BRYAN J. BAPTISTE
MAYOR

GARY K. HEU
ADMINISTRATIVE ASSISTANT

IAN K. COSTA
DIRECTOR OF PLANNING

MYLES S. HIRONAKA
DEPUTY DIRECTOR OF PLANNING

COUNTY OF KAUA'I
PLANNING DEPARTMENT
4444 RICE STREET
KAPULE BUILDING, SUITE A473
LIHU'E, KAUA'I, HAWAI'I 96766-1326

TELEPHONE: (808) 241-6677 FAX: (808) 241-6699

April 21, 2006

RECEIVED
'06 APR 24 P3:40
OFC. OF ENVIRONMENTAL
QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmonson

Subject : Finding of No Significant Impact (FONSI)
General Plan Amendment GPA-2006-2
Kauai Lagoons LLC, KD Golf Ownership LLC,
and KD Kapule LLC - Applicant
Lihue, Kauai

The County of Kauai Planning Department has reviewed the comments received during the 30-day public comment period which began on January 23, 2006. The Kauai Planning Department has reviewed the Draft EA, agency and public comments submitted to the Draft EA, and the Petitioner's responses to the written comments to the Draft EA. Based on this review, the Department has determined that the proposed project will not have significant environmental effects and hereby issues a FONSI. Please publish this notice in the next available Environmental Notice.

We have enclosed a completed OEQC Publication Form. Consultants to the Applicant, Wilson Okamoto & Associates will be submitting in a separate transmittal, four (4) paper copies of the final Environmental Assessment. As an option suggested by your agency, one (1) electronic PDF file and two paper copies of the Final Environmental Assessment may also be submitted in lieu of the four (4) paper copies.

Please contact Bryan Mamaclay of our staff at 241-6677 if you have any questions.

IAN K. COSTA
Planning Director

Enclosures

c: Rodney Funakoshi, AICP
Michael J. Belles, Esq.

2006-05-08 KA FEA KAUAI LAGOONS RESORT GENERAL PLAN AMENDMENT

MAY - 8 2006
FILE COPY

Final
Environmental Assessment

Kauai Lagoons Resort

Lihue, Kauai, Hawaii

RECEIVED
'06 APR 25 P1:45
DEPT. OF ENVIRONMENTAL
QUALITY CONTROL

Prepared For

Kauai Lagoons LLC

KD Golf Ownership LLC

KD Kapule LLC

Prepared By

Wilson Okamoto Corporation

April 2006

FINAL ENVIRONMENTAL ASSESSMENT

KAUAI LAGOONS RESORT

Lihue, Kauai, Hawaii

Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.) and 173

Prepared For:

Kauai Lagoons LLC
KD Golf Ownership LLC
KD Kapule LLC

Prepared By

Wilson Okamoto Corporation
Engineers and Planners
1907 South Beretania Street
Honolulu, Hawaii 96826

April 2006

Table of Contents

Table of Contents (continued)

List of Figures

List of Tables

Appendices

Appendix A: Biological Surveys Within the Kauai Lagoons Resort, Prepared by Rana Productions Ltd., October 31, 2005

Appendix B: Archaeological Assessment of an Approximately 71-Acres Portion of the Kauai Lagoons Resort Property, Prepared by Cultural Surveys Hawaii, October 2005.

Appendix C: Cultural Impact Evaluation of Two Portions, Totaling Approximately 400 Acres, of the Kauai Lagoons Property, Prepared by Cultural Surveys Hawaii, October 2005

Appendix D: Traffic Impact Report for the Proposed Kauai Lagoons Resort, Prepared by Wilson Okamoto Corporation, September 2004

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Affordable Housing Project), Prepared by Wilson Okamoto Corporation, June 2005

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Ninini Point Street Access), Prepared by Wilson Okamoto Corporation, September 2005.

PREFACE

This Final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) is prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS), and Title 11, Chapter 200, Administrative Rules, Department of Health, State of Hawaii. Proposed is an applicant action by Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC to amend the State Land Use District and County General Plan and Zoning boundaries for inland portions of the Kauai Lagoons Resort to provide lower-density development, develop in remnant golf course areas, permit additional lagoon bungalow units, reconfigure the Mokihana and Kiele Golf Courses, and enable permanent multi-family housing. The preparation of this Environmental Assessment (EA) arises from the need for a General Plan Amendment in conformance with Chapter 343, HRS.

PROJECT SUMMARY

Petitioners/Applicants:	Kauai Lagoons LLC KD Golf Ownership LLC KD Kapule LLC 55 Merchant Street, Suite 2000 Honolulu, Hawaii 96813
Approving Agency:	County of Kauai Planning Department
Location:	Lihue, Kauai, Hawaii
Tax Map Keys:	(4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173
Affected Area:	Approximately 400 acres
Recorded Fee Owners:	Kauai Lagoons LLC KD Golf Ownership LLC KD Kapule LLC
Existing Use:	Golf Course, lagoons, commercial buildings, vacant lands
State Land Use Classification:	Agricultural and Urban Districts
County General Plan:	Open, Resort and Urban Center
Lihue Development Plan:	Agriculture, Golf Course and Resort
County Zoning:	Open District (O), Limited Industrial District (IL), General Commercial District (CG), and Agriculture District (A)
Special Management Area (SMA):	Portion of the Proposed Area is within the SMA
Proposed Action:	Reduce the development density by spreading resort residential units over undeveloped open areas, lagoons, and create residential lots within the golf courses. Rezone the affordable housing site from Limited Industrial District (IL) to the Residential District (R-20).
Impacts:	No significant impacts are anticipated from the proposed land use changes, rezoning and future development of the Proposed Area.

Required Permits & Approvals:

State Land Use District Boundary Amendment
County General Plan Amendment
County Zoning Amendment
Special Management Area Use Permit
Class IV Zoning Permit
National Pollutant Discharge Elimination System (NPDES) Permit
Grading Permit
Building Permit

Agencies Consulted In Pre-Assessment Process:

County of Kauai Planning Department
State of Hawaii Department of Transportation, Highways Division

Agencies Consulted In Draft EA Process:

Federal
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers

State of Hawaii
Department of Agriculture
Department of Business, Economic Development, and Tourism
Department of Business, Economic Development, and Tourism, Office of Planning
Department of Education
Department of Health
Department of Health, Environmental Management Division
Department of Health, Office of Environmental Quality Control
Department of Land and Natural Resources
Department of Land and Natural Resources, Historic Preservation Division
Department of Transportation
Office of Hawaiian Affairs

County of Kauai
Planning Department
Department of Water
Department of Public Works
Fire Department

Others
Bays Deaver Lung Rose Baba
Lihue Public Library

1. INTRODUCTION AND PROJECT SETTING

1.1 Introduction

The Kauai Lagoons Resort in Lihue, Kauai is unique among Hawaii's resort destinations. The resort offers a secluded property with ocean vistas and a navigable waterway, interwoven amongst two championship golf courses and located just minutes from the civic center and the Lihue Airport. The Resort Property is situated on approximately 700 acres with existing facilities including two 18-hole golf courses, a golf and racquet club facility, parking lots, a network of man-made lagoons, the former Fashion Landing commercial development, and the former Inn-on-the-Cliffs restaurant. The Resort is located adjacent to the existing Kauai Marriott Resort and Beach Club.

In September 2002, Zoning Ordinance No. PM-2002-363 was approved by the Kauai County Council for the subject Property, which included a refinement of zoning designations. A number of conditions were imposed, including a limitation on development to 750 units, noise attenuation, public access, affordable housing, and requirements to initiate substantial construction within five years.

In August 2005, Kauai Lagoons Resort received Special Management Area Use Permit and other permit approvals from the Kauai Planning Commission to allow the development of 723 hotel/residential units, a new golf clubhouse, treatment spa, fitness center, retail and offices, a restaurant, resort check-in facilities, temporary sales facilities and model units, 1,818 off-street parking stalls, public recreational facilities, and other amenities on its properties.

The Petitioners/Applicants are now seeking to amend the land use and zoning boundaries for inland portions of the Property to provide lower-density development, develop in remnant golf course areas, permit additional lagoon bungalow units, reconfigure the Mokihana and Kiele Golf Courses, and enable permanent multi-family housing. Required approvals include a State Land Use District Boundary Amendment, County General Plan and Zoning Amendments, and expansion of the Visitor Destination Area (VDA) boundaries. The Petition for State Land Use District Boundary Amendment, General Plan Amendment and Zoning Amendment has been concurrently filed with the County of Kauai Planning Department. An Environmental Assessment (EA) is triggered from the need for the General Plan Amendment pursuant to Chapter 343, Hawaii Revised Statutes (HRS).

The following defined terms are used in this EA:

> "Property" refers to the approximately 700 acres of the Kauai Lagoons Resort Property.
>
> "Proposed Area" refers to the areas of proposed or potential changes in land use and zoning, which could encompass up to approximately 400 acres.
>
> "Petition Area" refers to the approximately 233 acres encompassed by the subject pending Petition for a State Land Use District Boundary Amendment, General Plan Amendment and Zoning Amendment.

"Project" or "Proposed Project" refers to the current plans for development of the Property at the Kauai Lagoons Resort.

It is noted that although the Petition Area encompasses approximately 233 acres of the Kauai Lagoons Resort Property, the scope of this EA encompasses the Proposed Area of approximately 400 acres in order to assess the potential impacts of the areas of proposed or potential changes in land use and zoning.

1.2 Project Location and Setting

The Proposed Area is located within the Kauai Lagoons Resort Property in Lihue, Kauai. The Kauai Lagoons Resort is located adjacent to and south/southwest of Lihue Airport and is adjacent to the existing Kauai Marriott Resort and Beach Club along its southern boundary. The Kauai Lagoons Resort is located approximately one mile southwest of the town of Lihue and adjacent to the coastline as shown on Figure 1.

The Proposed Area encompasses Tax Map Keys (TMKs): (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173 as shown on Figure 2.

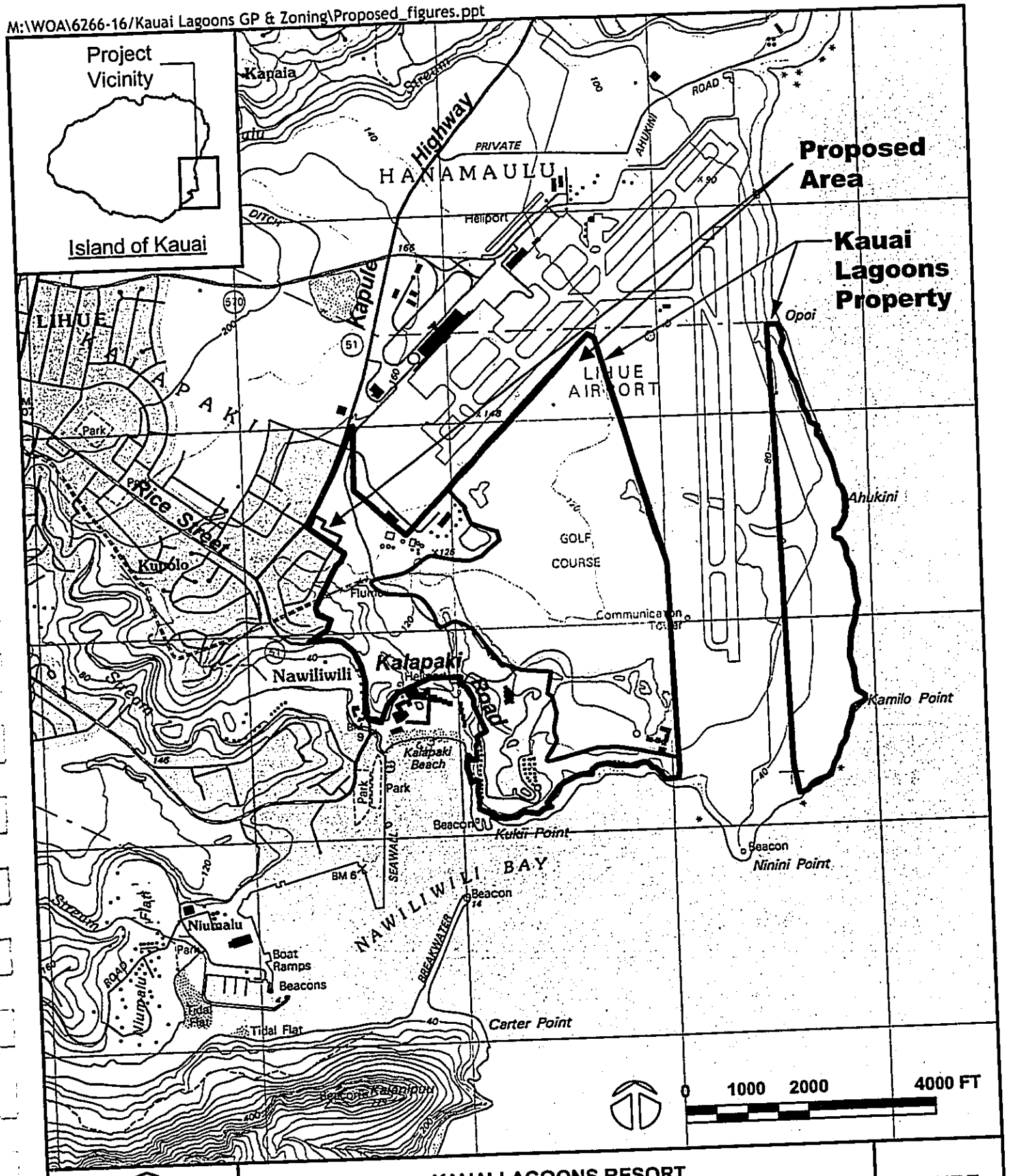
1.3 Existing and Surrounding Uses

Existing Uses: Existing uses within the Proposed Area include the 18-hole championship Mokihana Golf Course, a portion of the 18-hole championship Kiele Golf Course; vacant land adjacent to and north of the Mokihana Golf Course; parking lots, open lagoons, and vacant, undeveloped land within the south-central portions of the Proposed Area; the Fashion Landing commercial development and boat maintenance facility within the southeast portion of the Proposed Area; and, vacant land within the westernmost portion of the Proposed Area in the vicinity of Kapule Highway (see Figure 7).

Surrounding Uses: Land uses bordering the Proposed Area include Lihue Airport to the north, west and east; Kapule Highway and Lihue Industrial Park to the west and south; portions of the Kiele Golf Course to the south and west; and lagoons and vacant, undeveloped land to the south.

Other land uses in the vicinity of the Proposed Area include the County's Lihue Wastewater Treatment Plant to the west; the Kauai Marriott Resort and Beach Club, a golf and racquet club facility, tennis courts, parking lots, the vacant Inn on the Cliffs restaurant, open lagoons, and the coastline, including Kalapaki and Running Waters Beaches, to the south; Ahukini Recreation Pier State Park to the north; undeveloped land to the east across of Lihue Airport (portion of Kauai Lagoons Resort Property); Nawiliwili Harbor to the southwest; and the Ninini Point Lighthouse to the southeast at Ninini Point. Several private residences are located south and west of the Proposed Area near Kalapaki Beach. The Vidinha Memorial Stadium and the U.S. Post Office are located approximately 0.4 mile northwest of the Proposed Area.

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Location Map	FIGURE 1

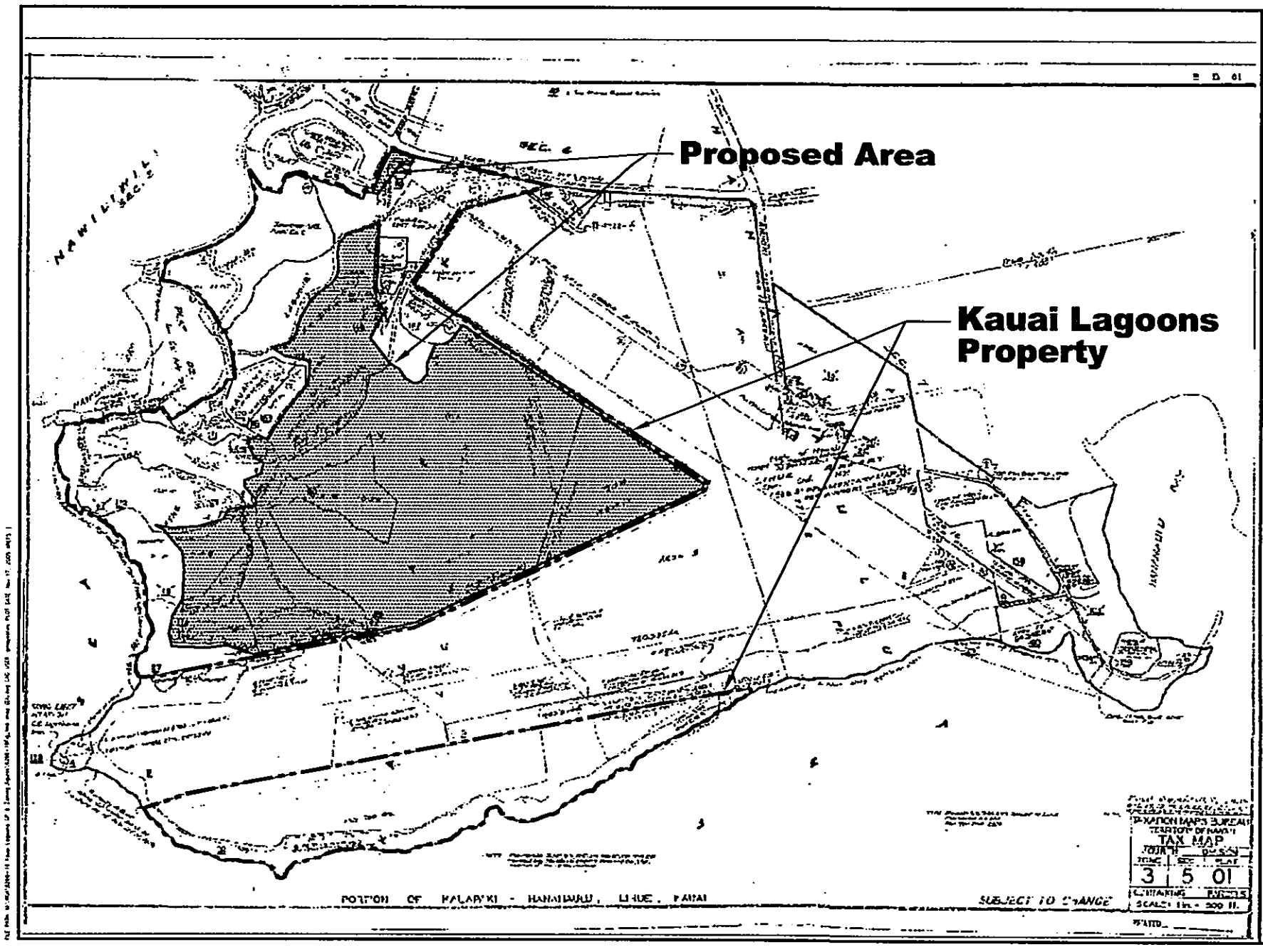


FIGURE 2
TAX MAP KEYS:
3-5-01: 6,
27(por.),165,
168,
172 (por.) and
173

2. PROJECT DESCRIPTION

2.1 Project Need

The need for the Proposed Project stems from the recent reconfiguration of the Kiele Golf Course and the desire to make more productive use of the Mokihana Golf Course. In late 2004, the Nicklaus Design Team, desiring to enhance the golfing experience for the Kiele Golf Course in conjunction with the proposed resort developments, proposed a reconfiguration of the Kiele Golf Course to relocate two golf holes further makai in the vicinity of the former second hotel site above the Running Waters Beach. This created an approximately 23.3-acre area of unplanned uses within the Open District which the Petitioners/Applicants now desire to rezone to Resort District (RR-2O) and relocate allowed density from elsewhere on the Project.

The maintenance of two 18-hole golf courses has become an expensive operating cost not offset by green fees. The Mokihana Golf Course in particular is an underperforming asset which is experiencing reduced golf play and high operating costs. In an effort to retain the golf course which is popular with the local golfing community, a reconfiguration of the golf course is proposed to place single-family residential lots adjacent to the golf holes along the golf courses. Implementation of this concept requires a modification to the existing Zoning Ordinance which prohibits the use of the Open District to attain resort density. This condition was based on the former resort owner's representation at the time and does not reflect the desires of the current Petitioners/Applicants.

2.2 Project Description

The initial phase of resort development entitled by the August 2005 permit approvals from the Kauai Planning Commission consists of approximately 115 resort residential units. The buildings are undergoing design and will be pursued shortly in the areas of the existing tennis courts, former Inn-on-the Cliffs Restaurant, and the Fashion Landing Commercial Area. The relocation of Kiele Hole No. 14 has left vacant undeveloped areas in the Open District. This provides the opportunity to reduce density from the existing zoned development lots by dispersing the planned resort residential units over a larger area. The total unit count of resort units (excluding the affordable housing units) will remain within the 750-unit maximum density established by the September 2002 Zoning Ordinance No. PM-2002-363.

Specific components of the master plan revisions to the Project include:

- Enable the development of resort-residential units in an area of land that is remnant of the existing Kiele No. 14 golf hole (which is being relocated), former Fashion Landing parking lot, lagoon and island areas, and the field area mauka of the relocated Kiele golf holes that is currently zoned Open. This will permit the resort units to be situated to allow additional green space between buildings and more open view corridors to the ocean, golf holes and lagoon.

- On an area on the downside bank of the relocated golf clubhouse and along the lagoons, permit lagoon bungalow units along the banks of the lagoon.

- Reconfigure the Mokihana and Kiele Golf Courses and relocate the existing Driving Range to allow for single-family resort residential lots between the golf holes. This is

intended to make more productive use of the golf courses, which are experiencing decreased golf demand and increased operational costs for the Resort.

- Permanently enable the multi-family use on the housing site at the intersection of Haoa Street and Kapule Highway. The 24 housing units exceed the allowable density in the Limited Industrial District (IL) once the affordable housing use expires in ten years. To permit the owner the ability to convert to a market rate housing project, a zone change to Residential District (R-20) will be required.

To accomplish the above, the Petitioners/Applicants propose the following entitlement actions:

1. State Land Use District Boundary Amendment

   The Petitioners/Applicants propose to reclassify 15 acres of land within the Mokihana Golf Course located within TMK: (4) 3-5-01: 168, from the State Agricultural District (A) to the Urban District (U) to allow single-family residential lots. This would occur in the vicinity of Mokihana Hole Nos. 7, 8 and 11 north of the existing driving range. The reclassification of 15 acres or less is subject to approval by the Kauai Planning Commission and the Kauai County Council.

2. County General Plan Amendment

   The Kauai General Plan Land Use Map is proposed to be amended to expand the Resort-designated area by approximately 190 acres from the Open designation to enable a lower density of development and accommodate residential development within the golf course. The approximately 190 acres encompass TMKs: (4) 3-5-01: 27 (por.) and 168 (por.). The areas of expansion include portions of the Mokihana and Kiele Golf Courses, up to the 65 Day-Night Level (DNL) noise contour established for Lihue Airport, and the area inland of the Running Waters Beach and relocated Kiele Hole Nos. 14 and 15. The General Plan Amendment triggers the preparation of this EA which will be processed pursuant to Chapter 343, HRS, and the Environmental Impact Statement (EIS) Administrative Rules. This EA is subject to acceptance by the Kauai Planning Department, and the General Plan Amendment is subject to review and approval by the Kauai Planning Commission and the Kauai County Council.

3. County Zoning Amendment

   For the Zoning Amendment Petition, several components are involved, including the amendment of the zoning designations for approximately 81.7 acres of the Petition Area:

   a. Condition No. 2 of Zoning Ordinance No. PM-2002-363, which prohibits the use of the Open District (O) for residential density, is proposed for deletion. This would enable the planned resort units to be developed at a lower density and provide for a more cohesive development. The maximum number of resort units (excluding the affordable housing units) that can be developed over the entire Resort will remain at the 750-unit limit established by the current Zoning Ordinance.

b. The 15 acres of State Agricultural District lands to be reclassified to the State Urban District within the Mokihana Golf Course are proposed to be rezoned from the Open District (O) to the Residential District (R-2) for the development of 28 single-family residential lots (TMK: (4) 3-5-01: 168 (por.).

c. Approximately 23.3 acres within TMK: (4) 3-5-01: 27 (por.) in the vicinity of the former second hotel site, Kiele Hole No. 14 and lagoons would be rezoned from the Open District (O) to the Resort District (RR-20) for the development of approximately 180 resort bungalow and multi-family condominium units.

d. Approximately 1.3 acres within TMK: (4) 3-5-01: 172 (por.) designated within the Open District (O) are proposed to be rezoned to the Resort District (RR-20) for the development of approximately 10 multi-family condominium units.

e. Approximately 40 acres within TMK: (4) 3-5-01: 27 (por.) designated within the Open District (O) are proposed to be rezoned to the Residential District (R-2) for the development of approximately 62 single-family residential lots.

f. For the 24-unit affordable housing site at the intersection of Haoa Street and Kapule Highway within TMK: (4) 3-5-01: 165, a zone change from Limited Industrial District (IL) to Residential District (R-20) is proposed.

g. The Visitor Destination Area (VDA) boundaries are proposed to be expanded by approximately 230.8 acres to include additional areas where resort-residential development may occur, generally within the 65 DNL noise contour of Lihue Airport and the Fashion Landing General Commercial parcel.

The Zoning Amendment Petition is subject to review and approval by the Kauai Planning Commission and the Kauai County Council. The State Land Use District, General Plan and Zoning Amendment petitions are allowed by the County to be processed concurrently.

The existing and proposed State Land Use Districts, Kauai General Plan Land Use Map, and Zoning map are shown in Figures 5, 5a, 6, 6a, 7, and 7a, respectively.

2.3 Project Schedule

The Proposed Project is projected to be completed within a 10-year timeframe following receipt of final entitlements approval. The following is the projected timeframe for development of the Project:

	Start	Completion
Subdivision	December 2005	August 2006
Construction Documents/Design	January 2006	December 2006
Infrastructure Construction	August 2006	December 2007
Building Construction	August 2006	July 2015

3. DESCRIPTION OF THE EXISTING ENVIRONMENT, PROJECT IMPACTS AND MITIGATION MEASURES

The following is a description of the existing environment, assessment of potential impacts and proposed measures to mitigate potential adverse impacts resulting from development in the Proposed Area.

3.1 Climate

The climate of Hawaii is relatively moderate throughout most of the year, although some differences in certain meteorological conditions may occur from one region to another. Most of these differences are caused by the islands' mountainous topography. The climate is characterized as semi-tropical with two seasons. The summer period from May through September is generally warm and dry, with predominantly northeast trade winds. In contrast, the winter season from October through April is associated with lower temperatures and higher rainfall. The trade winds are less prevalent during this period.

Long-term data collected at Lihue Airport indicates that the northeast wind direction prevails throughout the year with a mean annual wind speed of 20 miles per hour. Winds from the south are infrequent, occurring only a few days during the year and mostly in winter in association with Kona storms.

Average temperature ranges from about 66 degrees Fahrenheit (°F) in the coolest month to about 83°F in the warmest month. Median annual rainfall is approximately 43 inches.

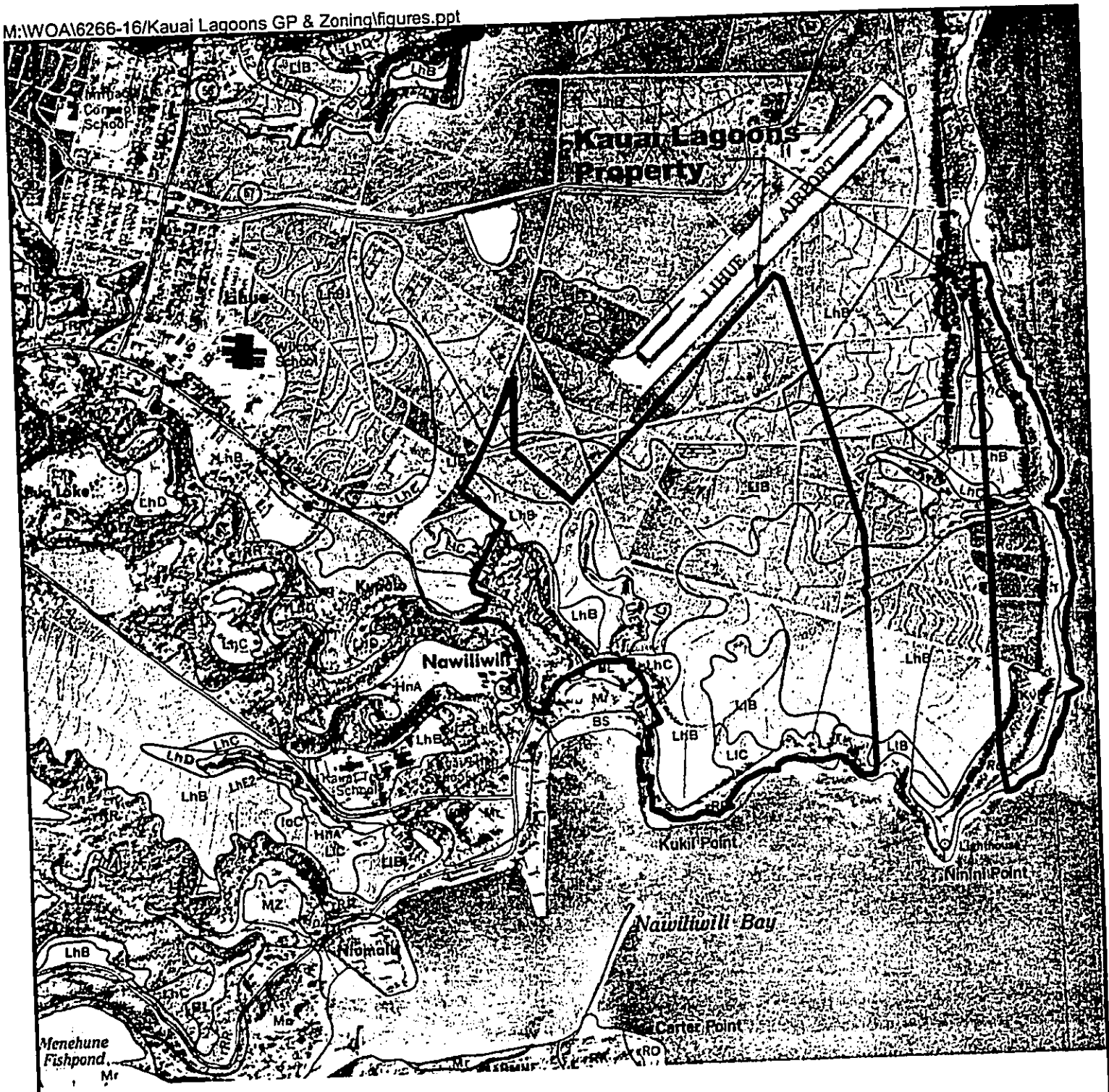
3.2 Geology, Topography and Soil

The Island of Kauai is geologically one of the oldest and structurally complex islands in the State of Hawaii, consisting principally of a large volcano, the Kauai shield, which became active approximately four million years ago. The Island's land mass was formed by two major volcanic series identified as the Waimea Canyon Volcanic Series and the Koloa Volcanic Series. The Waimea Volcanic Series refers to the flows that formed the original volcanic shield and caldera of the Island. The Koloa Volcanic Series refers to subsequent flows that overlaid much of the Waimea Volcanic Series formations on the lower slopes of the Island. The Property generally consists of clay silt underlain by decomposed, highly weathered basalt.

The Kauai Lagoons Property ranges from an elevation of about 120 feet above mean sea level (msl) near the center of the Property to about 40 feet above msl near the shoreline. The Property generally slopes towards Runway 17-35 of the Lihue Airport and towards Nawiliwili Bay and the Pacific Ocean.

Within the Proposed Area, the U.S. Department of Agriculture Natural Resources Conservation Service classifies the soils as predominantly Lihue gravelly silty clay, 0-8 percent slopes (LIB) occurring in the northern Open District (O) of the Property, and near the proposed Kiele Hole Nos. 14 and 15; and Lihue silty clay, 0-8 percent slopes (LhB) occurring near the lagoons, the golf courses and in the area proposed for residential development and affordable housing. The Soils Map of the Property is included as Figure 3. The Lihue series consists of well-drained soils on uplands. These soils developed in material weathered from basic igneous rock. The LIB and LhB soil series are similar in that permeability is moderately rapid, runoff is slow, and the erosion hazard is no more than slight.

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\figures.ppt



Legend

BL	Badland	**LhC**	Lihue silty clay, 8-15 percent slopes
HnA	Hanalei silty Clay, 0-2 percent slopes	**LhE2**	Lihue silty clay, 25-40 percent slopes
HfB	Halii gravelly silty clay, 3-8 percent slopes	**LIB**	Lihue gravelly silty clay, 0-8 percent slopes
KvB	Koloa stony silty clay, 3-8 percent slopes	**LIC**	Lihue gravelly silty clay, 8-15 percent slopes
KvD	Koloa stony silty clay, 15-25 percent slopes	**rRR**	Rough broken land
LhB	Lihue silty clay, 0-8 percent slopes	**rRO**	Rock outcrop

0 1000 2000 FT

Source: U.S. Department of Agriculture, National Resources Conservation Service

WILSON OKAMOTO CORPORATION
ENGINEERS - PLANNERS

KAUAI LAGOONS RESORT

Soils Map

FIGURE 3

The *Detailed Land Classification - Island of Kauai* published by the University of Hawaii Land Study Bureau (LSB), evaluates the quality or productive capacity of certain lands on the Island for selected crops and overall suitability in agricultural use. A five-class productivity rating system was established with "A" representing the class of highest productivity and "E" the lowest. The Kauai Lagoons Resort Property is classified as "B", which indicates a high suitability for productive agriculture.

The *Agricultural Lands of Importance in the State of Hawaii* (ALISH) map designates most of the Property, including all of the Mokihana Golf Course, as "Prime Agricultural Land", defined as land which has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods.

Impacts and Mitigation Measures

No significant impact to the geology or overall topography of the Proposed Area is anticipated with the rezoning and future low density residential and resort developments. Grading activities will be undertaken in full compliance with the State Department of Health (DOH) and County of Kauai grading ordinance requirements.

The Proposed Area is extensively developed with golf course landscaping and no agricultural activities are presently being pursued. Given the existing golf course and other resort-oriented uses within the Proposed Area, it is unlikely that the lands would revert to agricultural use.

3.3 Water Resources

Five aquifer systems make up the Lihue basin: Kilauea, Anahola, Wailua, Hanamaulu, and Koloa. The Proposed Area is located within the Hanamaulu system that mantled with the Koloa formation. The major stream valleys contain tongues of alluvium, which are not as effective as caprock. Perched water in the Koloa aquifer system is the most common type of groundwater, but basal water occurs near the coast. (Yuen, 1990). The Hanamaulu aquifer system has a sustainable yield of 40 million gallons per day (mgd). (CWRM, 2000).

The major streams on Kauai originate in the rainy uplands and are relatively large and uniform in flow. The Nawiliwili Stream is the nearest perennial stream to the Property, located southwest of the Proposed Area. The Hanamaulu Stream is located north of the Proposed Area and is also a perennial stream approximately one mile from the northernmost point of the Project. The major streams, and most minor ones, are sustained in large measure by groundwater drainage.

The Nawiliwili Watershed, identified as a Category 1 watershed by the State Department Health as a priority for restoration, is located to the west of the Proposed Project.

A network of man-made lagoons encompassing approximately 35 acres provides an attractive resort amenity that will be maintained. The lagoons are approximately 10 feet deep, aerated to help maintain water quality, and are supplied by non-potable wells within the Resort.

The coastal waters in the vicinity offshore of the Property are classified as Class A waters by the State DOH. The objective of this class is that "their use for recreational purposes and aesthetic enjoyment be protected. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class." *(Water Quality Standards, Title 11, Chapter 54, Hawaii Administrative Rules).*

Impacts and Mitigation Measures

Potential water quality impacts to near shore coastal waters during construction of the Project will be mitigated by adherence to State and County of Kauai water quality regulations governing grading, excavation and stockpiling. Appropriate erosion and sediment controls will be instituted during Project grading operations and construction site work activities in compliance with the County's grading ordinance and the State DOH's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Associated with Construction Activity. Mitigaton measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins.

Within the Proposed Project, on-site runoff may increase due to the addition of non-permeable surfaces. The Project's proposed drainage system will be designed to minimize impacts to nearshore coastal waters. Drainage systems will be designed to accommodate the increased runoff without increasing off-site impacts and will comply with the County of Kauai's Drainage Standards. The proposed residential developments will be buffered by the golf course landscaping and the resort lagoons which provide the needed mitigation for storm water runoff. As warranted, additional detention basins will be provided within the development lots or incorporated as part of the golf course. This will serve to keep flow rates and drainage patterns to pre-development conditions.

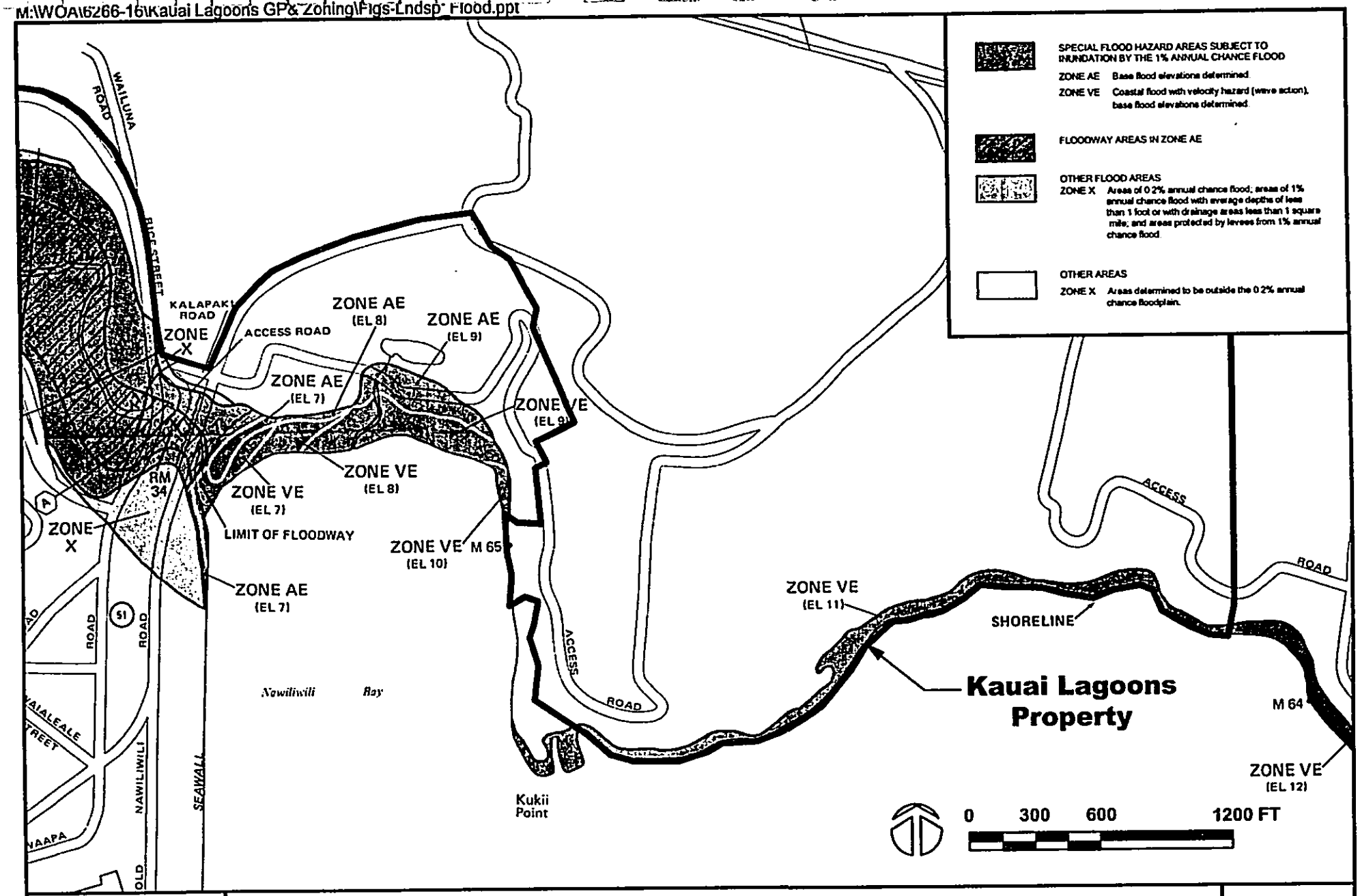
The Proposed Project will not impact the Nawiliwili Watershed. The existing drainage discharge from the Project's golf courses is near the mouth of Nawiliwili Stream and not to the watershed uplands.

3.4 Flood Hazard

According to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), the Kauai Lagoons Property is in zones "VE" and "X". However, both the Petition Area and Proposed Area are located within Zone "X", defined as "Areas determined to be outside the 0.2% annual chance floodplain" as shown on Figure 4.

The VE zone located near the coast along the southern portion of the Property is defined by the FIRM as "coastal flood with velocity hazard (wave action); based flood elevations determined". The base flood elevation for the VE zone is 11 feet above msl in the vicinity of the shoreline.

M:\WOA\6266-16\Kauai Lagoons GP& Zoning\Figs-Lndsp\ Flood.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Flood Hazards	FIGURE 4

Impacts and Mitigation Measures

No development within the Proposed Area is proposed to occur within the flood hazard zones. Any incidental or accessory use structures that may be developed within the Proposed Area will be developed in compliance with the Flood Hazard Ordinance of the County of Kauai.

3.5 Flora

Much of the Proposed Area has been developed for golf course use, with other areas including landscaped resort vegetation, and overgrown pasture and tree nursery. A botanical survey of the Proposed Area was conducted by Rana Productions in September-October 2005. The biological survey is included in Appendix A.

Golf Courses. These are highly manicured resort quality courses dominated by alien turf grasses, and various ornamental landscape plants, including numerous fig trees (*Ficus sp.*), silk oak (*Grevillea robusta*), ironwood (*Casuarina equisetifolia*), African tulip (*Spathodea campanulata*), coconut (*Cocos nucifera*), monkey pod (*Samanea saman*), *hau* (*Hibiscus tiliaceus*) Royal poinciana (*Delonix regia*), Manila palm (*Veitchia merrillii*), sago palm (*Cycas* sp.), plumeria (*Plumeria* sp.), bouganvillea (*Bouganvillea* sp.), and various ornamental palms. There is very little ground cover other than turf grass, though the more common ruderal weedy species are present between some of the paved cart paths and the vegetation separating the golf courses from the Resort areas.

Landscaped Resort Vegetation. The areas between the golf courses and the Kauai Marriott Resort and Beach Club buildings are heavily landscaped, and the landscaping is well maintained. All of the species seen within the golf course areas were seen within this habitat, along with many species more commonly used in resort and residential landscaping, including several species of heliconia (*Heliconia* sp.), white ginger (*Hedychium cornorarium*), yellow ginger (*Hedychium flavescens*), *kahili* ginger (*Hedychium gardnerianum*), Cook pine (*Arauaria columnaris*), Octopus tree (*Sheffelera actinophylla*), mango (*Mangifera indica*), banana (*Musa x paradisiaca*), avocado (*Persea americana*), papaya (*Carica papaya*), mock orange (*Philadelphus* sp.), croton (*Codiaeum* sp.), spider lily (*Hymenocallis* sp.), yellow oleander (*Cascabela thevetia*), *naupaka* (*Scaevola sericea*), and large areas of wedelia (*Sphagneticola trilobata*). Within the less well-tended area between the old brew pub and the ocean, the dominant vegetation is Guinea grass (*Panicum maximum*), with a scattering of African tulip trees and Cook pines.

Overgrown Pasture and Tree Nursery. Almost the entire northern three-quarters of this northern trianglar parcel is dominated by Guinea grass with scattered castor bean (*Ricinus communis*), lanatana (*Lantana camara*), and *koa haole* (*Leucaena leucocephala*). The southeastern corner of this parcel is used as a green waste dump. The area between the green waste dump and the western boundary of this parcel has an abandoned tree nursery, a small gray water overflow sump and fairly dense vegetation between that and the Lihue Airport boundary fence. Within the former nursery there are numerous coconut, monkey pod, and royal poinciana trees. The vegetation between the former nursery and Airport fence is made up of a mélange of grasses, including Guinea grass, California grass (*Brachiaria mutica*), wiregrass (*Eleusine indica*), swollen fingergrass (*Chloris barbata*), bufflegrass (*Cenchrus ciliaris*), Bermuda grass (*Cynodon dactylon*), dropseed grass (*Sporobolus indicus*), molasses grass (*Melinus minutiflora*), and Natal redtop (*Rhynchelytrum repens*). There are also numerous weedy herbaceous species present, including creeping indigo (*Indigofera hendecaphylla*), Spanish needle (*Bidens pilosa*), and

garden spurge (*Chamaesyce hirta*). There are several stands of Christmas berry (*Schinus terebinthefolius*), scrambled egg bush (Senna surrattenis), silk oak, and fig trees. In addition, there are scattered *koa haole*, sourbush (*Pluchea carolinensis*), and a few guava (*Psidium guajava*) bushes.

Impacts and Mitigation Measures

The vegetation present within the Proposed Area is almost totally alien, most of which is currently being maintained as either golf course greens or resort landscaping. The one area that is not currently being managed is within the roughly 70-acre triangular site which forms the northern apex of the Proposed Area. This area is overgrown with an eclectic mix of alien grasses, weedy species and abandoned landscaping trees, and a green waste disposal site. Weed control will be a part of the ongoing landscape maintenance program.

There is nothing botanically significant within the Proposed Area. The proposed modification of the existing habitat is not expected to have a deleterious impact on any native listed or rare plant species. No habitat of a proposed or listed, threatened or endangered species will be disturbed. Native flora will be incorporated into the landscaping of the Proposed Project. The use of native plants that are common to the area or endemic, indigenous, or Polynesian-introduced plants will be used in the landscape plans for each phase of development.

3.6 Fauna

A faunal survey was conducted by Rana Productions Ltd. in September-October 2005. The biological survey is included in Appendix A.

Avian Species. The findings of the survey reveal that avian diversity was relatively low, though densities recorded for several species were high. Four species, House Finch (*Carpodacus mexicanus frontalis*), Japanese White-eye (*Zosterops japonicus*), Western Meadowlark (*Sturnella neglecta*), and Chestnut Munia (*Lonchura atricapilla*) accounted for slightly more than 55% of the total number of all birds recorded during station counts. The most common avian species recorded was the House Finch, which accounted for 23% of the total number of individual birds recorded.

Six (6) native avian species were detected during the course of this survey. Four of these, Hawaiian Goose or Nene (*Branta sandvicensis*), Hawaiian Duck or Koloa mapu, Common Moorhen or Alaeula (*Gallinula chloropus sandvicensis*), and Hawaiian Coot or Alae Keokeo (*Fulica alai*), are listed as endangered species under both Federal and State of Hawaii endangered species statutes. There are well known concentrations of geese, coots and moorhen associated with the water features within the Kauai Marriott Resort and Beach Club. All four species also use resources within the Kauai Lagoons Resort golf courses. They also use resources in almost any area within the general vicinity that contains standing water, no matter how ephemerally. The other two native species recorded were Black-crowned Night-Heron (*Nycticorax nycticorax hactli*) and Pacific Golden-Plover (*Pluvialis fulva*), the first of which is a common resident indigenous heron, and the second an indigenous migratory shorebird species that nests in the high Arctic, returning to Hawaii and the tropical Pacific during the winter months.

Although not recorded during this survey, it is likely that the Short-eared Owl (*Asio flammeus sandwichensis*) forages over the Property at times, as they are regularly seen within the open lowland areas on the Island of Kauai and over the Lihue Airport grounds. Although not detected during this survey, it is likely that the endangered Hawaiian Petrel (*Pterodroma sandwichensis*) and the threatened endemic sub-species of the Newell's Shearwater (*Puffinus auricularis newelli*) over-fly over the Proposed Area between April and the end of November each year.

Mammalian species. No mammalian species were encountered during the survey, although signs of both dog (*Canis f. familiaris*) and cat (*Felis catus*) were encountered at several locations within the survey area. Signs of horse (*Equus c. caballus*) were encountered in the approximately 50-acre triangular plot at the north end of the Proposed Area, but it appeared to be quite old. This area was originally used as a pasture for the Clydesdale horses which were formerly used to pull carriages around the former Westin Kauai Resort.

No endangered Hawaiian hoary bats were detected during the course of this study. No mammalian species currently listed or proposed for listing under either Federal or State of Hawaii endangered species statutes were recorded during the survey.

Impacts and Mitigation Measures

The modification of habitat within the Project Area poses potential direct impacts to four listed avian species, Hawaiian Goose, Hawaiian Duck, Common Moorhen, and Hawaiian Coot. All four species are opportunistic, and though listed as endangered, are relatively widespread within the lowland areas of the Island of Kauai that support wetlands, or man-made water features such as ponds, wastewater ponds, and irrigation canals. The principal threats posed to these species by the modification of the habitat present within the Proposed Area are the inadvertent destruction of nests, eggs or chicks during construction activities and the temporary disturbance of non-nesting birds as a result of construction activity.

It is likely that the activity associated with the modification of the habitat within the Proposed Area will temporarily disturb avian species including the four endangered species known from within the site. This disturbance will be of a temporary basis, and there is adequate like habitat within the general Project vicinity into which the waterbirds would likely move, if sufficiently disturbed by construction activity. To assure that the modification of the habitat within the Project Area does not result in direct physical harm to nesting waterbirds, their nest, eggs, or young, the areas that may support nesting geese, coots and ducks will be surveyed immediately prior to the onset of construction activity to ensure that no active nesting activity is underway in those areas.

The Proposed Project also poses a potential secondary threat to two listed pelagic seabird species, Hawaiian Petrel (*Pterodroma sandwichensis*) and Newell's Shearwater (*Puffinus auricularis newelli*), both of which regularly over-fly the Property between April and the end of November each year. Both species are at risk of being downed by interactions with unshielded lighting and collisions with man-made structures when disoriented by lights. To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, any external lighting planned for the development will be shielded.

3.7 Air Quality

Air quality in the Proposed Area is considered to be good due to sparse development and the absence of point-source pollutant generators in the vicinity of the Property.

Currently, there is one DOH air-monitoring site in downtown Lihue at the Health District Office that is only equipped to measure PM_{10}. Generally PM_{10} levels are well below the State and Federal ambient air quality standards. In 2000, air quality measurements of total particulate matter ranged from a minimum of 8 micrograms per cubic meter (mg/m_3) to a high of 39 mg/m_3. The 2000 annual mean for all hours was 18 mg/m_3.

In the vicinity of the Proposed Area, air-quality is affected by aircraft operations from the Lihue Airport. Vehicular-related emissions in the form of carbon monoxide (CO) are also generated from traffic along the nearby roadways. It is likely that elevated concentrations of vehicle emissions are confined to areas near the Kapule Highway/Rice Street intersection during periods of traffic back up when dispersion conditions are poor.

Impacts and Mitigation Measures

Potential air quality impacts during construction of the Project will be mitigated by complying with the State DOH Administrative Rules, Title 11, Chapter 60, Air Pollution. The construction contractor(s) is responsible for complying with the State DOH regulations that prohibit visible dust emissions at property boundaries. Compliance with State regulations will require adequate measures to control airborne dust by methods such as water spraying and sprinkling of loose or exposed soil or ground surface areas and dust-generating equipment during construction. As may be deemed appropriate, paving of areas early in the construction schedule will also help to control dust.

No significant air quality impacts are anticipated from the Project's proposed land uses. The ambient air quality levels would be most affected by vehicular and emissions in the form of CO generated by Project-related traffic and development, although the elevated concentrations are anticipated to dissipate.

3.8 Noise

Ambient noise in the vicinity of the Kauai Lagoons Property is predominantly attributed to aircraft operations at Lihue Airport, and to a lesser extent, vehicular traffic along the major roadways.

Aircraft noise sources in the vicinity of the Proposed Area are associated with fixed and rotary wing aircraft operations at Lihue Airport. Aloha and Hawaiian Airlines primarily operate carrier flights, and additional flights are conducted by commuter general aviation, air taxi, tour helicopter, business jet, and military aircrafts.

In 1989, the State Department of Transportation, Airports Division (DOT-A) completed a Noise Compatibility Program for Lihue Airport in compliance with the guidelines contained in the Federal Aviation Regulations (FAR) Part 150 Noise Compatibility Planning Program for airports. This program establishes a single system for measuring airport noise, a standardized procedure for determining the exposure of individuals to noise, and a formal airport noise compatibility planning process. For aircraft noise, the DOT-A has recommended that 60 DNL (Day-Night Level average noise contour) be used as the common level for determining land use

compatibility with respect to noise sensitive uses near its airports. Low-density residential, resorts and hotels (outdoor facilities) are recommended for land use compatibility within 60 DNL or less.

Impacts and Mitigation Measures

Based on the official Calendar Year 1991 noise contours established by the FAR Part 150 study, the proposed resort-residential uses are planned to be within the 55 to 65 DNL noise contours. Condition No. 9 of Zoning Ordinance No. PM-2002-363 provides in part that:

> *No residential, condominium, or hotel units shall be constructed within areas greater than the 60 DNL noise contour of the Lihue Airport; provided, however, that such uses may be permitted within the 60 to 65 DNL noise contours, if there is an accompanying mitigation of interior noise to the 45 DNL noise level.*

The Petitioners/Applicants intend to comply fully with this condition. Design guidelines have been prepared and reviewed by the Kauai Planning Department as part of zoning approvals received in August 2005. These guidelines are specific in referencing this requirement for interior noise mitigation. Residential units located between the 60 to 65 DNL noise contours will be designed and certified by a registered professional acoustical engineer to achieve an interior noise level of 45 DNL.

In the vicinity of the Project Area, ambient noise levels associated with increases in vehicular traffic generated by the Proposed Project will not adversely impact nearby uses due to the relatively self-contained nature and design of the Resort.

3.9 Historic and Archaeological Resources

Most of the Proposed Area has been developed into golf course and resort-oriented uses. An archaeological reconnaissance survey in February 1980 was conducted on portions of the Proposed Area by Archaeological Research Center Hawaii, Inc. The TMKs surveyed included 3-5-01: 82, 83, 119 and portions 27, 115-118 and 120. The report noted that the area had been previously impacted by sugar cane cultivation and cattle grazing and no archaeological or historic sites were found. The report recommended archaeological clearance with no further investigation (Letter Report: Archaeological Reconnaissance of Ninini Point Area, February 27, 1980).

The State Historic Preservation Division of the Department of Land Natural Resources, in a letter dated May 9, 2005 in conjunction with Special Management Area and zoning permits received in August 2005, determined that "no historic properties will be affected".

In October 2005, a separate archaeological assessment survey was conducted by Cultural Surveys Hawaii for an approximately 71-acre triangular-shaped area at the northern end of the Property which has not previously been investigated as part of prior cultural resource management investigations within the Kauai Lagoons Resort. Because no historic properties were located in the 71-acre area, this investigation was termed an "archaeological assessment" pursuant to Section 13-13-284-5, Hawaii Administrative Rules. The assessment survey report is attached as Appendix B.

Impacts and Mitigation Measures

As documented during the supplemental field investigation, no surface historic properties are present within the 71-acre triangular area. Based on available information, a Project-specific effect recommendation of "no historic properties affected" is warranted, and no further archaeological investigation is recommended for the area.

The balance of the Proposed Area is mostly developed with golf course and resort landscaping. In the course of development, however, appropriate precautions will be taken. Personnel involved in future development activities in the Proposed Area will be informed of the possibility of inadvertent cultural finds, and made aware of the appropriate notification measures to follow, including consultation with the State Historic Preservation Division and, as may be appropriate, with Kauai community cultural organizations.

In accordance with Section 6E-46.6, Hawaii Revised Statutes, and Chapter 13-300, Hawaii Administrative Rules, in the event that any archaeological sites, significant cultural deposits, or human skeletal remains are found during future construction activities of the Proposed Project, all work will immediately cease pending consultation with the State Department of Land and Natural Resources Historic Preservation Division. The treatment of any remains or artifacts will be in accordance with procedures obtained by the Kauai/Niihau Islands Burial Council and the State Historic Preservation Division.

3.10 Cultural Resources

A Cultural Impact Evaluation was undertaken for the Kauai Lagoons Resort Property by Cultural Surveys Hawaii in October 2005. Their report is included in Appendix C.

By the end of the 18th century, population in the Kalapaki Ahupuaa likely focused along the floodplains of valley lands and along the shoreline. In the valley lands, streams fed taro loi, while along the shore, fishponds supported the coastal population. Plateau areas of Kalapaki like the Proposed Area may have been utilized for planting of dryland crops and gathering of timber and medicinal plants.

As confirmed by historical records and archaeological investigation, sugarcane cultivation and development of plantation infrastructure was the dominant land use within the Proposed Area and surrounding lands throughout the first half of the 20th century. The decades of sugar cultivation in the area would have eliminated any surface properties related to traditional Hawaiian culture that may have formerly existed. Further, plantation operations, and the sense that the area was private property, restricted access by cultural practitioners who may have formerly used the area. During the second half of the 20th century, resort development would have further eliminated any remnants of the former traditional landscape and further restricted access.

None of the community contacts queried for this evaluation identified any cultural sites or concerns specifically within the Proposed Area. Ms. Cheryl Lovell-Obatake noted that portions of the Resort Property are still accessed by community members "because the area is the last remnant of open space with no buildings." These portions of the Property may be the more makai lands along the coast, outside the present Proposed Area. Ms. Lovell-Obatake also noted that she has never heard of any burials in the Proposed Area.

Impacts and Mitigation Measures

Based on the above findings, future development of the Proposed Area within the Kauai Lagoons Resort Property will have minimal impact upon native Hawaiian cultural resources, beliefs and practices. It should be noted, however, that subsurface properties associated with former traditional Hawaiian activities in the Proposed Area, such as artifacts and cultural layers, may be present despite the decades of sugar cultivation and resort development. As a precautionary measure, personnel involved in future development of the Proposed Area will be informed of the possibility of inadvertent cultural finds, and made aware of the appropriate notification measures to follow, including consultation with the State Historic Preservation Division and, as may be appropriate, with Kauai community cultural organizations.

3.11 Visual Resources

Except from Lihue Airport or offshore and overhead, the Kauai Lagoons Property is not readily visible from public vantage points. From major roadways, most of the Proposed Area is not visible due to landscape screening along Kapule Highway and its distance from Rice Street. The affordable housing site at the intersection of Haoa Street and Kapule Highway will be readily visible, but will be screened by landscaping and berming of the perimeter. Views of the Property from coastal areas are also obscured due to its location on a coastal bluff. In public beach areas on Kalapaki Bay, the main views towards the Property are of the Kauai Marriott Resort and Beach Club and the Pali Kai cottages.

Impacts and Mitigation Measures

Development of the Project will alter the visual landscape from its relatively open state to one of urban use. However, as the Proposed Project will be a resort development compatible with the adjacent Kauai Marriott Resort and Beach Club, the change in views from the public vantage points will be of an intensification of the existing use.

The proposed land use amendments will result in a lower density of development than approved by the Planning Commission. Rather than all four-story buildings, density will be distributed over a larger area, providing more open space between buildings and lowering building heights. Despite the additional resort area to be entitled, there will be no increase in the maximum number of units allowed by zoning ordinance for the Resort. The resort area will be generously landscaped to complement the natural beauty of its surroundings.

3.12 Traffic

A traffic impact report was conducted by Wilson Okamoto Corporation in September 2004 to identify potential traffic impacts resulting from the Proposed Project and to provide improvements to mitigate such impacts as may be required. A supplemental traffic analysis report was issued in June 2005 to address the impacts from the affordable housing project at the intersection of Haoa Street and Kapule Highway. A second supplemental traffic report was issued in September 2005 in response to the permit requirement to use Ninini Point Street off Kapule Highway as the primary access to the resort. The Traffic Impact Report and supplements prepared are included in Appendix D.

The main roads providing access to the Property include Kapule Highway, Nawiliwili Road, and Rice Street. Roadways in the immediate vicinity of the Proposed Area include Kalapaki Road, Kapule Highway, and Rice Street. Kapule Highway is primarily a two-way, two-lane, undivided State highway providing access between Lihue and Hanamaulu to the north. Rice Street in the

vicinity of the Project is a two-way, two-lane roadway serving as a connector road between Nawiliwili Harbor and Lihue. Kalapaki Road off Rice Street is a two-way, two-lane private roadway which serves as the main access to the Resort. At the unsignalized intersection with Rice Street, Kalapaki Road westbound has separate left turn and right turn lanes. In recent years, traffic volumes along Rice Street and Kapule Highway near the Proposed Area have not increased significantly due to minimal development in the surrounding areas.

The primary vehicular access to the Kauai Lagoons Resort and adjacent Kauai Marriott Resort and Beach Club is from Rice Street. Limited vehicular access is provided on Ninini Street off of Kapule Highway to allow the public access to the coastal areas, access to the Lihue Wastewater Treatment Plant, and for general resort servicing requirements. A recent Zoning Permit condition requires that the Ninini Street entrance eventually be made the primary access for the Project.

Within the Kauai Lagoons Resort, the roadways and common driveways serving the residential units, hotel rooms, new golf clubhouse, commercial resort area, recreational facilities, and future residential areas will allow for two-way traffic and emergency vehicular access.

The following intersections were assessed to determine the relative impact of the Proposed Project:

- Rice Street at its intersections with Kalapaki Road and Kapule Highway.
- Haoa Street and Kapule Highway for the affordable housing project.
- Ninini Point Street and Kapule Highway for use as the primary Project access.

The intersections were assessed using the methodologies from the Transportation Research Board *Highway Capacity Manual* and the *Highway Capacity Software* developed by the Federal Highway Administration. Operating conditions at these intersections are described in terms of their level-of-service (LOS). LOS is identified by LOS "A" (best) and LOS "F" (worst).

Table 3-1
Comparison of Existing and Projected Year 2009 Peak Hour Traffic Conditions With and Without the Kauai Lagoons Resort

Intersection (NS/EW)	Critical Movement / Approach	AM			PM		
		Exist	Year 2009		Exist	Year 2009	
			w/out Proj	w/ Proj		w/out Proj	w/ Proj
Rice Street/ Kalapaki Rd[1]	Southbound (LT)	A	A	A	A	A	A
	Westbound (LT)	C	C	C	C	C	C
Kapule Highway/ Rice Street[1]	Eastbound (LT)	A	C	C	A	C	C
	Southbound (LT)	F	C	C	F	C	C
Kapule Highway/ Haoa Street[2]	Southbound (LT)	B	B	B	B	B	B
	Westbound (LT)	B	B	B	B	B	B

Table 3-1 (continued)
Comparison of Existing and Projected Year 2009 Peak Hour Traffic Conditions With and Without the Kauai Lagoons Resort

Intersection (NS/EW)	Critical Movement / Approach	AM			PM		
		Exist	Year 2009		Exist	Year 2009	
			w/out Proj	w/ Proj		w/out Proj	w/ Proj
Kapule Highway/ Ninini Point Street	Southbound	A	A	A	A	A	A
	Northbound	A	A	A	A	A	A
	Westbound	C	C	D	D	D	C
	Eastbound	D	D	D	E	E	C
			Year 2008			Year 2008	
Kapule Highway/ Haoa Street	Southbound (LT)	B	B	B	B	B	B
	Westbound (LT)	B	B	B	B	B	B

1- Traffic Impact Report, September 2004
2- Supplemental Traffic Analysis for Kauai Lagoons Resort, June 2005
[redacted]- Proposed Traffic Signal shown in the Traffic Impact Report, September 2004.

Based on the analysis of the traffic data for the proposed Kauai Lagoon Resort, the following is recommended:

1. Install a traffic signal system at the intersection of Kapule Highway and Rice Street.
2. Provide adequate turning radii at all Project driveways to avoid or minimize vehicle encroachments to oncoming traffic lanes.
3. Maintain adequate sight distances for motorists to safely enter and exit all Project driveways.
4. Install a traffic signal system at the intersection of Kapule Highway and Ninini Point Street. This improvement is necessary to improve the projected Year 2009 Project with recommended improvements traffic conditions. The installation of a traffic signal will improve the critical movements at this intersection from LOS "F" to LOS "C" during the afternoon peak hour traffic.

The traffic impact report for the proposed Lihue-Hanamaulu Master Plan, prepared by Austin Tsutsumi & Associates, Inc. in January 1995, accounts for the development of residential subdivisions, commercial, industrial and office uses, a school, and a civic center, as well as the anticipated ambient growth in traffic in the project vicinity. As stated in the Master Plan's traffic impact report, with the implementation of the recommended improvements, "all ten analyzed intersections will be operating at acceptable levels of service" in Year 2016, the Master Plan's expected completion year. The Kauai Lagoons Resort is anticipated to increase the total traffic volumes along Kapule Highway detailed in the Lihue-Hanamaulu Master Plan traffic impact report by approximately 2 percent during the AM and PM peak hours of traffic. These increases are in the range of daily fluctuations along Kapule Highway and represent a minimal increase in the overall traffic volumes. As such, the recommended improvements detailed in the Kauai

Lagoons Resort traffic impact report dated September 2004, and the supplemental reports dated June 2005 and September 2005 to mitigate Project-related impacts are still appropriate for the revised completion year of 2015 for the Kauai Lagoons Resort development.

Impacts and Mitigation Measures

With the implementation of the above recommendations, the Proposed Project is not expected to have a significant impact on traffic operations since the number of residential and resort units will not increase. The traffic volumes entering and exiting the Proposed Area through the two study intersections are expected to operate at acceptable levels of service with the recommended roadway improvements. The Proposed Project will be undertaking the recommended improvements to mitigate anticipated traffic impacts.

3.13 Socio-Economic Characteristics

The Proposed Area lies within a diverse district of Kauai -- Census Tract (CT) 405 in Lihue. The land uses surrounding the Proposed Area include residential, open, resort, commercial and industrial businesses. The following is an overview of the socio-economic characteristics of the Lihue Census Tract and is also indicated in Table 3-2.

Population and Housing: Based on the 2000 Census, the population in Lihue has decreased 2.2 percent since the 1990 Census. In 1990, Lihue (CT 405) had a population of 5,279 and in 2000 the population had decreased to 5,162. During the same 10-year period, the population of the Island of Kauai had increased 14.2 percent, from 51,177 to 58,463 (*State of Hawaii Data Book*). The population change in Lihue is indicative of stability, and that the population is aging with younger people moving out of the area.

- By age group, there is a lower proportion of people 20 to 64 years old in Lihue, but a higher proportion of those 65 and older than on Kauai;
- By racial mix, there are proportionately more Asians and less Whites and Native Hawaiian and other Pacific Islanders than Kauai;
- Households have a smaller average size, proportionately less married-couple families and more non-family householders than Kauai; and
- There are proportionately less vacant units.

Economy: According to the 2000 Census, the median household income for Lihue (CT 405) was 51,450, which is insignificantly lower than Kauai as a whole, yet the per capita income was 9.4 percent greater than Kauai.

Table 3-2
Demographic Characteristics: 2000

Subject	CT 405 (Lihue)		Kauai	
	Number	Percent	Number	Percent
Total population	**5,162**	**100**	**58,463**	**100**
AGE				
Under 5 Years	295	5.7	3,605	6.2
5 – 19 years	956	18.5	13,147	22.5
20 – 64 years	2,633	51.0	33,642	57.5
65 years and over	1,273	24.7	8,069	13.8
Median age (years)	44.7	–	38.4	–
RACE				
White	1,196	23.2	17,255	29.5
Black or African American	12	0.2	177	0.3
American Indian and Alaska Native	13	0.3	212	0.4
Asian	2,483	48.1	21,042	36.0
Native Hawaiian and other Pacific Islander	353	6.8	5,334	9.1
Two or more races	1,067	20.7	13,938	23.8
Other	38	0.7	505	0.9
HOUSEHOLD (BY TYPE)				
Total Households	**2,014**	**100**	**20,183**	**100**
Family households (families)	1,286	63.9	14,572	72.2
With own children under 18 years	576	28.6	6,865	34.0
Married-couple family	962	47.8	10,881	53.9
With own children under 18 years	353	17.5	4,842	24.0
Female householder, no husband present	231	11.5	2,582	12.8
With own children under 18 years	148	7.3	1,424	7.1
Nonfamily households	728	36.1	5,611	27.8
Average household size	2.50	–	2.87	–
HOUSING OCCUPANCY AND TENURE				
Total Housing Units	**2,228**	**100**	**25,331**	**100**
Occupied units	2,008	90.1	20,183	79.7
By owner	1,149	57.2	12,384	61.4
By renter	859	42.8	7,799	38.6
Vacant units	220	9.9	5,148	20.3
SOCIAL CHARACTERISTICS				
Population 25 years and over	3,751	100	38,872	100
High school graduate or higher	3,146	83.9	32,368	83.3
Bachelor's degree or higher	862	23.0	7,551	19.4

Table 3-2
DEMOGRAHIC CHARACTERISTICS: 2000 (Continued)

Subject	CT 405 (Lihue)		Kauai	
	Number	Percent	Number	Percent
Total population	**5,162**	**100**	**58,463**	**100**
ECONOMIC CHARACTERISTICS				
In labor force (pop. 16 & over)	2,341	55.6	28,355	63.1
Median household income (dollars)	42,563	–	45,020	–
Median family income (dollars)	51,450	–	51,378	–
Per capita income (dollars)	22,211	–	20,301	–

*Source: U.S. Census Bureau, Census 2000 Summary**

Impacts and Mitigation Measures

Population and Housing: Marginal impacts from the population and housing in Lihue are anticipated to result from the land use changes proposed for Kauai Lagoons. The Proposed Area changes allow for lower-density residential and resort dwellings by expanding resort-residential units into unused and existing golf course areas.

The proposed uses will complement the surrounding resort uses and will not result in adverse environmental impacts affecting the community. Therefore, no disproportionate adverse impact on any group of people identified by factors such as race, ethnicity or socio-economic is anticipated.

Relative to the neighboring Kauai Marriott Resort and its guests, it is expected that there will be net positive impacts to the visitor experience and economic welfare of the hotel. The proposed improvements include an expanded program of public shoreline access, including the provision of 20 public beach parking stalls, recreational shelters and picnic areas, and public restroom and shower facilities. The commercial area will be restored providing additional spa, retail and dining opportunities.

Economy: In the short term, the Project will bring about positive benefits to the local economy. This would include increased expenditures for construction, off-site infrastructure improvements, and construction-related jobs and tax revenue.

In the long-term, the proposed redevelopment will accommodate new and expanded low-density residential homes and resort services creating job opportunities in various sectors. There would be increases in State income and general excise tax revenue and in County property tax revenues. The Proposed Project will enable the Kauai Lagoons Resort to retain its employees and expand its work force.

3.14 Police and Fire

Police protection service for the Proposed Area is available by the County of Kauai Police Department's Lihue Headquarters, Sectors 4 to 6, located less than a mile northwest of the Proposed Area off of Kapule Highway.

Fire protection service for the Proposed Area is provided by the County's Lihue Fire Station located approximately one mile north of the Proposed Area at 4223 Rice Street.

Impacts and Mitigation Measures

The Project will not adversely impact police and fire protection services. On-site security is planned for the proposed development. The development will be designed and built in compliance with the applicable County of Kauai fire code requirements.

3.15 Medical Facilities

Emergency medical service is provided by American Medical Response, a private ambulance service contracted by the County to provide ambulance and paramedic services which is located at 3277 Palai Street, approximately 2 miles from the Property.

Health care services for residents of the Lihue area are available at the Wilcox Memorial Hospital located at 3420 Kuhio Highway. The Wilcox Memorial Hospital is operated by Hawaii Pacific Health and is located at the northern end of Lihue, about 2 miles from the Property. It consists of the main clinic and hospital that provides men's, women's, and children's health services, specialty services, elderly care, family support, a long-term care unit, and education and prevention services.

Impacts and Mitigation Measures

Due to the visitor-oriented and second home nature of the resort development, the Proposed Project is not anticipated to generate any significant demands on medical assistance. The existing medical facilities and ambulance service will be adequate to serve the needs of the Project.

3.16 Schools

Public schools servicing the Proposed Area include Wilcox Elementary School (Grades K to 6) located approximately 3.25 miles northwest of the Proposed Area, King Kaumualii Elementary School (Grades K to 6) located approximately 3.85 miles to the north of the Proposed Area, Chiefess Kamakahelei Middle School (Grades 6 to 8) located about 3.25 miles west of the Proposed Area, and Kauai High School (Grades 9-12) located approximately 0.45 miles west of the Proposed Area. According to the State Department of Education (DOE), these schools are currently operating below enrollment capacity. For school year 2004-2005, student enrollment at Wilcox Elementary School was 929 students, 529 students at King Kaumualii Elementary School, 1,023 students at Chiefess Kamakahelei Middle School, and 1,282 students at Kauai High School.

Impacts and Mitigation Measures

In general, the Proposed Project will not generate a significant demand on student enrollment at the area schools due to the visitor-oriented and second home nature of the resort development. The proposed 24-unit affordable housing development could potentially generate approximately 5 elementary school students, 2 middle school students, and 3 high school students based on

the DOE student enrollment criteria. This projected student enrollment would not significantly impact the current enrollment capacity of the schools servicing the Proposed Area.

3.17 Recreational Facilities

County parks in the region include Nawiliwili Beach Park, Niumalu Beach Park, Hanamaulu Beach Park, and Kalapaki Bay Memorial Park. The Ahukini Recreation Pier State Park is located to the north of the Proposed Area.

Impacts and Mitigation Measures

The Proposed Project is not anticipated to significantly impact recreational facilities. The Project will not generate a significant demand for parks due to the visitor-oriented nature of the development. The provision of private, on-site recreational amenities within the Kauai Lagoons Resort for the resort residents and guests, including resort recreational islands, tennis courts, outdoor recreational pool areas, a treatment spa, a fitness center, and the golf courses, will lessen the Project's impact on public recreational facilities in the area.

Public shoreline access will be maintained and enhanced with the provision of 20 public beach parking stalls, public recreational shelters and picnic areas, and public restroom and shower facilities within the Kauai Lagoons Resort. Shoreline access paths are provided near the Kauai Marriott Resort and Beach Club, the former Inn on the Cliffs restaurant, and near Fashion Landing. A lateral shoreline pathway will also be developed between the Fashion Landing area and the former Inn on the Cliffs. Should public access routes be temporarily blocked during construction activities of the Proposed Project, alternative routes will be provided during the interim period.

3.18 Solid Waste Disposal

Refuse generated by the Proposed Project will be collected by a private refuse collection company and transported to the Kekaha Landfill for disposal. The closest refuse transfer station to the Property is located at Lihue Airport to the north.

Impacts and Mitigation Measures

No significant impacts to solid waste disposal will be generated as a result of the proposed land use reclassification and development. To reduce solid waste generation, future projects will incorporate waste diversion and reduction facilities into its design. Recycling and composting will be encouraged. During construction, the Project will develop and implement a trash management and recycling program to minimize impacts to the local landfill.

3.19 Utilities

The Proposed Project will not adversely affect existing public utility systems, transport systems, facilities, and services.

3.19.1 Water System

The County of Kauai Department of Water (DOW) supplies the Kauai Lagoons Resort's potable water system through two major water distribution systems. One 8-inch water line located off Haoa Street in the Lihue Industrial Subdivision services the northern and eastern portions of the Property through a 4-inch water meter. The second 12-inch water line located near Rice Street south of the Proposed Area, which passes through the Kauai Marriott Resort and Beach Club, services the southern and western portions of the Property through two 6-inch water meters that

are being shared by the Kauai Lagoons Resort and the adjacent Kauai Marriott Resort and Beach Club.

Impacts and Mitigation Measures

The potable water demand for the Proposed Project is based on the number of units and other land uses proposed. A total of 750 units are being proposed which consists of single-family residences, condominium and time-share units, and hotel rooms. Based on the County's Water Standards and the hotel, residential, and commercial uses proposed, the estimated average daily demand for the Project is 300,000 gallons per day (gpd).

A water study has been prepared for the Project and is being coordinated with the DOW to determine the adequacy of the existing system and available capacity from the existing water meters. The existing source and storage facilities serving this area are operating at capacity, however, the DOW is in the process of obtaining additional source for this area. Grove Farm is completing a Surface Water Treatment Plant which will provide additional capacity for the Lihue area. Ongoing consultation with the DOW is anticipated to determine the adequacy and Project requirements for meeting off-site source and storage needs.

3.19.2 Wastewater System

The County of Kauai's Lihue Wastewater Treatment Plant (WWTP) is located within the Kauai Lagoons Resort. This secondary treatment plant has been upgraded to a present average design flow capacity of 2.5 million gallons per day (mgd). Sewage effluent from the WWTP is reclaimed for golf course irrigation or disposed of in injection wells. Currently, there is an agreement with the County allowing Kauai Lagoons Resort to accept up to 1.5 million gallons per day of R-2 treated effluent and a treatment capacity reservation of 150,000 gallons per day (gpd) at the Lihue WWTP to service additional resort developments.

Impacts and Mitigation Measures

Based on the County of Kauai Sewer Design Standards, the average sewer design flow is estimated at 240,000 gpd for the proposed 750 residential units and various commercial facilities, 24 affordable housing units, and various commercial facilities. The Lihue WWTP has a design treatment capacity of 2.5 mgd, with current flows under 1.5 mgd. Although there is available capacity, additional sewer allocations will need to be arranged with the County.

Project plans are also underway to establish an on-site R-1 processing plant using a refined sequencing batch reactor technology to receive the R-2 quality effluent from the WWTP and produce R-1 quality effluent. This would enable the use of high quality reclaimed water for all irrigation needs for the golf course and landscaping for the resort and residential common areas.

3.19.3 Drainage System

The majority of the runoff from the Property sheet flows onto the golf courses and lagoons. On-site drainage enters a ditch at Kapule Highway and runs through the property through three drop structures. At the outlet of the ditch is an energy dissipater, located at the north corner of the parking lot near the Administration Security office, which leads to an unnamed gulch that flows into Nawiliwili Stream.

Based on the FIRM prepared by FEMA, the majority of the Resort is designated Zone "X", "Areas determined to be outside the 0.2% annual chance floodplain".

Impacts and Mitigation Measures

With the Proposed Project, on-site runoff may increase due to the addition of non-permeable surfaces. Drainage systems will be designed to accommodate the increased runoff without increasing off-site impacts. The proposed residential developments will be buffered by the golf course landscaping and the resort lagoons which provide the needed mitigation for storm water runoff. As warranted, additional detention basins will be provided within the development lots or incorporated as part of the golf course. This will serve to keep flow rates and drainage patterns to pre-development conditions.

Appropriate erosion and sediment controls will be instituted during Project grading operations and construction site work activities, in compliance with the County's Grading Ordinance and the State Department of Health's (DOH) National Pollutant Discharge Elimination System (NPDES) Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structual Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins.

3.19.4 Electrical and Communications Systems

Electrical service for the Proposed Project is available from Kauai Island Utility Cooperative (KIUC). The KIUC electrical substation which serves the Lihue area is located north of the Proposed Area, with overhead transmission and distribution lines serving the Project.

The existing telephone service provided by Hawaiian Telcom enters the Kauai Lagoons Resort from Rice Street through underground cables. The existing cable television (CATV) is provided by Oceanic Time Warner Cable. The existing system enters the Kauai Lagoons Resort from the western portion of the Resort and terminates at the existing golf clubhouse.

Impacts and Mitigation Measures

KIUC currently supplies the electrical power that enters from the western portion of the Kauai Lagoons Resort. Based on preliminary consultation with KIUC, the existing electrical system is generally adequate and no problems are anticipated in the provision of electrical supply to service the Proposed Project.

Service for both telephone and CATV will be provided for the Proposed Project. Extension of existing service lines will be required.

4. RELATIONSHIP TO LAND USE PLANS AND POLICIES

The Project's consistency with relevant State and County land use plans and policies is discussed below.

4.1 State Land Use District

The State Land Use Law, Chapter 205, Hawaii Revised Statutes (HRS), is intended to preserve, protect and encourage the development of lands in the State for uses that are best suited to the public health and welfare of Hawaii's people. The State Land Use Commission classifies all lands in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The Proposed Area is within the State Agricultural and Urban Districts as shown in Figure 5.

The Proposed Project, which may include a reconfiguration of the Mokihana and Kiele Golf Courses for the placement of residential uses between the golf holes, will require a State Land Use District Boundary amendment from the Agricultural District to the Urban District as shown in Figure 5a. Should undeveloped Agricultural District lands, such as the triangular lot of the Property be used for golf course development, a district boundary amendment must also be obtained due to the B-rated soils in the area.

The standards for determining the boundaries for the Urban District include eight (8) areas which are listed and discussed below:

(1) It shall include lands characterized by "city-like" concentrations of people, structures, streets, urban level of services and other related land uses;

The Proposed Area is located in close proximity to Lihue Town and adjacent to the Lihue Airport, Kauai Marriott Resort and Beach Club, Lihue Industrial Park, and other Urban District lands used for public facilities, golf course, commercial, industrial and resort uses.

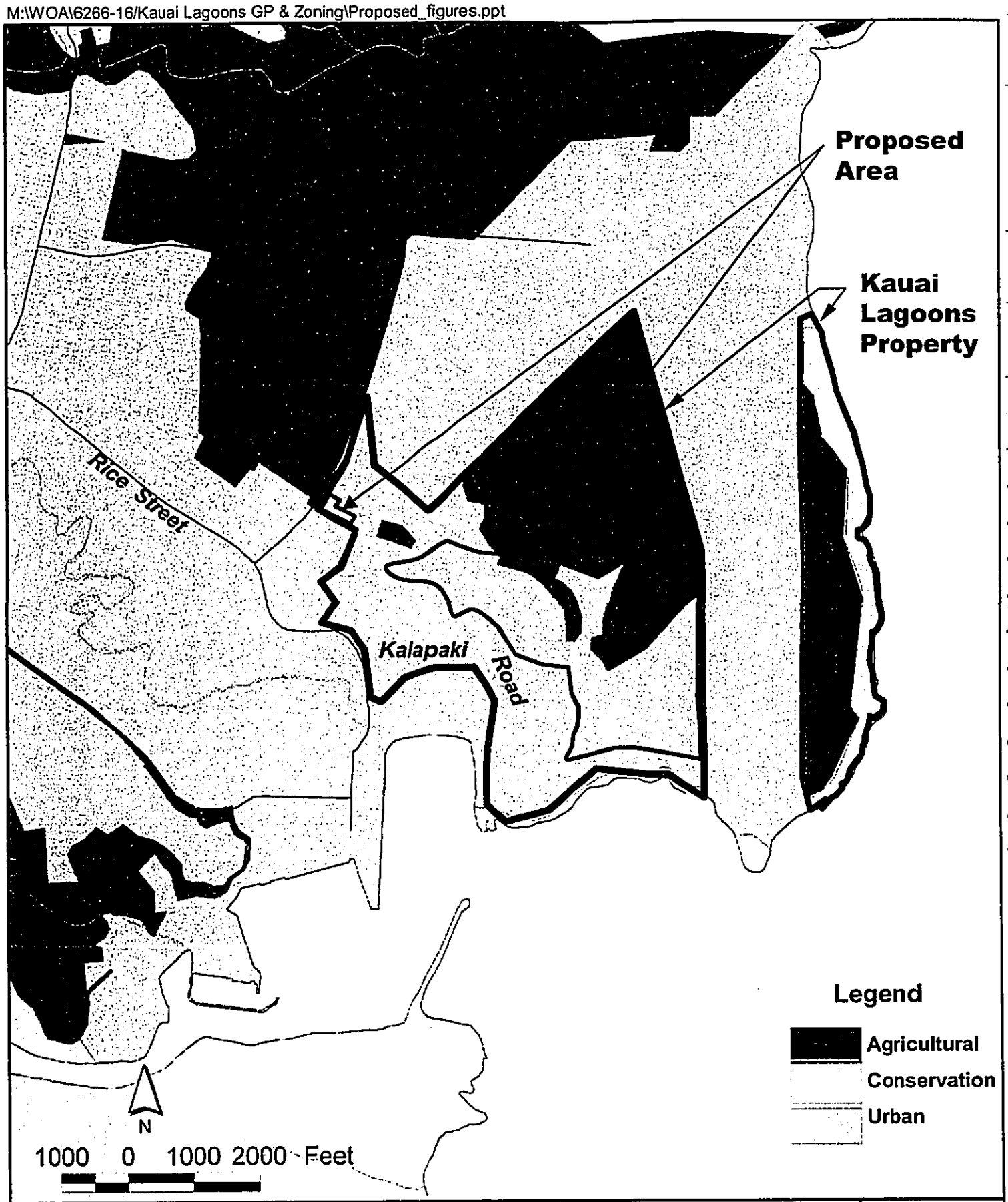
(2) It shall take into consideration the following specific factors:

(A) Proximity to centers of trading and employment except where the development would generate new centers of trading and employment;
(B) Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection; and
(C) Sufficient reserve areas for foreseeable urban growth;

The Proposed Area is in close proximity to Lihue Town and Nawiliwili Harbor, Kalapaki commercial area, Lihue Industrial Park, and public facilities including the Lihue Airport, U.S. Post Office, State judiciary complex, Vidinha Memorial Stadium, and police headquarters. The Property adjoins the Kauai Marriott Resort and Beach Club.

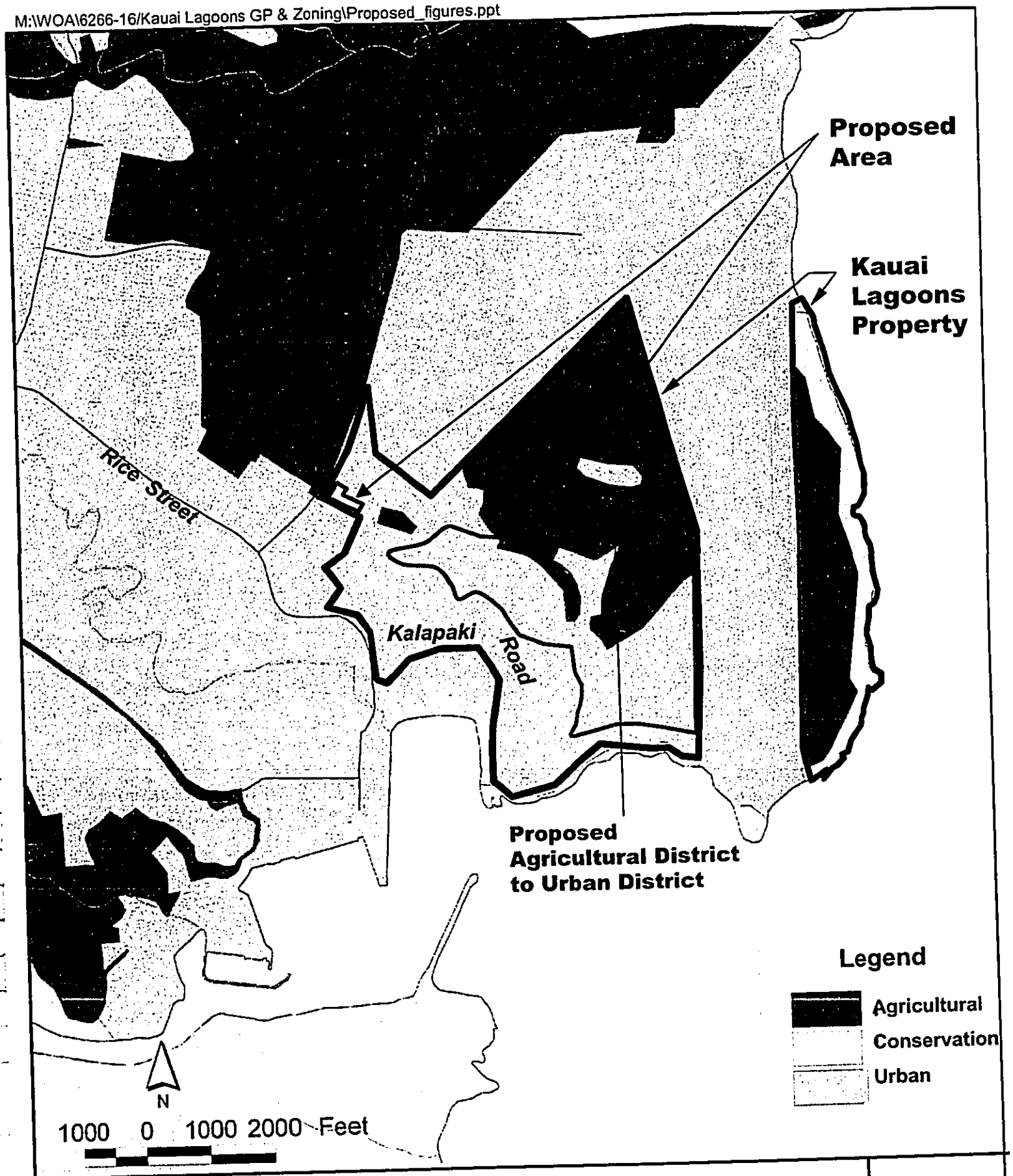
The Proposed Area is in close proximity to public transportation systems, utilities and services. The Project access roads include Kapule Highway and Rice Street which lead to the Lihue Airport and west side, Lihue Town, Nawiliwili Harbor and Puhi.

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Existing State Land Use Districts	FIGURE 5

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Proposed State Land Use Districts	FIGURE 5a

A new police headquarters is located just off Kapule Highway to the west of the Proposed Area and the Lihue Fire Station is located less than a mile away. The Lihue Wastewater Treatment Plant is adjacent to the Proposed Area and a 150,000-gallon per day sewer allocation has been provided. Water supply is available subject to coordination with the County Department of Water for any required improvements to source and storage. Electrical and communication services are available to the Proposed Area.

Although the resort-nature of the Project will minimize the need for schools, public schools serving the Project have adequate capacity to accommodate additional students. A variety of parks are located in the vicinity of the Project.

The Proposed Area is a logical extension of urbanization in the region since it lies adjacent to urban lands and is in close proximity to Lihue Town, Lihue Airport, and Kalapaki resort developments.

(3) *It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil conditions, and other adverse environmental effects;*

The Proposed Area is gently sloping or relatively flat with elevations ranging from approximately 120 feet to 80 feet above msl. Storm water runoff flows onto the golf courses and lagoons.

According to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), the Kauai Lagoons Property is in Zones "VE" and "X". The Proposed Area is located within Zone "X", defined as "Areas determined to be outside the 0.2% annual chance floodplain".

(4) *Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans;*

The Proposed Area is contiguous with existing urban areas, including Lihue Airport to the north, commercial, industrial, public facilities and residential areas to the west, and resort, commercial, and residential uses to the south. The County's General Plan designates the Proposed Area as Open, Resort, and Urban Center.

(5) *It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans;*

The Proposed Area is consistent with the designation of new urban concentrations and urban growth areas as shown on the County land use plans. The County's General Plan designates the Proposed Area as Open, Resort, and Urban Center.

(6) It may include lands which do not conform to the standards in paragraphs (1) to (5):

(A) When surrounded by or adjacent to existing urban development; and
(B) Only when those lands represent a minor portion of this district;

The Proposed Area conforms to the referenced paragraphs (1) to (5).

(7) It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services; and

The Proposed Area is contiguous with existing urban areas, including Lihue Airport to the north, commercial, industrial, public facilities and residential areas to the west, and resort, commercial, and residential uses to the south. Therefore, the Proposed Area is a logical extension of urbanization in the vicinity and will not contribute toward scattered or spot urban development. The Project will include all required on- and off-site infrastructure improvements to minimize the burden on public systems. The Project is not anticipated to have any significant impacts on public services in the area.

(8) It may include lands with a general slope of twenty per cent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction of controls, as adopted by any federal, state, or county agency, are adequate to protect the public health, welfare and safety, and the public's interests in the aesthetic quality of the landscape.

The Proposed Area is gently sloping at approximately 1 percent.

4.2 Hawaii State Plan

Hawaii State Plan: The Proposed Project is consistent with the following applicable goals, objectives and policies of the Hawaii State Plan, Chapter 226, Hawaii Revised Statutes (HRS):

Section 226-8 Objectives and policies for the economy – visitor industry.
(b)(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.
(b)(4) Encourage cooperation and coordination between the government and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities.

The Project will provide a high quality Hawaiian destination resort and residences instilled with an island/cultural influence. Landscaping will feature lush, colorful tropical foliage, with native and culturally important species. The extensive open lagoons will be supplemented by water features such as ponds, spas, waterfalls, fountains and swimming pools. The low density character of the residences coupled with extensive open spaces created by the golf courses, landscaping, and water features will create an attractive resort environment.

Section 226-11 Objectives and policies for the physical environment – land-based, shoreline and marine resources.
(b)(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.
(b)(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

The lagoons which currently provide habitat for endangered Hawaiian waterbirds will be maintained. An extensive network of pedestrian and bicycle trails available to the public is provided through the Property, including shoreline access paths and lateral shoreline encompassing approximately 36,000 lineal feet, or 6.8 miles.

Section 226-12 Objectives and policies for the physical environment – scenic, natural beauty, and historic resources.
(b)(1) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.
(b)(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

The low density character of the residences coupled with extensive open spaces created by the golf courses, landscaping, and water features will help maintain the aesthetic quality of the natural environment. Landscaping will feature lush, colorful tropical foliage, with native and culturally important species. The extensive open lagoons will be supplemented by water features such as ponds, spas, waterfalls, fountains and swimming pools.

Sec. 226-13 Objectives and policies for the physical environment – land, air and water quality.
(b)(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.
(b)(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.
(b)(7) Encourage urban developments in close proximity to existing services and facilities.

The Project's drainage system will use the golf courses, lagoons and open spaces to help retain storm water flows. As such, runoff generated by the Project will be retained on-site. Appropriate erosion and sediment controls will be instituted during Project grading operations and construction site work activities, in compliance with the County's Grading Ordinance and the State Department of Health's (DOH) National Pollutant Discharge Elimination System (NPDES) Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins.

No developments are proposed within the flood hazard zones. According to the Flood Insurance Rate Map (FIRM), the Proposed Area is located within Zone "X", defined as "Areas determined to be outside the 0.2% annual chance floodplain".

Section 226-16 Objective and policies for facility systems – water.
(b)(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.

Irrigation water for the golf courses is obtained from R-2 wastewater effluent provided by the Lihue Wastewater Treatment Plant. Plans are underway to upgrade the effluent to R-1 quality to enable irrigation of landscaping and common areas as well. Drainage systems make use of the golf course ponds, swales and open areas for the detention of storm water flows.

Sec. 226-19 Objective and policies for socio-cultural advancement – housing.
Sec. 226-19(b)(1): Effectively accommodate the housing needs of Hawaii's people.
Sec. 226-19(b)(2): Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.
Sec. 226-19(b)(3): Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.
Sec. 226-19(b)(5): Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.
Sec. 226-19(b)(6): Facilitate the use of available vacant, developable, and underutilized urban lands for housing.

The Project includes an on-site affordable rental housing project intended to meet the needs of affordable housing for residents of Kauai. A total of 24 multi-family affordable rental housing units will be developed within a 2.1-acre parcel at the western end of the Property. The Project will provide affordable rental housing opportunities for low- and moderate-income households by providing residential units to households whose incomes are within the 80% and below of the Kauai Median Household Income (KMHI) group, the 80% to 100% of the KMHI group, and the 100-120% of the KMHI group. The housing project will be operated in consultation with the Kauai Housing Agency with rents established in accordance with the Housing Agency guidelines.

4.3 Hawaii Coastal Zone Management (CZM) Program

The National Coastal Zone Management Program was created through passage of the Coastal Zone Management Act of 1972. Hawaii's Coastal Zone Management Program, adopted as Chapter 205A, HRS, provides a basis for protecting, restoring and responsibly developing coastal communities and resources. A discussion of the Project's consistency with the objectives and policies of the Coastal Zone Management Program is provided below.

(1) Recreational Resources

Objective:
Provide coastal recreational opportunities accessible to the public.

Policies
(A) Improve coordination and funding of coastal recreational planning and management; and
(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*

(ii) *Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;*

(iii) *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*

(iv) *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*

(v) *Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*

(vi) *Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters.*

(vii) *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*

(viii) *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.*

The Proposed Project will enhance coastal recreational activities by increasing public beach access, providing public beach access parking, public recreational shelters and picnic areas, and public restroom and shower facilities. Shoreline access paths are provided near the Kauai Marriott Resort and Beach Club, the former Inn on the Cliffs restaurant, and near Fashion Landing. A lateral shoreline pathway will also be developed between the Fashion Landing area and the former Inn on the Cliffs. Should public access routes be temporarily blocked during construction activities of the Proposed Project, alternative routes will be provided during the interim period.

(2) *Historic Resources*

Objective:
Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:
(A) *Identify and analyze significant archaeological resources;*
(B) *Maximize information retention through preservation of remains and artifacts or salvage operations; and*

(C) *Support state goals for protection, restoration, interpretation, and display of historic resources.*

Most of the Property has been developed into golf course and resort-oriented uses. An archaeological reconnaissance survey in February 1980 was conducted on portions of the current Proposed Area by Archaeological Research Center Hawaii, Inc. The TMKs surveyed included 3-5-01: 82, 83, 119 and portions 27, 115-118 and 120. The report noted that the area had been previously impacted by sugar cane cultivation and cattle grazing and no archaeological or historic sites were found. The report recommended archaeological clearance with no further investigation (Letter Report: Archaeological Reconnaissance of Ninini Point Area, February 27, 1980).

The State Historic Preservation Division of the Department of Land Natural Resources, in a letter dated May 9, 2005 in conjunction with Special Management Area and zoning permits received in August 2005, determined that "no historic properties will be affected".

An archaeological assessment survey has been prepared for the approximately 71-ascre undeveloped triangular-shaped parcel at the north end of the Property. Because no historic properties were located in the 71-acre area, this investigation was termed an "archaeological assessment" pursuant to Section 13-13-284-5, Hawaii Administrative Rules.

(3) *Scenic and Open Space Resources*

Objective:
Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:
(A) *Identify valued scenic resources in the coastal zone management area;*
(B) *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;*
(C) *Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and*
(D) *Encourage those developments which are not coastal dependent to locate in inland areas.*

Development of the Project will alter the visual landscape from its relatively open state to one of urban use. However, as the Proposed Project will be a resort development compatible with the adjacent Kauai Marriott Resort and Beach Club, the change in views from the public vantage points will be of an intensification of the existing use.

The Proposed Project revisions will result in a lower density of development than approved by the Planning Commission. Rather than all four-story buildings, density will be distributed over a larger area, providing more open space between buildings and lowering building heights. Despite the additional resort area to be entitled, there will be no increase in the maximum number of units allowed by zoning ordinance for the Resort. The resort area will be generously landscaped to complement the natural beauty of its surroundings.

(4) Coastal Ecosystems

Objective:
Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:
(A) Improve the technical basis for natural resource management;
(B) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
(D) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

No significant adverse impacts to coastal ecosystems will occur and no long-term impacts are expected. Any potential water quality impacts to nearshore coastal ecosystems will be mitigated by adherence to State of Hawaii and County of Kauai water quality regulations. A NPDES General Permit for Storm Water Associated with Construction Activity will be required to control storm water discharges. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMP) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins to minimize activity which may affect the coastal ecosystems.

(5) Economic Uses

Objective:
Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:
(A) Concentrate coastal dependent development in appropriate areas;
(B) Ensure that coastal dependent developments such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
(i) Use of presently designated locations is not feasible;
(ii) Adverse environmental effects are minimized; and
(iii) The development is important to the State's economy.

The Kauai Lagoons Property is a designated resort destination on the General Plan. The Proposed Project will be designed to minimize adverse social, visual and environmental impacts in the coastal area. A tropical environment and setting will be promoted and the use of native landscape plantings will be encouraged, with buildings of natural materials and subdued colors to complement the landscape.

(6) *Coastal hazards*

Objectives:
Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies
(A) *Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*
(B) *Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;*
(C) *Ensure that developments comply with requirements of the Federal Flood Insurance Program;*
(D) *Prevent coastal flooding from inland projects; and*
(E) *Develop a coastal point and nonpoint source pollution control program.*

No developments are proposed within the flood hazard zones. According to the Flood Insurance Rate Map (FIRM), the Proposed Area is located within Zone "X", defined as "Areas determined to be outside the 0.2% annual chance floodplain".

(7) *Managing Development*

Objective:
Improve the development review process, communication and public participation in the management of coastal resource and hazards.

Policies:
(A) *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*
(B) *Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and*
(C) *Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.*

Government agencies, organizations and the general public are being notified of the Project, and being given an opportunity to comment on the Project through the environmental review and land use approvals process. Short- and long-term impacts have been assessed in this Environmental Assessment.

(8) *Public Participation*

Objective:
Stimulate public awareness, education, and participation in coastal management.

Policies:
(A) *Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;*
(B) *Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities*; and
(C) *Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Government agencies, organizations and the general public are being notified of the Project, and being given an opportunity to comment on the Project, through the environmental review and land use approvals process.

(9) *Beach Protection*

Objective:
Protect beaches for public use and recreation.

Policies:
(A) *Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;*
(B) *Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and*
(C) *Minimize the construction of public erosion-protection structures seaward of the shoreline.*

The Proposed Project does not involve the construction of improvements in the shoreline setback or require any erosion-protection structures. The Project will improve access and coastal recreational opportunities available to the public.

(10) *Marine Resources*

Objective:
Implement the State's ocean resources management plan.

Policies:
(A) *Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*
(B) *Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*

(C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

(D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

The proposed reclassifications and future developments should have no adverse impact on marine resources. The Project will comply with the State of Hawaii water quality regulations and County of Kauai grading and erosion control standards and requirements.

4.4 County of Kauai General Plan

The County of Kauai General Plan provides broad policy statements to guide land use regulations, new developments and facilities, and planning for County facilities and services. Relevant sections of the General Plan and their consistency with the Project are as follows:

General Plan Designation: The Lihue District Land Use Map of the County of Kauai General Plan designates the Proposed Area as Open, Resort and Urban Center as shown in Figure 6. The Project proposes to expand the Resort-designated areas (from Open to Resort) by approximately 190 acres for portions of the Mokihana and Kiele Golf Courses and other open areas to achieve a lower density of development as shown in Figure 6a. The areas of amendment include golf holes within the 65 DNL noise contour established for the Lihue Airport and the area inland of the Running Waters Beach in the vicinity of Kiele Hole No. 14.

The policy for the Open designation is as follows (Section 5.3.1 Policy):

(a) The intent of the Open designation is to preserve, maintain or improve the natural characteristics of non-urban land and water areas that:

(1) are of significant value to the public as scenic or recreation resources;

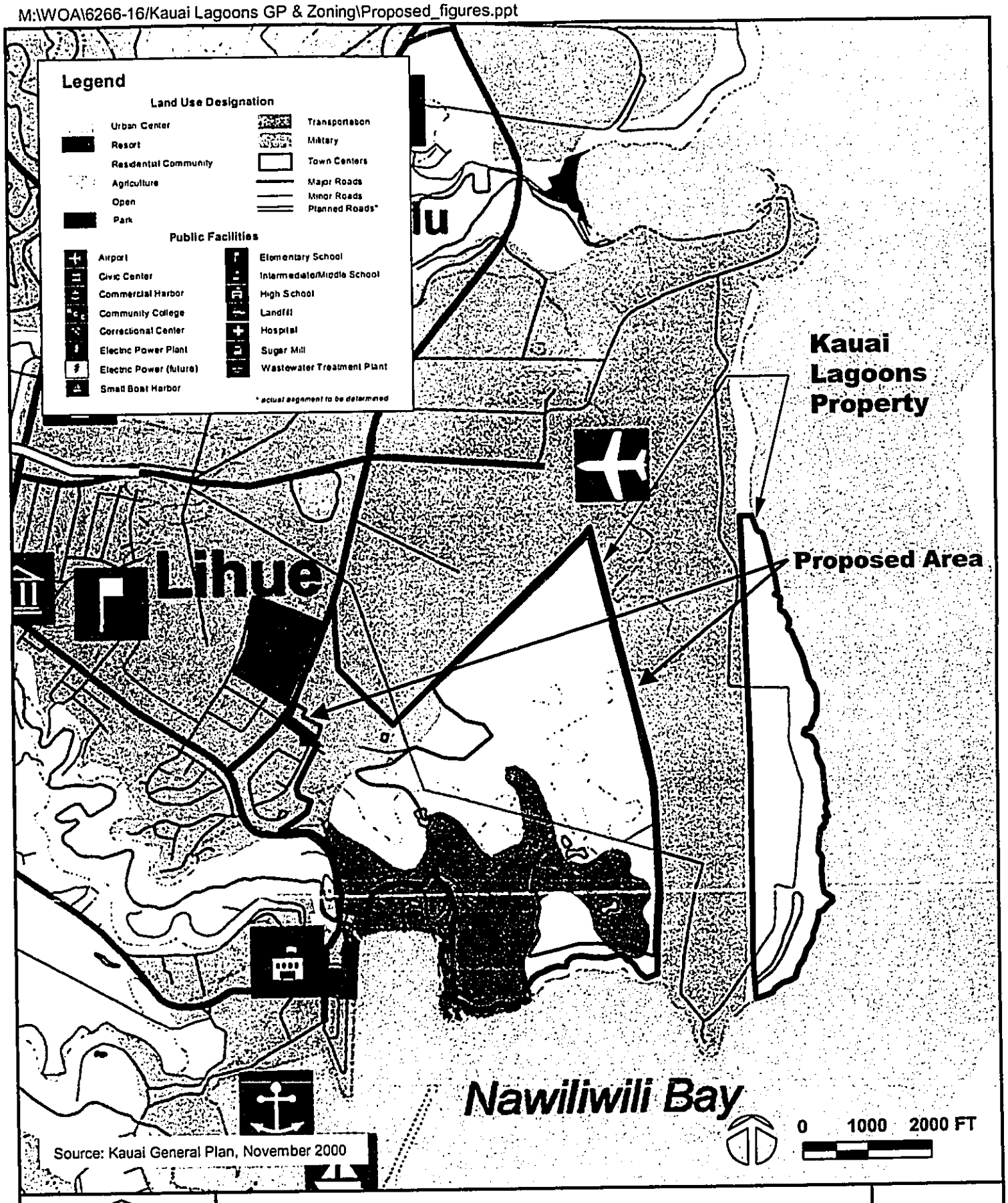
(2) perform essential physical and ecological functions important to the welfare of surrounding lands, waters, and biological resources;

(3) have the potential to create or exacerbate soil erosion or flooding on adjacent lands;

(4) are potentially susceptible to natural hazards such as flood, hurricane, tsunami, coastal erosion, landslide or subsidence; or

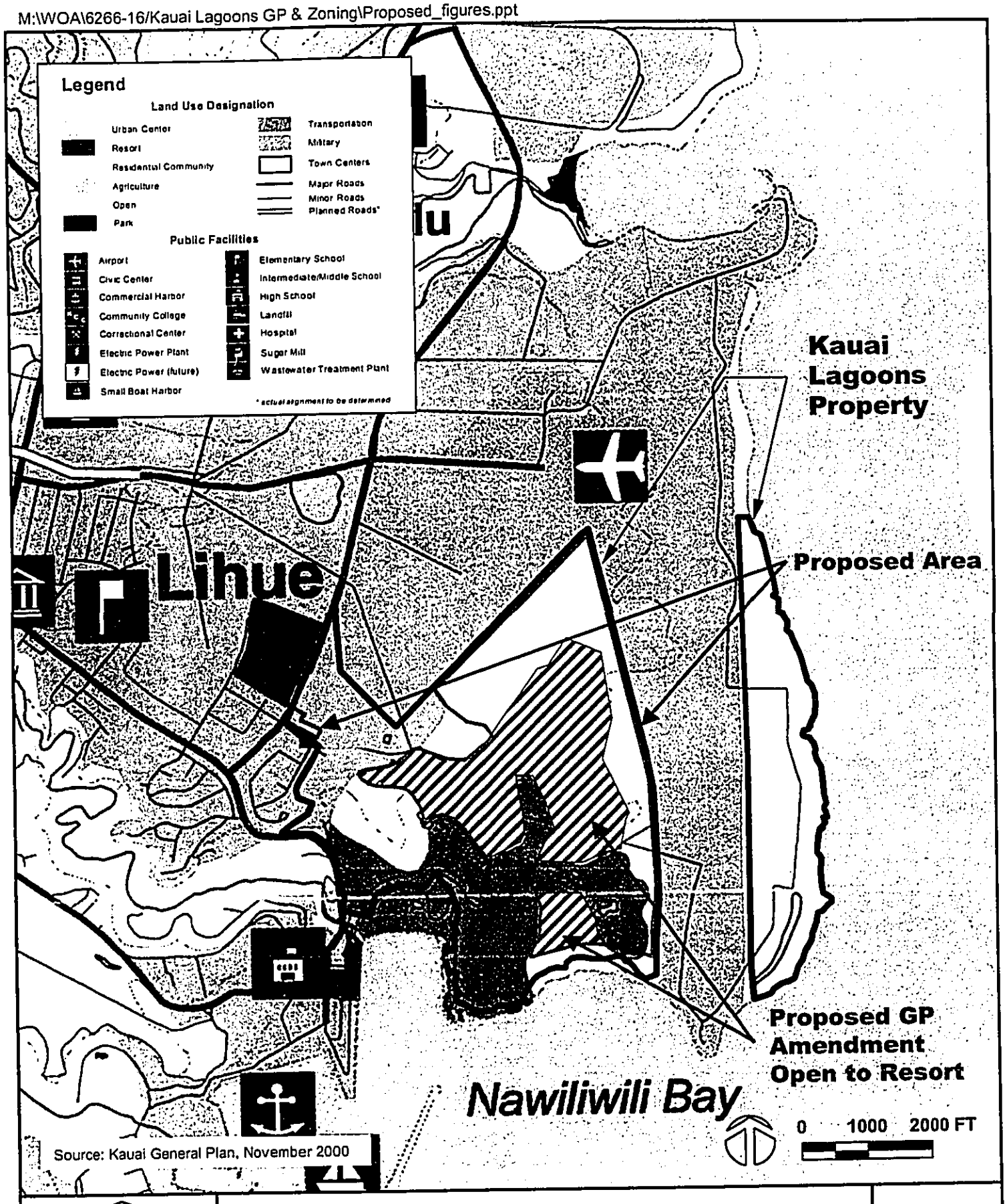
(5) form a cultural, historic or archaeological resource of significant public value.

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Existing Kauai General Plan Land Use Map	FIGURE 6

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures.ppt



WILSON OKAMOTO CORPORATION ENGINEERS · PLANNERS	KAUAI LAGOONS RESORT Proposed Kauai General Plan Land Use Map	FIGURE 6a

(b) *Lands designated Open shall include: important landforms such as mountains, coastal bluffs, cinder cones, and stream valleys; native plant and wildlife habitat; areas of predominantly steep slopes (20 percent or greater); beaches and coastal areas susceptible to coastal erosion or hurricane, tsunami, or storm-wave inundation; wetlands and flood plains; important scenic resources; and known natural, historic and archaeological resources. Open shall also include parks, golf courses, and other areas committed to outdoor recreation*

(c) *Lands designated Open shall remain predominantly free of development involving buildings, paving and other construction. With the exception of kuleanas and other small lots of record, any construction that is permitted shall be clearly incidental to the use and open character of the surrounding land.*

Lands in the Proposed Area are designated as Open due to their existing use as a golf course. These Open-designated lands do not otherwise possess any significant ecological, historic/cultural, scenic, or flood mitigation values typically attributed to the Open District.

The policy for the proposed land use Resort reclassification is designated as follows (Section 5.4.2.1 Policy):

(a) *Lands included within the Resort designation shall be used predominantly for housing and serving visitors to Kaua'i. In addition to hotels and multi- and single-family dwellings used for transient lodging, the Resort designation shall provide for commercial, recreational and public facilities that serve visitors or support the visitor industry. Lands designated Resort may also be used for residential purposes, including resort employee housing.*

(b) *Resort-designated areas shall be served with wastewater treatment plants and shall have the full range of urban services.*

(c) *The Resort designation shall be reserved for a limited number of locations.*

(2) *Secondary resort destinations include Nukoli'i and Līhu'e.*

Kauai Lagoons is a designated resort destination on the General Plan. The proposed land use map amendment is consistent with the Resort designation which allows for single- and multi-family residential uses within a resort setting, and including recreational amenities such as those provided by the golf courses and lagoons which serve the visitor industry. The Kauai Lagoons Resort is served by the adjacent County's Lihue WWTP. A wide range of urban services is available in nearby Lihue Town located approximately 1 mile northwest of the Resort.

The policy for the Urban Center designation is as follows (Section 5.4.1.1 Policy):

(a) *Lands included within the Urban Center designation shall be centers of government, commerce and transportation that serve the entire county or a large region. Uses may include shopping centers, government offices, churches and*

other institutions, office complexes, and industrial facilities. Residential or resort uses may also be located within the Urban Center designation, where compatible.

The proposed affordable housing development is consistent with the Urban Center designation which provides for residential use.

General Plan Policies: The Proposed Project is consistent with the following applicable policies that concern the needs of the people and function of government. These areas include Scenic Views; Historic and Archaeological Resources and Sites; Watersheds, Streams, and Water Quality; the Visitor Industry; Supporting Businesses and Jobs for Kauai Residents, and Land Supply for Commercial and Industry Use. The proposed action is in consonance with the following objectives and policies of the General Plan:

3.2 Scenic Views

3.2.1 Policy

(a) The County shall observe the following general principles in maintaining scenic resources:

(1) Preserve public views that exhibit a high degree of intactness or vividness..

(2) Preserve the scenic qualities of lowland/open space features, such as the shoreline, the edge of a coastal bluff, a marsh, a fishpond, or a historic or cultural property. Structures should not impede or intrude upon public views of the feature and should not alter the character of the immediate area around the land feature, historic or cultural property.

Existing public viewpoints of the Property include limited easterly views from Kalapaki Beach and the shoreline. Landscaping for the Project will maintain and enhance existing viewplanes from the shoreline. Development of the Project will alter the visual landscape from its relatively open current state to one of urban use. To reduce any visual impact from public vantage points, the Project will be developed in accordance with the applicable development standards of the County's Comprehensive Zoning Ordinance relative to building height and envelopes, setbacks, etc. The development will also minimize the intrusion of buildings on the visual environment through architectural design criteria and landscaping deemed appropriate for the resort and residential areas.

3.3 Historic and Archaeological Resource

3.3.2.1 Policy

3.3.2.2 Historic Properties

Preserve important archaeological and historic sites and provide: (1) a buffer area between the site and adjacent uses; and (2) public pedestrian access, as appropriate on to the site.

Most of the Property has been developed into golf course and resort-oriented uses. In February 1980, in conjunction with the reclassification of district boundaries from the State Agricultural to the Urban District (Docket Nos. A82-530 and A87-614), an archaeological reconnaissance survey was conducted of portions of the Proposed Area by Archaeological Research Center Hawaii, Inc. The report noted that the area had been previously impacted by sugar cane cultivation and cattle grazing and no archaeological or historic sites were found. The report recommended archaeological clearance with no further investigation. The State Historic Preservation Division of the Department of Land Natural Resources, in a letter dated May 9, 2005 in conjunction with Special Management Area and zoning permits received in August 2005, determined that "no historic properties will be affected".

An archaeological assessment survey has been prepared for the approximately 71-ascre undeveloped triangular-shaped parcel at the north end of the Property. Because no historic properties were located in the 71-acre area, this investigation was termed an "archaeological assessment" pursuant to Section 13-13-284-5, Hawaii Administrative Rules.

In accordance with Section 6E-46.6, Hawaii Revised Statutes, and Chapter 13-300, Hawaii Administrative Rules, in the event that any archaeological sites, significant cultural deposits, or human skeletal remains are found during future construction activities of the Proposed Project, all work will immediately cease pending consultation with the State Department of Land and Natural Resources Historic Preservation Division. The treatment of any remains or artifacts will be in accordance with procedures approved by the Kauai/Niihau Islands Burial Council and the State Historic Preservation Division.

3.4 Watersheds, Streams and Water Quality

3.4.2 Policy

(a) New Development

(1) Reduce average annual post-development sediment in runoff (total suspended solids), so that it is no greater than pre-development levels.

(2) Maintain post-development peak runoff rate and average volume at levels similar to pre-development.

(3) Work with other government agencies and community organizations to seek ways of reducing all types of nonpoint source water pollutants.

(b) Site Development Plan, design and develop sites to:

(1) Protect areas that provide important water quality benefits – i.e., wetlands;

(2) Protect areas that are particularly susceptible to erosion and sediment loss – i.e., stream banks;

(3) Promote the use of permeable surfaces for driveways and parking and limit increases of impervious areas;

(4) Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss;

(5) Avoid disturbance of natural drainage features and vegetation.

(c) Construction Site Erosion and Sediment control

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction.

(2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

No significant impacts on the geology, topography and soils are anticipated as a result of future development of the Proposed Area. A range of erosion and sediment controls will be instituted during any grading, grubbing and excavation operations in full compliance with the County of Kauai's Grading Ordinance and the State Department of Health's (DOH) National Pollutant Discharge Elimination System (NPDES) Permit for Construction of Storm Water Activities. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins.

4.2 Visitor Industry

4.2.8 Policy

4.2.8.1 Supply of Visitor Units and Location of Resort Development

(a) Encourage and support resort development on lands planned and zoned for resort use, primarily at Princeville, Kapa'a-Wailua, and Po'ipu.

The Project is consistent with the County's General Plan Resort designation, which provides for hotels, multi-family dwellings used for transient lodging, commercial and recreational uses serving the visitor industry.

4.5 Lihue Development Plan

The County of Kauai's *Lihue Development Plan* (1976) establishes long-range designations for commercial, industrial, residential and other land uses. The Development Plan is intended to provide the Lihue area with organized and more detailed criteria and standards to implement the objectives of the County General Plan. The reclassifications in the Proposed Area includes Residential and Resort.

The resort development is consistent with the Development Plan's policies for the Niumalu-Nawiliwili area, specifically the following:

> *The major assets of this area which should be preserved and enhanced include the resort areas... The overall Development Plan is based on more visitor activity as one ingredient for growth. The areas shown for new resort use appear both feasible and desirable additions to the existing resort areas. Because of the public interest in the shoreline, development of new resort facilities should include contiguous public access to those areas.*

The goals, objectives and policies that provide overall guidance to the implementation of the Lihue Development Plan and with which the Proposed Project is consistent are as follows:

Physical

- *Shoreline and other open space areas are becoming less accessible with each new development.*
  - *Maintain accessibility of these areas through enforcement of this Plan; acquire access ways through already developed areas as necessary.*

Extensive public access to the shoreline has been provided through the Kauai Lagoons Resort properties.

Economic

- *The following general goals have been adopted relative to formulating the economic elements of the Lihue Development Plan:*
  - *a) Increase employment quality and opportunity*
  - *b) Maintain a stable and healthy economy*

The Proposed Project will help to ensure the long term viability of the resort, retention of employees, and promote a strong, stable, and diversified economy for Kauai. The Proposed Project will help retain valued employees while creating a number of short- and long-term employment opportunities. Construction activities will benefit local contractors and building supply companies. Long-term employment opportunities will result from professional and skilled workers required to manage and maintain the future residential and resort developments.

- *Following are the policies and programs considered essential to the fulfillment of projected employment potentials and planning objectives:*
  - *a) Visitor industry activities and facilities enhancement*
  - *e) Commercial redevelopment and integration*

The Proposed Project will provide future opportunities for the visitor industry with activities that include outdoor recreation, water sports, and by promoting Kauai as a wellness destination. New resort and residential facilities will be compatible with the environment, supporting the community's quality of life and sustaining the qualities that attract visitors.

4.6 Kauai Comprehensive Zoning Ordinance

The County of Kauai Comprehensive Zoning Ordinance (CZO) sets forth standards for land development and construction of buildings and other structures in the County of Kauai. The CZO establishes land use districts and delineates the respective types of permitted uses and the development that can take place in those districts.

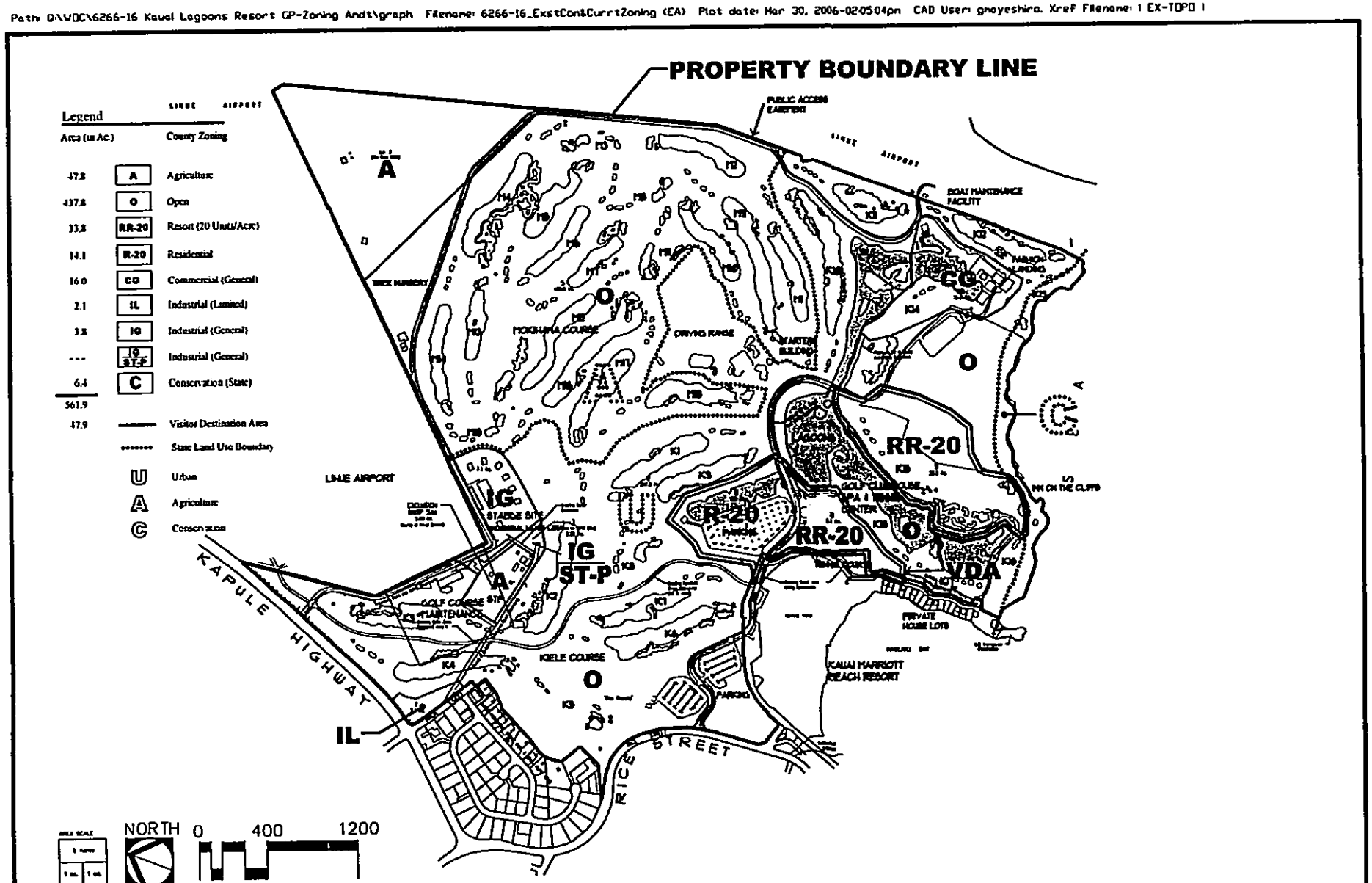
Within the Proposed Area, designations include Open District (O) encompassing areas of the existing golf courses and lagoons, General Commercial District (CG) for the Fashion Landing Area, and Limited Industrial District (IL) for the affordable housing site as shown in Figure 7. Reallocating residential density to areas adjacent to golf holes will require deleting a condition in Zoning Ordinance No. PM-2002-363 which prohibits the use of the Open District (O) for residential density. A zoning amendment would also be needed from the Open District (O) to the Residential District (R-2) and Resort District (RR-20) to accommodate the revised plans. For the 24-unit affordable housing site at the intersection of Haoa Street and Kapule Highway, a zone change from Limited Industrial District (IL) to the Residential District (R-20) is proposed to permanently enable this use. The proposed zoning amendments, encompassing a total of approximately 81.7 acres, are shown in Figure 7a.

The current Visitor Destination Area (VDA) boundaries within the Kauai Lagoons Resort are proposed to be expanded by approximately 230.8 acres to include additional areas where resort-residential development may occur, generally within the 65 DNL noise contour of Lihue Airport and the Fashion Landing General Commercial parcel. The proposed VDA boundaries will encompass lands within the Resort District (RR-20), the Residential District (R-2), the General Commercial District (CG), and the Open District (O).

4.7 County Special Management Area

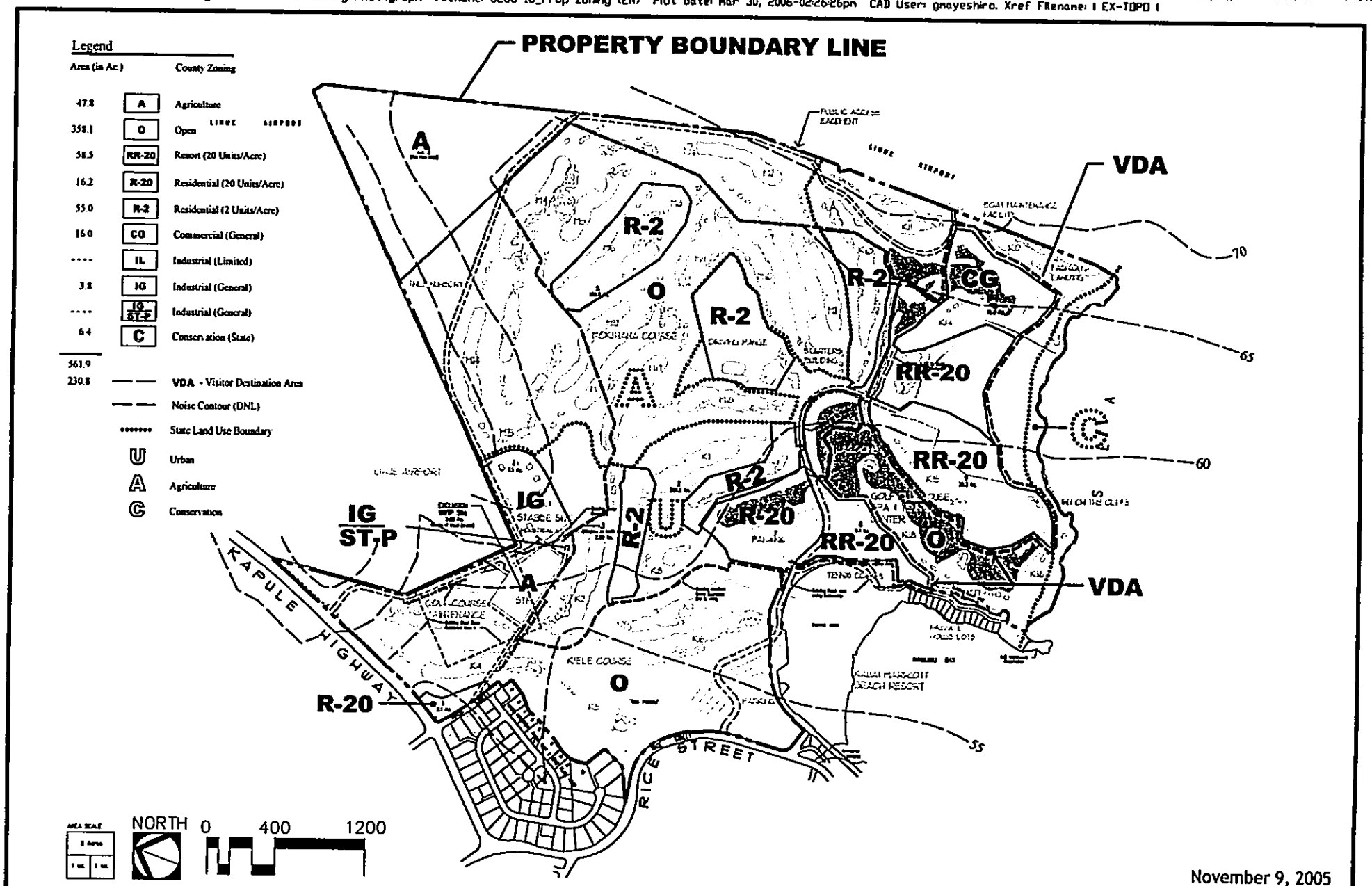
A portion of the Proposed Area is located within the Special Management Area (SMA) boundaries established pursuant to the Hawaii Coastal Zone Management Law, Chapter 205A, Hawaii Revised Statutes (HRS) as shown in Figure 8. A SMA Use Permit will be required from the County for any activities defined as "development" under the SMA rules.

Path: O:\WDC\6266-16 Kauai Lagoons Resort GP-Zoning Amdt\graph Filename: 6266-16_ExstCon&CurrtZoning (EA) Plot date: Mar 30, 2006-0205:04pm CAD User: gnayeshiro. Xref Filename: | EX-TOPO |



WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS	KAUAI LAGOONS RESORT Existing Conditions and Current Zoning	FIGURE 7

Path: D:\WOC\6266-16 Kauai Lagoons Resort GP-Zoning Amdt\graph Filename: 6266-16_Prop Zoning (EA) Plot date: Mar 30, 2006-02:26:26pm CAD User: gnayeshiro. Xref Filename: EX-TOPO



November 9, 2005

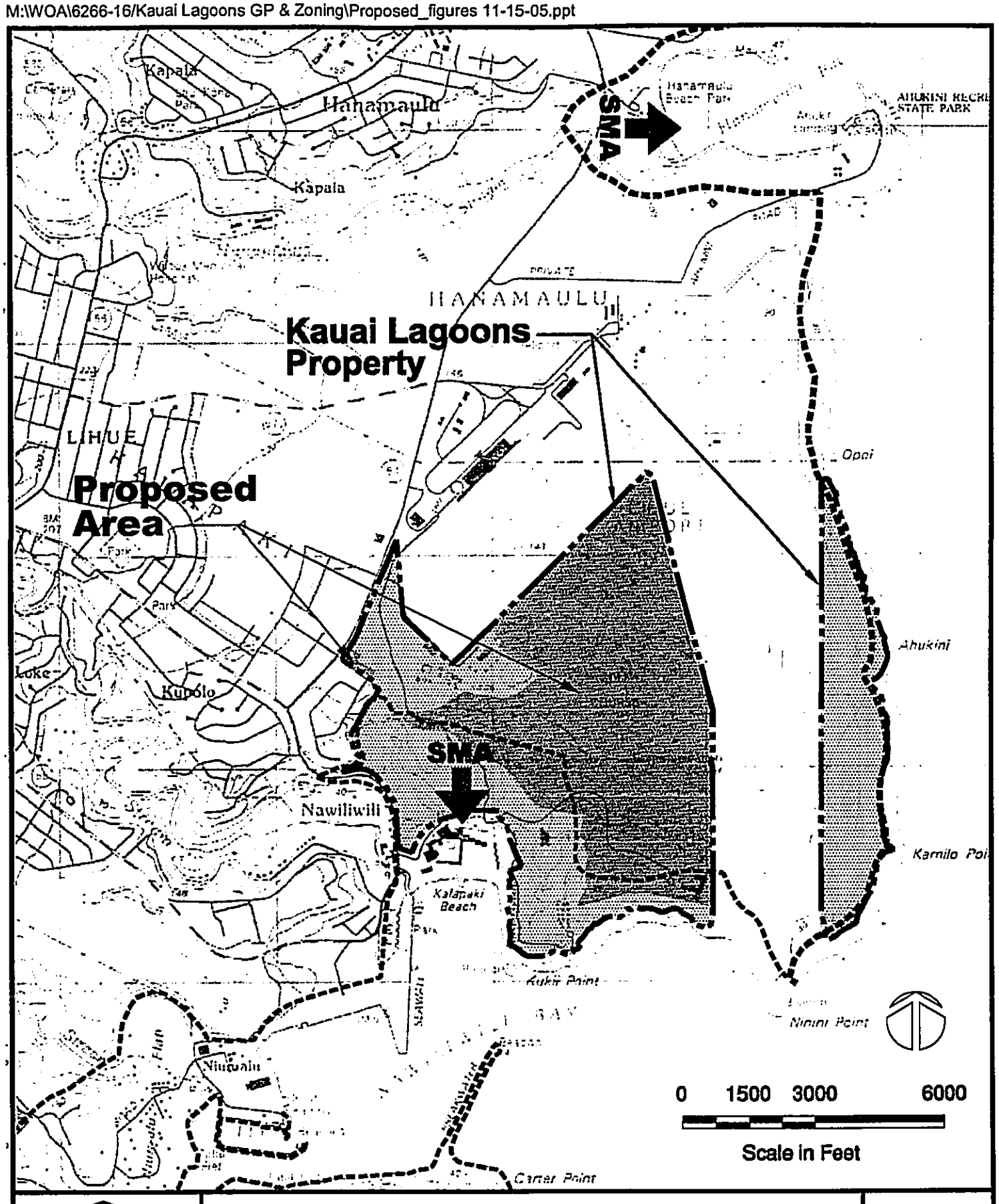
WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

Proposed Zoning

FIGURE 7a

M:\WOA\6266-16/Kauai Lagoons GP & Zoning\Proposed_figures 11-15-05.ppt



WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS	KAUAI LAGOONS RESORT Special Management Area	FIGURE 8

5. ALTERNATIVES TO THE PROPOSED ACTION

5.1 No Action Alternative

Under the No Action Alternative, the Proposed Project revisions, including the shifting of resort residential units over portions of the Mokihana and Kiele Golf Courses and other open areas, would not be undertaken. The developments approved in the Special Management Area Use Permit and Zoning Permits received from the Planning Commission in August 2005 could still be pursued, but these would result in a higher than desired density of development. Extensive golf course reconfigurations would not be required, but there would be unused open areas and a less than optimal use of the Mokihana Course. No Action would also threaten the Petitioners'/Applicants' ability to construct the 24-unit affordable housing project since the housing density past 10 years of affordability would not be secured.

The No Action alternative would preclude all short- and long-term beneficial and adverse physical, environmental and socio-economic impacts described in this EA. Construction-related impacts, including those on noise and air quality, would be avoided.

5.2 Closure of the Mokihana Golf Course

The closure of the Mokihana Golf Course would enable residential development to be placed without using the undeveloped triangular-shaped parcel at the north end of the Property. A State Land Use District Boundary Amendment for this area would be avoided, but there would still be the need to pursue a County zoning amendment to enable the golf course areas to be developed for residential use.

6. REQUIRED PERMITS AND APPROVALS

The following permits and approvals are required for the Proposed Project:

1. State Land Use District Boundary Amendment
2. County General Plan Amendment
3. County Zoning Amendment
4. Special Management Area Use Permit
5. Class IV Zoning Permit
6. National Pollutant Discharge Elimination System (NPDES) Permit
7. Grading Permit
8. Building Permit

7. NOTICE OF DETERMINATION

A. Petitioners/Applicants

Kauai Lagoons LLC
KD Golf Ownership LLC
KD Kapule LLC
55 Merchant Street, Suite 2000
Honolulu, Hawaii 96813

Contact: Mr. Kevin M. Showe, Manager
Telephone: (808) 440-6545
Facsimile: (808) 440-0880

B. Approving Agency

County of Kauai Planning Department

C. Description of Proposed Action

Kauai Lagoons LLC, KD Golf Ownership LLC and KD Kapule LLC are seeking to amend the land use and zoning boundaries for inland portions of the existing Kauai Lagoons Resort located in Lihue, Kauai. The areas of proposed or potential changes in land use and zoning could encompass up to approximately 400 acres.

In August 2005, Kauai Lagoons Resort received Special Management Area Use Permit and other permit approvals to allow the development of 723 hotel/residential units, a new golf clubhouse, treatment spa, fitness center, retail and offices, a restaurant, resort check-in facilities, temporary sales facilities and model units, 1,818 off-street parking stalls, public recreational facilities, and other amenities on its properties.

Through the proposed land use and zoning boundary amendments, the Applicants are proposing to provide lower-density development, develop in remnant golf course areas, permit additional lagoon bungalow units, reconfigure the existing Mokihana and Kiele Golf Courses, and enable permanent multi-family housing. Required approvals include a State Land Use District Boundary Amendment to reclassify 15 acres within the Mokihana Golf Course from the State Agricultural District (A) to the Urban District (U); a County General Plan Amendment to expand the Resort-designated area by approximately 190 acres from the Open designation; amendment to the zoning designations for approximately 81.7 acres from the Open District to the Resort District (RR-20) and Residential District (R-2), and from the Limited Industrial District (IL) to the Residential District (R-20); and expansion of the Visitor Destination Area (VDA) boundary by approximately 230.8 acres.

D. Determination and Reasons Supporting Determination

The Kauai Lagoons Resort Draft EA was filed with the State Office of Environmental Quality Control (OEQC) and published in the January 23, 2006 publication of The Environmental Notice. A total of eight (8) comment letters were received during the 30-day public review

period which ended on February 22, 2006. Based on the significance criteria set forth in Section 11-200-12 of Title 11, Chapter 200, Administrative Rules, State Department of Health, the County of Kauai Planning Department has determined that the Proposed Project will not have a significant effect on the environment, and that a Finding of No Significant Impact (FONSI) will be filed with the State Office of Environmental Quality Control (OEQC).

The findings supporting this determination are discussed below:

1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

The Project will not involve the loss or destruction of any natural or cultural resources. The Proposed Area has been previously cultivated or developed with golf courses, commercial facilities and landscaping.

2) Curtails the range of beneficial uses of the environment;

The intention of the area is to commit the Proposed Area to the proposed use over the long-term. The Proposed Project will not curtail the beneficial uses of the environment since the Proposed Area is an appropriate site in terms of surrounding land use and previous landscaping and development in the area.

3) Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344 HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

The Proposed Project will not conflict with the State's long-term environmental policies, goals and/or guidelines. As presented in this EA, the Proposed Project will help promote a strong, stable, and diversified economy for Kauai. The planned developments will improve the economic viability of the Kauai Lagoons Resort and help ensure its long-term continuation.

4) Substantially affects the economic or social welfare of the community or State;

The proposed reclassification and proposed development will create a number of short-term and long-term employment opportunities. Short-term employment will consist primarily of construction-related jobs generated by the proposed resort, residential, and golf course development. Long-term employment opportunities will result from professional, skilled and other workers required to manage and maintain the condominium/timeshare/multi-family and hotel developments, golf course, and commercial facilities.

The economic benefits will also be realized with the proposed reclassification. In the short-term, the Proposed Project will confer positive economic benefits in the local area. Direct economic benefits will result from construction expenditures both through the purchase of material from local suppliers and through the employment of local labor, thereby stimulating that sector of the economy. Indirect economic benefits may also include benefits to local retail businesses resulting from construction activities.

The Proposed Project will have a positive impact to the visitor experience and economic welfare of the existing Kauai Marriott Resort and Beach Club. The proposed improvements include an

expanded program of public shoreline access, including the provision of 20 public beach parking stalls, recreational shelters and picnic areas, and public restroom and shower facilities. Pedestrian access will be provided along the lagoons and a new lateral shoreline pathway will be developed between the Fashion Landing area and the former Inn on the Cliffs. The commercial area will be restored providing additional spa, retail and dining opportunities.

5) Substantially affects public health;

Minimal effects on public health are anticipated relative to air, noise, and water quality. In the short-term, any elevated concentrations of construction-related emissions are anticipated to dissipate quickly due to the area's isolation and coastal location. To mitigate the effects of noise, residential units located between the 60 to 65 DNL noise contours will be designed and certified by a registered professional acoustical engineer to achieve an interior noise level of 45 DNL. The Proposed Project will fully comply with the State and County regulations and ordinances relative to grading, erosion control and water quality protection.

6) Involves substantial secondary impacts, such as population changes or effects on public facilities;

The proposed resort-residential development will be visitor-oriented and second home in nature. Therefore, the Proposed Project is not anticipated to induce increased population growth. In conjunction with the development, specific public facilities will be upgraded to address the immediate local impacts of the Project. Payment of associated development-related fees (i.e., environmental impact assessment or park dedication fees, infrastructure facilities charges, etc.) for the Project will also be made.

7) Involves a substantial degradation of environmental quality;

The Proposed Project would not have a negative impact upon the environment. Much of the area is already developed with golf courses, landscaping, roads, lagoons, and support facilities. Construction activities associated with the Proposed Project are anticipated to result in short-term impacts to noise, air quality, water quality and traffic in the immediate vicinity. With the incorporation of mitigation measures during the construction period, the Project will not result in long-term degradation to this environmental quality.

8) Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for larger actions;

Given the low level of development density, there would not be any cumulative long-term effects, nor a commitment for larger actions. The existing Zoning Ordinance limits the total number of units to 750 (excluding the affordable housing units), and there are no plans to exceed this limit. Since the resort development will attract visitors, the Project is not anticipated to induce increased population growth or associated development in the region.

The impact that the Proposed Project would cumulatively have the most considerable effect upon the environment in the nearby vicinity is traffic. The proposed Lihue-Hanamaulu Master Plan being developed by Grove Farm to the north of the Proposed Project and Lihue Airport accounts for anticipated ambient growth in traffic in the project vicinity. The Master Plan

proposes a development of residential subdivisions, commercial, industrial and office uses, a school, and a civic center. With the implementation of the recommended Master Plan improvements, the traffic impact report for the Lihue-Hanamaulu development indicates that all ten analyzed intersections would be operating at acceptable levels of service in Year 2016, the development's anticipated completion year. Cumulatively, the Kauai Lagoons Resort is anticipated to increase the total traffic volumes along Kapule Highway by approximately 2 percent during the AM and PM peak hours of traffic. These increases are in the range of daily fluctuations along Kapule Highway and represent a minimal increase in the overall traffic volumes.

9) Substantially affects a rare, threatened or endangered species, or its habitat;

Since the Proposed Area does not provide a unique flora habitat, no significant impacts on flora species are anticipated from the construction and operation of the Proposed Project.

The principal threats posed to the four listed endangered avian species by the modification of the habitat present within the Proposed Area are the inadvertent destruction of nests, eggs or chicks during construction activities and the temporary disturbance of non-nesting birds as a result of construction activity. To assure that the modification of the habitat within the Project Area does not result in direct physical harm to nesting waterbirds, their nest, eggs, or young, the areas that may support nesting geese, coots and ducks will be surveyed immediately prior to the onset of construction activity to ensure that no active nesting activity is underway in those areas.

To reduce the potential for interactions between the two (2) listed pelagic seabird species, the Hawaiian Petrel and Newell's Shearwater, with external lights and man-made structures, any external lighting planned for the development will be shielded.

10) Detrimentally affects air or water quality or ambient noise levels;

During construction, dust and noise from construction activities will be unavoidable. Potential air quality impacts will be mitigated by complying with the State Department of Health (DOH) Administrative Rules, Title 11, Chapter 60, Air Pollution. With regard to noise, mitigation measures such as the use of properly muffled construction equipment and incorporation of State DOH construction noise limits pursuant to the provisions of the State DOH Administrative Rules, Title 11, Chapter 46, Community Noise Control are applicable to the Project.

Operation of the Project will have no significant long-term impact on ambient noise levels in the Project vicinity. Ambient noise levels in the Project area will increase slightly as a result of the associated increase in vehicular traffic generated by the Proposed Project. Although the nearest noise-sensitive uses are located south of the Proposed Area, ambient noise levels associated with increases in vehicular traffic generated by the Proposed Project will not adversely impact nearby uses due to the relatively self-contained nature of the Resort Property.

Potential water quality impacts to nearshore coastal waters during construction of the Proposed Project will be mitigated by adherence to State of Hawaii and County of Kauai water quality regulations governing grading, excavation and stockpiling. Appropriate erosion and sediment controls will be instituted during Project grading operations and construction site work activities

in compliance with the County's grading ordinance and the State DOH's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Associated with Construction Activity. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins.

Within the Proposed Project, on-site runoff may increase due to the addition of non-permeable surfaces. The Project's proposed drainage system will be designed to minimize impacts to nearshore coastal waters. Drainage systems will be designed to accommodate the increased runoff without increasing off-site impacts and will comply with the County's Drainage Standards. The proposed residential developments will be buffered by the golf course landscaping and the resort lagoons which provide the needed mitigation for storm water runoff. As warranted, additional detention basins will be provided within the development lots or incorporated as part of the golf course. This will serve to keep flow rates and drainage patterns to pre-development conditions.

11) Affects or is likely to suffer damage by being located in an environmentally sensitive area;

No developments are proposed within environmentally sensitive areas or the flood hazard zones. According to the Flood Insurance Rate Map (FIRM), the Proposed Area is located within Zone "X", defined as "Areas determined to be outside the 0.2% annual chance floodplain".

12) Substantially affects scenic vistas and viewplanes identified in county or state plans or studies;

There are no scenic vistas or viewplanes identified by any known County or State plans or studies relative to the Property. The Project will minimize the intrusion of buildings on the visual environment through architectural design criteria and landscaping deemed appropriate for the Resort. A tropical environment and setting will be promoted, with buildings of natural materials and subdued colors to complement the landscape.

13) Requires substantial energy consumption;

The Proposed Project will consume significant amounts of energy in the course of construction and operation. Project designers, however, are committed to considering the application of Leadership in Energy and Environmental Design (LEED) standards and strategies wherever feasible for sustainable site, utilities and building development and to reduce the demand and consumption of energy.

8. REFERENCES

1. County of Kauai, Planning Department. *Kauai General Plan.* November 2000

2. County of Kauai. *Lihue Development Plan.* 1976.

3. Department of Land and Natural Resources (DLNR), Commission on Water Resource Management. *Ground Water Hydrologic Unit Map – Island of Kauai.* 2000.

4. Geographic Decision Systems International for Office of State Planning. *State Definition and Delineation of Watersheds 1994.*

5. Hawaii Cooperative Park Service Unit, National Park Service for the State of Hawaii Commission on Water Resource Management. *Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii's Stream Resources, Report R84.* December 1990

6. Hawaii State Department of Business, Economic Development and Tourism. *Hawaii Census 2000.*

7. Hawaii State Department of Business, Economics Development and Tourism. *The State of Hawaii Data Book 2000.*

8. Hawaii State Department of Health. *Annual Summary of Hawaii Air Quality Data 2000.*

9. Macdonald, Gordon A., A.T. Abbott and Frank L. Peterson. *Volcanoes in the Sea, The Geology of Hawaii.* Second Edition 1986.

10. PBR Hawaii. *Lihue-Hanamaulu Master Plan Final Environmental Impact Statement.* Prepared for The Lihue Plantation Company, Limited and Amfac/JMB Hawaii, Inc. January 1995.

11. Sterns, Harold T. *Geology of the State of Hawaii.* Second Edition 1985.

12. United States Department of Agriculture Soil Conservation Service. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii,* August 1972.

13. University of Hawaii, Department of Geography. *Atlas of Hawaii.* The University Press of Hawaii, Honolulu, Third Edition 1998.

14. U.S. Census Bureau. *Census 2000 Summary 100 Percent Data.*

15. Yuen, George, And Associates. *Water Resources Protection Plan: Volumes I and II.* June 1990.

9. CONSULTATION

9.1 Pre-Assessment Consultation

The following agencies were consulted during the preparation of the Draft EA.

State of Hawaii
Department of Transportation, Highways Division

County of Kauai
Planning Department

9.2 Draft Environmental Assessment Consultation

The following agencies and organizations were consulted during the public review period of the Draft EA. Those who formally replied are indicated by the *. All written comments and responses are reproduced herein.

Federal

* U.S. Fish and Wildlife Service
* U.S. Army Corps of Engineers

State of Hawaii

Department of Agriculture
Department of Business, Economic Development, and Tourism
* Department of Business, Economic Development, and Tourism, Office of Planning
* Department of Education
Department of Health
Department of Health, Environmental Management Division
* Department of Health, Office of Environmental Quality Control
Department of Land and Natural Resources
Department of Land and Natural Resources, Historic Preservation Division
Department of Transportation
* Office of Hawaiian Affairs

County of Kauai

Planning Department
* Department of Water
Department of Public Works
* Fire Department

Others

* Bays Deaver Lung Rose Baba
Lihue Public Library

Draft Environmental Assessment Comments

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF

January 31, 2006

Regulatory Branch

File # POH-2006-35

RECEIVED
WILSON OKAMOTO CORPORATION

Rodney Funakoshi, AICP
Wilson Okamoto Corporation
1907 South Beratania Street, Suite 400
Honolulu, HI 96826

Subject: Comments for Draft Environmental Assessment (EA) report for Kauai lagoons Resort, Lihue, Kauai Island, Hawaii (TMKs: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.) and 173)

Dear Mr. Funakoshi:

This responds to your request dated January 9, 2006 for review and comment on the subject-referenced draft EA. We have reviewed the information you provided under the Corps' authority to issue Department of the Army (DA) permits pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403) and Section 404 of the Clean Water Act (CWA) of 1977 (33 USC 1344).

Based on the information provided and a follow up phone conversation held on January 27, 2006, it appears the 35 acres of man-made lagoons (including water golf course water hazards) of the approximately 400 acres of the "Proposed Area", as defined in the draft EA, do not meet with the Corps definition of waters of the U.S (33 CFR 328.3a). As indicated in the draft EA or yourself, the lagoons are concrete-lined, approximately 10 ft deep, non-tidally influenced, and are replenished by brackish groundwater pumped from non-potable wells within the resort. Also noted, is the presence of an overflow outlet, located near the former Cliffs Restaurant, which drains lagoon overspill into Nawiliwili Harbor during very heavy rain events. Because the lagoons are isolated, non-navigable, intra-state waters that are not subject to the ebb and flow of the tide and are not presently used, or have been used in the past in interstate or foreign commerce, and would revert to uplands should source waters become inhibited, a DA permit is not required.

Please note that this jurisdictional determination does not excuse the applicant from complying with other federal, state, or county permits, certifications or requirements that may also be required. Should you have any questions regarding this project, please contact Ms. Lolly Silva at (808) 438-7023, by fax at (808) 438-4060, or by email at *Laurene.L.Silva@usace.army.mil* and reference the above file number in future correspondence regarding this project.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

6266-16
March 31, 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS

1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. George P. Young, P.E., Chief
Regulatory Branch
U.S. Army Corps of Engineers
Building 230 Regulatory Branch
Fort Shafter, Hawaii 96858-5440

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Mr. Young:

Thank you for your letter of January 31, 2006 (Ref.: File # POH-2006-35) indicating that the 35 acres of man-made lagoons within the Proposed Area do not meet with the Corps definition of waters of the U.S., and that a DA permit is not required.

We very much appreciate your time and effort in reviewing the subject environmental assessment.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
LAURA H. THIELEN
DIRECTOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

RECEIVED
MAR 17 2006
WILSON OKAMOTO CORPORATION

Ref. No. P-11285

March 9, 2006

Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Attention: Mr. Rodney Funakoshi
Project Manager

Dear Mr. Funakoshi:

Subject: Draft Environmental Assessment
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4)3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

We have reviewed the Draft Environmental Assessment for the Kauai Lagoons Resort which was prepared for the purpose of amending the land use and zoning boundaries for inland portions of the 700-acre property. The applicant proposes to provide lower density development, develop in remnant golf course areas, permit additional lagoon bungalow units, reconfigure the Mokihana and Kiele Golf Courses, and enable permanent multi-family housing. The total resort unit count, excluding the affordable housing units, will not be more than the 750 units already approved by the Kauai County Zoning Ordinance No. PM-2002-363.

The applicant will seek a State Land Use District Boundary Amendment for 15 acres of land within the existing Mokihana Golf Course from the State Agricultural District to the Urban District to allow for the development of 28 single family residential lots. This would be subject to approval by the Kauai Planning Commission and the Kauai County Council. The total Project Area will also require a County General Plan amendment and County Zoning Amendment. A 24-unit affordable housing site at the intersection of Haoa Street and Kapule Highway is referenced on page 2-3. The affordable housing requirements of the Kauai Lagoons Resort employees should be thoroughly discussed.

We note that there are four endangered water birds which inhabit the lagoons in the Project Area. To insure that the modification of the habitat within the Project Area does not result in the direct physical harm to nesting waterbirds, their nests, eggs or young, the birds will be surveyed immediately prior to the onset of construction.

The Project Area is adjacent to the Lihue Airport, and the proposed residential, condominium or hotel units will avoid areas within the 60 DNL aircraft noise contour. Sound attenuation will be required for units within the 60 to 65 DNL aircraft noise contours. Noise contour maps should be provided in the Final Environmental Assessment (EA).

The Draft EA states that a network of man-made lagoons encompassing 35 acres will be supplied by non-potable wells within the Kauai Lagoons Resort and monitored for water quality. These water features should be clearly shown on all maps showing both existing and proposed conditions.

Thank you for the opportunity to review the proposal. If you have any questions or concerns, please contact Lorene Maki of the Land Use Division at 587-2888.

Sincerely,

Laura H. Thielen
Director

c: Genevieve Salmonson, OEQC
Ian Costa, County of Kauai Planning Department
Ted Liu, DBEDT

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH (808)946-2277
FAX: (808)946-2253

6266-16
March 31, 2006

Ms. Laura H. Thielen, Director
State of Hawaii
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Ms. Thielen:

Thank you for your letter of March 9, 2006 (Ref. No. P-11285) regarding the subject Draft EA.

With regard to the affordable housing requirements for the proposed project, the Applicant will be developing a total of 106 affordable housing units in accordance with the project's affordable housing requirements set forth in Condition No. 6 of Zoning Ordinance No. PM-2002-363. This includes the development of an 82-unit affordable housing project located in Waipouli which received Zoning Permit approvals in October 2005, in addition to the proposed 24 affordable rental housing units to be located within the Kauai Lagoons Resort property. The employees of the Kauai Lagoons Resort that meet the qualification requirements as set forth in the development's Affordable Housing Agreement would be eligible for the subject affordable housing units.

Surveys for nesting listed waterbird species will be conducted in advance of construction activities for the proposed project. Any nests located will be protected and an adequate disturbance buffer erected around them.

The Lihue Airport noise contours are depicted on Figure 7a, Proposed Zoning map, in the Draft EA.

The existing lagoons within the Kauai Lagoons Resort will be clearly depicted on the existing and proposed conditions map in the Final EA.

We very much appreciate your time and effort in reviewing the subject environmental assessment.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

February 10, 2006

RECEIVED

Mr. Ian Costa, Director
Department of Planning
County of Kauai
Moikeha Building
4444 Rice Street, Suite A-473
Lihue, Hawaii 96766

Dear Mr. Costa:

Subject: Draft Environmental Assessment for Kauai Lagoons Resort, Lihue Kauai

The Department of Education (DOE) has reviewed the Draft Environmental Assessment (DEA) for the Kauai Lagoons Resort in Lihue, Kauai. Based on our review we believe that a total of 304 residential units is being developed. The DOE requests that Kauai County impose a school fair-share contribution on the project to help offset the costs the DOE will incur to provide school land and facilities to the project's future residents. The DOE notes that students living within the project would attend Wilcox Elementary School, which is already expected to exceed its facility capacity in 2009.

The DEA states that the project will not generate a significant impact on school enrollment because of the visitor orientation and second home nature of the residential units. However, studies in other resort developments in Hawaii indicate a significant percentage of year-round residents. While other initial homeowners will be part-time residents, there are indications that part-time residents enroll their children in public schools during their residency.

The DOE only has this one opportunity to request a school condition while the proposed residential units can be expected to house residents and their students for several generations. There is no certainty that the residents will be part-time residents or full-time residents, but it is certain that if they have children, the DOE must be prepared to provide them with a public education.

We ask Kauai County to impose a school fair-share contribution condition. The standard language for such a condition reads as follows:

> The Applicant shall contribute to the development, funding, and/or construction of school facilities, on a fair-share basis, as determined by and to the satisfaction of the Department of Education. Terms of the contribution shall be agreed upon in writing by the Applicant and the Department of Education prior to obtaining county subdivision or building permits (one or the other) for any area of development.

If you have any questions, please call Heidi Meeker of the Facilities Development Branch at 733-4862.

Very truly yours,

Patricia Hamamoto

Patricia Hamamoto
Superintendent

PH:jmb

c: Randolph Moore, Acting Assistant Superintendent, OBS
Duane Kashiwai, Facilities Development Branch
Daniel Hamada, CAS, Kapaa/Kauai/Waimea Complex Area
Genevieve Salmonson, OEQC
✓Ronald Funakoshi, Wilson Okamoto Corporation

6266-16
March 31, 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Ms. Patricia Hamamoto, Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Ms. Hamamoto:

Thank you for your letter of February 10, 2006 regarding the subject Draft EA.

With regard to the DOE's request for a school fair-share contribution condition, we wish to indicate that the Petition for State Land Use District Boundary Amendment, County General Plan Amendment, and County Zoning Amendment for the proposed project is intended to allow for a rearrangement of land uses within an already entitled project area. Additional density is not being sought through the subject Petition. In September 2002, the subject property received zoning amendment approval (Zoning Ordinance No. PM-2002-363) from the Kauai County Council which included a refinement of zoning designations. In August 2005, Kauai Lagoons Resort received Special Management Area Use Permit and other permit approvals from the Kauai Planning Commission to allow the development of 723 hotel/residential units, a new golf clubhouse, treatment spa, fitness center, retail and offices, associated off-street parking, public recreational facilities, and other amenities on its properties.

Through the subject Petition, Kauai Lagoons Resort is now seeking to provide a lower-density of development by distributing the planned resort residential units over a larger area, as well as reconfigure the Mokihana and Kiele Golf Courses and enable permanent multi-family housing. The total unit count of resort units (excluding the 24 affordable housing units to be located within the project) will remain within the 750-unit maximum density established by the September 2002 Zoning Ordinance No. PM-2002-363.

Based on the intent of the subject Petition, as well as the resort and second home nature of the development, the imposition of a school fair-share contribution condition does not appear to be warranted for the subject project.

We very much appreciate your time and effort in reviewing the subject environmental assessment.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

February 21, 2006

RECEIVED
WILSON OKAMOTO CORPORATION

Mr. Ian Costa, Director
Planning Department, County of Kaua'i
4444 Rice Street, Suite 473
Lihue, Hawaii 96766

Dear Mr. Costa:

Subject: Draft EA for the Kauai Lagoons Resort, Kaua'i

Thank you for the opportunity to review the subject document. We have the following comments.

1. Storm runoff during construction may significantly impact the nearby ocean water quality. Please provide specific details of the mitigation measures to minimize construction related runoff.

2. The state Department of Transportation operates Lihue Airport next to this project. Please coordinate with SDOT-Airports to ensure that the Resort project is compatible the airport operations.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Director

c: Wilson Okamoto
Kauai Lagoons

6266-16
March 31, 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Ms. Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Ms. Salmonson:

In response to your letter of February 21, 2006 regarding the subject Draft EA, we offer the following:

1. Potential water quality impacts to nearshore coastal waters during construction of the proposed project will be mitigated by adherence to State and County water quality regulations governing grading. Appropriate erosion and sediment controls will be instituted during project grading operations and construction site work activities in compliance with the County of Kauai's Grading Ordinance and the State Department of Health's (DOH) National Pollutant Discharge Elimination System (NPDES) Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices (BMPs) such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors, and sediment basins. The foregoing will be incorporated in the Final EA.

2. Previous discussions have been held with the State Department of Transportation (DOT) Airports Division with regard to the subject project. In addition, the DOT Airports Division is a consulted party in the subject Draft EA public review process.

We very much appreciate your time and effort in reviewing the subject environmental assessment.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD05/2141

February 17, 2006

RECEIVED
[illegible] CORPORATION

Rodney Funakoshi
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 702
Honolulu, HI 96826

RE: Draft Environmental Assessment for the Proposed Expansion of the Kauai Lagoons Resort, Līhu'e, Kaua'i, TMK (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173.

Dear Mr. Funakoshi,

The Office of Hawaiian Affairs (OHA) is in receipt of your January 17, 2006 request for comment on the above listed proposed project. OHA offers the following comments:

Our staff reminds the applicant of the obligation to provide shoreline access to the public, specifically for Native Hawaiian cultural practices. If access routes are temporarily blocked during construction activities, alternative routes must be provided.

Our staff also recommends that native flora be incorporated into the future landscaping plan. This will promote native ecosystems in the Līhu'e area and provide a favorable habitat for avian species.

OHA also asks that, In accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaii Administrative Rules, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

CC: La France Kapaka-Arboleda
OHA Community Affairs Coordinator (Kaua'i)
3-3100 Kuhio Hwy., Suite C4
Lihue, HI 96766-1153

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Ian Costa, Director
County of Kaua'i
Planning Department
4444 Rice Street, Suite 473
Līhu'e, Kaua'i

6266-16
March 31, 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. Clyde W. Nāmu'o, Administrator
State of Hawaii
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Mr. Nāmu'o:

Thank you for your letter of February 17, 2006 (Ref.: HRD05/2141) regarding the subject Draft EA.

Existing vehicular and pedestrian public access to the shoreline through the Kauai Lagoons Resort property will be maintained. Public shoreline access will be maintained and enhanced with the provision of 20 public beach parking stalls, public recreational shelters and picnic areas, and public restroom and shower facilities within the Kauai Lagoons Resort. Shoreline access paths are provided near the Kauai Marriott Resort and Beach Club, the former Inn on the Cliffs restaurant, and near Fashion Landing. A lateral shoreline pathway will also be developed between the Fashion Landing area and the former Inn on the Cliffs. Should public access routes be temporarily blocked during construction activities of the proposed project, alternative routes will be provided during the interim period.

Native flora will be incorporated into the landscaping of the proposed project.

In accordance with Section 6E-46.6, Hawaii Revised Statutes, and Chapter 13-300, Hawaii Administrative Rules, in the event that any archaeological sites, significant cultural deposits, or human skeletal remains are found during construction activities of the proposed project, all work will immediately cease pending consultation with the State Department of Land and Natural Resources (DLNR) Historic Preservation Division. The treatment of any remains or artifacts will be in accordance with procedures obtained by the Kauai/Niihau Islands Burial Council and the State DLNR Historic Preservation Division.

The foregoing additional discussion of impacts and mitigation will be incorporated in the Final EA.

We appreciate your participation in the environmental review process.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and
KD Kapule LLC

Department of
Water
County of Kaua'i

Water has no substitute.....Conserve it

March 2, 2006

RECEIVED
MAR 0 6 2006
WILSON OKAMOTO CORPORATION

Mr. Rodney Funakoshi
Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Funakoshi:

Subject: Draft Environmental Assessment, Kauai Lagoons Resort, Lihue, Kauai, Hawaii
TMK: 3-5-01:006, 027, 165, 168, 172 and 173

Any actual development or subdivision will be dependent on the adequacy of the source, storage, and transmission facilities existing at that time. The Department of Water (DOW) is concerned about the increase in water demand associated with the proposed development. At the present time, the existing source and storage facilities are at capacity and cannot handle the additional demands of the proposed development.

Prior to building permit or water meter approval for the proposed 750 unit development, the applicant shall be required to:

1. Submit detailed water demand calculations along with proposed water meter size. Water demand calculations should include fixture count and water meter sizing worksheets. These calculations shall include but not be limited to domestic, irrigation and other applicable water demands of this project, and the proposed water meter size. Previously, the applicant submitted water demand calculations for 706 units. The water demand calculations were not approved by the DOW, and were returned to the applicant for further revisions and corrections.

There are three existing water meters currently serving this area. A 4-inch water meter assigned to Kaua'i Development LLC and two 6-inch water meters assigned to the Marriott Hotel. If the existing water meters will be used to provide water service to this development:

- Water demand calculations will be required for the existing and proposed uses and shall include the existing and proposed unit counts as well as the domestic, irrigation and other demands.
- Written approval must be granted by the appropriate water meter consumer. This written approval must address who will utilize the available water capacity from the existing water meter(s) and the amount of available water capacity that will be allocated for use by others.
- It will be the applicants' responsibility to assure that the total capacity of the three existing water meters will be available to all existing and proposed developments, as identified in the water report study.
- The applicant shall provide a comprehensive map of the entire study area. Lot and parcel boundaries shall be clearly shown. The map shall identify the existing and proposed developments. Proposed and existing development identification shall coincide with the fixture count nomenclature.
- Adequate on-site fire protection shall be the responsibility of the developer.

4398 Pua Loke St., P.O. Box 1706, Lihue, HI 96766 Phone: 808-245-5400
Engineering and Fiscal Fax: 808-245-5813, Operations Fax: 808-245-5402, Administration Fax: 808-246-8628

- The Department's comments may change depending on the approved water demand calculations.

2. Prepare and receive DOW's approval of construction drawings for the necessary water system facilities and construct said facilities. These facilities shall include but not be limited to:
   a) The domestic service connection, if applicable.
   b) The fire service connection, if applicable.
   c) The interior plumbing plans with the appropriate backflow prevention device, if applicable.
   d) Additional source facilities for this area. The applicant may wait until others (including the DOW) construct additional source for this area. The DOW is in the process of obtaining additional source for this area. Grove Farm is constructing a Surface Water Treatment Plant, which will provide additional water capacity for the Līhu'e area. Upon completion of this SWTP and its trial period, the DOW will reassess our water situation in the Līhu'e area.
   e) Additional storage facilities for this area.
3. Pay the applicable charges in effect at the time payment is made to the Department. At the present time, these charges shall include:
   a) The Facilities Reserve Charge (FRC) of either $4,600 per unit or the FRC as determined by the approved water meter size, whichever amount is greater.

The applicant is made aware that applicable FRC liability shall be offset by up to 33% each where water source or water storage improvements are constructed and up to 50% where transmission mains are constructed; provided that the total amount of all offsets shall not exceed 100% of the applicant's FRC liability, and provided further that the offset for any source or storage improvements or transmission main shall not exceed the actual cost of the source or storage improvement or transmission main.

If you have any questions, please contact Mr. Keith Aoki at (808) 245-5418.

Sincerely,

Gregg Fujikawa
Chief of Water Resources and Planning

c: Genevieve Salmonson, SOH Office of Environmental Quality Control
Ian Costa, COK Planning Department

4398 Pua Loke St., P.O. Box 1706, Lihue, HI 96766 Phone: 808-245-5400
Engineering and Fiscal Fax: 808-245-5813, Operations Fax: 808-245-5402, Administration Fax: 808-246-8628

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

6266-16
March 31, 2006

Mr. Gregg Fujikawa, Chief
Water Resources and Planning
County of Kauai
Department of Water
P.O. Box 1706
Lihue, Hawaii 96766

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Mr. Fujikawa:

Thank you for your letter of March 2, 2006 regarding the subject Draft EA.

The Applicant acknowledges the Department of Water's (DOW) concern regarding the increase in water demand associated with the proposed development. A water study (January 2005) for the proposed project was prepared by the Applicant to determine the adequacy of the existing system and available capacity from the existing water meters and submitted to the DOW for review. Based on review by the DOW, a revised water study will be prepared which will address the comments provided by the DOW by letter dated August 3, 2005. On-going consultation with the DOW will be conducted by the Applicant to determine the adequacy and project requirements for meeting off-site source and storage needs for the proposed development.

The Applicant acknowledges that prior to building permit or water meter approval for the proposed Kauai Lagoons Resort development, the Applicant will:

1. Submit detailed water demand calculations along with proposed water meter size to the DOW.

2. Prepare and receive the DOW's approval of construction drawings for the necessary water system facilities and construct said facilities.

3. Pay the applicable charges in effect at the time payment is made to the DOW.

We appreciate your participation in the environmental review process.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and
KD Kapule LLC

Bryan J. Baptiste
Mayor

Robert Westerman
Fire Chief

COUNTY OF KAUAI
Fire Department
Mo'ikeha Building
4444 Rice Street, Suite 295
Lihu'e, Hawaii 96766

February 22, 2006

RECEIVED
FEB 2 2 2006
WILSON OKAMOTO CORPORATION

Wilson Okamoto Corporation
ATTN: Rodney Funakoshi
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Funakoshi:

The Kauai Fire Department would like to comment on the Kauai Lagoons Resort project situated on TMK: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173. The Proposed project shall comply with the 1997 Uniform Fire Code and all other county agency requirements.

The development of 750 units in the proposed area will have an impact on the existing Fire Station in the Lihue district.

We look forward in working with you in the construction phases on the project and if you have any questions please do not hesitate to call the Prevention Bureau at 808-241-6511.

Sincerely,

David Bukoski
Fire Prevention Captain

Approved:

Robert Westerman
Fire Chief

Cc: Genevieve Salmonson, Ian Costa.

6266-16
March 31. 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS

1907 S BERETANIA ST
SUITE 400
HONOLULU HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. Robert Westerman, Chief
County of Kauai
Fire Department
Moikeha Building
4444 Rice Street, Suite 295
Lihue, Hawaii 96766

Subject: Draft Environmental Assessment (EA)
Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Mr. Westerman:

Thank you for your letter of February 22, 2006 regarding the subject Draft EA. We acknowledge that the subject project will have an impact on the existing Lihue Fire Station in the Lihue district. Development of the proposed project will comply with the 1997 Uniform Fire Code and all other applicable County agency requirements.

We very much appreciate your time and effort in reviewing the subject environmental assessment.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC

M:\WOA\6266-16 Kauai Lagoons GP & Zoning\Draft EA\DEA Response Letters\Fire Dept.doc

BAYS
DEAVER
LUNG
ROSE
BABA
Attorneys at Law

10th Floor • Ali'i Place
1099 Alakea Street
Honolulu, Hawai'i 96813

P.O. Box 1760
Honolulu, Hawai'i 96806

Tel: (808) 523-9000
Fax: (808) 533-4184
E-mail: mail@legalhawaii.com
www.legalhawaii.com

A. Bernard Bays
Phillip L. Deaver
Harvey J. Lung
Crystal K. Rose
Karin L. Holma
Bruce D. Voss
Julia Kim Kane
Craig P. Wagnild

A Partnership of
Law Corporations

Amy M. Voss
Amara Harrell
Ryan H. Engle
Sharon E. Har
Michael C. Carroll
Ako Miyaki-Murphy
Jennifer R. Sugita
Shabana Stationwala
Joshua E. Treyve
Prairie A. Bly
Robert J. Martin, Jr.
Craig Y. Iha

February 22, 2006

RECEIVED
FEB 2 3 2006
WILSON OKAMOTO CORPORATION

County of Kauai Planning Department
4444 Rice Street, Suite 473
Lihue, Hawaii 96766

Attention: Bryan Mamaclay

Re: Draft Environmental Assessment, Kauai Lagoons Resort, Lihue, Kauai
TMK: (4) 3-5-01: 6, 27 (por.), 165, 168, 172 (por.) and 173

Dear Mr. Mamaclay:

HPTMI Hawaii, Inc., by and through its counsel, respectfully submits its letter of comment and concerns regarding the Draft Environmental Assessment ("Draft EA") for the proposed Kauai Lagoons Resort in Lihue, Kauai, submitted to the Office of Environmental Quality Control on or about January 23, 2006.

HPTMI Hawaii, Inc. is the owner of 356 residential hotel units and 23 commercial units in the hotel portion of the project commonly known as Kauai Marriott Resort (hereafter referred to as "the Hotel"). The Hotel is adjacent to the Kauai Lagoons project site, and the Hotel and its guests will be the ones most immediately and directly affected by the proposed Kauai Lagoons development's construction and operation. As detailed below, the Hotel has serious concerns about the Kauai Lagoons project's potential environmental impact on drainage, water quality, traffic and congestion, and the visitor experience for guests at the Hotel. The Hotel believes the Draft EA fails to adequately address the "significance criteria" required by HAR § 11-200-12, and that the Draft EA is incomplete and insufficient under HAR § 11-200-10.

1. Drainage—In January 2005, stormwaters flowing from and over the Kauai Lagoons property caused a catastrophic failure of the Hotel's storm drain system, resulting in huge sink holes, flooding of the Hotel ballroom and health club, and damages to cars and property. News media pictures showed cars literally swallowed up by sinkholes in the Hotel's parking lot. The Hotel was nearly shut down, and the damage has cost millions of dollars to repair. The Hotel is, therefore, justifiably concerned about any development that could potentially increase the volume and velocity of stormwater runoff at or around the Hotel and jeopardize public safety and the safety of the Hotel's guests. Just this week, stormwaters flowing

off the Kauai Lagoons golf course flooded the road around the Hotel, forcing a closure of the Hotel's porte cochere. Attached as Exhibit A please find pictures, taken February 20, 2006, showing flooding at and around the Hotel entrance caused by stormwater flowing off the Kauai Lagoons property.

The comments from the County of Kauai Department of Public Works, Engineering Division, dated May 5, 2005 and appended to the Draft EA, state: **"A drainage study needs to be made to evaluate the impacts of the increased storm runoffs from the proposed developments. Measures to keep flow rates and drainage patterns to predevelopment conditions are required. The proposed developments along the manmade lagoon are also susceptible to flooding. The flood elevation of the lagoon will need to be re-evaluated."** The Draft EA contains no such study, and proposes no mitigation measures to "keep flow rates and drainage patterns to pre-development conditions," as required by HAR § 11-200-10(G). On that basis alone, the Draft EA should be rejected.

Regarding drainage, the Draft EA contains a number of broad statements such as: "Drainage systems will be designed to accommodate the increased runoff without increasing off-site impacts." See page 3-19. However, the nature of those impacts, and how they will be addressed, is not documented anywhere in the Draft EA. Any EA for the project should provide an estimate of how much impervious surface currently exists, and compare that to an estimate of future impervious site conditions. Such estimates are particularly important, given that the Draft EA fails to include a detailed site plan showing exactly where all the single-family and multi-family units will be located; how exactly the golf courses will be reconfigured; and how the lagoons may be altered to accommodate the planned "bungalow units" on the banks of the lagoon.

Any EA should estimate the current rate and volume of stormwater produced by the site under different storm scenarios (e.g. a 10-year, 24-hour rain event), and compare it to the estimated future rate and volume of stormwater produced by the site when fully built out. It should document where additional runoff will occur, and whether the development will increase the velocity of such runoff, and specify what methods will be used to control that runoff. It should discuss how the increase in stormwater discharge could affect the morphology of Nawiliwili Stream, and any adjacent properties. Any EA must also specify which level of storm event will be controlled by the Kauai Lagoons' drainage system. Given the past problems, and the risks of property damage and personal injury to the Hotel and its guests, the Kauai Lagoons' drainage system must be constructed to control a 100-year rain event to pre-development levels or better.

Any EA should provide a drainage site plan for the project, showing the exact location and relative size of stormwater control facilities such as lagoons. In that regard, the Hotel understands that the Kauai Lagoons stormwater lagoons were never expanded as proposed in the original site plan from the 1980s, and that has affected the storm flow patterns and volumes flowing onto the Hotel property. Any EA should thus also address whether the existing Kauai Lagoons stormwater system actually provides sufficient runoff control, and if mitigation of the impacts of the currently unimproved lagoon is also necessary.

Any EA must also list the specific "best management practices" that will be used to prevent indirect impacts to offsite properties and waterways both during and after construction has been completed. For example, the list should consider the timing of construction (e.g. only during the dry season), temporary and permanent structural controls to protect the Hotel and its guests, and management practices such as irrigation.

Our final point and concern about the site's drainage is that the Draft EA does not provide an overlay of the specific proposed project site plan onto the FEMA Flood Insurance Rate Map ("FIRM"). It also appears that the existing lagoons on the property have not been reflected on the FEMA FIRM. If the lagoons serve as stormwater drainage facilities, then by definition they will have a 100-year floodplain that should be reflected as Zone A or AE on a FEMA FIRM. As such, it is clear that the potential flooding risks have not been appropriately addressed, and that the Draft EA does not comply with HAR§ 11-200-10(E) and (G) (requiring summary description of FEMA FIRM for affected environment and proposed mitigation measures).

2. Water Resources and Quality—The Hotel understands that the Nawiliwili Watershed is a Category 1 watershed, but the Draft EA makes no mention of that. In general, such a designation means that this watershed does not currently meet, or faces an imminent threat of not meeting, clean water and other natural resource goals.

The "Water Resources" section of the Draft EA does not discuss the potential indirect/secondary impacts to water quality caused by construction and development. According to the draft EA, water from the site will be discharged into Nawiliwili Stream, and ultimately into Nawiliwili Bay. The Draft EA does not discuss how construction activities may increase sediment loading into the bay, and how that sedimentation may affect aquatic life and recreational opportunities within the bay. As the Draft EA acknowledges, the coastal waters near the Kauai Lagoons property (and the Hotel) are designated by the State Department of Health as Class A waters, and "their use for recreational purposes and aesthetic enjoyment (must) be protected." While the Draft EA states vaguely that Best Management Practices will be used "pertaining to grading, grubbing, stockpiling, soil erosion, and sedimentation," those practices must be detailed with specificity to ensure that the nearshore waters will be protected.

Similarly, the Draft EA fails to discuss how landscaping and long-term operation of the site may increase annual nitrogen loading to Nawiliwili Stream and the bay. As required by HAR § 11-200-10, any EA should list specific mitigation measures for potential water quality impacts, such as the use of vegetated filter strips, covenants or other restrictions on fertilizer use, and irrigation practices. In addition, it should include a definitive water quality monitoring plan that is coordinated with the Department of Health and implemented before construction, during construction, and over the long term.

3. Traffic and Congestion—The traffic studies appended to the Draft EA focus almost exclusively on roads and intersections on the exterior of the proposed Kauai Lagoons project. The Draft EA contains no traffic counts, no projections, and no analysis of how traffic and congestion will be impacted on the existing Kalapaki Road. Kalapaki Road is a narrow, winding, two-way road that currently provides access to the Hotel and a number of residences overlooking Nawiliwili Bay. While the developer proposes to construct a new access to the Kauai Lagoons project from the Kapule Highway/Ninini Point Street intersection, Figure 1 to the September 2005 Supplemental Traffic Analysis shows that the new access road will dump all of its traffic onto Kalapaki Road near the Hotel, exacerbating the congestion in and around the entrance to the Hotel. Figure 1 also shows a substantial number of units built in that same immediate area, further adding to the congestion on Kalapaki Road.

Any EA must include a detailed analysis of traffic impacts on Kalapaki Road, and measures to mitigate the increased traffic and congestion. The Draft EA's suggestion that the developer can merely "provide adequate turning radii at all Project driveways to avoid or minimize traffic encroachments" is patently insufficient under HAR § 11-200-10.

Furthermore, the Draft EA's traffic study is inconsistent with the Draft EA's project schedule. The traffic analysis uses 2009 as the build-out year, see page 3-12 and Appendix D, while the project schedule on page 2-3 shows final building completion as 2015. If actual construction and occupancy will not be complete until 2015, any EA traffic analysis must account for the potential additional growth of surrounding areas in years 2009-2015.

4. Visitor Experience and the Economic Welfare of the Community—Under HAR 11-200-12(4), any EA must examine whether the proposed project will "substantially affect the economic welfare . . . of the community or State." For this project, the primary local "community" affected is the Hotel and its guests; other than the handful of residences overlooking Nawiliwili Bay, the Hotel and its guests are the only persons in the immediate vicinity of the project. For guests of the Hotel, one of the key elements of the "visitor experience" is the relatively quiet, peaceful nature of the environment in and around Kalapaki Beach. In surveys, guests cite that relative peace and solitude as one of the reasons why they return again and again to the Hotel.

However, the Draft EA contains no discussion whatsoever as to how the proposed project will affect the visitor experience and economic welfare of the Hotel. The Draft EA casually states that the project "will confer positive economic benefits in the local area." See Draft EA, page 7-1. That conclusory statement is not supported by any data or analysis. Any EA must show, with sufficient supporting data, how the project will help or hurt the economic welfare of the Hotel, and how the congestion and overcrowding discussed above will impact the Hotel, its facilities, guests, and employees. For example, it is not enough to merely say that the project will create "long-term employment opportunities," see page 7-1, if those "opportunities" come at the expense of the Hotel and its employees. Furthermore, the water quality issues discussed above directly impact the Hotel's visitor experience and economic welfare. Turbidity in the bay's waters, algal blooms from eutrophication from increased nitrogen inputs, and sedimentation pollution of sand quality could all have a devastating effect on the Hotel.

5. Other Deficiencies—The Draft EA contains numerous other substantive and technical deficiencies, including:

a. Cumulative impacts—The discussion of "cumulative impacts" required by HAR 10-200-12(8) is a mere three sentences on page 7-2. For a project covering 700 acres, containing 723 units, and spanning 10 years, there must be a more detailed analysis, discussing historic, current, and reasonably foreseeable future projects that may occur in the area.

b. Alternatives to proposed action—The "alternatives to proposed action" are covered in only two paragraphs on page 5-1. To make an informed comparison between the proposed action and the no-action alternative, the impacts of the no-action alternative should be discussed under each sub-section and compared directly to the proposed action.

c. Noxious weeds—The Draft EA does not discuss noxious weeds. Any EA must describe the amount of permanent and temporary land disturbance because such disturbance could facilitate the establishment and/or spread of noxious weeds. Mitigation measures should include a noxious weed control plan. See HRS Chapter 152.

d. Impact on native endangered species—The discussion of the impact on rare, threatened, or endangered species and their habitats on page 7-2 is plainly inadequate, and indeed appears to contradict the discussion of endangered avian species on page 3-7.

* * * * *

In sum, as drafted the Draft EA fails to provide the information required by HAR 11-200-10 and 12, and in its current form cannot be the basis for a negative declaration under HAR 11-200-9.

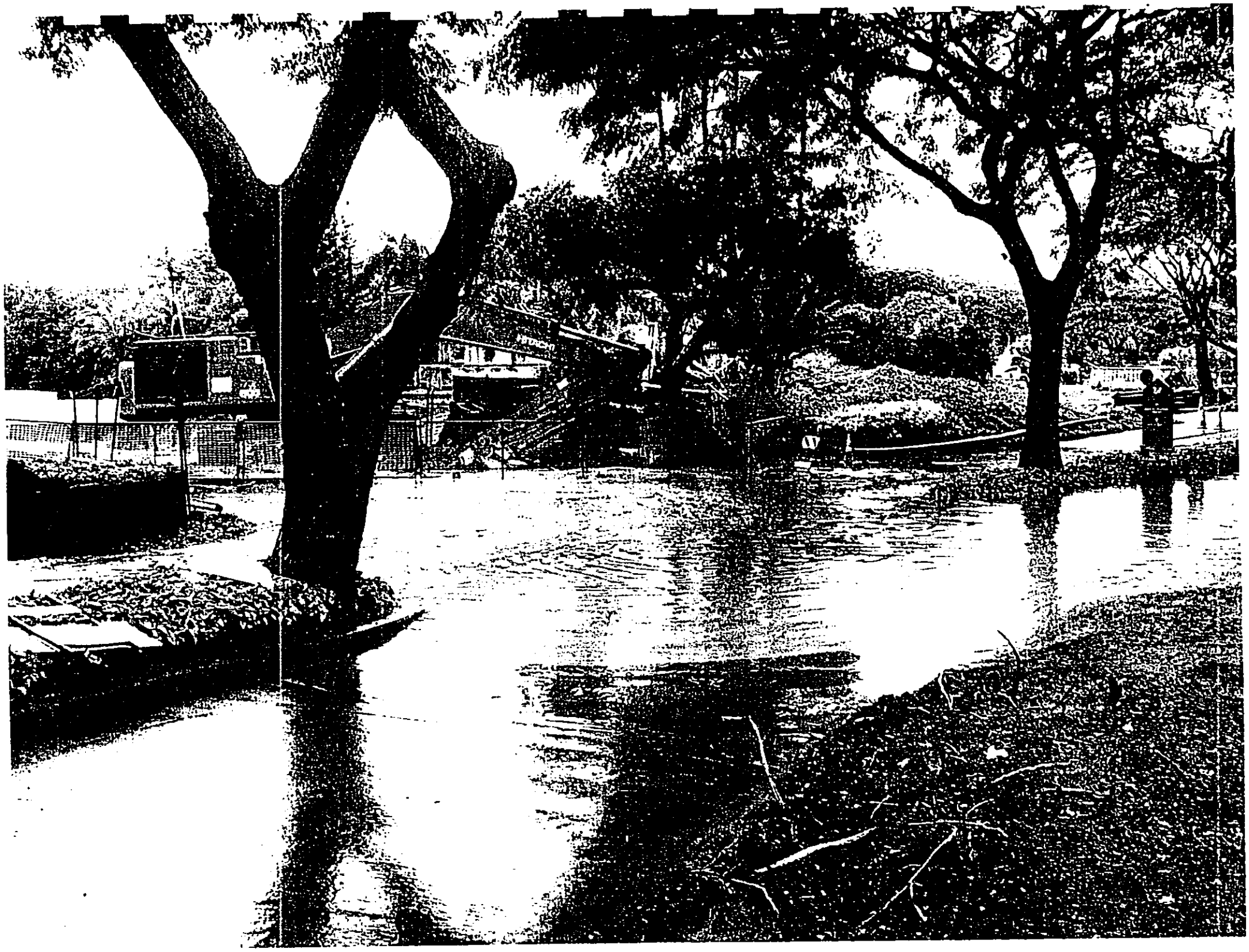
HPTMI Hawaii, Inc. appreciates the opportunity to comment on the Draft EA.

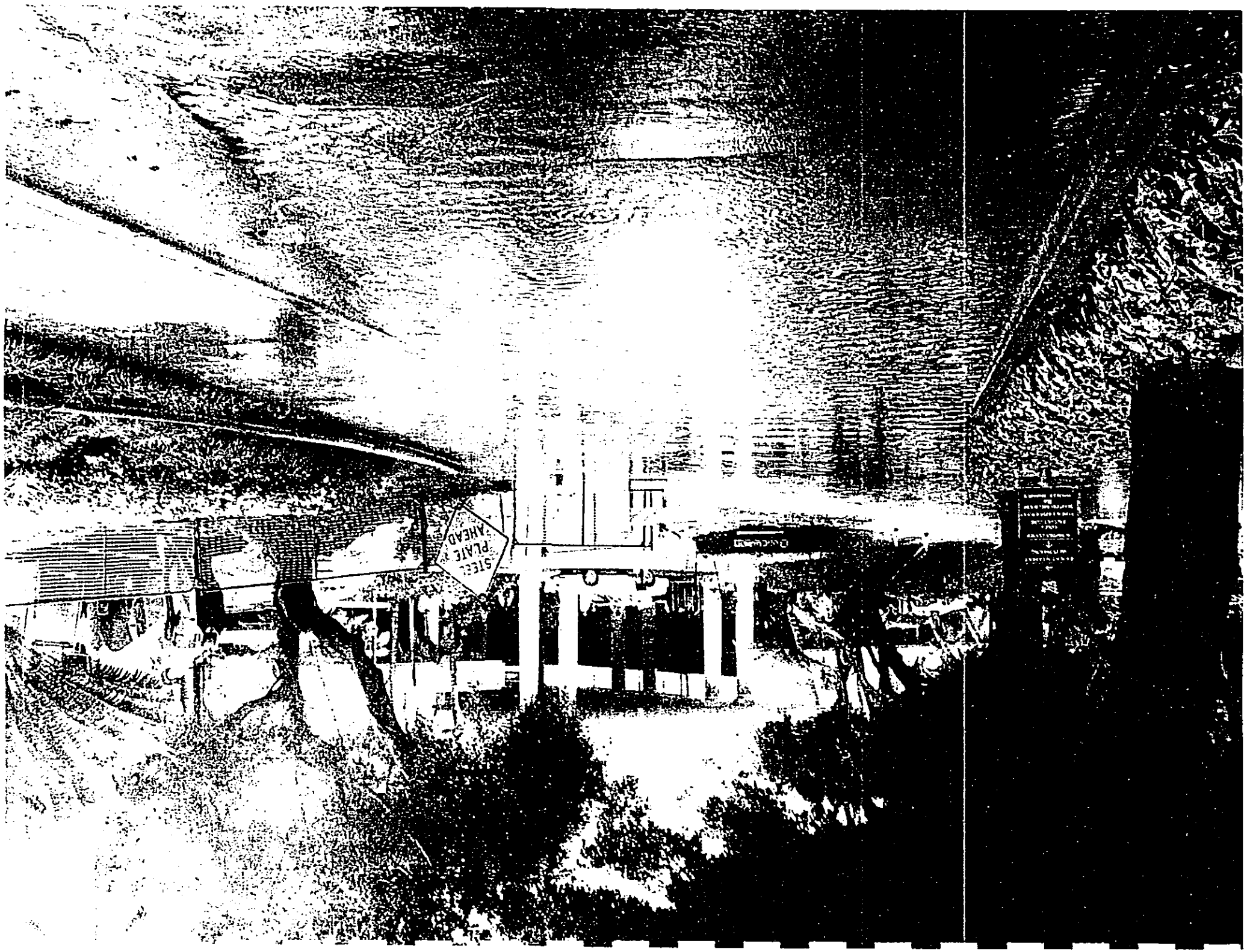
Very truly yours,

BAYS, DEAVER, LUNG, ROSE & BABA

By: Bruce D. Voss
Bruce D. Voss
Attorney at Law, A Law Corporation
Its General Partner

BDV:hc
Enclosures
cc: Office of Environmental Quality Control
Wilson Okamoto Corporation, Attn: Ronald Funakoshi, Consultant for Applicant




STEEL PLATE AHEAD

6266-16
March 31, 2006

WILSON
OKAMOTO
CORPORATION

ENGINEERS
PLANNERS
1907 S. BERETANIA ST.
SUITE 400
HONOLULU, HI 96826
PH. (808)946-2277
FAX: (808)946-2253

Mr. Bruce D. Voss
Bays, Deaver, Lung, Rose & Baba
Alii Place, 16th Floor
1099 Alakea Street
Honolulu, Hawaii 96813

Subject: Draft Environmental Assessment, Kauai Lagoons Resort
Lihue, Kauai, Hawaii
Tax Map Keys: 6, 27 (por.), 165, 168, 172 (por.), and 173

Dear Mr. Voss:

This is in response to your letter of February 22, 2006 regarding the subject Draft Environmental Assessment (EA). We strongly disagree with your remarks that the Draft EA is incomplete and insufficient under Hawaii Administrative Rules (HAR), §11-22-10. We believe the EA adequately addresses the significance criteria required by HAR §11-200-12, and that we have fully incorporated the content requirements of HAR §11-200-10.

Our responses to your numbered comments are as follows:

1. Drainage.

Your letter provides photos taken February 20, 2006 and states that flooding at and around the Hotel entrance was caused by stormwater flowing off the Kauai Lagoons Resort property. This flooding at the entrance, however, appears instead to be attributable to your present construction activities to replace the drain line for the Hotel's storm drain system. We understand from Kauai Lagoons personnel that sand bags were placed by your contractor covering the drain lines under the roadway which resulted in overtopping of the road and flooding of your entrance.

A drainage study for the proposed Kauai Lagoons Resort developments will be prepared and submitted to the County of Kauai Department of Public Works once the development plans are finalized. This drainage study is not required for the Draft EA. We note that the comments from the County Department of Public Works, Engineering Division dated May 5, 2005 were made in response to the Special Management Area Use Permit/Project Development Use Permit/Use Permit/Variance/Class IV Zoning Permit Application which subsequently received approval from the County Planning Commission on August 23, 2005. The drainage study will be based on a 100-year storm event or as otherwise required by the County of Kauai.

We note that the EA was prepared to support conceptual land use changes for a General Plan and Zoning Amendment. The proposed improvements from these changes will not adversely affect drainage patterns to your Hotel property. The

proposed improvements include residential lots in portions of the Kiele and Mokihana golf courses, and in the area of the former second hotel site near Kiele Hole Nos. 14 and 15. These areas do not drain towards your Hotel property.

Attached is a drainage map we have prepared showing the contours and direction of storm water flow from the proposed areas of development covered by the Draft EA. The map shows that the proposed development areas do not drain towards the Hotel. The proposed development areas instead drain to the lagoons or towards Nawiliwili Bay in the vicinity of Kiele Hole Nos. 14 and 15 to the east of the Hotel property. The proposed R-2 Residential District lot in the vicinity of Kiele Hole No. 2 will drain to the pond feature at Kiele Hole No. 8. The existing golf course parking will be relocated further inland to the vicinity of the existing golf driving range. This will reduce the amount of impermeable surface and runoff from the existing parking lot which is shared with and which drains towards the Hotel.

The proposed residential developments are buffered by the golf course landscaping and the resort lagoons which provide the needed mitigation for storm water runoff. As warranted, additional detention basins will be provided within the development lots or incorporated as part of the golf course. This will serve to keep flow rates and drainage patterns to pre-development conditions.

Potential water quality impacts to nearshore coastal waters during construction of the proposed project will be mitigated by adherence to State and County water quality regulations governing grading. Appropriate erosion and sediment controls will be instituted during project grading operations and construction site work activities in compliance with the County of Kauai's Grading Ordinance and the State Department of Health's National Pollutant Discharge Elimination system Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural Best Management Practices such as minimizing time of exposure between construction and replanting, retaining perimeter vegetation and landscaping, and implementing erosion control measures such as silt fences, graveled construction entrances, inlet protectors and sediment basins.

You indicated the need to provide an overlay of the specific proposed project site plan onto the Flood Insurance Rate Map, however, specific project site plans have not yet been developed for these areas. The existing lagoons were designed and remain primarily for aesthetic and recreation purposes and not as storm detention facilities. Drainage flows to the lagoons will be kept to a minimum.

As appropriate, the foregoing supplemental information will be included in the forthcoming Final EA.

2. Water Resources and Quality

The status of the Nawiliwili watershed as a Category 1 watershed will be indicated in the Final EA. We note, however, that the proposed developments covered by the Draft EA are situated on the eastern portion of the Kauai Lagoons Resort property and are located well to the east of the Nawiliwili watershed. The existing drainage discharge from the golf courses is near the mouth of Nawiliwili Stream and not to the watershed uplands.

As discussed in our response to drainage issues above, the proposed development areas covered by the EA do not drain towards the Hotel. The proposed development areas drain to the golf courses and lagoons or towards Nawiliwili Bay in the vicinity of Kiele Hole Nos. 14 and 15 to the east of the Hotel property. The proposed R-2 Residential District lot in the vicinity of Kiele Hole No. 2 will drain to the pond feature at Kiele Hole No. 8.

More specific discussion of proposed best management practices relative to construction and landscaping of the proposed Kauai Lagoons Resort development will be incorporated in the Final EA. A water quality monitoring plan will be implemented if required.

3. Traffic and Congestion

The traffic impact study is properly focused on the intersections connecting to public roadways and their associated project impacts. Traffic impact studies are not typically done on internal private roadways as the orientation is to the impacts on public roads and intersections. In view of your concerns, however, we have conducted a brief analysis of the capacity of Kalapaki Road. The analysis shows that the level of service on Kalapaki Road will remain well within the acceptable range with the inclusion of the proposed Kauai Lagoons Resort developments, and that traffic volumes will be well below half of the roadway capacity. Kalapaki Road is thus more than adequate to handle the proposed developments. We note that the Kapule Highway access has been provided to relieve traffic impacts from the existing singular access off Rice Street. This will allow much of the traffic from Kauai Lagoons Resort to bypass the main Hotel parking lot and porte cochere, as well as provide another outlet for Hotel guests headed to the north side of the island. Regarding the build-out year, a revision to the traffic assessment will be provided in the Final EA to reflect the revised development schedule.

4. Visitor Experience and Economic Welfare of the Community

As suggested, we will incorporate discussion of the proposed development's effects on the hotel and its guests in our Final EA. We believe there will be positive impacts to the visitor experience and economic welfare of the hotel. The proposed improvements include an expanded program of public shoreline access, including the provision of 20 public beach parking stalls, recreational shelters and picnic areas, and public restroom

and shower facilities. Pedestrian access will be provided along the lagoons and a new lateral shoreline pathway will be developed between the Fashion Landing area and the former Inn on the Cliffs. The commercial area will be restored providing additional spa, retail and dining opportunities.

5. Cumulative Impacts
Additional discussion of the cumulative impacts of the proposed project in consideration of future developments in the project area will be incorporated in the Final EA.

6. Alternatives to the Proposed Action
A discussion of impacts relative to the no-action alternative will be provided in the Final EA.

7. Noxious weeds
Nearly all of the project site will be landscaped. Weed control will be a part of the landscape maintenance program.

8. Impact on endangered species.
Additional discussion will be provided in Section 7 of the Final EA on the impacts to endangered species and associated mitigation measures.

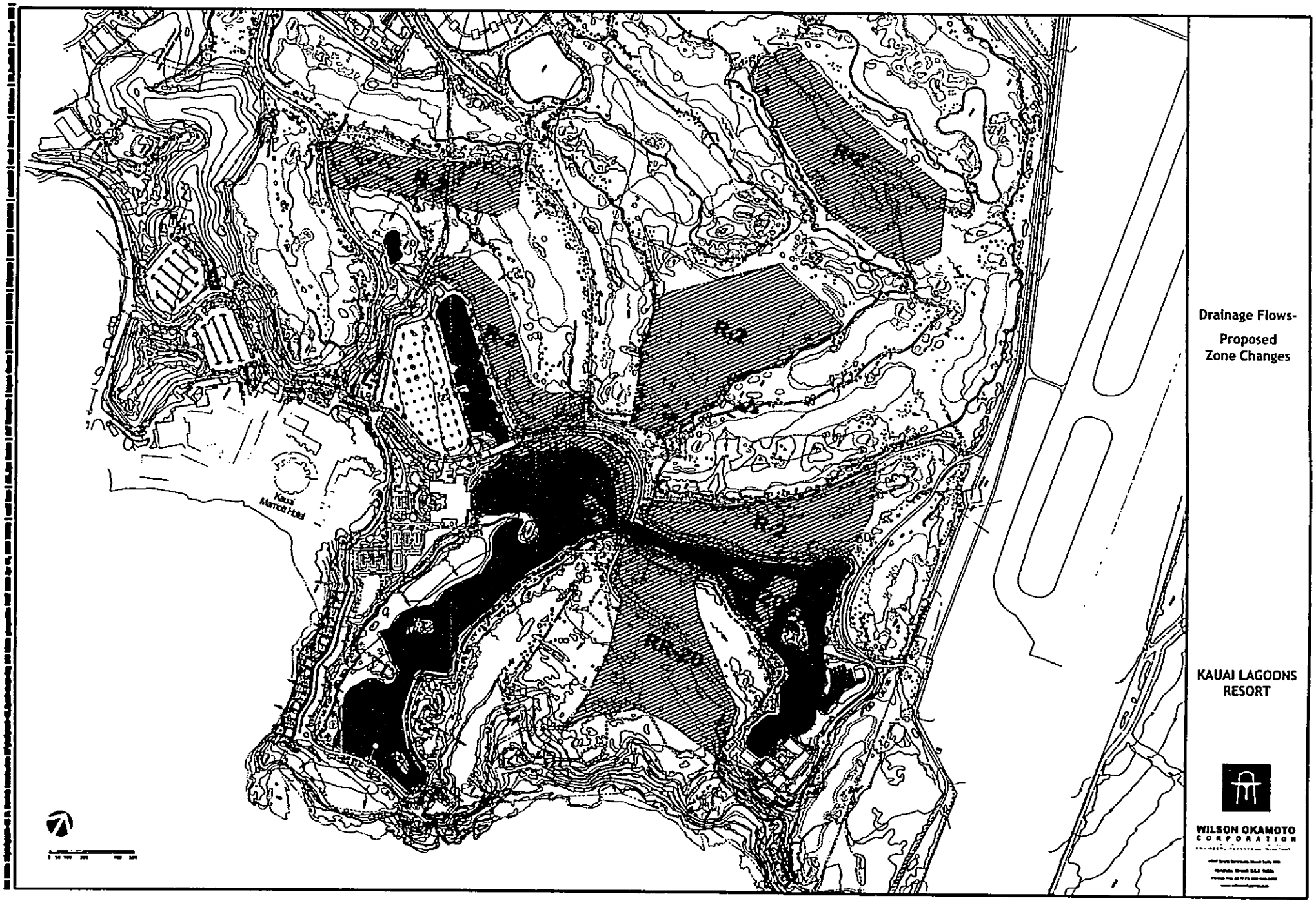
We appreciate your participation in the environmental review process.

Sincerely,

Rodney Funakoshi, AICP
Project Manager

Enclosure

cc: Mr. Ian Costa, County of Kauai Planning Department
Ms. Genevieve Salmonson, State Office of Environmental Quality Control
Mr. Kevin M. Showe, Kauai Lagoons LLC, KD Golf Ownership LLC, and KD Kapule LLC


R-2
R-2
R-2
R-2
R-20
Kauai Marriott Hotel
Drainage Flows-
Proposed
Zone Changes
KAUAI LAGOONS
RESORT
WILSON OKAMOTO
CORPORATION

Appendix A

Biological Surveys Within the
Kauai Lagoons Resort
Prepared by Rana Productions, Ltd.
October 31, 2005

Biological Surveys Within the Kaua'i Lagoons Resort, Lihue District, Island of Kaua'i.

Prepared for:

Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Prepared by:

Reginald E. David
Rana Productions, Ltd.
P.O. Box 1371
Kailua-Kona, Hawai'i 96745

October 31, 2005

Table of Contents

Figures & Tables

Introduction

The Kaua'i Lagoons Resort Co., Ltd. is pursuing land use amendments to lower planned densities and distribute the allowable resort residential units over portions of the Mokihana and Kiele Golf Courses and other open areas and reconfigure the golf holes as needed. An affordable housing site will also be rezoned at the west end of the property. Up to 300+ acres could be involved in the proposed revised plan, the exact acreage involved will depend somewhat on the extent of golf course reconfiguration. This report summarizes the findings of botanical, ornithological and mammalian surveys conducted on the subject property. Fieldwork was conducted on September 7th, 8th and October 13th and 14th, 2005.

A primary goal of the surveys was to determine if there were any Federal or State of Hawai'i listed endangered, threatened, proposed, or candidate avian, mammalian or botanical resources on, or in the immediate vicinity of the petition area. Federal and State of Hawai'i listed species status follows species identified in the following referenced documents (Department of Natural Land and Resources (DLNR) 1998, Federal Register, 1999a, 1999b, 2001, 2002, 2004).

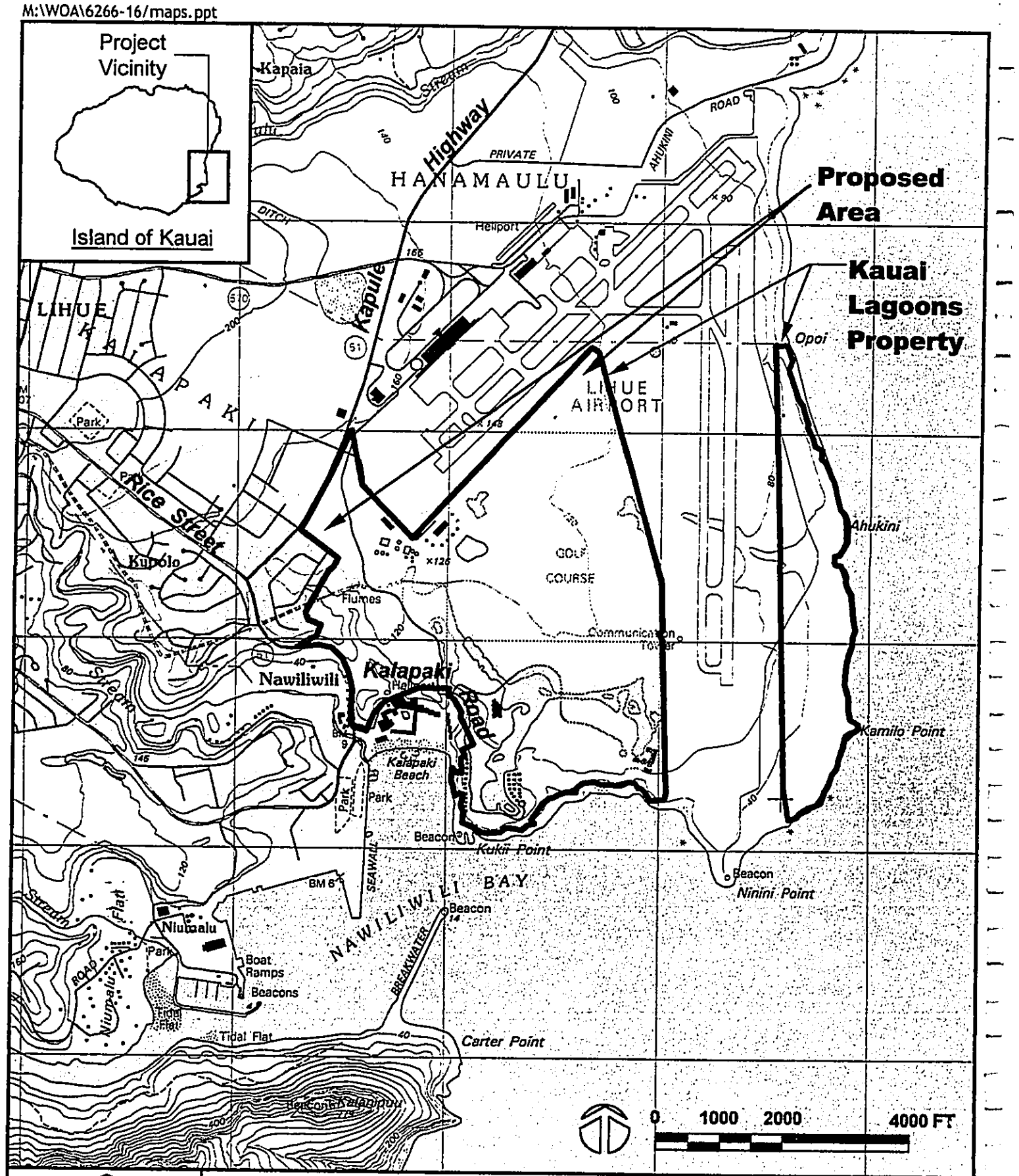
The avian phylogenetic order and nomenclature used in this report follows *The American Ornithologists' Union Check-list of North American Birds 7th Edition* (American Ornithologists' Union 1998), and the 42nd through the 46th supplements to *Check-list of North American Birds* (American Ornithologists' Union 2000; Banks et al. 2002, 2003, 2004, 2005). Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986). Higher native and naturalized plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner et al. and Wagner and Herbst, 1990, 1999). Landscape plant names follow *A Tropical Garden Flora: Plants Cultivated in the Hawaiian Islands and Other Tropical Places* (Staples and Herbst 2005). Place names follow *Place Names of Hawaii* (Pukui et al. 1976).

Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document which may be unfamiliar to the reader are included at the end of the narrative text on page 14.

General Site Descriptions

The petition area encompasses some 300-acres of land associated with the Kaua'i Lagoons Resort. The bulk of these lands have already been developed as part of the Mokihana and Kiele Golf Courses and associated infrastructure improvements. There is an approximately 71-acre undeveloped triangular lot at the northern end of the property which was formerly used by the Westin Kaua'i Resort as a landscape plant nursery, green waste dump and pasturage for their Clydesdale horses. This lot is now overgrown, though the green waste dump is still being actively used by the resort (Figure 1).

M:\WOA\6266-16/maps.ppt



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT Location Map	FIGURE 1

The site is bound to the north and east by the Lihu'e International Airport runways, and to the south by the Kaua'i Marriott Resort and Beach Club. The habitat present within the petition area can be divided into three rough habitat types or vegetation associations:

- Golf Course - The bulk of the site is made up of portions of two highly manicured resort golf courses and associated paved areas.
- Landscaped Resort - The lands immediately to the south of the golf courses are landscaped resort areas, the bulk of which are highly manicured, though there is a small portion of the property along the southern shoreline which is less well maintained, mainly just kept as an open space between the Resort and the ocean.
- Overgrown Pasture and Tree Nursery - An approximately 71-acre lot at the northern apex of the site is overgrown primarily with alien grasses and ornamental trees from the former nursery.

Mammalian Survey Methods

All observations of mammalian species were of an incidental nature. With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or *'ōpe'ape'a* as it is known locally, all terrestrial mammals currently found on the Island of Kaua'i are alien species, and most are ubiquitous. Two hours were spent within the project area on the evenings of September 7th and October 13th, 2005, and again in the early morning hours of September 8th and October 14th, 2005 in an attempt to detect Hawaiian hoary bats. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal signs. A running tally was kept of all vertebrate species observed and heard within the study area.

Mammalian Survey Results

I did not see a single mammalian species within the site. Scat and sign of both dog (*Canis f. familiaris*) and cat (*Felis catus*) was encountered at several locations within the study area. Scat and sign of horse (*Equus c. caballus*) was encountered in the approximately71-acre triangular plot at the north end of the study area, it appeared to be quite old. This area was originally used as a pasture for the Clydesdale horses which were formerly used to pull carriages around the Westin Kaua'i Resort.

No endangered Hawaiian hoary bats were detected during the course of this study. No mammalian species currently listed, or proposed for listing under either federal or State of Hawai'i endangered species statutes were recorded during the survey.

Avian Survey Methods

Nine avian count stations were established within the three major habitats found within the petition area. Eight-minute point counts were made at each station. Stations were each counted once. Field observations were made with the aid of Leitz© 10 X 42 binoculars

and by listening for vocalizations. Counts were concentrated between 07:00 a.m. and 10:00 a.m., the peak of daily bird activity.

Additionally, two hours were spent within the project area on the evenings of the September 7th, 8th and again on October 13th and in the early morning hours of the 8th of September 2005 in an attempt to detect nocturnally flying seabirds over-flying the project site. Time not spent counting was used to search the area for species and habitats not detected during count sessions.

Avian Survey Results

A total of 460 individual birds of 20 species, representing 15 separate families, were recorded during station counts (Table 1). Six of which are native species, and four of these, Hawaiian Goose (*Branta sandvicensis*), or Nēnē, Hawaiian Duck (*Anas wyvilliana*), or *Koloa mapū*, Common Moorhen (*Gallinula chloropus sandvicensis*), or *'Alae 'ula*, and Hawaiian Coot (*Fulica alai*), or *'Alae ke 'oke 'o* are listed as endangered species under both the Federal and State of Hawai'i endangered species statutes (Table 1). The other 14 species detected are considered to be alien species, all are commonly encountered in the low to mid elevation areas on the Island of Kaua'i.

Avian diversity was relatively low, though densities recorded for several species were high. Four species, House Finch (*Carpodacus mexicanus frontalis*), Japanese White-eye (*Zosterops japonicus*), Western Meadowlark (*Sturnella neglecta*), and Chestnut Munia (*Lonchura atricapilla*) accounted for slightly more than 55% of the total number of all birds recorded during station counts. The most common avian species recorded was the House Finch, which accounted for 23% of the total number of individual birds recorded. An average of 51 birds were detected per station count. No additional species were recorded flying over the project area during the course of crepuscular and nocturnal visits to the site.

Botanical Survey Methods

I conducted a reconnaissance level botanical survey of the property while conducting the more structured faunal surveys. The principal goal of the botanical survey was to characterize the vegetation present within the petition area and to determine if the vegetation present warranted a more in depth botanical survey given the highly developed nature of the bulk of the petition area.

Botanical Survey Results

As previously mentioned the petition area can be divided into three rough habitat types or vegetation associations:

Table 1. Avian Species Detected, Kaua'i Lagoons Resort			
Common Name	*Scientific Name*	*ST*	*RA*
	ANSERIFORMES		
	ANATIDAE - Ducks, Geese & Swans		
	Anserinae - Geese & Swans		
Hawaiian Goose	*Branta sandvicensis*	EE	3.22
	Anatinae -True Ducks		
Hawaiian Duck	*Anas wyvilliana*	EE	3.44
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	Phasianinae - Pheasants & Allies		
Red Junglefowl	*Gallus gallus*	A	4.22
Ring-necked Pheasant	*Phasianus colchicus*	A	0.11
	CICONIIFORMES		
	ARDEIDAE - Herons, Bitterns & Allies		
Cattle Egret	*Bubulcus ibis*	A	0.67
Black-crowned Night-Heron	*Nycticorax nycticorax hoactli*	IR	0.11
	GRUIFORMES		
	RALLIDAE - Rails & Allies		
Common Moorhen	*Gallinula chloropus sandvicensis*	EE	0.22
Hawaiian Coot	*Fulica alai*	EE	0.44
	CHARADRIIFORMES		
	CHARADRIIDAE - Lapwings & Plovers		
	Charadriinae - Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	1.56
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Spotted Dove	*Streptopelia chinensis*	A	1.44
Zebra Dove	*Geopelia striata*	A	1.67
	PASSERIFORMES		
	TURDIDAE - Thushes		
White-rumped Shama	*Copsychus malabaricus*	A	1.00
	ZOSTEROPIDAE - White-Eyes		
Japanese White-eye	*Zosterops japonicus*	A	6.22

Common Name	*Scientific Name*	*ST*	*RA*
	MIMIDAE - Mockingbirds & Thrushes		
Northern Mockingbird	*Mimus polyglottos*	A	0.22
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*	A	2.78
	EMBERIZIDAE - Emberizids		
Red-crested Cardinal	*Paroaria coronata*	A	0.33
	CARDINALIDAE - Cardinals Saltators & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	1.33
	ICTERIDAE - Blackbirds		
Western Meadowlark	*Sturnella neglecta*	A	4.78
	FRINGILLIDAE - Fringilline And Cardueline Finches & Allies		
	Carduelinae - Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	12.00
	ESTRILDIDAE - Estrildid Finches		
	Estrildinae - Estrildine Finches		
Chestnut Munia	*Lonchura atricapilla*	A	5.33

Key to Table 1.

ST Status
EE Endangered Endemic Species
IR Indigenous Resident Species
IM Indigenous Migratory Species
A Alien species
RA Relative Abundance: Number of birds detected divided by the number of count stations (9)

Botanical Survey Results cont.

Golf Courses. These are highly manicured resort quality courses dominated by alien turf grasses, and various ornamental landscape plants including, numerous fig trees (*Ficus sp.*), silk oak (*Grevillea robusta*), ironwood (*Casuarina equisetifolia*), African tulip (*Spathodea campanulata*), coconut (*Cocos nucifera*), monkey pod (*Samanea saman*), *hau* (*Hibiscus tiliaceus*) Royal poinciana (*Delonix regia*), Manila palm (*Veitchia merrillii*), sago palm (*Cycas* sp.), plumeria (*Plumeria* sp.), bouganvillea (*Bouganvillea* sp.), and various ornamental palms. There is very little ground cover other than turf grass, though the more common ruderal weedy species are present between some of the paved cart paths and the vegetation separating the golf courses from the Resort areas. The bulk of this habitat is

heavily manicured and the vegetation along the borders of the golf course and golf cart paths are maintained with herbicides and mechanical means.

Landscaped Resort Vegetation. The areas between the golf courses and the Kaua'i Marriott Resort and Beach Club buildings is heavily landscaped, and the landscaping is clearly very well maintained. All of the species seen within the golf course areas were seen within this habitat, along with many species more commonly used in resort and residential landscaping including, several species of heliconia (*Heliconia* sp.), white ginger (*Hedychium cornorarium*), yellow ginger (*Hedychium flavescens*), *kahili* ginger (*Hedychium gardnerianum*), Cook pine (*Arauaria columnaris*), Octopus tree (*Sheffelera actinophylla*), mango (*Mangifera indica*), banana (*Musa x paradisiaca*), avocado (*Persea americana*), papaya (*Carica papaya*), mock orange (*Philadelphus* sp.), croton (*Codiaeum* sp.), spider lilly (*Hymenocallis* sp.), yellow oleander (*Cascabela thevetia*), *naupaka* (*Scaevola sericea*), and large areas of wedelia (*Sphagneticola trilobata*). Within the less well tended area between the old brew pub and the ocean the dominant vegetation is Guinea grass (*Panicum maximum*), with a scattering of African tulip trees and Cook pines.

Overgrown Pasture and Tree Nursery. Almost the entire northern three-quarters of this 71-acres parcel is dominated by Guinea grass with scattered castor bean (*Ricinus communis*), lanatana (*Lantana camara*), and *koa haole* (*Leucaena leucocephala*). The south eastern corner of this parcel has an active green waste dump on it, and the area has been repeatedly bulldozed. The area between the green waste dump and the western boundary of this parcel has an abandoned tree nursery, a small gray water overflow sump and fairly dense vegetation between that and the airport boundary fence. Within the former nursery there are numerous coconut, monkey pod, and royal poinciana trees. The vegetation between the former nursery and airport fence is made up of a mélange of grasses including, Guinea grass, California grass (*Brachiaria mutica*), wiregrass (*Eleusine indica*), swollen fingergrass (*Chloris barbata*), bufflegrass (*Cenchrus ciliaris*), Bermuda grass (*Cynodon dactylon*), dropseed grass (*Sporobolus indicus*), molasses grass (*Melinus minutiflora*), and Natal redtop (*Rhynchelytrum repens*). There are also numerous weedy herbaceous species present including, creeping indigo (*Indigofera hendecaphylla*), Spanish needle (*Bidens pilosa*), and garden spurge (*Chamaesyce hirta*). There are several stands of Christmas berry (*Schinus terebinthefolius*), scrambled egg bush (Senna surrattenis), silk oak, and fig trees. In addition there are scattered, *koa haole*, sourbush (*Pluchea carolinensis*), and a few guava (*Psidium guajava*) bushes.

Discussion

Mammalian Resources

The findings of the mammalian survey are consistent with the results of other recent faunal surveys conducted within the general project area in the recent past (David 1999, 2001, 2003), and with similar surveys conducted in the lowland areas in the Līhu'e –

Kapa'a Area (David 2002, 2004). Although no Hawaiian hoary bats were detected foraging above the site it is likely that this endangered species forages for insects over the project area. Hawaiian hoary bats are regularly seen in and around the Nāwiliwili and Lihue areas, as well as within most of the lowland areas on the Island of Kaua'i (Tomich, 1986; David, 1995, 2001, 2003, Day et al. 2001a, 2001b).

Unlike nocturnally flying seabirds, which often collide with man-made structures, bats are uniquely adapted to avoid collision with obstacles, man-made or natural. They navigate and locate their prey primarily by using ultrasonic echolocation, which is sensitive enough to allow them to locate and capture small volant insects during crepuscular and nocturnal hours.

Although no rodents were detected during the course of this survey, it is likely that roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use resources within the general project area. All of these introduced rodents are deleterious to remaining native ecosystems and the native floral and faunal species that are dependant on them for their survival.

Avian Resources

The findings of the avian survey are consistent with the findings of other recent surveys conducted within close proximity of this project site (David 1999, 2001, 2003), and within other alien species dominated habitats in other lowland areas on Kaua'i in the past five years (David, 1995, 2001, 2003, Day et al. 2001a, 2001b).

Six native avian species were detected during the course of this survey, four of these, Hawaiian Goose, Hawaiian Duck, Common Moorhen, and Hawaiian Coot, are listed as endangered species under both Federal and State of Hawaii endangered species statutes. There are well known concentrations of geese, coots and moorhen associated with the water features within the Kaua'i Marriott Resort and Beach Club. All four species also use resources within the Kaua'i Lagoons Resort golf courses. They also use resources in almost any area within the general vicinity that contains standing water, no matter how ephemerally. The other two native species recorded were, Black-crowned Night-Heron (*Nycticorax nycticorax hactli*), or *'Auku'u*, and Pacific Golden-Plover (*Pluvialis fulva*), or *Kōlea*, the first of which is a common resident indigenous heron, and the second an indigenous migratory shorebird species that nests in the high Arctic, returning to Hawaii and the tropical Pacific during the winter months.

Although not recorded during the course of this survey it is likely that Short-eared Owls (*Asio flammeus sandwichensis*), or *Pueo*, forage over the project site at times, as they are regularly seen within the open lowland areas on the Island of Kaua'i and are regularly seen

over the Kaua'i International Airport grounds, immediately adjacent to the subject property.

Although not detected during this survey it is likely that the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), or *U'au*, and the threatened endemic sub-species of the Newell's Shearwater (*Puffinus auricularis newelli*), or *'A'o*, over-fly over the petition area between April and the end of November each year. Both species have been well documented crossing the northern, eastern and southern coastline of Kaua'i across a broad front and in relatively large numbers during the breeding season (Cooper and Day, 1995, 1998, Day and Cooper 1997, 1999, 2001 Day et al. 2000, 2001a, 2001b, 2003, David et al., 2002; Morgan et al. 2003, 2004).

Both species of seabirds, especially fledging birds, can become disoriented by exterior lighting on their way to sea in the Fall. When disoriented, these seabirds often collide with manmade and naturally occurring physical features. If the downed birds are not killed outright, the dazed and/or injured birds become easy targets of opportunity for feral mammals (Reed et al., 1985, Telfer et al. 1987). The primary cause of mortality in both these species is thought to be predation by alien mammalian species at the nesting colonies (Ainley et al. 2001, Cooper and Day 1995, 1998; Day and Cooper 1997, Hue et al. 2001). There are no nesting colonies nor appropriate nesting habitat for either seabird species within or close to the petition area. The closest Newell's Shearwater colonies are located at Kāluahonu some nine-kilometers west-south-west of the study area, and one above Kalāheo, some 17-kilometers west of the petition area. The Kāluahonu colony may no longer be active, due to major habitat changes caused by invasive alien plant species (David et al. 2002, David 2003).

Botanical Resources

The vegetation present within the petition area is almost totally alien, most of it is currently being maintained as either golf course greens or resort landscaping. The one area that is not currently being managed is within the roughly 71-acre triangular site which forms the northern apex of the petition area. This area is overgrown with an eclectic mix of alien grasses, weedy species and abandoned landscaping trees, and a green waste disposal site.

Potential Impacts to Protected Species

Waterbirds

The modification of habitat within the petition area poses potential direct impacts to four listed avian species, Hawaiian Goose, Hawaiian Duck, Common Moorhen, and Hawaiian Coot. All four species are opportunistic, and though listed as endangered, are relatively widespread within the lowland areas of the Island of Kaua'i that support wetlands, or man-made water features such as ponds, wastewater ponds, irrigation canals and the like.

The principal threats posed to these species by the modification of the habitat present within the petition area, falls into two major categories:

- The inadvertent destruction of nests, eggs or chicks during construction activities.
- The temporary disturbance of non-nesting birds as a result of construction activity.

The former is the more significant threat, since if birds, their nests, or eggs are harmed or destroyed, that action would represent a take under Section 9 of the Endangered species act of 1973, as amended. It is not currently known if any of the listed species under discussion actually nest within the petition area.

It is likely that the activity associated with the modification of the habitat within the petition area will temporarily disturb avian species including the four endangered species known from within the site. This disturbance will be of a temporary basis, and there is adequate like habitat within the general project vicinity into which the waterbirds would likely move, if sufficiently disturbed by construction activity.

Seabirds

The proposed action also poses a potential secondary threat to two listed pelagic seabird species, Hawaiian Petrel, and Newell's Shearwater, both of which regularly over-fly the petition area between April and the end of November each year, As previously discussed, both species are at risk of being downed by interactions with unshielded lighting and collisions with man-made structures when disoriented by lights. Both species have regularly been recovered from within the Kaua'i Marriott Resort and Beach Club facilities by the Save our Shearwater program.

Flora

There is nothing botanically significant within the petition area. The proposed modification of the existing habitat is not expected to have a deleterious impact on any native listed or rare plant species.

Recommendations

Waterbirds

To assure that the modification of the habitat within the petition area does not result in direct physical harm to nesting waterbirds, their nest, eggs, or young, it is recommended that in areas that may support nesting geese, coots and ducks that those areas be surveyed immediately prior to the onset of construction activity to ensure that no active nesting activity is underway in those areas.

Seabirds

To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, it is recommended that any external lighting planned to be used during construction, that might be planned for the development be shielded (Reed et al. 1985, Telfer et al. 1987).

Glossary:

Alien – Introduced to Hawai'i by humans.
Crepuscular – Twilight hours either in the evening or the morning.
Endemic – Native and unique to the Hawaiian Islands.
Endangered – Listed and protected under the ESA as an endangered species.
Indigenous - Native to Hawai'i, but also found elsewhere naturally.
Nocturnal – Night-time, after dark.
Ruderal – Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles.
Volant – Flying, capable of flight - as in flying insect.
Threatened – Listed and protected under the ESA as a threatened species.

DLNR – Hawaii State Department of Land & Natural resources.
ESA – Federal Endangered Species Act of 1973, as amended.

Literature Cited:

Ainley, D. G, R. Podolsky, L. Deforest, G. Spencer, and N. Nur. 2001. The Status and Population Trends of the Newell's Shearwater on Kaua'i: Insights from Modeling, *in*: Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna.* Studies in Avian Biology No. 22: Cooper's Ornithological Society, Allen Press, Lawrence, Kansas. (Pg. 108-123).

American Ornithologist's Union. 1998. *Check-list of North American Birds.* 7th edition. AOU. Washington D.C. 829pp.

_____. 2000. Forty-second supplement to the American Ornithologist's Union *Check-list of North American Birds.* Auk 117:847-858.

Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2002. Forty-third supplement to the American Ornithologist's Union *Check-list of North American Birds.* Auk 119:897-906.

_____. 2003 Forty-fourth supplement to the American Ornithologist's Union *Check-list of North American Birds.* Auk 120:923-931.

_____. 2004 Forty-fifth supplement to the American Ornithologist's Union *Check-list of North American Birds.* Auk 121:985-995.

_____. 2005 Forty-sixth supplement to the American Ornithologist's Union Check-list of North American Birds. Auk 122:1026-1031.

Cooper, B. A and R. H. Day. 1995. Kauai endangered seabird study. Volume 1: Interactions of Dark-rumped Petrels and Newell's Shearwaters with utility structures on Kauai, Hawaii: Final Report, TR-105847-V1, Electric Power Research Institute, Palo Alto, California.

_____. 1998. Summer Behavior and Mortality of Dark-rumped Petrels and Newell's Shearwaters at Power Lines on Kauai. Colonial Waterbirds, 21 (1): 11-19.

David, R. E. 1995. Faunal Survey for the Princeville Master Plan Environmental Impact Statement, Hanalei District, Island of Kaua'i, Hawaii. Prepared for Group 70 & The Princeville Corporation.

_____. 1999. A Survey of Terrestrial Vertebrates for the Proposed Lihu'e Airport Expansion, Lihu'e, Island of Kaua'i, Hawai'i. Prepared for Wilson Okamoto & Associates and the State of Hawai'i Airports Division.

_____. 2001. A Survey of Avian and Terrestrial Mammalian Species Ocean Bay Plantation at Hanama'ula Master Plan, Lihu'e, District, Island of Kaua'i. Prepared for: Group 70 International, Inc. & EWM Kauai, LLC.

_____. 2002. A Survey of Avian and Terrestrial Mammalian Species Conducted for the Kapa'a to Keālia Bike and Pedestrian Path Kawaihau District, Kaua'i. Prepared for SSFM Engineers International and the County of Kaua'i.

David, R. E. 2003a. A Survey of Avian and Terrestrial Mammalian Species for the Kapa'a Bypass Road, Kuhio Highway, Kapa'a to Hanamaula, Island of Kaua'i, Hawai'i. Prepared for Kimura International and the Hawai'i Department of Transportation (HDOT).

_____. 2003b. Results of a Survey of the Newell's Shearwater Colony at Kaluahonu, Island of Kaua'i, Hawai'i, July 2003. Prepared for Planning Solutions, Inc., and Kaua'i Island Utility Cooperative.

_____. 2004. A Survey of Avian and Terrestrial Mammalian Species Conducted for the Lydgate Park to Kapa'a Bike and Pedestrian Path, Kaua'i. Prepared for: Kimura International, Inc. & The County of Kaua'i.

David, R. E., and B. E. Guinther 2005. A Survey of Botanical, Avian and Terrestrial Mammalian Species Conducted Within the Conservation District, Kukui'Ula, Kōloa District, Island of Kaua'i. Prepared for: Kukui'Ula Development Company (Hawaii), LLC.

David, R. E., R. H. Day, and B. A. Cooper 2002. Results of Newell's Shearwater Surveys at the Kaluahonu, Moalepe and Anahola Memorial Colonies, Island of Kaua'i, Hawai'i, July 2002. Prepared for Planning Solutions, Inc., and Kaua'i Electric.

Day, R. H., and B. Cooper, 1997. Patterns of Movement of Dark-rumped Petrels and Newell's Shearwaters on Kauai. The Condor, 97: 1011-1027.

_____. 1999. Results of Petrel and Shearwater Surveys on Kauai, June 1999. Unpublished report, prepared for: University of Hawaii, Pacific Cooperative Studies Unit.

_____. 2001. Results of Petrel and Shearwater Surveys on Kauai, June 2001. Unpublished report, prepared for: University of Hawaii, Pacific Cooperative Studies Unit.

Day, R. H., R. E. David, and B. A. Cooper. 2001a. Results of Radar and Night Vision Surveys of Petrels and Shearwaters Near the Lihu'e Energy Service Center Powerline on Kaua'i, June 2001. Prepared for: Planning Solutions, Inc., and Kaua'i Electric.

Day, R. H., R. E. David, and B. A. Cooper. 2001b. Results of Radar and Night Vision Surveys of Petrels and Shearwaters Near the Lihu'e Energy Service Center Powerline on Kaua'i, October 2001. Prepared for: Planning Solutions, Inc., and Kaua'i Electric.

Day, R. H., B. Cooper, and T. C. Telfer. 2003. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. The Auk 120: 669-679.

Day, R. H., T. J. Mabee, and B. Cooper, 2000. Results of Petrel and Shearwater Surveys on Kauai, June 2000. Unpublished report, prepared for: University of Hawaii, Pacific Cooperative Studies Unit.

Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

Federal Register 1999a. Department of the Interior, Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 – December 3, 1999.

Federal Register. 1999b. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions. *Federal Register*, **64** No. 205 (Monday, October 25, 1999): 57534-57547.

_____. 2001. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Notice of Findings on Recycled Petitions. *Federal Register*, **66** No. 5 (Monday, January 8, 2001): 1295 – 1300.

_____. 2002. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidate or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petition; Annual Description of Progress on Listing Actions. *Federal Register*, **67** No. 114 (Thursday, June 13, 2002): 40657-40679.

_____. 2004. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. *Federal Register*, **69** No. 86 (Tuesday, May 4, 2004): 24876-24904.

Hue, D., C. Glidden, J. Lippert, L. Schnell, J. MacIvor and J. Meisler. 2001. Habitat Use and Limiting Factors in a Population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawai'i. , *in:* : Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna.* Studies in Avian Biology No. 22. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas (Pg. 234-242).

Morgan, C., P. White, and R. E. David. 2003. Habitat Conservation Plan: Kaua'i Island Utility Cooperative: Working Paper No. 2 - Data Analysis: Interpreting the Save Our Shearwaters Bird Recovery Database (1979-2002) for Habitat Conservation Planning. Prepared for: Kaua'i Island Utility Cooperative.

Morgan, C., P. White, and R. E. David. Habitat Conservation Plan: Kaua'i Island Utility Cooperative: Data Report and Analysis: Save Our Shearwaters Bird Program 2003 Update. Prepared for: Kaua'i Island Utility Cooperative.

Pukui , M. K., S. H. Elbert, and E. T. Mookini 1976. *Place Names of Hawaii.* University of Hawaii Press. Honolulu, Hawai'i. 289 pp.

Reed, J. R., J. L Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariform Birds: Reduction by Shielding Upward Radiation. Auk 102: 377-383.

Staples, G. W., and D. R. Herbst 2005. *A Tropical Garden Flora: Plants Cultivated in the Hawaiian Islands and Other Tropical Places.* Bishop Museum Press.

Tomich, P.Q. 1986. *Mammals in Hawaii.* Bishop Museum Press. Honolulu, Hawaii. 375 pp.

Telfer, T. C. , J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. Wildlife Society Bulletin 15:406-413.

Wagner, W.L., D.R Herbst, and S.H. Sohmer 1990. *Manual of the Flowering Plants of Hawai'i*. University of Hawaii Press, Honolulu, Hawaii 1854 pp.

Wagner, W.L. and D.R. Herbst. 1999. *Supplement to the Manual of the flowering plants of Hawai'i*, pp. 1855-1918. *In:* Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. Revised edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

Appendix B

Archaeological Assessment of An Approximately 71-Acre Portion of the Kauai Lagoons Resort Property Prepared by Cultural Surveys Hawaii October 2005

Archaeological Assessment of an Approximately 71-Acre Portion of the Kauai Lagoons Resort Property

Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island

TMK: (4) 3-5-001: 6 & 168 por.

Prepared for

Wilson Okamoto Corporation

Prepared by

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai'i, Inc.

Kailua, Hawai'i

(Job Code: KALA 26)

October 2005

O'ahu Office
P.O. Box 1114
Kailua, Hawai'i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
16 S. Market Street, Suite 2N
Wailuku, Hawai'i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Archaeological Assessment of an Approximately 71-Acre Portion of the Kauai Lagoons Resort Property, Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island (Hammatt 2005)
Date	October 2005
Project Number (s)	Cultural Surveys Hawai'i, Inc. (CSH) Job Code: KALA 26
Investigation Permit Number	The fieldwork for this investigation was carried out under archaeological permit number 0508 issued by the Hawai'i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR).
Project Acreage and Location	Approximately 71 acres, Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island, TMK (4) 3-5-001: 6 & 168 por. This area is depicted on the 1998 Līhu'e USGS 7.5-minute topographic quadrangle.
Land Jurisdiction	Private, part of the overall Kaua'i Lagoons Resort
Agency	SHPD
Project Description	The Kauai Lagoons Resort recently received permit approvals from the County of Kaua'i to develop up to 723 hotel/residential units, a new golf clubhouse, and related recreational and commercial facilities. The owners of the resort are now proposing to make changes to the golf course layout by reconfiguring the Mokihana and Kiele courses, and spreading the allowable resort residential units over portions of the golf courses and other open areas. For the purposes of this investigation, the "project" is defined as a specific subset of the overall proposed reconfiguration of the Kaua'i Lagoons Resort. For this investigation, the project is defined as the expansion/reconfiguration of the adjacent Mokihana Golf Course on to the currently undeveloped approximately 71-acre project area. Within the current 71-acre project area, additional golf holes may be created. This expansion will provide space for proposed residential units along portions of the golf course outside the current 71-acre project area.
Area of Potential Effect (APE) and Survey Acreage	Based on available information, the proposed golf course expansion/reconfiguration within the project area will not impose adverse visual, auditory or other environmental impact to any significant historic properties, including standing architecture, located in the project area's vicinity. Accordingly, the project's APE extends no further than the proposed project area's 71-acre footprint. The survey area for the current investigation was limited to the approximately 71-acre APE.

Historic Preservation Regulatory Context	The proposed reconfiguration of the Kaua'i Lagoons Resort constitutes a project requiring compliance with and review under state of Hawai'i historic preservation review legislation [Hawai'i Revised Statutes (HRS) Chapter 6E-42 and Hawai'i Administrative Rules (HAR) 13-284]. At the request of the Wilson Okamoto Corporation, CSH completed an archaeological inventory survey investigation, per the requirements of HAR Chapter 13-13-276, of a specific 71-acre portion of the overall Kaua'i Lagoons Resort parcel. This currently undeveloped 71-acre area, defined above as the "project area" for this investigation, had not been previously investigated as part of prior cultural resource management investigations within the Kaua'i Lagoons Resort. Because no historic properties were located in the 71-acre project area, this investigation is termed an archaeological assessment per HAR Chapter 13-13-284-5. This archaeological assessment report was prepared to support historic preservation review of the proposed reconfiguration of the Kaua'i Lagoons Resort.
Fieldwork Effort	Robert Hill, BA, and Hallett H. Hammatt, PhD carried out the investigation fieldwork on October 20, 2005, requiring two person days.
Effect Recommendation	Based on the results of this investigation, there are no historic properties within the project area. Accordingly, a project-specific effect recommendation of "no historic properties affected" is warranted for the proposed golf course expansion/reconfiguration within the current 71-acre project area.
Mitigation Recommendation	No further historic preservation work is recommended for the 71-acre project area. However, it should be noted that, while unlikely, subsurface properties associated with former traditional Hawaiian activities in the project area, such as artifacts and cultural layers, may be present despite the decades of sugar cultivation activities and resort development. As a precautionary measure, personnel involved in future development activities in the project area should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow (including consultation with the State Historic Preservation Division and, as may be appropriate, with Kaua'i community cultural organizations).

Table of Contents

List of Figures

Section 1 Introduction

1.1 Project Background

At the request of Wilson Okamoto Corporation, Cultural Surveys Hawai'i, Inc. (CSH) has completed this archaeological assessment investigation of two parcels comprising an approximately 71-acre portion of the Kauai Lagoons Resort property. Located in Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island [TMK (4) 3-5-001:6 & 168 por.], this area is depicted on the 1998 Līhu'e USGS 7.5-minute topographic quadrangle (Figures 1 & 2).

The Kauai Lagoons Resort recently received permit approvals from the County of Kaua'i to develop up to 723 hotel/residential units, a new golf clubhouse, and related recreational and commercial facilities. The owners of the resort are now proposing to make changes to the golf course layout by reconfiguring the Mokihana and Kiele courses, and spreading the allowable resort residential units over portions of the golf courses and other open areas.

For the purposes of this investigation, the "project" is defined as a specific subset of the overall proposed reconfiguration of the Kaua'i Lagoons Resort. For this investigation, the project is defined as the expansion/reconfiguration of the adjacent Mokihana Golf Course on to the currently undeveloped approximately 71-acre project area. Within the current 71-acre project area, additional golf holes may be created. This expansion will provide space for proposed residential units along portions of the golf course outside the current 71-acre project area.

Based on available information, the proposed golf course expansion/reconfiguration within the project area will not impose adverse visual, auditory or other environmental impact to any significant historic properties, including standing architecture, located in the project area's vicinity. Accordingly, the project's area of potential effect (APE) extends no further than the proposed project area's 71-acre footprint. The survey area for the current investigation was limited to the approximately 71-acre APE.

The proposed reconfiguration of the Kaua'i Lagoons Resort constitutes a project requiring compliance with and review under state of Hawai'i historic preservation review legislation (Hawai'i Revised Statutes (HRS) Chapter 6E-42 and Hawai'i Administrative Rules (HAR) 13-284). At the request of the Wilson Okamoto Corporation, CSH completed an archaeological inventory survey investigation, per the requirements of HAR Chapter 13-13-276, of a 71-acre portion of the overall Kaua'i Lagoons Resort parcel. This currently undeveloped 71-acre area, defined above as the "project area" for this investigation, had not been previously investigated as part of prior cultural resource management investigations within the Kaua'i Lagoons Resort. Because no historic properties were located in the 71-acre project area, this investigation is termed an archaeological assessment per HAR Chapter 13-13-284-5. This archaeological assessment report was prepared to support historic preservation review of the proposed reconfiguration of the Kaua'i Lagoons Resort.

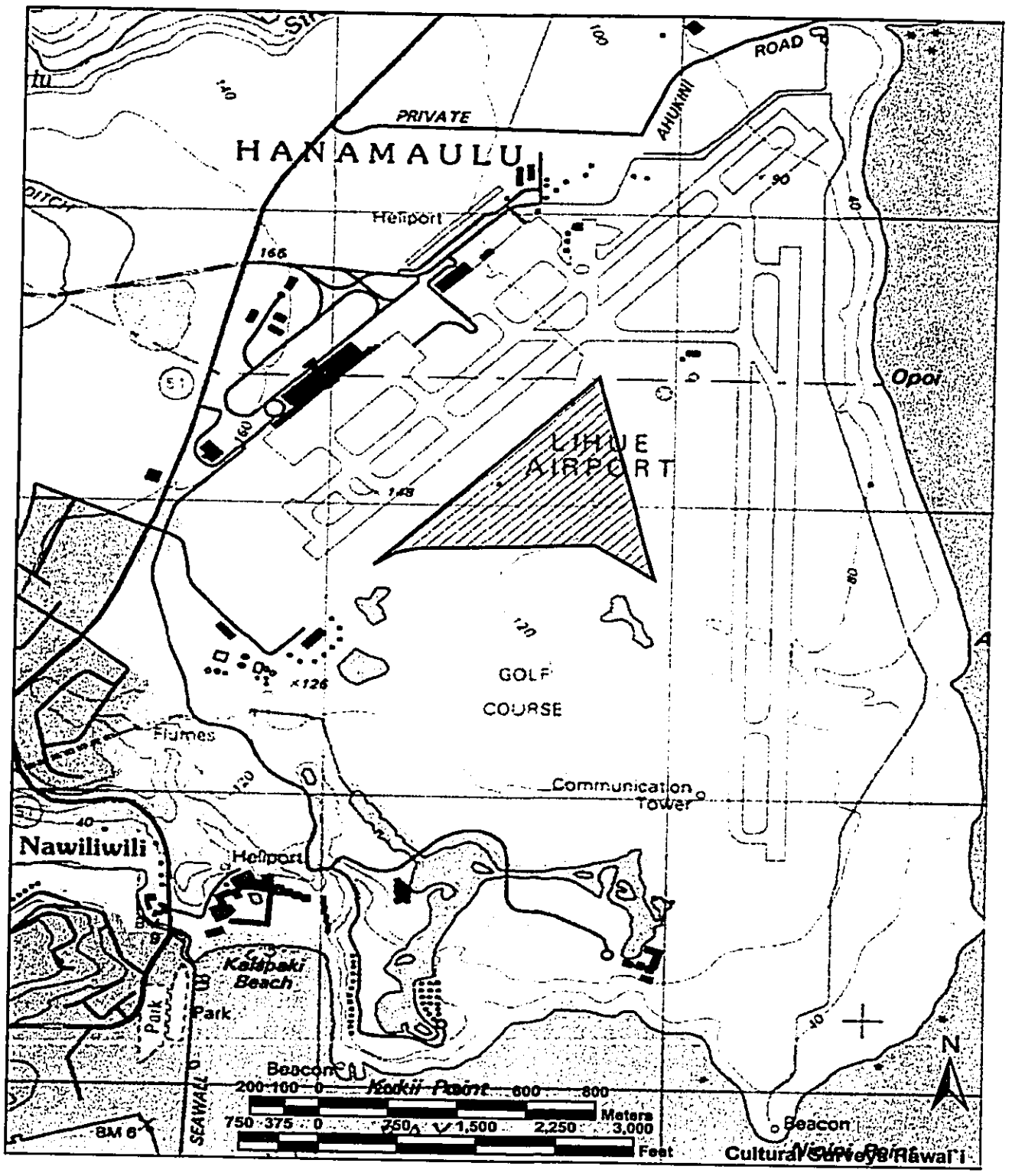


Figure 1. USGS 7.5 Minute Series topographic map, Līhu'e Quadrangle, showing project area location

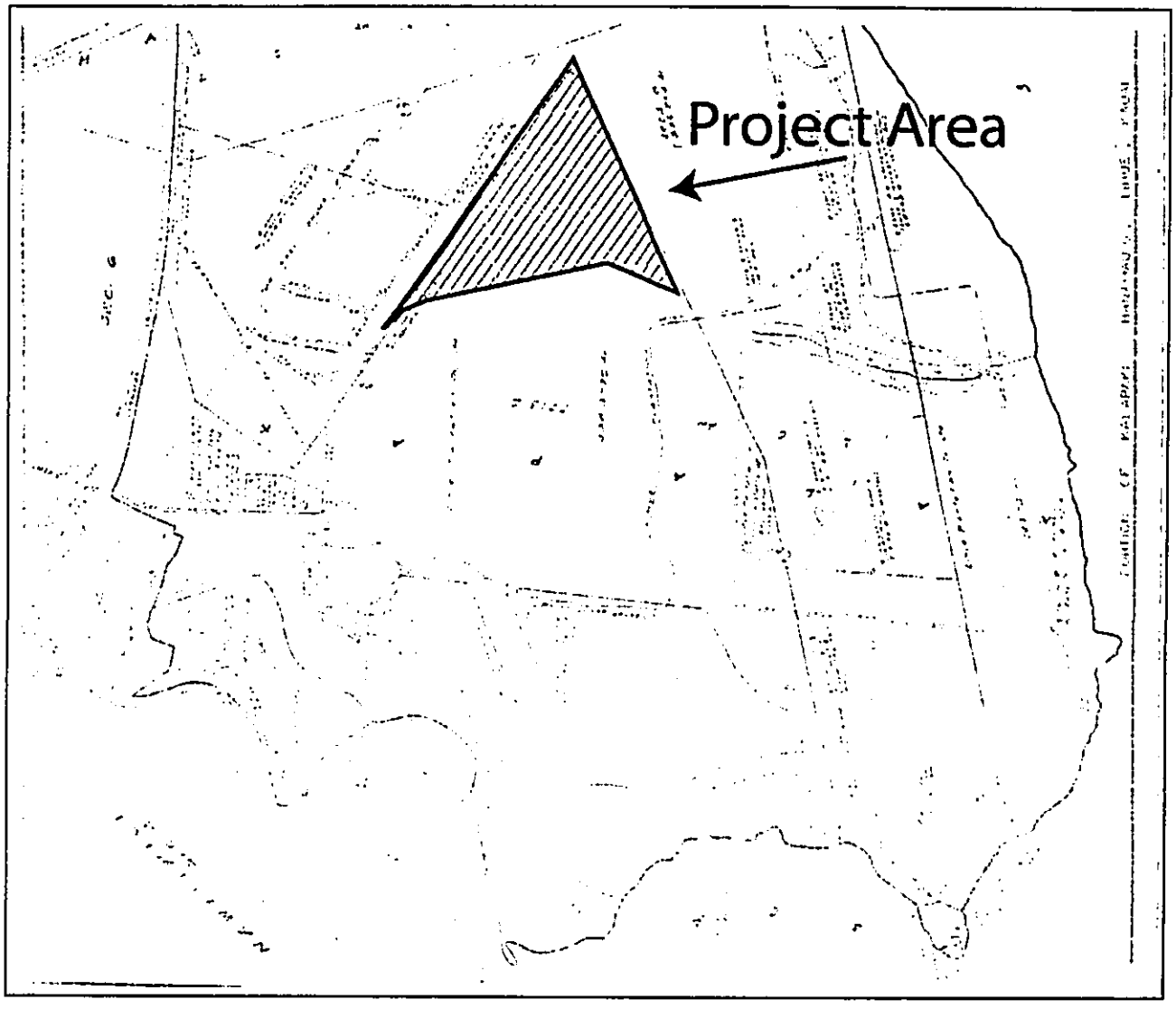


Figure 2. Tax map showing project area

DOCUMENT CAPTURED AS RECEIVED

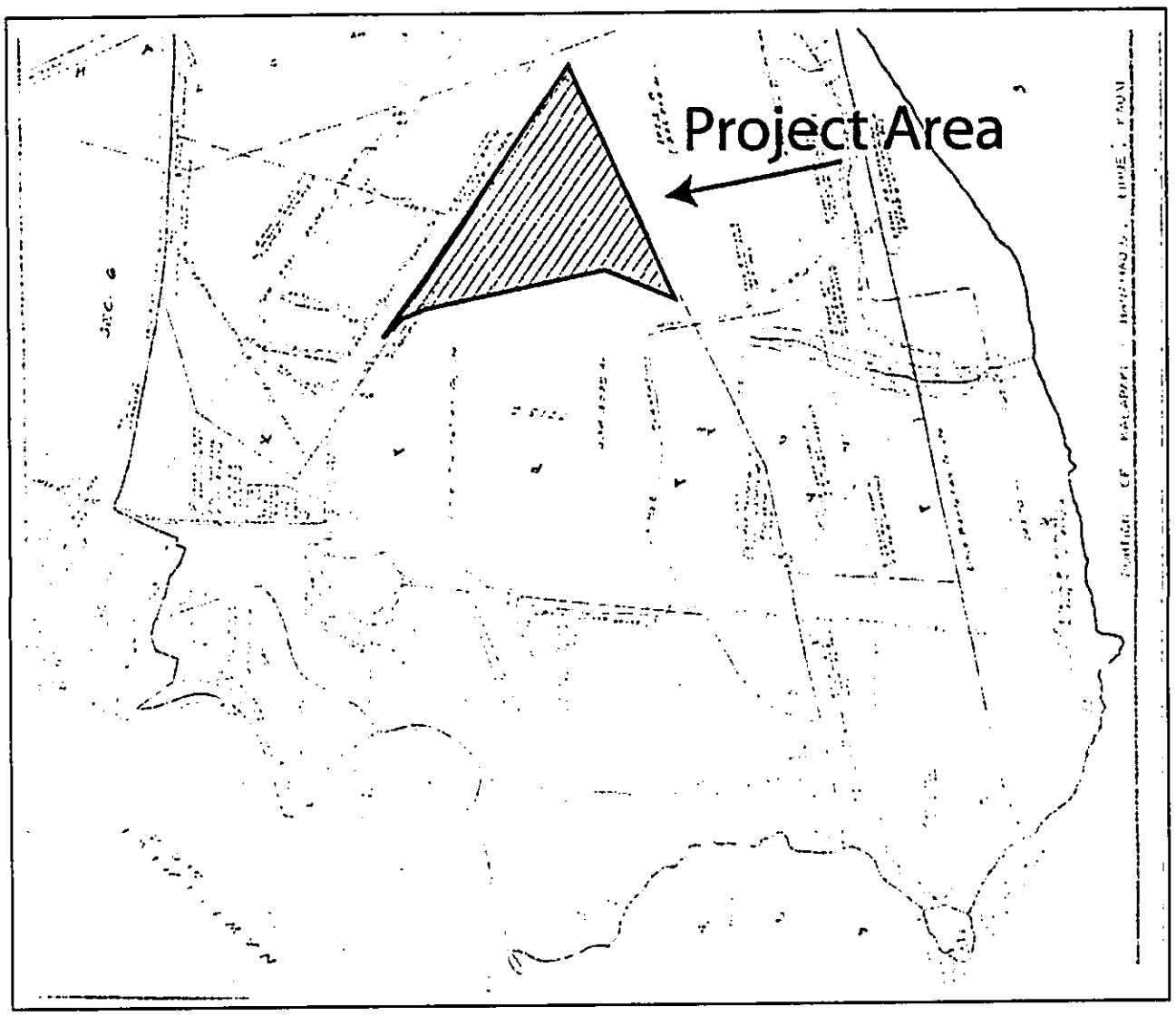


Figure 2. Tax map showing project area

1.2 Scope of Work

Based on historical, cultural, and archaeological background research, and a field inspection of the project area, this report presents documentation of past land use within the project area and in the surrounding portion of Kalapakī Ahupua'a. The report is intended to facilitate the project's planning and support the project's historic preservation compliance.

The following scope of work was followed:

1. Consultation with community members as part of the inventory survey process. This consultation required contacting knowledgeable members of the community and requesting information on historic and cultural issues related to the project area.
2. A complete ground survey of the project area for the purpose of historic property identification and documentation.
3. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research focused on the specific project area with general background on the *ahupua'a* and district and emphasized settlement patterns.
4. Preparation of this assessment report, which includes the following:
    a. A topographic map of the survey area showing all historic properties;
    b. Results of consultation with knowledgeable community members about the property and its historical and cultural issues.
    c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the project area's historic properties;
    d. Recommendations based on all information generated regarding the need for additional historic preservation work related to the proposed project.

1.3 Methods

Historical documents, maps, and photographs were inspected at: the Kaua'i Historical Society; the Hawai'i State Archives; the Survey Office of the Department of Accounting and General Services; the Hawai'i State Library; the Bernice Pauahi Bishop Museum archives and library; Hamilton Library at the University of Hawai'i Mānoa; the Mission Houses Museum Library; the State Historic Preservation Division (SHPD) library; and the library of CSH.

The fieldwork for this investigation was carried out under archaeological permit number 0508 issued by the Hawai'i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR). Robert Hill, BA, and Hallett H. Hammatt, PhD carried out the investigation fieldwork on October 20, 2005, requiring two person days. Fieldwork included an inspection of the project area's ground surface to identify potential historic properties, and included an assessment of the effects of past commercial agriculture within the project area.

1.4 Community Consultation

At the time of the preparation of this archaeological assessment, Cultural Surveys Hawai'i had recently prepared a cultural impact evaluation of an approximately 400-acre portion of the Kauai Lagoons Resort property that includes the present 71-acre project area (Mitchell *et al.* DRAFT 2005). Results of the community consultation effort for that evaluation are applicable to the present project area and are summarized below.

Hawaiian organizations, government agencies, and community members were contacted to: (1) identify potentially knowledgeable individuals with cultural expertise and knowledge of the project area and the surrounding vicinity, and (2) identify historic properties and potential impacts within the project area. The organizations and agencies contacted included: the Office of Hawaiian Affairs, the Kaua'i/Ni'ihau Islands Burial Council, the Kaua'i Historic Preservation Committee, Hui Mālama I Nā Kūpuna O Hawai'i Nei, and the State Historic Preservation Division.

Based on recommendations, Ms. Cheryl Lovell-Obatake, *Kama'āina* of Kalapakī and cultural specialist, was interviewed by Cultural Surveys Hawai'i Inc. on October 20, 2005: Ms. Lovell-Obatake did not identify any historic properties within the portion of the Kauai Lagoons Resort property that includes the present project area. She specifically noted that she "never heard of any burials in the area of study."

No historic properties were identified within the project area as a result of the community consultation.

1.5 Environmental Setting

The project area – rising to 160 feet a.ms.l. – lies within the Līhu'e depression or basin. Of the area's volcanic history, Macdonald, Abbot and Peterson note:

> Lava flows of the Koloa Series cover about half the surface of the eastern part of the island. They form the entire floor of the Lihue basin except for two small kipukas of Waimea Canyon rocks (Aaohoaka hill and Puu Pilo) that protrude through them west of the gap through which the Wailua River crosses the Kālepa Nounou Ridge...The greatest exposed thickness of Koloa lavas is 650 meters, in the east wall of Hanalei Valley; but they may be even thicker in the Lihue basin and along the southern edge of the island, where their base is not exposed. (Macdonald, Abbot and Peterson 1983: 460-461)

The project area is situated on the southeast coast of Kaua'i and is exposed to the prevailing northeast trade winds generally from 10-20 miles per hour and experiences 40 to 50 inches of rainfall annually. Rainfall increased to 75 to 100 inches in more inland (western) localities. The average temperature ranges from 75-80° F at the Līhu'e Airport.

The soils in the area are Lihue silty clay (LhB and LhC) and Lihue gravelly silt clay (LIB) (Foote *et al.* 1972: Sheets 30 &31).

> Lihue soils have a surface layer of dusky-red to dark reddish-brown, firm to friable silty clay. The subsoil is dark-red to dark reddish brown, firm silty clay.

The substratum is soft, weathered basic igneous rock. (U.S. Department of Agriculture 1972: 12)

Section 2 Traditional and Historical Background

2.1 Traditional Land Use

2.1.1 Mythological and Traditional Accounts

In *Hawaiian Antiquities and Folklore* (Fornander, 1918-1919), a pioneering collection of Hawaiian lore, references are made to Kalapakī Ahupua'a, and to Līhu'e. One of the named Kaua'i winds, "*He waikai ko Kalapakī*" refers to the salty fresh water of Kalapakī (vol. 2: 96-97). The place name Līhu'e appears in the "Legend of Uweuwelekehau." Uweuwelekehau and his wife Luukia are being punished: they are stripped of their clothing and sent to Manā [at the west end of the island]. When they reach the plains of Līhu'e, Luukia complains of her nakedness. Uweuwelekehau tells her that they will find on a nearby hill a *pa'u* and all manner of *kapa*, which they do (vol. 2:196-197).

During the 1920s, William Hyde Rice, a life-long resident of Kaua'i, recorded and collected Hawaiian lore of the island in *Hawaiian Legends* (1977). In that volume two place names in the vicinity of the present project area--Ninini and Ahukini--are mentioned once each. In "The Goddess Pele":

> Two brothers of Pele who had come from foreign lands, saw Lohiau's body lying as a stone where the lava flow had overtaken him. Pity welled up . . . and they brought Lohiau to life again. One of these brothers made his own body into a canoe and carried the unfortunate Lohiau to Kauai, where he was put ashore at Ahukini. (Rice 1977: 14)

Ahukini in the above quote probably refers to the *heiau*, which formerly stood in Kalapakī near Ahukini Point on the bluff overlooking the sea, since the name "Ahukini" means "altar of many blessings

In "The Menehunes," a favorite place for their sport of jumping off cliffs into the sea is Ninini: A...little beach surrounded by cliffs, just inside the point where the larger Nāwiliwili lighthouse now stands"; the tale also mentions that part of a large rock from Kīpūkai is at Ninini (Rice 1977:44).

2.1.2 Early Journals and Survey Expeditions

The first written accounts of the lifestyle on Kaua'i are from travelers, missionaries and surveying expeditions. Missionary accounts from the first half of the 19th century provide the majority of the early written records for this portion of Kaua'i.

Ethel Damon, in *Koamalu* repeats the scenic description of Līhu'e given by Reverend Hiram Brigham in his book, *A Residence of Twenty-One Years in the Sandwich Islands*, published in 1847:

> In 1824, when walking around the island from Waimea to counsel the people after the wreck of The Cleopatra's Barge, Rev. Hiram Bingham crossed from Hanapepe, as has been seen, over the old upland trail back of Kilohana, and wrote of it as "a country of good land, mostly open, unoccupied and covered with grass, sprinkled with trees, and watered with lively streams that descend from the forest-covered mountains and wind their way along ravines to the sea, - a much finer country than the western part of the island. (Damon 1931: 401).

In the *Narrative of the United States Exploring Expedition* (1845), Lt. Commander G.E.G. Wilkes describes the "Lihui" District:

> At noon they reached Lihui, a settlement lately undertaken by the Rev. Mr. Lafon, for the purpose of inducing the natives to remove from the sea-coast, thus abandoning their poor lands to cultivate the rich plains above. Mr. Lafon has the charge of the mission district lying between those of Koloa and Waioli. This district was a short time ago formed out of the other two
>
> ...The temperature of Lihui has much the same range as that of Koloa, and the climate is pleasant: the trade-winds sweep over it uninterruptedly, and sufficient rain falls to keep the vegetation green throughout the year.
>
> As yet there is little appearance of increase in industry, or improvement in the dwellings of the natives. There are no more than about seventy pupils in this district, who are taught by natives. There are two houses of worship, and about forty communicants. No decrease is apparent in the population within a few years.
>
> On the fertile places, although the pasture was good, yet no cattle were to be seen.
>
> From Lihui, they pursued their way to Hanawale, which is a small fishing village at the mouth of a little stream. The country on this route was uninteresting, until they reached Wailua... (Wilkes 1845:67-68)

2.1.3 The Māhele Claims

Paulo Kanoa, Governor of Kaua'i at the time of the Māhele claimed both the *ahupua'a* of Hanamā'ulu and Kalapakī but was awarded neither. Victoria Kamāmalu was awarded both *ahupua'a* under No. 7713:2. The Victoria Kamāmalu award (7713:2 part 7) includes land within the present project area.

The locations of *kuleana* or commoner land claims of the Māhele (1848-1853) in Kalapakī Ahupua'a are from the shore back into and along the floodplains of the valley land. There were 13 claims in Kalapakī, of which 12 were awarded. The cultivation of "taro" (*kalo*), the major staple, was along the river flood plains. All the house lots in Kalapakī were at the shore. There were small *kula* listed for the *ahupua'a* where presumably sweet potatoes and other produce were grown. The only crop other than "*kalo*" mentioned specifically is *wauke* in Kalapakī. Additionally, more than one claim in Kalapakī mentions the fishponds of Koenaawa. Two streams--Koenaawa nui and Koenaawa iki--are identified in the claims but neither is named on current maps.

The Kalapakī claimants described traditional taro *lo'i* cultivation along the river with houses at the shore in a village. The Kalapakī *lo'i* claims were on the north side of Nāwiliwili River (the *wauke* land in Claim 3907 on the south side of the river being the sole exception) and along the smaller brooks of Kalapakī and Koenaawa where there were springs. The claims on the south side of the Nāwiliwili River are in the *ahupua'a* of Nāwiliwili. Most Kalapakī claimants lived, however, at the shore in the "*kulana kauhale*" or village of Kalapakī, located on Nāwiliwili Bay. Several of the claimants describe their village house lots in relation to the fishponds of Koenaawa (Koenaawainui & Koenaawaiki). There is also a description of the *muliwai* or estuary of Koenaawanui.

Cattle, introduced by Vancouver, had at first been under a royal *kapu* and were allowed to roam freely and reproduce. Within a few decades cattle had begun to wreck havoc on village gardens and taro lands and homes. Residents either abandoned the land destroyed by roaming cattle or else started building walls to keep the cattle out of their homes and gardens. Huleia, an *ahupua'a* to the south of the project area, was claimed by Victoria Kamāmalu during the Māhele, as a preserve for cattle (Māhele information). Apparently, as the report by Wilkes suggests, the people of Līhu'e had so far been safe from such depredation (*ca.* 1840s).

Following the death of Victoria Kamāmalu in 1866, her lands were inherited by Princess Ruth Ke'elikōlani. In 1870 Ke'elikōlani sold large portions of her Kalapakī and Līhu'e lands to William Hyde Rice of Lihue Plantation. Also in 1870, Paul Isenberg purchased the *ahupua'a* of Hanamā'ulu from J.O. Dominis which includes the present airport area. William Hyde Rice made subsequent land purchases from Princess Ruth in 1879:

> William Hyde Rice, who already had his own home on the hill east of the mill, bought a large *makai* section of the *ahupua'a* of Kalapakī from Princess Ruth in 1879 and there conducted the Lihue Ranch. In later years he sold most of this land to the plantation. (Damon 1931:747)

The large tracts of inland areas (*kula*), not in the river valleys or at the shore, are not described in the claims but were probably in use. This *kula* land at the time of the Māhele belonged to Victoria Kamāmalu. Land use is not elaborated in her claims for Hanamā'ulu or Kalapakī. Traditional *kula* resources for all claimants would have been medicines, herbs, construction materials such as *pili* grass and trees for building houses, canoes, and perhaps lithic materials for

tools. Sweet potatoes and other dryland crops, such as *wauke*, probably were cultivated in patches throughout the area at one time or another.

2.1.4 Other Sources

In William Hyde Rice's *Hawaiian Legends* (discussed above), Rice's granddaughter Edith Rice Pleus notes that Kalapakī in the 1920s comprised fertile lands. She probably referred to the extensive plains or *kula* lands existing prior to use for commercial sugar cane. The cultivation of sweet potatoes, gourds and *wauke*, and other dryland crops would have dominated land use in these *kula* lands.

A document listed only as *Land Matters, Document 11* with no date in the State Archives refers to *konohiki* rights (either prior to or contemporary with Land Commission claims since the *konohiki* received their claims after the *ali'i* and before the *kuleana* awards). The *konohiki* had proprietary rights to fish caught in the bay fishing. Document No. 11 lists *ana'e* as the protected fish of Hanamā'ulu, and *uhu* for Kalapakī. These protected fish are part of the *konohiki* resources, which he or she would use to meet his/her obligations to superior chiefs, governors/governesses and the King or Queen. Wikolia is listed as the *konohiki* for Wailua, Hanamā'ulu, Kalapakī, Nāwiliwili, Niumalu, Ha'iku, Kīpū, and a few other places. The proper procedure for fishing in the bay would be when:

> the proper fishing season arrives all the people may take fish, and when the fish are collected, they shall be divided - one third to the fishermen, and two thirds to the landlord (Kosaki, 1954:14).

And the protected fish might all be for the *konohiki*.

One of the last vestiges of the pre-cash crop landscape is depicted in the diary entry for the Rice family's arrival on Kauai in 1854. During the second half of the 19th century, western settlers and entrepreneurs set their sights on southeast Kaua'i. Ethel Damon, in *Koamalu*, her history of the Rice family of Kaua'i, describes the Līhu'e landscape at the time of the family's arrival at Nāwiliwili Bay:

> From the deck of their river craft in 1854 Mrs. Rice and the children could plainly see above the rocky shore and ruins of Kuhiau, the old heiau, or temple, and nearby on the bluff the flaming blossoms of a great wili-wili tree among koa trees which ten grew almost down to the water's edge (Damon 1931:17-18).

These early written documents describe a good land with a nice climate and plentiful provisions for the traveler. Residents of the land live near the ocean and fishing villages are scattered along the shore; and at that time at Kalapakī many trees grew right down to the water's edge (e.g. *koa* and *wiliwili*).

While foreigners may have seen the shoreline as unproductive, Hawaiians would have disagreed. The indigenous settlement pattern indicates that the shoreline was the locus for

villages like Kalapakī at the mouth of Nāwiliwili River and "Hanawale" perhaps a village near Hanamā'ulu Bay. Shoreline areas were certainly favored for fishing, swimming, surfing and residence. Depending on the distances, they may have had temporary residences among their agricultural lands and even in the uplands while gathering materials for house or canoe building. Others resided inland near their fields, but would have traveled around to acquire needed or desirable resources.

2.2 Transition to Cash Crops and Exportable Products

2.2.1 Journals and Surveyor's Records

In the earlier journals, lack of industry is noted and this refers specifically to production of goods beyond the needs of those producing them. Pigs, sweet potatoes and salt, among other items were traded to the earliest sailing vessels arriving in Hawaii (post 1794) and it is likely that in Līhu'e District, as elsewhere, the production of these items increased beyond the needs of the immediate family and their expected contributions to their chiefs during this period of early visiting voyagers.

Cutting and shipping sandalwood to the Orient was probably the fist real "industry" seen from a western perspective. We have only one indirect reference to the sandalwood trade in the Līhu'e area. Ethel Damon records that early settler, Richard Isenberg, had been told by Chief Forester C.S. Judd, that Mount Kalepa, had formerly been covered with sandalwood (Damon 1931:913).

The sandalwood trade or industry was soon replaced by the whaling trade. Between the 1840s and 1860s whaling ships would come to the Hawai'i to spend the winter, repair their ships, recruit sailors, leave sick sailors behind and stock up supplies for the next season. Early historical accounts relate that Kōloa, on the south side of Kaua'i, was a major port or roadstead for the victualing trade for whalers, fur traders and merchant ships plying their trades between Asia and the west and back and forth to the Arctic. Though there is no specific evidence of crops raised in the Līhu'e area were for trade in Kōloa, the roadstead would have provided residents of Līhu'e with a market for their produce (see Wilkes below).

In the *Narrative of the United States Exploring Expedition* (1845), Lt. Commander G.E.G. Wilkes describes the "Lihui" District:

> The principal village is Nawiliwili, ten miles east of Koloa. This district contains about forty square miles, being twenty miles long by two broad. The soil is rich: it produces sugar-cane, taro, sweet-potatoes, beans, &c. The only market is that of Koloa. The cane suffers somewhat from the high winds on the plains (Wilkes 1845:67-68).

While sweet potatoes, gourds, sugar cane and *wauke* were important commodities in pre-Contact days, they supplemented the basic traditional diet of fish and taro. Thus, early foreign

ideas of fertility and industry, backed by the needs of traders and whalers for supplies, mark the beginning of the shift to cash crops as the new landscape of inland "fertile plains."

The missionaries came to preach and teach western religion and culture. Missionary-sponsored schools of Līhu'e are also documented by Damon:

> 1842: Number of schools in Lihue district 5: teachers 7: scholars 185; of whom readers 123, writers 28, those in arithmetic 64, and in geography 8. The Catholics have succeeded in getting away 12 children from one of these schools. (Damon 1931:407)

The new settlers and entrepreneurs brought new activity to southeast Kaua'i. Cotton was among the crops grown in Hanamā'ulu, adjacent to Kalapakī:

> Later Mr. August Dreier was engineer in the mill. He had come out about 1869 for Hoffschlaeger and Stapenhorst to install a cotton mill in upper Hanamaulu land. The combination of a cool temperature with rain and red dust proved too much for successful cotton growing, but many wild bushes of it are still found in Kapaia valley. (Damon 1931:586)

Paramount, however, among the new cash crops was sugar. The plantation at Līhu'e was first established in 1849 by Henry A. Pierce; Judge Wm. Little Lee, the chairman of the Land Commission; and Charles Reed Bishop. It became Lihue Plantation in 1850. It was probably the best-capitalized and most-modern plantation at that time in all Hawai'i. The mill was north and west of the present airport. A steam-powered mill was built in 1853 at Lihue Plantation, the first use of steam power on a Hawaiian sugar plantation. Another important innovation at Līhu'e was created in 1856, when William H. Rice completed the ten-mile-long Hanamā'ulu Ditch, the first large-scale irrigation project for any of the sugar plantations (Moffatt & Fitzpatrick 1995:103). Plantation labor was brought in from many countries and these new laborers brought some of their own cash crops.

2.2.2 Early 20th Century Maps

The 1910 USGS map shows railroad tracks crisscrossing the non-valley land and indicate cane cultivation reaching toward the shore (Figure 3). The cane fields have expanded toward the ocean into the area of the present airport. The expansion of Lihue Plantation's sugar cane cultivation would accelerate throughout the entire coastal area in the early decades of the 20th century.

Sugar cane cultivation transformed the traditional landscape of Kalapakī into plantation landscape. By 1931, Lihue Plantation had 6,712 acres in cane. The plantation's field map of 1941 (Figure 4) shows sugarcane covering the entire coast and the present project area. Lihue Plantation "developed a water collection system second only to East Maui Irrigation Company ... Altogether there are 51 miles of ditch and eighteen intakes" (C. Wilcox 1996:68). Railroads

extended across the plantation to and from the shipping facilities and beyond the plantation itself to other plantations.

2.2.3 Non-Sugar Landscapes Associated with Sugar Cane Cultivation

The plantation landscape in Ḷīhu'e began about mid 19th century and continued to expand for a century. In 1950, about the time of the advent of the new airport, and after Statehood in 1959 Ḷīhu'e's plantation landscape began to give way to the present urban center.

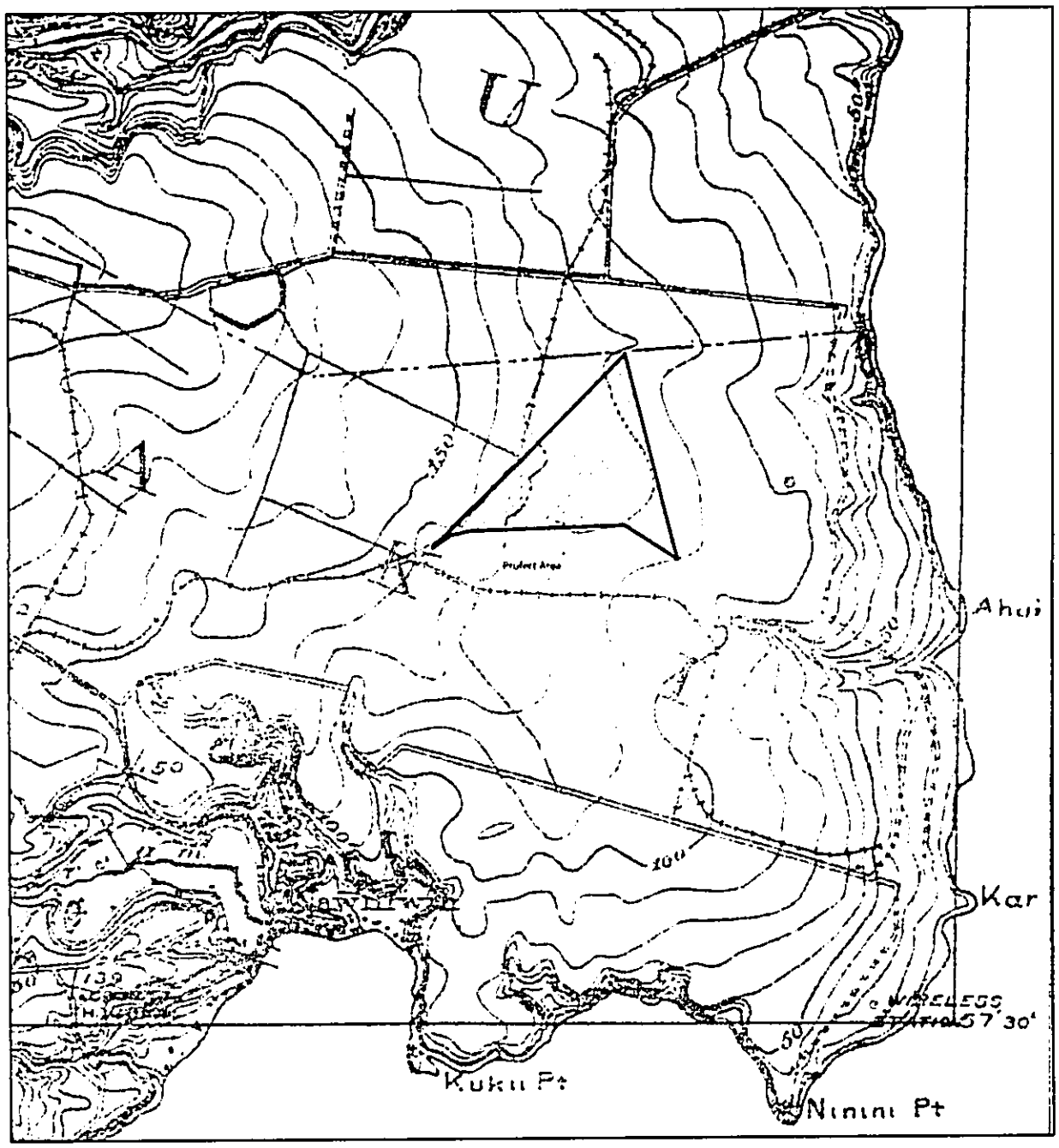


Figure 3. 1910 USGS map with location of present project area indicated

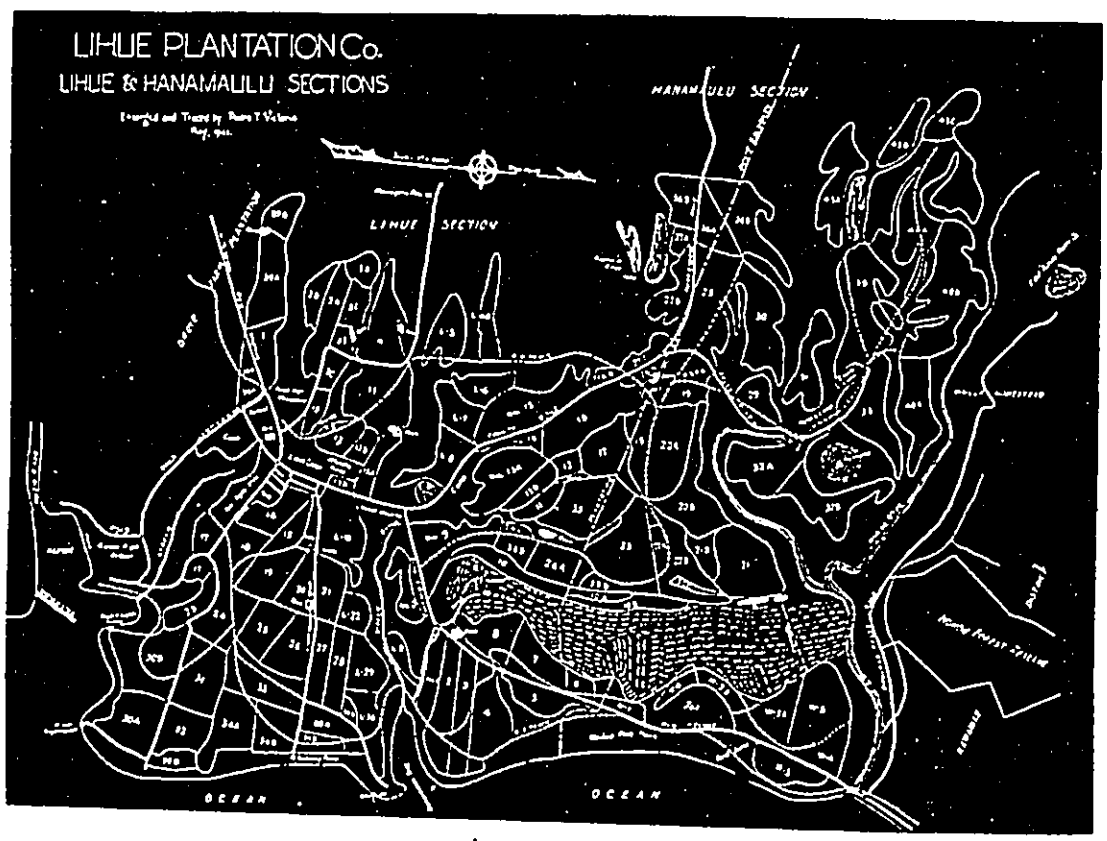


Figure 4. Lihue Plantation field map of 1941

Rice production was an off-shoot industry of the sugar plantation in the 1870s, since many of the new Chinese plantation workers began to grow rice for themselves and then for trade with California. Japanese immigrants, by the end of the 19th century did the same and took over many of the Chinese rice paddies. Growing and milling rice also became a means for immigrants to leave the plantations after their indenture period. Field note drawings (1885) by Lt. Geo. G.E. Jackson, a cartographer for Territory of Hawaii in the early 1880s show rice fields at the mouth of Nāwiliwili River in the estuary and he shows a few houses left in Kalapakī Village. In general, rice planters used abandoned taro fields, but made the patches larger than the traditional taro *lo'i*. This is probably true of the Kalapakī floodplain.

Jackson's drawings also show that the Kalapakī land north of Kuki'i Point, where the airport now lies, as a "level grassy land with volcanic boulders," showing no cane cultivation in 1885. Gay and Kittridge's map of 1898 still shows the same "stony land" and notes its use as a goat and sheep pasture.

Lihue Plantation owners and managers were concerned about reforesting their landscape, to make it more fruitful, productive, and pleasant. Forests, which would have existed possibly down to the sea, had been cleared during the sandalwood era, and perhaps earlier. Former forest lands were barren by the time the plantation management controlled the land. A major reforestation plan was carried out.

Ethel Damon records that early settler, Richard Isenberg,

> often looked out on to the bare slopes of Mount Kalepa, said later by Chief Forester C.S. Judd to have been covered formerly with a growth of sandalwood. On his departure Richard Isenberg left funds for the planting of ten acres on Kalepa hill to young ironwood. Today a roadway up this hill has been constructed for Kauai's first wireless telephone station, Ka Lepa, The Signal Hill, thus resuming what is said to have been its ancient importance as a peak for signaling messages. (Damon 1931:913)

A major reforestation effort was also carried out on Kilohana Crater:

> Paul Isenberg engaged a German forester who remained on Lihue Plantation for five or six years and then returned to the Prussian Forest Service after passing much of his knowledge on to others here. His first and principal task was to plant and tend a young forest on a tract of valley and a ridge of about 300 acres on the eastward slope leading up to Kilohana crater. This is often called the German Forest and was, as far as is known, the first extensive attempt at reforestation any where on the islands. ... the Pride of India was finally chosen, as a tropical tree long a denizen of the islands, and some Australian ironwoods where also propagated for the purpose, as far as seed could be obtained. The albizzia, known

> as the white-flowering monkeypod, was also largely planted in the valleys, and has proven a useful tree, having one characteristic of the Hawaiian hau, its branches sprouting easily when cut off and inserted in the ground as fence posts. (Damon 1931: 772)
>
> In the course of a few years it was evident that the Pride of India was not well adapted for these wind-swept slopes, and Manager Carl Isenberg set out thousands of koa seedlings, a hard wood native to those ridges and a lusty child of Hawaiian forests. ... So dense did the shade become at one time that hundreds of the koa trees were cut out for firewood. (Damon 1931: 773)

While the plant species of the plantation landscape changed so did the architectural landscape. The sugar plantation infrastructure included ditch systems, railroads and engine houses, bridges, interisland shipping storage facilities and housing. Today, the remnants of this commercial sugar cane landscape can still be seen around or near the airport.

By the end of the 19th century there was not much fishing on Kaua'i even though the waters were said to teem with fish "largely accounted for by the fact that the efforts of the islanders are devoted almost exclusively to sugar-cane growing, in which more money can be made than in fishing" (Cobb 1902:498). However, the ocean and shoreline, which had been so integral to the traditional Hawaiian way of life in Kalapakī and neighboring lands, began to take on importance with growing harbor facilities of the early 20th century.

2.2.4 20th Century Developments in Kalapakī and Neighboring Ahupua'a

In 1929, the Territorial government began construction of a new harbor facility at Nawiliwili. (*Garden Island* 12/24/29;1:3).

In 1950, the Līhu'e Airport opened (*Garden Island* 1/10/50: 1:3 & 11:1)

Throughout most of the 20th century the present project area was under sugarcane cultivation by the Lihue Plantation Company. An aerial photograph of 1950 shows the entire landscape including the project area planted in sugarcane (Figure 5).

During the second half of the 20th century the project area was a portion of Kalapakī lands that would be transformed by resort development on Kaua'i. The Kauai Surf Hotel on Kalapaki Bay was developed by Inter-Island Resorts in 1960. Then in 1970 the adjacent Kauai Surf Golf Course opened. Subsequently, in the mid-1980s, these Kalapakī properties were sold or leased to Hemmeter-VMS Kauai Company, which began development of the Westin Kauai Lagoons Resort on approximately 850 acres.

In 1991, the Kauai Lagoons Resort was sold to Shinwa Golf Kabushiki Kaisha, which operated the resort and golf courses under Kauai Lagoons Resort Company, Ltd. The approximately 700-acre property, including the present project area, was acquired by Kauai Development LLC and KD Golf Ownership LLC in 2004.

Figure 5. 1950 aerial photograph of Kalapakī with location of present project area indicated

Section 3 Previous Archaeological Research

Two tables outline the archaeological research and historic properties within Kalapakī Ahupua'a. These tables are followed by discussion of the research and historic properties. Table 1 lists the archaeological research conducted within the *ahupua'a* and includes: author(s), location, type of research, and date. Table 2 is a list of known historic properties within the *ahupua'a* and includes: site numbers, site type, location and reference.

Table 1 Previous Archaeological Studies (Figure 6)

Author(s)	Location	Archaeological Research	Year
Thrum, Thomas	Kaua'i	Listing	1907
Bennett, Wendell C.	Kaua'i	Island-wide Reconnaissance	1931
Handy, E.S. Craighill	Hawaiian Islands, Kaua'i	Reconnaissance of agricultural lands	1940
Hammatt, Hallett H.	Kalapakī	Reconnaissance of Ninini Point area	1978
Hammatt, Hallett H.	Kalapakī	Archaeological Reconnaissance of an 18-Acre Parcel in Lihue Town	1978
Hammatt, Hallett H.	Kalapakī	Reconnaissance of 118 acres	1978
Hammatt, Hallett H.	Kalapakī	Archaeological Reconnaissance of 150-Acres of Coastal Land, Kalapakī, Kauai Island (Site of a Proposed 3rd Golf Course, Kauai Lagoon's Resort	1988
Hammatt, Hallett H.	Kalapakī	Archaeological Assessment of Kauai Lagoons Resort	1990
McMahon, Nancy	Kalapakī, Hanamaulu	Archaeological Fieldcheck of Three Parcels in Lihue Judiciary District: Possible Locations for a New Kauai Judiciary Building, Nāwiliwili, Kalapakī, and Hanamā'ulu	1990
Rosendahl, Paul & Alan Walker	Kalapakī Point	Memorandum Report: Archaeological Inventory Survey and Related Consultant Services, Kalapakī Point Subdivision, Land of Nawiliwili	1990
Walker, Alan T., Lehua Kajima and Susan T. Good fellow	Hanamaulu, Kalapakī	Archaeological Inventory Survey, Lihue /Puhi/ Hanamaulu Master Plan, Lands of Hanamā'ulu, Kalapakī, Nāwiliwili, Niumalu, and	1991

Author(s)	Location	Archaeological Research	Year
		Wailua	
Walker, Alan T. and Paul H. Rosendahl	Kalapakī Point	Archaeological Inventory Survey, Kalapakī Point Development Project Area, Land of Nāwiliwili	1991
Creed, Victoria, Loren Zulick, Gerald Ida, David Shideler, and Hallett H. Hammatt	Eleven localities in Hanamā'ulu and Kalapakī Ahupua'a	Archaeological field inspection and literature review of Proposed Līhu'e Airport Expansion Area	1999

Table 2. Historic Properties (Figure 7)

Site Identification No.	Site Type	*Ahupua'a* Location and Reference
50-30-11-099	Kuhiau Heiau, A large paved *heiau*, whose enclosure covered an area of about four acres; long since destroyed	Kalapakī from Thrum IN Bennett 1931:124
50-30-11-100	Ninini Heiau (near site of Nawiliwili light house, double paved wall remnant)	Kalapakī; Bennett 1931:124
50-30-11-101	Ahukini Heiau (A *heiau* of medium size; foundations only now remain)	Kalapakī; from Thrum IN Bennett 1931:125
50-30-11-421	Midden Scatter of marine shells	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-422	Remnant/probable cattle wall	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-423	Remnant/probable cattle wall	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-424	Oval Terrace Alignment	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-1999	Paukini rock (in the ocean)	Kalapakī or Nawiliwili Bay; N. McMahon (personal comm. to CSH in 1999)
50-30-11-6009	Nawiliwili Cemetery	Kalapakī near high school Hammatt & Folk, ed. 1997
50-30-08-9402	Historic Building Remnant at Site of Radio Station KIVM	Off Radio Road near Ahukini Hwy (McMahon 1990; Franklin & Walker 1994)
11-B001	Lihu`e Lutheran Church Cemetery	Kikuchi & Remoaldo 1992
11-B002	Japanese Cemetery, purported to have been moved	Kikuchi & Remoaldo 1992

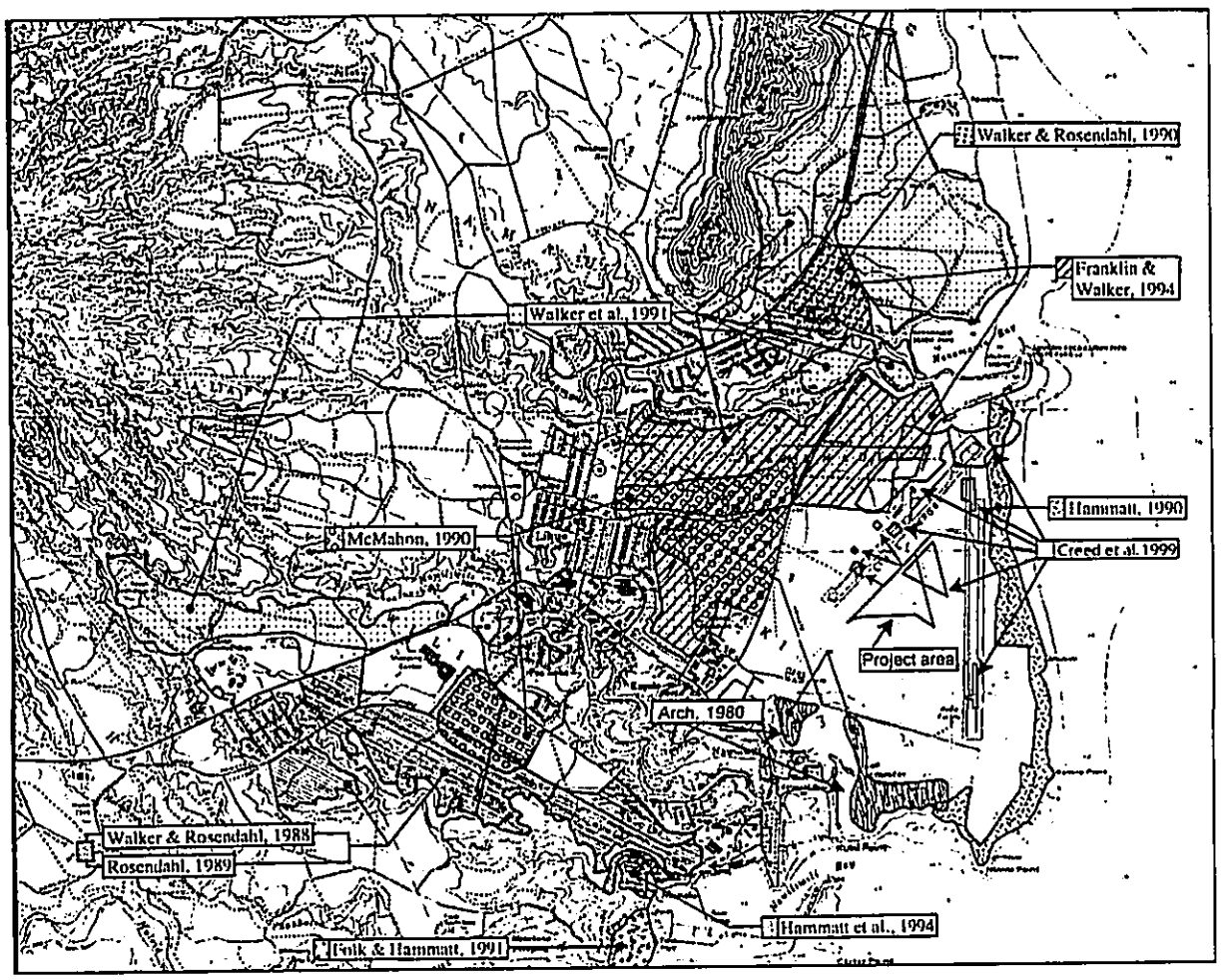


Figure 6. Previous archaeological investigations in the vicinity of the project area

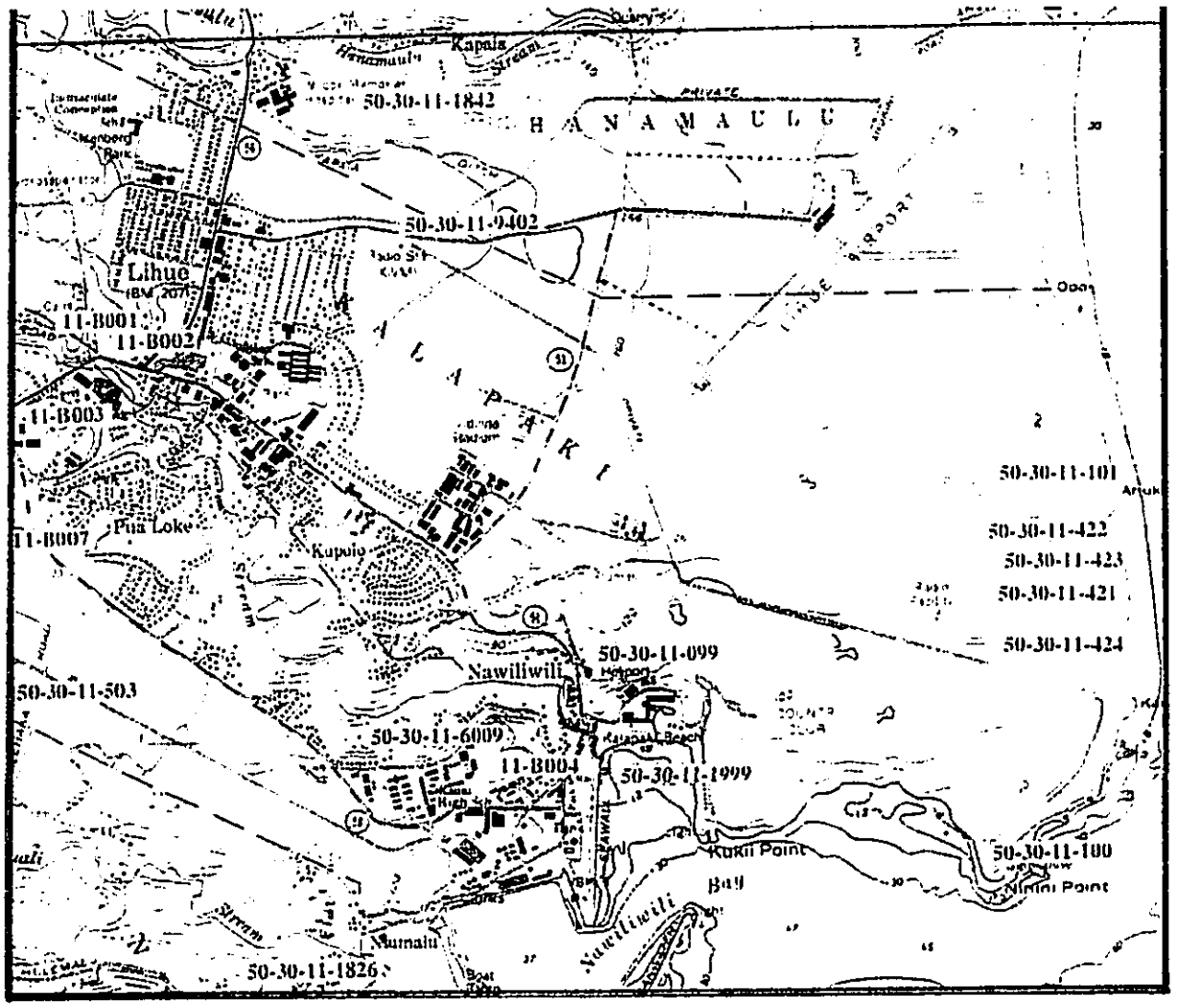


Figure 7. Previously recorded historic properties in the vicinity of the project area

Previous archaeological background research shows there are some 12 known historic properties in the *ahupua'a* of Kalapakī. Ten of the sites are on the State Inventory of Historic Places (SIHP) and the other two are cemeteries not listed on the SIHP. None of these 12 properties is within the present project area.

Thomas Thrum, the publisher of the Hawaiian Almanac, gathered lists of *heiau* on all islands. From the *ahupua'a* of Kalapakī we begin with his list of four as found in Bennett:

1. Ninini, Kalapakī, near site of Nawiliwili light house. All destroyed (Site 100)(Thrum 1907)

2. Ahukini,. Kalapakī. A heiau of medium size; foundations only now remain (Site 101)(Thrum 1907)

3. Pohakoelele, Kalapakī. A medium sized heiau; all destroyed (no site number) (Thrum 1907)

4. Kuhiau, Nawiliwili, near site of court house - a large paved heiau, whose enclosure covered an area of about four acres: long since destroyed (Site 099). The rock Paukini, now separate from but formerly connected with the shore was where the kahuna lived (Thrum 1907).

The first comprehensive archaeological survey on the Island of Kaua'i was undertaken by Wendell Bennett and published in 1939. Bennett used Thrum's list for reference and added the sites he found. For Kalapakī he lists one *heiau* but that it had been destroyed.

Bennett repeats the descriptions given by Thrum for Sites 99-102 and adds "Paukini Rock, a heiau or priest's house now under water in Nawiliwili harbor" (Bennett 1931:48) (recently given State Site #50-50-11-1999). Sites 99-102 had been either entirely or mostly destroyed by the time Bennett did his survey in 1930.

Neither Thrum nor Bennett mention a *heiau* noted by Lt. George E.G. Jackson, Navy cartographer for the Hawaii Government Survey Office in 1881 at Kukii Point. The Kaua'i Community College newsletter, *Archaeology on Kauai*, notes that these "remains of ancient heiau" noted by Jackson are "where the cottages of the Kauai Surf now stand" (Volume 2; 4 October 1973: 4).

Ethel Damon in her book about Kaua'i history (*Koamalu* 1931) mentions Kuhiau in Nāwiliwili and we cite her here for her mention of Pohako-eleele and Paukini Rock, the location of the first unknown and the second shown on Figure 13 (Site 1999):

> Below it, in the bay, is still the rock called Paukini, which was said to be its companion or sister heiau, and was probably also the home of the kahuna, or priest, of Kuhiau. .. and of the three small heiaus in the neighboring ahupua'a of Kalapakī, those of Ninini, Ahukini and Pohako-eleele, little more than the names survive (Damon 1931:397-398).

Bennett does not mention the Pohakoelele *heiau* and Damon probably would have mentioned its location if she had known it. There do not seem to be other references to Pohakoelele *heiau* and it is unknown if Damon used Thrum for her source or if she knew the information from persons on Kaua'i. Although its existence could not be verified by Bennett and its location

speculative, is included as a non-located site of pre-Contact Kalapakī, passed down in local memory. Ms. Nancy McMahon indicated that the Paukini Rock location was shown to her by Ms. Cheryl Lovell (pers. comm. to Cultural Surveys Hawai'i in 1999) and it has been added to the SHIP list (Site 50-50-11-1999).

In an archaeological reconnaissance survey for the Kauai Lagoons Resort, a wall, possibly related to Ninini *Heiau* was noted. "A high well-constructed wall running 400' north of Ninini Lighthouse [is a] possible prehistoric wall and [it is] possibly related to the former Ninini Heiau (Site 100) (Hammatt 1990:11). A dune midden scatter (Site -421), two probable cattle walls (Sites -422 & -423), and an oval terrace alignment (Site -424) were also recorded. This survey area was on the coast of Kalapakī, *makai* of the present project area.

The archaeological inventory survey of the 552.3 acres of Molokoa Lands (Franklin and Walker 1994) included extensive areas of Kalapakī but the only site in Kalapakī was a re-identified Site 9402, an historic building associated with Radio Station KIVM (Franklin and Walker 1994:27)

Walker, Kajima and Goodfellow's *Archaeological Inventory Survey Lihue / Puhi / Hanamaulu Master Plan* (1991) identified no archaeological sites in Kalapakī.

Kikuchi and Remoaldo's *Cemeteries of Kauai* (1992) notes two cemeteries in Kalapakī.

In 1999 Cultural Surveys Hawai'i conducted an archaeological field inspection and literature review (Creed et al. 1999 draft) of eleven parcels for proposed Līhu'e Airport expansion. One parcel comprised portions of the northernmost 50 acres of the present project area. Nothing of concern was noted in this area at that time. This planning document, however, was not submitted for review by the State Historic Preservation Division.

Section 4 Field Inspection Findings

All portions of the project area were accessible to visual inspection and were documented by field notes and photographs (Figures 8-12).

The project area is triangular in shape and is situated between two runways of the Līhu'e Airport. Just outside the east and west boundaries are dirt roads that parallel the airport runways (Figure 8). A cyclone fence defines the boundary between the airport property and the present project area.

The entire project area has been extensively modified as a result of its former use as cane fields (documented in Section 2 of this assessment—also refer to Figure 8). The land surface shows abundant evidence of plantation-era land use, including plastic mulch, plow marks, and some typical vegetation associated with feral cane fields.

The northern portion of the project area between the two airport runways is covered in one to two foot high grass. There is a large abandoned open-sided metal shed in the central portion previously used for storage and maintenance.

The southeastern portion is presently used as a green waste dump.

The southwestern portion of the project area contains several metal sheds of relatively recent construction associated with grounds maintenance.

There are dirt access roads throughout the project area. Additionally there are debris piles from construction scattered throughout the project area, indicating land modification since the plantation-era.

No surface historic properties related to traditional Hawaiian culture or to subsequent plantation-era activities were observed in the project area. The plantation-era remains in the project area, although common, do not appear to be older than 50 years. Based on the extensive evidence of former plantation-era cane cultivation, it is highly unlikely that any intact subsurface historic properties occur within the project area.

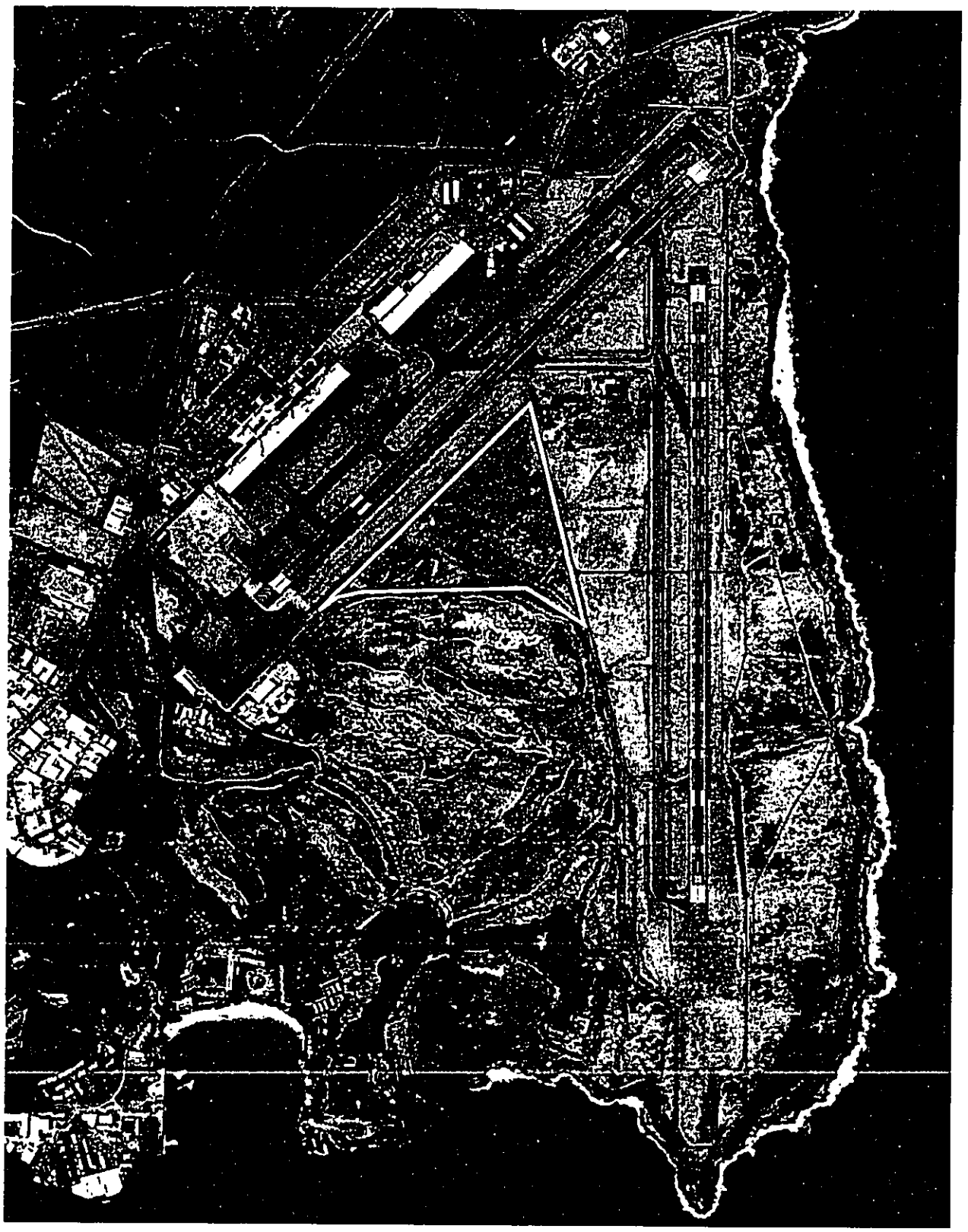


Figure 8. 2004 aerial photograph of the project area showing past disturbance

Figure 9.General view of grasses in north central portion of project area with Līhu'e Airport terminal in background; view to southwest

Figure 10. Debris pile in northeast portion of project area; view to south

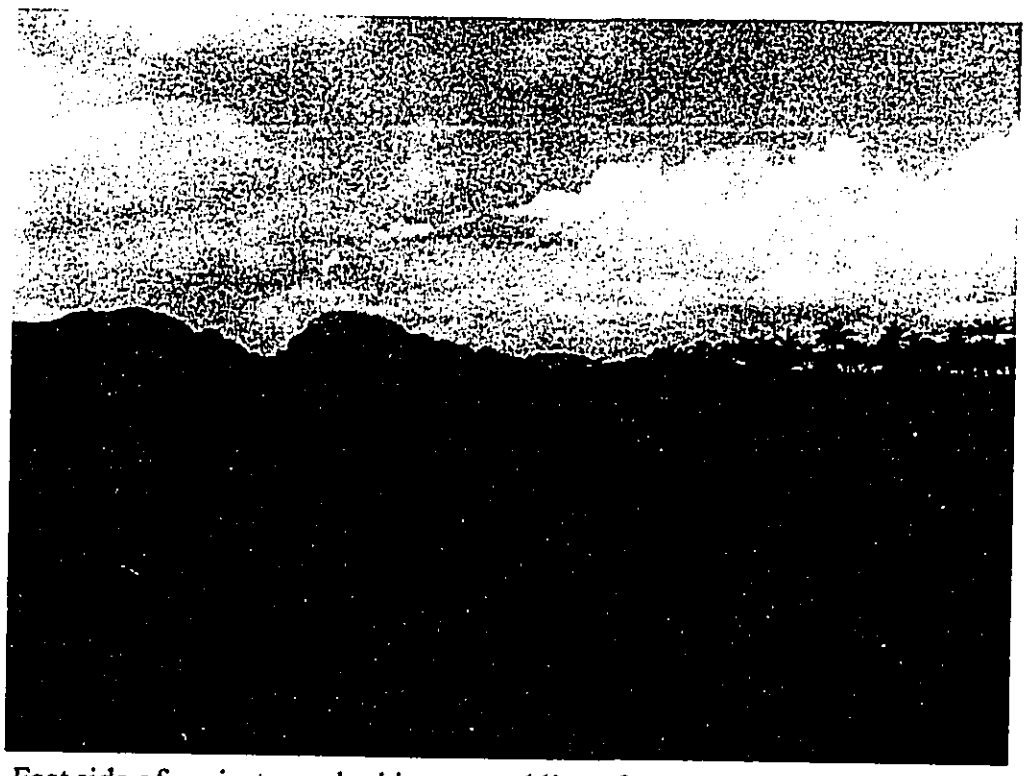


Figure 11. East side of project area looking toward line of coconut trees at southern boundary of project area; view to southwest

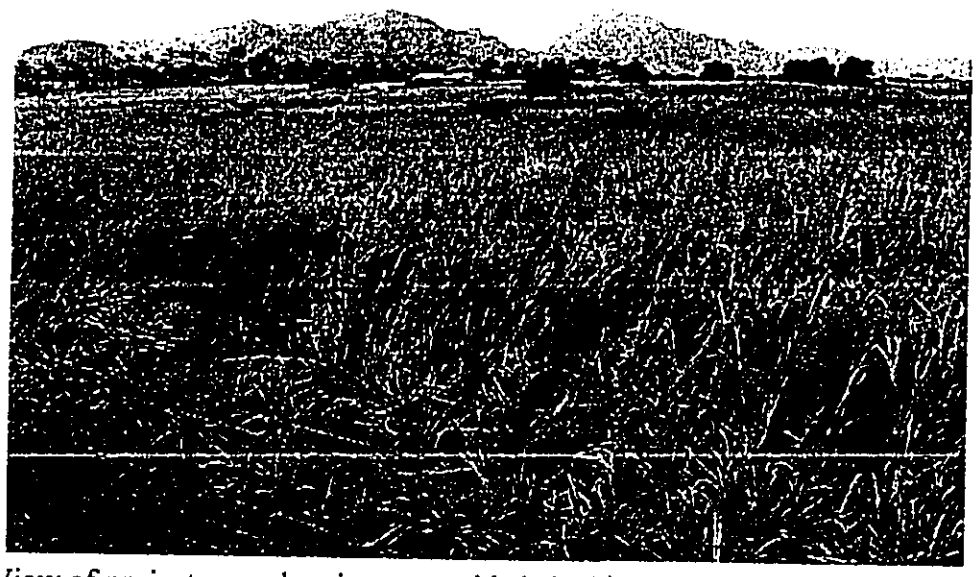


Figure 12. View of project area showing open-sided shed in central portion; view to southwest

Section 5 Summary and Recommendations

Background research suggests that, by the end of the eighteenth century, Hawaiian population in Kalapakī Ahupua'a likely focused along the floodplains of valley lands and along the shoreline. In the valley lands, streams fed taro *lo'i* while, along the shore, fishponds supported the coastal population. Plateau areas of Kalapakī like the present project area may have been utilized for planting of dryland crops and gathering of timber and medicinal plants.

Archaeological studies have documented historic properties related to traditional Hawaiian culture in *makai* areas of Kalapakī outside the project area. These properties include *heiau*. As noted in the Previous Archaeology section of this assessment, a 1999 archaeological field inspection and literature review by Cultural Surveys Hawai'i included portions of the northernmost 50 acres of the present project area (Creed *et al.* 1999). Nothing of archaeological concern was noted in this area at that time.

As confirmed by historical records, maps and photographs, sugarcane cultivation and development of plantation infrastructure was the dominant land use within the project area and surrounding lands throughout the first half of the 20th century.

As documented during the field inspection, no surface historic properties are present within the project area.

No historic properties were identified within the project area as a result of the community consultation.

Based on available information, a project-specific effect recommendation of "no historic properties affected" is warranted for the approximately 71-acre project area within the Kauai Lagoons Resort property.

No further archaeological investigation is recommended for the project area. However, it should be noted that, while unlikely, subsurface properties associated with former traditional Hawaiian activities in the project area, such as artifacts and cultural layers, may be present despite the decades of sugar cultivation activities and resort development. As a precautionary measure, personnel involved in future development activities in the project area should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow (including consultation with the State Historic Preservation Division and, as may be appropriate, with Kaua'i community cultural organizations).

Section 6 References

Archives of Hawaii
No date Land Matters, Document No. 11; List of Konohiki, Prohibited Fish and Prohibited wood.

Baptiste, Lucinda
1993 "Ahukini memories: The glory days," *The Garden Island*, November 24, 1993, 1, 5A.

Baptiste, Lucinda
1993 "Bustling Ahukini fades into fond memories, " *The Garden Island*, November 26, 1993, 1-2.

Clark, John R. K.
1990 *Beaches of Kauai and Niihau*, University of Hawaii Press, Honolulu, HI.

Cobb, Scott
1902 "Commercial Fisheries of the Hawaiian Islands," *U.S. Fish Commission Report for 1901*, Government Printer, Washington D.C.

Condé., Jesse C. and Gerald M. Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*, Glenwood Publishers, Felton, CA.

Creed, Victoria, Hallett H. Hammatt, Gerald K. Ida, Ian Masterson and John Winieski
1995 A Summary of the Archaeological Monitoring for the Kapa'a Sewerline Project Waipouli and Kapa'a Ahupua'a, Puna District, Kaua'i (TMK: 4-3-09 and 4-5-03 to 11), Cultural Surveys Hawaii, Kailua, HI.

Creed, Victoria, Loren Zulick, Gerald K. Ida, David W. Shideler, and Hallett H. Hammatt
1999 "Archaeological Assessment of the Proposed Līhu'e Airport Expansion Area, Hanama'ulu and Kalapakī Ahupua'a, Līhu'e District, Island of Kaua'i (TMK 3-5-01: 5,6,8,9,109,111, and 158 and 3-7-02:Por 1)", Cultural Surveys Hawai'i, Kailua, HI.

Damon, Ethel M.
1931 *Koamalu*, Privately printed at the Honolulu Star-Bulletin Press, Honolulu, (2 Volumes).

Folk, William H. and Hallett H. Hammatt
1995 Archaeological Monitoring of the Fiberoptic Cable Conduit Installation Through the Wailua Golf Course at Wailua, Kauai, Cultural Surveys Hawaii, Inc., Kailua, HI.

Foote, Donald E., E.L. Hill, S. Nakamura and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii*, U.S. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

Franklin, Leta J. and Alan T. Walker
1994 Additional Archaeological Inventory Survey, Molokoa Lands Project Area, Lands of Hanama'ulu and Kalapakī, Lihu'e District, Island of Kauai, PHRI, Hilo HI

Hammatt, Hallett H.
1988 *Archaeological Reconnaissance Survey of 150 acres of Coastal Land, Kalapak□, Kauai Island* (Site of a Proposal 3rd Gold Course, Kauai Lagoon's Resort), Cultural Surveys Hawaii, Kailua, HI.

Hammatt, Hallett H. and William H. Folk (eds)
1995 *Nawiliwili Cemetery Burial Treatment: An Archaeological and Osteological Study*, "The Documentary History of Nawiliwili Cemetery" by Patrick O. Walsh; "The Archaeological Investigation," by William H. Folk and Hallett H. Hammatt; "Burial Containment and Associated Grave Goods," by Jennifer Robins, "Catalog of Graves," by Melody Heidel; "Osteological Analysis," by Patricia Kajima and Michael Pietrusewsky; "Archaeological Summary and Recommendations," by William H. Folk, Cultural Surveys Hawaii, Inc., Kailua, HI.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*, Volume 1, Bishop Museum Bulletin No. 161, B.P. Bishop Museum, Honolulu, HI.

Hommon, Robert J.
1976 *The Formation of Primitive States in Pre-Contact Hawai'i*, Ph.D. Dissertation, University of Arizona, Tucson, AZ.

Kaua'i Community College
"Archaeology on Kaua'i: A Collection of Newsletters" (AOK), *Kaua'i Community College News Letter*, Lihue, Kaua'i, HI.

Kikuchi, William A.
1992 Use Permit for J.C. Sandblasting, Hanam□'ulu, L□hu'e, Kaua'i.

McMahon, Nancy
1990 Archaeological Fieldcheck of Three Parcels in Lihue Judiciary District: Possible Locations for a New Kaua'i Judiciary Building, Nawiliwili, Kalapakī, and Hanamaulu, Kaua'i, Historic Preservation Program, State of Hawaii.

Mitchell, Aulii, Rodney Chiogioji, and Hallett H. Hammatt
2005 DRAFT *Cultural Impact Evaluation of Two Portions, totaling Approximately 400 Acres, of the Kaua'i Lagoons Resort Property Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island TMK: (4) 3-5-001: 8 & 82*, Cultural Surveys Hawai'i, Inc., Kailua HI.

Moffat, Riley M. and Gary L. Fitzpatrick
1995 Survey the Mahele, Mapping the Hawaiian Land Revolution, (Palapala'aina, Volume 2), Editions, Ltd., Honolulu, HI.

Peterson, Barbara Bennett, Editor
1984 *Notable Women of Hawaii*, University of Hawaii Press, Honolulu, HI.

Pukui, Mary Kawena
1983 *Olelo No`eau: Hawaiian Proverbs and Poetical Sayings*, Bishop Museum Special Publication No.71, Bishop Museum Press, Honolulu, HI.

Rice, William Hyde
1977 *Hawaiian Legends, Bernice P. Bishop Museum*, Honolulu, HI, originally published 1923.

Rosendahl, Paul H.
1990 Archaeological Field Inspection and Limited Subsurface Testing, Kalepa Radio Station and Kalepa Road Improvement Project Area, Land of Hanamā`ulu, Līhu`e District, Island of Kaua`i. PHRI, Hilo, HI.

Spencer Mason Architects
1989 *Historic Bridge Inventory: Island of Kauai*, Department of Transportation Highways Division, Honolulu, HI.

Territorial Planning Board
1939 An Historic Inventory of the Physical, Social and Economic and Industrial Resources of the Territory of Hawaii: First Progress Report, Honolulu, HI.

Thrum, Thomas G.
1907 "Tales from the Temples," (Preliminary paper in the study of the Heiaus of Hawaii, with plans of the principal ones of Kauai and Oahu), *The Hawaiian Annual*, Honolulu, HI

University of Hawai`i at Hilo, Department of Geography
1998 Atlas of Hawai`i, 3rd edition, Edited by Sonia P. Juvick, James O. Juvik, Chief cartographer Thomas R. Paradise, University of Hawai`i Press, Honolulu.

U.S. Department of Agriculture Soil Conservation Service
1972 *Soil Survey Interpretations, Kauai, Report R41*, U.S. Government Printing Office, Washington, D.C.

Waihona `Aina Corp.
1998 The Mahele Database at waihona.com, Kailua, HI.

Walker, Alan T. and Paul H. Rosendahl
1990 Archaeological Inventory Survey, Hanamaulu Affordable Housing Project Area, Land of Hanamaulu, Lihue District, Island of Kauai (TMK: 3-7-03:Por. 20), PHRI, Hilo, HI.

Appendix C

Cultural Impact Evaluation of Two Portions, Totaling Approximately 400 Acres, of the Kauai Lagoons Property Prepared by Cultural Surveys Hawaii October 2005

Cultural Impact Evaluation of Two Portions, Totaling Approximately 400 Acres, of the Kaua'i Lagoons Resort Property Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island TMK: (4) 3-5-001: 6, 27 por., 165, 168, & 173

Prepared for
Wilson Okamoto Corporation

Prepared by
Aulii Mitchell, B.A.,
Rodney Chiogioji, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai'i, Inc.
Kailua, Hawai'i
(Job Code: KALA 25)
October 2005

O'ahu Office
P.O. Box 1114
Kailua, Hawai'i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
16 S. Market Street, Suite 2N
Wailuku, Hawai'i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Evaluation of Two Portions, Totaling Approximately 400 Acres, of the Kauai Lagoons Resort Property, Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island (Mitchell, Chiogioji, and Hammatt 2005)
Date	October 2005
Project Number	Cultural Surveys Hawai'i Inc. (CSH) Job Code: KALA 25
Agencies	State of Hawai'i Department of Health / Office of Environmental Quality Control (DOH / OEQC)
Project Funding and Land Jurisdiction	Private
Project Acreage and Location	Approximately 400 acres, Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island, TMK (4) 3-5-001: 6, 27 por., 165, 168, & 173. This area is depicted on the 1998 Līhu'e USGS 7.5-minute topographic quadrangle.
Project Description	The Kauai Lagoons Resort recently received permit approvals from the County of Kaua'i to develop up to 723 hotel/residential units, a new golf clubhouse and related recreational and commercial facilities. The owners of the resort are now proposing to make changes to the golf course layout by reconfiguring the Mokihana and Kiele courses, and spreading the allowable resort residential units over portions of the golf courses and other open areas. Additionally, a 24-unit affordable housing project at the intersection of Haoa Street and Kapule Highway is proposed.
Area of Potential Effect (APE) and Study Area.	For this cultural impact evaluation, the project's APE is defined as the entire approximately 400-acre footprint of the two portions of the Kauai Lagoons Resort property.
Regulatory Context and Document Purpose	The proposed project requires: 1) a General Plan amendment to expand the resort-designated areas; 2) an environmental assessment; and, 3) a zoning amendment. A State land use change from Agriculture to Urban for a portion of the Mokihana Course may also be pursued to enable residential development. The 24-unit affordable housing project requires rezoning from Light Industrial to Residential to permanently allow the residential use and needed density. The project requires compliance with the State of Hawai'i environmental review process [Hawai'i Revised Statutes (HRS) Chapter 343], which requires consideration of a proposed project's effect on traditional cultural practices. At the request of the Wilson Okamoto Corporation, CSH undertook this cultural impact evaluation. It provides information pertinent to the assessment of the proposed project's cultural impacts [per HRS Chapter 343 and the Office of Environmental Quality's *Guidelines for Assessing Cultural Impacts*[1]). The document is intended to support the project's environmental review and may also serve to support the project's

	historic preservation review under HRS Chapter 6E-42 and Hawai'i Administrative Rules Chapter 13-284.
Consultation Effort	Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project area and the vicinity. The organizations consulted included the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), the Kaua'i/Ni'ihau Islands Burial Council, and Hui Malama I Nā Kūpuna O Hawai'i Nei. Cultural anthropologist Aulii Mitchell conducted the consultation effort under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator).
Findings	Sugarcane cultivation and development of plantation infrastructure was the dominant land use within the project area and surrounding lands throughout the first half of the 20th century. The decades of sugar cultivation in the project area would have eliminated any surface historic properties related to traditional Hawaiian culture that may have formerly existed. Further, plantation operations – and the sense that the project area was private property – restricted access inside the project area by cultural practitioners who may have formerly utilized the area. During the second half of the 20th century, development of the resort property would have further eliminated any remnants of the former traditional landscape and further restricted access. None of the community contacts queried for this evaluation identified any cultural sites or concerns specifically within the project area. Ms. Cheryl Lovell-Obatake noted that portions of the resort property are still accessed by community members "because the area is the last remnant of open space with no buildings." These portions of the property may be the more *makai* lands along the coast, outside the present project area which is already fully incorporated into the resort development or is vacant land surrounded by urban industrial development – i.e. the two-acre parcel at the intersection of Haoa Street and Kapule Highway. Especially relevant to this evaluation, Ms. Lovell-Obatake also noted that she has never heard of any burials in the project area.

Cultural Impact Recommendations	Based on the above findings future development of the specific project area within the Kauai Lagoons Resort property will have minimal impact upon native Hawaiian cultural resources, beliefs and practices. It should be noted, however, that subsurface properties associated with former traditional Hawaiian activities in the project area, such as artifacts and cultural layers, may be present despite the decades of sugar cultivation activities and resort development. As a precautionary measure, personnel involved in future development activities in the project area should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow (including consultation with the State Historic Preservation Division and, as may be appropriate, with Kaua'i community cultural organizations).

[1]CSH's scope of work and methods for cultural impact evaluation studies includes consultation with knowledgeable individuals and groups regarding current cultural practices, but does not include formal ethnographic interviews and oral histories, as described in the OEQC's "*Guidelines for Assessing Cultural Impacts*" (OEQC 2004). Cultural impact evaluation studies are intended as a more time and cost effective means of addressing potential impacts to cultural practices within project areas that have been fully developed for a long time and where, accordingly, there is less likelihood of ongoing cultural practices.

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 Project Background

At the request of Wilson Okamoto Corporation, Cultural Surveys Hawai'i, Inc. (CSH) has prepared a cultural impact evaluation for two portions of the privately owned Kauai Lagoons Resort property in Kalapakī Ahupua'a, Līhu'e District, Kaua'i Island [TMK (4) 3-5-001: 6, 27 por., 165, 168, & 173] (Figures 1 & 2). The two portions of the overall Resort property amount to approximately 400 acres.

The Kauai Lagoons Resort recently received permit approvals from the County of Kaua'i to develop up to 723 hotel/residential units, a new golf clubhouse and related recreational and commercial facilities. The owners of the Resort are now proposing to make changes to the golf course layout by reconfiguring the Mokihana and Kiele courses, and spreading the allowable resort residential units over portions of the golf courses and other open areas.

The proposed project requires: 1) a General Plan amendment to expand the resort-designated areas; 2) an environmental assessment; and, 3) a zoning amendment. A State land use change from Agriculture to Urban for a portion of the Mokihana Course may also be pursued to enable residential development. The 24-unit affordable housing project requires rezoning from Light Industrial to Residential to permanently allow the residential use and needed density.

The project requires compliance with the State of Hawai'i environmental review process [Hawai'i Revised Statutes (HRS) Chapter 343], which requires consideration of a proposed project's effect on traditional cultural practices. At the request of the Wilson Okamoto Corporation, CSH undertook this cultural impact evaluation. It provides information pertinent to the assessment of the proposed project's cultural impacts [per HRS Chapter 343 and the Office of Environmental Quality's (OEQC) *Guidelines for Assessing Cultural Impacts*[1]]. The document is intended to support the project's environmental review and may also serve to support the project's historic preservation review under HRS Chapter 6E-42 and Hawai'i Administrative Rules Chapter 13-284. For this cultural impact evaluation, the project's APE is defined as the entire approximately 400-acre footprint of the two portions of the Kauai Lagoons Resort property.

1.2 Scope of Work

CSH's scope of work and methods for cultural impact evaluation studies includes consultation with knowledgeable individuals and groups regarding current cultural practices, but does not include formal ethnographic interviews and oral histories, as described in the OEQC's "*Guidelines for Assessing Cultural Impacts*" (OEQC 2004). Cultural impact evaluation studies are intended as a more time and cost effective means of addressing potential impacts to cultural practices within project areas that have been fully developed for a long time and where, accordingly, there is less likelihood of ongoing cultural practices.

The scope of work included:

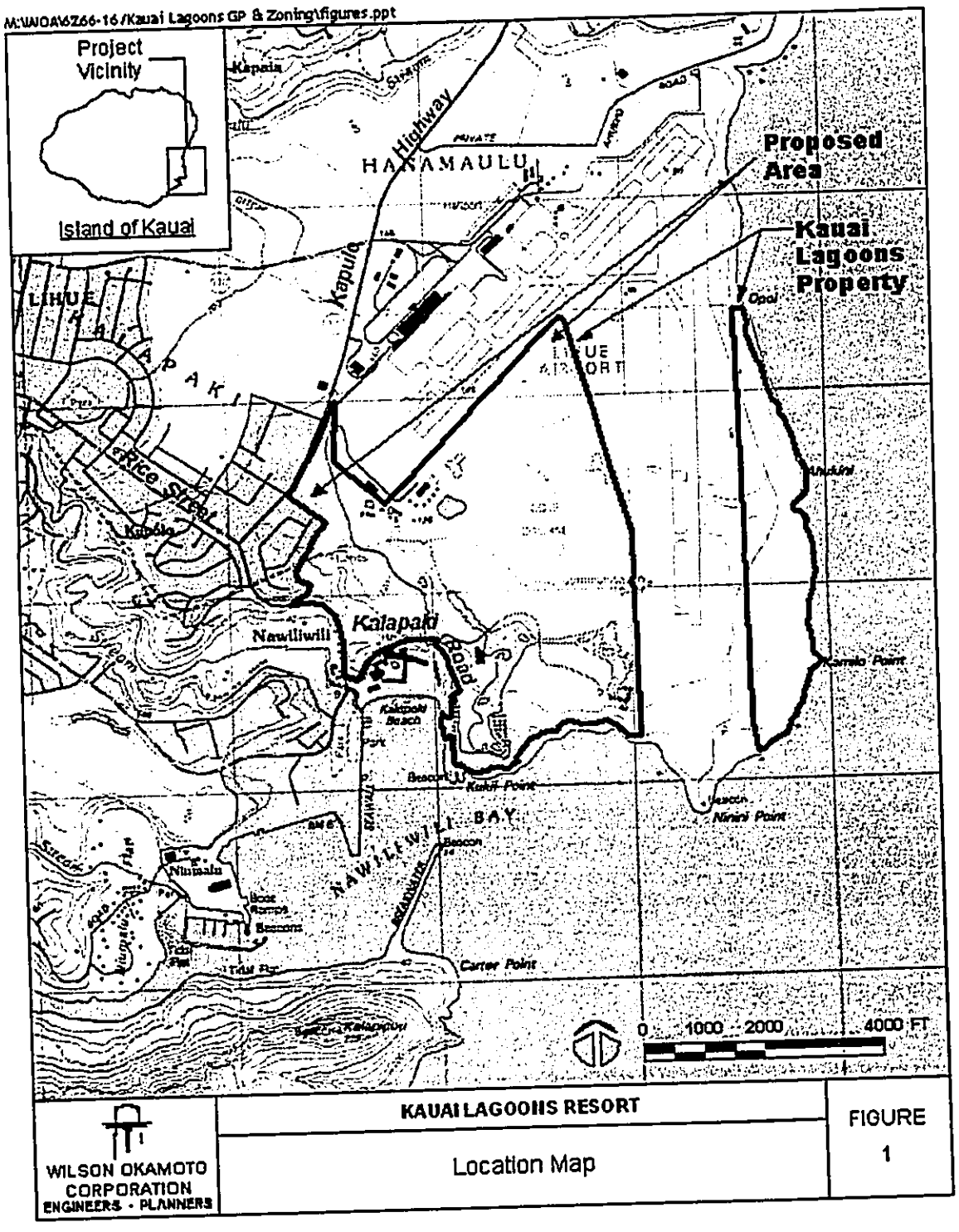
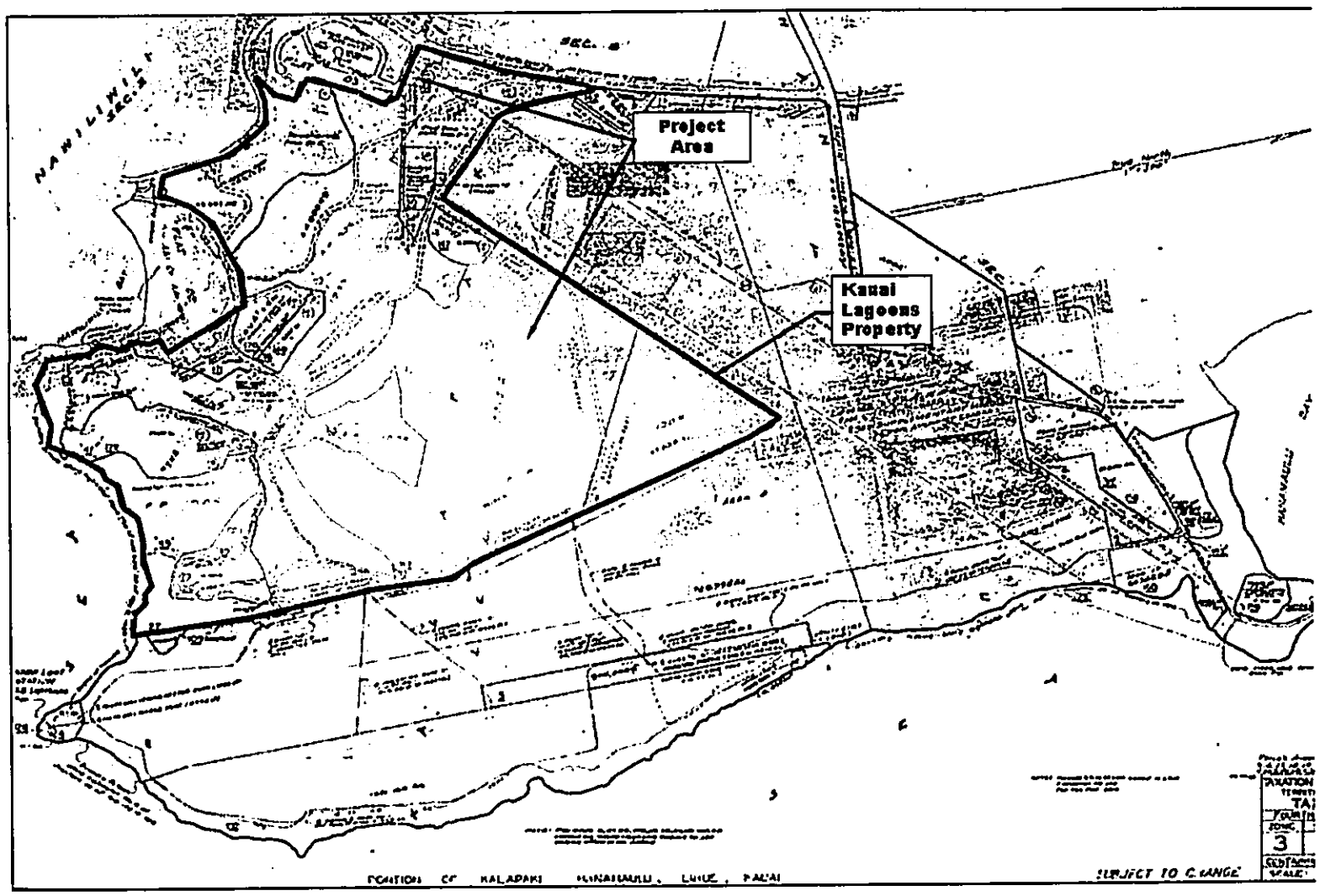


Figure 1. Project Area (yellow) within the overall Kaua'i Lagoons Property, shown on a portion of the 1998 Līhu'e USGS 7.5- minute topographic quadrangle



Project Area (yellow) within the overall Kaua'i Lagoons Property, shown on a Tax Key Map

1. Historical and previous archaeological background research, including study of archival sources, historic maps, Land Commission Awards, and previous archaeological reports, to construct a history of land use and to determine if archaeological sites or other cultural properties have been recorded on or near this property;
2. A field inspection of the project area to identify any cultural impact issues;
3. Limited consultation primarily by written and/or telephone requests for information with individuals and groups;
4. Preparation of this report that assesses the likelihood that the proposed project will impact cultural practices. This assessment is based on the background research, the review of land use within the vicinity of the project area, and the results of consultation. As indicated above, no formal interviews were undertaken.

1.3 Methods

Historical documents, maps, and photographs were researched at: the Kaua'i Historical Society; the Hawai'i State Archives; the Survey Office of the Department of Accounting and General Services; the Hawai'i State Library; the Bernice Pauahi Bishop Museum archives and library; Hamilton Library at the University of Hawai'i Mānoa; the Mission Houses Museum Library; the State Historic Preservation Division (SHPD) library; and the library of CSH.

A field inspection of the project area by Cultural Surveys Hawai'i, Inc. was accomplished on October 20, 2005 by Robert Hill, B.A., and Hallett H. Hammatt, Ph.D.

Hawaiian organizations, government agencies, and community members were contacted to: (1) identify potentially knowledgeable individuals with cultural expertise and knowledge of the project area and the surrounding vicinity, and (2) identify cultural concerns and potential impacts within the project area. Results of the community contact process are presented in Section 4 below. Cultural anthropologist Aulii Mitchell conducted the consultation effort under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator).

Section 2 Background Research

2.1 Traditional and Historical Background

2.1.1 Mythological and Traditional Accounts

In *Hawaiian Antiquities and Folklore* (Fornander, 1918-1919), a pioneering collection of Hawaiian lore, references are made to Kalapakī Ahupua'a, and to Līhu'e. One of the named Kaua'i winds, "*He waikai ko Kalapakī*" refers to the salty fresh water of Kalapakī (vol. 2: 96-97). The place name Līhu'e appears in the "Legend of Uweuwelekehau." Uweuwelekehau and his wife Luukia are being punished: they are stripped of their clothing and sent to Manā [at the west end of the island]. When they reach the plains of Līhu`e, Luukia complains of her nakedness. Uweuwelekehau tells her that they will find on a nearby hill a *pa'u* and all manner of *kapa*, which they do (vol. 2:196-197).

During the 1920s, William Hyde Rice, a life-long resident of Kaua'i, recorded and collected Hawaiian lore of the island in *Hawaiian Legends* (1977). In that volume two place names in the vicinity of the present project area--Ninini and Ahukini--are mentioned once each. In "The Goddess Pele":

> Two brothers of Pele who had come from foreign lands, saw Lohiau's body lying as a stone where the lava flow had overtaken him. Pity welled up . . . and they brought Lohiau to life again. One of these brothers made his own body into a canoe and carried the unfortunate Lohiau to Kauai, where he was put ashore at Ahukini. (Rice 1977: 14)

Ahukini in the above quote probably refers to the *heiau*, which formerly stood in Kalapakī near Ahukini Point on the bluff overlooking the sea, since the name "Ahukini" means "altar of many blessings

In "The Menehunes," a favorite place for their sport of jumping off cliffs into the sea is Ninini: A...little beach surrounded by cliffs, just inside the point where the larger Nāwiliwili lighthouse now stands"; the tale also mentions that part of a large rock from Kīpūkai is at Ninini (Rice 1977:44).

2.1.2 Early Journals and Survey Expeditions

The first written accounts of the lifestyle on Kaua'i are from travelers, missionaries and surveying expeditions. Missionary accounts from the first half of the 19th century provide the majority of the early written records for this portion of Kaua'i.

Ethel Damon, in *Koamalu* repeats the scenic description of Līhu'e given by Reverend Hiram Brigham in his book, *A Residence of Twenty-One Years in the Sandwich Islands*, published in 1847:

> In 1824, when walking around the island from Waimea to counsel the people after the wreck of The Cleopatra's Barge, Rev. Hiram Bingham crossed from Hanapepe, as has been seen, over the old upland trail back of Kilohana, and wrote of it as "a country of good land, mostly open, unoccupied and covered with grass, sprinkled with trees, and watered with lively streams that descend from the forest-covered mountains and wind their way along ravines to the sea, - a much finer country than the western part of the island. (Damon 1931: 401).

In the *Narrative of the United States Exploring Expedition* (1845), Lt. Commander G.E.G. Wilkes describes the "Lihui" District:

> At noon they reached Lihui, a settlement lately undertaken by the Rev. Mr. Lafon, for the purpose of inducing the natives to remove from the sea-coast, thus abandoning their poor lands to cultivate the rich plains above. Mr. Lafon has the charge of the mission district lying between those of Koloa and Waioli. This district was a short time ago formed out of the other two
>
> ...The temperature of Lihui has much the same range as that of Koloa, and the climate is pleasant: the trade-winds sweep over it uninterruptedly, and sufficient rain falls to keep the vegetation green throughout the year.
>
> As yet there is little appearance of increase in industry, or improvement in the dwellings of the natives. There are no more than about seventy pupils in this district, who are taught by natives. There are two houses of worship, and about forty communicants. No decrease is apparent in the population within a few years.
>
> On the fertile places, although the pasture was good, yet no cattle were to be seen. From Lihui, they pursued their way to Hanawale, which is a small fishing village at the mouth of a little stream. The country on this route was uninteresting, until they reached Wailua... (Wilkes 1845:67-68)

2.1.3 The Māhele Claims

Paulo Kanoa, Governor of Kaua'i at the time of the Māhele claimed both the *ahupua'a* of Hanamā'ulu and Kalapakī but was awarded neither. Victoria Kamāmalu was awarded both *ahupua'a* under No. 7713:2. The Victoria Kamāmalu award (7713:2 part 7) includes land within the present project area.

The locations of *kuleana* or commoner land claims of the Māhele (1848-1853) in Kalapakī Ahupua'a are from the shore back into and along the floodplains of the valley land. There were 13 claims in Kalapakī, of which 12 were awarded. The cultivation of "taro" (*kalo*), the major staple, was along the river flood plains. All the house lots in Kalapakī were at the shore. There were small *kula* listed for the *ahupua'a* where presumably sweet potatoes and other produce were grown. The only crop other than "*kalo*" mentioned specifically is *wauke* in Kalapakī. Additionally, more than one claim in Kalapakī mentions the fishponds of

Koenaawa. Two streams--Koenaawa nui and Koenaawa iki--are identified in the claims but neither is named on current maps.

The Kalapakī claimants described traditional taro *lo'i* cultivation along the river with houses at the shore in a village. The Kalapakī *lo'i* claims were on the north side of Nāwiliwili River (the *wauke* land in Claim 3907 on the south side of the river being the sole exception) and along the smaller brooks of Kalapakī and Koenaawa where there were springs. The claims on the south side of the Nāwiliwili River are in the *ahupua'a* of Nāwiliwili. Most Kalapakī claimants lived, however, at the shore in the "*kulana kauhale*" or village of Kalapakī, located on Nāwiliwili Bay. Several of the claimants describe their village house lots in relation to the fishponds of Koenaawa (Koenaawainui & Koenaawaiki). There is also a description of the *muliwai* or estuary of Koenaawanui.

Cattle, introduced by Vancouver, had at first been under a royal *kapu* and were allowed to roam freely and reproduce. Within a few decades cattle had begun to wreck havoc on village gardens and taro lands and homes. Residents either abandoned the land destroyed by roaming cattle or else started building walls to keep the cattle out of their homes and gardens. Huleia, an *ahupua'a* to the south of the project area, was claimed by Victoria Kamāmalu during the Māhele, as a preserve for cattle (Māhele information). Apparently, as the report by Wilkes suggests, the people of Līhu'e had so far been safe from such depredation (*ca.* 1840s).

Following the death of Victoria Kamāmalu in 1866, her lands were inherited by Princess Ruth Ke'elikōlani. In 1870 Ke'elikōlani sold large portions of her Kalapakī and Līhu'e lands to William Hyde Rice of Lihue Plantation. Also in 1870, Paul Isenberg purchased the *ahupua'a* of Hanamā'ulu from J.O. Dominis which includes the present airport area. William Hyde Rice made subsequent land purchases from Princess Ruth in 1879:

> William Hyde Rice, who already had his own home on the hill east of the mill, bought a large *makai* section of the *ahupua'a* of Kalapakī from Princess Ruth in 1879 and there conducted the Lihue Ranch. In later years he sold most of this land to the plantation. (Damon 1931:747)

The large tracts of inland areas (*kula*), not in the river valleys or at the shore, are not described in the claims but were probably in use. This *kula* land at the time of the Māhele belonged to Victoria Kamāmalu. Land use is not elaborated in her claims for Hanamā'ulu or Kalapakī. Traditional *kula* resources for all claimants would have been medicines, herbs, construction materials such as *pili* grass and trees for building houses, canoes, and perhaps lithic materials for tools. Sweet potatoes and other dryland crops, such as *wauke*, probably were cultivated in patches throughout the area at one time or another.

2.1.4 Other Sources

In William Hyde Rice's *Hawaiian Legends* (discussed above), Rice's granddaughter Edith Rice Pleus notes that Kalapakī in the 1920s comprised fertile lands. She probably referred to the extensive plains or *kula* lands existing prior to use for commercial sugar cane. The cultivation of

sweet potatoes, gourds and *wauke*, and other dryland crops would have dominated land use in these *kula* lands.

A document listed only as *Land Matters, Document 11* with no date in the State Archives refers to *konohiki* rights (either prior to or contemporary with Land Commission claims since the *konohiki* received their claims after the *ali'i* and before the *kuleana* awards). The *konohiki* had proprietary rights to fish caught in the bay fishing. Document No. 11 lists *ana'e* as the protected fish of Hanamā'ulu, and *uhu* for Kalapakī. These protected fish are part of the *konohiki* resources, which he or she would use to meet his/her obligations to superior chiefs, governors/governesses and the King or Queen. Wikolia is listed as the *konohiki* for Wailua, Hanamā'ulu, Kalapakī, Nāwiliwili, Niumalu, Ha'iku, Kīpū, and a few other places. The proper procedure for fishing in the bay would be when:

> the proper fishing season arrives all the people may take fish, and when the fish are collected, they shall be divided - one third to the fishermen, and two thirds to the landlord (Kosaki, 1954:14).

And the protected fish might all be for the *konohiki*.

One of the last vestiges of the pre-cash crop landscape is depicted in the diary entry for the Rice family's arrival on Kauai in 1854. During the second half of the 19th century, western settlers and entrepreneurs set their sights on southeast Kaua'i. Ethel Damon, in *Koamalu*, her history of the Rice family of Kaua'i, describes the Līhu'e landscape at the time of the family's arrival at Nāwiliwili Bay:

> From the deck of their river craft in 1854 Mrs. Rice and the children could plainly see above the rocky shore and ruins of Kuhiau, the old heiau, or temple, and nearby on the bluff the flaming blossoms of a great wili-wili tree among koa trees which ten grew almost down to the water's edge (Damon 1931:17-18).

These early written documents describe a good land with a nice climate and plentiful provisions for the traveler. Residents of the land live near the ocean and fishing villages are scattered along the shore; and at that time at Kalapakī many trees grew right down to the water's edge (e.g. *koa* and *wiliwili*).

While foreigners may have seen the shoreline as unproductive, Hawaiians would have disagreed. The indigenous settlement pattern indicates that the shoreline was the locus for villages like Kalapakī at the mouth of Nāwiliwili River and "Hanawale" perhaps a village near Hanamā'ulu Bay. Shoreline areas were certainly favored for fishing, swimming, surfing and residence. Depending on the distances, they may have had temporary residences among their agricultural lands and even in the uplands while gathering materials for house or canoe building. Others resided inland near their fields, but would have traveled around to acquire needed or desirable resources.

2.2 Transition to Cash Crops and Exportable Products

2.2.1 Journals and Surveyor's Records

In the earlier journals, lack of industry is noted and this refers specifically to production of goods beyond the needs of those producing them. Pigs, sweet potatoes and salt, among other items were traded to the earliest sailing vessels arriving in Hawaii (post 1794) and it is likely that in Līhu'e District, as elsewhere, the production of these items increased beyond the needs of the immediate family and their expected contributions to their chiefs during this period of early visiting voyagers.

Cutting and shipping sandalwood to the Orient was probably the fist real "industry" seen from a western perspective. We have only one indirect reference to the sandalwood trade in the Līhu'e area. Ethel Damon records that early settler, Richard Isenberg, had been told by Chief Forester C.S. Judd, that Mount Kalepa, had formerly been covered with sandalwood (Damon 1931:913).

The sandalwood trade or industry was soon replaced by the whaling trade. Between the 1840s and 1860s whaling ships would come to the Hawai'i to spend the winter, repair their ships, recruit sailors, leave sick sailors behind and stock up supplies for the next season. Early historical accounts relate that Kōloa, on the south side of Kaua'i, was a major port or roadstead for the victualing trade for whalers, fur traders and merchant ships plying their trades between Asia and the west and back and forth to the Arctic. Though there is no specific evidence of crops raised in the Līhu'e area were for trade in Kōloa, the roadstead would have provided residents of Līhu'e with a market for their produce (see Wilkes below).

In the *Narrative of the United States Exploring Expedition* (1845), Lt. Commander G.E.G. Wilkes describes the "Lihui" District:

> The principal village is Nawiliwili, ten miles east of Koloa. This district contains about forty square miles, being twenty miles long by two broad. The soil is rich: it produces sugar-cane, taro, sweet-potatoes, beans, &c. The only market is that of Koloa. The cane suffers somewhat from the high winds on the plains (Wilkes 1845:67-68).

While sweet potatoes, gourds, sugar cane and *wauke* were important commodities in pre-Contact days, they supplemented the basic traditional diet of fish and taro. Thus, early foreign ideas of fertility and industry, backed by the needs of traders and whalers for supplies, mark the beginning of the shift to cash crops as the new landscape of inland "fertile plains."

The missionaries came to preach and teach western religion and culture. Missionary-sponsored schools of Līhu'e are also documented by Damon:

> 1842: Number of schools in Lihue district 5: teachers 7: scholars 185; of whom readers 123, writers 28, those in arithmetic 64, and in geography 8. The Catholics

> have succeeded in getting away 12 children from one of these schools. (Damon 1931:407)

The new settlers and entrepreneurs brought new activity to southeast Kaua'i. Cotton was among the crops grown in Hanamā'ulu, adjacent to Kalapakī:

> Later Mr. August Dreier was engineer in the mill. He had come out about 1869 for Hoffschlaeger and Stapenhorst to install a cotton mill in upper Hanamaulu land. The combination of a cool temperature with rain and red dust proved too much for successful cotton growing, but many wild bushes of it are still found in Kapaia valley. (Damon 1931:586)

Paramount, however, among the new cash crops was sugar. The plantation at Līhu'e was first established in 1849 by Henry A. Pierce; Judge Wm. Little Lee, the chairman of the Land Commission; and Charles Reed Bishop. It became Lihue Plantation in 1850. It was probably the best-capitalized and most-modern plantation at that time in all Hawai'i. The mill was north and west of the present airport. A steam-powered mill was built in 1853 at Lihue Plantation, the first use of steam power on a Hawaiian sugar plantation. Another important innovation at Līhu'e was created in 1856, when William H. Rice completed the ten-mile-long Hanamā'ulu Ditch, the first large-scale irrigation project for any of the sugar plantations (Moffatt & Fitzpatrick 1995:103). Plantation labor was brought in from many countries and these new laborers brought some of their own cash crops.

2.2.2 Early 20th Century Maps

The 1910 USGS map shows railroad tracks crisscrossing the non-valley land and indicate cane cultivation reaching toward the shore (Figure 3). The cane fields have expanded toward the ocean into the area of the present airport. The expansion of Lihue Plantation's sugar cane cultivation would accelerate throughout the entire coastal area in the early decades of the 20th century.

Sugar cane cultivation transformed the traditional landscape of Kalapakī into plantation landscape. By 1931, Lihue Plantation had 6,712 acres in cane. The plantation's field map of 1941 (Figure 4) shows sugarcane covering the entire coast and the present project area. Lihue Plantation "developed a water collection system second only to East Maui Irrigation Company ... Altogether there are 51 miles of ditch and eighteen intakes" (C. Wilcox 1996:68). Railroads extended across the plantation to and from the shipping facilities and beyond the plantation itself to other plantations.

2.2.3 Non-Sugar Landscapes Associated with Sugar Cane Cultivation

The plantation landscape in Līhu'e began about mid 19th century and continued to expand for a century. In 1950, about the time of the advent of the new airport, and after Statehood in 1959 Līhu'e's plantation landscape began to give way to the present urban center.

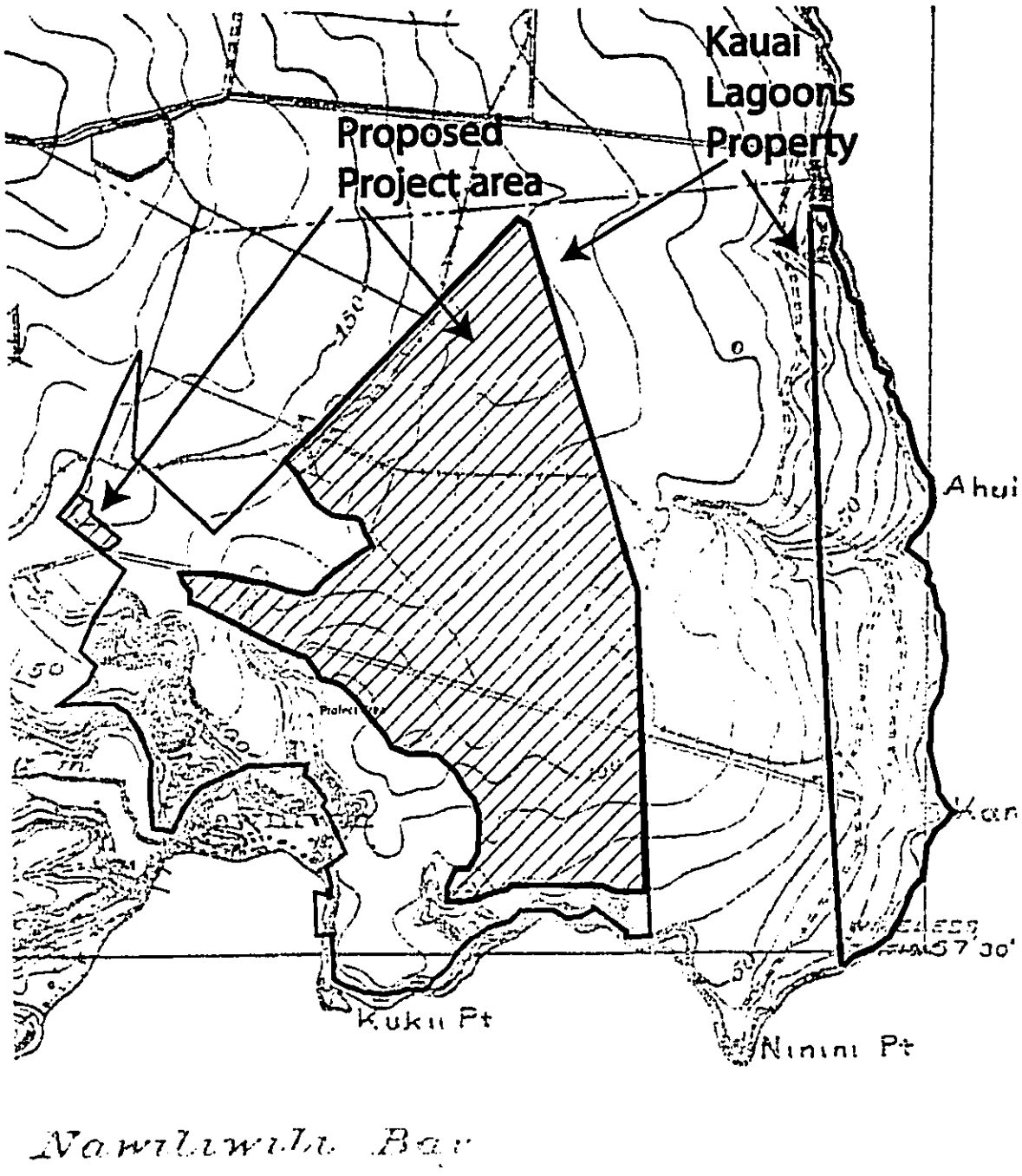


Figure 3. 1910 USGS map with location of present project area indicated

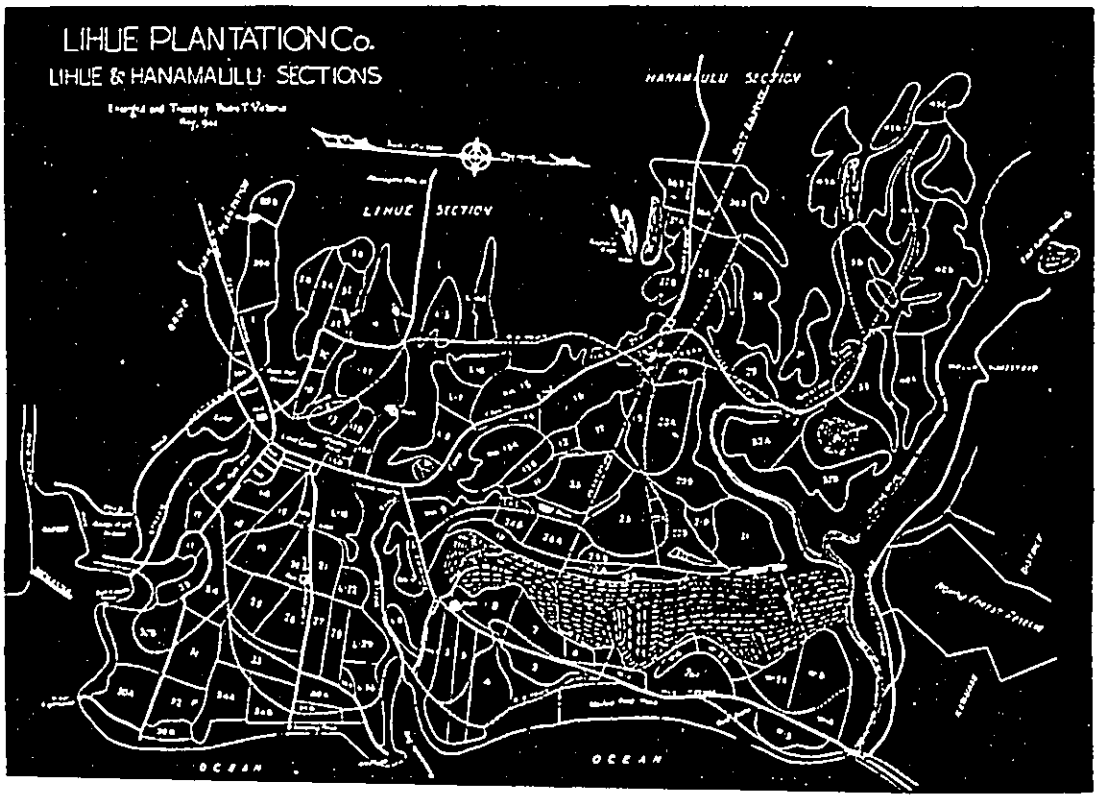


Figure 4. Lihue Plantation field map of 1941

Rice production was an off-shoot industry of the sugar plantation in the 1870s, since many of the new Chinese plantation workers began to grow rice for themselves and then for trade with California. Japanese immigrants, by the end of the 19th century did the same and took over many of the Chinese rice paddies. Growing and milling rice also became a means for immigrants to leave the plantations after their indenture period. Field note drawings (1885) by Lt. Geo. G.E. Jackson, a cartographer for Territory of Hawaii in the early 1880s show rice fields at the mouth of Nāwiliwili River in the estuary and he shows a few houses left in Kalapakī Village. In general, rice planters used abandoned taro fields, but made the patches larger than the traditional taro *lo'i*. This is probably true of the Kalapakī floodplain.

Jackson's drawings also show that the Kalapakī land north of Kuki'i Point, where the airport now lies, as a "level grassy land with volcanic boulders," showing no cane cultivation in 1885. Gay and Kittridge's map of 1898 still shows the same "stony land" and notes its use as a goat and sheep pasture.

Lihue Plantation owners and managers were concerned about reforesting their landscape, to make it more fruitful, productive, and pleasant. Forests, which would have existed possibly down to the sea, had been cleared during the sandalwood era, and perhaps earlier. Former forest lands were barren by the time the plantation management controlled the land. A major reforestation plan was carried out.

Ethel Damon records that early settler, Richard Isenberg,

> often looked out on to the bare slopes of Mount Kalepa, said later by Chief Forester C.S. Judd to have been covered formerly with a growth of sandalwood. On his departure Richard Isenberg left funds for the planting of ten acres on Kalepa hill to young ironwood. Today a roadway up this hill has been constructed for Kauai's first wireless telephone station, Ka Lepa, The Signal Hill, thus resuming what is said to have been its ancient importance as a peak for signaling messages. (Damon 1931:913)

A major reforestation effort was also carried out on Kilohana Crater:

> Paul Isenberg engaged a German forester who remained on Lihue Plantation for five or six years and then returned to the Prussian Forest Service after passing much of his knowledge on to others here. His first and principal task was to plant and tend a young forest on a tract of valley and a ridge of about 300 acres on the eastward slope leading up to Kilohana crater. This is often called the German Forest and was, as far as is known, the first extensive attempt at reforestation any where on the islands. ... the Pride of India was finally chosen, as a tropical tree long a denizen of the islands, and some Australian ironwoods where also propagated for the purpose, as far as seed could be obtained. The albizzia, known as the white-flowering monkeypod, was also largely planted in the valleys, and

> has proven a useful tree, having one characteristic of the Hawaiian hau, its branches sprouting easily when cut off and inserted in the ground as fence posts. (Damon 1931: 772)
>
> In the course of a few years it was evident that the Pride of India was not well adapted for these wind-swept slopes, and Manager Carl Isenberg set out thousands of koa seedlings, a hard wood native to those ridges and a lusty child of Hawaiian forests. ... So dense did the shade become at one time that hundreds of the koa trees were cut out for firewood. (Damon 1931: 773)

While the plant species of the plantation landscape changed so did the architectural landscape. The sugar plantation infrastructure included ditch systems, railroads and engine houses, bridges, interisland shipping storage facilities and housing. Today, the remnants of this commercial sugar cane landscape can still be seen around or near the airport.

By the end of the 19th century there was not much fishing on Kaua'i even though the waters were said to teem with fish "largely accounted for by the fact that the efforts of the islanders are devoted almost exclusively to sugar-cane growing, in which more money can be made than in fishing" (Cobb 1902:498). However, the ocean and shoreline, which had been so integral to the traditional Hawaiian way of life in Kalapakī and neighboring lands, began to take on importance with growing harbor facilities of the early 20th century.

2.2.4 20th century Developments in Kalapakī and Neighboring Ahupua'a

In 1929, the Territorial government began construction of a new harbor facility at Nawiliwili. (*Garden Island* 12/24/29;1:3).

In 1950, the Līhu'e Airport opened (*Garden Island* 1/10/50: 1:3 & 11:1)

Throughout most of the 20th century the present project area was under sugarcane cultivation by the Lihue Plantation Company. An aerial photograph of 1950 shows the entire landscape including the project area planted in sugarcane (Figure 5).

During the second half of the 20th century the project area was a portion of Kalapakī lands that would be transformed by resort development on Kaua'i. The Kauai Surf Hotel on Kalapaki Bay was developed by Inter-Island Resorts in 1960. Then in 1970 the adjacent Kauai Surf Golf Course opened. Subsequently, in the mid-1980s, these Kalapakī properties were sold or leased to Hemmeter-VMS Kauai Company, which began development of the Westin Kauai Lagoons Resort on approximately 850 acres.

In 1991, the Kauai Lagoons Resort was sold to Shinwa Golf Kabushiki Kaisha, which operated the resort and golf courses under Kauai Lagoons Resort Company, Ltd. The approximately 700-acre property, including the present project area, was acquired by Kauai Development LLC and KD Golf Ownership LLC in 2004.

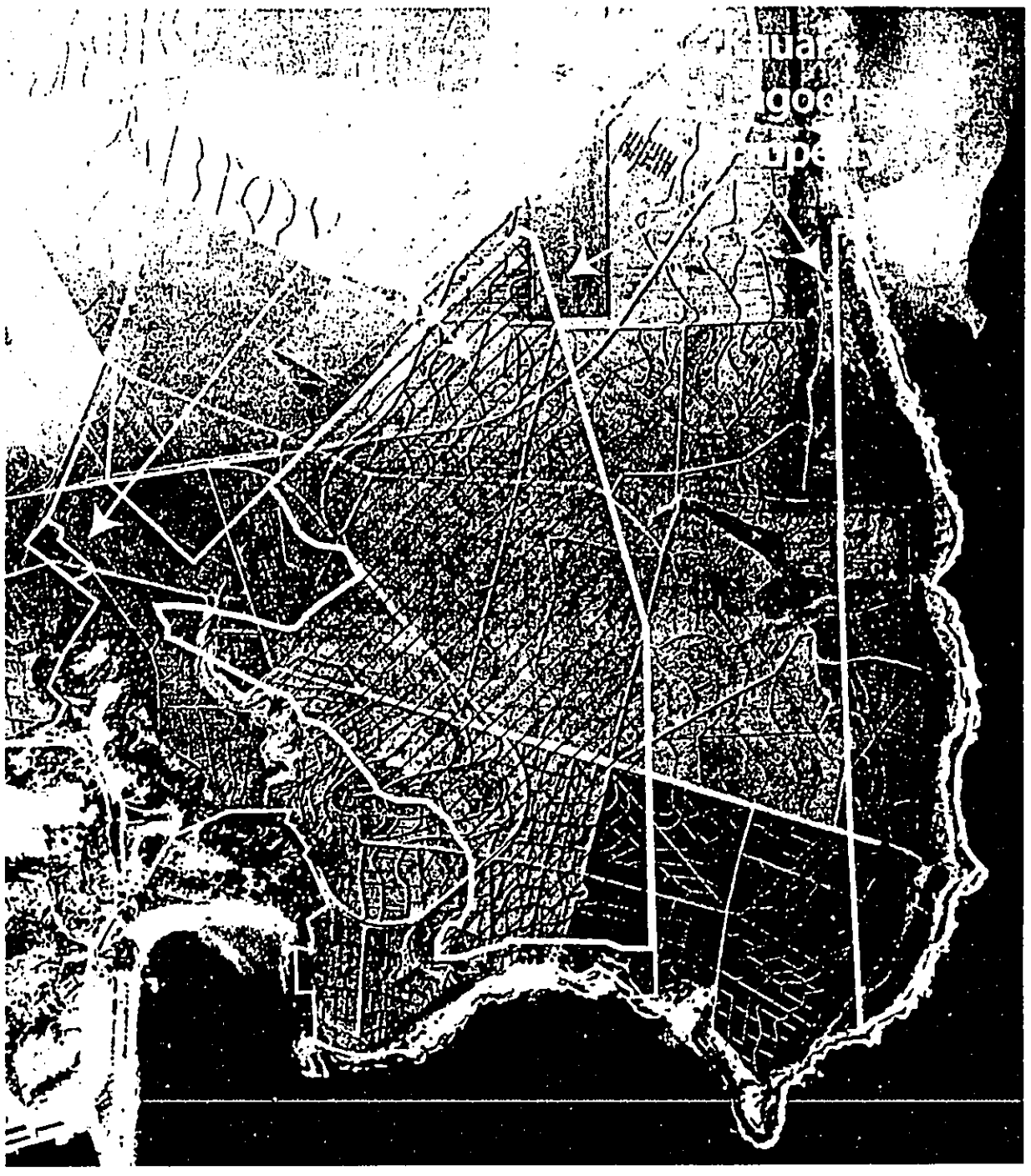


Figure 5. 1950 aerial photograph of Kalapakī with location of present project area indicated

Section 3 ARCHAEOLOGICAL RESEARCH

Two tables outline the archaeological research and historic properties within Kalapakī Ahupua'a. These tables are followed by discussion of the research and historic properties. Table 1 lists the archaeological research conducted within the *ahupua'a* and includes: author(s), location, type of research, and date. Table 2 is a list of known historic properties within the *ahupua'a* and includes: site numbers, site type, location and reference.

Table 1: Previous Archaeological Studies (Figure 6)

Author(s)	Location	Archaeological Research	Year
Thrum, Thomas	Kaua'i	Listing	1907
Bennett, Wendell C.	Kaua'i	Island-wide Reconnaissance	1931
Handy, E.S. Craighill	Hawaiian Islands, Kaua'i	Reconnaissance of agricultural lands	1940
Hammatt, Hallett H.	Kalapakī	Reconnaissance of Ninini Point area	1978
Hammatt, Hallett H.	Kalapakī	Archaeological Reconnaissance of an 18-Acre Parcel in Lihue Town	1978
Hammatt, Hallett H.	Kalapakī	Reconnaissance of 118 acres	1978
Hammatt, Hallett H.	Kalapakī	Archaeological Reconnaissance of 150-Acres of Coastal Land, Kalapakī, Kauai Island (Site of a Proposed 3rd Golf Course, Kauai Lagoon's Resort	1988
Hammatt, Hallett H.	Kalapakī	Archaeological Assessment of Kauai Lagoons Resort	1990
McMahon, Nancy	Kalapakī, Hanamaulu	Archaeological Fieldcheck of Three Parcels in Lihue Judiciary District: Possible Locations for a New Kauai Judiciary Building, Nāwiliwili, Kalapakī, and Hanamā'ulu	1990
Rosendahl, Paul & Alan Walker	Kalapakī Point	Memorandum Report: Archaeological Inventory Survey and Related Consultant Services, Kalapakī Point Subdivision, Land of Nawiliwili	1990
Walker, Alan T., Lehua Kajima and Susan T. Good fellow	Hanamaulu, Kalapakī	Archaeological Inventory Survey, Lihue /Puhi/ Hanamaulu Master Plan, Lands of Hanamā'ulu, Kalapakī,	1991

Author(s)	Location	Archaeological Research	Year
		Nāwiliwili, Niumalu, and Wailua	
Walker, Alan T. and Paul H. Rosendahl	Kalapakī Point	Archaeological Inventory Survey, Kalapakī Point Development Project Area, Land of Nāwiliwili	1991
Creed, Victoria, Loren Zulick, Gerald Ida, David Shideler, and Hallett H. Hammatt	Eleven localities in Hanamā'ulu and Kalapakī Ahupua'a	Archaeological assessment of Proposed Līhu'e Airport Expansion Area	1999

Table 2: Historic Properties (Figure 7)

Site Identification No.	Site Type	*Ahupua'a* Location and Reference
50-30-11-099	Kuhiau Heiau, A large paved *heiau*, whose enclosure covered an area of about four acres; long since destroyed	Kalapakī from Thrum IN Bennett 1931:124
50-30-11-100	Ninini Heiau (near site of Nawiliwili light house, double paved wall remnant)	Kalapakī; Bennett 1931:124
50-30-11-101	Ahukini Heiau (A *heiau* of medium size; foundations only now remain)	Kalapakī; from Thrum IN Bennett 1931:125
50-30-11-421	Midden Scatter of marine shells	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-422	Remnant/probable cattle wall	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-423	Remnant/probable cattle wall	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-424	Oval Terrace Alignment	Kalapakī; on shoreline; Hammatt 1990:
50-30-11-1999	Paukini rock (in the ocean)	Kalapakī or Nawiliwili Bay; N. McMahon (personal comm. to CSH in 1999)
50-30-11-6009	Nawiliwili Cemetery	Kalapakī near high school Hammatt & Folk, ed. 1997
50-30-08-9402	Historic Building Remnant at Site of Radio Station KIVM	Off Radio Road near Ahukini Hwy (McMahon 1990; Franklin & Walker 1994)
11-B001	Lihu'e Lutheran Church Cemetery	Kikuchi & Remoaldo 1992
11-B002	Japanese Cemetery, purported to have been moved	Kikuchi & Remoaldo 1992

Figure 6. Previous archaeological investigations in the vicinity of the project area

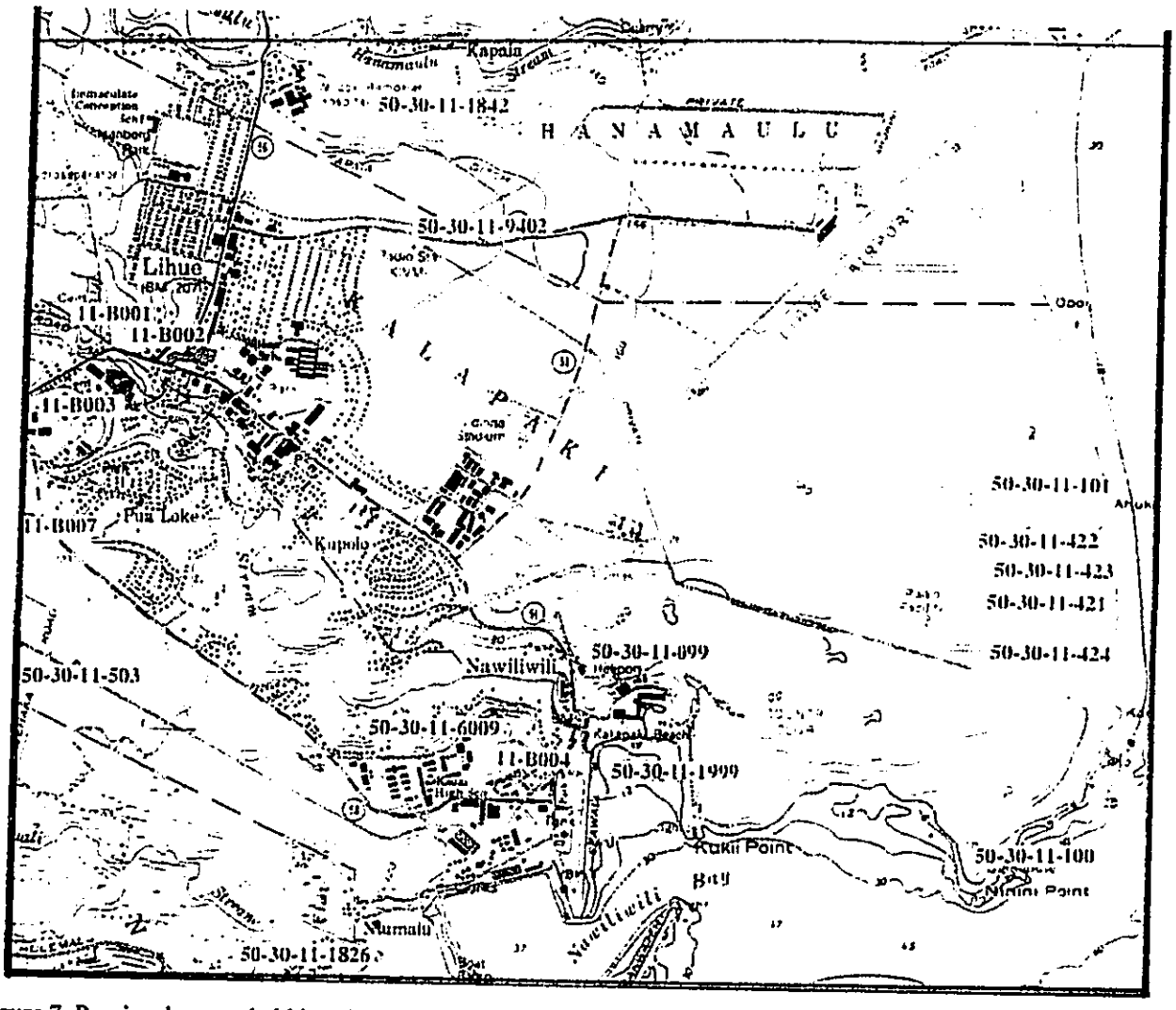


Figure 7. Previously recorded historic properties in the vicinity of the project area

Previous archaeological background research shows there are some 12 known historic properties in the *ahupua'a* of Kalapakī. Ten of the sites are on the State Inventory of Historic Places (SIHP) and the other two are cemeteries not listed on the SIHP. None of these 12 properties is within the present project area.

Thomas Thrum, the publisher of the Hawaiian Almanac, gathered lists of *heiau* on all islands. From the *ahupua'a* of Kalapakī we begin with his list of four as found in Bennett:

1. Ninini, Kalapakī, near site of Nawiliwili light house. All destroyed (Site 100)(Thrum 1907)

2. Ahukini,. Kalapakī. A heiau of medium size; foundations only now remain (Site 101)(Thrum 1907)

3. Pohakoelele, Kalapakī. A medium sized heiau; all destroyed (no site number) (Thrum 1907)

4. Kuhiau, Nawiliwili, near site of court house - a large paved heiau, whose enclosure covered an area of about four acres: long since destroyed (Site 099). The rock Paukini, now separate from but formerly connected with the shore was where the kahuna lived (Thrum 1907).

The first comprehensive archaeological survey on the Island of Kaua'i was undertaken by Wendell Bennett and published in 1939. Bennett used Thrum's list for reference and added the sites he found. For Kalapakī he lists one *heiau* but that it had been destroyed.

Bennett repeats the descriptions given by Thrum for Sites 99-102 and adds "Paukini Rock, a heiau or priest's house now under water in Nawiliwili harbor" (Bennett 1931:48) (recently given State Site #50-50-11-1999). Sites 99-102 had been either entirely or mostly destroyed by the time Bennett did his survey in 1930.

Neither Thrum nor Bennett mention a *heiau* noted by Lt. George E.G. Jackson, Navy cartographer for the Hawaii Government Survey Office in 1881 at Kukii Point. The Kaua'i Community College newsletter, *Archaeology on Kauai*, notes that these "remains of ancient heiau" noted by Jackson are "where the cottages of the Kauai Surf now stand" (Volume 2; 4 October 1973: 4).

Ethel Damon in her book about Kaua'i history (*Koamalu* 1931) mentions Kuhiau in Nāwiliwili and we cite her here for her mention of Pohako-eleele and Paukini Rock, the location of the first unknown and the second shown on Figure 13 (Site 1999):

> Below it, in the bay, is still the rock called Paukini, which was said to be its companion or sister heiau, and was probably also the home of the kahuna, or priest, of Kuhiau. .. and of the three small heiaus in the neighboring ahupua'a of Kalapakī, those of Ninini, Ahukini and Pohako-eleele, little more than the names survive (Damon 1931:397-398).

Bennett does not mention the Pohakoelele *heiau* and Damon probably would have mentioned its location if she had known it. There do not seem to be other references to Pohakoelele *heiau* and it is unknown if Damon used Thrum for her source or if she knew the information from persons on Kaua'i. Although its existence could not be verified by Bennett and its location

speculative, is included as a non-located site of pre-Contact Kalapakī, passed down in local memory. Ms. Nancy McMahon indicated that the Paukini Rock location was shown to her by Ms. Cheryl Lovell (pers. comm. to Cultural Surveys Hawai'i in 1999) and it has been added to the SHIP list (Site 50-50-11-1999).

In an archaeological reconnaissance survey for the Kauai Lagoons Resort, a wall, possibly related to Ninini *Heiau* was noted. "A high well-constructed wall running 400' north of Ninini Lighthouse [is a] possible prehistoric wall and [it is] possibly related to the former Ninini Heiau (Site 100) (Hammatt 1990:11). A dune midden scatter (Site -421), two probable cattle walls (Sites -422 & -423), and an oval terrace alignment (Site -424) were also recorded. This survey area was on the coast of Kalapakī, *makai* of the present project area.

The archaeological inventory survey of the 552.3 acres of Molokoa Lands (Franklin and Walker 1994) included extensive areas of Kalapakī but the only site in Kalapakī was a re-identified Site 9402, an historic building associated with Radio Station KIVM (Franklin and Walker 1994:27)

Walker, Kajima and Goodfellow's *Archaeological Inventory Survey Lihue / Puhi / Hanamaulu Master Plan* (1991) identified no archaeological sites in Kalapakī.

Kikuchi and Remoaldo's *Cemeteries of Kauai* (1992) notes two cemeteries in Kalapakī.

In 1999 Cultural Surveys Hawai'i conducted an archaeological assessment (Creed et al. 1999 draft) of eleven parcels for proposed Līhu'e Airport expansion. One parcel comprised the northernmost 50 acres of the present study area. Nothing of concern was noted in this area at that time. The assessment report, however, was not submitted for review by the State Historic Preservation Division.)

Section 4 Community Contact Findings

An effort was made to contact and consult with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about the proposed project area. This effort was made by letter, e-mail, telephone, and person-to-person contact. In the majority of cases, letters along with maps of the project area were mailed with the following text:

> At the request of Wilson Okamoto Corporation Cultural Surveys Hawai'i Inc. is conducting a Cultural Impact Evaluation of the project described below:
>
> The Kaua'i Lagoons Resort recently received permit approvals from the County of Kaua'i to develop up to 723 hotel/residential units, a new golf clubhouse and related recreational and commercial facilities. The owners of the Resort are now proposing to make changes to the golf course layout by reconfiguring the Mokihana and Kiele courses, and spreading the allowable resort residential units over portions of the Mokihana course and other open areas. This would have the effect of reducing the density of the resort development while staying within the 750-unit maximum allowed by the County.
>
> To pursue the changes to the Resort layout, a General Plan amendment to expand the resort designated areas, an environmental assessment, and zoning amendment are needed. A State land use change from Agriculture to Urban for a portion of the Mokihana Course may also be pursued to enable residential development. A 24-unit affordable housing project at the intersection of Haoa Street and Kapule Highway also requires rezoning from Light Industrial to Residential to permanently allow the use and needed density.
>
> All told, approximately 400 acres of the 700-acre resort would be affected.
>
> The study area for this cultural impact evaluation, comprising two parcels, is shown on the enclosed map and aerial photograph. The larger parcel is irregularly shaped and is located east of the Marriott Resort Hotel. The smaller parcel is L-shaped and is located at the corner of Kapule Highway and Haoa Road.
>
> We are seeking your input regarding the following issues:
>
> Identification of traditional Hawaiian activities including gathering of native plants, animals and other resources.
>
> Identification of existing archaeological or cultural sites, trails, burials etc., which may be impacted by the proposed study.
>
> Cultural associations with the study area through legends, traditional use or otherwise.
>
> I invite you to contact me, Auli'i Mitchell at 1-800-599-9962 or e-mail me at amitchell@culturalsurveys.com if you have any information you would like to share.

As part of this investigation, CSH attempted to contact the following individuals, organizations, and agencies. The results of this consultation effort are presented in Table 3, below. More extensive responses were provided by Cheryl Lovell-Obatake and by the Office of Hawaiian Affairs. These are presented following the table.

Table 3. Consultation Effort Responses

Name	Background, Affiliation	Comments
Ayau, Halealoha	Hui Mālama I Nā Kūpuna O Hawai'i Nei	Referred to Kehaulani Kekua
Kapaka-Arboleda, La France	Kaua'i/Ni'ihau Island Burial Council/ Office of Hawaiian Affairs	See below.
Lovell-Obatake, Cheryl	Kama'āina	See below.
McMahon, Nancy	Archaeologist State Historic Preservation Division	No comment at this time.
Oi, Thomas	Department of Land and Natural Resources-Kaua'i Land Division	Contacted.
Tsuchiya, Rick	Kaua'i Historic Preservation Review Commission – Kaua'i County Planning	Contacted. KHPRC will discuss project at November 1, 2005 meeting.

Ms. La France Kapaka-Arboleda, the chairperson for the Kaua'i/Ni'ihau Island Burial Council and the Community Resource Coordinator for the Office of Hawaiian Affairs commented in an e-mail on October 19, 2005:

> On Kalapakī Lagoon, the best reference would be to refer you to Cheryl Lovell-Obatake... All the old ones are gone. There is another Cheryl who used to live on the property with her grandmother Kapeka Keuma Aiu (passed on). I will try to find her. She may have the most to contribute since she lived there in the 50's.

Ms. Cheryl Lovell-Obatake, *Kama'āina* of Kalapakī participated in a telephone interview with Cultural Surveys Hawai'i Inc. on October 20, 2005:

> I remember that Hal [Hammatt of Cultural Surveys Hawai'i] did work there along the coast and Kalapakī Point. I am sure you will find cultural sites in his report.
>
> Independently we still access the place today. Not many people go in – only certain ones because the area is the last remnant of open space with no buildings. I never heard of any burials in the area of study and Nancy McMahon would verify that. It is important that we still have access rights to this land that will be developed. I remember some native plants in the area we used for medicine, such as the *ilima*.

I am very active in the fishing rights along the coastal regions of Kalapakī. My Uncle Enoka Lovell III, known as "Buddy", was a traditional practitioner when it came to fishing. He is also the one who salvaged the boat when it sank in Wailua. There are sacred trails that run from Nawiliwili side coming from Kalapakī Point along the coast.

Section 5 Traditional Hawaiian Culture in Kalapakī Ahupua'a and the Project Area

5.1 Kalapakī Ahupua'a

The archaeological record in Līhu'e District indicates a date range of *ca.* AD 1100 to 1650 for early Hawaiian occupation (Walker, Kajima and Good fellow 1991). As pointed out by Franklin and Walker (1994), important *ahupua'a* with large rivers lie north and south of Kalapakī (Franklin and Walker 1994:17). Adjacent to the north, Hanamā'ulu offered an extraordinary bay and an extensive and broad river flood plain. To the south are located the broad Huleia River Valley and the *ahupua'a* of Haiku. Kalapakī Ahupua'a thus would have had less varied pre-Contact resources than the larger neighboring *ahupua'a.*

In Pre-Contact Hawaii, the coastal zone of Kalapakī and Hanamā'ulu was the locus for permanent habitation, *heiau*, and numerous major cross-*ahupua'a* and inter-*ahupua'a* trails. There are fishponds at Kalapakī, and major garden activities were within the valley floodplain on the north side of Nāwiliwili River. In the dryland areas *(kula)* crops of *wauke*, sweet potatoes, gourds and trees were likely but no traces of these crops have been documented to date.

The *Māhele* records, archeological surveys and ethno-historical accounts confirm that in traditional Hawaiian times, habitation focused along the shoreline and in the stream valley. At the shoreline, activities included the farming of fishponds and dispersed taro *lo'i. Mauka*, the stream valley contained the majority of the *ahupua'a* settlement and most of the *lo'i* and *wauke* gardens.

During the mid-19th century, the *Māhele* claims describe villages on the shore at both Kalapakī and neighboring Hanamā'ulu. The claims report a fishpond at the shore in Kalapakī. The total number of *lo'i* mentioned in Kalapakī was 56, the number of houses was 9, and there were 5 *kula* lands mentioned.

All known *heiau* for Kalapakī Ahupua'a were coastal. The coastal zone distribution of *heiau* seems quite normal for Kaua'i *ahupua`a* other than those of Wailua and Waimea.

There are several references to tapa in the legends, one in particular where the tapa is being made to give as a wedding gift. There may well have been additional *wauke* plantations on the plains in the pre-Contact period in Kalapakī Ahupua'a.

Archaeological remains of a terrace and midden along the Kalapakī coast (Hammatt 1998) indicate other shoreline habitations existed that were not included in the *Māhele* records. Shorelines are also traditional burial areas.

Inland, in areas of Kaua'i like Kilohana Crater, birds were caught for food (Damon 1931, story of Lauhaka). Typically, *kuleana* holders would have had access to wood and herbs in the uplands and in the mountains the bird catchers and canoe makers would have had temporary shelters but the present records are silent on these activities for Kalapakī.

5.2 Project Area

Plateau lands, like the present project area, were typically less intensively utilized in traditional Hawaiian times. Utilization likely focused on dryland cultigens – such as sweet potatoes, dryland taro, *wauke*, ti leaf, and possibly banana. Timber and medicinal plants may also have been available for gathering. More speculatively, a plateau land like the project area could have been transformed into savannah lands where grasses like *pili* were grown for construction purposes.

There are no records of major trails running through the project area. Such trails within Kalapakī would likely have been located more *mauka* or *makai* along the shoreline.

Section 6 Summary of Findings and Conclusions

Reviewing the information provided by the elements of this cultural impact evaluation – historical documentation, archaeological research, and community contacts – a speculative portrait emerges of the traditional Hawaiian landscape of Kalapakī Ahupua'a and the present project area. By the end of the eighteenth century, population in the *ahupua'a* likely focused along the floodplains of valley lands and along the shoreline. In the valley lands, streams fed taro *lo'i* while, along the shore, fishponds supported the coastal population. Plateau areas of Kalapakī like the present project area may have been utilized for planting of dryland crops and gathering of timber and medicinal plants.

Archaeological studies have documented historic properties related to traditional Hawaiian culture in *makai* areas of Kalapakī outside the project area. These properties include *heiau.* It should be noted that construction of the resort area in Kalapakī began in the 1960s, before archaeological investigations prior to development were mandated by Hawai'i state law. Portions of the present Kauai Lagoons Resort property – including the present project area – were not subject to prior inventory-level archaeological study. (As noted in the Previous Archaeology section of this evaluation, in 1999 an archaeological assessment by Cultural Surveys Hawai'i included the northernmost 50 acres of the present project area (Creed et al. 1999). Nothing of archaeological concern was noted in this area at that time. The assessment report, however, has not been submitted for review by the State Historic Preservation Division.)

As confirmed by historical records and archaeological investigation, sugarcane cultivation and development of plantation infrastructure was the dominant land use within the project area and surrounding lands throughout the first half of the 20th century. The decades of sugar cultivation in the project area would have eliminated any surface properties related to traditional Hawaiian culture that may have formerly existed. Further, plantation operations – and the sense that the project area was private property – restricted access inside the project area by cultural practitioners who may have formerly utilized the area.

During the second half of the 20th century, development of the resort property would have further eliminated any remnants of the former traditional landscape and further restricted access.

An aerial photograph, taken in 2000, shows the complete integration of the present project area lands into the resort development and urban industrial landscape of Kalapakī (Figure 8).

None of the community contacts queried for this evaluation identified any cultural sites or concerns specifically within the project area. Ms. Cheryl Lovell-Obatake noted that portions of the resort property are still accessed by community members "because the area is the last remnant of open space with no buildings." These portions of the property may be the more *makai* lands along the coast, outside the present project area which, as the 2000 aerial photograph confirms, is already fully incorporated into the resort development or is vacant land surrounded by urban industrial development – i.e. the two-acre parcel at the intersection of Haoa Street and Kapule Highway and the northern most portion of the project area between the runways of Līhu'e Airport.

Especially relevant to this evaluation, Ms. Lovell-Obatake also noted that she has never heard of any burials in the project area.

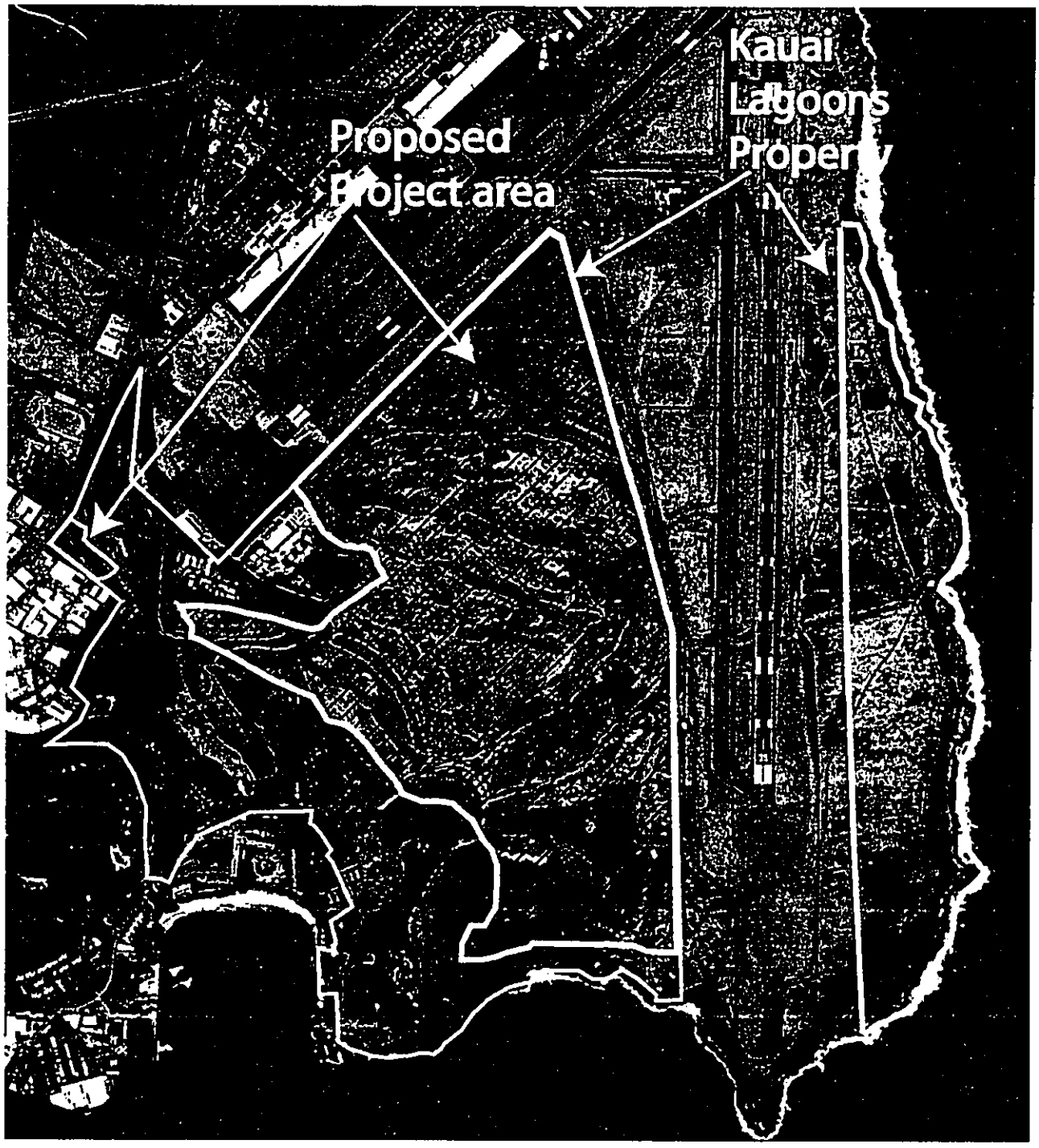


Figure 8. 2000 aerial photograph of Kalapakī Ahupua'a with present project area indicated

Based on the above findings, future development of the specific project area within the Kauai Lagoons Resort property will have minimal impact upon native Hawaiian cultural resources, beliefs and practices. It should be noted, however, that subsurface properties associated with former traditional Hawaiian activities in the project area, such as artifacts and cultural layers, may be present despite the decades of sugar cultivation activities and resort development. As a precautionary measure, personnel involved in future development activities in the project area should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow (including consultation with the State Historic Preservation Division and, as may be appropriate, with Kaua'i community cultural organizations).

Section 7 References

Archives of Hawaii
No date Land Matters, Document No. 11; List of Konohiki, Prohibited Fish and Prohibited wood.

Baptiste, Lucinda
1993 "Ahukini memories: The glory days," *The Garden Island*, November 24, 1993, 1, 5A.

Baptiste, Lucinda
1993 "Bustling Ahukini fades into fond memories, " *The Garden Island*, November 26, 1993, 1-2.

Clark, John R. K.
1990 *Beaches of Kauai and Niihau*, University of Hawaii Press, Honolulu, HI.

Cobb, Scott
1902 "Commercial Fisheries of the Hawaiian Islands," *U.S. Fish Commission Report for 1901*, Government Printer, Washington D.C.

Condé., Jesse C. and Gerald M. Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*, Glenwood Publishers, Felton, CA.

Creed, Victoria, Hallett H. Hammatt, Gerald K. Ida, Ian Masterson and John Winieski
1995 A Summary of the Archaeological Monitoring for the Kapa'a Sewerline Project Waipouli and Kapa'a Ahupua'a, Puna District, Kaua'i (TMK: 4-3-09 and 4-5-03 to 11), Cultural Surveys Hawaii, Kailua, HI.

Creed, Victoria, Loren Zulick, Gerald K. Ida, David W. Shideler, and Hallett H. Hammatt
1999 "Archaeological Assessment of the Proposed Līhu'e Airport Expansion Area, Hanama'ulu and Kalapakī Ahupua'a, Līhu'e District, Island of Kaua'i (TMK 3-5-01: 5,6,8,9,109,111, and 158 and 3-7-02:Por 1)", Cultural Surveys Hawai'i, Kailua, HI.

Damon, Ethel M.
1931 *Koamalu*, Privately printed at the Honolulu Star-Bulletin Press, Honolulu, (2 Volumes).

Folk, William H. and Hallett H. Hammatt
1995 Archaeological Monitoring of the Fiberoptic Cable Conduit Installation Through the Wailua Golf Course at Wailua, Kauai, Cultural Surveys Hawaii, Inc., Kailua, HI.

Foote, Donald E., E.L. Hill, S. Nakamura and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii*, U.S. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

Franklin, Leta J. and Alan T. Walker
1994 Additional Archaeological Inventory Survey, Molokoa Lands Project Area, Lands of Hanama`ulu and Kalapakī, Lihu`e District, Island of Kauai, PHRI, Hilo HI

Hammatt, Hallett H.
1988 *Archaeological Reconnaissance Survey of 150 acres of Coastal Land, Kalapak□, Kauai Island* (Site of a Proposal 3rd Gold Course, Kauai Lagoon's Resort), Cultural Surveys Hawaii, Kailua, HI.

Hammatt, Hallett H. and William H. Folk (eds)
1995 *Nawiliwili Cemetery Burial Treatment: An Archaeological and Osteological Study*, "The Documentary History of Nawiliwili Cemetery" by Patrick O. Walsh; "The Archaeological Investigation," by William H. Folk and Hallett H. Hammatt; "Burial Containment and Associated Grave Goods," by Jennifer Robins, "Catalog of Graves," by Melody Heidel; "Osteological Analysis," by Patricia Kajima and Michael Pietrusewsky; "Archaeological Summary and Recommendations," by William H. Folk, Cultural Surveys Hawaii, Inc., Kailua, HI.

Handy, E.S. Craighill
1940 *The Hawaiian Planter*, Volume 1, Bishop Museum Bulletin No. 161, B.P. Bishop Museum, Honolulu, HI.

Hommon, Robert J.
1976 *The Formation of Primitive States in Pre-Contact Hawai`i*, Ph.D. Dissertation, University of Arizona, Tucson, AZ.

Kaua`i Community College
"Archaeology on Kaua`i: A Collection of Newsletters" (AOK), *Kaua`i Community College News Letter*, Lihue, Kaua`i, HI.

Kikuchi, William A.
1992 Use Permit for J.C. Sandblasting, Hanam□`ulu, L□hu`e, Kaua`i.

McMahon, Nancy
1990 Archaeological Fieldcheck of Three Parcels in Lihue Judiciary District: Possible Locations for a New Kaua`i Judiciary Building, Nawiliwili, Kalapakī, and Hanamaulu, Kaua`i, Historic Preservation Program, State of Hawaii.

Moffat, Riley M. and Gary L. Fitzpatrick
1995 Survey the Mahele, Mapping the Hawaiian Land Revolution, (Palapala`aina, Volume 2), Editions, Ltd., Honolulu, HI.

OEQC (Office of Environmental Quality Control, State of Hawai'i)
2004 A Guidebook for the Hawai'i State Environmental Review Process. The Environmental Guidebook.

Peterson, Barbara Bennett, Editor
1984 *Notable Women of Hawaii*, University of Hawaii Press, Honolulu, HI.

Pukui, Mary Kawena
1983 *Olelo No`eau: Hawaiian Proverbs and Poetical Sayings*, Bishop Museum Special Publication No.71, Bishop Museum Press, Honolulu, HI.

Rice, William Hyde
1977 *Hawaiian Legends, Bernice P. Bishop Museum*, Honolulu, HI, originally published 1923.

Rosendahl, Paul H.
1990 Archaeological Field Inspection and Limited Subsurface Testing, Kalepa Radio Station and Kalepa Road Improvement Project Area, Land of Hanamā`ulu, Līhu`e District, Island of Kaua`i. PHRI, Hilo, HI.

Spencer Mason Architects
1989 *Historic Bridge Inventory: Island of Kauai*, Department of Transportation Highways Division, Honolulu, HI.

Territorial Planning Board
1939 An Historic Inventory of the Physical, Social and Economic and Industrial Resources of the Territory of Hawaii: First Progress Report, Honolulu, HI.

Thrum, Thomas G.
1907 "Tales from the Temples," (Preliminary paper in the study of the Heiaus of Hawaii, with plans of the principal ones of Kauai and Oahu), *The Hawaiian Annual*, Honolulu, HI

University of Hawai`i at Hilo, Department of Geography
1998 Atlas of Hawai`i, 3rd edition, Edited by Sonia P. Juvick, James O. Juvik, Chief cartographer Thomas R. Paradise, University of Hawai`i Press, Honolulu.

U.S. Department of Agriculture Soil Conservation Service
1972 *Soil Survey Interpretations, Kauai, Report R41*, U.S. Government Printing Office, Washington, D.C.

Waihona `Aina Corp.
1998 The Mahele Database at waihona.com, Kailua, HI.

Walker, Alan T. and Paul H. Rosendahl
1990 Archaeological Inventory Survey, Hanamaulu Affordable Housing Project Area, Land of Hanamaulu, Lihue District, Island of Kauai (TMK: 3-7-03:Por. 20), PHRI, Hilo, HI.

Wichman, Frederick B.
1998 *Kauai: Ancient Place-Names and Their Stories*, University of Hawaii Press, Honolulu, HI.

Wilcox, Carol
1996 *Sugar Water, Hawaii's Plantation Ditches*, UH Press, Honolulu, HI.

Wilkes, Charles
1845 *Narrative of the United States Exploring Expedition*, Volume 4, Lea and Blanchard, Philadelphia, PA.

Wilson Okamoto & Associates
1998 Lihue Airport Master Plan, Environmental Impact Statement, Preparation Notice, for State of Hawaii, Department of Transportation, Airports Division and U.S. Department of Transportation, Federal Aviation Administration.

Appendix D

Traffic Impact Report for the Proposed Kauai Lagoons Resort
Prepared by Wilson Okamoto Corporation
September 2004

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Affordable Housing Project)
Prepared by Wilson Okamoto Corporation
June 2005

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Ninini Point Street Access)
Prepared by Wilson Okamoto Corporation
September 2005

Traffic Impact Report for the Proposed Kauai Lagoons Resort Prepared by Wilson Okamoto Corporation September 2004

TRAFFIC IMPACT REPORT

FOR THE PROPOSED

KAUAI LAGOONS RESORT

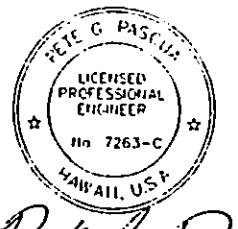
FINAL

Prepared for:

National Housing Corporation
55 Merchant Street, Suite 2000
Honolulu, HI 96813

Prepared by:

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



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

EXPIRATION DATE
OF LICENSE - 4/30/06

September 2004

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICIES

I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to identify and assess the traffic impacts resulting from the proposed Kauai Lagoons Resort development in Lihue on the Island of Kauai. The proposed Kauai Lagoons Resort will consist of approximately 705 residential dwelling units. However, the traffic analysis contained in this study conservatively assumes a maximum allowable density of 750 residential dwelling units. The project will be located along Kalapaki Road approximately 2,000 feet (0.4 miles) northeast of Rice Street.

B. Scope of Study

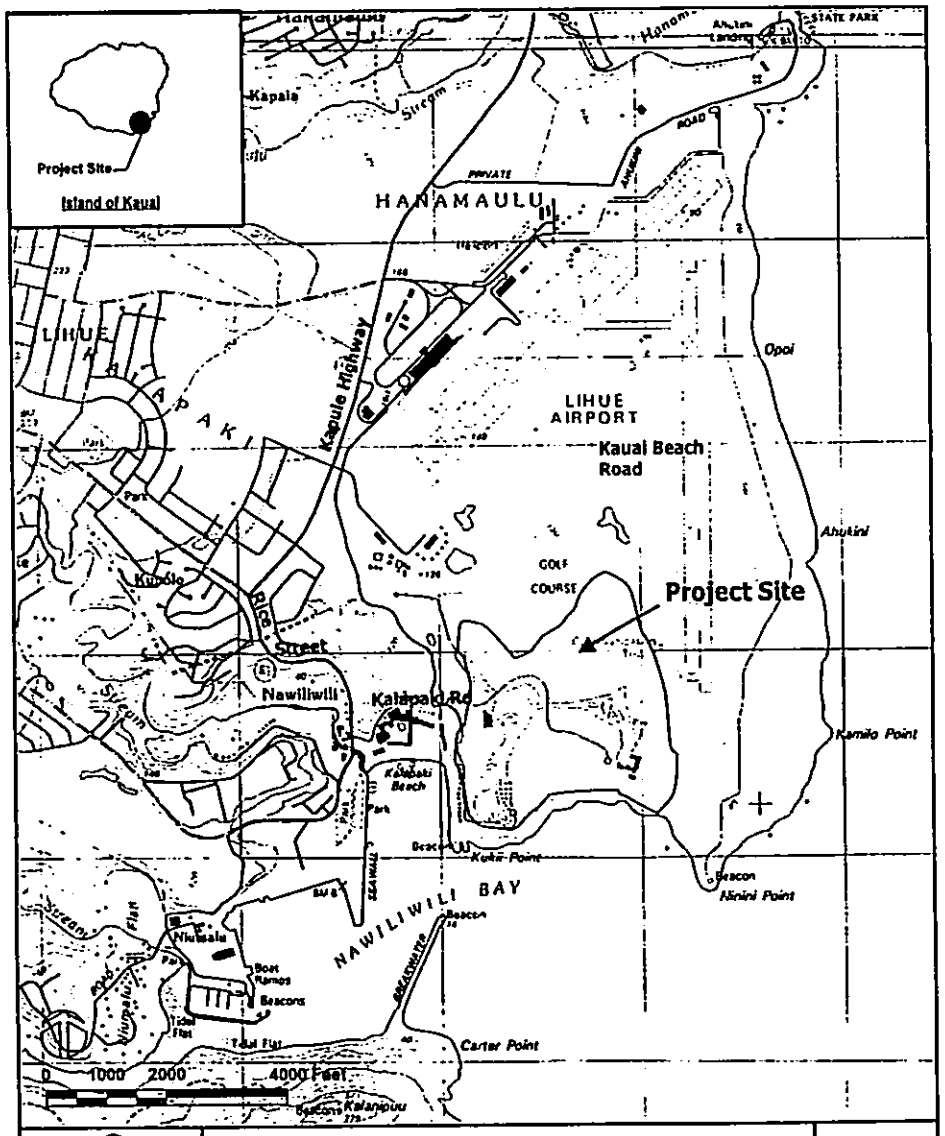
This report presents the findings and conclusions of the traffic study, the scope of which includes:

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

II. PROJECT DESCRIPTION

A. Location

The project site will be located along Kalapaki Road approximately 2,000 feet (0.4 miles) northeast of Rice Street in Lihue, Kauai and is further identified as Tax Map Keys: (4) 3-5-01: 102, 006, 082, 083, 027, and 115 to 120 (see Figure 1). The project site is located in Lihue between Lihue Airport to the north and the Harbor along Nawiliwili Bay to the south. The proposed primary access is via Kalapaki Road.



WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT LOCATION MAP	FIGURE 1

B. Project Characteristics

The proposed Kauai Lagoons Resort redevelopment will be located along Kalapaki Road, north of the Kauai Marriott Resort and Beach Club. The proposed luxury resort project will entail the development of approximately 304 multi-family units, 29 single-family units, 331 condominium/recreational units, 41 hotel units, and a new clubhouse and spa. As shown on the project site plan, Figure 2, a portion of the existing open space along the golf course and all of the existing structures will either be replaced or renovated to accommodate the new development. The existing project site currently houses a clubhouse, golf course, tennis courts, spa, restaurant (currently vacant), and other vacant retail spaces. The luxury resort will be constructed in four phases over the next five years and is expected to be complete and occupied by the Year 2009. Access to the proposed project would be via Kalapaki Road off of the intersection of Rice Street and Kalapaki Road.

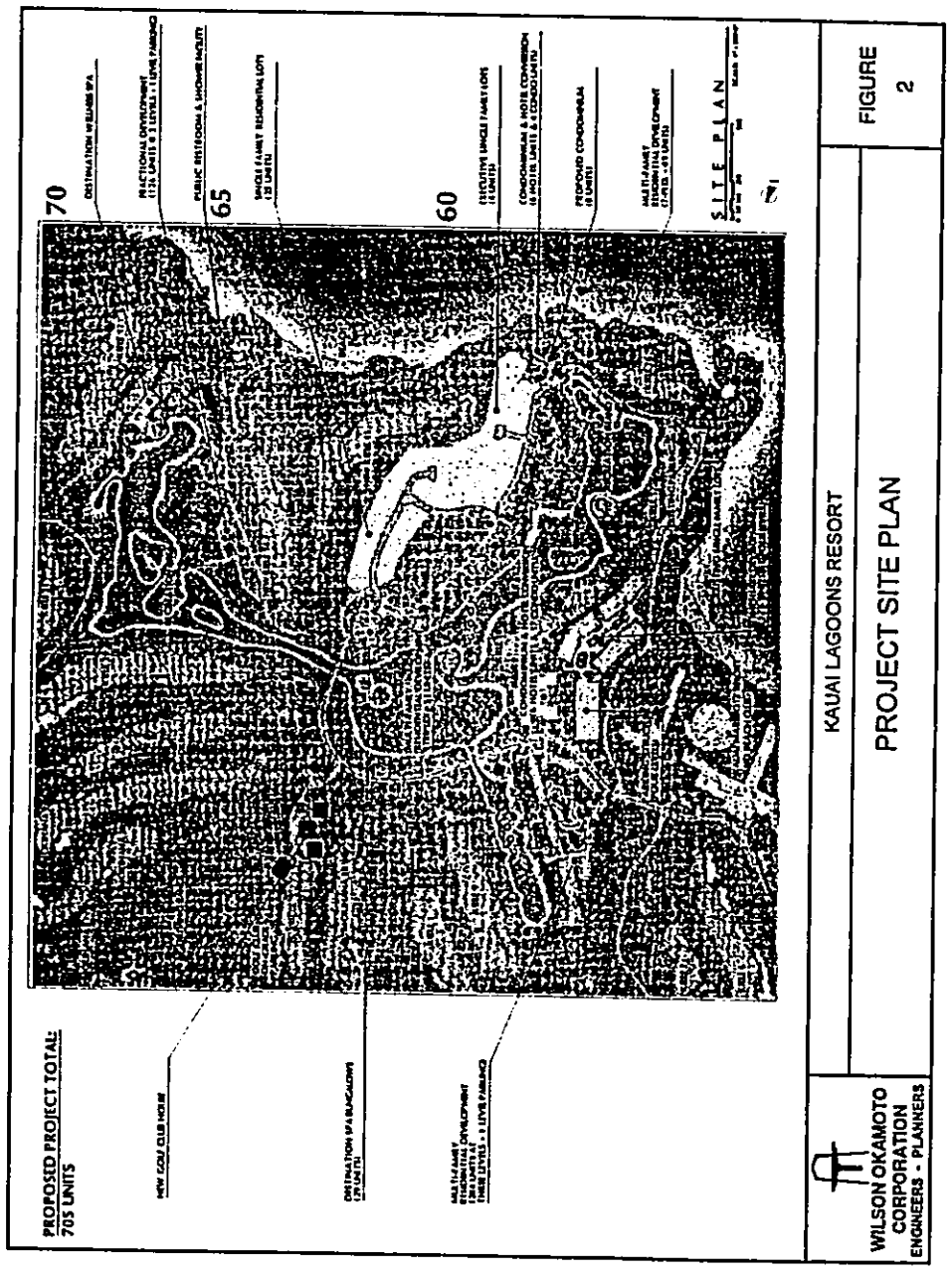
III. EXISTING TRAFFIC CONDITIONS

A. General

Primary access to the project site will be via Kalapaki Road off of Rice Street, which originates near the Nawiliwili Harbor and continues as a two lane, two-way State of Hawaii roadway to Kapule Highway. Beyond Kapule Highway, Rice Street is a four-lane roadway to its termination at Kuhio Highway. Approximately 2,600 feet (0.5 miles) northwest of intersection with Kalapaki Road, Rice Street intersects Kapule Highway, a predominately two-lane, two-way State of Hawaii roadway that serves as a connector road between Rice Street and Kuhio Highway. In recent years, traffic volumes along Rice Street and Kapule Highway near the project site have not increased significantly due to minimal development in the surrounding areas.

B. Area Roadway System

In the vicinity of the project site, Rice Street is predominantly a two-way, two-lane roadway. It serves as a connector road between Nawiliwili Harbor and Lihue. At the unsignalized T-intersection with Rice Street, the westbound approach of Kalapaki Road, a private roadway that has two lanes that serve right-turn and left-turn traffic movements.



The northbound approach of Rice Street has one through lane and a right-turn lane while the southbound approach has one left-turn lane and one through lane. The northbound and southbound through movements are uncontrolled traffic movements.

Further north, Rice Street intersects Kapule Street a predominately two-way, two-lane State of Hawaii roadway that continues northward to Kuhio Highway. Residents and visitors that originate from the northern or southern parts of the island may use Kapule Highway to travel to-and-from Lihue Airport. At the southern end of the highway, Kapule Highway intersects with Rice Street. The southbound approach of Kapule Highway at the intersection with Rice Street has one right-turn lane and a stop controlled left-turn lane. In the westbound approach, Rice Street has one right-turn lane and one through lane while the eastbound approach has one left-turn lane and one through lane. The westbound and eastbound through movements are uncontrolled traffic movements.

C. Traffic Volumes and Conditions

1. General

The existing traffic counts were taken by Wilson Okamoto Corporation (WOC) in July 2004 during periods when schools were not in session. These counts were verified against State Department of Transportation (DOT) 24-hour traffic counts taken when schools were in session to determine if they should be modified to account for school-related traffic. A comparison of these two counts indicated that although PM peak hour traffic is not significantly affected by school-related traffic, the AM peak hour traffic volumes are significantly lower during periods when school was not in session. As such, a growth factor of 21.4% was applied to the existing AM peak hour turning movements traffic counts to simulate periods when school is in session.

a. Field Investigation

A field investigation was conducted on July 13 and July 14, 2004 and consisted of manual turning movement count surveys during the morning peak period between 7:00 AM and 9:00 AM, and the

afternoon peak period between 3:00 PM and 6:00 PM at the intersections of Rice Street with Kapule Highway and Kalapaki Road. In addition, a 24-hour mechanical count survey was taken along Rice Street, east of Kapule Highway. Appendix A includes the existing traffic count data.

b. Capacity Analysis Methodology

The highway capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Transportation Research Board, 2000, and the "Highway Capacity Software", developed by the Federal Highway Administration. The analysis is based on the concept of Level of Service (LOS) to identify the traffic impacts associated with traffic demands during the peak hours of traffic.

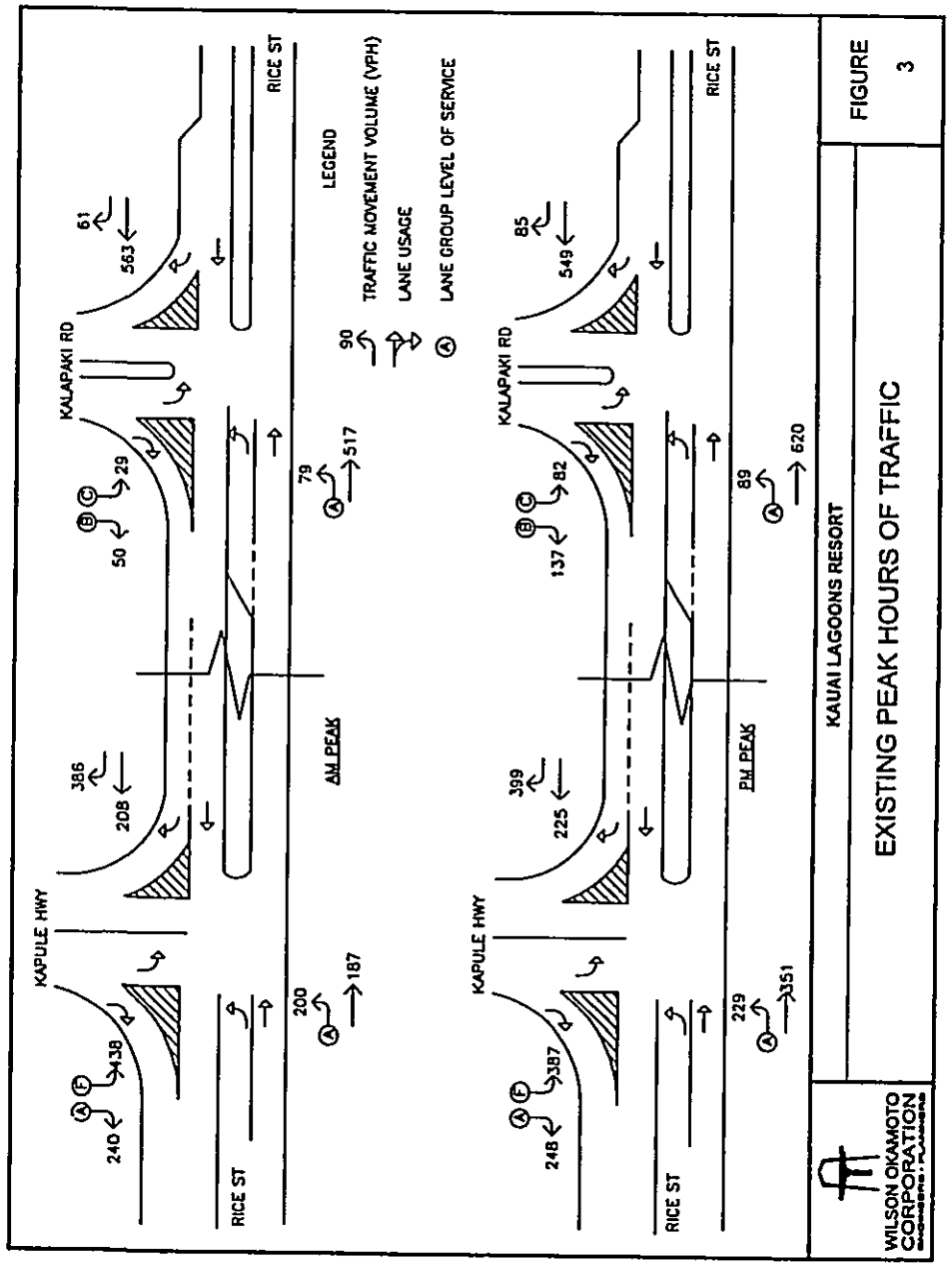
LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing ideal or free-flow traffic operating conditions and LOS "F" unacceptable or potentially congested traffic operating conditions.

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

2. Existing Peak Hour Traffic

a. General

Figure 3 illustrates the existing AM and PM peak hour traffic volumes and operating traffic conditions. In the vicinity of the



proposed project, the absolute commuter peak hour time periods for each intersection are shown in Table 2.

Table 2: Peak Hours of Traffic

Intersection	AM Peak	PM Peak
Rice Street/ Kalapaki Road (Project Driveway)	7:15 AM to 8:15 AM	3:45 PM to 4:45 PM
Kapule Highway/ Rice Street	7:30 AM to 8:30 AM	3:45 PM to 4:45 PM

The analysis is based on these peak hour time periods to identify the traffic impacts resulting from the proposed project. The LOS calculation worksheets are included in Appendix C.

b. Rice Street and Kalapaki Road (Project Access Roadway)

At the intersection of Rice Street and Kalapaki Road, Rice Street carries 596 vehicles southbound and 624 vehicles northbound during the AM peak hour. The volumes are significantly higher during the PM peak hour with 709 vehicles southbound and 634 vehicles northbound. During both peak hours, the critical movement for the Rice Street approach is the southbound left-turn movement which operates well at LOS "A" during both the AM and PM peak hours of traffic.

Kalapaki Road carries 79 vehicles on the westbound approach in the AM peak hour which increases significantly to 219 vehicles during the PM peak hour of traffic. The critical movement for the Kalapaki Road approach is the westbound left-turn movement which operates at LOS"B" during the AM peak hour and LOS "C" during the PM peak hour of traffic.

Field observations at the intersection indicate that the most significant queuing occurs on the westbound approach. Maximum vehicle queue lengths of approximately 5 vehicles periodically formed

during the morning peak hour and approximately 5 to 10 vehicles during the afternoon peak hour. These queues cleared quickly and did not appear to significantly affect traffic on the approach.

c. Kapule Highway and Rice Street

At the T-intersection with Rice Street, Kapule Highway carries 678 vehicles southbound during the AM peak hour and 635 vehicles southbound during the PM peak hour. During both peak hours, the critical movement of the Kapule Highway approach is the southbound left-turn movement which operates at LOS "C" in the AM peak hour and LOS "F" during the PM peak hour of traffic.

Rice Street carries 594 vehicles westbound and 387 vehicles eastbound during the AM peak hour. During the PM peak hour, the traffic demand increases with 624 vehicles traveling westbound and 580 vehicles traveling eastbound. The critical movement of the Rice Street approaches is the eastbound left-turn movement which operates well at LOS "A" during both the AM and PM peak hours of traffic.

Field observations at the intersection indicate that the most significant queuing occurs on the southbound approach. Maximum vehicle queue lengths of approximately 5 to 10 vehicles periodically formed during the morning peak hour. During the afternoon peak hour, queues were significantly longer approximately 20 to 25 vehicles in length, and periodically extended through the intersection of Kapule Highway and Haoa Street.

IV. PROJECTED TRAFFIC CONDITIONS

A. Site-Generated Traffic

1. Trip Generation Methodology

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 7th Edition," 2003. The ITE trip generation rates are developed empirically by correlating the vehicle

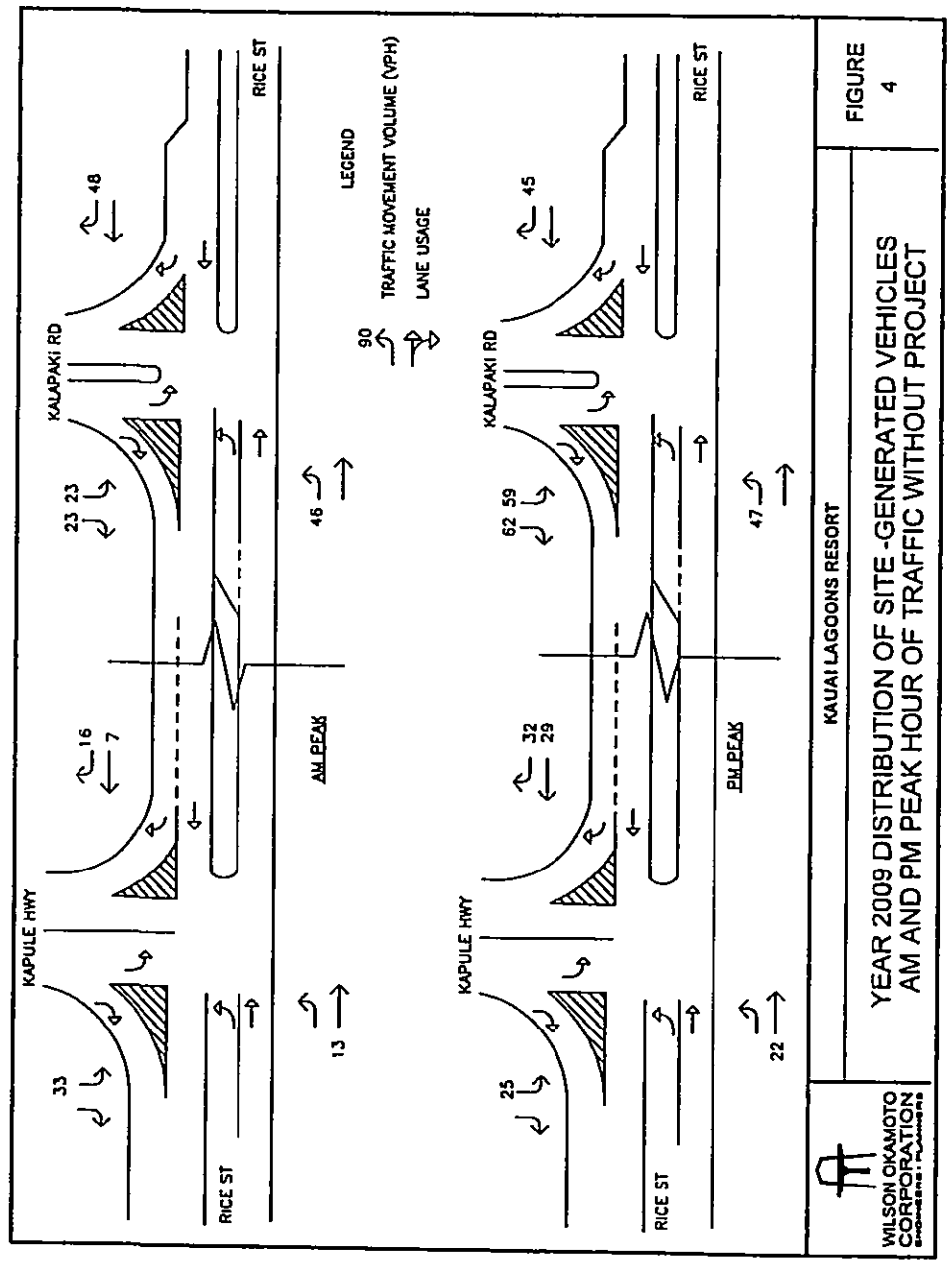
trip generation data with various land use characteristics such as the number of vehicle trips generated per dwelling unit. Table 3 summarizes the project site trip generation characteristics applied to the AM and PM peak hours of traffic.

Table 3: Peak Hour Trip Generation

RECREATIONAL HOME		
INDEPENDENT VARIABLE:	Dwelling Units = 709	
		PROJECTED TRIP ENDS
AM PEAK	ENTER	78
	EXIT	35
	TOTAL	113
PM PEAK	ENTER	78
	EXIT	106
	TOTAL	184
HOTEL		
INDEPENDENT VARIABLE:	Dwelling Units = 41	
		PROJECTED TRIP ENDS
AM PEAK	ENTER	16
	EXIT	11
	TOTAL	27
PM PEAK	ENTER	14
	EXIT	15
	TOTAL	29
TOTAL PROJECT TRIPS		
AM PEAK	ENTER	94
	EXIT	46
	TOTAL	140
PM PEAK	ENTER	92
	EXIT	121
	TOTAL	213

2. **Trip Distribution**

Figure 4 shows the distribution of site-generated vehicular trips at the two study intersections during the AM and PM peak hours of traffic. Access to the proposed Kauai Lagoon Resort development would be via Kalapaki



Road. The directional distribution of traffic at the intersection of Rice Street and Kalapaki Road was based upon the existing directional distribution of traffic along Rice Street. As such, 51% of vehicles were assumed to be traveling westbound and 49% of vehicles traveling eastbound during the AM peak hour while in the PM peak hour, 49% of vehicles were assumed to be traveling westbound and 51% traveling eastbound. The directional distribution of all site-generated vehicular trips at the intersection of Rice Street and Kapule Highway was assumed to remain similar to existing travel patterns.

B. Through Traffic Forecasting Methodology

The travel forecast is based upon the average annual traffic growth rate as described in the Kauai Long-Range Land Transportation Plan (KLRLTP). The KLRLTP, prepared for the State of Hawaii Department of Transportation in cooperation with the County of Kauai Department of Public Works and the County of Kauai Planning Department, serves as a guide for the development of major surface transportation facilities and programs to be implemented with the County of Kauai. The Plan 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 KLRLTP more accurately reflects the anticipated impacts of traffic growth in the region than the use of historical traffic count data. Based upon statewide population, employment, and visitor forecasts to the Year 2020, the KLRLTP estimates that the average daily traffic in the project vicinity would increase at an average rate of 0.8% and 1.3 % per year during the AM and PM peak hours of traffic, respectively. Using 2004 as the Base Year, growth factors of 1.041and 1.067 were applied to the AM and PM existing traffic demands along Rice Street and Kapule Highway, respectively, to simulate projected Year 2009 traffic conditions.

C. Traffic Signal Warrant

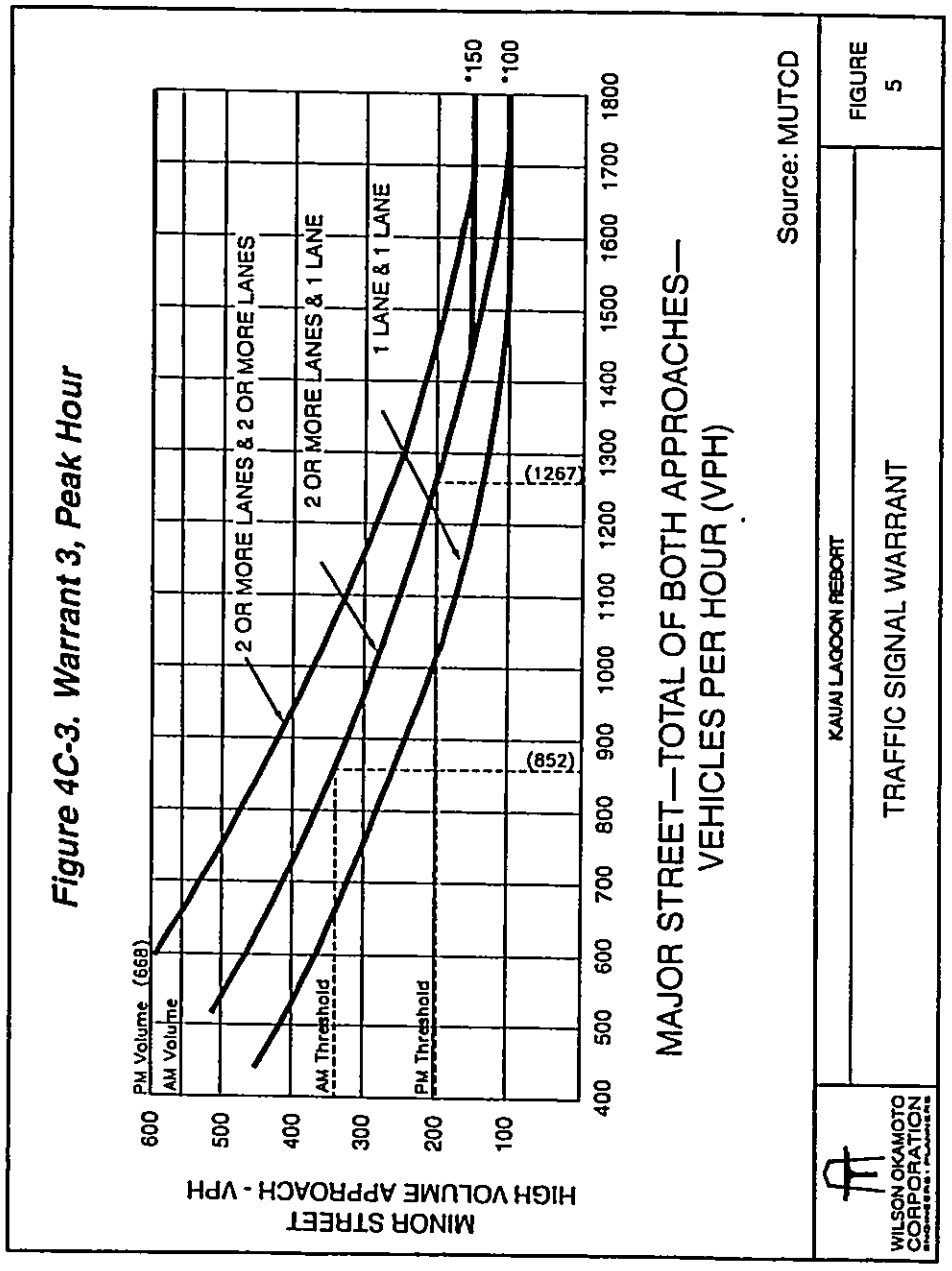
The installation of a traffic signal may be justified by one or more of the eight warrants outlined in the "Manual on Uniform Traffic Control Devices for Streets and

Highways," Millennium Edition (MUTCD). These warrants take into account factors such as eight-hour vehicular volumes (Warrant 1), four-hour vehicular volumes (Warrant 2), peak hour volumes (Warrant 3), pedestrian volumes (Warrant 4), the presence of a school crossing or coordinated signal system (Warrant 5 and 6), crash experience (Warrant 7), and other characteristics of the roadway network (Warrant 8).

At the unsignalized study intersections in the project vicinity, traffic conditions at the intersection of Kapule Highway and Rice Street are expected to deteriorate to unacceptable levels of service under existing and Year 2009 without project conditions indicating the potential need for a traffic signal system. As such, this intersection was assessed to verify whether or not a traffic signal system might be justified. Since the data collected at the intersection of Kapule Highway and Rice Street was collected primarily during the peak hours, Warrant 3, "Peak Hour Warrant" was applied to the intersection traffic demands. It should be noted that these warrants serve only as a guide and do not strictly warrant a traffic signal if met.

Warrant 3 consists of several conditions that may justify the installation of the traffic signal at an intersection where vehicles experience high traffic delay and impaired safety during peak hour periods. One of the conditions is based upon the relationship between the traffic volumes along the major and minor streets. If the traffic volume along the minor street exceeds the thresholds shown in Figure 4C-3 of the MUTCD, a traffic signal system may be justified. Under existing and projected Year 2009 without project conditions, the traffic volumes on the southbound left-turn lane on Kapule Highway at the Rice Street intersection satisfy Warrant 3 for minor street approaches with one lane for high through traffic volumes on the major street. The AM and PM peak hour volumes are significantly higher than the minimum volume for the minor street approach (see Figure 5).

This intersection may also satisfy the remaining warrants for traffic signal consideration which take into account factors other than peak hour volumes and requires further study. However, for the purpose of this study, since at least one of the warrant is satisfied at this intersection under existing Year 2009 without project



conditions, the intersection of Kapule Highway and Rice Street hereinafter assumed to be signalized.

D. Total Traffic Volumes Without Project

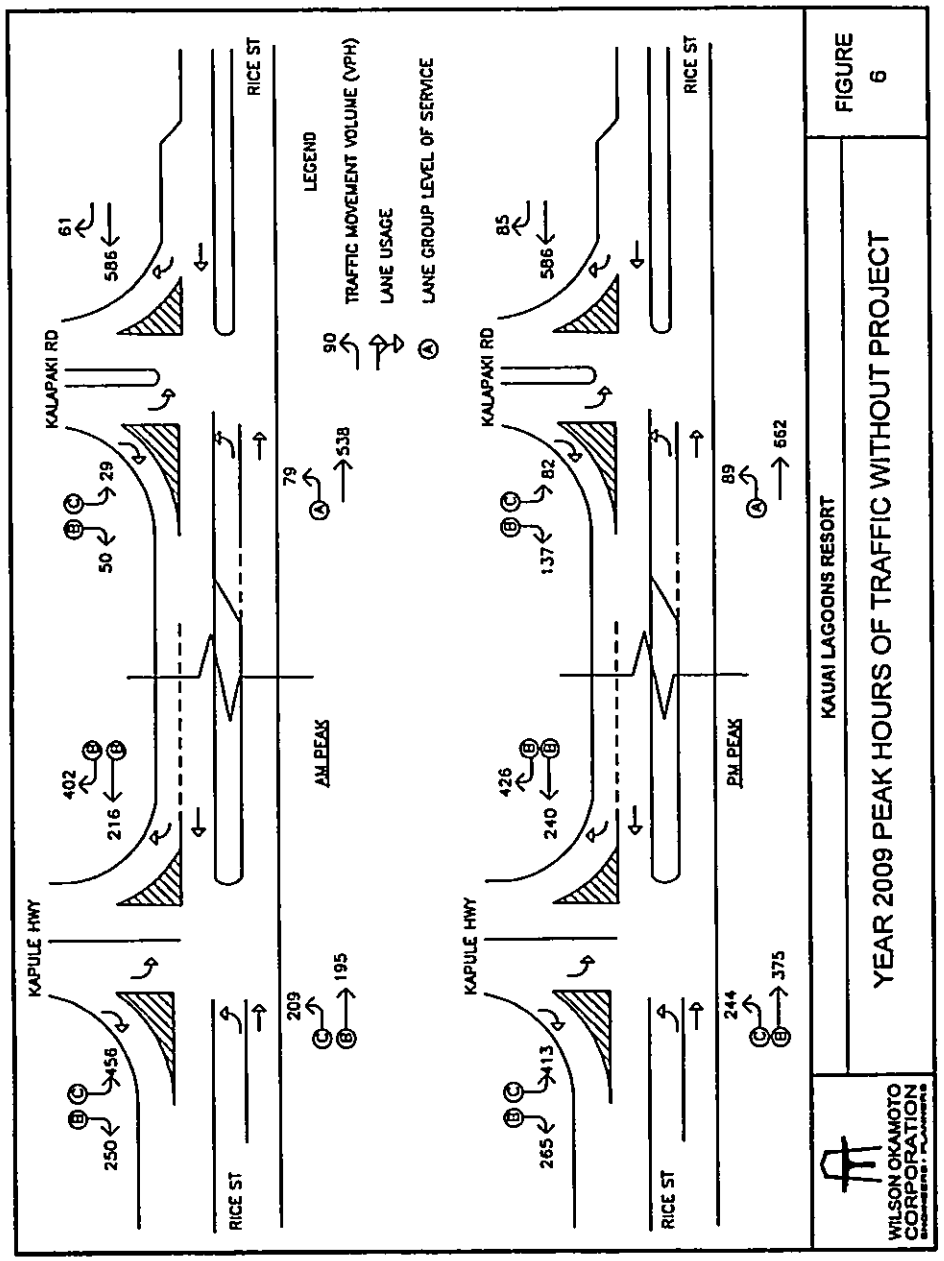
The projected Year 2009 without project AM and PM peak hour traffic volumes and operating conditions along Rice Street, Kapule Highway, and Kalapaki Road without the development of the proposed Kauai Lagoons Resort is shown on Figure 6 and summarized in Table 4. The existing levels of service are provided for comparison purposes. LOS calculations are included in Appendix D.

Table 4: Existing and Projected Year 2009 (Without Project) Traffic Operating Conditions

Intersection (NS/EW)	Critical Movement	AM		PM	
		Exist	Year 2009 w/out Proj	Exist	Year 2009 w/out Proj
Rice Street/ Kalapaki Road	Southbound (LT)	A	A	A	A
	Westbound (LT)	C	C	C	C
Kapule Highway/ Rice Street	Eastbound (LT)	A	[redacted]	A	[redacted]
	Southbound (LT)	F	[redacted]	F	[redacted]

Note:
[redacted] Year 2009 Without Project Conditions, intersection Kapule Hwy/Rice St is analyzed as a signalized intersection

Traffic operations within the project vicinity are expected to improve or remain similar to existing conditions during both peak hours of traffic despite the anticipated increases in traffic along Kapule Highway and Rice Street. The southbound and westbound left turn traffic movements at the intersection of Rice Street and Kalapaki Road are anticipated to remain at LOS "A" and LOS "C", respectively, during both peak hours of traffic. At the intersection of Kapule Highway and Rice Street, traffic operations are anticipated to improve significantly due to the installation of a traffic signal system at that intersection. The eastbound and southbound left-turn traffic movements are anticipated to operate at LOS "C" during both peak periods.



E. Total Traffic Volumes With Project

Figure 7 shows the Year 2009 cumulative AM and PM peak hour traffic conditions resulting from the projected external traffic and the development of the proposed Kauai Lagoons Resort. The cumulative volumes consist of site-generated traffic superimposed over Year 2009 projected traffic demands. The traffic impacts resulting from the proposed project are addressed in the following section.

V. TRAFFIC IMPACT ANALYSIS

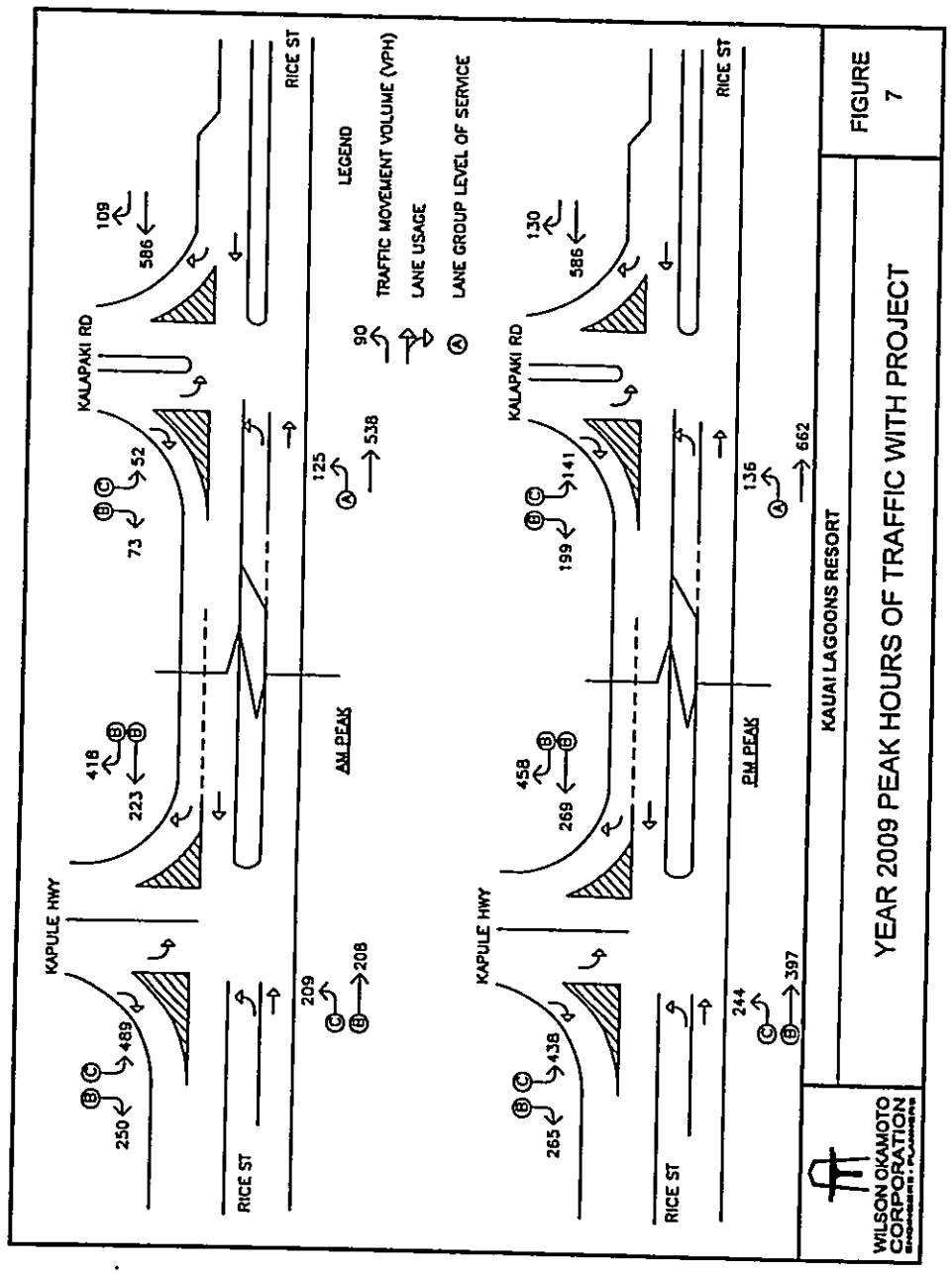
The Year 2009 cumulative AM and PM peak hour traffic conditions with the development of the proposed Kauai Lagoons Resort are summarized in Table 5. The existing and projected Year 2009 operating conditions without the proposed project are provided for comparison purposes. LOS calculations are included in Appendix E.

Table 5: Existing and Projected Year 2009 (With and Without Project) Traffic Operation Conditions

Intersection (NS/EW)	Critical Movement	AM			PM		
			Year 2009			Year 2009	
		Exist	w/out Proj	w/ Proj	Exist	w/out Proj	w/ Proj
Rice Street/ Kalapaki Road	Southbound (LT)	A	A	A	A	A	A
	Westbound (LT)	C	C	C	C	C	C
Kapule Highway/ Rice Street	Eastbound (LT)	A	C	C	A	C	C
	Southbound (LT)	F	C	C	F	C	C

Note:
Year 2009 Without Project Conditions, intersection Kapule Hwy/Rice St is analyzed as a signalized intersection.

Despite the addition of site-generated vehicles to the surrounding roadways, traffic operations within the project vicinity are expected to remain similar to Year 2009 (Without Project) conditions. At the intersection of Kalapaki Road and Rice Street, the critical movements on the westbound and southbound approaches are anticipated to remain at LOS "C" and LOS "A", respectively during both peak periods of traffic. Similarly, the eastbound and southbound left-turn traffic movements at the intersection of Kapule Highway and Rice Street are anticipated to operate at LOS "C" during both peak periods.



VI. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study associated with the project:

1. Install traffic signal system at the intersection of Kapule Highway and Rice Street. It should be noted that the County and/or State may have plans to install a traffic signal system at this intersection in the near future.

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

3. Maintain adequate sight distance for motorists to safely enter and exit the project roadways.

VII. CONCLUSION

With the implementation of the aforementioned recommendations, the proposed Kauai Lagoons Resort is not expected to have a significant impact on traffic operations in the project vicinity. The total traffic volumes entering the intersection of Kapule Highway and Rice Street are expected to increase by less than 2% during both peak hours of traffic with the development of the proposed project. These increases in the total traffic volumes are in the range of daily volume fluctuations along those roadways and represent a minimal increase in the overall traffic volumes. The increases in total traffic volumes entering the intersection of Rice Street and Kalapaki Road are higher at approximately 12 to 15%. However, the critical movements at this intersection are expected to continue operating at acceptable levels of service despite the anticipated increases in traffic.

APPENDIX A

EXISTING TRAFFIC COUNT DATA

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

Counter: D1-0525
Counted By: KT
Weather: Clear

File Name : RicdwyA
Site Code : 00000002
Start Date : 7/14/2004
Page No : 1

Groups Printed- Unshifted

	Rice St Southbound				Kalapaki Rd Westbound				Rice St Northbound					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0			
07:00 AM	0	72	18	90	14	0	8	22	18	69	0	85	0	197
07:15 AM	0	85	19	104	11	0	6	17	13	92	0	105	0	226
07:30 AM	0	116	31	147	7	0	11	18	24	126	0	150	0	315
07:45 AM	0	132	18	150	12	0	7	19	14	148	0	162	0	331
Total	0	405	86	491	44	0	32	76	67	435	0	502	0	1069
08:00 AM	0	93	11	104	20	0	5	25	10	98	0	108	0	237
08:15 AM	0	102	9	111	9	0	12	21	6	82	0	88	0	220
08:30 AM	0	81	15	96	14	0	8	22	12	92	0	104	0	222
08:45 AM	0	119	8	127	14	0	5	19	13	106	0	119	0	265
Total	0	395	43	438	57	0	30	87	41	378	0	419	0	944
Grand Total	0	800	129	929	101	0	62	163	108	813	0	921	0	2013
Apprch %	0.0	86.1	13.9		62.0	0.0	38.0		11.7	88.3	0.0			
Total %	0.0	39.7	6.4	46.2	5.0	0.0	3.1	8.1	5.4	40.4	0.0	45.8	0.0	

	Rice St Southbound				Kalapaki Rd Westbound				Rice St Northbound					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1														
Intersection	07:15 AM													
Volume	0	426	79	505	50	0	29	79	61	464	0	525	0	1109
Percent	0.0	84.4	15.6		63.3	0.0	36.7		11.6	88.4	0.0			
07:45 Volume	0	132	18	150	12	0	7	19	14	148	0	162	0	331
Peak Factor														0.838
High Int.	07:45 AM				08:00 AM				07:45 AM				8:45:00 AM	
Volume	0	132	18	150	20	0	5	25	14	148	0	162		
Peak Factor				0.842				0.790				0.810		

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

Counter: D1-0525/T-1839
Counted By: KT/CL
Weather: Clear

File Name : RicdwyP
Site Code : 00000002
Start Date : 7/13/2004
Page No : 1

Groups Printed- Unshifted

	Rice St Southbound				Kalapaki Road Westbound				Rice St Northbound					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0			
03:00 PM	0	110	29	139	39	0	28	67	21	122	0	143	0	349
03:15 PM	0	102	23	125	21	0	15	36	15	139	0	154	0	315
03:30 PM	0	126	28	154	31	0	17	48	12	138	0	150	0	352
03:45 PM	0	141	24	165	15	0	16	31	23	124	0	147	0	343
Total	0	479	104	583	106	0	76	182	71	523	0	594	0	1359
04:00 PM	0	145	20	165	54	0	27	81	19	160	0	179	0	425
04:15 PM	0	144	21	165	32	0	20	52	20	125	0	145	0	362
04:30 PM	0	190	24	214	36	0	19	55	23	140	0	163	0	432
04:45 PM	0	154	19	173	30	0	16	46	12	107	0	119	0	338
Total	0	633	84	717	152	0	82	234	74	532	0	606	0	1557
05:00 PM	0	146	21	167	30	0	25	55	19	118	0	137	0	359
05:15 PM	0	114	26	140	32	0	27	59	13	95	0	108	0	307
05:30 PM	0	112	19	131	24	0	23	47	16	94	0	110	0	288
05:45 PM	0	95	18	113	23	0	27	50	19	88	0	107	0	270
Total	0	467	84	551	109	0	102	211	67	395	0	462	0	1224
Grand Total	0	1579	272	1851	367	0	260	627	212	1450	0	1662	0	4140
Apprch %	0.0	85.3	14.7		58.5	0.0	41.5		12.8	87.2	0.0			
Total %	0.0	38.1	6.6	44.7	8.9	0.0	6.3	15.1	5.1	35.0	0.0	40.1	0.0	

	Rice St Southbound				Kalapaki Road Westbound				Rice St Northbound					
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1														
Intersection	03:45 PM													
Volume	0	620	89	709	137	0	82	219	85	549	0	634	0	1562
Percent	0.0	87.4	12.6		62.6	0.0	37.4		13.4	86.6	0.0			
04:30 Volume	0	190	24	214	36	0	19	55	23	140	0	163	0	432
Peak Factor														0.904
High Int.	04:30 PM				04:00 PM				04:00 PM				2:45:00 PM	
Volume	0	190	24	214	54	0	27	81	19	160	0	179		
Peak Factor				0.826				0.676				0.885		

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

Counter: D1-0527/T-1841
Counted By: JP/MAF
Weather: Clear

File Name : RickapA
Site Code : 00000001
Start Date : 7/14/2004
Page No : 1

Groups Printed- Unshifted

	Kapule Hwy Southbound				Rice St Westbound					Rice St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0			1.0	1.0	1.0		
07:00 AM	39	0	70	109	50	29	0	79	0	0	28	33	61	249
07:15 AM	53	0	70	123	81	26	0	107	0	0	35	44	79	309
07:30 AM	43	0	92	135	70	53	0	123	0	0	45	44	89	347
07:45 AM	56	0	94	150	106	52	0	158	0	0	50	39	89	397
Total	191	0	326	517	307	160	0	467	0	0	158	160	318	1302
08:00 AM	54	0	82	136	74	38	0	112	0	0	26	38	64	312
08:15 AM	45	0	93	138	68	28	0	96	0	0	33	44	77	311
08:30 AM	51	0	76	127	75	29	0	104	0	0	23	46	69	300
08:45 AM	61	0	83	144	70	41	0	111	0	0	36	56	92	347
Total	211	0	334	545	287	136	0	423	0	0	118	184	302	1270
Grand Total	402	0	660	1062	594	296	0	890	0	0	276	344	620	2572
Apprch %	37.9	0.0	62.1		66.7	33.3	0.0			0.0	44.5	55.5		
Total %	15.6	0.0	25.7	41.3	23.1	11.5	0.0	34.6	0.0	0.0	10.7	13.4	24.1	

	Kapule Hwy Southbound				Rice St Westbound					Rice St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1														
Intersection	07:30 AM													
Volume	196	0	361	559	318	171	0	489	0	0	154	165	319	1367
Percent	35.4	0.0	64.6		65.0	35.0	0.0			0.0	48.3	51.7		
07:45 Volume	56	0	94	150	106	52	0	158	0	0	50	39	89	397
Peak Factor														0.861
High Int.	07:45 AM				07:45 AM				6:45:00 AM	07:30 AM				
Volume	56	0	94	150	106	52	0	158	0	0	45	44	89	
Peak Factor				0.932				0.774					0.896	

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

Counter:D1-0527/T-1841
Counted By: JP/MAF
Weather: Clear

File Name : RickapP
Site Code : 00000001
Start Date : 7/13/2004
Page No : 1

Groups Printed- Unshifted

	Kapule Hwy Southbound				Rice St Westbound					Rice St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0			1.0	1.0	1.0		
03:00 PM	45	0	84	129	95	44	0	139	0	0	57	59	116	384
03:15 PM	53	0	77	130	103	56	0	159	0	0	57	56	113	402
03:30 PM	106	0	96	202	99	59	0	158	0	0	57	71	128	488
03:45 PM	68	0	90	158	85	52	0	137	0	0	74	56	130	425
Total	272	0	347	619	382	211	0	593	0	0	245	242	487	1699
04:00 PM	60	0	96	156	119	67	0	186	0	0	85	62	147	489
04:15 PM	60	0	102	162	93	51	0	144	0	0	71	49	120	426
04:30 PM	60	0	99	159	102	55	0	157	0	0	121	62	183	499
04:45 PM	39	0	93	132	83	54	0	137	0	0	86	41	127	396
Total	219	0	390	609	397	227	0	624	0	0	363	214	577	1810
05:00 PM	54	0	97	151	96	54	0	150	0	0	75	52	127	428
05:15 PM	51	0	78	129	79	36	0	115	0	0	60	42	102	346
05:30 PM	44	0	72	116	50	49	0	99	0	0	58	34	92	307
05:45 PM	30	0	74	104	52	42	0	94	0	0	55	27	82	280
Total	179	0	321	500	277	181	0	458	0	0	248	155	403	1361
Grand Total	670	0	1058	1728	1056	619	0	1675	0	0	856	611	1467	4870
Apprch %	38.8	0.0	61.2		63.0	37.0	0.0			0.0	58.4	41.6		
Total %	13.8	0.0	21.7	35.5	21.7	12.7	0.0	34.4	0.0	0.0	17.6	12.5	30.1	

	Kapule Hwy Southbound				Rice St Westbound					Rice St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1														
Intersection	03:45 PM													
Volume	248	0	367	615	399	225	0	624	0	0	351	229	580	1839
Percent	39.1	0.0	60.9		63.9	36.1	0.0			0.0	60.5	39.5		
04:30 Volume	60	0	99	159	102	55	0	157	0	0	121	62	183	499
Peak Factor														0.921
High Int.	04:15 PM				04:00 PM				2:45:00 PM	04:30 PM				
Volume	60	0	102	162	119	67	0	186	0	0	121	62	183	
Peak Factor				0.960				0.839					0.792	

Wilson Okamoto Corporation
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Kauai Lagoons
Title2 : SUNNY
Title3 : 0314

Site: 1
Date: 07/14/04

Interval	WB			EB			Combined			Dy: Wednesday
Begin	AM	PM		AM	PM		AM	PM		
12:00	13	46	•	9	30	•	22	76	•	
12:15	10		•	10		•	20		•	
12:30	10		•	4		•	14		•	
12:45	13		•	7		•	20		•	
01:00	12	38	•	6	17	•	18	55	•	
01:15	8		•	4		•	12		•	
01:30	10		•	1		•	11		•	
01:45	7	18	•	7	11	•	14	29	•	
02:00	6		•	1		•	7		•	
02:15	2		•	0		•	2		•	
02:30	1		•	3		•	4		•	
02:45	8		•	6	10	•	14	18	•	
03:00	1		•	4		•	5		•	
03:15	3		•	3		•	6		•	
03:30	2		•	5		•	7		•	
03:45	2		•	1		•	3		•	
04:00	5	29	•	7	28	•	12	57	•	
04:15	6		•	5		•	11		•	
04:30	10		•	10		•	20		•	
04:45	10		•	6		•	16		•	
05:00	12	58	•	8	79	•	20	137	•	
05:15	10		•	18		•	28		•	
05:30	14		•	16		•	30		•	
05:45	22		•	37		•	59		•	
06:00	26	178	•	30	243	•	56	421	•	
06:15	42		•	58		•	100		•	
06:30	52		•	79		•	131		•	
06:45	58		•	76		•	134		•	
07:00	84	496	•	86	470	•	170	966	•	
07:15	115		•	102		•	217		•	
07:30	128		•	130		•	258		•	
07:45	169		•	152		•	321		•	
08:00	132	500	•	101	439	•	233	939	•	
08:15	109		•	116		•	225		•	
08:30	127		•	102		•	229		•	
08:45	132		•	120		•	252		•	
09:00	120	467	•	112	462	•	232	929	•	
09:15	100		•	123		•	223		•	
09:30	123		•	94		•	221		•	
09:45	120		•	133		•	253		•	
10:00	0		•	0		•	0		•	
10:15			•			•			•	
10:30			•			•			•	
10:45			•			•			•	
11:00			•			•			•	
11:15			•			•			•	
11:30			•			•			•	
11:45			•			•			•	
Totals	1,818	0	•	1,789	0	•	3,607	0	•	
Split%	50.7		•	49.3		•			•	
Day Totals	1,818			1,789			3,607			
Day Split%	50.7			49.3						

Peak Hour	07:15	•	07:30	•	07:30	•	
Volume	544	•	499	•	1,037	•	
Factor	0.90	•	0.83	•	0.81	•	

Data File: Kauai Lagoons

Printed : 7/15/2004

Page : 2

Wilson Okamoto Corporation
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Kauai Lagoons
Title2 : SUNNY
Title3 : 0234

Site: 1
Date: 07/13/04

Interval	WB			EB			Combined			Day: Tuesday
Begin	AM	PM		AM	PM		AM	PM		
12:00	*	182	712	*	174	639	*	356	1,351	
12:15	*	190		*	177		*	367		
12:30	*	178		*	166		*	344		
12:45	*	162		*	122		*	284		
01:00	*	165	665	*	164	594	*	329	1,259	
01:15	*	162		*	140		*	302		
01:30	*	152		*	144		*	296		
01:45	*	186		*	146		*	332		
02:00	*	172	597	*	122	555	*	294	1,152	
02:15	*	136		*	147		*	283		
02:30	*	148		*	144		*	292		
02:45	*	141		*	142		*	283		
03:00	*	148	642	*	135	577	*	283	1,219	
03:15	*	164		*	134		*	298		
03:30	*	186		*	148		*	334		
03:45	*	144		*	160		*	304		
04:00	*	188	663	*	168	706	*	356	1,369	
04:15	*	162		*	162		*	324		
04:30	*	173		*	204		*	377		
04:45	*	140		*	172		*	312		
05:00	*	158	509	*	167	543	*	325	1,052	
05:15	*	132		*	140		*	272		
05:30	*	121		*	120		*	241		
05:45	*	98		*	116		*	214		
06:00	*	120	467	*	104	365	*	224	832	
06:15	*	130		*	93		*	223		
06:30	*	109		*	90		*	199		
06:45	*	108		*	78		*	186		
07:00	*	109	371	*	70	274	*	179	645	
07:15	*	110		*	103		*	213		
07:30	*	78		*	50		*	128		
07:45	*	74		*	51		*	125		
08:00	*	76	248	*	55	223	*	131	471	
08:15	*	64		*	54		*	118		
08:30	*	52		*	60		*	112		
08:45	*	56		*	54		*	110		
09:00	*	69	229	*	50	188	*	119	417	
09:15	*	44		*	56		*	100		
09:30	*	65		*	49		*	114		
09:45	*	51		*	33		*	84		
10:00	*	43	130	*	28	103	*	71	233	
10:15	86	37		70	31		156	68		
10:30	151	29		138	20		289	49		
10:45	146	21		129	24		275	45		
11:00	134	27	75	130	14	47	264	41	122	
11:15	122	18		145	15		267	33		
11:30	156	18		152	11		308	29		
11:45	154	12		178	7		332	19		
Totals	949	5,308		942	4,814		1,891	10,122		
Split%	50.2	52.4		49.8	47.6					
Day Totals		6,257			5,756			12,013		
Day Splits		52.1			47.9					
Peak Hour	11:00	12:00		11:00	04:00		11:00	04:00		
Volume	566	712		605	706		1,171	1,369		
Factor	0.91	0.94		0.85	0.87		0.88	0.91		

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

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

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

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

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

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

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: Ktandoc
Agency/Co.: Wilson Okamoto corp
Date Performed: 7/19/2004
Analysis Time Period: AM Peak Hour
Intersection: Kalapaki Rd/Rice St
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Existing Conditions
Project ID: Kauai Lagoons
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		563	61	79	517	
Peak-Hour Factor, PHF		0.81	0.81	0.84	0.84	
Hourly Flow Rate, HFR		695	75	94	615	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	29		50			
Peak Hour Factor, PHF	0.79		0.79			
Hourly Flow Rate, HFR	36		63			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		94	36		63			
C(m) (vph)		901	331		706			
v/c		0.10	0.11		0.09			
95% queue length		0.35	0.37		0.29			
Control Delay		9.5	17.2		10.6			
LOS		A	C		B			
Approach Delay				13.0				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Existing Condition
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		549	85	89	620	
Peak-Hour Factor, PHF		0.89	0.89	0.83	0.83	
Hourly Flow Rate, HFR		616	95	107	746	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	82		137			
Peak Hour Factor, PHF	0.68		0.68			
Hourly Flow Rate, HFR	120		201			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		107	120		201			
C(m) (vph)		964	377		773			
v/c		0.11	0.32		0.26			
95% queue length		0.37	1.39		1.05			
Control Delay		9.2	19.0		11.3			
LOS		A	C		B			
Approach Delay				14.2				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst:	KTandoc
Agency/Co.:	Wilson Okamoto Corp
Date Performed:	7/21/2004
Analysis Time Period:	AM Peak Hour
Intersection:	Kapule Hwy/Rice St
Jurisdiction:	Lihu'e, Kauai
Units: U. S. Customary	
Analysis Year:	Existing Conditions
Project ID: 6266-06 Kauai Lagoons	
East/West Street:	Rice Street
North/South Street:	Kapule Highway
Intersection Orientation: EW	Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	200	187			208	386
Peak-Hour Factor, PHF	0.90	0.90			0.77	0.77
Hourly Flow Rate, HFR	222	207			270	501
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						Yes
Lanes	1	1			1	1
Configuration	L	T			T	R
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				438		240
Peak Hour Factor, PHF				0.93		0.93
Hourly Flow Rate, HFR				470		258
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes				1		1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	222					470		258
C(m) (vph)	1293					519		1144
v/c	0.17					0.91		0.23
95% queue length	0.62					16.99		0.87
Control Delay	8.4					63.1		9.1
LOS	A					F		A
Approach Delay							43.9	
Approach LOS							E	

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst:	Ktandoc
Agency/Co.:	Wilson Okamoto Corp
Date Performed:	7/21/2004
Analysis Time Period:	PM Peak Hour
Intersection:	Kapule Hwy/Rice Street
Jurisdiction:	Lihu'e, Kauai
Units: U. S. Customary	
Analysis Year:	Existing Conditions
Project ID: 6266-06 Kauai Lagoons	
East/West Street:	Rice Street
North/South Street:	Kapule Highway
Intersection Orientation: EW	Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	229	351			225	399
Peak-Hour Factor, PHF	0.79	0.79			0.84	0.84
Hourly Flow Rate, HFR	289	444			267	475
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						Yes
Lanes	1	1			1	1
Configuration	L	T			T	R
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				387		248
Peak Hour Factor, PHF				0.98		0.98
Hourly Flow Rate, HFR				394		253
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes				1		1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	289					394		253
C(m) (vph)	1297					347		1148
v/c	0.22					1.14		0.22
95% queue length	0.86					38.75		0.85
Control Delay	8.6					327.2		9.0
LOS	A					F		A
Approach Delay							202.8	
Approach LOS							F	

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2009 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst:
Agency/Co.: Wilson Okamoto corp
Date Performed: 7/19/2004
Analysis Time Period: AM Peak Hour
Intersection: Kalapaki Rd/Rice St
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: Kauai Lagoons
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	61	79	538	
Peak-Hour Factor, PHF		0.81	0.81	0.84	0.84	
Hourly Flow Rate, HFR		723	75	94	640	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	29		50			
Peak Hour Factor, PHF	0.79		0.79			
Hourly Flow Rate, HFR	36		63			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		94	36		63			
C(m) (vph)		879	314		684			
v/c		0.11	0.11		0.09			
95% queue length		0.36	0.39		0.30			
Control Delay		9.6	17.9		10.8			
LOS		A	C		B			
Approach Delay				13.4				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		583	85	89	662	
Peak-Hour Factor, PHF		0.89	0.89	0.83	0.83	
Hourly Flow Rate, HFR		655	95	107	797	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	82		137			
Peak Hour Factor, PHF	0.68		0.68			
Hourly Flow Rate, HFR	120		201			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		107	120		201			
C(m) (vph)		932	350		739			
v/c		0.11	0.34		0.27			
95% queue length		0.39	1.54		1.12			
Control Delay		9.4	20.6		11.7			
LOS		A	C		B			
Approach Delay				15.0+				
Approach LOS				C				

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: AM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 without Project
N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	209	195			216	402				456		250
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						127						104

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru				
Right					Right				
Peds					Peds				
WB Left					SB Left	A			
Thru	A				Thru				
Right	A				Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	39.0					41.0			
Yellow	4.0					4.0			
All Red	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	421	972	0.55	0.43	20.6	C		
T	807	1863	0.27	0.43	16.5	B	18.6	B
Westbound								
T	807	1863	0.30	0.43	16.8	B	17.7	B
R	686	1583	0.45	0.43	18.4	B		
Northbound								
Southbound								
L	806	1770	0.63	0.46	20.3	C		
							19.0	B
R	721	1583	0.22	0.46	15.0	B		

Intersection Delay = 18.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: PM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highway/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	244	375			240	426				413		265
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						210						131

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru			
Right	A				Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	41.0					39.0		
Yellow	4.0					4.0		
All Red	1.0					1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	431	945	0.63	0.46	21.7	C		
T	849	1863	0.49	0.46	17.6	B	19.2	B
Westbound								
T	849	1863	0.31	0.46	15.8	B	15.9	B
R	721	1583	0.33	0.46	16.0	B		
Northbound								
Southbound								
L	767	1770	0.60	0.43	20.8	C		
R	686	1583	0.22	0.43	16.1	B	19.7	B

Intersection Delay = 18.4 (sec/veh) Intersection LOS = B

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2009 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: Ktandoc
Agency/Co.: Wilson Okamoto corp
Date Performed: 7/19/2004
Analysis Time Period: AM Peak Hour
Intersection: Kalapaki Rd/Rice St
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: Kauai Lagoons
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	109	125	538	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.89	
Hourly Flow Rate, HFR		651	121	138	604	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	52		73			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	57		81			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		138	57		81			
C(m) (vph)		935	306		742			
v/c		0.15	0.19		0.11			
95% queue length		0.52	0.68		0.37			
Control Delay		9.5	19.5		10.4			
LOS		A	C		B			
Approach Delay				14.2				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	130	136	662	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		651	144	151	735	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1		1	1
Configuration		T	R		L	T
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	141		199			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	156		221			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		151	156		221			
C(m) (vph)		935	340		742			
v/c		0.16	0.46		0.30			
95% queue length		0.58	2.48		1.27			
Control Delay		9.6	24.5		11.9			
LOS		A	C		B			
Approach Delay				17.1				
Approach LOS				C				

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: AM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	209	208			223	418				489		250
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						173						104

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru				
Right					Right				
Peds					Peds				
WB Left					SB Left	A			
Thru		A			Thru				
Right		A			Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		39.0				41.0			
Yellow		4.0				4.0			
All Red		1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	415	958	0.56	0.43	20.8	C		
T	807	1863	0.29	0.43	16.7	B	18.7	B
Westbound								
T	807	1863	0.31	0.43	16.9	B	17.4	B
R	686	1583	0.40	0.43	17.8	B		
Northbound								
Southbound								
L	806	1770	0.67	0.46	21.5	C		
R	721	1583	0.22	0.46	15.0	B	20.0+	C

Intersection Delay = 18.9 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: PM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	244	397			269	458				438		265
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						232						133

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru				
Right					Right				
Peds					Peds				
WB Left					SB Left	A			
Thru		A			Thru				
Right		A			Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		41.5				38.5			
Yellow		4.0				4.0			
All Red		1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	414	898	0.65	0.46	22.5	C		
T	859	1863	0.51	0.46	17.7	B	19.5	B
Westbound								
T	859	1863	0.35	0.46	15.8	B	15.8	B
R	730	1583	0.34	0.46	15.8	B		
Northbound								
Southbound								
L	757	1770	0.64	0.43	22.2	C		
R	677	1583	0.22	0.43	16.4	B	20.9	C

Intersection Delay = 18.9 (sec/veh) Intersection LOS = B

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Ninini Point Street Access)

Prepared by Wilson Okamoto Corporation

September 2005

SUPPLEMENTAL TRAFFIC ANALYSIS

FOR THE PROPOSED

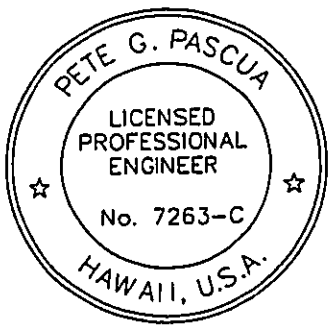
KAUAI LAGOONS RESORT

Prepared for:

Kauai Development LLC
55 Merchant Street, Suite 1900
Honolulu, HI 96813

Prepared by:

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



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

EXPIRATION DATE
OF LICENSE - 4/30/06

September 2005

LIST OF FIGURES

LIST OF APPENDICIES

I. INTRODUCTION

A. Background

The analysis and documentation of this study supplements the Traffic Impact Report for the Proposed Kauai Lagoons Resort, dated September 2004. This supplement was prepared in response to comments received from the State Department of Transportation, (June 17, 2005) and the Kauai Department of Public Works, (May 24, 2005). The initial study and report included the analysis of two intersections along Rice Street at Kapule Highway and at the primary access driveway of Kalapaki Road. The supplemental analysis evaluates an additional access roadway at Ninini Point Street off Kapule Highway. This supplemental analysis evaluates traffic conditions along Rice Street at the Kalapaki Road and Kapule Highway intersections; and along Kapule Highway at the intersections with Haoa Street and Ninini Point Street.

The primary access road to the Kauai Lagoons Resort project site would be provided at Ninini Point Street and Kapule Highway intersection. Ninini Point Street is currently a service/maintenance and construction access road for Kauai Lagoons Resort as well as the access for the County's WWTP and also serves as a public shoreline access. Figure 1 shows the proposed access points to the Kauai Lagoons Resort area. Figures 2 and 3 shows the existing AM and PM peak hour traffic conditions for the study intersections within the project vicinity.

B. Scope of Study

This report presents the findings of the supplemental traffic analysis, the scope of which includes:

1. Distribution of traffic demands to the added access road on Ninini Point Street at Kapule Highway.
2. Incorporation of the revised traffic distribution to the primary access at the intersection of Ninini Point Street and Kapule Highway.
3. Analysis of future traffic conditions at all of the study intersections.

II. TRAFFIC ANALYSIS

A. Traffic Distribution

The directional distribution of traffic at the two access roads for Kauai Lagoons Resort is based on activity centers throughout the island and includes 60% of project vehicles entering and exiting Ninini Point Street at Kapule Highway and 40% of project vehicles entering and exiting Kalapaki Road at Rice Street.

At the intersection of Kapule Highway and Ninini Point Street, the traffic demands on Ninini Point Street indicate that 16 vph (vehicle per hour) during the AM peak hour and 14 vph during the PM peak hour of traffic in the eastbound approach while the westbound approach indicates 12 vph during the AM peak hour and 16 vph during the PM peak hour. The northbound approach along Kapule Highway includes a traffic demand of 454 vph during the AM peak hour and 725 vph during the PM peak hour while the southbound approach includes a traffic demand of 658 vph during the AM peak hour and 632 vph during the PM hour of traffic. Figures 4 and 5

show the Year 2009 distribution of site-generated vehicles for AM and PM peak hour traffic conditions at the study intersections in the vicinity of the project. The trip generation computations for the proposed Kauai Lagoons Resort are shown in Table 1.

Table 1: Peak Hour Trip Generation

RECREATIONAL HOME		
INDEPENDENT VARIABLE:		Dwelling Units = 709
		PROJECTED TRIP ENDS
AM PEAK	ENTER	78
	EXIT	35
	TOTAL	113
PM PEAK	ENTER	78
	EXIT	106
	TOTAL	184
HOTEL		
INDEPENDENT VARIABLE:		Dwelling Units = 41
		PROJECTED TRIP ENDS
AM PEAK	ENTER	16
	EXIT	11
	TOTAL	27
PM PEAK	ENTER	14
	EXIT	15
	TOTAL	29
APARTMENT		
INDEPENDENT VARIABLE:		Dwelling Units = 41
		PROJECTED TRIP ENDS
AM PEAK	ENTER	2
	EXIT	10
	TOTAL	12
PM PEAK	ENTER	10
	EXIT	5
	TOTAL	15
TOTAL PROJECT TRIPS		
AM PEAK	**ENTER**	**96**
	EXIT	**56**
	TOTAL	**152**
PM PEAK	**ENTER**	**102**
	EXIT	**126**
	TOTAL	**228**

B. Traffic Conditions

Figures 6 and 7 show the Year 2009 AM and PM peak hour traffic conditions without the project and is based upon ambient growth factors developed in the September 2004 traffic report. Figures 8 and 9 show the Year 2009 AM and PM peak hour traffic conditions with the project. These traffic projections incorporate the revised distribution associated with proposed residential units at the corner of Kapule Highway and Haoa Street, and traffic associated with the additional project access road via Ninini Point Street. The revised distribution of project vehicles to the primary access road at Ninini Point Street, the levels of service for existing, Year 2009 without the project, and Year 2009 with the project traffic operating conditions are provided in Table 2 for comparison.

Table 2: Comparison of the Existing and Projected Year 2009 Peak Hour Traffic Conditions With and Without the Kauai Lagoons Resort

Intersection (NS/EW)	Critical Movement / Approach	AM			PM		
		Exist	Year 2009 w/out Proj	Year 2009 w/ Proj	Exist	Year 2009 w/out Proj	Year 2009 w/ Proj
Rice Street/ Kalapaki Road [1]	Southbound (LT)	A	A	A	A	A	A
	Westbound (LT)	C	C	C	C	C	C
Kapule Highway/ Rice Street [1]	Eastbound (LT)	A	C	C	A	C	C
	Southbound (LT)	F	C	C	F	C	C
Kapule Highway/ Haoa Street [2]	Southbound (LT)	B	B	B	B	B	B
	Westbound (LT)	B	B	B	B	B	B
Kapule Highway/ Ninini Point Street	Southbound	A	A	A	A	A	A
	Northbound	A	A	A	A	A	A
	Westbound	C	C	D	D	D	F
	Eastbound	D	D	D	E	E	F

[1] - Traffic Impact Report, September 2004.

[2] - Supplemental Traffic Analysis for Kauai Lagoons Resort, June 2005.

TS - Proposed Traffic Signal shown in the Traffic Impact Report, September 2004

Despite the addition of site-generated vehicles to the surrounding roadways, traffic operations within the project vicinity are expected to remain similar to Year 2009 (Without Project) conditions except for the intersection of Kapule Highway and Ninini Point Street. At this intersection, the westbound approach is anticipated to deteriorate from LOS "C" to LOS "D" during the projected AM peak hour and from LOS "D" to LOS "F" during the projected PM peak hour of traffic while the eastbound approach is anticipated to deteriorate from LOS "E" to LOS "F" during the projected PM peak hour of traffic.

C. Traffic Signal Warrant Summary

Due to the anticipated increases in traffic along Kapule Highway as a result of the proposed development for Kauai Lagoons Resort, a traffic signal system may be warranted at the intersection of Kapule Highway and Ninini Point Street. The installation of a traffic signal may be justified by one or more of the eight warrants outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways," Millennium Edition (MUTCD). These warrants take into account factors such as eight-hour vehicular volumes (Warrant 1), four-hour vehicular volumes (Warrant 2), peak hour volumes (Warrant 3), pedestrian volumes (Warrant 4), the presence of a school crossing or coordinated signal system (Warrant 5 and 6), crash experience (Warrant 7), and other characteristics of the roadway network (Warrant 8).

At the unsignalized study intersections in the project vicinity, traffic conditions at the intersection of Kapule Highway and Ninini Point Street are expected to deteriorate to unacceptable levels of service under Year 2009 with project conditions indicating the potential need for mitigative measures such as a traffic signal system. As such, this intersection was assessed to verify whether or not a traffic signal system might be justified. Data was collected at the subject intersection during the peak periods of traffic therefore Warrant 3 was applied to determine whether a traffic signal system might be justified. Warrant 3, the "Peak Hour Warrant," consists of several conditions that may justify delay due to large volumes of intersecting traffic during the peak hour periods. It should be noted that the warrants serve only as a guide and do not strictly warrant a traffic signal if met, nor does it mean a signal system should not be installed if the warrants are not met.

One of the conditions for the Peak Hour Warrants is based upon the relationship between the traffic volumes along the major and minor streets. If the traffic volume along the minor street exceeds the thresholds shown in Figure 4C-3 of the MUTCD, a traffic signal system may be justified. Under Year 2009 with project conditions, the traffic volumes on the westbound approach of Ninini Point Street at the Kapule Highway intersection does not satisfy Warrant 3 for minor street approaches with two lanes for high through traffic volumes on the major street (see Figure 10). This intersection and conditions may also satisfy the remaining warrants for traffic signal consideration which take into account factors other than peak hour volumes and requires further study. However due to the potential undesirable projected traffic conditions, the intersection of Kapule Highway and Ninini Point Street is herein assumed to be signalized to mitigate poor projected traffic conditions.

III. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study associated with the project including appropriate recommendations identified in the September 2004 traffic report.

1. Install traffic signal system at the intersection of Kapule Highway and Rice Street.

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

3. Maintain adequate sight distance for motorists to safely enter and exit the project roadways.

4. The recommended roadway improvements at Kapule Highway and Ninini Point Street include an exclusive left-turn lane and one shared through and right-turn lane for the westbound and eastbound approaches. The northbound approach includes an exclusive left-turn lane, one through lane, and one exclusive right-turn lane while the southbound approach will have an exclusive left-turn lane and a shared through and right-turn lane. The recommended roadway improvements at the intersection of Kapule Highway and Ninini Point Street are illustrated in Figure 11. The projected Year 2009 with and without project, and Year 2009 with project with recommended improvements are provided in Table 3 for comparison.

Table 3: Comparison of the Projected Year 2009 Peak Hour Traffic Conditions With/Without Project and With Improvements

Intersection (NS/EW)	Critical Movements	AM			PM		
		w/out Proj	w/ Proj	w/ Imp *	w/out Proj	w/ Proj	w/ Imp *
Kapule Highway/ Ninini Point Street	Southbound (L)	A	A	C	A	A	C
	Northbound (L)	A	A	C	A	A	C
	Westbound (L)	C	D	C	D	F	C
	Eastbound (L)	D	D	C	E	F	C

- Installation of traffic signal and intersection improvements

4. Install traffic signal system at the intersection of Kapule Highway and Ninini Point Street. This improvement is necessary to improve the projected Year 2009 with project with recommended improvements traffic conditions. The installation of a traffic signal will improve the critical movements at this intersection from LOS "F" to LOS "C" during the afternoon peak hour of traffic.

VI. CONCLUSION

There would be an increase in traffic demands along Kapule Highway and Rice Street with the primary access road at Ninini Point Street as a result of the proposed Kauai Lagoons Resort redevelopment. The analysis assumes 60% of project trips will access Ninini Point Street at Kapule Highway and 40% will access Kalapaki Road at Rice Street. With the primary access road at Ninini Point Street and a secondary access road at Kalapaki Road, the traffic volumes entering and exiting the project site at the study intersections are expected to operate at acceptable levels of service with the recommended roadway improvements at the intersection of Ninini Point Street and Kapule Highway. In addition to mitigation measures identified in the Kauai Lagoons Resort Traffic Report dated September 2004, the additional recommended improvements identified in the study should mitigate Year 2009 ambient traffic growth and traffic generated by the proposed Kauai Lagoons Resort development.

C. Traffic Signal Warrant Summary

Due to the anticipated increases in traffic along Kapule Highway as a result of the proposed development for Kauai Lagoons Resort, a traffic signal system may be warranted at the intersection of Kapule Highway and Ninini Point Street. The installation of a traffic signal may be justified by one or more of the eight warrants outlined in the "Manual on Uniform Traffic Control Devices for Streets and Highways," Millennium Edition (MUTCD). These warrants take into account factors such as eight-hour vehicular volumes (Warrant 1), four-hour vehicular volumes (Warrant 2), peak hour volumes (Warrant 3), pedestrian volumes (Warrant 4), the presence of a school crossing or coordinated signal system (Warrant 5 and 6), crash experience (Warrant 7), and other characteristics of the roadway network (Warrant 8).

At the unsignalized study intersections in the project vicinity, traffic conditions at the intersection of Kapule Highway and Ninini Point Street are expected to deteriorate to unacceptable levels of service under Year 2009 with project conditions indicating the potential need for mitigative measures such as a traffic signal system. As such, this intersection was assessed to verify whether or not a traffic signal system might be justified. Data was collected at the subject intersection during the peak periods of traffic therefore Warrant 3 was applied to determine whether a traffic signal system might be justified. Warrant 3, the "Peak Hour Warrant," consists of several conditions that may justify delay due to large volumes of intersecting traffic during the peak hour periods. It should be noted that the warrants serve only as a guide and do not strictly warrant a traffic signal if met, nor does it mean a signal system should not be installed if the warrants are not met.

One of the conditions for the Peak Hour Warrants is based upon the relationship between the traffic volumes along the major and minor streets. If the traffic volume along the minor street exceeds the thresholds shown in Figure 4C-3 of the MUTCD, a traffic signal system may be justified. Under Year 2009 with project conditions, the traffic volumes on the westbound approach of Ninini Point Street at the Kapule Highway intersection does not satisfy Warrant 3 for minor street approaches with two lanes for high through traffic volumes on the major street (see Figure 10). This intersection and conditions may also satisfy the remaining warrants for traffic signal consideration which take into account factors other than peak hour volumes and requires further study. However due to the potential undesirable projected traffic conditions, the intersection of Kapule Highway and Ninini Point Street is herein assumed to be signalized to mitigate poor projected traffic conditions.

III. RECOMMENDATIONS

Based on the analysis of the traffic data, the following are the recommendations of this study associated with the project including appropriate recommendations identified in the September 2004 traffic report.

1. Install traffic signal system at the intersection of Kapule Highway and Rice Street. ~~It should be noted that the County and/or State may have plans to install a traffic signal system at this intersection in the near future.~~

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

3. Maintain adequate sight distance for motorists to safely enter and exit the project roadways.

4. The recommended roadway improvements at Kapule Highway and Ninini Point Street include an exclusive left-turn lane and one shared through and right-turn lane for the westbound and eastbound approaches. The northbound approach includes an exclusive left-turn lane, one through lane, and one exclusive right-turn lane while the southbound approach will have an exclusive left-turn lane and a shared through and right-turn lane. The recommended roadway improvements at the intersection of Kapule Highway and Ninini Point Street are illustrated in Figure 11. The projected Year 2009 with and without project, and Year 2009 with project with recommended improvements are provided in Table 3 for comparison.

Table 3: Comparison of the Projected Year 2009 Peak Hour Traffic Conditions With/Without Project and With Improvements

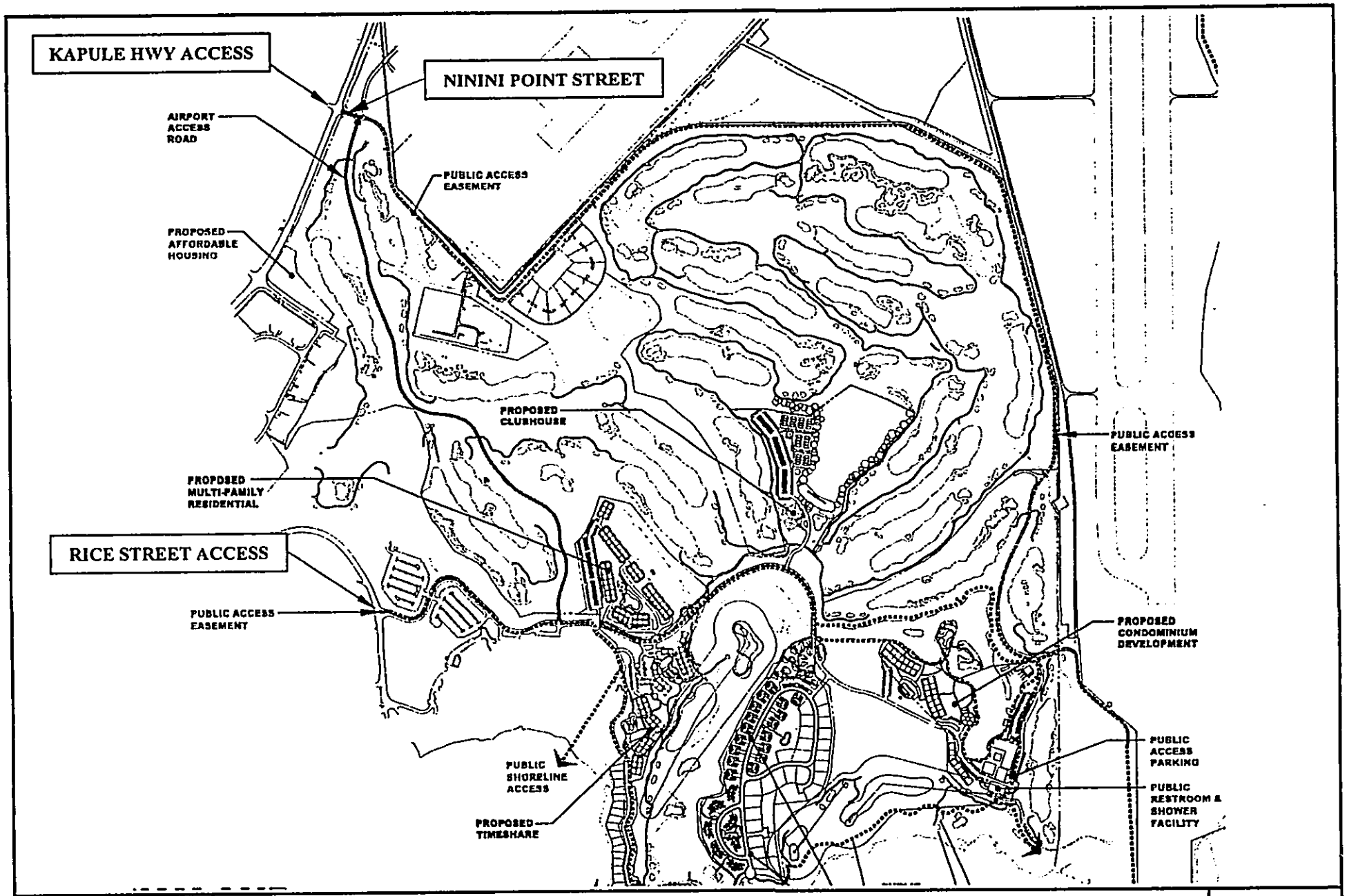
Intersection (NS/EW)	Critical Movements	AM			PM		
		w/out Proj	w/ Proj	w/ Imp *	w/out Proj	w/ Proj	w/ Imp *
Kapule Highway/ Ninini Point Street	Southbound (L)	A	A	C	A	A	C
	Northbound (L)	A	A	C	A	A	C
	Westbound (L)	C	D	C	D	F	C
	Eastbound (L)	D	D	C	E	F	C

- Installation of traffic signal and intersection improvements

4. Install traffic signal system at the intersection of Kapule Highway and Ninini Point Street. This improvement is necessary to improve the projected Year 2009 with project with recommended improvements traffic conditions. The installation of a traffic signal will improve the critical movements at this intersection from LOS "F" to LOS "C" during the afternoon peak hour of traffic.

VI. CONCLUSION

There would be an increase in traffic demands along Kapule Highway and Rice Street with the primary access road at Ninini Point Street as a result of the proposed Kauai Lagoons Resort redevelopment. The analysis assumes 60% of project trips will access Ninini Point Street at Kapule Highway and 40% will access Kalapaki Road at Rice Street. With the primary access road at Ninini Point Street and a secondary access road at Kalapaki Road, the traffic volumes entering and exiting the project site at the study intersections are expected to operate at acceptable levels of service with the recommended roadway improvements at the intersection of Ninini Point Street and Kapule Highway. In addition to mitigation measures identified in the Kauai Lagoons Resort Traffic Report dated September 2004, the additional recommended improvements identified in the study should mitigate Year 2009 ambient traffic growth and traffic generated by the proposed Kauai Lagoons Resort development.

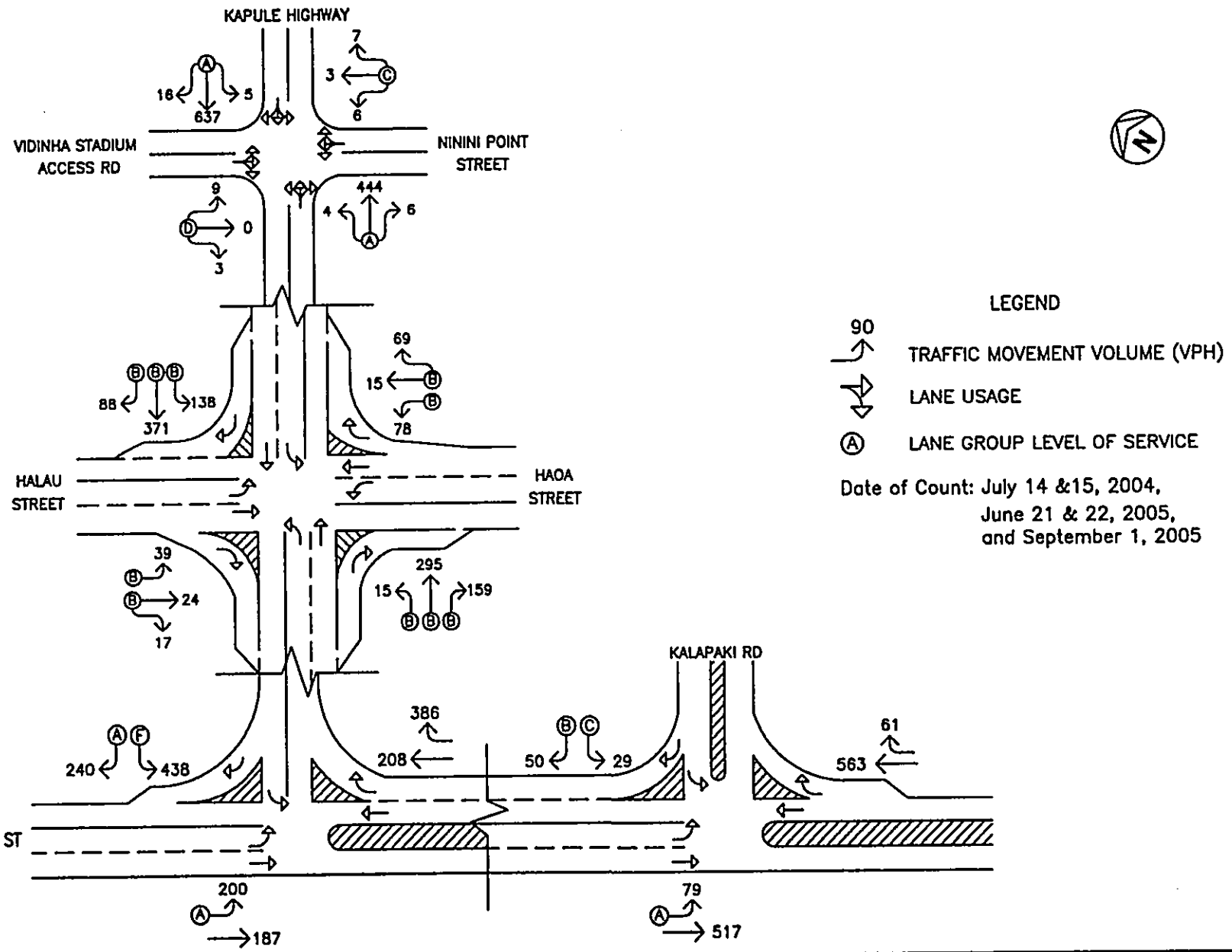


WILSON OKAMOTO CORPORATION
ENGINEERS - PLANNERS

KAUAI LAGOONS RESORT

PROJECT SITE PLAN

FIGURE 1



LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

Ⓐ LANE GROUP LEVEL OF SERVICE

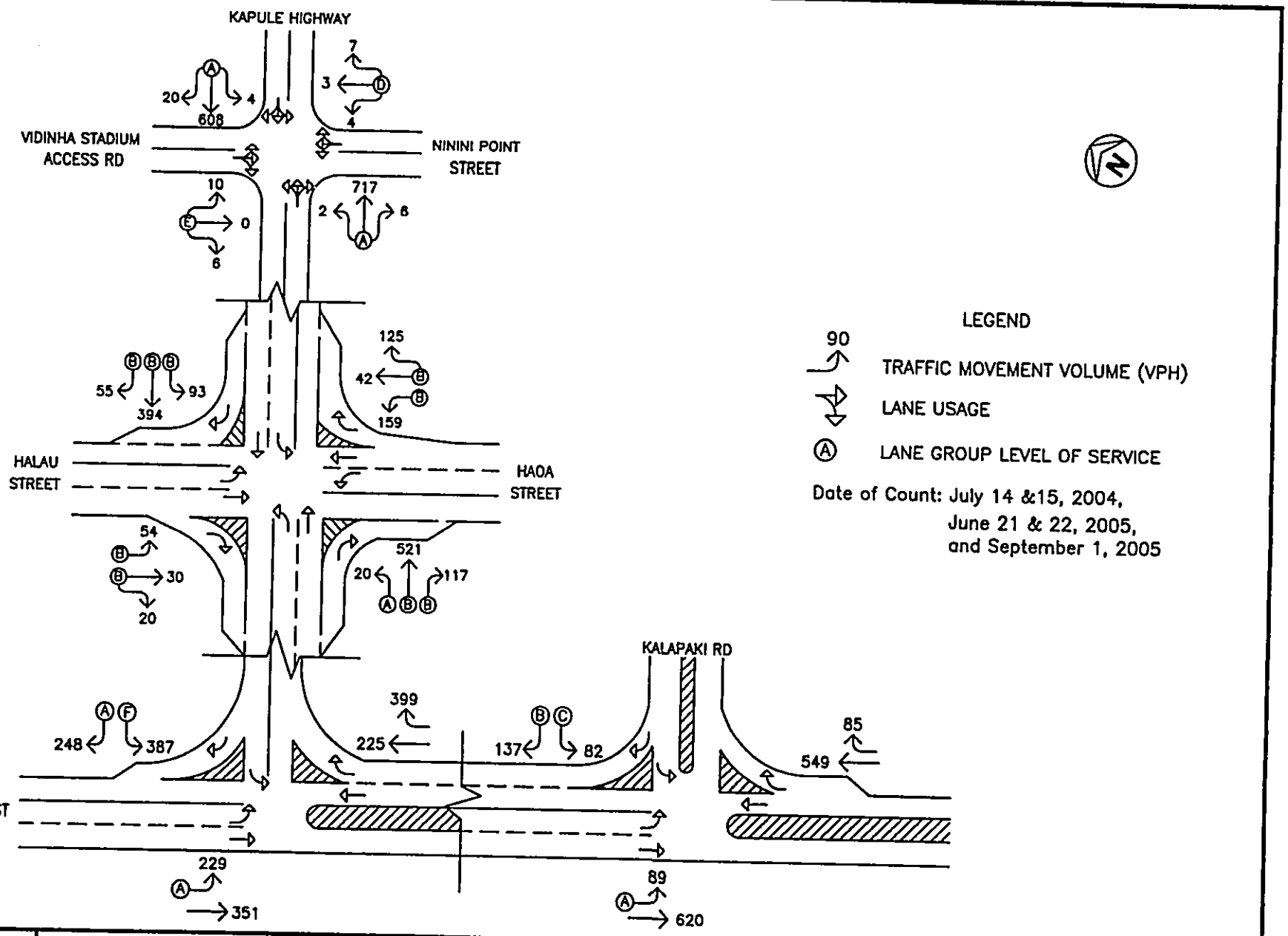
Date of Count: July 14 &15, 2004,
June 21 & 22, 2005,
and September 1, 2005

WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

EXISTING AM PEAK HOUR OF TRAFFIC

FIGURE 2

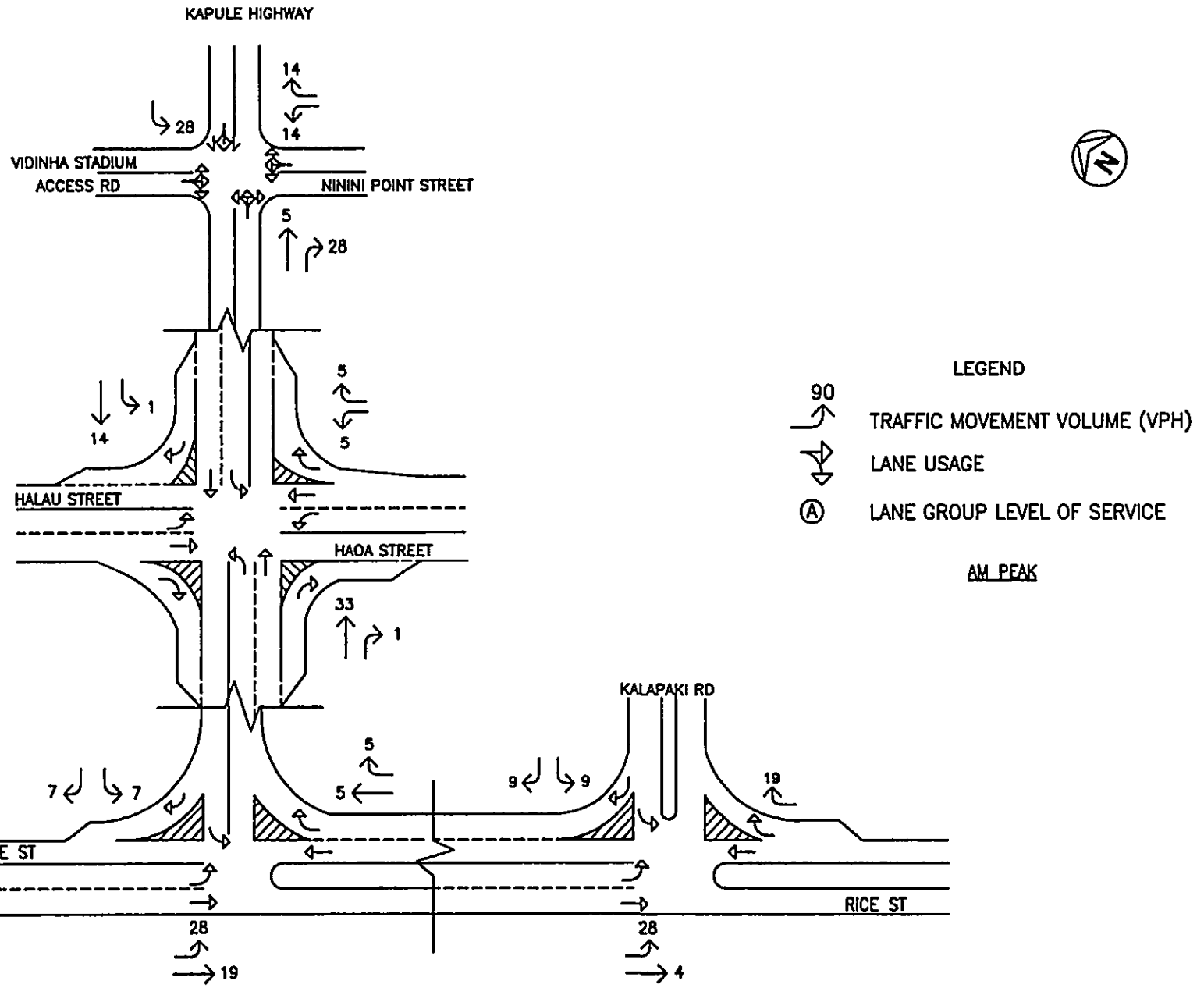


WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

EXISTING PM PEAK HOUR OF TRAFFIC

FIGURE 3

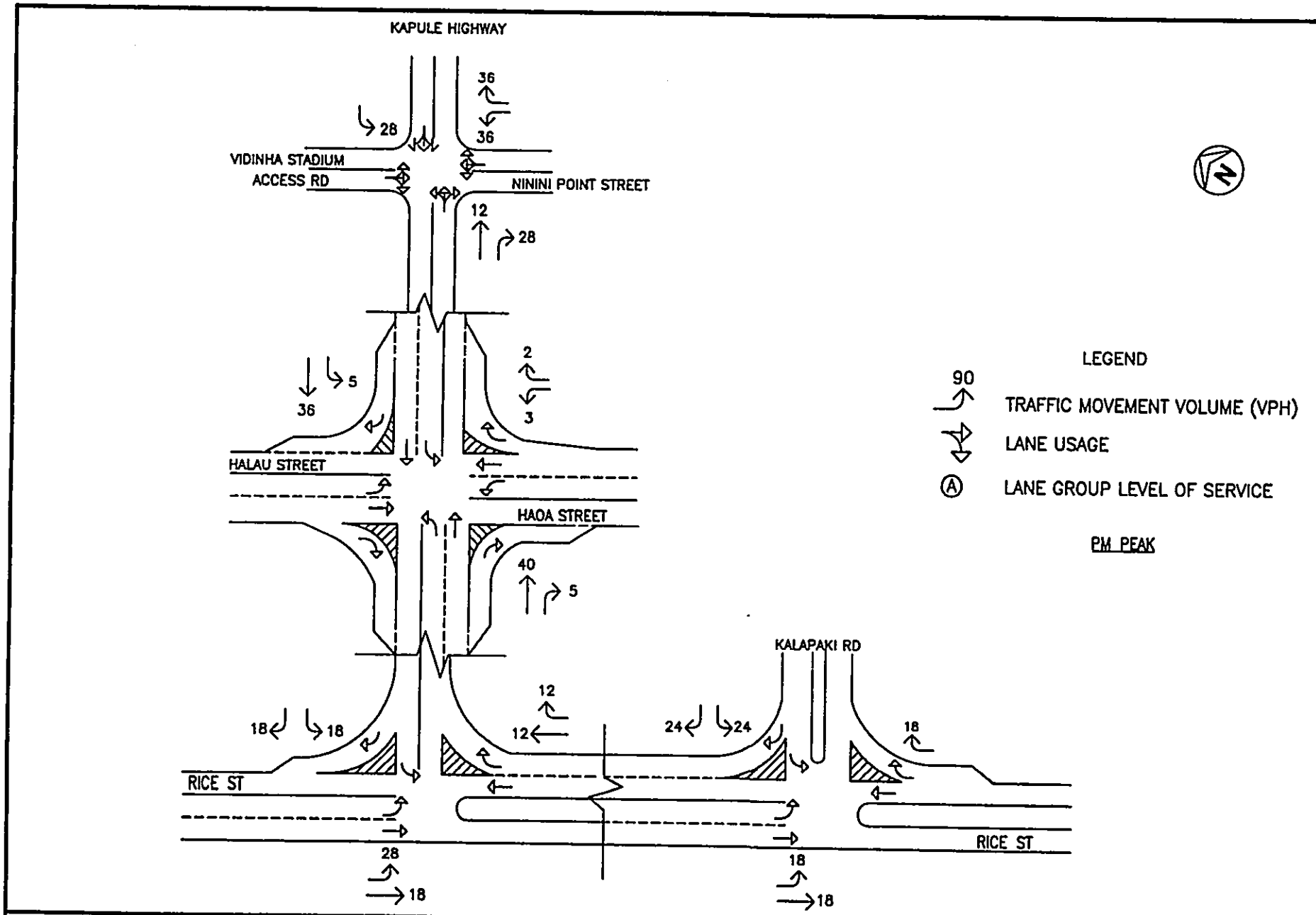


WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 DISTRIBUTION OF SITE-GENERATED VEHICLES AM PEAK HOUR OF TRAFFIC

FIGURE 4

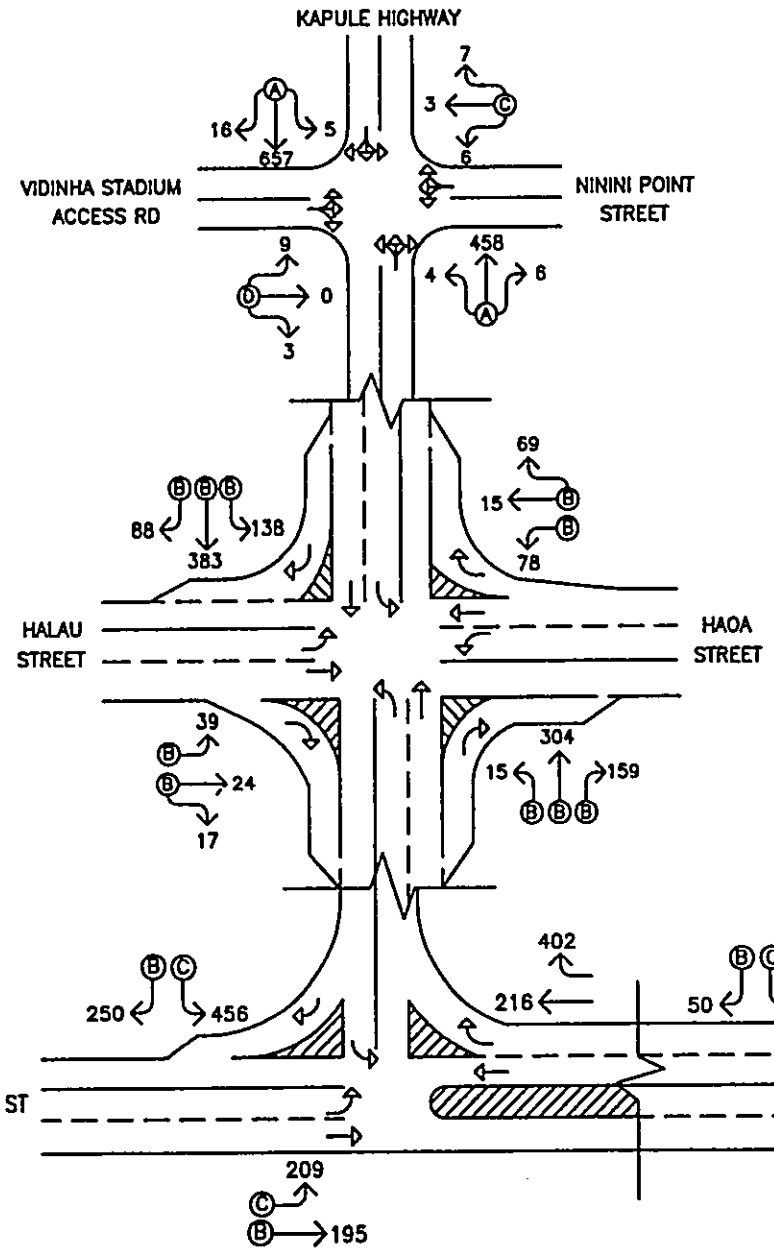


WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 DISTRIBUTION OF SITE-GENERATED VEHICLES PM PEAK HOUR OF TRAFFIC

FIGURE 5



LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

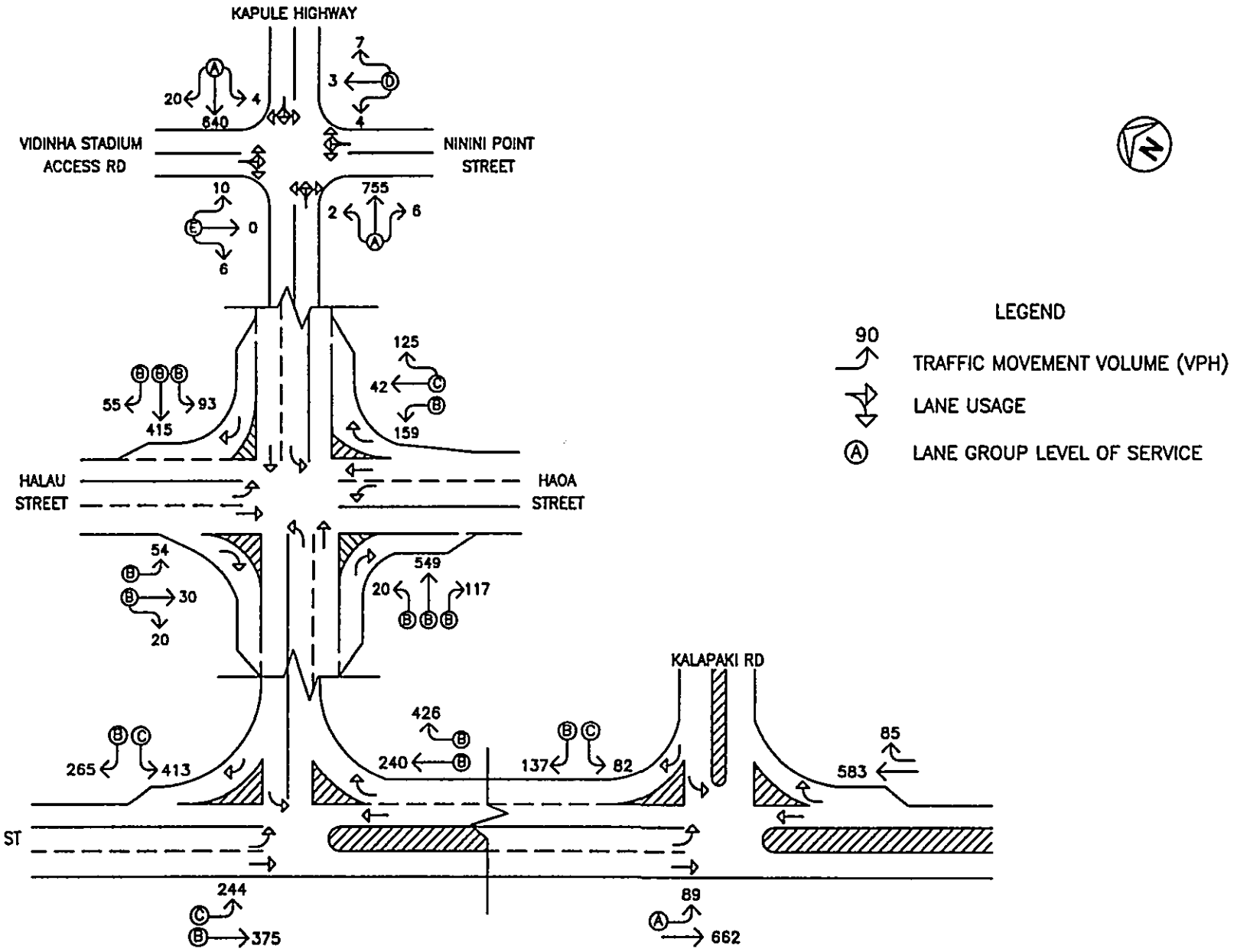
Ⓐ LANE GROUP LEVEL OF SERVICE

WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 AM PEAK HOUR OF TRAFFIC WITHOUT PROJECT

FIGURE 6

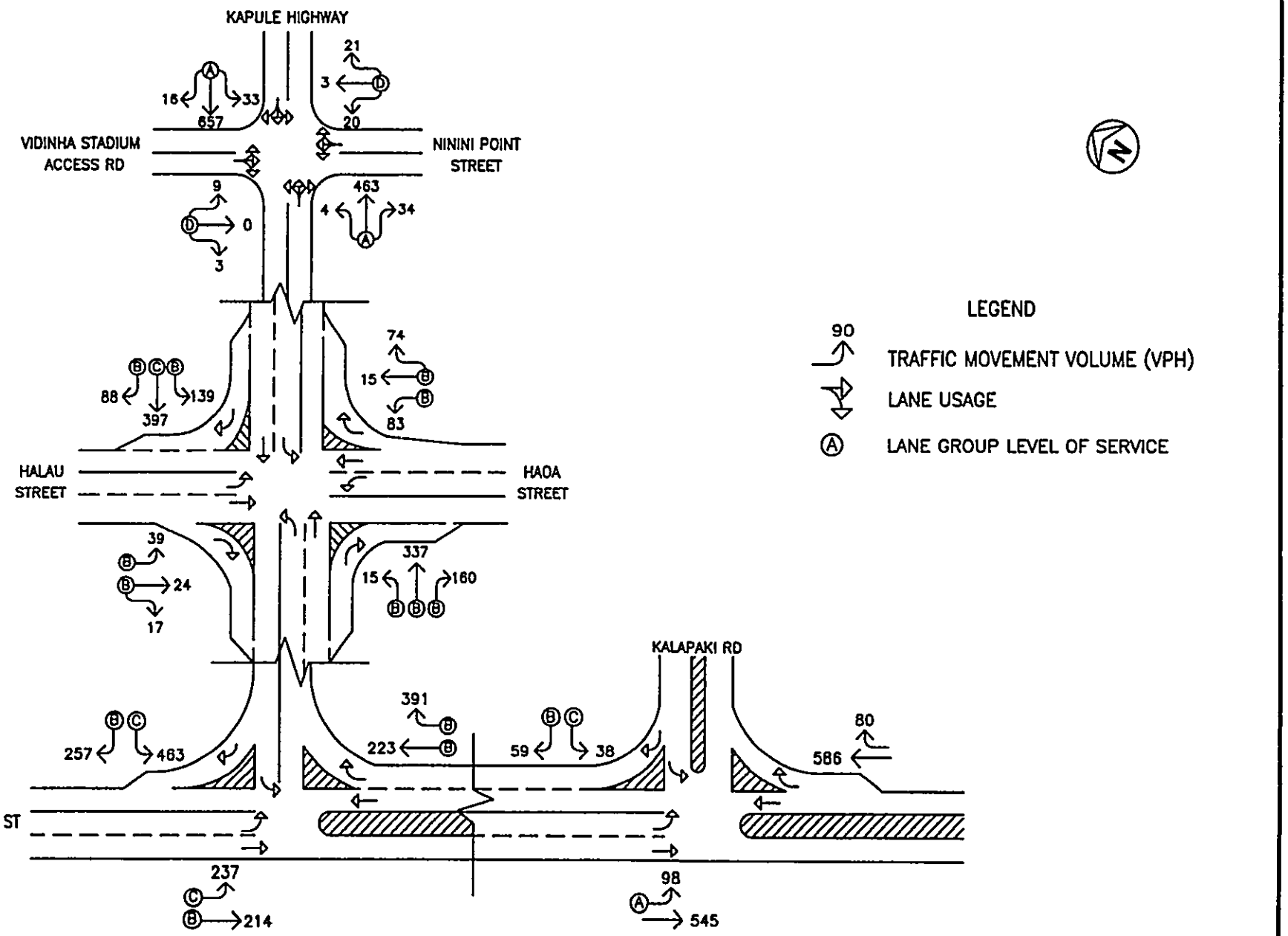


WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 PM PEAK HOUR OF TRAFFIC WITHOUT PROJECT

FIGURE 7

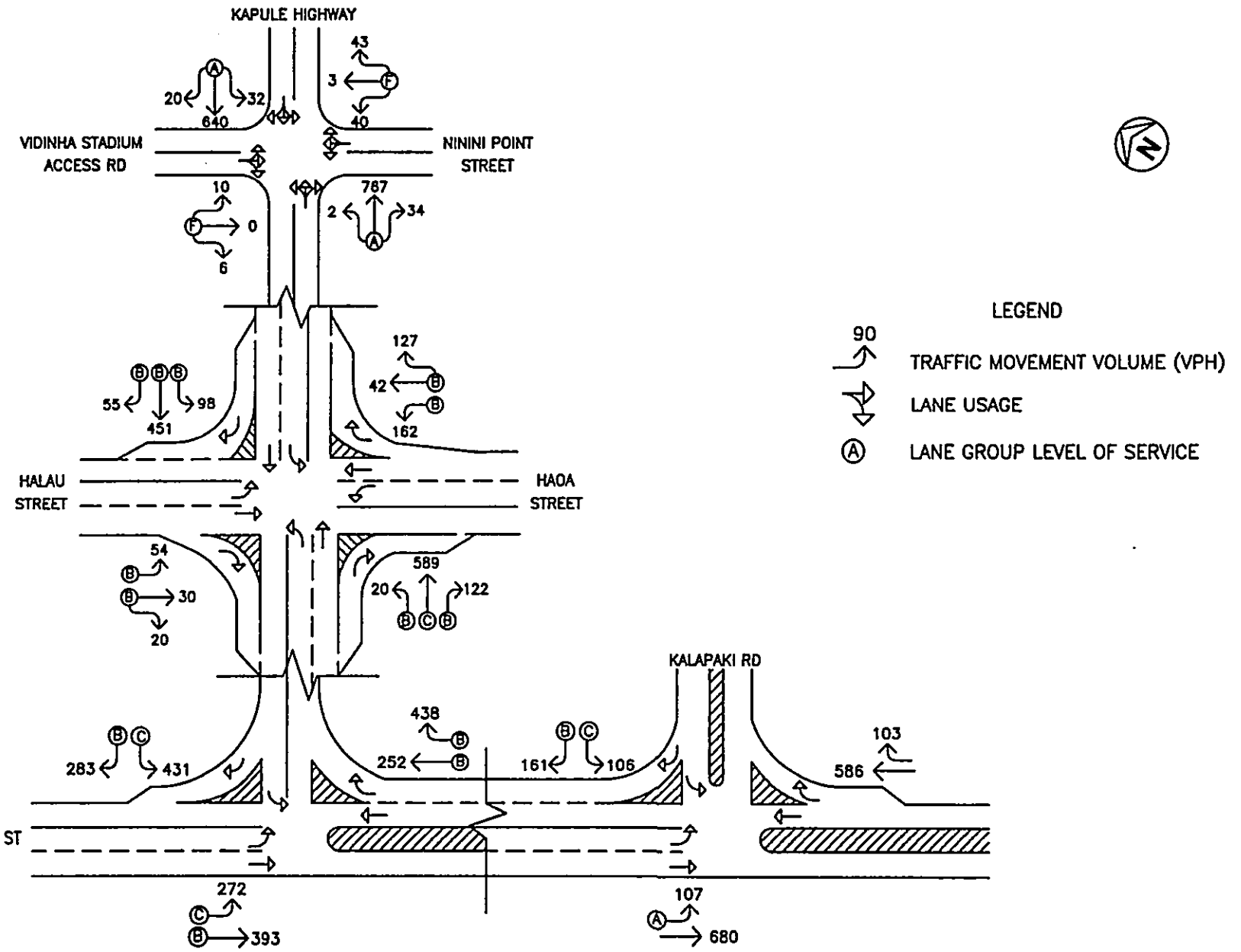


WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 AM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 8



LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

Ⓐ LANE GROUP LEVEL OF SERVICE

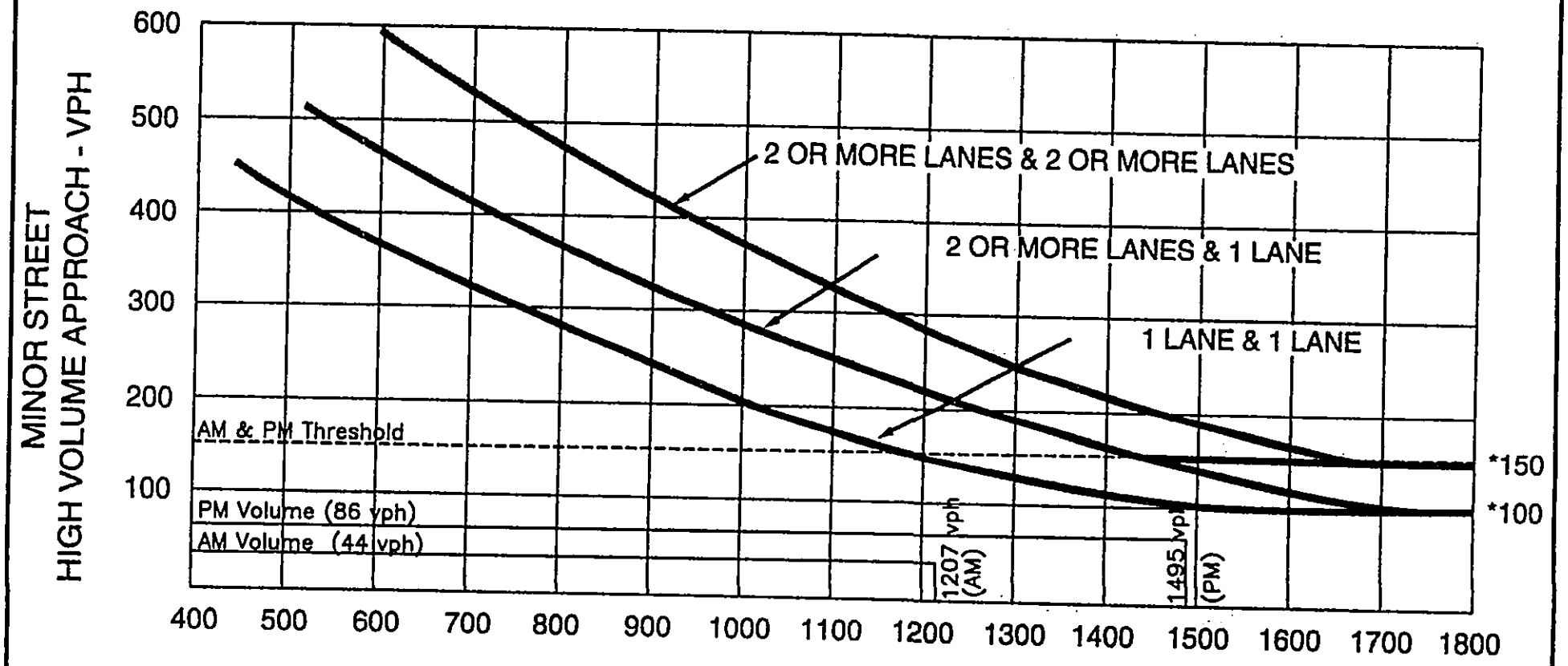
WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 PM PEAK HOUR OF TRAFFIC WITH PROJECT

FIGURE 9

Figure 4C-3. Warrant 3, Peak Hour

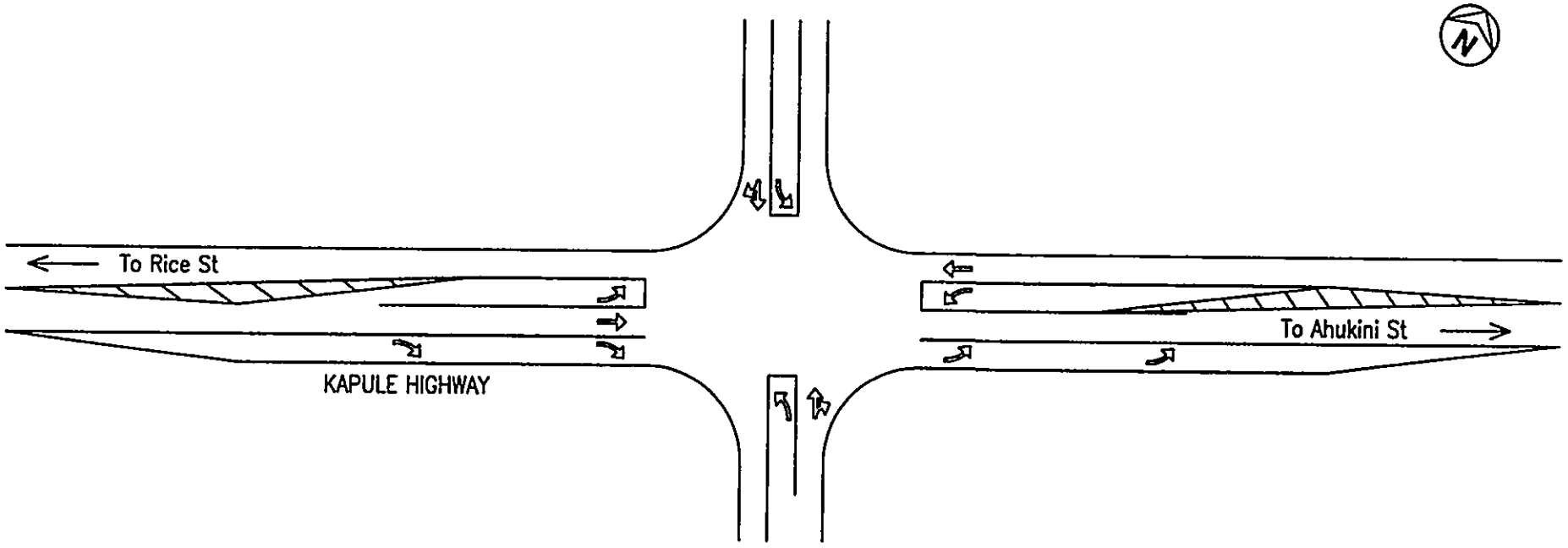


MAJOR STREET—TOTAL OF BOTH APPROACHES—
VEHICLES PER HOUR (VPH)

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: MUTCD

WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS	TRAFFIC SIGNAL WARRANT STUDY	FIGURE 10
	TRAFFIC SIGNAL WARRANT NO. 3	



CONCEPTUAL INTERSECTION LAYOUT

KAPULE HIGHWAY AT KAUAI LAGOONS RESORT ACCESS ROAD

WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

KAUAI LAGOONS RESORT

YEAR 2009 WITH PROJECT WITH IMPROVEMENTS

FIGURE 11

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AND
COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISIONS
COMMENTS

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.1792

June 17, 2005

Mr. Kevin M. Showe
Kauai Development LLC
55 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Showe:

Subject: Kauai Lagoons Resort – Traffic Impact Analysis Report

This is in reply to your letter dated March 28, 2005.

We are agreeable to having you fully fund the improvements that are needed for a full build-out of the Kapule Highway/Rice Street intersection including, without limitation, a traffic signal system when warranted; and acceleration, deceleration, and storage lanes. Please coordinate this effort with our Highways Division to determine the improvements that will be required at this intersection.

Additionally, we have the following comments:

- The only permitted access to and from the Kauai Lagoons Resort to Kapule Highway will be from Haoa Street.

- The TIAR did not address and evaluate the proposed affordable housing development at the corner of Kapule Highway and Haoa Street. We are requesting that a supplemental traffic report addressing this development be submitted for our review and approval.

There are no further conditions by the State Department of Transportation on the proposed Kauai Lagoons Resort.

Very truly yours,

for RODNEY K. HARAGA
Director of Transportation

c: Kauai County Planning Department

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE 473, LIHUE, HI 96766

FROM: Ian K. Costa, Director (MYLES) Date: May 5, 2005

SUBJECT: Zoning Permit Application Z-IV-2005-30, Use Permit Application U-2005-25, Project Development Application P.D. U-2005-26, Variance Permit Application V-2005-7 and Special Management Use Permit Application SMA)(U)-2005-08, KAUAI DEVELOPMENT LLC/KD GOLF OWNERSHIP, LLC. PW5.070 & 5.195

COUNTY OF KAUAI PLANNING DEPT.

TO:
- (X) PW-Engineering Div.
- (X) PW-Waste Water
- (X) PW-Parks & Recreation
- ( ) Solid Waste
- (X) Water Department
- (X) State Health Dept.
- (X) State Historic Preservation Div. – DLNR
- (X) Fire Department
- (X) Kaua'i Housing Agency
- (X) State Highways Div. – DOT (Kaua'i Office – FYI only)
- (X) State Airports Div. – DOT (Kaua'i Office – FYI only)
- ( ) State Land Use Commission – DBEDT
- ( ) State Office of Planning – DBEDT
- ( ) State Dept. of Agriculture
- ( ) U.S. Fish and Wildlife Service – Kilauea Point National Wildlife Refuge
- ( ) Div. of Land Management – DLNR (Kaua'i and Oahu)
- ( ) Kaua'i Historic Preservation Review Commission

FOR YOUR COMMENTS (pertaining to your department:) May 24, 2005

We reviewed the subject application and offer the following comments:

A grading permit will be required for this project. Best Management Practices shall be employed at all times to the maximum extent practicable to prevent sedimentation, erosion or dust to streams, watercourses, natural areas and the property of others.

In accordance with the Sedimentation and Erosion Control Ordinance No. 808, The maximum area that may be opened for grading or grubbing at any one time is ten (10) acres. The grading plans will need to show the incremental grading and best management practices in controlling sedimentation, erosion and dust.

A drainage study needs to be made to evaluate the impacts of the increased storm runoffs from the proposed developments. Measures to keep flow rates and drainage patterns to predevelopment conditions are required. The proposed developments along the

manmade lagoon are also susceptible to flooding. The flood elevation of the lagoon will need to be re-evaluated.

The subject property is also susceptible to flooding based on panel no. 202 C of the Federal Insurance Rate Maps (FIRM) dated March 4, 1987. The flood zonings are VE and X unshaded. The VE flood Zones are located along the shoreline and have a corresponding base flood elevation of 11 feet Mean Sea level (MSL) between Kukii Point and Ninini Point.

The traffic impact report needs to comply with HAR 16-115-9. Hawai'i Administrative Rules states "All plans, specifications, maps, reports, surveys description, and every sheet in a set of design drawings prepared by or under the supervision of a licensed professional engineer, architect, land surveyor, or landscape architect shall be stamped with the authorized seal or stamp when filed with public officials, and under the seal or stamp, the authentication shall state **"This work was prepared by me or under my supervision,"** be signed by the licensee, and shall state the **expiration date of the licensee."**

The primary access to the project site is from Kalapaki Road off of Rice Street. Rice Street is a two lane, two way State roadway under the jurisdiction of the State Department of Transportation, Highways Division between Kāpule Highway and Lala Road.

A secondary access to the project site is from Ninini Point Street off of Kāpule Highway. Kāpule Highway is a two lane, two way State roadway under the jurisdiction of the State Department of Transportation, Highways Division. The traffic report needs to address the impacts to Kapule Highway and the County's stadium access road. With the Vidinha Stadium Complex Expansion of the 10 acre site adjacent to the Vidinha Stadium, the County's improvement to Kāpule Highway does not address the additional traffic as a result of the development, although left turn storage lanes will be provided as an unsignalized intersection. Review of our construction plan for the improvements at Kāpule Highway and the Stadium Access Road has been completed by the State DOT. We do not have a construction time frame. If time is of the essence. the intersection improvements shall be completed by the applicant.

The traffic report needs to address the impacts as a result of the 24 multi family affordable rental housing at the corner of Kāpule Highway and Haoa Street. Kāpule Highway is a state roadway and Haoa Road is classified as a collector street with 60 feet right of way and a pavement width of 24 feet. The pavement width is adequate for two way passenger vehicular traffic.

The subject zoning for the affordable housing is designated as Limited Industrial. As required by zoning curb, gutters and sidewalks shall be provided for all proposed or existing

Streets within or abutting the subdivision in Commercial and Resort Districts where the density permitted is 10 units or more per acre.

If required, bus stop and bus shelters shall be provided within the development. We do not recommend the bus shelter or bus stop to be located on Haoa Street. Haoa Street is classified as a collector street where traffic flow into and out of the industrial area should not be impeded or affect the existing traffic signal at Haoa Street and Kāpule Highway. Moreover, resolution no 53-1995 restricts parking on both roadway shoulders along Haoa Street.

We recommend comments be solicited from the State Department of Transportation and our Wastewater Division.

Very truly yours,

Wallace Kudo

Wallace Kudo, P.E.
Chief, Engineering Division

CONCUR:

DONALD M. FUJIMOTO, P.E.
County Engineer

WK

Please return comments by May 25, 2005. MAHALO!

D:\KUDO\Z-IV-2005-30, Kauai Development LLC.doc

EXISTING TRAFFIC COUNT DATA

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

Counter: D4-3888
Counted By: TO
Weather: SUNNY

File Name : KapNiniA
Site Code : 00000001
Start Date : 9/1/2005
Page No : 1

Groups Printed- Unshifted

	Kapule Highway Southbound				Ninini Point St Westbound				Kapule Highway Northbound				Vidinha Stadium Access Rd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:45 AM	3	139	9	151	1	1	1	3	0	80	2	82	1	0	0	1	237
Total	3	139	9	151	1	1	1	3	0	80	2	82	1	0	0	1	237
07:00 AM	0	133	6	139	2	0	0	2	1	89	1	91	2	0	1	3	235
07:15 AM	2	151	6	159	2	0	3	5	1	98	1	100	2	0	0	2	266
07:30 AM	0	142	5	147	1	1	1	3	3	112	0	115	3	0	3	6	271
07:45 AM	3	166	5	174	3	1	1	5	0	119	3	122	1	0	0	1	302
Total	5	592	22	619	8	2	5	15	5	418	5	428	8	0	4	12	1074
08:00 AM	0	178	0	178	0	1	2	3	0	115	2	117	3	0	0	3	301
Grand Total	8	909	31	948	9	4	8	21	5	613	9	627	12	0	4	16	1612
Apprch %	0.8	95.9	3.3		42.9	19.0	38.1		0.8	97.8	1.4		75.0	0.0	25.0		
Total %	0.5	56.4	1.9	58.8	0.6	0.2	0.5	1.3	0.3	38.0	0.6	38.9	0.7	0.0	0.2	1.0	

	Kapule Highway Southbound				Ninini Point St Westbound				Kapule Highway Northbound				Vidinha Stadium Access Rd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 06:45 AM to 08:00 AM - Peak 1 of 1																	
Intersection	07:15 AM																
Volume	5	637	16	658	6	3	7	16	4	444	6	454	9	0	3	12	1140
Percent	0.8	96.8	2.4		37.5	18.8	43.8		0.9	97.8	1.3		75.0	0.0	25.0		
07:45 Volume	3	166	5	174	3	1	1	5	0	119	3	122	1	0	0	1	302
Peak Factor																	0.944
High Int.	08:00 AM				07:15 AM				07:45 AM				07:30 AM				
Volume	0	178	0	178	2	0	3	5	0	119	3	122	3	0	3	6	
Peak Factor				0.924				0.800				0.930				0.500	

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

Counter: D4-3888
Counted By: TO
Weather: SUNNY

File Name : KapNiniP
Site Code : 00000001
Start Date : 9/1/2005
Page No : 1

Groups Printed- Unshifted

	Kapule Highway Southbound				Ninini Point St Westbound				Kapule Highway Northbound				Vidinha Stadium Access Rd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
03:00 PM	0	144	4	148	1	0	0	1	1	158	0	159	1	0	3	4	312
03:15 PM	1	166	5	172	1	0	0	1	0	172	1	173	8	0	0	8	354
03:30 PM	0	159	6	165	1	0	1	2	0	174	0	174	1	0	0	1	342
03:45 PM	1	147	3	151	1	1	4	6	0	176	0	176	0	0	2	2	335
Total	2	616	18	636	4	1	5	10	1	680	1	682	10	0	5	15	1343
04:00 PM	2	136	6	144	1	2	2	5	2	195	5	202	1	0	4	5	356
04:15 PM	3	129	3	135	2	0	3	5	3	137	1	141	2	0	3	5	286
04:30 PM	1	127	4	132	0	1	0	1	6	190	3	199	1	1	3	5	337
04:45 PM	0	121	7	128	4	1	1	6	8	140	3	151	7	0	6	13	298
Total	6	513	20	539	7	4	6	17	19	662	12	693	11	1	16	28	1277
Grand Total	8	1129	38	1175	11	5	11	27	20	1342	13	1375	21	1	21	43	2620
Apprch %	0.7	96.1	3.2		40.7	18.5	40.7		1.5	97.6	0.9		48.8	2.3	48.8		
Total %	0.3	43.1	1.5	44.8	0.4	0.2	0.4	1.0	0.8	51.2	0.5	52.5	0.8	0.0	0.8	1.6	

	Kapule Highway Southbound				Ninini Point St Westbound				Kapule Highway Northbound				Vidinha Stadium Access Rd Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 03:00 PM to 04:45 PM - Peak 1 of 1																	
Intersection	03:15 PM																
Volume	4	608	20	632	4	3	7	14	2	717	6	725	10	0	6	16	1387
Percent	0.6	96.2	3.2		28.6	21.4	50.0		0.3	98.9	0.8		62.5	0.0	37.5		
04:00 Volume	2	136	6	144	1	2	2	5	2	195	5	202	1	0	4	5	356
Peak Factor																	0.974
High Int.	03:15 PM				03:45 PM				04:00 PM				03:15 PM				
Volume	1	166	5	172	1	1	4	6	2	195	5	202	8	0	0	8	
Peak Factor				0.919				0.583				0.897				0.500	

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

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

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

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

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

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

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

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

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

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

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

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

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

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

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

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

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

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

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

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst:	Ktandoc
Agency/Co.:	Wilson Okamoto corp
Date Performed:	7/19/2004
Analysis Time Period:	AM Peak Hour
Intersection:	Kalapaki Rd/Rice St
Jurisdiction:	Li'hue, Kauai
Units: U. S. Customary	
Analysis Year:	Existing Conditions
Project ID: Kauai Lagoons	
East/West Street:	Kalapaki Road (Proj Driveway)
North/South Street:	Rice Street
Intersection Orientation: NS	Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		563	61	79	517	
Peak-Hour Factor, PHF		0.81	0.81	0.84	0.84	
Hourly Flow Rate, HFR		695	75	94	615	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	29		50			
Peak Hour Factor, PHF	0.79		0.79			
Hourly Flow Rate, HFR	36		63			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		94	36		63			
C(m) (vph)		901	331		706			
v/c		0.10	0.11		0.09			
95% queue length		0.35	0.37		0.29			
Control Delay		9.5	17.2		10.6			
LOS		A	C		B			
Approach Delay				13.0				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Existing Condition
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		549	85	89	620	
Peak-Hour Factor, PHF		0.89	0.89	0.83	0.83	
Hourly Flow Rate, HFR		616	95	107	746	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	82		137			
Peak Hour Factor, PHF	0.68		0.68			
Hourly Flow Rate, HFR	120		201			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		107	120		201			
C(m) (vph)		964	377		773			
v/c		0.11	0.32		0.26			
95% queue length		0.37	1.39		1.05			
Control Delay		9.2	19.0		11.3			
LOS		A	C		B			
Approach Delay				14.2				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 7/21/2004
Analysis Time Period: AM Peak Hour
Intersection: Kapule Hwy/Rice St
Jurisdiction: Lihu'e, Kauai
Units: U. S. Customary
Analysis Year: Existing Conditions
Project ID: 6266-06 Kauai Lagoons
East/West Street: Rice Street
North/South Street: Kapule Highway
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1 L	2 T	3 R	4 L	5 T	6 R
Volume	200	187			208	386
Peak-Hour Factor, PHF	0.90	0.90			0.77	0.77
Hourly Flow Rate, HFR	222	207			270	501
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						Yes
Lanes	1	1			1	1
Configuration	L	T			T	R
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume				438		240
Peak Hour Factor, PHF				0.93		0.93
Hourly Flow Rate, HFR				470		258
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes				1		1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	222					470		258
C(m) (vph)	1293					519		1144
v/c	0.17					0.91		0.23
95% queue length	0.62					16.99		0.87
Control Delay	8.4					63.1		9.1
LOS	A					F		A
Approach Delay							43.9	
Approach LOS							E	

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: Ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 7/21/2004
Analysis Time Period: PM Peak Hour
Intersection: Kapule Hwy/Rice Street
Jurisdiction: Lihu'e, Kauai
Units: U. S. Customary
Analysis Year: Existing Conditions
Project ID: 6266-06 Kauai Lagoons
East/West Street: Rice Street
North/South Street: Kapule Highway
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	229	351			225	399
Peak-Hour Factor, PHF	0.79	0.79			0.84	0.84
Hourly Flow Rate, HFR	289	444			267	475
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?					Yes	
Lanes	1	1			1	1
Configuration	L	T			T	R
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				387		248
Peak Hour Factor, PHF				0.98		0.98
Hourly Flow Rate, HFR				394		253
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes				1		1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L					L		R
v (vph)	289					394		253
C(m) (vph)	1297					347		1148
v/c	0.22					1.14		0.22
95% queue length	0.86					38.75		0.85
Control Delay	8.6					327.2		9.0
LOS	A					F		A
Approach Delay							202.8	
Approach LOS							F	

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Existing Conditions

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	78	15	69	15	295	159	138	371	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			69			159			88

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A	A			NB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
WB	Left	A	A			SB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		10.0	14.0					6.0	20.0		
Yellow		0.0	4.0					0.0	4.0		
All Red		0.0	1.0					0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	503	1770	0.10	0.40	11.4	B		
TR	435	1863	0.07	0.23	18.0	B	13.9	B
Westbound								
L	501	1770	0.21	0.40	11.9	B		
TR	435	1863	0.05	0.23	17.9	B	12.9	B
Northbound								
L	327	1770	0.05	0.43	10.8	B		
T	621	1863	0.51	0.33	16.7	B	16.4	B
R	528	1583	0.00	0.33	13.3	B		
Southbound								
L	381	1770	0.38	0.43	11.8	B		
T	621	1863	0.62	0.33	18.7	B	16.9	B
R	528	1583	0.00	0.33	13.3	B		

Intersection Delay = 16.0 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Existing Conditions

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	159	42	125	20	521	117	93	394	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			125			117			55

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A	A			NB Left	A	A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
WB Left	A	A			SB Left	A	A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.5	14.0				2.5	25.0	
Yellow	0.0	4.0				0.0	4.0	
All Red	0.0	1.0				0.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	454	1770	0.13	0.38	12.5	B		
TR	435	1863	0.08	0.23	18.0	B	14.4	B
Westbound								
L	457	1770	0.39	0.38	13.8	B		
TR	435	1863	0.11	0.23	18.2	B	14.7	B
Northbound								
L	311	1770	0.07	0.46	9.9	A		
T	776	1863	0.71	0.42	17.4	B	17.1	B
R	660	1583	0.00	0.42	10.2	B		
Southbound								
L	212	1770	0.46	0.46	13.1	B		
T	776	1863	0.53	0.42	13.8	B	13.6	B
R	660	1583	0.00	0.42	10.2	B		

Intersection Delay = 15.3 (sec/veh) Intersection LOS = B

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: AM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Existing Conditions
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	444	6	5	637	16
Peak-Hour Factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92
Hourly Flow Rate, HFR	4	477	6	5	692	17
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	3	7	9	0	3
Peak Hour Factor, PHF	0.80	0.80	0.80	0.50	0.50	0.50
Hourly Flow Rate, HFR	7	3	8	18	0	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	4	5		18			24	
C(m) (vph)	890	1080		240			185	
v/c	0.00	0.00		0.08			0.13	
95% queue length	0.01	0.01		0.24			0.44	
Control Delay	9.1	8.3		21.2			27.4	
LOS	A	A		C			D	
Approach Delay				21.2			27.4	
Approach LOS				C			D	

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: PM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Existing Conditions
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	2	717	6	4	608	20
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92
Hourly Flow Rate, HFR	2	796	6	4	660	21
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	4	3	7	10	0	6
Peak Hour Factor, PHF	0.58	0.58	0.58	0.50	0.50	0.50
Hourly Flow Rate, HFR	6	5	12	20	0	12
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	2	4		23			32	
C(m) (vph)	912	822		173			135	
v/c	0.00	0.00		0.13			0.24	
95% queue length	0.01	0.01		0.46			0.92	
Control Delay	9.0	9.4		29.0			39.9	
LOS	A	A		D			E	
Approach Delay				29.0			39.9	
Approach LOS				D			E	

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2009 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst:
Agency/Co.: Wilson Okamoto corp
Date Performed: 7/19/2004
Analysis Time Period: AM Peak Hour
Intersection: Kalapaki Rd/Rice St
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: Kauai Lagoons
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	61	79	538	
Peak-Hour Factor, PHF		0.81	0.81	0.84	0.84	
Hourly Flow Rate, HFR		723	75	94	640	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	29		50			
Peak Hour Factor, PHF	0.79		0.79			
Hourly Flow Rate, HFR	36		63			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		94	36		63			
C(m) (vph)		879	314		684			
v/c		0.11	0.11		0.09			
95% queue length		0.36	0.39		0.30			
Control Delay		9.6	17.9		10.8			
LOS		A	C		B			
Approach Delay				13.4				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		583	85	89	662	
Peak-Hour Factor, PHF		0.89	0.89	0.83	0.83	
Hourly Flow Rate, HFR		655	95	107	797	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	82		137			
Peak Hour Factor, PHF	0.68		0.68			
Hourly Flow Rate, HFR	120		201			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		107	120		201			
C(m) (vph)		932	350		739			
v/c		0.11	0.34		0.27			
95% queue length		0.39	1.54		1.12			
Control Delay		9.4	20.6		11.7			
LOS		A	C		B			
Approach Delay				15.0+				
Approach LOS				C				

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: AM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	209	195			216	402				456		250
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						127						104

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru				
Right					Right				
Peds					Peds				
WB Left					SB Left	A			
Thru	A				Thru				
Right	A				Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	39.0					41.0			
Yellow	4.0					4.0			
All Red	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	421	972	0.55	0.43	20.6	C		
T	807	1863	0.27	0.43	16.5	B	18.6	B
Westbound								
T	807	1863	0.30	0.43	16.8	B	17.7	B
R	686	1583	0.45	0.43	18.4	B		
Northbound								
Southbound								
L	806	1770	0.63	0.46	20.3	C		
							19.0	B
R	721	1583	0.22	0.46	15.0	B		

Intersection Delay = 18.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: PM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	244	375			240	426				413		265
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						210						131

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru			
Right	A				Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	41.0					39.0		
Yellow	4.0					4.0		
All Red	1.0					1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	431	945	0.63	0.46	21.7	C		
T	849	1863	0.49	0.46	17.6	B	19.2	B
Westbound								
T	849	1863	0.31	0.46	15.8	B	15.9	B
R	721	1583	0.33	0.46	16.0	B		
Northbound								
Southbound								
L	767	1770	0.60	0.43	20.8	C		
							19.7	B
R	686	1583	0.22	0.43	16.1	B		

Intersection Delay = 18.4 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	78	15	69	15	304	159	138	383	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			0			0			88

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	A	A			NB Left	A	A	
	Thru		A			Thru		A	
	Right		A			Right		A	
	Peds					Peds			
WB	Left	A	A			SB Left	A	A	
	Thru		A			Thru		A	
	Right		A			Right		A	
	Peds					Peds			
NB	Right					EB Right			
SB	Right					WB Right			
Green		8.0	16.0				5.0	21.0	
Yellow		0.0	4.0				0.0	4.0	
All Red		0.0	1.0				0.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	470	1770	0.11	0.40	11.4	B		
TR	497	1863	0.06	0.27	16.5	B	13.3	B
Westbound								
L	488	1770	0.21	0.40	11.9	B		
TR	435	1633	0.26	0.27	17.6	B	14.9	B
Northbound								
L	310	1770	0.05	0.43	10.8	B		
T	652	1863	0.50	0.35	15.9	B	15.3	B
R	554	1583	0.31	0.35	14.5	B		
Southbound								
L	367	1770	0.39	0.43	11.9	B		
T	652	1863	0.61	0.35	17.8	B	16.3	B
R	554	1583	0.00	0.35	12.7	B		

Intersection Delay = 15.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	159	42	125	20	549	117	93	415	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			0			0			55

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A	A			NB Left	A	A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
WB Left	A	A			SB Left	A	A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.0	14.5				3.0	24.5	
Yellow	0.0	4.0				0.0	4.0	
All Red	0.0	1.0				0.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	419	1770	0.14	0.38	12.5	B		
TR	450	1863	0.07	0.24	17.6	B	14.3	B
Westbound								
L	453	1770	0.40	0.38	13.8	B		
TR	400	1654	0.47	0.24	20.3	C	17.2	B
Northbound								
L	300	1770	0.07	0.46	10.1	B		
T	761	1863	0.76	0.41	19.8	B	18.1	B
R	646	1583	0.19	0.41	11.5	B		
Southbound								
L	213	1770	0.46	0.46	13.5	B		
T	761	1863	0.57	0.41	14.7	B	14.5	B
R	646	1583	0.00	0.41	10.5	B		

Intersection Delay = 16.6 (sec/veh) Intersection LOS = B

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: AM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	458	6	5	657	16
Peak-Hour Factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92
Hourly Flow Rate, HFR	4	492	6	5	714	17
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	3	7	9	0	3
Peak Hour Factor, PHF	0.80	0.80	0.80	0.50	0.50	0.50
Hourly Flow Rate, HFR	7	3	8	18	0	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	4	5		18			24	
C(m) (vph)	873	1066		229			175	
v/c	0.00	0.00		0.08			0.14	
95% queue length	0.01	0.01		0.26			0.47	
Control Delay	9.1	8.4		22.1			28.8	
LOS	A	A		C			D	
Approach Delay				22.1			28.8	
Approach LOS				C			D	

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: PM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 Without Project
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	2	755	6	4	640	20
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92
Hourly Flow Rate, HFR	2	838	6	4	695	21
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	4	3	7	10	0	6
Peak Hour Factor, PHF	0.58	0.58	0.58	0.50	0.50	0.50
Hourly Flow Rate, HFR	6	5	12	20	0	12
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	2	4		23			32	
C(m) (vph)	885	792		156			119	
v/c	0.00	0.01		0.15			0.27	
95% queue length	0.01	0.02		0.51			1.08	
Control Delay	9.1	9.6		32.1			46.3	
LOS	A	A		D			E	
Approach Delay				32.1			46.3	
Approach LOS				D			E	

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2009 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: Ktandoc
Agency/Co.: Wilson Okamoto corp
Date Performed: 7/19/2004
Analysis Time Period: AM Peak Hour
Intersection: Kalapaki Rd/Rice St
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: Kauai Lagoons
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	80	98	545	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		651	88	108	605	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	38		59			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	42		65			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		108	42		65			
C(m) (vph)		935	335		742			
v/c		0.12	0.13		0.09			
95% queue length		0.39	0.43		0.29			
Control Delay		9.4	17.3		10.3			
LOS		A	C		B			
Approach Delay				13.1				
Approach LOS				B				

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: KTandoc
Agency/Co.: Wilson Okamoto Corp.
Date Performed: 7/15/2004
Analysis Time Period: PM Peak Hour
Intersection: Rice St/Driveway
Jurisdiction: Li'hue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: 6266-06 Kauai Lagoon
East/West Street: Kalapaki Road (Proj Driveway)
North/South Street: Rice Street
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		586	103	107	680	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.90	
Hourly Flow Rate, HFR		651	114	118	755	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?			Yes			
Lanes		1	1	1	1	
Configuration		T	R	L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	106		161			
Peak Hour Factor, PHF	0.90		0.90			
Hourly Flow Rate, HFR	117		178			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			
Configuration	L		R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		118	117		178			
C(m) (vph)		935	368		742			
v/c		0.13	0.32		0.24			
95% queue length		0.43	1.38		0.94			
Control Delay		9.4	19.3		11.4			
LOS		A	C		B			
Approach Delay				14.5				
Approach LOS				B				

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: AM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	237	214			223	391				463		257
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						391						257

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru			
Right	A				Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	40.0					40.0		
Yellow	4.0					4.0		
All Red	1.0					1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	430	968	0.61	0.44	21.7	C		
T	828	1863	0.29	0.44	16.1	B	19.0	B
Westbound								
T	828	1863	0.30	0.44	16.2	B	16.2	B
R	704	1583	0.00	0.44	13.9	B		
Northbound								
Southbound								
L	787	1770	0.65	0.44	21.5	C	21.5	C
R	704	1583	0.00	0.44	13.9	B		

Intersection Delay = 19.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: Ktandoc
Agency: Wilson Okamoto Corp
Date: 7/22/2004
Period: PM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Rice Street

Inter.: Kapule Highwy/Rice Street
Area Type: All other areas
Jurisd: Lihu'e, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	0	1	1	0	0	0	1	0	1
LGConfig	L	T			T	R				L		R
Volume	272	393			252	438				431		283
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						438						283

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru			
Right	A				Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	42.5					37.5		
Yellow	4.0					4.0		
All Red	1.0					1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	443	939	0.68	0.47	22.8	C		
T	880	1863	0.50	0.47	16.8	B	19.3	B
Westbound								
T	880	1863	0.32	0.47	15.0	B	15.0	B
R	748	1583	0.00	0.47	12.5	B		
Northbound								
Southbound								
L	737	1770	0.65	0.42	23.1	C		
							23.1	C
R	660	1583	0.00	0.42	15.3	B		

Intersection Delay = 19.7 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	83	15	74	15	337	160	139	397	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			74			160			88

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A	A			NB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
WB	Left	A	A			SB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		10.0	14.0					6.0	20.0		
Yellow		0.0	4.0					0.0	4.0		
All Red		0.0	1.0					0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	504	1770	0.09	0.40	11.4	B		
TR	435	1863	0.06	0.23	18.0	B	13.9	B
Westbound								
L	502	1770	0.18	0.40	11.8	B		
TR	435	1863	0.04	0.23	17.8	B	12.7	B
Northbound								
L	301	1770	0.06	0.43	11.2	B		
T	621	1863	0.60	0.33	18.3	B	18.0	B
R	528	1583	0.00	0.33	13.3	B		
Southbound								
L	336	1770	0.46	0.43	12.6	B		
T	621	1863	0.71	0.33	21.2	C	19.0	B
R	528	1583	0.00	0.33	13.3	B		

Intersection Delay = 17.8 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	162	42	127	20	589	122	98	451	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			127			122			55

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A	A			NB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
WB	Left	A	A			SB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		8.5	14.0					2.5	25.0		
Yellow		0.0	4.0					0.0	4.0		
All Red		0.0	1.0					0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	454	1770	0.13	0.38	12.5	B		
TR	435	1863	0.08	0.23	18.0	B	14.4	B
Westbound								
L	457	1770	0.40	0.38	13.9	B		
TR	435	1863	0.11	0.23	18.2	B	14.8	B
Northbound								
L	268	1770	0.08	0.46	10.3	B		
T	776	1863	0.80	0.42	21.2	C	20.9	C
R	660	1583	0.00	0.42	10.2	B		
Southbound								
L	198	1770	0.52	0.46	14.8	B		
T	776	1863	0.61	0.42	15.0	B	15.0	B
R	660	1583	0.00	0.42	10.2	B		

Intersection Delay = 17.4 (sec/veh) Intersection LOS = B

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: AM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	463	34	33	657	16
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	4	514	37	36	730	17
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	20	3	21	9	0	3
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	22	3	23	10	0	3
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	4	36		48			13	
C(m) (vph)	861	1019		193			135	
v/c	0.00	0.04		0.25			0.10	
95% queue length	0.01	0.11		0.98			0.32	
Control Delay	9.2	8.7		29.8			34.5	
LOS	A	A		D			D	
Approach Delay				29.8			34.5	
Approach LOS				D			D	

HCS2000: Unsignalized Intersections Release 4.1d

TWO-WAY STOP CONTROL SUMMARY

Analyst: ktandoc
Agency/Co.: Wilson Okamoto Corp
Date Performed: 9/2/2005
Analysis Time Period: PM Peak Hour
Intersection: Kapule Hwy/Ninini Point St
Jurisdiction: Lihue, Kauai
Units: U. S. Customary
Analysis Year: Year 2009 With Project
Project ID: Kauai Lagoons Resort
East/West Street: Vidinha Stadium-Ninini Point
North/South Street: Kapule Highway
Intersection Orientation: NS Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1 L	2 T	3 R	4 L	5 T	6 R
Volume	2	767	34	32	640	20
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	2	852	37	35	711	22
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume	40	3	43	10	0	6
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	44	3	47	11	0	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			No /
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	2	35		94			17	
C(m) (vph)	872	762		118			83	
v/c	0.00	0.05		0.80			0.20	
95% queue length	0.01	0.14		7.30			0.76	
Control Delay	9.1	10.0-		130.4			59.5	
LOS	A	A		F			F	
Approach Delay				130.4			59.5	
Approach LOS				F			F	

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2009 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT WITH IMPROVEMENTS

HCS+: Signalized Intersections Release 5.1

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 9/9/2005
Period: AM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Ninini Point Street

Inter.: Kapule Highway/Ninini Point St
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 With Improvements

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	0
LGConfig	L	TR		L	TR		L	T	R	L	TR	
Volume	9	0	3	20	3	21	4	463	34	33	657	16
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			2			3			2

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds	X				Peds		X	
WB Left	A				SB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds	X				Peds		X	
NB Right					EB Right			
SB Right					WB Right			
Green	8.5	0.0				8.0	28.5	0.0
Yellow	4.0					4.0	4.0	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	196	1381	0.05	0.14	22.4	C		
TR	224	1583	0.01	0.14	22.2	C	22.3	C
Westbound								
L	199	1408	0.11	0.14	22.7	C		
TR	229	1618	0.10	0.14	22.6	C	22.7	C
Northbound								
L	236	1770	0.02	0.13	22.6	C		
T	885	1863	0.58	0.47	12.4	B	12.2	B
R	752	1583	0.05	0.47	8.5	A		
Southbound								
L	236	1770	0.16	0.13	23.3	C		
TR	882	1857	0.85	0.47	22.1	C	22.1	C

Intersection Delay = 18.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.1

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 9/9/2005
Period: PM Peak Hour
Project ID: Kauai Lagoons Resort
E/W St: Ninini Point Street10

Inter.: Kapule Highway/Ninini Point St
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2009 With Improvements

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	0
LGConfig	L	TR		L	TR		L	T	R	L	TR	
Volume	10	0	6	40	3	43	2	767	34	32	640	20
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			4			3			2

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds	X				Peds		X	
WB Left	A				SB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds	X				Peds		X	
NB Right					EB Right			
SB Right					WB Right			
Green	7.5	0.0				6.5	31.0	0.0
Yellow	4.0					4.0	4.0	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	169	1354	0.07	0.13	23.3	C		
TR	198	1583	0.04	0.13	23.1	C	23.3	C
Westbound								
L	175	1403	0.25	0.13	24.5	C		
TR	200	1602	0.23	0.13	24.2	C	24.4	C
Northbound								
L	192	1770	0.01	0.11	23.9	C		
T	963	1863	0.88	0.52	24.1	C	23.4	C
R	818	1583	0.04	0.52	7.2	A		
Southbound								
L	192	1770	0.19	0.11	24.8	C		
TR	958	1855	0.76	0.52	15.4	B	15.8	B

Intersection Delay = 20.2 (sec/veh) Intersection LOS = C

Supplemental Traffic Analysis for the Proposed Kauai Lagoons Resort (Affordable Housing Project)

Prepared by Wilson Okamoto Corporation

June 2005

SUPPLEMENTAL TRAFFIC ANALYSIS

FOR THE PROPOSED

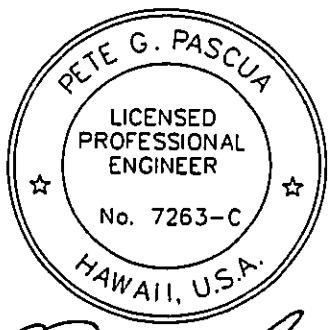
KAUAI LAGOONS RESORT

Prepared for:

Kauai Development LLC
55 Merchant Street, Suite 1900
Honolulu, HI 96813

Prepared by:

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



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

EXPIRATION DATE
OF LICENSE - 4/30/06

June 2005

LIST OF FIGURES

LIST OF APPENDICIES

I. INTRODUCTION

A. Background

The analysis and documentation of this study supplements the Traffic Impact Report for the Proposed Kauai Lagoons Resort, dated September 2004. The traffic supplement was requested in comments made from the State of Department of Transportation, (June 17, 2005) and the Kauai Department of Public Works, (May 24, 2005). The original study and report analyzed two intersections along Rice Street, which intersects with Kapule Highway and the primary access driveway, Kalapaki Road for the 750 recreational units. The supplemental analysis evaluates a proposed additional 24-multi-family affordable rental housing units to be developed within a 2.1-acre parcel. The site is identified as Tax Map Keys: (4) 3-5-01: 165 and is located within the western portion of the Kauai Lagoons Resort property at the corner of Kapule Highway and Haoa Street, approximately 1,100 feet (0.21 miles) north of the intersection of Kapule Highway and Rice Street. This supplemental analysis evaluates traffic conditions at the Kapule Highway and Haoa Street intersection.

The supplemental analysis requires the distribution of the project generated trips for the 24-multi-family affordable rental housing units expected to enter the project site via Kapule Highway, a two-way, two-lane state roadway and Haoa Street, classified as a collector road, with an access driveway further southeast along Haoa Street.

A secondary access to the project site is provided from Ninini Point Street off of Kapule Highway. This is mainly a service maintenance and construction access road for Kauai Lagoons Resort as well as the access for the County's WWTP and public access to the shoreline around Ninini Point. Resort guest will not typically be using this entrance.

Project trips associated with the multi-family affordable rental housing will only access the site through Kapule Highway and Haoa Street. The proposed affordable housing site plan is shown in Figure 1.

B. Scope of Supplemental Study

This report presents the findings of the supplemental traffic analysis, the scope of which includes:

1. Distribution of traffic demands to the added housing units at Kapule Highway and Haoa Street.
2. Incorporation of the proposed affordable housing units
3. Analysis of future traffic conditions at Kapule Highway and Haoa Street.

II. TRAFFIC ANALYSIS

A. Traffic Distribution

The directional distribution of traffic at the intersection of Kapule Highway and Haoa Street was based upon the existing directional distribution of traffic along Kapule Highway. As such, 45% of vehicles were assumed to be traveling northbound and 55% of vehicles traveling southbound during the AM peak hour while in the PM peak hour, 55% of vehicles were assumed to be traveling northbound and 45% traveling southbound.

The traffic demands at Kapule Highway indicate that 469 vph (vehicle per hour) in the AM peak hour and 658 vph in the PM peak hour of traffic will be heading northbound and turning into Haoa Street. The southbound approach would have 597 vph in the AM peak hour and 542 vph in the PM peak hour heading southbound and turning into Haoa Street. The westbound approach along Haoa Street has a traffic demand of 162 vph in the AM peak hour and 326 vph in the PM peak hour of traffic. Figure 2 shows the existing AM and PM peak hour traffic conditions for the intersection of Kapule Highway and Haoa Street. The trip generation for the proposed affordable housing units is shown in Table 1.

Table 1: Peak Hour Trip Generation

APARTMENT		
INDEPENDENT VARIABLE:	Dwelling Units = 24	
		PROJECTED TRIP ENDS
AM PEAK	ENTER	2
	EXIT	10
	TOTAL	12
PM PEAK	ENTER	10
	EXIT	5
	TOTAL	15

B. Traffic Conditions

Figure 3 shows the Year 2008 AM and PM peak hour traffic without project condition that is based upon the growth factor shown in the September 2004 traffic report. Figure 4 shows the Year 2008 AM and PM peak hour traffic with project conditions using the same distribution shown in the September 2004 traffic report. For the proposed project, construction traffic will temporarily access the service maintenance road on Ninini Point Street off Kapule Highway and will occur during off-peak hours of traffic. Should any problems arise, construction scheduling will be reviewed to minimize any impacts on daily peak hour traffic. With the proposed affordable housing project, the levels of service comparison of existing, Year 2008 without project and with project is shown in Table 2.

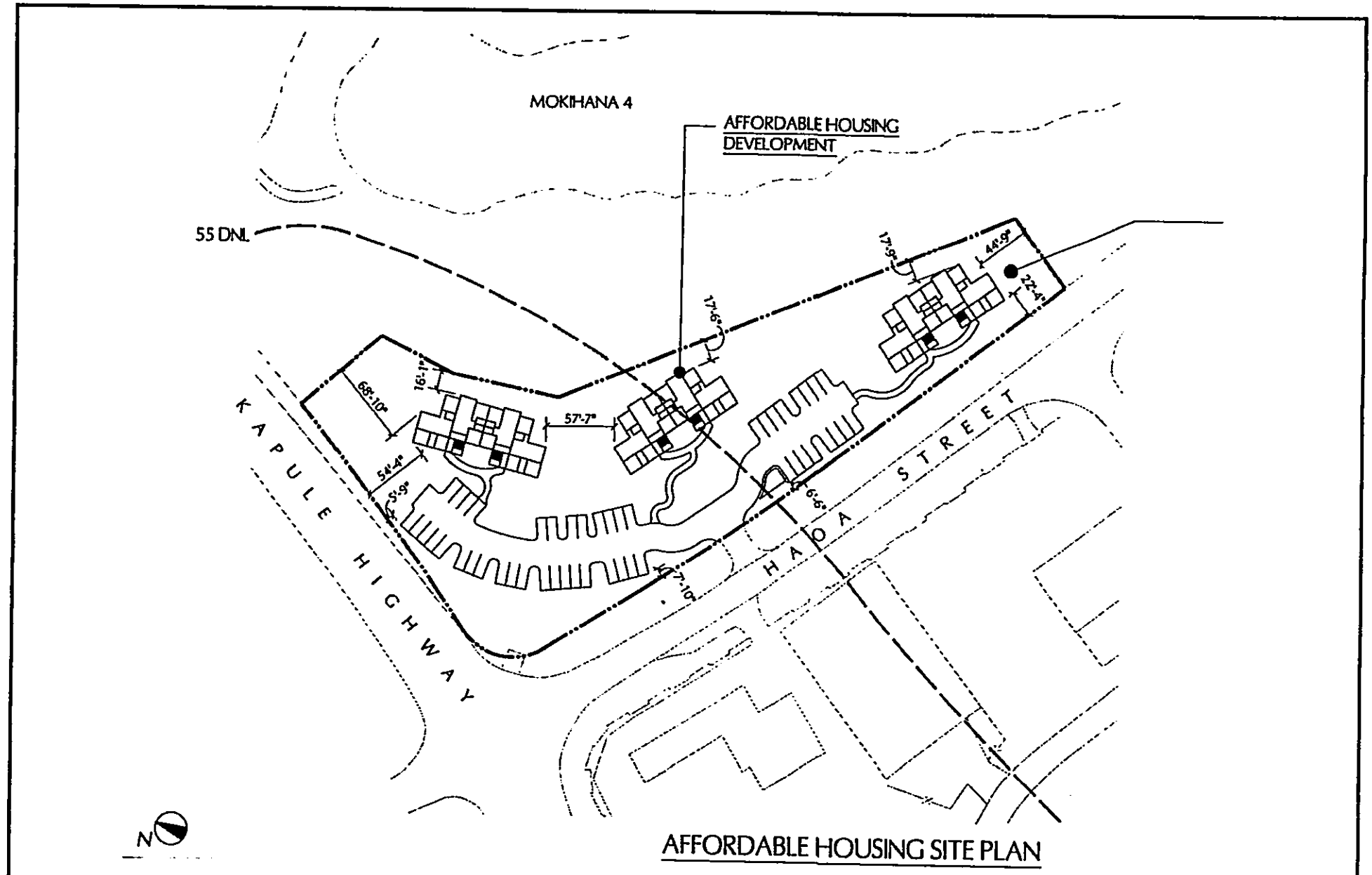
Table 2: Comparison of the Existing and Projected Year 2008 Peak Hour Traffic Conditions With and Without the Affordable Housing Units
Traffic Operating Conditions

Intersection (NS/EW)	Critical Movement	AM			PM		
			Year 2008			Year 2008	
		Exist	w/out Proj	w/ Proj	Exist	w/out Proj	w/ Proj
Kapule Highway/ Haoa Street	Southbound (LT)	B	B	B	B	B	B
	Westbound (LT)	B	B	B	B	B	B

Despite the addition of site-generated vehicles to the surrounding roadways, traffic operations within the project vicinity are expected to remain similar to Year 2008 (Without Project) conditions. At the intersection of Kapule Highway and Haoa Street, the critical movements on the westbound and southbound approaches are anticipated to remain at LOS "B", respectively during both peak periods of traffic.

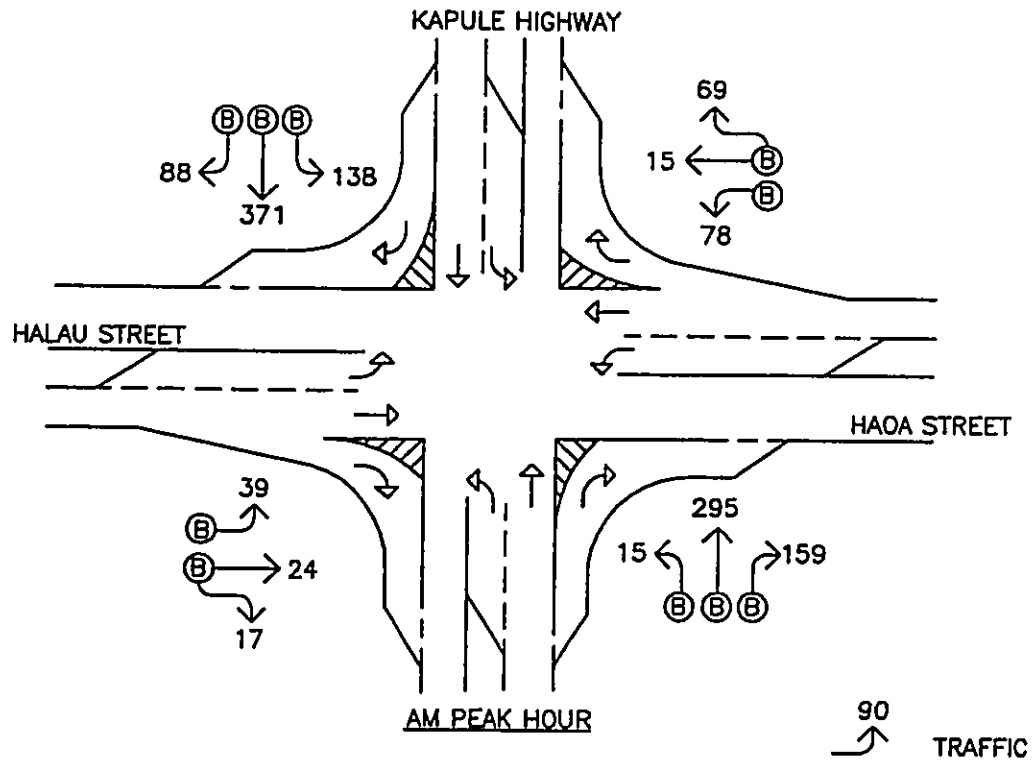
VI. *CONCLUSION*

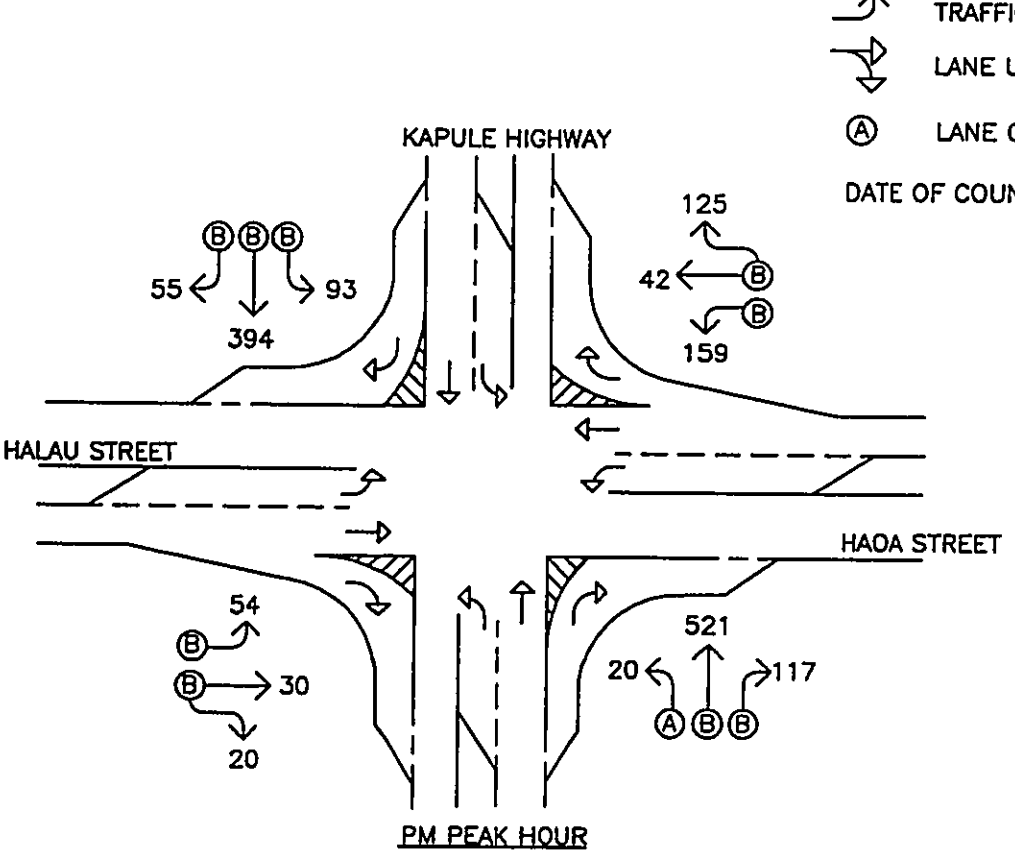
As indicated in the analysis and table above, there would be minimal effect on traffic operations along Kapule Highway and Haoa Street with or without the 24 multi-family affordable rental-housing units. The analysis assumes that no project trips will access the service/maintenance road off Ninini Point access Road and will only have access along Haoa Street, southeast of Kapule Highway and Haoa Street. The increases in total traffic volumes entering the intersection of Kapule Highway and Haoa Street are approximately 1% during the projected AM and PM peak hours of traffic. The critical movements at this intersection are expected to continue operating at acceptable levels of service despite the anticipated increases in traffic.



AFFORDABLE HOUSING SITE PLAN

WILSON OKAMOTO CORPORATION ENGINEERS - PLANNERS	KAUAI LAGOONS RESORT PROJECT SITE PLAN	FIGURE 1





LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

Ⓐ LANE GROUP LEVEL OF SERVICE

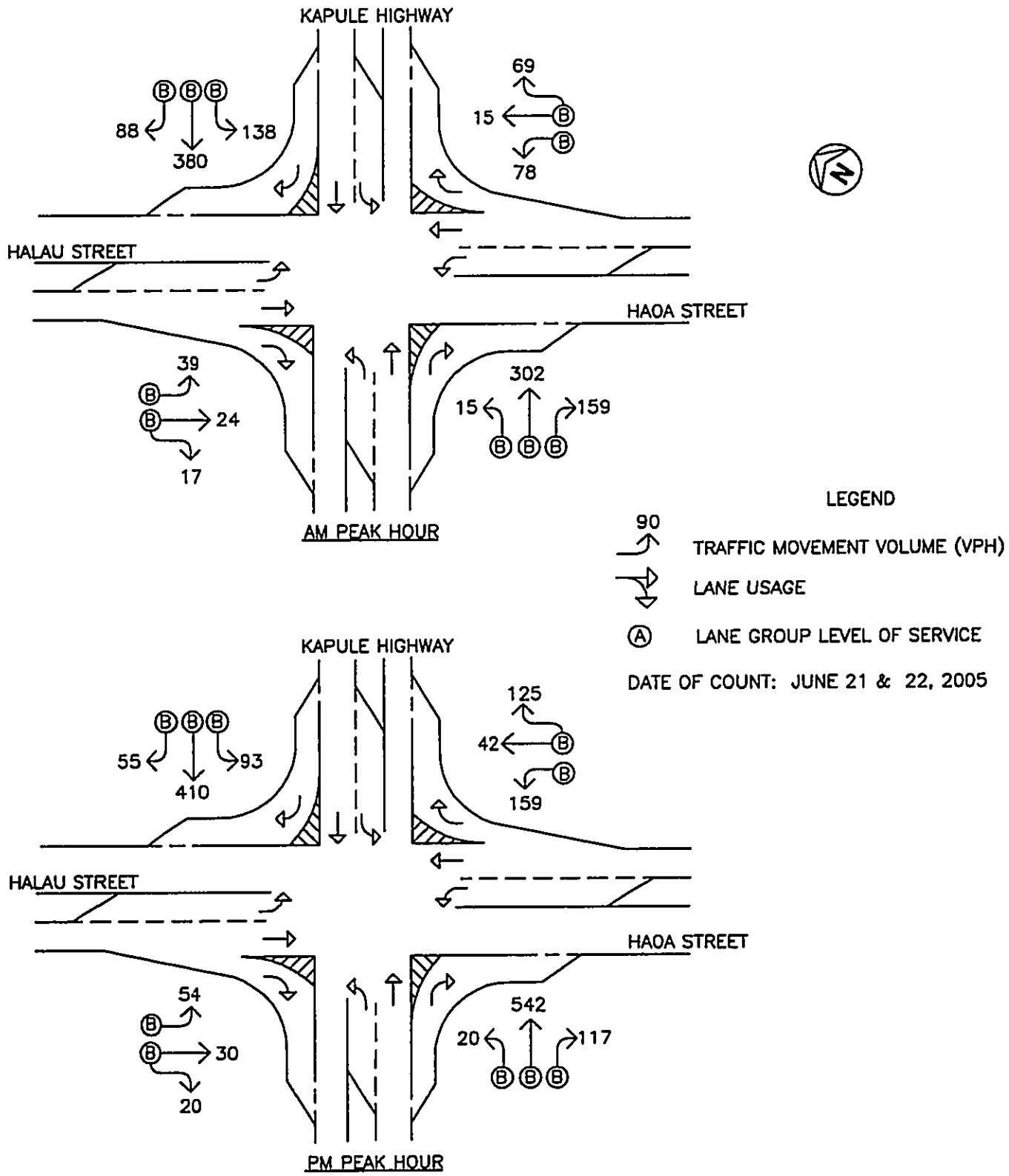
DATE OF COUNT: JUNE 21 & 22, 2005

WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KAUAI LAGOONS RESORT

EXISTING PEAK HOURS OF TRAFFIC

FIGURE 2

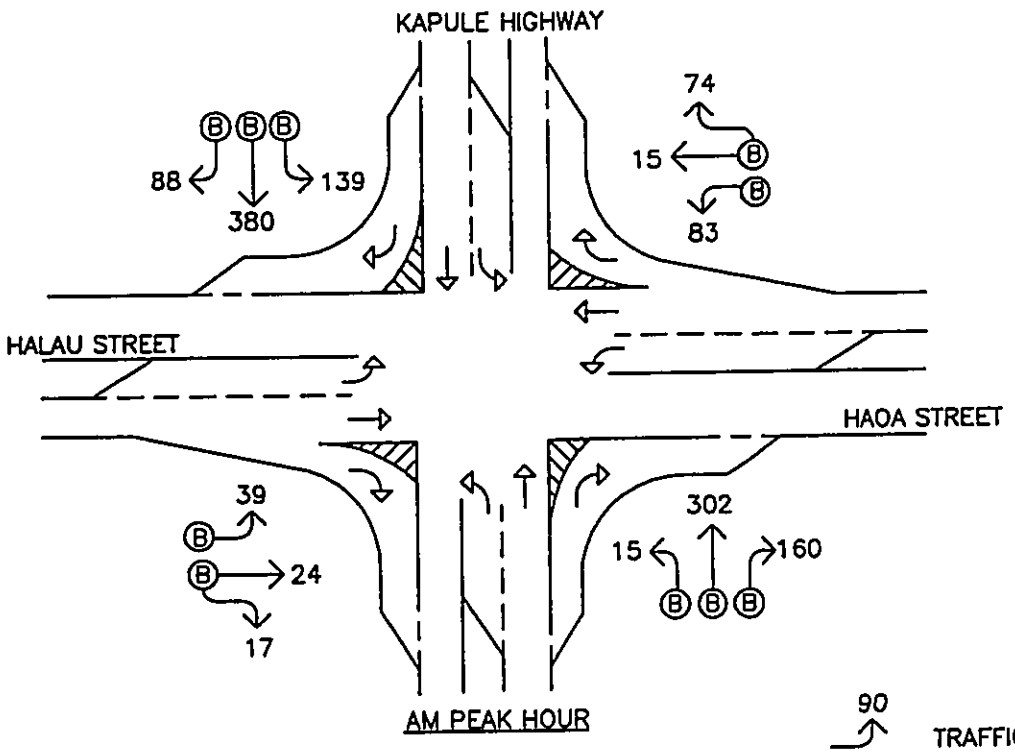


WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KAUAI LAGOONS RESORT

YEAR 2008 PEAK HOURS OF TRAFFIC WITHOUT PROJECT

FIGURE 3



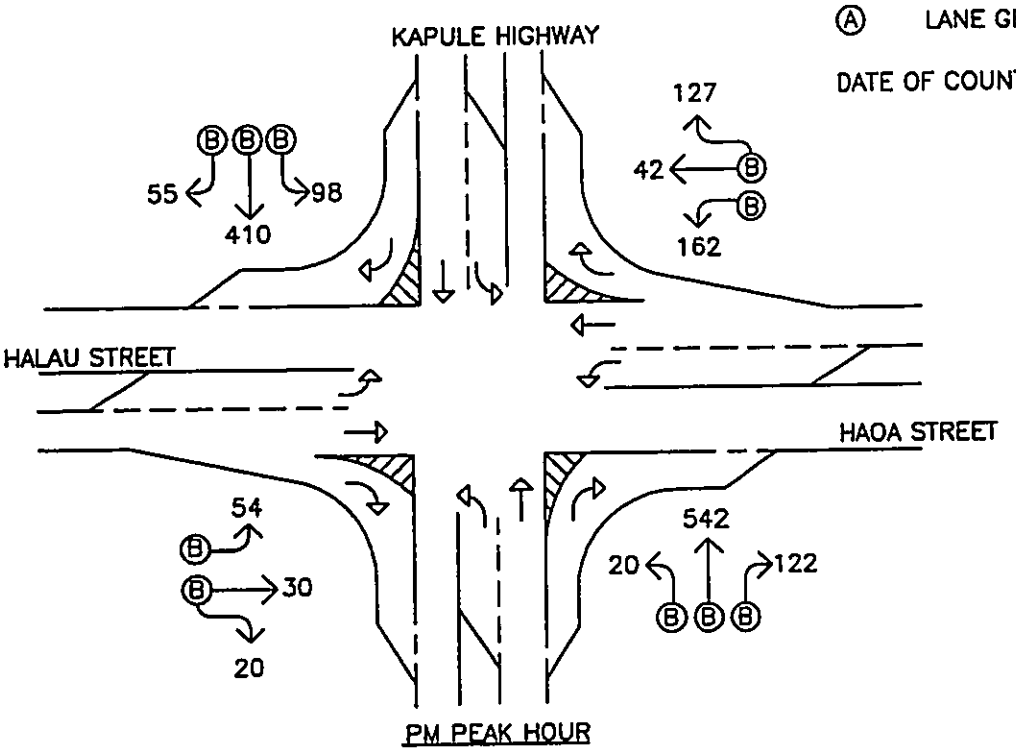
LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

Ⓐ LANE GROUP LEVEL OF SERVICE

DATE OF COUNT: JUNE 21 & 22, 2005



WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KAUAI LAGOONS RESORT

YEAR 2008 PEAK HOURS OF TRAFFIC WITH PROJECT

FIGURE 4

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AND
COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS ENGINEERING DIVISION
COMMENTS

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.1792

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

June 17, 2005

Mr. Kevin M. Showe
Kauai Development LLC
55 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Showe:

Subject: Kauai Lagoons Resort – Traffic Impact Analysis Report

This is in reply to your letter dated March 28, 2005.

We are agreeable to having you fully fund the improvements that are needed for a full build-out of the Kapule Highway/Rice Street intersection including, without limitation, a traffic signal system when warranted; and acceleration, deceleration, and storage lanes. Please coordinate this effort with our Highways Division to determine the improvements that will be required at this intersection.

Additionally, we have the following comments:

- The only permitted access to and from the Kauai Lagoons Resort to Kapule Highway will be from Haoa Street.

- The TIAR did not address and evaluate the proposed affordable housing development at the corner of Kapule Highway and Haoa Street. We are requesting that a supplemental traffic report addressing this development be submitted for our review and approval.

There are no further conditions by the State Department of Transportation on the proposed Kauai Lagoons Resort.

Very truly yours,

for RODNEY K. HARAGA
Director of Transportation

c: Kauai County Planning Department

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE 473, LIHUE, HI 96766

FROM: Ian K. Costa, Director (MYLES) Date: May 5, 2005

SUBJECT: Zoning Permit Application Z-IV-2005-30, Use Permit Application U-2005-25, Project Development Application P.D. U-2005-26, Variance Permit Application V-2005-7 and Special Management Use Permit Application SMA)(U)-2005-08, KAUAI DEVELOPMENT LLC/KD GOLF OWNERSHIP, LLC. PW5.070 & 5.195

COUNTY OF KAUAI PLANNING DEPT.

TO:
- (X) PW-Engineering Div.
- (X) PW-Waste Water
- (X) PW-Parks & Recreation
- ( ) Solid Waste
- (X) Water Department
- (X) State Health Dept.
- (X) State Historic Preservation Div. – DLNR
- (X) Fire Department
- (X) Kaua'i Housing Agency
- (X) State Highways Div. – DOT (Kaua'i Office – FYI only)
- (X) State Airports Div. – DOT (Kaua'i Office – FYI only)
- ( ) State Land Use Commission – DBEDT
- ( ) State Office of Planning – DBEDT
- ( ) State Dept. of Agriculture
- ( ) U.S. Fish and Wildlife Service – Kilauea Point National Wildlife Refuge
- ( ) Div. of Land Management – DLNR (Kaua'i and Oahu)
- ( ) Kaua'i Historic Preservation Review Commission

FOR YOUR COMMENTS (pertaining to your department:) May 24, 2005

We reviewed the subject application and offer the following comments:

A grading permit will be required for this project. Best Management Practices shall be employed at all times to the maximum extent practicable to prevent sedimentation, erosion or dust to streams, watercourses, natural areas and the property of others.

In accordance with the Sedimentation and Erosion Control Ordinance No. 808, The maximum area that may be opened for grading or grubbing at any one time is ten (10) acres. The grading plans will need to show the incremental grading and best management practices in controlling sedimentation, erosion and dust.

A drainage study needs to be made to evaluate the impacts of the increased storm runoffs from the proposed developments. Measures to keep flow rates and drainage patterns to predevelopment conditions are required. The proposed developments along the

manmade lagoon are also susceptible to flooding. The flood elevation of the lagoon will need to be re-evaluated.

The subject property is also susceptible to flooding based on panel no. 202 C of the Federal Insurance Rate Maps (FIRM) dated March 4, 1987. The flood zonings are VE and X unshaded. The VE flood Zones are located along the shoreline and have a corresponding base flood elevation of 11 feet Mean Sea level (MSL) between Kukii Point and Ninini Point.

The traffic impact report needs to comply with HAR 16-115-9. Hawai'i Administrative Rules states "All plans, specifications, maps, reports, surveys description, and every sheet in a set of design drawings prepared by or under the supervision of a licensed professional engineer, architect, land surveyor, or landscape architect shall be stamped with the authorized seal or stamp when filed with public officials, and under the seal or stamp, the authentication shall state **"This work was prepared by me or under my supervision,"** be signed by the licensee, and shall state the **expiration date of the licensee."**

The primary access to the project site is from Kalapaki Road off of Rice Street. Rice Street is a two lane, two way State roadway under the jurisdiction of the State Department of Transportation, Highways Division between Kāpule Highway and Lala Road.

A secondary access to the project site is from Ninini Point Street off of Kāpule Highway. Kāpule Highway is a two lane, two way State roadway under the jurisdiction of the State Department of Transportation, Highways Division. The traffic report needs to address the impacts to Kapule Highway and the County's stadium access road. With the Vidinha Stadium Complex Expansion of the 10 acre site adjacent to the Vidinha Stadium, the County's improvement to Kāpule Highway does not address the additional traffic as a result of the development, although left turn storage lanes will be provided as an unsignalized intersection. Review of our construction plan for the improvements at Kāpule Highway and the Stadium Access Road has been completed by the State DOT. We do not have a construction time frame. If time is of the essence. the intersection improvements shall be completed by the applicant.

The traffic report needs to address the impacts as a result of the 24 multi family affordable rental housing at the corner of Kāpule Highway and Haoa Street. Kāpule Highway is a state roadway and Haoa Road is classified as a collector street with 60 feet right of way and a pavement width of 24 feet. The pavement width is adequate for two way passenger vehicular traffic.

The subject zoning for the affordable housing is designated as Limited Industrial. As required by zoning curb, gutters and sidewalks shall be provided for all proposed or existing

Streets within or abutting the subdivision in Commercial and Resort Districts where the density permitted is 10 units or more per acre.

If required, bus stop and bus shelters shall be provided within the development. We do not recommend the bus shelter or bus stop to be located on Haoa Street. Haoa Street is classified as a collector street where traffic flow into and out of the industrial area should not be impeded or affect the existing traffic signal at Haoa Street and Kapule Highway. Moreover, resolution no 53-1995 restricts parking on both roadway shoulders along Haoa Street.

We recommend comments be solicited from the State Department of Transportation and our Wastewater Division.

Very truly yours,

Wallace Kudo

Wallace Kudo, P.E.
Chief, Engineering Division

CONCUR:

DONALD M. FUJIMOTO, P.E.
County Engineer

WK

Please return comments by May 25, 2005. MAHALO!

DAKUDOZ-IV-2005-30, Kaual Development LLC.doc

EXISTING TRAFFIC COUNT DATA

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

Counter: D1-0526/ D1-0528
Counted By: KA/KT
Weather: CLEAR

File Name : KapHaoA
Site Code : 00000001
Start Date : 6/22/2005
Page No : 1

Groups Printed- 1 - Unshifted

	Kapule Highway Southbound				Haoa Street Westbound				Kapule Highway Northbound				Halau Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	12	65	2	79	6	0	5	11	1	32	12	45	0	0	1	1	136
06:15 AM	21	73	12	106	5	2	12	19	0	46	16	62	2	0	0	2	189
06:30 AM	29	61	10	100	10	1	19	30	1	58	28	87	1	1	1	3	220
06:45 AM	27	84	15	126	9	2	16	27	0	64	26	90	2	1	1	4	247
Total	89	283	39	411	30	5	52	87	2	200	82	284	5	2	3	10	792
07:00 AM	33	91	16	140	12	4	22	38	0	72	38	110	5	2	2	9	297
07:15 AM	34	97	22	153	13	4	17	34	6	75	40	121	11	5	5	21	329
07:30 AM	32	96	27	155	32	5	17	54	3	72	38	113	13	8	5	26	348
07:45 AM	39	87	23	149	21	2	13	36	6	76	43	125	10	9	5	24	334
Total	138	371	88	597	78	15	69	162	15	295	159	469	39	24	17	80	1308
08:00 AM	31	69	14	114	26	6	15	47	3	66	29	98	11	6	6	23	282
08:15 AM	32	103	16	151	37	7	24	68	3	51	28	82	9	16	4	29	330
08:30 AM	18	78	12	108	37	9	20	66	1	66	31	98	10	6	2	18	290
08:45 AM	26	80	12	118	33	5	31	69	5	77	45	127	13	5	4	22	336
Total	107	330	54	491	133	27	90	250	12	260	133	405	43	33	16	92	1238
Grand Total	334	984	181	1499	241	47	211	499	29	755	374	1158	87	59	36	182	3338
Apprch %	22.3	65.6	12.1		48.3	9.4	42.3		2.5	65.2	32.3		47.8	32.4	19.8		
Total %	10.0	29.5	5.4	44.9	7.2	1.4	6.3	14.9	0.9	22.6	11.2	34.7	2.6	1.8	1.1	5.5	

	Kapule Highway Southbound				Haoa Street Westbound				Kapule Highway Northbound				Halau Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Intersection	07:00 AM																
Volume	138	371	88	597	78	15	69	162	15	295	159	469	39	24	17	80	1308
Percent	23.1	62.1	14.7		48.1	9.3	42.6		3.2	62.9	33.9		48.8	30.0	21.3		
07:30 Volume	32	96	27	155	32	5	17	54	3	72	38	113	13	8	5	26	348
Peak Factor																	0.940
High Int.	07:30 AM				07:30 AM				07:45 AM				07:30 AM				
Volume	32	96	27	155	32	5	17	54	6	76	43	125	13	8	5	26	
Peak Factor				0.963				0.750				0.938				0.769	

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

Counter: D1-0526/ D1-0528
Counted By: KA/KT
Weather: CLEAR

File Name : KapHaoP
Site Code : 00000001
Start Date : 6/21/2005
Page No : 1

Groups Printed- Unshifted

	Kapule Highway Southbound				Haoa Street Westbound				Kapule Highway Northbound				Halau Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
03:00 PM	23	105	11	139	30	8	40	78	4	123	30	157	18	8	3	29	403
03:15 PM	32	87	15	134	36	10	28	74	9	125	27	161	15	10	1	26	395
03:30 PM	20	106	15	141	51	12	29	92	3	141	29	173	11	8	10	29	435
03:45 PM	18	96	14	128	42	12	28	82	4	132	31	167	10	4	6	20	397
Total	93	394	55	542	159	42	125	326	20	521	117	658	54	30	20	104	1630
04:00 PM	22	83	13	118	32	7	47	86	8	116	27	151	20	10	4	34	389
04:15 PM	18	106	13	137	25	7	21	53	3	136	16	155	14	7	4	25	370
04:30 PM	11	114	12	137	44	19	30	93	3	122	14	139	12	8	2	22	391
04:45 PM	8	95	12	115	23	8	32	63	3	110	13	126	14	1	2	17	321
Total	59	398	50	507	124	41	130	295	17	484	70	571	60	26	12	98	1471
05:00 PM	7	86	5	98	40	9	20	69	3	132	10	145	14	1	4	19	331
05:15 PM	6	103	10	119	21	6	22	49	2	91	8	101	13	7	1	21	290
05:30 PM	7	76	8	91	15	3	8	26	0	114	8	122	10	0	1	11	250
05:45 PM	5	76	8	89	6	4	9	19	1	91	3	95	7	0	3	10	213
Total	25	341	31	397	82	22	59	163	6	428	29	463	44	8	9	61	1084
Grand Total	177	1133	136	1446	365	105	314	784	43	1433	216	1692	158	64	41	263	4185
Apprch %	12.2	78.4	9.4		46.6	13.4	40.1		2.5	84.7	12.8		60.1	24.3	15.6		
Total %	4.2	27.1	3.2	34.6	8.7	2.5	7.5	18.7	1.0	34.2	5.2	40.4	3.8	1.5	1.0	6.3	

	Kapule Highway Southbound				Haoa Street Westbound				Kapule Highway Northbound				Halau Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection	03:00 PM																
Volume	93	394	55	542	159	42	125	326	20	521	117	658	54	30	20	104	1630
Percent	17.2	72.7	10.1		48.8	12.9	38.3		3.0	79.2	17.8		51.9	28.8	19.2		
03:30 Volume	20	106	15	141	51	12	29	92	3	141	29	173	11	8	10	29	435
Peak Factor																	0.937
High Int.	03:30 PM				03:30 PM				03:30 PM				03:00 PM				
Volume	20	106	15	141	51	12	29	92	3	141	29	173	18	8	3	29	
Peak Factor				0.961				0.886				0.951				0.897	

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

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

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

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

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

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

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

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

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

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

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

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

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

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Existing Conditions

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	78	15	69	15	295	159	138	371	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			69			159			88

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A	A			NB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
WB	Left	A	A			SB	Left	A	A		
	Thru		A				Thru		A		
	Right		A				Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		10.0	14.0					6.0	20.0		
Yellow		0.0	4.0					0.0	4.0		
All Red		0.0	1.0					0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	503	1770	0.10	0.40	11.4	B		
TR	435	1863	0.07	0.23	18.0	B	13.9	B
Westbound								
L	501	1770	0.21	0.40	11.9	B		
TR	435	1863	0.05	0.23	17.9	B	12.9	B
Northbound								
L	327	1770	0.05	0.43	10.8	B		
T	621	1863	0.51	0.33	16.7	B	16.4	B
R	528	1583	0.00	0.33	13.3	B		
Southbound								
L	381	1770	0.38	0.43	11.8	B		
T	621	1863	0.62	0.33	18.7	B	16.9	B
R	528	1583	0.00	0.33	13.3	B		

Intersection Delay = 16.0 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Existing Conditions

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	159	42	125	20	521	117	93	394	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			125			117			55

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	A	A			NB Left	A	A		
	Thru		A			Thru		A		
	Right		A			Right		A		
	Peds					Peds				
WB	Left	A	A			SB Left	A	A		
	Thru		A			Thru		A		
	Right		A			Right		A		
	Peds					Peds				
NB	Right					EB Right				
SB	Right					WB Right				
Green		8.5	14.0				2.5	25.0		
Yellow		0.0	4.0				0.0	4.0		
All Red		0.0	1.0				0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	454	1770	0.13	0.38	12.5	B		
TR	435	1863	0.08	0.23	18.0	B	14.4	B
Westbound								
L	457	1770	0.39	0.38	13.8	B		
TR	435	1863	0.11	0.23	18.2	B	14.7	B
Northbound								
L	311	1770	0.07	0.46	9.9	A		
T	776	1863	0.71	0.42	17.4	B	17.1	B
R	660	1583	0.00	0.42	10.2	B		
Southbound								
L	212	1770	0.46	0.46	13.1	B		
T	776	1863	0.53	0.42	13.8	B	13.6	B
R	660	1583	0.00	0.42	10.2	B		

Intersection Delay = 15.3 (sec/veh) Intersection LOS = B

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2008 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2008 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	78	15	69	15	302	159	138	380	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			69			159			88

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	A	A			NB Left	A	A		
	Thru		A			Thru		A		
	Right		A			Right		A		
	Peds					Peds				
WB	Left	A	A			SB Left	A	A		
	Thru		A			Thru		A		
	Right		A			Right		A		
	Peds					Peds				
NB	Right					EB Right				
SB	Right					WB Right				
Green		10.0	14.0				6.0	20.0		
Yellow		0.0	4.0				0.0	4.0		
All Red		0.0	1.0				0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	503	1770	0.10	0.40	11.4	B		
TR	435	1863	0.07	0.23	18.0	B	13.9	B
Westbound								
L	501	1770	0.21	0.40	11.9	B		
TR	435	1863	0.05	0.23	17.9	B	12.9	B
Northbound								
L	320	1770	0.05	0.43	10.9	B		
T	621	1863	0.52	0.33	16.9	B	16.6	B
R	528	1583	0.00	0.33	13.3	B		
Southbound								
L	376	1770	0.38	0.43	11.9	B		
T	621	1863	0.64	0.33	19.1	B	17.2	B
R	528	1583	0.00	0.33	13.3	B		

Intersection Delay = 16.3 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2008 without Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	159	42	125	20	542	117	93	410	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			125			117			55

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A	A			NB Left	A	A		
Thru		A			Thru		A		
Right		A			Right		A		
Peds					Peds				
WB Left	A	A			SB Left	A	A		
Thru		A			Thru		A		
Right		A			Right		A		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.5	14.0				2.5	25.0		
Yellow	0.0	4.0				0.0	4.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	454	1770	0.13	0.38	12.5	B		
TR	435	1863	0.08	0.23	18.0	B	14.4	B
Westbound								
L	457	1770	0.39	0.38	13.8	B		
TR	435	1863	0.11	0.23	18.2	B	14.7	B
Northbound								
L	299	1770	0.07	0.46	10.0+	B		
T	776	1863	0.74	0.42	18.4	B	18.1	B
R	660	1583	0.00	0.42	10.2	B		
Southbound								
L	198	1770	0.49	0.46	13.7	B		
T	776	1863	0.55	0.42	14.1	B	14.0	B
R	660	1583	0.00	0.42	10.2	B		

Intersection Delay = 15.8 (sec/veh) Intersection LOS = B

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2008 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: AM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2008 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	39	24	17	83	15	74	15	302	160	139	380	88
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			17			69			159			88

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	A			NB	Left	A	A		
Thru		A				Thru		A		
Right		A				Right		A		
Peds						Peds				
WB Left	A	A			SB	Left	A	A		
Thru		A				Thru		A		
Right		A				Right		A		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0	14.0					6.0	20.0		
Yellow	0.0	4.0					0.0	4.0		
All Red	0.0	1.0					0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	502	1770	0.10	0.40	11.4	B		
TR	435	1863	0.07	0.23	18.0	B	13.9	B
Westbound								
L	501	1770	0.22	0.40	12.0	B		
TR	418	1790	0.06	0.23	18.0	B	13.1	B
Northbound								
L	320	1770	0.05	0.43	10.9	B		
T	621	1863	0.52	0.33	16.9	B	16.6	B
R	528	1583	0.00	0.33	13.3	B		
Southbound								
L	376	1770	0.39	0.43	11.9	B		
T	621	1863	0.64	0.33	19.1	B	17.2	B
R	528	1583	0.00	0.33	13.3	B		

Intersection Delay = 16.2 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1d

Analyst: KT
Agency: Wilson Okamoto Corp
Date: 6/21/2005
Period: PM Peak Period
Project ID: Kauai Lagoons Resort
E/W St: Haoa Street

Inter.: Kapule Highway/Haoa Street
Area Type: All other areas
Jurisd: Lihue, Kauai
Year : Year 2008 with Project

N/S St: Kapule Highway

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	1	1	1	1	1	1
LGConfig	L	TR		L	TR		L	T	R	L	T	R
Volume	54	30	20	162	42	127	20	542	122	98	410	55
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			20			125			117			55

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A	A			NB Left	A	A		
Thru		A			Thru		A		
Right		A			Right		A		
Peds					Peds				
WB Left	A	A			SB Left	A	A		
Thru		A			Thru		A		
Right		A			Right		A		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.5	14.0				2.5	25.0		
Yellow	0.0	4.0				0.0	4.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	454	1770	0.13	0.38	12.5	B		
TR	435	1863	0.08	0.23	18.0	B	14.4	B
Westbound								
L	457	1770	0.40	0.38	13.9	B		
TR	432	1851	0.11	0.23	18.2	B	14.8	B
Northbound								
L	299	1770	0.07	0.46	10.0+	B		
T	776	1863	0.74	0.42	18.4	B	18.0	B
R	660	1583	0.01	0.42	10.2	B		
Southbound								
L	198	1770	0.52	0.46	14.2	B		
T	776	1863	0.55	0.42	14.1	B	14.1	B
R	660	1583	0.00	0.42	10.2	B		

Intersection Delay = 15.9 (sec/veh) Intersection LOS = B