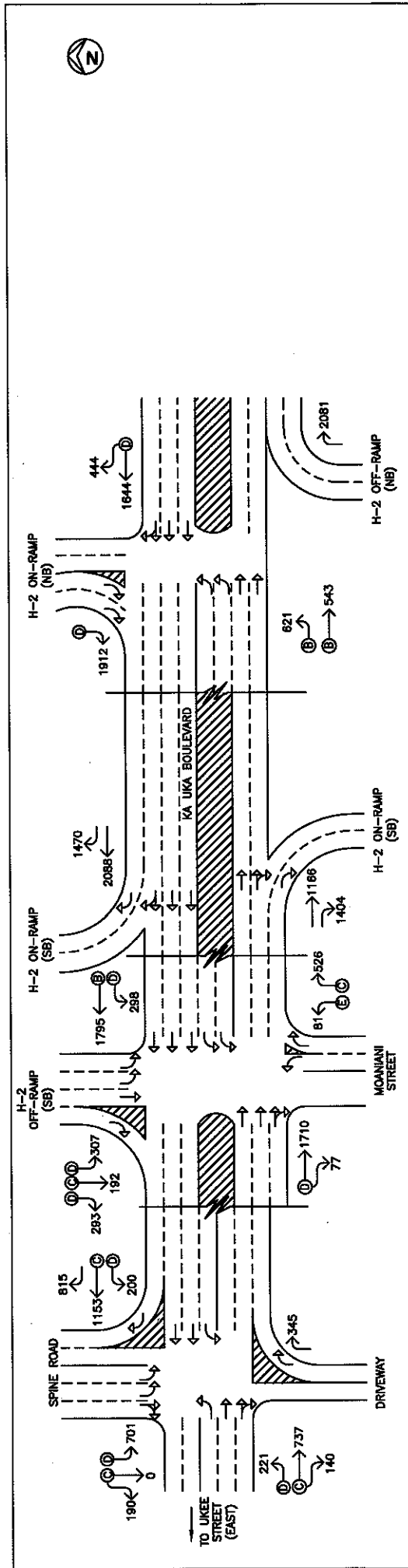
Figures 29 to 32 show the resulting traffic operational improvements as a result of the implementation of additional roadway and intersection improvements identified above. The levels of service for Year 2016 With Koa Ridge Makai and Castle and Cooke Waiawa Developments, incorporating the additional roadway improvements are summarized in Table 13. The resulting levels of service without the additional improvements are provided for comparison. The LOS calculations are provided in Appendix J under separate cover.



YEAR 2016 AM PEAK HOUR OF TRAFFIC WITH PROJECT AND ADDITIONAL IMPROVEMENTS
KAMEHAMEHA HIGHWAY

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

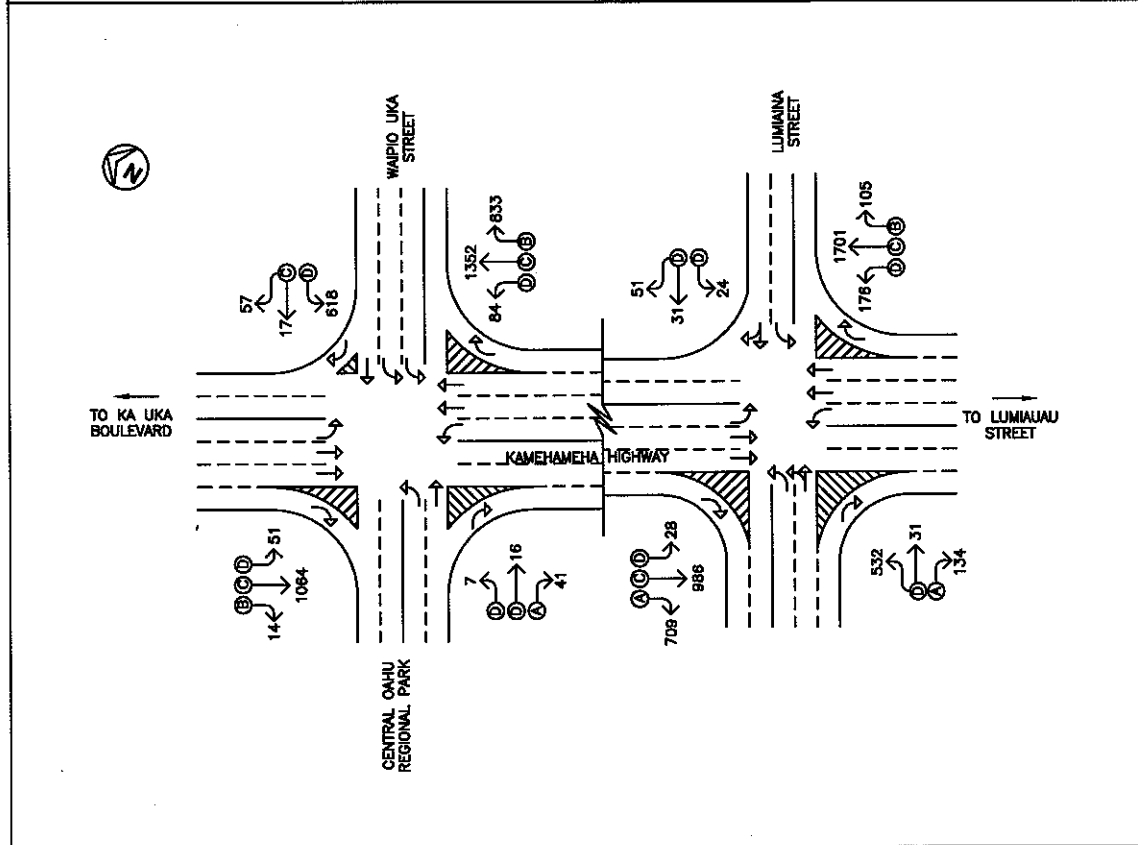
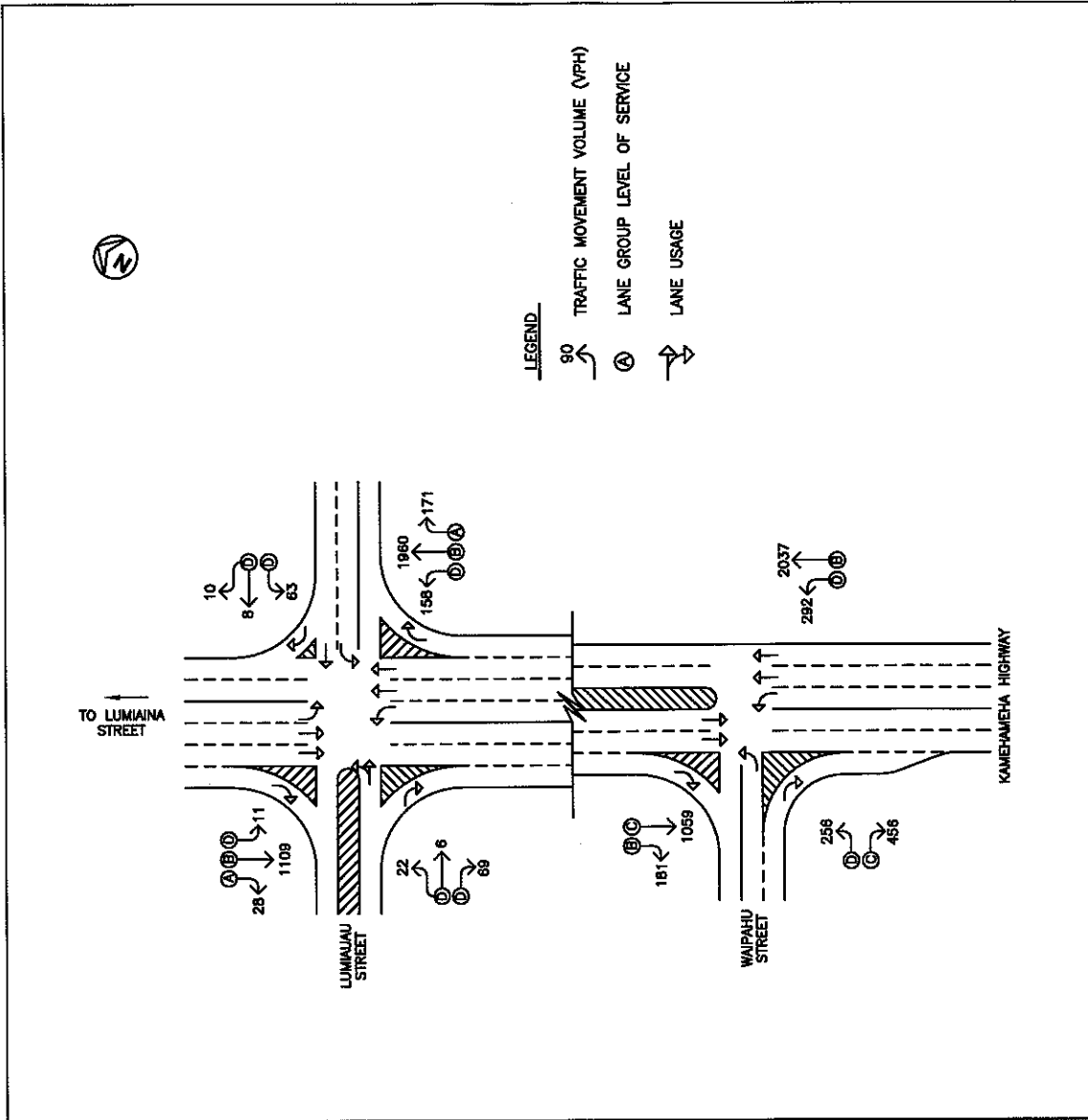
FIGURE 30



LEGEND

- 90 TRAFFIC MOVEMENT VOLUME (VPH)
- LANE GROUP LEVEL OF SERVICE
- LANE USAGE

YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT AND ADDITIONAL IMPROVEMENTS
KA UKA BOULEVARD



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2016 PM PEAK HOUR OF TRAFFIC WITH PROJECT AND ADDITIONAL IMPROVEMENTS

KAMEHAMEHA HIGHWAY

FIGURE 32

**Table 13: Projected Year 2016
(With Koa Ridge Makai and Waiawa Projects LOS)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Imp	Year 2016 w/ Imp*	Year 2016 w/out Imp	Year 2016 w/ Imp*
Ka Uka Blvd/ Waipio IC NB Ramps/	Eastbound	LT	D	B	F	B
		TH	A	A	B	B
	Westbound	TH	C	B	F	B
		RT	B	B	B	B
	Northbound	RT	B	-	F	-
Southbound	RT	-	B	-	D	
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	D	C	F	D
	Westbound	LT	E	D	F	D
		TH	B	A	D	B
	Northbound	LT	C	D	D	E
		RT	E	C	F	C
	Southbound	LT-TH	D	D	E	D
RT		D	C	D	D	
Ka Uka Blvd/ Driveway	Eastbound	LT	A	C	B	D
		TH-RT	-	C	-	C
	Westbound	LT	B	C	B	D
		TH	-	B	-	C
		RT	-	-	-	-
	Northbound	RT	B	-	B	-
	Southbound	LT	F	C	F	D
TH-RT		B	C	B	C	
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	C	C	C	C
Southbound	LT-TH-RT	C	C	B	B	
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	B	B
	Southbound	LT-TH-RT	B	B	B	B

* With proposed additional intersection or roadway improvements.

**Table 13: Projected Year 2016
(With Koa Ridge Makai and Waiawa Projects LOS)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Imp	Year 2016 w/ Imp*	Year 2016 w/out Imp	Year 2016 w/ Imp*
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	C	C
		TH-RT	B	B	C	C
	Westbound	LT	C	C	C	C
		TH-RT	B	B	B	B
	Northbound	LT-TH-RT	C	C	C	C
Southbound	LT-TH-RT	B	B	B	B	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT-TH	C	C	D	D
		RT	A	A	B	B
	Northbound	LT	C	C	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
TH		B	B	B	B	
RT		B	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	C	C	D	D
		TH	B	B	C	C
		RT	B	B	B	B
	Southbound	LT	C	C	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

* With proposed additional intersection or roadway improvements.

**Table 13: Projected Year 2016
(With Koa Ridge Makai and Waiawa Projects)
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/out Imp	Year 2016 w/ Imp*	Year 2016 w/out Imp	Year 2016 w/ Imp*
Kamehameha Hwy/ Lumiaina St	Northbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	D	D
		RT	C	C	D	D
	Westbound	LT	C	C	D	D
		TH-RT	C	C	D	D
	Northbound	LT	C	C	D	D
		TH	B	B	B	B
		RT	A	A	A	A
	Southbound	LT	C	C	D	D
		TH	B	B	B	B
		RT	B	B	A	A
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	D	D
		RT	D	D	C	C
	Northbound	LT	D	D	D	D
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

* With proposed additional intersection or roadway improvements.

2. Ka Uka Boulevard at Waipio Interchange Northbound Off-Ramp Intersection

At the intersection with the Waipio Interchange northbound on- and off-ramps, the eastbound approach of Ka Uka Boulevard is expected to service 183 vehicles with the eastbound through movement operating at LOS "A" during the projected AM peak period. During the PM peak period, the traffic volume would be greater with 543 vehicles traveling eastbound with the through movement operating at LOS "C".

The westbound approach of the intersection is expected to service 1,630 vehicles and 2,061 vehicles during the AM and PM peak periods, respectively. The westbound approach would operate at LOS "B" during the projected AM peak hours of traffic and LOS "C" during PM peak hours of traffic.

The northbound off-ramp intersection approach is expected to service 1,511 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour, the northbound intersection approach is expected to service 3,993 vehicles, and is expected to operate at LOS "C".

The southbound approach as a result of the new loop off-ramp is expected to operate at LOS "A" and LOS "B" during the AM and PM peak hours of traffic, respectively.

3. Ka Uka Boulevard at Waipio Interchange Southbound Loop On-Ramp

At the intersection with the Waipio Interchange southbound loop on-ramp, the westbound approach of Ka Uka Boulevard is expected to service a total of 2,296 vehicles while the southbound loop on-ramp services 1,274 vehicles during the AM peak hour of traffic. The eastbound traffic flow on Ka Uka Boulevard is expected to service 2,026 vehicles during the AM peak hour. During the PM peak hour of traffic, the westbound approach of Ka Uka Boulevard at the southbound loop on-ramp is expected to service a total of 3,558 vehicles with the southbound loop on-ramp servicing 1,470 vehicles. The eastbound traffic flow on Ka Uka Boulevard is expected to service 2,570 vehicles during the projected PM peak hour of traffic.

4. Ka Uka Boulevard at Moaniani Street/Waipio Interchange Southbound Off-Ramp

At the intersection with Moaniani Street and the Waipio Interchange southbound off-ramp, the westbound approach of Ka Uka Boulevard is expected to service 1,013 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D" and the through movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to carry a total of 2,093 vehicles with the

left-turn movement operating at LOS "D" and the through movement operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Moaniani Street and the southbound off-ramp is expected to service a total of 1,633 vehicles during the AM peak hour of traffic and operate at LOS "C". During the PM peak hour of traffic, the eastbound approach is expected to service 1,787 vehicles and operate at LOS "D" conditions.

The northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service a total 359 vehicles during the AM peak hour of traffic with the left-turn and right-turn movements operating at LOS "D" and LOS "C", respectively. Similarly, during the PM peak hour of traffic, the northbound approach of Moaniani Street at the Ka Uka Boulevard intersection is expected to service 607 vehicles with the left-turn and right-turn movements operating at LOS "E" and LOS "C" conditions, respectively.

The southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 501 vehicles during the AM peak hour of traffic with the approach operating at LOS "C", and the left-turn movement operating at LOS "D". During the PM peak hour of traffic, the southbound off-ramp at the Ka Uka Boulevard and Moaniani Street intersection is expected to service 792 vehicles with the approach operating at LOS "D".

5. Ka Uka Boulevard at Commercial Driveway

The westbound and eastbound approaches of Ka Uka Boulevard at the intersection with the commercial driveway is expected to service a total of 1,103 vehicles and 1,126 vehicles during the AM peak hour of traffic, respectively. The westbound left-turn movement is expected to operate at LOS "C". During the PM peak hour of traffic, the westbound approach is expected to service 2,168 vehicles while the eastbound approach services 1,098 vehicles. The westbound left-turn movement would operate at LOS "D".

The northbound approach of the driveway at the Ka Uka Boulevard intersection is expected to service 142 vehicles and 345 vehicles during the AM and PM peak hours of traffic, respectively, and operate as a free movement right-turn with the proposed additional eastbound lane on Ka Uka Boulevard.

6. Ka Uka Boulevard at Ukee Street (east)

At the intersection with Ukee Street (east), the westbound approach of Ka Uka Boulevard is expected to service 748 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,338 vehicles with the left-turn movement also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (east) is expected to service a total of 1,169 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "A". During the PM peak hour of traffic, the eastbound approach would service a total of 1,049 vehicles with the left-turn movement also operating at LOS "A" conditions.

The northbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection is expected to service a total 77 vehicles during the AM peak hour of traffic and operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (east) at Ka Uka Boulevard is expected to service 198 vehicles and operate at LOS "C". The southbound approach of Ukee Street (east) at the Ka Uka Boulevard intersection would service 20 vehicles during the AM peak hour and operate at LOS "C", while the southbound approach services 72 vehicles during the PM peak hour of traffic and operate at LOS "B".

7. Ka Uka Boulevard at Waipio Uka Street

At the intersection with Waipio Uka Street, the westbound approach of Ka Uka Boulevard is expected to service 625 vehicles during the AM peak hour of traffic with the left-turn, through, and right-turn movements all operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach would service a total of 1,340 vehicles with the left-turn, through, and right-turn movements also operating at LOS "A" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Waipio Uka Street is expected to service a total of 1,190 vehicles and 1,043 vehicles during the projected AM and PM peak hour of traffic, respectively. During both peak periods, all traffic movement on the eastbound approach of Ka Uka Boulevard at the Waipio Uka Street intersection would operate at LOS "A" conditions.

The northbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service a total of 206 vehicles during the AM peak hour of traffic and would operate at LOS "B". During the PM peak hour of traffic, the northbound approach of Waipio Uka Street at Ka Uka Boulevard is expected to service 207 vehicles and also would operate at LOS "B" conditions. The southbound approach of Waipio Uka Street at the Ka Uka Boulevard intersection is expected to service 75 vehicles during the AM peak hour and operate at LOS "B", while the southbound approach is expected to service 166 vehicles during the PM peak hour of traffic and would also operate at LOS "B" conditions.

8. Ka Uka Boulevard at Ukee Street (west)

At the intersection with Ukee Street (west), the westbound approach of Ka Uka Boulevard is expected to service 645 vehicles during the AM peak

hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movements operating at LOS B". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,355 vehicles with the left-turn movement operating at LOS "C" and the shared through and right-turn movements operating at LOS "B" conditions.

The eastbound approach of Ka Uka Boulevard at the intersection with Ukee Street (west) is expected to service a total of 1,004 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" and the shared through/right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, the eastbound approach is expected to service a total of 1,001 vehicles with the left-turn movement operating at LOS "C" conditions while the shared through/right-turn movements would also operate at LOS "C" conditions.

The northbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service a total 414 vehicles during the AM peak hour of traffic and would operate at LOS "C". During the PM peak hour of traffic, the northbound approach of Ukee Street (west) at Ka Uka Boulevard is expected to service 348 vehicles and would operate at LOS "C". The southbound approach of Ukee Street (west) at the Ka Uka Boulevard intersection is expected to service 17 vehicles during the AM peak hour and operates at LOS "B", while the southbound approach is expected to service 141 vehicles during the PM peak hour of traffic and also would operate at LOS "B".

9. Ka Uka Boulevard at Kamehameha Highway

At the intersection with Ka Uka Boulevard and the Kamehameha Highway, the westbound approach of Ka Uka Boulevard is expected to service 590 vehicles during the AM peak hour of traffic with the shared left-turn/through movements operating at LOS "C" and the right-turn movement operating at LOS "A". During the PM peak hour of traffic, the westbound Ka Uka Boulevard approach is expected to service a total of 1,421 vehicles with the shared left-turn/through movements operating at LOS "D" and the right-turn movement operating at LOS "B" conditions. The eastbound approach of Ka Uka Boulevard at the intersection with Kamehameha Highway is expected to service a total of 43 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for both the individual eastbound left-turn and shared through/right-turn traffic movements, respectively. During the PM peak hour of traffic, the eastbound approach is expected to service 113 vehicles with all of the individual movements generally operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total 767 vehicles during the AM peak hour of traffic with both the left-turn movement, and the through and right-turn movements all operating at LOS "C" conditions. During the

PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service a total of 1,417 vehicles with the left-turn movement operating at LOS "D", and the through movement and right-turn movement operating at LOS "C" conditions.

The southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,613 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C" conditions while the through and right-turn movements both would operate at LOS "B". During the PM peak hour of traffic, the southbound approach of Kamehameha Highway at the Ka Uka Boulevard intersection is expected to service 1,036 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "B" conditions.

10. Kamehameha Highway at Waipio Uka Street

At the intersection with Kamehameha Highway, the westbound approach of Waipio Uka Street is expected to service 623 vehicles during the AM peak hour of traffic with the left-turn and through movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Waipio Uka Street approach is expected to service a total of 692 vehicles with the left-turn movement operating at LOS "D" and the through and right-turn movements also operate at LOS "C" conditions.

The eastbound approach of Waipio Uka Street at the intersection with Kamehameha Highway is expected to service a total of 14 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements. During the PM peak hour of traffic, the eastbound approach is expected to service 64 vehicles with the left-turn and through movements also operating at LOS "D" conditions.

The northbound approach of Kamehameha Highway at the Waipio Uka Street intersection is expected to service a total 1,304 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 2,269 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" and LOS "B", respectively.

The southbound approach of Kamehameha Highway at the Waipio Uka Boulevard intersection is expected to service 1,217 vehicles during the AM peak hour of traffic with the left-turn movement and the through movement operating at LOS "C" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipio Uka Street intersection is expected to service 1,129 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "C" or better conditions.

11. Kamehameha Highway at Lumiaina Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiaina Street is expected to service 176 vehicles during the AM peak hour of traffic with the left-turn and shared through/right-turn movements operating at LOS "D". During the PM peak hour of traffic, the westbound Lumiaina Street approach is expected to service a total of 106 vehicles with the left-turn, through, and right-turn movements also operating at LOS "D" conditions.

The eastbound approach of Lumiaina Street at the intersection with Kamehameha Highway is expected to service 604 vehicles during the AM peak hour of traffic resulting in LOS "D" conditions for the left-turn and through movements, and LOS "A" conditions for the right-turn movements. During the PM peak hour of traffic, the eastbound approach is expected to service 697 vehicles with the left-turn/through movements operating at LOS "D" while the right-turn movement operate at LOS "A".

The northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service a total 860 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and both the through and right-turn movements operating at LOS "C" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,982 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,770 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", the through movement also operating at LOS "C", and the right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiaina Street intersection is expected to service 1,723 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "C", and the right-turn movement operating at LOS "B" conditions.

12. Kamehameha Highway at Lumiauau Street

At the intersection with Kamehameha Highway, the westbound approach of Lumiauau Street is expected to service 199 vehicles during the AM peak hour of traffic with both the left-turn and shared through/right-turn movements operating at LOS "C" conditions. During the PM peak hour of traffic, the westbound Lumiauau Street approach is expected to service a total of 81 vehicles with the left-turn operating at LOD "D", and the shared through/right-turn movements also operating at LOS "D", conditions.

The eastbound approach of Lumiauau Street at the intersection with Kamehameha Highway is expected to service 450 vehicles during the AM peak hour of traffic resulting in LOS "C" conditions for the shared left-turn/through movements, and also LOS "C" conditions for the right-turn movement. During the PM peak hour of traffic, the eastbound approach is expected to service 97 vehicles with the shared left-turn/through movements operating at LOS "D" while the right-turn movement also operating at LOS "D". The northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service a total 812 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", and both the through and right-turn movements operating at LOS "B" or better conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 2,289 vehicles with the left-turn movement operating at LOS "D", and the through and right-turn movements operating at LOS "B" or better conditions.

The southbound approach of Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,322 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "C", the through movement operating at LOS "B", and the right-turn movement also operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Lumiauau Street intersection is expected to service 1,148 vehicles with the left-turn movement operating at LOS "D", the through movement operating at LOS "B", and the right-turn movement operating at LOS "A" conditions.

13. Kamehameha Highway at Waipahu Street

At the intersection with Kamehameha Highway, the eastbound approach of Waipahu Street is expected to service 737 vehicles during the AM peak hour of traffic with both the left-turn and right-turn movements both operating at LOS "D". During the PM peak hour of traffic, the eastbound Waipahu Street approach is expected to service a total of 712 vehicles with the left-turn and right-turn movements operating at LOS "D" and LOS "C", respectively.

The northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service a total 831 vehicles during the AM peak hour of traffic with the left-turn movement operating at LOS "D", and the through movement operating at LOS "A" conditions. During the PM peak hour of traffic, the northbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 2,329 vehicles with the left-turn movement also operating at LOS "D" and the through movement operating at LOS "B".

The southbound approach of Kamehameha Highway at the Waipahu Street intersection is expected to service 1,819 vehicles during the AM peak

hour of traffic with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions. During the PM peak hour of traffic, southbound Kamehameha Highway at the Waipahu Street intersection is expected to service 1,240 vehicles with the through movement operating at LOS "C" and the right-turn movement operating at LOS "B" conditions.

14. Interstate H-2 Freeway Segments

During the projected Year 2016 AM peak hour of traffic with the proposed project and additional improvements, the Interstate H-2 Freeway south of the Waipio Interchange would carry 3,778 vehicles northbound and 6,277 vehicles southbound. The northbound and southbound freeway segments along H-2 south of the Waipio Interchange would both operate at LOS "B" during the projected Year 2016 AM peak hour of traffic with the proposed project. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing. However, queuing further south as a result of spillback conditions from the Waiawa Interchange is expected to continue. No vehicular queuing is expected in the northbound direction during the projected Year 2016 AM peak hour of traffic.

North of the Waipio Interchange, the Interstate H-2 Freeway would carry approximately 2,836 vehicles northbound and 4,037 vehicles southbound during the projected morning peak hours of traffic and would both operate at LOS "B". Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing during the projected morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway south of the Waipio Interchange would carry 7,350 vehicles northbound and 5,273 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments south of the Waipio Interchange would operate at LOS "C" and LOS "B", respectively, during the projected Year 2016 PM peak hours of traffic with the project. No significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic without the proposed project.

North of the Waipio Interchange, the Interstate H-2 Freeway is expected to carry approximately 4,421 vehicles northbound and 3,191 vehicles during the projected PM peak hours of traffic. This freeway segment is expected to operate at LOS "C" and LOS "B", respectively, during the PM peak hours of traffic with the proposed project. Based on simulation modeling, no significant queuing is expected along this freeway segment during the projected Year 2016 PM peak hours of traffic with the project.

15. Waipio Interchange Ramp Merge/Diverge Operations

During projected Year 2016 AM peak hour traffic operations with the proposed project, the Interstate H-2 Freeway northbound off-ramp at the Waipio Interchange would operate at LOS "A" conditions with the committed

implementation of the northbound loop on-ramp identified in earlier sections of this document. The existing configuration of the northbound on-ramp to service westbound Ka Uka Boulevard traffic east of the interchange destined to areas north via the northbound Interstate H-2 Freeway would continue to operate at LOS "B" conditions while the northbound loop on-ramp operate at LOS "A". The southbound loop on-ramp would operate at LOS "C" during the projected Year 2016 with the project while the existing southbound on-ramp accommodating eastbound Ka Uka Boulevard traffic destined to areas south via the Interstate H-2 Freeway would continue to operate at LOS "C" during the project Year 2016 AM peak hours of traffic with the project. The southbound off-ramp would continue to operate at LOS "C" conditions during the same period. With the committed improvement to extend the northbound off-ramp capacity by providing a three-lane off-ramp, merge and diverge conditions at all of the ramps of the Waipio Interchange would operate at LOS "C" or better, with no anticipated queuing at the ramp and freeway interfaces during the Year 2016 M peak hour.

During the projected Year 2016 PM peak hour of traffic, the northbound off-ramp at the Waipio Interchange would operate at LOS "F" with queuing anticipated at the ramp junction without additional ramp improvements. To accommodate ramp diverge conditions, and to accommodate the ramp 95th percentile projected queue, the ramp should be extended by a total of 1,600 feet upstream from the ramp gore, and providing a three-lane off-ramp thereafter downstream. The off-ramp traffic operations with the improvement would result in LOS "B" conditions. Based on simulation modeling, no queuing effects would be anticipated on the freeway due to the proposed improvement to extend the ramp deceleration lane, including the committed improvement to provide three off-ramp lanes downstream from the ramp and freeway interface. The northbound loop on-ramp would also operate well at LOS "B" during the projected Year 2016 PM peak hour of traffic with the project, while the existing configuration of the northbound on-ramp serving westbound traffic from areas east of the freeway also operate at LOS "B" conditions.

The southbound loop on-ramp and existing southbound on-ramp configuration would both operate at LOS "C", while the southbound off-ramp also operate at LOS "C" during the projected Year 2016 PM peak hour of traffic with the project. Based on modeling and traffic simulations, the merge and diverge operations are not expected to result in queuing on to the freeway.

Table 14 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway and at the Waipio Interchange for Year 2016 with project conditions. The Year 2016 With Project Conditions with no additional transportation improvement are provided for comparison.

Table 14: Summary of Year 2016 (With Koa Ridge Makai and Waiawa Projects) Interstate H-2 Freeway Segment and Ramp LOS Operations

Freeway Segment/ Interchange Ramp	2016 AM Peak		2016 PM Peak	
	Without Imp	With Imp*	Without Imp	With Imp*
NB segment south of Waipio Interchange	B	B	D	C
NB segment north of Waipio Interchange	B	B	C	C
SB segment south of Waipio Interchange	B	B	B	B
SB segment north of Waipio Interchange	B	B	B	B
NB Off-ramp	B	A	B	B
NB On-ramp	B	B	B	B
NB Loop Off-ramp	A	A	B	B
SB On-ramp	C	C	C	C
SB Loop On-Ramp	C	C	C	C
SB Off-ramp	C	C	C	C

* With proposed additional Interchange improvements.

K. Koa Ridge Makai and Waiawa Year 2025 Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this phase of the project is also based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. Similar to the projected Year 2016 traffic analysis and for the purposes of this report as recommended by SDOT, 15% of site-generated trips were conservatively assumed as internal trips. Tables 15 and 16 summarize the net project site trip generation characteristics applied to the Year 2025 AM and PM peak hours of traffic.

**Table 15: Koa Ridge Makai Peak Hour Trip Generation
(External Trips Only)**

YEAR 2025 (additional to Year 2016 projections)		
SINGLE-FAMILY DETACHED HOUSING		
INDEPENDENT VARIABLE:		# of Dwelling Units = 575
		PROJECTED TRIP ENDS
AM PEAK	ENTER	92
	EXIT	275
	TOTAL	367
PM PEAK	ENTER	311
	EXIT	183
	TOTAL	494
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 589
		PROJECTED TRIP ENDS
AM PEAK	ENTER	37
	EXIT	183
	TOTAL	220
PM PEAK	ENTER	174
	EXIT	86
	TOTAL	260
MULTI-FAMILY HOUSING (APARTMENT)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 945
		PROJECTED TRIP ENDS
AM PEAK	ENTER	82
	EXIT	328
	TOTAL	410
PM PEAK	ENTER	324
	EXIT	174
	TOTAL	498
RETAIL (SHOPPING CENTER)		
INDEPENDENT VARIABLE:		1,000 sf of development = 75
		PROJECTED TRIP ENDS
AM PEAK	ENTER	40
	EXIT	25
	TOTAL	65
PM PEAK	ENTER	115
	EXIT	124
	TOTAL	239

**Table 15: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

HOTEL		
INDEPENDENT VARIABLE:		# of Rooms = 150
		PROJECTED TRIP ENDS
AM PEAK	ENTER	43
	EXIT	28
	TOTAL	71
PM PEAK	ENTER	40
	EXIT	36
	TOTAL	76
HOSPITAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 196
		PROJECTED TRIP ENDS
AM PEAK	ENTER	134
	EXIT	66
	TOTAL	200
PM PEAK	ENTER	65
	EXIT	132
	TOTAL	197
GENERAL OFFICE BUILDING		
INDEPENDENT VARIABLE:		1,000 sf of development = 20
		PROJECTED TRIP ENDS
AM PEAK	ENTER	23
	EXIT	3
	TOTAL	26
PM PEAK	ENTER	4
	EXIT	21
	TOTAL	25
GENERAL LIGHT INDUSTRIAL		
INDEPENDENT VARIABLE:		1,000 sf of development = 40
		PROJECTED TRIP ENDS
AM PEAK	ENTER	28
	EXIT	4
	TOTAL	32
PM PEAK	ENTER	4
	EXIT	29
	TOTAL	33

**Table 15: Koa Ridge Makai Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2025 TOTALS (additional to Year 2016 projections)		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	479
	EXIT	912
	TOTAL	1391
PM PEAK	ENTER	1037
	EXIT	785
	TOTAL	1822

**Table 16: Waiawa Peak Hour Trip Generation
(External Trips Only)**

YEAR 2025 (additional to Year 2016 projections)		
SINGLE-FAMILY DETACHED HOUSING		
INDEPENDENT VARIABLE:		# of Dwelling Units = 255
		PROJECTED TRIP ENDS
AM PEAK	ENTER	41
	EXIT	122
	TOTAL	163
PM PEAK	ENTER	138
	EXIT	81
	TOTAL	219
MULTI-FAMILY HOUSING (CONDOMINIUM/TOWNHOUSE)		
INDEPENDENT VARIABLE:		# of Dwelling Units = 1,045
		PROJECTED TRIP ENDS
AM PEAK	ENTER	66
	EXIT	325
	TOTAL	391
PM PEAK	ENTER	309
	EXIT	152
	TOTAL	461

**Table 16: Waiawa Peak Hour Trip Generation (Cont'd)
(External Trips Only)**

YEAR 2025 (additional to Year 2016 projections)		
RETAIL (SHOPPING CENTER)		
INDEPENDENT VARIABLE:		1,000 sf of development = 30
		PROJECTED TRIP ENDS
AM PEAK	ENTER	16
	EXIT	10
	TOTAL	26
PM PEAK	ENTER	46
	EXIT	50
	TOTAL	96
ELEMENTARY SCHOOL		
INDEPENDENT VARIABLE:		Students = 375
		PROJECTED TRIP ENDS
AM PEAK	ENTER	17
	EXIT	14
	TOTAL	31
PM PEAK	ENTER	7
	EXIT	8
	TOTAL	15
YEAR 2025 TOTALS (additional to Year 2016 projections)		
		PROJECTED TRIP ENDS
AM PEAK	ENTER	140
	EXIT	471
	TOTAL	611
PM PEAK	ENTER	500
	EXIT	291
	TOTAL	791

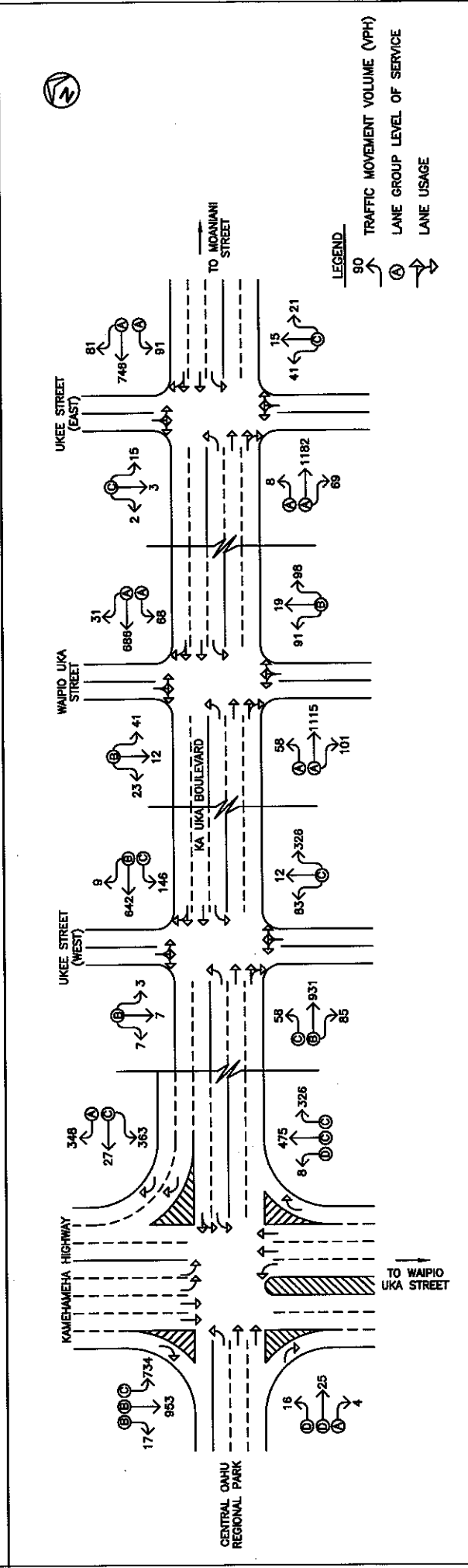
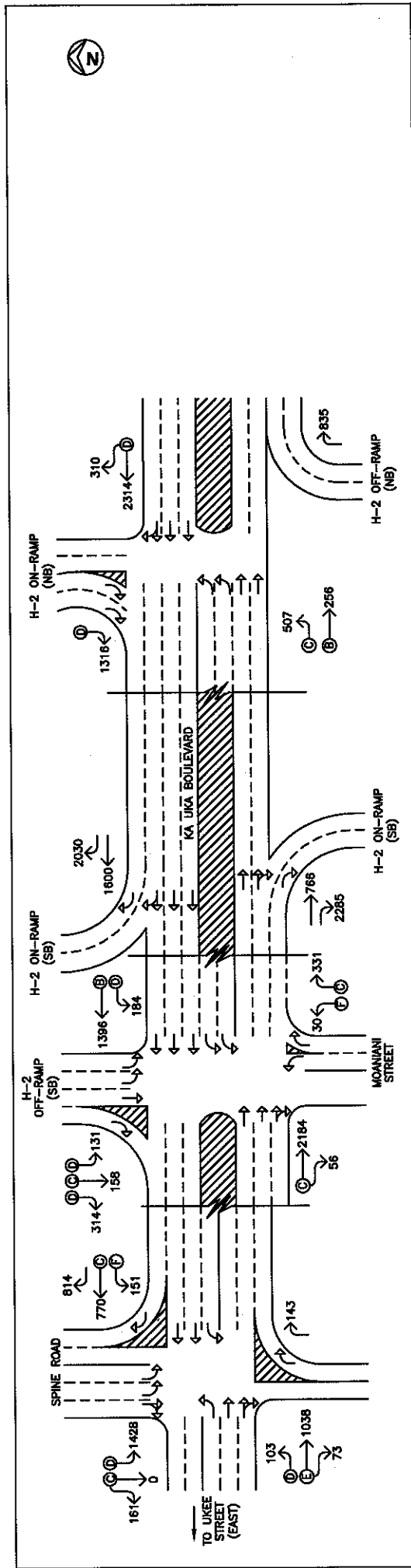
2. Trip Distribution

The distribution of project-related traffic on the surrounding roadways and study intersections for projected Year 2025 traffic demands follow the pattern as Year 2016 traffic demands described in previous sections of this document and is based on the travel patterns of traffic in the vicinity.

L. Year 2025 Traffic Projections With Koa Ridge Makai and Waiawa Developments (No Additional Improvements)

1. General

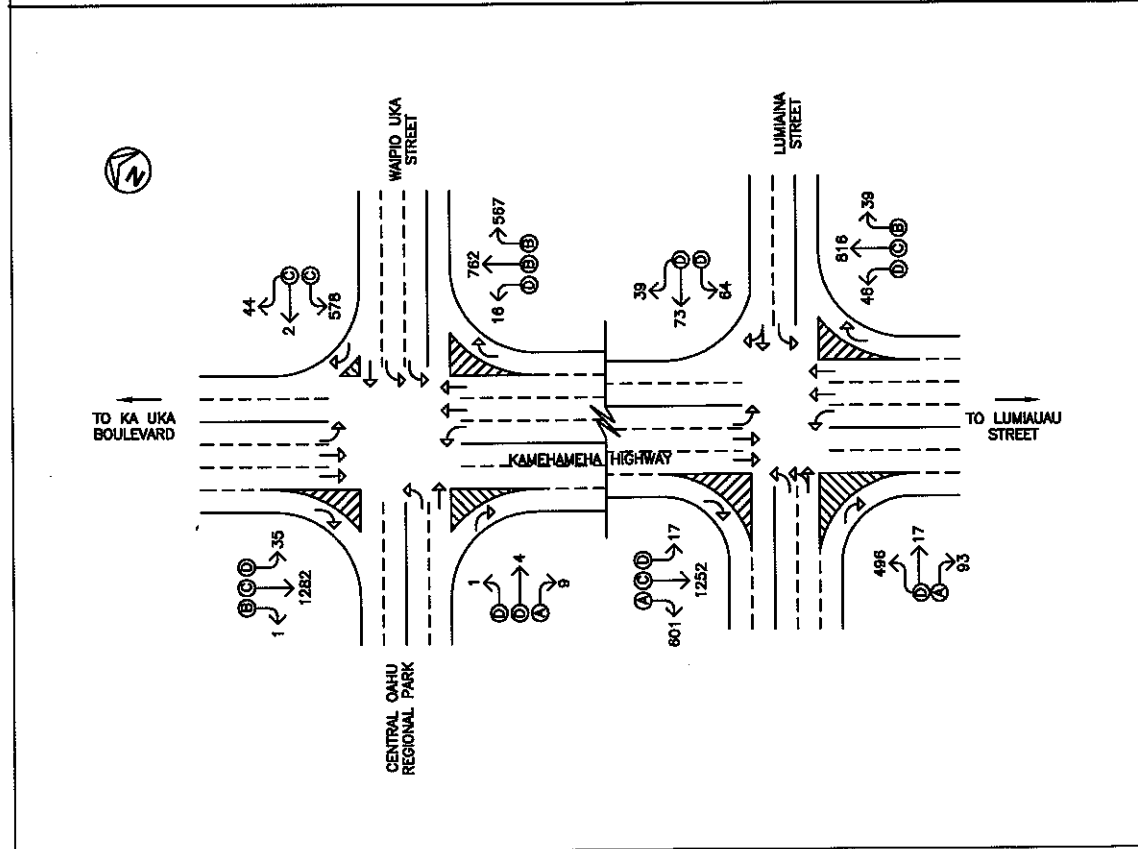
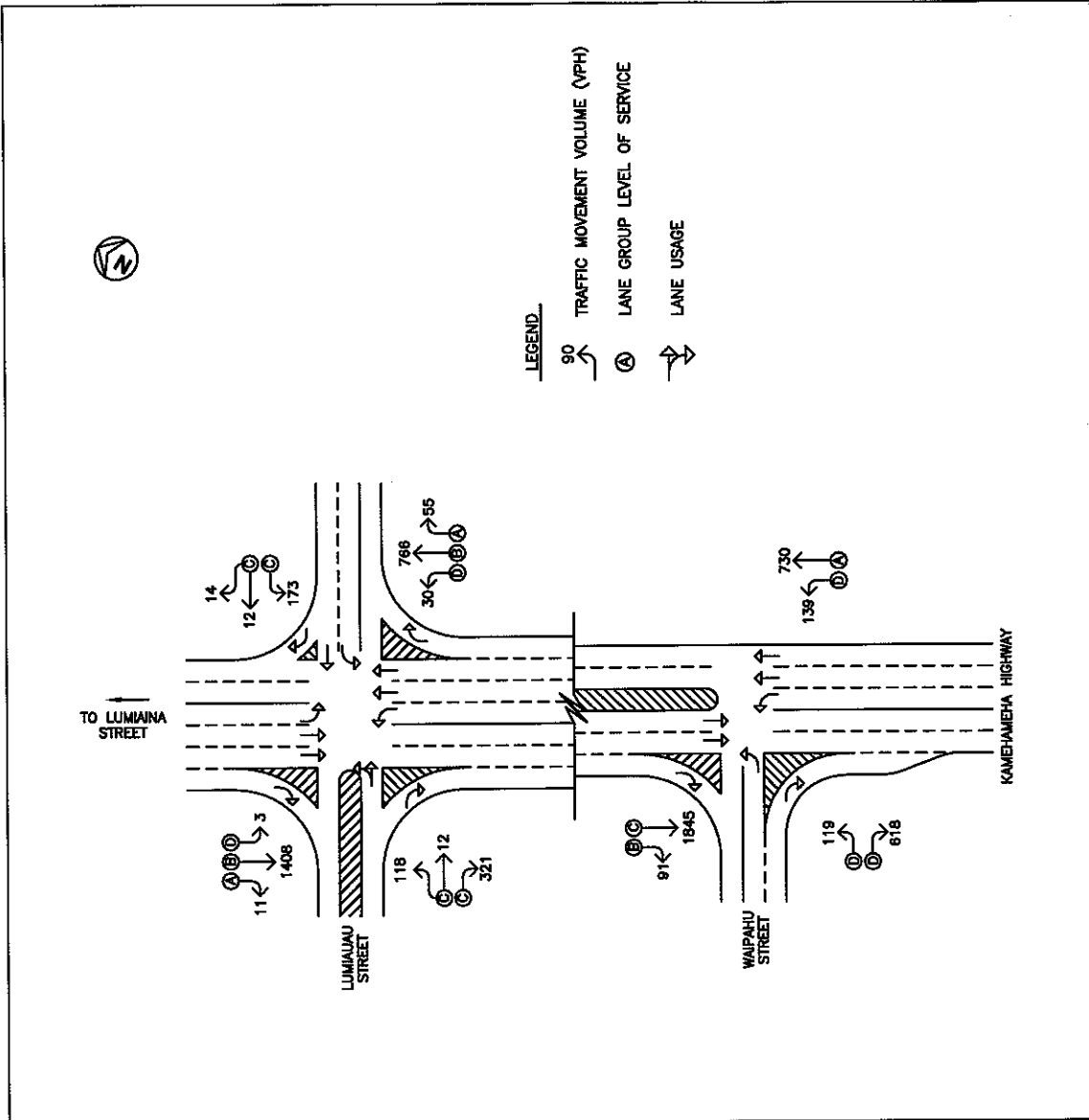
The cumulative Year 2025 AM and PM peak hour traffic conditions resulting from the projected external traffic, ambient growth, other developments in the region, and the proposed Koa Ridge Makai and Waiawa developments are shown in Figures 33 to 36, and summarized in Table 17. The projected Year 2016 operating conditions with the proposed developments are provided for comparison purposes. located in previous sections of this report. The LOS calculations are included in Appendix K under separate cover.



KOA RIDGE MAKAI AND WAJAWA DEVELOPMENT

YEAR 2025 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS
KA IKA BOULEVARD

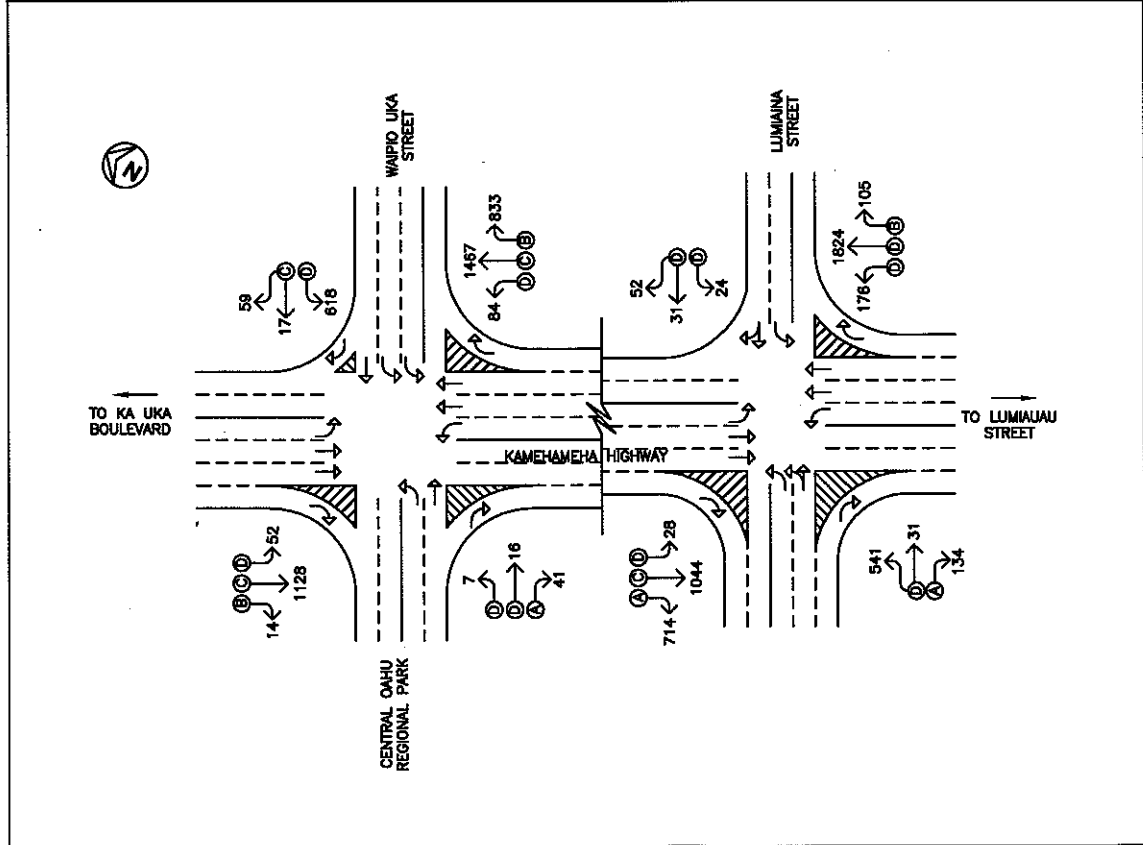
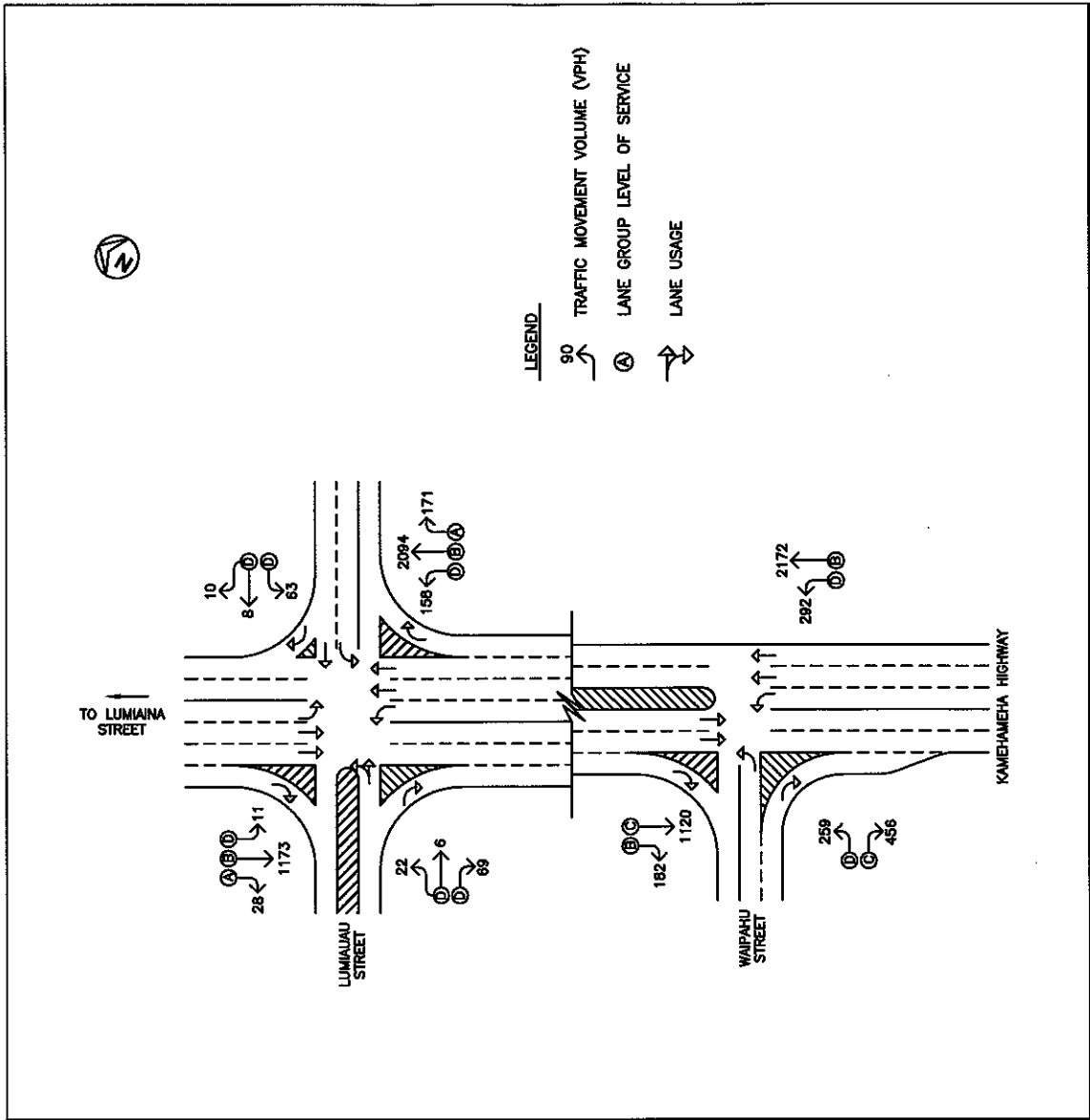
FIGURE 33



**YEAR 2025 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS
KAMEHAMEHA HIGHWAY**

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

FIGURE 34



WILSON OKAMOTO CORPORATION ENGINEERS & PLANNERS

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2025 PM PEAK HOUR OF TRAFFIC WITH PROJECT WITHOUT ADDITIONAL IMPROVEMENTS

KAMEHAMEHA HIGHWAY

FIGURE 36

**Table 17: Projected With Koa Ridge Makai and Waiawa Projects LOS
(Year 2016 and Year 2025)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/ Proj	Year 2025 w/ Proj	Year 2016 w/ Proj	Year 2025 w/ Proj
Ka Uka Blvd/ Waipio IC NB Ramps/	Eastbound	LT	B	C	B	B
		TH	A	B	B	B
	Westbound	TH	B	D	B	F
		RT	B	D	B	F
	Southbound	RT	B	D	D	F
	Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	C	C	D
Westbound		LT	D	D	D	F
		TH	A	B	B	C
Northbound		LT	D	F	E	F
		RT	C	C	C	D
Southbound		LT	D	D	D	E
		TH	C	C	C	D
		RT	C	D	D	F
Ka Uka Blvd/ Driveway		Eastbound	LT	C	D	D
	TH-RT		C	E	C	D
	Westbound	LT	C	F	D	E
		TH	B	C	C	E
		RT	-	-	-	-
	Northbound	RT	-	-	-	-
	Southbound	LT	C	D	D	F
		TH-RT	C	C	C	C
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	C	C	C	C
	Southbound	LT-TH-RT	C	C	B	C
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	B
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	B	C
	Southbound	LT-TH-RT	B	B	B	B

1. Assumes no additional roadway improvements from Year 2016

**Table 17: Projected With Koa Ridge Makai and Waiawa Projects
(Year 2016 and Year 2025)
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/ Proj	Year 2025 w/ Proj	Year 2016 w/ Proj	Year 2025 w/ Proj
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	C	D
		TH-RT	B	B	C	C
	Westbound	LT	C	C	C	D
		TH-RT	B	B	B	B
	Northbound	LT-TH-RT	C	C	C	D
Southbound	LT-TH-RT	B	B	B	C	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT-TH	C	C	D	D
		RT	A	A	B	B
	Northbound	LT	C	D	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
TH		B	B	B	B	
RT		B	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	C	D	D	D
		TH	B	B	C	C
		RT	B	B	B	B
	Southbound	LT	C	D	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

1. Assumes no additional roadway improvements from Year 2016

**Table 17: Projected With Koa Ridge Makai and Waiawa Projects
(Year 2016 and Year 2025)
Levels of Service (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2016 w/ Proj	Year 2025 w/ Proj	Year 2016 w/ Proj	Year 2025 w/ Proj
Kamehameha Hwy/ Lumiaina St (Cont'd)	Northbound	LT	D	D	D	D
		TH	C	C	C	D
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	D	D
		RT	C	C	D	D
	Westbound	LT	C	C	D	D
		TH-RT	C	C	D	D
	Northbound	LT	C	D	D	D
		TH	B	B	B	B
		RT	A	A	A	A
	Southbound	LT	C	D	D	D
		TH	B	B	B	B
RT		B	A	A	A	
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	D	D
		RT	D	D	C	C
	Northbound	LT	D	D	D	D
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

1. Assumes no additional roadway improvements from Year 2016

M. Year 2025 Traffic Projections With Koa Ridge Makai and Waiawa Developments (With Additional Improvements)

1. General

The cumulative volumes consist of site-generated traffic superimposed over Year 2025 projected traffic demands. The implementation of intersection and roadway improvements identified above for the *Year 2016 With and Without Koa Ridge Makai and Waiawa Developments* analysis scenario are also assumed since these improvements are expected to be funded and implemented by entities associated with developments in the vicinity. The additional intersection and roadway improvements for the Year 2025 cumulative analysis include the proposed new Interstate H-2 Interchange at the existing Pineapple Road Overpass location. A conceptual layout of the proposed interchange based on prior discussions with SDOT during the land planning stage of the project is presented in earlier sections of this report.

2. Year 2025 Traffic Distribution (With Additional Improvements)

a. Koa Ridge Makai

During the second phase of development for Year 2025, a new interchange for the Interstate H-2 Freeway is proposed at the existing Pineapple Road overpass. This connection will provide the development second access point, and is expected to serve the northern portion of the project that is planned for constructed in the latter phase of the development. Given this area's proximity to the access point at Ka Uka Boulevard, the associated traffic generation is assigned the proposed northern access via the new interchange at the Pineapple Road Overpass along the Interstate H-2 Freeway. Access via the Waipio Interchange would result in the circuitous routing of project-related trips for these northern areas. As such, all site-generated vehicles associated with the Year 2025, or the second phase of the project, are assumed to utilize the new interchange to access the Interstate H-2 Freeway with the exception of internal trips within the Waipio region. Similar to those generated by the first phase of development, trips within the Waipio region were assumed to utilize the proposed Spine Road and Ka Uka Boulevard intersection to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West) since they provide a direct access to areas within Waipio. The distribution of traffic between these local roadways was based upon the relative distribution of turning traffic at each of these roadways.

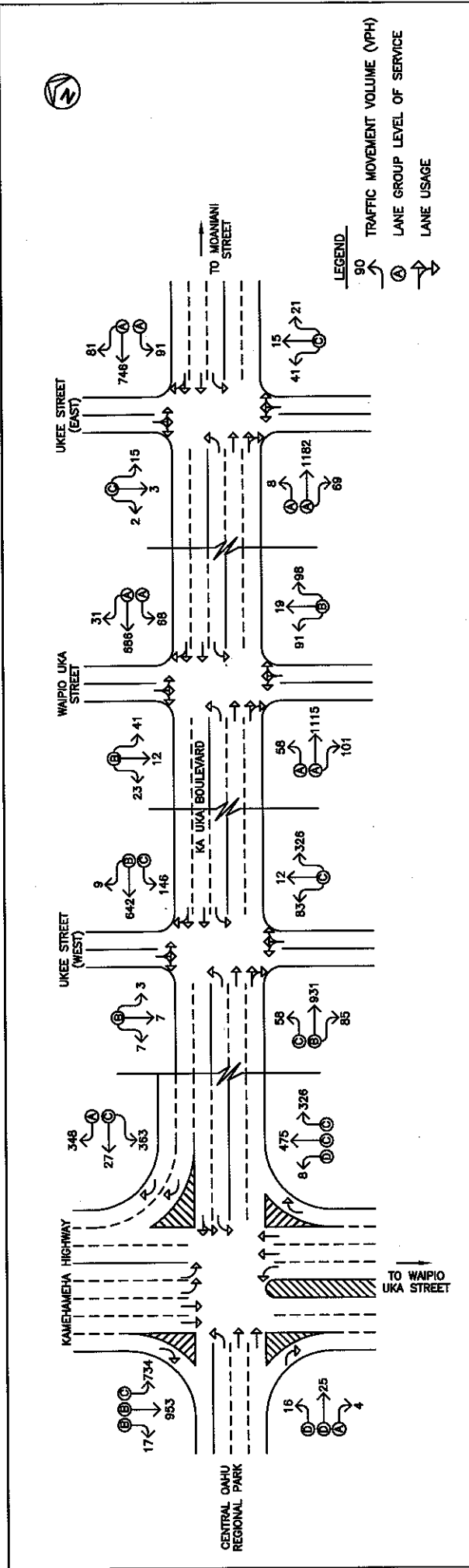
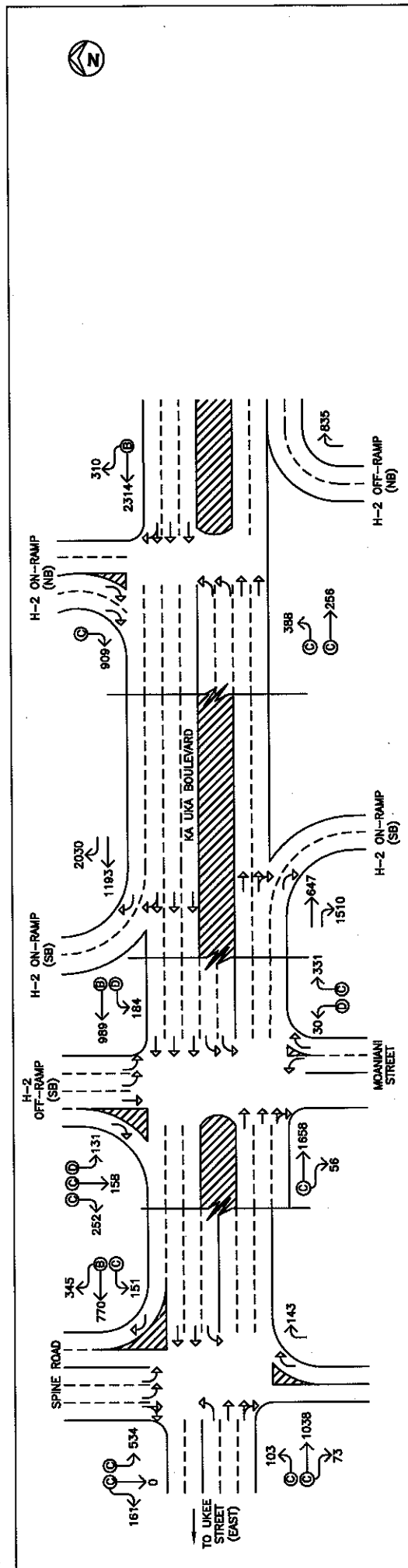
b. Waiawa

Vehicular access to the proposed Waiawa development for Year 2025 will continue to be provided via an extension of Ka Uka Boulevard. As with the first phase in Year 2016, the directional distribution of all site-generated vehicles is also based upon the distribution of population and activity centers on the island of Oahu. As such, approximately 13% of the vehicles are assumed to be traveling to/from areas to the north, approximately 85% are assumed to be traveling to/from areas to the south, and approximately 2% are assumed to be internal trips traveling to/from areas within Waipio. All vehicle trips traveling to/from areas outside of Waipio were distributed between the two north-south roadways in the vicinity, the Interstate H-2 Freeway and Kamehameha Highway, based upon the relative distribution of traffic between those two roadways. As such, approximately 80% of the vehicles were assumed to utilize the Interstate H-2 Freeway while approximately 20% of the vehicles were assumed to access Kamehameha Highway via Ka Uka Boulevard. For trips within Waipio, all vehicles were assumed to utilize Ka Uka Boulevard to access Moaniani Street, Ukee Street (East), Waipio Uka Street, or Ukee Street (West) since alternate routes would result in circuitous travel patterns. The distribution of traffic between these local roadways was based upon the relative distribution of turning traffic at each of these roadways.

3. Year 2025 Traffic Operations (With Additional Improvements)

a. General

Figures 37 to 40 show *Year 2025 With Project* (Koa Ridge Makai and Castle & Cooke Waiawa) traffic operations incorporating Year 2016 necessary improvements as well as additional improvements to mitigate Year 2025 traffic demands. Table 18 summarizes the resulting Year 2025 traffic operations at the study intersections. The Year 2025 With Project conditions without the additional improvements are provided for comparison. The LOS calculations are provided in Appendix L under separate cover.

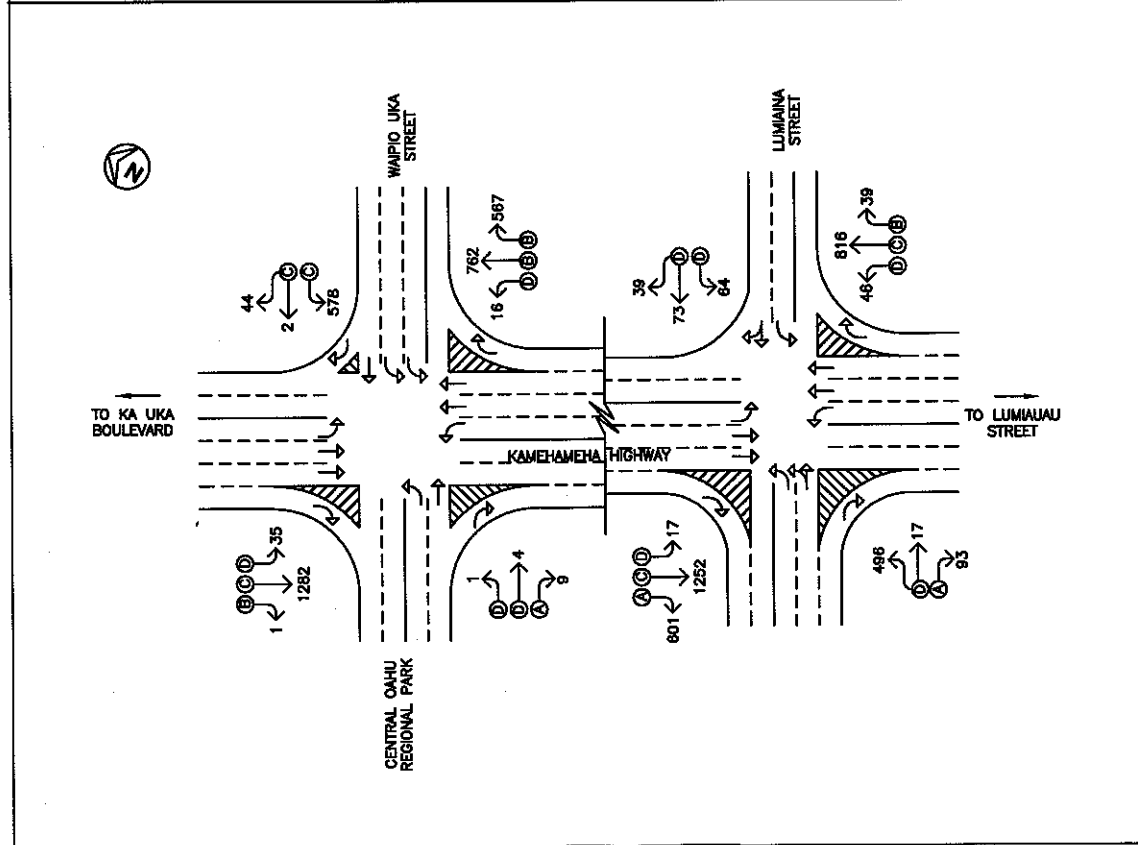
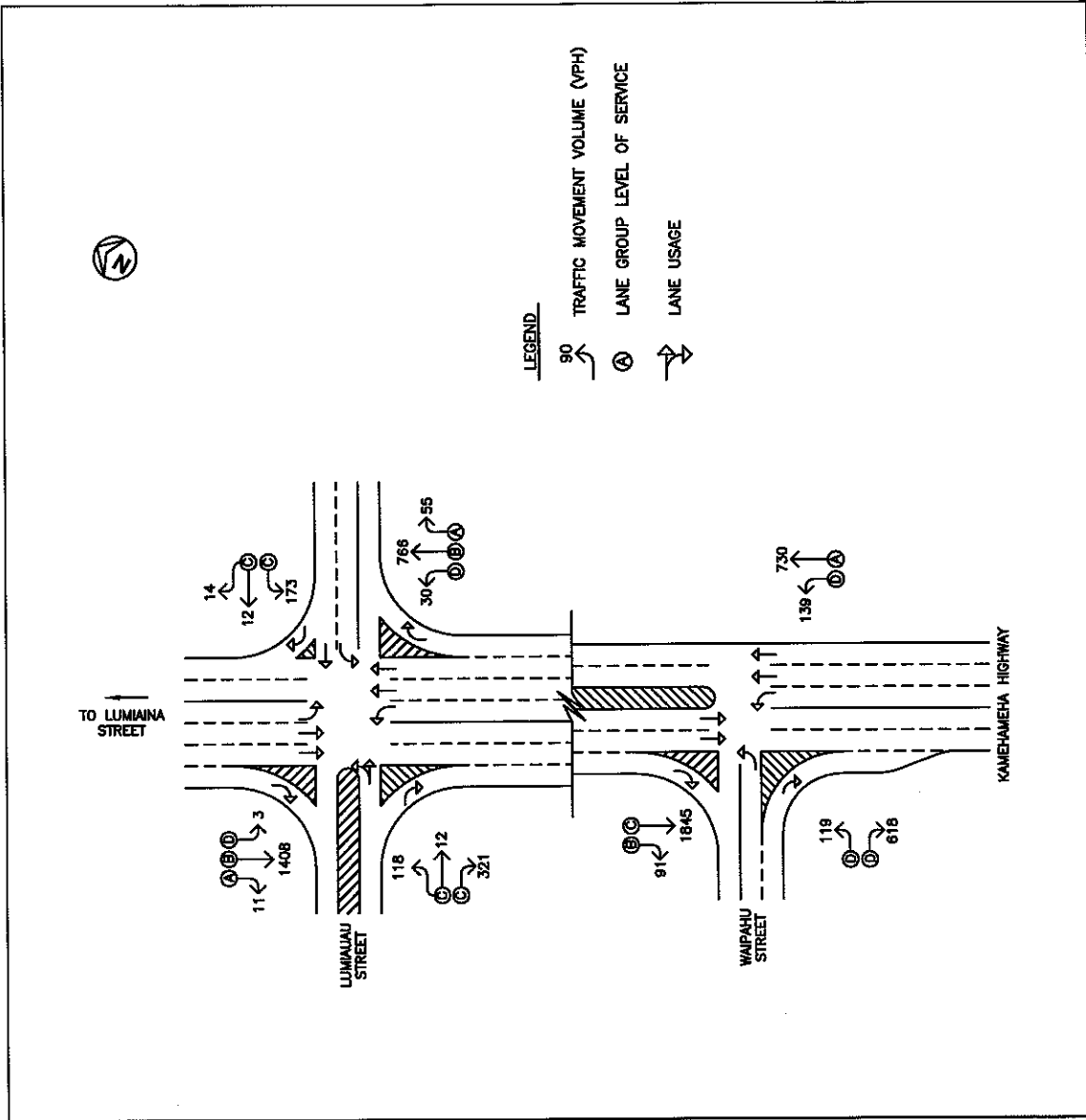


YEAR 2025 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITH ADDITIONAL IMPROVEMENTS
KA UKA BOULEVARD

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

WILSON OKAMOTO CORPORATION
ENGINEERS - PLANNERS

FIGURE 37

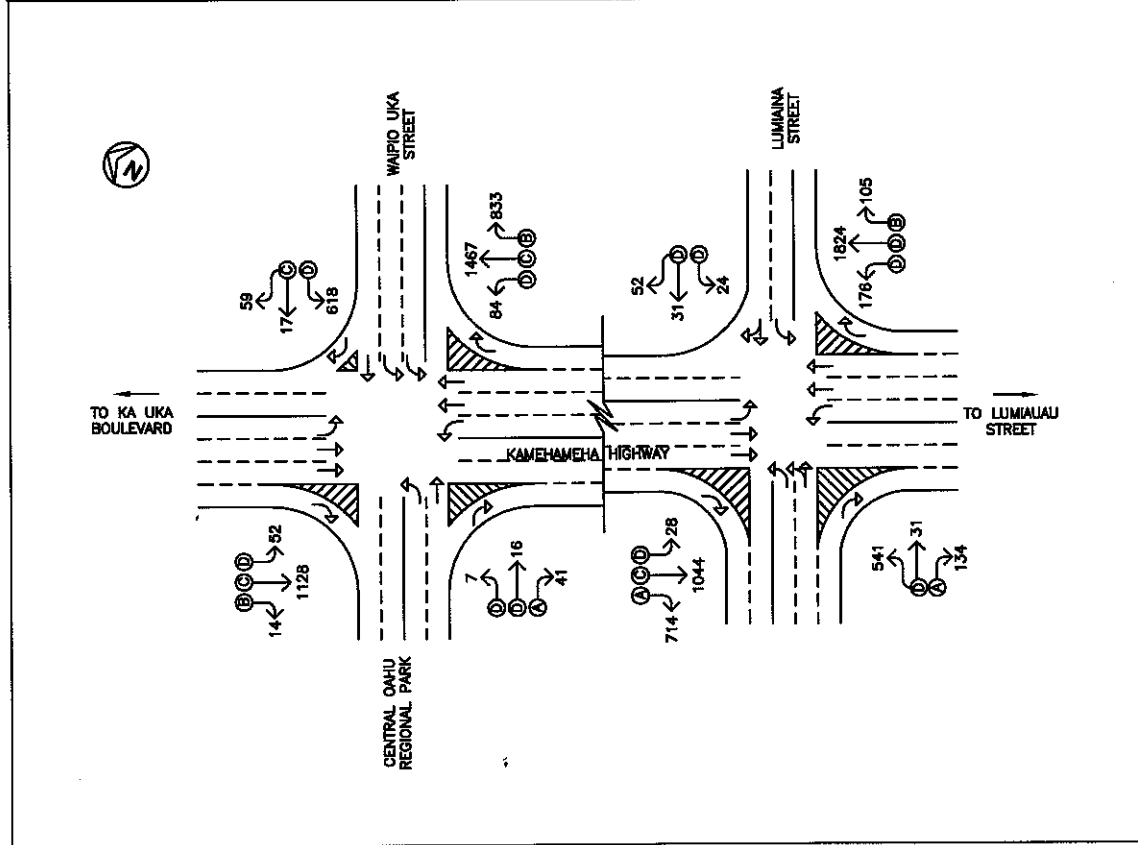
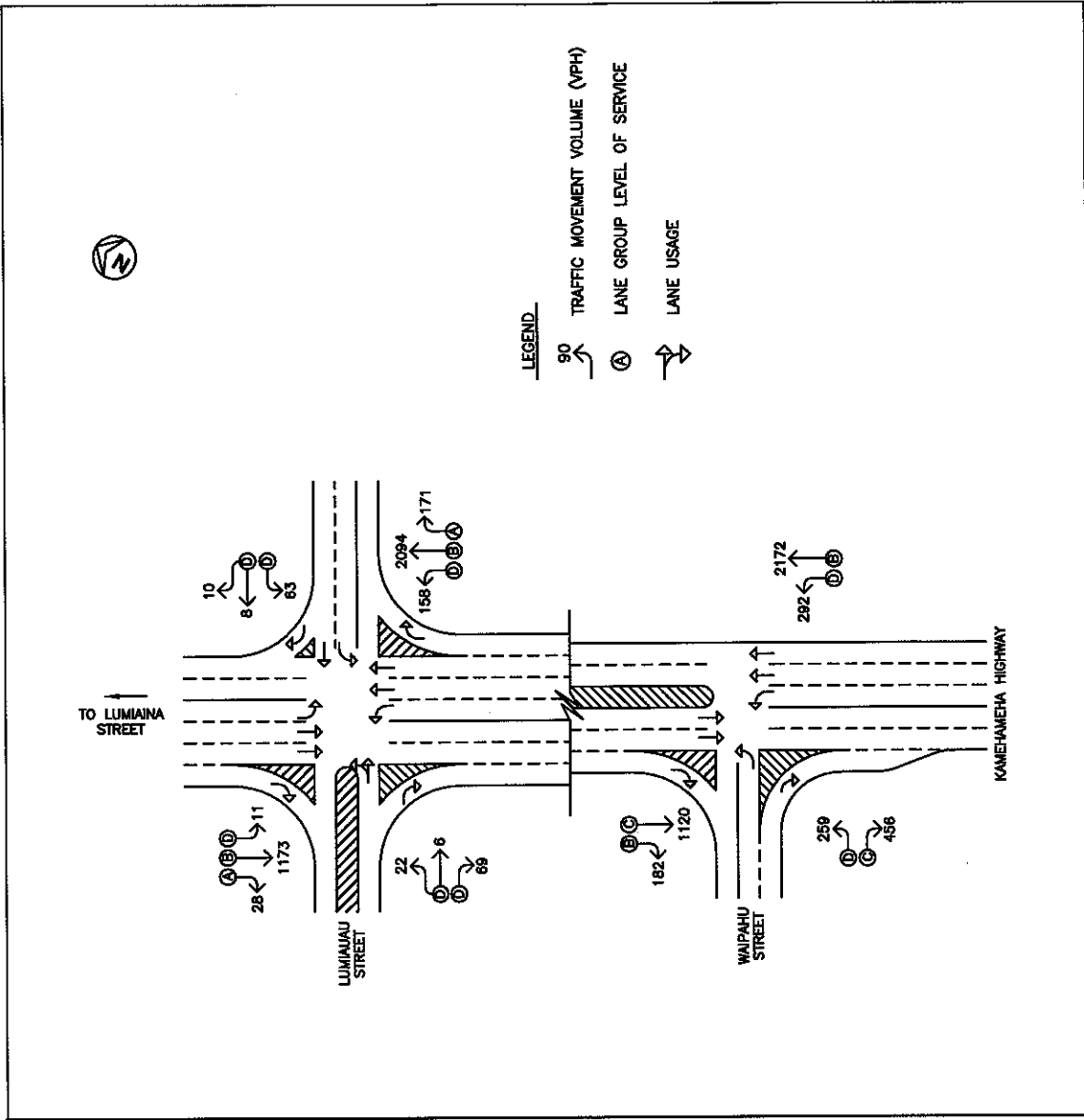


KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

YEAR 2025 AM PEAK HOUR OF TRAFFIC WITH PROJECT WITH ADDITIONAL IMPROVEMENTS

KAMEHAMEHA HIGHWAY

FIGURE 38



YEAR 2025 PM PEAK HOUR OF TRAFFIC WITH PROJECT WITH ADDITIONAL IMPROVEMENTS
KAMEHAMEHA HIGHWAY

KOA RIDGE MAKAI AND WAIAWA DEVELOPMENT

FIGURE 40

**Table 18: Projected Year 2025 With Koa Ridge Makai and Waiawa Projects
LOS - Without and With Additional Improvements**

Intersection	Traffic Movement		AM		PM	
			Year 2025 w/o Imp	Year 2025 w/ Imp	Year 2025 w/o Imp	Year 2025 w/ Imp
Ka Uka Blvd/ Waipio IC NB Ramps/	Eastbound	LT	C	C	B	C
		TH	B	C	B	C
	Westbound	TH	D	B	F	D
		RT	D	B	F	D
	Southbound	RT	D	C	F	D
Ka Uka Blvd/ Moaniani St/ Waipio IC SB Off-Ramp	Eastbound	TH-RT	C	C	F	D
	Westbound	LT	D	D	F	D
		TH	B	B	C	B
	Northbound	LT	F	D	F	E
		RT	C	C	D	D
	Southbound	LT	D	D	E	D
		TH	C	C	D	D
		RT	D	C	F	D
Ka Uka Blvd/ Driveway	Eastbound	LT	D	C	F	D
		TH-RT	E	C	D	C
	Westbound	LT	F	C	E	D
		TH	C	B	E	C
		RT	-	-	-	-
	Northbound	RT	-	-	-	-
	Southbound	LT	D	C	F	D
		TH-RT	C	C	C	C
Ka Uka Blvd/ Ukee St (East)	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	C	C	C	C
	Southbound	LT-TH-RT	C	C	C	C
Ka Uka Blvd/ Waipio Uka St	Eastbound	LT	A	A	A	A
		TH-RT	A	A	A	A
	Westbound	LT	A	A	B	B
		TH-RT	A	A	A	A
	Northbound	LT-TH-RT	B	B	C	C
	Southbound	LT-TH-RT	B	B	B	B

**Table 18: Projected Year 2025 With Koa Ridge Makai and Waiawa Projects
Levels of Service
Without and With Additional Improvements (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2025 w/o Imp	Year 2025 w/ Imp	Year 2025 w/o Imp	Year 2025 w/ Imp
Ka Uka Blvd/ Ukee St (West)	Eastbound	LT	C	C	D	D
		TH-RT	B	B	C	C
	Westbound	LT	C	C	D	D
		TH-RT	B	B	B	B
	Northbound	LT-TH-RT	C	C	D	D
Southbound	LT-TH-RT	B	B	C	C	
Ka Uka Blvd/ Kamehameha Hwy	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT-TH	C	C	D	D
		RT	A	A	B	B
	Northbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	C	C	C	C
	Southbound	LT	C	C	D	D
TH		B	B	B	B	
RT		B	B	B	B	
Kamehameha Hwy/ Waipio Uka St	Eastbound	LT	D	D	D	D
		TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	C	C	D	D
		TH-RT	C	C	C	C
	Northbound	LT	D	D	D	D
		TH	B	B	C	C
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
TH		C	C	C	C	
RT		B	B	B	B	
Kamehameha Hwy/ Lumiaina St	Eastbound	LT-TH	D	D	D	D
		RT	A	A	A	A
	Westbound	LT	D	D	D	D
		TH-RT	D	D	D	D

**Table 18: Projected Year 2025 With Koa Ridge Makai and Waiawa Projects
Levels of Service
Without and With Additional Improvements (Cont'd)**

Intersection	Traffic Movement		AM		PM	
			Year 2025 w/o Imp	Year 2025 w/ Imp	Year 2025 w/o Imp	Year 2025 w/ Imp
Kamehameha Hwy/ Lumiaina St (Cont'd)	Northbound	LT	D	D	D	D
		TH	C	C	D	D
		RT	B	B	B	B
	Southbound	LT	D	D	D	D
		TH	C	C	C	C
		RT	A	A	A	A
Kamehameha Hwy/ Lumiauau St	Eastbound	LT-TH	C	C	D	D
		RT	C	C	D	D
	Westbound	LT	C	C	D	D
		TH-RT	C	C	D	D
	Northbound	LT	D	D	D	D
		TH	B	B	B	B
		RT	A	A	A	A
	Southbound	LT	D	D	D	D
		TH	B	B	B	B
RT		A	A	A	A	
Kamehameha Hwy/ Waipahu St	Eastbound	LT	D	D	D	D
		RT	D	D	C	C
	Northbound	LT	D	D	D	D
		TH	A	A	B	B
	Southbound	TH	C	C	C	C
		RT	B	B	B	B

Traffic operations at the study intersections are expected to deteriorate to Year 2025 projected conditions with the development of the proposed project due to the anticipated increase in traffic in the vicinity. However, implementing additional intersection and roadway improvements identified above and previous sections of the report should alleviate traffic operational deficiencies.

b. Interstate H-2 Freeway Segments

During the projected Year 2025 AM peak hour of traffic with the proposed project, the Interstate H-2 Freeway south of the Waipio Interchange would carry 4,516 vehicles northbound and 8,005 vehicles

southbound. The northbound and southbound freeway segments along H-2 south of the Waipio Interchange would operate at LOS "B" and LOS "C" during the projected Year 2025 AM peak hour of traffic with the proposed project. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing.

North of the Waipio Interchange, the Interstate H-2 Freeway would carry approximately 3,470 vehicles northbound and 5,006 vehicles southbound during the projected morning peak hours of traffic and would operate at LOS "B" and LOS "C", respectively. Simulation modeling of traffic operations for this freeway segment resulted in no significant queuing during the projected Year 2025 morning peak periods.

During the PM peak hours of traffic, the Interstate H-2 Freeway south of the Waipio Interchange would carry 9,224 vehicles northbound and 6,493 vehicles southbound. The northbound and southbound Interstate H-2 Freeway segments south of the Waipio Interchange would operate at LOS "D" and LOS "B" during the projected Year 2025 PM peak hours of traffic with the project. Although some isolated queuing may occur, no significant queuing is expected along this freeway segment during the projected Year 2025 PM peak hours of traffic with the proposed project.

North of the Waipio Interchange, the Interstate H-2 Freeway is expected to carry approximately 5,563 vehicles northbound and 4,086 vehicles during the PM peak hours of traffic. This freeway segment is expected to operate at LOS "C" and LOS "B" for the northbound and southbound directions, respectively, during the PM peak hours of traffic. No significant queuing is expected along this freeway segment during the projected Year 2025 PM peak hours of traffic with the proposed project.

The proposed Pineapple Road Overpass northbound on- and off-ramps providing access to northern areas of the proposed Koa Ridge Makai development are both expected to operate at LOS "B" during the AM peak hour during *Year 2025 With Project* conditions. During the PM peak hour, the northbound on- and off-ramp at the proposed interchange at the Pineapple Road Overpass would operate at LOS "B" and LOS "C", respectively, during the projected *Year 2025 With Project* conditions. The southbound on- and off-ramp at the proposed interchange would operate at LOS "C" and LOS "B", respectively, during the *Year 2025 AM With Project* peak hour conditions, and both at LOS "B" during *Year 2025 PM With Project* PM peak hour conditions.

c. Waipio Interchange Ramp Merge/Diverge Operations

During the projected Year 2025 AM peak hour traffic operations, the Interstate H-2 Freeway northbound off-ramp at the Waipio Interchange would operate at LOS "A", an improvement from existing conditions with the committed implementation of the loop off-ramp identified in earlier sections of this document. The existing configuration of the northbound on-ramp to service westbound Ka Uka Boulevard traffic east of the Waipio Interchange destined to areas north via the northbound Interstate H-2 Freeway would continue to operate at LOS "B" conditions. The southbound loop on-ramp would operate at LOS "D" during the projected Year 2025 with the project while the existing southbound on-ramp accommodating eastbound Ka Uka Boulevard traffic destined to areas south via the Interstate H-2 Freeway would also operate at LOS "D". The southbound off-ramp would continue to operate at LOS "C" conditions during the same period.

During the projected PM peak hour of traffic, the northbound off-ramp at the Waipio Interchange would operate at LOS "C". Based on simulation modeling, no resulting queuing effects would be anticipated on the freeway due to the proposed improvement to extend the ramp deceleration lane, including the improvement to provide a three-lane off-ramp at the freeway interface. The northbound loop on-ramp would operate well at LOS "B" during the projected Year 2025 PM peak hour of traffic, while the existing configuration of the northbound on-ramp serving westbound traffic from areas east of the freeway also operate at LOS "C" conditions.

The southbound loop on-ramp and existing southbound on-ramp configuration would both operate at LOS "C", while the southbound off-ramp also operate at LOS "C" during the projected Year 2025 PM peak hour of traffic. Based on modeling and traffic simulations, the merge and diverge operations are not expected to result in queuing onto the freeway.

With the committed improvement to extend the northbound off-ramp capacity, merge and diverge conditions, all of the freeway on- and off-ramps would operate at LOS "D" or better with no significant queuing on the ramps and at the freeway interfaces for the projected Year 2025 AM and PM peak hours of traffic with the proposed project.

Table 19 summarizes the freeway segments and ramp operations along the Interstate H-2 Freeway and at the Waipio Interchange and proposed interchange at the Pineapple Road Overpass for Year 2025 conditions with the proposed project. The levels of service under Year 2025 conditions without additional improvements are provided for comparison purposes.

Table 19. Summary of Year 2025 (with Koa Ridge Makai and Waiawa Projects) Interstate H-2 Freeway Segment and Ramp LOS Operations With and Without Additional Improvements

Freeway Segment/ Interchange Ramp	AM Peak		PM Peak	
	2025 w/o Imp	2025 w/ Imp	2025 w/o Imp	2025 w/ Imp
NB segment south of Waipio Interchange	B	B	D	D
NB segment north of Waipio Interchange	B	B	B	C
SB segment south of Waipio Interchange	C	C	B	B
SB segment north of Waipio Interchange	B	C	B	B
NB Off-ramp	A	A	F	C
NB On-ramp	B	B	B	B
NB Loop Off-ramp	A	A	B	B
SB On-ramp	D	D	D	C
SB Loop On-Ramp	D	D	C	C
SB Off-ramp	C	C	C	C
NB Off-ramp (Pineapple Rd OP)	-	B	-	C
NB On-ramp (Pineapple Rd OP)	-	B	-	B
SB Off-ramp (Pineapple Rd OP)	-	B	-	B
SB On-ramp (Pineapple Rd OP)	-	C	-	B

V. COMMUTER TRAVEL TIME

A. General

South of the Waipio Interchange at approximately 2.5 miles along the Interstate H-2 Freeway is the Waiawa Interchange. The Waiawa Interchange represents the convergence and divergence of the Interstate H-1 and Interstate H-2 Freeways, serving traffic demands associated with the east, west, and north regions of

the island. Connecting ramps are provided at the interchange as well as on- and off-ramps linking with the surrounding surface streets. The Interstate H-2 Freeway includes three lanes each in the northbound and southbound directions just north of the Waiawa Interchange, while the Interstate H-1 Freeway has three eastbound travel lanes west of the interchange and five eastbound travel lanes east of the interchange. In the westbound direction, five lanes are provided east of the interchange and four lanes are provided on the west side. An additional eastbound shoulder lane is provided during the morning peak periods of traffic east of the interchange, and a concurrent eastbound zipper lane is provided beginning from a location west of the interchange and ending at the Keehi Interchange. Beyond the Keehi Interchange the zipper lane transitions to a contra-flow lane along Nimitz Highway until just before Pacific Street.

B. Existing Travel Times

The evaluation of the regional roadway facilities is based on traffic data collected by the State Department of Transportation in Year 2005, and supplemented with additional information collected or contained in other studies for the region. In addition, field investigations of freeway operations were conducted on various days of the week during the months of January and February 2008 including travel time survey between Mililani Interchange, through the Waipio Interchange, and Kaahumanu Street Overpass, just beyond the Waiau Interchange. The travel time analysis was limited to the freeway segments of the Interstate H-1 and H-2 freeways between the Mililani Interchange and the Kaahumanu Street Overpass to minimize external effects that are not associated with Central Oahu traffic demands. Beyond the travel time analysis limits, external effects can greatly influence travel time characteristics resulting in unreliable traffic simulations and possibly inaccurate traffic modeling and analysis techniques. The travel time data was collected utilizing Global Positioning System (GPS) devices connected to other devices storing continuous data throughout the travel time survey. Travel time survey run data is processed via the *PC-Travel* software developed by Jamar Technologies, Inc.

Travel time surveys were conducted in September 2008 at 15-minute intervals between the hours of 5:00 AM to 8:00 AM in the morning and between the hours of 3:00 PM and 6:00 PM in the afternoon. Table 20 shows the travel time data between the Mililani Interchange and the Kaahumanu Street Overpass along the Interstate H-1 and H-2 Freeways. The table includes travel time run surveys for both the northbound and southbound directions of the freeway.

**Table 20: Existing Travel Time Data
Between Mililani IC (H-2) and Kaahumanu St OP (H-1)**

AM Peak Period		
Start Time	Travel Time (minutes)	
	Northbound	Southbound
5:00 AM	6.95	8.03
5:15 AM	6.94	8.58
5:30 AM	6.76	9.30
5:45 AM	6.48	15.32
6:00 AM	6.71	10.07
6:15 AM	6.54	13.95
6:30 AM	7.14	15.82
6:45 AM	6.78	11.82
7:00 AM	6.78	9.95
7:15 AM	7.13	12.18
7:30 AM	8.66	9.57
7:45 AM	6.41	8.08
8:00 AM	6.65	7.87
PM Peak Period		
Start Time	Travel Time (minutes)	
	Northbound	Southbound
3:00 PM	7.75	7.85
3:15 PM	8.05	7.91
3:30 PM	8.00	8.12
3:45 PM	7.50	8.60
4:00 PM	7.88	8.16
4:15 PM	7.82	8.16
4:30 PM	8.50	8.47
4:45 PM	9.08	8.00
5:00 PM	8.48	8.11
5:15 PM	8.65	8.19
5:30 PM	7.90	8.59
5:45 PM	8.70	8.08
6:00 PM	8.15	7.94

Vehicular queuing occurs in the vicinity of the Waiawa Interchange during the morning commute periods, with the southbound Interstate H-2 Freeway queues extending approximately 4,300 feet from the interchange, or one-third the distance to the Waipio Interchange at Ka Uka Boulevard. This freeway segment services approximately 5,000 vehicles southbound during the peak morning traffic periods. Along the eastbound Interstate H-1 Freeway, just beyond the Waiawa Interchange, the

freeway segment operates at LOS "E" during the morning peak periods and services 13,000 eastbound vehicles. At the H-1/H-2 merge of the Waiawa Interchange, queues along the eastbound Interstate H-1 Freeway oftentimes extend from the Waiawa Interchange to the Paiwa (Waikele) Interchange during the morning peak periods. This queue would extend beyond the Paiwa Interchange on occasions when an incident on the freeway impedes traffic flow.

During the afternoon peak periods of traffic, the predominant traffic volumes occur in the westbound direction. Along the westbound Interstate H-1 Freeway, traffic queues oftentimes extend upstream through the Waiiau Interchange and beyond the Halawa Interchange. Just east of the Waiawa Interchange, the westbound lanes of the Interstate H-1 Freeway segment operate at LOS "E" during the afternoon peak periods of traffic and services approximately 10,500 vehicles during the peak hour.

C. Projected Traffic Conditions

Traffic demands for projected Year 2016 and Year 2025 conditions were simulated utilizing computer traffic simulation programs to identify travel time differences resulting from the addition of both the Koa Ridge Makai and Waiawa developments. Traffic generation determined in the traffic impact analysis were superimposed over projected analysis year conditions and simulated to determine the differences in travel times between the control survey points. The simulations were conducted for the southbound direction on Interstate H-2 Freeway and the eastbound Interstate H-1 Freeway segments between the route termini points. The simulations were conducted for the projected AM peak period only representing the worse traffic flow condition traveling through the Waiawa Interchange. The traffic simulation assumes that the roadway network would remain the same as existing with no regional or localized transportation infrastructure modifications implemented to improve the traffic flow characteristics along the survey route. Travel time run simulations indicate an increase in travel times of approximately two to five minutes for the various 15-minute intervals throughout morning period for Year 2016 and approximately three to seven minutes over existing baseline conditions for Year 2025.

Table 21 shows the travel time simulation results for the route from the Mililani Interchange to the Kaahumanu Street Overpass along the Interstate H-2 and H-1 Freeways for projected morning commute conditions. The table includes travel time simulation results for the town-bound direction of the freeways.

**Table 21: Existing and Projected Travel Time
Between Mililani IC (H-2) and Kaahumanu St OP (H-1)**

AM Peak Period – Southbound (Town-bound)			
Start Time	Travel Time (minutes)		
	Existing	Projected Year 2016	Projected Year 2025
5:00 AM	8.03	9.93	13.14
5:15 AM	8.58	11.07	15.01
5:30 AM	9.30	12.52	15.55
5:45 AM	15.32	20.42	22.60
6:00 AM	10.07	19.05	21.08
6:15 AM	13.95	19.06	21.00
6:30 AM	15.82	21.03	22.83
6:45 AM	11.82	16.87	17.32
7:00 AM	9.95	13.45	16.34
7:15 AM	12.18	16.38	17.88
7:30 AM	9.57	12.17	13.77
7:45 AM	8.08	10.38	11.02
8:00 AM	7.87	10.07	10.89

It should be noted that the projected travel time run results reflect conditions over the existing roadway network with no improvements to the roadway infrastructure or consideration of the ancillary benefits of the City and County of Honolulu Rail Transit project. It is expected that travel times would reduce when incorporating these factors. The travel time results, however, provide a measure of impacts associated with the proposed developments over the existing regional roadway network and existing traffic demands.

At the Waiawa Interchange, queuing would continue to occur in the vicinity during the morning commute periods with the southbound Interstate H-2 queues extending approximately 8,000 feet or about one-half the distance between the Waiawa Interchange and the Waipio Interchange in the Year 2016 with the proposed developments in the Central Oahu region. At Year 2025, the southbound Interstate H-2 queues would extend approximately 10,000 feet from the Waiawa Interchange, or approximately two-thirds of the distance to the Waipio Interchange. Both periods would operate at LOS “F” conditions. This freeway segment would service approximately 7,000 vehicles and approximately 8,700 vehicles during the projected peak morning traffic periods in years 2016 and 2025, respectively. Along the eastbound Interstate H-1 Freeway, just beyond the Waiawa Interchange, the freeway segment would also operate at LOS “F” during the projected morning peak periods and would service approximately 17,000 and 19,500 vehicles in years 2016 and 2025, respectively.

During the afternoon peak periods of traffic, the predominant traffic volumes would continue to occur in the westbound direction as a result of significant future developments expected on the west side of the island. Along the westbound Interstate H-1 Freeway, traffic queues would continue to extend upstream through the Waiiau Interchange and beyond the Halawa Interchange. Just east of the Waiawa Interchange, the westbound lanes of the Interstate H-1 Freeway segment would operate at LOS "F" during the projected afternoon peak periods of traffic for both Year 2016 and Year 2025, and would service approximately 15,000 and 16,500 vehicles during the projected afternoon peak hours, respectively.

VI. RECOMMENDATIONS

A. General

Based on the analysis of the traffic projections, the following are general recommendations of this study associated with existing and projected conditions:

1. Consider formulating and executing a Memorandum of Agreement with the State Department of Transportation identifying the necessary mitigating measures as a result of the project, funding strategies and commitments, and implementation schedules.
2. Maintain sufficient sight distance for motorists to safely enter and exit all project driveways, intersections, and roadways.
3. Design all improvements following applicable standards as required by the governmental agencies and obtain approvals as applicable.
4. Minimize the number of median breaks along Ka Uka Boulevard to facilitate the movement of through traffic along the roadway. Where median breaks occur, provide auxiliary lanes to minimize the impact of turning vehicles on through traffic.
5. Consideration should be given to the required turning radius for large vehicles during the geometric design of the roadways to accommodate vehicles from the nearby industrial uses.
6. Ensure that all pedestrian facilities including walkways and crossings are ADA compliant.

B. Year 2016

1. Without Koa Ridge Makai and Waiawa Developments

Traffic conditions in the project vicinity are anticipated to deteriorate under *Year 2016 Without Koa Ridge and Waiawa Developments*. The analysis of the traffic data, which includes trips generated by other major developments in the region (Waiawa Ridge Development) based on assumed development absorption schedules, result in the following recommendations to improve the projected *Year 2016 Without Project* traffic conditions:

At the intersection of Ka Uka Boulevard and the Interstate H-2 northbound on- and off-ramps, provide or construct the following:

- Two exclusive right-turn lanes on the Interstate H-2 northbound off-ramp approach.
- Four eastbound lanes east of the Waipio Interchange northbound on- and off-ramps to accept two free-flow right-turn lanes from the off-ramp and two eastbound through lanes on Ka Uka Boulevard.
- Two through movement lanes and an exclusive right-turn lane on the westbound approach of Ka Uka Boulevard.
- Two through lanes on the eastbound approach of Ka Uka Boulevard.
- Widen the Interstate H-2 northbound off-ramp to two ramp diverge lanes to accommodate two northbound left-turn lanes and two exclusive right-turn lanes at the ramp junction of Ka Uka Boulevard.

At the intersection of Ka Uka Boulevard and the Interstate H-2 southbound on-ramps, provide or construct the following:

- Southbound loop on-ramp to the Interstate H-2 freeway in the northwest quadrant of the Waipio Interchange.
- One through lane, a shared through and right-turn lane, and an exclusive right-turn lane on the eastbound approach of Ka Uka Boulevard.
- One through lane and a shared through and right-turn lane on the westbound approach of Ka Uka Boulevard.

At the intersection of Ka Uka Boulevard with the Interstate H-2 southbound off-ramp and Moaniani Street, provide or construct the following:

- Two exclusive left-turn lanes and two through lanes on the westbound approach of Ka Uka Boulevard.
- Two southbound departure lanes along Moaniani Street to accept the double left-turn lanes from westbound Ka Uka Boulevard.
- Three lanes on the Interstate H-2 southbound off-ramp approach to accommodate an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane.
- Widen Ka Uka Boulevard between Moaniani Street and the Interstate H-2 southbound on-ramp (from west) to accommodate an additional eastbound lane providing free-flow movement from northbound right-turn Moaniani Street.
- Modify the traffic signal phasing at the intersection to allow for simultaneous left-turn movements on the northbound and southbound approaches. Intersection geometry may need to be adjusted to provide adequate vehicle spacing to accommodate turning maneuvers.

At the intersection of Ka Uka Boulevard and Kamehameha Highway, provide or construct the following:

- Modify the traffic signal phasing at the intersection to allow for simultaneous left-turn movements on the eastbound and westbound approaches.

- Provide an exclusive left-turn lane, a through lane, and two exclusive right-turn lanes on the westbound approach of Ka Uka Boulevard. Intersection geometry may need to be adjusted to accommodate the necessary approach laneage.

At the intersection of Lumiaina Street and Kamehameha Highway, provide or construct the following:

- Provide an additional eastbound left-turn lane that results in an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane on the Lumiaina Street intersection approach.
- Modify traffic signal system operations to permit split phases for the eastbound and westbound approaches of Lumiaina Street.

At the intersection of Waipahu Street and Kamehameha Highway, provide or construct the following:

- Provide an additional eastbound left-turn lane on the eastbound approach of Waipahu Street that results in separate left-turn and right-turn lanes with a southbound intersection departure lane on Kamehameha Highway to accommodate the new eastbound right-turn lane.
- Modify traffic signal system operations to permit phasing for eastbound right-turn movements.

2. Without Koa Ridge Makai Development Only

Traffic conditions in the project vicinity are also anticipated to deteriorate under *Year 2016 Without Koa Ridge Makai Only development*. The analysis of the traffic data under this scenario differs from the *Year 2016 Without Koa Ridge and Waiawa Developments* described above in that trips generated by other major developments in the region (Waiawa Ridge Development) are excluded from the analysis. Hence, the development of Koa Ridge Makai Only since access to lands in the Waiawa area east of the Interstate H-2 freeway would not be provided by the extension of Ka Uka Boulevard. The following are recommendations to improve the projected *Year 2016 Without Koa Ridge Makai Only* traffic conditions:

At the intersection of Ka Uka Boulevard and the Interstate H-2 northbound on- and off-ramps, provide or construct the following:

- Modify the eastbound approach of Ka Uka Boulevard at the northbound on-ramp to provide an exclusive left-turn lane and a shared left-turn/through lane. Widen the northbound on-ramp to accept two left-turn lanes.
- Modify traffic signal system to accommodate lane assignment changes.

At the intersection of Ka Uka Boulevard with the Interstate H-2 southbound off-ramp and Moaniani Street, provide or construct the following:

- Two exclusive left-turn lanes and two through lanes on the westbound approach of Ka Uka Boulevard.
- Two southbound departure lanes along Moaniani Street to accept the double left-turn lanes from westbound Ka Uka Boulevard.

At the intersection of Lumiaina Street and Kamehameha Highway, provide or construct the following:

- Provide an additional eastbound left-turn lane that results in an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane on the Lumiaina Street intersection approach.
- Modify traffic signal system operations to permit split phases for the eastbound and westbound approaches of Lumiaina Street.

At the intersection of Waipahu Street and Kamehameha Highway, provide or construct the following:

- Provide an additional eastbound left-turn lane on the eastbound approach of Waipahu Street that results in separate left-turn and right-turn lanes with a southbound intersection departure lane on Kamehameha Highway to accommodate the new eastbound right-turn lane.
- Modify traffic signal system operations to permit overlap phasing for eastbound right-turn movements.

3. With Koa Ridge Makai Development Only

The following are additional recommendations of this study to accommodate *Year 2016 With Koa Ridge Makai Development* conditions, and to improve traffic operations in the vicinity as a result of the proposed project and other projects in the region. These additional recommendations assume that the improvements identified in the *without projects* scenarios will be implemented with those listed below.

Ka Uka Boulevard/Interstate H-2 Northbound Off-ramp

- Widen the northbound off-ramp to provide two diverge lanes including off-ramp auxiliary lane.

Ka Uka Boulevard/Interstate H-2 Southbound On-ramp

- Provide additional eastbound lane to result in a through lane, and two exclusive on-ramp lanes

Ka Uka Boulevard/Interstate H-2 Southbound Off-Ramp/Moaniani Street

- Provide an additional lane on Ka Uka Boulevard on the eastbound approach that result in two exclusive through movement lanes and a shared through/right-turn lane.
- Two northbound lanes on the Moaniani Street approach that result in an exclusive left-turn lane and exclusive right-turn lane.
- Provide additional lane on the southbound approach that result in an exclusive left-turn lane, an exclusive through movement lane, and an exclusive right-turn lane.

- Modify traffic signal timing to provide simultaneous left-turn movements for the northbound and southbound approaches.

Ka Uka Boulevard/Commercial Driveway/Spine Road

- Provide additional three lanes on the southbound approach of Spine Road that result in two exclusive left-turn lanes, and a shared through/right-turn lane.
- Provide additional westbound lane between the southbound off-ramp and Spine Road
- Provide exclusive left-turn lane on Ka Uka Boulevard eastbound approach.
- Provide an additional eastbound lane on Ka Uka Boulevard between the Commercial Driveway/Spine Road and the southbound on-ramp
- Channelize northbound right-turn movements from the Commercial Driveway to eastbound Ka Uka Boulevard.
- Signalize Intersection and provide protected left-turn movements from southbound Spine Road to eastbound Ka Uka Boulevard.

4. With Both Koa Ridge Makai and Waiawa Developments

The following are additional recommendations of this study to accommodate *Year 2016 With Koa Ridge Makai and Castle & Cooke Waiawa Projects*, and to improve traffic operations in the vicinity as a result of the proposed project and other projects in the region. These additional recommendations listed below will be implemented along with those identified in the *without Koa Ridge Makai and Castle & Cooke Waiawa* scenario.

At the intersection of Ka Uka Boulevard with the Interstate H-2 northbound on- and off-ramps, provide or construct the following:

- Widen Ka Uka Boulevard west of the off-ramp junction at Ka Uka Boulevard to provide three westbound lanes.
- Extend off-ramp deceleration length 800 feet upstream from the ramp diverge point.
- Provide a northbound off-ramp in the northeast quadrant of the Waipio Interchange. Relocate the northbound on-ramp to accommodate the new loop ramp.

At the intersection of Ka Uka Boulevard with the Interstate H-2 southbound off-ramp and Moaniani Street, provide or construct the following:

- Modify southbound approach to include an exclusive left-turn lane, a through lane, and an exclusive right-turn lane.
- Modify the traffic signal phasing at the intersection to allow for simultaneous left-turn movements on the northbound and southbound approaches. Intersection geometry may need to be adjusted to provide adequate vehicle spacing to accommodate turning maneuvers.

At the intersection of Ka Uka Boulevard with the Commercial Driveway and New Spine Road, provide or construct the following:

- Three lanes on the southbound approach of the Spine Road to accommodate two exclusive left-turn lanes and a shared through and right-turn lane.
- Provide an exclusive right-turn lane on the westbound approach of Ka Uka Boulevard between the H-2 southbound off-ramp and Spine Road.
- Install traffic signal system with protected left-turn movements along Ka Uka Boulevard.

C. Year 2020 With Koa Ridge Makai Development Only

The *Year 2020 With Koa Ridge Development* will increase traffic demands in the project vicinity and would require an additional project access point to accommodate projected Year 2020 traffic demands with the proposed project. The proposed access point at the existing Pineapple Road Overpass along the Interstate H-2 Freeway would provide project egress and ingress for northern portion of the project as well as relieve other facilities serving regional traffic demands. Modifications to the interstate system require the preparation and approval of an Interstate Access Modifications Request by the State Department of Transportation, with final approving authority by the Federal Highway Administration. However, in addition to the proposed new interchange at the Pineapple Road Overpass, other improvements identified in the *Year 2016 with and without project* analyses should also be implemented to accommodate the anticipated increases in traffic demand at the study intersections at Year 2020.

In addition, other strategies to reduce traffic demands in the region and improve traffic operations are offered for consideration. These Transportation Demand Management (TDM) strategies are related to land use planning concepts and operations of the individual land uses. The following are TDM strategies for considerations that may be applied to commercial, office, or similar applicable land uses to further mitigate traffic impacts to the surrounding roadways in the vicinity:

1. Implement flexible or staggered work shift times for employees when possible to minimize trips during peak periods of traffic.
2. Establish a bus pass program for employees to encourage the use of public transit. This initiative may be in the form of a subsidized program as an incentive to attract employees to use public transit as a mode of travel.
3. Provide adequate and secure bicycle parking areas to encourage the use of alternate modes of travel.
4. Encourage ride-sharing and establish a program to identify employees of same work shifts and similar travel routes that potentially may carpool together. The program should be initiated by surveying the work force and coordinating the matching of employees desiring to participate in the ride-sharing program.

The program may also consider the assignment of convenient parking stalls for carpooling vehicles, as well as, discounted parking rates as incentives.

5. Restrict deliveries to off-peak hours when possible to minimize trips during peak periods of traffic.

In addition, for the residential uses within the development, some or all of the following land use planning strategies and concepts could be considered:

1. Design mixed-use components within the project to reduce the use of regional transportation facilities.
2. Provide multiple or alternate routes within the project that promote connectivity concepts to lessen the reliance on specific travel routes.
3. Provide a system of safe and usable pedestrian routes.
4. Provide safe and secure bike facilities.
5. Consider park-and-ride lots on or in the vicinity of the project coinciding with supporting transit service.

Detailed discussions of these and other strategies are included in *Castle & Cooke Koa Ridge Makai and Waiawa Project, Alternative Transportation Components*, prepared by Weslin Consulting Services, Inc., dated November 2008.

D. Year 2025 With Both Koa Ridge Makai and Waiawa Developments

The Year 2025 With Koa Ridge and Waiawa Developments will increase traffic demands in the project vicinity. However, in addition to the proposed new interchange at the Pineapple Road Overpass, improvements identified in the *Year 2016 with and without project* analyses should be able to accommodate the anticipated increases in traffic demand at the study intersections at Year 2025. Modifications to the interstate system require the preparation and approval of an Interstate Access Modifications Request by the State Department of Transportation, with ultimate approving authority by the Federal Highway Administration.

Further strategies to reduce traffic demands in the region and improve traffic operations identified in the previous section of this report should be considered.

VII. OTHER CONSIDERATIONS

A. City Rail System Benefits

The proposed Honolulu High-Capacity Transit Corridor Project is intended to increase east-west mobility on Oahu's most heavily congested corridor. As described in the November 2008 Draft EIS, the transit project is intended to:

- provide faster, more reliable public transportation service than can be achieved with buses operating in congested mixed-flow traffic
- provide reliable mobility in areas of the corridor having with people of limited income, an aging population and rapidly developing areas
- provide additional transit capacity and an alternative to the automobile, and
- moderate anticipated traffic congestion in conjunction with other improvements included in the Oahu Regional Transportation Plan 2030 (ORTP)

The rapid transit system alignment does not extend to Central Oahu, however, Central Oahu commuters would benefit to the extent that the Interstate H-1 freeway corridor from Kapolei to the Waiawa Interchange experiences capacity relief and there is a reduction in traffic congestion on the H-1 Freeway to and from the west. The transit's Draft EIS reports that total congestion would be reduced by 23 percent with the transit improvements.

Although not directly served by the rail system, Central Oahu commuters can make use of a complementary system to realize the benefits of travel mode choices afforded to those along the proposed route. This would be in the form of transit system feeder buses or shuttles traveling between established and planned park-and-ride facilities and the rail transit stations. The current community service and long haul bus routes would need to be modified to provide connections between users and these stations. Existing park-and-ride lots in Central Oahu and existing and proposed bus transit stations could be integrated with the high-capacity transit system with modified shuttle services supporting the high-capacity transit system.

A major transit station and supporting park-and-ride facility are planned in the vicinity of the Pearl Highlands Shopping Center (Kamehameha Highway at Kuala Street). The Pearl Highlands Station on approximately 11 acres will have a parking structure with 1,600 parking stalls for Park-and-Ride commuters. Central Oahu commuters will benefit from the construction of a new direct access ramp from the H-2 Freeway. The ramp connection will allow both bus transit vehicles and park-and-ride automobiles direct access with the proposed Pearl Highlands Transit Station park-and-ride lot. Of all the stations along the rail route, the Pearl Highlands Station is expected to have the highest number of boardings in the morning two-hour peak period. The Park-and-Ride Lot at Pearl Highlands with 1,600 stalls is the largest of four proposed park-and-ride lots, and is the only one with structure parking. Discussion on proposed modified bus service routes and system is included in *Castle & Cooke Koa Ridge Makai and Waiawa Project, Alternative Transportation Components*, prepared by Weslin Consulting Services, Inc.

The transit project's construction phasing has the East Kapolei to Pearl Highlands segment as the first of four phases of development. Central Oahu commuters thus would be one of the early beneficiaries of the rail transit project. Upon build-out in 2018, Central Oahu commuters can be expected to benefit from the following transit project effects:

- improved transit service mobility, reliability, equity, and access,
- decline in vehicle miles traveled, vehicle hours traveled, and vehicle hours of delay, and
- improved transit travel times between major employment centers in Downtown and West Oahu.

B. Regional Transportation Improvements and Issues

1. General

A number of regional transportation projects are planned in the vicinity that are in various stages of planning and implementation. These projects are identified in the Oahu Regional Transportation Plan, 2030 (ORTP), that serve as a planning document to address mobility issues and transportation needs for the island of Oahu. The plan is intended to integrate growth patterns of the island's communities recognizing available financial resources over the next 25 years. The plan identifies transportation projects and outlines an implementation program based on available transportation funds to incorporate mid- and long-range projects for the island. The following are transportation projects in the region identified in the ORTP.

2. H-1 Widening of Westbound lanes between Waiawa Interchange and Waiawa Interchange

The proposed Interstate H-1 Freeway widening project of the westbound lanes between Waiawa Interchange and the Waiawa Interchange includes improvements to provide an additional travel lane in the westbound direction for general-purpose use. This segment of the freeway includes five existing westbound lanes. An additional lane would provide a total of six westbound travel lanes east of the Waiawa Interchange. During the morning peak period of traffic, the deployment of the eastbound zipper lane utilizes two of the westbound lanes resulting in a total of three westbound lanes at this freeway section. Near the Waiawa Interchange, two of the resulting three westbound lanes are used for the Waipahu exit and connections to the northbound Interstate H-2 Freeway. The remaining single lane services all of the westbound traffic beyond the Waiawa Interchange during the morning peak periods of traffic. Immediately east of the Waiawa Interchange during eastbound zipper lane deployment, there are three westbound lanes. During periods other than the morning peak, the additional lane would provide a total of six westbound lanes immediately east of the Waiawa Interchange and four westbound lanes through the interchange, with two westbound lanes transitioning to the northbound Interstate H-2 Freeway. This widening project provides added westbound capacity through this section of the freeway at an estimated construction cost of \$137,500,000 (2005 dollars). The ORTP identifies this project as a congestion relief project to be implemented within the 2006 and 2015 timeframe.

3. H-1 Widening of Westbound lanes between Waiawa Interchange and Paiwa Interchange

The proposed Interstate H-1 Freeway widening project of the westbound lanes between Waiawa Interchange and Paiwa Interchange includes improvements to provide an additional general-purpose travel lane in the westbound direction and accompanying freeway shoulder improvements. The additional lane would serve as a continuation of the westbound freeway widening efforts along the Interstate H-1 Freeway providing additional freeway capacity in that direction. During the morning peak periods of traffic when the eastbound zipper lane is deployed, two existing lanes near the Waiawa Interchange are provided to service westbound traffic. During other time periods, four existing westbound lanes are provided. The additional lane would result in a total of three westbound lanes during the morning peak periods and five westbound travel lanes during other periods of the day without the deployment of the eastbound zipper lane at this section of the freeway. The additional lane would improve westbound traffic flow through the freeway section during all periods of the day at an estimated construction cost of \$6,900,000 (2005 dollars). The ORTP identifies this project as a congestion relief project to be implemented within the 2006 and 2015 timeframe.

4. H-1 PM Zipper Lane from Keehi Interchange to Kunia Interchange

The PM westbound zipper lane from the Keehi Interchange to Kunia Interchange along the Interstate H-1 Freeway during the afternoon peak periods would improve westbound traffic flow by creating additional freeway capacity. The westbound zipper lane would be deployed using moveable concrete barriers similar to those provided for the eastbound zipper lane along the Interstate H-1 freeway to service eastbound traffic flow during the morning peak periods. Previous studies indicate that traffic demand along the Interstate H-1 Freeway is expected to increase by approximately 1.5% to 2% per year based on historical trends. As such, future westbound operating conditions along the Interstate H-1 Freeway would operate poorly at LOS "E" or worse conditions. Deployment of an afternoon zipper lane would improve westbound operating conditions by providing added freeway capacity. However, an afternoon westbound zipper lane would generally utilize two eastbound lanes on the freeway. With the increase in traffic demands also occurring in the eastbound direction of the freeway, the use of two lanes in the eastbound direction to service westbound traffic flow would result in poor traffic operating conditions for eastbound commuters. Additional freeway capacity with the use of existing available shoulder lanes in the eastbound direction would be necessary to accommodate the use of eastbound lanes for a westbound zipper lane. Other improvements to the eastbound lanes of the freeway may be necessary to accommodate the afternoon zipper lanes along

the Interstate H-1 Freeway. With the deployment of an afternoon zipper lane, and the use of an eastbound shoulder lane along the Interstate H-1 Freeway, the eastbound traffic flow would operate at LOS "E" or better conditions while considerable improvement to the operating levels of service for the westbound direction during the afternoon peak periods of traffic along the Interstate H-1 Freeway occur in the immediate future. The estimated cost of this project is \$19,900,000 (2005 dollars) identified for construction within the 2006 and 2015 timeframe and described as a congestion relief project in the ORTP.

5. H-1 Waipahu Westbound off-ramp Widening

The Interstate H-1 Freeway Waipahu Street westbound off-ramp widening project includes the construction of an additional off-ramp lane to facilitate traffic movement exiting the freeway. The additional off-ramp lane would connect to westbound Kamehameha Highway/Farrington Highway with direct access to Waipahu town and surrounding communities. During the existing afternoon peak hours of traffic, the off-ramp is generally congested with vehicles exiting the freeway. The congestion oftentimes impedes traffic flow in the westbound and northbound directions. An additional off-ramp lane would provide increased capacity resulting in improvements to both westbound and northbound traffic flows of the Interstate H-1 and H-2 Freeways, respectively. The estimated cost of this project is \$11,700,000 (2005 dollars) identified for construction within the 2006 and 2015 timeframe and described as a congestion relief project in the ORTP.

6. H-2 Waipio Interchange on- and off-ramps and Ka Uka Overpass Widening

The Interstate H-2 Waipio Interchange on- and off-ramps, and Ka Uka Overpass widening project includes the widening of the ramps to facilitate traffic movements through the interchange. These improvements include separate turning lanes and intersection modifications that will provide additional storage capacity and improved traffic flow at the ramp junctions of the interchange. In addition, this project includes the widening of the Ka Uka Overpass to include a total of seven lanes and includes the extension of existing turning lanes or provisions for separate turning lanes providing additional storage capacity at the on- and off-ramp intersections. These improvements are intended to improve intersection operations at the ramp junctions and provide additional capacity to accommodate increased traffic demands. The estimated cost of this project is \$20,700,000 (2005 dollars) identified for construction within the 2006 and 2015 timeframe and described as a congestion relief project in the ORTP.

7. H-1/H-2 Merge Eastbound Transition Lane

The Interstate H-1/H-2 Merge Eastbound Transition Lane project is to improve the merging characteristics between the southbound Interstate H-2 Freeway and the eastbound Interstate H-1 Freeway with additional transition lanes. The Interstate H-1 and H-2 merge is the convergence of three southbound lanes on the Interstate H-2 freeway and three eastbound lanes on the Interstate H-2 to a total of five lanes. The bottleneck condition in addition to the eastbound Waipahu on-ramp traffic demands oftentimes result in queuing at the Waiawa Interchange on both the southbound Interstate H-2 and eastbound Interstate H-1 freeways during the morning peak periods of traffic. The removal of the bottleneck condition is expected to improve southbound and eastbound traffic flows on the freeways. The estimated cost of this project is \$45,500,000 (2005 dollars) identified for construction within the 2006 and 2015 timeframe and described as a congestion relief project in the ORTP.

8. H-1 Widening of Eastbound lanes from Waiawa Interchange to Halawa Interchange

The proposed Interstate H-1 Freeway widening project of the eastbound lanes between Waiawa Interchange and the Halawa Interchange includes improvements to provide an additional general purpose travel lane in the eastbound direction and associated freeway shoulder improvements. Currently, portions within this section of freeway include a shoulder lane used by motorists during restricted morning peak periods of traffic, providing added freeway capacity. The existing shoulder lane will be upgraded to a general-purpose lane providing some increase in freeway capacity. Between the Waiau Interchange and Waiawa Interchange, the widening of the freeway viaduct may be necessary to accommodate an additional lane. New freeway shoulders will also be provided for clearances, drainage, and emergency uses. The new lane would be available to motorists throughout the day and is intended to improve traffic flow and increase safety through the freeway section for eastbound motorists. The estimated construction cost for this project is \$251,300,000 (2005 dollars). The ORTP identifies this project as a congestion relief project to be implemented within the 2016 and 2030 timeframe.

9. Pineapple Road Interchange and Overpass Widening

The Pineapple Road Interchange and Overpass Widening project is located along the Interstate H-2 Freeway between the Waipio Interchange and the Mililani Interchange. The project entails the development of a full-service freeway interchange to accommodate future developments in Central Oahu and surrounding regions. The project also includes the widening of the Pineapple Road Overpass from two lanes to four lanes to accommodate anticipated traffic demands at the interchange. Although the Castle & Cooke

Waiawa Development is not expected to connect directly with the proposed Pineapple Road Interchange since there is no feasible connection available, the Koa Ridge Makai development proposes the construction of interchange ramps at this location to facilitate access for the development and relieve traffic demand at the Waipio Interchange. Although the ORTP indicate an estimated cost of \$50,000,000 to implement a full-service interchange at the Pineapple Road Overpass, that figure may be significantly under-estimated given the slope requirements of associated service ramps relative to the existing longitudinal grades of the freeway and existing terrain in the vicinity. The ORTP identifies this project as a congestion relief project to be implemented within the 2016 and 2030 timeframe.

10. Elevated reversible 2-lane highway from Waiawa Interchange to Keehi Interchange

A permanent elevated reversible 2-lane highway along the Interstate H-1 freeway between the Waiawa and Keehi Interchanges would function similar to a zipper lane deployment between the two interchanges to service unbalanced directional traffic flows. However, two lanes would provide double the operating capacity of a single zipper lane configuration. A reversible roadway is intended to service imbalanced traffic flows associated with daily commuter traffic periods without impacting opposing traffic flow, as would a zipper lane deployment. During the morning peak periods, the reversible roadway would service eastbound flow along the Interstate H-1 Freeway, and westbound flow during the afternoon peak periods. Permanent reversible lanes could also provide alternate routes, additional directional freeway capacity, and circulation improvements during freeway lane closures for construction or maintenance work in the associated general-purpose lanes, major events at the Halawa Stadium or other venues with high trip generating characteristics, as well as provide additional freeway capacity to facilitate evacuations or other emergencies. Since the elevated roadway would be a permanent structure, links and termini points of connections with the surface streets and freeway require special consideration that minimize impacting the movement, circulation, and safety of those facilities. The estimated construction cost for this project as identified in the ORTP is very high at \$2,500,000,000 (2005 dollars). The ORTP also identifies this project as a congestion relief project and is characterized as an Illustrative Project. An Illustrative Project may be considered as a potential project in the regional transportation plan that could prove beneficial as a transportation improvement and is considered as a high priority project for potential inclusion to the regional transportation plan should funding become available. However, Illustrative Projects are not considered part of the official regional transportation plan. Therefore, no timeframe is set in the ORTP for these types of projects.

11. Central Mauka Road

The Central Mauka Road project is intended to provide a second or alternate route along the east side of the Interstate H-2 corridor between Waiawa and Mililani Mauka. The roadway would connect Kamehameha Highway in Pearl City and Meheula Parkway in Mililani Mauka with connections at available interchanges along the route. The roadway is planned as a four-lane roadway with channelized intersections along the alignment with connecting roads at the interchanges along the Interstate H-2 freeway. Several long bridges are expected given the existing terrain in the vicinity. The Central Mauka Road would provide additional capacity servicing north-south mobility. Such a roadway may also provide connectivity with other regions in Central Oahu, reduce future traffic demands along existing transportation facilities, and service as an additional or alternate route at times of emergency. The estimated construction cost for this project is \$160,000,000 (2005 dollars). The ORTP identifies this project as a second access project to be implemented within the 2016 and 2030 timeframe. The major challenges facing the project are its high cost of construction in light of dwindling local resources, and because the proposed Central Mauka Road is not a part of the State Highway System and thus is not eligible for federal highways funding.

12. Kamehameha Highway Paiwa Road Connection

The Paiwa Road Extension project includes the northward extension of the roadway in Waipahu at Lumiauw Street in Waikele to the Kamehameha Highway intersection with Ka Uka Boulevard. The roadway extension would connect the immediate communities of Waipio, Waikele, and Waipahu. The roadway extension would provide an alternate route in the region and improve circulation in the vicinity, as well as provide connectivity and access between the existing roadway facilities. However, it is acknowledged and understood that the majority of the surrounding neighborhood residents do not support the project. The estimated construction cost for this project as identified in the ORTP is \$15,000,000 (2005 dollars). The ORTP also identifies this project as a congestion relief project and is characterized as an Illustrative Project. An Illustrative Project may be considered as a potential project in the regional transportation plan that could prove beneficial as a transportation improvement and is considered as a high priority project for potential inclusion to the regional transportation plan should funding become available. However, Illustrative Projects are not considered part of the official regional transportation plan. Therefore, no timeframe is set in the ORTP for these types of projects.

13. Kamehameha Highway Widening

The State Department of Transportation is currently pursuing Kamehameha Highway widening project. The project includes the widening of the highway from a three-lane undivided roadway to a four lane divided roadway between Lanikuhana Avenue in Mililani and Ka Uka Boulevard in Waipio. The highway widening will provide added service capacity and improve safety along the alignment, and will provide a continuous four-lane roadway between Waipio and Mililani. The estimated construction cost for this project is \$78,900,000 (2005 dollars). The ORTP identifies this project as a congestion relief project to be implemented within the 2006 and 2015 timeframe.

14. H-2 Park-and-Ride Facility

A park-and-ride facility has been considered within the median of the Interstate H-2 Freeway, just north of the Waipio Interchange. Such a facility was recommended in a 2003 Mililani Mauka Park-and-Ride study and also referenced in the 2006 Alternatives Analysis report for the City's Rail Transit project. In the City's most recent Draft EIS, however, this H-2 median park-and-ride facility was no longer being considered, as the Pearl Highlands Station incorporates a large 1,600-stall park-and-ride structure with a direct access ramp from the H-2 freeway.

The Alternative Transportation Components report (Weslin, 2008) considered the center median island as an option for an H-2 Freeway Flyer Transit Station. A regional bus station could be created in this median island between the Ka Uka Boulevard Bridge and the Pineapple Road bridge. The median island is up to 250 feet wide and 2,000 feet long providing an ample footprint for such a facility consistent with comparable projects in Seattle and Los Angeles without interference with other interchange traffic movements. An H-2 Freeway Flyer Transit Station would use direct access ramps from the existing H-2 HOV lanes. Access to the Station would be by a pedestrian and bicycle only bridge over H-2 with direct, curb-separated, safely designed pathway connections integrated with the Koa Ridge Makai site. Such pedestrian and bicycle only bridges are being increasingly used worldwide to connect major mixed use developments across both natural and manmade barriers.

C. Secondary and Cumulative Impacts on Transportation Infrastructure

Cumulative impacts are typically defined as the effects on the environment which result from the incremental impact of a project when added to past, present, and reasonably foreseeable future actions. The estimation of future impacts is important for cumulative impact analysis. However, the focus must be on "reasonably foreseeable" actions which are those that are likely to occur or probable, rather than those that are merely possible or subject to speculation. The prediction of

reasonably foreseeable impacts thus requires judgment based on information obtained from reliable sources such as adopted plans and similar documents.

Based upon this framework, the methodology used in the traffic analysis does take into account and evaluate the cumulative impacts on transportation infrastructure. The methodology used in the traffic study utilizes an approach that is applicable to a reasonable approach in evaluating cumulative impacts which are explained below.

1. Establish the geographic scope for the analysis. The scope of the study was regional in nature and included several major intersections, interchanges, the Interstate H-2 Freeway, and Kamehameha Highway as described in Sections I and II of this report. This study area was also determined based upon consultations with the State DOT. An assessment was also undertaken of the Waiawa Interchange (H-1/H-2 merge) in terms of commuter travel time effects.
2. Establish the timeframe for the analysis. The timeframe for the analysis included the project's build-out year of 2025 along with an interim study year of 2016.
3. Characterize the infrastructure system. The existing transportation system and present levels of operation was discussed in Section III.
4. Identify other developments or improvements affecting the transportation infrastructure in the study area. The study fully incorporates the Waiawa Ridge Development's development schedule over the project period. Information from the ORTP was also utilized because it serves as a guide for the development of the major surface transportation facilities and programs to be implemented on Oahu. For longer range studies, use of the report's information more accurately reflects the anticipated impacts of traffic growth in the region than the use of historical traffic count data because it is based upon statewide population, employment, and visitor forecasts, and is thus a reliable source.
5. Define a baseline condition for the infrastructure system for which future impacts can be identified and evaluated. The traffic study developed future projections and established conditions without the project that serves as the baseline condition for which project related effects can be identified and evaluated.
6. Determine the magnitude and significance of cumulative effects. Traffic projections were then updated to include the project related traffic over the without project conditions to identify project impacts. Therefore, these results identify the cumulative effects of the project since it includes the impacts of other developments and growth affecting the study area.

A number of regional highway improvements identified in the ORTP were discussed in this report. However, they could not be reasonably included in the analysis because: 1) implementation of the improvements is programmed based on available transportation funds and priorities which are difficult to establish; and 2) determining which of the many identified improvements would be completed by a certain timeframe is difficult to

estimate. Nevertheless, the traffic analysis completed represents a more conservative assessment for determining impacts and necessary mitigation improvements. Having any of the regional improvements implemented within the study period would result in improved conditions over that indicated. Thus, the traffic analysis conducted already incorporates methods to assess the cumulative impacts associated with the proposed project.

Secondary effects, or otherwise referred to as indirect effects, are described as those effects caused by a project, but occur later in time or farther removed in distance than direct impacts. They may include impacts on environmental resources that occur as a result of the project's influence on land use. Secondary impact analyses are appropriately concerned with impacts that are sufficiently "likely" to occur and not with the speculation of any impact that can be conceived of or imagined.

The traffic methodology utilized accounts for likely secondary effects associated with the project. Information from the ORTP incorporates land use information on a regional scale that were factored into the traffic projections and subsequent analysis. The regional roadway network for this project was modeled using transportation software to develop the forecasts which thus accounted for changes in traffic assignments as development progressed out to the 2025 build-out year. Thus, secondary effects have been accounted for within the traffic impact analysis along with cumulative effects.

VIII. CONCLUSION

Traffic volumes along Ka Uka Boulevard are expected to increase significantly by the Year 2016 and even greater by the Year 2025 due to the development of the proposed project as well as other major developments in the region and immediate vicinity. However, the proposed development is dependent on many other external factors that are not controlled by Castle & Cooke Homes Hawaii. Therefore the analyses contained herein identify mitigating measure as a result of several development scenarios. With these various development scenario, increased traffic volumes on the surrounding roadways are expected.

In addition, commute travel times are expected to increase. All traffic-generating uses in the area contribute to the traffic loading of the roadway network in the vicinity. Although internal capture concepts for highly applicable land uses were incorporated in the analysis, the overall percentage assumed to represent internal trips used in the traffic analysis were considerably lower than the calculated percentage rate that can be realized through a variety of strategies and initiatives, resulting in an analysis that may be considered conservative. However, implementation of the recommended intersection and roadway modifications identified above for the applicable study intersections should minimize the traffic impacts associated with these projects. Roadway and intersection improvements were presented to understand the transportation needs of the region on a cumulative basis. The analysis scenarios however were segregated to identify specific needs for specific conditions, for specific periods of proposed development, and for specific time periods of development. Such an approach addresses the timing of necessary improvements and defines the general source of the resulting individual need. Roadway improvements identified in this report

represents major investments by area developers that will not only mitigate project-related traffic, but would aid in the overall function of the transportation system in the project vicinity.

VOLUMES 2 & 3

APPENDICES

(UNDER SEPARATE COVER)