Draft Environmental Assessment/
Anticipated Finding of No Significant Impact

KŪHIŌ HIGHWAY SHORT-TERM IMPROVEMENTS

Kuamoʻo Road to Temporary Bypass Road

Federal Aid Project No. 56-A-01-06
Kawaihau, Kauaʻi

Prepared for:
State of Hawai`i
Department of Transportation

Prepared by:
Wilson Okamoto Corporation

June 2009

DRAFT
ENVIRONMENTAL ASSESSMENT

Kūhiō Highway Short-Term Improvements:
Kuamoʻo Road to Temporary Bypass Road Project

District of Kawaihau, Island of Kauaʻi

Prepared for:

STATE OF HAWAIʻI
DEPARMENT OF TRANSPORTATION
HIGHWAYS DIVISION

Prepared by:

WILSON OKAMOTO
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JUNE 2009

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Appendix A-3: March 5, 2009 Meeting Minutes, Kauaʻi County Historic Preservation Review Commission.

Appendix A-4: Meeting Notes for Kauaʻi/Niʻihau Burial Council. Prepared by Wilson Okamoto Corporation. March 5, 2009.

Appendix B Project Site Photos

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Appendix D Biological and Water Quality Surveys of Kaloko Marsh at Kūhiō Highway, Wailuā, Kauaʻi, AECOS Inc. May 12, 2009.

Appendix E Biological and Water Quality Survey for the Kuamoʻo Culvert Extension in Wailuā, Kauaʻi, AECOS Inc. November 5, 2007.

Appendix F Biological Survey for Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road, Rana Biological Consulting, Inc. and AECOS Inc. April 29, 2009.

Appendix G Archaeological Assessment and Related Correspondence

Appendix G-1: Letter from SHPD, DLNR. Chapter 6E-42 – Historic Preservation Review – Archaeological Assessment for Kūhiō Highway Short-Term Improvements, Kuamoʻo Road to the Temporary Kapaʻa Bypass Road. July 18, 2007.

Appendix G-2: Letter from SHPD, DLNR. Chapter 6E-42 – Pre Assessment Consultation for Kūhiō Highway Short-Term Improvements, Kuamoʻo Road to the Temporary Kapaʻa Bypass Road. September 21, 2007.

Appendix G-3: Letter from SHPD, DLNR. National Historic Preservation Act – Section 106 Review – Final Archaeological Monitoring Plan for the Proposed Kūhiō Highway Short-Term Improvements, Kuamoʻo Road to the Temporary Kapaʻa Bypass Road. March 16, 2009.

Appendix G-4: Draft Archaeological Assessment for the State DOT Kūhiō Highway Short-Term Improvements Project, Cultural Surveys Hawaiʻi, Inc. April 2009.

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SUMMARY

Project Name: Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road Project

Proposing Agency: Highways Division
Department of Transportation
State of Hawaiʻi
869 Punchbowl Street, 3rd Floor
Honolulu, Hawaiʻi 96813

Contact: Darell Young, P.E.

Authorized Agent Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaiʻi 96826

Contact: Ronald Sato, AICP

Approving Agency: Highways Division
Department of Transportation
State of Hawaiʻi

Project Description: The State Department of Transportation, Highways Division is proposing to implement widening improvements to Kūhiō Highway along an approximately 0.64-mile section of highway between the Temporary Kapaʻa Bypass Road and Kuamoʻo Road. Other intersection and accessory improvements would be implemented with this highway widening. The existing right-turn storage lane along Kuamoʻo Road would also be extended mauka (inland) from its intersection with Kūhiō Highway.

The State DOT is also planning to relocate existing overhead utility lines underground as part of mitigation measures for endangered and threatened sea birds present in the area. Existing overhead utility lines along the highway corridor would be relocated underground starting from an area just north of the Temporary Kapaʻa Bypass Road (near Aleka Loop) and proceed southbound down to the Kauaʻi Island Utility Cooperative's (KIUC) Lydgate Substation at South Leho Drive. This utilities relocation would extend about 1.70 miles in length. This project is estimated to cost about $25.0 million and construction is planned to start in the Fall of 2009.

Project Location: The project area associated with this highway widening corridor and utilities relocation is in the Kawaihau district on the island of Kauaʻi. The relocation of most utilities south of the Wailuā River occurs in the Līhuʻe district.

Land Ownership: Properties affected by this project includes parcels owned that are both privately-owned and publicly-owned. Most of the highway improvements would be constructed within the existing State DOT right-of-way. Some highway improvements and utilities relocation would occur outside the right-of-way for which easements would be obtained from the property owners.

Tax Map Key: Various parcels associated with the following TMKs 3-9-002, 3-9-006; 4-1-003, 4-1-005, 4-3-001, 4-3-002, and 4-3-010.

State Land Use: Mainly within Urban District, and a small portion within the Agricultural District.

General Plan: Under the General Plan land use maps, the improvements would occur within the following designations: 1) Agriculture, 2) Residential Community, 3) Resort; and 4) Open.

SMA Designation: The highway widening improvements are situated within the SMA, and a SMA Use Permit was obtained in September 2007 (SMA(U)-2008-2). A portion of the utility lines being relocated underground south of Kuamoʻo Road is within the SMA, however, the utility improvements are exempt from the SMA requirements.

1. INTRODUCTION

The State of Hawaiʻi (State), Department of Transportation (DOT), Highways Division is proposing to implement widening improvements to Kūhiō Highway along an approximately 0.65-mile section of highway in the Kawaihau district on the island of Kauaʻi. Kūhiō Highway is planned to be widened on the southbound side from three to four lanes between the intersections of the Temporary Kapaʻa Bypass Road and Kuamoʻo Road. Other accessory improvements would be implemented with this highway widening. The existing right-turn storage lane along Kuamoʻo Road would also be extended 650 feet mauka (inland) from its intersection with Kūhiō Highway. This highway project (Federal Aid Project No. 56A-01-06) is collectively referred to as the "Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road Project".

In addition to the highway widening improvements, the State DOT is also planning to relocate existing overhead utility lines (electrical, telephone, and cable) underground as part of mitigation measures for endangered and threatened sea birds present in the area based upon consultation with the U.S. Fish and Wildlife Service (USFWS). Existing overhead utility lines along the highway corridor would be relocated underground starting from an area just north of the Temporary Kapaʻa Bypass Road (near Aleka Loop) and proceed southbound down to the Kauaʻi Island Utility Cooperative's (KIUC) Lydgate Substation at South Leho Drive. This utilities relocation would extend about 1.70 miles in length, and is being included as part of the highway widening project.

1.1. PURPOSE FOR ENVIRONMENTAL DOCUMENT

This proposed Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road Project triggers the State environmental review process because the improvements involve the following actions: 1) use of State funds, and 2) use of State lands. Highway improvements and portions of the utility relocation would be constructed using State funds. Highway improvements and utility relocation would also occur within the State DOT's right-of-way and other State-owned property. A summary of pertinent project information is provided in Table 1.1, and discussed in further detail within various sections of this document.

Project Background

This project initially started with just highway and accessory improvements between Kuamoʻo Road and the Temporary Kapaʻa Bypass Road without the relocation of existing overhead utilities underground. These improvements were determined to be exempt from the preparation of an Environmental Assessment based on the State DOT's Exemption List. However, during consultation with the U.S. Fish and Wildlife Service (USFWS) as part of Section 7 under the Endangered Species Act of 1973, as amended (ESA), they recommended that the overhead utility lines along this corridor be relocated underground. The USFWS were concerned with the presence of the following three pelagic seabird species within the project corridor particularly near Wailuā River: 1) Newell's Shearwater (*Puffinus auricularis newelli*); 2)

Hawaiian Petrel (*Pterodroma sandwichensis*); and 3) Band-rumped Storm-Petrel (*Oceanodroma castro*).

The State DOT is now planning to relocate existing overhead utility lines underground as part of mitigation for this project. Developing plans for the relocation of overhead utility lines into underground duct lines has involved a coordinated effort between State DOT, U.S. Department of Transportation Federal Highways Administration (FHWA), KIUC, Hawaiian Telcom, and Oceanic Time Warner Cable. Based upon this coordination, the relocation of overhead utility lines will now extend beyond the highway widening corridor and proceed down to the KIUC's Lydgate Substation.

An Environmental Assessment (EA) under the State environmental regulations is consequently being prepared as a result of the relocation of utility lines underground. The relocation of utilities underground will cross the Wailuā River area which is potentially an environmentally sensitive area. Although the initial highway improvements were exempt from the environmental review process, all improvements will now be included under this environmental review process so that the entire project consisting of the highway widening, accessory improvements, and relocation of utilities can be addressed.

1.2. PROPOSING AGENCY AND APPROVING AGENCY

The proposed project is considered an "Agency Action" under the State's environmental review regulations because it is being initiated by the State DOT. As a result, the State DOT will serve as the "Applicant" initiating the preparation of the environmental document under these requirements. Wilson Okamoto Corporation is serving as the "Authorized Agent" on behalf of the State DOT in the preparation of this environmental document.

This Draft Environmental Assessment (Draft EA) was prepared pursuant to Chapter 343, Environmental Impact Statements, Hawaii Revised Statutes (HRS), as amended (State of Hawaiʻi, 2007), and Title 11, Chapter 200, (Environmental Impact Statement Rules) of the State Department of Health's Administrative Rules, as amended (State of Hawaiʻi, 1996). Under the environmental review process, pre-assessment consultation was conducted with various agencies and community organizations which are discussed in greater detail later in this document. Copies of comment letters received and responses to them are included in Appendix A.

The State Department of Transportation will serve as the "Approving Agency" for the environmental assessment document since this project is an Agency Action involving the use of State lands and funds. This department will thus serve this role as the authorized representative for the Governor of the State of Hawaiʻi.

1.3. BACKGROUND ON FEDERAL REQUIREMENTS

This Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road Project is being partially funded by the U.S. Department of Transportation, Federal

Highway Administration (FHWA). Federal funds made available through the American Recovery and Reinvestment Act (ARRA), also referred to as Federal Stimulus funds, will also be used for the relocation of utilities underground. The use of Federal funds thus makes this project subject to the National Environmental Policy Act (NEPA) environmental requirements prescribed under 40 CFR Parts 1500-1508 (Council on Environmental Quality (CEQ)) along with the provisions of 23 CFR Part 771, Environmental and Related Procedures, as amended (FHWA, 2005). The FHWA serves as the lead Federal Agency, or Administrator, responsible for the project's compliance with NEPA documentation and processing requirements. There are three types of environmental documents under NEPA, 1) Categorical Exclusions, 2) Environmental Assessments, and 3) Environmental Impact Statements. The appropriate environmental document will be prepared in order to meet NEPA requirements.

Section 106 Consultation

The use of Federal funds for this project also triggers other Federal regulatory procedures often referred to as "cross-cutter" requirements. This project is considered a Federal Action subject to Section 106 consultation under the National Historic Preservation Act and the Advisory Council on Historic Preservation's implementation procedures prescribed by 36 CFR, Part 800 (ACHP, 2004). The "Agency Official" responsible for this consultation will be the FHWA, and this consultation effort has been integrated with this environmental review process.

The Section 106 consultation process conducted thus far has incorporated the pre-assessment, agency, and public consultation efforts conducted as part of the environmental review process for this project. Information from this Draft EA document is also being utilized to solicit further public input as part of the Section 106 consultation process. Currently, a "no adverse effect" determination under the Section 106 regulations is proposed for this project. Documentation will be submitted to the State Historic Preservation Officer for a final confirmation of the project's effect and necessary mitigative measures based upon the findings from the environmental review process.

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2. PROJECT DESCRIPTION

2.1. PROJECT LOCATION AND VICINITY

The project is located along the Kauaʻi's eastern coastline in the Wailuā area of the Līhuʻe and Kawaihau Districts. All project improvements would primarily occur along the State DOT's Kūhiō Highway corridor and total about 1.70 miles in length. Kūhiō Highway (Route 56) is a part of the National Highway System and provides a critical connection between the communities of Līhuʻe and Kapaʻa which are the two largest urban centers on Kauaʻi. Figure 2-1 includes a location map showing the general project corridor.

The proposed highway widening improvements occur along a 0.64-mile section of Kūhiō Highway. This is located between the highway's intersection with the Temporary Kapaʻa Bypass Road and Kuamoʻo Road. Improvements would also occur along Kuamoʻo Road for 650 feet (0.12 miles) which is also a State DOT roadway. The relocation of overhead utility lines would involve about 1.70 miles in length along the highway corridor. This relocation starts from an area just north of the Temporary Kapaʻa Bypass Road (near Aleka Loop) and proceed southbound down to KIUC's Lydgate Substation at South Leho Drive.

Existing Surrounding Uses

The project is located in the Wailuā community extending from the southern end of Waipouli toward Kawailoa. Existing land uses within the immediate area of the project area include a mix of uses comprised of residences, commercial uses, various types of public facilities including the Wailuā River, and multi-family visitor accommodation units. Visitor units are predominantly concentrated near the shoreline area while commercial uses are generally situated along the highway corridor. A number of residences in the area consist of single-family homes located inland of the highway primarily up Haleilio Road. Figure 2-2 includes an aerial photo showing the various land uses along this project corridor. Photos of the surrounding area are also included in Appendix B.

North of the Temporary Kapaʻa Bypass Road intersection is the Coconut Plantation Resort which includes several visitor hotel and condominium units and the Coconut Marketplace shopping center. South of this Resort along Papaloa Road are more visitor units along the shoreline such as the Kauaʻi Sands, Kapaʻa Sands, and Islander on the Beach. The area mauka of the highway is presently undeveloped consisting of former agriculture land used for sugar cane cultivation. The Courtyards at Waipouli is an affordable housing project consisting of 82 townhome units next to Lanikai Street that is currently under construction.

0 362 725 1,450 2,175 2,900 Feet

FIGURE 2-1
PROJECT LOCATION MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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NOT TO SCALE

FIGURE 2-2
PROJECT VICINITY MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Land uses along the highway near the Haleilio Road intersection consist of a concentration of commercial uses such as restaurants and retail shops (see Exhibit 2-1). These uses include a Shell service station at the Papaloa Road intersection, Wailuā Shopping Plaza, Kinipopo Shopping Village, and the Kintaro Restaurant. The County's wastewater pump station is also situated at the southern corner of Haleilio Road with the highway. Further south is the Coco Palms Resort which is vacant and planned for redevelopment in the future.

Exhibit 2-1 – Existing Uses Along Kūhiō Highway

South of Wailuā River along the shoreline is the Aloha Beach Resort near the northern end of Leho Drive, and the Aston Kaha Lani resort at the southern end of Leho Drive. Further south of this area is the County's Wailuā Golf Course. The area mauka of the highway is presently undeveloped and owned by the State Department of Hawaiian Home Lands (DHHL). These uses and the general area were previously shown on Figure 2-2.

Several areas makai (seaward) of the highway consist of open space and beach parks used for recreational activities such as Wailuā Beach Park and Lydgate State Park near the Wailuā River. The Wailuā River State Park is a State-owned park established in 1954 and had an estimated annual visitation of about 615,000 in 2003 (Kimura International, July 2007). Commercial boat rides, a restaurant, and other recreational activities (ex. fishing, kayaking, etc.) occur within the river. Exhibit 2-2 includes an aerial photo showing this area of the State Park.

Exhibit 2-2 – View of Wailuā River State Park Area

2.2. PROJECT CORRIDOR ROADWAYS AND INTERSECTIONS

A summary of the existing major State and County roadways and intersections within the project area that would be affected by the highway improvements is provided. The logical termini to address environmental matters under this document for the highway widening project was determined to be within the highway's intersections with Kuamoʻo Road northbound up to the Temporary Kapaʻa Bypass Road. The relocation of utility lines being undertaken as part of mitigative measures for this highway project will incorporate into this assessment the highway corridor from the area of the Temporary Kapaʻa Bypass Road south to South Leho Drive.

2.2.1. Existing Roadway Facilities

Existing public roadways in the vicinity of this project includes both State and County roadway facilities. Kūhiō Highway is a State roadway generally oriented in the north-south direction and serves as the main access roadway along the eastern coast. Other major roadway facilities in the area consist of County roadways mainly providing local access from the highway to inland (mauka) areas. Figure 2-3 identifies the major roadway facilities in the project corridor. Photos of this highway and roadways are included in Appendix B.

Kūhiō Highway is predominantly a three-lane, two-way roadway (see Exhibit 2-3). This highway is coned for contraflow operations during the morning peak hours of 5:30 a.m. to 10:00 a.m. in the project vicinity. During contraflow operations, the center northbound through lane is coned to provide additional roadway capacity for the southbound commuter traffic demand. Kuamoʻo Road is a State roadway that is predominantly a two-lane, two-way roadway generally oriented in the east-west (mauka-makai) direction. This road provides access to inland (mauka) areas within Wailuā (ex. Wailuā Homesteads subdivision) and behind the Nonou Mountain.

Exhibit 2-3 – Southbound View of Kūhiō Highway

The State DOT's Wailuā River Highway Bridge consists of a two-lane bridge (one in each direction) crossing over the Wailuā River. A cane haul bridge also crosses this River in the same location and consists of a single lane for northbound vehicles. The State DOT is starting construction to replace this cane haul bridge with a new steel bridge providing two travel lanes and a bike path.

M:\WOA\7169-12 Kuhio Hwy - Planning\120 DEA Figures\Final Figures\Fig2-3 Road Map.pdf

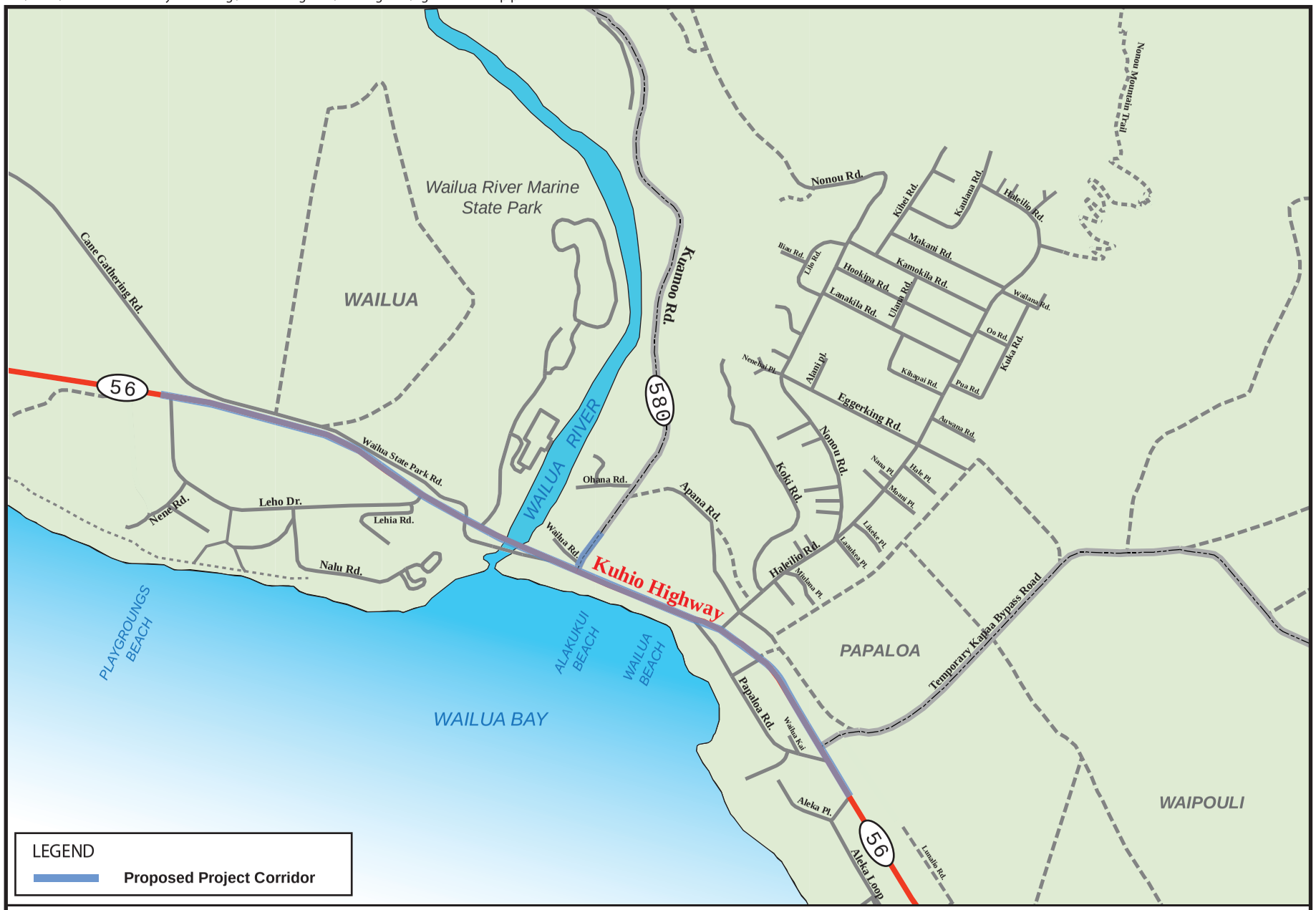

FIGURE 2-3
ROADWAYS NETWORK MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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ENGINEERS|PLANNERS|CONSULTANTS

Haleilio Road is a County-owned predominantly two-lane, two-way roadway generally oriented in the east-west direction. This road provides vehicular access to the many homes associated with the Wailuā House Lots subdivision. Papaloa Road is located near Haleilio Road running in a north-south direction makai (seaward or east) of the highway. This County-owned road is a short predominantly two-lane, two-way roadway providing access to shoreline properties, commercial uses, and visitor-oriented residences in that area. Lanikai Street is a County-owned two-lane, two-way roadway generally oriented in the east-west direction providing a connection between Kūhiō Highway and Papaloa Road.

The Temporary Kapaʻa Bypass Road at the northern end of the project corridor is a State roadway facility serving as a bypass road for the Kapaʻa and Waipouli areas on a temporary basis until a future permanent alternate road serving this region is completed by the State DOT. This road is predominantly a two-lane, two-way roadway that was converted from being used as a cane haul road for agricultural activities in the region after sugar cane operations ceased.

2.2.2. Existing Intersections

Kuamoʻo Road forms a signalized T-intersection with Kūhiō Highway. The northbound approach of the highway has an exclusive left-turn lane and two through lanes while the southbound approach has one through lane and an exclusive right-turn lane (see Exhibit 2-4). At this intersection the eastbound approach of Kuamoʻo Road has exclusive left-turn and right-turn lanes. Photos of this intersection and other intersections along the project corridor are included in Appendix B.

Further north, Papaloa Road forms an unsignalized T-intersection with the highway just south of the Haleilio Road intersection. The highway's northbound approach has two through lane and the southbound approach has one through lane. Papaloa Road intersects the highway at a slight angle and has one stop-controlled lane serving both left and right-turn traffic movements (see Exhibit 2-5).

Exhibit 2-4 – Southbound View of Kūhiō Highway
At Kuamoʻo Road Intersection

Exhibit 2-5 – Northbound View of Kūhiō Highway
At Papaloa Road Intersection

Haleilio Road forms a signalized T-intersection with Kūhiō Highway. The highway's northbound approach has an exclusive left-turn lane and two through lanes while the southbound approach has a shared through and right-turn lane. The eastbound approach of Haleilio Road at this intersection is striped to provide one wide lane that serves both left-turn and right-turn traffic movements.

Lanikai Street forms an unsignalized T-intersection with Kūhiō Highway. The northbound approach of Kūhiō Highway has one through lane and a shared through and right-turn lane while the southbound approach has an exclusive left-turn lane and one through lane. Lanikai Street has one stop-controlled lane that serves both left-turn and right-turn traffic movements.

Kūhiō Highway's intersection with the Temporary Kapaʻa Bypass Road is presently an unsignalized T-intersection. The northbound approach of Kūhiō Highway has an exclusive left-turn lane and two through lanes while the southbound approach has one through lane and an exclusive right-turn lane. The Temporary Kapaʻa Bypass Road's approach to this intersection has an exclusive left-turn and right-turn lane. In addition, a right-turn storage lane is provided along the highway for vehicles merging onto the highway in the southbound direction.

2.2.3. Existing Traffic Volumes Within Highway Project Corridor

In August 2006, State DOT traffic volume data along Kūhiō Highway within the project corridor recorded an average daily traffic of about 33,000 vehicles. About 2,080 vehicles (northbound and southbound) traveled along the highway during the morning peak hour, and about 2,680 vehicles during the afternoon peak hour (DOT, July 2007). Manual turning moving counts of existing traffic were also taken at signalized intersections within the project corridor in January 2009. Figures 2-4 and 2-5 show the existing morning and afternoon peak hour traffic volumes by turning movements within the project corridor.

Kūhiō Highway carries 625 vehicles northbound and 1,287 vehicles southbound during the weekday morning peak hour of traffic at the intersection with Kuamoʻo Road. During the afternoon peak hour, the overall traffic volume is higher with 1,688 vehicles traveling northbound and 940 vehicles traveling southbound. The Kuamoʻo Road eastbound approach (makai) at this intersection carried 624 vehicles during the morning peak hour of traffic, but only 314 vehicles during the afternoon peak hour.

At the intersection of the Temporary Kapaʻa Bypass Road, Kūhiō Highway had 748 vehicles traveling northbound and 607 vehicles southbound during the morning peak hour. During the afternoon peak hour, the overall traffic volume was higher with 1,355 vehicles traveling northbound and 470 vehicles traveling southbound. The Temporary Kapaʻa Bypass Road approach of the intersection had 565 vehicles traveling eastbound during the morning peak hour of traffic, but only 397 vehicles traveling eastbound during the PM peak hour.

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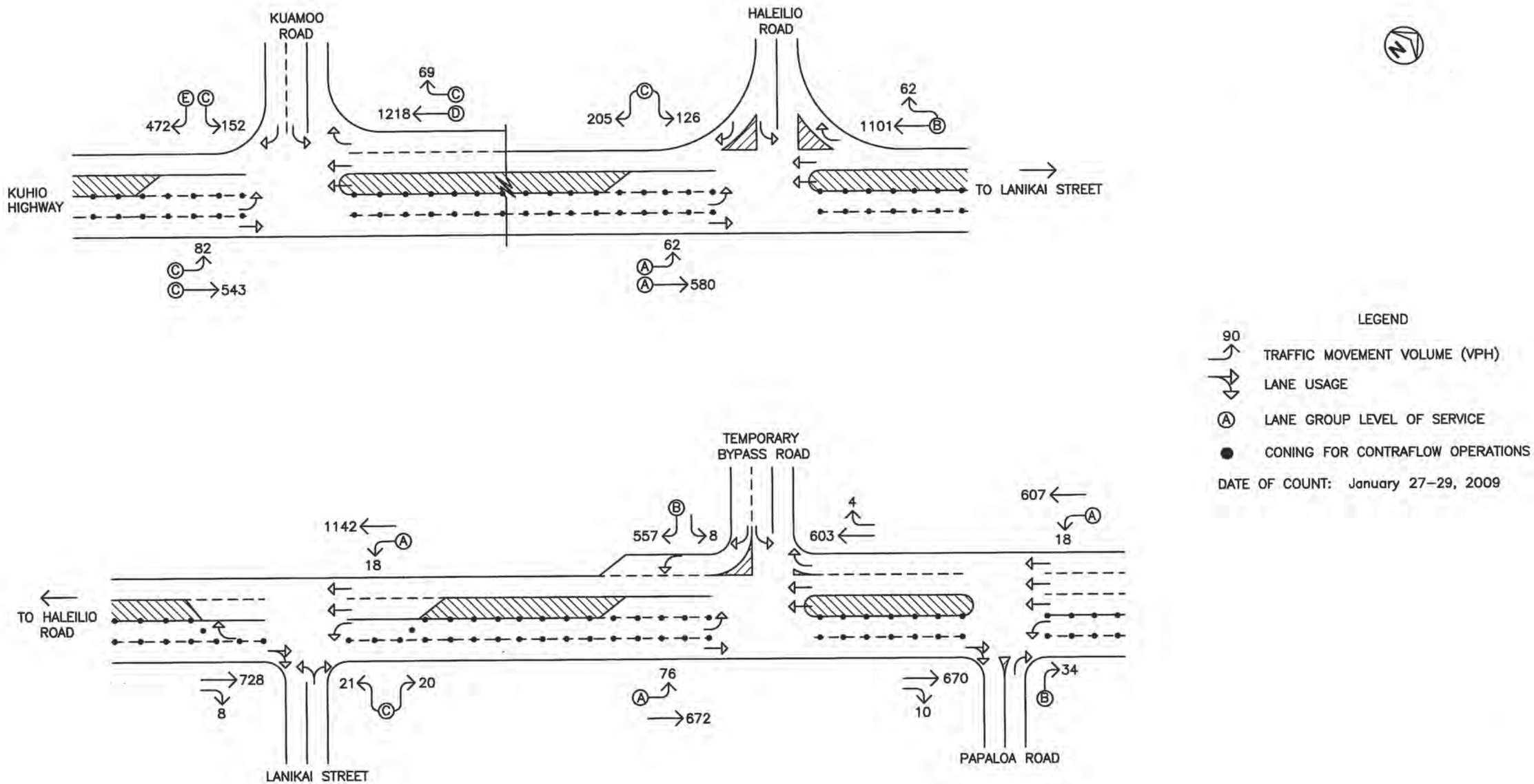

FIGURE 2-4

EXISTING WEEKDAY MORNING TRAFFIC COUNTY DATA

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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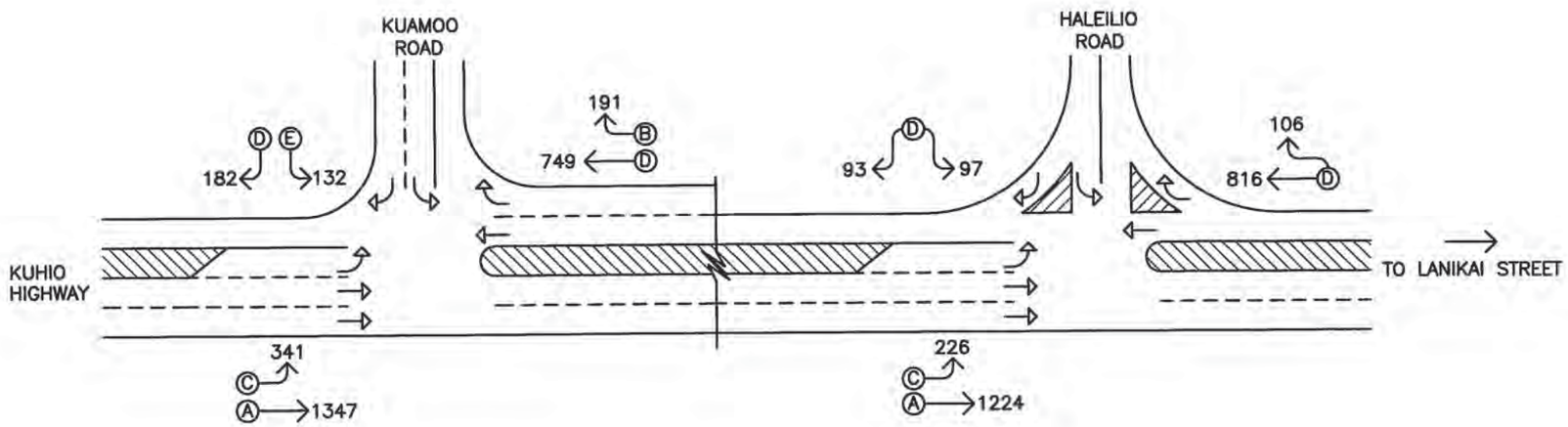

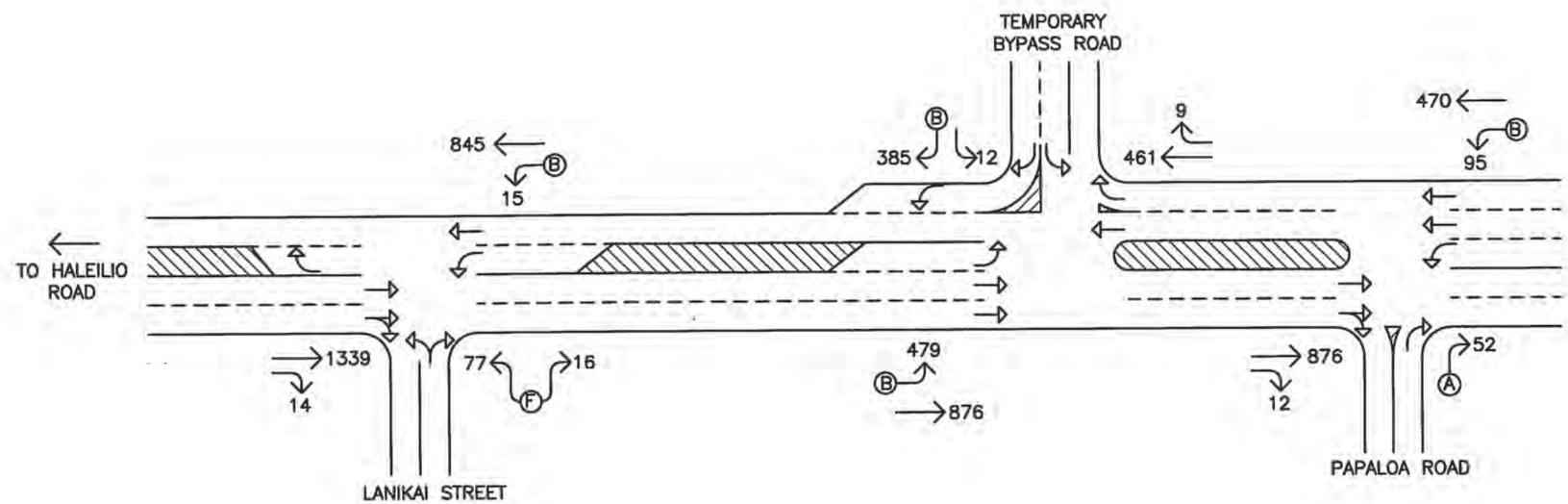

LEGEND

90 TRAFFIC MOVEMENT VOLUME (VPH)

LANE USAGE

Ⓐ LANE GROUP LEVEL OF SERVICE

DATE OF COUNT: January 27–29, 2009

FIGURE 2-5

EXISTING WEEKDAY AFTERNOON TRAFFIC COUNTY DATA

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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2.3. PROPERTIES AFFECTED BY PROJECT

Properties affected by this project include parcels that are both privately-owned and publicly-owned. These properties would be affected by physical improvements associated with widening of the highway, intersection modifications, and relocation of utilities.

Identification of Properties

Most of the associated highway improvements would be constructed within the existing State DOT right-of-way. However, some highway improvements and utilities relocation would occur outside the right-of-way for which easements would be obtained from the property owners. Table 2-1 identifies the properties affected by this project. Figure 2-6 graphically identifies parcels affected.

TABLE 2-1
PARCELS AFFECTED BY PROPOSED PROJECT

Tax Map Key		Parcel	Size (ac)	Property Owner	Purpose
1.	3-9-006	009	41.152	State Department of Hawaiian Home Lands	Utility easement
2.	4-1-003	017	0.855	State of Hawaiʻi (road easement)	Highway widening, intersection, utility easement
3.	4-1-003	039	0.492	State of Hawaiʻi (set aside for State DOT)	Highway widening
4.	4-1-003	044	0.412	State of Hawaiʻi (leased to County for wastewater pump station)	Utilities easement
5.	4-1-005	005	1.018	Privately-owned (commercial)	Utility easement
6.	4-1-005	008	0.975	Privately-owned (commercial)	Utility easement
7.	4-3-001	006	0.167	Privately-owned (residence)	Utility easement
8.	4-3-001	007	0.167	Privately-owned (undeveloped)	Utility easement
9.	4-3-002	018	7.559	Privately-owned (commercial)	Utility easement
10.	4-3-002	021	0.010	State of Hawaiʻi (State DOT)	Utility easement
11.	4-3-010	001	381.854	Privately-owned (undeveloped)	Utility easement

Parcels Needed for Highway Improvements

Properties affected by the highway widening improvements involve two parcels, both owned by the State of Hawaiʻi. These parcels generally front the Coco Palms Resort and are identified as TMK 4-01-003: 017 and 039.

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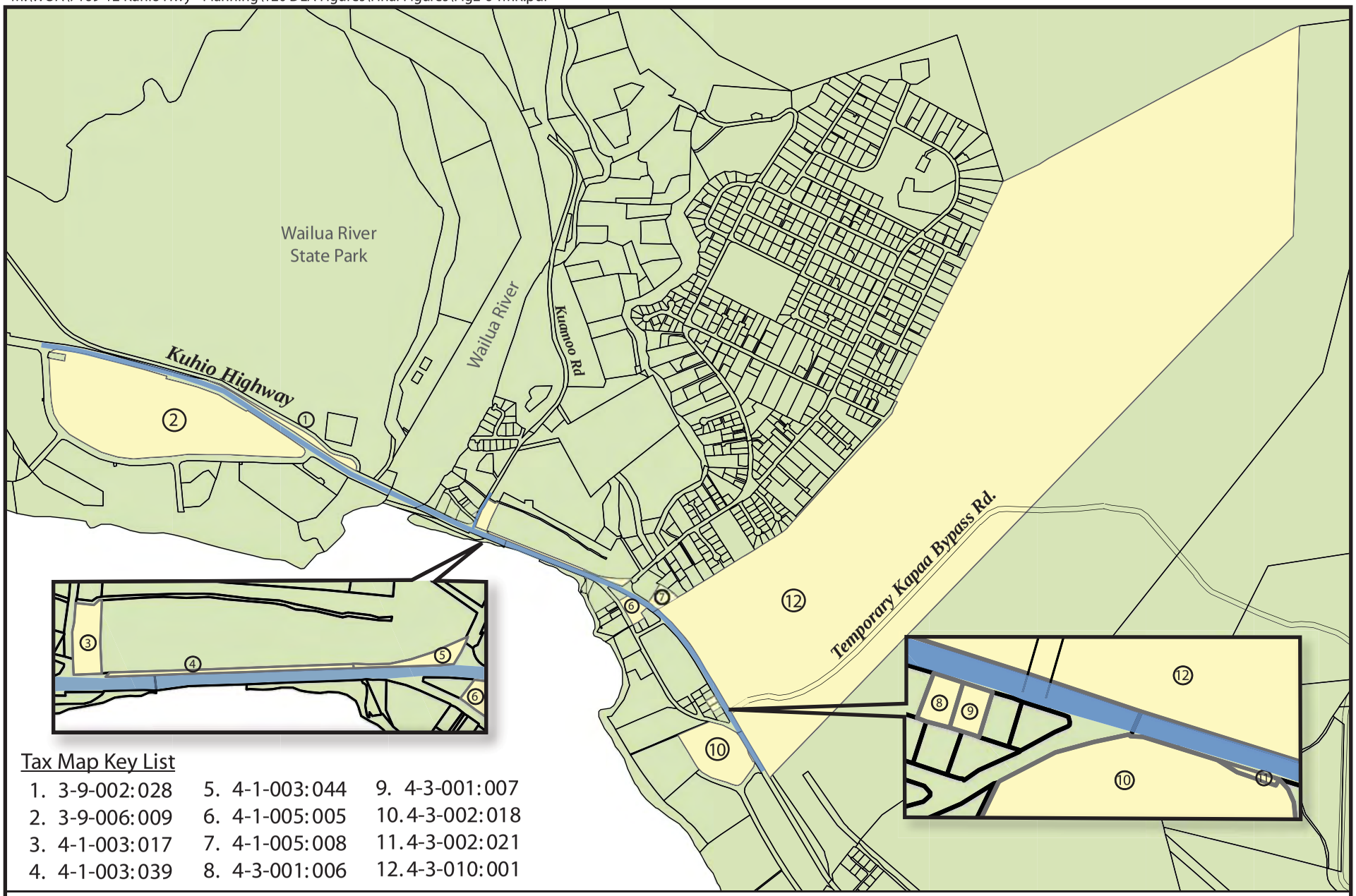

Tax Map Key List

1. 3-9-002:028
2. 3-9-006:009
3. 4-1-003:017
4. 4-1-003:039
5. 4-1-003:044
6. 4-1-005:005
7. 4-1-005:008
8. 4-3-001:006
9. 4-3-001:007
10. 4-3-002:018
11. 4-3-002:021
12. 4-3-010:001

LEGEND

- Property Affected by the Project and its TMK Number
- Proposed Project Corridor
- Other TMK Parcels in the Project Vicinity

0 375 750 1,500 2,250 3,000 Feet

FIGURE 2-6

PARCELS AFFECTED BY PROJECT

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Parcel 017 is a rectangular-shaped parcel located at the northern corner of the highway's intersection with Kuamoʻo Road next to the Coco Palms Resort property. This parcel totals 0.855 acres in size and a road easement is established along this property bordering the State DOT highway's right-of-way. Proposed highway widening and intersection improvements here would utilize a portion of this easement. In addition, an easement would be obtained for the relocation of existing overhead electrical lines underground in this area.

Parcel 039 consists of a strip of land totaling 0.492 acres. It was formerly used as a cane haul road routed along the mauka side of Kūhiō Highway. On February 10, 2006, the State Board of Land and Natural Resources approved a request from the State DOT to set aside this parcel for road-widening purposes planned under this project. Therefore, this parcel is now under the jurisdiction of the State DOT for use by the proposed project.

Parcels Needed for Utility Relocation Improvements

The relocation of existing overhead utilities associated with this project would predominantly occur within the existing State DOT right-of-way for Kūhiō Highway. However, areas of additional parcels of private and government owned property would be affected to accommodate manholes for electrical or other utility company equipment along with conduits for the utilities. Manholes would vary in size from about 70 square feet (7 feet by 10 feet) up to 400 square feet (20 feet by 20 feet).

Table 2.1 identified the properties that would be affected and easements needed from the property owners in favor of the utility companies. The areas of these properties affected would generally be located along the highway or County roadways. The largest manhole would be about 400 square feet in size situated within the State parcel (TMK 4-01-003: 017) at the intersection of Kūhiō Highway with Kuamoʻo Road. An electrical transformer vault is planned at the State-owned parcel (TMK 4-01-003: 044) leased to the County for their wastewater pump station at the intersection of Kūhiō Highway with Haleilio Road.

Manholes would be situated within property owned by the State DHHL identified as TMK 3-09-006: 009 and located at North Leho Drive near its intersection with the highway. A 15-foot-wide easement running adjacent to the State DOT highway right-of-way within this DHHL property from North Leho Drive southbound (to Līhuʻe) to the KIUC Lydgate Substation would also be required for the relocation of utility lines. Consultations between the State DOT and DHHL are occurring to address the terms and other details associated with executing this easement.

2.4. PROJECT NEED AND OBJECTIVES

The mission of the State DOT, Highways Division is to provide a safe, and efficient and accessible highway system for the public through the utilization of available resources in the maintenance, enhancement and support of land transportation facilities. As a result, the Kūhiō Highway Short-Term Improvements project was initiated by the State DOT to relieve existing

and future projected traffic congestion along Kūhiō Highway in the Wailuā community. This project is intended to provide short-term improvements to address existing traffic congestion along the project corridor. A long-term solution is being developed separately by the State DOT under the Kapaʻa Relief Route Project to address necessary regional improvements for East Kauaʻi from Hanamāʻulu to Kapaʻa. Further details on the need for planned improvements are provided in the following sections.

2.4.4. Background on Short-Term Improvements

This project was initiated in the Summer of 2005 as a joint effort between the State DOT, the County of Kauaʻi, and FHWA to address traffic congestion in the Wailuā community. The intent was to come up with solutions and improvements that can be implemented in a short timeframe. The State DOT was already working on the Kapaʻa Relief Route project to serve as a long-term solution to regional traffic conditions on East Kauaʻi. However, it would be several years before the environmental study is completed, and funding obtained for the project's design and construction would likely be in phases.

After subsequent agency coordination meetings, two short-term improvement projects were identified which were: 1) the Wailuā Cane Haul Bridge improvement and 2) the Kūhiō Highway widening project between the Temporary Kapaʻa Bypass Road and Kuamoʻo Road. Short-term projects were identified to be those that can be funded and completed within about 5 to 7 years. A public informational meeting was jointly held by the County of Kauaʻi and State DOT on February 16, 2006 at Kapaʻa Middle School to present the short-term improvements planned for Wailuā. Since then, the State DOT proceeded with the Wailuā Cane Haul Bridge project integrating the County's bike and pedestrian path into the plans, and completed an Environmental Assessment. The design phase has been completed, and construction of these bridge improvements is scheduled to start in July 2009.

The widening of the Kūhiō Highway project was also initiated by the State DOT and was being coordinated with the Wailuā Cane Haul Bridge plans. Design plans were developed for the widening improvements and a Special Management Area Use Permit from the County Planning Commission was obtained on September 11, 2007. Construction of the highway widening improvements were planned to begin in late 2008 and were to be coordinated with the construction of the Wailuā Cane Haul Bridge improvement to minimize traffic disruptions for residents and the public from construction activities.

However, during consultation with the USFWS on these highway improvements under Section 7 of the ESA, concerns were raised regarding the effects on endangered seabirds from the existing overhead utility lines along the project corridor. These existing overhead utility lines included electrical, cable, and telephone lines on wooden poles, and certain seabirds have been downed after becoming entangled in these utility lines. The utility poles and associated overhead lines were planned to be relocated further inland (mauka) to accommodate the addition of a second southbound through lane on the highway.

The State DOT thus conducted further consultations with the USFWS and utility companies to address the project's effects. Discussions with utility companies focused on the feasibility of relocating overhead utility lines underground, determining the costs, negotiating cost sharing with the State DOT, and finally establishing agreements. Therefore, the project has been delayed while these negotiations have been developed. The project is now moving forward by incorporating the relocation of overhead utility lines underground within the highway project corridor and extending the relocation further south to the KIUC Lydgate Substation as part of mitigative measures.

2.4.5. Need for Highway Improvements

The need to provide improvements to Kūhiō Highway within the Wailuā area can be categorized into the following main reasons which are discussed in greater detail.

1. Address existing traffic congestion occurring along Kūhiō Highway.
2. Address projected increases in traffic volumes along Kūhiō Highway due to future growth in population, employment, and visitors to the region.
3. Increase safety along the project corridor for pedestrians, joggers, and bicyclists.

Existing Congestion Along Corridor

Traffic analysis was conducted of study intersections based upon the existing traffic count data taken in January 2009. A copy of a traffic assessment report is included in the Appendix C. Analysis results are expressed based upon the concept of Level-of-Service (LOS) which is a quantitative and qualitative assessment of traffic operations. Levels of service are defined by LOS "A" through "F" with LOS "A" representing ideal or free-flow traffic operating conditions and LOS "F" unacceptable or potentially congested traffic operating conditions.

Traffic operations along Kūhiō Highway are currently congested through Kapaʻa and Wailuā with extensive queuing occurring along the highway during the afternoon peak period. This project corridor experiences heavy traffic volumes due to the commuter travel to and from the Līhuʻe district during the peak periods. Visitor travel within this region and through this corridor also contributes to increased traffic. Kūhiō Highway has two northbound lanes but only one southbound lane within the project area which restricts the volume of vehicles able to travel through this corridor. As a result, the current volumes of vehicles traveling along this highway corridor during the weekday morning and afternoon commuter periods have historically been heavy resulting in increased travel delays and a lower level-of-service.

A summary of existing operating conditions at three major intersections situated along the widening project corridor is discussed. These conditions document the existing congestion and queuing of vehicles along this corridor (see Exhibit 2-6). It should be noted that these results are based upon traffic counts taken in January 2009 during a period of lower economic and tourism activity Statewide. Thus, present traffic conditions are not as congested as it has typically been compared to a few years ago. Further discussion of existing operating conditions from the traffic assessment study is provided in Chapter 4 of this document.

Exhibit 2-6 – Southbound View of Kūhiō Highway Near Temporary Kapaʻa Bypass Road Intersection

1. Kūhiō Highway with Kuamoʻo Road
   - Traffic queues formed periodically along the highway with the most significant queuing occurring on the southbound approach during the afternoon peak period.
   - Average queue lengths of 12 to 15 vehicles were observed in the through lane of this approach during this peak period. However, these queues would clear the intersection after each traffic signal cycle change.
2. Kūhiō Highway with Haleilio Road
   - Traffic queues formed periodically on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the afternoon peak period.
   - These traffic queues extended through the highway's intersections with Lanikai Street, the Temporary Kapaʻa Bypass Road, and Papaloa Road (North).
3. Kūhiō Highway with Temporary Kapaʻa Bypass Road
   - Southbound traffic queues along the highway extended through this intersection northbound past the Papaloa Road (North) intersection during the afternoon peak period.
   - This southbound traffic queues began further south of this intersection near Haleilio Road.
   - Southbound queues along the highway further impeded vehicles trying to make right-turns from the Temporary Kapaʻa Bypass Road onto the highway resulting in queuing along that roadway.

Future Increased Congestion Along Corridor

Future increases in traffic volumes along Kūhiō Highway through the Wailuā-Kapaʻa corridor as well as through East Kauaʻi are anticipated due to the probable growth in resident population, employment, and visitors. Along the project corridor, additional future traffic volumes are also anticipated from construction completion of The Courtyards at Waipouli which is an 82-unit County affordable housing project. Without capacity enhancements, existing traffic conditions along the highway corridor will continue to deteriorate causing longer queues of vehicles and traffic delays for drivers.

The Kauaʻi Long-Range Land Transportation Plan (KLRLTP), prepared for the State DOT (ATA, May 1997), serves as a guide for the development of the major surface transportation facilities and programs to be implemented on Kauaʻi. Information from the KLRLTP was utilized to project future traffic increases along Kūhiō Highway in the project corridor. Based upon statewide population, employment, and visitor forecasts to the Year 2020, the KLRLTP estimated that the average daily traffic along Kūhiō Highway would increase at an average rate of approximately 1.6 percent and 2.1 percent per year during the morning and afternoon peak periods, respectively. Using these average annual growth rates, traffic volumes along Kūhiō Highway in the project corridor would increase by over 44 percent and 61 percent during the morning and afternoon peak hours, respectively by the year 2032 (20 years after anticipated completion of project in 2012).

With this growth, traffic operations along Kūhiō Highway are expected to deteriorate under Year 2032 conditions due to the anticipated growth in ambient traffic. The critical movements at the highway's intersection with Kuamoʻo Road are expected to operate at LOS "F" during the morning peak period and LOS "E" during the afternoon peak period. Critical movements at the intersection with Haleilio Road are expected to operate at LOS "E" during the morning peak period and LOS "F" during the afternoon peak period. Critical movements at the intersection with the Temporary Kapaʻa Bypass Road are expected to operate at LOS "F" during both peak periods. Queuing of vehicles along the highway are also expected to worsen given those traffic conditions further contributing to traffic delays driving through the corridor.

Increase Highway Safety Along Corridor

Highway improvements are also planned to improve highway safety along this project corridor. Improvements to traffic flow and intersection operating conditions are needed to reduce congestion and provide safer roadway conditions for drivers. Improved conditions are needed to reduce the potential for traffic accidents and injury to motorists along with pedestrians, joggers, and bicyclists in the area. Eliminating several existing utility poles along the highway corridor would also reduce potential accidents from cars hitting these poles.

2.4.6. Need for Underground Relocation of Utilities

The USFWS expressed concerns with the three pelagic seabird species within the project corridor particularly near Wailuā River: 1) Newell's Shearwater (*Puffinus auricularis newelli*); 2) Hawaiian Petrel (*Pterodroma sandwichensis*); and 3) Band-rumped Storm-Petrel (*Oceanodroma castro*).

Both private and government entities own or operate overhead utilities within the corridor. These companies include the KIUC, Hawaiian Telcom (HT), Oceanic Time Warner Cable (TV) and the State DOT. KIUC currently operates and maintains three separate electrical systems within the project corridor consisting of a 57 kV transmission system, a 12 kV customer distribution system, and a street lighting system. KIUC's electrical systems are all located overhead along existing poles within the project corridor.

The existing vertical configurations of the overhead utility systems consist of HT, TV, and State DOT located between 15 and 20 feet above ground. Electrical distribution lines are located approximately 24 and 35 feet above ground, and the electrical transmission lines are located approximately 46 to 60 feet above ground level. See Exhibit 2-7 showing existing lines and poles near Wailuā River.

Exhibit 2-7 – Northbound View of Existing Overhead Utility Lines and Poles Along Kūhiō Highway

The principal potential threats primarily to the Newell's Shearwater and Hawaiian Petrel are the street lights, business lighting, and the 17 separate utility wires and associated poles that run the length of the project corridor in various configurations and numbers. The threats posed by these structures and outdoor lighting are associated with birds being downed after becoming disoriented by outdoor lighting and possibly colliding with above ground utility structures, and other man-made structures. Thus, existing overhead utilities lines within the project corridor are being relocated underground as part of mitigative measures associated with this project.

2.4.7. Project Objectives

The project objective is to provide some highway improvements to alleviate existing and future traffic congestion along Kūhiō Highway between the Temporary Kapaʻa Bypass Road and Kuamoʻo Road in the short-term. This project is planned to be implemented in the late Fall of 2009 with construction being completed by 2012. With construction funding for this project secured, the improvements can be implemented in a short time period to address traffic conditions within the corridor.

The project would provide short-term improvements to traffic conditions while a more permanent solution is being addressed in the State DOT's Kapaʻa Relief Route Project that is still in the planning stages. As a result, it would be a few more years before the planning work is completed for this regional solution, and several years after that before construction is able to start pending availability of funds.

The widening of Kūhiō Highway to add a second southbound lane would provide more highway capacity for vehicles traveling through this corridor. Because there is presently only one southbound lane, the flow of vehicles is restricted causing traffic congestion and queues which are particularly congested during the afternoon peak commuter period. Other intersection and highway improvements planned would thereby improve the operations and efficiency of traffic through this corridor over present conditions. The project improvements should also address future projected traffic conditions within the near future while a permanent long-term regional solution is developed. The project would also improve highway safety along the corridor.

Mitigative measures incorporated into this project consisting of relocating existing overhead utility lines underground would address issues within the project corridor associated with the previously identified seabird species. These actions will significantly reduce the existing threats to these listed seabird species, and represents a significant minimization of existing threats to these species from those currently found within the State DOT right-of-way.

Relocating overhead utility lines and removing their poles would also improve existing views along this highway corridor. Improvements to the view corridor would provide aesthetic benefits for both residents and visitors to the island. Removing utility poles also increases safety along the highway since there is less chance for vehicles hitting such structures. The highway improvements and relocation of overhead utility lines support the mission of the State DOT to provide a safe, efficient, and accessible highway system.

2.5. DESCRIPTION OF IMPROVEMENTS

The project consists of constructing the following three main areas of improvements identified below. The widening and relocation of overhead utility lines improvements affect a total 1.70-mile section of Kūhiō Highway from its intersection with South Leho Drive northward to the area of its intersection with the Temporary Kapaʻa Bypass Road (including Kuamoʻo Road improvements). Figures 2-7 to 2-11 show the general roadway plans for these improvements.

1. Widen Kūhiō Highway from the Temporary Kapaʻa Bypass Road to Kuamoʻo Road.
2. Extend the right-turn storage lane along Kuamoʻo Road.
3. Relocate various existing overhead utility lines underground from South Leho Drive to the Temporary Kapaʻa Bypass Road.

2.5.1. Widening of Kūhiō Highway

The widening improvements associated with Kūhiō Highway will involve: 1) adding a second southbound through lane; 2) implementing various intersection improvements along the highway and synchronizing the timing of signalized intersections within this project corridor; and 3) constructing accessory improvements associated with the widening.

Highway Widening Improvements

Kūhiō Highway will be widened to add a second southbound through lane from the Temporary Kapaʻa Bypass Road southbound (toward Līhuʻe) to Kuamoʻo Road. The length of this widening is about 3,400 linear feet or 0.64 miles. Adding a second southbound travel lane will then create a total of four (4) lanes for Kūhiō Highway comprised of two northbound and two southbound lanes.

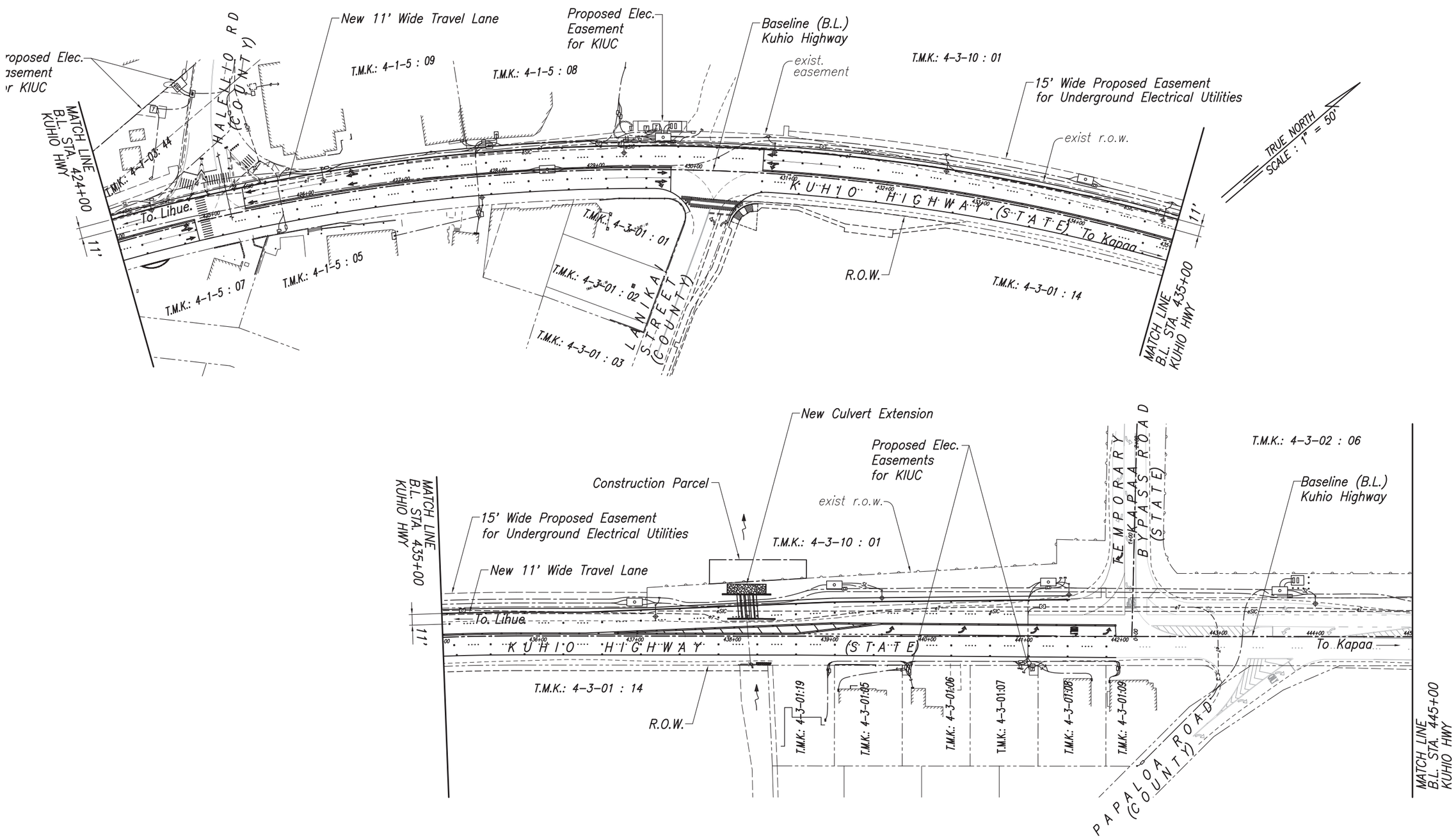
The widening of Kūhiō Highway will be constructed within the State DOT's existing right-of-way which is predominantly 60 feet wide. This right-of-way increases up to about 130 feet near the Temporary Kapaʻa Bypass Road, and up to about 77 feet near Kuamoʻo Road. Some easements would be obtained for certain accessory highway improvements and utilities needed outside the State right-of-way.

All the highway travel lanes would be designed to be 11 feet wide. As a result, portions of the existing highway pavement would be modified and restriped to provide these lane widths. Paved shoulders would be provided on both sides of the highway generally varying from about 5 to 6 feet in width. Along the makai (southern) side of the highway, the shoulder would increase to about 10.5 feet on the northern end of the corridor. Figure 2-12 shows some typical roadway sections planned for the highway.

Intersection Improvements

As part of the Kūhiō Highway widening, existing intersections along the project corridor would be modified to improve operating conditions and traffic flow. The intersections along the highway include: 1) Temporary Kapaʻa Bypass Road; 2) Lanikai Street; 3) Haleilio Road; 4) Papaloa Road; and 5) Kuamoʻo Road.

1. Temporary Kapaʻa Bypass Road Intersection. Figure 2-13 graphically shows the proposed improvements.
    a. The existing northbound left-turn storage lane on the highway would be increased from about 240 feet to 330 feet including taper. This would provide increased storage capacity for vehicles turning left onto the Temporary Kapaʻa Bypass Road.



GRAPHIC SCALE:

50 25 0 50 100

FIGURE 2-7

GENERAL ROADWAY PLAN - SECTION 1

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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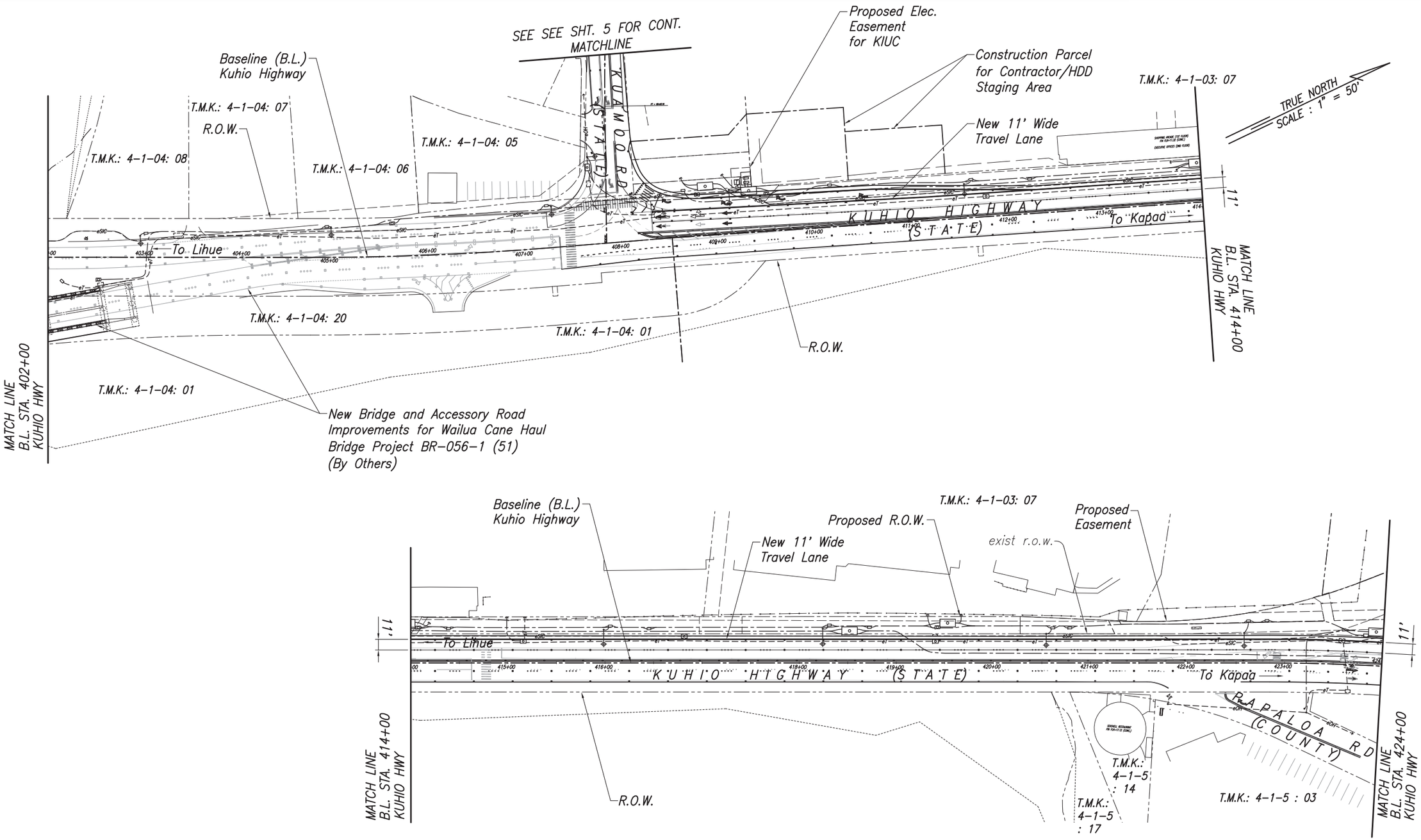

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FIGURE 2-8

GENERAL ROADWAY PLAN - SECTION 2

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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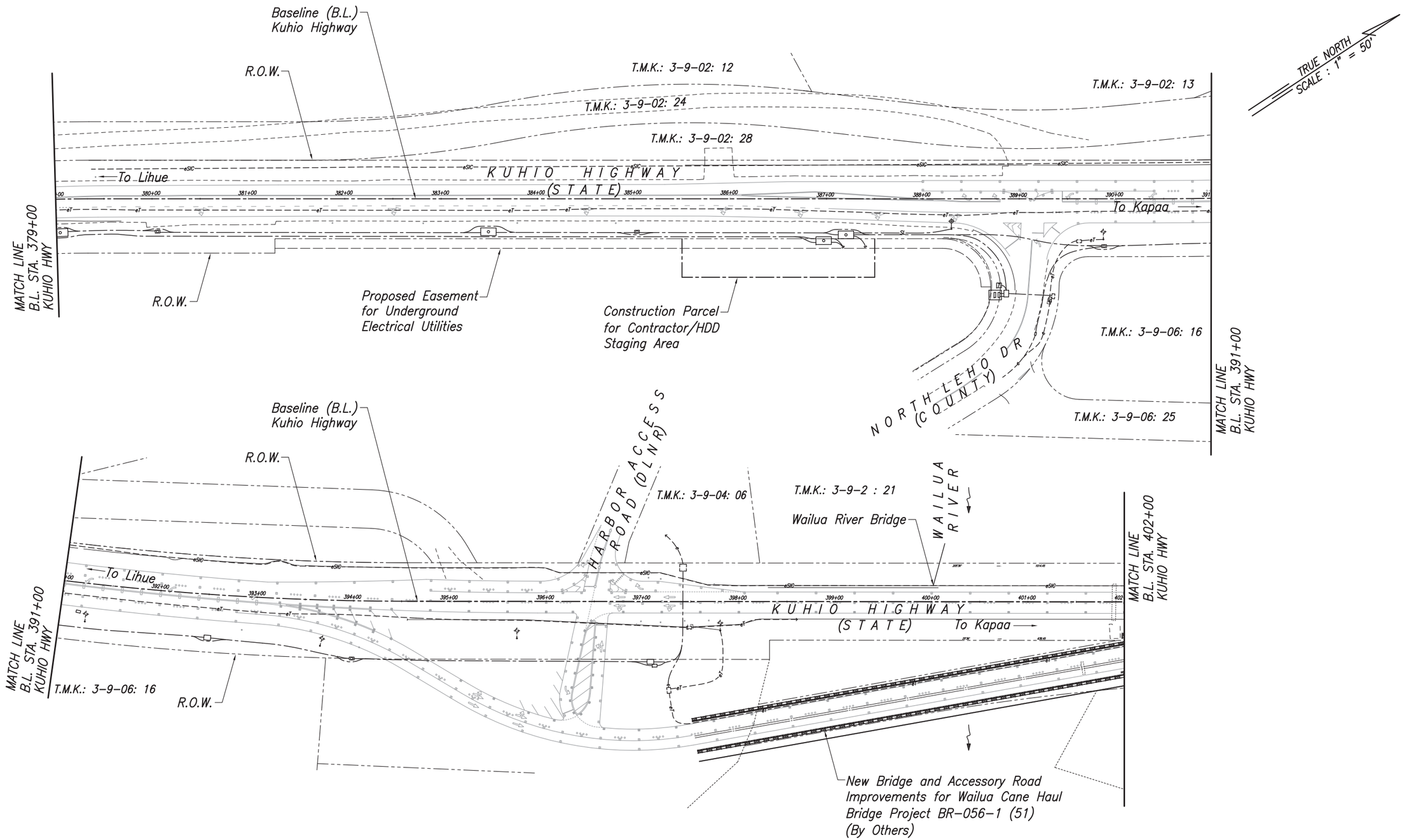

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FIGURE 2-9

GENERAL ROADWAY PLAN - SECTION 3

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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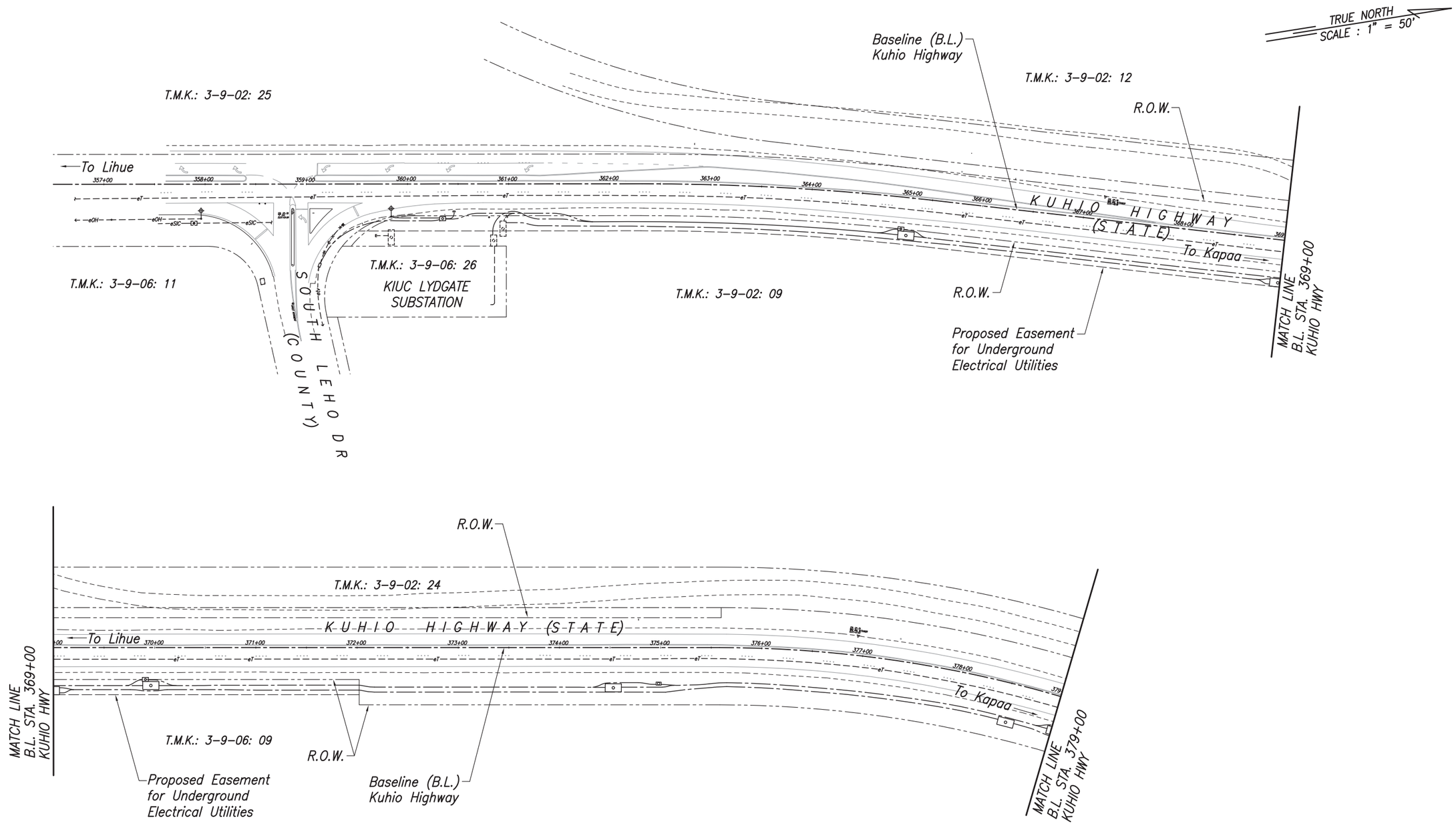

GRAPHIC SCALE:

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FIGURE 2-10

GENERAL ROADWAY PLAN - SECTION 4

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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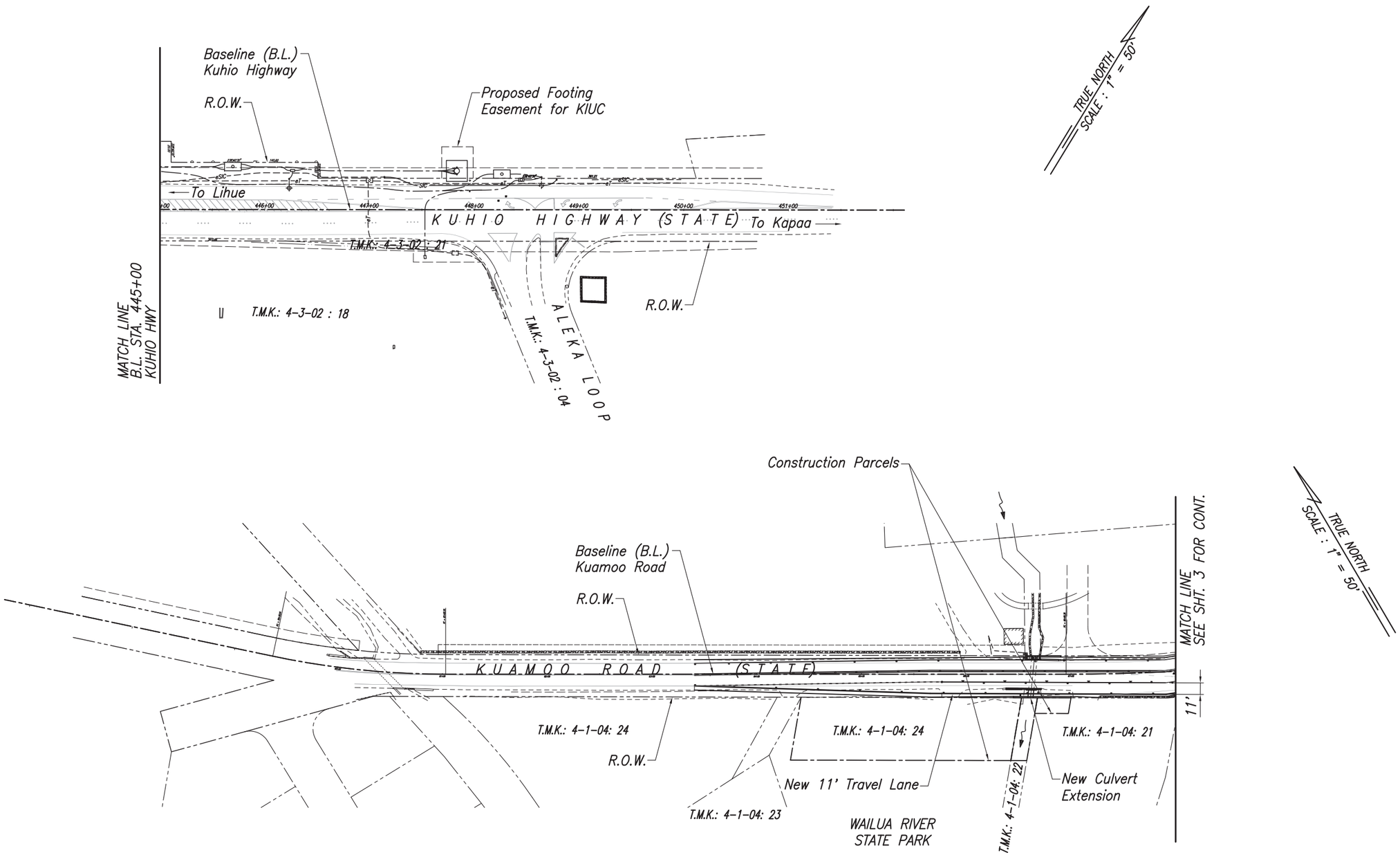

GRAPHIC SCALE:

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Scale: 1"=50'

FIGURE 2-11
GENERAL ROADWAY PLAN - SECTION 5

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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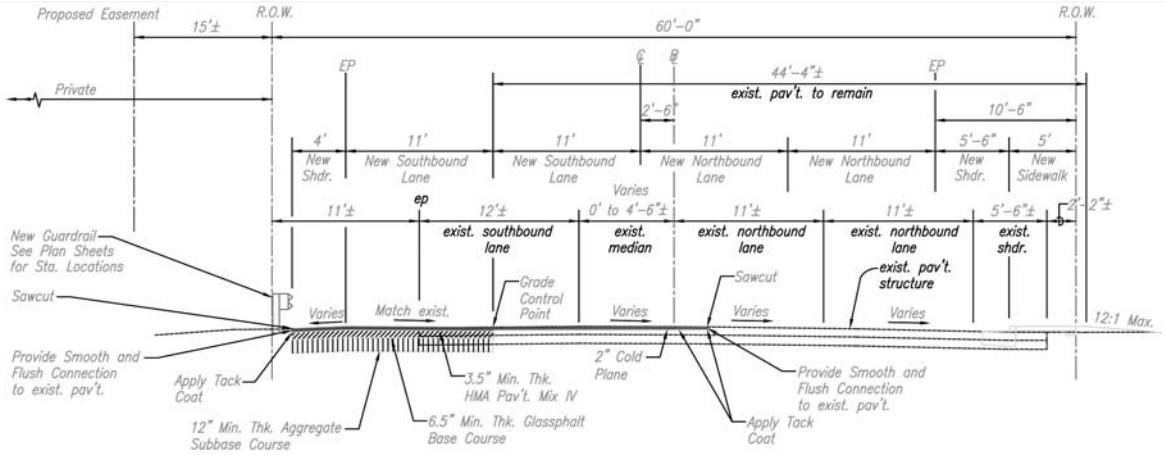
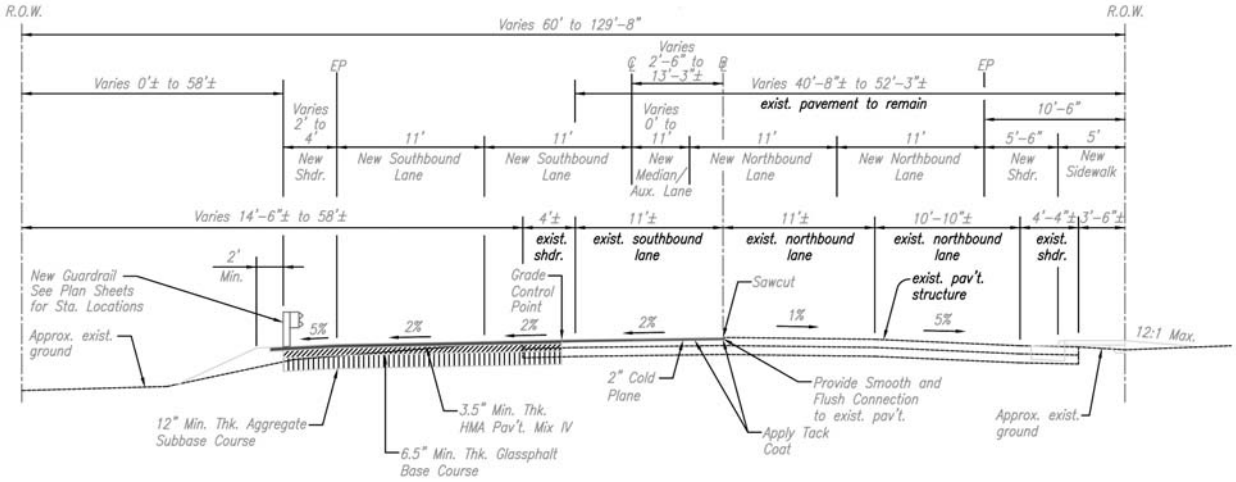
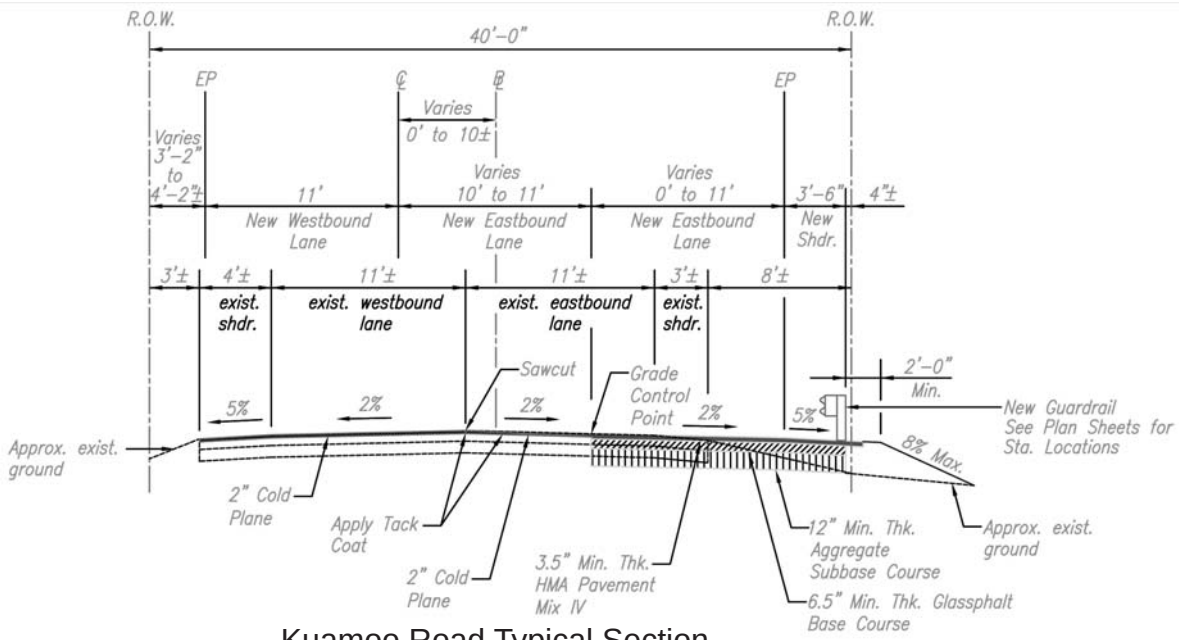


Kuhio Highway Typical Section (60' ROW)



Kuhio Highway Typical Section (60'-130' ROW)



Kuamoo Road Typical Section

FIGURE 2-12

TYPICAL ROADWAY SECTIONS

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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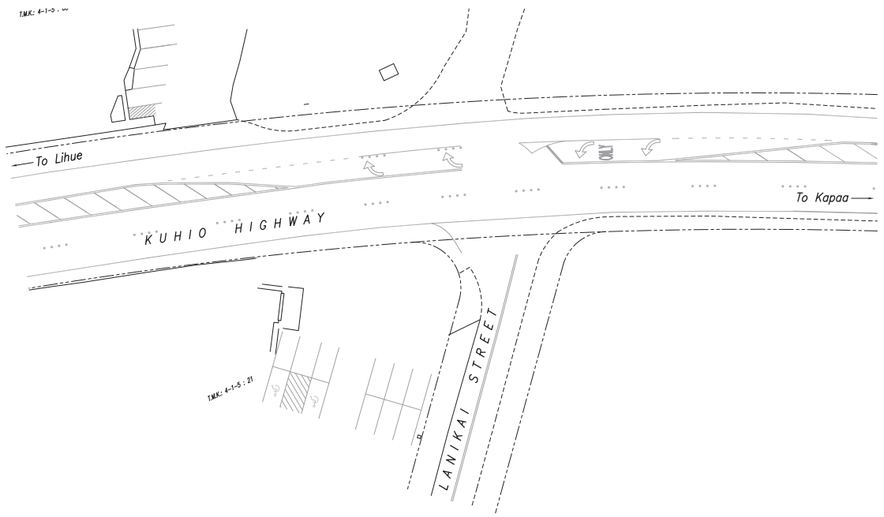
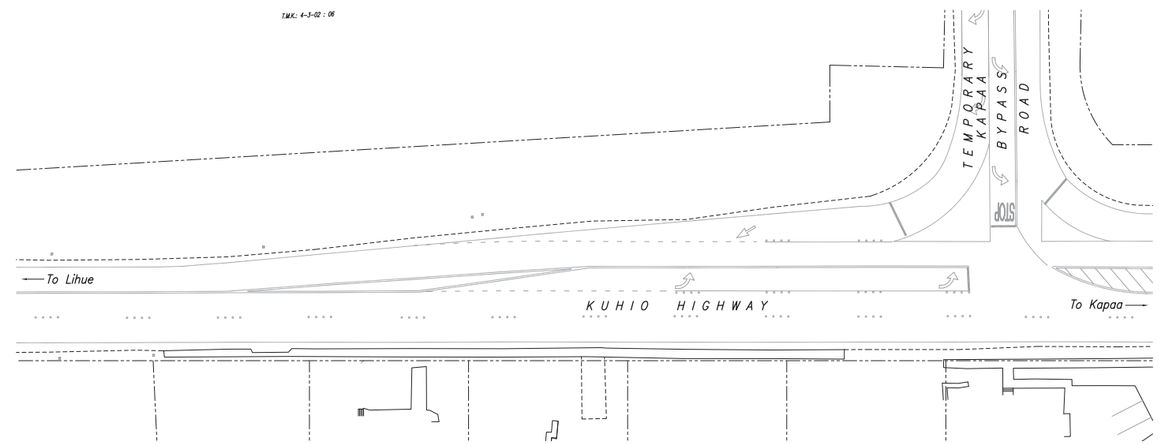
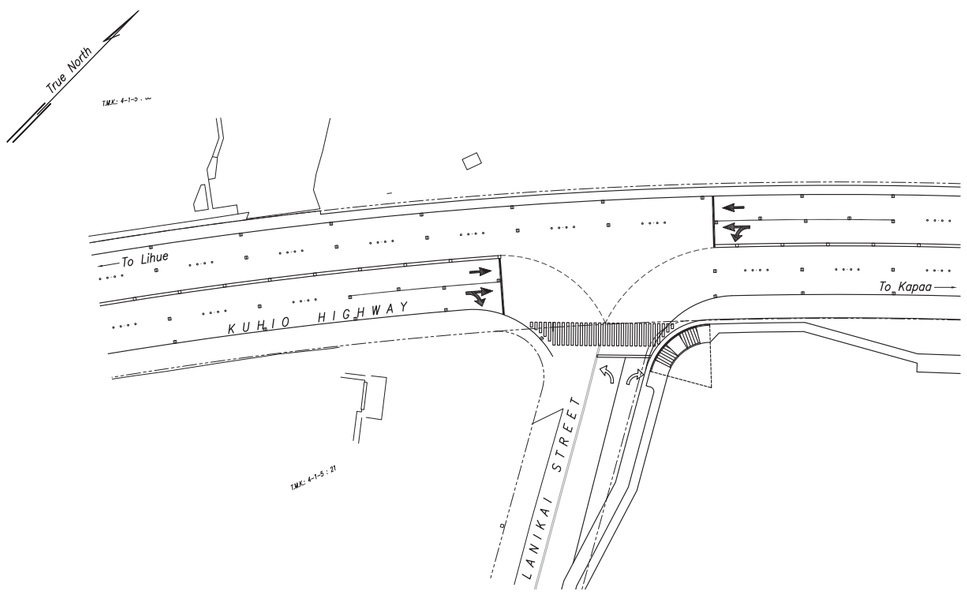


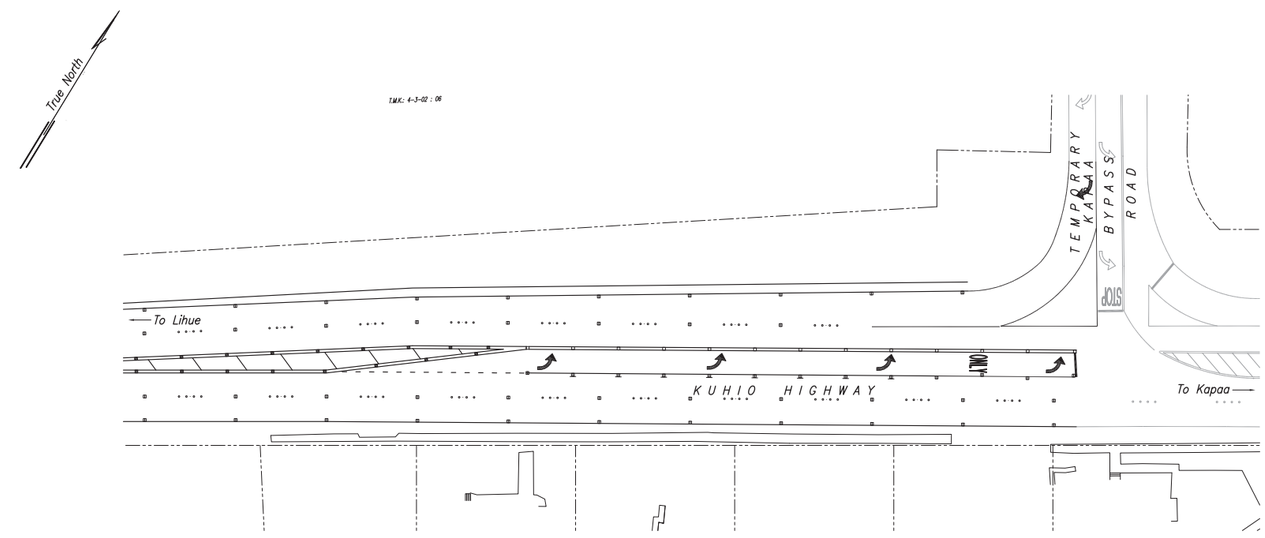
EXISTING LANIKAI STREET INTERSECTION



EXISTING TEMPORARY KAPAA BYPASS ROAD INTERSECTION



PROPOSED LANIKAI STREET INTERSECTION



PROPOSED TEMPORARY KAPAA BYPASS ROAD INTERSECTION

GRAPHIC SCALE:
40' 20' 0 40' 80'

FIGURE 2-13
INTERSECTION IMPROVEMENTS - TEMPORARY KAPAA BYPASS ROAD AND LANIKAI STREET

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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b. The existing right-turn acceleration lane from the Temporary Kapaʻa Bypass Road will now become the second southbound travel lane on the highway. As a result, this acceleration lane which presently merges into the one southbound lane along the highway would be eliminated. Vehicles turning from the Temporary Kapaʻa Bypass Road would be able to freely flow onto the highway's second southbound travel lane.

2. Lanikai Street Intersection. Figure 2-13 graphically shows the proposed improvements.
   a. This intersection would be signalized.
   b. The short southbound left-turn storage lane on the highway would be eliminated. Left-turns into Lanikai Street from one of the two southbound through lanes would be permitted, and the traffic signal would also provide a protected left-turn phase for cars.
   c. Lanikai Street would have separate left-turn and right-turn lanes at this intersection. Presently, there is only one lane on this street for both movements. This would allow cars to make right-turns onto the highway during the red light phase at the intersection.

3. Haleilio Road Intersection. Figure 2-14 graphically shows the proposed improvements.
   a. The existing northbound left-storage lane would be eliminated to accommodate the second southbound through lane along the highway because there is not enough right-of-way. Left-turns would still be permitted from a shared left-turn and through northbound lane on the highway. The traffic signal would provide a protected left-turn phase for cars turning onto Haleilio Road.
   b. Minor modifications (ex. cross walks) would be needed at the Haleilio Road portion of the intersection to accommodate the second southbound through lane.

4. Papaloa Road (South) Intersection. Figure 2-14 graphically shows the proposed improvements.
   a. Left-turns from the highway (southbound) onto Papaloa Road would be eliminated. Signage would be provided for motorists informing of no left-turns allowed. Eliminating this left-turn would remove traffic delays and conflicts through this area.
   b. Left-turns from Papaloa Road onto Kūhiō Highway would be eliminated. This road would only allow right-turns onto the highway to proceed northbound. Eliminating this left-turn from Papaloa Road would remove traffic delays and conflicts in this area.
   c. Vehicles needing to access Papaloa Road from the highway (southbound) on would be able to do so from the newly signalized Lanikai Street located further north.

5. Kuamoʻo Road Intersection. Figure 2-15 graphically shows the proposed improvements.
   a. A separate right-turn deceleration lane will be provided for southbound vehicles on the highway turning onto Kuamoʻo Road. This deceleration lane would be about 300 feet long with taper.
   b. Other minor modifications would be provided to incorporate the second southbound lane (ex. restriping the median).

The intersections of Kuamoʻo Road, Haleilio Road, and Lanikai Street along Kūhiō Highway will be synchronized to optimize traffic flow through this corridor. Traffic synchronization of signalized intersections helps improve mobility on congested local highways and streets and would be an innovative and low-cost operational improvement included as part of this project. The goal is to allow cars to move through the corridor with the fewest stops at intersections, while minimizing delay for the side street. Traffic signals along the route would be upgraded to keep them synchronized, vehicle detectors will be placed in the pavement to detect the presence of vehicles, the timing of the signals between successive intersections coordinated, and traffic signals would automatically adjust to facilitate the movement of vehicles through the intersections.

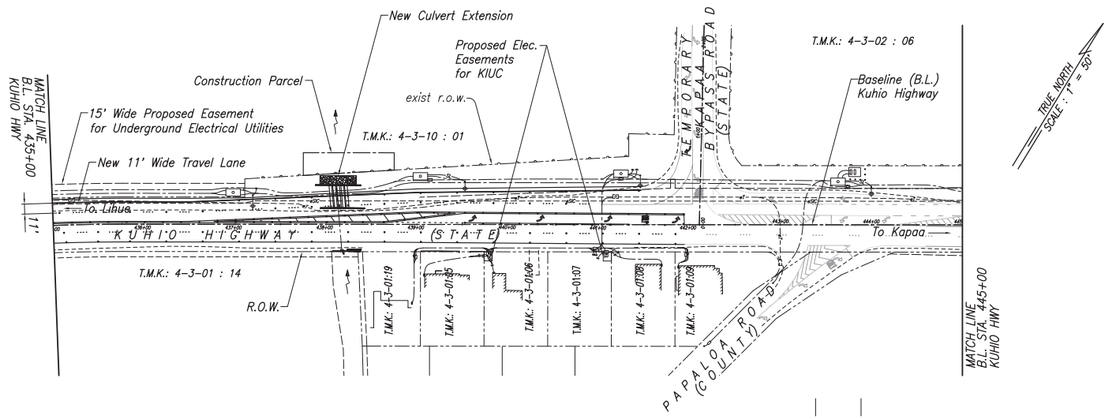
Accessory Improvements

Accessory improvements associated with the widening of the highway are also planned to be constructed. An existing drainage culvert along the highway would be extended inland (mauka) within the existing State DOT right-of-way to accommodate the additional southbound lane. The drainage culvert is currently located under Kūhiō Highway about 400 feet south of the Temporary Kapaʻa Bypass Road, and has four 36-inch drainage pipes.

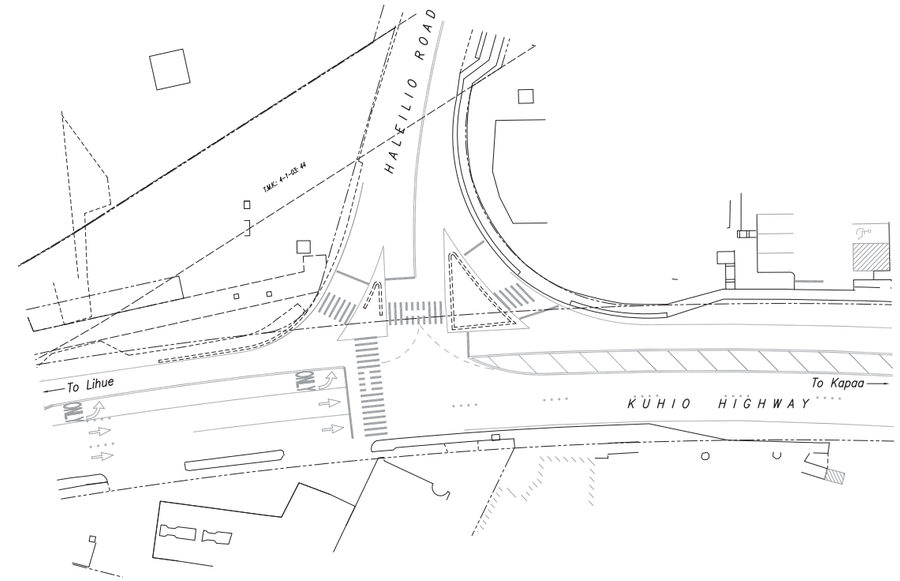
Other accessory improvements would include new or modified signage along the highway, relocation of existing guardrails, adjustments to existing utilities (ex. manholes), and re-striping the highway. A new sidewalk would also be provided on the makai (seaward) side of the highway generally starting about 200 feet north of Lanikai Street and proceeding northbound to connect up to an existing sidewalk from residences along the highway.

2.5.2. Kuamoʻo Road Improvements

Kuamoʻo Road would be improved by extending the existing right-turn storage lane further inland to provide more storage capacity for cars making right-turns onto the highway to travel southbound towards Līhuʻe. Starting from its intersection with Kūhiō Highway, this right-turn storage lane would be improved to extend it up to a total length of about 650 feet inland (mauka) including the taper. This existing storage lane is about 350 feet with taper from the intersection with the highway. Figure 2-11 showed the general plan for this Kuamoʻo Road improvement.



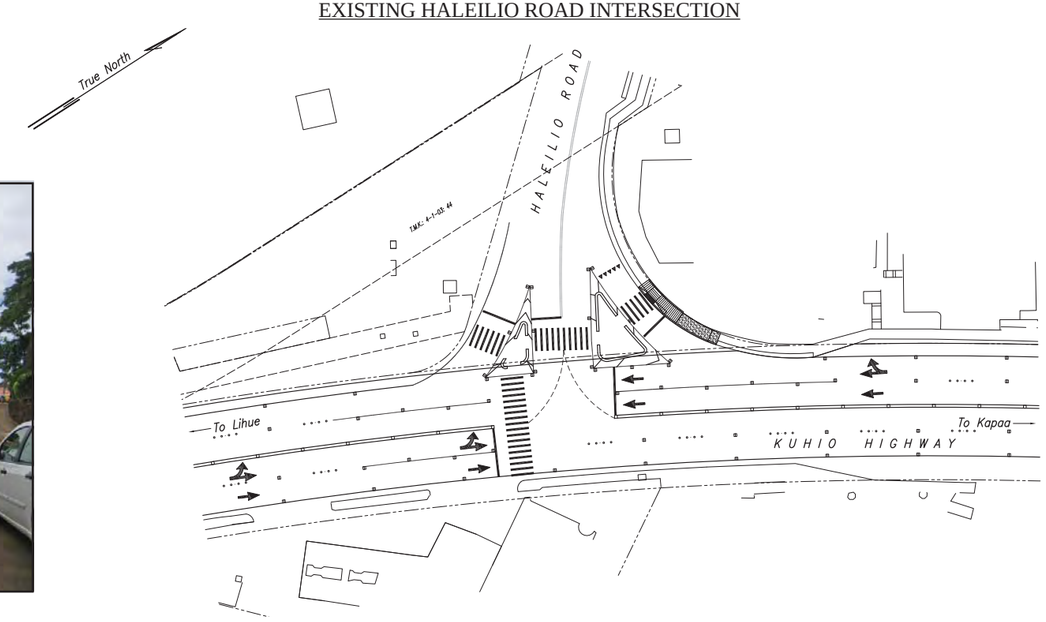
PAPALOA ROAD INTERSECTION



EXISTING HALEILIO ROAD INTERSECTION

View of Papaloa Road

View of Haleilio Road



PROPOSED HALEILIO ROAD INTERSECTION

GRAPHIC SCALE:
40' 20' 0 40' 80'

FIGURE 2-14
INTERSECTION IMPROVEMENTS - HALEILIO ROAD AND PAPALOA ROAD

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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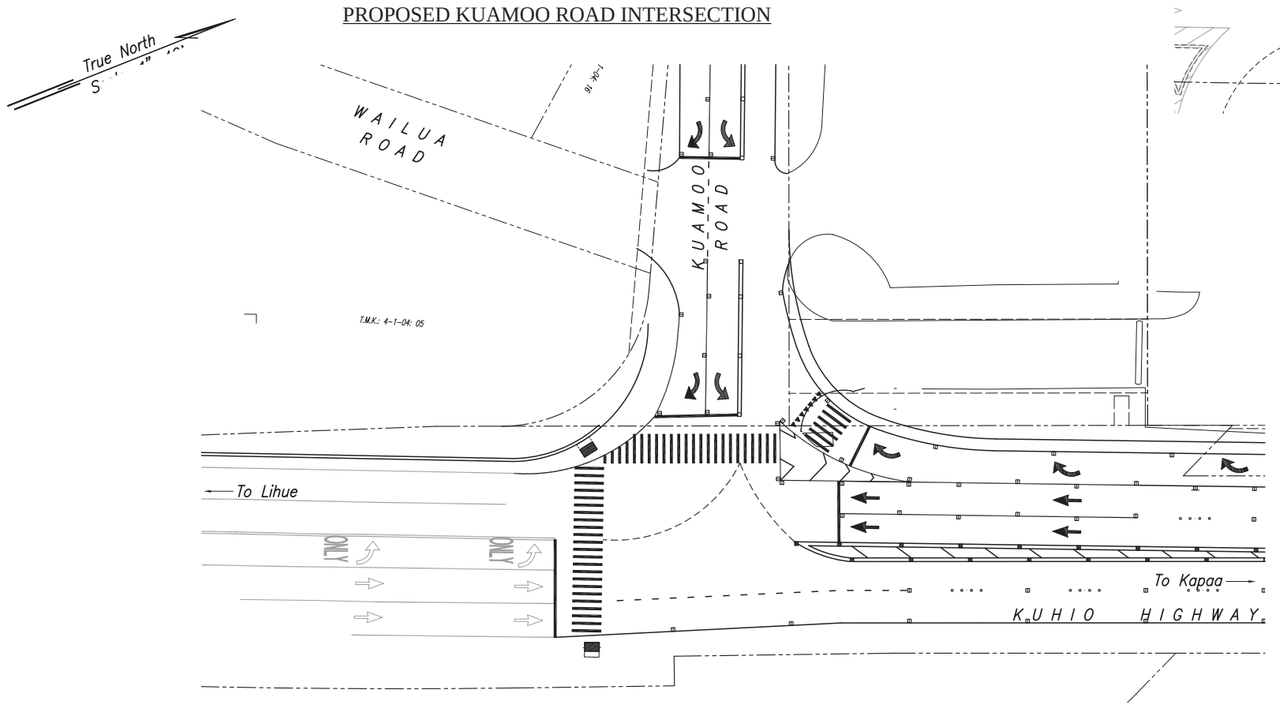
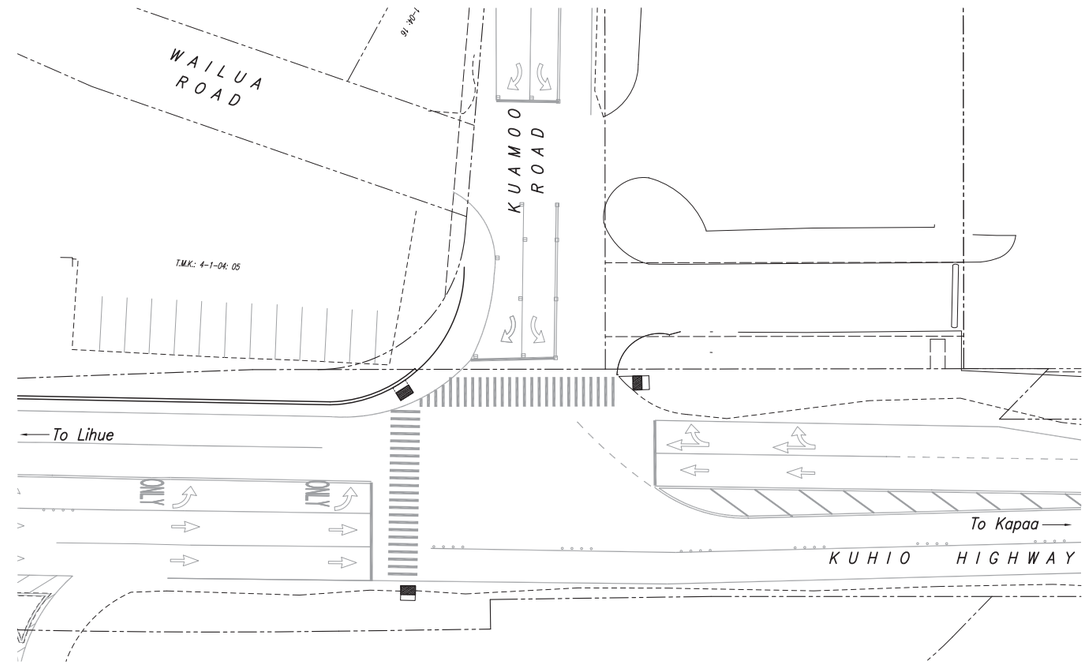
Eastbound View on Kuamoo Road

PROPOSED KUAMOO ROAD INTERSECTION





EXISTING KUAMOO ROAD INTERSECTION

Northbound View on Kuhio Highway

GRAPHIC SCALE:
40' 20' 0 40' 80'
SCALE: 1" = 40'

FIGURE 2-15
INTERSECTION IMPROVEMENTS - KUAMOO ROAD

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Kuamoʻo Road is constructed on fill material and is presently elevated above the surrounding adjacent properties. Extending the right-turn storage lane would involve utilizing the existing shoulder area and property within the State DOT right-of-way. The makai bound lane of Kuamoʻo Road would also be repaved as part of this project. Some portions of the roadway would require fill material to allow construction of the storage lane.

Accessory improvements associated with Kuamoʻo Road include: 1) extending an existing drainage culvert along Kuamoʻo Road to accommodate the storage lane extension, 2) relocating existing guardrails and signage affected, and 3) adjusting existing driveways along Kuamoʻo Road that provide access into two State parcels affected. The driveways affected are to Wailuā River State Park (TMK 4-1-004: 024) and to a few retail shops located on a parcel (TMK 4-01-004: 021).

At Wailuā River State Park, the storage lane extension would require modifying a portion of the roadway shoulder within the State DOT right-of-way and adjacent to the Park. Based upon coordination with the State Department of Land and Natural Resources (DLNR) State Parks Division, the park property will be adjusted to match into the roadway shoulder slope. State DOT would also remove several existing coconut trees within the park, many of which are old and were planned for removal by the State Parks Division and a certified arborist. The State DOT will replace each removed coconut tree with a new 10- to 12-foot-tall coconut tree, re-grassed, the repave the park driveway, and the replace the park sign.

2.5.3. Relocation of Overhead Utility Lines

The State DOT is planning to relocate existing overhead utility lines underground as part of this widening project to mitigate effects on endangered and threatened sea birds. Existing electrical, telephone, and cable overhead lines along the highway from the area of the Temporary Kapaʻa Bypass Road southbound down to Kuamoʻo Road would be relocated underground as part of widening improvements. From Kuamoʻo Road, existing overhead electrical, telephone, and cable lines along the highway would also be relocated up to KIUC's Lydgate Substation situated at South Leho Drive. Figures 2-7 to 2-11 previously showed these improvements.

This relocation of overhead utilities would occur over a total length of about 8,200 linear feet or 1.55 miles. Of this total, about 3,400 feet (0.64 miles) would occur as part of the highway widening improvements. The remaining approximately 4,800 linear feet (0.91 miles) would only involve relocating the overhead utility lines. The existing wooden utility poles serving these overhead lines would be removed, however, existing poles used for street lighting along the highway would remain. From the Temporary Kapaʻa Bypass Road southbound to Kuamoʻo Road, relocated utility lines would be routed along the mauka (inland) side of the highway. The utility lines would be located either within the State DOT right-of-way or within a 15-foot-wide easement obtained from affected landowners.

From Kuamoʻo Road, the electrical lines would be relocated underground within the State DOT right-of-way and would be routed under the Wailuā River using horizontal directional drilling (HDD) construction. Electrical lines would be placed about 60 to 80 feet below the surface crossing under the Wailuā River. The HDD construction of electrical lines would then continue up to an area situated at the southern corner of Kūhiō Highway with North Leho Drive. Telephone and cable lines would be attached to the new Wailua Cane Haul Bridge being constructed from the north bank of Wailuā River to the south bank.

From the corner of North Leho Drive, electrical, telephone, and cable utility lines would be placed underground and routed southbound along the highway to KIUC's Lydgate Substation. These utilities are planned to be located on the makai (seaward) side of the highway within a 15-foot-wide easement on a parcel of land owned by the State DHHL as previously discussed in Section 2.3.

2.5.4. Construction Schedule and Cost Estimates

Construction of the project is planned to commence once this environmental document is completed, other environmental clearances are obtained, and ministerial permits obtained. Design work for this project is in progress and construction plans are being developed for final approval by pertinent government agencies in the Fall of 2009. The State DOT is planning to bid the construction of this project this year in the Fall of 2009 with construction planned to commence shortly thereafter.

Completion of the highway widening improvements are planned to take about 18 to 24 months and be completed in the year 2012. The installation of support infrastructure (ex. ducts, manholes, etc.) for placing utility lines underground would also be constructed during this timeframe. However, the utility companies would be responsible for actually installing their utility lines within this infrastructure. It is anticipated this installation of utility lines would be completed in the year 2012.

The proposed project is being partially funded by federal funds administered by the Federal Highways Administration and by the State of Hawaii funds for its construction. The estimated construction costs for highway widening, utilities relocation, and accessory improvements is about $25.0 million. Federal funds made available through the American Recovery and Reinvestment Act, also referred to as Federal Stimulus funds, will also be used for constructing the relocation of utilities underground. The right-turn storage lane extension improvements along Kuamoʻo Road and the relocation of utilities for a section fronting the Coco Palms Resort is being funded by both Federal and State funds. The owner of the Coco Palms Resort will be reimbursing the State DOT for the costs associated with these improvements as part of their entitlement conditions.

2.5.5. Listing of Required Permits

A listing of required discretionary land use approvals and ministerial permits for this project is provided.

Federal Permits and Approvals

Department of Army

- Section 404 Nationwide Permit

State of Hawaiʻi Permits and Approvals

Department of Health

- National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Associated with Construction Activity
- NPDES Permit for Dewatering
- Section 401 Water Quality Certification
- Noise Permit
- Construction Noise Variance – if required
- Air Quality Permit

Department of Land and Natural Resources

- Chapter 6E, HRS Historic Preservation Review

Office of Planning

- Coastal Zone Management (CZM) Program Consistency Determination

County of Kauaʻi Permits and Approvals

Department of Public Works

- Road Permit
- Grading/Grubbing Permit
- Building Permit
- Excavation Permit
- Drainage Plan Approval

Utility Companies

- Utility Service Agreements

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3. ALTERNATIVES CONSIDERED

This chapter discusses alternatives to the proposed project improvements described in Chapter 2 that were identified and considered. These alternatives include: 1) not implementing development of the project, otherwise referred to as the No-Action Alternative, and 2) other alternatives considered but which have been eliminated due to constraints or other reasons.

3.1. NO ACTION ALTERNATIVE

Under the No Action Alternative, the State DOT would not proceed with implementing the proposed highway widening, intersection improvements, and accessory improvements along the highway thru the project corridor. Without these highway improvements, the relocation of existing overhead utility lines will not occur since it wouldn't be needed. This alternative was eliminated from consideration because it would not achieve the project need and objectives.

Under this scenario, existing traffic conditions within the project corridor would remain. Traffic congestion particularly during the afternoon peak commuter period would continue with generally poor levels of service, and queues of vehicles stacking up at various intersections would continue. Existing overhead utility lines and associated poles would remain and continue to be a factor contributing to concerns related to the Newell Shearwater, Hawaiian Petrel, and Band-rumped Storm-Petrel particularly in the area of the Wailuā River.

In the future, traffic conditions within the project corridor are expected to worsen due to increased traffic growth particularly in the afternoon. Presently, the number of vehicles traveling through this region has been lower than past years due to lower visitors to Kauaʻi affected by the current nationwide economic condition. When the economy improves, visitor travel to Kauaʻi would be expected to increase as well which would increase traffic thru the project corridor worsening existing conditions.

In the future, additional developments would be completed such as the County's affordable housing project at Waipouli contributing to increased traffic along the highway thru this project corridor. Based upon historic growth rates on the island, additional traffic within and through the project corridor can also be expected over the years. These conditions would result in further traffic congestion in the area and likely increase the length of queues at intersections.

3.2. OTHER ALTERNATIVES CONSIDERED

Other alternatives considered to this project were the following: 1) delayed action alternative; 2) intersection modification alternative, and 3) utilities relocation alignment alternative. All of these alternatives were considered and evaluated, however, they were eliminated from further consideration because they would not adequately address the project need and objectives.

Delayed Action Alternative

Under the delayed action alternative, the proposed improvements would be postponed from implementation to some date in the future such as the year 2012 or beyond. With this alternative, the traffic problems presently being encountered along with future traffic congestion discussed under the No Action Alternative would apply.

The construction costs for the project would increase due to inflation making the project more costly and difficult to finance. Furthermore, there is no guarantee that current Federal funding appropriated from FHWA and the State would be available in the future to implement this project since the current funding appropriation would lapse. Additional Federal funds being made available through the American Recovery and Reinvestment Act (Federal Stimulus) for constructing the relocation of utilities underground would lapse under this alternative. As a result, either the utility companies or the State DOT would need to obtain funding in the future from other sources for this portion of the project. The relocation of utilities presently accounts for the majority of the total construction cost estimate.

This delay action alternative was therefore eliminated from consideration because it would not address the project need or meet the project objectives resulting in the same traffic conditions as discussed for the No Action alternative. Furthermore, funding for the project would likely be unavailable or difficult to obtain in the future.

Intersection Modification Alternative

Alternatives to the intersection of Kūhiō Highway with Haleilio Road were considered to try to retain the highway's existing northbound left-turn storage lane with the widening improvement. Under the proposed project, this left-turn storage lane will be eliminated because there is not enough right-of-way available. Alternatives considered were increasing the right-of-way in that area or reducing lane widths and shoulders.

Increasing the present 60-foot right-of-way was eliminated from consideration because it would require acquiring privately-owned property either on the mauka, makai, or both sides of the highway. Existing land uses along the highway consist of a Shell service station at the Papaloa Road intersection, the Kinipopo Shopping Village, and the County's wastewater pump station at the southern corner of Haleilio Road. Increasing the existing right-of-way would impact some of these land uses due to property needing to be acquired. The acquisition of frontage property from these uses could also make their continued ability to operate difficult resulting in the relocation of the entire commercial use. Impacts to the wastewater pump station would involve considerable relocation of existing sewer lines and facilities. Therefore, this alternative was eliminated because it would impact these existing uses, involve the acquisition and likely relocation of facilities, and include additional costs.

The second alternative was reducing the lane widths and shoulders to try to retain a left-turn storage lane. Lane widths would need to be reduced to 10 feet wide or less to accommodate this storage lane. This lane width would create possible safety issues and increase the potential for accidents in the area because they are so narrow. Larger trucks, buses, emergency vehicles (fire trucks), etc. would have a difficult time moving through this highway corridor given the narrow lane widths. The existing storage lane is already short and doesn't hold many cars. Thus, queues of vehicles already back up into the northbound through lane along the highway.

Therefore, this alternative was eliminated because it would negatively effect traffic flow through this intersection and possibly increase safety issues. A protected left-turn phase would be provided at this intersection, and vehicles would still be able make left-turns at this intersection to mitigate removing the storage lane.

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

The following is a description of the existing environment, an assessment of probable project effects, and proposed mitigation measures if necessary.

4.1. CLIMATE

The climate of Kauaʻi is characterized as semi-tropical and is influenced by Hawaii's geographic location within the tropics, southwest of the Pacific High or anticyclone. Although the climate is relatively moderate throughout most of the State of Hawaiʻi, significant differences may occur in regional and local climates are caused by the mountainous topography.

Kauaʻi lies within the belt of northeasterly tradewinds generated by the semi-permanent Pacific high pressure cell to the north and east of the islands. These tradewinds are one of the outstanding features of Kauaʻi 's climate along with equable temperatures from day to day and season to season, and the marked variation in rainfall from the wet to the dry season and from place to place. The nearest long-term wind data available for the Wailuā project area are collected at the Līhuʻe Airport and are at least semi-representative of the project area. Northeasterly tradewinds prevail throughout most of the year, and the average wind speed is 12.4 miles per hour.

Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the tradewinds tend to have the least temperature variation, while inland and leeward areas often have the most. In 2002, the National Oceanic and Atmospheric Association (NOAA) recorded the average annual temperature range in the project area between 81 degrees Fahrenheit during the warmest month and 70 degrees Fahrenheit during the coolest month.

Rainfall in Hawaiʻi is highly variable depending on elevation and on location with respect to the trade wind. The Līhuʻe area has a moderately wet climate which is similar to the Wailuā project area. The average annual rainfall for Līhuʻe Airport is about 43 inches. Three-fourths of this total, on the average, falls during the wet season of October through April.

4.2. GEOLOGY AND TOPOGRAPHY

Kauaʻi is the oldest of the eight main Hawaiian Islands. The Island is made up largely of a huge basaltic shield volcano, which has the largest central caldera in the Hawaiian Islands. The caldera of the shield volcano is ovoid (egg-shaped), approximately 12 miles long northeast-southeast, and 10 miles wide northwest-southwest. The Island still has the roughly circular outline of the original circular dome, even though it has been profoundly affected by collapse, faulting, erosion, and later volcanism.

Kauaʻi was formed by two major lava flows. The Waimea volcanic series refers to the flows that formed the original volcanic shield and caldera of the Island. The Kōloa volcanic series refers to subsequent flows that overlaid much of the Waimea volcanic series formations

on the lower slopes of the Island. The rocks on Kauaʻi are all volcanic, except for minor amounts of sediments derived from volcanic rocks by erosion, and a narrow, discontinuous fringe of calcareous reef and beach deposits.

Topography

The project corridor predominantly consists of the State DOT's existing right-of-way for Kūhiō Highway along with surrounding areas adjacent to this highway corridor. Within the corridor planned for the highway widening improvements, there are no unique or unusual geological formations located within the right-of-way or immediate adjacent areas. The topography along the existing highway corridor could generally be characterized as a coastal plain setting with slight to moderate variations in ground elevation and slopes. The existing highway profiles are generally rolling as it traverses across the relatively flat coastline from Kuamoʻo Road northward to the Temporary Kapaʻa Bypass Road area. Ground elevations along this highway range from about 6 to 15 feet above mean sea level (msl).

South of Kuamoʻo Road is the Wailuā River which is were the relocation of existing overhead utility lines would continue down to the KIUC Lydgate Substation. The pear-shaped Wailuā River is part of a larger watershed that extends approximately 11-miles in the east to west direction from its mouth to the summit of Mount Waiʻaleʻale. At the existing Wailuā River Bridge, the mouth of the River is about 400 feet wide and the water level depth was sampled showing it varied from about 7 to 10 feet deep. South of Wailuā River, the highway gradually rises in elevation from about 20 feet to 50 feet msl. The highway then gradually lowers in elevation to about 25 feet msl near the KIUC Lydgate Substation at South Leho Drive.

Impacts and Mitigation Measures

No significant impacts to the present geology and topography associated with the project corridor and immediate surrounding properties are anticipated from the construction of the proposed project. There are no unique or significant geological land formations present along the highway corridor planned for widening improvements. No major cut or fill activities are anticipated that would significantly alter present geologic land forms.

Planned improvements would not substantially alter the existing topography in this area since most of the work would occur within the State DOT's existing right-of-way. Additional easements obtained for utilities relocation would similarly not significantly alter topographic conditions since the utilities would be located underground either within the roadway pavement or along the paved highway. Existing topography associated with the highway and improved areas would be similar to current conditions which are relatively flat with slight slopes.

4.3. SOILS

Soil suitability studies completed for the Hawaiian Islands describe the physical attributes and the relative productivity of different land types for agricultural uses. Relevant studies include: 1) U.S. Department of Agriculture Soil Conservation Services (SCS) Soil Survey (SCS,

August 1972); 2) U.S. Department of Agriculture Natural Resources Conservation Service GIS data, 3) the University of Hawaiʻi Land Study Bureau (LSB) Detailed Land Classification, and 4) the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawaiʻi. The soil classifications and types along the project corridor are described below.

Soil Survey

The SCS's *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* includes general soil maps developed for these islands based upon soil surveys. These soil maps show soil characteristics by area, classified by soil series and associations. The U.S. Department of Agriculture Natural Resources Conservation Service has also established areas of soil types based upon GIS data. Figure 4-1 graphically shows the locations of these soil types found in the project area.

- Kaloko Clay (KfA): This soil is nearly level and occurs on coastal plains. In a representative profile the surface layer is dark-brown clay, about 12 inches thick. The subsoil, about 8 inches thick, is dark reddish-brown and weak-red clay. Below this is mottled, white to light-gray, platy silty clay about 13 inches thick. Permeability is moderately slow to slow. Runoff is slow to very slow, and the erosion hazard is no more than slight.
- Koloa stony silty clay, 3 to 8 percent slopes (KvB): This soil occurs on upland slopes. In a representative profile the surface layer is dark reddish-brown stony silty clay about 7 inches thick. The subsoil, about 13 inches thick, is dark-red and dark reddish-brown stony silty clay that has subanular blocky structure. The substratum is hard rock. Permeability is moderately rapid. Runoff is slow, and the erosion hazard is slight. This soil is used for sugarcane.
- Koloa stony silty clay, 15 to 25 percent slopes (KvD): On this soil, runoff is medium and the erosion hazards is moderate to severe. This soil is used for irrigated sugarcane, pasture, woodland, and wildlife habitat.
- Līhuʻe silty clay, 0 to 8 percent slopes (LhB): This soil is on the topes of broad interfluves in the uplands. In a representative profile the surface layer is dusky-red silty clay about 12 inches thick. The subsoil, more than 48 inches thick, is dark-red and dark reddish-brown, compact silty clay that has subangular blocky structure. The substrative is soft, weather rock. Permeability is moderately rapid. Runoff is slow and erosion hazard is no more than slight. This soil is used for sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, and home sites.

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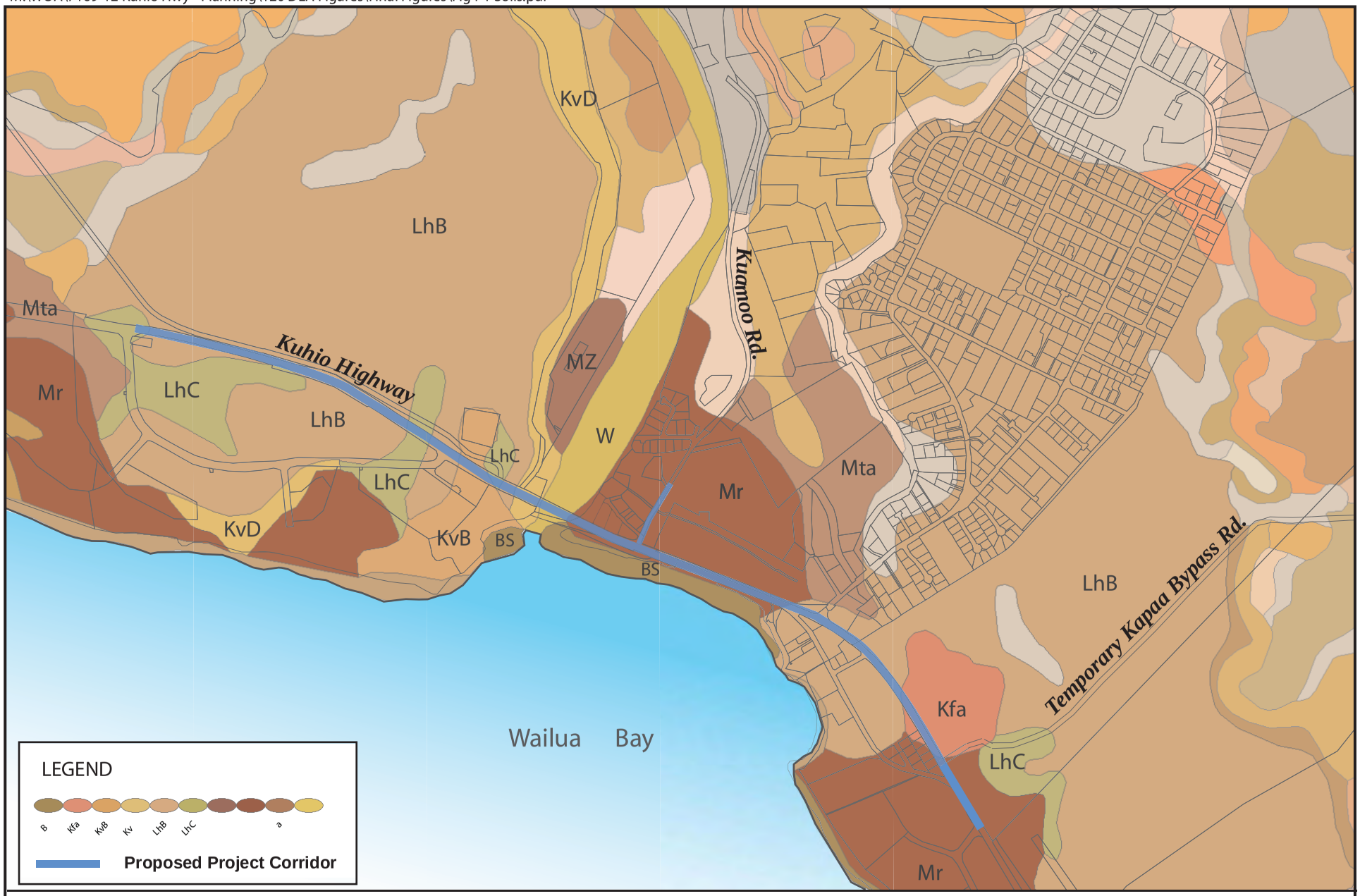

0 375 750 1,500 2,250 3,000 Feet

FIGURE 4-1
SOILS MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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- Līhuʻe silty clay, 8 to 15 percent slopes (LhC): On this soil, runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, and home sites.
- Mokuleia fine sandy loam (Mr): This soil occurs on the eastern and northern coastal plains of Kauaʻi. This soils has a profile like that of Mokuleia clay loam, except for the texture of the surface layer. Permeability is moderately rapid in the surface layer and rapid in the subsoil. Runoff is very slow, and the erosion hazard is slight. This soil is used for pasture.
- Beach (BS): The BS series occurs in sandy, gravelly, or cobbly areas, and consists mainly of light-colored sands derived from coral and seashells.

Land Study Bureau

The *Detailed Land Classification - Island of Kauai* published by the University of Hawaiʻi Land Study Bureau 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 project area is classified as “B”, “C” and “E” (see Figure 4-2).

The majority of the project corridor intended for widening of the highway is designated “Unclassified” because these lands have been designated for urban use. The northern section of the project corridor has soils rated “B”, “C”, and “E”. Lands situated south of Wailuā River where the existing overhead utilities will be relocated underground are predominantly rated as “B” with a small section rated “C”. Although these areas have productivity ratings established based upon the GIS data, these areas consist of the existing Kūhiō Highway and State DOT right-of-way.

Agricultural Lands of Importance to the State of Hawaiʻi

The State Department of Agriculture’s *Agricultural Lands of Importance to the State of Hawaii* (ALISH), established a classification system for identification of agriculturally important lands to the State of Hawaiʻi. Three classes of lands were established for the State, primarily, but not exclusively, on the basis of soil characteristics. The three classes of ALISH lands are: 1) prime, 2) unique, and 3) other. Lands not included under this system are “unclassified”.

ALISH data classifies portions of the project area as “prime agricultural land” (see Figure 4-3). The remainder of the project area consists of “unclassified” lands of no agricultural importance. The area of prime land situated along the northern portion of the highway corridor is presently not used for agricultural production. Areas south of Wailuā River also classified as prime land are similarly not being used for agricultural production. These areas are owned by the State DHHL which has plans for future residential housing and commercial uses on these properties (Lyons Associates, June 2007).

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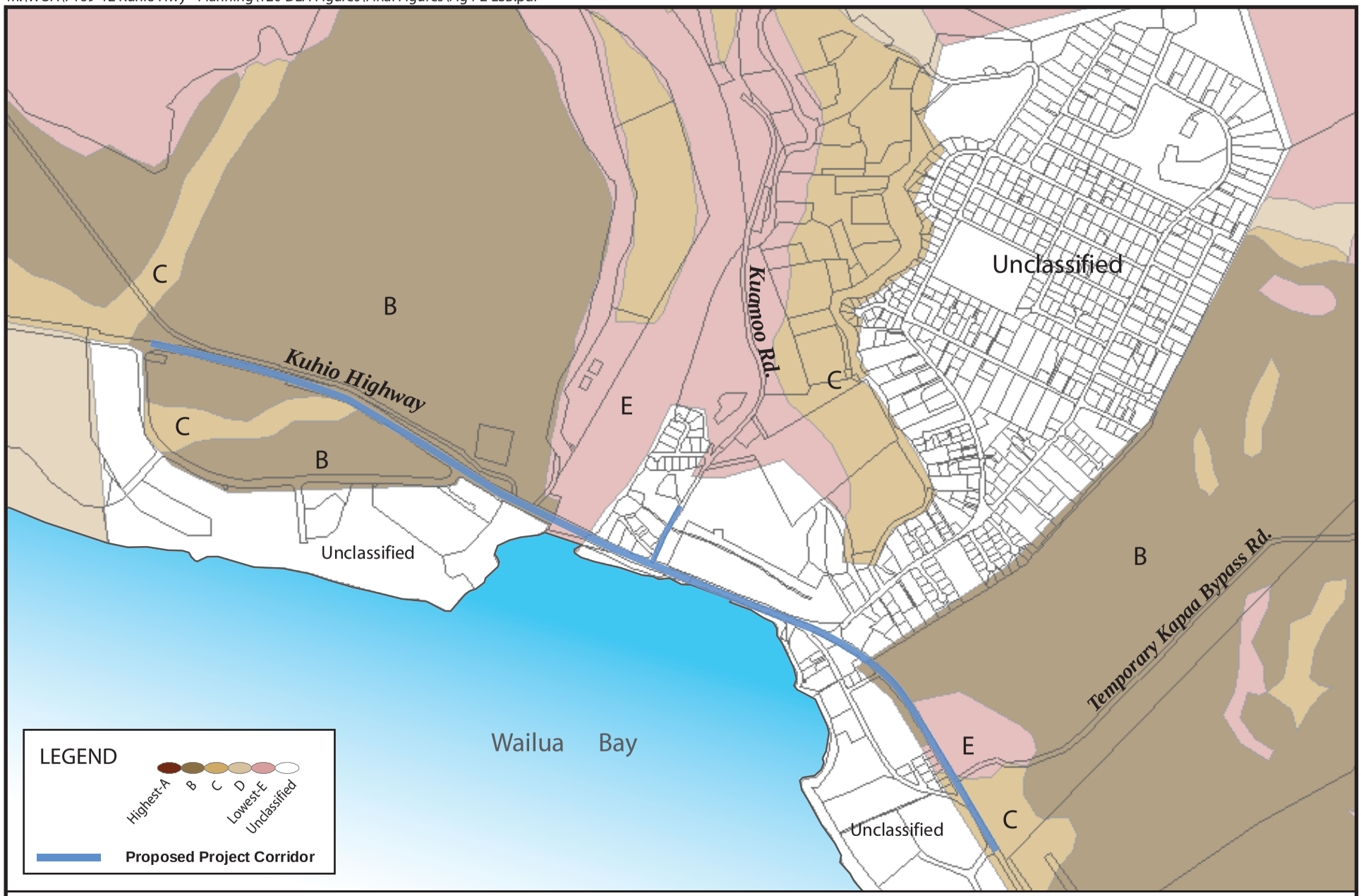

FIGURE 4-2

LAND STUDY BUREAU MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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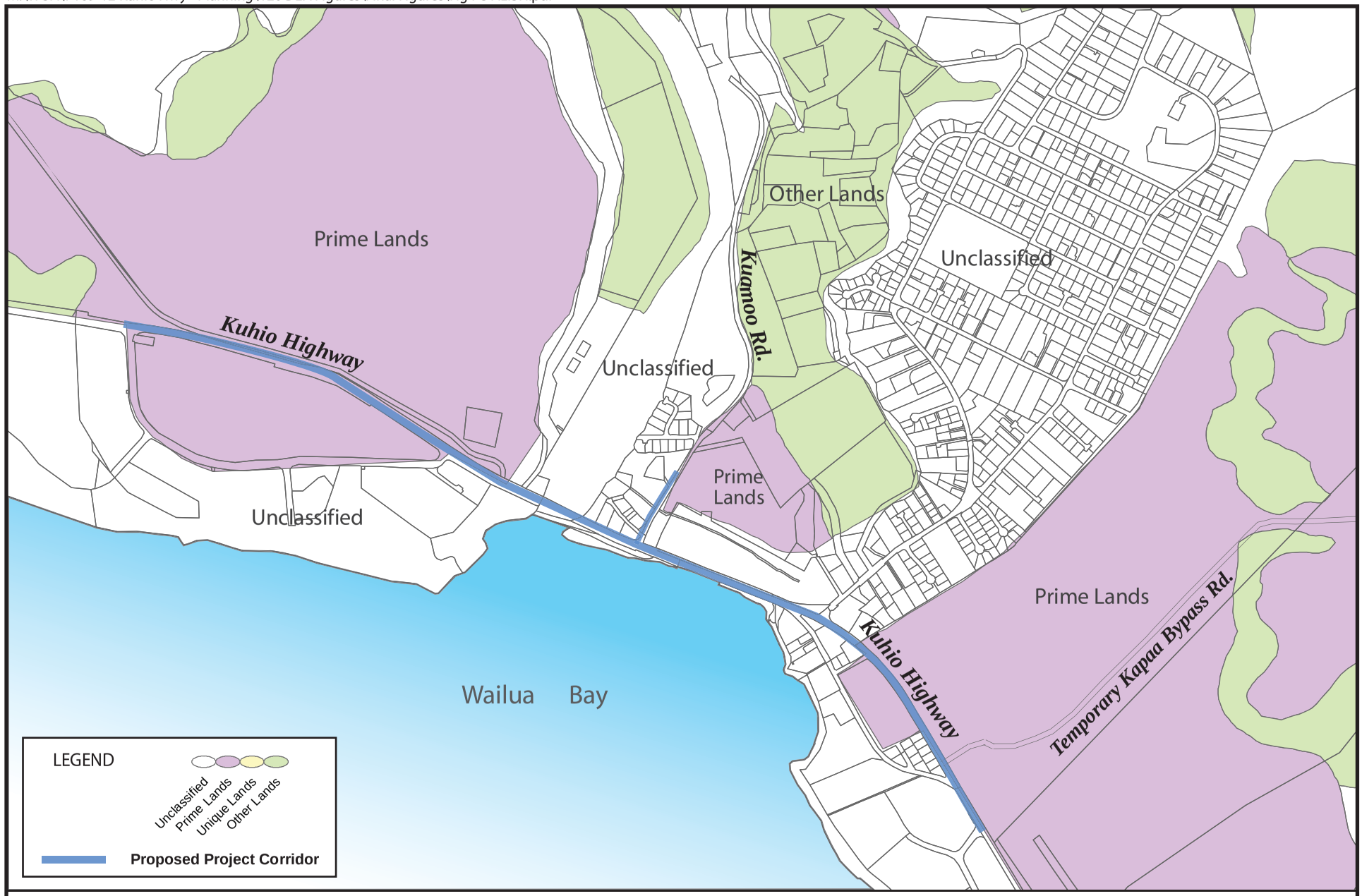

0 280 560 1,120 1,680 2,240 Feet

FIGURE 4-3
AGRICULTURAL LANDS OF IMPORTANCE STATE OF HAWAII MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Impacts and Mitigation Measures

No significant impacts on soils are anticipated as a result of the construction of the proposed project. Once constructed, the project should not have long-term impacts on existing soils. Graded areas not part of the paved highway would be grassed to minimize erosion. Therefore, most project effects on existing soils would be associated with soil erosion resulting from short-term construction related activities.

Most of the highway widening improvements would be constructed within the State DOT's existing right-of-way which is already paved. Additional undeveloped areas with this right-of-way affected by improvements would be limited, and construction work would not require large quantities of cut and fill. Construction of the utilities relocated would occur within undeveloped areas adjacent to the highway right-of-way. However, these areas would primarily involve open trench construction with backfilling of materials and thus not significantly impact existing soil conditions.

Construction of the project area would inevitably involve temporary land-disturbing activities that may result in some soil erosion during periods of heavy rainfall or high winds. Various mitigation measures will be incorporated into the project's design to minimize potential short-term erosion impacts during such construction activities. Erosion control measures considered may include: use of temporary sprinklers in non-active construction areas; stationing water trucks nearby during construction to provide sprinkling in active areas; use of temporary silt fencing, sand bags, or screens; or thorough watering of disturbed areas after construction activity has ceased for the day.

A full range of erosion and sediment controls will be instituted during grading and excavation operations of the proposed project, and in compliance with the County of Kauaʻi'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 structural and non-structural Best Management Practices (BMPs), as deemed appropriate.

4.4. HYDROLOGY

This section discusses the regional hydrology present in the project corridor which includes ground water and surface water resources.

4.4.1. Hydrogeological Resources

The State Department of Land and Natural Resources (DLNR), Commission on Water Resource Management (CWRM), under the authority of the State Water Code, Chapter 174C HRS, has established ground water hydrologic units to provide a consistent basis for managing ground water aquifers. Under the State's *Water Resource Protection Plan* (Yuen, June 1990), aquifers of the island of Kauaʻi have been classified under an aquifer coding system to identify

and describe these aquifers. This system is comprised of Aquifer Sectors, and then Aquifer Systems located within these sectors. An Aquifer Sector reflects an area with broad hydrogeological (subsurface) similarities while maintaining traditional hydrographic (surface), topographic and historical boundaries. The Aquifer system is an area within a sector that is more specifically defined by hydrogeologic continuity, particularly hydraulic connections among aquifer types and units.

The project corridor is located within the Līhuʻe Aquifer Sector (201) which has the following aquifer systems: 1) Hanamāʻulu Aquifer System (20102), 2) Wailuā Aquifer System (20103), and 3) Anahola Aquifer System (20104). The aquifer system area boundaries are illustrated in Figure 4-4. The State *Water Resources Protection Plan* describes these systems as follows:

- Hanamāʻulu Aquifer System. This system experiences a mean annual rainfall less than 50 inches at the coast to greater than 300 inches in the interior. Basal, perched and high-level dike aquifers occur in this System. Basal water occurs in the Nāpali lava flows, perched aquifers are found within the Kōloa volcanics, and high-level aquifers occur in the west wall of the Līhuʻe Depression and Hāʻupu Ridge. Streams in the system are spring-fed and gaining. Perched aquifers within the Kōloa Volcanics continually add water to the major streams. Currently, CWRM lists the Hanamāʻulu Aquifer as having a sustainable yield of 36 mgd.
- Wailuā Aquifer System. This system experiences rainfall varying from 50 to 400 inches. The annual rainfall is a reflection of the extreme rainfall at Mt. Waiʻaleʻale, which sustains the Wailuā River through voluminous seepage from perched aquifers in the Kōloa series and high-level dike aquifers in the Nāpali formations. The majority of the Aquifer System is covered with the Kōloa series with some outlying Nāpali formations rising above the Kōloa platform. Groundwater found in the Waimea Nāpali formation generally occurs as high-level aquifers where it is contained within compartments formed by volcanic dikes or the highly weathered saprolite and soil face of the original surface. CWRM lists the Wailuā Aquifer as having a sustainable yield of 43 mgd.
- Anahola Aquifer System. This system is drier than the other systems in that the rainfall varies from slightly less than 50 inches to slightly more than 150 inches at the summit of Namahana Peak. Basal, perched, and possibly high-level dike aquifers are found within this System. Currently, the State Department of Land and Natural Resources (DLNR) Commission on Water Resource Management lists the Anahola Aquifer as having a sustainable yield of 17 million gallons per day (mgd).

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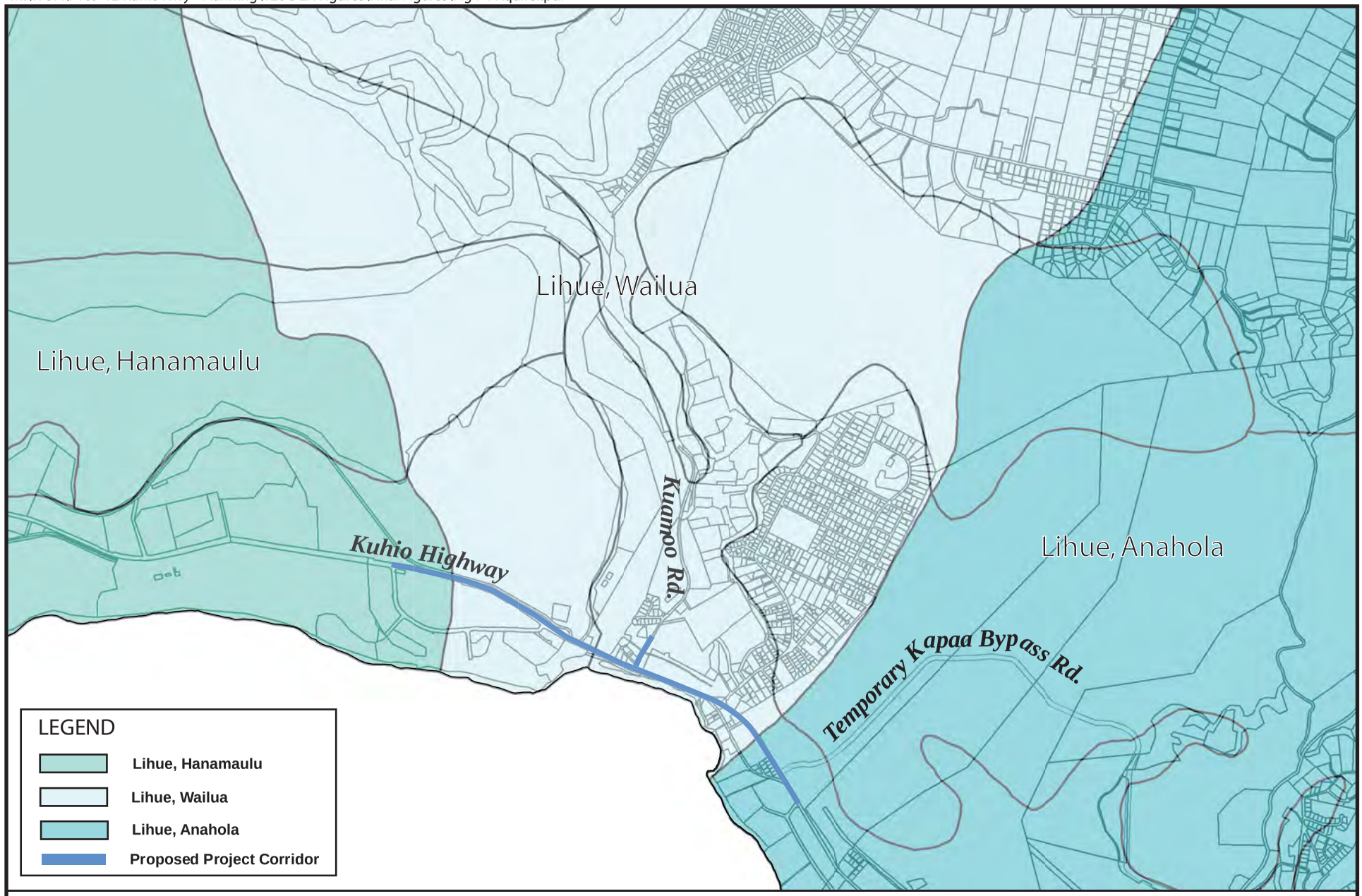

0 650 1,300 2,600 3,900 5,200 Feet

FIGURE 4-4

LIHUE AQUIFER SECTOR AND SYSTEM MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Impacts and Mitigation Measures

Construction of the highway improvements and utility relocation is expected to have minimal impacts on the surrounding groundwater system. Most of the improvements would occur within the existing State DOT right-of-way which includes already paved areas. Furthermore, the highway corridor is predominantly located along the coastline reducing the importance of groundwater recharge occurring in this area. As a result, the project should not adversely impact the underlying aquifer system nor contaminate potable water sources.

The small increase in additional impervious surface created from this project would inevitably decrease the amount of localized groundwater recharge occurring along the highway corridor. However, this decrease is expected to be negligible and ultimately inconsequential to the overall function of the area's natural hydrological system.

A full range of erosion and sediment controls will be instituted during grading and excavation operations of the proposed project, and in compliance with the County of Kauaʻi's Grading Ordinance and the State DOH's NPDES Permit for Construction of Storm Water Activities. Mitigation measures will be instituted following site-specific assessments, incorporating structural and non-structural BMPs, as deemed appropriate. Appropriate BMPs would be incorporated into design plans to address potential short-term impacts from runoff, and such plans would be reviewed by pertinent agencies for comments and approval prior to construction.

4.4.2. Watersheds Along Project Corridor

The project corridor is in the vicinity of three definable watersheds which are referred to as: 1) Kālepa, 2) Wailuā-ʻŌpaekaʻa, and 3) Kapaʻa. Of these three, the Wailuā-ʻŌpaekaʻa watershed would be affected by project improvements planned within this corridor. The project should not affect surface water resources in the other two watersheds because they are located away from the highway and utility improvements.

The Kalepa Watershed encompasses about three-square miles and extends in a mauka to makai direction from the top of Kālepa Ridge down to the shoreline, and from Hanamāʻulu up to the Wailuā River State Park. Surface water from a Kapaia Reservoir located inland of Kālepa Ridge was brought into the watershed to irrigate sugar cane as part of plantation operations. The plantation's distribution system consisted of open ditches running through the fields located on both sides of the highway. With the exception of significant rainfall events producing large runoff, the occurrence of perennial surface water in this watershed is limited to those drainage ditches. These existing perennial surface water drainage ditches are not located in the immediate vicinity of the project area. They are located further toward Hanamāʻulu south of the County's Wailuā Golf Course (TNWRE, November 2003).

The Kapaʻa watershed encompasses about nine-square miles in the Waipouli to Kapaʻa area. This watershed consists of a network of plantation built irrigation ditches and reservoirs, and three man-made drainage canal systems providing flood protection for Kapaʻa town. The Waipouli canal system, which is the nearest man-made drainage canal, would not be affected by the project because it serves areas further north of the highway corridor.

Wailuā-ʻŌpaekaʻa Watershed

The Wailuā-ʻŌpaekaʻa watershed encompasses about 53-square miles extending inland up to the top of Mount Waiʻaleʻale. The Wailuā River drains this watershed and ʻŌpaekaʻa Stream is a tributary to this river. A drainage canal located behind the Coco Palms Hotel is another perennial surface water feature located in the lower portion of this watershed and in the vicinity of the project corridor. The Wailuā River and ʻŌpaekaʻa Stream are navigable for considerable distances inland. A wave-built beach berm at the shoreline of the river creates some restriction of the river's discharge into the ocean (TNWRE, November 2003).

In 2003, water samples were collected from the Wailuā River, ʻŌpaekaʻa Stream, and drainage canal behind the Coco Palms Hotel. Sampling locations in the river included near the Wailuā River Bridge, by the marina, and above (mauka) the marina. Additional field measurements were made to characterize the hydrology of the surface water in this watershed. Characteristics of this waterway during the dry weather conditions when this fieldwork was done can be summarized as follows:

- Water quality data shows that water from the Wailuā River consists of a mix between ocean water and surface water. Salinity profiles of Wailuā River were basically identical as far inland as its confluence with ʻŌpaekaʻa Stream, and the water at depth has near seawater salinity.
- Freshwater moves toward the shoreline in a layer overlying saltwater within the lower reaches of this river. The surface layer of freshwater is about four degrees cooler than the underlying saline water in both Wailuā River and ʻŌpaekaʻa Stream.
- The wave-built beach berm at the shoreline of Wailuā River creates some restriction on the river's discharge into the ocean. As a result, the amplitude and phase of the tide on the river are considerably reduced and lagged up stream.
- Groundwater is not a significant water component in the lower reaches of Wailuā River, in ʻŌpaekaʻa Stream, and in the drainage canal (TNWRE, November 2003).

Coastal water resources of Wailua Bay and the Pacific Ocean are located west of the project corridor. Coastal waters are identified as Class "A" Marine waters (subtype sand beaches) by the State DOH. According to Chapter 11-54, Hawaii Administrative Rules, Class A waters are protected for recreational purposes and aesthetic enjoyment such that, "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."

Impacts and Mitigation Measures

The project should not have a significant impact on the existing pattern of surface water flows within the project area. Highway improvements would occur within the State's existing right-of-way and therefore have minimal effects on surface runoff and surface waters. Relocated utilities would be placed underground and similarly not affect surface waters. The Wailuā River should not be affected because the electrical lines would be constructed under the river via horizontal directional drilling within the State's right-of-way.

The highway widening will increase the present pavement area that will inevitably increase surface runoff. However, based on a 25-year, 1-hour storm event, the project would only generate an additional increase of 3.31 cubic feet per second (cfs) of surface runoff. The discharge from the highway was estimated to increase from 44.02 cfs to 47.33 cfs. Existing drainage patterns would be the same, and the project should not adversely impact adjacent and downstream properties, the existing drainage system, or coastal waters.

In terms of water quality, the stream and canal systems in the Wailuā-ʻŌpaekaʻa watershed have surprising consistency in water chemistry among the individual water bodies and through the length of each system from the shoreline inland. This consistency appears to be a result of relatively uniform input to the streams and canals from both the land and ocean, and due to the relatively short residence time of water preventing biotic cycling from dominating water composition. Water quality in these systems measured in 2003 under dry conditions was generally within the limits set by DOH's Water Quality Standards (TNWRE, November 2003).

With such clear and consistent water quality patterns in this watershed, it appears that the project should not have any permanent effect on water quality. This is based on the observation that water in this system has a relatively short residence time and flows continually to the ocean with little obstruction. If materials are added to the River from construction activities, these materials will not stay within the streams for a period of time sufficient to promote a permanent change to the stream system (TNWRE, November 2003). BMPs would be designed and implemented to further minimize environmental impacts to water quality.

Short-term, temporary impacts to coastal waters may occur as a result of clearing, grading and other related construction activities. The project improvements are not expected to generate considerable storm water runoff from construction activities. Widening improvements would occur within the State DOT right-of-way and involve minor modifications to existing topographic conditions. No major cut or fill activities would occur under this project. The relocation of utility lines underground would not significantly alter the present ground conditions since work would involve creating open trenches or using horizontal directional drilling.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's

drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

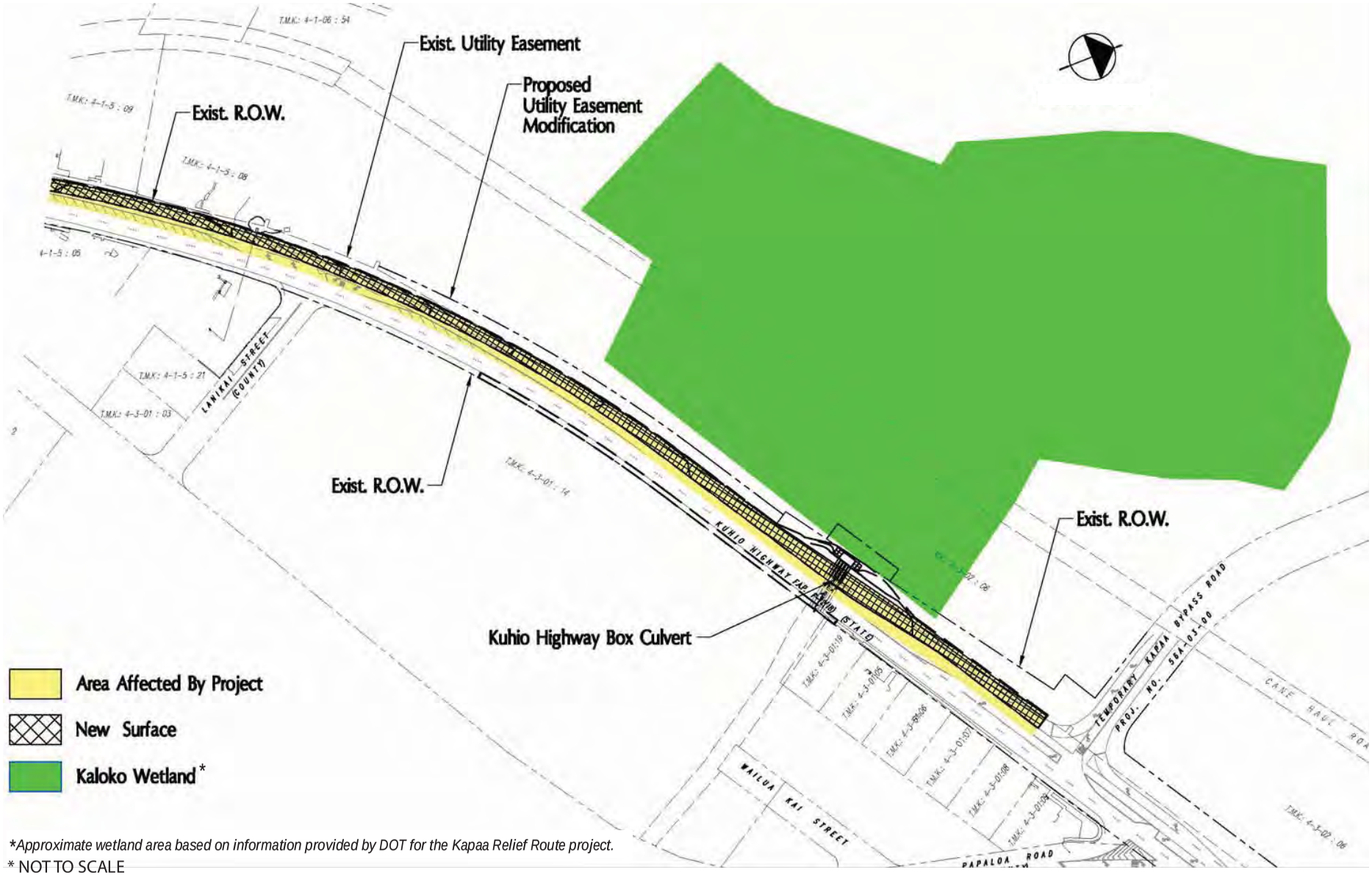
Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

4.4.3. Kaloko Marsh

A biological survey was conducted for a waterway referred to as the Kaloko Marsh situated inland of the highway generally south of the Temporary Kapaʻa Bypass Road. This marsh consists of a wetland that was identified in 2003 (Char, 2003), and the delineation of it approved by the U.S. Department of Army, Corps of Engineers (COE) in November 2004. This wetland delineation would expire in November 2009. Figure 4-5 shows the approximate boundary of this wetland.

In February and March 2009, AECOS, Inc. conducted biological and water quality surveys of this Kaloko Marsh. The report is included in Appendix D of this document. This Kaloko Marsh connects to a drainage swale that originates from an area near Papaloa Road. The marsh connects to this drainage swale via a culvert under Kūhiō Highway. The drainage swale normally drains northwest or inland (mauka) through the culvert and into the marsh area situated west of Kūhiō Highway (see Exhibit 4-1). The mauka culvert is about 10 feet wide by 800 feet long, and opens into the marsh which is a depression completely covered by the aggressive, introduced grass known as California grass (*Urochloa mutica*). The marsh had no open water areas at the culvert under the highway.

Exhibit 4-1 – West View of Kaloko Marsh Toward Highway



*Approximate wetland area based on information provided by DOT for the Kapaa Relief Route project.

* NOT TO SCALE

FIGURE 4-5

APPROXIMATE LOCATION AND BOUNDARY OF KALOKO WETLAND

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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It is likely that high water level occurring in the marsh results from water backing up from the drainage swale near Papaloa Road and flowing in the opposite direction (makai to mauka) through the culvert structure (see Exhibit 4-2). Although not observed, high water could seep seaward (makai direction). The drainage swale on the makai side of the highway is being modified as part of the County's affordable housing project under construction.

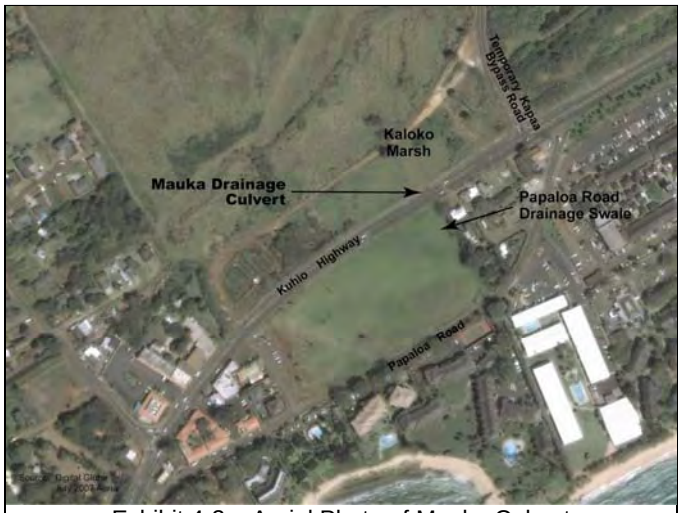


Exhibit 4-2 – Aerial Photo of Mauka Culvert And Kaloko Marsh Area

The marsh itself appears to "naturally" drain to the northeast flowing roughly parallel to the highway on the mauka side. The historical flow appears to have been toward the northeast from the project area toward Waipouli before continuing southeast and toward the shoreline at some point about 4,250 feet north of the project area. However, a culvert pipe beneath the Temporary Kapaʻa Bypass Road has been filled with concrete, preventing outflow in this direction.

It is possible that another outlet for this marsh exists somewhere in the southwest direction because there is a drainage ditch behind the former Coco Palms Resort. However, no such connection was found during the field survey. The drainage pattern in this area is complicated since the marsh is not comprised of a single large depressed area. It is divided by a substantial farm road (old cane haul road) that runs parallels to Kūhio Highway about 200 feet inland (refer to Exhibit 4.2). A culvert beneath this unimproved road permits the interchange of surface water between the two parts of the marsh.

Water Quality

Water quality field measurements determined that only isolated pools of water were present in the project waterway during the survey. No actual flow was evident. The largest pool of water was located on the southeast (makai) side of Kūhio Highway. Conductivity results indicate fresh water with no influence from brackish groundwater. Dissolved oxygen concentrations in the project waterway were low with saturation averaging 19%. Turbidity levels and total suspended solids (TSS) concentrations were high, reflecting the poor underwater visibility at the time of sampling. Elevated ammonia concentrations are typical of waterways with sluggish or stagnant flow due to an accumulation and then decomposition of organic matter. Nitrate-nitrite, total nitrogen and total phosphorus levels were also high.

Aquatic Biota

No aquatic organisms (fishes, invertebrates) were observed in the marsh at the project site on any of the several visits made to the culvert area.

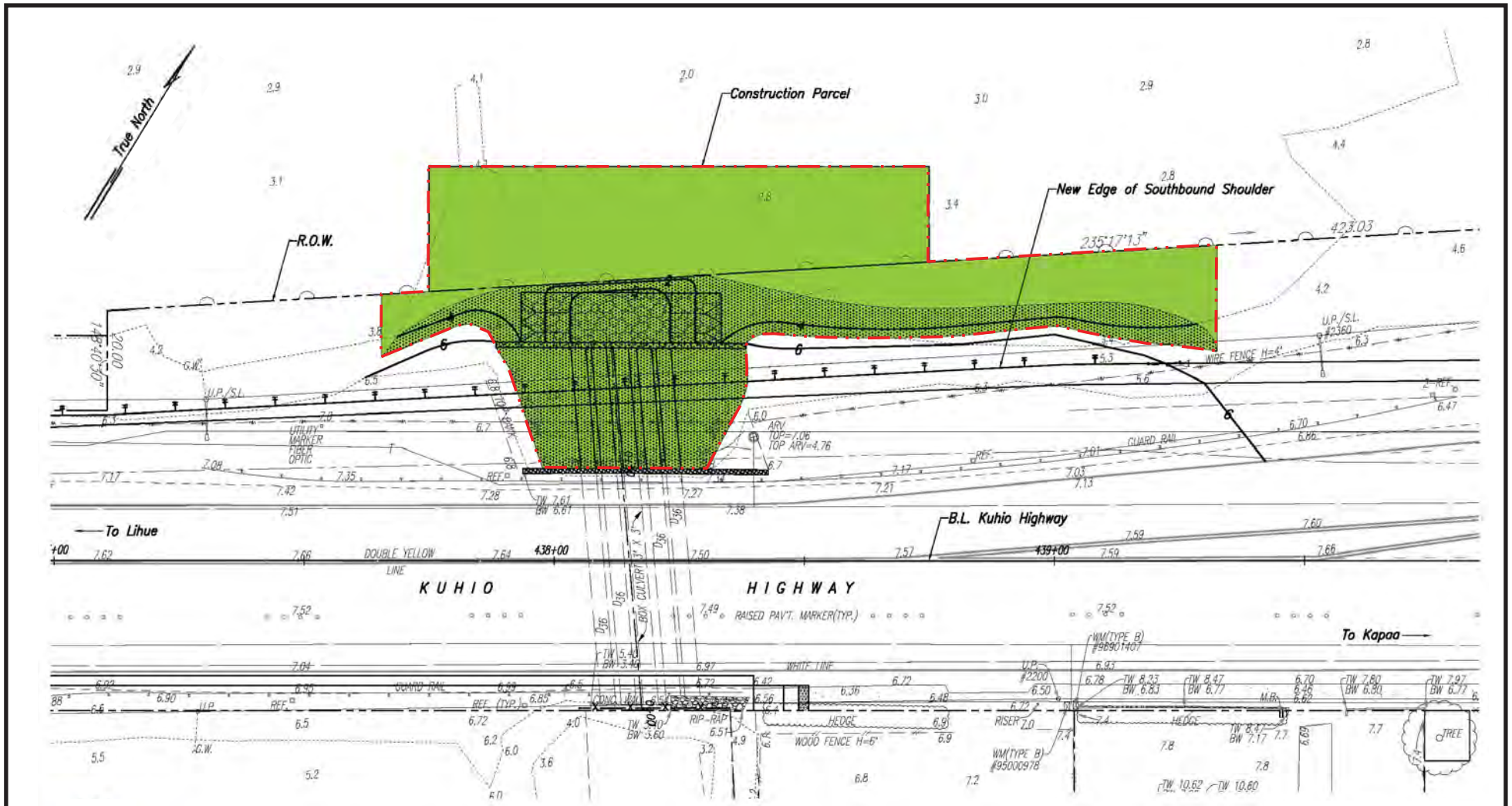
Impacts and Mitigation Measures

A drainage culvert on the mauka side of highway is planned to be extended to accommodate the additional southbound lane. The culvert will be extended by approximately 25 feet in the mauka direction, and will include a pre-cast box drain and four new 36-inch pre-cast reinforced concrete pipes. Pipe cushion (comprised of crushed rock, pea gravel or comparable) will be installed beneath the culvert extension. Permanent improvements associated with the culvert extension will be installed within the existing State DOT right-of-way. However, construction activities including clearing and grubbing, silt curtain installation, and water quality monitoring will occur outside the right-of-way.

With regard to Kaloko Wetland, about 2,385 square feet will be affected by the permanent culvert improvements. In addition, during the short-term period, approximately 3,198 square feet will be temporarily affected by construction activities and access. Therefore, the total estimated impact to the wetland is approximately 5,583 square feet. However, once construction is complete, all in-water BMPs and construction debris will be removed and it is anticipated that this portion of the wetland will revert back to its pre-construction condition. Figure 4-5 shows the proposed extension of this culvert along with the wetland area affected.

The culvert extension needed for the highway widening is not expected to have a significant impact on the Kaloko Marsh. This wetland is a waterway of lower value and does not function as a significant resource because it is a depression and receiving point for discharges from a drainage swale on the makai side of the highway during instances of heavy rainfall. The marsh had no open water areas and was covered by the introduced species California grass. This marsh does not currently support aquatic biota. No federally endangered or threatened species were encountered during the surveys, and none are anticipated to utilize aquatic habitats in the project area. Thus, the function of this wetland should not be significantly impacted during the short-or long-term.

The extended culvert would be situated within the existing State DOT right-of-way and affect only a relatively small area of this marsh primarily around this existing culvert opening. The culvert's design would not change the present drainage pattern which is from the lower makai side across the highway to the marsh through this culvert. Widening the highway would add increased impervious area increasing surface runoff in the area. However, the additional pavement in the area of this marsh would be relatively small and is not expected to significantly impact drainage conditions in this area. Relocated utilities routed underground would not occur



LEGEND

Construction Area (Temporary and Permanent Impact) – Approximately 5,583 square feet

Permanent Impact Area – Approximately **2,385** square feet

Note: Approximate wetland area based on existing topography

GRAPHIC SCALE:

20' 10' 0' 40' 80'

SCALE 1" = 40'

FIGURE 4-6
APPROXIMATE WETLAND IMPACT AREA

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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within this marsh. Once installed during construction, ground conditions would be returned to existing conditions. This should not significantly change the depression's condition or alter drainage patterns.

Therefore, the project is not expected to have significant long-term impacts on the Kaloko Marsh and drainage swale. Short-term construction activities would disturb existing conditions. However, such effects would be temporary and affected areas would be returned to pre-existing conditions to the extent practicable. A BMP plan and Water Quality Monitoring and Assessment Program would be designed and implemented to minimize environmental impacts to water quality of the project waterway in the vicinity of the project site. A Department of Army permit for nationwide coverage will be obtained for this improvement along with other associated agency permits (ex. DOH 401 water quality certification, etc.). Additional measures could be added to minimize effects based upon these approvals along with other applicable ministerial approvals obtained from other governmental agencies.

4.4.4. Kuamoʻo Road Culvert

On October 12, 2007, AECOS, Inc. conducted a biological and water quality survey for a culvert located along Kuamoʻo Road that is planned to be extended to support the storage lane improvements planned along this roadway. This culvert is referred to as the Kuamoʻo Culvert. The report is summarized below and included in its entirety in Appendix E. The existing culvert is located beneath Kuamoʻo Road approximately 350 feet west of its intersection with Kūhiō Highway. The culvert is approximately 30 feet by five feet wide. Figure 4-7 shows the proposed plans for this culvert along with some photos of surrounding waters.

North of the culvert, the lagoons of the Coco Palms Resort are connected to a small channel which lead to the culvert in Kuamoʻo Road. The south end of the culvert opens to an open drainage ditch that is overgrown with vegetation and appears to be slightly higher in elevation than the culvert opening. This drainage ditch then leads to two small, below-ground culverts within a private residence. These pipe culverts then connect to a concrete-lined channel before reaching and discharging into the northern bank of the Wailuā River.

The lagoon situated within the Coco Palms Resort property is a man-made body of water that is replenished through rainfall, surface runoff, and from groundwater seepage directly into the lagoon. Water is present in the lagoon and channel throughout the year. However, water does not naturally flow southbound into the culvert from the lagoon's channel because the culvert opening is elevated about two feet above the surface water in the channel. A sluice gate, now broken, is present at the culvert opening to control water from the channel. The resort also has a currently inoperable pump system situated near this culvert which was used to pump water from the channel into the culvert during periods of heavy rainfall to prevent flooding of the resort property. Photos of these conditions are provided in Appendix B.

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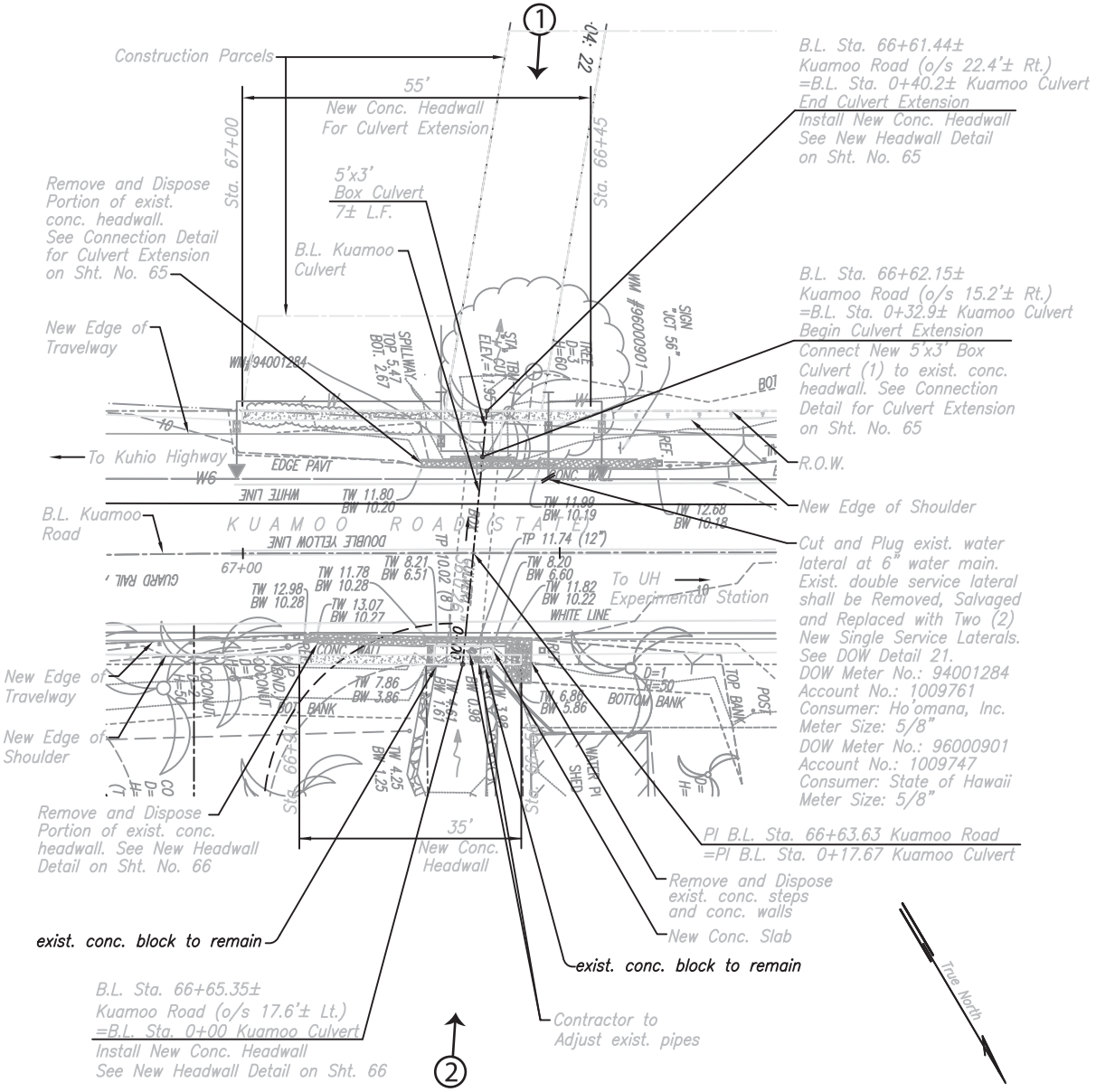

① Northbound View of Culvert

② Southbound View of Culvert

FIGURE 4-7
KUAMOO ROAD CULVERT LAYOUT PLAN AND PHOTOS

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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Water Quality

During the October 2007 survey by AECOS, Inc., water was present in the resort's lagoon, the channel, and within the Kuamoʻo Road culvert. There was no water present in the system on the south side of the Kuamoʻo Road culvert, with terrestrial vegetation well established in the drainage ditch indicating that water flow in that direction had not occurred for some time. Water samples were collected and field parameters measured from three locations within this waterway which were: 1) Station "Culvert" located one yard from the culvert on the north side of Kuamoʻo Road; 2) Station "Canal" located about 100 feet north of the culvert next to a small chain link fence collecting debris in the waterway; and 3) Station "Lagoon" located about 330 feet north of the culvert along the western shore of the lagoon.

The waterway fits the description of an estuary under Chapter 54-5.2, HAR, and water quality results were compared to those State standards. The water quality at the culvert, within the lagoon channel, and in the lagoon itself was poor. Salinity measurements taken throughout the waterway revealed that a salinity of 5 parts per thousand (ppt) was uniform throughout the project waterway, an indication of a system reflecting groundwater conditions. Dissolved oxygen levels for all three stations were well below the State standard of 75 percent saturation. There was no flowing water to bring in oxygenated water, and decaying organic debris may regularly consume what oxygen is present from photosynthesis and atmospheric diffusion.

Total phosphorus (TP) levels were very high relative to State criteria for TP. Total nitrogen, nitrate-nitrite, and ammonia levels were also high at almost all stations. High total nitrogen levels coupled with low ammonia and nitrate-nitrite concentrations indicate high levels of organic nitrogen in the project waterways. Sources of organic nitrogen include decaying organic debris (like the numerous decaying palm fronds and coconuts in the canal and lagoon), residential or agricultural runoff, and waste produced by aquatic biota and waterfowl.

Oil and grease was detected at station "Culvert" at a concentration of 1.2 mg/L. Some of the possible sources of this include runoff from Kuamoʻo Road, leakage from the resort's now defunct water pump station, or runoff from the resort's flooded parking garage situated nearby. The presence of oil and grease in detectable levels is a violation of a State standard that states all waters shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including floating debris, oil, grease, scum, or other floating material (DOH, 2004).

Aquatic Biota

The oxygen levels were low in these waterways, however, there was enough present to support populations of non-native fish species that are currently abundant in the waterways. The aquatic biota survey revealed the poeciliid fishes guppies (*Gambusia affinis*) and mosquito fish (*Poecilia reticulata*), and tilapia (*Oreochromis mossambicus, Tilapia zilli*) present feeding and schooling in the channel leading to the culvert and lagoon. Poeciliid fishes are a family of

fresh-water fish which are live-bearing aquarium fish. Tilapia also occurred abundantly throughout the lagoon with at least the two species identified being present.

Benthic infauna present in the channel and lagoon included the thiarid snails, Melanoides tuberculata and Tarebia granifera, and physid snails. ʻOʻopu nakea (*Awaous guamensis*) were also noted on the sandy bottom in the lagoon channel. In the lagoon, aholehole (*Kuhlia xenura*) and mullet (*Mugil cephalus*) were uncommon in small schools. Dip netting along the lava rock walls on the eastern side of the lagoon revealed grass shrimp (Palaemon debilis) and a Samoan crab (Scylla serrata). *Alae ula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*), which is an endangered subspecies, were observed along the eastern bank of the lagoon.

Macroalgae were not abundant in the resort's lagoon and associated channel. Samples collected from benthic substrata and floating debris included two green algae (*Cladophora* sp. and *Rhizoclonium* sp.) and two blue-green algae (*Oscillatoria* sp. and *Schizothrix* sp.).

Impacts and Mitigation Measures

The culvert extension and other improvements at Kuamoʻo Road are not expected to have a significant impact on existing waterways serving this culvert. The culvert extension for the storage lane extension would occur on the southern side of the roadway where there is only a drainage ditch overgrown with vegetation. This ditch did not have water present, and conditions indicated that water flow had not occurred for some time. As a result, the culvert extension on this end should not significantly impact this drainage ditch, aquatic biota, or water quality.

A new headwall at this culvert would be constructed about three feet to the north within the State DOT right-of-way extending toward the resort's lagoon channel. This new headwall is not expected to have a significant impact on the resort's waterways because no improvements are planned within the waterways. The new headwall would be constructed on top of the present culvert structure. Therefore, this improvement should not significantly affect the lagoon's water quality, aquatic biota, or endangered Hawaiian moorhens that may be present.

Water quality associated with the resort's lagoon and channel leading up to the Kuamoʻo Road culvert site is generally poor. Dissolved oxygen levels in these waterways are low because there was no flowing water to bring in oxygenated water, and decaying organic debris consumes what oxygen is present. Decaying organic debris in these waterways, such as decaying palm fronds and coconuts, along with residential or agricultural runoff, and waste produced by aquatic biota and waterfowl contribute to the high levels of Nitrogen (ammonia, nitrate-nitrite, total nitrogen) and phosphorus (chemical nutrients) concentrations.

Oil and grease was detected at station "Culvert", however, the source could be attributed to runoff from Kuamoʻo Road, leakage from the resort's now defunct water pump station, or runoff from the resort's flooded parking garage situated nearby. Oil and grease runoff from roadways does occasionally occur in all urbanized environments. However, what amounts that may have come from Kuamoʻo Road should not have a significant impact on these waterways.

The lack of flowing water into this system may have contributed to oil and grease not being removed from the waterway.

The two fish species and one crab species found during the biological survey are regulated by the State DLNR. State regulations (HAR 13-95) further regulate the taking of aholehole (*Kuhlia xenura*) and Samoan crab (*Scylla serrata*) present in the resort's lagoon. Other State regulations (HAR 13-100 and 188-43) prohibit the taking of ʻoʻopu nakea (*Awaous guamensis*) also present in the lagoon channel. The project and culvert improvements along Kuamoʻo Road would not affect these species or the regulations governing their taking.

The project and culvert improvements are also not expected to significantly impact endangered or threatened species in the resort's waterway. The endangered Hawaiian moorhen (*Gallinula chloropus sandvicensis*), sited about 500 feet away from the culvert, usually nests within 6 to 7 feet of open waters and may be nesting on the property of the Coco Palms Resort. The federally protected Newcomb's snail (*Erinna newcombi*), endemic to Kauaʻi, was not found in these waterways. Its habitat is restricted to streams and springs with exceptionally clean water quality conditions, and not in estuarine waters. No other federally endangered or threatened species were encountered or were anticipated to inhabit the aquatic environments in the resort's waterways.

To minimize potential short-tem construction related effect on these waterways within the resort property along with the drainage ditch on the southern side of Kuamoʻo Road, best management practices would be incorporated into design plans for implementation by the contractor. BMPs should minimize environmental impacts to water quality and aquatic biota in the vicinity of this culvert. If required, nationwide permit coverage for this project improvement would be obtained from the Department of Army, Corps of Engineers. Any conditions associated with the permit would also be implemented by the contractor. Design plans are also being coordinated with pertinent government agencies for ministerial review and approval.

4.5. NATURAL HAZARDS

This section addresses those natural and urban-related hazards applicable to the project. Of the potential natural hazards, earthquake, flooding, tsunami, and hurricane hazards are addressed. Electric-magnetic fields are discussed as part of urban-related hazards.

4.5.5. Earthquake Hazards

Earthquakes in the Hawaiian Islands are primarily associated with volcanic eruptions resulting from the inflation or shrinkage of subsurface magma reservoirs which shift segments of the volcano (Macdonald et al. 1983). Volcanism is the source of energy for about 95 percent of the earthquakes on Hawaiʻi Island. However, in the central region defined as the area encompassing Maui and Oahu, the seismicity is generally related to tectonic activity on the seafloor near the Hawaiian Islands. The northwestern region (Kauaʻi-Niʻihau) has experienced tremors from earthquakes originating farther south, but no known seismic activity has originated

among these islands. The earthquake risk for the northwestern islands has been evaluated as minimal. (Fletcher, Grossman, Richmond, and Gibbs, January 2002).

Impacts and Mitigation Measures

Earthquakes can pose a threat to communities and could potentially cause large economic losses on all islands. The Island of Kauaʻi is not situated in a highly seismic area subject to historic or numerous earthquakes. The County of Kauaʻi's Uniform Building Code seismic hazard rankings is 2A. There is a possibility of future earthquakes occurring on the Island of Kauaʻi based upon past events, therefore, the project may be subject to damage from an earthquake of sufficient magnitude occurring in the area.

The highway widening along with accessory improvements would be designed and constructed in accordance with the State highway design requirements. Utility improvements would also be designed and constructed in conformance to applicable standards. Therefore, the susceptibility of the project being damaged from an earthquake would be no different from other existing highway facilities present in the surrounding East Kauaʻi region.

4.5.6. Hurricane Hazards

The major hazards associated with hurricanes are strong winds, heavy rainfall, large waves, and storm surges. A hazard mitigation report prepared by the Federal Emergency Management Agency (FEMA) after Hurricane Iniki in 1992 determined that nine hurricanes approached within 300 nautical miles (about one day's travel time) of the Hawaiian Island's coastlines between 1970 and 1992. Most hurricanes affecting the islands have impacted Kauaʻi. According to FEMA, hurricane tracks since 1950 do not reveal any geographical or meteorological reasons why hurricanes tend to steer toward Kauaʻi while bypassing other islands (FEMA 1993).

Impacts and Mitigation Measures

In the event of a hurricane, the project corridor would be subject to strong winds, heavy rainfall, and possibly large waves, and storm surges because the highway is routed along the coastline in this area. Therefore, a hurricane of significant strength or high winds passing close to the island could damage the roadway improvements along with other existing infrastructure facilities and urban developments (ex. homes, businesses, etc.).

To minimize damages, the highway improvements would be constructed using acceptable materials and in accordance with appropriate State highway design requirements and standards. Thus, the risk of potential damage from the effects of a hurricane should be no more than other existing highway or roadway facilities. Relocating existing overhead utilities underground and removing associated wooden poles would have a positive effect since it will considerably reduce the potential for damages to those utilities from a hurricane.

4.5.7. Flooding and Tsunami Inundation

Flooding

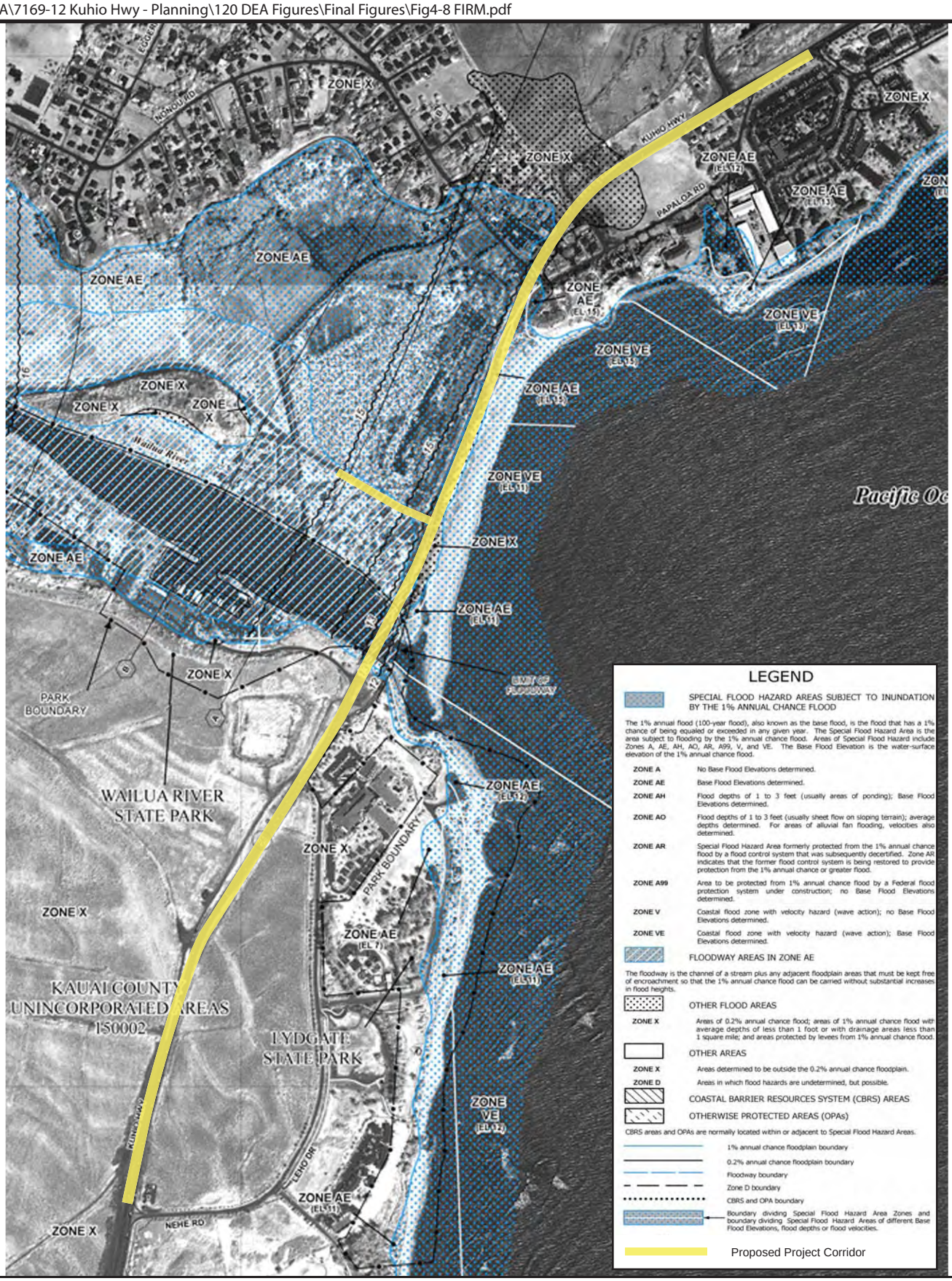
The FEMA designates flood zones according to varying levels of flood risk. According to FEMA's Flood Insurance Rate Map (FIRM), Community Panel Number 1500020130D and 1500020140D dated September 30, 1995, the project corridor is situated within four zones designations. Figure 4-8 graphically shows the flood designations within the project corridor.

- Zone AE: "Special flood hazard areas inundated by the 100-year flood with base flood elevations determined." The base flood elevations for the "AE" zone are 11 and 15 feet above msl.
- Zone VE: "Coastal flood with velocity hazard (wave action); base flood elevations determined". The base flood elevation for the "VE" 11 and 15 feet above msl.
- Floodway areas on Zone AE: "The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights."
- Zone X: "Other flood areas determined to have areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."
- Zone X: "Other areas determined to be outside the 0.2% annual chance floodplain."

Most of the highway widening and Kuamoʻo Road improvements are located within the flood hazard area based upon Figure 4-8. South of Kuamoʻo Road, the utilities relocation would be within the flood hazard area that extends up to and including the Wailuā River. South of the river, the project corridor is outside of the flood hazard area.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly change or affect the risk of flood hazard in the area. The highway widening improvements would occur within the State DOT's existing right-of-way, and only involve a small increase in additional impervious area for roadway pavement. Highway and roadway improvements would be designed and constructed in conformance with State DOT standards. Therefore, these improvements would not significantly change the drainage patterns and associated flood hazards present along the corridor. The relocated utilities planned would be situated underground and thus not affect the above ground drainage patterns and flood hazard. South of the Wailuā River, the relocated utilities are not situated within a flood hazard area. The relocated utilities would also cross under the river using horizontal directional drilling and therefore not affect the flood hazard associated with the river.



MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

FIGURE 4-8
FLOOD INSURANCE RATE MAP FOR PROJECT CORRIDOR

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

WILSON OKAMOTO CORPORATION
ENGINEERS | PLANNERS | CONSULTANTS

Tsunami Inundation

The Hawaiian Islands have a history of destructive tsunamis. The recorded history of Hawaiian tsunamis shows that 26 large tsunamis have made landfall within the islands, and 8 have had significant damaging effects on Kauaʻi. The last of these damaging tsunamis occurred in 1964, yet before this time (since 1868), a damaging tsunami reached Kauaʻi on average once every 12 years. It is important to note that the frequency of tsunami occurrence is chaotic or unpredictable and particular periods of time may be characterized by significantly different tsunami activity than others (Fletcher, Grossman, Richmond, and Gibbs, January 2002).

Severe tsunamis have occurred with wave heights at varying locations in Hawaiʻi ranging from 4 to 60 feet. On Kauaʻi, four tsunamis have occurred in recent history in 1946, 1957, 1960, and 1964. The 1946 tsunami wave heights varied from 12 to 15 feet in height, and the 1957 tsunami had heights between 7 and 20 feet along the project corridor (Loomis, May 1976).

Impacts and Mitigation Measures

The highway widening and accessory improvements planned could potentially be subject to damages from a tsunami of sufficient height in the future since the highway is routed along the coastline. Portions of the highway corridor are within or close to the Zone VE flood designation as indicated in Figure 4-7 primarily within the Wailuā River to Haleilio Road section. The highway improvements are not expected to be significantly damaged from a tsunami since it is comprised of pavement as compared to above ground structures in the area such as residences. Highway and roadway improvements would be designed in accordance with State and County requirements to further minimize damages from a tsunami.

The relocation of existing overhead utilities and removal of associated poles would eliminate potential exposure from damages due to a tsunami for that section of utilities because they would be underground. This would be a beneficial effect of the project minimizing potential damages and improving safety for residents in the area.

4.5.8. Electric and Magnetic Fields (EMF)

There has been increasing public interest in the potential health effects associated with high and low frequency electric and magnetic fields (EMF). People at home are frequently exposed to EMF from common appliances such as stoves, televisions, refrigerators, and computers. As a result, research has been conducted worldwide by several agencies, such as National Institute of Environmental Health Sciences, as well as epidemiological studies of children and adults, clinical studies of how humans react to typical EMF exposures, and laboratory research with animals and cells.

EMF Background

Electric and magnetic fields (EMF) are invisible lines of force that surround any electrical device. Power lines, electrical wiring, and electrical equipment all produce EMF. Electric fields are produced by voltage and its strength depends on the voltage and decreases with distance. Most electrical equipment must be connected to an electrical outlet for an electric field to be produced. Electric fields are shielded or weakened by materials that conduct electricity along with other objects such as trees, buildings, and human skin which can partially block or shield out electric fields. Electric fields decrease rapidly as the distance from the source increases. (NIEHS, June 2002).

Magnetic fields result from an electrical current and are not present unless current is flowing due to the operation of an appliance or devise. The stronger the current is, the greater the magnetic field. Like electric fields, magnetic fields also decrease rapidly as the distance from the source increases. Magnetic fields, however, pass through most materials and are therefore more difficult to shield.

EMF usually refers to electric and magnetic fields at extremely low frequency (ELF) which ranges from 3 to 3,000 hertz (Hz). This range includes power-frequency (50 to 60 Hz) fields which are produced by the generation, transmission, and use of electricity. Cellular phones and towers involve radio-frequency and microwave-frequency electromagnetic fields. These are a much higher frequency range than are the power-frequency electric and magnetic fields associated with the transmission and use of electricity (see Exhibit 4-3).

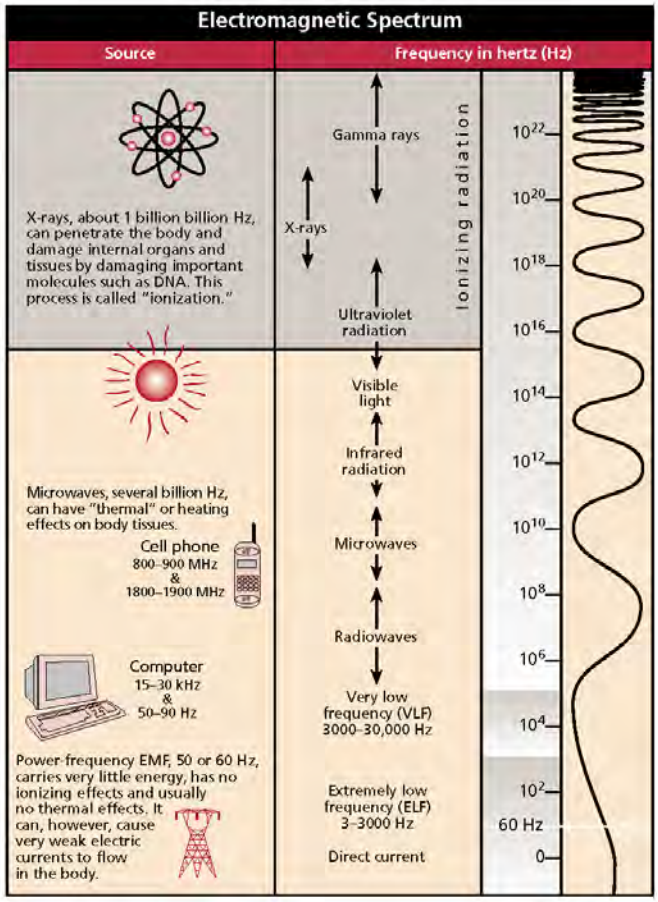


Exhibit 4-3 – Electromagnetic Spectrum

The following is an excerpt from the National Institute of Environmental Health Sciences (NIEHS) EMF Questions and Answers (June 2002).

Since 1995, two major U.S. major reports concluded that limited evidence exists for an association between EMF exposure and increased leukemia risk, but that when

all scientific evidence is considered, the link between EMF exposure and cancer is weak. The World Health Organization in 1997 reached a similar conclusion.

The two reports were the U.S. National Academy of Sciences Report in 1996 and in 1999 the National Institute of Environmental Health Sciences report to the U.S. Congress at the end of the U.S. EMF Research and Public Information Dissemination (RAPID) Program.

Existing Conditions Associated with EMF

There are no federal standards limiting occupational or residential exposure to 60-Hz EMF. Six states have set standards for transmission line electric fields. The American Conference of Governmental Industrial Hygienists (ACGIH) publishes "Threshold Limit Values" (TLVs) for various physical agents. The ACGIH has developed TLVs for 60-Hz EMF and are guides to control exposure. The Hawaiʻi State Department of Health (1994) recognizes that EMF has not yet proven to be a health hazard. Since the research is inconclusive, DOH's policy is to favor protection of the public health and recommends public exposure be minimized where feasible. The DOH has recommended a "prudent avoidance" policy.

"Prudence avoidance" means that reasonable, practical, simple, and relatively inexpensive action should be considered to reduce exposure.

KIUC currently operates three separate electrical systems within the project corridor consisting of a 57 kV transmission system, a 12 kV customer distribution system, and a street lighting system which are all located overhead along existing poles. Hawaiian Telcom and Oceanic Time Warner Cable also have overhead utility lines routed within the project corridor on these poles. These overhead utility lines thus produce some electrical and magnetic fields.

Electric fields in the home, on average, range from 0 to 10 volts per meter. They can be hundreds or thousands of times weaker than those encountered outdoors near power lines. Electric fields directly beneath power lines may vary from a few volts per meter for some overhead distribution lines to several thousands of volts per meter for extra high voltage power lines (not present on Kauaʻi). However, electric fields from power lines rapidly become weaker with distance and can be greatly reduced by walls and roofs of buildings. Underground lines do not produce electrical fields above ground but may produce magnetic fields above ground (NIEHS, June 2002).

Most people in the United States are exposed to magnetic fields that average less than 2 milligauss (mG). Data indicates that magnetic fields ranged from 2 to 8 mG at a distance of 2 feet away from color televisions, and from 2 to 6 mG at a distance of 1 foot away from a computer monitor. Based upon data from other transmission lines, the KIUC's 57 kV lines may generate magnetic fields in the range of 15.3 mG under the line, and 2.17 mG 50 feet away. Thus, the magnetic fields from these lines at a distance of 50 feet may be similar to typical background levels found in most homes.

Impacts and Mitigation Measures

The project will place existing overhead utilities underground along the entire project corridor from the Temporary Kapaʻa Bypass Road to South Leho Drive. As a result, this improvement would greatly reduce current electrical fields occurring from KIUC's existing overhead lines since underground lines do not produce electrical fields above ground. Relocating the overhead utility lines underground would also reduce the exposure to magnetic fields. Therefore, this project should have a positive beneficial effect by reducing potential exposure from EMF. Research to date has not demonstrated evidence of health hazards cause by overhead utility lines. This improvement would also support the State DOH's policy of "prudent avoidance" approach to reduce exposure to EMF.

4.6. BOTANICAL RESOURCES

Rana Biological Consulting, Inc. conducted a botanical survey of the proposed highway corridor which included the utilities relocation on February 16, 2009. A copy of their report is included in Appendix F. The purpose of the survey was to determine if there were any botanical species currently listed or proposed for listing under either federal or State of Hawaiʻi endangered species statutes within or adjacent to the proposed project area.

A plant checklist was compiled from field observations and can be found in Appendix F. The total number of flowering plants, cycads, and ferns recorded during the survey was 110. Of this number, only three (3) or 2.7 percent were considered native, indigenous (found in Hawaii and elsewhere) species and another three (3) early Polynesian introductions. While this number of Hawaiian plants is low, the environment is a highly disturbed one. The natives include naupaka (*Scaevola taccada*) and hala (*Pandanus tectorius*) used in this area for landscaping, and hau (*Hibiscus tiliaceus*) which lines the bank of the river upstream of the highway bridge.

Nearly all of the plants encountered are introduced (non-native) species, many considered opportunistic weeds (ruderal species) typical of disturbed areas, such as the frequently maintained highway verge. The small numbers of native species found along the project right-of-way are considered to be common throughout the islands, and, in this area, have been planted as part of landscaping efforts.

Impacts and Mitigation Measures

No plant species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawaiʻi's endangered species programs were recorded within or close to the proposed project area. Therefore, it is not expected that the modification to the environment proposed under this project will result in deleterious impacts to any plant species currently listed under either federal or State of Hawaiʻi endangered species statutes.

Since the project site does not provide a unique habitat, no significant impacts on flora species are anticipated from the construction and operation of the proposed project. No habitat

of a threatened or endangered plant species, or species of concern will be affected. Construction of the proposed project will require the removal of predominantly introduced vegetation, as well as native but not rare plant species that are indigenous to the Hawaiian Islands and elsewhere throughout the Pacific.

4.7. FAUNAL RESOURCES

Rana Biological Consulting, Inc. conducted a faunal survey of highway corridor which included the utilities relocation on February 16, 2009. A copy of their report is included in Appendix F. The purpose of the survey was to determine if there were any avian or mammalian species currently listed, or proposed for listing under either federal or State of Hawaii endangered species statutes within or adjacent to the proposed project area.

4.7.9. Avian Survey

Eight avian count stations were sited along the length of the proposed project corridor, at approximately 300-meter (984 foot) intervals. Counts were concentrated in the early morning hours, the peak of daily bird activity. Weather during the course of the survey was ideal.

A total of 133 individual birds of 14 species, representing 12 separate families, were recorded during station counts (see Appendix F). An additional species, Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*) was recorded as an incidental observation adjacent to the southern terminus of the Temporary Kapaʻa Bypass Road. Two of the species detected during the course of this survey, Black-crowned Night-Heron, and Pacific Golden-Plover (*Pluvialis fulva*) are native species. The former is an indigenous breeding species, and the later a migratory indigenous species. The remaining 13 species are considered to be alien to the Hawaiian Islands.

Avian diversity and densities were in keeping with the locations and the habitat present on the site. Four species accounted for slightly less than 64 percent of the total number of all birds recorded during station counts. These were the Common Myna (*Acridotheris tristis*), Japanese White-eye (*Zosterops japonicus*), Zebra Dove (*Geopelia striata*), and House Sparrow (*Passer domesticus*). The most commonly recorded species was Common Myna, which accounted for over 19 percent of the total number of individual birds recorded. An average of 17 birds was detected per station count.

No waterbirds were recorded during the course of this February 2009 survey conducted along the Wailuā River. No avian species currently protected, or proposed for protection under either the Federal or State of Hawaiʻi endangered species programs were also detected during this survey.

During a separate field survey conducted previously on October 2007 for the Kuamoʻo Road culvert, an *Alae ula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*), which is an endangered subspecies, was observed along the eastern bank of the lagoon within the Coco Palms Resort. This endangered Hawaiian Moorhen was sighted in the lagoon approximately

500 feet away from the culvert at Kuamoʻo Road. This subspecies is federally protected by the Endangered Species Act of 1973). The Hawaiian Moorhen usually nests within about 6 to 7 feet of open waters and may be nesting on the property of the Coco Palms Resort.

Hawaiian Petrel and Newell's Shearwaters

Although not detected during this survey, both the endangered Hawaiian Petrel (*Pterodroma sandwichensis*) and the threatened endemic sub-species of the Newell's Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the general project area between April and the end of November each year. There are no nesting colonies or suitable nesting habitat for either of these species on, or close to the project corridor.

The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies. Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawaiʻi. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals.

Data gathered as part of the Save Our Shearwaters (SOS) Program over the past 30-years showed that both Hawaiian Petrels and Newell's Shearwaters have been downed along the project corridor on an annual basis over the last 30 years. It is impossible to state with any certainty the exact number of these two species that have been recovered in the general project corridor over the life of the SOS program, since much of the data is not site specific enough to identify the pickup locations of birds recovered to within the confines of this projects limits.

What can be said is that at least 182 Newell's Shearwaters have been collected by the SOS program within the general project area between 1979 and 2007. The number of birds recovered on an annual basis has dropped after the Coco Palms Hotel ceased operations following hurricane Iniki in September 1992. The SOS data recorded 154 shearwaters recovered within the general project area between 1979 and 1992 (an average of 11-birds a year). Between 1993 and 2007, the data recorded 28-birds recovered for an average of slightly less than two (2) birds a year. Over the past 10 years, a total of nine (9) birds have been recovered within the general project area, or slightly less than one bird a year.

It should also be noted that the SOS program has not recovered any Hawaiian Petrels within the general project area has over the past 30-years.

4.7.10. Mammalian Survey

All terrestrial mammals currently found on the Island of Kaua'i are alien species, and most are ubiquitous. The only exception is the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or ʻōpeʻapeʻa as it is know locally. The survey of mammals was limited to visual and

auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project area.

No mammals were recorded during this survey. This is a finding that is not unusual considering that the survey was conducted along the shoulder of one of the busiest highway's on the island of Kauaʻi.

Although no rodents were detected during this survey, it is likely that the four established alien *muridae* found on Kauaʻi use various resources found within the general project area. These rodents consist of the roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), European house mouse (*Mus musculus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*). All of these introduced rodents are deleterious to native ecosystems and the native faunal species dependant on them.

The findings of the mammalian survey are consistent with the location of the property and the habitat currently present along the project corridor. Although no Hawaiian hoary bats were detected during the course of this survey, bats have been recorded foraging for insects in the general project area. Hoary bats are widely distributed in the lowland areas on the Island of Kauaʻi, and have been documented in and around almost all areas that still have some dense vegetation.

Impacts and Mitigation Measures

The project should not have a significant impact on majority of avian and mammalian species present within or along the project corridor. The majority of avian species identified along the project corridor are alien to the Hawaiian Islands and would not be impacted by the project improvements. Terrestrial mammals in this area are alien species, and most are present everywhere on the island. All of the introduced rodents that are likely in the area are harmful to native ecosystems and the native faunal species.

The project is not expected to significantly impact endangered or threatened species that may be present in affected waterways. The endangered Hawaiian Moorhen was sited within the Coco Palms Resort's lagoon about 500 feet away from the Kuamoʻo Road culvert which is planned for modifications. However, this species or others that may be present within the resort's lagoon should not be affected. Construction activities would be limited to the immediate area of the culvert and thus occur well away.

No waterbirds were recorded along the Wailuā River during the February 2009 survey conducted. No avian species currently protected, or proposed for protection, under either the Federal or State of Hawaiʻi endangered species programs were also detected along the project corridor during this survey. The Kaloko Marsh and its adjacent waterways do not currently support aquatic biota, therefore, no federally endangered or threatened species were encountered during the surveys, and none are anticipated to utilize aquatic habitats in this

project area. As a result, the impacts discussion focuses on the Hawaiian Petrel, the Newell's Shearwater, and Hawaiian hoary bat.

Hawaiian Petrel and Newell's Shearwaters

The principal potential threats that currently exist within the general project area to the Hawaiian Petrel and the Newell's Shearwater are those posed by street lights, business lighting and the utility wires and associated poles that run the length of the proposed project corridor in various configurations and numbers. The threats posed by these structures and outdoor lighting are associated with birds being downed after becoming disoriented by outdoor lighting and possibly colliding with above ground utility structures, and other man-made structures.

The proposed project will relocate existing overhead utilities (electrical, telephone, cable) underground from the area just north of the Temporary Kapaʻa Bypass Road southbound to the KIUC Lydgate Substation at South Leho Drive. The utility poles associated with these lines will also be removed. These actions will have a positive beneficial impact because it will eliminate the existing threats to these listed seabird species from these overhead utilities within this project corridor.

Hawaiian Hoary Bat

The current habitat present along the project corridor is not of the type or general plant makeup that one would ordinarily expect to find bats roosting in. It is possible that bats forage over the site on a seasonal basis. However, the clearing of the necessary areas for construction and the operation of the highway improvements is not expected to result in any deleterious impacts to this listed species.

Mitigative Measures for Construction Activities

The State DOT plans to incorporate the following minimization measures during the course of construction activities to ensure that such activities have a minimal impact on either of the listed seabird species previously discussed.

- During the construction phase of the project, any lighting necessary to conduct nighttime activities will be shielded and or directed at the ground.
- No nighttime construction will occur during the peak fallout period, namely between September 15 and December 15 annually.
- All construction personnel will be required to attend a seabird awareness program prior to the initiation of construction activity.
- A pet carrier will be maintained on site at all times, and will be used to temporarily hold any downed seabird recovered in the general project area.
- If a downed seabird is found within the general project area it will be retrieved and placed in the pet carrier and maintained in a shady location until DOFAW or SOS program personnel retrieve the bird.

- DOFAW and/or the SOS program will be contacted immediately upon recovery of any downed bird.
- The USFWS shall be notified of any downed seabird within 24-hours of the occurrence.

Best Management Practices would be incorporated into design plans for implementation by the contractor. These practices developed should minimize and mitigate short-term construction related impacts to avian species, waterbirds, or mammals that may be present in the vicinity of project corridor. This includes improvements to the existing culvert along Kūhiō Highway by the Kaloko Marsh and culvert along Kuamoʻo Road by the Coco Palms Resort drainageway. Any conditions associated with the permit would also be implemented by the contractor. Design plans are also being coordinated with pertinent government agencies for ministerial review and approval.

4.8. NOISE

4.8.11. Noise Standards and Guidelines

State and Federal agencies have established guidelines and standards for assessing environmental noise impacts and have set noise limits as a function of land use. Noise programs, goals, and policies administered by the FHWA, the State DOT, and State DOH are described below.

Federal Highways Administration Noise Standards

The U.S. Department of Transportation, FHWA administers the federal noise standard for highway traffic noise and construction noise, which is Title 23 of the Code of Federal Regulations, Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772). The purpose of the law is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.

Highway traffic noise is never constant. The noise level is always changing with the number, type, and speed of the vehicles which produce the noise. For practical purposes, data for varying traffic noise levels is expressed using statistical descriptors. One of the most common statistical descriptors for traffic noise is Leq. Leq is the constant, average sound level, which over a period of time contains the same amount of sound energy as the varying levels of the traffic noise.

The FHWA defines four land use categories and assigns corresponding maximum hourly equivalent sound levels, Leq(h), for traffic noise exposure. Table 4-1 identifies these sound levels based upon activity categories. For example, Category B, defined as picnic and recreation areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals, has a corresponding maximum exterior Leq of 67 dBA and a maximum interior Leq of 52 dBA

under Category E. These limits are viewed as design goals, and all projects meeting these limits are deemed in conformance with FHWA noise standards.

Table 4-1
FHWA & State DOT Noise Abatement Criteria
Hourly A – Weighted Sound Level – Decibels (dBA)

Activity Category	Description of Activity Category	Hourly A-Weighted Sound Level – decibels (dBA)[1]
		$L_{eq}(h)$
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.	57 (Exterior)
B	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.	67 (Exterior)
C	Developed lands, properties, or activities not included in Categories A or B above.	72 (Exterior)
D	Undeveloped lands.	–
E	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.	52 (Interior)

Source: 23 CRF 772, Table 1.

State DOT Noise Analysis and Abatement Policy

The State DOT has adopted FHWA's design goals for traffic noise exposure in its noise analysis and abatement policy. According to the policy, a traffic noise impact occurs when the predicted traffic noise levels "approach" or exceed FHWA's design goals or when the predicted traffic noise levels "substantially exceed the existing noise levels." The policy also states that "approach" means at least 1 dB less than FHWA's design goals and "substantially exceed the existing noise levels" means an increase of at least 15 dB.

State DOH, Community Noise Control

The State DOH, Environmental Health Services Division, Indoor and Radiological Health Branch implements the Community Noise Program. This program provides for the enforcement of maximum permissible sound levels for stationary noise sources and the issuance of permits for agricultural, construction, and industrial activities.

Under Title 11, Chapter 46 (Community Noise Control), HAR, the State DOH defines three classes of zoning districts with corresponding maximum permissible sound levels due to stationary noise sources such as air-conditioning units, exhaust systems, generators, compressors, pumps, and equipment related to agricultural, construction, and industrial activities. These rules do not address most moving sources of noise such as vehicular traffic. The maximum permissible sound levels are enforced for any location at or beyond the property line and are not to be exceeded for more than 10 percent of the time during any 20-minute

period, except by permit or variance. The zoning district classification and maximum permissible sound levels are summarized in Table 4-2 below.

Table 4-2
State DOH Community Noise Level
Classification of Zoning Districts and Maximum Permissible Sound Levels

Zoning District	Maximum Permissible Sound Levels (dBA)	
	Daytime (7 a.m. to 10 p.m.)	**Nighttime (10 p.m. to 7 a.m.)**
Class A: Includes all areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.	55	45
Class B: Includes all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: Includes all areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70

4.8.12. Existing Acoustical Environment

Noise measurements of existing conditions were obtained at several locations along the highway project corridor in April 2007. Noise receptor locations were situated along both the east (makai) and west (mauka) sides of the highway. Receptor locations also included an elevated 3-story condominium (Wailuā Bay View), single family residences, and the abandoned 3-story buildings of the Coco Palms Resort.

Commercial establishments border the east and west sides of the project corridor near the middle and north sections of the project corridor. The buildings and structures associated with these commercial establishments are situated at very short distances away from the State DOT's existing right-of-way for Kūhiō Highway. Because of these very short setback distances, existing traffic noise levels varied between 69 and 72 Leq(h) at these commercial establishments.

The Wailuā Beach Park is located at the south end of the project corridor along the east (makai) side of the highway's right-of-way. The existing 66 Leq(h) traffic noise contour encloses the beach parking lot and the normally unoccupied vegetation area situated between the highway and the high water (vegetation) line about 66 feet seaward or makai of the highway's right-of-way. The existing traffic noise levels probably do not exceed the State DOT's 66 Leq(h) criteria at the water recreation and sunbathing areas of the beach park. These areas are at a lower elevation and partially shielded from vehicles along the highway by the sloping terrain to the shoreline.

Existing traffic and background ambient noise levels within the project corridor currently exceed the FHWA and State DOT noise abatement criteria for residential, commercial, and park lands. The existing traffic and background ambient noise levels at almost all the noise sensitive receptor locations are currently greater than the FHWA and State DOT noise abatement criteria level of 66 Leq(h). Because existing traffic noise levels are relatively high, it is unlikely that the State DOT's other criteria of "15 dB increase or more above existing background noise levels" will be exceeded by future traffic in the year 2012.

Impacts and Mitigation Measures

Future traffic noise levels in the year 2012 are expected to continue exceeding the 66 Leq State DOT noise abatement criteria at existing residential buildings east (or makai) of the highway, and at planned condominium units west (or mauka) of the highway. No public use facilities are expected to be adversely impacted by future traffic noise levels from the proposed roadway improvements. Existing and future traffic noise levels will continue to exceed the 66 Leq criteria along the fence and in the vegetation area of the Wailuā Beach Park, but potential noise impacts on park users are not anticipated. Future traffic noise levels are expected to exceed the 71 Leq criteria for commercial properties situated along the middle section of the project corridor (Haleilio Road area).

Traffic noise mitigation measures in the form of solid noise barriers could be applied at the affected residences or commercial establishments situated along the highway project corridor, but should be examined according to the criteria of reasonable and feasible. Under the existing State DOT policy, construction of walls can be considered to be reasonable and feasible if the cost of the sound attenuating walls does not exceed $35,000 per benefited residence. However, construction of a sound attenuating wall may not be desired by residents or commercial establishments.

The use of sound attenuating walls was considered to not be appropriate since businesses typically require visual exposure from the highway rather than concealment behind walls. Walls are also potentially subject to graffiti which would further impact businesses and residences. In addition, the majority of the existing commercial establishments fronting the highway are currently air conditioned which is already an effective noise mitigation measure for commercial establishments.

Furthermore, traffic conditions along the highway project corridor will change in the future with the probable implementation of the Kapaʻa Relief Route project. This State DOT bypass road project is still in the planning phase and is intended to serve as a regional solution to address traffic conditions in East Kauaʻi. Therefore, traffic volumes along Kūhiō Highway will change with a large amount of traffic routed onto the new bypass highway, and this will subsequently change future traffic noise volumes along the highway. Implementation of traffic noise mitigation measures should thus be more appropriately determined based upon the results of the studies and technical documents associated with that regional transportation

project. Based upon this regional solution being developed, necessary noise mitigation measures should be more appropriately developed and determined at that time.

Short-Term Noise Impacts from Construction Activities

Construction noise impacts will be unavoidable, but will be short-term and are not expected to result in significant noise impacts. Noise from construction activities is regulated under Title 11, Chapter 46 (Community Noise Control) of the State DOH's Administrative Rules. Construction activities will temporarily increase ambient noise levels within the vicinity of the work area. The project would involve excavation, grading, and construction of the new highway and supporting infrastructure. Earthmoving equipment such as bulldozers and diesel-powered trucks would probably be the loudest equipment used during construction. Typical ranges of construction equipment noise vary between 70 and 95 dBA. Noise exposure due to construction activities at any point along the project corridor is not expected to be continuous over the entire duration of the construction period.

The project corridor includes land uses that fall under all three of the State DOH Community Noise Class zoning districts categories. This is due to the various mix of land uses present which include fallow agricultural land, residences, hotel, open space, and commercial uses. As a result, the maximum permissible noise levels along this corridor vary from 55 to 60, and 70 dBA at the property line during daytime hours. The majority of construction activities for this project are planned to be scheduled during the day. However, some night work will be required for certain improvements due to the closing of some lanes, therefore, a noise variance will be applied for from the State DOH.

A noise permit will also be obtained from the State DOH for construction activities planned during daytime hours. This permit includes restrictions to help mitigate the potential noise impacts resulting from short-term construction activities. Specific restrictions that may be imposed as conditions for construction activity noise permits include the following:

- No permit shall allow construction activities creating excessive noise before 7:00 a.m. and after 6:00 p.m. of the same day.
- No permit shall allow construction activities that create excessive noise before 9:00 a.m. and after 6:00 p.m. on Saturdays.
- No permit shall allow construction activities which exceed the allowable noise levels on Sundays and holidays.

4.9. AIR QUALITY

Federal ambient air quality standards (AAQS) have been established by the U.S. Environmental Protection Agency (EPA) for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), lead (Pb), ozone (O3), and concentrations of particulate matter less than 10 microns (PM10) and 2.5 microns (PM2.5). A summary of the

federal and Hawaii ambient air quality standards that apply to the proposed project area is presented in Table 4-3.

Since 2003, the State began participating in the National $PM_{2.5}$ speciation monitoring program. Additionally, a State standard has been established for hydrogen sulfide (H_2S) primarily associated with geothermal and volcanic activity since there are no federal standards for this pollutant. For selected criteria pollutants, the State of Hawaii has established State ambient air quality standards that are somewhat more stringent than the federal standards under Title 11, Chapter 59, Hawaiʻi Administrative Rules (HAR) as indicated in Table 4-3.

Table 4-3
State and Federal Ambient Air Quality Standards

Air Pollutant	Averaging Time	Hawaii AAQS	Federal (NAAQS)	
			Primary	Secondary
Carbon Monoxide (CO)	1-hour	9 ppm	35 ppm	--
	8-hour	4.4 ppm	9 ppm	--
Lead (Pb)	Quarterly	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3
Nitrogen Dioxide (NO_2)	Annual	0.04 ppm	0.053 ppm	0.053 ppm
Ozone (O_3)	8-hour	0.08 ppm	0.075 ppm	0.075 ppm
Particulate Matter ≤10 micrometers in diameter (PM_{10})	Annual	50 µg/m^3	--	--
	24-hour	150 µg/m^3	150 µg/m^3	150 µg/m^3
Particulate Matter ≤2.5 micrometers in diameter ($PM_{2.5}$)	Annual	--	15 µg/m^3	15 µg/m^3
	24-hour	--	35 µg/m^3	35 µg/m^3
Hydrogen Sulfide (H_2S)	1-hour	0.025 ppm	--	--
Sulfur Oxides (SO_2)	Annual	0.03 ppm	0.03 ppm	--
	24-hour	0.14 ppm	0.14 ppm	--
	3-hour	0.50 ppm	--	0.50 ppm

Source: State Department of Health, 2008.

4.9.13. Existing Ambient Air Quality Conditions

The State DOH operates several ambient air monitoring stations throughout the State. The pollutants monitored by the State are generally done on a regional level, and most of these stations are located at various sites on the Island of Oahu. There are no monitoring stations for lead. Stations located on the Island of Hawaii are intended to monitor pollutants associated with volcanic (vog) and geothermal activity (SO_2 and H_2S). Another monitoring station is located in Kihei on the Island of Maui. However, the monitoring objective for this station is for pollutants associated with sugarcane burning (PM_{10} and $PM_{2.5}$).

There are no air quality monitoring stations on the island of Kauaʻi. Regional air quality on Kauaʻi and in the State is generally characterized as relatively clean and low in pollution. The pollutant levels remain well below both State and federal ambient air quality standards for all

pollutants monitored. The State DOH's 5-year trends of air quality data for PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3, and CO from 2003 to 2007 indicate levels are within standards which further confirm this determination (DOH, October 2008).

Air quality in the vicinity of the project site is generally good with prevalent tradewinds blowing seaward through most of the year. Within the immediate vicinity of the project site, air quality is primarily affected by vehicular-related emissions in the form of carbon monoxide (CO) generated by traffic along Kūhiō Highway and other nearby roadways.

Impacts and Mitigation Measures

Short-term impacts on air quality from construction activities would predominantly be associated with fugitive dust emissions and exhaust emissions from on-site construction equipment. Fugitive dust emissions would generally arise from dirt moving activities associated with site clearing, grading, and ground preparation work. As a result, such effects would only be temporary and should not have a significant impact on air quality resulting in exceeding the State and federal ambient air quality standards.

Temporary on-site mobile and stationary construction equipment would emit air pollutants from engine exhausts. Nitrogen dioxide and carbon monoxide emissions from construction equipment should not violate State air quality standards since such emissions will be short-term, and Nitrogen dioxide standards are set on an annual basis. To limit potential air quality impacts, engine exhaust emissions from construction vehicles will be minimized through the proper operation and maintenance of all equipment.

State air pollution controls prescribed under the State Department of Health's Chapter 11-59, HAR "Ambient Air Quality Standards" and Chapter 11-60.1, HAR "Air Pollution Control" prohibit visible emissions of fugitive dust from construction activities at the property line. Therefore, a dust control plan will be prepared and implemented to ensure that the contractor complies with these regulations. Fugitive dust emissions associated with grading and dirt-moving activities are difficult to estimate accurately. However, an effective dust control plan for the project's construction will be implemented to minimize any short-term air quality impacts.

Fugitive dust can be controlled by watering active work areas, using wind screens, keeping adjacent paved roads clean, and covering open-bodied trucks. Other dust control measures may include limiting the disturbed area at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Open-bodied trucks will be covered at all times in motion if they are transporting materials that could blow away. Tire washing may also limit haul trucks tracking dirt onto paved streets from unpaved areas within the property. Paving of the roadway and/or the establishment of landscaping early in the construction schedule can also lower potential fugitive dust emissions.

In the long-term, the proposed Kūhiō Highway improvements should not significantly impact air quality. The utility improvements should have no effect on air quality in the region.

The highway improvements will alleviate existing and future traffic congestion along Kūhiō Highway in the Wailuā area. As a result, air quality should be improved over existing and projected conditions due to the reduction of traffic congestion and corresponding reduction in carbon monoxide emissions concentrated at intersections due to vehicles waiting idle in traffic. Therefore, air quality impacts due to vehicles traveling along the highway are not expected to result in exceeding the State or federal air quality standards. Several of those pollutants monitored are also regional issues such as ozone, or monitored on an annual basis such as nitrogen dioxide. The project would thus have minimal effect on those pollutants and should not result in the State or federal standards being exceeded.

Federal air pollution control regulations also require new motor vehicles to be equipped with emission control devices that reduce emissions significantly compared to a several years ago. Amendments to the Clean Air Act required further emission reductions which have been phased in since 1994. The added restrictions on emissions from new motor vehicles will further lower average emissions each year as older vehicles leave the County's roadways. Carbon monoxide emissions, for example, could go down by an average of about 30 to 40 percent per vehicle during the next 10 years due to the replacement of older vehicles with newer models.

4.10. ARCHAEOLOGICAL, HISTORIC AND CULTURAL RESOURCES

An archaeological inventory survey was conducted by Cultural Surveys Hawaii, Inc. (CSH), and the results of this survey are included in Appendix G. The archaeological inventory survey scope of work was developed and implemented to satisfy SHPD requirements. The scope of work for this inventory survey was designed in accord with State Historic Preservation Division rules governing standards for archaeological inventory surveys and reports (HAR 13-13-276). This scope of work also included full coordination with the SHPD and County relating to archaeological matters. It should be noted this inventory survey later became an archaeological assessment because no archaeological or historic properties were located within the project corridor. A summary of the primary survey work tasks conducted is provided.

1. A complete ground survey of the entire project area for the purpose of historic property inventory.
2. Ground penetrating radar (GPR) survey to: 1) locate potential subsurface cultural anomalies, 2) assess local stratigraphy, and 3) locate modern utilities along areas designated for subsurface testing.
3. Given the location of the parcel, subsurface testing with a backhoe was needed during the inventory survey. Backhoe testing focused on locating and evaluating subsurface deposits, such as buried cultural layers and/or deposits with significant paleoenvironmental data, which could not be located by surface pedestrian inspection. Testing in sensitive areas was conducted by hand after the initial backhoe work. If appropriate samples from these excavations were found, they will be analyzed for chronological and paleoenvironmental information.
4. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research

focused on the specific area with general background on the ahupuaʻa and district and emphasized settlement patterns.

4.10.1. Background Research

The review of traditional mythological literature indicates that Wailuā was prominently associated with some of the most famous legendary and historical individuals including Maui, Kawelo, Pikoiakaala, Laieikawai, Moikeha, Laamaikahiki and Kaililauokekoa. These associations suggest a long, continuous occupation of the area.

The traditional settlement patterns for the Wailuā ahupuaʻa suggest the Wailuā River was the most important high-status area on Kauaʻi in pre-contact times. This was the royal center where the high chiefs and chiefesses dwelled and entertained visitors when they were not traveling throughout the islands. The prominence of this area is indicated by the proximity of remnants within the Wailuā Complex of Heiau in the project vicinity. The Wailuā Complex of Heiau was designated a National Historic Landmark in 1962. There exist no visible surface remnants of the chiefly homes, the supporting loʻi and kula lands, the places of recreation, the burial place called Mahunapuoni (just makai of Kapule's fishponds), the fish traps or the canoe landings. Figure 4-9 shows archaeological sites in coastal Wailua Ahupuaa.

Some house sites were south of the river (makai of the present highway), but the majority of house sites were on the north side of the river just mauka of the highway between the Coco Palms Resort and the river. A burial area or cemetery is also associated with these house lots between the Coco Palms Lagoon and beach and previous archaeological work shows there are still present remains of the habitation layer and the burials.

During the building of the Coco Palms Resort, an unknown number of human burials were encountered and reinterred at the front of the hotel with a plaque attached on a boulder on the spot to mark the reinternment. In addition, there are four SIHP Sites on the Coco Palms Resort property: 50-80-08-660, historic burial; -680, two fishponds, -681, burial ground; and -1711 an intermittent cultural layer.

The portion of Kūhiō Highway north of Wailuā River was originally owned by the Ahukini Terminal and Railway Company (ATR) as a railroad right-of-way. The railway later became part of the Līhuʻe Plantation Company. Remnants of the railroad can be found on the mauka side of Kūhiō Highway. In 2007, an archaeological inventory survey with subsurface testing was conducted for a former railroad/cane haul road corridor, lying between the Coco Palms Resort and Kūhiō Highway. A total of 10 trenches were excavated and no traditional Hawaiian artifacts, diagnostic historic artifacts, or burials were observed. A weak cultural layer was observed and determined to be a component of an intermittent cultural layer (SIHP 50-30-08-1711) previously discovered.

SIHP #50-30-08-866 located near the northern end of the project corridor consisted of a subsurface cultural layer containing a hearth remnant, a possible buried ʻauwai and two sets of

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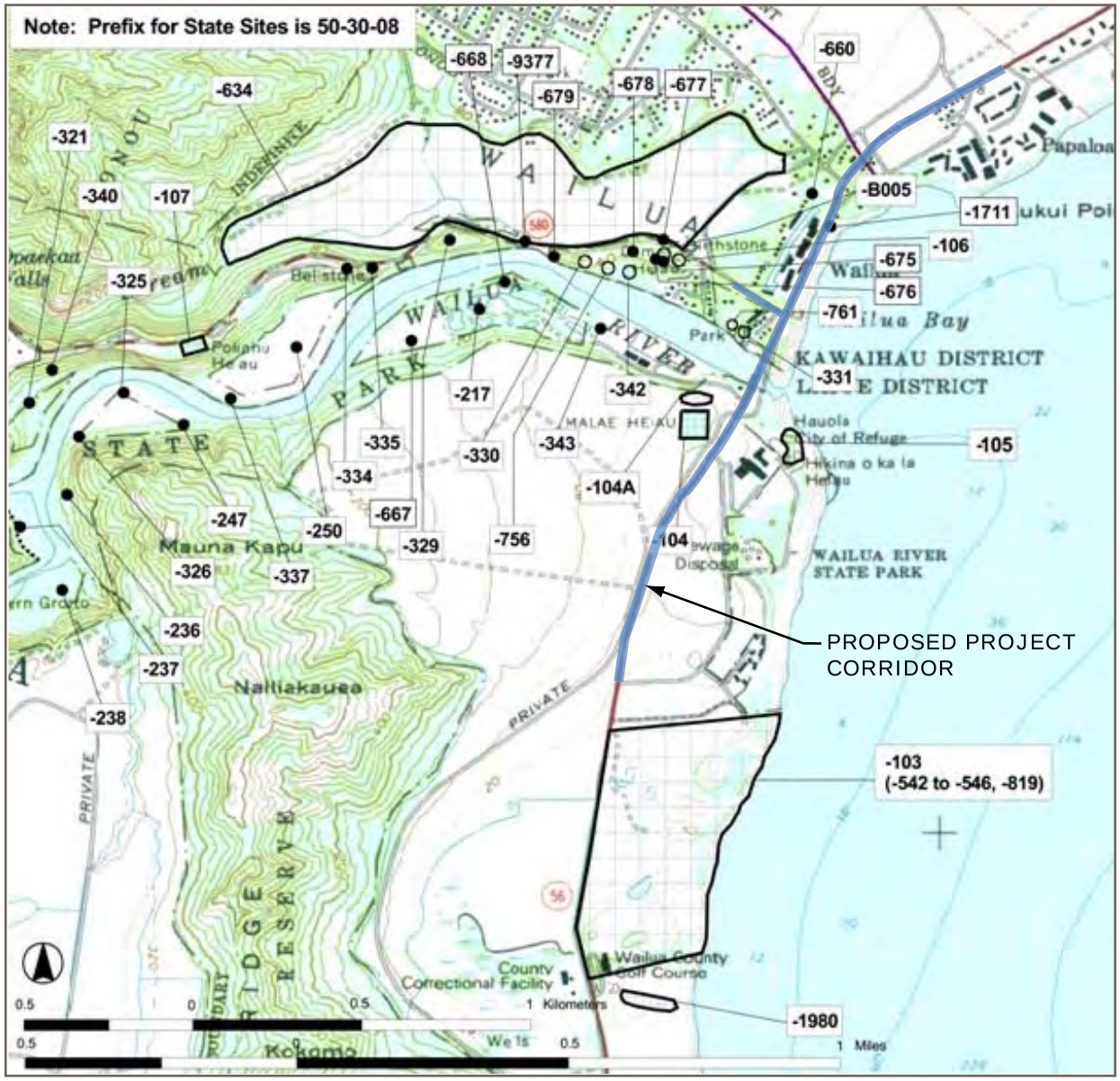

Source: Cultural Surveys Hawaii, Archaeological Assessment Report, May 2009

FIGURE 4-9

ARCHAEOLOGICAL SITES IN COASTAL WAILUA AHUPUAA

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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previously disturbed disarticulated human remains. The exact location is undetermined, but it appears that the hearth observed was between Haleilio Road the Temporary Kapaʻa Bypass Road, and that the ʻauwai was identified north of the Temporary Kapaʻa Bypass Road. The human remains were "identified across the entrance to Coconut Market Place" that would place them just north of the Temporary Kapaʻa Bypass Road.

The *Final Environmental Assessment for Kuhio Highway Short-Term Improvements Wailua Cane Haul Bridge* (Kimura, July 2007) identified the Wailuā Plantation Bridge (Cane Haul Bridge), Wailuā Bridge (Highway Bridge), and Former Wailuā Bridge Remnants (1919 Bridge) as historic properties that may be eligible for listing on the National Register of Historic Places. The Wailuā Plantation Bridge satisfied the National Register of Historic Places Criterion A and C, since it was associated with events that have made it a significant contribution to Hawaii's history, and it has the distinctive characteristics of its period of construction.

4.10.2. Fieldwork Results

Pedestrian Survey

A 100 percent pedestrian inspection of the project area's surface confirmed that there were no surface historic properties present. As there were no surface historic properties, the inventory survey's historic property identification efforts focused on the identification of subsurface cultural deposits, which, based on background research, may be beneath the existing surface.

Ground Penetrating Radar (GPR)

Fieldwork involved conducting a GPR survey of a 960 square foot study area located on a State-owned parcel of land situated at the northern corner of Kūhiō Highway with Kuamoʻo Road. An area of this parcel is planned for use as a pit for the horizontal directional drilling to relocate the existing electrical lines under the Wailuā River. The use of GPR provides no guarantees of potential findings or non-findings but can increase the probability of avoiding cultural materials by selecting certain locations for eventual excavation.

Thus, testing was conducted to identify areas that are more suitable to subsurface testing to minimize disturbances to potential sites due to the sensitivity associated with prior subsurface sites encountered in this area. The GPR testing was broken down into 6 test areas. Each test area measured approximately 15 feet by 10 feet with the exception of test area 2, which measured at 10 feet by 6 feet. Figure 4-10 graphically shows these test areas.

The GPR survey identified numerous subsurface anomalies within the six test area. Observed anomalies could be associated with tree roots, buried concrete slabs, subsurface utilities, and miscellaneous construction debris. The anomalies could also indicate the presence of cultural deposits; including human burials which are known to be present throughout the area.

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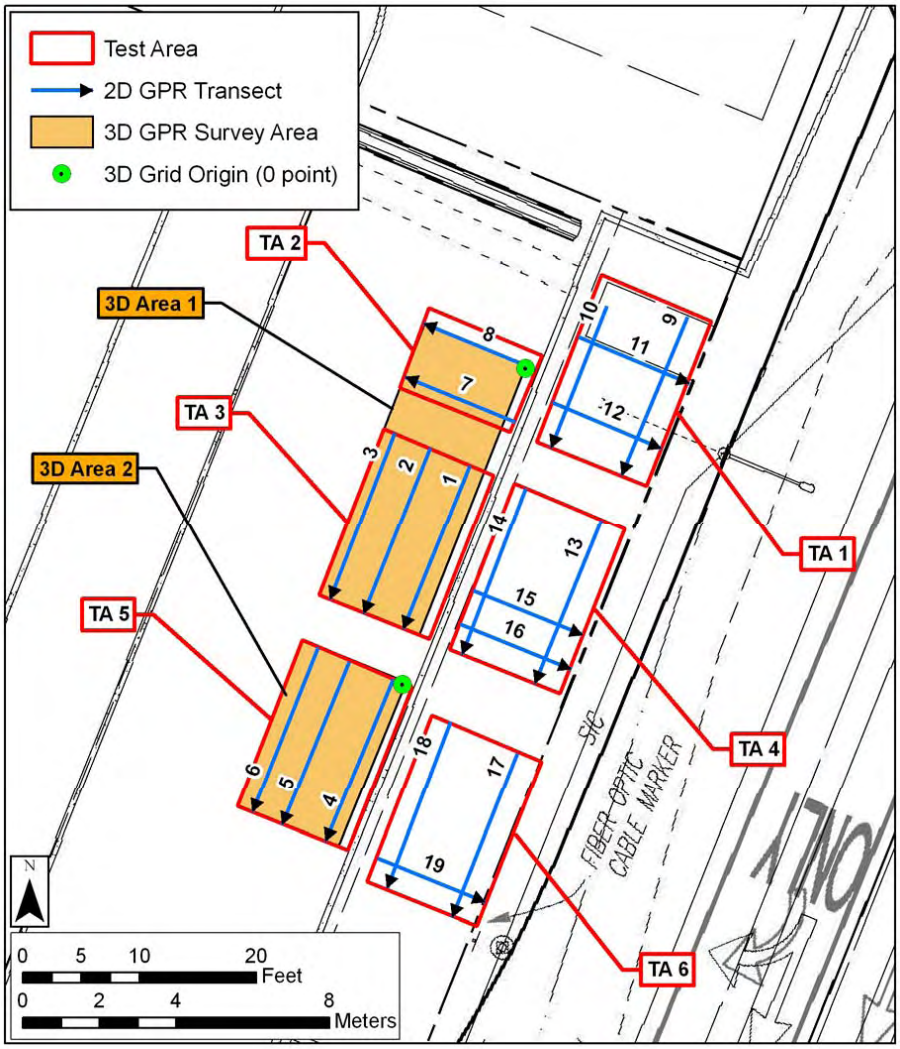
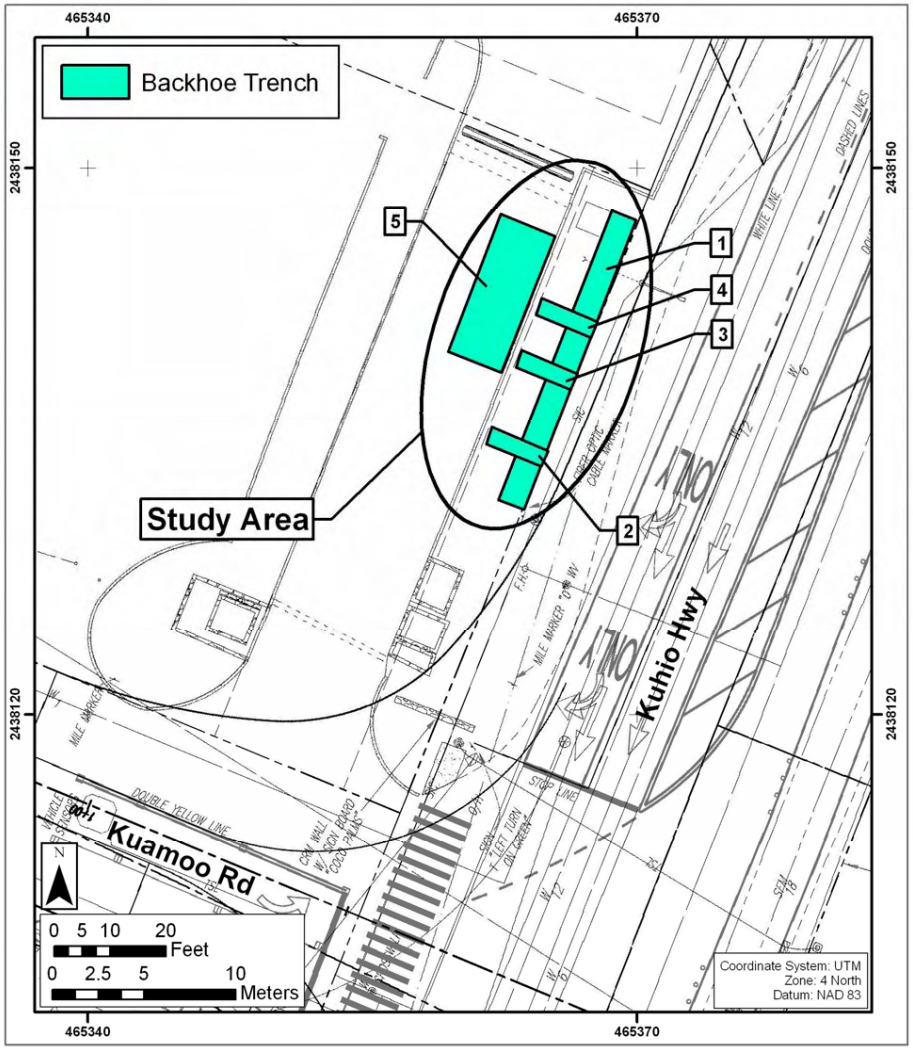


GPR Test Locations



Subsurface Test Locations

Source: Cultural Surveys Hawaii, Archaeological Assessment Report, May 2009

FIGURE 4-10

GPR AND SUBSURFACE TEST LOCATIONS

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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The GPR survey also identified stratigraphic irregularities that may indicate previous subsurface disturbance and the presence of a buried A horizons (former land surfaces).

Test areas 1, 4, and 6 could not be 100 percent surveyed by GPR due to the presence of large trees located in the middle of each of these test areas. A review of the data obtained suggested that Test Area 5 had the highest potential for encountering subsurface cultural deposits, including human burials. Additionally, the large subsurface anomalies identified at approximately 30 cm depths in test areas 2 and 3 may have masked additional subsurface anomalies located at greater depths. Thus the presence of cultural deposits at test areas 1, 2, 3, 4, and 6 could not be ruled out. Based upon these results, subsurface testing was initiated for all test areas except test area 5. These findings were also presented to the Kauaʻi / Niʻihau Islands Burial Council on March 5, 2009 along with proposed subsurface testing.

Subsurface Testing

Five (5) backhoe trenches were placed throughout the areas previously subjected to a GPR survey. A stratigraphic profile was taken at each backhoe trench. Figure 4-9 shows the locations of these test areas. In general, the observed and documented stratigraphy consisted of naturally deposited sandy loam, disturbed by previous grading activities and/or prior subsurface utility installation, overlying naturally deposited marine sand. These observations were consistent with the USDA soil data for the project area and its vicinity.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing. Additionally, the subsurface anomalies observed via GPR could not be conclusively correlated to specific objects or features in the ground. It was believed that a majority of the anomalies corresponded to tree roots, buried basalt boulders, and abandoned utilities observed during subsurface testing.

These findings were largely in keeping with expectations based on background research. Although a review of LCA documentation indicated that lands in the vicinity of the project area were utilized for traditional Hawaiian habitation, agriculture, and aquaculture, the land modifications associated with the development of Kūhiō Highway would have destroyed any surface remains of pre-contact land use that may have been present. Previous archaeological research has identified pre-contact cultural layers and human burials in the immediate vicinity of the project area. This suggests that there is still a probability of encountering subsurface cultural deposits and/or human burials during project related ground disturbance.

Impacts and Mitigation Measures

The project's highway widening improvements were previously assessed by the SHPD as part of a County SMA permit application and review process in 2007. Based upon that review, the SHPD issued a "no adverse effect" on historic properties determination subject to implementation of an archaeological monitoring plan (see Appendix G). This determination was

based upon letters dated July 18, 2007 (DOC: 0707NM23) as part of Chapter 6E-42, HRS review and August 24, 2007 (DOC: 0708NM20) as part of Section 106 compliance review. The highway widening improvements would occur within the State DOT's existing right-of-way. Thus, no surface historic properties would be affected. However, there is a potential for effects on subsurface sites within the existing right-of-way resulting in the implementation of an archaeological monitoring plan. A draft Archaeological Monitoring Plan for the highway widening improvements was submitted to the SHPD in November 2008. This monitoring was finalized in March 2009, and accepted by the SHPD based upon their letter dated March 16, 2009 (DOC: 0903WT117) (see Appendix G). This monitoring plan included provisions for on-site monitoring of highway improvements during construction activities.

The project specific effect recommendation under Chapter 6E-42, HRS for the relocation of existing overhead utilities lines underground based upon the field work and study conducted is "effect, with proposed mitigation commitments." The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's area of potential effect (APE). The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed undergrounding of utility lines and be pro-active in addressing possible community concerns.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

4.10.3. Effects on Cultural Resources

In terms of cultural resources, this project is not expected to significantly affect traditional native Hawaiian cultural practices or other traditional cultural practices occurring within the project corridor or in the immediate vicinity of proposed improvements. There are no known traditional cultural practices occurring within or along the existing highway or Kuamoʻo Road since it is under the jurisdiction of the State DOT. Along the highway widening corridor, the adjacent properties are predominantly privately owned consisting of residential lots, commercial developments, and resort uses. The Wailuā Beach Park property is owned by the County which is situated on the makai side of the highway. Highway widening improvements would occur on the mauka side of the highway and not affect access or use of that beach park.

The utility relocation would similarly not affect properties presently known to be used for traditional cultural practices. The electrical utility lines would be relocated to cross under the Wailuā River and thus not affect properties within that section. South of the river, the utilities would be relocated along with highway within the State DHHL property which is undeveloped and not known to have any resources used for traditional cultural practices.

Removal of the overhead utility lines crossing the Wailuā River would also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve the cultural view corridor.

The project would also not restrict access to the surrounding areas which may potentially be used for traditional Native Hawaiian cultural practices. Surrounding uses generally consist of other existing residences, commercial uses, and resort uses mainly along the coastline. Therefore, this project would not significantly restrict access to other surrounding areas that may be used for cultural practices because improvements would be primarily limited to the State DOT right-of-way and a few privately-owned parcels adjacent to the highway. Temporary construction activities would similarly not restrict or prohibit access to other land areas that may be used for traditional gathering or other cultural practices.

4.10.4. Project Effect Under Section 106 Regulations

This project is also evaluated under Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's implementation procedures prescribed by 36 CFR, Part 800 (ACHP, 2004). The FHWA is the Agency Official responsible for this consultation effort which has been integrated with this environmental review process.

The Section 106 consultation process conducted thus far has incorporated the pre-assessment, agency, and public consultation efforts conducted as part of the environmental review process for this project. This included presentations to the Kauaʻi / Niʻihau Islands Burial Council and Kauaʻi Historic Preservation Review Commission to solicit input. Meetings with the SHPD have occurred as part of consultation efforts, and archaeological studies with field work were conducted.

As previously discussed, the highway widening improvements have already been reviewed by the SHPD under Section 106 consultation which issued a "no adverse effect" on historic properties determination subject to implementation of an archaeological monitoring plan per their August 24, 2007 letter. An archaeological monitoring plan has already been prepared and approved by SHPD for highway improvements.

For the relocation of existing overhead utilities underground, a "no adverse effect" on historic properties determination subject to implementation of an archaeological monitoring plan

is also planned. The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation. Based upon the results of the environmental review process, separate documentation will be submitted to the State Historic Preservation Officer for a final confirmation of the project's effect with necessary mitigative measures.

4.11. VISUAL RESOURCES

The Heritage Resources Map in the 2000 Kauaʻi General Plan identifies important scenic resources, such as major land forms, open spaces, viewing points, and scenic drives. The Heritage Resources Map for the Kawaihau Planning District designates Kūhiō Highway as a Scenic Roadway Corridor from the Waipouli areas southbound toward the Wailuā Golf Course area. In addition, Kuamoʻo Road is also designated as a Scenic Roadway Corridor from the highway mauka (inland) up to the Ōpaekaʻa Falls area. The proposed highway improvements, storage lane extension, and utilities relocation occur within these scenic corridors.

The County seeks to preserve scenic resources and public views. Public views are those from a public place, such as a park, highway, or along the shoreline. A general principle used in maintaining scenic resources is to preserve public views that exhibit a high degree of intactness or vividness. "Intactness" refers both to the integrity of visual patterns and the extent to which the landscape is free from structures or other visually encroaching features. "Vividness" relates to the memorability of a view, caused by contrasting landforms which create striking and distinctive patterns.

Another principle is to preserve the scenic qualities of mountains, hills and other elevated landforms. The third principle is to 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.

Existing Visual Resources

Along the project highway corridor, existing scenic views are mainly of the coastline. From the Temporary Kapaʻa Bypass Road to Haleilio Road, coastline views are predominantly screened by existing residences, resort uses, and commercial developments. A new County affordable housing project under construction is infilling a large open space area along the highway. Mauka views of the mountain range are available. Several existing overhead utility lines and associated poles line this highway corridor.

South of Haleilio Road up past the Wailuā River, scenic views of the shoreline and ocean are available along the highway because Wailuā Beach Park borders the highway right-of-way. Mauka views along the highway are screened by the Coco Palms Resort. As shown in photos in Appendix B, several overhead utility lines and poles line this stretch of highway and across

the River. Views along Kuamoʻo Road pertinent to the project is predominantly of the shoreline (Wailuā Beach Park) as vehicles travel makai toward the highway.

South of the river, shoreline views are again screened by an existing resort development. From this resort southbound to South Leho Drive, makai views along the highway is of open space comprised of former agricultural land owned by the State DHHL. This property borders the highway and existing resort uses line the shoreline. Mauka views similarly consist of open space comprised of former agricultural land also owned by the State DHHL.

Impacts and Mitigation Measures

The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. There are no important land forms or other visual resources present along the highway corridor that would be impacted by the project. Highway improvements would occur within the existing State DOT right-of-way. As a result, the addition of the second southbound travel lane and intersection improvements would have minimal if any affect on existing scenic views along the highway. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained. These highway improvements would only occur between the Temporary Kapaʻa Bypass Road and Kuamoʻo Road. The extension of the makai bound right-turn storage lane along Kuamoʻo Road would also have minimal if any effect on existing views along this roadway.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

4.12. SOCIO-ECONOMIC CHARACTERISTICS

4.12.5. Existing Social and Economic Conditions

Population

The U.S. Census Bureau's Census 2000 report states that the Wailuā-Kapaʻa Homesteads Census Tract (CT) and Puhi-Hanamāʻulu had a combined resident population of 14,610, 25% of the island wide population of 58,463. Census data for the Wailuā Homesteads (CT 402.02) and the Puhi- Hanamāʻulu Census Tract (CT 404) is compared to census data for the entire island in Table 4-4. Approximately 22% of the total housing island wide is located within these CTs.

Economy

The County of Kauaʻi, Office of Economic Development published a study entitled *Kauaʻi Economic Outlook,* prepared by the University of Hawaiʻi, Economic Research Organization in July 2008. The study analyzed economic conditions for Kauaʻi through 2009. According to the study, while Kauaʻi shared in the State's economic growth in 2007, the rate of deceleration was less obvious than in other counties. The visitor industry continued to expand at a healthy rate, construction was buoyant, and business confidence remained relatively high.

In 2007, where total visitors to the State declined, Kauaʻi led the counties in visitor arrivals growth. Visitor days rose 4% in 2007, compared with declines of 1.0 – 2.1% in the other counties and Kauaʻi's total visitor spending growth led the State at 4.5%.

According to the study, the Kauaʻi visitor plant had a higher share of timeshare and condo units and independent vacation rentals than any other market in the State. In recent years the timeshare sector on Kauaʻi has been stable, but this will increase when units now under construction are completed and become available. On the east side of the island, currently there is the Kauaʻi Lagoons development in Līhuʻe, Waipouli Beach Resort Condos in Kapaʻa, and Kealanani agricultural subdivision north of Kapaʻa.

The real estate market on Kauaʻi has slowed down in transaction volume and a moderate decline in prices, which became evident in 2005. Between 1995 – 2005, single family resale volume had grown 435%, median home prices had risen 280% by 2006. The median Kauaʻi single family home price of $578,500 in the fourth quarter of 2007 were down more than 20% from their third quarter 2006 peak.

The County also continues to add to the affordable housing pool with projects such as the Courtyards at Waipouli.

Table 4-4
Demographic Characteristics 2000

Subject	County of Kauaʻi		Wailuā Homesteads CT 402.02		Puhi- Hanamāʻulu CT 404	
	Number	**%**	**Number**	**%**	**Number**	**%**
Total population	**58,463**	**100**	**7,750**	**100**	**6,860**	**100**
AGE						
Under 5 Years	3,605	6.2	476	6.1	457	6.6
5 – 17 years	11,838	20.2	1,592	20.5	1,387	20.2
18 – 64 years	34,951	59.7	4,831	62.3	4,189	61.1
65 years and over	8,069	13.8	851	10.9	827	12.1
Median age (years)	38.4	--	39.3	--	34.7	--
RACE (alone or in combination with other races)						
White	17,255	29.5	2,950	38.1	826	12.0
Black or African American	177	0.3	36	0.5	22	0.3
American Indian and Alaska Native	212	0.4	37	0.5	20	0.3
Asian alone	21,042	36.1	1,970	25.4	4,010	58.5
Native Hawaiian & other Pacific Islander	5,334	9.1	661	8.5	327	4.8
Some Other Race	505	0.8	77	1.0	26	0.4
Two or More Races	13,938	23.8	2,019	26.1	1,629	23.7
HOUSEHOLD (BY TYPE)						
Total Households	**20,183**	**--**	**2,802**	**--**	**1,970**	**--**
Family households (families)	14,572	72.2	2,008	71.7	1,558	79.1
With own children under 18 years	6,865	34.0	983	35.1	761	38.6
Married-couple family	10,881	53.9	1,545	55.1	1,139	57.8
With own children under 18 years	4,842	24.0	696	24.8	553	28.1
Female householder, no husband present	2,582	12.8	319	11.4	299	15.2
With own children under 18 years	1,424	7.1	197	7.0	154	7.8
Non – families	5,611	27.8	794	28.3	412	21.0
Householder living alone	4,321	21.4	582	20.8	297	15.1
Householder 65 years and over	1,556	7.7	151	5.4	79	4.0
Average household size	2.87	--	2.74	--	3.41	--
HOUSING OCCUPANCY AND TENURE						
Total Housing Units	**25,331**	**--**	**3,370**	--	**2,273**	--
Occupied units	20,183	79.7	2,802	83.1	1,970	86.7
By owner	12,384	61.4	1,694	60.5	1,353	68.7
By renter	7,799	38.6	1,108	39.5	617	31.3
Vacant units	5,148	20.3	568	16.9	303	13.3

Several key events that have occurred may affect growth in 2008 – 2009, including the exit of two inter-island cruise ships and the closure of ATA and Aloha Airlines, and the increase of oil prices.

4.12.6. Economic and Fiscal Factors

This section discusses both the short and long-term effects of the project on both the County and State's economic and fiscal factors. Development of the project will have different impacts in relation to Kauaʻi County and the State of Hawaiʻi. Construction of this infrastructure improvement will have a minor positive economic impact mainly associated with the creation of short-term construction related jobs.

Once the highway, roadway, and utility improvements are constructed, there would not be any long-term jobs generated by this project or additional State or County agency positions created. Maintenance of the highway is expected to be accommodated by existing State personnel, and thus not require additional full-time government positions to be created.

Short-Term Construction Related Jobs

The estimated construction cost for this project is approximately $25 million. As a result, this construction project would create several construction jobs. In discussions of jobs and income, three broad types are distinguished:

- Direct jobs are immediately involved with construction of a project or with its operations.
- Indirect jobs are created as businesses directly involved with a project purchase goods and services in the local economy.
- Induced jobs are created as workers spend their income for goods and services.

Construction of the project should have a positive economic impact associated with the creation of short-term construction related jobs. Direct construction jobs would typically consist of on-site laborers, tradesmen, mechanical operators, supervisors, etc. These new jobs created would also generate additional personal income for construction workers. Personal income is defined as the wages paid to the direct construction workers or operational employees associated with a development. It is anticipated that these construction jobs would likely be filled by residents from the Island of Kauaʻi or within the State of Hawaii employed within the construction industry.

Direct construction jobs created would also stimulate indirect and induced employment within other industries on the island such as retail, restaurants, material distributors, and other related businesses supporting the construction industry.

Fiscal Factors

Fiscal impacts associated with this project would predominantly be associated with short-term construction activities. Such effects mainly involve some additional tax revenue generated to the State. Tax revenue sources for State government are composed primarily of general excise taxes (GET) on development costs and construction materials, along with corporate income tax, and personal income tax from construction workers and long-term permanent jobs. Construction related tax revenues are one-time or short-term increases in revenue since they are only associated with construction activities.

The multi-million construction budget expended by the State DOT for construction of the project would therefore generate a moderate positive increase in tax revenue to the State. County revenues are primarily limited to tax revenues on privately-owned property and improvements. This project is therefore expected to have minimal or minor effect on the current or future levels of County tax revenues being generated.

The improvements planned would all occur within State-owned property, or easements obtained from private property for accessory improvements or utilities relocation. Thus, there would be no County property taxes generated from these lands. This project is not expected to generate any new in-migrant residents to the Island of Kauaʻi to fill short-term construction related jobs. Thus, there would not be any impact on State and County operational expenditures for public services serving this community and surrounding areas.

4.12.7. Social Impact Factors

The proposed project only involves widening the highway to accommodate a second southbound through lane, intersection improvements, and accessory improvements within the State DOT's existing right-of-way. Relocation of existing overhead utilities underground is also being included with this project. As a result, this project should not have a significant effect on the projected resident population growth and corresponding housing units planned for East Kauaʻi. The project would not increase the number of housing units and population in the region since those land uses are regulated by the County of Kauaʻi.

The project would not generate any new in-migrant residents to the Island of Kauaʻi affecting the future population growth trends projected. Improvements planned would not require the acquisition of existing homes and subsequently not impact existing residents in the area. Highway improvements are being accommodated within the State DOT's existing right-of-way, and easements are being obtained for utilities or other accessory improvements associated with this project.

This project would not have a significant effect in influencing the relocation or in-migration of new persons to the island from other islands within the State or outside the State of Hawaiʻi. The project should improve existing traffic congestion within this corridor, however, these factors should not significantly influence individual decisions to relocate or migrate to the island from

the outside. Such decisions would more appropriately be based upon other economic factors such as job opportunities, economic conditions, or future developments permitted by the County of Kauaʻi.

The proposed improvements would not result in a disproportionately high impact on minority populations or low-income populations in the study corridor or immediate surrounding area. This includes both short-term construction related effects and long-term effects from the operation of the highway. Improvements would not require the acquisition or displacement of any homes and the associated effects on minority populations or low-income resident populations.

This project is not expected to significantly impact the existing character of this Wailuā community. The character of the project corridor and surrounding area would not be significantly altered from that already planned and approved by the County of Kauai.

4.12.8. Effects on Agricultural Activities

Areas along the project corridor south of Wailuā River and near the Temporary Kapaʻa Bypass Road were formerly used for agricultural production before being left fallow. These lands were formerly used for large scale sugarcane plantation agriculture under the Līhuʻe Plantation Company before operations ceased. There are presently no known existing small or large scale agricultural activities being conducted within the areas affected by the project or immediate adjacent areas.

As previously discussed, the majority of undeveloped land along the highway corridor located south of Wailuā River is owned by the State DHHL with small parcels owned by the State of Hawaiʻi (DLNR). An easement for the relocated utility lines within a State DHHL parcel is being established, and this parcel is planned for future commercial use. Future plans for the State DHHL parcels on the mauka side of the highway intended for residential housing and community use. Therefore, the project would not affect existing or future agricultural activities in this area.

Undeveloped property located north of Haleilio Road up to the Temporary Kapaʻa Bypass Road area is privately owned. An easement along the highway right-of-way would be obtained for the relocated utility lines from this owner, and the State DOT is consulting with the owner. There are no known plans for future agricultural activities within the area needed for the easement. Therefore, the project would not affect existing or future agricultural activities in this area.

4.13. TRAFFIC

A traffic impact report was prepared by Wilson Okamoto Corporation in March 2009 to identify potential traffic impacts resulting from the proposed widening of Kūhiō Highway between Kuamoʻo Road and the Temporary Bypass Road and provide recommendations to mitigate

such impacts, as may be required. The traffic impact report is included in Appendix C and is summarized below.

4.13.1. Existing Traffic Conditions

Field investigations were conducted from January 27 to 29, 2009 and consisted of manual turning movement count surveys along Kūhiō Highway in the project vicinity. The field counts were conducted between the morning peak hours of 6:00 am and 9:00 am, and the afternoon peak hours of 3:00 pm and 6:00 pm at the following intersections:

- Kūhiō Highway and Kuamoʻo Road
- Kūhiō Highway and Haleilio Road
- Kūhiō Highway and Lanikai Street
- Kūhiō Highway and Temporary Bypass Road
- Kūhiō Highway and Papaloa Road (northern end)

The *Highway Capacity Manual*, Transportation Research Board's evaluation concept of Level of Service (LOS), quantitative and qualitative assessment of traffic operations, was used to describe facility operations. Levels of Service are defined by LOS "A" through "F", indicating a range of traffic conditions from ideal or free-flowing operating conditions to unacceptable or potentially congested operating conditions, respectively.

The critical movements of the study intersections during the AM and peak traffic hours are summarized in Table 4-5. The morning peak hour of traffic generally occurs between the hours of 7:15 a.m. and 8:15 a.m. In the afternoon, the peak hour traffic generally occurs between the hours of 4:30 p.m. and 5:30 p.m.

Kūhiō Highway and Kuamoʻo Road

The critical traffic movements on the highway approaches of the intersection are the northbound left-turn and southbound through traffic movements which operate at LOS "C" and LOS "D," respectively, during both peak periods (see Table 4-5). Traffic queues formed periodically on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the PM peak period.

The left-turn traffic movement on the Kuamoʻo Road approach operates at LOS "C" and LOS "E" during the AM and PM peak periods, respectively, while the right-turn traffic movement operates at LOS "E" and LOS "D" during the AM and PM peak periods, respectively. Traffic queues formed periodically on the Kuamoʻo Road approach of the intersection with the most significant queuing occurring during the AM peak period.

Table 4-5
Existing and Projected Year 2012 LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2012	Exist	Year 2012
Kūhiō Hwy/ Kuamoʻo Rd	Eastbound	LT	C	C	E	E
		RT	E	E	D	D
	Northbound	LT	C	C	C	A
	Southbound	TH	D	C	D	B
Kūhiō Hwy/ Haleilio Rd	Eastbound	LT-RT	C	D	D	D
	Northbound	LT	A	A	C	B
		TH	A		A	
	Southbound	TH-RT	B	A	D	A
Kūhiō Hwy/ Lanikai St*	Westbound	LT	C	D	F	E
		RT		D		D
	Northbound	TH-RT	-	A	-	A
	Southbound	LT	A	A	B	A
		TH	-		-	
Kūhiō Hwy/ Temporary Bypass Rd	Eastbound	RT	B	D	B	B
	Northbound	LT	A	A	B	B
Kūhiō Hwy/ Papaloa Rd	Westbound	RT	B	A	A	A
	Southbound	LT	A	A	B	B

Kūhiō Highway and Haleilio Road

The critical traffic movements on the highway approaches of the intersection are the northbound left-turn traffic movement which operates at LOS “A” and LOS “C” during the AM and PM peak periods, respectively, and southbound through and right-turn traffic movement which operates at LOS “B” and LOS “D” during the AM and PM peak periods, respectively. Traffic queues formed periodically on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the PM peak period.

The Haleilio Road approach operates at LOS “C” and LOS “D” during the AM and PM peak periods, respectively. Traffic queues formed periodically on the Haleilio Road approach of the intersection with the most significant queuing occurring during the AM peak period.

Kūhiō Highway and Lanikai Street

The critical traffic movement on the highway approaches of the intersection is the southbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak period, as well as, the upstream intersections with the temporary bypass road and Papaloa Road (North).

The Haleilio Road approach operates at LOS "C" and LOS "F" during the AM and PM peak periods, respectively.

Kūhiō Highway and Temporary Bypass Road

The critical traffic movement on the highway approaches of the intersection is the northbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak period, as well as, the upstream intersection with Papaloa Road (North).

The critical traffic movement on the temporary bypass road approach of the intersection is the eastbound right-turn traffic movement which operates at LOS "B" during both peak periods. During this peak period, southbound queues along the highway impeded right-turning vehicles from the temporary bypass road resulting in queuing along that roadway.

Kūhiō Highway and Papaloa Road (northern end)

The critical traffic movement on the highway approaches of the intersection is the southbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak period.

The Papaloa Road approach of the intersection operates at LOS "B" and LOS "A" during the AM and PM peak periods, respectively.

4.13.2. Probable Traffic Impacts

Future Traffic Volumes in 2012

In conjunction with the proposed roadway widening of Kūhiō Highway, left-turn movements will be prohibited at the southern intersection of Kūhiō Highway with Papaloa Road. As such, southbound vehicles turning left onto Papaloa Road and westbound vehicles turning left onto Kūhiō Highway must utilize Lanikai Street instead. As such, these vehicles were reassigned from the southern intersection with Papaloa Road to the intersection with Lanikai Street.

Travel forecast was based upon the average annual traffic growth rate as described in the Kauaʻi Long-Range Land Transportation Plan (KLRLTP). The KLRLTP, prepared for the State DOT in cooperation with the County of Kauaʻi, served as a guide for the development of the major surface transportation facilities and programs to be implemented on Kauaʻi. Projected traffic conditions also considered the development of Courtyards at Waipouli, the Cane Haul Bridge Replacement and the Kapaʻa Relief Route.

Results of Traffic Analysis

Traffic analysis was conducted using the forecast traffic volumes for the project's study year of 2012. For this analysis, the signal timing and cycle lengths at the intersections of Kūhiō Highway with Kuamoʻo Road and with Haleilio Road were assumed to have been modified and coordinated to accommodate the additional southbound lane. In addition, the current contraflow operations within this project corridor during the morning peak period were assumed to be suspended once the widening project is completed.

Traffic conditions along Kūhiō Highway in the project vicinity are currently congested with extensive queuing observed for the southbound direction of travel along the highway during the PM peak period. The proposed widening of Kūhiō Highway to a four-lane roadway between Kuamoʻo Road and the existing Temporary Kapaʻa Bypass Road is intended as a short-term measure to alleviate existing conditions. The provision of an additional southbound lane and the coordination of the traffic signals along this segment of the highway are expected to alleviate existing queuing and improve traffic operating conditions for the short-term.

The projected Year 2012 AM and PM peak traffic operating conditions in the project vicinity with the proposed widening were summarized in Table 4-5. Based upon the proposed highway widening and associated improvements, traffic operations within the project corridor are expected to improve over existing conditions when completed in the year 2012 during both peak hours of traffic.

The critical movements on the highway approaches of the intersection with Kuamoʻo Road are expected to operate at LOS "C" during the AM peak period and LOS "B" or better during the PM peak period. Critical movements at the highway's intersection with Haleilio Road are expected to operate at LOS "A" during the AM peak period and LOS "B" or better during the PM peak period. Similarly, the highway approaches of the intersection with Lanikai Street are expected to operate at LOS "A" during both peak periods. The provision of an additional southbound lane along the highway, installation of a traffic signal system at the intersection with Lanikai Street, and the coordination of the traffic signal systems in the project vicinity are anticipated to alleviate the existing queuing along the highway.

The traffic movements on the cross street approaches of the study intersections are expected, in general, to continue operating at levels-of-service similar to existing conditions. The eastbound approach of the intersection with Haleilio Road is expected to operate at a slightly lower LOS "D" during the AM peak period due to expected modifications to the existing

signal timing at that intersection. In addition, the eastbound right-turn traffic movement at the intersection with the Temporary Kapaʻa Bypass Road is expected to operate at LOS "D" during the AM peak period due to anticipated increase in traffic along that roadway due to ambient growth in traffic. At the intersection with Lanikai Street, the westbound left-turn traffic movement is expected to operate at LOS "D" and LOS "E" during the AM and PM peak periods, respectively, while the right-turn traffic movement is expected to operate at LOS "D" during both peak periods.

In addition, traffic forecasts and analysis for 20 years beyond the project's completion year was conducted for the year 2032. This long-range forecast is commonly conducted for State highway projects. However, the State DOT is currently in the planning phase for the new Kapaʻa Relief Route project which is intended to address the regional traffic conditions in East Kauaʻi. The long-term projections created for 2032 will thus change with the probable addition of a new bypass road because future traffic would be split between using both Kūhiō Highway and this new bypass road. Without this new bypass highway, traffic conditions along Kūhiō Highway would be expected to deteriorate to low levels of service during both peak periods due to ambient growth in traffic. Therefore, future long-term traffic conditions (year 2032 and beyond) and necessary improvements would be addressed under the Kapaʻa Relief Route project.

4.14. POLICE, FIRE AND HOSPITAL SERVICES

Police Protection

The County has three stations that are located in Waimea, Līhuʻe and Hanalei. The project area is served by the County Police Department's Līhuʻe Headquarters located approximately 5.5 miles southwest of the project area. The Līhuʻe District provides police services from Maluhia Tree Tunnel (south) to Kukui Street in Kapaʻa Town (east).

Fire Protection

The County has seven fire stations that are located in Hanalei, Kapaʻa, Līhuʻe, Koloa, Kalaheo, Hanapepe, and Waimea. Fire protection service for the project area is provided by the County's Kapaʻa Fire Station located approximately 1 mile north of the project area.

Medical Services

The health care facility nearest to the project site is the Wilcox Memorial Hospital located approximately 5.2 miles south on Kūhiō Highway. Wilcox Memorial Hospital is a full-service hospital providing emergency care and medivac transport capabilities.

Samuel Mahelona Memorial Hospital (SMMH) located in Kapaʻa is the oldest operating hospital on Kauaʻi. SMMH provides emergency services, outpatient services, psychiatric services, and long-term care to the east and north shore communities.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact emergency services. Although it is likely that the proposed project would require the occasional police and fire protection and medical services, it would likely not represent a significant amount relative to the overall regional demand. To mitigate traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on pubic safety services.

The proposed highway improvements would improve highway safety along this project corridor. Improvements to traffic flow and intersection operating conditions are needed to reduce congestion and provide safer roadway conditions for drivers. Improved conditions are needed to reduce the potential for traffic accidents and injury to motorists along with pedestrians, joggers, and bicyclists in the area. Eliminating several existing utility poles along the highway corridor would also reduce potential accidents from cars hitting these poles.

4.15. SCHOOLS

Public schools servicing the project area include Kapaʻa Elementary School (Grades K to 5) and Kapaʻa High School (Grades 9 to 12) located approximately 3 miles northwest of the project site, and Kapaʻa Middle School (Grades 6 to 8) located about 2.2 miles northwest of the site. According the DOE's *School Status and Improvement Report for School Year 2006 to 2007*, student enrollment at Kapaʻa Elementary School was 915 students, 729 students at Kapaʻa Middle School, and 1,031 students at Kapaʻa High School.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact public school facilities. The proposed project will not generate a demand on student enrollment at the area schools.

4.16. RECREATIONAL FACILITIES

County parks in the region include Wailuā Beach Park located directly makai of the Coco Palms Resort across Kūhiō Highway, Kapaʻa Beach Park located about 1 miles to the north, Kapaʻa Park located approximately 2 miles to the north, and Waipouli Beach Park located about 1.5 miles to the north. State recreational facilities in the project vicinity include Lydgate Park and Wailuā River State Park. The County's Wailuā Golf Course is located approximately 1.5 miles to the south of the project.

Wailuā River State Park is a state owned park that was established in 1954. The Wailuā River State Park is located along the banks of the Wailuā River and covers a large tract of land extending from the shoreline makai of Kūhiō Highway up to the valley. Lessees include Smith's Tropoical Paradise and the Marina Restaurant.

Wailuā Beach Park encompasses approximately 6 acres of beach area located immediately north of Wailuā River and makai of Kūhiō Highway.

The County of Kauaʻi, Department of Public Works proposes to construct a shared use path for pedestrians, bicyclists, and other users from Lydgate Park to Waikaea Canal in Kapaʻa (referred to as the Lydgate Park – Kapaʻa Bike/Pedestrian Path). This project is part of the County's overall 16-mile pedestrian/bike path project that starts from Nawiliwili in the south to Anahola in the north. The north-south segment of the Lydgate Park – Kapaʻa Bike/Pedestrian Path starts near Aloha Beach Resort (south of Wailuā River) and runs north along the makai side of Kūhiō Highway on to Papaloa Road and then left on Lanikai Street. The east – west segment connects Kūhiō Highway to to the Wailuā House Lots up mauka (west).

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact recreational facilities. Short-term impacts would be related to noise and air quality due to construction in areas near parks. The proposed project will be within the State ROW along the mauka side of Kūhiō Highway and are not expected to impact access to nearby parks. To mitigate traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on recreational facilities.

4.17. UTILITIES AND INFRASTRUCTURE

4.17.1. Wastewater System

The Wailuā area is served by the County's Wailuā Wastewater Treatment Facility (WWTF) located on Leho Drive southeast of the project area. Although the original design capacity of the WWTF is 1.5 million gallons per day (mgd), the treatment capacity has been reduced to approximately 1.2 mgd, with current treatment volumes at approximately 0.8 mgd.

Wastewater generated in the Wailuā area is collected via gravity lines and sewage pump stations along Kūhiō Highway and Paploa Road. Sewage is

An existing 8-inch lateral located in the northeast corner of the Coco Palms Hotel site provides connection to the County's wastewater system in Kūhiō Highway. The 8-inch lateral extends along the mauka side of Kūhiō Highway to the County's sewer pump station located near the intersection of Kūhiō Highway and Haleilio Road. From the pump station, a 10-inch sewer force main extending along Kūhiō Highway transports sewage flows to the WWTF.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact wastewater facilities in the project area. The proposed project will not generate additional wastewater flows.

4.17.2. Water System

The Wailuā area is served by the County Department of Water's (DOW) Kapaʻa Homestead and Makaleha water tanks located to the west of the project site. The storage capacity of each tank is 1 mg. The County DOW's system in the area consists of a looped system of transmission mains and pressure reducing valve systems. Waterlines are generally located in the roadways and distribute potable water for domestic, commercial, industrial, and emergency services.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact wastewater facilities in the project area. Short-term impacts will be due to construction, as result of water being used for dust control or planting vegetation for erosion control purposes. In the long-term, the proposed project will not generate additional water flows.

4.17.3. Electrical System

Electrical service for the project is available from the Kauaʻi Island Utility Cooperative (KIUC). KIUC's Lydgate Substation is located at South Leho Drive andserves the Wailuā area. KIUC currently operates three separate electrical systems within the project corridor consisting of a 57 kV transmission system, a 12 kV customer distribution system, and a street lighting system which are all located overhead along existing poles.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact the existing electrical system. The utility poles and overhead utility lines will be placed underground. Close coordination will be maintained with KIUC to minimize any potential conflicts with services adjacent to the project area.

4.17.4. Communications Systems

Telephone, data line access to the internet, and cable TV service is provided by Hawaiian Telcom (formerly Verizon Kauaʻi) and Oceanic Time Warner Cable via overhead lines along Kūhiō Highway.

Sandwich Isle Telecommunications is another utility company that provides telecommunication service via an existing underground fiber optic ductline which runs mauka of Kūhiō Highway.

Impacts and Mitigation Measures

The proposed project is not anticipated to significantly impact the existing communication system. The utility poles and overhead utility lines will be placed underground. Close

coordination will be maintained with respective utility companies to minimize any potential conflicts with services adjacent to the project area.

4.17.5. Solid Waste

The County's only landfill is the Kekaha Landfill located on the west side of Kauaʻi. There are several drop-off recycling centers, refuse transfer stations, green waste diversion sites, and deposit beverage container redemption centers throughout the island. In March 2009 the County of Kauaʻi Department of Public Works, Solid Waste Division prepared the *Integrated Solid Waste Management Plan*. In April 2005 the County received approval from the DOH for a vertical expansion to 85 feet. The increased elevation provides an approximate 4 – 5 years of additional landfill capacity, based on annual receipts of approximately 90,000 tons. As of March 2009, the County is currently in the process of requesting a lateral expansion, which could yield an additional six years of capacity.

The closest transfer station to the project site is the Kapaʻa Transfer Station located to the north.

Impacts and Mitigation Measures

The proposed project will not significantly impact the county's solid waste collection and disposal system. Solid waste impacts will be short-term and related to construction activities. Construction of the proposed improvements will require grading and excavation activities, which may result in excess soil. It will be the responsibility of the contractor(s) to dispose of any excess soil or waste removed during construction. The excess soil could be used as fill for the project or other projects or disposed of in a landfill. The contractor(s) will prepare a waste disposal plan that specifies proper removal and disposal of debris from the project area.

4.18. SECONDARY AND CUMULATIVE IMPACTS

4.18.1. Secondary Impacts

Secondary effects, or otherwise referred to as indirect effects, are described as those effects caused by a project, but occur later in time or farther removed in distance than direct impacts but are still reasonably foreseeable. Such effects may include impacts on environmental resources or public facilities that occur as a result of the project's influence on land use. For example, a new housing development would have a secondary impact on schools by increasing student enrollments at schools serving that area. Secondary impact analyses are appropriately concerned with impacts that are sufficiently "likely" to occur and not with the speculation of any impact that can be conceived of or imagined.

The proposed project is expected to have minimal if any secondary impacts on resident population, land use patterns, public facilities and infrastructure, and the natural environment along the project corridor or Wailuā community. The project involves the widening of Kūhiō Highway to add a second southbound lane along with intersection improvements within the

State DOT's existing right-of-way. The corridor for the improvements occurs along a short 0.65-mile section of the highway. Therefore, this project would help alleviate existing traffic conditions within this corridor, but it would not create a substantial change to the highway infrastructure serving East Kauaʻi that would likely cause significant changes to land use patterns, resident population, or public facilities serving this area.

Changes to land use patterns and future development in the surrounding area as well as within East Kauaʻi falls under the jurisdiction and control of the County of Kauaʻi. The County's land use policies and entitlements process via their General Plan and entitlement process under their comprehensive zoning code ultimately controls what developments are permitted in the region. Thus, the improvements planned to this short segment of the highway is not expected to significantly cause secondary impacts altering County approved land uses and settlement patterns in the area. Similarly, the relocation of existing overhead utilities lines should also not effect land use patterns, public facilities, and infrastructures serving this region.

Construction of this project is expected to generate some short-term impacts associated with these construction activities. Creation of short-term construction jobs are not expected to generate any permanent in-migrating of workers to the Island of Kauaʻi to fill these jobs. It is anticipated that qualified local contractors on Kauaʻi or within the State of Hawaii would be used for the project's construction. Therefore, construction of the project should not contribute to significant secondary impacts associated with in-migration of workers.

This project would not have significant secondary impacts on infrastructure facilities. The highway improvements are located within the State DOT's existing right-of-way, and coordination with government agencies has occurred during the preparation of design plans to address any effects on sewer or water lines. Coordination with utility companies has occurred to address the relocation of overhead utility lines and associated poles. The project involves highway and roadway improvements that would not generate increased water, sewer, or solid wastes that necessitate additional off-site infrastructure improvements. Similarly, the project would not have a significant impact on public facilities such as schools, medical facilities, and recreational facilities.

4.18.2. Cumulative Impacts

Cumulative impacts are typically defined as the effects on the environment which result from the incremental impact of a project when added to past, present, and reasonably foreseeable future actions. The estimation of future impacts is important for cumulative impact analysis. However, the focus must be on "reasonably foreseeable" actions which are those that are likely to occur or probable, rather than those that are merely possible or subject to speculation. The prediction of reasonably foreseeable impacts thus requires judgment based on information obtained from reliable sources such as adopted plans and similar documents.

The discussion of impacts presented within this document has provided information to assist in addressing the applicable cumulative effects associated with the project and other

reasonably foreseeable future actions being implemented. The project is not expected to result in significant cumulative impacts on the surrounding environment. The only other known projects occurring within the project corridor that would be completed before 2012 (project completion date) consist of bridge improvements and a County housing project. Construction of the Wailuā Bridge improvements is anticipated to start in July 2009 and be completed before the 2012 study year. The County's Courtyards at Waipouli is an affordable housing project consisting of townhome units next to Lanikai Street that is nearing construction completion.

In terms of physical resources, no significant cumulative impacts are expected with the project on the various resources such as soils, topography, botanical, natural hazards, and hydrology. Appropriate mitigative measures were identified to address impacts which would primarily be associated with short-term construction related activities. The project would contribute a beneficial effect by minimizing effects on seabirds due to the relocation of existing overhead utility lines underground within the project corridor. Similarly, the project would contribute to improved views along this highway project corridor with the utilities relocation.

There are no significant cumulative impacts on archaeological resources or other historic properties present within the project corridor. Mitigative measures are being implemented under the Wailuā Bridge project based upon the Final EA document completed for that improvement. Similarly, archaeological monitoring for this highway project is planned to serve as appropriate mitigative measures. The relocation of overhead utility lines crossing the river would have a beneficial impact to cultural views associated with the Wailuā Complex of Heiaus. There are no known historic properties affected by the County's affordable housing development. Thus, the implementation of mitigative measures should prevent significant cumulative impacts from occurring on historic properties within the project corridor.

The highway project would not contribute to significant cumulative impacts on the social and economic context of the Wailuā community based upon the discussion in previous sections of this document. The highway widening and utilities relocation should have minimal if any effect on the resident population, economic characteristics of the area, land use patterns, and character of the community which are controlled by the County. Correspondingly, the project would not contribute to significant cumulative impacts on infrastructure facilities (ex. sewer, water, etc.) and public facilities such as schools and parks. The traffic study did address cumulative effects with the project by including the affordable housing project in the analysis. This project would help alleviate traffic conditions in the short term within the corridor and improve present queuing.

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5. RELATIONSHIPS TO PLANS, POLICIES AND CONTROLS

This section discusses State and County of Kauaʻi land use controls, and County plans and policies relating to the proposed project.

5.1. STATE OF HAWAIʻI

5.1.1. Hawaiʻi State Plan

The Hawaiʻi State Plan (Chapter 226, Hawaiʻi Revised Statutes, as amended) provides the overall theme, goals, objectives, policies and priority guidelines for statewide planning. The Hawaiʻi State Plan also directs the appropriate State agencies to prepare functional plans for their respective program areas. The proposed project supports and is consistent with the following State Plan objectives:

§226-12 Objective and policies for the physical environment – scenic, natural beauty and historic resources.

(b)(1) Promote the preservation and restoration of significant natural and historic resources.

(b)(4) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.

Comment: The proposed project is being designed to avoid and/or minimize impacts to significant natural and historic resources, and to preserve the views of these important resources in the project area.

The project specific effect recommendation under Chapter 6E-42, HRS for the relocation of existing overhead utilities lines underground based upon the field work and study conducted is "effect, with proposed mitigation commitments." The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's area of potential effect (APE). The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed undergrounding of utility lines and be pro-active in addressing possible community concerns.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

§226-14 Objectives and policies for facility systems – in general.

(b)(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

(b)(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing pubic demands and priorities.

(b)(3) Ensure that facility systems can be supported within resources capacities and at reasonable cost to the user.

(b)(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction and maintenance.

§227-17 Objectives and policies for facility systems – transportation.

(a)(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.

(a)(2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.

(b)(1) Design, program, and develop a multi-modal system in conformance with desire growth and physical development as stated in this chapter;

(b)(2) Coordinate state, county, federal, and private transportation activities and program toward the achievement of statewide objectives;

(b)(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;

(b)(6) Encourage transportation systems that serve to accommodate present and future development needs of communities;

(b)(10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment

Comment: The mission of the State DOT is to provide a safe, and efficient and accessible highway system for the public through the utilization of available resources in the maintenance, enhancement and support of land transportation facilities. As a result, the proposed project was initiated by the State DOT to relieve existing and future projected traffic congestion along Kūhiō Highway in the Wailuā area. A long-term solution is being developed separately by the State DOT to address necessary regional improvements for East Kauaʻi from Hanamāʻulu to Kapaʻa.

The proposed project is also being designed with sensitivity to the needs of the affected communities, as well as the natural and cultural resources. The proposed project is partially being funded by federal funds administered by the FHWA and by the State of Hawaiʻi funds for its construction. Federal funds made available through the American Recovery and Reinvestment Act, also referred to as Federal Stimulus funds, will also be used for constructing the relocation of utilities underground. The right-turn storage lane extension improvements along Kuamoʻo Road and the relocation of utilities for a section fronting Coco Palms Resort is being funded by both Federal and State funds. The owner of the Coco Palms Resort will be reimbursing the State DOT for the costs associated with these improvements as part of their entitlement conditions.

5.1.2. State Land Use District

The Hawaii Land Use Law of Chapter 205, Hawaii Revised Statutes, classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural land use districts. The project alignment lies within the Agriculture, Conservation, and Urban Districts (see Figure 5-1).

5.1.3. Kauaʻi Long Range Land Transportation Plan

The *Kauaʻi Long Range Land Transportation Plan* (KLRLTP) was completed in May 1997 by the State Department of Transportation in cooperation with the County Planning Department.

The KLRLTP used a State-generated set of economic and population projections that is substantially higher than the Planning Department's 2020 projections. The KLRLTP identifies the land transportation improvements needed to support projected growth for the island of Kauaʻi to the year 2020. The KLRLTP was prepared in accordance with federal requirements, as a prerequisite to receiving federal highway transportation funds. The proposed project is consistent with the recommendations of the KLRLTP.

5.2. COUNTY OF KAUAʻI

5.2.4. County of Kauaʻi General Plan Designation

This section discusses the project's conformance with pertinent policies from the County of *Kauaʻi's General Plan* which was adopted under Ordinance No. 753 on November 30, 2000. The General Plan establishes policy for the long-range development, conservation, use and allocation of land, water, and other resources in the County of Kauaʻi. The General Plan includes vision statements which describes the desired state of the County 20 years in the future. Furthermore, the General Plan includes policies intended to achieve that vision as well as implementing actions that set forth recommended courses of action to carry out the policies.

Consistency with Applicable Policies and Implementing Actions

Heritage Resources Map:

Policies:

(a) The Heritage Resources Map depicts natural, cultural and scenic resources that are important to the County of Kauaʻi and that are intended to be conserved. The mapping of important landforms, streams and other physical elements represents the general location of the resource. The mapping of historic and archaeological sites, other features and Scenic Roadway Corridors is intended to be representational, not precise.

(d) Projects undertaken with State or County lands or funds shall be designed to conserve heritage resources.

Comment: The Heritage Resources Map in the 2000 Kauaʻi General Plan identifies important scenic resources, such as major land forms, open spaces, viewing points, and scenic drives. The Heritage Resources Map for the Kawaihau Planning District designates Kūhiō Highway as a Scenic Roadway Corridor from the Waipouli areas southbound toward the Wailuā Golf Course area. In addition, Kuamoʻo Road is also designated as a Scenic Roadway Corridor from the highway mauka (inland) up to the Ōpaekaʻa Falls area. The proposed highway improvements, storage lane extension, and utilities relocation occur within these scenic corridors.

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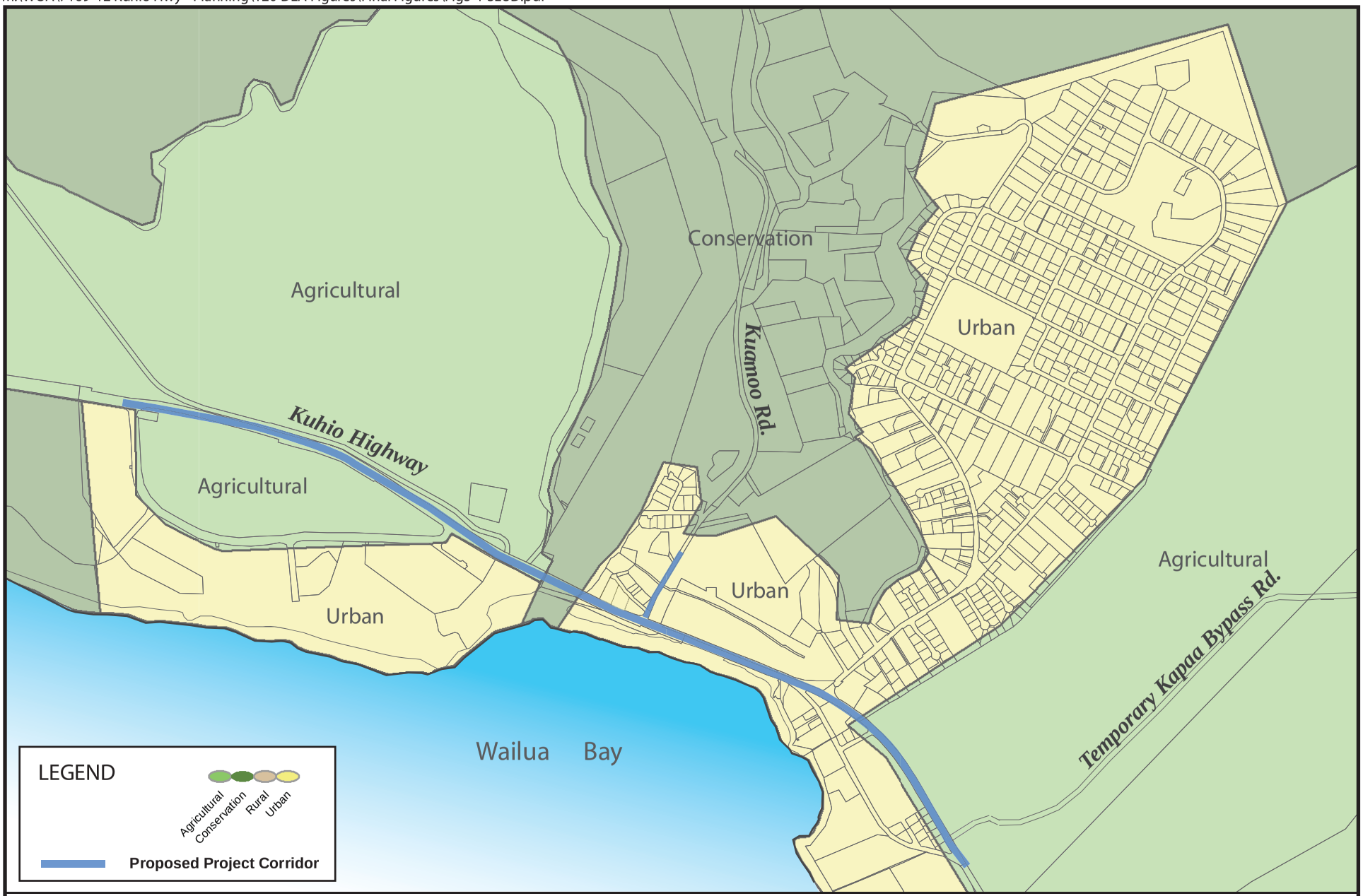

0 375 750 1,500 2,250 3,000 Feet

FIGURE 5-1

STATE LAND USE DISTRICT MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

WILSON OKAMOTO CORPORATION
ENGINEERS|PLANNERS|CONSULTANTS

The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

Scenic Views:

Policies:

(a) In developing public facilities and in administering land use regulations, the County shall seek to preserve scenic resources and public views. Public views are those from a public place, such as a park, highway, or along the shoreline.

Comment: The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the

shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

Historic and Archaeological Sites:

Policies:

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 to the site.

Comment: The proposed project is being designed to avoid and/or minimize impacts to significant natural and historic resources, and to preserve the views of these important resources in the project area.

The project specific effect recommendation under Chapter 6E-42, HRS for the relocation of existing overhead utilities lines underground based upon the field work and study conducted is "effect, with proposed mitigation commitments." The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's area of potential effect (APE). The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed undergrounding of utility lines and be pro-active in addressing possible community concerns.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these

potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

Watersheds, Streams and Water Quality:

Policies:

(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 lost – i.e., stream banks;

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

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

(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.

(d) Watershed Management

(1) Manage land use and earth-moving activities from the standpoint of the entire watershed, considering important characteristics such as scenic landscape features, historic sites, native species of plants and animals and other special resources.

Comment: The project should not have a significant impact on the existing pattern of surface water flows within the project area. Highway improvements would occur within the State's existing right-of-way and therefore have minimal effects on surface runoff and surface waters. Relocated utilities would be placed underground and similarly not affect surface waters. The

Wailuā River should not be affected because the electrical lines would be constructed under the river via horizontal directional drilling within the State's right-of-way.

Short-term, temporary impacts to coastal waters may occur as a result of clearing, grading and other related construction activities. The project improvements are not expected to generate considerable storm water runoff from construction activities. Widening improvements would occur within the State DOT right-of-way and involve minor modifications to existing topographic conditions. No major cut or fill activities would occur under this project. The relocation of utility lines underground would not significantly alter the present ground conditions since work would involve creating open trenches or using horizontal directional drilling.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

Native Hawaiian Rights:

Policies

(a) Under the State Constitution and the County Charter, the County of Kauaʻi is empowered to promote the health, safety, welfare of all inhabitants without discrimination as to the ethnic origin. As part of carrying out its responsibilities under the Constitution and the Charter, the County recognizes the rights of Native Hawaiians and the laws concerning lands and waters that have been established through the State Constitution, State and Federal Laws, and State and Federal court decisions. No County Ordinance or rule shall modify or diminish these rights:

- *Kuleana lands, water rights and access rights provided under the Kuleana Act of 1850, as recognized in current statutes, rules and court decisions.*

- *Traditional and customary rights of Native Hawaiians, such as for access and gathering, provided under the State Constitution and Hawaiʻi Revised Statutes, as interpreted by the courts (i.e. the PASH case).*

- *Burial rights provided under the Hawaiʻi Historic Preservation Act and federal Native American Graves Repatriation Act.*

- *Preservation of historic properties and archaeological resources provided under the federal Archaeological Resources Protection Act of 1979; the National Historic Preservation Act of 1966; and the Hawaiʻi Historic Preservation Act.*

Comment: The proposed project will be consistent with these policies as it will not diminish any Native Hawaiian rights specified by the referended laws and court cases. Studies conducted and discussed in Section 4-10 show the proposed improvements should not have adverse effect on cultural practices, and necessary mitigative measures will be implemented to ensure this is in compliance with the identified regulations.

The project specific effect recommendation under Chapter 6E-42, HRS for the relocation of existing overhead utilities lines underground based upon the field work and study conducted is "effect, with proposed mitigation commitments." The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's area of potential effect (APE). The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed undergrounding of utility lines and be pro-active in addressing possible community concerns.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

<u>Scenic Roadway Corridors</u>

Policies

(a) The purpose of designating Scenic Roadway Corridors is to conserve open space, scenic features, and views within and along Kauaʻi most heavily-traveled routes. The policy of conservation recognizes the vital function of these roadways in meeting the public need for transportation. It also recognizes the legitimate desire of private landowners to make

economic use of their lands. The intent of this policy is to establish basic principles for roadway design and land use within these scenic corridors and to provide a basis for County action to establish programs and regulations to implement them.

Comment: The Heritage Resources Map for the Kawaihau Planning District designates Kūhiō Highway as a Scenic Roadway Corridor from the Waipouli areas southbound toward the Wailuā Golf Course area. In addition, Kuamoʻo Road is also designated as a Scenic Roadway Corridor from the highway mauka (inland) up to the Ōpaekaʻa Falls area. The proposed highway improvements, storage lane extension, and utilities relocation occur within these scenic corridors.

The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Kawaihau Land Use Map

According to the Land Use Map of the County of Kauaʻi General Plan the project alignment falls within Resort, Residential, Open and Agriculture designations (See Figure 5-2).

Regional Highways and Roads

Policies

(a) Use General Plan policies concerning rural character, preservation of historic and scenic resources, and scenic roadway corridors as part of the criteria for long-range highway planning and design. The goal of the efficient movement of through traffic should be weighted against community goals and policies relating to community character, livability, and natural beauty.

Comment: The proposed project is consistent with the General Plan's recommendation for new facilities needed by 2020, including the future construction of the new Kapaʻa Relief Route. The proposed project follows General Plan policies concerning rural character, preservation of historic and scenic resources, and scenic roadway corridors.

M:\WOA\7169-12 Kuhio Hwy - Planning\120 DEA Figures\Final Figures\Fig5-2 GP.pdf

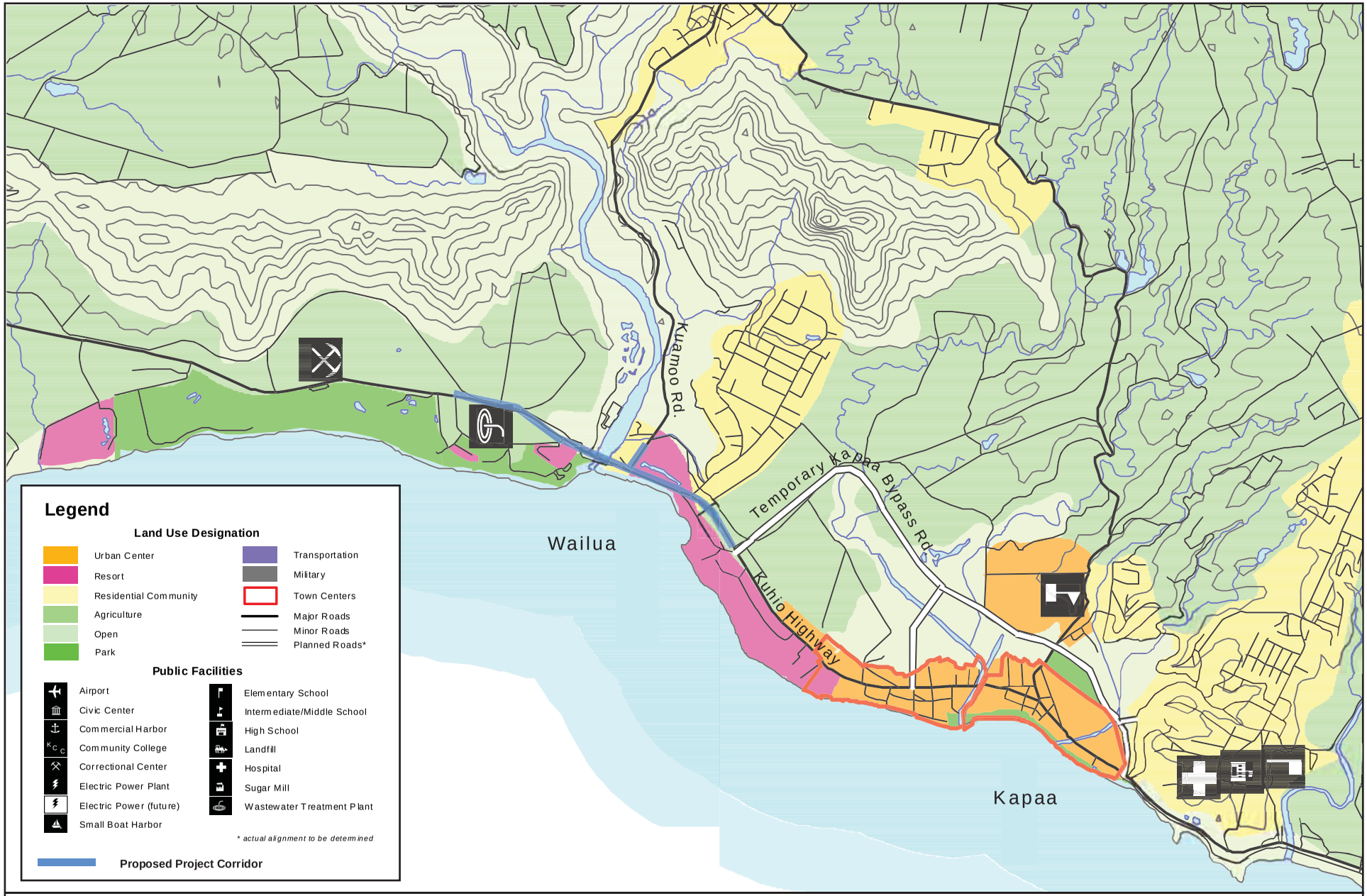

FIGURE 5-2

COUNTY OF KAUAI GENERAL PLAN LAND USE MAP

0 2000 4000 6000 8000 10000 Feet

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

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5.2.5. County of Kauaʻi Comprehensive Zoning Ordinance

The Kauaʻi Comprehensive Zoning Ordinance (CZO) provides regulations and standards for development of land uses and the construction of structures. The CZO establishes various zoning districts and overlay districts; delineates uses and development standards for each district; establishes permits and permit processes, and establishes criteria for granting permits.

The proposed project is situated in Resort (RR-20), Open (O), Neighborhood Commercial (C-N), Residential (R-20), and Residential (R-10) districts (See Figure 5-3).

5.2.6. Coastal Zone Management Plan

The State of Hawaii Coastal Zone Management (CZM) Program, Chapter 205A, Hawaii Revised Statutes, provides for the beneficial use, protection, and development of Hawaii's coastal zone. The objectives and policies of the CZM Program encompass ten areas of concern, which are discussed in relation to the proposed project as follows:

Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Comment: The proposed project is not anticipated to significantly impact recreational facilities. Short-term impacts would be related to noise and air quality due to construction in areas near parks. The proposed project will be within the State ROW along the mauka side of Kūhiō Highway and are not expected to impact access to nearby parks. To mitigate traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on recreational facilities.

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.

Comment: Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

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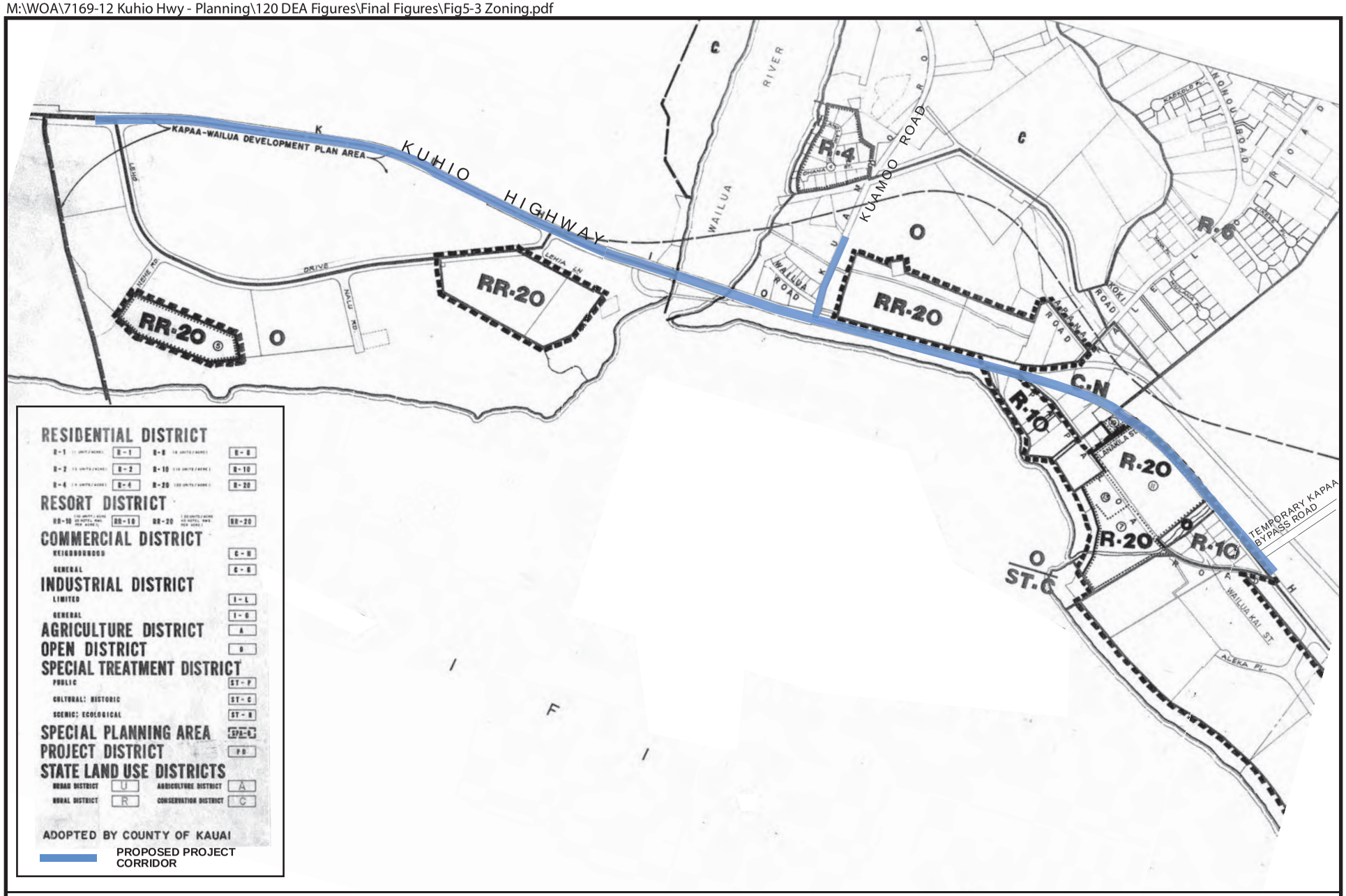

FIGURE 5-3
COUNTY OF KAUAI ZONING MAP

Kuhio Highway Short-Term Improvements
Lihue and Kawaihau Districts, Island of Kauai

WILSON OKAMOTO CORPORATION
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Scenic and Open Space Resources

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

Comment: The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

Coastal Ecosystems

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

Comment: The project should not have a significant impact on coastal ecosystems. Highway improvements would occur within the State's existing right-of-way and therefore have minimal effects on surface runoff and surface waters. Relocated utilities would be placed underground and similarly not affect surface waters. The Wailuā River should not be affected because the electrical lines would be constructed under the river via horizontal directional drilling within the State's right-of-way.

Short-term, temporary impacts to coastal waters may occur as a result of clearing, grading and other related construction activities. The project improvements are not expected to generate considerable storm water runoff from construction activities. Widening improvements would occur within the State DOT right-of-way and involve minor modifications to existing topographic conditions. No major cut or fill activities would occur under this project. The relocation of utility

lines underground would not significantly alter the present ground conditions since work would involve creating open trenches or using horizontal directional drilling.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

Economic Uses

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

Comment: The mission of the State DOT is to provide a safe, and efficient and accessible highway system for the public through the utilization of available resources in the maintenance, enhancement and support of land transportation facilities. As a result, the proposed project was initiated by the State DOT to relieve existing and future projected traffic congestion along Kūhiō Highway in the Wailuā area. A long-term solution is being developed separately by the State DOT to address necessary regional improvements for East Kauaʻi from Hanamāʻulu to Kapaʻa.

The proposed project will create a number of short-term employment opportunities. Short-term employment will consist primarily of construction-related jobs generated by the proposed development.

Coastal Hazards

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

Comment: According to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), the proposed project corridor falls within the following designated areas (see Figure 4-7).

- Zone AE: "Special flood hazard areas inundated by the 100-year flood with base flood elevations determined." The base flood elevations for the "AE" zone are 11 and 15 feet above msl.

- Zone VE: "Coastal flood with velocity hazard (wave action); base flood elevations determined". The base flood elevation for the "VE" 11 and 15 feet above msl.

- Floodway areas on Zone AE: "The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights."

- Zone X: "Other flood areas determined to have areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

- Zone X: "Other areas determined to be outside the 0.2% annual chance floodplain."

The proposed project is not anticipated to significantly change or affect the risk of flood hazard in the area. The highway widening improvements would occur within the State DOT's existing right-of-way, and only involve a small increase in additional impervious area for roadway pavement. Highway and roadway improvements would be designed and constructed in conformance with State DOT standards. Therefore, these improvements would not significantly change the drainage patterns and associated flood hazards present along the corridor. The relocated utilities planned would be situated underground and thus not affect the above ground drainage patterns and flood hazard. South of the Wailuā River, the relocated utilities are not situated within a flood hazard area. The relocated utilities would also cross under the river using horizontal directional drilling and therefore not affect the flood hazard associated with the river.

Managing Development

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

Comment: The proposed project has involved outreach and public participation, including a public informational meeting on March 5, 2009 and the pre-assessment consultation for the draft EA (see Appendix A).

Public Participation

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

Comment: The proposed project has involved outreach and public participation, including a public informational meeting on March 5, 2009 and the pre-assessment consultation for the draft EA (see Appendix A).

Beach Protection

Objective: Protect beaches for public use and recreation.

Comment: The proposed project is not anticipated to significantly impact recreational facilities. Short-term impacts would be related to noise and air quality due to construction in areas near parks. The proposed project will be within the State ROW along the mauka side of Kūhiō Highway and are not expected to impact access to nearby parks. To mitigate traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on recreational facilities.

Marine Resources

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

Comment: The project should not have a significant impact on marine resources within the project area. Highway improvements would occur within the State's existing right-of-way and therefore have minimal effects on surface runoff and surface waters. Relocated utilities would be placed underground and similarly not affect surface waters. The Wailuā River should not be affected because the electrical lines would be constructed under the river via horizontal directional drilling within the State's right-of-way.

Short-term, temporary impacts to coastal waters may occur as a result of clearing, grading and other related construction activities. The project improvements are not expected to generate considerable storm water runoff from construction activities. Widening improvements would occur within the State DOT right-of-way and involve minor modifications to existing topographic conditions. No major cut or fill activities would occur under this project. The relocation of utility lines underground would not significantly alter the present ground conditions since work would involve creating open trenches or using horizontal directional drilling.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance

with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

5.3. SPECIAL MANAGEMENT AREA

The Special Management Area (SMA) Rules and Regulations were established to regulate development along the shoreline in order to preserve, protect and where possible, restore the natural resources of the coastal zone. The highway widening improvements are situated within the SMA, and a SMA Use Permit was obtained in September 2007 (SMA(U)-2008-2). A portion of the utility lines being relocated underground south of Kuamoʻo Road is within the SMA, however, the utility improvements are exempt from the SMA requirements.

The guidelines of the SMA within the CZM Program encompass three areas of concern, which are discussed in relation to the proposed project as follows:

(1) All development in the special management area shall be subject to reasonable terms and conditions set by the authority in order to ensure:

(a) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles;

(b) Adequate and properly located public recreation areas and wildlife preserves are reserved;

(c) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources; and

(d) *Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, wind damage, storm surge, landslides, erosion, siltation, or failure in the event of earthquake.*

Comment: The proposed project is not anticipated to significantly impact access to recreational facilities. The proposed project will be within the State ROW along the mauka side of Kūhiō Highway and are not expected to impact access to nearby recreational facilities. To mitigate

traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on recreational facilities.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

(2) No development shall be approved unless the authority has first found:

(a) That the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests. Such adverse effects shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options;

(b) That the development is consistent with the objectives, policies, and special management area guidelines of this chapter and any guidelines enacted by the legislature; and

(c) That the development is consistent with the county general plan and zoning. Such a finding of consistency does not preclude concurrent processing where a general plan or zoning amendment may also be required.

Comment: The principal potential threats that currently exist within the general project area to the Hawaiian Petrel and the Newell's Shearwater are those posed by street lights, business lighting and the utility wires and associated poles that run the length of the proposed project corridor in various configurations and numbers. The threats posed by these structures and outdoor lighting are associated with birds being downed after becoming disoriented by outdoor

lighting and possibly colliding with above ground utility structures, and other man-made structures.

The proposed project will relocate existing overhead utilities (electrical, telephone, cable) underground from the area just north of the Temporary Kapaʻa Bypass Road southbound to the KIUC Lydgate Substation at South Leho Drive. The utility poles associated with these lines will also be removed. These actions will have a positive beneficial impact because it will eliminate the existing threats to these listed seabird species from these overhead utilities within this project corridor.

The State DOT plans to incorporate the following minimization measures during the course of construction activities to ensure that such activities have a minimal impact on either of the listed seabird species previously discussed.

- During the construction phase of the project, any lighting necessary to conduct nighttime activities will be shielded and or directed at the ground.
- No nighttime construction will occur during the peak fallout period, namely between September 15 and December 15 annually.
- All construction personnel will be required to attend a seabird awareness program prior to the initiation of construction activity.
- A pet carrier will be maintained on site at all times, and will be used to temporarily hold any downed seabird recovered in the general project area.
- If a downed seabird is found within the general project area it will be retrieved and placed in the pet carrier and maintained in a shady location until DOFAW or SOS program personnel retrieve the bird.
- DOFAW and/or the SOS program will be contacted immediately upon recovery of any downed bird.
- The USFWS shall be notified of any downed seabird within 24-hours of the occurrence.

Best Management Practices would be incorporated into design plans for implementation by the contractor. These practices developed should minimize and mitigate short-term construction related impacts to avian species, waterbirds, or mammals that may be present in the vicinity of project corridor. This includes improvements to the existing culvert along Kūhiō Highway by the Kaloko Marsh and culvert along Kuamoʻo Road by the Coco Palms Resort drainageway. Any conditions associated with the permit would also be implemented by the contractor. Design plans are also being coordinated with pertinent government agencies for ministerial review and approval.

The proposed project will comply with the objectives and policies of the special management area guidelines, the County General Plan, and zoning.

(3) The authority shall seek to minimize, where reasonable;

(a) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;

(b) Any development which would reduce the size of any beach or other area usable for public recreation;

(c) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management areas and the mean high tide line where there is no beach;

(d) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast; and

(e) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Comment: Planned improvements would not substantially alter the existing topography in this area since most of the work would occur within the State DOT's existing right-of-way. Additional easements obtained for utilities relocation would similarly not significantly alter topographic conditions since the utilities would be located underground either within the roadway pavement or along the paved highway. Existing topography associated with the highway and improved areas would be similar to current conditions which are relatively flat with slight slopes.

The proposed project will be within the State ROW along the mauka side of Kūhiō Highway and are not expected to impact access to nearby recreational facilities. To mitigate traffic impacts, a traffic control plan will be developed and coordinated with the appropriate State and County agencies. The proposed project is not expected to have long term impacts on recreational facilities.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed

by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's *Storm Water Permanent Best Management Practices Manual* (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

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6. DETERMINATION OF ANTICIPATED FONSI

This Draft EA was prepared for review in accordance with the consultation process of Chapter 343, Hawaii Revised Statutes. Potential impacts of the proposed project have been evaluated in accordance with the significance criteria set forth in Section 200-12 of Title 11, Administrative Rules, Department of Health, State of Hawaii. Discussion of the project's conformance to the criteria is presented as follows.

1. Involve an irrevocable commitment to loss or destruction of any natural or cultural resource;

The proposed project is not anticipated to involve any construction activity that might lead to a loss or destruction of any natural or cultural resources. The proposed improvements will occur within the State ROW. The placement of utilities underground will enhance and improve the travel along Kūhiō Highway, as well as significantly reduce the existing threats to these listed seabird species, and represents a significant minimization of existing threats to these species from those currently found within the project right-of-way.

The principal potential threats that currently exist within the general project area to the Hawaiian Petrel and the Newell's Shearwater are those posed by street lights, business lighting and the utility wires and associated poles that run the length of the proposed project corridor in various configurations and numbers. The threats posed by these structures and outdoor lighting are associated with birds being downed after becoming disoriented by outdoor lighting and possibly colliding with above ground utility structures, and other man-made structures.

The proposed project will relocate existing overhead utilities (electrical, telephone, cable) underground from the area just north of the Temporary Kapaʻa Bypass Road southbound to the KIUC Lydgate Substation at South Leho Drive. The utility poles associated with these lines will also be removed. These actions will have a positive beneficial impact because it will eliminate the existing threats to the Hawaiian Petrel and the Newell's Shearwater from these overhead utilities within this project corridor.

The State DOT plans to incorporate the following minimization measures during the course of construction activities to ensure that such activities have a minimal impact on either of the listed seabird species previously discussed.

The project specific effect recommendation under Chapter 6E-42, HRS for the relocation of existing overhead utilities lines underground based upon the field work and study conducted is "effect, with proposed mitigation commitments." The proposed underground utilities alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's area of potential effect (APE). The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed undergrounding of utility lines and be pro-active in addressing possible community concerns.

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus, it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Therefore, the already approved monitoring plan (March 2009) for the highway improvements will be amended to include monitoring provisions associated with the utility lines relocation.

2. Curtail the range of beneficial uses of the environment;

The proposed project will not curtail the beneficial uses of the environment. The proposed roadway improvements will relieve existing and future projected traffic congestion along Kūhiō Highway in the Wailuā area. A long-term solution is being developed separately by the State DOT to address necessary regional improvements for East Kauaʻi from Hanamāʻulu to Kapaʻa.

3. Conflict 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 does not conflict with long-term environmental policies, goals, and guidelines of the State of Hawaii. As presented in this EA, the project's potential temporary adverse impacts are associated primarily with short-term construction-related activities and can be mitigated through adherence to standard construction mitigation practices.

4. Substantially affect the economic or social welfare of the community or state;

The proposed project 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 development. Long-term employment opportunities will result from professional, skilled and other workers required to manage and maintain the resort-residential complex and restaurant.

Economic benefits will also be realized with the proposed project. In the short-term, the 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 include benefits to local retail businesses resulting from construction activities.

5. Substantially affect public health;

With the exception of minor short-term, construction-related impacts to ambient air and noise levels, no significant impacts to the public's health and welfare are anticipated.

6. Involve substantial secondary impacts, such as population changes or effects on public facilities;

The proposed project is not expected to generate population or business growth, but is expected to relive existing and future projected traffic congestion along Kūhiō Highway in the Wailuā area.

7. Involve a substantial degradation of environmental quality;

Construction activities associated with the proposed project are anticipated to result in relatively insignificant short-term impacts to noise, air quality, water quality and traffic in the immediate project vicinity. With the incorporation of mitigation measures during the construction period, the project will not result in long-term degradation to the environmental quality.

8. Individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

The proposed project is expected to address existing traffic congestion along Kūhiō Highway in the Wailuā area. The proposed project is being coordinated with a separate project to improve the Wailuā Cane Haul Bridge, which will be starting in July 2009. A long-term solution is being developed separately by the State DOT to address necessary regional improvements for East Kauaʻi from Hanamāʻulu to Kapaʻa. The project is not expected to have a significant cumulative effect on the environment as discussed in this document.

9. Substantially affect a rare, threatened, or endangered species, or its habitat;

No plant species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawaiʻi's endangered species programs were recorded within or close to the proposed project area. Therefore it is not expected that the modification to the environment as proposed will result in deleterious impacts to any plant species currently listed under either federal or State of Hawaiʻi endangered species statutes. Since the project site does not provide a unique habitat, no significant impacts on flora species are anticipated from the construction and operation of the proposed project.

The principal potential threats that currently exist within the general project area to the Hawaiian Petrel and the Newell's Shearwater are those posed by street lights, business lighting and the utility wires and associated poles that run the length of the proposed project corridor in various configurations and numbers. The proposed project will place overhead utilities underground between the Temporary Kapaʻa Bypass Road and Lydgate Substation at South

Leho Drive. The utility poles associated with these lines will also be removed. These actions will significantly reduce the existing threats to these listed seabird species, and represents a significant minimization of existing threats to these species from those currently found within the project right-of-way.

Kaloko Marsh and its adjacent waterways does not currently support aquatic biota, therefore not federally endangered or threatened species were encountered during the surveys, and none is anticipated to utilize aquatic habitats in the project area. A BMP plan will be designed and implemented to minimize environmental impacts to water quality of the project waterway in the vicinity of the project site.

During the aquatic biota survey for the Kuamoʻo Road Culvert Extension the aholehole, samoan crab, and *O'opu nakea* were observed. These species are regulated by HAR 13-95 and HAR 13-100. A BMP plan for the Kuamoʻo Road Culvert extension will be designed and implemented to minimize environmental impacts to water quality and marine resources of the project waterway in the vicinity of the project site.

10. Detrimentally affect air or water quality or ambient noise levels;

Operation of construction equipment would temporarily elevate ambient noise and concentrations of exhaust emission in the immediate vicinity of the project site. Operation of the proposed project will have no significant long-term impact on air or water quality or ambient noise levels in the vicinity.

During construction of the proposed project, two potential types of air pollution emissions will likely occur, resulting in air quality impacts: 1) airborne dust from vehicle movement and grading activities; and 2) carbon monoxide and nitrogen oxide emissions from on-site construction equipment traveling to and from the project work site. Potential air quality impacts during construction of the proposed development will be mitigated by complying with the State DOH Administrative Rules, Title 11, Chapter 60, "Air Pollution Control". Operation of the project will have no significant long-term impact on ambient air quality in the project vicinity.

Water quality impacts to nearshore coastal waters during construction of the project will be mitigated by adherence to applicable State and County regulations governing construction activities. The project's associated drainage modifications will comply with the State DOT's drainage standards, and will be designed to minimize impacts to surface water resources and coastal waters. Highway improvements would be designed and constructed in conformance with pertinent storm water permanent best management practices and measures described under the State DOT's Storm Water Permanent Best Management Practices Manual (February 2007).

Appropriate erosion and sediment controls will also be instituted during land ground disturbing operations and construction site work activities in compliance with the County's

Grading Ordinance and the State DOH's NPDES Permit program. Mitigation measures will be instituted following site-specific assessments, incorporating appropriate structural and non-structural BMPs, such as minimizing time of exposure between construction and replanting, and implementing erosion control measures such as silt fences and sediment basins.

11. Affect or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;

According to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA), the proposed project corridor falls within the following designated areas (see Figure 4-7).

- Zone AE: "Special flood hazard areas inundated by the 100-year flood with base flood elevations determined." The base flood elevations for the "AE" zone are 11 and 15 feet above msl.
- Zone VE: "Coastal flood with velocity hazard (wave action); base flood elevations determined". The base flood elevation for the "VE" 11 and 15 feet above msl.
- Floodway areas on Zone AE: "The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights."
- Zone X: "Other flood areas determined to have areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."
- Zone X: "Other areas determined to be outside the 0.2% annual chance floodplain."

The proposed project is not anticipated to significantly change or affect the risk of flood hazard in the area. The highway widening improvements would occur within the State DOT's existing right-of-way, and only involve a small increase in additional impervious area for roadway pavement. Highway and roadway improvements would be designed and constructed in conformance with State DOT standards. Therefore, these improvements would not significantly change the drainage patterns and associated flood hazards present along the corridor. The relocated utilities planned would be situated underground and thus not affect the above ground drainage patterns and flood hazard. South of the Wailuā River, the relocated utilities are not situated within a flood hazard area. The relocated utilities would also cross under the river using horizontal directional drilling and therefore not affect the flood hazard associated with the river.

12. Substantially affect scenic vistas and viewplanes identified in county or state plans or studies; or,

The Heritage Resources Map for the Kawaihau area designates the proposed project corridor, Kūhiō Highway from S. Leho Drive to the Temporary Bypass Road, as a Scenic Roadway Corridor. Roadway improvements near the will be consistent with the Scenic Roadway Corridor policy. The proposed project will not significantly impact views or visual resources. The placement of utilities underground will enhance and improve the travel along Kūhiō Highway. In addition, the removal of the overhead lines would enhance the look by removing the cluttered look along this roadway corridor.

The proposed project will not significantly impact existing scenic coastal views along the highway or visual resources. The highway and roadway improvements do not involve any large structures or other obstructions that would reduce the existing available views of the shoreline. The scenic qualities of the mountains on one side and coastline on the other would be retained.

The relocation of existing overhead utility lines underground and the removal of associated wooden poles will have a beneficial effect on existing views along the highway corridor. Removing these utility lines will enhance and improve the scenic views of the coastline and inland areas for vehicles traveling along Kūhiō Highway. As a result, the intactness of the coastal view would be improved since the obstruction of the utility lines will be removed creating a more natural visual pattern of the landscape and coastline. Also, the vividness of the coastal views would be enhanced without these obstructions creating more scenic and memorable views.

Removal of the overhead utility lines crossing the Wailuā River will also have a beneficial effect on the Wailuā River State Park and complex of heiaus. The complex of heiaus has a cultural view corridor from Poliahu Heiau toward the Hikina a Kala Heiau which is presently obstructed by existing overhead utility lines. Therefore, the removal of these overhead utility lines and associated poles would eliminate these structures and improve both the intactness and vividness of the view corridor.

13. Require substantial energy consumption.

Construction and operation of the project will not require substantial increases in energy consumption. The proposed transportation

7. CONSULTATION

7.1. PARTIES CONSULTED DURING THE PRE-ASSESSMENT CONSULTATION PERIOD

The following agencies, organizations, and individuals were consulted during the preparation of the Draft EA. Consultation was conducted to solicit comments from public agencies, elected officials, and community organizations regarding their concerns and agency requirements. A pre-assessment consultation package consisting of a letter with informational material was distributed to these consulted parties. Those who formally replied to the pre-assessment consultation package are indicated by an asterisk (*). Copies of all written comments received along with responses to them are reproduced and included in Appendix A.

Federal

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service, Pacific Islands Ecological Field Service Office *

State

Department of Accounting and General Services *

Department of Business, Economic Development and Tourism (DBEDT)

Office of Planning, DBEDT *

Department of Education *

Department of Health (DOH)

Department of Health Environmental Management Division, DOH

Office of Environmental Quality Control, DOH

Environmental Planning Office, DOH

Department of Land and Natural Resources (DLNR)

Land Division, DLNR *

Land Division - Kauaʻi District, DLNR *

Engineering Division, DLNR *

Division of Boars and Recreation, DLNR *

Division of State Parks, DLNR *

Historic Preservation Division, DLNR

SHPD - Kauaʻi Office, DLNR

Kauaʻi Burial Council, DLNR

Division of Forestry and Wildlife DLNR *

Department of Hawaiian Homelands *

Office of Hawaiian Affairs *

Civil Defense*

County

Office of the Mayor

Office of the County Clerk

County Council

Parks Division

Planning Department

Department of Public Works, Engineering Division *

Department of Water

Police Department

Fire Department

Other

Bette Midler Family Trust

Bernice Lamar and Robert Lamar

Representative Hermina Morita

Senator Gary Hooser

Kauaʻi Island Utility Cooperation

Hawaiian Telcom *

Oceanic Time Warner Cable

Kauaʻi Historical Society

Kauaʻi Historic Preservation Review Commission

Na Kahu Hikina A Ka La

Hui Malama I Na Kupuna O Hawaii

Smith's Motorboat Services

Charlotte S. Kaui Trust

Wailua Shopping Plaza

7.2. PUBLIC INFORMATION MEETING

A public information meeting was held on Thursday, March 5, 2009 at the Aston Kauaʻi Beach at Makaiwa. The purpose of this meeting was to provide information about the project and solicit feedback and concerns from members of the community. The meeting was attended by 18 members of the community. During the Q&A session that followed the presentation,

questions were raised and comments offered about project costs, schedule, construction-related traffic disruptions, and suggestions for additional measures to relive congestion. Summary meeting notes are included herein as Appendix A.

Notice of the public information meeting was advertised in the *Garden Island Newspaper* and *Honolulu Star Bulletin* on February 15, 2009.

7.3. CONSULTATION WITH OTHER AGENCIES

Several meetings were conducted with the various agencies. The purpose of the meetings was to provide information on the project, provide an update of the project and obtain feedback.

Department of Hawaiian Home Lands

- April 7, 2009

Division of State Parks, Department of Land & Natural Resources

- October 25, 2007
- April 15, 2009

U.S. Fish & Wildlife Service

- October 17, 2007
- December 18, 2007
- May 12, 2008
- January 22, 2009

7.4. SECTION 106 CONSULTATION

This environmental document was prepared pursuant to State environmental review requirements prescribed under Chapter 343, HRS, and Title 11, Chapter 200, HAR. However, since this project is Federally-funded, it is considered a Federal Action subject to Section 106 consultation under the National Historic Preservation Act, as amended (NHPA) (16 U.S.C. 470(f)) and the Advisory Council on Historic Preservation's implementation procedures prescribed by 36 CFR, Part 800 (ACHP, 2004). The "Agency Official" responsible for this consultation is the FHWA, and this consultation effort has been integrated and documented in this environmental assessment.

Section 106 consultation requires Federal agencies to take into account the effects of their undertakings on historic properties. The environmental review process was thus used to facilitate consultation efforts with consulting parties in identifying the presence of historic properties and assessing the project's impact on historic properties. Consultation was also

conducted with the SHPD in coordination with the State Historic Preservation Officer. The information provided in this Draft EA is being used to facilitate consultation efforts with the SHPD, consulting parties, and the public in reviewing the proposed determination of effect for the project.

A consultation package consisting of project informational material were sent to the following agencies and organizations:

- Department of Hawaiian Home Lands
- Office of Hawaiian Affairs
- State Historic Preservation Division, Department of Land & Natural Resources
- Kauaʻi /Niʻihau Burial Council
- County of Kauaʻi, Planning Department
- Kauaʻi Historic Preservation Review Commission
- Kauaʻi Historical Society
- Na Kahu Hikina A Ka La
- Hui Malama I Na Kupuna O Hawaii

SHPD made a determination of “no adverse effects” with the conditions that an archaeological monitoring plan be submitted to SHPD (see Attachment H). OHA also concurred with SHPD’s determination (see Appendix A-3).

An Archaeological Monitoring Plan was approved by SHPD on March 16 and April 6, 2009

In addition to the consultation through correspondence, meetings were conducted with the State Historic Preservation Division on January 30, 2009, the Kauaʻi /Niʻihau Burial Council and Kauaʻi Historic Preservation Review Commission on March 5, 2009, respectively. The purpose of the meetings was to provide information on the project, provide an update of the project and obtain feedback.

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Appendix A

Pre-Assessment Consultation

Appendix A-1

Pre-Assessment Consultation Letters

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

REPLY TO

March 9, 2009

Regulatory Branch

Corps File No. POH-2007-280

Mr. Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

RECEIVED
MAR 12 2009
WILSON OKAMOTO CORPORATION

Dear Mr. Sato:

This letter is in response to your request for the U.S. Army Corps of Engineers (Corps) input pursuant to our Section 404 of the Clean Water Act (CWA) of 1972 (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) authorities. Our comments are provided to assist your office in preparing a draft Environmental Assessment (EA) for the **Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road Project** located in Kauai, Hawaii.

Based on the information submitted to our office, we understand the project would entail the implementation of improvements along a 1.75-mile section of Kuhio Highway. The improvements would include: 1) widening the highway on the southbound side from three to four lanes between Kuamoo Road and Temporary Bypass Road, 2) extending the existing right-turn lane along Kuamoo Road, and 3) relocating overhead utility lines underground as a mitigation measure based on previous consultation with the U.S. Fish and Wildlife Service. These proposed activities are separate from the long-term plans associated with the Kapaa Relief Route, Kuhio Highway Corridor Improvements from Hanamā'ulu to Kapaa Project, and appear to constitute a "single and complete project" with independent utility.

The Corps suggests the draft EA include site-specific information pertaining to the occurrence of water resources within the project area, such as perennial, intermittent and ephemeral streams and wetlands. For any non-tidal tributary waters occurring within the project area, the ordinary high water mark must be determined as described at 33 C.F.R. 328.3(e). Similarly, for coastal areas and tidally influenced waters that may occur within the project area, the draft EA (or its supporting technical studies) should clearly demarcate or otherwise identify the mean high water line and high tide line [as described at 33 C.F.R. 328.3(d)]. The boundaries of wetlands that may exist on-site or adjacent to the project site should be delineated based on the procedures set forth in the Corps' 1987 *Wetlands Delineation Manual*. In fact, we note that a wetlands delineation was performed by Char & Associates for the proposed Kapaa Relief Route, Kuhio Highway Improvements Project in September 2003. This wetlands delineation was conducted as part of the aforementioned project and in accordance with the 1995 *National Environmental Policy Act/Section 404 of CWA Integration Process for Surface Transportation Projects in the State of Hawaii Memorandum of Understanding*. The wetlands delineation report encompasses a relatively broad study area, including the 1.75-mile segment of the Kuhio Highway, and was verified/approved by our office on November 29, 2004 (reference Corps File No. POH-2004-1085). The findings from the Char & Associates delineation should be incorporated into the draft EA, as appropriate. With respect to the 2003 wetlands delineation document, it is important to advise you and the project's applicant that based on Corps policy, the delineation is set to expire November 29, 2009.

We recommend the draft EA contain or address the following additional information and analyses, as applicable:

- A clear and succinct written project purpose and need statement, and a discussion of how the proposed short-term improvements relate to (or not) the long-term Kuhio Highway Corridor Improvements Project;
- The source and volume of fill material;
- The method and timing for any discharge (placement) of dredged or fill material;
- A detailed illustration and description of the footprint of disturbance (including temporary and permanent impacts), expressed in acres, relative to the boundaries of the Corps' jurisdiction in tidal and non-tidal waters of the U.S., including wetlands;
- The location of disposal sites for any excess excavated materials and/or construction-related debris. If such sites are other than existing landfill operations, the draft EA should also identify impacts associated with the disposal of such materials at those sites;
- An assessment of the functions, values and services of the waters of the U.S.;
- An evaluation and quantification of the direct, indirect and cumulative effects on the aquatic ecosystem;
- A statement of how impacts to the aquatic ecosystem were avoided or minimized, and a draft conceptual mitigation plan for unavoidable impacts to waters of the U.S.;
- An estimate of the total construction period; and
- A detailed description of the short- and long-term maintenance activities associated with the highway improvements, if any.

In general, the Corps asserts jurisdiction over traditional navigable waters (e.g., Pacific Ocean), wetlands adjacent to traditional navigable waters, non-navigable tributaries that have perennial flow or continuous seasonal flow, and wetlands that directly abut such tributaries. For other types of waters, we must decide on a case-by-case basis using fact-specific analysis what our jurisdiction is, if any, under Section 404 of the CWA. These waters include any non-navigable tributaries that do not have relatively permanent flows and any wetlands adjacent to such tributaries, as well as wetlands that are adjacent to but do not directly abut a relatively permanent non-navigable tributary. In the latter set of circumstances, a "significant nexus evaluation" is required in order to render a final approved jurisdictional determination. We do not, however, generally assert jurisdiction over swales, erosional features or ditches excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

Although we have not formally issued a written preliminary or final approved jurisdictional determination for this project, it appears the proposed construction activities would result in the discharge (placement) of dredged and/or fill material into jurisdictional waters of the U.S., including wetlands, pursuant to Section 404 of the CWA. Accordingly, the Kuhio Highway Short-Term Improvements Project is likely to require Department of the Army (DA)

authorization. As you prepare the draft EA, we suggest you consider the data needs and permitting requirements outlined above.

If you need further assistance, please contact Ms. Susan A. Meyer, Project Manager, by phone at (808) 438-2137 or by electronic mail at susan.s.meyer@usace.army.mil. Please refer to Corps File No. POH-2007-280 in future correspondence or communications related to this project. Thank you for your cooperation with our regulatory program. Please be advised you can provide comments on your experience with the Corps' Honolulu District Regulatory Branch by accessing our web-based customer survey form at http://www.poh.usace.army.mil/EC-R/forms/eer-CustomerSurvey.pdf.

Sincerely,

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

Copies Furnished:
Mr. Pat Phung, Federal Highway Administration, Hawaii Division
Mr. Darell Young, State of Hawaii, Department of Transportation
Mr. Edward Chen, State of Hawaii, Department of Health, Clean Water Branch

WILSON OKAMOTO CORPORATION

7169-12
June 24, 2009

Mr. George P. Young, P.E., Chief
Regulatory Branch
Department of the Army
U.S. Army Corps of Engineers, Honolulu District
Fort Shafter, HI 96858-5440

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Young:

Thank you for your letter dated March 9, 2009. We offer the following responses to your comments.

1. The Draft EA will include site specific information pertaining to existing water resources within the project area. Available information on non-tidal tributary waters within the project area will be included.
2. The only tidally influenced water within the project area would be the Wailuā River. Relocated electrical lines will be routed under the river via horizontal directional drilling. As a result, there would be no discharge of materials into the River as the lines would be situated 60 to 80 feet below the water's surface near the highway bridge crossing. Nevertheless, information on Wailuā River and the project's effects will be included in the Draft EA.
3. Information on the Kaloko Wetland situated along the highway will be incorporated into the Draft EA, as appropriate. Thank you for notifying us of the expiration date for the 2003 wetland delineation.
4. The Draft EA will include information to address the various items identified in your letter. We appreciate the information identifying the Corps jurisdiction over waters and criteria used in making such determinations. Most of the information requested would be included in a Department of Army permit application being completed for submittal.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2009-TA-0106

FEB 23 2009

Mr. Ronald A. Sato, AICP
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96825

RECEIVED
FEB 24 2009

Subject: Pre-Assessment for the Draft Environmental Assessment for Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road and the Undergrounding of Utilities, Kauai

Dear Mr. Sato:

Thank you for your letter, received February 4, 2009, requesting our input on the development of a draft Environmental Assessment (DEA) for the proposed short-term improvements to the Kuhio Highway from Kuamoo Road to the Temporary Bypass Road. The proposed project is includes widening Kuhio Highway on the southbound side from three to four lanes. The existing right-turn storage lane along Kuamoo Road will also be extended inland from its intersection with the highway. The Hawaii Department of Transportation (HDOT), in cooperation with the Federal Highway Administration and Kauai Island Utility Cooperative (KIUC), also plans to underground overhead electrical lines from KIUC's Lydgate Substation to Kuamoo Road. From South Leho Drive to North Leho Drive, all electrical lines will be undergrounded, but other utilities will remain above ground. From North Leho Drive to Kuamoo Road, all existing utility lines will be placed underground by way of horizontal directional drilling under Wailua River.

As stated in the DEA, the purpose of the undergrounding of the utility lines is to minimize impacts to the Newell's shearwater (*Puffinus auricularis newelli*). We recommend the DEA also include the Hawaiian petrel (*Pterodroma sandwichensis*) as a species that is impacted by overhead utility lines.

The DEA indicates an overhead static wire will be added to the existing utility poles from the Temporary Bypass Road northward toward Kapaa for approximately one-quarter mile. The static line is being installed to serve as a grounding device in the event of a lightning strike. We request that you provide more information regarding the placement of this line and whether or not the line is a permanent structure. We recommend this additional line be placed in parallel with existing lines, as an additional line increases the collision risk to the Newell's shearwater and Hawaiian petrel.

TAKE PRIDE® IN AMERICA

The DEA does not describe construction-related minimization measures that will be implemented as part of this project. For example, during the most recent meeting about this project on January 22, 2009, between representatives from your company, HDOT, Federal Highways Administration, and the U.S. Fish and Wildlife Service, seabird minimization measures such as avoiding night-time work during the fledging period were discussed, and our office was assured this and other measures would be implemented as part of this project. We recommend that the DEA fully describe the methods that will be undertaken to avoid and minimize environmental impacts associated with this project.

If you have questions regarding these comments would like additional information, please contact Megan Laut, Fish and Wildlife Biologist, Consultation and Technical Assistance Program (phone: 808-792-9400, fax: 808-792-9581).

Sincerely,

Christa Russell

for Patrick Leonard
Field Supervisor

7169-12
June 24, 2009

Mr. Patrick Leonard, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Ecological Field Service Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, HI 96850

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Leonard:

Thank you for your letter dated February 23, 2009 (2009-TA-0106). We offer the following responses in the respective order of each Division's comments:

1. As stated in the pre-assessment consultation package, the purpose of undergrounding the overhead utility lines is to minimize impacts to the Newell's shearwater (*Puffinus auricularis newelli*). In the Draft EA, we will also include the Hawaiian petrel (*Pterodroma sandwichensis*) as a species that is impacted by overhead utility lines.
2. The overhead static wire needed for overhead lines is not be included under this project because the Kaua'i Island Utility Cooperative (KIUC) will be responsible for implementing that. However, it will be addressed as appropriate in the Draft EA. KIUC should also coordinate that portion with your agency.
3. The Draft EA will discuss the construction-related measures to be implemented to minimize any impacts on the Newell's shearwater and Hawaiian petrel.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

BARBARA A. ANNIS
DEPUTY COMPTROLLER

(P)1053.9

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

FEB 1 2 2009

RECEIVED
FEB
WILSON OKAMOTO CORPORATION

Mr. Ronald A. Sato, Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Sato:

Subject: Kuhio Highway Short-Term Improvements
Kuamoo Road to Temporary Bypass Road and Under-grounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment (DEA)
Lihue and Kawaihau Districts, Kauai, Hawaii

Thank you for the opportunity to review the proposed DEA Pre-Assessment Consultation. This project does not directly impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any questions, please call me at 586-0400 or have your staff call Mr. Bruce Bennett of the Public Works Division at 586-0491.

Sincerely,

RUSS K. SAITO
State Comptroller

c: Ms. Katherine Kealoha, DOH-OEQC
Mr. Darell Young, DOT HWY-P

WILSON OKAMOTO CORPORATION

7169-12
June 24, 2009

Mr. Russ K. Saito, State Comptroller
Department of Accounting and General Services
State of Hawaii
1151 Punchbowl Street
Honolulu, HI 96813

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Saito:

Thank you for your letter dated February 12, 2009 ((P)1053.9). We acknowledge that the proposed project does not have any impacts to any of the Department of Accounting and General Services' projects or existing facilities, and that you have no comments to offer at this time.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
ABBEY SETH MAYER
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

Ref. No.: P-12448

February 19, 2009

RECEIVED
FEB 20 2009

Mr. Ronald A. Sato, AICP
Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Sato:

Subject: Pre-Assessment Consultation for Draft Environmental Assessment
Kuhio Highway Short-Term Improvements
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Lihue and Kawaihau Districts, Kauai, Hawaii

Thank you for the opportunity to review and comment on the subject Pre-Assessment Consultation for the Draft Environmental Assessment regarding the proposed project. The State of Hawaii, Department of Transportation (DOT), Highways Division proposes to implement widening improvements to Kuhio Highway along an approximately 1.75-mile section of Highway in the Lihue and Kawaihau districts on the island of Kauai. The proposed project includes widening Kuhio Highway on the southbound side from three to four lanes between Kuamoo Road and Temporary Bypass Road.

For this widening project, the State DOT is planning to place existing overhead utility lines underground. Overhead electrical lines will be placed underground from the Kauai Island Utility Cooperative's (KIUC) Lydgate Substation at South Leho Drive to Kuamoo Road. From north Leho Drive to Kuamoo road, existing utility lines will be placed underground by way of horizontal directional drilling (HDD) under Wailua River, an environmentally sensitive area.

We understand that the following approvals and reviews are required for the proposed project:

1. Department of the Army (DA) permit review;
2. U.S. Fish and Wildlife Service (USFWS) review;
3. Conformance with the State of Hawaii water quality standards and National Pollutant Discharge Elimination System (NPDES) permit requirements, as specified in HAR Chapter 11-54 and Chapter 11-55;

4. State of Hawaii historic preservation program, as specified in HRS, Chapter 6E-42 administrated by the Department of Land and Natural Resources, Historic Preservation Office (SHPO); and
5. Conformance with the County of Kauai Special Management Area (SMA) Use regulations.

With the understanding that the above stated approvals and reviews will be conducted along with the preparation of an Environmental Assessment in accordance with Chapter 343, Hawaii Revised Statutes, the Office of Planning has no comments at this time. In so stating, the Office offers no judgment of either the adequacy of the document/application itself or the merits of the proposed project.

If you have any questions, please contact Debra Mendes, of our Land Use Division at 587-2840.

Sincerely,

Abbey Seth Mayer
Director

WILSON OKAMOTO
CORPORATION

7169-12
June 24, 2009

Mr. Abbey Seth Mayer, Director
Office of Planning
Department of Business, Economic Development and Tourism
State of Hawaii
P.O. Box 2359
Honolulu, HI 96804

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Mayer:

Thank you for your letter dated February 19, 2009 (Ref. No. P-12448). We acknowledge that the various agency reviews and approvals indicated in your letter will be conducted for this project. Based upon this understanding, have no comments to offer at this time.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR

MAJOR GENERAL ROBERT G. F. LEE
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

February 20, 2009

Mr. Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1970 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

RECEIVED
FEB 24 2009

Dear Mr. Sato:

Pre-Assessment Consultation for Draft Environmental Assessment
Kuhio Highway Short–Term Improvements, Lihue, Kauai, Hawaii

Thank you for the opportunity to comment on this project. After reviewing your letter and the Project Summary, we strongly endorse the effort to place existing overhead utility lines underground. This will significantly reduce the exposure of utility lines to loss due to hurricane and other high wind events. We look forward to receiving the Draft Environmental Assessment when it is prepared and will make any appropriate comments or suggestions at that time.

If you have any questions, please contact Mr. Richard Stercho, Hazard Mitigation Planner, at 733-4300, extension 583.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

c: Darell Young, State Department of Transportation

WILSON OKAMOTO CORPORATION

7169-12
June 24, 2009

Mr. Edward T. Teixeira, Vice-Director
Civil Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, HI 96816-4495

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Teixeira:

Thank you for your letter dated February 20, 2009. We acknowledge your endorsement for relocating existing overhead utility lines underground, and agree it will reduce the exposure of utility lines to damages from natural disasters such as a hurricane. A copy of the Draft EA will be submitted for your department's review when published.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

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

OFFICE OF THE SUPERINTENDENT

February 16, 2009

RECEIVED
FEB 19 2009
WILSON OKAMOTO CORPORATION

Mr. Ronald A. Sato
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawai'i 96826

Dear Mr. Sato:

Subject: Kuhio Highway Improvements Pre-Assessment Consultation

The Department of Education (DOE) has reviewed your letter describing improvements proposed for a 1.75-mile section of Kuhio Highway in the Lihue and Kawaihao Districts of the island of Kauai.

DOE has no specific comment or concern that should be addressed in the Draft Environmental Assessment. Should you have any questions, please call Heidi Meeker of the Facilities Development Branch at 377-8301.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
William Arakaki, CAS, Kapaa/Kauai/Waimea Complex Areas

WILSON OKAMOTO CORPORATION

7169-12
June 24, 2009

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

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Ms. Hamamoto:

Thank you for your letter dated February 16, 2009. We acknowledge that you have no comments to offer at this time.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

KAULANA H. PARK
DEPUTY TO THE CHAIRMAN

ROBERT J. HALL
EXECUTIVE ASSISTANT

STATE OF HAWAI'I
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

February 23, 2009

Mr. Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street
Honolulu, Hawaii 96826

SUBJECT: Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines,
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Sato:

Thank you for soliciting our pre-assessment comments and requirements. Our properties will be affected by the underground placement of existing utility lines from South Leho Drive to the Temporary Bypass Road. While we do not have any current developments on our properties that would be affected by the project, we are in the process of preparing an Environmental Assessment for a residential subdivision on our mauka parcel (TMK 3-9-002:012). In addition, although our makai parcel (TMK 3-9-006:009) is not currently slated for development, in the future, we expect that a revenue-generating land use would be proposed.

We understand that most of the undergrounding of utility lines would be within the Department of Transportation's easement, however, your request for a right-of-entry agreement indicates the potential use of some of our makai lands as the need may require.

Our primary concern relates to the limited scope of undergrounding only the electric utility lines from South Leho Drive to North Leho Drive, but from North Leho Drive to the Temporary Bypass Road, all overhead utility lines would be placed underground. Since all of the utility lines have to be placed under Wailua River, and since action is being committed to place the electric lines underground, why not include all utility lines, affording visual relief from South Leho Drive to the

Temporary Bypass Road? If there are concerns about whether the Department of Transportation's easement is sufficient, we would be able to provide a right-of-entry to accommodate undergrounding the additional lines (cable and phone).

If all utility lines will not be placed underground between South Leho Drive and North Leho Drive, we have questions about why we would incur impacts of the project, including intrusion on our property, if at the end of the project, we still have utility poles and lines running along that very same corridor.

It appears that concessions and additions have been made to this project and we hope that our recommendation to underground all utility lines from South Leho Drive to the Temporary Bypass Road will be seriously considered. If there is anything my office can do to assist, please let us know.

We understand that the underground electric lines running along our property will be high powered lines and that there will be restrictions on the land uses that can be placed over them. Our Conceptual Land Use Plan for Wailua includes a 50-foot landscape buffer along Kuhio Highway. Therefore we do not anticipate any negative impacts related to land use restrictions above the underground electric lines if they run along our mauka parcel.

However, if the electric lines are run along our mauka parcel, are you considering the effect of different alignments proposed for the Wailua Relief Route? For example, the Department prefers the alignment that is farthest from the Malae Heiau, affording the largest buffer area around the Malae Heiau, but instead of bisecting our property, we prefer the alignment that joins up with the existing Kuhio Highway, leaving our mauka parcel as in tact as possible. If this alignment is chosen, there will be a very large right-of-way in order to accommodate the existing and proposed lanes. This may require the electric lines to be placed further mauka than the existing right-of-way will allow. The impact of the different alignments proposed for the Wailua Relief Route should be considered in your Assessment.

If the underground electric lines are run along our makai parcel we are interested in knowing what kind of land use restrictions would be imposed and the size of "buffer" or area around the electric lines that would be affected. This would certainly affect land use designs proposed for our revenue-generating activity on the makai parcel.

We plan to continue phased development of residential homesteads at our mauka parcel. We eventually envision a large, thriving homestead community at Wailua. Will there be any Electro-Magnetic Frequencies generated by the high-powered electric lines? Will there be any other potential impacts to

residents residing, say, 50-feet from the underground electric lines? At what distance from the electric lines can we say that there are absolutely no potential health and safety impacts posed to our potential homesteaders?

We thank you for the opportunity to identify our concerns before you prepare the Environmental Assessment. We are also excited about the prospect of having a view corridor from South Leho Drive to the Temporary Bypass Road that is without overhead utility lines. Please do not hesitate to contact my planning office at 620-9480 for more information.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

7169-12
June 24, 2009

Mr. Micah Kane, Chairman
Department of Hawaiian Homelands
State of Hawaii
PO Box 1879
Honolulu, HI 96805

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Kane:

Thank you for your letter dated February 23, 2009. We offer the following responses in the respective order of each comment:

1. We appreciate the information on the status of pending and future development plans for State Department of Hawaiian Home Lands (DHHL) parcels in the immediate vicinity of the project. We understand that your makai parcel, identified as TMK 3-09-002: 012, is planned
2. The majority of relocated utilities would be placed within the existing State Department of Transportation's (DOT) right-of-way. In addition, right-of-entry is also being requested for planned construction activities associated with the utilities relocation.
3. Based upon our recent discussions with your staff, the State DOT is seeking an easement within your makai parcel (parcel 012) for the relocation of utility lines. The State DOT has recently coordinated and negotiated with the utility companies to now have all of these existing overhead lines relocated underground from the Wailuā River south to the South Leho Drive intersection. Therefore, the existing lines fronting your makai parcel will be relocated underground. As a result, the proposed easement within the State DHHL parcel is needed to allow these utilities to be relocated.
4. Based upon our discussions with your staff, the State DOT will not need to route the relocated utility lines along the mauka side of the highway fronting your other property planned for residential housing. Planning for the Kapa'a Relief Route project to address regional traffic conditions in East Kaua'i would not be affected by this utility relocation now.
5. A 15-foot-wide easement is being requested from your department for the makai parcel to allow for the utilities to be relocated underground. There would be no other buffer areas required beyond this easement within the makai parcel. However, this does not include future right-of-way that may be needed for the planned Kapa'a Relief Route.

7169-12
June 24, 2009

6. Within the proposed utility easement for the makai parcel, permanent structures such as new buildings would not be allowed. However, other uses would be permitted such as landscaping, driveways, etc. State DOT staff from the Right-Of-Way Branch can provide further details associated with this easement.
7. The relocated utility lines will be routed underground along the makai side of the highway in the proposed easement which is a considerable distance away from the residences planned on the mauka parcel. With the relocation of electrical lines underground, the potential effects from these lines should be greatly diminished. Having the electrical lines placed underground should be no different a situation than that occurring within other communities in the State of Hawai'i. A discussion on the potential impacts from electromagnetic fields (EMF) will be included in the Draft EA.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL ST., ROOM 325
HONOLULU, HAWAII 96813
TEL (808) 587-0166 FAX (808) 587-0160

February 11, 2009

RECEIVED
FEB 1
WILSON OKAMOTO

Mr. Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street
Artesian Plaza, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Sato:

RE: Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road and under-grounding of Utility Lines. Pre-Consultation for Draft Environmental Assessment - Lihue and Kawaihau Districts, Kauai, Hawaii.

DLNR, Division of Forestry and Wildlife have reviewed your subject request. Based on the information provided, we have no objections to your proposed highway improvements, as it will have minimal impacts to any of our resource management programs. Thank you for the opportunity to comment on this project.

Sincerely yours,

Paul J. Conry
Administrator

C: DOFAW, Kauai Branch

WILSON OKAMOTO

7169-12
June 24, 2009

Mr. Paul Conry, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, HI 96813

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Conry:

Thank you for your letter dated February 11, 2009. We acknowledge that you have no objections to the proposed project, as it will have minimal impacts on the Division's programs.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

FEB 27 2009

February 25, 2009

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

Attention: Mr. Ronald A. Sato, AICP

Ladies and Gentlemen:

Subject: Pre-Assessment Consultation for Draft Environmental Assessment for Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Division of Boating & Ocean Recreation, Engineering Division, Land Division-Kauai District, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Charlene E Unoki
for Morris M. Atta
Administrator

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION

2009 FEB 20 A 10:49

LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 4, 2009

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
x Div. of Boating & Ocean Recreation
x Engineering Division
__Div. of Forestry & Wildlife
x Div. of State Parks
__Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Kauai District

FEB 5 '09

FROM: for Morris M. Atta
SUBJECT: Pre-assessment consultation for draft environmental assessment for Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary bypass Road and Undergrounding of Utility Lines
LOCATION: Lihue and Kawaihau, Kauai
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by February 19, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

(X) We have no objections.
( ) We have no comments.
( ) Comments are attached.

Signed: [illegible]
Date: 2/6/2009

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 4, 2009

RECEIVED
LAND DIVISION
2009 FEB 12 A 8:51
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
x ~~Div. of Boating~~ & Ocean Recreation
x Engineering Division
__ ~~Div. of Forestry~~ & Wildlife
x Div. of State Parks
__ Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Kauai District

FROM: Morris M. Atta
SUBJECT: Pre-assessment consultation for draft environmental assessment for Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary bypass Road and Undergrounding of Utility Lines
LOCATION: Lihue and Kawaihau, Kauai
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by February 19, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed:
Date: 2/11/09

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/MorrisAtta
Ref.:PreConDEAKuhioHighway
Kauai.72

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) **Please take note that based on the map that you provided the project sites, according to the Flood Insurance Rate Map (FIRM), are located in Zones X, AE and AEF. The National Flood Insurance Program does not regulate activities under Zone X, however, it does regulate developments within Zones AE and AEF as indicated in bold letters below.**

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

(X) **Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.**

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

( ) Mr. Robert Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.
( ) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.
( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.
(X) **Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.**

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

(X) **The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.**

( ) Additional Comments:

( ) Other:

Should you have any questions, please call Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed:
ERIC T. HIRANO, CHIEF ENGINEER
Date: 2/11/09

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 4, 2009

MEMORANDUM

TO: DLNR Agencies:
x Div. of Aquatic Resources
x Div. of Boating & Ocean Recreation
x Engineering Division
__Div. of Forestry & Wildlife
x Div. of State Parks
__Commission on Water Resource Management
x Office of Conservation & Coastal Lands
x Land Division –Kauai District

RECEIVED
LAND DIVISION
2009 FEB 11 P 2:05
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

FROM: Morris M. Atta
SUBJECT: Pre-assessment consultation for draft environmental assessment for Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary bypass Road and Undergrounding of Utility Lines
LOCATION: Lihue and Kawaihau, Kauai
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by February 19, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Date: 2/10/09

WILSON OKAMOTO

7169-12
June 24, 2009

Mr. Morris M. Atta, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Atta:

Thank you for your letters dated February 25, 2009 and March 2, 2009. We offer the following responses in the respective order of each Division's comment:

Land Division – Kauai District

1. We acknowledge that you have no objections to the proposed project.

Engineering Division

1. We confirm that the proposed project site is located in Zones X, AE and AEF on the Flood Insurance Rate Map.
2. The proposed project will comply with the rules and regulations of the NFIP and Kauai's Flood Plain Management Ordinance.
3. The project does not include any new land uses such as residences that will generate additional potable water demands. However, the State DOT will coordinate design plans with the Engineering Division for review and comments, and address applicable water demands and calculations, if needed.

Division of Boating & Ocean Recreation

1. We acknowledge that you have no comments to offer at this time.

Division of State Parks

1. Thank you for providing information on lands designated 6(f) in the Wailuā area. The proposed improvements are not planned to take any 6(f) lands triggering the conversion process for replacement. There are also no easements planned to be obtained from 6(f) lands associated with this project. The Wailuā River Bridge project is separate from this highway widening and utilities relocation project.

7169-12
June 24, 2009

2. We appreciate your assistance in coordinating with the State DOT to identify and address project requirements and coordinating with the National Park Service (NPS) on this matter. These discussions have been related to the extension of the right-turn storage lane along Kuamoʻo Road which fronts a portion of the Kaumualiʻi section of Wailuā River State Park.
3. Based upon recent coordination with your staff, which included a joint site visit at the park, an easement will no longer be required for the roadway improvements fronting this park. Based upon updated design plans provided, the affected area of the park will be modified to include a slight grade change up to the highway, the removal of several old coconut trees, and the replanting of new trees. We understand the majority of these old trees were already planned to be removed by State Parks as part of the department's own park improvement project. Therefore, this highway project represents a mutually beneficial solution that supports the department's planned improvements for the park. A Memorandum of Agreement will be drafted for execution by State DOT and State DLNR to confirm the implementation of these improvements and actions.
4. We are aware of the ongoing communication between the State DOT and NPS concerning the new Wailuā River Bridge project and County bike path improvements. The relocation of electrical utility lines underground crossing under the Wailuā River will be constructed using horizontal directional drilling. There will be no park lands along the river that will be used for these construction activities. Therefore, no temporary non-conforming uses will need to be requested for this project. If possible, the State DOT would like to coordinate the construction of the new bridge and highway widening projects so that construction for both can occur concurrently.
5. We appreciate the Division support for the placement of overhead utility lines underground. The relocation of utilities will be within the State DOT right-of-way or easements acquired from private landowners where needed. We also concur that relocating the utilities underground will enhance view corridors within the Wailuā Complex of Heiau.

Your letters, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation
Thomas Oi, Land Division, Kauai District, DLNR
Eric Hirano, Engineering Division, DLNR
Division of Boating & Ocean Recreation, DLNR
Martha Yent, State Parks Division, DLNR

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF STATE PARKS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 27, 2009

Mr. Ronald Sato, Project Manager
Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawai'i 96826

Dear Mr. Sato:

SUBJECT: Pre-Assessment Consultation for Draft Environmental Assessment
Kūhiō Highway Short-Term Improvements, Līhu'e and Kawaihau, Kaua'i

Thank you for the opportunity to comment on the improvements proposed by the Department of Transportation (DOT) for the short-term improvements along Kūhiō Highway from South Leho Drive to Kuamo'o Road and along Kuamo'o Road. To preface our comments, the park lands at Wailua have been designated 6(f) because Land and Water Conservation Fund (LWCF) federal grant funds were used for park acquisition and development. Potentially affected by the proposed short-term improvements are the 6(f) lands at Wailua Beach and the Kaumuali'i Section, Hikinaakalā Section, and Marina of Wailua River State Park. The 6(f) designation requires that the park lands remain in outdoor recreation and if there should be any taking of 6(f) land for other uses, a conversion is required and replacement property for outdoor recreation must be provided. Easements for underground utilities are allowed by the National Park Service (NPS) under the LWCF guidelines as long the outdoor recreation is not affected. However, NPS approval is required before executing these easements.

We have previously discussed the widening of Kuamo'o Road in the vicinity of the Kaumuali'i Section of Wailua River State Park. To accommodate the road widening, State Parks has agreed to grant an easement to the DOT to construct and maintain the bank from the paved road to the lower ground surface within the park. However, a formal request to NPS still needs to be made for this easement.

Please be aware that there is ongoing communication with DOT and NPS on the improvements associated with the new cane-haul bridge and pedestrian/bike path along Kūhiō Highway. There is the potential for some overlap in the 6(f) concerns for this project and your project area. The proposal for buried utilities under the Wailua River raises some concerns about any use of park land on the riverbanks for construction. Temporary non-conforming uses are being requested by DOT to use park sites on both sides of the river for the cane-haul bridge replacement project. Are there any plans to coordinate these two projects or will they be done separately?

We support plans to put the utility lines underground and wanted to confirm that this will occur within either the DOT right-of-way or existing utility easements. Further consultation will be needed with State Parks and NPS if any new easements occur within the 6(f) park properties. Placing the overhead lines underground will also serve to enhance the view corridors within the Wailua Complex of Heiau, a National Historic Landmark.

If you have questions about our comments, we are willing to meet and discuss in more detail. You may also contact Martha Yent at 587-0287 or Martha.E.Yent@hawaii.gov

Very truly yours,

DANIEL S. QUINN
State Parks Administrator

cc: Land Division

7169-12
June 24, 2009

Mr. Daniel S. Quinn, Administrator
Division of State Parks
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, HI 96809

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Quinn:

Thank you for your letter dated February 27, 2009. We offer the following responses in the respective order of each comment:

1. Thank you for providing information on lands designated 6(f) in the Wailuā area. The proposed improvements are not planned to take any 6(f) lands triggering the conversion process for replacement. There are also no easements planned to be obtained from 6(f) lands associated with this project. The Wailuā River Bridge project is separate from this highway widening and utilities relocation project.
2. We appreciate your assistance in coordinating with the State DOT to identify and address project requirements and coordinating with the National Park Service (NPS) on this matter. These discussions have been related to the extension of the right-turn storage lane along Kuamoʻo Road which fronts a portion of the Kaumualiʻi section of Wailuā River State Park.
3. Based upon recent coordination with your staff, which included a joint site visit at the park, an easement will no longer be required for the roadway improvements fronting this park. Based upon updated design plans provided, the affected area of the park will be modified to include a slight grade change up to the highway, the removal of several old coconut trees, and the replanting of new trees. We understand the majority of these old trees were already planned to be removed by State Parks as part of the department's own park improvement project. Therefore, this highway project represents a mutually beneficial solution that supports the department's planned improvements for the park. A Memorandum of Agreement will be drafted for execution by State DOT and State DLNR to confirm the implementation of these improvements and actions.
4. We are aware of the ongoing communication between the State DOT and NPS concerning the new Wailuā River Bridge project and County bike path improvements. The relocation of electrical utility lines underground

7169-12
June 24, 2009

crossing under the Wailuā River will be constructed using horizontal directional drilling. There will be no park lands along the river that will be used for these construction activities. Therefore, no temporary non-conforming uses will need to be requested for this project. If possible, the State DOT would like to coordinate the construction of the new bridge and highway widening projects so that construction for both can occur concurrently.
5. We appreciate the Division support for the placement of overhead utility lines underground. The relocation of utilities will be within the State DOT right-of-way or easements acquired from private landowners where needed. We also concur that relocating the utilities underground will enhance view corridors within the Wailuā Complex of Heiau.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

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

OHA-NATIVE RIGHTS
2009 MAR 12 P 12:43

HRD09/3254C

March 4, 2009

RECEIVED
MAR 13 2009
WILSON OKAMOTO CORPORATION

Ronald A. Sato, AICP
Wilson Okamoto Corporation
1907 South Beretania St., Suite 400
Honolulu, HI 96826

RE: Request for comments on the upcoming Draft Environmental Assessment for the proposed Kuhio Highway short-term improvements, Kuamo'o Road to Temporary Bypass Road and undergrounding of utility lines project, Lihue and Kawaihau Districts, Kaua'i.

Aloha e Ronald A. Sato,

The Office of Hawaiian Affairs (OHA) is in receipt of your February 2, 2009, request for comments on the above project, which would include widening improvements to Kuhio Highway in the Līhu'e and Kawaihau districts of Kaua'i. The proposed project includes widening the southbound side of Kuhio Highway between Kuamo'o Road and the Temporary Bypass Road from three to four lanes. Existing overhead utility lines would be placed underground in three segments from South Leho Drive to the Temporary Bypass. Additional improvements will be made to Kuamo'o Road, including extending the right-turn storage lane, repaving the makai bound lane, etc. OHA has reviewed the project and offers the following comments.

OHA has substantive obligations to protect the cultural and natural resources of Hawai'i for its beneficiaries, the people of this land. The Hawaii Revised Statutes mandate that OHA "[s]erve as the principal public agency in the State of Hawaii responsible for the performance, development, and coordination of programs and activities relating to native Hawaiians and Hawaiians; . . . and [t]o assess the policies and practices of other agencies impacting on native Hawaiians and Hawaiians, and conducting advocacy efforts for native Hawaiians and Hawaiians." (HRS § 10-3)

Chapter 343 of the Hawaii Revised Statues (HRS) requires that a Draft EA include a Cultural Impact Assessment (CIA). The CIA should include information relating to the traditional and customary practices and beliefs of the area's Native Hawaiians, and the community should be involved in this assessment. Consideration must also be afforded to any individuals accessing the project area for constitutionally protected traditional and customary purposes, in accordance with the Hawai'i State Constitution, Article XII, Section 7.

OHA requests clarification about whether an archaeological inventory survey for the project will be submitted to the State Historic Preservation Division for review and approval. If so, OHA should be allowed the opportunity to comment on the criteria assigned to any cultural or archaeological sites identified within the archaeological inventory survey, per the requirements of HRS Chapter 6E.

This area is particularly sacred to Native Hawaiians as an area of significance to Kaua'i's ali'i and as a well-known burial area. Thus, OHA requests the applicant's assurances that should iwi kūpuna or Native Hawaiian cultural or traditional deposits be found during the construction of the project, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

In addition, OHA recommends that the applicant use native vegetation in its landscaping plan for the subject parcel. Landscaping with native plants furthers the traditional Hawaiian concept of mālama 'āina and creates a more Hawaiian sense of place.

Thank you for the opportunity to comment. We look forward to reviewing your forthcoming Draft EA and providing further comments at that time. If you have further questions, please contact Heidi Guth by phone at (808) 594-1962 or e-mail her at heidig@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Administrator

C: OHA Kaua'i CRC Office

WILSON OKAMOTO
CORPORATION

7169-12
June 24, 2009

Mr. Clyde M. Namuo, Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, HI 96813

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Namuo:

Thank you for your letter dated March 4, 2009 (HRD09/3254C). We offer the following responses in the respective order of each comment:

1. The Draft Environmental Assessment will include discussion to address cultural impacts associated with the project.
2. An archaeological inventory survey has been prepared for this project, and the report will be included in the Draft EA. This inventory survey report will be submitted to the State Historic Preservation Division for their review. A copy of the Draft EA will be provided to OHA for review as part of the normal agency review process.
3. An archaeological monitoring plan is being prepared for this project which addresses the monitoring requirements needing to be implemented by the contractor during the project's construction. In the event Native Hawaiian traditional, cultural, or burial sites are found during construction activities, all work will cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the SHPD will be contacted immediately in compliance with State regulations.
4. Native vegetation will be considered for incorporation into the project's design as applicable.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

BERNARD P. CARVALHO, JR.
MAYOR

GARY K. HEU
ADMINISTRATIVE ASSISTANT

DONALD M. FUJIMOTO
COUNTY ENGINEER
TELEPHONE 241-4992

EDMOND P.K. RENAUD
DEPUTY COUNTY ENGINEER
TELEPHONE 241-4992

AN EQUAL OPPORTUNITY EMPLOYER
COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
4444 RICE STREET
MO'IKEHA BUILDING, SUITE 275
LIHU'E, KAUA'I, HAWAI'I 96766-1340

February 23, 2009

RECEIVED
FEB 2 9 2009
WILSON OKAMOTO CORPORATION

Wilson Okamoto Corp
1907 South Beretania Street, Suite 400
Honolulu, HI 96826
Attention: Mr. Ronald A. Sato

SUBJECT: KŪHIŌ HWY SHORT TERM IMPROVEMENTS, KUAMO'O ROAD TO TEMPORARY BYPASS ROAD & UNDERGROUNDING OF UTILITY LINES PRE-ASSESSMENT CONSULTATION FOR A DRAFT ENVIRONMENTAL ASSESSMENT, LIHU'E AND KAWAIHAU DISTRICT, KAUA'I, HAWAI'I.

Gentlemen,

We reviewed the subject project Draft Environmental Assessment and Project Summary dated February 2009. We offer the following comments:

1. We request the subject draft pre-assessment consultation be submitted to our Wastewater Management Division for their review and comments. The County has existing gravity sewer and force mains along Kūhiō Highway between Haleilio Road, (south) Papaloa Road to South Leho Drive that feeds its Wailua Wastewater Treatment Plant.

2. We also recommend comments be solicited from Sandwich Isle Communication's for which underground fiber optic cables were installed along and within Kūhiō Highway rights of way.

3. Page 3, paragraph 5 states "Associated improvements will be made at the intersection of Kūhiō Highway with Kuamo'o Road, Haleilio Road, Papaloa Road and Lanikai Street to improve vehicular movement through the corridor. These improvements include: 1) signalizing the intersection of Kūhiō Highway with Lanikai Street, 2) improving the highway's intersection with Kuamo'o Road, 3) restricting left-turn movements at the southern end of Papaloa Road, and

modifying the traffic signal plan at Haleilio Road." Haleilio Road, Papaloa Road and Lanikai Street are all County Roadways that intersect with Kūhiō Highway. Construction plans needs to be submitted for our review and approval.
We are concerned with the restricting of the left turn movement from South Papaloa Road onto Kūhiō Highway. This would mean that all motorists approaching the intersection **must** turn right. The right turn movement onto Kūhiō Highway presents motor vehicle operational problems due to the intersection geometrics. The motorist will not be able to negotiate the sharp turn without encroaching into the inner most Kapa'a bound lane. The right turn movement restriction at (south) Papaloa Road and Kūhiō Highway may be a problem for the Shell Gas Station as there may be more motorist turning into the gas station to make a left turn from the Shell Service Station onto Kūhiō Highway. Technical report #1 "Kūhiō Highway Traffic Operations (Review Wailua to Kapa'a) prepared by Kimberly Horn recommended a concrete median separating the north and south Kūhiō Highway with a right in and right out at (south) Papaloa Road and Kūhiō Highway.

Additionally, we are concerned with the Lanikai Street and Kūhiō Highway intersection. There is a sight distance problem at this intersection. While a traffic signal would be a permanent solution, temporary measures will need to be provided with the opening of the Marriott's Courtyard at Waipouli Project. The additional traffic would increase the traffic safety problems at this intersection.

4. This project may affect the County's Lydgate to Kapa'a Bike and Pedestrian Path. We recommend comments be solicited from our project manager for the captioned bike and pedestrian project.

5. Grading within the State's Right of Way is exempted from the County's Sediment and Erosion Control Ordinance No. 808, however, we expect the State to monitor their Contractor's grading activities and provide BMP's (Best Management Practices) at all times to the maximum extent practicable to prevent damage by sedimentation, erosion or dust to streams, water courses, natural areas and the property of others. A separate grading permit may be required for the borrow site and disposal sites. The disposal and borrow sites shall comply with the County's Sediment and Erosion Control Ordinance No. 808.

Thank you for this opportunity to provide our comments. We wish to remain on your mailing list in receiving a copy of the Draft Environmental Assessment. Should you have any questions please feel free to contact Wallace Kudo at (808) 241-4981.

Very truly yours,

Wallace Kudo, P.E.
Chief, Engineering Division

CONCUR:

DONALD M. FUJIMOTO, P.E.
County Engineer

WK
cc:
Doug Haigh, Building Division
Ed Tschupp, Chief, Wastewater Management Division
Darryl Young, State DOT, Highways Division,

WILSON OKAMOTO

7169-12
June 24, 2009

Mr. Donald Fujimoto, P.E., County Engineer
Department of Public Works
Engineering Division
County of Kauai
4444 Rice Street, Suite 175
Lihue, HI 96766

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Fujimoto:

Thank you for your letter dated February 23, 2009. We offer the following responses in the respective order of each comment:

1. The pre-assessment consultation letter was not sent to the County's Wastewater Management Division, however, the Draft EA will be submitted to that division for their review. We are aware of the existing sewer lines along Kūhiō Highway and coordination with that division will continue to minimize disruption to those lines. This includes agency review of design plans.
2. The Draft EA will be submitted to Sandwich Isle Communications, Inc. for their review, and we are aware of their existing fiber optic lines.
3. Construction plans for the proposed project will be submitted to your Department for your review and approval.
   - Restricting left-turns from South Papaloa Road onto the highway was included because it would reduce movement conflicts and delays at this intersection. With the signalization of Lanikai Street, vehicles would be able to utilize that intersection to travel southbound on the highway.
   - The intersection geometrics for the current right-turn from the County's South Papaloa Road onto the highway is an existing condition, and the State DOT did not want to restrict this existing right-turn. Highway improvements would not alter the configuration of that intersection since widening improvements would occur on the inland (mauka) side of the highway. However, if the County wants to improve the geometric configuration of Papaloa Road, the State DOT is willing to coordinate with the County on this matter.
   - The State DOT will continue coordinating with the owners of the Shell Service Station regarding this project.
   - The project is implementing the right-turn in and right-turn out recommendation for South Papaloa Road from the technical report mentioned. Unfortunately, there is not enough right-of-way to provide for a concrete median in that area.

7169-12
June 24, 2009

- Implementation of this project is expected to start by the end of this year, and consideration would be given to signalizing Lanikai Street as part of the initial construction phases of this project.

4. The State DOT has been coordinating with the County's project manager for the Lydgate to Kapa'a Bike and Pedestrian Path. That individual has been involved with the project's development and has attended several status meetings on the project.

5. We acknowledge that grading within the State's right-of-way is exempt from the County's Sediment and Erosion Control Ordinance. Best Management Practices will be implemented by the contractor, and implementation of these practices will be monitored for compliance by the construction management firm contracted for this project. Other applicable ministerial permits required will be obtained from the County.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

If you have any questions, please call me at 808-946-2277 or fax to 808-946-2253.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation
Wally Kudo, County DPW

COUNTY OF KAUAI
PLANNING DEPARTMENT
4444 RICE STREET, SUITE A473
LIHUE, KAUAI, HAWAII 96766-1326

MEMORANDUM

RECEIVED
APR 08 2009
WILSON OKAMOTO CORPORATION

DATE: April 4, 2009

TO: Ronald Sato, Project Manager, Wilson Okamoto Corp.

FROM: Kauai Historic Preservation Review Commission

SUBJECT: EA/106 Project Review-Kuhio Highway Short-Term Improvements, Kuamoo Road to Temp. Bypass

This is to inform you that the Kauai Historic Preservation Review Commission (KHPRC) met on March 5, 2009 to review your proposed plans to perform short-term improvements on Kuhio Highway. More specifically, it is our understanding that the project consists of:

Widening of Kuhio Hwy between Kuamoo Road and the Temp. Bypass Road to add a fourth lane;
Relocate above ground utility lines due to the widening;
Kuamoo Road storage lane improvements;
Accessory improvements pertaining to guard rails, signage, culvers & driveways.

Based on the information provided, your presentation and ensuing discussion on the project, the KHPRC offered the following recommendations:

Be aware of the stone wall extending along the old original government highway and that if possible, keep the underground improvements on the road side of the stone wall along the old government highway. Also be aware of the historic dirt berm along that corridor.

The village of Makakiu also is in that sector in the vicinity of the original Lydgate Park. This is also a sensitive area that should be identified and impacts, if any, appropriated mitigated.

It is also recommended that you look at the 1918 Robert Lydgate map which provides an excellent close up of the Kuamoo corridor and shows where the habitations and related historic associations are which should help define the historic context of the area and the appropriate level of testing and mitigation.

Because of the sensitivity and numerous ahupuaa along the corridor slated for improvements, archaeological monitoring of all ground disturbing activities is recommended.

Thank you for the opportunity to comment on this project and we request that the KHPRC be allowed to submit further comments depending on plan revisions and comments from SHPD.

Aloha.

cc: State Historic Preservation Division
Planning Department

WILSON OKAMOTO CORPORATION

7169-12
June 24, 2009

Ms. Patsy Sheehan, Chair
Kaua'i Historic Preservation Review Commission
Planning Department
County of Kaua'i
4444 Rice Street, Suite A473
Līhu'e, Hawai'i 96766-1326

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Ms. Sheehan:

Thank you for the letter from the Planning Department dated April 4, 2009. We offer the following responses to Commission's comments.

1. The State DOT and project team is aware of the information provided regarding the stone wall and dirt berm extending along the mauka side of the highway. Based upon recent coordination with agencies and utility companies, the relocated utility lines south of Wailuā River will now be routed on the makai side of the highway. As a result, the project would not affect the stone wall and dirt berm situated along the mauka side of the highway.
2. Available information on the area in the vicinity of Lydgate Park is noted and has been provided to the archaeologist for their use in their inventory survey report.
3. We appreciate the information on the 1918 map referenced, and our team's archaeologist has obtained a copy of that map for their use.
4. Archaeological monitoring is being recommended for sections within the project corridor. Information on this monitoring will be included in the Draft EA.
5. The Draft EA will be submitted to the Kaua'i Historic Preservation Review Commission for their review and comments as part of the normal public review process.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

Network Engineering & Planning

Hawaiian Telcom

Hawaiian Telcom
4040 Halau St.
Lihue, HI 96766

Phone 808 241-5062

February 16, 2009

RECEIVED
FEB 1 7 2009

Mr. Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street
Artesian Plaza, Suite 400
Honolulu, HI 96826

Subject: **KUHIO HIGHWAY SHORT-TERM IMPROVEMENTS,**
KUAMOO ROAD TO TEMPORARY BYPASS ROAD AND UNDERGROUNDING OF UTILITY LINES
PRE-ASSESSMENT CONSULTATION FOR DRAFT ENVIRONMENTAL ASSESSMENT
LIHUE AND KAWAIHAU DISTRICTS, KAUAI, HAWAII

Dear Mr. Sato:

Thank you for your February 2, 2009 letter requesting comments for the preparation of a Draft Environmental Assessment (EA) on behalf of the State of Hawaii (State), Department of Transportation (DOT), Highways Division for the proposed Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines Project.

Hawaiian Telcom has an underground conduit system on the mauka side of Kuhio Highway in the project vicinity. However, there are multiple homes and businesses along Kuhio Highway from the temporary bypass road to the Haleilio Rd. intersection that are serviced from existing pole and aerial cable facilities along the highway. The project plans must address the proposal to convert these overhead facilities to underground.

There are also pullboxes and handholes fronting the former Coco Palms hotel which will need to be converted to manholes to accommodate traffic loads. Finally, the proposed extension of the right turn storage lane along Kuamoo Road will require relocation of the existing pole facilities along Kuamoo Road since it is on the right side of the road as you travel in the makai direction.

Presumably, existing Utility Agreement No. 1991 will need to be revised to reflect the changes from the original project plans.

Please call me at 241-5052 or email jimmy.sone@hawaiiantel.com should you have any questions.

Sincerely,

James 'Jimmy' Sone P.E.
Lead Network Engineer

c: File

WILSON OKAMOTO

7169-12
June 24, 2009

Mr. James Sone, Lead Network Engineer
Hawaiian Telcom
OSP- Engineering-Network Engineering and Planning
4040 Halau Street
Lihue, HI 96766

Subject: Kuhio Highway Short-Term Improvements,
Kuamoo Road to Temporary Bypass Road and Undergrounding of Utility Lines
Pre-Assessment Consultation for Draft Environmental Assessment
Lihue and Kawaihau Districts, Kauai, Hawaii

Dear Mr. Sone:

Thank you for your letter dated February 16, 2009. We offer the following responses in the respective order of each comment:

1. The proposed project will relocate existing overhead lines underground, and a description of the relocation will be included in the Draft EA. Design plans for this relocation will be coordinated with your company.
2. Existing pullboxes and handholes fronting the Coco Palms Resort will be converted to manholes as appropriate to accommodate traffic loads. Design plans will be coordinated with your company which includes improvements associated with the extension of the right-turn storage lane along Kuamo'o Road.

Your letter, along with this response will be reproduced in the forthcoming Draft EA. We appreciate your participation during this phase of the process.

Sincerely,

Ronald A. Sato, AICP
Project Manager

cc: Darell Young, State Department of Transportation

Appendix A-2

March 5, 2009 Public Information Meeting
Summary Notes
Wilson Okamoto Corporation

WILSON OKAMOTO
CORPORATION
ENGINEERS | PLANNERS | CONSULTANTS

1907 South Beretania Street
Artesian Plaza, Suite 400
Honolulu, Hawaii, 96826 USA
Phone: 808.946.2277
Fax: 808.946.2253
www.wilsonokamoto.com

7169-12
March 5, 2009

SUMMARY MEETING NOTES

SUBJECT: Kuhio Highway Improvements;
Kuamoo Road to Temporary Bypass Road Project
Public Informational Meeting

MEETING DATE: Thursday, March 5, 2009, 5:30 pm

MEETING LOCATION: Aston Beach Resort at Makaiwa
Paddle Room

MEETING OVERVIEW:

1. The public meeting started with an open house at 5:30 p.m. A handful of residents were present at that time and viewed the presentation materials displayed. Questions asked were responded to by project team members stationed at the display areas.

2. The formal portion of the public meeting started at 6:00 p.m. The meeting was opened by the State DOT. About 12 to 15 individuals from the public were in attendance. Other individuals present included the consultant team, State DOT representatives, FHWA, and the County of Kaua'i. A copy of the sign-in sheet is attached.

3. Wilson Okamoto Corporation (Mr. Sato) conducted a Powerpoint presentation on the project. After the presentation, comments from the public were solicited.

PUBLIC COMMENTS:

1. Resident stated there are many houselots located along Haleilio Road. Residents who want to make a left-turn onto Kuhio Highway wait at the intersection for two cycles. Since the wait is so long, residents make a right-turn onto Kuhio Highway and make a left-turn onto Papaloa Road. How will the synchronization affect residents here?

   Mr. Sato stated the synchronization of the signalized intersections is intended to improve the operation of the intersections in the area so that vehicles can move thru this corridor more efficiently. The additional southbound lane on Kuhio Highway should also improve the situation.

2. Resident asked if a 650-foot right-turn storage lane could be added to Haleilio Road?

   Mr. Sato responded that the 650 foot right-turn storage lane along Kuamoo Road is part of the Coco Palms Resort project improvements. The State DOT has been coordinating with the Coco Palms Resort owners on the highway improvements. Haleilio Road is not a State roadway, however,

Coco Palms Resort is required to make improvements to Haleilio Road as part of their approvals.

3. Resident acknowledged the great job consultants and DOT are doing, however, there are many concerns with the affordable housing project coming in. The traffic at the intersection of Lanikai Street and Kuhio Highway should be addressed. Resident also concerned with eliminating the left-turn storage lane on Kuhio Highway (northbound) at Haleilio Road and the left-turn storage lane on Kuhio Highway (southbound) at Lanikai Street. More accidents may occur without those storage lanes.

   Mr. Sato stated the proposed roadway widening is limited to the existing State ROW. Unfortunately, there isn't enough right-of-way space now to accommodate keeping the northbound left-turn storage lane on the highway at Haleilio Road. Existing businesses in the area would need to be relocated to provide enough room which would take years to complete. Similarly, at the Lanikai Street intersection, there isn't enough existing right-of-way to provide a left-turn storage lane.

4. Resident asked if there will be construction at night?

   Mr. Sato responded that there may be some construction occurring at night. This would primarily due to the need to close some lanes along the highway. The intent is to minimize lane closures during the day to prevent further traffic congestion within the corridor.

5. Resident stated illegal left-turns currently an issue.

   Mr. Sato stated that the left-turn onto Papaloa Road from Kuhio Highway (southbound) and left-turn out from Papaloa Road onto Kuhio Highway will be prohibited. Only right-turns in and right-turns out on Papaloa will be allowed with the project improvements. The State DOT can coordinate with the County to address illegal turns in the corridor.

6. Resident asked how many lanes would be open during construction?

   Mr. McCormick of the State DOT stated there would be at least one lane in each direction open during construction.

7. Resident commented that it's an excellent idea that the overhead utilities are being placed underground. Is the project a candidate for stimulus funds?

   Mr. Sato and Mr. Phung (FHWA) stated the project will be a candidate for stimulus funds.

Materials Used for Meeting

1. Project summary, comment Sheet and Powerpoint presentation
2. Exhibit displays

Prepared by: Tracy Fukuda (WOC)

Appendix A-3

Section 106 Consultation:

Letter from Office of Hawaiian Affairs, October 23, 2007

March 5, 2009 Meeting Minutes, Kaua'i County Historic Preservation Review Commission

March 5, 2009 Meeting Notes for Kaua'i/Ni'ihau Burial Council, Wilson Okamoto Corporation

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

HRD07/3185

October 23, 2007

Ronald A. Sato, AICP
Project Manager
Wilson Okamoto Corporation
1907 South Beretania Street
Honolulu, Hawaii 96826

RE: Section 106 Consultation for Kuhio Highway Short-Term Improvements Project, TMK 4-1-003:017 (por.), 039, 044 (por.), and 4-3-002: 006 (por.), Wailua, Kaua'i

Dear Mr. Ronald A. Sato,

The Office of Hawaiian Affairs (OHA) is in receipt of your September 28, 2007 submission and offers the following comments:

The results of the Archeological Inventory Survey conducted by Cultural Surveys Hawaii for the Kuhio Highway Short-Term Improvements Project recommended archeological monitoring during construction. The State of Hawaii Historic Preservation Division (SHPD) also made a determination of "no adverse effects" with the conditions that an archeological monitoring plan be submitted to SHPD; archeological monitoring shall take place during subsurface construction work, and a draft monitoring report shall be submitted 90 days after the completion of fieldwork.

If the project moves forward, and 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. OHA would also like to be notified.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jason Jeremiah, Policy Advocate-Preservation, Native Rights, Land and Culture, at (808) 594-1816 or jasonj@oha.org.

Aloha,

Clyde W. Nāmu'o
Administrator

KAUAI COUNTY HISTORIC PRESERVATION REVIEW COMMISSION
Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B

MINUTES

A regular meeting of the Kaua'i County Historic Preservation Commission (KHPRC) was held on March 5, 2009 in the Lihue Civic Center, Moikeha Building, Meeting Room 2A/2B.

The following Commissioners were present: Patsy Sheehan, Chairperson, Molly Summers, Vice Chairperson, Dennis Alkire, Alan Faye, Jr., Dr. John Lydgate, Annette Manaday and Randy Wichman.

The following Commissioner was absent: Kehaulani Kekua.

CALL TO ORDER

Commissioner Sheehan called the meeting to order at 3:04 p.m.

APPROVAL OF THE AGENDA

The agenda was approved as circulated.

APPROVAL OF THE MINUTES

The February 2, 2009 minutes were approved as amended.

ANNOUNCEMENTS AND GENERAL BUSINESS MATTERS

Re: Submittal by Commissioner Faye regarding the educational PowerPoint slide show pertaining to the Certified Local Government Program and the Kauai Historic Preservation Commission.

Mr. Faye: What I did at the last meeting was pass out to people some information about what could happen in the way of three different types of video presentations. There would be a brief version maybe twenty minutes that the commissioners, Planning Commissioners people who only have a time to look at a short like executive overview of the purpose of our commission. Some examples of what we have been able to do so that's a short version. Then there is going to be a middle version which would be closer to an hour maybe 45 minutes or something like that which would be directed to architects, people who are thinking about making changes to their house and their house maybe on the register.

Mr. Wichman: (Inaudible) maybe hopefully PBS push it out further than just Kauai.

Mr. Faye: Then there is a third one that is more oriented towards classroom use at KCC and other, in fact remember Paula Creech, you weren't here but she was here the last meeting and she's the…

Mr. Wichman: She started a power point explaining what a Local Certified Government is all about and Alan busted out his thing which was ten times more professional and we were light years ahead of what they knew about it. So Alan you did a good thing.

Mr. Faye: She was very enthused about the whole thing and she thought that our little commission here on Kauai would become the role model for the other islands that have their commission coming along so they could use this in educating themselves. The thing is the more you know about it and the schools, universities are more awareness and the more chance of preserving our historic sites.

Ms. Manaday: How long is that version?

Mr. Faye: That's a good question.

Mr. Wichman: That's a curriculum.

Mr. Faye: That would be several sessions.

Mr. Wichman: Yes curriculum writer will have to come in and take a look at that.

Mr. Faye: WE may want to have somebody involved from KCC. They have a class there at KCC.

Mr. Wichman: But also we are looking at CLG funding being applied to this right? And then right now you have marching orders for all of us to contribute to the project right?

Mr. Faye: Right. Now that's what was I asked the last time was that legal to present that material to the Commission?

Mr. Wichman: What was?

Mr. Faye: I gave you all handouts.

Mr. Wichman: Where?

Mr. Faye: We passed em around.

Mr. Wichman: Shanlee I don't need yours.

Staff: This is an extra.

Mr. Wichman: Is it? Ok.

Mr. Faye: I can email it to you I have it all on the computer.

Mr. Wichman: How can we help move this along?

Mr. Faye: What I was hoping for as Commission is to think about what you would like to depict. After talking to the Mayor and Planning Commission and so forth what do you think we should present in 20 minutes?

Mr. Wichman: The actual application of the law. Where it helps us and where we failed. So it's about nuts and bolts. So let's take a particular example of how it can get really tricky. We could take the Kilauea Plantation Manager's House when it came before us. There were a couple of sticky wickets on that one because they wanted to rearrange an old Porte-cocheres on that. They wanted to add on three times the size of the original house. So those architectural reviews that kind of we dealt with at that point. I think Barnes helped us do it but it got really technical. I am just throwing examples out. But there are many of them. KHPRC has a long history of examples right. KHPRC also sued wildlife in Hanalei over a warehouse. So there is also taking on Federal Government in court. But whether you want to do that or not and then now we can also deal with Hawaiian issues too so specific examples of our historic preservation law working.

Mr. Faye: So we have buildings, we have cultural sites and many given cultural view planes.

Mr. Wichman: Kapalawai could be an example. You know there were a lot of sticky wickets in Kapalawai remember. And then we had both cooperation of the landowners and the carriage house came back right?

Mr. Faye: How about proactive mention that we have an inventory somewhere. That's supposed to be updated from which there is some need to approach these people that have these houses.

Mr. Wichman: The County of Kauai Historic Building Survey.

Mr. Faye: We could be proactive in identifying and encouraging those that could be on the register. So that's an activity that's more than we just reviewing things. We actually go out there into the public. Let's say if we look at the Menehune Ditch we point that out that, that's a site that needs to be restored/preserved.

Mr. Wichman: That's a painful one.

Mr. Faye: Yes. Then there is Salt Pond. So the question is do we want to show ourselves as just being educational to the public or we can do review? We have actually be activist in identifying and encouraging.

Mr. Wichman; I think so we can find, there are examples of it. Then there is an example of objectivity where people just completely ignore it. But most people have good intentions but it

is in the nature of advice, take it or leave it. Most people need advice right? That's why we are advisory and it's take it or leave it right?

Mr. Faye: We could take an example I don't know whether it would be in the first version but I know the second one I would like us to take the Hanapepe Hotel and the fact that she came here two or three times.

Mr. Wichman: Hanapepe Hotel?

Mr. Faye: You remember that?

Mr. Wichman: Yes.

Mr. Faye: That's an example where we had a good...

Mr. Wichman: We had a good exchange where we gave up things on both sides of the fork.

Mr. Faye: She came to us and that's the kind of thing that you want out in public so that they know oh I have got one of those places too. It could be a really simple, Larry Lasota wanted to bring in the Kee Beach, the Hula mound and he wanted to bring that it with the fact that we are preserving the Hula, the Kahiko whatever pertains to a site like that.

Mr. Wichman: That's a sticky wicket.

Mr. Faye: Maybe not to good to put at the beginning?

Mr. Wichman: Let's talk about that. We have a lot of good examples so let's work them up.

Dr. Lydgate: Coco Palms Hotel? We could find out who owns it and is it listed? Is it fifty years? Is it a building? Is it a park?

Mr. Wichman: 2003 it became fifty years. It's older than that.

Dr. Lydgate: All these messy things that no one wants to touch.

Mr. Wichman: I think we need to go to things that worked out right?

Mr. Faye: Right examples.

Mr. Wichman: Yes. So we are taking one Hawaiian Culture. We are taking one Japanese Culture. Let's do ethnically because KHPRC deals with all ethnic groups and so that would be an important thing.

Mr. Faye: But the thing is at the beginning of the presentation we refer to our ordinance, our legal and stuff like that but without making it too boring some how that's the trouble when you...

Mr. Wichman: By adding these specific examples over the years I think to the application of the law is absolutely fascinating because that's where the interpretive comes in. But without getting into too many details about how vague it is sometimes.

Mr. Faye: I think the other thing we were talking about it needs to have a good voice/audio and I think Randy has a good…

Mr. Wichman: I think John is the English major.

Dr. Lydgate: (Inaudible) of historic Lahaina that was done by…

Ms. Summers: Eddie Kamai?

Dr. Lydgate: That was winds of change about old Lahaina and what it was once was beautifully done and a retro video.

Mr. Wichman: Do you have specific things that we can do as commissioners to help you with this project? Cause we know as soon as the local government funding is in part of it is going to this and the other part again is we are going into the registry. We are going to nominate the salt ponds and making that move so we might want to use those examples inside the video cause we are moving those quickly. As soon as our next round of funding coming in we up there building survey cause that is important too and we haven't done it in ten years and we are slacking and it's critical. So again once again that's another thing that the building survey we can start to do. Ricky would be able to go through that in ten minutes.

Dr. Lydgate: Could we get a grant?

Mr. Wichman: We have the funding for it.

Mr. Faye: Paula says we would be able to go in for some of the Preserve America money.

Mr. Wichman: Yes but what we are doing here is not big money. With Preserve America you want to go in with $40,000.00 to $200,000.00.

Mr. Faye: What she said (inaudible) $50,000.00. The first cut can be on our own.

Mr. Wichman: Yes within the Commission that way it will be done quicker with our own funding.

Mr. Faye: That's just to provide an example then you get into a little bit more depth and as she said on the phone call me anytime and she said that there are grants that area funded that aren't being implemented. So we can come in and get the money to move it. So here is another question to raise and unfortunately Ricky is not here we talked about the fact that you gotta get County Council approval to do this as a condition, you got to get permission from the Cou to… I think what he said we have to get Council to agree maybe in principle that maybe th something we want to do. I mean we can start working on it can't we?

Mr. Wichman: You gotta go to Council? Hard work.

Mr. Faye: Is it the budget or the purpose of the money being spent on this?

Mr. Wichman: Well we got to give them a master plan on what everything is and the break down to the County Council and they gotta…

Mr. Faye: I mean that's going to delay if we can't, we could actually start the process going.

Dr. Lydgate: Which council is the Planning?

Mr. Wichman: Council will be sympathetic it's just the time involved and being prepared for that.

Mr. Faye: It would have to go on their agenda. We need to clarify at this point. Rick is not here today. Ok let's if we get started so in the cycle of County Council when do we get to get on their agenda?

Mr. Wichman: They have Sunshine Law. We will know within the next, well at least have a month before we can get on their agenda. They are under the Sunshine Law like we are 7 days it has to be posted and stuff. No changes, etc., etc.

Mr. Faye: How do we apply to the Council for…

Mr. Wichman: Ricky will do that we just get on the agenda and then we go with the presentation and hopefully…

Mr. Faye: And the question is before we go to the Council we want to lay out our plan, the whole plan which is like the first addition more or less to show we can do it and more or less for the local government. Council, Planning Commission, Mayor's Office, staff people and then the next one we are orienting towards the larger scale, Hoike Channel and then the third one I am not sure that's educational.

Mr. Wichman: Now we can have like Preserve America has curriculum writing in that.

Mr. Faye: For the educational part.

Mr. Wichman: Yes. I have always admired what KHPRC did when they did the historic house poster you know. To me that worked really good. That's one of the highlights for the KHPRC's public outreach which we haven't done in so long and I think it's time. And I think it's a good idea and I think we still need to get that out in our public outreach.

Mr. Faye: In fact that was one of the buzz words that she had that slide presentations which we had on paper and she had one item in there and that was public outreach and I asked her if this was appropriate and she said oh yes. She's around here for about another twelve months or so.

So we may want to stay in touch with her and tell her and I can do that. But what I am thinking of is other people here have great imaginations to think about for the next meeting what are we more specific on the progression on the opening scene. You want to have oli you know and some Hawaiian introduction about the culture and the beauty of this island comes from the fact that we retained so much of our culture in this island and one reason people like to come here is because of that.

Mr. Wichman: When you say the opening oli it could be by (inaudible), plan b Sabre Kauka if you want both male and female those two and then they can figure the particular oli.

Mr. Faye: Next step would be the fact that the legislature exists. Why are we here? What's our purpose? So forth and so on.

Mr. Wichman: So on our next meeting what we can do is our County Council approach because that's the blue print.

Mr. Faye: That's what we want to present to the Council?

Mr. Wichman: Right whatever we present to the Council is our road map so therefore we can define exactly what our road map will be for our County Council. Then that way we know how to spec the low down to help you do what it is that you need to do right?

Ms. Summers: Is that presentation in and of itself a slideshow?

Mr. Wichman: It's documentary video so chances are is that certain one Alan and his crew…

Mr. Faye: (Inaudible) the slides up there and some of the stuff we can just flash up on the screen…

Mr. Wichman: Some of it is a video interview of you and your experience on KHPRC and then you can go to Dennis' house you know.

Ms. Manaday: As part of the presentation to the Council?

Mr. Wichman: No, no but as far as the overall package that we will be presenting to the Council. Part of it is the video right? Interviews right cause that video is going to add quite a bit.

Ms. Manaday: But we are not going to go to the Council for just the funding?

Mr. Wichman: No the funding I think needs because if and when we get our CLG funding I think we can earmark easy a couple grand to get the video to the first step. Then you have a working model of something then from then on we can either take a bit from the next go around and add to it as we go or we could actually get serious write grants. But I think if we kept it in house we will be able to get a product out there and into the public hands as soon as possible. But if we…

Ms. Manaday: You are not talking about the executive you are talking about the next stage then. Cause he was talking about the next stage then…

Mr. Wichman: The role of KHPRC.

Mr. Faye: That's the first part right?

Mr. Wichman: Right.

Mr. Faye: But actually the first part is also going to be part of the second one because it's going to have more depth. Ok example architect comes in with the plan for making a major change on the house. It's an architect from the mainland comes down here and wants to change the house. Doesn't know anything about the historic so the thing is when the owner buys the house in Hanalei then the owner should have a copy of this video. It goes to the architect and say look if you are going to do anything on this island then you better look at this video because you are going to have to come to this commission. That's the one I think that really counts because I think if anybody is going to buy a house especially an historic house.

Mr. Wichman: Yes the County can have it right there at the Planning desk.

Ms. Manaday: You walk with their permit request.

Mr. Wichman: That's the idea. Those are the marching orders.

Mr. Faye: Let's say Randy goes out and buys a historic house, some historic house so you hire an architect but the fact that you bought the house on Kauai it's an historic house and that means that you use us to let your architect know that he's got to look at this video before he pays any money to change the house. Then he comes in and he applies for a building permit right but it's too late because he's already got this design and his architect doesn't know the first thing about it. So you want to get it before you do anything. What can you get away with if you are going to change this house if it's an historic house on the register and you gotta know that you can't change it.

Dr. Lydgate: But surely they don't have to do it. Unfortunately that's the sad thing.

Mr. Faye: The purpose of the video I think is to have people get he feeling that this island is special because w are preserving as much as we can and people can't even see that.

Mr. Wichman: There are parameters in the law.

Mr. Faye: Yes and the thing is they don't have to do it but it's sure nice if they play ball (inaudible).

Dr. Lydgate: All Saints said they didn't wan to be on the register because they had all this fear. Oh yes it's tax free? Well it's tax free anyways it's a church. So they didn't want to do it. They said some do and some don't.

Mr. Faye: I called Gaylord Wilcox a number of times and said why don't you put Kilohana on the register. He said I don't know why should I exactly? He's afraid there might be restrictions. Anyway…

Mr. Wichman: How about on the agenda we put on that the County Council, going before the County Council because at this particular point even if they were given this right here to have it available at the County Planning Department it's already a step forward. We are moving.

Mr. Faye: We have already taken steps.

Mr. Wichman; I we can make sure that we have a product that's good for the public right here. So it think at the next meeting we should be ready to vote on that particular part and get ready for County Council.

Mr. Faye: Right and we need Ricky's manao. It would be important for Ricky to be at this next meeting.

Mr. Wichman: But right now this particular power point could be put on within the Planning Department at this particular point until we get better funding (inaudible).

Mr. Alkire: We might need to take our show to the Planning Department to Ian and get their blessing.

Mr. Wichman: Let's take it up on our next agenda then we go.

Mr. Faye: How about that invite the Planning Department, Rick and Ian and some of the people there cause they have to face all of these permits requests coming in.

Mr. Alkire: Just the last part of this discussion can be a video too. What if you do own a historic property and you are thinking about putting it on the register. What do you get? (Inaudible).

Mr. Wichman: There is a lot of work that's put into it so the sooner we get it out the better.

Mr. Alkire: There is HTA monies too you realize.

Mr. Wichman: Once we start writing grants we stall the whole process down.

Mr. Faye: Do you need a grant from HTA?

Mr. Wichman: Right now we don't.

Mr. Alkire: Aren't we going to get money from…

Mr. Wichman; That's only after the curriculum but right now CLG will give us the money to be able to get 100 copies of this DVD that's placed right there at the County Planning Department at the desk and are handed out whenever they have anything with historic tricky wickets.

Mr. Faye: And each one of the Council guys and Planning Commission has to have this because we will be giving then a quiz. Just kidding just make sure they look at this. Have a couple of flashes with some lady on the beach sitting next to an historic heiau.

Mr. Wichman: So Shanlee doesn't have to write up…

Mr. Faye: I think that's really worthwhile so people can appreciate what we can do and what they can do.

COMMUNICATIONS

Re: Letter (2/19/09) from Ronald A. Sato, AICP, Project Manager, Wilson Okamoto Corporation requesting consultation with the KHPRC on behalf of the State of Hawaii DOT for the proposed Kuhio Highway Short-Term Improvements, Kuamoo Road to Temporary Bypass Road Project as part of the EA process and as part of Section 106 consultation under the National Historic Preservation Act.

Mr. Ron Sato: We have to the Commission to give you a briefing on the project and why we are doing it is part of the 106 consultation. You should have a hand out I just handed out a short project summary with a map. I first wanted to just give a quick overview on the history of this project. It actually started in 2006 back then the County coordinated with the State Department of Transportation for highway improvements on Kuhio Highway for the bypass road towards Kuamoo and this is tied to the Wailua Bridge project they are doing that bridge improvements. Since there was a public meeting in February of that year and since then we have come on board to work on the widening portion and we are working on getting all of our engineering done and our approvals done and we are trying to get the construction started for last year 2008 and what happened was we were consulting with Fish and Wildlife Service they had some concerns with the utilities along the corridor. I guess cause Wailua River is a prime corridor for sea birds they come in through that area so what the DOT was they went back and they consulted with the utility companies about seeing if they can relocate it. So because of that the project actually got delayed until 2009.

It did take a while because the utilities had to go back and look at the feasibility of utilities underground. DOT had to work with them in terms of cost sharing and other factors. The good news today is that DOT has agreement with the utility company to relocate the utilities underground from the temporary bypass road and half Kuamoo Road which I will get into. Because of that we are having to go back and do environmental assessment which includes the utilities plus the widening. The widening portion was initially (inaudible) it just involved widening improvements in the DOT right of way but when we add the utilities improvements relocation the State went back and said we are going to do environmental to cover everything. So that's where we are today. We are proceeding with the (inaudible) trying to work on the draft

EA trying to get it published and consulting with this commission on this project. Questions so far?

Ok what I would like to do is I used this, this is a little bit different from what you have but the State has this nice form that I put to use but in the back of your handouts you should have 11X17 schematic that shows the project. Basically our project starts from the temporary bypass road and it extends to Kuamoo Road. This is our original project where we were going to widen the highway by adding another south bound lane mauka side. There is also going to be improvements to Kuamoo Road, extending the right turn storage lane.

There is going to be some intersection improvements as well. One is the temporary bypass road where you make the right turn to Lihue. Its gong to be with a second lane after it stars a second south bound lane. When we get to Lanikai Street it's going to be signalized. When you get to Haleilio Road we are going to fit in a second south bound lane but we are going to have to take out the left hand storage lane, we are going to have to take that out because there is not enough right of way with that additional lane in. You are going to still have the left turn signal to make that turn but we are going to have to make that as an add on. I will touch on that.

On Papaloa Road they are going to restrict the left turns coming out and going in. So you have a right turn coming in and a right turn coming out. That would alleviate some of the congestion created when people left turns trying to go into Kapaa. (Inaudible). When you get to Kuamoo Road again we are going to have the original south bound lane. This one doesn't show it but it's going to be a separate right turn storage lane as well to get up to Kuamoo Road and then we are going to extend this right turn storage lane about sixty feet to fifty feet inland. So that will be a lot more storage capacity coming through here, right now it kind of merges. So that's our actually our widening project. They are also going to synchronize the intersections cause they are going to signalize (inaudible). So it's not synchronize so what will happen it will improve the operating efficiency and it won't stop so that going through there (inaudible).

(Inaudible) So before the plan was to just relocate the poles mauka, the utility poles, but because of the change they are all going to be placed underground includes electrical, phone cable the pole gotta come down. So that will increase safety, less chance of wires and poles coming down if an accident or natural hazard and improve some of the views along the corridor. When you get pass Kuamoo Road we are going to place the utilities underground as well. So that extends to the Lydgate substation, so all the poles along this corridor is going to come down as well. Also they have been working with DOT and working hard with cable and telephone. So they have cable lines, those are going to come down as well. So basically we are taking down all the poles in the entire corridor which helps improve views and clean that up. What we are going to have to do is we are going to have to cross under the Wailua River. They are going to attach the cable and telephone to the bridge to get across. The electrical lines are going to have to go under the Wailua River. So from this point in the State Parks right here and I think I showed you the block on your map. We are going to drill from this point here and under the Wailua River and then they are going to go on the mauka side of the highway and the right of way and then cross to the substation. We are also looking to see if we can also instead of keep it on the makai side. The problem with why they couldn't do that initially was because there are other water utility lines under there.

Mr. Wichman: Fiber optics too.

Mr. Sato: So that made it difficult but we are discussing with Hawaiian Homelands the possibility of getting an easement maybe so if that works out then we can just keep it on the makai side. But right now the plan is to keep it straight on the makai side. But right now the plan is to come here and go across that. That was a change that just happened just recently. So that's the project.

I should mention that we did meet with the Burial Council this morning. They had their meeting. We talked... we discussed the burial issues with the Council. We are going to be doing testing on this parcel here. What we did was Cultural Surveys assisting us did some ground penetrating radar, GPR, they identified about six test areas about ten by fifteen feet. So they used the GPR to assess anomalies up to about seven feet below the surface. What we want to do, we kind of went a little beyond the normal testing associated with digging but we wanted to be sensitive because of the Wailua River and the coastline areas so we did that to see if there were anything that shows out. There are some anomalies but five of the test pits look like there might not be something. One of em maybe so we talked to the Burial Council with that we are going to leave that one alone we are going to just test the others. (Inaudible) we are taking this one step further so they are ok with that.

We have been meeting with SHPD as well that's how we came up with the plan of testing in the area. They said we didn't need to, they actually did some work in this area anyways prior and they didn't find anything so they were comfortable with that. But otherwise we are going to have archeological monitoring along the corridor during construction. Otherwise there is no real surface or historic properties we are really affecting. DOT is doing the improvements pretty much in their right of way so there is no homes that are going to be relocated. There is no businesses that are going to be relocated. Again since we call it a short term improvement project in a sense that they want to get it started in the next coupe years.

As far as the long term solution the State is working on the Kapaa Relief Route. That's actually starts all the way back from Hanamaulu and it goes all the way to the end of Kapaa. So they are working on that as for as the long term regional solution to the traffic but this is where they wanted to go in and provide some short term relief. If all goes well we are looking to fish all our requirements and start construction in the fall of this year. The Bridge project is going to be starting as well. So what the State is trying to do is tie in the two together. Not tie in as one but initially that was the plan it could be coordinated together but because they had to deal with the Fish and Wildlife Service and their concerns this one got pushed back. The plan is to finish this one time.

This project is going to take a couple years construction so that they... they don't want to do constructions six months and then stop six months and start construction again. It can't be compressed as far as schedule to minimize construction. Not to say it's going to take tow years for the entire widening cause that's actually fast but when they actually go and begin to do the wires and place it in. So the State is working hard to coordinate that two projects together to

minimize the traffic. So as far as Wailua River we are taking down the utility lines to improve the view corridors.

Dr. Lydgate: Is the buffer of the heiau going to be intact?

Mr. Wichman: Yes they are not moving toward Malae in any way.

Dr. Lydgate: And why are you crossing twice from the hotel and then back to the other side. You are going makai and then you are going mauka by the Aloha Beach Hotel.

Mr. Sato: Yes because there is a lot of utilities on the makai side. So there is not enough room. So that's why we are trying to work with Hawaiian Homelands to see if we can also get an easement from them. (Inaudible).

Mr. Faye: Does it make sense to split the two when you cross the river then if you just kept them together under the river you wouldn't have to hang it on the bridge. You are splitting the… they would be bundled together until the bridge right?

Mr. Sato: When they cross the cable and telephone will be attached to the bridge but the electrical lines cannot because of high power electrical, safety and so from that standpoint it would have to be under the bridge.

Mr. Faye: Is it cost effective to split em that way? I mean of course if ever have a problem and lose the bridge in a tsunami and you lose the bridge you are going to loose the cable and telephone. As long as you are going down there why don't you bundle them all together?

Mr. Sato: We could consider it but I think the plans have already been designed and we are ready to hang it on the bridge.

Mr. Wichman: (Inaudible) it was one of the compromises that they can screw the little holes and brackets to the historic bridge. But there is a lot of tricky things going on in this.

Mr. Alkire: There are no changes to the bridge structures?

Mr. Sato: That's a separate project. The bridge structure we came before you guys for changes on the cane haul bridge. Basically we are removing the existing decking and putting a 2 lane decking on top and then we came back later because of traffic control issues.

Mr. Wichman: Three lanes on the main bridge.

Mr. Sato: Temporarily three lanes on the highway bridge and at the end we will take off that lane and restore it to the original condition. And that's tie into the cane haul bridge project. So I guess in the ultimate when everything is put back I don't know if you guys live up there but you will have two south bound lanes and then two north bound lanes along that corridor.

Mr. Alkire: Is there left turn queuing lane on to Kuamoo?

Mr. Sato: Yes there is one now.

Mr. Faye: Can you leave that one there with the widening?

Mr. Alkire: I am concerned about the removal of the left hand turn going to the Wailua Houselots, which is that's Haleilio. There is like over a thousand people that live up there and with no left turn lane how do you expect them to cross two lanes of traffic. It sounds like you are creating a, you are also blocking one of the north bound lanes. It will constantly be blocked guarantee.

Mr. Sato: Unfortunately they are still going to have a left turn, a protected left turn on the signal. But it's one of those things because there is not enough right of way. We would have to move the gas station and there is the County pump station and other businesses over here. And it's going to take another several years to do that. Unfortunately that's one of the things and that's why by Lanikai…

Mr. Alkire: There is no other way in and out of there also. Just to make sure Honolulu people understand that. That's the only way in and out of that community and it's severely compromised.

Mr. Sato: It's a very short left hand turn in there now.

Mr. Alkire: It's very short. It's way short and it's often stacked up and goes out.

Mr. Sato: Hopefully when they do the synchronizing of the intersections that would help to alleviate to provide that but unfortunately that's…

Mr. Alkire: That's going to be a blow coming south bound.

Mr. Sato: But as far as we are trying to keep it so we don't have to affect any historic properties.

Mr. Alkire: The real problem is the Mayor doesn't live in the Houselots where as the last two Mayors did. (Laughter in the background). You wouldn't be able to do this with the last two Mayors but maybe this one doesn't care so.

Mr. Sato: We want to minimize any relocation. We don't want to affect any historical properties or sites.

Mr. Alkire: Well if you get rid of that pump station any day because it's always in a malfunction mode and it's like driving past a latrine most of the time. It's ridiculous.

Mr. Wichman: Has SHPD reviewed this project? Where are their recommendations?

Mr. Sato: They haven't sent any. The last meeting we had with them was to talk about the testing. That's where we are.

Mr. Wichman: Normally we review the SHPD recommendations.

Mr. Sato: We are going to prepare an inventory survey as part of the results and we complete the EA will get a response from them and when we complete the 106 we will also have another letter from them.

Mr. Wichman: So I guess our comments or recommendations will be pending SHPD recommendations.

Mr. Sato: Actually yes that's (inaudible).

Mr. Wichman: There was a couple of things I wanted to quickly outline. I don't want to take much time at all because we can do this outside this. This is the 1923 Lihue Plantation that shows this is the bridge right here, the rail road bridge right here coming out of there. Here is the Smith Boat entrance. These are the two houses. This is the original Lydgate Park and executive order of 1923 which you can see in the photograph is right here. What I am pointing out right here from the Leho Drive here is the stone wall that runs the entire length of the highway. So mostly your transmission lines are underground but under the berm is a stone wall. So you can see the original government highway ran along the edge of it so when they realigned what they have done they have moved it away from this particular wall. Now I know it's breeched here and a couple of other places but you can see right here through the entire length there is that wall. So you will be able to be aware that the berm is a wall. So you are going to have to bring your trenching just a little bit further over right.

And then the reason why they did this the original Lydgate Park right here in the sector, here is Malae Heiau as you are coming into the river mouth. This is the 1924 right. This is the original village of Makakiu which is this right here. So there is, you are coming into the old village site right here exactly what the subsurface is going on you should be aware of that. There is some really goof photographs of this sector right here in the Hawaiian Historical Society if you need it. Naturally right along in here, here we have the 1918 map done by his grandfather that would put in detail exactly where your testing is going to be. So Hal you may want to have that map. It's a good one because you will pin point exactly what's going on. This shows all the fish ponds and everything in here.

We have early photographs of this road when it was still there. This wasn't here the actually built it in the late 30s. It went up to Holoholoku but not from behind Kuamoo didn't come in apparently the 30s or early 40s, the upper section but we have good detailed maps of all this area here. But yes your transmission lines are coming across so just be aware of that berm. Jim Powell, Scientific Consultant Service did it for the Hawaiian Homelands so that's the report that you are referring too. So but they didn't find out till a couple of days after the fact that the stone wall was there. They could have transected it but just to be aware of it right there. This continues and gives you a little bit of an enlarged picture of that corridor also. Again this is the old Wailua Airport entrance right here the original, the entrance. So you can see the way the

wall was built up right here. But you will be able to put yourself into this map right here. And also…

Dr. Lydgate: An airport?

Mr. Wichman; Yes there was an airport originally going into Wailua.

Dr. Lydgate: Where?

Mr. Faye: Charlie Fern used to fly in and out of there.

Mr. Wichman: And then this one right here also shows your entire corridor. This is the right way of the old railroad track which you can see it right here in this photograph coming through Hikinaakala which is this right here. So we are looking at this section within the photograph right here but more importantly taking a good close up so you will be able to see if there is any pertinent data that you especially on that side of the road. But again this is the one I wanted to bring your attention to you since I saw that you do your underground on this side of the road and also be careful of this section right here. But I know that you are going to have archeological monitoring. But that's all I wanted to do for now.

Mr. Sato: I guess how can we get a copy of this?

Mr. Wichman: Either come by or Iida can come into the Historic Society tomorrow then we can give you everything you need.

Dr. Lydgate: We will charge you though. (Laughter in background).
Mr. Wichman: A couple bucks. And I think that will help you align yourself in that corridor. Again you are having archeological monitoring all along the stretch right here. I think as soon as you rise over the hill you will be more out of it until you get to the open flats. Most of the Bishop Museum collection on Kiis for example, the tallest Kii is idols right, all came out of this sector. Yes. When you look at the Bishop Museum collection the tallest known idol existence came out of this area here. These swamps are rich. This is where the finest of the, we call em archives but you call them something else but have come out it. So it's again this particular corridor, but again once you come out here. Here you are having stone walls but you are filling in the County side of the road right?

Mr. Sato: Actually the State.

Mr. Wichman; Cause its actually bermed up into a little and then there is that wall here. You actually cut into the County park right there, State park.

Mr. Sato: State park yes. So basically we just need an easement for the.

Mr. Wichman: So there is some subsurface going along the stretch of road right here. But I can show you the really old photographs that we have on that stretch of road. The old village that comes through here right, the old village of Wailua is all this right here. But since it's already

bermed up I presuming you are filling in and rather then moving too much subsurface in this corridor right here. And when you look at the maps you will also see the way they come across. But that's what I wanted to get into right now.

Mr. Faye: Just out of curiosity is that cable, electrical is that well shielded? Is there any chance that emission from the actual cable itself you know what I mean?

Mr. Sato: This is Brian Lock our Civil Engineer.

Mr. Brian Lock: I don't think there is a whole lot of electric emissions from the cable. We are more worried about from the cables is infusion and the design will take (inaudible) which is also why the cable and telephone can't be next to it. There needs to be some kind of horizontal separation.

Mr. Faye: So there really won't be a measurable quantity of emission? There might be a little bit?

Mr. Lock: (Inaudible) and I don't think there will be.

Mr. Faye: I just thought the impact on the wildlife, fish life, whatever in the river itself or anybody that's.

Mr. Sato: We will be well beneath the river.

Mr. Faye: How far down will you go?

Mr. Sato: It will probably be at least ten to twenty feet below the bed of the river.

Mr. Faye: I thought you were laying it on the bottom, buried ok that's good.

Ms. Summers: I had a question. I realize you are going to be doing the underground drilling across the river but then I assume you are going to be trenching when you do the stuff that's going to be along side the highway? So that's going to be going through that seven foot where the anomalies are?

Mr. Wichman: All along there is tricky. You can see by the fiber optics and everything too if you want to get their data of what they came up coming through that corridor. If you wanted to get some heads up you can get their data.

Mr. Sato: Or you can actually place it on the makai side.

Mr. Wichman: There are also some serious cultural layers also that the punched through when they came through. I have seen those along that stretch. I saw it at Coco Palms.

Mr. Faye: It's just that along trenching in the road itself just before (inaudible) I mean you have to avoid the heiau right that's why you are crossing over closer. That doted line looks like…

Mr. Sato: Yes it is. Where they are going to directional drill we are starting way back from over here and they are going to come all the way under here and pop up under here.

Mr. Faye: The power line also?

Mr. Sato: Yes the directional drill is for the electrical line. And then the telephone and cable will be under the bridge and then after that they are going to be put underground.

Mr. Faye: Short crossing then? It shows a long dotted line.

Mr. Sato: Yes it's a long stretch. That's why it did take a while engineering wise and we have these companies to work it out. So hopefully in two years it will be all done.

Mr. Faye: So drilling you never really get a chance to find out what's there till dig out what's there like iwi.

Mr. Sato: We're working with the Burial Council.

Mr. Wichman: Yes that's their turf. The iwi are their turf.

Ms. Summers: Does anybody else have any questions? Is there anybody here to do other testimony? (None.)

Mr. Wichman: Is there anybody else with questions? (None.) Can we start with recommendations? You are expecting recommendations coming out of this body today yes? Pending SHPD comments, normally we either concur or not with this SHPD. Having not been able to see State Historic Preservation Division recommendations then we are just going to move along with our own now. Which is essentially right here is you are aware of the stone wall that stretches mauka of Leho Drive extending the entire length to the bridge. Essentially to the Hawaiian Homes gate right? So KHPRC recommends that you be aware of that stone wall extending along the old original government highway and that if you can keep your underground just this side of the stone wall you will be following the old government highway. But once you are into the berm then now you are into something else. Just be careful of the berm. It just looks like a dirt berm but there is.

Also that KHPRC would also like to have you be aware that the village of Makakiu also is in that sector that we are talking about along the original Lydgate Park right there. It's also a sensitive area. I hope you don't see anything there.

Also that KHPRC recommends that you come and take a look at the 1918 Robert Lydgate map which will give you a really good close ups of that corridor right in Kuamoo corridor that's going to help you a great big deal and then they will be able to know exactly where the habitations and things are and then you will be able to define your testing and place it exactly within the context within this map right here.

And then also the KHPRC recommends the archeological monitoring along this whole corridor especially the lower parts of it as you come up over the hill beyond the service stations right you start rising up you start coming into the wetlands and the upper plans now you have the boundaries of Wailua which ends right there by the Houselots light. Then you enter into Waipouli and then shortly after that you are entering into Olohena South and the North and then Kapaa. By the time you get to the Coconut Plantation you have already crossed plenty of ahupuaa right there. But as you get further up there will be less likely along the road corridor right there. But still to be aware that the sensitive things have come out of that corridor I am hoping it is going to be less sensitive for you.

Mr. Sato: As far as the monitor we are kind of working with SHPD on them being the monitor.

Mr. Wichman: Definitely that's the standard operating procedure along the corridor because you are here on the 106 is you are coming across the Wailua Complex of Heiau National Historic Landmark right and so definitely as you are coming into the Makakiu Village into that sector right there.

Mr. Sato: Yes definitely within this corridor yes.

Mr. Wichman: That triggered you 106 is over there on this side yes.

Mr. Sato: Yes cause actually but initial consultation with SHPD monitoring along this part may (inaudible) but definitely between this sensitive corridor here.

Mr. Wichman: Also I don't find any problem with where you are coming up with the underground utilities up until that corner right there because Scientific Consultant, Mike Dega did the Hawaiian Homes Land but to the best of my knowledge nothing really important came up into that particular sector. They were luck because it was right after the fire. They were lucky that they did that whole sector after the fire that burnt that whole sector down right? It also burned across the field and opened up that whole bit and so know I am not raising a flag on any of that right now.

So I think those were four recommendations. Number 1, the stone wall mauka and extending along the main government highway; the proximity of the village Makakiu; and number 3, the Kuamoo corridor with the Lydgate map; and number 4, archeological monitoring.

Mr. Faye: Sounds good, that's part of the motion right?

Mr. Wichman: Yes those are the four points of this motion. Now we ask anybody in the audience.

Ms. Summers: Those in favor? (Unanimous voice vote.) Opposed? (None.) Thank you.

Mr. Wichman: Good luck. Get to work people are waiting. (Laughter in the background.)

Ms. Summers: When is exactly does it actually start?\

Mr. Sato: Fall of this year.

Re: Letter (2/23/09) from Brian Cruz, Cultural Researchers, Cultural Surveys Hawaii requesting consultation with the KHPRC for a Cultural Impact Assessment (CIA) for SFFM International Incorporated's proposed 15-acre Kalepa Moto-Cross Project located on TMK: [4]3-9-002:020 (por), Lihue District.

Ms. Summers: Ok next item on our agenda is the Kalepa Moto-Cross Project.

Mr. Wichman: Is someone here for the Kalepa Moto-Cross? Hal you wrote the, that's Cultural Surveys that doing the…

Mr. Hal Hammatt: Yes I believe this is just, this is a consultation letter asking for information as a beginning to our Cultural Impact Assessment.

Mr. Wichman: Very quickly after going through all the area photographs and all the Lihue Plantation Maps of course I was able to find it. We have some very good close up aerials in the 30s and 40s of this particular bit. No flags. At first it was difficult to find because it didn't have the larger picture of the Wailua Falls Road right but then clearly the landmarks are still there and in the old photographs I was still able to find it. It is old plantation you don't need the field numbers for that but no flags.

Mr. Hammatt: When Gerald comes back we can check.

Mr. Wichman: Well no flags. Yes so there I thought because of the map you were pretty close to the edge but no the way the property is. Yea at first I thought it was makai I lined myself up with Kalepa on the way in and I knew where I was but eventually I figured it out that it was actually mauka of the road to Wailua Falls not makai that I originally thought. But yes I wanted to find out the proximity of this property to the old wagon road that linked the island. We have a good map of the old wagon trail that goes through that sector again it's not close too it. So again so far we haven't seen any flags. Plantation hammered this land for quite a while right?

Mr. Iida: Yes the only thing we found was part of a ditch that is along the mauka side of the road.

Mr. Wichman: Yes so I think it would be a pretty good idea for the County to be using that. They chose wisely I am hoping. But it looks like they did.

Dr. Lydgate: It's about fifteen acres right?

Mr. Dave Caylor: My name is Dave Caylor I am the County's Park Planner. Just to draw the connection what I am doing here is now Shan is gone but she asked me to come today to answer any questions and what County Parks and Recreation Department did was contract with SSFM

International on Oahu to do the Environmental Assessment that's required as part of this project and Cultural Survey's Hawaii is subcontracting with SSFM to do the cultural survey portion of the EA.

So I can give you a little bit of history of the project if you would like. So the County of Kauai requested of the Bureau of Land and Natural Resources as part of their as submitted to DLNR on February 23, 2001 a request for set aside of 18 acres at the site identified on the map. It was a portion of TMK: 3-9-2:20 but surprise we have a new TMK now. I am not sure you guys are aware it just happened so it's now 3-9-2:36 because one of the requirements of the set aside was that the County sub-divide that 18 acre parcel. The parcel itself is not 18 acres. The project site will be less then 15. Why we kept it lest then 15 was so that the County can have control of the permitting process rather than go up to the State Land Use Commission which is required over 15 acres.

Mr. Wichman: So this would be administered by County Parks then right?

Mr. Caylor: Yes it will.

Mr. Wichman: Yes its County Parks initiative.

Mr. Caylor: And so there was one thing I think that was in the letter or the way that its worded on the agenda it says that SSFM International Incorporation proposed 15 acre... it's actually a County project.

Mr. Wichman: I saw that I know it's spearheaded by County.

Mr. Alkire: This parcel the subdivision work is complete?

Mr. Caylor: Yes the subdivision was received final approval in 2003. Let's see what I have in my notes here and the request was approved by the DLNR six months after it was submitted so August 24, 2001. One of the conditions was that we subdivide out that 18 acre parcel, that happened was received final approval from Planning Commission on May 13, 2003. Governor Lingle signed executive order which moved the management authority for the 18 acre parcel over to the County for recreational purposes, that's executive order 4186. It was signed August 11, 2006. And so right now we are going through the EA process and expect that to be completed within the coming year. I think I have all the pieces in place and then SSFM has also contracted to apply for the required permits for the development of that site. The other thing that County Parks is doing is we are working with various moto-cross bike groups because there is several on the island and trying to put together a coalition so that they can assist in the development and management of that site.

Mr. Wichman: I really think it's a really good idea that you centralize all moto-cross activities if you can. This will take some pressure off, not all you know, of them riding all over the place. When I first saw Kalepa all the flags went up but then I realized quickly that it was way mauka of the ridgeline itself. So like I said earlier no flags.

Mr. Caylor: The intention of DLNR and it was very explicit in the submission of DLNR was that this would be the movement of the current moto-cross track that's at Nukolii. The removal of that track and moving to the mauka section and so from a cultural stand point probably doing more…

Mr. Wichman: This island does produce some superb moto-cross riders so… the County Parks chose wisely on this piece of property.

Dr. Lydgate: Who is maintaining it? Who maintains it? County Parks?

Mr. Wichman: It's the association that will be getting involved.

Mr. Caylor: Well I think it was the desire of the late Mayor Baptiste that this be something that was spearheaded by the moto-cross groups itself. How it will come out once we get the thing underway it just depends on how successful the County is in putting together that coalition of moto-cross groups. So I think that's yet to be determined exactly who is going to administer the site.

Mr. Wichman: Yes and I think any further data all you are going to see is the field number and you guys walked the land already so you guys you know kind of concur with what the data is saying. I don't know what at this particular point what we can do about it. I say we have no objections.

Mr. Faye: (Inaudible).

Mr. Alkire: I have a question the existing site how large is it and do you have future plans?

Mr. Caylor: My memory is not that great. I can't remember exactly how many acres. I believe it's smaller than the future site.

Mr. Faye: It used to be part of the marine camp.

Mr. Wichman: Yes right, the dairy Nukolii Dairy and all that.

Mr. Caylor: Future plans for the site? Definitely les incompatible then what the current site is. One of the suggestions that I had heard and I think one of the ideas that might have been on the table is expansion of the golf course to do a youth type, you know junior type of a training facility. Something like that. I don't know. I don't think there is plans on the table at this point. That would be all separate review later.

Dr. Lydgate: I would like to see the bike path go through there. The golfers don't want it so

Mr. Caylor: I think that's still under review right now they are still trying to determine where the corridor would run. But one thing that I did want to point too is that you know this is simply a component of the larger environmental assessment and when the environmental assessment is a in draft form and sent out for review you will be asked again to take a look at the overall EA.

Ms. Summers: Any other questions?

Mr. Wichman: Yes at this particular point we normally always have a little hooking to you or not or at least some recommendations about it but I am not sure what to do about this one right here. KHPRC wishes to commend the County for chooses appropriately.

Mr. Faye: We look forward to another look at the EA.

Mr. Wichman; But there is no historical at this particular unless something comes up but right now this particular property unless something special comes up we shouldn't have to review it again. They are done.

Mr. Faye: Unless they want us too.

Mr. Wichman: For anytime you wish to consult us under no obligations to you or us you are welcome to avail yourself to the think tank but in the mean time unless something significant comes up on the property you are done here. So right now the motion simply would be that we commend the County Parks for choosing appropriately on this piece of property and with that KHPRC sees no, has no objections pending SHPD recommendations right? Cause again we don't have their recommendations.

Ms. Summers: That's the motion is there a second?

Ms. Manaday: Second.

Ms. Summers: Discussion?

Mr. Wichman: Any further discussion?

Ms. Summers: All those in favor? (Unanimous voice vote.) Opposed? (None.) Thank you.

UNFINISHED BUSINESS

There were no Unfinished Business Matters.

NEW BUSINESS

There were no New Business Matters.

SELECTION OF NEXT MEETING DATE AND AGENDA TOPICS

The next KHPRC Meeting is scheduled on Thursday April 2, 2009.

ADJOURNMENT

The meeting was adjourned at 4:40 p.m.

Respectfully Submitted,

Shanlee U. Jimenez
Secretary
Date: APR 0 2 2009

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7169-12
April 2, 2009

SUMMARY MEETING NOTES

SUBJECT: Kauai/Niihau Islands Burial Council (KNIBC)
Kuhio Highway Improvements;
Kuamoo Road to Temporary Bypass Road Project

MEETING DATE: Thursday, March 5, 2009, 9:00 am

MEETING LOCATION: Grove Farms Conference Room
3-1850 Kaumualii Highway
Lihue, Hawaii 96766

INFORMATION ITEMS:

Purpose of the meeting was to present the proposed project to the Kauai/Niihau Islands Burial Council (KNIBC Agenda and Handout Materials attached).

1. The project's agenda meeting item began with Mr. Sato of Wilson Okamoto Corporation (WOC) giving background information on the proposed project, including the following:

   a. Intersection improvements and synchronization of signalized intersections.

   b. Placement of overhead utilities underground from Temporary Bypass Road to Lydate Substation at S. Leho Drive based on U.S. Fish & Wildlife Service (FWS) concern on impacts to threatened and endangered seabirds.

   c. Department of Transportation (DOT) coordinating with KIUC.

2. Ms. Cayan (SHPD) asked if the proposed project is a short-term project and is a part of the overall regional Kapaa Relief Project. Mr. Sato explained the proposed project would be completed in approximately 3 years and is not part of the Kapaa Relief Route Project which is addressing the regional improvements.

3. Burial Councilmember stated drivers wait up to 7 minutes to make a left-turn from Kuhio Highway (northbound) onto Haleilio Road.

4. Burial Councilmember restated that the roadway widening would occur on the mauka side of Kuhio Highway and the makai side would remain the same.

5. Burial Councilmember asked if the utilities would go under or on the bridge. Mr. Sato clarified that the electrical lines will go under the Wailua River and the telephone and cable lines will be attached to the new Cane Haul Bridge.

6. Burial Councilmember asked about the depth of the drilling. Mr. Lock (WOC) stated that the depth would be shallow towards both ends of the horizontal directional drilling (HDD), but under the river a 30 inch casing would be placed at a depth of 20 to 40 feet. Burial Councilmember indicated that water backs up behind the Wailua Bridge when Wailua River experiences heavy flows. Mr. Lock added that the HDD will not impact the flow of Wailua River.

7. Burial Councilmember indicated there are burials located near the pump station at Haleilio. Mr. Sato appreciated the input on burials. Archaeological monitoring would occur during construction in that area as part of mitigation measures.

8. Mr. Sato explained that the roadway widening along Coco Palms property would occur within the State ROW.

9. Burial Councilmember stated that a Mr. Valakoff (sp.?) is very knowledgeable about the presence and history of burials at Coco Palms.

10. Burial Councilmember noted that the owner of Coco Palms is requesting a 3-year extension to their existing land use permit.

11. Burial Councilmember asked if the reinterment site on Coco Palms property would be used if any iwi are found. Mr. Sato stated that DOT will start discussing the option with the owners of the Coco Palms Resort.

12. Burial Councilmember stated that the reinterment site at the front of Coco Palms is sealed and the other reinterment site at the back of Coco Palms will have to be used.

13. Burial Councilmember asked if the project is near the alignment of Sandwich Isles Communication's (SIC) fiber optic lines. Mr. Lock stated that SIC installed lines underground and the roadway widening does not come close to it. The lines were routed on the mauka side of the highway in general.

14. Mr. Sato explained that six areas were tested using ground penetrating radar (GPR). Cultural Surveys Hawaii (CSH) conducted the tests and the project team has been coordinating this effort with SHPD.

15. Dr. Hammatt (CSH) explained what GPR testing was and went over the results of the six test areas. Anomalies were identified going by shape, depth, patterns and GPR measures the timing of penetration of the radar. CSH laid out a grid for testing and was able to obtain 3-D results for some test areas, and only 2-D used for other areas. He mentioned that GPR testing is not 100% accurate.

16. Dr. Hammatt stated there were anomalies identified. There is a certain degree of probability that test area #5 may have burials. Other anomalies could be man-made disturbances such as previous trenching, rebar etc. Test area #5 area appears to be the most sensitive area, therefore this area will be avoided.

17. CSH will start testing as early as next week Monday, March 9, 2009.

18. Burial councilmember asked if GPR could detect rock walls. Dr. Hammatt said yes.

19. Burial Councilmember asked if any other consultants are using this type of technology. Dr. Hammatt said there are others who use it.

20. Burial Councilmember asked if there are any concerns at the exit end (N. Leho Drive) of the HDD. Mr. Sato indicated that during consultation with SHPD, the area at N. Leho Drive does not consist of sandy soils and appear to be an area of concern. Prior survey work done some time ago for that parcel helped with that assessment.

21. Dr. Hammatt added that there will be archaeological monitoring for the roadway widening project. However, the consultant has not been chosen since the project has not been bid out yet.

22. KNIBC appreciated the pro-activeness and the information presented to them.

23. Burial Councilmember stated that the reinterment site should be close to the project.

24. Ms. Cayan requested updates on the testing and the project.

25. Burial Councilmember asked if the project is part of the stimulus project. Mr. Sato answered yes.

ACTION ITEMS:

1. DOT to initiate discussions with Coco Palms on the use of reinterment site.
2. Project team to update KNIBC on testing, project, and anything else that may be of importance (by letter is sufficient).

Materials Used for Meeting
1. Handouts
2. Test Pit Area Maps

Tracy Fukuda

Appendix B

Project Site Photos

Kühiö Highway and South Leho Drive intersection (northbound) near KIUC Substation to the right.

Northbound on Kühiö Highway approaching the Wailuä Bridge.

Kühiö Highway and N. Leho Drive intersection (southbound, makai side).

Kühiö Highway and N. Leho Drive intersection (southbound, mauka side). Overhead utilities will be placed underground.

Entrance to Wailuä State Park, looking makai.

Southbound on Kühiö Highway before the Wailuä Bridge.

Kühiö Highway Improvements
Kuamoʻo Road to Kapaʻa Temporary Bypass Road

Project Site Photos

Photos

1-6

Wailuä Beach Park.

Kühiö Highway and Kuamoʻo Road intersection (northbound)

Kühiö Highway and Kuamoʻo Road intersection (southbound). Smithʻs Motorboat in the background.

Intersection of Kühiö Highway and Haleilio Road, facing south.

Proposed culvert extension at Kühiö Highway (makai side). Waipouli Development in the background.

Proposed culvert extension at Kühiö Highway (mauka side).

Kühiö Highway Improvements
Kuamoʻo Road to Kapaʻa Temporary Bypass Road

Project Site Photos

Photos

7-12

Kühiö Highway along Coconut Marketplace (facing south, mauka side).

Kühiö Highway along Coconut Marketplace (facing south, mauka side).

Kühiö Highway and Temporary Kapaÿa Bypass Road intersection (facing mauka).

Makai bound on Kuamoÿo Road. Coco Palms Resort to the left and Wailuä State Park and Smithÿs Motorboat to the right.

Mauka bound on Kuamoÿo Road. Location of proposed Kuamoÿo Culvert extension.

Kuamoÿo Road facing Wailuä State Park. Proposed roadway improvements along the southern side of Kuamoÿo Road. Some of the coconut trees will be removed during construction and replaced after completion.

Kühiö Highway Improvements
Kuamoÿo Road to Kapaÿa Temporary Bypass Road

Project Site Photos

Photos

13-18

Appendix C

Traffic Impact Assessment Report
Kūhiō Highway Widening
Wilson Okamoto Corporation
March 2009

Traffic Assessment Report

Kuhio Highway Widening

Prepared For

State of Hawaii
Department of
Transportation

Prepared By

Wilson Okamoto
Corporation

March 2009

TRAFFIC ASSESSMENT REPORT

FOR THE

KUHIO HIGHWAY WIDENING

Prepared for:

State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Prepared by:

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1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826
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March 2009

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I. INTRODUCTION

A. Purpose of Study

The purpose of this study is to assess traffic conditions with the proposed widening of Kuhio Highway between Kuamoo Road and the existing temporary bypass road in Wailua on the island of Kauai. The proposed widening would provide an additional southbound through lane along the highway.

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 in the Year 2012 and Year 2032 with the proposed project.
4. Recommendations of improvements, if appropriate, that would alleviate projected traffic conditions.

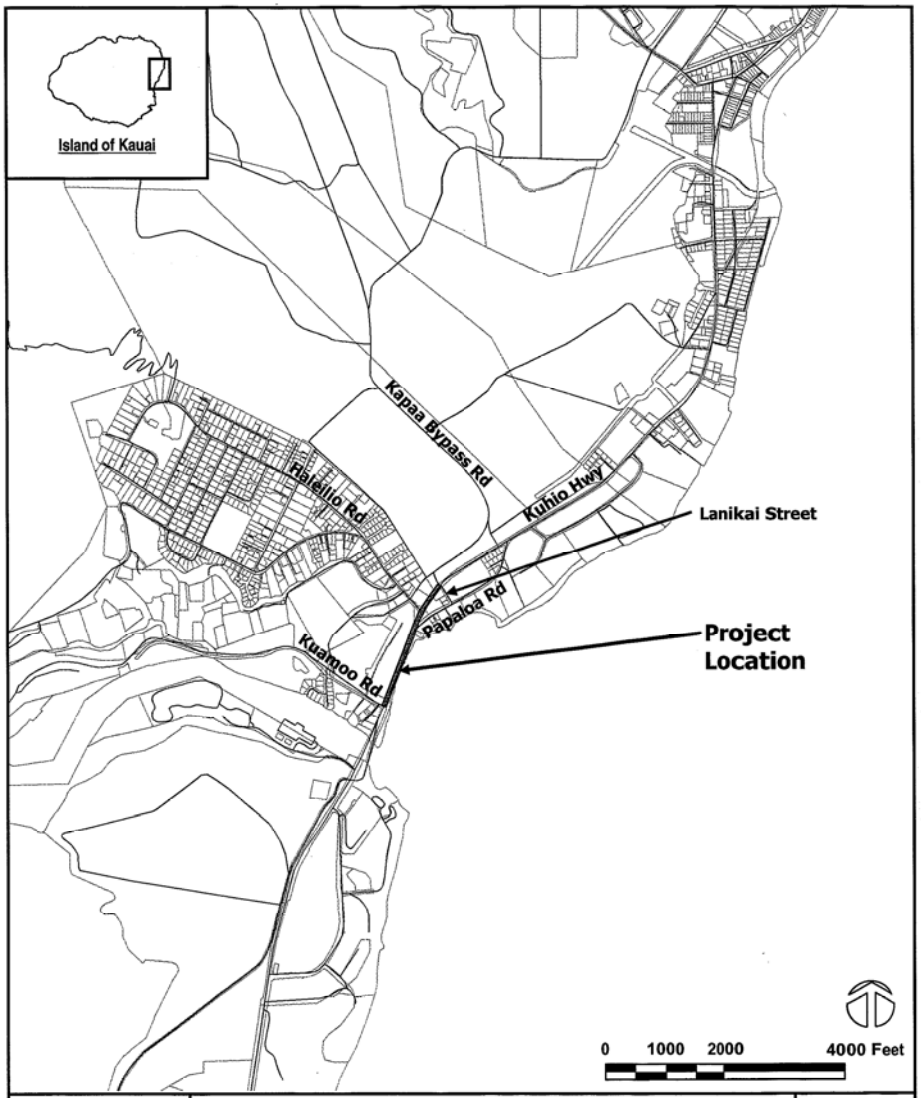
II. PROJECT DESCRIPTION

Traffic operations along Kuhio Highway are currently congested through Kapaa and Wailua on the island of Kauai with extensive queuing occurring along the highway during the afternoon peak period. As a short-term measure to alleviate existing conditions, the State of Hawaii Department of Transportation (SDOT) is planning on widening Kuhio Highway to a four-lane roadway between Kuamoo Road and the existing temporary bypass road (see Figure 1). In conjunction with this widening, left-turn movements will be prohibited at the southern intersection of Kuhio Highway with Papaloa Road and a traffic signal system will be installed at the intersection of the highway with Lanikai Street.

III. EXISTING TRAFFIC CONDITIONS

A. Area Roadway System

Kuhio Highway is a State of Hawaii roadway generally oriented in the north-south direction that serves as the main access roadway through Lihue and along the eastern and northern coastlines of the island of Kauai. In the vicinity of the project site, Kuhio Highway is a predominantly three-lane, two-way roadway that is coned for



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KUHIO HIGHWAY WIDENING

LOCATION MAP

FIGURE 1

contraflow operations during the morning peak hours of 5:30 AM to 10:00 AM. During contraflow operations, the center northbound through lane is coned to provide additional roadway capacity for the southbound commuter traffic demand.

At the southern edge of the project site, Kuhio Highway intersects Kuamoo Road. During non-contraflow operations, the northbound approach of Kuhio Highway has an exclusive left-turn lane and two through lanes at this signalized T-intersection while the southbound approach has one through lane and an exclusive right-turn lane. Kuamoo Road is a predominantly two-lane, two-way roadway generally oriented in the east-west direction. At the intersection with the highway, the eastbound approach of Kuamoo Road has exclusive left-turn and right-turn lanes.

Northeast of the intersection with Kuamoo Road, the highway intersects Haleilio Road. At this signalized T-intersection, the northbound approach of Kuhio Highway has an exclusive left-turn lane and two through lanes during non-contraflow operations while the southbound approach has a shared through and right-turn lane. Haleilio Road is a predominantly two-lane, two-way roadway generally oriented in the east-west direction. At the intersection with the highway, the eastbound approach of Haleilio Road is striped to provide one wide lane that serves left-turn and right-turn traffic movements. However, field observations indicated that the existing pavement width near the intersection is wide enough to accommodate two lanes of traffic and, as such, right-turning vehicles were often observed bypassing the queue of left-turning vehicles.

Further northeast, Kuhio Highway intersects Lanikai Street. At this unsignalized T-intersection, the northbound approach of Kuhio Highway has one through lane and a shared through and right-turn lane during non-contraflow operations while the southbound approach has an exclusive left-turn lane and one through lane. Lanikai Street is a two-lane, two-way roadway generally oriented in the east-west direction between Kuhio Highway and Papaloa Road. At the intersection with the highway, Lanikai Street has one stop-controlled lane that serves left-turn and right-turn traffic movements. In addition, a median refuge lane is provided along the highway for vehicles turning left from Lanikai Street.

Near the northern edge of the project site, the highway intersects the existing temporary bypass road. At this unsignalized T-intersection, the northbound approach of Kuhio Highway as an exclusive left-turn lane and two through lanes during non-contraflow operations while the southbound approach has one through lane and an exclusive right-turn lane. The existing temporary bypass road is a predominantly two-lane, two-way roadway that serves as an alternate route through Kapaa. At the intersection with the highway, the stop-controlled approach of the temporary bypass road approach has exclusive left-turn and right-turn lanes. In addition, a right-turn storage lane is provided along the highway for vehicles turning right from the bypass road to facilitate merging with the through traffic along the highway.

Northeast of the intersection with the temporary bypass road, Kuhio Highway intersects the northern connection of Papaloa Road. At this unsignalized T-intersection, the northbound approach of the highway has one through lane and a shared through and right-turn lane during non-contraflow operations while the southbound approach has an exclusive left-turn lane and two through lanes. The outside through lane on the southbound approach transitions into an exclusive right-turn lane at the downstream intersection with the temporary bypass road. Papaloa Road is a predominantly two-lane, two-way roadway generally oriented in the north-south direction. At the intersection with the highway, the Papaloa Road approach has one stop-controlled lane that serves right-turn traffic movements.

B. Traffic Volumes and Conditions

1. General

a. Field Investigation

Field investigations were conducted on January 27-29, 2009 and consisted of manual turning movement count surveys along Kuhio Highway in the project vicinity. The manual turning movement count surveys were conducted between the morning peak hours of 6:00 AM and 9:00 AM, and the afternoon peak hours of 3:00 PM and 6:00 PM at the following intersections:

- Kuhio Highway and Kuamoo Road
- Kuhio Highway and Haleilio Road
- Kuhio Highway and Lanikai Street
- Kuhio Highway and the Temporary Bypass Road
- Kuhio Highway and Papaloa Road (North)

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).

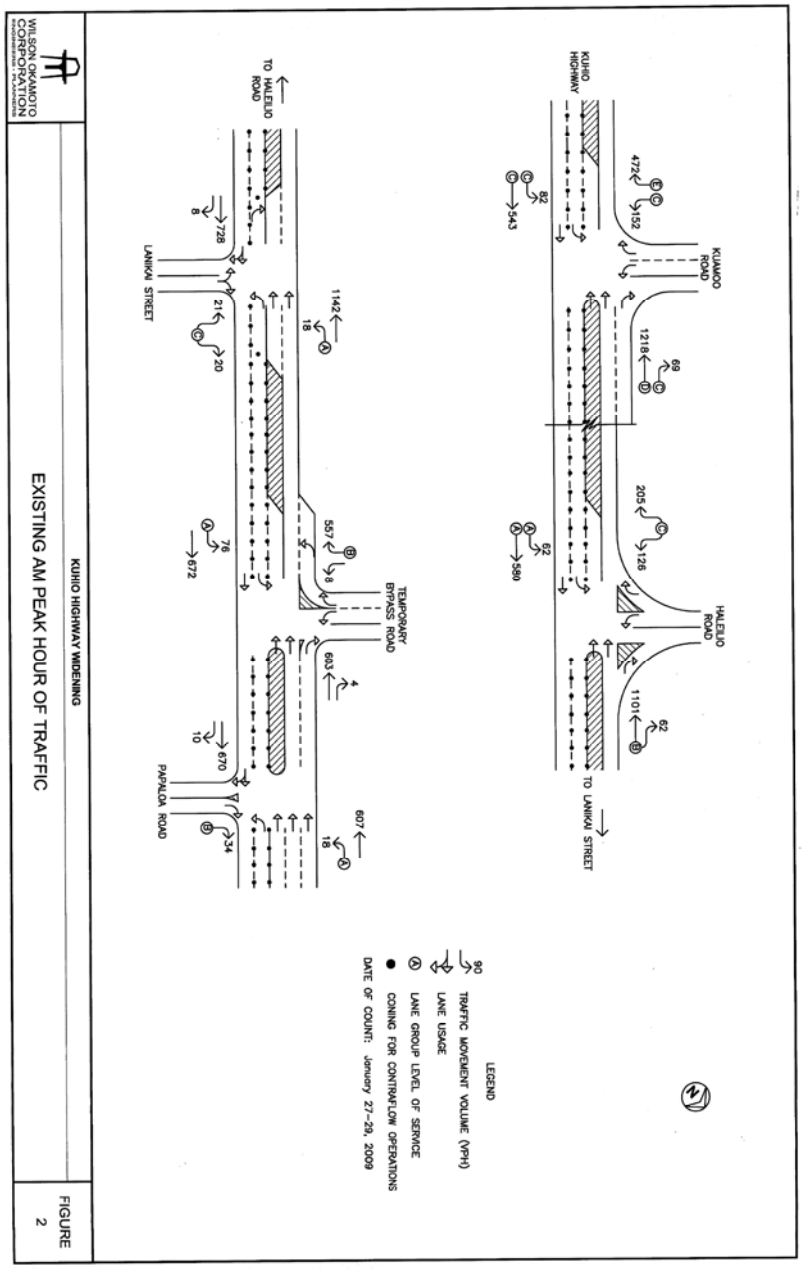
LOS is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing ideal or free-flow traffic operating conditions and LOS "F" unacceptable or potentially congested traffic operating conditions.

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

2. Existing Peak Hour Traffic

a. General

Figures 2 and 3 show the existing AM and PM peak hour traffic volumes and operating traffic conditions. The AM peak hour of traffic generally occurs between the hours of 7:15 AM and 8:15 AM. In the afternoon, the PM peak hour of traffic generally occurs between the hours of 4:30 PM and 5:30 PM. The analysis is based on these peak hour time periods for each intersection to identify the traffic



KUHIO HIGHWAY WIDENING

EXISTING AM PEAK HOUR OF TRAFFIC

FIGURE 2

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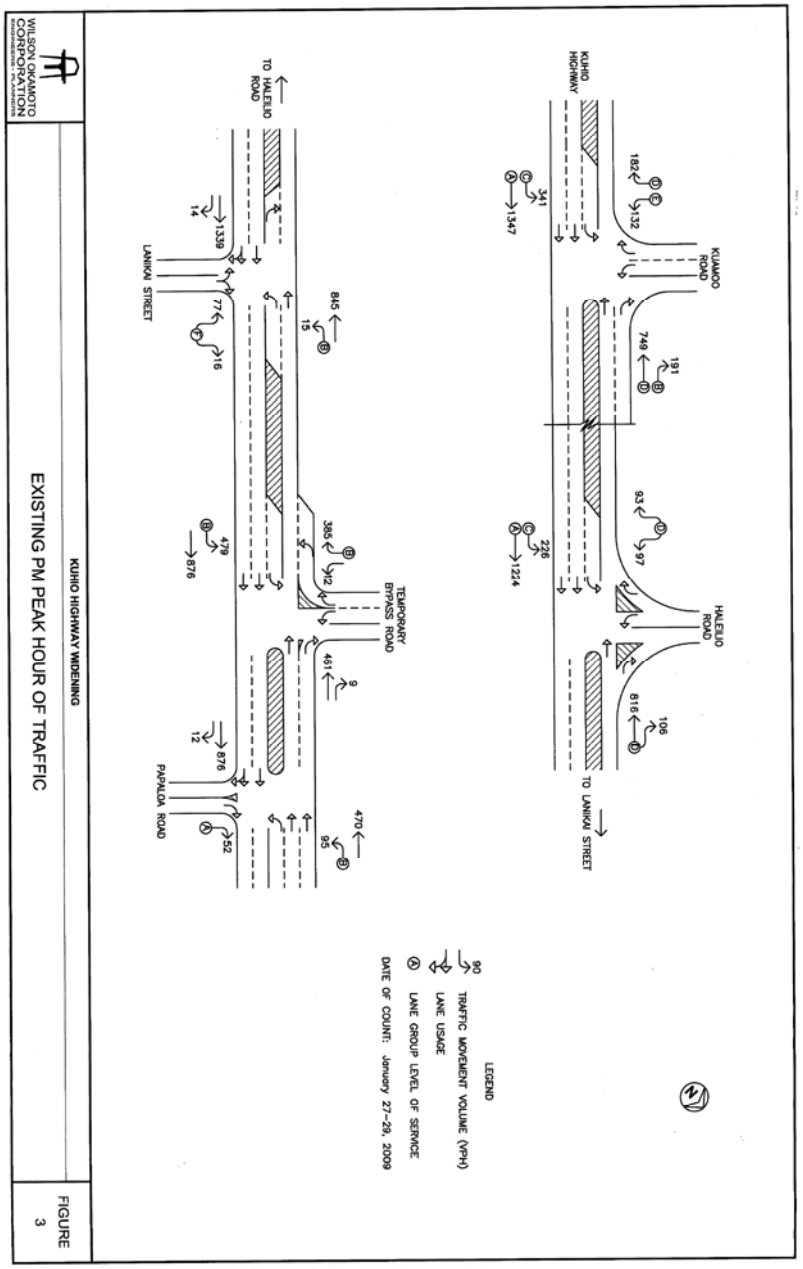
impacts resulting from the proposed project. LOS calculations are included in Appendix C.

b. Kuhio Highway and Kuamoo Road

At the intersection with Kuamoo Road, Kuhio Highway carries 625 vehicles northbound and 1,287 vehicles southbound during the AM peak hour of traffic. During the PM peak hour, the overall traffic volume is higher with 1,688 vehicles traveling northbound and 940 vehicles traveling southbound. The critical traffic movements on the highway approaches of the intersection are the northbound left-turn and southbound through traffic movements which operate at LOS "C" and LOS "D," respectively, during both peak periods. Traffic queues formed periodically on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the PM peak period. Average queue lengths of 12-15 vehicles were observed in the through lane of this approach during this peak period. These queues were observed to clear the intersection after each traffic signal cycle change.

The Kuamoo Road approach of the intersection carries 624 vehicles eastbound during the AM peak hour of traffic. During the PM peak hour, the traffic volume is less with 314 vehicles traveling eastbound. The left-turn traffic movement on the Kuamoo Road approach operates at LOS "C" and LOS "E" during the AM and PM peak periods, respectively, while the right-turn traffic movement operates at LOS "E" and LOS "D" during the AM and PM peak periods, respectively. Traffic queues formed periodically on the Kuamoo Road approach of the intersection with the most significant queuing occurring during the AM peak period. Average queue lengths of 5-7 vehicles were observed on this approach during this peak period with occasional queues extending beyond 20 vehicles. Most of these queues were observed to clear the intersection after each traffic signal



KUHIO HIGHWAY WIDENING

EXISTING PM PEAK HOUR OF TRAFFIC

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FIGURE 3

cycle change, but occasionally vehicles had to wait for more than one traffic signal cycle length.

c. Kuhio Highway and Haleilio Road

At the intersection with Haleilio Road, Kuhio Highway carries 642 vehicles northbound and 1,163 vehicles southbound during the AM peak hour of traffic. During the PM peak hour, the overall traffic volume is higher with 1,450 vehicles traveling northbound and 922 vehicles traveling southbound. The critical traffic movements on the highway approaches of the intersection are the northbound left-turn traffic movement which operates at LOS "A" and LOS "C" during the AM and PM peak periods, respectively, and southbound through and right-turn traffic movement which operates at LOS "B" and LOS "D" during the AM and PM peak periods, respectively. Traffic queues formed periodically on the highway approaches of the intersection with the most significant queuing occurring on the southbound approach during the PM peak period. During this peak period, traffic queues from this intersection extended through the upstream intersections with Lanikai Street, the temporary bypass road, and Papaloa Road (North).

The Haleilio Road approach of the intersection carries 331 vehicles eastbound during the AM peak hour of traffic. During the PM peak hour, the traffic volume is less with 190 vehicles traveling eastbound. The Haleilio Road approach operates at LOS "C" and LOS "D" during the AM and PM peak periods, respectively. Traffic queues formed periodically on the Haleilio Road approach of the intersection with the most significant queuing occurring during the AM peak period. Average queue lengths of 5-7 vehicles were observed on this approach during this peak period. These queues were observed to clear the intersection after each traffic signal cycle change.

d. Kuhio Highway and Lanikai Street

At the intersection with Lanikai Street, Kuhio Highway carries 736 vehicles northbound and 1,160 vehicles southbound during the AM peak hour of traffic. During the PM peak hour, the overall traffic volume is higher with 1,353 vehicles traveling northbound and 860 vehicles traveling southbound. The critical traffic movement on the highway approaches of the intersection is the southbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak period, as well as, the upstream intersections with the temporary bypass road and Papaloa Road (North).

The Lanikai Street approach of the intersection carries 41 vehicles westbound during the AM peak hour of traffic. During the PM peak hour, the traffic volume is higher with 93 vehicles traveling westbound. The Haleilio Road approach operates at LOS "C" and LOS "F" during the AM and PM peak periods, respectively.

e. Kuhio Highway and the Temporary Bypass Road

At the intersection with the existing temporary bypass road, Kuhio Highway carries 748 vehicles northbound and 607 vehicles southbound during the AM peak hour of traffic. During the PM peak hour, the overall traffic volume is higher with 1,355 vehicles traveling northbound and 470 vehicles traveling southbound. The critical traffic movement on the highway approaches of the intersection is the northbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak

period, as well as, the upstream intersection with Papaloa Road (North).

The temporary bypass road approach of the intersection carries 565 vehicles eastbound during the AM peak hour of traffic. During the PM peak hour, the traffic volume is less with 397 vehicles traveling eastbound. The critical traffic movement on the temporary bypass road approach of the intersection is the eastbound right-turn traffic movement which operates at LOS "B" during both peak periods. During this peak period, southbound queues along the highway impeded right-turning vehicles from the temporary bypass road resulting in queuing along that roadway.

f. Kuhio Highway and Papaloa Road (North)

At the intersection with the northern connection of Papaloa Road, Kuhio Highway carries 680 vehicles northbound and 625 vehicles southbound during the AM peak hour of traffic. During the PM peak hour, the overall traffic volume is higher with 888 vehicles traveling northbound and 565 vehicles traveling southbound. The critical traffic movement on the highway approaches of the intersection is the southbound left-turn traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. As previously stated, southbound traffic queues from the intersection with Haleilio Road extended through this intersection during the PM peak period.

The Papaloa Road (North) approach of the intersection carries 34 vehicles westbound during the AM peak hour of traffic. During the PM peak hour, the traffic volume is higher with 52 vehicles traveling westbound. The Papaloa Road approach of the intersection operates at LOS "B" and LOS "A" during the AM and PM peak periods, respectively.

IV. PROJECTED TRAFFIC CONDITIONS

A. Traffic Reassignment

In conjunction with the proposed widening of Kuhio Highway, left-turn movements will be prohibited at the southern intersection of Kuhio Highway with Papaloa Road. As such, southbound vehicles turning left onto Papaloa Road and westbound vehicles turning left onto the highway must utilize Lanikai Street instead. As such, these vehicles were reassigned from the southern intersection with Papaloa Road to the intersection with Lanikai Street.

B. Through Traffic Forecasting Methodology

The travel forecast is based upon the average annual traffic growth rate as described in the Kauai Long-Rang 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 the major surface transportation facilities and programs to be implemented on 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 along Kuhio Highway would increase at an average rate of approximately 1.6% and 2.1% per year during the AM and PM peak periods, respectively. Using 2009 as the Base Year, the growth factors applied to the AM and PM existing through traffic demands along Kuhio Highway and the existing temporary bypass road to achieve the projected traffic demands are detailed in Table 1.

Table 1: Ambient Growth Factors

Time Period	Year 2012	Year 2032
AM Peak	1.049	1.441
PM Peak	1.064	1.613

C. Other Considerations

1. Courtyards at Waipouli

a. General

The proposed Courtyards at Waipouli development will be located on the northeast corner of the intersection of Kuhio Highway with Lanikai Street. The proposed affordable housing project will consist of approximately 82 units and parking areas with access provided via a driveway off Lanikai Street. In conjunction with the development, Lanikai Street will be widened to provide exclusive turning lanes. The proposed development is expected to be completed and occupied by the Year 2012 and, as such, is incorporated into the Year 2012 conditions.

b. Trip Generation and Distribution

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 8th Edition," 2008. The ITE trip generation rates are developed empirically by correlating the vehicle trip generation data with various land use characteristics such as the number of vehicle trips generated per dwelling unit. Table 2 summarizes the project site trip generation characteristics for the AM and PM peak hours of traffic.

Table 2: Trip Generation

Residential Condominium/Townhouse		
INDEPENDENT VARIABLE:		Dwelling Units = 82
		PROJECTED TRIP ENDS
AM PEAK	ENTER	7
	EXIT	37
	TOTAL	44
PM PEAK	ENTER	34
	EXIT	17
	TOTAL	51

Access to the proposed Courtyards at Waipouli development will be provided via a driveway off Lanikai Street.. All site-generated vehicles were assumed to utilize Lanikai Street to access Kuhio Highway. At the intersection of Kuhio Highway with Lanikai Street, the directional distribution of traffic was based on the existing directional distribution along Kuhio Highway. At the other study intersections, the site-generated vehicles were assumed to travel along the highway to areas outside of the project area.

2. Cane Haul Bridge Replacement

South of Kuamoo Road, there is two-lane bridge along Kuhio Highway that has one lane in each direction. In addition, there is an existing cane haul bridge that runs parallel to the highway that provides an additional lane for northbound traffic. The State of Hawaii Department of Transportation (SDOT) is planning to replace the existing cane haul bridge with a new two-lane bridge. This bridge will provide two northbound lanes and the existing northbound lane along the highway will be converted to an additional southbound lane thereby providing two lanes in each direction. Construction on this project is expected to begin shortly and the planned improvements are expected to be completed by the Year 2012.

3. Kapaa Relief Route

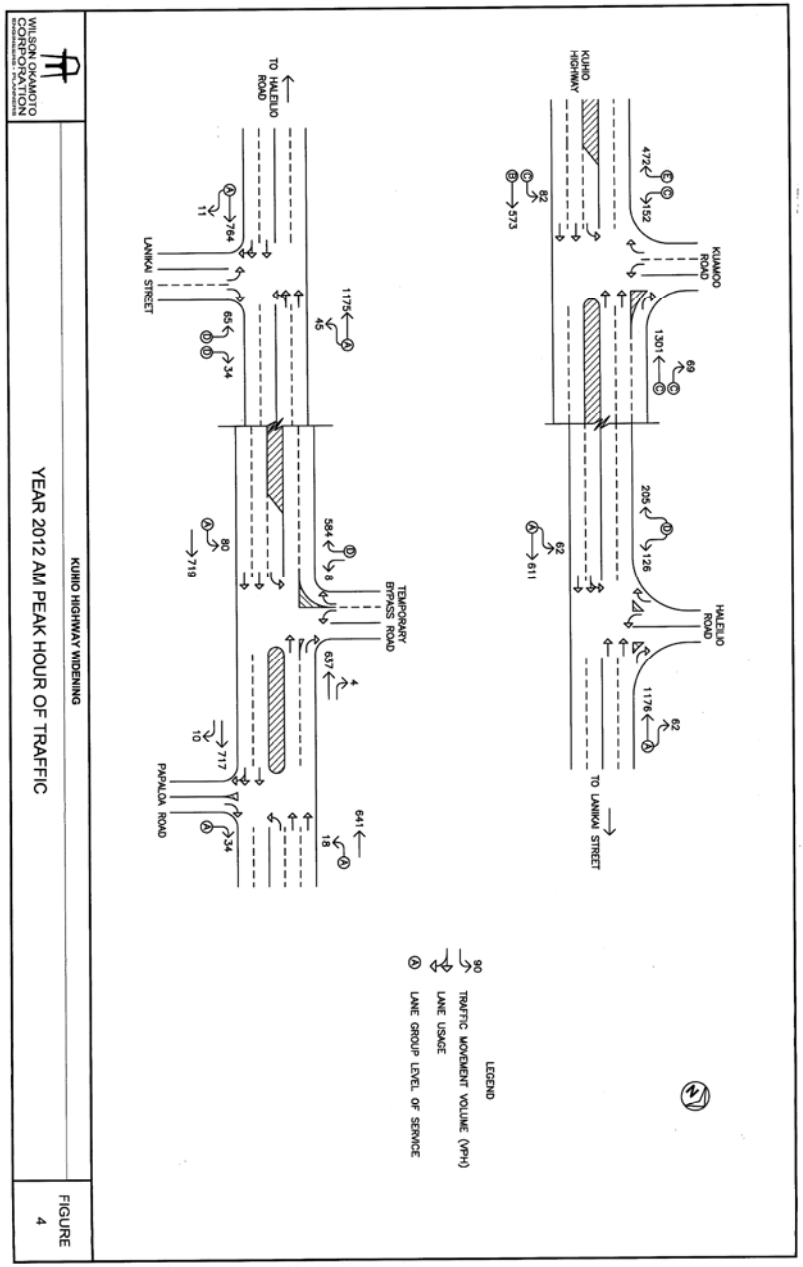
The proposed widening of Kuhio Highway between Kuamoo Road and the existing temporary bypass road is intended to serve as a short-term measure to alleviate the existing congestion along the highway. The State of Hawaii Department of Transportation (SDOT) is planning to replace the existing temporary bypass road with a new Kapaa Relief Route as a long-term measure to alleviate existing and projected conditions. The proposed four-lane, two-way roadway is expected to extend between Kawaihau Road north of Kapaa and Kuhio Highway south of the Wailua River. At the time of this report, the schedule for this project is not known and, as such, is not incorporated into projected conditions.

D. Year 2012 Total Traffic Volumes

The projected Year 2012 AM and PM peak hour traffic volumes and operating conditions in the project vicinity with the proposed widening are shown on Figures 4 and 5, and summarized in Table 3. The signal timing and cycle lengths at the intersections of Kuhio Highway with Kuamoo Road and Haleilio Road are assumed to have been modified and coordinated to accommodate the additional southbound lane. In addition, the current contraflow operations during the morning peak period are assumed to be suspended once the widening is completed. The existing levels of service are provided for comparison purposes. LOS calculations are included in Appendix D.

Table 3: Existing and Projected Year 2012 LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2012	Exist	Year 2012
Kuhio Hwy/ Kuamoo Rd	Eastbound	LT	C	C	E	E
		RT	E	E	D	D
	Northbound	LT	C	C	C	A
	Southbound	TH	D	C	D	B



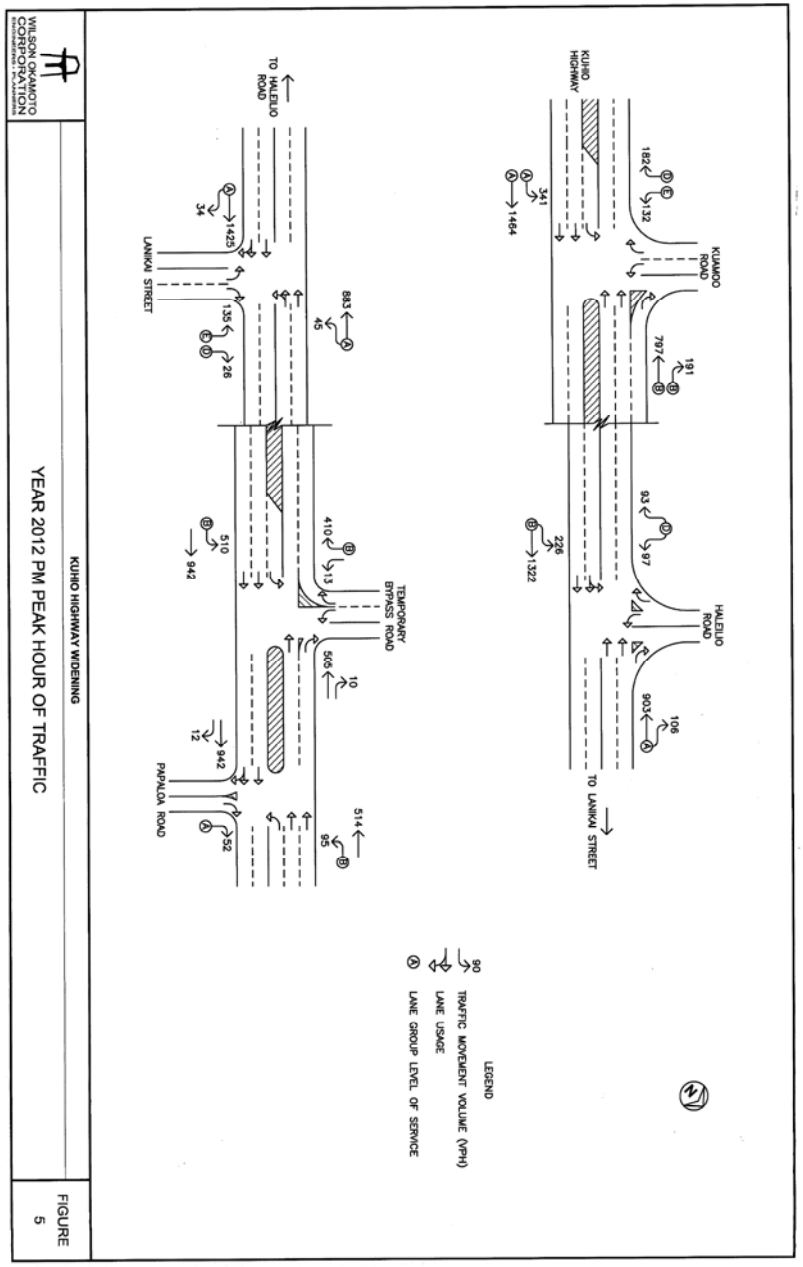


Table 3: Existing and Projected Year 2012 LOS Traffic Operating Conditions (Cont'd)

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2012	Exist	Year 2012
Kuhio Hwy/ Haleilio Rd	Eastbound	LT-RT	C	D	D	D
	Northbound	LT	A	A	C	B
		TH	A		A	
	Southbound	TH-RT	B	A	D	A
Kuhio Hwy/ Lanikai St*	Westbound	LT	C	D	F	E
		RT		D		D
	Northbound	TH-RT	-	A	-	A
	Southbound	LT	A	A	B	A
		TH	-		-	
Kuhio Hwy/ Temporary Bypass Rd	Eastbound	RT	B	D	B	B
	Northbound	LT	A	A	B	B
Kuhio Hwy/ Papaloa Rd	Westbound	RT	B	A	A	A
	Southbound	LT	A	A	B	B

*Traffic signal system installed.

Under Year 2012 conditions, traffic operations along Kuhio Highway are expected to improve from existing conditions during both peak hours of traffic. The critical movements on the highway approaches of the intersection with Kuamoo Road are expected to operate at LOS "C" during the AM peak period and LOS "B" or better during the PM peak period while those at the intersection with Haleilio Road are expected to operate at LOS "A" during the AM peak period and LOS "B" or better during the PM peak period. Similarly, the highway approaches of the intersection with Lanikai Street are expected to operate at LOS "A" during both peak periods. The provision of an additional southbound lane along the highway, installation of a traffic signal system at the intersection with Lanikai Street, and the coordination of the traffic signal systems in the project vicinity are anticipated to alleviate the existing queuing along the highway. The traffic movements on the cross street approaches of

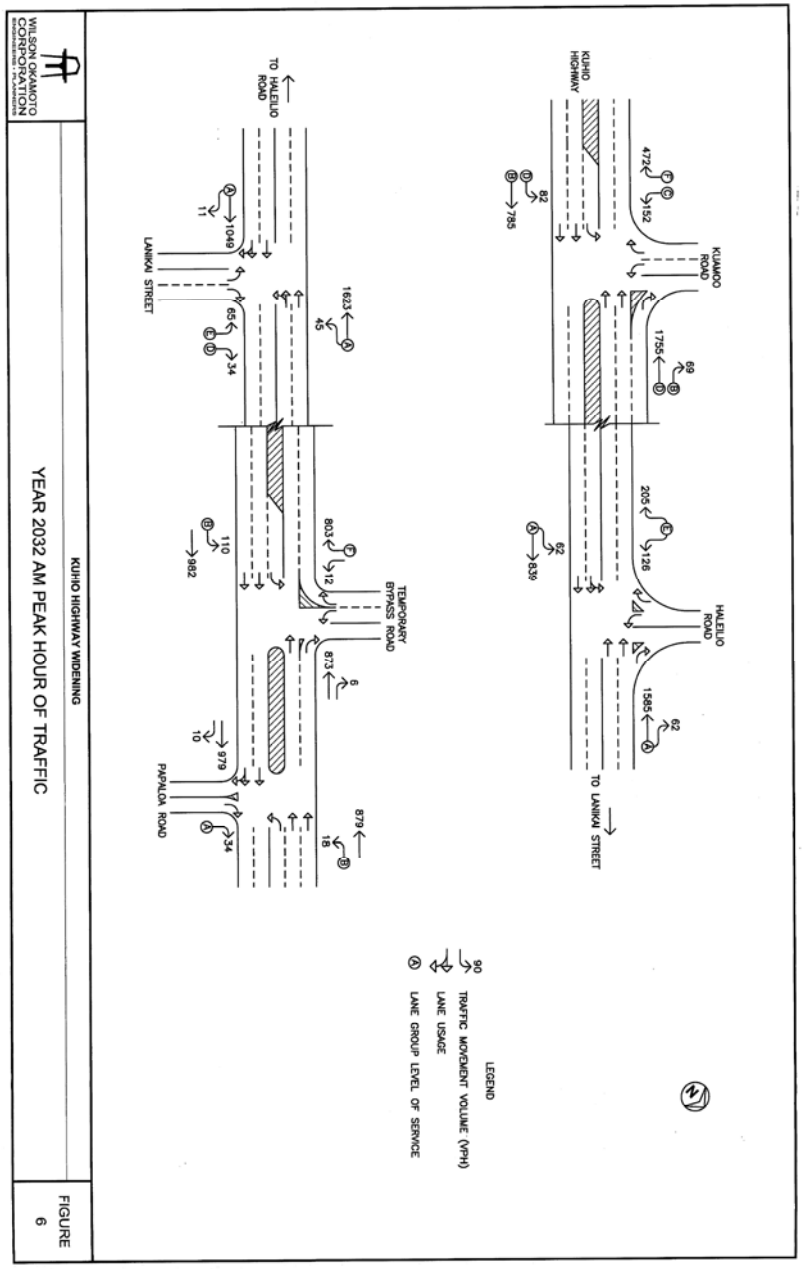
the study intersections are expected, in general, to continue operating at levels-of-service similar to existing conditions. The eastbound approach of the intersection with Haleilio Road is expected to operate at a slightly lower LOS "D" during the AM peak period due to expected modifications to the existing signal timing at that intersection. In addition, the eastbound right-turn traffic movement at the intersection with the temporary bypass road is expected to operate at LOS "D" during the AM peak period due to anticipated increase in traffic along that roadway due to ambient growth in traffic. At the intersection with Lanikai Street, the westbound left-turn traffic movement is expected to operate at LOS "D" and LOS "E" during the AM and PM peak periods, respectively, while the right-turn traffic movement is expected to operate at LOS "D" during both peak periods.

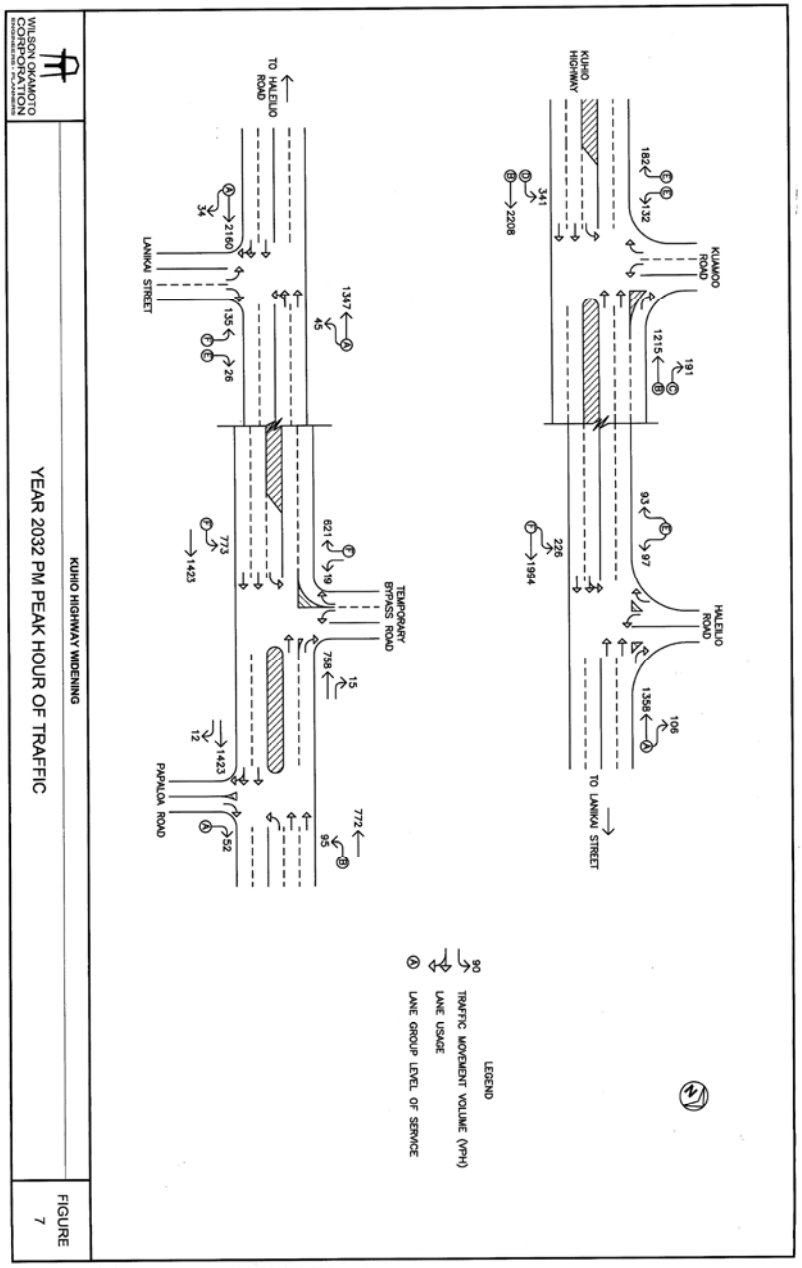
E. Year 2032 Total Traffic Volumes With Project

The projected Year 2032 AM and PM peak hour traffic volumes and operating conditions in the project vicinity with the proposed widening are shown on Figures 6 and 7, and summarized in Table 4. The projected Year 2012 levels of service are provided for comparison purposes. LOS calculations are included in Appendix D.

Table 4: Projected Year 2012 and Year 2032 LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Year 2012	Year 2032	Year 2012	Year 2032
Kuhio Hwy/ Kuamoo Rd	Eastbound	LT	C	C	E	E
		RT	E	F	D	E
	Northbound	LT	C	D	A	D
	Southbound	TH	C	D	B	B
Kuhio Hwy/ Haleilio Rd	Eastbound	LT-RT	D	E	D	E
	Northbound	LT-TH	A	A	B	F
	Southbound	TH-RT	A	A	A	A





KUHIO HIGHWAY WIDENING

YEAR 2032 PM PEAK HOUR OF TRAFFIC

WILSON OKAMOTO CORPORATION ENGINEERS PLANNERS

FIGURE 7

Table 4 Projected Year 2012 and Year 2032 LOS Traffic Operating Conditions (Cont'd)

Intersection	Critical Traffic Movement		AM		PM	
			Year 2012	Year 2032	Year 2012	Year 2032
Kuhio Hwy/ Lanikai St	Westbound	LT	D	E	E	F
		RT	D	D	D	E
	Northbound	TH-RT	A	A	A	A
	Southbound	LT-TH	A	A	A	A
Kuhio Hwy/ Temporary Bypass Rd	Eastbound	RT	D	F	B	F
	Northbound	LT	A	B	B	F
Kuhio Hwy/ Papaloa Rd	Westbound	RT	A	A	A	A
	Southbound	LT	A	B	B	B

Traffic operations along Kuhio Highway are expected to deteriorate under Year 2032 conditions due to the anticipated growth in ambient traffic. The critical movements at the intersection with Kuamoo Road are expected to operate at LOS "F" or better during the AM peak period and LOS "E" or better during the PM peak period while those at the intersection with Haleilio Road are expected to operate at LOS "E" or better during the AM peak period and LOS "F" or better during the PM peak period. Similarly, the critical movements at the intersection with Lanikai Street are expected to operate at LOS "E" or better during the AM peak period and LOS "F" or better during the PM peak period while those at the intersection with the temporary bypass road are expected to operate at LOS "F" or better during both peak periods.

V. CONCLUSION

Traffic conditions along Kuhio Highway in the project vicinity are currently congested with extensive queuing observed for the southbound direction of travel along the highway during the PM peak period. The proposed widening of Kuhio Highway to a four-lane roadway between Kuamoo Road and the existing temporary bypass road in Wailua to provide an additional southbound lane is intended as a short-term measure to alleviate existing conditions. The provision of an additional southbound lane and the coordination of the traffic signals along this segment of the highway is expected to alleviate existing queuing

and improve traffic operating conditions for the short-term. However, traffic conditions along the highway are eventually expected to deteriorate to low levels of service during both peak periods due to ambient growth in traffic. As such, the State Department of Transportation (SDOT) is planning to replace the existing temporary bypass road with a new Kapaa Relief Route as a long-term measure to alleviate existing and projected conditions.

APPENDIX A

EXISTING TRAFFIC COUNT DATA

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:D4-3891, D4-5672
Counted By:RY, TO
Weather:Clear

File Name : KuhKuaPM
Site Code : 00000001
Start Date : 1/27/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Westbound	Kuhio Highway Northbound				Kuamo'o Road Eastbound				
Start Time	Left	Thru	Right	App. Total	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	0	190	42	232	0	66	255	0	321	46	0	56	102	655
03:15 PM	0	217	45	262	0	65	283	0	348	32	0	42	74	684
03:30 PM	0	212	34	246	0	71	304	1	376	31	0	57	88	710
03:45 PM	0	213	41	254	0	74	295	0	369	31	0	41	72	695
Total	0	832	162	994	0	276	1137	1	1414	140	0	196	336	2744
04:00 PM	0	203	46	249	0	64	328	0	392	23	0	49	72	713
04:15 PM	0	204	49	253	0	94	317	0	411	18	0	44	62	726
04:30 PM	0	199	49	248	0	80	342	0	422	25	0	41	66	736
04:45 PM	0	190	50	240	0	91	344	0	435	26	0	51	77	752
Total	0	796	194	990	0	329	1331	0	1660	92	0	185	277	2927
05:00 PM	0	203	50	253	0	80	310	0	390	35	0	42	77	720
05:15 PM	0	178	48	226	0	90	357	0	447	46	0	48	94	767
05:30 PM	0	170	43	213	0	102	272	0	374	28	0	42	70	657
05:45 PM	0	147	42	189	0	77	285	0	362	40	0	31	71	622
Total	0	698	183	881	0	349	1224	0	1573	149	0	163	312	2766
Grand Total	0	2326	539	2865	0	954	3692	1	4647	381	0	544	925	8437
Apprch %	0	81.2	18.8			20.5	79.4	0		41.2	0	58.8		
Total %	0	27.6	6.4	34	0	11.3	43.8	0	55.1	4.5	0	6.4	11	

	Kuhio Highway Southbound				Westbound	Kuhio Highway Northbound				Kuamo'o Road Eastbound				
Start Time	Left	Thru	Right	App. Total	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 04:30 PM														
04:30 PM	0	199	49	248	0	80	342	0	422	25	0	41	66	736
04:45 PM	0	190	**50**	240	0	**91**	344	0	435	26	0	**51**	77	752
05:00 PM	0	**203**	50	**253**	0	80	310	0	390	35	0	42	77	720
05:15 PM	0	178	48	226	0	90	**357**	0	**447**	**46**	0	48	**94**	**767**
Total Volume	0	770	197	967	0	341	1353	0	1694	132	0	182	314	2975
% App. Total	0	79.6	20.4			20.1	79.9	0		42	0	58		
PHF	.000	.948	.985	.956	.000	.937	.947	.000	.947	.717	.000	.892	.835	.970

Wilson Okamoto Corporation

1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:D4-3891, D4-5672
Counted By:RY, TO
Weather:Clear

File Name : KuhKuaAM
Site Code : 00000001
Start Date : 1/28/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Westbound	Kuhio Highway Northbound				Kuamo'o Road Eastbound				
Start Time	Left	Thru	Right	App. Total	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
06:00 AM	0	138	2	140	0	7	51	0	58	11	0	52	63	261
06:15 AM	0	178	8	186	0	4	68	0	72	17	0	58	75	333
06:30 AM	0	211	11	222	0	12	85	0	97	24	0	88	112	431
06:45 AM	0	267	13	280	0	12	87	0	99	26	0	87	113	492
Total	0	794	34	828	0	35	291	0	326	78	0	285	363	1517
07:00 AM	0	282	8	290	0	10	87	0	97	30	0	123	153	540
07:15 AM	0	353	13	366	0	16	119	0	135	36	0	140	176	677
07:30 AM	0	347	11	358	0	17	120	0	137	52	0	149	201	696
07:45 AM	0	270	22	292	0	22	149	0	171	28	0	102	130	593
Total	0	1252	54	1306	0	65	475	0	540	146	0	514	660	2506
08:00 AM	0	258	24	282	0	27	138	0	165	31	0	81	112	559
08:15 AM	0	220	31	251	0	29	132	0	161	33	0	80	113	525
08:30 AM	0	248	34	282	0	38	163	0	201	33	0	79	112	595
08:45 AM	0	237	22	259	0	27	161	0	188	39	0	77	116	563
Total	0	963	111	1074	0	121	594	0	715	136	0	317	453	2242
Grand Total	0	3009	199	3208	0	221	1360	0	1581	360	0	1116	1476	6265
Apprch %	0	93.8	6.2			14	86	0		24.4	0	75.6		
Total %	0	48	3.2	51.2	0	3.5	21.7	0	25.2	5.7	0	17.8	23.6	

	Kuhio Highway Southbound				Westbound	Kuhio Highway Northbound				Kuamo'o Road Eastbound				
Start Time	Left	Thru	Right	App. Total	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 07:15 AM														
07:15 AM	0	**353**	13	**366**	0	16	119	0	135	36	0	140	176	677
07:30 AM	0	347	11	358	0	17	120	0	137	**52**	0	**149**	**201**	**696**
07:45 AM	0	270	22	292	0	22	**149**	0	**171**	28	0	102	130	593
08:00 AM	0	258	**24**	282	0	**27**	138	0	165	31	0	81	112	559
Total Volume	0	1228	70	1298	0	82	526	0	608	147	0	472	619	2525
% App. Total	0	94.6	5.4			13.5	86.5	0		23.7	0	76.3		
PHF	.000	.870	.729	.887	.000	.759	.883	.000	.889	.707	.000	.792	.770	.907

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Honolulu, Hi 96826

Counter:D4-3888, D4-3889
Counted By:ER, ZW
Weather:Clear

File Name : KuhHal PM
Site Code : 00000001
Start Date : 1/27/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Shell Service Station/Food Mart Westbound				Kuhio Highway Northbound				Haleilio Road 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
03:00 PM	0	229	24	253	0	0	7	7	43	232	0	275	20	0	30	50	585
03:15 PM	0	217	26	243	0	0	8	8	52	272	0	324	21	0	33	54	629
03:30 PM	1	219	27	247	0	0	4	4	49	283	0	332	15	0	29	44	627
03:45 PM	0	213	28	241	0	0	10	10	49	277	0	326	24	0	38	62	639
Total	1	878	105	984	0	0	29	29	193	1064	0	1257	80	0	130	210	2480
04:00 PM	0	222	29	251	0	0	10	10	37	293	0	330	16	0	30	46	637
04:15 PM	0	205	32	237	0	0	10	10	49	297	0	346	26	0	35	61	654
04:30 PM	0	216	20	236	0	0	12	12	55	291	0	346	29	0	15	44	638
04:45 PM	0	224	18	242	0	0	9	9	56	316	0	372	17	0	23	40	663
Total	0	867	99	966	0	0	41	41	197	1197	0	1394	88	0	103	191	2592
05:00 PM	0	213	30	243	0	0	5	5	56	282	0	338	24	0	30	54	640
05:15 PM	0	190	41	231	0	0	6	6	59	331	0	390	27	0	25	52	679
05:30 PM	0	188	27	215	0	0	12	12	32	262	0	294	31	0	34	65	586
05:45 PM	0	154	26	180	0	0	6	6	37	283	0	320	26	0	24	50	556
Total	0	745	124	869	0	0	29	29	184	1158	0	1342	108	0	113	221	2461
Grand Total	1	2490	328	2819	0	0	99	99	574	3419	0	3993	276	0	346	622	7533
Apprch %	0	88.3	11.6		0	0	100		14.4	85.6	0		44.4	0	55.6		
Total %	0	33.1	4.4	37.4	0	0	1.3	1.3	7.6	45.4	0	53	3.7	0	4.6	8.3	

	Kuhio Highway Southbound				Shell Service Station/Food Mart Westbound				Kuhio Highway Northbound				Haleilio Road 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 Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	216	20	236	0	0	**12**	**12**	55	291	0	346	**29**	0	15	44	638
04:45 PM	0	**224**	18	242	0	0	9	9	56	316	0	372	17	0	23	40	663
05:00 PM	0	213	30	**243**	0	0	5	5	56	282	0	338	24	0	**30**	**54**	640
05:15 PM	0	190	**41**	231	0	0	6	6	**59**	**331**	0	**390**	27	0	25	52	**679**
Total Volume	0	843	109	952	0	0	32	32	226	1220	0	1446	97	0	93	190	2620
% App. Total	0	88.6	11.4		0	0	100		15.6	84.4	0		51.1	0	48.9		
PHF	.000	.941	.665	.979	.000	.000	.667	.667	.958	.921	.000	.927	.836	.000	.775	.880	.965

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1907 S. Beretania Street Suite 400
Honolulu, Hi 96826

Counter:D4-3888, D4-3889
Counted By:ER, ZW
Weather:Clear

File Name : KuhHalAM
Site Code : 00000001
Start Date : 1/28/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Gas Station/Food Mart Westbound				Kuhio Highway Northbound				Haleilio Road 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
06:00 AM	0	117	3	120	0	0	5	5	2	52	0	54	4	0	22	26	205
06:15 AM	0	159	4	163	0	0	7	7	4	75	0	79	9	0	24	33	282
06:30 AM	0	197	0	197	0	0	9	9	4	91	0	95	10	0	34	44	345
06:45 AM	0	222	8	230	0	0	2	2	9	99	0	108	29	0	44	73	413
Total	0	695	15	710	0	0	23	23	19	317	0	336	52	0	124	176	1245
07:00 AM	0	271	8	279	0	0	2	2	7	103	0	110	21	0	43	64	455
07:15 AM	0	307	15	322	0	0	10	10	17	128	0	145	39	0	72	111	588
07:30 AM	0	300	13	313	0	0	8	8	11	153	0	164	44	0	55	99	584
07:45 AM	0	237	20	257	0	0	7	7	14	143	0	157	26	0	48	74	495
Total	0	1115	56	1171	0	0	27	27	49	527	0	576	130	0	218	348	2122
08:00 AM	0	268	15	283	0	0	4	4	20	134	0	154	12	0	30	42	483
08:15 AM	0	214	13	227	0	0	5	5	26	138	0	164	22	0	28	50	446
08:30 AM	0	223	15	238	0	0	8	8	16	176	8	200	13	0	44	57	503
08:45 AM	0	206	13	219	0	0	7	7	12	153	0	165	16	0	35	51	442
Total	0	911	56	967	0	0	24	24	74	601	8	683	63	0	137	200	1874
Grand Total	0	2721	127	2848	0	0	74	74	142	1445	8	1595	245	0	479	724	5241
Apprch %	0	95.5	4.5		0	0	100		8.9	90.6	0.5		33.8	0	66.2		
Total %	0	51.9	2.4	54.3	0	0	1.4	1.4	2.7	27.6	0.2	30.4	4.7	0	9.1	13.8	

	Kuhio Highway Southbound				Gas Station/Food Mart Westbound				Kuhio Highway Northbound				Haleilio Road 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 Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	**307**	15	**322**	0	0	**10**	**10**	17	128	0	145	39	0	**72**	**111**	**588**
07:30 AM	0	300	13	313	0	0	8	8	11	**153**	0	**164**	**44**	0	55	99	584
07:45 AM	0	237	**20**	257	0	0	7	7	14	143	0	157	26	0	48	74	495
08:00 AM	0	268	15	283	0	0	4	4	**20**	134	0	154	12	0	30	42	483
Total Volume	0	1112	63	1175	0	0	29	29	62	558	0	620	121	0	205	326	2150
% App. Total	0	94.6	5.4		0	0	100		10	90	0		37.1	0	62.9		
PHF	.000	.906	.788	.912	.000	.000	.725	.725	.775	.912	.000	.945	.688	.000	.712	.734	.914

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Honolulu, Hi 96826

Counter:D4-888, D4-3889
Counted By:ER, ZW
Weather:Clear

File Name : KuhLanPM
Site Code : 00000002
Start Date : 1/28/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Lanikai Westbound				Kuhio Highway Northbound				Eastbound	
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	App. Total	Int. Total
03:00 PM	5	220	0	225	13	0	6	19	0	238	4	242	0	486
03:15 PM	3	257	0	260	10	0	3	13	0	310	3	313	0	586
03:30 PM	6	222	0	228	14	0	8	22	0	304	5	309	0	559
03:45 PM	7	237	0	244	15	0	5	20	0	342	1	343	0	607
Total	21	936	0	957	52	0	22	74	0	1194	13	1207	0	2238
04:00 PM	4	221	0	225	11	0	4	15	0	287	0	287	0	527
04:15 PM	8	221	0	229	10	0	7	17	0	347	4	351	0	597
04:30 PM	6	204	0	210	25	0	2	27	0	297	4	301	0	538
04:45 PM	6	217	0	223	17	0	5	22	0	333	3	336	0	581
Total	24	863	0	887	63	0	18	81	0	1264	11	1275	0	2243
05:00 PM	1	203	0	204	24	0	5	29	0	394	3	397	0	630
05:15 PM	2	181	0	183	11	0	4	15	0	365	4	369	0	567
05:30 PM	5	221	0	226	11	0	1	12	0	333	1	334	0	572
05:45 PM	2	224	0	226	11	0	2	13	0	305	5	310	0	549
Total	10	829	0	839	57	0	12	69	0	1397	13	1410	0	2318
Grand Total	55	2628	0	2683	172	0	52	224	0	3855	37	3892	0	6799
Apprch %	2	98	0		76.8	0	23.2		0	99	1			
Total %	0.8	38.7	0	39.5	2.5	0	0.8	3.3	0	56.7	0.5	57.2	0	

	Kuhio Highway Southbound				Lanikai Westbound				Kuhio Highway Northbound				Eastbound	
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 04:45 PM														
04:45 PM	**6**	217	0	223	17	0	**5**	22	0	333	3	336	0	581
05:00 PM	1	203	0	204	**24**	0	5	**29**	0	**394**	3	**397**	0	**630**
05:15 PM	2	181	0	183	11	0	4	15	0	365	**4**	369	0	567
05:30 PM	5	**221**	0	**226**	11	0	1	12	0	333	1	334	0	572
Total Volume	14	822	0	836	63	0	15	78	0	1425	11	1436	0	2350
% App. Total	1.7	98.3	0		80.8	0	19.2		0	99.2	0.8			
PHF	.583	.930	.000	.925	.656	.000	.750	.672	.000	.904	.688	.904	.000	.933

Wilson Okamoto Corporation
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Counter:D4-3888, D4-3889
Counted By:ER, ZW
Weather:Clear

File Name : KuhLanAM
Site Code : 00000002
Start Date : 1/29/2009
Page No : 1

Groups Printed- Unshifted

	Southbound				Westbound				Northbound				Eastbound	
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	App. Total	Int. Total
06:00 AM	1	123	0	124	3	0	0	3	0	51	3	54	0	181
06:15 AM	3	168	0	171	1	0	1	2	0	99	0	99	0	272
06:30 AM	5	219	0	224	3	0	0	3	0	127	0	127	0	354
06:45 AM	6	236	0	242	7	0	1	8	0	137	1	138	0	388
Total	15	746	0	761	14	0	2	16	0	414	4	418	0	1195
07:00 AM	3	264	0	267	2	0	3	5	0	163	0	163	0	435
07:15 AM	4	335	0	339	5	0	9	14	0	217	2	219	0	572
07:30 AM	3	332	0	335	3	0	7	10	0	258	1	259	0	604
07:45 AM	3	256	0	259	9	0	3	12	0	230	2	232	0	503
Total	13	1187	0	1200	19	0	22	41	0	868	5	873	0	2114
08:00 AM	8	248	0	256	4	0	1	5	0	257	3	260	0	521
08:15 AM	7	242	0	249	2	0	3	5	0	254	0	254	0	508
08:30 AM	4	273	0	277	7	0	2	9	0	277	1	278	0	564
08:45 AM	6	258	0	264	6	0	1	7	0	233	0	233	0	504
Total	25	1021	0	1046	19	0	7	26	0	1021	4	1025	0	2097
Grand Total	53	2954	0	3007	52	0	31	83	0	2303	13	2316	0	5406
Apprch %	1.8	98.2	0		62.7	0	37.3		0	99.4	0.6			
Total %	1	54.6	0	55.6	1	0	0.6	1.5	0	42.6	0.2	42.8	0	

	Southbound				Westbound				Northbound				Eastbound	
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 07:15 AM														
07:15 AM	4	**335**	0	**339**	5	0	**9**	**14**	0	217	2	219	0	572
07:30 AM	3	332	0	335	3	0	7	10	0	**258**	1	259	0	**604**
07:45 AM	3	256	0	259	**9**	0	3	12	0	230	2	232	0	503
08:00 AM	**8**	248	0	256	4	0	1	5	0	257	**3**	**260**	0	521
Total Volume	18	1171	0	1189	21	0	20	41	0	962	8	970	0	2200
% App. Total	1.5	98.5	0		51.2	0	48.8		0	99.2	0.8			
PHF	.563	.874	.000	.877	.583	.000	.556	.732	.000	.932	.667	.933	.000	.911

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

Counter:D4-3891, D4-5672
Counted By:TO, RY
Weather:Clear

File Name : KuhKapPM
Site Code : 00000002
Start Date : 1/28/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio Highway Southbound				Access Road from Hotels Westbound				Kuhio Highway Northbound				Kapaa By-Pass Road 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
03:00 PM	15	140	2	157	0	0	17	17	56	206	5	267	6	0	89	95	536
03:15 PM	8	134	5	147	0	0	13	13	82	240	5	327	6	0	118	124	611
03:30 PM	21	107	5	133	0	0	11	11	86	206	6	298	5	0	113	118	560
03:45 PM	11	130	6	147	0	0	16	16	98	251	3	352	11	0	102	113	628
Total	55	511	18	584	0	0	57	57	322	903	19	1244	28	0	422	450	2335
04:00 PM	29	146	1	176	0	0	12	12	91	193	5	289	2	0	95	97	574
04:15 PM	24	106	4	134	0	0	15	15	110	220	4	334	3	0	117	120	603
04:30 PM	37	114	2	153	0	0	15	15	110	175	1	286	1	0	93	94	548
04:45 PM	23	125	3	151	0	0	12	12	112	199	4	315	5	0	99	104	582
Total	113	491	10	614	0	0	54	54	423	787	14	1224	11	0	404	415	2307
05:00 PM	23	114	1	138	0	0	11	11	143	249	2	394	1	0	96	97	640
05:15 PM	12	92	3	107	0	1	14	15	115	244	5	364	5	0	97	102	588
05:30 PM	24	119	4	147	0	0	6	6	79	202	0	281	1	0	80	81	515
05:45 PM	24	148	13	185	0	0	8	8	66	188	1	255	2	0	73	75	523
Total	83	473	21	577	0	1	39	40	403	883	8	1294	9	0	346	355	2266
Grand Total	251	1475	49	1775	0	1	150	151	1148	2573	41	3762	48	0	1172	1220	6908
Apprch %	14.1	83.1	2.8		0	0.7	99.3		30.5	68.4	1.1		3.9	0	96.1		
Total %	3.6	21.4	0.7	25.7	0	0	2.2	2.2	16.6	37.2	0.6	54.5	0.7	0	17	17.7	

	Kuhio Highway Southbound				Access Road from Hotels Westbound				Kuhio Highway Northbound				Kapaa By-Pass Road 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 Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	8	134	5	147	0	0	13	13	82	240	5	327	6	0	**118**	**124**	611
03:30 PM	21	107	5	133	0	0	11	11	86	206	**6**	298	5	0	113	118	560
03:45 PM	11	130	**6**	147	0	0	**16**	**16**	**98**	**251**	3	**352**	**11**	0	102	113	**628**
04:00 PM	**29**	**146**	1	**176**	0	0	12	12	91	193	5	289	2	0	95	97	574
Total Volume	69	517	17	603	0	0	52	52	357	890	19	1266	24	0	428	452	2373
% App. Total	11.4	85.7	2.8		0	0	100		28.2	70.3	1.5		5.3	0	94.7		
PHF	.595	.885	.708	.857	.000	.000	.813	.813	.911	.886	.792	.899	.545	.000	.907	.911	.945

Wilson Okamoto Corporation
1907 S. Beretania Street Suite 400
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Counter:D4-3891, D4-5672
Counted By:RY, TO
Weather:Clear

File Name : KuhKapAM
Site Code : 00000002
Start Date : 1/29/2009
Page No : 1

Groups Printed- Unshifted

	Kuhio highway Southbound				Access Road From Hotels Westbound				Kuhio Highway Northbound				Kapaa By-Pass Road 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
06:00 AM	4	122	0	126	0	0	7	7	1	56	0	57	0	0	29	29	219
06:15 AM	4	142	0	146	0	0	5	5	2	89	0	91	0	0	38	38	280
06:30 AM	3	188	0	191	0	0	5	5	6	110	0	116	2	0	76	78	390
06:45 AM	13	145	0	158	0	0	6	6	10	110	1	121	2	0	81	83	368
Total	24	597	0	621	0	0	23	23	19	365	1	385	4	0	224	228	1257
07:00 AM	9	179	0	188	0	0	10	10	13	136	1	150	2	0	136	138	486
07:15 AM	2	167	0	169	0	0	7	7	24	176	2	202	4	0	181	185	563
07:30 AM	6	117	1	124	0	0	10	10	21	186	2	209	2	0	177	179	522
07:45 AM	7	144	1	152	0	0	11	11	17	164	3	184	2	0	116	118	465
Total	24	607	2	633	0	0	38	38	75	662	8	745	10	0	610	620	2036
08:00 AM	3	168	2	173	0	0	6	6	17	162	3	182	0	0	77	77	438
08:15 AM	7	166	0	173	0	0	10	10	18	171	1	190	3	0	86	89	462
08:30 AM	6	185	0	191	0	0	16	16	23	163	2	188	0	0	88	88	483
08:45 AM	4	192	2	198	0	0	7	7	11	178	0	189	0	0	90	90	484
Total	20	711	4	735	0	0	39	39	69	674	6	749	3	0	341	344	1867
Grand Total	68	1915	6	1989	0	0	100	100	163	1701	15	1879	17	0	1175	1192	5160
Apprch %	3.4	96.3	0.3		0	0	100		8.7	90.5	0.8		1.4	0	98.6		
Total %	1.3	37.1	0.1	38.5	0	0	1.9	1.9	3.2	33	0.3	36.4	0.3	0	22.8	23.1	

	Kuhio highway Southbound				Access Road From Hotels Westbound				Kuhio Highway Northbound				Kapaa By-Pass Road 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 Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**9**	**179**	0	**188**	0	0	10	10	13	136	1	150	2	0	136	138	486
07:15 AM	2	167	0	169	0	0	7	7	**24**	176	2	202	**4**	0	**181**	**185**	**563**
07:30 AM	6	117	**1**	124	0	0	10	10	21	**186**	2	**209**	2	0	177	179	522
07:45 AM	7	144	**1**	152	0	0	**11**	**11**	17	164	**3**	184	2	0	116	118	465
Total Volume	24	607	2	633	0	0	38	38	75	662	8	745	10	0	610	620	2036
% App. Total	3.8	95.9	0.3		0	0	100		10.1	88.9	1.1		1.6	0	98.4		
PHF	.667	.848	.500	.842	.000	.000	.864	.864	.781	.890	.667	.891	.625	.000	.843	.838	.904

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

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

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

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

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

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

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

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

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

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

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

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

LEVEL OF SERVICE DEFINITIONS

LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

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

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

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

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

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

Lane Configurations						
Volume (vph)	152	472	82	543	1218	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	3539	1583
Flt Permitted	0.95	1.00	0.06	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	115	1863	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.89	0.89
Adj. Flow (vph)	197	613	92	610	1369	78
RTOR Reduction (vph)	0	73	0	0	0	18
Lane Group Flow (vph)	197	540	92	610	1369	60
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	49.7	49.7	71.8	71.8	59.6	59.6
Effective Green, g (s)	49.7	49.7	71.8	71.8	59.6	59.6
Actuated g/C Ratio	0.38	0.38	0.55	0.55	0.45	0.45
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	669	598	153	1017	1604	717
v/s Ratio Prot	0.11		0.03	c0.33	c0.39	
v/s Ratio Perm		c0.34	0.29			0.04
v/c Ratio	0.29	0.90	0.60	0.60	0.85	0.08
Uniform Delay, d1	28.6	38.6	25.3	20.2	32.1	20.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	16.9	6.5	1.0	4.6	0.1
Delay (s)	28.9	55.5	31.8	21.1	36.7	20.5
Level of Service	C	E	C	C	D	C
Approach Delay (s)	49.0			22.5	35.8	
Approach LOS	D			C	D	

HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	131.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Kuamoo & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	132	182	341	1347	749	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	1863	1583
Flt Permitted	0.95	1.00	0.09	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	173	3539	1863	1583
Peak-hour factor, PHF	0.84	0.84	0.95	0.95	0.96	0.96
Adj. Flow (vph)	157	217	359	1418	780	199
RTOR Reduction (vph)	0	186	0	0	0	36
Lane Group Flow (vph)	157	31	359	1418	780	163
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	18.3	18.3	98.1	98.1	61.4	61.4
Effective Green, g (s)	18.3	18.3	98.1	98.1	61.4	61.4
Actuated g/C Ratio	0.14	0.14	0.78	0.78	0.49	0.49
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	229	535	2747	905	769
v/s Ratio Prot	c0.09		c0.17	0.40	c0.42	
v/s Ratio Perm		0.02	0.35			0.10
v/c Ratio	0.61	0.14	0.67	0.52	0.86	0.21
Uniform Delay, d1	50.7	47.2	30.1	5.3	28.7	18.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	0.3	3.3	0.2	8.5	0.1
Delay (s)	55.0	47.4	33.4	5.5	37.2	18.8
Level of Service	E	D	C	A	D	B
Approach Delay (s)	50.6			11.1	33.5	
Approach LOS	D			B	C	

HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	126.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Haleilio & Kuhio

3/12/2009

Lane Configurations						
Volume (vph)	126	205	62	580	1101	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	1863	3511	
Flt Permitted	0.95	1.00	0.11	1.00	1.00	
Satd. Flow (perm)	1770	1583	209	1863	3511	
Peak-hour factor, PHF	0.73	0.73	0.95	0.95	0.91	0.91
Adj. Flow (vph)	173	281	65	611	1210	68
RTOR Reduction (vph)	0	125	0	0	3	0
Lane Group Flow (vph)	173	156	65	611	1275	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	14.4	14.4	49.0	49.0	38.3	
Effective Green, g (s)	14.4	14.4	49.0	49.0	38.3	
Actuated g/C Ratio	0.20	0.20	0.67	0.67	0.52	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	347	311	261	1244	1832	
v/s Ratio Prot	0.10		0.02	c0.33	c0.36	
v/s Ratio Perm		c0.10	0.15			
v/c Ratio	0.50	0.50	0.25	0.49	0.70	
Uniform Delay, d1	26.3	26.3	7.8	6.0	13.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	1.3	0.5	0.3	1.2	
Delay (s)	27.4	27.6	8.3	6.3	14.3	
Level of Service	C	C	A	A	B	
Approach Delay (s)	27.5			6.5	14.3	
Approach LOS	C			A	B	

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Haleilio & Kuhio

3/12/2009

Lane Configurations						
Volume (vph)	97	93	226	1224	816	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	3539	1834	
Flt Permitted	0.95	1.00	0.07	1.00	1.00	
Satd. Flow (perm)	1770	1583	123	3539	1834	
Peak-hour factor, PHF	0.88	0.88	0.93	0.93	0.98	0.98
Adj. Flow (vph)	110	106	243	1316	833	108
RTOR Reduction (vph)	0	49	0	0	3	0
Lane Group Flow (vph)	110	57	243	1316	938	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	15.0	15.0	96.5	96.5	68.4	
Effective Green, g (s)	15.0	15.0	96.5	96.5	68.4	
Actuated g/C Ratio	0.12	0.12	0.79	0.79	0.56	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	219	195	411	2811	1032	
v/s Ratio Prot	c0.06		c0.11	0.37	c0.51	
v/s Ratio Perm		0.04	0.36			
v/c Ratio	0.50	0.29	0.59	0.47	0.91	
Uniform Delay, d1	49.8	48.4	32.3	4.1	23.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	0.8	2.3	0.1	11.4	
Delay (s)	51.6	49.3	34.6	4.2	35.2	
Level of Service	D	D	C	A	D	
Approach Delay (s)	50.4			9.0	35.2	
Approach LOS	D			A	D	

HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	121.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/12/2009

Lane Configurations						
Volume (veh/h)	21	20	728	8	18	1142
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.73	0.73	0.93	0.93	0.88	0.88
Hourly flow rate (vph)	29	27	783	9	20	1298
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			555			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	1477	787			791	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1472	631			636	
tC, single (s)	*4.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	89	96			97	
cM capacity (veh/h)	258	661			774	

Volume Total	56	791	20	649	649
Volume Left	29	0	20	0	0
Volume Right	27	9	0	0	0
cSH	367	1700	774	1700	1700
Volume to Capacity	0.15	0.47	0.03	0.38	0.38
Queue Length 95th (ft)	13	0	2	0	0
Control Delay (s)	16.6	0.0	9.8	0.0	0.0
Lane LOS	C		A		
Approach Delay (s)	16.6	0.0	0.2		
Approach LOS	C				

Average Delay	0.5		
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/12/2009

Lane Configurations						
Volume (veh/h)	77	16	1339	14	15	845
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.80	0.80	0.88	0.88	0.92	0.92
Hourly flow rate (vph)	96	20	1522	16	16	918
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			555			
pX, platoon unblocked	0.87	0.87			0.87	
vC, conflicting volume	2481	769			1538	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2401	428			1314	
tC, single (s)	*4.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	*2.5	*2.3			2.2	
p0 queue free %	4	98			96	
cM capacity (veh/h)	101	867			453	

Volume Total	116	1014	523	16	918	
Volume Left	96	0	0	16	0	
Volume Right	20	0	16	0	0	
cSH	119	1700	1700	453	1700	
Volume to Capacity	0.98	0.60	0.31	0.04	0.54	
Queue Length 95th (ft)	161	0	0	3	0	
Control Delay (s)	146.1	0.0	0.0	13.2	0.0	
Lane LOS	F			B		
Approach Delay (s)	146.1	0.0		0.2		
Approach LOS	F					

Average Delay	6.6		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
2: Bypass & Kuhio

3/12/2009

Lane Configurations							
Volume (veh/h)	8	557	76	672	603	4	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.76	0.76	0.93	0.93	0.89	0.89	
Hourly flow rate (vph)	11	733	82	723	678	4	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	1564	339	682				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1564	339	682				
tC, single (s)	*4.8	*4.9	4.1				
tC, 2 stage (s)							
tF (s)	*2.5	*2.3	2.2				
p0 queue free %	96	33	91				
cM capacity (veh/h)	267	1098	907				

Volume Total	11	733	82	723	339	339	4
Volume Left	11	0	82	0	0	0	0
Volume Right	0	733	0	0	0	0	4
cSH	267	1098	907	1700	1700	1700	1700
Volume to Capacity	0.04	0.67	0.09	0.43	0.20	0.20	0.00
Queue Length 95th (ft)	3	135	7	0	0	0	0
Control Delay (s)	19.0	14.6	9.4	0.0	0.0	0.0	0.0
Lane LOS	C	B	A				
Approach Delay (s)	14.7		1.0		0.0		
Approach LOS	B						

Average Delay	5.2		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
2: Bypass & Kuhio

3/12/2009

Lane Configurations							
Volume (veh/h)	12	385	479	876	461	9	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.95	0.95	0.86	0.86	0.90	0.90	
Hourly flow rate (vph)	13	405	557	1019	512	10	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	2135	512	512				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2135	512	512				
tC, single (s)	*4.8	*4.9	4.1				
tC, 2 stage (s)							
tF (s)	*2.5	*2.3	2.2				
p0 queue free %	83	56	47				
cM capacity (veh/h)	75	914	1049				

Volume Total	13	405	557	509	509	512	10
Volume Left	13	0	557	0	0	0	0
Volume Right	0	405	0	0	0	0	10
cSH	75	914	1049	1700	1700	1700	1700
Volume to Capacity	0.17	0.44	0.53	0.30	0.30	0.30	0.01
Queue Length 95th (ft)	14	58	81	0	0	0	0
Control Delay (s)	62.3	12.0	12.2	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	13.6		4.3			0.0	
Approach LOS	B						

Average Delay		5.0	
Intersection Capacity Utilization		64.1%	ICU Level of Service C
Analysis Period (min)		15	

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
11: Papaloa & Kuhio

3/12/2009

Lane Configurations						
Volume (veh/h)	0	34	670	10	18	607
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.77	0.77	0.93	0.93	0.89	0.89
Hourly flow rate (vph)	0	44	720	11	20	682
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	994	726			731	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	994	726			731	
tC, single (s)	6.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	94			98	
cM capacity (veh/h)	236	728			869	

Volume Total	44	731	20	227	227	227
Volume Left	0	0	20	0	0	0
Volume Right	44	11	0	0	0	0
cSH	728	1700	869	1700	1700	1700
Volume to Capacity	0.06	0.43	0.02	0.13	0.13	0.13
Queue Length 95th (ft)	5	0	2	0	0	0
Control Delay (s)	10.3	0.0	9.2	0.0	0.0	0.0
Lane LOS	B		A			
Approach Delay (s)	10.3	0.0	0.3			
Approach LOS	B					

Average Delay		0.4	
Intersection Capacity Utilization		45.9%	ICU Level of Service A
Analysis Period (min)		15	

* User Entered Value

Lane Configurations						
Volume (veh/h)	0	52	876	12	95	470
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.86	0.86	0.90	0.90
Hourly flow rate (vph)	0	59	1019	14	106	522
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1498	516			1033	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1498	516			1033	
tC, single (s)	6.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	94			84	
cM capacity (veh/h)	95	910			669	

Volume Total	59	679	353	106	261	261
Volume Left	0	0	0	106	0	0
Volume Right	59	0	14	0	0	0
cSH	910	1700	1700	669	1700	1700
Volume to Capacity	0.06	0.40	0.21	0.16	0.15	0.15
Queue Length 95th (ft)	5	0	0	14	0	0
Control Delay (s)	9.2	0.0	0.0	11.4	0.0	0.0
Lane LOS	A			B		
Approach Delay (s)	9.2	0.0		1.9		
Approach LOS	A					

Average Delay	1.0		
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2012 PEAK HOUR TRAFFIC ANALYSIS

Lane Configurations						
Volume (vph)	152	472	82	573	1301	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.07	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	122	3539	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.89	0.89	0.89	0.89
Adj. Flow (vph)	197	613	92	644	1462	78
RTOR Reduction (vph)	0	78	0	0	0	38
Lane Group Flow (vph)	197	535	92	644	1462	40
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	42.7	42.7	67.3	67.3	55.9	55.9
Effective Green, g (s)	42.7	42.7	67.3	67.3	55.9	55.9
Actuated g/C Ratio	0.36	0.36	0.56	0.56	0.47	0.47
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	630	563	156	1985	1649	737
v/s Ratio Prot	0.11		c0.03	0.18	c0.41	
v/s Ratio Perm		c0.34	0.30			0.02
v/c Ratio	0.31	0.95	0.59	0.32	0.89	0.05
Uniform Delay, d1	28.0	37.6	23.6	14.1	29.2	17.6
Progression Factor	1.00	1.00	1.00	1.00	0.89	1.24
Incremental Delay, d2	0.3	26.0	5.6	0.4	6.5	0.1
Delay (s)	28.3	63.6	29.2	14.6	32.5	21.9
Level of Service	C	E	C	B	C	C
Approach Delay (s)	55.0			16.4	32.0	
Approach LOS	E			B	C	

HCM Average Control Delay	34.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Configurations						
Volume (vph)	132	182	341	1464	797	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.28	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	516	3539	3539	1583
Peak-hour factor, PHF	0.84	0.84	0.95	0.95	0.96	0.96
Adj. Flow (vph)	157	217	359	1541	830	199
RTOR Reduction (vph)	0	188	0	0	0	75
Lane Group Flow (vph)	157	29	359	1541	830	124
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	15.9	15.9	94.1	94.1	74.5	74.5
Effective Green, g (s)	15.9	15.9	94.1	94.1	74.5	74.5
Actuated g/C Ratio	0.13	0.13	0.78	0.78	0.62	0.62
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	235	210	557	2775	2197	983
v/s Ratio Prot	c0.09		c0.08	0.44	0.23	
v/s Ratio Perm		0.02	c0.43			0.08
v/c Ratio	0.67	0.14	0.64	0.56	0.38	0.13
Uniform Delay, d1	49.5	46.0	5.6	5.0	11.3	9.4
Progression Factor	1.00	1.00	1.00	1.00	0.93	1.18
Incremental Delay, d2	7.0	0.3	2.6	0.8	0.5	0.3
Delay (s)	56.5	46.3	8.1	5.8	10.9	11.3
Level of Service	E	D	A	A	B	B
Approach Delay (s)	50.6			6.2	11.0	
Approach LOS	D			A	B	

HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Configurations						
Volume (vph)	126	205	62	611	1178	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	2006	1583		3523	3513	
Flt Permitted	0.95	1.00		0.70	1.00	
Satd. Flow (perm)	2006	1583		2461	3513	
Peak-hour factor, PHF	0.73	0.73	0.95	0.95	0.91	0.91
Adj. Flow (vph)	173	281	65	643	1295	68
RTOR Reduction (vph)	0	95	0	0	2	0
Lane Group Flow (vph)	173	186	0	708	1361	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	19.1	19.1		90.9	90.9	
Effective Green, g (s)	19.1	19.1		90.9	90.9	
Actuated g/C Ratio	0.16	0.16		0.76	0.76	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	319	252		1864	2661	
v/s Ratio Prot	0.09				c0.39	
v/s Ratio Perm		c0.12		0.29		
v/c Ratio	0.54	0.74		0.38	0.51	
Uniform Delay, d1	46.4	48.1		5.0	5.8	
Progression Factor	1.00	1.00		0.80	0.84	
Incremental Delay, d2	1.9	10.7		0.1	0.6	
Delay (s)	48.3	58.8		4.1	5.4	
Level of Service	D	E		A	A	
Approach Delay (s)	54.8			4.1	5.4	
Approach LOS	D			A	A	

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Configurations						
Volume (vph)	97	93	226	1322	868	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1770	1583		3514	3482	
Flt Permitted	0.95	1.00		0.62	1.00	
Satd. Flow (perm)	1770	1583		2197	3482	
Peak-hour factor, PHF	0.88	0.88	0.93	0.93	0.98	0.98
Adj. Flow (vph)	110	106	243	1422	886	108
RTOR Reduction (vph)	0	90	0	0	5	0
Lane Group Flow (vph)	110	16	0	1665	989	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	12.4	12.4		97.6	97.6	
Effective Green, g (s)	12.4	12.4		97.6	97.6	
Actuated g/C Ratio	0.10	0.10		0.81	0.81	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	183	164		1787	2832	
v/s Ratio Prot	c0.06				0.28	
v/s Ratio Perm		0.01		c0.76		
v/c Ratio	0.60	0.10		0.93	0.35	
Uniform Delay, d1	51.4	48.7		8.6	2.9	
Progression Factor	1.00	1.00		0.91	0.93	
Incremental Delay, d2	5.5	0.3		8.2	0.3	
Delay (s)	56.9	49.0		16.0	3.0	
Level of Service	E	D		B	A	
Approach Delay (s)	53.0			16.0	3.0	
Approach LOS	D			B	A	

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	65	34	764	11	45	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			5.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	3532			3533
Flt Permitted	0.95	1.00	1.00			0.87
Satd. Flow (perm)	1770	1583	3532			3092
Peak-hour factor, PHF	0.73	0.73	0.93	0.93	0.83	0.83
Adj. Flow (vph)	89	47	822	12	54	1416
RTOR Reduction (vph)	0	43	1	0	0	0
Lane Group Flow (vph)	89	4	833	0	0	1470
Turn Type		Perm			pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	11.4	11.4	98.6			98.6
Effective Green, g (s)	11.4	11.4	98.6			98.6
Actuated g/C Ratio	0.10	0.10	0.82			0.82
Clearance Time (s)	5.0	5.0	5.0			5.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	168	150	2902			2541
v/s Ratio Prot	c0.05		0.24			
v/s Ratio Perm		0.00				c0.48
v/c Ratio	0.53	0.03	0.29			0.58
Uniform Delay, d1	51.7	49.3	2.5			3.6
Progression Factor	1.00	1.00	0.76			1.00
Incremental Delay, d2	3.0	0.1	0.2			0.3
Delay (s)	54.7	49.4	2.1			4.0
Level of Service	D	D	A			A
Approach Delay (s)	52.9		2.1			4.0
Approach LOS	D		A			A

HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	135	26	1425	34	45	883
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			5.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	3527			3531
Flt Permitted	0.95	1.00	1.00			0.75
Satd. Flow (perm)	1770	1583	3527			2650
Peak-hour factor, PHF	0.80	0.80	0.88	0.88	0.92	0.92
Adj. Flow (vph)	169	32	1619	39	49	960
RTOR Reduction (vph)	0	28	1	0	0	0
Lane Group Flow (vph)	169	4	1657	0	0	1009
Turn Type		Perm			pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	16.7	16.7	93.3			93.3
Effective Green, g (s)	16.7	16.7	93.3			93.3
Actuated g/C Ratio	0.14	0.14	0.78			0.78
Clearance Time (s)	5.0	5.0	5.0			5.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	246	220	2742			2060
v/s Ratio Prot	c0.10		c0.47			
v/s Ratio Perm		0.00				0.38
v/c Ratio	0.69	0.02	0.60			0.49
Uniform Delay, d1	49.2	44.6	5.6			4.8
Progression Factor	1.00	1.00	0.62			1.00
Incremental Delay, d2	7.7	0.0	0.5			0.2
Delay (s)	56.9	44.6	4.0			5.0
Level of Service	E	D	A			A
Approach Delay (s)	54.9		4.0			5.0
Approach LOS	D		A			A

HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Configurations						
Volume (veh/h)	8	584	80	719	537	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.93	0.93	0.89	0.89
Hourly flow rate (vph)	9	649	86	773	716	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1162		
pX, platoon unblocked						
vC, conflicting volume	1274	716	716			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1274	716	716			
tC, single (s)	*4.8	*4.9	4.1			
tC, 2 stage (s)						
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	98	12	90			
cM capacity (veh/h)	358	736	881			

Volume Total	9	649	86	387	387	716	4
Volume Left	9	0	86	0	0	0	0
Volume Right	0	649	0	0	0	0	4
cSH	358	736	881	1700	1700	1700	1700
Volume to Capacity	0.02	0.88	0.10	0.23	0.23	0.42	0.00
Queue Length 95th (ft)	2	277	8	0	0	0	0
Control Delay (s)	15.3	34.7	9.5	0.0	0.0	0.0	0.0
Lane LOS	C	D	A				
Approach Delay (s)	34.4		1.0			0.0	
Approach LOS	D						

Average Delay	10.5		
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Lane Configurations						
Volume (veh/h)	13	410	510	942	505	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.86	0.86	0.90	0.90
Hourly flow rate (vph)	14	432	593	1095	561	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1163		
pX, platoon unblocked	0.97					
vC, conflicting volume	2295	561	561			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2275	561	561			
tC, single (s)	*4.8	*4.9	4.1			
tC, 2 stage (s)						
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	75	50	41			
cM capacity (veh/h)	55	868	1006			

Volume Total	14	432	593	548	548	561	11
Volume Left	14	0	593	0	0	0	0
Volume Right	0	432	0	0	0	0	11
cSH	55	868	1006	1700	1700	1700	1700
Volume to Capacity	0.25	0.50	0.59	0.32	0.32	0.33	0.01
Queue Length 95th (ft)	21	71	100	0	0	0	0
Control Delay (s)	90.7	13.2	13.6	0.0	0.0	0.0	0.0
Lane LOS	F	B	B				
Approach Delay (s)	15.6		4.8			0.0	
Approach LOS	C						

Average Delay	5.5		
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
11: Papaloa & Kuhio

3/13/2009

Lane Configurations						
Volume (veh/h)	0	34	717	10	18	641
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.77	0.77	0.93	0.93	0.89	0.89
Hourly flow rate (vph)	0	44	771	11	20	720
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			1317			
pX, platoon unblocked						
vC, conflicting volume	1177	391			782	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1177	391			782	
tC, single (s)	6.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	96			98	
cM capacity (veh/h)	180	1039			832	

Volume Total	44	514	268	20	360	360
Volume Left	0	0	0	20	0	0
Volume Right	44	0	11	0	0	0
cSH	1039	1700	1700	832	1700	1700
Volume to Capacity	0.04	0.30	0.16	0.02	0.21	0.21
Queue Length 95th (ft)	3	0	0	2	0	0
Control Delay (s)	8.6	0.0	0.0	9.4	0.0	0.0
Lane LOS	A			A		
Approach Delay (s)	8.6	0.0		0.3		
Approach LOS	A					

Average Delay	0.4		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
11: Papaloa & Kuhio

3/13/2009

Lane Configurations						
Volume (veh/h)	0	52	942	12	95	514
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.86	0.86	0.90	0.90
Hourly flow rate (vph)	0	59	1095	14	106	571
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			1318			
pX, platoon unblocked	1.00	1.00			1.00	
vC, conflicting volume	1599	555			1109	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1598	553			1108	
tC, single (s)	6.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	93			83	
cM capacity (veh/h)	81	875			626	

Volume Total	59	730	379	106	286	286
Volume Left	0	0	0	106	0	0
Volume Right	59	0	14	0	0	0
cSH	875	1700	1700	626	1700	1700
Volume to Capacity	0.07	0.43	0.22	0.17	0.17	0.17
Queue Length 95th (ft)	5	0	0	15	0	0
Control Delay (s)	9.4	0.0	0.0	11.9	0.0	0.0
Lane LOS	A			B		
Approach Delay (s)	9.4	0.0		1.9		
Approach LOS	A					

Average Delay	1.0		
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2032 PEAK HOUR TRAFFIC ANALYSIS

HCM Signalized Intersection Capacity Analysis
5: Kuamoo & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	152	472	82	785	1755	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.06	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	113	3539	3539	1583
Peak-hour factor, PHF	0.77	0.77	0.95	0.95	0.95	0.95
Adj. Flow (vph)	197	613	86	826	1847	73
RTOR Reduction (vph)	0	49	0	0	0	30
Lane Group Flow (vph)	197	564	86	826	1847	44
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	40.0	40.0	70.0	70.0	61.0	61.0
Effective Green, g (s)	40.0	40.0	70.0	70.0	61.0	61.0
Actuated g/C Ratio	0.33	0.33	0.58	0.58	0.51	0.51
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	590	528	121	2064	1799	805
v/s Ratio Prot	0.11		c0.02	0.23	c0.52	
v/s Ratio Perm		c0.36	0.39			0.03
v/c Ratio	0.33	1.07	0.71	0.40	1.03	0.05
Uniform Delay, d1	30.0	40.0	27.7	13.6	29.5	14.9
Progression Factor	1.00	1.00	1.00	1.00	0.86	1.06
Incremental Delay, d2	0.3	58.4	17.8	0.6	25.5	0.1
Delay (s)	30.3	98.4	45.6	14.2	50.8	15.9
Level of Service	C	F	D	B	D	B
Approach Delay (s)	81.9			17.1	49.5	
Approach LOS	F			B	D	

HCM Average Control Delay	48.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Kuamoo & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	132	182	341	2208	1215	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.95	1.00	0.15	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	276	3539	3539	1583
Peak-hour factor, PHF	0.84	0.84	0.95	0.95	0.96	0.96
Adj. Flow (vph)	157	217	359	2324	1266	199
RTOR Reduction (vph)	0	191	0	0	0	73
Lane Group Flow (vph)	157	26	359	2324	1266	126
Turn Type		Perm	pm+pt			Perm
Protected Phases	4		5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	17.9	17.9	122.1	122.1	94.7	94.7
Effective Green, g (s)	17.9	17.9	122.1	122.1	94.7	94.7
Actuated g/C Ratio	0.12	0.12	0.81	0.81	0.63	0.63
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	211	189	448	2881	2234	999
v/s Ratio Prot	c0.09		0.12	c0.66	0.36	
v/s Ratio Perm		0.02	0.53			0.08
v/c Ratio	0.74	0.14	0.80	0.81	0.57	0.13
Uniform Delay, d1	63.8	59.1	25.1	7.6	15.9	11.1
Progression Factor	1.00	1.00	1.00	1.00	1.17	2.02
Incremental Delay, d2	13.3	0.3	9.9	2.5	0.9	0.2
Delay (s)	77.1	59.5	35.0	10.1	19.5	22.6
Level of Service	E	E	D	B	B	C
Approach Delay (s)	66.9			13.4	19.9	
Approach LOS	E			B	B	

HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Haleilio & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	126	205	62	839	1585	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1770	1583		3527	3519	
Flt Permitted	0.95	1.00		0.65	1.00	
Satd. Flow (perm)	1770	1583		2289	3519	
Peak-hour factor, PHF	0.73	0.73	0.95	0.95	0.95	0.95
Adj. Flow (vph)	173	281	65	883	1668	65
RTOR Reduction (vph)	0	68	0	0	2	0
Lane Group Flow (vph)	173	213	0	948	1731	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	20.4	20.4		89.6	89.6	
Effective Green, g (s)	20.4	20.4		89.6	89.6	
Actuated g/C Ratio	0.17	0.17		0.75	0.75	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	301	269		1709	2628	
v/s Ratio Prot	0.10				c0.49	
v/s Ratio Perm		c0.13		0.41		
v/c Ratio	0.57	0.79		0.55	0.66	
Uniform Delay, d1	45.8	47.8		6.6	7.6	
Progression Factor	1.00	1.00		1.12	0.77	
Incremental Delay, d2	2.6	14.6		0.4	1.0	
Delay (s)	48.5	62.4		7.7	6.8	
Level of Service	D	E		A	A	
Approach Delay (s)	57.1			7.7	6.8	
Approach LOS	E			A	A	

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Haleilio & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	97	93	226	1994	1358	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1770	1583		3521	3501	
Flt Permitted	0.95	1.00		0.55	1.00	
Satd. Flow (perm)	1770	1583		1944	3501	
Peak-hour factor, PHF	0.88	0.88	0.95	0.95	0.98	0.98
Adj. Flow (vph)	110	106	238	2099	1386	108
RTOR Reduction (vph)	0	71	0	0	3	0
Lane Group Flow (vph)	110	35	0	2337	1491	0
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	13.6	13.6		126.4	126.4	
Effective Green, g (s)	13.6	13.6		126.4	126.4	
Actuated g/C Ratio	0.09	0.09		0.84	0.84	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	160	144		1638	2950	
v/s Ratio Prot	c0.06				0.43	
v/s Ratio Perm		0.02		c1.20		
v/c Ratio	0.69	0.24		1.43	0.51	
Uniform Delay, d1	66.1	63.4		11.8	3.2	
Progression Factor	1.00	1.00		1.08	0.81	
Incremental Delay, d2	11.6	0.9		194.1	0.4	
Delay (s)	77.8	64.3		206.8	3.0	
Level of Service	E	E		F	A	
Approach Delay (s)	71.2			206.8	3.0	
Approach LOS	E			F	A	

HCM Average Control Delay	124.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	120.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	65	34	1049	11	45	1623
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			5.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	3534			3534
Flt Permitted	0.95	1.00	1.00			0.87
Satd. Flow (perm)	1770	1583	3534			3080
Peak-hour factor, PHF	0.73	0.73	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	47	1104	12	47	1708
RTOR Reduction (vph)	0	43	0	0	0	0
Lane Group Flow (vph)	89	4	1116	0	0	1755
Turn Type		Perm			pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	11.3	11.3	98.7			98.7
Effective Green, g (s)	11.3	11.3	98.7			98.7
Actuated g/C Ratio	0.09	0.09	0.82			0.82
Clearance Time (s)	5.0	5.0	5.0			5.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	167	149	2907			2533
v/s Ratio Prot	c0.05		0.32			
v/s Ratio Perm		0.00				c0.57
v/c Ratio	0.53	0.03	0.38			0.69
Uniform Delay, d1	51.8	49.4	2.8			4.4
Progression Factor	1.00	1.00	0.94			1.00
Incremental Delay, d2	3.2	0.1	0.3			0.8
Delay (s)	55.1	49.5	2.9			5.2
Level of Service	E	D	A			A
Approach Delay (s)	53.1		2.9			5.2
Approach LOS	D		A			A

HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Lanikai & Kuhio

3/13/2009

Lane Configurations						
Volume (vph)	135	26	2160	34	45	1347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0			5.0
Lane Util. Factor	1.00	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1583	3531			3534
Flt Permitted	0.95	1.00	1.00			0.65
Satd. Flow (perm)	1770	1583	3531			2294
Peak-hour factor, PHF	0.80	0.80	0.95	0.95	0.95	0.95
Adj. Flow (vph)	169	32	2274	36	47	1418
RTOR Reduction (vph)	0	28	1	0	0	0
Lane Group Flow (vph)	169	4	2309	0	0	1465
Turn Type		Perm			pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	17.8	17.8	122.2			122.2
Effective Green, g (s)	17.8	17.8	122.2			122.2
Actuated g/C Ratio	0.12	0.12	0.81			0.81
Clearance Time (s)	5.0	5.0	5.0			5.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	210	188	2877			1869
v/s Ratio Prot	c0.10		c0.65			
v/s Ratio Perm		0.00				0.64
v/c Ratio	0.80	0.02	0.80			0.78
Uniform Delay, d1	64.4	58.4	7.4			7.1
Progression Factor	1.00	1.00	0.46			1.00
Incremental Delay, d2	19.6	0.0	0.2			2.2
Delay (s)	84.0	58.4	3.7			9.4
Level of Service	F	E	A			A
Approach Delay (s)	80.0		3.7			9.4
Approach LOS	E		A			A

HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
2: Bypass & Kuhio

3/13/2009

Lane Configurations							
Volume (veh/h)	12	803	110	982	873	6	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly flow rate (vph)	13	845	116	1034	919	6	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (ft)				1162			
pX, platoon unblocked	0.99						
vC, conflicting volume	1667	919	925				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1658	919	925				
tC, single (s)	*4.8	*4.9	4.1				
tC, 2 stage (s)							
tF (s)	*2.5	*2.3	2.2				
p0 queue free %	94	0	84				
cM capacity (veh/h)	222	592	734				
Volume Total	13	845	116	517	517	919	6
Volume Left	13	0	116	0	0	0	0
Volume Right	0	845	0	0	0	0	6
cSH	222	592	734	1700	1700	1700	1700
Volume to Capacity	0.06	1.43	0.16	0.30	0.30	0.54	0.00
Queue Length 95th (ft)	4	990	14	0	0	0	0
Control Delay (s)	22.2	221.7	10.8	0.0	0.0	0.0	0.0
Lane LOS	C	F	B				
Approach Delay (s)	218.7		1.1			0.0	
Approach LOS	F						

Average Delay	64.4		
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
2: Bypass & Kuhio

3/13/2009

Lane Configurations						
Volume (veh/h)	19	621	773	1423	758	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	20	654	814	1498	798	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)				1162		
pX, platoon unblocked	0.74					
vC, conflicting volume	3174	798	798			
vC1, stage 1 conf vol	798					
vC2, stage 2 conf vol	2376					
vCu, unblocked vol	3236	798	798			
tC, single (s)	*4.8	*4.9	4.1			
tC, 2 stage (s)	3.8					
tF (s)	*2.5	*2.3	2.2			
p0 queue free %	0	3	1			
cM capacity (veh/h)	2	674	820			

Volume Total	20	654	814	749	749	798	16
Volume Left	20	0	814	0	0	0	0
Volume Right	0	654	0	0	0	0	16
cSH	2	674	820	1700	1700	1700	1700
Volume to Capacity	12.23	0.97	0.99	0.44	0.44	0.47	0.01
Queue Length 95th (ft)	Err	360	427	0	0	0	0
Control Delay (s)	Err	52.2	51.9	0.0	0.0	0.0	0.0
Lane LOS	F	F	F				
Approach Delay (s)	347.5		18.3			0.0	
Approach LOS	F						

Average Delay		72.7	
Intersection Capacity Utilization		96.1%	ICU Level of Service F
Analysis Period (min)		15	

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
11: Papaloa & Kuhio

3/13/2009

Lane Configurations						
Volume (veh/h)	0	34	979	10	18	879
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.77	0.77	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	44	1031	11	19	925
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			1317			
pX, platoon unblocked						
vC, conflicting volume	1536	521			1041	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1536	521			1041	
tC, single (s)	6.8	*4.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	95			97	
cM capacity (veh/h)	104	906			664	

Volume Total	44	687	354	19	463	463
Volume Left	0	0	0	19	0	0
Volume Right	44	0	11	0	0	0
cSH	906	1700	1700	664	1700	1700
Volume to Capacity	0.05	0.40	0.21	0.03	0.27	0.27
Queue Length 95th (ft)	4	0	0	2	0	0
Control Delay (s)	9.2	0.0	0.0	10.6	0.0	0.0
Lane LOS	A			B		
Approach Delay (s)	9.2	0.0		0.2		
Approach LOS	A					

Average Delay		0.3	
Intersection Capacity Utilization		37.4%	ICU Level of Service A
Analysis Period (min)		15	

* User Entered Value

Lane Configurations						
Volume (veh/h)	0	52	1423	12	95	772
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.88	0.88	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	59	1498	13	100	813
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL			None
Median storage veh)			2			
Upstream signal (ft)			1317			
pX, platoon unblocked	0.75	0.75			0.75	
vC, conflicting volume	2111	755			1511	
vC1, stage 1 conf vol	1504					
vC2, stage 2 conf vol	606					
vCu, unblocked vol	1817	14			1018	
tC, single (s)	6.8	*5.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	*2.3			2.2	
p0 queue free %	100	95			80	
cM capacity (veh/h)	200	1156			509	

Volume Total	59	999	512	100	406	406
Volume Left	0	0	0	100	0	0
Volume Right	59	0	13	0	0	0
cSH	1156	1700	1700	509	1700	1700
Volume to Capacity	0.05	0.59	0.30	0.20	0.24	0.24
Queue Length 95th (ft)	4	0	0	18	0	0
Control Delay (s)	8.3	0.0	0.0	13.8	0.0	0.0
Lane LOS	A			B		
Approach Delay (s)	8.3	0.0		1.5		
Approach LOS	A					

Average Delay	0.8		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

* User Entered Value

Appendix D

Biological and Water Quality Surveys of
Kaloko Marsh at Kūhiō Highway
Wailuā, Kaua'i
AECOS, Inc.
May 12, 2009

AECOS REPORT No. 1155A

Biological and water quality surveys of Kaloko Marsh at Kūhio Highway, Wailua, Kaua'i

Photo Credit: Laura Mau, WOA

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May 12, 2009

Biological and water quality surveys of Kaloko Marsh at Kūhio Highway, Wailua, Kaua'i.

May 12, 2009 *AECOS* No. 1155A

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Introduction

On February 16, March 9, 10, and 11, 2009, *AECOS*, Inc. biologists conducted water quality and biological reconnaissance surveys of the highway edge of Kaloko Marsh in Wailua, Kauai (Fig. 1). The State Department of Transportation (HDOT) is planning to widen a segment of Kūhio Highway (state Rte. 56) from Kuamo'o Rd to the Kapa'a Bypass Road as part of the Kūhio Highway Short Term Improvement Project. This segment of Kūhio Hwy. borders Kaloko Marsh, and connects via culvert under the highway to a drainage swale that originates at nearby Papaloa Road. The culvert crosses under the highway approximately 400 ft (120 m) southwest of the intersection with the Kapa'a Bypass Road. *AECOS*, Inc. was contracted by Wilson Okamoto and Associates, Inc. to ascertain biological resources and assess water quality of the waterway for permitting of the construction project. This report details the findings of the surveys.

Waterway Description

The waterway under the highway is part of a drainage swale that extends from Papaloa Road to Kaloko Marsh, a distance of about 400 ft (0.12 km). The drainage swale normally drains into Kaloko Marsh, located on the mauka (west) side of Kūhio Highway. At the proposed project site this ditch or swale is only some 10 ft (3 m) in width and overgrown with grasses and ruderal weeds[2]. It is likely that high water level in the marsh results in water backing up in the opposite direction (mauka to makai) through the culvert structure. Although

[1] Rana Productions, Ltd., Kailua-Kona, Hawai'i.
[2] Because of construction ongoing on the parcel south of the culvert, conditions in the this swale have regularly changed over the period of time of our studies.

not observed, high water could seep seaward (makai direction) since Papaloa Road is on the order of 600-700 ft (0.2 km) inland from the windward shore of Wailua Bay; old dunes may be the reason the land here has a gentle slope downward away from the coast, and dunes are generally highly permeable to groundwater movement.

Figure 1. The proposed project location in Wailua, Kauai.

The marsh itself appears to "naturally" drain to the northeast (roughly parallel to the highway on the mauka side). At least the historical flow was northeast from the project area for some 700 ft (213 m) into the Waipouli Reservoir, and continuing northeast for 2700 ft (820 m), then 1450 ft (440 m) southeast to the Pacific Ocean at Waipouli, some 4250 ft (1.3 km) distant of the project site. However, the culvert pipe beneath Kapa'a Bypass Road has been filled with concrete, preventing outflow in this direction.

It is possible that another outlet for this wetland exists somewhere, perhaps in the southwest direction as there is a drainage ditch beyond Hale'īlio Road in this direction (behind the former Coco Palms Resort), but no such connection was found. The drainage pattern in this area is complicated by the fact that the marsh itself is not a single large depressed area, but is divided by a substantial farm road (old cane haul road) that parallels Kūhio Hwy some 200 ft (0.06 km) inland. A culvert beneath this unimproved road permits the interchange of surface water between the two parts of the marsh.

Methods

AECOS, Inc. biologists took water quality field measurements, collected water samples for laboratory analyses, and identified aquatic biota present at the proposed project site. Field measurements for temperature, dissolved oxygen, and pH were measured directly from the project waterway near the culvert opening on the makai side of Kūhio Hwy (Fig. 2). Samples collected for laboratory analysis were shipped to *AECOS*, Inc. laboratory in Kāne'ohe, O'ahu (*AECOS* Log Nos. 25067, 25095, 25096). The aquatic resource survey area included observations on both sides of Kūhio Hwy.

Figure 2. Water quality sampling site (Station Hwy) on makai side of culvert under Kūhio Hwy.

Water Quality

Only isolated pools of water were present in the project waterway during the survey. No actual flow was evident. The largest pool of water was located on the southeast (makai) side of Kūhio Highway approximately 10 ft (3 m) from the culvert. A single water quality station, "Hwy," was established and sampled from this pool on March 9, 10, and 11, 2009. Results are displayed in Table 1.

Table 1. Water quality characteristics of a pool in the project waterway on March 9, 10, and 11, 2009.

Station	Time hhmm	Temp. (°C)	pH (pH units)	Dissolved Oxygen (mg/l)	D.O. % Sat. (%)	Cond. (µmhos/cm)
Hwy. (3-9-09)	1515	21.5	6.41	1.60	18	326
Hwy. (3-10-09)	1701	21.9	6.73	1.42	16	311
Hwy. (3-11-09)	1729	21.4	6.52	2.12	24	331
Arth. Mean	**--**	**21.6**	**6.55**	**1.71**	**19**	**323**
	TSS (mg/l)	**Turbidity (ntu)**	**Ammonia (µg N/l)**	**Nitrate +nitrite (µg N/l)**	**Total N (µg N/l)**	**Total P (µg P/l)**
Hwy. (3-9-09)	38	77.0	70	374	1050	165
Hwy. (3-10-09)	25	51.5	58	206	862	173
Hwy. (3-11-09)	24	39.0	80	113	714	118
Geo. Mean	**28**	**54**	**69**	**206**	**866**	**150**

Conductivity results indicate fresh water with no influence from brackish groundwater. Dissolved oxygen concentrations in the project waterway were low with saturation averaging 19%. Turbidity levels and total suspended solids (TSS) concentrations were high, reflecting the poor underwater visibility at the time of sampling. Elevated ammonia concentrations, like those found at Sta. Hwy, are typical of waterways with sluggish or stagnant flow due to an accumulation and then decomposition of organic matter. Nitrate-nitrite, total nitrogen and total phosphorus levels were also high here.

Aquatic Biota

The culvert under Kūhio Hwy. opens (on the mauka side) into Kaloko Marsh, which in this area is a depression completely covered by the aggressive, introduced grass known as para or California grass (*Urochloa mutica*; see Fig. 3). The marsh itself shows no open water areas other than at the culvert under the highway and the culvert under the old cane haul road.

The Kaloko wetland was previously surveyed by Char (2003a), but included in the general descriptions of the numerous small and large wetlands that dot this part of the Kaua'i coastal plain. Her report discusses the predominance of California grass in the "fresh water influenced" wetlands of this area (other nearby wetlands are "brackish water influenced"). More specific information appears in Char (2003b), which notes that the "wetland is bisected by a dirt road" and "[t]he makai half by the highway is covered by tall, dense mats of California grass…" and with a "dark, black organic soil."

Figure 3. Kaloko Marsh showing the makai portion overgrown with California grass. Houses in background are along the makai side of Kūhio Highway.

The vertebrate zoologist did not conduct any avian or mammalian surveys within either section of the Kaloko wetland. However, one native avian species, Black-crowned Night-Heron (*Nycticorax nycticorax*), was observed to fly out of the inland portion of the wetland. No aquatic organisms (fishes, invertebrates) were observed in the waterway at the project site on any of the several visits to the culvert area.

Given the highly overgrown state of the makai portion of this wetland feature, it is unlikely that it is currently usable by native wetland avian species. The inland section may provide resources that are used by three listed waterbird species, Hawaiian Coot, (*Fulica alai*), Common Moorhen (*Gallinula chloropus sandvicensis*), and occasionally Hawaiian Duck (*Anas wyvilliana*), on a seasonal

basis, as all three of these species have been recorded in wetland areas found to the north of the site. Char (2003b) noted that the inland portion (that part mauka of the cane haul road) was grazed, whereas the makai portion was not grazed, and thus more overgrown, eliminating any open water.

Assessment

The proposed project waterway is an approximately 800 ft (245 m) long ditch (drainage swale) that typically contains little water except for instances following heavy local precipitation. During these events, water may pond in the vicinity of the Kūhio Highway culvert. Nitrogen (total nitrogen and nitrate-nitrite), ammonia, phosphorus (total phosphorus), turbidity and total suspended solids concentrations were all elevated with respect to State of Hawai'i water quality standards for inland waters and do not meet geometric mean criteria (see Table 2), although given the short span of time samples were collected over, the representativeness of the means may be questionable. On the other hand, except during rainy periods, water may be absent from the makai end of the highway culvert.

Table 2. State of Hawai'i water quality criteria for inland waters/streams during wet season (November 1 through April 30) from HAR §11-54-05.2d (HDOH, 2004).

Parameter units	TSS (mg/l)	Turbidity (NTU)	Total Nitrogen (µg N/l)	Nitrate + Nitrite (µg N/l)	Total Phosphorus (µg P/l)
Geometric mean not to exceed given value	20	5	250	70	50
Value not to be exceeded more than 10% of the time	50	15	520	180	100
Value not to be exceeded more than 2% of the time	80	25	800	300	150

- pH – shall not deviate more than 0.5 units from ambient and not be lower than 5.5 nor higher than 8.0.
- Dissolved oxygen – not less than 80% saturation.
- Temperature – shall not vary more than 1 °C from ambient.

The waterway does not currently support aquatic biota, therefore no federally endangered or threatened species (Federal Register, 2005; USFWS, 2005) were

encountered during the surveys, and none is anticipated to utilize aquatic habitats in the project area. A Best Management Practices (BMP) plan should be designed and implemented to minimize environmental impacts to water quality of the project waterway in the vicinity of the project site.

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Appendix E

Biological and Water Quality Surveys for the
Kuamo'o Culvert Extension in Wailuā, Kaua'i
AECOS, Inc.
November 5, 2007

AECOS REPORT No. 1161

Biological and water quality survey for the Kuamoo Road culvert extension in Wailua, Kaua'i.

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November 5, 2007

Biological and water quality survey for the Kuamoo Road culvert extension in Wailua, Kaua'i[1].

November 5, 2007 | ***Draft*** | *AECOS* No. 1161

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Introduction

On October 12, 2007 *AECOS* biologists conducted a water quality and biological survey of a drainage ditch and adjacent waterways for the Kuamoo Road Culvert Extension (hereafter called the project). The Department of Transportation is planning to increase the number of traffic lanes on Kuamoo Road requiring that the Kuamoo Road culvert be extended. The project will require dewatering of the waterway to facilitate construction. *AECOS*, Inc. was contracted by Wilson Okamoto to ascertain biological resources and assess water quality at the site for an environmental assessment needed for permitting of the construction project. This report presents findings of the survey.

Site Description

The project is located on the east side of Kaua'i, just north of the Wailua River estuary (Figure 1). Kuamoo Road intersects with Kuhio Highway just north of the Wailua River bridge and extends northwest from Kuhio Highway initially paralleling the river. The project culvert crosses under Kuamoo Road approximately 330 ft (100 m) from Kuhio Highway. North of the culvert, the "lagoons" of the dilapidated Coco Palms Resort are connected to the culvert by a small channel. To the south, the culvert connects to a drainage ditch which borders the Wailua River State Park before leading to two small, below-ground culverts under a private residence. These pipe culverts connect to a concrete-lined channel before reaching the Wailua River's northern bank.

[1] Report prepared for Wilson Okamoto and Associates, Honolulu for use in a project Environmental Assessment and other public submittals.

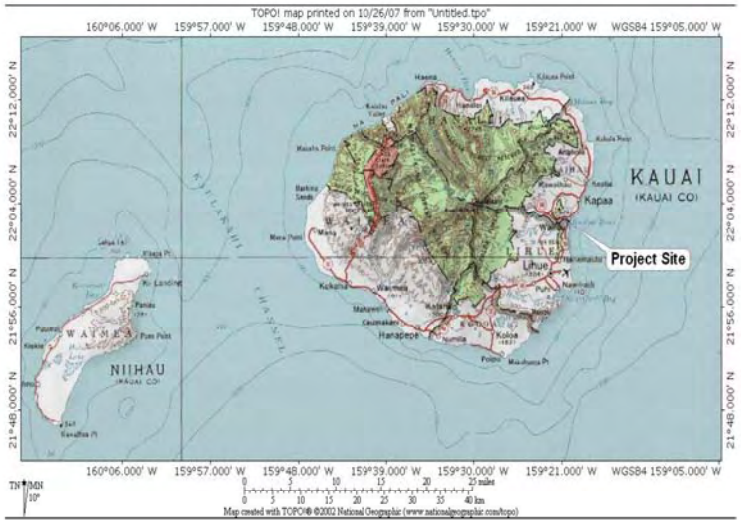

Figure 1. The project location in Wailua, Kauai.

The contiguous waterways within and adjacent to the project site are unnamed. The lagoon, located on the Coco Palms Resort property, is a man-made body of water that is replenished both through rainfall (and associated runoff) and from groundwater seepage directly into the lagoon. The groundwater is brackish, creating an estuarine environment throughout the lagoon and contiguous waters. Water is present in the lagoon and culvert throughout the year and the waterway may flow south into the Wailua River during heavy rainfall events. However, during the flooding event associated with heavy rains in March 2006, the management of the Coco Palms Resort rented pumping equipment to facilitate water flow into the Wailua River (Laura Mau, Pers. Comm.). This may indicate that little or no water flow naturally occurs in this direction.

Methods

AECOS biologists took water quality field measurements, collected water samples for laboratory analyses, and identified aquatic biota present in the culvert and the contiguous Coco Palms Resort lagoon. Nearby waters including the Wailua River and Wailua Drainage canal were visually surveyed for aquatic biota since these waterways may connect to the project waterways in times of heavy rainfall and/or flooding. Water clarity allowed fish and invertebrates to be surveyed from shore.

Identifications were facilitated through the use of dip nets. Benthic infauna grab samples (approx. 1.3 liters each) were taken from two locations and sorted for macro-invertebrates in aluminum trays on site. Algae samples were collected in 1 gal. Ziploc bags and transported to *AECOS* laboratory in Käneʻohe for microscopic identification.

Water Quality

On October 12, 2007, the subject waterways had water present in the Kuamoo Road culvert, the Coco Palms lagoon, and the ditch connecting the two. There was no water present in the system on the south side of the Kuamoo Road culvert, with terrestrial vegetation well established in the drainage ditch indicating that water flow in that direction had not occurred for some time. *AECOS* biologists collected water samples and measured field parameters from three locations within the project waterway (Figure 2).

Figure 2. Water quality stations and aquatic biota survey boundaries for the Kuamoo Road Culvert Extension in Wailua, Kauai.

Station "Culvert" was located one yard (one meter) from the culvert on the north side of Kuamoo Road. Station "Canal" was located approximately 100 ft (30 m) north of the culvert next to a small chain link fence collecting debris in the waterway. Station "Lagoon" was located approximately 330 ft (100 m) north of the culvert along the western shore of the lagoon. All samples were taken from a depth of 1 ft below the surface. Temperature, dissolved oxygen (DO), pH, and salinity by

hand-held refractometer were measured in the field. Water samples for laboratory analysis were collected in appropriate polypropylene and amber glass containers and taken to the *AECOS* Laboratory in Kāneʻohe, Oʻahu (*AECOS* Laboratory Log No. 23424). Table 1 lists the field instruments and analytical methods used to evaluate these samples.

Table 1. Analytical methods and instruments used for October 12, 2007 water quality sampling of waterway adjacent to project site in Wailua, Kauai.

Analysis	Method	Reference	Instrument
Ammonia	EPA 350M	Karloeff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Chlorophyll α	10200 H	Standard Methods, 20th Edition (1998)	Turner Model 112 fluorometer
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 550A DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1979)	Hannah pocket pH meter
Salinity	refractive index	---	handheld temperature compensating refractometer
Temperature	thermister calibrated to NBS cert. thermometer (EPA 170.1)	EPA (1979)	YSI Model 550A DO meter
Total Nitrogen	persulfate digestion/EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion/EPA 365.1	Koroleff in Grasshoff et al. (1986)/EPA 1993)	Technicon AutoAnalyzer II
Total Suspended Solids	Method 2540D (EPA 160.2)	Standard Methods 20th Edition (1998); EPA(1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 20th Edition (1998); EPA (1993)	Hach 2100N Turbidimeter

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The purpose of the water quality measurements was to characterize the existing aquatic environments, not to set baseline values or determine compliance with Hawaiʻi water quality standards (HDOH, 2004). In fact, the state criteria for all nutrient measurements, chlorophyll α, total suspended solids (TSS), and turbidity are based upon geometric mean values and a minimum of three separate samples per sampling location would be needed to compute a geometric mean. Nonetheless,

our results can be evaluated against the water quality criteria, as long as limitations regarding single-sample lack of representativeness are realized.

The Hawaii Administrative Rules (HAR 54-5.2) definition for developed estuaries is "any volume of brackish coastal waters in well defined basins, constructed by man or otherwise highly modified from their natural state." The project waterway fits that description and water quality results can be compared to state standards for estuaries (Table 2).

Table 2. State of Hawaiʻi water quality criteria for estuaries (geometric mean values) from HAR §11-54-05.2(d).

Parameter units	Total Nitrogen (µg N/l)	Ammonia Nitrogen (µg N/l)	Nitrate + Nitrite (µg N/l)	Total Phosphorus (µg P/l)	Turbidity (NTU)	Chlorophyll α (mg/l)
Not to exceed given value	200.0	6.0	8.0	25.0	2.0	1.5
Not to exceed more than 10% of the time	350.0	10.0	25.0	50.0	5.0	3.0
Not to exceed more than 2% of the time	500.0	20.0	35.0	75.0	10.0	5.0

- pH – shall not deviate more than 0.5 units from ambient and not be lower than 7.0 nor higher than 8.6.
- Dissolved oxygen – not less than 75% saturation.
- Temperature – shall not vary more than 1 °C from ambient.
- Salinity –shall not vary more than 10% from ambient.

Table 3 lists the water quality results from the October 12, 2007 sampling event. Results for temperature ranged from 25.7 to 28.6ºC. Temperature variations within the project waterways were likely due to shading. Water quality stations "Culvert" and "Canal" were well shaded during sampling while station "Lagoon" was receiving direct sunlight. Salinity measurements taken throughout the waterway revealed that a salinity of 5 ppt was uniform throughout the project waterway, an indication of a system reflecting groundwater conditions. pH readings ranged from 7.70 to 8.08. Dissolved oxygen levels for all three stations were well below the state standard of seventy-five percent saturation. There was no flowing water to bring in oxygenated water and decaying organic debris may regularly consume what oxygen is present from photosynthesis and atmospheric diffusion. Station "Lagoon" had roughly twice the level of chlorophyll α and dissolved oxygen as the other two stations probably due to greater exposure to sunlight at the time of sampling.

Turbidity levels were nearly uniform throughout the project waterway ranging from 1.52 to 1.86 ntu. These levels are under the state geometric mean standard for estuaries. Total suspended solid (TSS) levels for stations "Culvert", "Canal" and "Lagoon" were 4.2, 2.2, and 4.6 mg/L respectively. Phytoplankton present in water samples may have contributed to elevated TSS readings. The state has no standard for TSS in estuaries.

Table 3. Water quality characteristics of project waterways on October 12, 2007.

	Time	Temp. (°C)	Salinity (ppt)	DO (mg/l)	DO (% Sat.)	pH (pH units)	Turbidity (ntu)
Culvert	1100	25.7	5	1.66	21	7.70	1.52
Canal	1115	26.2	5	1.44	19	7.80	1.55
Lagoon	1130	28.6	5	3.38	45	8.08	1.86

	TSS (m/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	Chlorophyll α (mg/l)	Oil & Grease (mg/l)
Culvert	4.2	39	58	839	525	3.38	1.2
Canal	2.2	42	22	792	539	5.22	no sample
Lagoon	4.6	15	<1	850	555	10.5	no sample

Total phosphorus (TP) levels were very high relative to state criteria for TP. Total nitrogen, nitrate-nitrite, and ammonia levels for all stations were also high at most stations. Station "Lagoon" had no detectable nitrate-nitrite, indicating uptake by the phytoplankton, a process that would also elevate the pH and DO at this location. High total nitrogen levels coupled with low ammonia and nitrate-nitrite concentrations indicate high levels of organic nitrogen in the project waterways. Sources of organic nitrogen include decaying organic debris (like the numerous decaying palm fronds and coconuts in the canal and lagoon), residential or agricultural runoff, and waste produced by aquatic biota and waterfowl.

"Oil and Grease" was detected at station "Culvert" at a concentration of 1.2 mg/L. Some of the many possible sources of oil and grease include runoff from Kuamoo Road, leakage from a now defunct water pump station (formerly operated by Coco Palms Resort) that is situated near the culvert, or runoff from the flooded parking

garage of the Coco Palms Resort nearby. The fact that oil and grease was present in detectable levels is a violation of a state standard that states:

> All waters shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including … (2) Floating debris, oil, grease, scum, or other floating material (DOH, 2004).

Aquatic Biota

The aquatic biota survey revealed poecillid fishes (*Gambusia affinis, Poecillia reticulata*) and tilapia (*Oreochromis mossambicus, Tilapia zilli*) present feeding and schooling in the culvert and lagoon outlet ditch. *'O'opu nakea* (*Awaous guamensis*) were also noted on the sandy bottom in the ditch. Benthic infauna present in the lagoon ditch included thiarid, lymnaeid, and physid snails.

In the lagoon *ʻaholehole* (*Kuhlia xenura*) and mullet (*Mugil cephalus*) were uncommon in small schools. Tilapia occured abundantly throughout with at least two species present (*Oreochromis mossambicus, Tilapia zilli*). Guppies (*Poecilia reticulata*) and mosquitofish (*Gambusia affinis*) were common near the banks. Dip netting along the lava rock walls on the eastern side of the lagoon revealed grass shrimp (*Palaemon debilis*) and a Samoan crab (*Scylla serrata*). Benthic infauna in the lagoon included the thiarid snails, *Melanoides tuberculata* and *Tarebia granifera,* and an unidentified physid snail. *Alae ula* or Hawaiian moorhen (*Gallinula chloropus sandvicensis*), an endangered subspecies, were observed along the eastern bank of the lagoon (Figure 3).

Macroalgae were not abundant in the project lagoon and canal. Samples collected from benthic substrata and floating debris included two green algae (*Cladophora* sp. and *Rhizoclonium* sp.) and two blue-green algae (*Oscillatoria* sp. and *Schizothrix* sp.).

The brief visual survey of the Wailua Drainage Canal was conducted at its crossings with Haleilio Road and Kuamoo Road. The Haleilio Road crossing is approximately 200 meters northwest from northern-most point of the lagoon. The Kuamoo Road crossing is approximately 300 meters northwest from the project site. The Wailua Drainage Canal contained similar fish species to the project waterway except that *'O'opu nakea* (*Awaous guamensis)* was not observed. The same fish species were also found in the Wailua River near the project site. The grapsid crab, *Metopograpsus thukuhar*, was abundant along the rivers bank. A Cuban topminnow (*Limia vittata*) was also sighted in the river. Table 4 list aquatic biota collected or observed during the survey.

Figure 3. The endangered Hawaiian Moorhen (*Gallinula chloropus sandvicensis*) was sighted along the eastern bank of the Coco Palms "lagoon".

A previous biological survey (Kido, 2003) that included the nearby Wailua Drainage Canal noted poecillid fishes (*Gambusia affinis, Poecillia reticulata, Xiphophorus helleri*) and tilapia (*Oreochromis mossambicus*) as being present.

Table 4. Checklist of aquatic biota observed 0n October 12, 2007, in Wailua, Kauai.

PHYLUM, CLASS, ORDER FAMILY ***Species name***	**Common name**	**Abundance**	**Status**	**Site**
	ALGAE			
PROTISTA, CYANOBACTERIA				
OSCILLATORIACEAE				
Oscillatoria sp.	blue-green alga	P		1
SCHIZOTRICACEAE				
Schizothrix sp.	blue-green alga	P		1

Table 4 (continued).

PHYLUM, CLASS, ORDER FAMILY ***Species name***	**Common name**	**Abundance**	**Status**	**Site**
CHLOROPHYTA				
CLADOPHORACEAE				
Cladophora sp.	green alga	P		1
Rhizoclonium sp.	green alga	P		1
	INVERTEBRATES			
MOLLUSCA, GASTROPODA, CAENOGASTROPODA				
THIARIDAE				
Melanoides tuberculata	thiarid snail	C	Nat.	1,2
Tarebia granifera	thiarid snail	C	Nat.	1,2
GASTROPODA, BASOMMATOPHORA				
LYMNAEIDAE				
Unidentified	lymnaeid snail	U	Nat.	2
PHYSIDAE				
Unidentified	pond snail	C	Nat.	1,2
ARTHROPODA, MALACOSTRACA, DECAPODA				
PALAEMONIDAE				
Palaemon debilis	grass shrimp, '*opae huna*	P	Ind.	1
PORTUNIDAE				
Scylla serrata	Samoan crab	P	Nat.	1
GRAPSIDAE				
Metopograpsus thukuhar	grapsid crab	C	**Ind.**	4
	FISHES (PISCES)			
MUGILIDAE				
Mugil cephalus	striped mullet, *ama ama*		**Ind.**	2,3,4
POECILIDAE				
Gambusia affinis	mosquitofish	A	Nat.	1,2,3,4
Limia vittata	Cuban topminnow	R	Nat.	4
Poecilia reticulata	guppy, rainbow fish	C	Nat.	1,2,3,4
KUHLIIDAE				
Kuhlia xenura	*ähole*hole	P	**End.**	2,3,4

Table 4 (continued).

PHYLUM, CLASS, ORDER FAMILY ***Species name***	**Common name**	**Abundance**	**Status**	**Site**
CICHLIDAE				
Oreochromis mossambicus	Mosambique tilapia	A	Nat.	1,2,3
Tilapia zilli	red-belly tilapia	C	Nat.	1
GOBIDAE				
Awaous guamensis	*'o'opu nakea*	P	**Ind.**	2
	BIRDS (AVES)			
RALLIDAE				
Gallinula chloropus sandvicensis	Hawaiian moorhen *alae ula*	P	**End.**	1

KEY TO SYMBOLS USED:
Status:
nat. - naturalized. An introduced or exotic species.
ind. - indigenous. A native species also found elsewhere in the Pacific.
end. - endemic - A native species found only in the Hawaiian Islands.
Abundance at survey location:
P - present; not common, but unable to assess abundance.
R - rare; only one or two individuals seen.
U - uncommon; several individuals seen, in some habitat places visited.
C - common; numerous individuals seen, or seen in most habitat places visited.
A - abundant; numerous in most or all habitat places visited
Location within survey area:
1 – Coco Palms Lagoon
2 – Kuamoo Rd. Culvert/Ditch
3 – Wailua Drainage Ditch
4 – Wailua River

Assessment

Water quality at the project culvert site is generally poor. Nitrogen (ammonia, nitrate-nitrite, total nitrogen) and phosphorus (chemical nutrients) concentrations were high. Dissolved oxygen levels are low, although there is enough present to support populations of several non-native fish species that are abundant in the project waterways.

Two fish species and one crab species found during this survey are regulated by the State of Hawaii, Department of Land and Natural Resources. Hawaii Administrative Rule 13-95 regulates the taking of *ʻaholehole (Kuhlia xenura)* and Samoan crab (*Scylla serrata*), both present in the project waterway. HAR 13-100 and 188-43

prohibit the taking of *'o'opu nakea (Awaous guamensis)* which was sighted a few meters from the culvert.

The endangered Hawaiian moorhen (*Gallinula chloropus sandvicensis*) was sighted in the project waterway approximately 150 meters from the culvert. This subspecies is federally protected by the Endangered Species Act of 1973 (USFWS, 2005). The Hawaiian Moorhen usually nests within 2 meters of open waters (Erickson and Puttock, 2006) and may be nesting on the property of the Coco Palms Resort. The federally protected Newcomb's snail (*Erinna newcombi*), endemic to Kaua'i, was not found in the project waterways; its habitat is restricted to streams and springs with exceptionally clean water quality conditions (USFWS, 2006), not estuarine waters. No other federally endangered or threatened species (Federal Register, 2005; USFWS, 2005) were encountered or are anticipated to inhabit the project aquatic environments.

A Best Management Practices (BMP) plan should be designed and implemented to minimize environmental impacts to water quality and aquatic biota in the vicinity of the project site.

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Appendix F

Biological Survey for

Kūhiō Highway Widening Short-Term Improvements; Kuamo'o Road to

Temporary Bypass Road

Rana Biological Consulting, Inc. and AECOS, Inc.

April 29, 2009

Kūhiō Highway Short-Term Improvements; Kuamoʻo Road to Temporary Bypass Road, Wailua, Island of Kauaʻi.

FAP No. NH-056-1(50)

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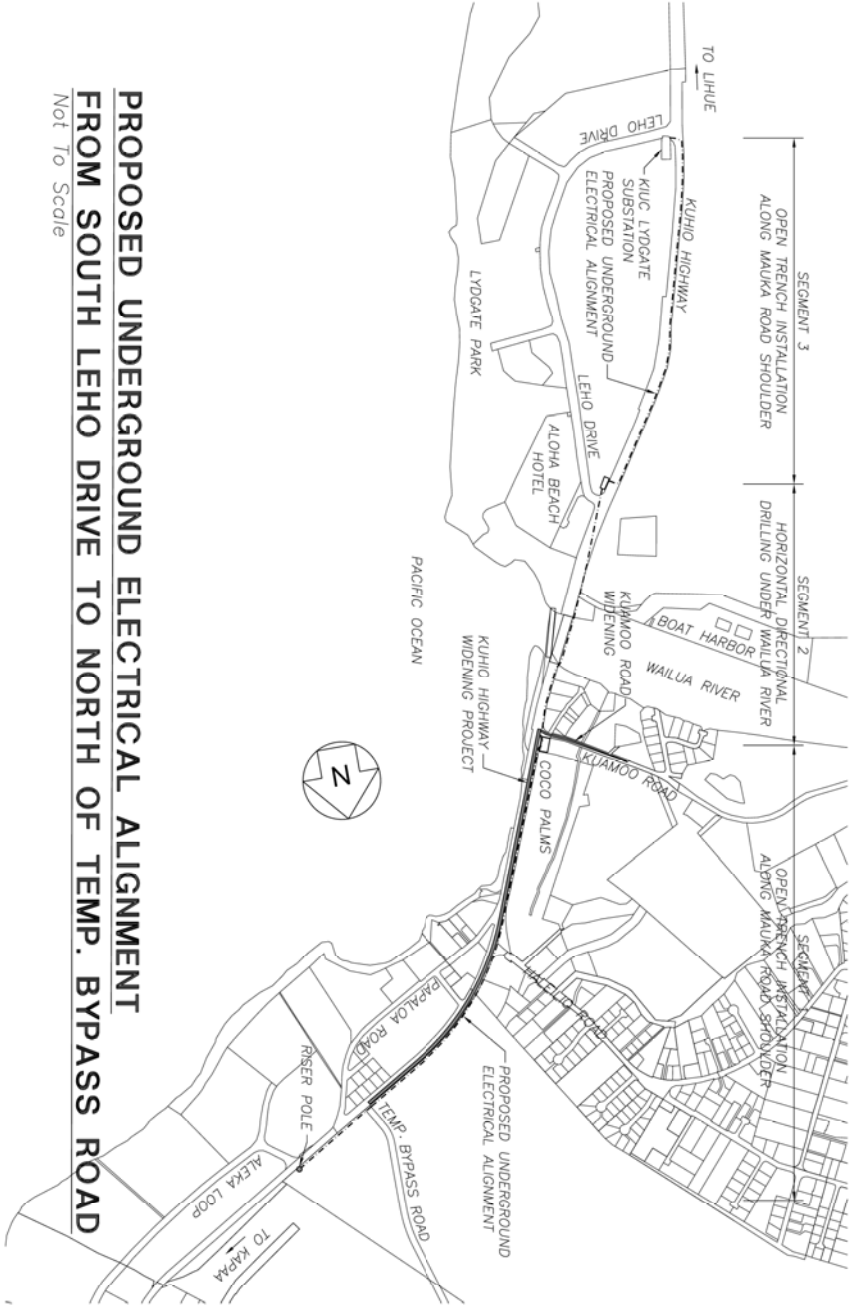
Introduction

The State of Hawai‘i, Department of Transportation, Highways Division (HDOT), proposes to construct various improvements along an approximately 1,030 meters (0.64 miles) section of the existing Kūhiō Highway between Kuamo‘o Road and the southern terminus of the Temporary Kapa‘a Bypass Road (Figure 1). Improvements proposed include adding an additional southbound lane between Kuamo‘o Road and the Kapa‘a Temporary Bypass Road, and undergrounding the existing utility pole-lines and associated utility wires between the Kapa‘a Temporary Bypass Road and Kuamo‘o Road. Additionally the project is proposing to underground the electrical lines between Kuamo‘o Road to the Lydgate Sub-station located at the intersection of Kūhiō Highway and South Leho Drive (Figure 1).

This report details the biological surveys that were performed as part of the environmental disclosure process. The primary purpose of the surveys was to determine if there are any botanical, avian or mammalian species currently listed, or proposed for listing under either federal or State of Hawai‘i endangered species statutes within or adjacent to the study area. We were also asked to evaluate the potential impacts that the development of the project might pose to any sensitive or protected native botanical, avian or mammalian species, and to propose appropriate minimization and, or mitigative measures that could be implemented to reduce or eliminate any such impacts. The federal and State of Hawai‘i listed species status follows species identified in the following referenced documents, (Division of Land and Natural Resources (DLNR) 1998, Federal Register 2005, U. S. Fish & Wildlife Service (USFWS) 2005, 2008). Fieldwork was conducted on February 16, 2009.

The avian phylogenetic order and nomenclature used in this report follows *The American Ornithologists' Union Checklist of North American Birds 7th Edition* (American Ornithologists' Union 1998), and the 42nd through the 49th supplements to *Check-list of North American Birds* (American Ornithologists' Union 2000; Banks et al. 2002, 2003, 2004, 2005, 2006, 2007, 2008). Mammal scientific names follow *Mammals in Hawaii* (Tomich 1986). Plant names follow *Hawai'i's Ferns and Fern Allies* (Palmer, 2003) for ferns, *Manual of the Flowering Plants of Hawai'i* (Wagner et al., 1990, 1999) for native and naturalized flowering plants, and *A Tropical Garden Flora* (Staples and Herbst, 2005) for crop and ornamental plants. Place names follow *Place Names of Hawaii* (Pukui et al. 1974).

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 17.



PROPOSED UNDERGROUND ELECTRICAL ALIGNMENT
FROM SOUTH LEHO DRIVE TO NORTH OF TEMP. BYPASS ROAD
Not To Scale

General Project Description

The project site is located along the existing Kūhiō Highway between South Leho Drive and the southern terminus of the Temporary Kapa‘a Bypass Road (Figure 1). The project proposes to add a new southbound travel lane along Kūhiō Highway between Kuamo‘o Road and the Temporary Kapa‘a Bypass Road. The highway will be widened from three to four lanes without acquiring additional right-of-way. The existing right-turn storage lane along Kuamo‘o Road will also be extended inland from its intersection with the highway approximately 650-feet inland (Figure 1).

Both private and government entities currently own, and/or operate overhead utilities within the project area include Kauai Island Utility Cooperative (KIUC), Hawaiian Telcom (HT), Oceanic Time Warner Cable (TV) and the Hawaii Department of Transportation (HDOT). KICU currently operates and maintains three separate electrical systems within the project corridor consisting of, a 57 kV transmission system, a 12 kV customer distribution system and a street lighting system. KIUC's electrical systems are all located along the primary utility pole alignment. The existing vertical configurations of the overhead utility systems consist of HT, TV, and TS located between 4.5-meters (15 feet), and 6-meter (20 feet), above ground. Electrical distribution lines are located approximately 7.6 and 10.6-meters (24 and 35 feet) above ground, and the electrical transmission lines are located approximately 14 to 18-meters (46 to 60 feet), above ground level.

The existing overhead utility lines located on both the *mauka* and *makai* sides of Kūhiō Highway between the south bank of the Wailua River and the Kapa‘a Temporary Bypass Road will be relocated into underground duct banks. Between the south bank of Wailua River and Leho Drive the electrical lines and Oceanic Time Warner cable will be removed from the 18-meter (60 foot) tall wood poles running along the *makai* shoulder of Kūhiō Highway, and placed in underground duck banks (Figure 1). At the time that this report is being written, April 23, 2009, Hawaiian Telcom lines will be left on the utility poles between the south bank of the Wailua River and South Leho Drive. As these lines are located at approximately 6-meters (20 feet) above ground level, the project is proposing to cut off the tops of the 18-meter (60 foot) tall wood utility poles above these lines after the electrical lines have been removed from the poles along this section of the project (Figure 1).

General Site Description

The disturbance corridor associated with this project falls within the existing Kūhiō Highway right-of-way. Vegetation a short distance beyond the verge of the roadway can be separated into two general vegetation associations: a weedy borderland between the maintained verge and pasture lands beyond (in some cases, agricultural use has been long abandoned) and landscaped areas associated with developments.

Botanical Survey Methods

The botanical survey was undertaken on February 16, 2009 and entailed walking the corridor (mostly the *mauka* side of Kūhiō Highway) from one end to the other while recording all species of plants observed. In areas of active and inactive pasture ("weedy borderland"), the survey area

was extended beyond the highway right-of-way to insure that a complete characterization was achieved. In landscaped (developed and mostly maintained) areas, the survey was more limited to a short distance inland from the verge because a majority of the plants present are ornamentals. The "developed" section extended from Hale‘ilio Road, to the entrance to Waialua State Park south of the bridge over the Wailua River.

Botanical Survey Results

A plant checklist (Table 1) was compiled from field observations, with entries arranged alphabetically under plant family names (standard practice). Included in the list are scientific name, common name, and status (whether native or non-native) for each species observed along the project corridor. In addition to identifying the plants present within the study site, qualitative estimates of plant abundance were made. These are coded in the table as explained in the Legend to Table 1 and apply to observations made during the present survey. For some species, a two-level system of abundance is used: the letter-number codes indicating species that have a limited distribution (e.g., found in only one small area of the property), but present there in numbers exceeding just a few individuals. For example, an abundance rating of "R" indicates a plant encountered only once or twice during the entire survey. A "R2" indicates a plant encountered in just one or two places, but with several to many individuals present where encountered. A "R3" would be a plant seldom encountered (i.e., rare), but locally abundant in one or more of the locations where encountered.

Table 1. Flora for Kūhiō Highway Widening Project, Kapa‘a, Kaua‘i

Species	***Common name***	***Status***	***Abundance***	***Notes***
	FERNS			
POLYPODIACEAE				
Phymatosorus grossus (Langsd. & Fisch.) Brownlie	*lauae*	Nat	U	<2>
	CYCADS			
CYCADACEAE				
Cycas sp.	sago palm	Orn	R	<2>
ZAMIACEAE				
Zamia sp.	coontie	Orn	R	<2>
	FLOWERING PLANTS			
	DICOTYLEDONE			
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	U3	
Barlaria cristata L.	Philippine violet	Nat	R	
Thunbergia fragrans Roxb.	sweet clockvine	Nat	R	
AIZOACEAE				
Tetragonia tetragonioides (Pall.) Kuntze	New Zealand spinach	Nat	R	<2>

Table 1 continued.

Species	*Common name*	*Status*	*Abundance*	*Notes*
AMARANTHACEAE				
Alternanthera pungens Kunth	khaki weed	Nat	U	
ANACARDIACEAE				
Schinus terebinthifolius Raddi	Christmas berry	Nat	U	
ARALIACEAE				
Schefflera actinophylla (Endl.) Harms	octopus tree	Nat	R	
ASTERACEAE (COMPOSITAE)				
Ageratum conyzoides L.	maile hohono	Nat	O	
Bidens pilosa L.	ki	Nat	O3	
Calyptocarpus vialis Less.	---	Nat	C	
Partheniuim hysterophorus L.	false ragweed	Nat	O2	
Emilia fosbergii Nicolson	Flora's paintbrush	Nat	O	
Pluchea carolinensis (Jacq.) G. Don	sourbush	Nat	U	
Sonchus oleraceus L.	sow thistle	Nat	O	
Sphagneticola triloba (L.) Pruski	wedelia	Nat	O3	
Synedrella nodiflora (L.) Gaertn.	nodeweed	Nat	O3	<2>
Tridax procumbans L.	coat buttons	Nat	O	
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	Nat	O3	
Xanthium strumarium L.	kīkānia, cocklebur	Nat	R2	
BIGNONIACEAE				
Spathodea campanulata P. Beauv.	African-tulip tree	Nat	R	<2>
BORAGINACEAE				
Heliotropium procumbens Mill.	---	Nat	R	
Tournefortia argentea L. fil.	tree heliotrope	Nat	O	<2>
BRASSICACEAE				
Lepidium virginicum L.	---	Nat	O3	
CASUARINACEAE				
Casuarina equisetifolia L.	ironwood	Nat	O	<2>
COMBRETACEAE				
Terminalia catappa L.	tropical almond	Nat	O	<2>
CONVOLVULACEAE				
Ipomoea obscura (L.) Ker-Gawl.	---	Nat	C	
Ipomoea triloba L.	little bell	Nat	U	
CUCURBITACEAE				
Momordica charantia L.	wild bitter melon	Nat	U	
EUPHORBIACEAE				
Aleurites moluccana (L.) Willd.	kukui	Pol	R	
Chamaesyce hirta (L.) Millsp.	garden spurge	Nat	R	
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	Nat	R	
Chamaesyce prostrate (Aiton) Small	prostrate spurge	Nat	U	

Table 1 continued.

Species	*Common name*	*Status*	*Abundance*	*Notes*
Codiaeum variegatum (L.) Blume	croton	Orn	U	<2>
Euphorbia heterophylla L.	kaliko	Nat	O	
Macaranga tanarius (L.) Müll. Arg	---	Nat	R	
Phyllanthus debilis Klein ex Willd.	niuri	Nat	R	
Ricinis communis L.	castor bean	Nat	O	
FABACEAE				
Canavalia cathartica Thours	maunaloa	Nat	U2	
Chamaecrista nictitans (L.) Moench	partridge pea	Nat	U	
Crotalaria incana L.	fuzzy rattlepod	Nat	R	<2>
Crotalaria pallida Aiton	smooth rattlepod	Nat	R	
Desmanthus pernambucanus (L.) Thellung	virgate mimosa	Nat	R	
Desmodium tortuosum (Sw.) DC	Florida beggarweed	Nat	R	
Desmodium triflorum (L.) *DC*	---	Nat	U	
Indigofera hendecaphyla Jacq.	prostrate indigo	Nat	U3	
Leucaena leucocephala (Lam.) deWit	koa haole	Nat	AA	
Macroptilium atropurpureum (DC) Urb.	---	Nat	U1	
Mimosa pudica L.	sensitive plant	Nat	U	
Neonotonia wightii (Wight & Arnott) Lackey	glycine	Nat	C	
Senna occidentalis (L.) Link	coffee senna	Nat	U1	
Senna surattensis (N.L. Burm.) H. Irwin & Barneby	kolomana	Nat	U	
GOODINACEAE				
Scaevola taccada (J. Gaert.) Roxb.	naupaka kahakai	**Ind**	C	<2>
LAMIACEAE				
Leonotis nepetifolia (L.) R.Br.	lion's ear	Nat	U2	
MALVACEAE				
Abutilon grandifolium (Wild.) Sweet	hairy abutilon	Nat	R	
Hibiscus rosa-sinensis L.	Chinese hibiscus	Orn	R	<2>
Hibscus tiliaceus L.	hau	**Ind** ?	R2	
Malvastrum coromendalianum (L.) Garcke	false mallow	Nat	U3	
Sida rhombifolia L.	Cuba jute	Nat	O	
MORACEAE				
Ficus microcarpa L. fil.	Chinese banyan	Nat	R	<2>
MYRTACEAE				
Psidium cattleianum Sabine	strawberry guava	Nat	R	
Syzygium cumini (L.) Skeels.	Java plum	Nat	U2	
NYCTAGINACEAE				
Boerhavia coccinea Mill.	false alena	Nat	R	

Table 1 Continued.

Species	*Common name*	*Status*	*Abundance*	*Notes*
OLEACEAE				
Noronhia emarginata (Lam.) Poir.	Madagascar-olive	Nat	C	<2>
PAPAVERACEAE				
Argemone mexicana L.	Mexican poppy	Nat	U1	
PLANTAGINACEAE				
Plantago lanceolata L.	nrw-lvd plantain	Nat	C	
Plantago major		Nat	U3	<2>
POLYGONACEAE				
Coccoloba uvifera (L.) L.	sea-grape	Nat	O	<2>
RUBIACEAE				
Gardenia taitensis de Candolle	Tahitian gardenia	Orn	R	<2>
Gardenia sp.	tree gardenia	Orn	R	<2>
Morinda citrifolia L.	noni	Pol	R	<2>
Spermacoce assurgens Ruiz. & Pav.	buttonweed	Nat	C	
SOLANACEAE				
Solanum americanum P. Miller	pōpolo	Pol	R	
VERBINACEAE				
Stachytarpheta cayennensis (Rich.) Vahl	nettle-leaved vervain	Nat	R	
Stachytarpheta jamaicensis (L.) Vahl	Jamaican vervain	Nat	O	
Verbena litoralis Kunth	ōwi	Nat	R	
Vitex trifolia L.	blue vitex	Nat	A	<2>
MONOCOTYLEDONES				
AGAVACEAE				
Cordyline fruticosa (L.) A. Chev.	ti cultivars	Orn	O	<2>
Dracaena sanderiana M. T. Masters	sanderiana	Orn	R	<2>
Sanseviera trifasciata Prain	bowstring-hemp	Orn	R1	<2>
ARACEAE				
Epipremnum pinnatum 'Aureum' J. Linden & André	pothos	Nat	U	<2>
ARECACEAE				
Cocos nucifera L.	coconut palm	Nat	O2	<2>
Dypsis lutescens (H. Wendl.) Beentje & Dransfield	golden-fruited palm	Orn	R	<2>
Phoenix sp.	juv. date palms	Nat	R	
Pritchardia cf. *thurstonii* F. Muel. & Drude	---	Orn	R	<2>
Ptychosperma macarthurii (Veitch) J. D. Hook.	Macarthur palm	Orn	R	<2>
COMMELINACEAE				
Commelina diffusa N. L. Burm.	dayflower	Nat	U	<1>

Table 1 Continued.

Species	*Common name*	*Status*	*Abundance*	*Notes*
CYPERACEAE				
Cyperus sp.	umbrella sedge	Orn	R	<2>
LILIACEAE				
Crinum asiaticum L.	giant lily	Nat	C	<2>
MUSACEAE				
Musa hybrid	banana	Orn	R	
PANDANACEAE				
Pandanus textorius S. Parkinson ex Z	*hala*	**Ind**	O	<2>
POACEAE (GRAMINEAE)				
Bothriochloa pertusa (L.) A. Camus	pitted beardgrass	Nat	U3	
Brachiaria subquadripara (Trin.) Hitchc.		Nat	U	
Cenchrus echinatus L.	common sandbur	Nat	C	
Chloris barbata (L.) Sw.	swollen fingergrass	Nat	O3	
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	C3	
Dactyloctenium aegyptium (L.) Willd.	beach wiregrass	Nat	U3	<2>
Digitaria insularis (L.) Mez ex Ekman	sourgrass	Nat	R	
Eleusine indica (L.) Gaertn.	wiregrass	Nat	C	
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	A	
Melinus repens (Willd.) Zizka	Natal redtop	Nat	U	
Paspalum fimbriatum Kunth	fimbriate paspalum	Nat	O	
Paspalum sp.	indet.	Nat	O2	
Pennisetum purpureum Schumach.	elephant grass	Nat	O3	
Sacciolepis indica (L.) Chase	Glenwood grass	Nat		
Sporobolis africanus (Poir.) Robyns & Tournay	smutgrass	Nat	R	
Urochloa maxima (Jacq.) Webster	Guinea grass	Nat	A	
Urochloa mutica (Forssk.) Nguyen	California grass	Nat	AA	<1>

Legend to Table 1

Status = distributional status
End. = endemic; native to Hawai'i and found naturally nowhere else.
Ind. = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
Nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
Orn. = exotic, ornamental or cultivated crop; plant not naturalized (not well-established outside of cultivation, at least at this location).
Pol. = Polynesian introduction; brought to the Hawaiian Islands before 1778.

Abundance = occurrence ratings for plants on property in March 2008

R – Rare -	only one or two plants seen.
U - Uncommon -	several to a dozen plants observed.
O - Occasional -	found regularly, but not abundant anywhere.
C - Common -	considered an important part of the vegetation and observed numerous times.
A - Abundant -	found in large numbers; may be locally dominant.
AA - Abundant -	very abundant and dominant; defining vegetation type.

Numbers (as in R3) offset occurrence ratings (1 – several plants; 2 – many plants; 3 – abundant in a limited area) in cases where distribution across the survey area may be limited, but individuals seen are more than indicated by the occurrence rating alone.

Notes:

<1> Seen in the wetland just south of the bypass road. (relative abundance refers to this area only).
<2> Seen mostly in the developed area between Hale'ilio Road and the entrance to Wailua State Park, south of the Wailua River (relative abundance refers to this area only).

The total number of flowering plants, cycads, and ferns recorded during the survey was 110. Of this number, only three (3) or 2.7% are considered native, indigenous (found in Hawaii and elsewhere) species and another three (3) early Polynesian introductions. While this number of Hawaiian plants is low, the environment is a highly disturbed one. The natives include *naupaka* (*Scaevola taccada*) and *hala* (*Pandanus tectorius*) used in this area for landscaping and *hau* (*Hibiscus tiliaceus*), which lines the bank of the river upstream of the highway bridge.

Avian Survey Methods

Eight avian count stations were sited along the length of the proposed project corridor, at approximately 300-meter (984 foot) intervals. Six-minute point counts were made at each station. Stations were each counted once. Additionally a time dependant 30-minute waterbird count was conducted from the southern bank of the Wailua River. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated in the early morning hours, the peak of daily bird activity. Weather during the course of the survey was ideal. Time not spent counting was used to search the rest of the site for species and habitats not detected during count sessions.

Avian Survey Results

A total of 133 individual birds of 14 species, representing 12 separate families, were recorded during station counts (Table 2). An additional species, Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*) was recorded as an incidental observation adjacent to the southern terminus of the Temporary Kapa'a Bypass Road. Two of the species detected during the course of this survey, Black-crowned Night-Heron, and Pacific Golden-Plover (*Pluvialis fulva*) are native species. The former is an indigenous breeding species, and the later a migratory indigenous species. The remaining 13 species are considered to be alien to the Hawaiian Islands (Table 2).

Avian diversity and densities were in keeping with the locations and the habitat present on the site. Four species, Common Myna (*Acridotheris tristis*), Japanese White-eye (*Zosterops japonicus*), Zebra Dove (*Geopelia striata*), and House Sparrow (*Passer domesticus*), accounted for slightly less than 64% of the total number of all birds recorded during station counts. The most commonly recorded species was Common Myna, which accounted for 19.55% of the total number of individual birds recorded. An average of 17 birds were detected per station count.

No waterbirds were recorded during the course of the time-dependant waterbird count conducted along the Wailua River. No avian species currently protected, or proposed for protection under either the Federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR 1998, Federal Register 2005, USFWS 2005, 2008).

Table 2. Avian Species Detected: Kūhiō Highway Widening Project

Common Name	*Scientific Name*	*ST*	*RA*
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	Phasianinae - Pheasants & Allies		
Red Junglefowl	*Gallus gallus*	A	1.13
	CICONIIFORMES		
	ARDEIDAE - Herons, Bitterns & Allies		
Cattle Egret	*Bubulcus ibis*	A	0.50
Black-crowned Night-Heron	*Nycticorax nycticorax hoactli*	IB	**I-1**
	CHARADRIIFORMES		
	CHARADRIIDAE - Lapwings & Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	0.13
	COLUMBIFORMES		
	COLUMBIDAE – Pigeons & Doves		
Rock Pigeon	*Columba livia*	A	0.25
Spotted Dove	*Streptopelia chinensis*	A	0.50
Zebra Dove	*Geopelia striata*	A	2.38
	PASSERIFORMES		
	SYLVIIDAE – Old World Warblers & Gnatcatchers		
	Sylviinae – Old World Warblers		
Japanese Bush-Warbler	*Cettia diphone*	A	0.38
	TURDIDAE – Thushes		
White-rumped Shama	*Copsychus malabaricus*	A	0.38
	ZOSTEROPIDAE – White-Eyes		
Japanese White-eye	*Zosterops japonicus*	A	2.63
	STURNIDAE – Starlings		
Common Myna	*Acridotheres tristis*	A	3.25
	EMBERIZIDAE – Emberizids		
Red-crested Cardinal	*Paroaria coronata*	A	0.38
	CARDINALIDAE – Cardinals Saltators & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	0.50
	FRINGILLIDAE – Fringilline And Cardueline Finches & Allies		
	Carduelinae – Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	1.88
	PASSERIDAE - Old World Sparrows		
House Sparrow	*Passer domesticus*	A	2.38

Key to Table 2.

ST	Status
A	Alien species – introduced to Hawai'i by humans that have become established in the wild
IB	Indigenous Breeding species – Native breeding species also found elsewhere naturally
IM	Indigenous Migratory species – Native migratory species also found elsewhere naturally
RA	Relative Abundance: Number of birds detected divided by the number of count stations (8)

Mammalian Survey Methods

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or *'ōpe'ape'a* as it is know locally, all terrestrial mammals currently found on the Island of Kaua'i are alien species, and most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all vertebrate species observed and heard within the project area.

Mammalian Survey Results

No mammals were recorded during the course of this survey, a finding that is not unusual considering that the survey was conducted along the shoulder of arguably, the busiest road on the island of Kaua'i.

Discussion

Botanical Resources

Nearly all of the plants encountered are introduced (non-native) species, many considered opportunistic weeds (ruderal species) typical of disturbed areas, such as the frequently maintained highway verge. The small numbers of native species found along the project right-of-way are considered to be common throughout the islands, and, in this area, have been planted as part of landscaping efforts.

Avian Resources

The findings of the avian survey are consistent with the location of the property, and the habitat present along the right-of-way, as well as the findings of at least one other relatively recent survey conducted along the same corridor (David 2003).

Fifteen separate species of birds were recorded during the time on site, all but two of these are considered to be alien to the Hawaiian Islands. The two native species detected, Black-crowned Night-Heron and Pacific Golden-Plover are indigenous to the islands. The former is an indigenous breeding species, and the later a migratory indigenous species. As previously mentioned the study corridor is located along the shoulder of the existing Kūhiō Highway, which is an extremely busy roadway, not the ideal situation in which to census birds. Though the existing habitat present along the roadway does not represent the kind of habitat in which one would expect to find listed avian species.

Although not detected during this survey, both the endangered Hawaiian Petrel (*Pterodroma sandwichensis*) and the threatened endemic sub-species of the Newell's Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the general project area between April and the end of November each year (Morgan et al., 2003, 2004, Verschuyk, and Dennis 2007, Verschuyk, Colclazier and Dennis 2007), David and Planning Solutions 2008). There are no nesting colonies or suitable nesting habitat for either of these species on, or close to the subject property.

The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983, Simons and Hodges 1998, Ainley et al. 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Hadley 1961, Telfer 1979, Sincock 1981, Reed et al. 1985, Telfer et al. 1987, Cooper and Day 1994, Podolsky et al. 1998, Ainley et al. 2001).

Data gathered as part of the Save Our Shearwaters (SOS) Program over the past 30-years documents that both Hawaiian Petrels and Newell's Shearwaters have been downed along the project corridor on an annual basis over the last 30 years (Morgan et al., 2003, 2004, David and Planning Solutions 2008, DOFAW unpublished data 1979-2008). It is impossible to state with any certainty the exact number of these two species that have been recovered in the general project corridor over the life of the SOS program, since much of the data is not site specific enough to identify the pickup locations of birds recovered to within the confines of this projects limits (Morgan et al., 2003, 2004, David and Planning Solutions 2008). What can be said is that at least 182 Newell's Shearwaters have been collected by the SOS program within the general project area between 1979 and 2007. What can also be stated is that the number of birds recovered on an annual basis has dropped after the Coco Palms Hotel ceased operations following hurricane Iniki in September 1992. The SOS data records 154 shearwaters recovered within the general project area between 1979 and 1992, an average of 11-birds a year, the data records 28-birds recovered between 1993 and 2007, or an average of slightly less than 2-birds a year, and over the past 10-years a total of 9-birds have been recovered within the general project area, or slightly less than one bird a year. It should also be noted that the SOS program has not recovered any Hawaiian Petrels within the general project area has over the past 30-years.

Mammalian Resources

The findings of the mammalian survey are consistent with the location of the property and the habitat currently present on the site. Although no Hawaiian hoary bats were detected during the course of this survey, bats have been recorded foraging for insects in the general project area (Verschuyk, and Dennis 2007, David 2008). Hoary bats are widely distributed in the lowland areas on the Island of Kaua'i, and have been documented in and around almost all areas that still have some dense vegetation (Tomich 1986, David 1999, 2000, 2008, USFWS 1998).

Although no rodents were detected during the course of this survey, it is likely that the four established alien *muridae* found on Kaua'i, roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), European house mouse (*Mus musculus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources found within the general project area. All of these introduced rodents are deleterious to native ecosystems and the native faunal species dependant on them.

Potential Impacts to Protected Species

Botanical Resources

No plant species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawai'i's endangered species programs were recorded within or close to the proposed project area. Therefore it is not expected that the modification to the environment as proposed will result in deleterious impacts to any plant species currently listed under either federal or State of Hawai'i endangered species statutes (DLNR 1998, Federal Register 2005, USFWS 2005, 2008).

Hawaiian Petrel and Newell's Shearwater

The principal potential threats that currently exists within the general project area to these two species are those posed by street lights, business lighting and the seventeen separate utility wires and associated poles that run the length of the proposed project corridor in various configurations and numbers. The threats posed by these structures and outdoors lighting are associated with birds being downed after becoming disoriented by outdoors lighting and possibly colliding with above ground utility structures, and other man-made structures.

The project is proposing to underground all of the utility lines between the Kapa'a Bypass Road and the south bank of the Wailua River and to remove the utility poles associated with these lines. South of the river it is being proposed that the electrical lines will be removed and placed underground, and the utility poles will be toped to reduce their existing height of 18-meter (60 foot), to approximately 7-9 meters (25 to 30 foot). These actions will significantly reduce the existing threats to these listed seabird species, and represents a significant minimization of existing threats to these species from those currently found within the project right-of-way.

If night-time construction work is necessary on this project the use of lights to conduct construction activity or service construction equipment will pose a temporary threat to these listed seabird species as previously discussed.

Hawaiian Hoary Bat

The current habitat present on the site is not of the type or general plant makeup that one would ordinarily expect to find bats roosting in. It is possible that bats forage over the site on a seasonal basis. It is not expected that the clearing of the site, and the operation of a proposed roadway improvements will result in deleterious impacts to this listed species.

Conclusions

It is not expected that the modification of the environment found within or adjacent to the project area will have a negative impact on any botanical, avian or mammalian species currently listed as endangered, threatened, or that are currently proposed for listing under either federal or State of Hawai'i endangered species statutes (DLNR 1998, Federal Register 2005, USFWS 2005, 2008).

It is expected that the undergrounding of electrical lines, and the removal and/or toping of utility poles along the length of the project will significantly reduce the existing threats posed by these structures to Hawaiian Petrels and Newell's Shearwaters.

Recommended Minimization Measures

The project proposes to enact the following minimization measures during the course of construction activities to ensure that such activities have a minimal impact on either of the listed seabird species discussed above.

- If nighttime work will be required in conjunction with the development of the project, it is recommended that lights be shielded to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures (Reed et al. 1985, Telfer et al. 1987).
- During the construction phase of the project, any lighting necessary to conduct nighttime activities will be shielded and or directed at the ground.
- No nighttime construction will occur during the peak fallout period, namely between September 15 and December 15 annually.
- All construction personnel will be required to attend a seabird awareness program prior to the initiation of construction activity.
- A pet carrier will be maintained on site at all times, and will be used to temporarily hold any downed seabird recovered in the general project area.
- If a downed seabird is found within the general project area it will be retrieved and placed in the pet carrier and maintained in a shady location until DOFAW or SOS program personnel retrieve the bird.
- DOFAW and/or the SOS program will be contacted immediately upon recovery of any downed bird.
- The USFWS shall be notified of any downed seabird within 24-hours of the occurrence.

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
Mauka – Upslope, towards the mountains
Makai – Down-slope, towards the ocean
Muridae – Rodents, including rats, mice and voles, one of the most diverse families of mammals
Nocturnal – Night-time, after dark
Pelagic – An animal that spends it's life at sea – in the case of seabirds only returning to land to nest
Ruderal – Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles
Sign – Biological term referring tracks, scat, rubbing, odor, marks, nests, and other signs created by animals by which their presence may be detected
Volant – Flying, capable of flight - as in flying insect
Threatened - Listed and protected under the ESA as a threatened species

ESA – Federal Endangered Species Act of 1973, as amended
DLNR – Hawaii State Department of Land & Natural resources
USFWS – U.S. Fish & Wildlife Service

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Appendix G

Archaeological Assessment and Related Correspondence

Appendix G-1

Letter from SHPD, DLNR, Chapter 6E – Historic Preservation Review – Archaeological Assessment for Kūhiō Highway Short-Term Improvements, Kuamo'o Road to the Temporary Bypass Road,

July 18, 2007

LINDA LINGLE
GOVERNOR OF HAWAII

ALLAN A. SMITH
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

WAILUA

July 18, 2007

Hallett Hammatt, Ph.D.
Cultural Surveys Hawai'i
Post Office Box 1114
Kailua, Hawai'i 96734

LOG: 2007.2362
DOC: 0707NM23
Archaeology

Dear Dr. Hammatt:

Subject: **Chapter 6E-42 - Historic Preservation Review – Archaeological Assessment for Kuhio Highway Short-Term Improvements – Kuamo'o Road to the Temporary Kapaa ByPass Road Wailua Ahupua'a Puna District Koloa, Kauai (CSH, Hammatt and Shideler June 2007)**
TMK: [4] 4-1-003: 039 por.

Thank you for submitting the aforementioned archaeological assessment by CSH, Hammatt and Shideler (2007). Ten backhoes trenches were dug along Kuhio Highway. In trench 9, a remnant of a cultural layer identified as site 50-30-08-1711 (Buffum and Dega 2002) was found. No other historic properties or burials were found. We concur with your recommendation of archaeological monitoring during the construction of the widening of Kuhio highway. Mitigation for inadvertent discoveries would be covered by archaeological monitoring. Therefore we recommend the following conditions be attached to this permit for a "no adverse effect" on historic properties:

An archaeological monitoring plan shall be submitted to the State Historic Preservation Division for review and approval. Archaeological monitoring shall take place during all subsurface construction work due to the high probability of finding human burials. A draft monitoring report shall be submitted 90 days after the completion of fieldwork for review and approval to the State Historic Preservation Division.

The assessment report is acceptable. If you have any questions, please call Nancy McMahon, the Kauai and Molokai Archaeologist who reviewed this plan at 808.742.7033.

Sincerely,

Melanie A. Chinen, Administrator
State Historic Preservation Division

NM:
c: DLNR –Kauai Land Division
DOT – Highways Division
County - Public Works and Planning Departments
KHPRC

Appendix G-2

Letter from SHPD, DLNR, Chapter 6E-42 –

Pre-Assessment Consultation for Kūhiō Highway Short-Term Improvements, Kuamo'o Road to the Temporary Bypass Road,

September 21, 2007

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
INTERIM CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEN C. KAWAHARA
DEPUTY DIRECTOR · WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

September 21, 2007

RECEIVED
SEP 24 2007
WILSON OKAMOTO CORPORATION

Ron Sato, Senior Planner
Wilson Okamoto Corp
1907 South Beretania Street, Suite 400.
Honolulu, Hawaii 96826

LOG NO: 2007.2770
DOC NO: 0709NM12
Archaeology

Dear Mr. Sato:

SUBJECT: Chapter 6E-42 - Historic Preservation Review – Pre- Assessment Consultation for Kuhio Highway Short Term Improvements Kuamoo Road to Temporary By-Pass Road FAP No. NH-056-I(50)
Wailua, Kawaihau District, Island of Hawai'i
TMK: (4) 4 various

The aforementioned permit is for Kuamoo Road improvements to the existing right –turn storage lane.

We believe that "**no historic properties will be affected,**" because:

- ☒ Intensive cultivation has altered the land
- ☒ Residential development/urbanization has altered the land
- ☒ Previous grubbing/grading has altered the land
- ☐ An accepted archaeological inventory survey (AIS) found no historic properties
- ☐ SHPD previously reviewed this project and mitigation has been completed
- ☐ Other:

In the event that historic resources, including human skeletal remains, are identified during routine construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Kauai Section, needs to be contacted immediately at (808) 742-7033.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

NM:jen

Appendix G-3

Letter from SHPD, DLNR, National Historic Preservation Act – Section 106 Review – Final Archaeological Monitoring Plan for the Proposed Kūhiō Highway Short-Term Improvements, Kuamo'o Road to the Temporary Bypass Road, March 16, 2009

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
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COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

March 16, 2009

Mr. David Schideler
Cultural Surveys Hawai'i
P. O. Box 1114
Kailua, Hawai'i 96734

LOG NO: 2009.1329
DOC NO: 0903WT117
Archaeology

Dear Mr. Shideler:

SUBJECT: National Historic Preservation Act – Section 106 Review—
FINAL Archaeological Monitoring Plan for the Proposed Kūhiō Highway Short – Term Improvements – Kuamo'o Road to the Temporary Kapa'a Bypass Road Project,
Wailua Ahupua'a, Puna District, Kaua'i
TMK: (4) 4-1-003: 017, 039, 044 and 4-3-002: 006 por.

Thank you for providing the opportunity to review this Final Archaeological Monitoring Plan (AMP) (FINAL *Archaeological Monitoring Plan for the Proposed Kūhiō Highway Short –Term Improvements – Kuamo'o Road to the Temporary Kapa'a Bypass Road Project, Wailua Ahupua'a, Puna District, Kaua'i TMK: (4) 4-1-003: 017, 039, 044 and 4-3-002: 006 por. [Goza and Schideler MA, March 2009])* which we received on March 10, 2009.

This project is the creation of short-term improvements to the Kūhiō Highway between Kuamo'o Road on the south and the Temporary Kapa'a Bypass Road on the north. The project area is located in an archaeologically sensitive area fronting the Coco Palms Resort where previous archaeological inventory surveys recorded a widely dispersed buried cultural layer and numerous human burials on the grounds of the resort. These findings were the impetus behind the request from this office to develop this AMP (LOG NO: 2007.2373/DOC NO: 0707NM35 and LOG NO: 2007.1399/DOC NO: 0708NM20).

We requested revisions including the checking of references so that all match throughout the body of the report and in the References Cited Section and the revision of the Background Summary and the Predictive Model Section. These revisions have been made.

This AMP is accepted and meets the minimum requirements for compliance under HRS and Hawaii Administrative Rules (HAR) §13-13-279: *Rules Governing Standards for Archaeological Monitoring Studies and Reports.*

As this monitoring plan has received final acceptance, and we are in receipt of a hard copy, we will mark this document as FINAL and place in our library. Please send a copy of this review letter and a text-searchable PDF version on CD to the attention of Wendy Tolleson and the "**SHPD Library**" at the Kapolei SHPD office.

Please contact Wendy Tolleson at (808) 692-8024 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy A. McMahon (Deputy SHPO)
State Historic Preservation Officer

Appendix G-4

Draft Archaeological Assessment for the State DOT Kūhiō Highway Short-Term Improvements Project

Cultural Surveys Hawai'i, Inc.

April 2009

DRAFT

Archaeological Assessment for the State DOT Kūhiō Highway Short-Term Improvements Project, Wailua Ahupuaʻa, Kawaihau District, Island of Kauaʻi

TMK: [4] 4-1-003: 007 por. & 017 por.; [4] 3-9-006: 009 por. & 026 por.

Prepared for

Wilson Okamoto Corporation

and

the State of Hawaiʻi Department of Transportation

Prepared by

Jon Tulchin, B.A.

and

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.

Kailua, Hawaiʻi

(Job Code: WAILUA 7)

April 2009

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Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Archaeological Assessment for the State DOT Kūhiō Highway Short-Term Improvements Project, Wailua Ahupuaʻa, Kawaihau District, Island of Kauaʻi, TMK: [4] 4-1-003: 007 por. & 017 por.; [4] 3-9-006: 009 por. & 026 por.
Date	April 2009
Project Number (s)	Cultural Surveys Hawaiʻi Inc. (CSH) Job Code: WAILUA 7
Investigation Permit Number	Fieldwork in this report has been performed under CSH's annual archaeological research permit, No. 09-20, issued by DLNR / SHPD.
Project Area Location	The project area consists of a linear corridor stretching from Aleka Loop to Leho Drive and is situated along the *mauka* (inland) side of Kūhiō Highway. The project area is depicted on the 1996 Kapaʻa U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Land Jurisdiction	Public, State of Hawaiʻi
Agencies	State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR)
Project Description	The project area is proposed for the installation of an underground electrical alignment. Associated ground disturbance would involve open trench installation from Aleka Loop to Kuamoʻo Road, horizontal directional drilling underneath the Wailua River (from Kuamoʻo Road to the northern end of Leho Drive), and open trench installation from the northern end of Leho Drive to the southern end of Leho Drive.
Project Area length	2.8 km (1.7 miles) linear corridor.
Area of Potential Effect (APE) & Survey Acreage	Based on available information, the proposed new subsurface utility installation will not impose adverse visual, auditory or other environmental impact to any known historic properties, including standing architecture, located outside the project area. Accordingly, the proposed subsurface utility installation, based on available information lacks potential to affect historic properties outside the project area. As a result the subsurface utility installation's APE is the same as the project area. The survey area for the current investigation included the entire approximately 2.8 km (1.7 miles) linear APE/project area.

Historic Preservation Regulatory Context	The State DOT Kūhiō Highway Short-Term Improvements Project constitutes a project requiring compliance with and review under state of Hawai'i historic preservation legislation [Hawai'i Revised Statutes (HRS) Chapter 6E-8 and Hawai'i Administrative Rules (HAR) Chapter 13-13-275]. At the request of Wilson Okamoto Corporation, CSH completed what began as an archaeological inventory survey investigation of the project area, per the requirements of HAR Chapter 13-13-276. Because no archaeological historic properties were located, this investigation became an archaeological assessment, per the language of HAR Chapter 13-13-275-5. This document is intended to support the proposed project's historic preservation review under HRS Chapter 6E-8 and HAR Chapter 13-13-275, as well as the project's environmental review under HRS Chapter 343. It is also intended to support any project-related historic preservation consultation with stake-holding state, and county agencies and interested Native Hawaiian and community groups.
Fieldwork Effort	Jon Tulchin, B.A., Todd Tulchin, B.S., Geral Ida, B.A., and Missy Kamai, B.S., conducted the fieldwork effort, which required 6 person-days to complete. Fieldwork took place on February 19th, March 10th and 11th 2009 under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator).
Number of Historic Properties Identified	None
Historic Properties Recommended Eligible to the Hawai'i Register of Historic Places (Hawai'i Register)	None
Historic Properties Recommended Ineligible to the Hawai'i Register	None
Effect Recommendation	CSH's project specific effect recommendation is "effect, with proposed mitigation commitments." The proposed underground electrical alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's APE. The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed trunk sewer line and be pro-active in addressing possible community concerns.

Mitigation Recommendation	Background research has indicated that the area in the vicinity of the project area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus it is very likely that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Specifics of the archaeological monitoring will be addressed in the archaeological monitoring plan to be reviewed and approved by the State Historic Preservation Division. This monitoring program will facilitate the identification and proper treatment of any burials that might be discovered during project construction, and will gather information regarding the project's non-burial archaeological deposits, should any be discovered.

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Section 1 Introduction

1.1 Project Background

At the request of Wilson Okamoto Corporation, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey/archaeological assessment of approximately 960 square feet for the State DOT Kūhiō Highway Short-Term Improvements Project, Wailua Ahupua‘a, Kawaihau District, Island of Kaua‘i, TMK: [4] 4-1-003: 007 por. & 017 por.; [4] 4-39-006: 009 por. & 026 por. The project area consists of a linear corridor stretching from Aleka Loop to the southern end of Leho Drive and is primarily situated within the Kūhiō Highway right-of-way. The project area is depicted on the 1996 Kapa‘a U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle. This area is depicted on the 1996 Kapa‘a U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle, a Tax Map Key (TMK), and an aerial photograph (Figure 1, Figure 2, & Figure 3).

The project area consists of an approximately 2.8 km (1.7 mile) linear corridor under the land jurisdiction of the State of Hawai‘i. The project area is proposed for the installation of an underground electrical alignment. Associated ground disturbance would involve open trench installation from Aleka Loop to Kuamo‘o Road, horizontal directional drilling underneath the Wailua River (from Kuamo‘o Road to the northern end of Leho Drive), and open trench installation from the northern end of Leho Drive to the southern end of Leho Drive (Figure 4).

Based on available information, the proposed new subsurface utility installation will not impose adverse visual, auditory or other environmental impact to any known historic properties, including standing architecture, located outside the project area. Accordingly, the proposed subsurface utility installation, based on available information lacks potential to affect historic properties outside the project area. As a result the subsurface utility installation's APE is the same as the project area. The survey area for the current investigation included the entire approximately 2.8 km (1.7 miles) linear APE/project area.

The State DOT Kūhiō Highway Short-Term Improvements Project constitutes a project requiring compliance with and review under state of Hawai‘i historic preservation legislation [Hawai‘i Revised Statutes (HRS) Chapter 6E-8 and Hawai‘i Administrative Rules (HAR) Chapter 13-13-275]. At the request of Wilson Okamoto Corporation, CSH completed what began as an archaeological inventory survey investigation of the project area, per the requirements of HAR Chapter 13-13-276. Because no archaeological historic properties were located, this investigation became an archaeological assessment, per the language of HAR Chapter 13-13-275-5. This document is intended to support the proposed project's historic preservation review under HRS Chapter 6E-8 and HAR Chapter 13-13-275, as well as the project's environmental review under HRS Chapter 343. It is also intended to support any project-related historic preservation consultation with stake-holding state, and county agencies and interested Native Hawaiian and community groups.

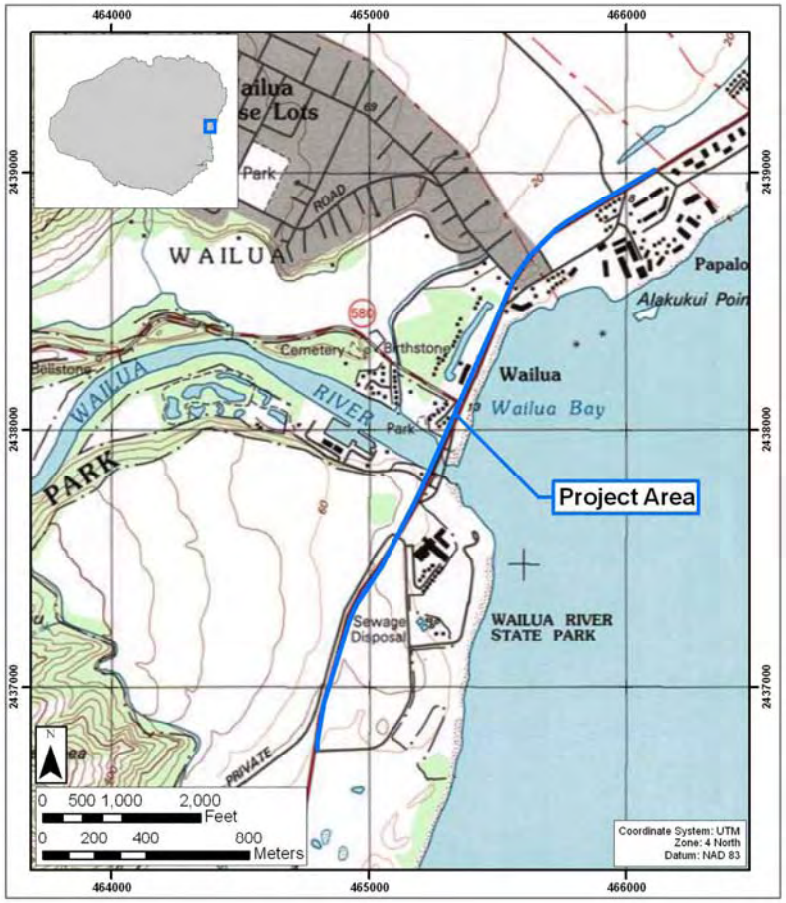

Figure 1. USGS 7.5 Minute Series Topographic Map, Kapa‘a Quadrangle (1996), showing the location of the project area

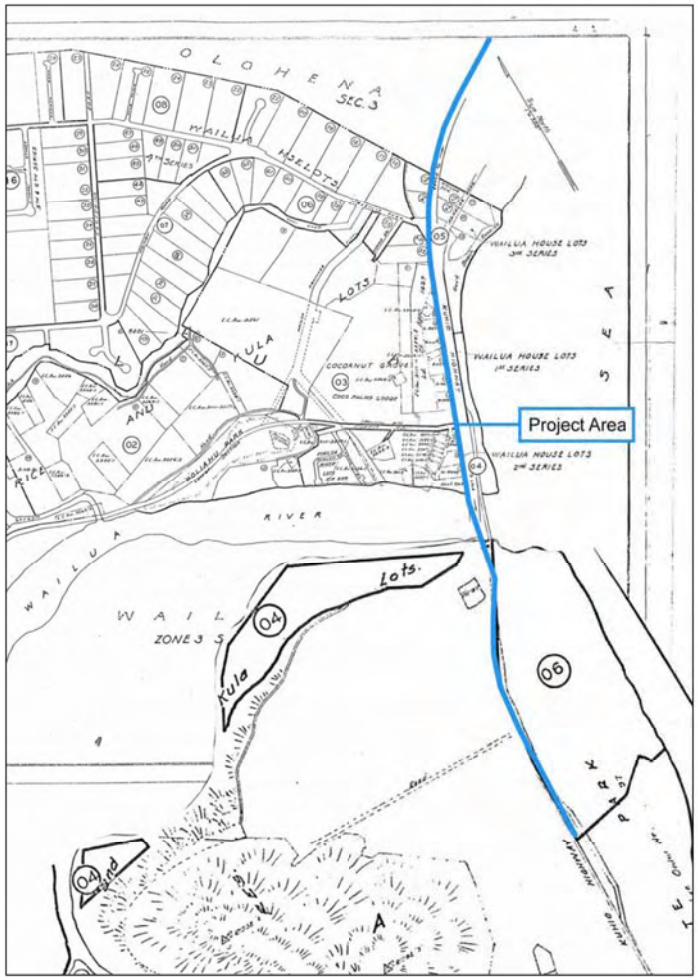

Figure 2. Composite of TMK [4] 4-1 and [4] 3-9 showing the location of the project area

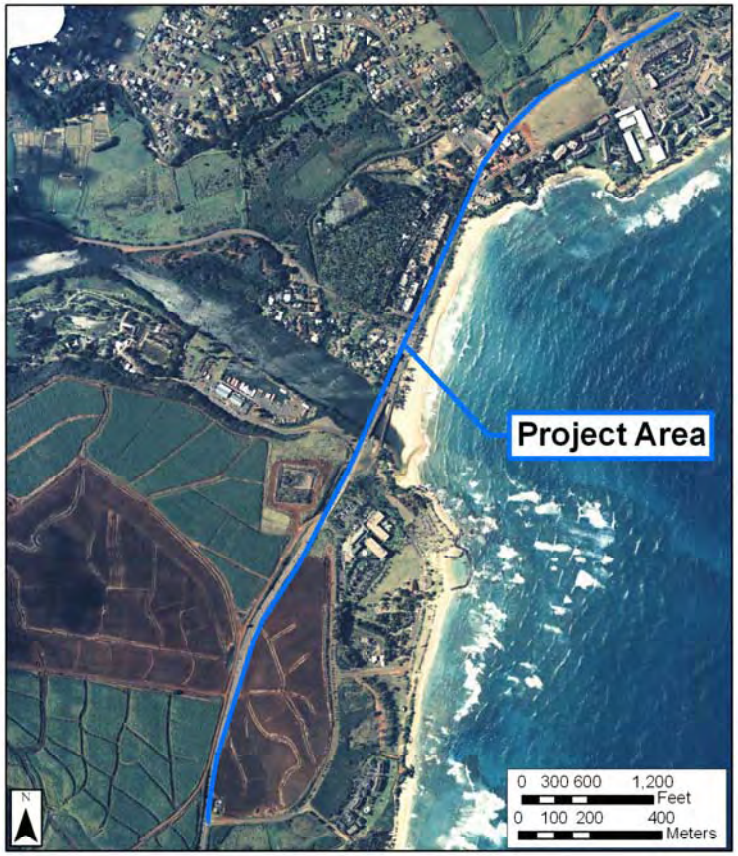

Figure 3. Aerial photograph showing the location of the project area (source: USGS Orthoimagery 2005)

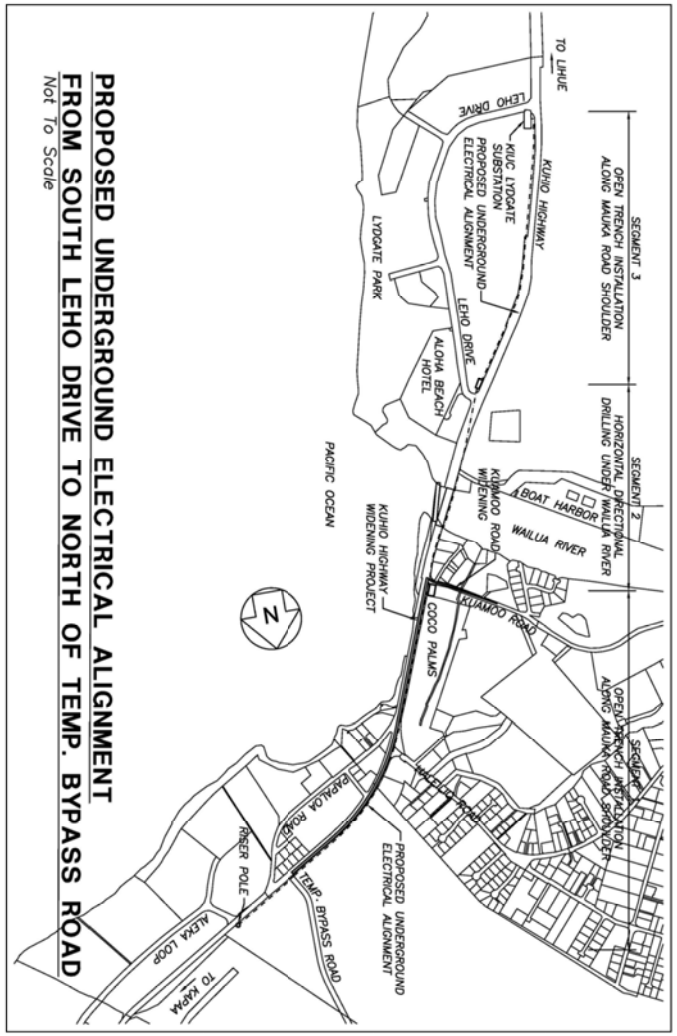

Figure 4. Proposed underground electrical alignment route (source: Wilson Okamoto Corporation)

1.2 Scope of Work

The following archaeological inventory survey scope of work was developed and implemented to satisfy SHPD requirements. The scope of work for this inventory survey (which later became an archaeological assessment because no archaeological historic properties were located within the project area) was designed in accord with State Historic Preservation Division rules governing standards for archaeological inventory surveys and reports (HAR 13-13-276):

1. A complete ground survey of the entire project area for the purpose of historic property inventory. If historic properties were located the following would be applicable: All historic properties would be located, described, and mapped with evaluation of function, interrelationships, and significance; and documentation in the form of photographs and scale drawings of selected sites and complexes.
2. Ground penetrating radar (GPR) survey to 1) locate potential subsurface cultural anomalies, 2) assess local stratigraphy, and 3) locate modern utilities along areas designated for subsurface testing.
3. Given the location of the parcel, subsurface testing with a backhoe is needed during the inventory survey. Backhoe testing will focus on locating and evaluating subsurface deposits, such as buried cultural layers and/or deposits with significant paleoenvironmental data, which could not be located by surface pedestrian inspection. Testing in sensitive areas will be conducted by hand after the initial backhoe work. If appropriate samples from these excavations are found, they will be analyzed for chronological and paleoenvironmental information.
4. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research will focus on the specific area with general background on the *ahupua'a* and district and will emphasize settlement patterns.
5. Preparation of a survey report which will include 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's past land use and historic properties.
    c. Description of all historic properties with selected photographs, scale drawings, and discussions of function;
    d. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the project area's historic properties;
    e. A summary of historic property categories and their significance in an archaeological and historic context;
    f. Recommendations based on all information generated that will specify what steps should be taken to mitigate impact of development on the project area's significant historic properties - such as data recovery (excavation) and

preservation of specific areas. These recommendations will be developed in consultation with the client and the State agencies.

This scope of work also includes full coordination with the State Historic Preservation Division (SHPD), and County relating to archaeological matters. This coordination takes place after consent of the owner or representatives.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is approximately 66 m (217 ft) west of the coast, and is approximately 218 m (715 ft) northeast of Wailua River. The project area receives approximately 91 inches (1500 millimeters) of rainfall per year (Giambelluca et al. 1986) and has no naturally occurring vegetation.

Lands within the project area are relatively level with an elevation of 20 ft above mean sea level (AMSL). According to U.S. Department of Agriculture (USDA) soil survey data the sediments within the project area consist of Mokuleia Fine Sandy Loam (Mr), Lihue Silty Clay (LhB & LhC), Koloa Stony Silty Clay (KvB & KvD), and Kaloko Clay (Kfa) (Foote et al. 1972) (Figure 5). The following is a synopsis of each soil series:

> The Mokuleia series consists of well-drained soils along the coastal plains...formed in recent alluvium deposited over coral sand...used for sugarcane, truck crops, and pasture (Foote et al. 1972).
>
> The Lihue series consists of well-drained soils on uplands...developed in material weathered from basic igneous rock...used for irrigated sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, woodland, and homesites(Foote et al. 1972).
>
> The Koloa series consists of well-drained soils on slopes of old volcanic vents and upland ridges...underlain by hard rock at a depth of 20 to 40 inches...developed in material weathered from basic igneous rock...used for irrigated sugarcane (Foote et al. 1972).
>
> The Kaloko series consists of poorly drained soils on coastal plains...developed in alluvium derived from basic igneous rock; the alluvium has been deposited over marly lagoon deposits...used for irrigated sugarcane and pasture. The natural vegetation consists of kiawe, klu, bermudagrass, and annuals (Foote et al. 1972).

1.3.2 Built Environment

The project area is primarily situated within the Kūhiō Highway right-of-way and has been subjected to extensive grading due to highway development.

Figure 5. Overlay of Soil Survey of the State of Hawai'i (Foote et al. 1972), indicating sediment types within the project area (indicated in red)

Section 2 Methods

2.1 Field Methods

2.1.1 Pedestrian Survey

A 100 percent pedestrian inspection of the project area confirmed that there were no surface historic properties. Accordingly, the inventory survey focused on a program of subsurface testing to locate any buried cultural deposits, which, based on the results of background research, CSH expected to find beneath layers of historic and modern fill. For this report, historic is defined as anything older than 50 years and modern is defined as anything younger than 50 years.

2.1.2 Ground Penetrating Radar Survey

2.1.2.1 Survey Methodology

Survey was performed using a Geophysical Survey Systems, Inc. SIR-3000 system equipped with 400 MHz antenna. This is a bistatic system in which electromagnetic energy in the radar frequency range is transmitted into the ground via a sending antenna. Radar energy is reflected off of the subsurface matrix and is then received by another, paired antenna. Reflected energy is sampled and the travel time (in nanoseconds) of the individual reflection waves is recorded. Wave propagation speed varies depending on the nature of the subsurface medium. Any changes in density or electromagnetic properties within the stratigraphic column may cause observable variations in reflection intensity. Reflection features may include discrete objects, stratigraphic layering, or other subsurface unconformities.

GPR survey for this project was conducted using single-run transects to generate two-dimensional (2D) depth profiles. Additionally, selected areas were subjected to a three-dimensional (3D) GPR survey. This involved the collection of GPR data from X and Y transects, spaced 50 cm apart, forming a data grid which was utilized to generate 3D images of subsurface anomalies (Figure 6).

2.1.2.2 Data Collection & Post-processing

Data collection parameters (Table 1) were held constant throughout the survey under the assumption that soil conditions were relatively consistent across the study area. A Dielectric permittivity (RDP) of 8 was utilized in anticipation of the presence of loamy soils within the project area based on the USGS soil survey of the area (Foote et al. 1972). Estimated depth of view is 2 m.

All collected radar data was post-processed using RADAN 6.6 software. Position correction was utilized to remove unwanted surface "noise" from GPR profiles. A Horizontal High Pass Finite Impulse Response "Boxcar" (Background Removal) filter was not utilized in order to retain the image of recorded stratigraphic layers.

Table 1. GPR Data Collection Settings

Parameter	Settings
Antenna	400 MHz
Samples per Scan	512
Format	16-bit
Depth	2 meters
Dielectric	8
Soil	Type 2
Scans per Unit	50/m

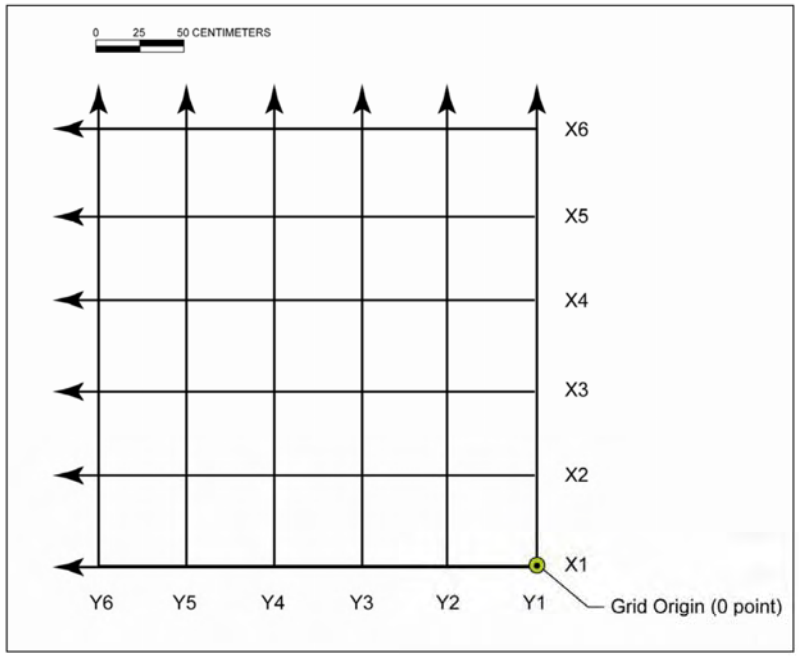

Figure 6. Illustration of X-Y grid layout utilized to collect 3D GPR depth profiles

2.1.3 Subsurface Testing

The sub-surface testing program consisted of the excavation of 5 trenches. Trenches were excavated to assess the stratigraphy and potential for subsurface cultural deposits within the archaeological inventory survey area.

A standard backhoe with a two-foot wide bucket was used to excavate at least portions of each test trench. Generally, trenches excavated to assess subsurface stratigraphy and prospect for subsurface cultural deposits were approximately 6 m long, 1 m wide, and between 1.3 to 2 m deep. When possible trenches were excavated down to the underlying coral shelf or below the water table.

The assisting backhoe was initially used to remove overlying alluvial sediment or fill deposits within each test trench. The bucket's teeth were be used to facilitate excavation of these stiffer, more consolidated deposits. When excavation occurred through Jaucas sand deposits, which are more likely to contain human skeletal remains or other significant cultural deposits, the backhoe bucket's teeth were sheathed in a detachable steel blade. This blade made it possible for the backhoe to carefully strip away thin layers of sand, approximately 5 cm (centimeters) thick, which is not possible with the standard toothed backhoe bucket.

The bladed backhoe bucket was only be used to remove Jaucas sand from trenches once at least one hand-excavated shovel trench was first dug down the center of the trench, parallel to the trench's long axis. This hand excavation in sand deposits was specifically undertaken to identify potential burial deposits prior to sand excavation with the backhoe. These shovel trenches were one shovel width wide (approximately 25 cm) and dug from the upper Jaucas sand surface. Shovel testing was terminated once the Jaucas sand could be determined to be culturally sterile. Sand was carefully scraped off in thin layers in order to minimize any possible burial disturbance. Smaller shovel test probes, approximately 25 by 25 cm, were excavated down from the base of the shovel trench as an extra precaution to identify any particularly deep burial deposits.

Only once the hand excavation through the sand deposit was completed was the backhoe's bladed bucket used to further excavate Jaucas sand deposits. CSH personnel closely monitored all backhoe excavation activity. In sand deposits, at least two archaeologists monitored the backhoe excavation, one positioned at either end of the trench to monitor both the removal of sediment from the trench and the emptying of the backhoe bucket on the adjacent back-dirt pile.

The stratigraphy in each trench was drawn and photographed. The sediments were described for each of the trenches using standard USDA soil description observations/ terminology. Sediment descriptions include Munsell color, texture, consistency, structure, plasticity, cementation, origin of sediments, descriptions of any inclusions such as cultural material and/or roots and rootlets, lower boundary distinctiveness and topography, and other general observations.

2.1.4 Backfilling of Trenches

Following all documentation and sampling each trench was backfilled

2.2 Document Review

Background research included: a review of previous archaeological studies on file at SHPD; review of documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona 'Aina database (<www.waihona.com>).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of historic properties in the project area.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Origin of the Place Name - Wailua

The most popular and literal meaning of the place name Wailua is "two waters", supposedly referring to the two main forks (north and south) that flow together to form the Wailua River. However, as Lyle Dickey says (1917:15) "this explanation never seems to occur to a native Hawaiian." Other meanings include "water pit" referring to the pools at the bottom of several waterfalls along the river's course (Damon 1931:360) and "ghost or spirit" (Kikuchi 1973:5).

Perhaps even more plausible is the explanation that it comes from the name of the high chief – Wailuanuiaho'āno.

> Wailuanui-a-Ho'ano was born in 'Ewa, O'ahu, and his descendants went to Kaua'i and to Maui, and wherever they settled they called the land after the name of their ancestor. Wailua was a song of La'akona, ancestor of the 'Ewa family by Ka-ho'ano-o-Kalani. His name, Wailuanui-a-Ho'ano, came from adding the name of his mother [Kamakau 1976:7].

3.1.2 Mythological and Traditional Accounts of Wailua

Archaeological and ethnographic evidence reinforce one another and indicate that Wailua was the religious and political center of Kaua'i during ancient times. There were more *heiau* (temples) in Wailua than within other Kaua'i *ahupua'a* (see Bennett 1931). The lower portion of the river valley, *makai* of Nonou ridgeline to the north and Mauna Kapu to the south, was known as Wailuanuiho'āno (Wailuanuiaho'āno) or alternately Wailuanuilani. It was an area so sacred that it was *kapu* to *maka'āinana* or commoners. Only the *ali'i*, their *kahuna* and retainers could reside or visit here (Dickey 1917). Also, there have been at least seven major *heiau* recorded in this relatively small area of the *ahupua'a* (Ching 1968:28). This complex of *heiau* was declared a National Historic Landmark in 1962 (Figure 7).

A survey of traditional mythological literature shows Wailua prominently associated with some of the most famous legendary and historical figures including Maui, Kawelo, Pikoiakaala, Laieikawai, Mō'īkeha, La'amaikahiki and Kaililauokekoa (Dickey 1917, Fornander 1917-19, Kalākaua 1888, Rice 1923). These associations suggest an ancient and continuous occupation of the area. Martha Yent (1989:1) suggests that because of the traditional connection of several Wailua *heiau* with Mō'īkeha as well as the mythical menehune, the religious complex there may have been constructed circa A.D. 1200.

A famous O'ahu chief, Mō'īkeha (dates ca. A.D. 1340-1360 by the 20 years per generation count), according to tradition, sailed off to Kahiki and on his return settled in Wailua, Kaua'i, where the Puna family of chiefs welcomed him. "On the death of Puna, Mō'īkeha became the principal chief (*Ali'i nui*) of Kauai, and remained there the balance of his life" (Fornander 1969:54).

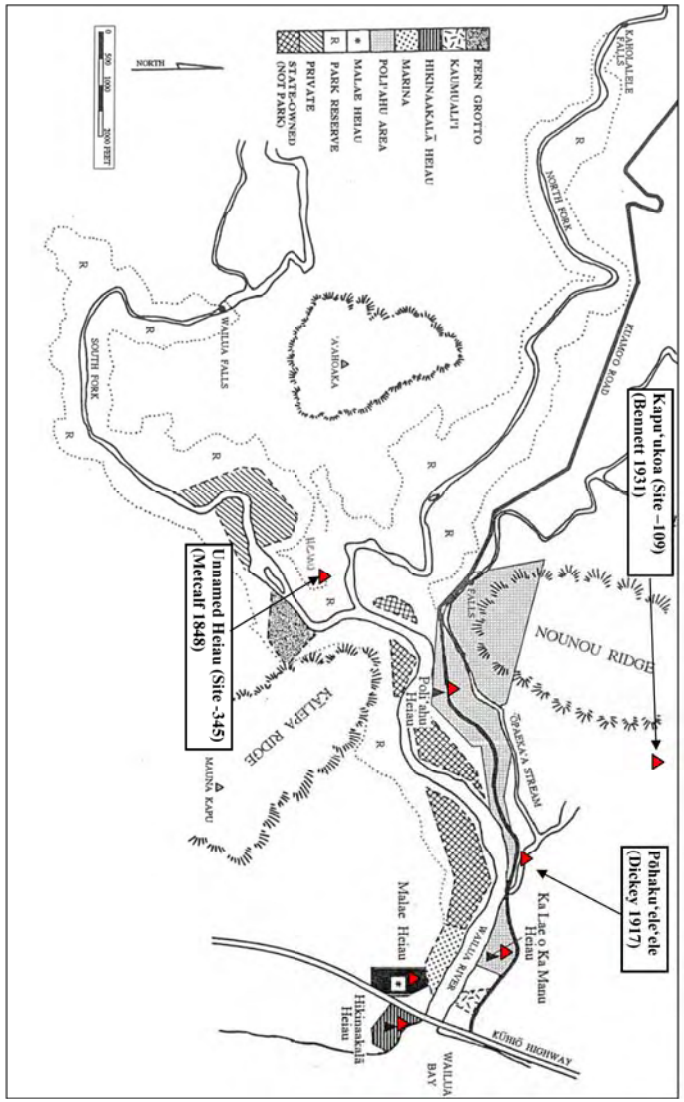

Figure 7. Map of the location of the seven *heiau* of Wailua (some locations approximate) marked by red triangles (modification of figure in Yent 1997b:5). Hikinaakalā is the closest *heiau* to the current project area at approximately 380 m inland

There is a chant associated with Mō'īkeha's favorite son, Kila (by the Kaua'i chiefess Ho'oipoikamalani), who also traveled to Kahiki. Kila is sent to seek a new chief, and at each place he stops along the way he is asked who he is and what has become of Mō'īkeha. He answers that Mō'īkeha is alive and, "Dwelling at ease on Kaua'i where the sun rises and sets; where the surf of Makaīwa curves and bends; by the changing blossoms of the *kukui* of Puna; by the broad waters of Wailua, he will live on Kaua'i and die on Kaua'i" (Beckwith 1970:355-356).

Also pointing to the great antiquity and importance of the settlement at Wailua is that the area is, in recorded traditions, the site of many "firsts." Dickey (1917:24) states that traditions tell us that Mō'īkeha planted the first *kalo* (taro) and *'uala* (sweet potato) on Kaua'i. Mō'īkeha's *hānai* (foster) son, La'amaikahiki, brought the first temple drum to the islands and placed it at the *heiau* of Holoholokū at Wailua (Fornander 1878-85:II:62). Here also were introduced the first *hau* trees on Kaua'i at Hihiakalahau along the river below Poli'ahu Heiau, and the first coconut tree in the islands at Molohua, just north of the river mouth (Dickey 1917:16, 24, 30).

Dickey (1917:20-21) also gives several traditional accounts relating to certain "footprint" marks on the sides of the mouth of the Wailua River. In one tradition a magician from Hawai'i Island came to Kaua'i looking for the deity Kamapua'a and landed at Wailua. It is said that on the north side of Wailua Bay at Malohua the magician's footprints can be seen, evidently one above and one below the water. Dickey relates another tradition that "a famous maker of riddles once stepped here on landing to match riddles with the people of Wailua." While it is not stated, this would appear to relate to the legend of Kaipalaoa, the young expert at *ho'opāpā* riddling. In a list of important sites, *heiau*, and fishing grounds on the island of Kaua'i, an informant told a study group for the Lahahinaluna School in 1885 that *Kapuaimolohue* [Kapua'i-o-molohua, meaning "footprint of Molohua"] was a famous place in Wailua, "a house for riddling champions" (Lahainaluna Students 1885, HEN No. 18, p. 214)" In the same collection (Lahainaluna Students 1885, HEN No. 19, p. 218), the *heiau* of Waimea are named, including a *heiau* called Mahunapuuone, which "belonged to the chief Kawelomahamahaia."

3.1.3 Early Historic Period

Few Westerners visited Wailua in the years just after Cook's arrival and detailed descriptions of the area are scarce. Most of the voyagers during the late eighteenth and early nineteenth centuries landed at Waimea, on the southwestern side of the island, a location that would eventually overshadow Wailua in its royal importance because of the opportunities there to associate and trade with these foreigners (Lydgate 1920).

However, in March 1793, Wailua was still the "capital" of Kaua'i and Capt. George Vancouver, who had already visited the island several times, both under Capt. James Cook and later as captain of his own expedition, knew this fact well and tried to land there. Although conditions prevented him from anchoring, Vancouver observed the area from off shore and gave this description:

> This part seemed to be very well watered, as three other rapid small streams were observed to flow into the sea within the limits above mentioned. This portion of Attouai, the most fertile and pleasant district of the island, is the principal residence of the King, or, in his absence, of the superior chief, who generally takes up his abode in an extensive village, about a league to the southward of the

> north-east point of the island. Here Enemo the regent, with the young prince Tamooerrie, were now living . . . [Vancouver 1798:221-222].

Within decades of western contact the area lost its ancient importance, and likely its population also. The *ali'i* who enjoyed and benefited from their contact with westerners, spent more time in Waimea - the preferred anchorage for visiting ships. Also the complex of *heiau* at Wailua lost their great significance after the abolishment of the *kapu* system.

Missionary Hiram Bingham passed through Wailua twice in 1824 and visited the birthplace of King Kaumuali'i (the *pōhaku ho'ohānau* site), a *hōlua* slide, and the lower falls on the south fork of the river, but left no clues as to the size or extent of the settlement there (Bingham 1847:220, 231).

In October 1840, members of the U.S. Exploring Expedition came to Wailua and recorded the following:

> The country on this route was uninteresting, until they reached Wailua, the residence of Deborah, a chief woman of the islands, readily known as such from her enormous size, and the cast of her countenance. She has a person living with her called Oliva Chapin, who speaks English, and has learned how to extort money. Deborah has about forty men in her district; but they were absent, being employed in the mountains cutting timber to pay the tax to the king.
>
> Near Deborah's residence are extensive fishponds belonging to her, which have been made with great labour: they are of different degrees of saltiness. The fish are taken from the sea when young and put into the saltiest pond; as they grow larger, they are removed into one less salty, and are finally fattened in fresh water. While our gentlemen were there, Deborah received young fish in payment of the poll-tax, which were immediately transferred to her ponds.
>
> Wailua, (two waters,) was formerly a place of some importance. It is situated on a small stream of the same name, in a barren, sandy spot.
>
> Deborah furnished them with a double canoe, to carry them up the river to visit the falls. Taking the western branch, they ascended it for two and a half miles.
>
> There are many good taro-patches and sugar plantations on its banks. They landed in what appeared to have been an old crater, in front of a basin, with high perpendicular bank. The low grounds along the river are extremely fertile, producing bread-fruit, sugar-cane, oranges, etc. The latter, however, are suffering from the blight, and some of the trees were covered with a black smut, produced by a species of aphis.
>
> In ascending, an insulated black rock is passed, known as the "Muu," which has been detached from a high rocky bluff, that is remarkable for the dikes visible in it.

> They afterwards ascended the bank, two hundred feet high, and crossed about half a mile to the falls, over a plain covered with grass and wild sugar-cane. The stream was very small, running sluggishly, and passed over a precipice of barren rocks, one hundred and sixty feet in height. Although there is neither tree nor shrub along the stream above the fall, the valley beneath is filled with them; the most conspicuous was the pandanus. The whole scene is picturesque. Below, the falls present a very curious appearance, the wind continually breaking and dispersing the water in heavy showers over a great variety of ferns, which are growing in the crevices of the rocks. The volume of water does not exceed ten hogsheads a minute. In the basin beneath were found many fine specimens of *Neritina granulata*, and two other species were found further down the stream, about four feet below the surface; these were procured by diving. Mr. Rich obtained specimens of the plants.
>
> Mr. Peale found but few birds; ducks were abundant on the river's banks, some of which were killed. Rushes were growing along the banks from eight to ten feet in length, four or five feet under the water; besides these, the banks were covered with hibiscus and ricinus (castor-oil trees), growing wild [Wilkes 1846:IV:68-69].

Debora Kapule was a member of Kaua'i's royalty. Kapule, the former wife of Kaua'i sovereign Kaumuali'i, took up residence in Wailua in 1835, shortly after the rebellion of 1824 in which Kaumuali'i's son George led a revolt that was put down by forces loyal to Kamehameha II. Debora, who remained loyal to Kamehameha II, was granted lands at Wailua by Ka'ahumanu, *kuhina nui* or regent of the islands. The fishponds mentioned above as belonging to Debora Kapule were located on the property of the current Coco Palms, just *mauka* (inland) of the project area. Today a similar fishpond/lagoon exists in its place, but the extent of modification in historic times is uncertain.

3.1.4 The Māhele Period

3.1.4.1 Wailua Ahupua'a

During the 1848 privatization of land in Hawai'i, known as the Māhele, only fifty-one parcels totaling approximately 75 acres were awarded to twenty-seven individual claimants in Wailua. These parcels comprise 122+ *lo'i* (ponded fields), 5 *mo'o* (strips of cultivated land), 24 house lots, and 8 *kula* (typically pasture claims) (see Table 2). All of the parcels are within approximately a mile of the shore. Of the parcels on which *kalo* was cultivated on the north side of the Wailua River, most were watered by *'auwai* (irrigation canals) sourced in 'Ōpaeka'a (or Wailuaiki) Stream, as shown in the Lydgate Map of 1920 (Figure 8).). The 1920 map also shows LCAs within the project area vicinity as does Plat 3056 (Figure 9) for the portion south of Wailua River.

Eleven other *ahupua'a* on Kaua'i have greater numbers of claims at the time of the Māhele (1848-1853). When Wailua was the former religious, economic and social center of Kaua'i, more land would have been under cultivation, not only for *lo'i* and *kula* but for other traditional crops, such as *wauke* and *noni*, bananas, woods and fishponds. The fact that so few claimed land in Wailua at the time of the Māhele, no doubt reflects Wailua's changed status after trading ships

Table 2. Land Use from Wailua Land Commission Awards (source: Native Register, Native Testimony and Foreign Testimony)

LCA #	Claimant	'Ili of the 'Ahupua'a	Land use	No. of *'Āpana*
3111	Kapule, Debora	Kapeleula Pakoli Kaimoki Kawaiiki Pohoula	house lot 2 *lo'i* 2 fishponds	1 (4 acres, 2 roods, 9 rods) 1 (3 acres, 3 roods, 15 rods) 1 (5 acres, 29 rods)
3226	Chapin, Oliva	Kuemanu Papohaku	house lot, 4 *lo'i* and *kula*	1 (1 acre, 3 roods, 7 rods) 1 (4 acres, 2 roods, 32 rods)
3238	Hawea / Kawea	Kahakoa Village Kahihei / Heikei	sleeping house, 1 *lo'i*	1 (36 rods) 1 (2 roods, 17 rods)
3248	Hanalea/ Hanale/ Hanare/ Henry	-	claims in Nawiliwili, lives in Wailua	-
3264	Lanikaula	Hio, Kamani	7 *lo'i,* house lot	(1 acre, 2 roods, 22 rods) 1 (2 roods 34 rods)
3281	Wahine / Wahineai	Kahakoa Luaiokama/ Inaiokama	house lot, 2 *lo'i*	1 (30 rods) 1 (1 acre, 29 rods)
3282	Wahapuu, Sera	Halepuola Kahakoa Village	2 *lo'i,* house lot	1 (3 acres, 3 roods) 1 (14 rods)
3302	Maawe / Maawi	Kahakoa Village Puhauula	house lot, 6 *lo'i*	1 (27 rods) 1 (1 acre, 1 rood, 20 rods)
3303	Makaiki / Makaike	Kapalai (Waioo) Kapuaiomolohua	5 (1*) *lo'i,* house lot	1 (2 roods, 20 rods) 1 (27 rods)
3345	Nakai	Kapalai Kahakoa Village	2 *lo'i,* house lot	1 (1 acre, 31 rods) 1 (32 rods)
3346 (See also 3345)	Nawai	Kulaakapueo Makunapanone	3 *lo'i*, 1 dry *lo'i,* house lot	1 1
3367	Noi	Hapuupuu Kahakoa	3 *lo'i* and *kula,* house lot	1 (2 roods, 9 rods) 1 (35 rods)
3368	Nakaakai	Maulili Palakawai	3 *lo'i,* house lot (also mentions a claim in Waimea, containing a *heiau*)	1 (2 roods, 22 rods) 1 (2 roods, 4 rods)
3403	Pahio	Kapuhai Malaihauono	3 *lo'i* and *kula*, house lot	1 (1 acre, 1 rood, 18 rods) 1 (1 rood, 1 rod)

3405	Poka	Kaiwaiiki / Halilauhau	3 *lo‘i* and house lot	1 (1 rood, 4 rods)
LCA #	**Claimant**	**‘Ili of the ‘Ahupua‘a**	**Land use**	**No. of *‘Āpana***
3406	Pula	Kapuaiomolohua Village Waioo	house lot, 5 *lo‘i* and *kula*	1 (29 rods), 1 (1 acre, 8 rods)
3551	Kehenui / Kaihenui	Noleha Palauhulu	house lot, 1 *lo‘i* and 2 *mo‘o*	1 (1 acre) 1 (3 acres, 1 rood, 4 rods)
3552	Kaula / Nakaula - died in epidemic	-	-	-
3553	Kekalo / Kikolo left the land	-	-	-
3555	Kiaipali	Malaehakoa/ Melehakoa Naliha	house lot, 10 *lo‘i*	1 (1 rood, 7 rods) 1 (2 acres, 15 rods)
3556	Kekua	Kapalai	3 lo‘i	1 (1.75 acres, 14 rods)
3557	Kaniwi / Kaniui	Kahakoa Lanipaa	house lot, 14 *lo‘i*	1 (2 roods, 26 rods) 1 (2 acres, 20 rods)
3559 see 3111 Kapule	-	-	-	-
3560	Kauakahi / Kanakahi	Pua / Puaa Puuiki Village	3 *lo‘i* and *kula* (pasture), house lot	1 (3 acres, 1 rood, 16 rods) 1 (1 rood, 12 rods)
3561	Kaumualii, Josiah	Papaalai	12 *lo‘i, kula*, 2 houses and grave, 8 or 10 *lo‘i* and *kula*	1 (17.75 acres, 28 rods)
3567	Kaiapa	Hapuupuu	7 *lo‘i* (4 taro and 3 brush) and house lot	2 (1.25 acres, 18 rods)
3568	Kelani	Kawaiiki on shore Waioo	house lot, 5 *lo‘i*	1 (29 rods) 1 (1 acre, 3 roods)
3569 (LCA testimony lists as 3568)	Kupalu	Paki Pahoula	3 *lo‘i,* house lot	1 (1 acre, 1 rood, 24 rods) 1 (19 rods)
3756	Amara / Amala / Amaia (died)	-	-	-
3759	Alika	Alalike Kauakahiuna Village	4 *lo‘i,* house lot	1 1

3909	Nahinu, I	Kupapaupapa Pelehuna	4 *mo‘o a lihi* (w/ 3 orange trees)	1 (4 acres, 16 rods) 1 (16 rods)
LCA #	**Claimant**	**‘Ili of the ‘Ahupua‘a**	**Land use**	**No. of *‘Āpana***
4146	Kaliu	Kamaluokukui Kaulupalau	2 *lo‘i* and *kula* house lot	1 (2 roods, 26 rods)
Number of *lo‘i* differs among Native Register, Native Testimony and Foreign Testimony Kamehameha III awarded the *ahupua‘a* 53 *‘āpana* claims - 51 awarded Claimed: more than 122 *lo‘i*, 24 house lots, 8 kula, 2 fishponds 5 *mo‘o*, 1 grave yard, 1 burial ground, 3 orange trees				

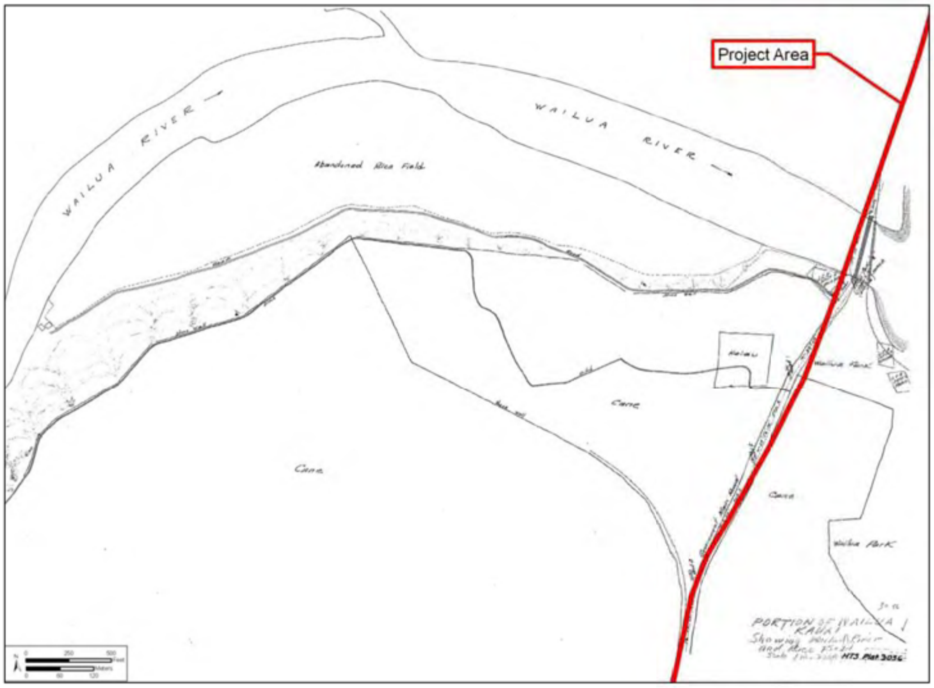

Figure 9. Plat 3056 showing portion of project area south of Wailua River including Malae Heiau, LCAs, and cane fields (Hawai'i Land Survey Division, HTS Plat No. 3056)

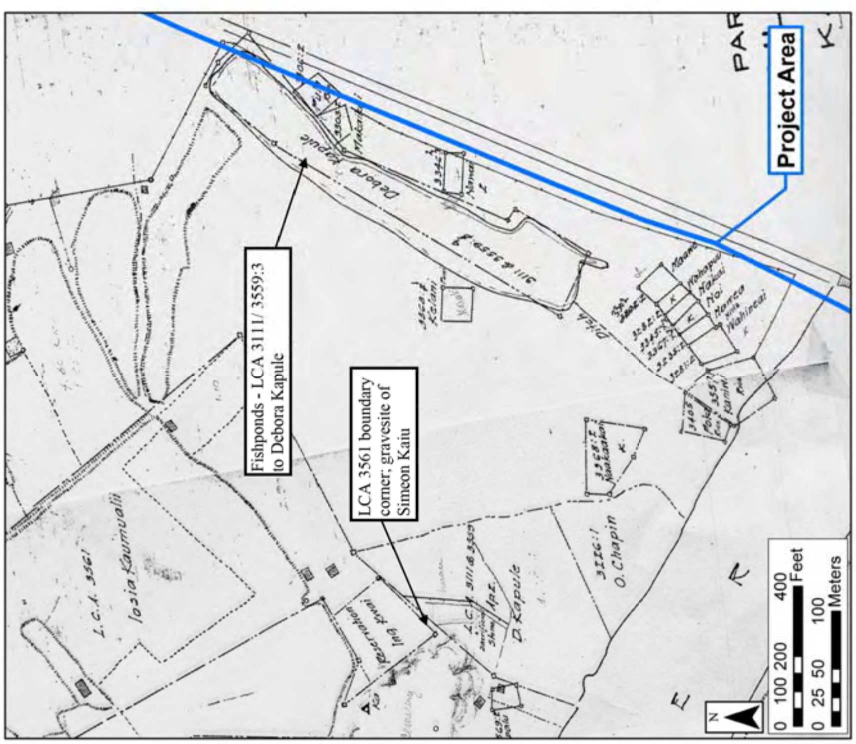

Figure 8. Portion of 1920 map by John Lydgate, showing LCA awards in Wailua Kai and in the vicinity of the project area (Hawai'i Land Survey Division, Registered Map No. 2699)

and missionaries arrived. Communities grew up around the new social and economic centers, especially on the south side of the island and drew people away from their former establishments. By the mid-1800s only a small population, decimated in part by disease, existed in the Wailua River Valley within a mile from the sea. They were displaced within decades by Japanese and Chinese farmers growing imported crops.

Almost all of the *kuleana* (land claim) awardees originally received their land from Debora Kapule "in the days of Kaikioewa" or "in the days of Ka'ahumanu" indicating a rather short tenancy since around 1825 or later. It is generally understood that following the suppression of the Kaua'i Rebellion of 1824 by the forces loyal to Kamehameha II, a massive redistribution of Kaua'i lands occurred. Apparently when Debora Kapule received the Wailua lands from Ka'ahumanu, she served as *konohiki* (overseer) for the *ahupua'a* or in her own words, the *haku'āina* or landlord (*Native Register* 1848:IX:55-56). In Wailua, she claimed a house lot, taro patches and two fishponds. These two fishponds, as mentioned above, still exist, though modified, on the grounds of the Coco Palms Resort. Both ponds were of the Loko Pu'uone type, which "were formed by the stranding of a body of water by a natural sand barrier. Some of these ponds were later altered by digging ditches which allowed the sea to enter and exit during times of high tide" (Kikuchi 1987a:9).

> In the early 1840s, Kapule's house complex was situated near the Wailua River. The complex consisted of substantial thatched buildings, and the area was fenced with stakes. Extensive taro (*Colocasia esculenta*) patches and fishponds were located behind her house [Jarves 1844:150].

3.1.4.2 Land Commission Awards in the vicinity of the Project Area

3.1.4.2.1 North of Wailua River

One commoner land claim for a house lot was within the project area, 3406:2 to Pula (Figure 8). Nine commoner land claims for house lots are within the vicinity of the project area as shown on Figure 8 (from north to south): 3303:2 to Makaiki (Makaikai); 3346:2 to Nawai; 3568:1 to Kelani; 3302 to Maawe; 3282:2 to Wahapuu; 3345 to Nakai; 3367 to Noi; 3238.2 to Nawea; and 3281:2 to Wahineai. The house lots of Pula, Makaiki, and Nawai were on the east (*makai*) margin of the fishpond and the house lot of Kelani was on the west (*mauka*) margin of the pond. The six other house lots to Maawe, Wahapuu, Nakai, Noi, Nawea, and Wahineai were south of the pond but in the vicinity of the *auwai* or ditch extending south from the pond

The cardinal directions reported in the following accounts are consistently skewed 90° clockwise (hence the pond that is to the west is reported to the north and so on).

Pula (LCA 3406) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from the informant Kaniwi asserted that the house lot was "in the village of Kapuaimolohua" surrounded by a stone fence and was bounded to the north by a pond called "Weuweu", to the east by *kula* (pasturage) of Kapuaimolohua, south by road from Wailua to Kapaa and west by *kula*. The *Native Testimony* of Kaniui asserted that the house lot was in the *'Ili* of Waioo and was bounded *mauka* by Weuweu pond, *ko'olau* by Kapuaiomolohua pasture, *makai* by Kasuaiomolohua pasture and *kona* by "walk road." Although the house lot is reported

as "in the village of Kapuaimolohua" no neighbors are mentioned and the indication is that the surrounding lands were undeveloped *kula*

Makaiki (LCA 3303) claimed two parcels *('āpana*): *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from a certain Kaniwi asserted that the house lot was "in the village of Kapuaimolohua" and was bounded to the north by a pond called "Weuweu", to the east by the *kula* of Molohua, to the south by a road leading to Kapa'a and to the west by the *kula* of Molohua. The *Native Testimony* by a certain Kaniui for this application asserted that the house lot was in the *'ili* of Kapuaimolohua and was bounded *mauka* by Weuweu pond, *ko'olau* by Molohua pasture, *makai* by "leading to Kapoo [understood to refer to Kapa'a], a road", and *kona* by Molohua pasture. These two accounts are completely consistent in emphasizing a road *makai* (that would become present day Kūhiō Highway) and the fishpond *mauka* the name of which is recorded as "Weuweu". The only other landscape mentioned is the pasture of Molohua.

Although the house lot is reported as "in the village of Kapuaimolohua" no neighbors are mentioned and the indication is that the surrounding lands were undeveloped *kula* (pasturage).

Nawai (LCA 3346) claimed two parcels: *lo'i* land *('āpana* 1) and a house lot *('āpana* 2). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the *'ili* of Mahunapuoni and was bounded to the north by a pond called Kaimiki, east by the house lot of Pau, south by the seashore and west by burying ground. The recorded name of the pond as "Kaimiki" is notably close to the reported names "Kaiwiki" and "Kaiuki" (in the Kelani claim discussed below) and is likely to reflect some error in interpreting handwriting. The *Native Testimony* of Kaniui asserted that the house lot was "at Kunapuuone" and was bounded *mauka* by Kaiuiki Pond, *ko'olau* by Pau's house lot, *makai* by beach, and *kona* by cemetery. Both the *Foreign Testimony* and *Native Testimony* cite a burying ground/cemetery on the *kona* (actually south side) of the house lot. "Kaiuki" is yet another variant spelling of the pond. The place names reported as "Mahunapuoni" and "Kunapuuone" almost certainly refer to sand dunes ("*pu'uone*") and are probably the same place name reported as "Mahuapuoni" and "Mahunapuuone" in the testimony for the house lot of Maawe (LCA 3302); see below.

Kelani (LCA 3568) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the *'ili* of "Kaiuki, on the seashore" and was bounded to the north by *kula* of village of Wailua, east by *kula* of village of Wailua south by pond called "Kaiwiki" and west by Halekula (schoolhouse). The *Native Testimony* of Kaniui asserted that the house lot was in the *ahupua'a* of Wailua and was bounded *mauka* by Wailua *kula*, *ko'olau* by Wailua *kula*, *makai* by Wailua pond and *kona* by Wailua pond. The reported name of the pond as "Kaiwiki" seems quite close to the reported name of the *'ili* ("Kaiuki") and may reflect an error in interpreting handwriting. The reference to the pond by the name "Wailua pond" is understood as geographic and generic and not as reflecting a formal name for the pond. The *Foreign Testimony* for Kelani's house lot claim also mentions a *halekula* or missionary school on the south side of his property. The *Native Testimony* makes no mention of any school citing only the pond and pasturage. Sometimes lands were dedicated for school development but no school was ever actually established or the school house was an informal structure and instruction of short duration.

Maawe (LCA 3302) claimed two parcels: *lo'i* land *('āpana* 1) and a house lot *('āpana* 2). His house lot was *mauka* of the present project area and adjacent to several other LCAs also *mauka*

of the project area (see Figure 8). The *Foreign Testimony* in support of Maawe's claim (again from Kaniwi) asserts that the parcel was bounded north by *kula* of Kahakoa, east by burying ground of Mahuapuoni, south by seashore, and west by house lot of Puali. Again the consistent directional correction puts this burying ground more properly to the north-northeast. The *Native Testimony* for Maawe's claim (again from Kaniui) describes the "*ko'olau*" boundary of his house lot as "Mahunapuuone". Although there is no reference to burials in the *Native Testimony* for Maawe's claim, Kaniui is using a very similar place name. It seems likely that the transcription of the name associated with this burying ground is more accurate in the *Native Testimony* with *"pu'uone"* being a clear reference to a "sand dune" and perhaps "*huna*" referring to the "hidden" burials there. These names ("Mahuapuoni", "Mahunapuuone") for the northern boundary of Maawe's house lot are quite similar to the spelling of the place of Nawai's (LCA 3346) house lot reported as "Mahunapuoni" and "Kunapuuone" It seems likely the burying ground was named, in present orthography, "Mahunapu'uone" which may have meant "at the hidden (burial) sand dunes". Two other possible translations for *māhuna* are: a type of scented *tapa*, and a variety of taro (Pukui and Elbert 1986:220). As noted in the "Mythological and Traditional Accounts" section of this report, a local Kaua'i resident in 1885 identified Māhunapu'uone as a *heiau*, which "belonged to the chief Kawelo-mahamahaia" (Lahainaluna Students 1885, HEN No. 19, p. 218).

Sera Wahapuu (wahine; LCA 3282) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the *ili* of Wailua in the village of Kahakoa", north by a cluster of Hau bushes, east by house lot of "Kahakua lanea", south by sand beach, and west by house lot of Nakai. "Kahakua lanea" was the wife of Maawe and the secondary claimant of LCA 3302 (see above), north of Wahapuu's house lot. The *Native Testimony* is very similar to the *Foreign Testimony*. LCA 3282 was just *mauka* of the project area.

Nakai (LCA 3345) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in Kahakoa, bounded north by *kula* of Kahakoa, east by house lot of Puali, south by road, and west by house lot of Hawea. Pualiupo, Sera Wahapuu's sister, inherited the house lot lands after Wahapuu's death in 1848; the house lot is actually north of Nakai's house lot. The road "to the south" is actually to the east, and is described as a "walk road" in the *Native Testimony*. The road does not appear to be describing today's Kūhiō Highway, since none of the other LCAs within the vicinity mention a road; they all state the beach is "to the south".

Noi (LCA 3367) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in Kahakoa, north by *kula* of Kahakoa, east by house lot of Haea, south by seashore, and west by house lot of Wahineai. The *Native Testimony* describes the "Koolau" boundary as Hawea's house lot, indicating a spelling error in the *Foreign Testimony* since LCA 3238 is southwest and adjacent to LCA 3367 (see below). Wahineai's (LCA 3281) claim was southwest of Noi's, although LCA 3238 separates the two.

Hawea (LCA 3238) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the *ili* of Kahihei, north by clump of Hau bushes called Moeapaki, east by house lot of Nakai, south by sea beach, west by

Wahineai's house lot. The *Native Testimony* only describes one parcel that is a combination of the *Foreign Testimony* descriptions for the two parcels.

Wahineai (also Wahine) (LCA 3281) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the "village of Kahakoa", north by *kula* of Kahakoa, east by *kula* of Kahakoa, south by sand beach, west by Wailua River, and "the house lot is surrounded by [a] turf fence." The *Native Testimony* is similar with the exception of the land being "surrounded by Maluki (grass?)".

Naakaakai (LCA 3368) claimed three parcels: two house lots *('āpana 1* and *3*) and *lo'i* land *('āpana 2*). While Figure 8 shows Naakaakai's *'āpana 2 mauka* of the project area, the *Foreign Testimony* from Kaniwi asserted that the *lo'i* land was in the '*ili* of Maulili, bounded north by stream of Maulili, east by Kelani's *loi*, south by '*ili* of Punana, and west by Kulaakapineo which is an '*ili*. The *Native Testimony* differs slightly, bounded *mauka* by Maulili's ditch, and *kona* by Akapueo's house lot. The ditch / stream is likely the *auwai* that extends south from the fishpond, and Kelani's LCA 3368 is north-northeast of Naakaakai's *lo'i* land. The name Akapueo, however, is not listed in the Māhele documents although Akapueo may never have claimed his house lot.

Figure 8 shows a portion of Josiah (Iosia) Kaumuali'i's 17-acre parcel (LCA 3561), which extends into the area of the Coco Palms tennis courts. Kaumuali'i, son of Debora Kapule and Simeon Kaiu, claimed 20 to 22 *lo'i*, two *kula*, and mentions that one boundary point for his land (LCA 3561) is the grave of his "*makuakane*" (father). This boundary corner coincides with the location of a stone slab near the Holoholokū birthing stones and Kikuchi et al. (1976:19) believe this sandstone slab marks this grave.

3.1.4.2.2 South of Wailua River

One commoner land claim for a house lot extends within the southern portion of the project area, LCA 3567:2 to Kaiapa (see Figure 9). Two other commoner land claims for house lots are east of Kūhiō Highway as shown on Figure 9 (from west to east): 3555.2 to Kiaipali, and 3403:2 to Pahio.

As mentioned in the section above, the cardinal directions reported in the following accounts are consistently skewed 90° clockwise (hence Wailua River that is to the north is reported to the east and so on).

Kaiapa (LCA 3567) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Lupe asserted that the house lot was in Wailua, bounded "north by kula, east by pali, south by house lot of Alika, and west by road leading inland". The *Native Testimony* is the similar and although neither mention the name of the *'ili*, the māhele database lists Hapuupuu (Waihona 'Aina).

Pahio (LCA 3403) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Wilama Puamana asserted that the house lot was "fenced in "Malai hauono", bounded on the north by "kula of Malaihaanono, east by kula of Malaihaanono, south by Wailua River, west by kula. The *Native Testimony* is similar with the exception of the spelling of Malaihaanono, which is spelled Melehaanounou.

Kiaipali (LCA 3555) claimed two parcels: *lo'i* land *('āpana 1*) and a house lot *('āpana 2*). The *Foreign Testimony* from Kaniwi asserted that the house lot was in the *'ili* of Meleha Koa, bounded on the north by "kula of Melehakoa, east by Wailua River, south by house lot of Kuleilei, west by kula of Melehakoa". The *Native Testimony* is the same with the exception of the spelling of Melehakoa, which is spelled Malaehaakoa.

3.1.4.3 Land Use Patterns as Indicated in LCA Testimony in the vicinity of the Project Area

3.1.4.3.1 The Fishpond

Clearly the pond was a prominent geographic reference point in the area in 1848. Reported names for the pond include:

Weuweu	Testimony of Kaniwi and Kaniui for Pula (LCA 3406)
Weuweu	Testimony of Kaniwi and Kaniui for Makaiki (LCA 3303)
Kaimiki	Testimony of Kaniwi for Nawai (LCA 3346)
Kaiuiki	Testimony of Kaniui for Nawai (LCA 3346)
Kaiwiki	Testimony of Kaniwi for Kelani (LCA 3568)
Wailua pond	Testimony of Kaniui for Kelani (LCA 3568)

Thus it would seem clear that there were two names for the pond(s) and that the name for the northern pond was Weuweu. In all probability the southern pond had one clear name but interpretations of pronunciation or handwriting lead to the variant spellings of "Kaimiki", "Kaiuiki", and "Kaiwiki". It seems likely the name of this southern pond lent itself to the vicinity. Kaniwi in the testimony for Kelani (LCA 3568) reports Kelani's house lot as in the *'ili* of "Kaiuki" – yet another variant. With traditional Hawaiian fishponds it was a common practice to divide or partition the pond to segregate growth stages of fish with a nursery pond for fry segregated from a grow-out pond. This may have been the case here explaining two very different names for what appears to have been one elongated pond.

3.1.4.3.2 Residential Pattern North of Wailua River

The informant Kaniwi asserted that the house lot of Makaiki (LCA 3303) and the house lot of Pula (LCA 3406) were "in the village of Kapuaimolohua" suggesting greater density of settlement in the vicinity than the land commission award record would otherwise suggest. Rather notably both informants list no neighboring house lots in the vicinity of these homes mentioning only *kula* land the fishpond and the road. Both the *Native Testimony* and *Foreign Testimony* for Nawai 's house lot (LCA 3346), however, make reference to a neighboring house lot of a certain "Pau" which would have been just to the northeast, also located on the southeast edge of the fishpond and in line with the homes of Nawai, Makaiki and Pula. It seems probable that prior to western contact the density of settlement around the margins of the pond was greater than the 1848 record reflects. This may have been a preferred residential area of centuries duration. The density of settlement may always have been greater, however, between the pond and the river just to the south, where the house lots of Maawe, Wahapuu, Nakai, Noi, Nawea, Wahineai, Kaniwi, and Poka within the village of Kahakoa were awarded in the Māhele.

The descriptions of these two northern LCA parcels are similar. Both refer to a "*kula* of Molohua" and the village of Kapua'i-o-molohua. As noted in the previous section on "Mythological and Traditional Accounts", the first coconut tree in the islands was planted at Molohua, described as just north of the Wailua River mouth (Dickey 1917:16). Dickey also relates several traditions of Hawaiian heroes that made footprints (*kapua'i*) near the Wailua River, with one footprint in a rock at Molohua, north of the Wailua river (Dickey 1917:20-21). This would seem to explain the name of the village, Kapua'i-o-molohua, "the footprint of Molohua." Another document on Wailua traditions collected in 1885, states that *Kapuaimolohue in Wailua* was a famous "house for riddling champions" (Lahainaluna Students 1885, HEN No. 18, p. 214).

3.1.4.3.3 Residential Pattern South of Wailua River

Māhele documents do not relate that any villages were present south of Wailua River and little settlement is indicated based on the number of land grants awarded. House sites appear to be concentrated on the north side of the river, and those sites that are to the south are within close proximity to Wailua River.

3.1.4.3.4 The Burial Ground North of Wailua River

References to a burying ground or cemetery are given by both informants in the testimony for Nawai (LCA 3346). This burying ground was to the south of Nawai's house lot between the fishpond and the sea.

Another reference to this same burying ground would appear to be given in the testimony for the house lot of Maawe, LCA 3302 (see Figure 8), as described above. While the extent of this burying ground is uncertain in general terms it may be understood as including an area of low sand dunes between the fishpond and the sea extending north from Maawe's house lot to, and possibly into Nawai's house lot. This is consistent with the finds reported by Kikuchi (1973), the location of the present burial re-interment site with a marker plaque, and the location of the human remains recovered during the *Archaeological Inventory Survey of Coco Palms* (Hoffman et al. 2005).

3.1.5 Post-Māhele Period

Like most well watered areas in Hawai'i, rice crops began taking over former *lo'i kalo* in the second half of the 1800s. Figure 10 shows the project area and its proximity to Wailua River in 1878. Sharing of the land by the Chinese rice farmers and native *kalo* growers continued through the end of the century. Knudsen (1991:152) visited Wailua in 1895 and wrote:

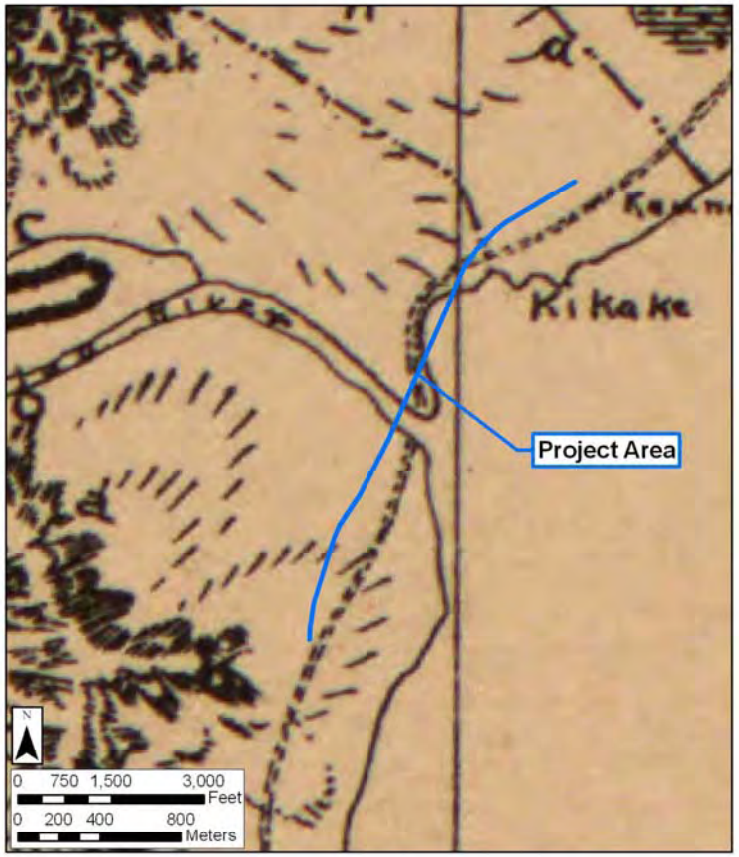

Figure 10. 1878 Kaua'i Government Survey map (portion) by W.D. Alexander showing the approximate location of the project area and vicinity (map on file at Library of Congress)

> We rode through the Lihue Plantation cane fields, passed through Hanamaulu and came to the Wailua River. What a sight! The great river lay clear and placid - winding away up toward the mountains with rice fields and taro patches filling all the low lands [Knudsen 1991:152].

However, by 1935, Handy (1940:67) found no *kalo* being cultivated. The terraces had been taken up by rice, sugar cane, sweet potato and pasture.

> Kapa'a, Waipouli, Olohena, and Wailua are districts which have broad coastal plains bordering the sea, any part of which would be suitable for sweet potato plantings; presumably a great many used to be grown in this section. There are a few flourishing plantations in Wailua at the present time [Handy 1940:153].

Debora Kapule left the area in the early 1850s when she chose to move back to Waimea. Upon her death in 1853, her lands in Wailua, as well as those of her son, Kaumuali'i, were willed to her adopted daughter Kaluaipihana. By 1867 a Mr. LaPaz indicated that nothing remained of Kapule's complex (LaPaz 1867). This was echoed by Gerald Fowke in the early 1920s: "Near the mouth of the Wailua River . . . is the former abode of the royal family. The place is so overgrown, except in the few cultivated spots, that no examination of it can be made. No traces of the residences are apparent although the stone boundary walls of the grounds are still standing" (Fowke 1922:192).

3.1.6 Lihue Plantation Company

The portion of Kūhiō Highway north of Wailua River was originally owned by the Ahukini Terminal & Railway Company (A. T. & R.) as a railroad-right-of-way. The railway later became part of the Lihue Plantation Company. The Lihue Plantation Company Ltd. began in 1849 as the Henry A. Pierce & Company. Company partners included Henry A. Pierce of Boston, Charles Reed Bishop, and Judge William L. Lee. A new partnership was formed in 1859 and the company name was changed at that time to the Lihue Plantation Company. The first portion of the Lihue Plantation Company railroad was laid and the first sugar moved by rail on January 7, 1892. By 1921, the Lihue Plantation Co. was reputed to have the most modern and extensive railroad system in the islands. In that same year the Lihue Plantation Company sponsored the separately incorporated Ahukini Terminal & Railway Company, which "was inaugurated as a common carrier railroad to operate between Ahukini and Kealia." (Condé and Best 1973:166). It appears most likely the railroad track (30" gauge, 35 lb rail) was constructed in 1921 or 1922 (Figure 11).

In 1934, the Lihue Plantation Co. absorbed the A. T. & R., which then became an operating part of its parent company. The conversion from railroad to truck hauling began in 1957 and was completed by 1959. The 1959 annual report noted "With the completion of the harvesting season this year (October 10, 1959) hauling cane over our railroad system comes to an end. We are the last plantation in the Island to give up the railroad and move to truck hauling. This marks the end of an era" (Condé and Best 1973: 165-169).

Figure 12 and Figure 13 show a rock wall within the Lihue Plantation Co. running parallel and *mauka* of Kauai Belt Road, today's Kūhiō Highway. Figure 14 shows the layout of plantation fields and railroad tracks in the portion of the project area south of Wailua River.

Figure 11. 1954 photograph of the Coco Palms hotel, showing railroad tracks along the current Kūhiō Highway in the vicinity of the project area (photograph in Penhallow 2007:28)

3.1.7 The Coco Palms Resort

Ernst Lindeman leased Kapule's *kuleana* and planted the 2,000-tree coconut grove the Coco Palms Resort is famous for in the mid 1890s. The site was planted with nuts from Samoa for the purpose of harvesting copra.

Lindeman's coconut plantation was apparently not profitable, and the coconut grove and plantation lodge were eventually sold in 1952 to Lyle and Grace Guslander. The 24-room lodge was opened as a small hotel on January 25, 1953. Figure 15 is a 1953 Land Application Map that shows the scattered buildings of this early hotel in relation to the four Land Commission Awards. The Wailua Coconut Grove, Parcel C in the lower portion of the graphic is the location of the current project area. Poli'ahu Road, constructed just south of this parcel, later became Kuamo'o Road.

Grace Guslander managed the Coco Palms, growing the resort to a maximum capacity of 416 rooms. The resort was very well known in its heyday and served as the set for several movies including "Blue Hawaii" starring Elvis Presley. The wedding chapel that currently stands on the property was built by MGM for the film "Miss Sadie Thompson" with Rita Hayworth, and was then donated to Coco Palms.

The Coco Palms Resort was badly damaged by Hurricane Iniki in 1992, and has stood empty since. The property is currently unused except for daily movie tours that stop at the property. The chapel is also used several times a month for wedding ceremonies. The property of the Seashell Restaurant, across Kūhiō Highway from Coco Palms, has also been unused since September 1992.

Figure 16, a portion of a 1963 US Geological Survey map, shows the project area and its proximity to the Coco Palms Resort; the buildings just west of the project area are the resort.

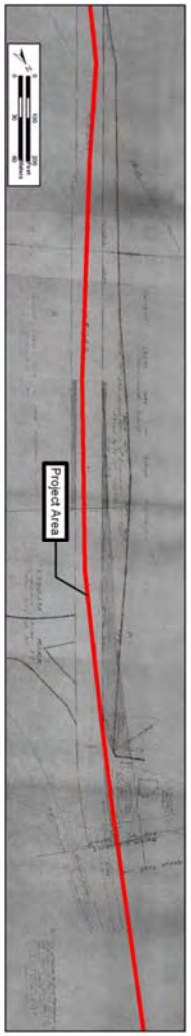

Figure 12. Portion of 1933 Lihue Plantation Co., LTD. to Territory of Hawai'i, Surrender of Portion of General Lease 1495 for Realignment of Kaua'i Belt Road map, showing rock wall *mauka* of project area

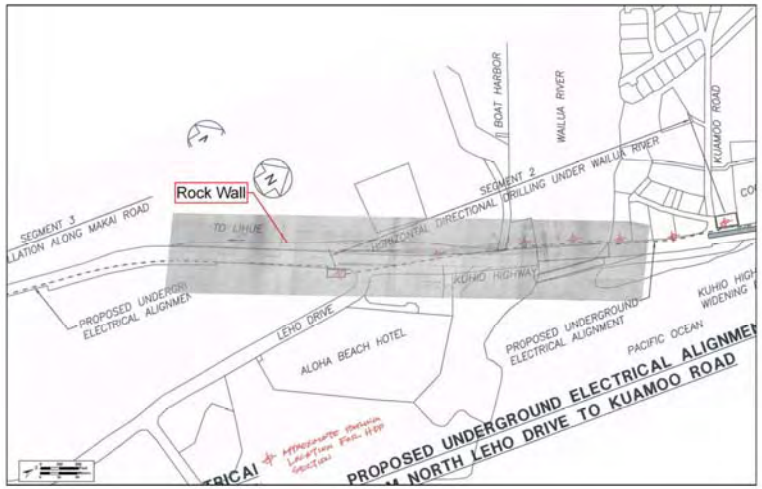

Figure 13. Portion of 1933 Lihue Plantation Co., LTD. to Territory of Hawai'i, Surrender of Portion of General Lease 1495 for Realignment of Kaua'i Belt Road map, showing rock wall *mauka* of project area and project plans

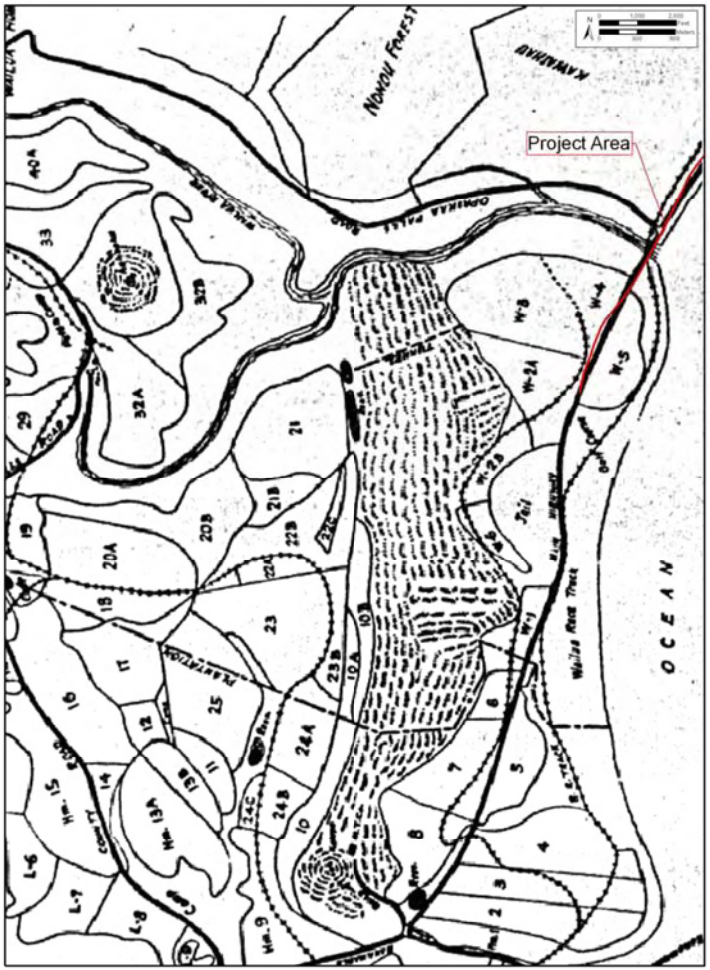

Figure 14. Lihue Plantation Co. map 1941, showing railroad tracks and plantation fields within and adjacent to the project area

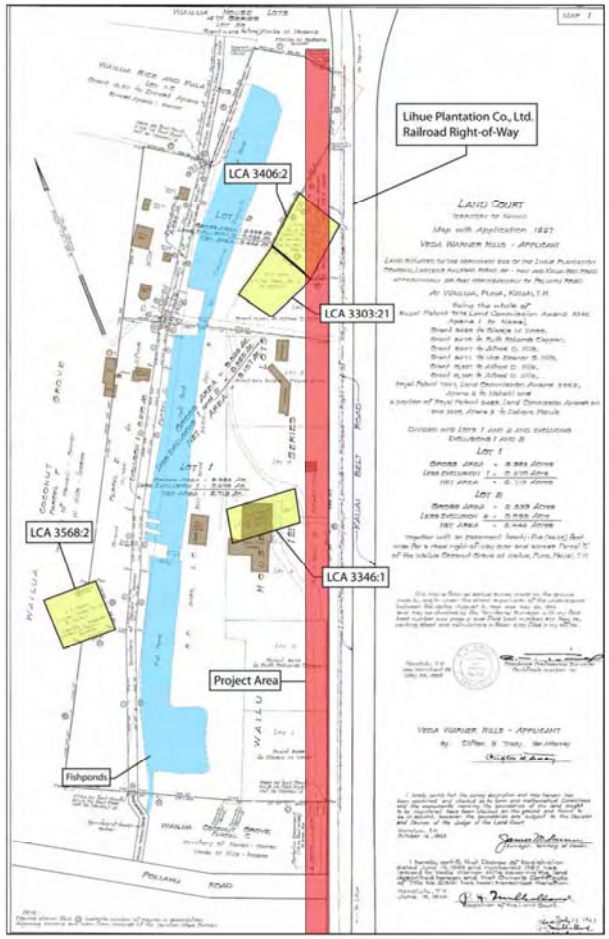

Figure 15. 1953 Land Court Application map #1667, showing the locations of the early Coco Palms Lodge structures (in brown), LCA parcels (in yellow), fishponds (in blue); the Lihue Plantation Co. railroad right-of-way (in gray), and the current project area (in red) (Hawai'i Land Survey Division, Registered Map No.1667)

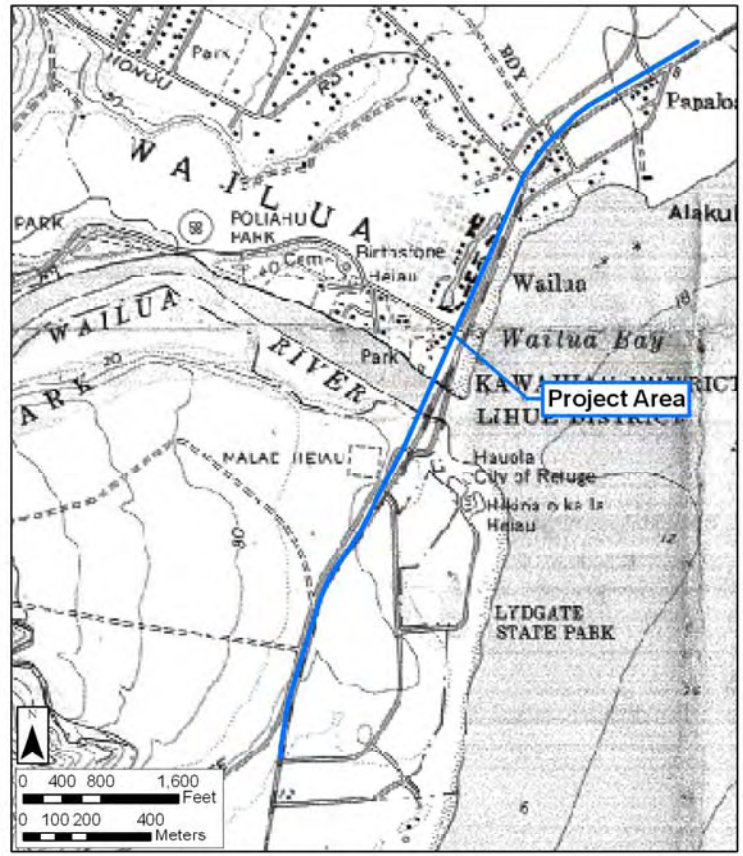

Figure 16. Portion of 1963 USGS map, Kapa'a quadrangle, showing the project area and vicinity; Coco Palms Resort buildings west of the project area

3.2 Previous Archaeological Research

3.2.1 Previous Archaeological Research in Wailua

A list of archaeological research conducted within Wailua Ahupua‘a is provided in Table 3. Figure 17 shoes archaeological studies conducted within coastal Wailua Ahupua‘a. Table 4 lists archaeological sites identified in Wailua Ahupua‘a and Figure 18 shows their location.

Table 3. Previous Archaeological Studies in Coastal Wailua Ahupua‘a

Source	Location	Nature of Study	Findings
Thrum 1906	Mouth of Wailua River	Listing of *heiau*	Lists 4 *heiau*: Malae, Poli‘ahu, Holoholokū and Hikinaakalā
Bennett 1931	Mouth of Wailua River	Archaeological reconnaissance survey of *heiau* and place of refuge	Describes 6 sites- Site 103: Dune burials, Site 104: Malae Heiau, Site 105: Hikinaakalā Heiau, Site 106: Holoholokū Heiau and sacred grove, Site 107: Poli‘ahu Heiau and Site 109: an unnamed *heiau*
Soehren 1967	Wailua River Valley, North and South Forks	Field Trip Report	Locates and briefly describes 34 sites with B.P.B.M. site numbers A1-1 to A1-34
Ching 1968	Wailua River Valley, North and South Forks	Surface Survey	Locates and briefly describes Soehren's (1967) 34 sites and adds sites 35-58 with B.P.B.M. site numbers A1-1 to A1-58
Handy and Handy 1972	Archipelago-wide	Native Planters Study	Discusses agricultural pattern at Wailua Ahupua‘a
Kikuchi 1973	Coco Palm Hotel, north of Wailua River, *mauka* of Kūhiō Hwy.	Burial Study	Discusses 34 burial finds, other features and artifacts
Kikuchi 1974	Wailua River mouth	*Heiau* Study	Hikinaakalā Heiau
Walton and Spilker 1974	Lydgate State Park Pavilion, south of river mouth, *makai* of Kūhiō Hwy.	Assessment and sub-surface testing (7 post hole digger excavations)	Testing did not locate any archaeological materials
Kikuchi et al. 1976	Holoholokū and Pōhaku Ho‘ohānau	Study of oral documentation and historical records	Compendium of information regarding these sites
Cox 1977	Wailua Golf Course	Burial Recovery project	13 burials located (Sites -542 to -546 and -819)

Source	Location	Nature of Study	Findings
Yent 1980	North side of *makai* portion of Wailua River	Evaluation of bellstone	Bellstones located, described and traditions are given along with preservation recommendations
Kikuchi 1984	South of mouth of Wailua River	Mapping of Petroglyphs	Survey of petroglyphs noted 36 figures, more possibly in river and bulldozer damage from clearing mouth of river
Kikuchi 1987b	Malae Heiau, South of mouth of Wailua River	Adze study	Discusses adze fragments from Malae Heiau
Yent 1987	South of mouth of Wailua River	Demolition of old comfort station and corings for new comfort station	No subsurface cultural deposits located
Dunbar 1988	Wailua Complex of Heiau	National Register of Historic Places (NRHP) Inventory-Nomination Form	"One of the most important site complexes in the Hawaiian Islands"
Yent 1989	Wailua River mouth – south side, Hikinaakalā Heiau and Hauola	Mapping and testing of Site 50-30-08-105 in 1986 (6 1m^2 excavations)	Concluded 2 periods of occupation, one historic, and an earlier period may or may not be associated with *heiau* building
Hammatt 1991	Kūhiō Hwy. near Wailua River mouth	Subsurface Testing	No cultural deposit observed
McMahon 1991	Eastern margin of Sleeping Giant Mountain on north edge of Wailua Ahupua‘a	Archaeological Investigations	No significant findings
Walker et al. 1991	Both sides of Kūhiō Hwy. at south end of the *ahupua‘a*	Archaeological inventory survey for a master plan	Identified no sites
Yent 1991a	Mouth of Wailua River	Archaeological Testing	Although several fill layers and extensive ground alteration was indicated, a possible pre-contact cultural deposit was noted; no site number was assigned
Yent 1991b	Malae Heiau South of mouth of Wailua River	Park Planning	Discusses Malae Heiau in context of proposed incorporation into Wailua River State Park

Source	Location	Nature of Study	Findings
Yent 1991c	South side Wailua River mouth	Damage Assessment	Summary of petroglyph site 50-30-08-105A
Folk and Hammatt 1992	Wailua County Golf Course from coast to Kūhiō Hwy.	Assessment for Fiber Optic Cable	Examination of exposed strata revealed no cultural material, informants described burials in the golf course area
Kikuchi and Remoaldo 1992	Island-wide, B005 on north bank of *makai* Wailua River	Cemeteries of Kaua'i	Identifies site 50-30-08-B005-Poli'ahu Japanese Cemetery
Spear 1992	North of Wailua River mouth, *makai* of Kūhiō Hwy.	Sub-surface Testing (7 backhoe trenches)	No significant findings; two charcoal lenses noted
State of Hawai'i 1992	Poli'ahu Heiau	Interpretive Signage Plan	Summarizes data on Poli'ahu Heiau
Yent 1992	Wailua River mouth	Hurricane Damage Assessment	Damage report
Erkelens and Welch 1993	Kaua'i Community Correctional Center west of Kūhiō Hwy. & the Wailua County Golf Course	Archaeological assessment	Summarizes literature and notes probability of burials
Kawachi 1993	Wailua River mouth	Survey of river mouth (4-1-04:01)	Discovered unreported submerged petroglyph, no site number assigned
Beardsley 1994	Kaua'i Community Correctional Center west of Kūhiō Hwy. and the Wailua County Golf Course	Sub-surface testing for sewer line	One burial designated Site -9357 regarded as part of Bennett's site 50-30-08-103 but no other significant findings
Folk et al. 1994	Wailua County Golf Course from coast to Kūhiō Hwy.	Archaeological Inventory Survey with sub-surface testing	No significant finds

Source	Location	Nature of Study	Findings
Hammatt et al. 1994	Lands *mauka* of Kūhiō Highway	Archaeological Assessment	Identifies archaeological concerns including: 1) impact on the Wailua Complex of *heiau*, 2) impact on potential burial sites in the Wailua Golf Course and the Coco Palms Resort area, and 3) impact on existing and former Wailua marshlands in the vicinity of the County Correctional facility and on the north side of Wailua River
Carpenter and Yent 1995	North Fork of the Wailua River	Archaeological Reconnaissance	Notes high potential for extensive archaeology
Flores 1995	Malae (Malaeha'akoa) Heiau; south of Wailua River mouth, *mauka* of Kūhiō Hwy.	Historical and Cultural Research	Data on the *heiau* (Site 50-30-08-104) and Wailua Ahupua'a in general is presented
Folk and Hammatt 1995	Wailua County Golf Course from coast to Kūhiō Hwy.	Monitoring fiberoptic cable conduits	Found remains of eight individuals from disturbed, possibly secondary, deposits
Hammatt et al. 1997	Lands *mauka* of Kūhiō Highway	Archaeological Inventory Survey for Kūhiō Highway widening	1 new site found north of river, 50-30-08-756; a terrace
Yent 1997a	Extreme south, coastal Wailua, *makai* of Kūhiō Highway	Burial Treatment and Monitoring Plan	Plans to attend proposed work at a temporary automobile storage facility close to Dune Burials sites
Yent 1997b	Malae Heiau, south of Wailua River, *mauka* of Kūhiō Highway	Vegetation Removal and Landscaping Plan	Outlines methodology and guidelines for vegetation removal at Malae Heiau
Yent 1997c	Malae Heiau	Vegetation Removal Report	Summarizes work
Bush et al. 1998	Parcel between Papaloa Road and beach	Inventory Survey	No cultural finds
Fager and Spear 2000	Wailua Golf Course	Archaeological Monitoring Report	Documents several burials

Source	Location	Nature of Study	Findings
Shideler et al. 2000	Lydgate Park	Inventory Survey	Recommends monitoring during proposed construction of bike trail
Yent 2000	Holoholokū and Hikina‘akalā sites	Restoration Report	Describes restoration of *heiau* and birthstones
Hammatt 2001	Along Kūhiō Hwy.	Archaeological Assessment	Indicates high potential for encountering historic properties north of Wailua River during proposed installation of fiber optic cable
Rechtman and Clark 2001	Parcel between Kuamo‘o Road and Wailua River	Inventory Survey	No cultural findings
Shideler et al. 2001	Lydgate Park	Archaeological Assessment	Summarizes work
Buffum and Dega 2002	Coco Palms	Archaeological Monitoring Report	Cultural layer identified as site -1711
Hammatt and Shideler 2003	Kūhiō Hwy. Bypass options	Archaeological Assessment	Summarizes work, describes six new sites (667, 668, 676-679)
Morawski and Dega 2003	Lydgate Park	Monitoring Report	Two burials, two isolated skeletal finds and a cultural layer (Site -356)
Hammatt 2005	Coco Palms resort, lagoon feature	National Register of Historic Places Nomination Form	Weuweu-Kawai-iki Fishpond; SIHP 50-30-80-680; Debora Kapule’s Fishponds LCA 3111/3559
Hoffman et al. 2005	Coco Palms Resort	Archaeological Inventory Survey with Subsurface Testing	Three sites recorded: two historic fishponds, combined as SIHP Site 50-30-08-680, an historic burial ground, Site 50-30-08-681, documented by Kikuchi in 1973; and, an intermittent traditional cultural layer (Site 50-30-08-1711) first described by Buffum and Dega (2002) and Dega and Powell (2003).
O’Hare et al. 2005	Pu‘u Kī Ridge, near north side of Wailua River mouth	Research Report and Archaeological Assessment	Research on the place names Holoholokū and Kalaeomanu and Assessment of Site 676 on Pu‘u Kī Ridge
O’Leary and Hammatt 2006	Coco Palms resort – NW corner	Archaeological Inventory Survey Addendum	No additional historic properties beyond those described in the original archaeological inventory survey were identified during excavation for this addendum

Source	Location	Nature of Study	Findings
Carney and Hammatt 2007	Leho Drive 24” Sewer Line Installation Project	Archaeological Monitoring Report	No significant cultural resources were documented during the monitoring fieldwork.
Hammatt and Shideler 2007	Kūhiō Highway between Kuamo‘o Road and the Temporary Kapa‘a Bypass Road	Archaeological Assessment (substantial subsurface testing – no new sites identified)	One weak cultural layer was identified in Backhoe Trench 9. This is understood as part of an intermittent traditional cultural layer (Site 50-30-08-1711) described by Buffum and Dega (2002), Dega and Powell (2003) and Hoffman et al. (2005).

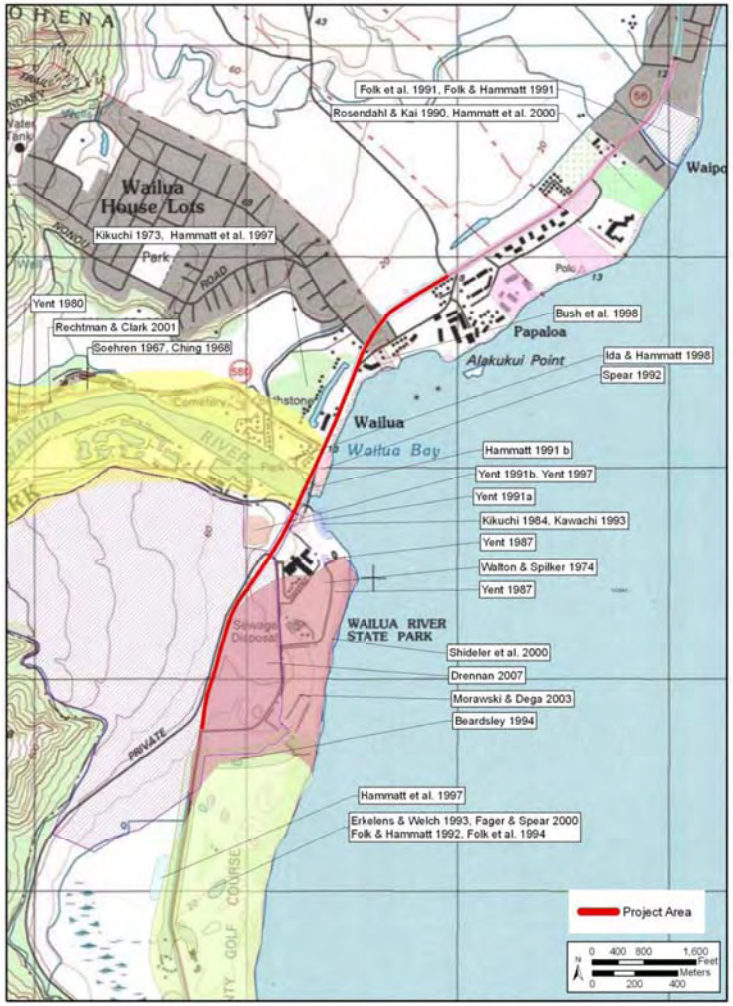

Figure 17. Previous archaeological studies in coastal Wailua Ahupua'a

Table 4. Archaeological Sites in Coastal Wailua Ahupua'a

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
B005	Poli'ahu Japanese Cemetery (Site 50-30-08-675)	South side Kuamo'o Road (Poli'ahu Road)	Discrete Historic Cemetery approx 118 burials, interments as late as 1979	Kikuchi & Remoaldo 1992:66-74
103	Dune Burials	Wailua Golf Course, large area, not well defined; primarily seaward of Kūhiō Hwy, N of Wailua Golf Course club house	Minimum number of individuals encountered to date approx. 100; consultation and monitoring in vicinity indicated	Bennett 1931:125; Erkelens & Welch 1993; Beardsley 1994; Fager & Spear 2000, Morawski & Dega 2003
104	Malae Heiau	South bank of Wailua River, 200 feet *mauka* of Kūhiō Highway	Part of Wailua Complex of Heiau National Historic Landmark - defined area 2 acres, *heiau* and buffer 9.49 acres, in State Park, Yent 2000 specifies view corridor concerns	Thrum 1906:40; Bennett 1931:125; Yent 1991b; Yent 2000
104A	Adze Workshop/ flake scatter	In cane field N and NE of Malae Heiau to road to marina	Within 9.49 acre Malae Heiau and buffer parcel in State Park	Kikuchi 1987:1-9; see Yent 2000
105	Hikinaakalā Heiau and Pu'uhōnua o Hauola	Southern side of the mouth of Wailua River	Part of Wailua Complex of Heiau defined area 2.3 acres in State Park	Thrum 1906:40; Bennett 1931:125-126; Kikuchi 1974; Yent 1989
106	Kalaeokamanu (Holoholokū) Heiau & the Pōhaku Ho'ohānau	North bank of the Wailua River at the base of Pu'ukī	Part of Wailua Complex of Heiau defined area 37,960 sq ft., in State Park	Bennett 1931:127; Damon 1934
107	Poli'ahu Heiau	Wailua River State Park	Part of Wailua Complex of Heiau defined area 49,140 sq ft., in State Park	Thrum 1906:40; Bennett 1931:127

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
217 (Soehren & Ching Site 10)	Kauhihalau agricultural site	S of *makai* portion of Wailua River, E quarter in Wailua State Marina	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:16
247 (Soehren & Ching Site 33)	Kamalau agricultural site	N. of Mauna Kapu on flats	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:16
250 (Soehren & Ching Site 11)	Hauloa agricultural site	N of *makai* portion of Wailua River	No data, size unclear, further work in area indicated; in State Park	Ching 1968:16
321 (Soehren and Ching Site 12)	*'Auwai*, earthen ditch	N of Confluence of North and South Forks, Wailua River (associated with sites 218 and 250) along base of valley wall	Little data, length unclear, further work in area indicated; in State Park	Soehren 1967; Ching 1968:16; Yent 1989a:7; Carpenter & Yent 1997:35
325 (Ching Site 38)	Kamalau and Kulaina storied rocks	N of Mauna Kapu, at *mauka* end of site -247 one rock in middle of river below Poli'ahu *Heiau*	Site consists of two storied rocks; description insufficient for identification; in State Park	Ching 1968:16-18
326 (Ching Site 39)	Kamalau and Kulaina storied rocks	N of Mauna Kapu, at *mauka* end of site -247 one rock in middle of river below Poli'ahu *Heiau*	Site consists of two storied rocks; description insufficient for identification; in State Park	Ching 1968:16-18
329 (Ching Site 42)	Ahuhauli, reported home and burial ground of Kumauna/ Lono Kelekoma family	N of *makai* portion of Wailua River "near the little hillock, Ahuhauli, where the one (lone) tall coconut tree stands" (Salisbury 1936)	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:14, Salisbury 1936

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
330 (Ching Site 43)	Kaluamokila legendary cave through hill from N to S, south end just above water level; sealed with a stone,	North of *makai* portion of Wailua River	Virtually no data, may only be legendary, further work in area indicated; in State Park	Ching 1968:13
331 (Ching Site 44)	Old Rice Mill	North of Wailua River mouth, just *mauka* of Smith's and Doris' old boat landing	Still stood in 1953, only foundations are left in State Park, testing and marker recommended;	Ching 1968:12-13
334 (Ching Site 47)	Pōhaku'ele'ele Heiau (and several other sites reported by Dickey [1917:29])	"On the *makai* tip of a hill near the eastern end of the promontory between the two northern branches of the Wailua River" (Dickey 1917:14)	Virtually no data, some uncertainty about the location, size unclear, further work in area indicated; in State Park	Dickey 1917:29; Ching 1968:14-15
335 (Ching Site 48)	Bellstone(s)	North of *makai* portion of Wailua River	Part of Wailua Complex of Heiau National Historic Landmark - defined area N.A.; in State Park	Ching 1968:14
337 (Ching Site 50)	Hihiakalahu "the place where the first *hau* trees of Kaua'i grew"	North of Mauna Kapu, south of Poli'ahu	Seemingly just a legendary *hau* tree grove, size unclear; in State Park	Ching 1968:16
340 (Ching Site 53)	Agricultural Terraces "indicated as being in rice in 1900 and 1923"	North of confluence of North and South Forks, Wailua River	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:18

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
342 (Ching Site 55)	Agricultural flat "appears as rice land on Monsarratt's map of 1900 and Wall's map of 1923"	North of *makai* portion of Wailua River	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:13
343 (Ching Site 56)	*Kula* "indicated as *kula* land on Wall's map of 1923"	South side of *makai* portion of Wailua River	Virtually no data, size unclear, further work in area indicated; in State Park	Ching 1968:16
356	Pre-contact cultural layer	Lydgate Park	Extent of the cultural layer remains unknown	Morawski and Dega 2003
502	Wailua Complex of Heiau	Mouth of the Wailua River	Includes five discrete parcels, sites: -104, -105, -106, -107, -335; in State Park	1962 National Register of Historic Places; 1981 Hawai'i Register of Historic Places
542	Burial	North part of Wailua County Golf Course	Burials part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977
543	Burial	North part of Wailua County Golf Course	Burials part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977
544	Burial	North part of Wailua County Golf Course	Burials part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977
545	Burial	North part of Wailua County Golf Course	Burials part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977
546	Burial	North part of Wailua County Golf Course	Burials part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
634	Extensive wetlands, former *lo'i* area	North bank of Wailua River	130-acre; further archaeological work indicated	Hammatt et al. 1997:68, 70
660	Burial	North end of Coco Palms	1 historic burial, consultation and monitoring indicated	Elmore & Kennedy 2000
667	Linear Terrace	North side of pasture access road, *mauka* of Smith's Tropical Paradise	Approx. 2 m by 5 m long, further archaeological work indicated	Hammatt & Shideler 2003
668	Cement slabs inscribed with year 1926	North central portion Smith's Tropical Paradise	An area 4 m by 5 m., further archaeological work indicated	Hammatt & Shideler 2003
675	Poliahu Japanese Cemetery	East end of Pu'u Kī Ridge above Pōhaku Ho'ohānau and Holoholokū Heiau	(formerly known as 50-30-08-B005)	Hammatt and Shideler 2003
676	Alignments and enclosures	Greatly modified as a contemporary sacred site – possibly former *heiau*	Recent modifications make it difficult to discern what is a traditional Hawaiian construction	Hammatt & Shideler 2003
677	Two lava tubes	Just S of Kuamo'o Road in the N side of Pu'u Kī 100 m W of Pōhaku Ho'ohānau	No cultural material observed but traditional use likely	Hammatt & Shideler 2003
678	Terrace	central Pu'u Kī summit ridge	Modest alignment on top of ridge	Hammatt & Shideler 2003
679	Overhang rock shelter	N bank of Wailua River, SW portion of Pu'u Kī ridge	No cultural material observed but traditional use likely	Hammatt & Shideler 2003
680	Two historic fishponds	Coco Palms water feature	Approximately the same size and location as the Coco Palms water feature	Hoffman et al. 2005
681	Burial ground	SE corner of the Coco Palms	Size and extent uncertain	Hoffman et al. 2005, Kikuchi 1973

Site 50-30-08-	Site Type/ Name	Location	Size/Comments	Reference
756	Terrace	North bank of Wailua River	In State Park, 30 m by 12 m-further archaeological work indicated	Hammatt et al. 1997:68,70
761	Burial	North bank of Wailua River mouth	Consultation and monitoring in vicinity indicated	Ida and Hammatt 1998
819	Burial	North part of Wailua County Golf Course	Burials understood as part of Site -103 consultation and monitoring in vicinity indicated	Cox 1977
1711	Cultural layer	Coco Palms Resort	Extent of cultural layer remains unknown	Buffum & Dega 2002; Dega & Powell 2003:38-49), Hoffman et al. 2005, Hammatt & Shideler 2007:69
1980	Burial	Wailua County Golf Course east of County Correctional Facility, half way to the sea	Minimum number of eight individuals encountered	Folk & Hammatt 1995
9357	Burial	County Correctional Facility	Burial understood as part of Site -103, consultation and monitoring in vicinity indicated	Beardsley 1994

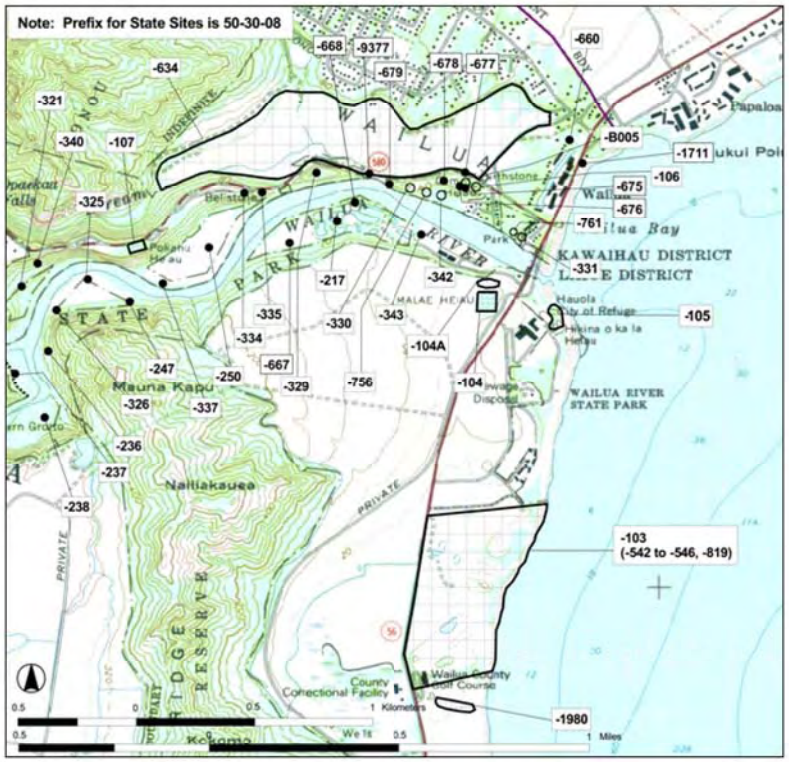

Figure 18. Map showing archaeological sites in coastal Wailua Ahupua'a

3.2.2 Archaeological Research near the Project Area

Previous archaeological studies conducted in the vicinity of the project area are shown on Figure 19.

The first mention of the vicinity of the project area in an archaeological context appears in Bennett's 1931 *Archaeology of Kauai*. Bennett's (1931:127) site 106 is a "Heiau and sacred coconut grove, on the north bank of the Wailua River." Ethel Damon (1934) noted a couple of years later that "on the north bank of this river is an extensive cocoanut grove which now looks so venerable that it is often mistaken for an ancient, perhaps also, a sacred grove. As a matter of fact, it was planted as an experiment in 1896, and is therefore of no great antiquity." Apparently Bennett mistook the grove in the vicinity of the present Coco Palms resort for one of traditional date and significance.

During the building of the Coco Palms resort, an unknown number of human burials were encountered and reburied at the front of the hotel. In 1973, during construction of a new wing to the hotel more human remains were encountered in sand deposits. William Kikuchi (1973) was called to document the findings. In all 34 sets of human remains were documented by Kikuchi, though the actual number of individuals disinterred may be as high as 85 (Hoffman et al. 2005:26). All of these human remains were reinterred at the site of the previous reburials, and a plaque was attached to a boulder on the spot to mark it (Figure 20).

Kikuchi's report notes that there were two general groupings of remains, a northern group and a southern group. The northern group was found at or below sea level, and the exterior of the bones had a dark coloration. The bones recovered from the southern group were clean and in very good condition. No conclusion was made as to the implications of these differences. Also found were several pieces of logs and a large helmet shell (*Cassis cornuta*) that had been modified. While examining the sides of the excavation pit, Kikuchi also made note of several small pits. "These pits, seen as black filled outlines, were probably *imu*, underground cooking ovens. Most seem to have been of small size, a foot or two in diameter and not over a foot in depth. Several pits still had the cooking or heating stones within them, but there was little or no sign of any midden" (Kikuchi 1973:4).

During archaeological subsurface testing for a proposed Kapa'a sewerline (Hammatt 1991) one backhoe trench and eight hand-excavated archaeological test trenches were excavated on the *makai* side of Kūhiō Highway between the north side of the Wailua River mouth and Hale'īlio Road. While no historic properties were documented, the study (Hammatt 1991:46) noted the prospect of burials and/or cultural deposits in some areas.

During an inventory survey of three alternate routes for a Kūhiō Highway By-pass, Cultural Surveys Hawai'i excavated ten backhoe trenches in the *mauka* portion of the Coco Palms property (Hammatt et al. 1997). No historic properties were identified.

Another burial was discovered in the Coco Palms resort area when contaminated soil near a diesel tank was being excavated in 2000 (Elmore and Kennedy 2000). The burial was designated State Inventory of Historic Places (SIHP) number 50-30-08-660. The burial was associated with several historic glass beads. Despite the historic date of the burial, the investigators concluded that the remains were Hawaiian based on the presence of a coral abrader and the nature of the

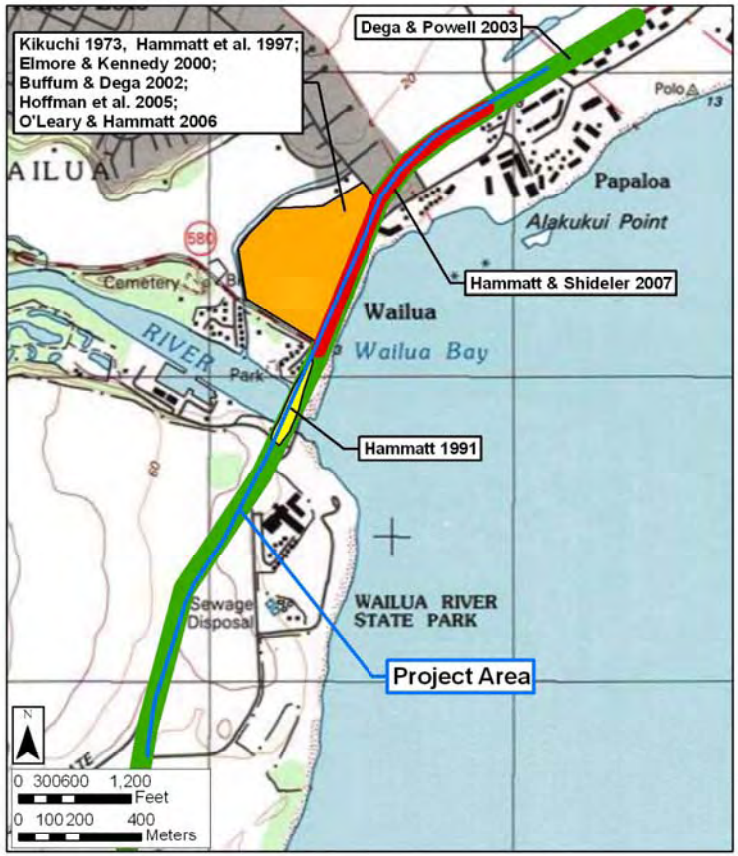

Figure 19. Previous archaeological studies in the vicinity of the project area

Figure 20. Plaque marking location of reburials associated with hotel construction at Coco Palms

burial in a sand matrix. The remains were disinterred and reburied in a boulder platform re-interment site, standing about a meter high, at the north central edge of the Coco Palms property.

In 2002, a cultural layer was identified at Coco Palms during the monitoring of the installation of a perimeter fence around the property (Buffum and Dega 2002). Findings consisted of a single adze pre-form, and the cultural layer was designated SIHP #50-30-08-1711.

In 2003, Scientific Consultant Services (SCS) conducted archaeological monitoring for the Sandwich Isles fiber optic cable project, which was situated within the Kūhiō Highway right-of-way and stretched from Moloa'a Bay to Hanamā'ulu Bay, a corridor that appears to include the entire length of the current project area (the exact location of monitored excavations could not be precisely overlaid within the current project area). Numerous pre- and post-contact cultural deposits, including human burials, were identified, with two historic properties were documented within or in the immediate vicinity of the current project area. In the immediate vicinity of the Coco Palms ("along the northeastern flank of the highway near Coco Palms") a rock-lined hearth filled with charcoal was recorded at a depth of 68-99 cmbs. The hearth was determined to be a component of SIHP #50-30-08-1711, previously identified by Buffum and Dega in 2002. Radiocarbon analysis of charcoal collected from the hearth indicated that the feature was utilized during the sixteenth or seventeenth century.

Dega and Powell (2003) also documented SIHP #50-30-08-886 within or in the immediate vicinity of the northern end of the present project area. SIHP #50-30-08-886 consisted of a subsurface cultural layer containing a hearth remnant, a possible buried *'auwai* (ditch) and two sets of previously disturbed disarticulated human remains. Determining the exact location of SIHP #50-30-08-886 is problematic but it appears the hearth observed was between Hale'īlio Road and the Kapa'a Bypass Road and that the *'auwai* was identified north of the Kapa'a Bypass Road. The human remains were "identified across from the entrance to Coconut Market Place" that would place them just north of the Kapa'a Bypass Road.

Dega and Powell (2003) also a noted a section of rail, a railroad spike and a three-link coupling chain near the intersection of Kūhiō Highway and Kuamo'o Road. These features were determined to be associated with the Lihue Plantation Company railroad. State site numbers were not assigned to these features.

In 2005 Cultural Surveys Hawai'i carried out an archaeological inventory survey (Hoffman et al. 2005) at the Coco Palms resort excavating 86 trenches. CSH excavated an additional 13 trenches in the tennis court area in the northwestern corner of Coco Palms (Trenches 87-99) in 2006 (O'Leary and Hammatt 2006), bringing the total number of trenches to 99, shown on Figure 21. Two new sites (previously described but not given SIHP numbers) and one previously designated SIHP site were recorded within the project area, shown on Figure 22.

The newly designated sites were two historic fishponds, now combined into one water feature as SIHP Site 50-30-08-680, and an historic burial ground previously documented by Kikuchi in 1973 and now designated Site 50-30-08-681. The previously designated site consisted of an intermittent traditional cultural layer (Site 50-30-08-1711) first described by Buffum and Dega (2002) and Dega and Powell (2003).

In general, the natural stratigraphy of the Coco Palms Inventory Survey project area consisted of three major layers. The first was a dark brown loamy-sand topsoil (Stratum I). Below that was

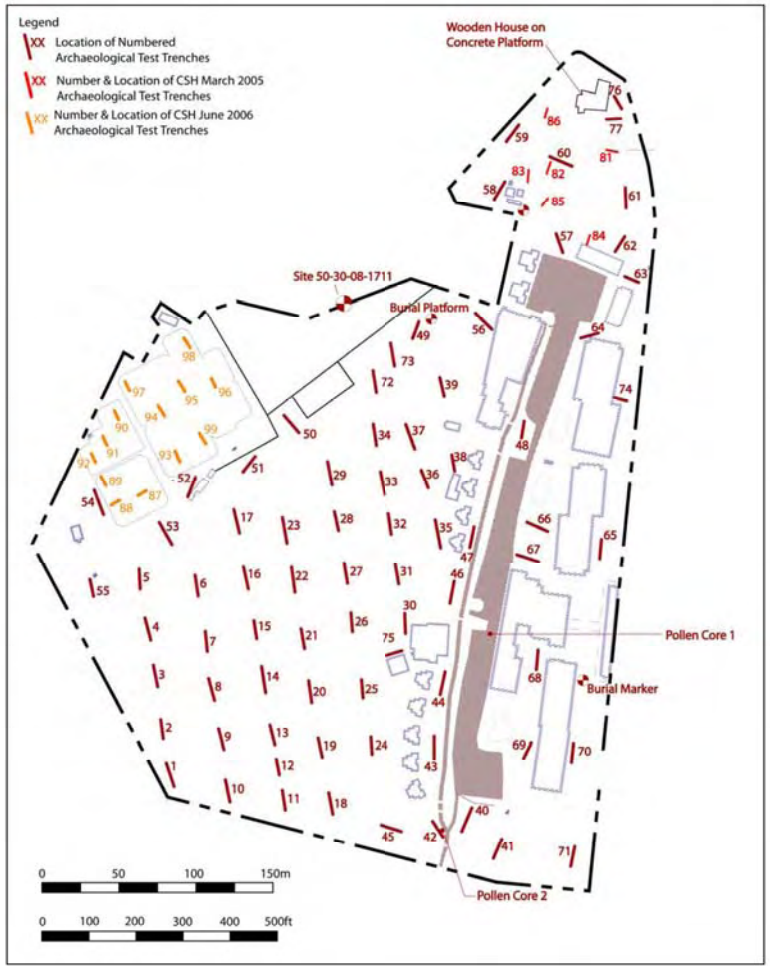

Figure 21. Location of 99 backhoe trenches excavated on the adjacent Coco Palms property (from O'Leary and Hammatt 2006:1)

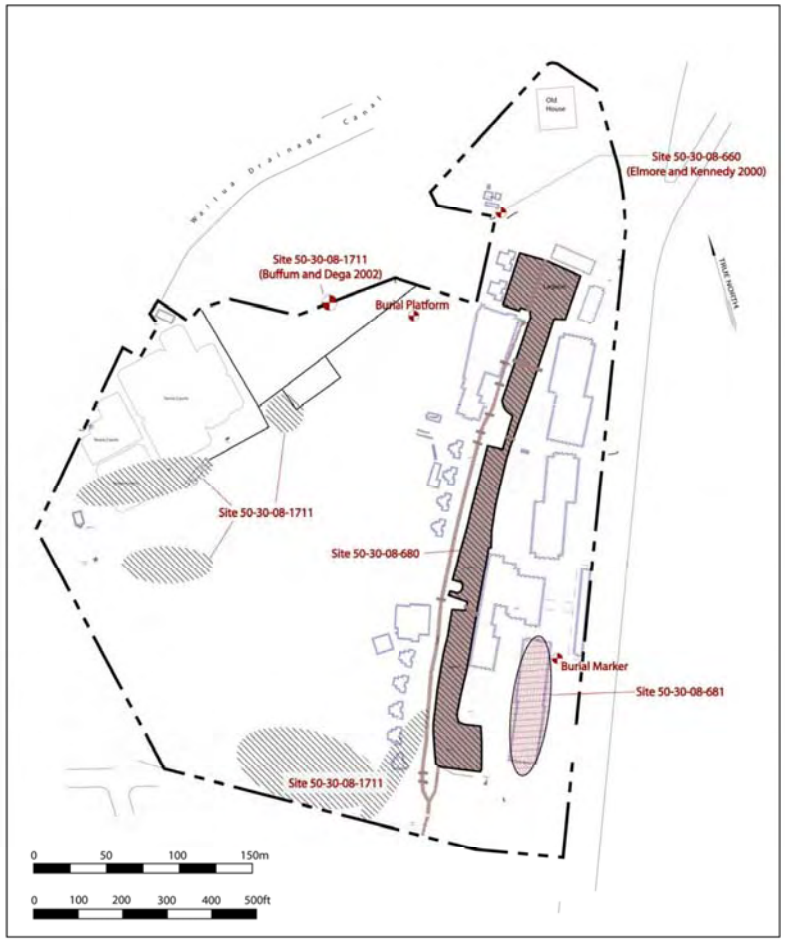

Figure 22. Dashed line indicates adjacent Coco Palms Resort, showing location of four SIHP Sites: 50-80-08-660, historic burial; -680, two fishponds; -681, burial ground; and, -1711, an intermittent cultural layer; current project area is seaward (to the right) and just south of the Coco Palms Resort (from O'Leary and Hammatt 2006:22)

an olive yellow loose medium coralline sand layer (Stratum II). The deepest deposit was generally a compact fine sand, in some areas cemented into pebbles, varying in color from light yellow to gray (Stratum IV).

In several trenches to the south and the northwest of the coconut grove, a dark grayish brown sandy loam layer was found between Strata II and IV. This layer was associated with the few cultural remains on the property and is therefore identified as a cultural layer (Stratum III) corresponding to SIHP #50-30-08-1711 (Buffum and Dega 2002). None of the trenches excavated in 2005 *makai* of the Coco Palms resort buildings (and thus adjacent to the present project area) contained Stratum III.

Trenching results reveal the historic landscape and areas of traditional cultural activity. Figure 23 indicates areas within the project area where Stratum III, a cultural layer, was identified. Figure 24 indicates which backhoe trenches had either boulder fill or clays and/or gleyed sediments. Clays and gleyed sediments are formed in low energy, wet environments, and in this case probably indicate areas where a marsh formerly existed within the project area. Boulder fill layers indicate previously low-lying areas of the site that were later filled (sometime in the late nineteenth century) to create a level landscape on which to plant the coconut grove. Both boulder fill layers and clay layers indicate the remains of a low-lying marsh located behind the fishpond

The Hoffman et al. 2005 inventory survey excavated a number of trenches in very close proximity to the present project area. The profiles for the Hoffman et al. 2005 trenches 61-63, 65, 70, 71, 74, 76, 77 & 81 are summarized below from south to north in Table 5. In general terms the trenches excavated seaward of the Coco Palms buildings and in close proximity to the present project area revealed extensive fill deposits most likely related to construction episodes at the Coco Palms resort. There were no finds of significant artifacts or intact cultural features but two bone fragments, possibly human, were recovered from a fill layer of Trench 70 (Figure 25).

In 2007, Cultural Surveys Hawai'i conducted an archaeological inventory survey (Hammatt & Shideler 2007) with subsurface testing for TMK [4] 4-1-003-039, a former railroad/cane haul road corridor, lying seaward of the Coco Palms Resort and *mauka* of Kūhiō Highway. In total, 10 trenches were excavated utilizing the assistance of a backhoe. No traditional Hawaiian artifacts, diagnostic historic artifacts, or burials were observed. A weak cultural layer in the form of charcoal flecking, a few fragments of fire-cracked rock, marine shell midden was observed and determined to be a component of an intermittent traditional cultural layer (Site 50-30-08-1711) previously described by Buffum and Dega (2002), Dega and Powell (2003), and Hoffman et al. (2005).

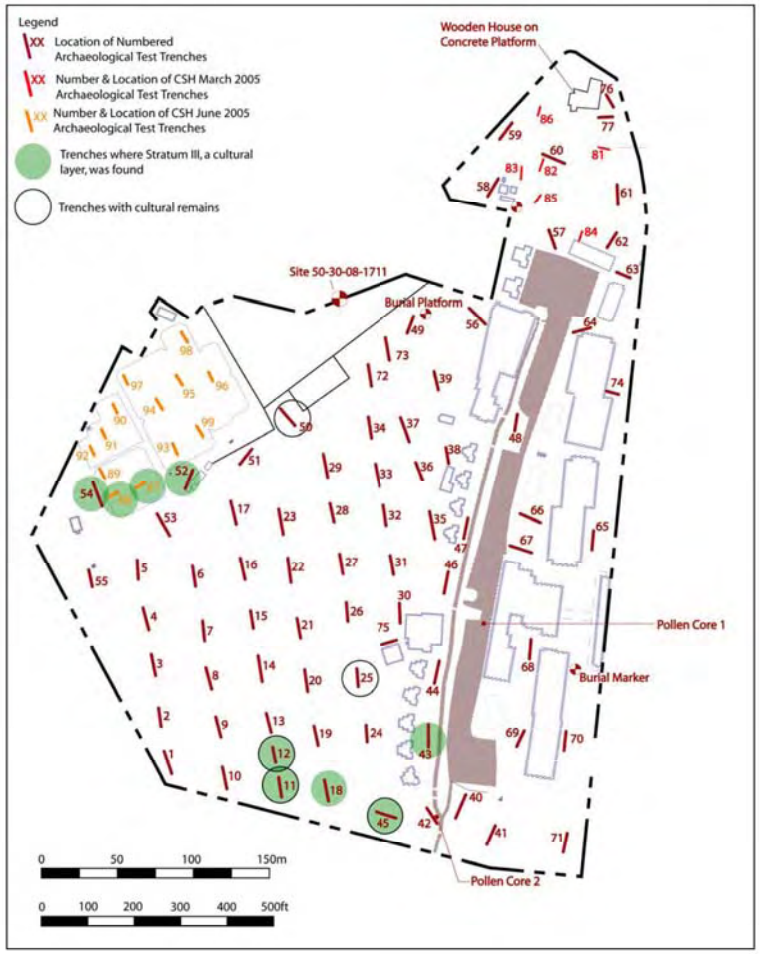

Figure 23. Coco Palms Inventory Survey Project area, showing location of 99 trenches; 9 trenches (green circles) contained a cultural strata, part of the discontinuous site 50-30-08-1711

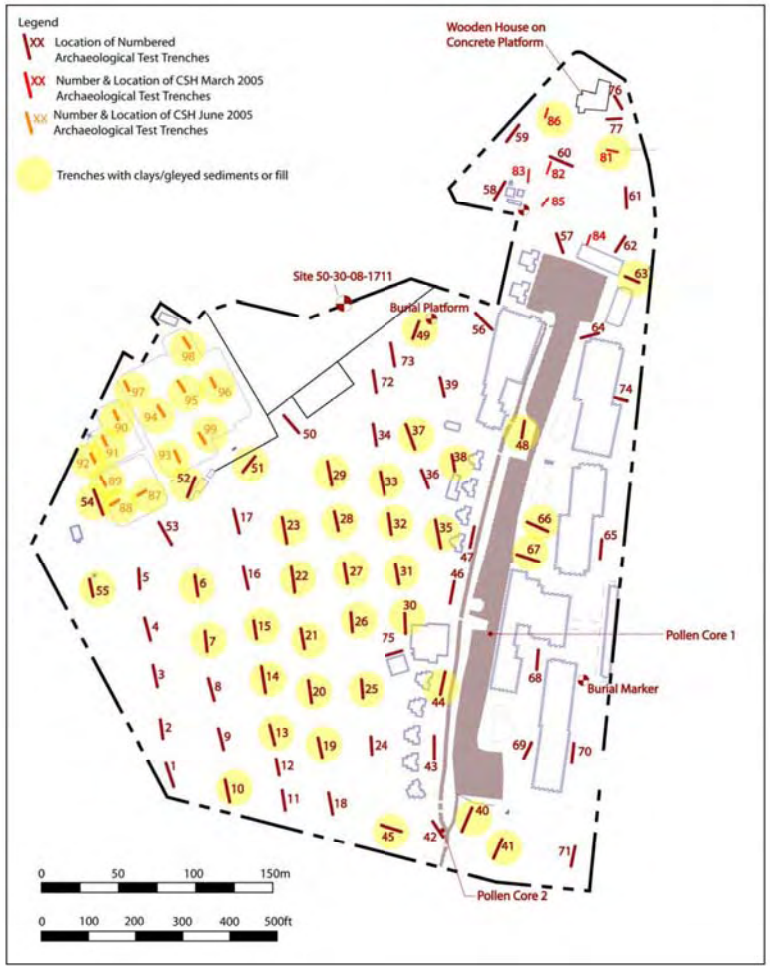

Figure 24. Diagram of Coco Palms Inventory Survey project area showing backhoe trenches where sediments were significantly disturbed by modern construction activities

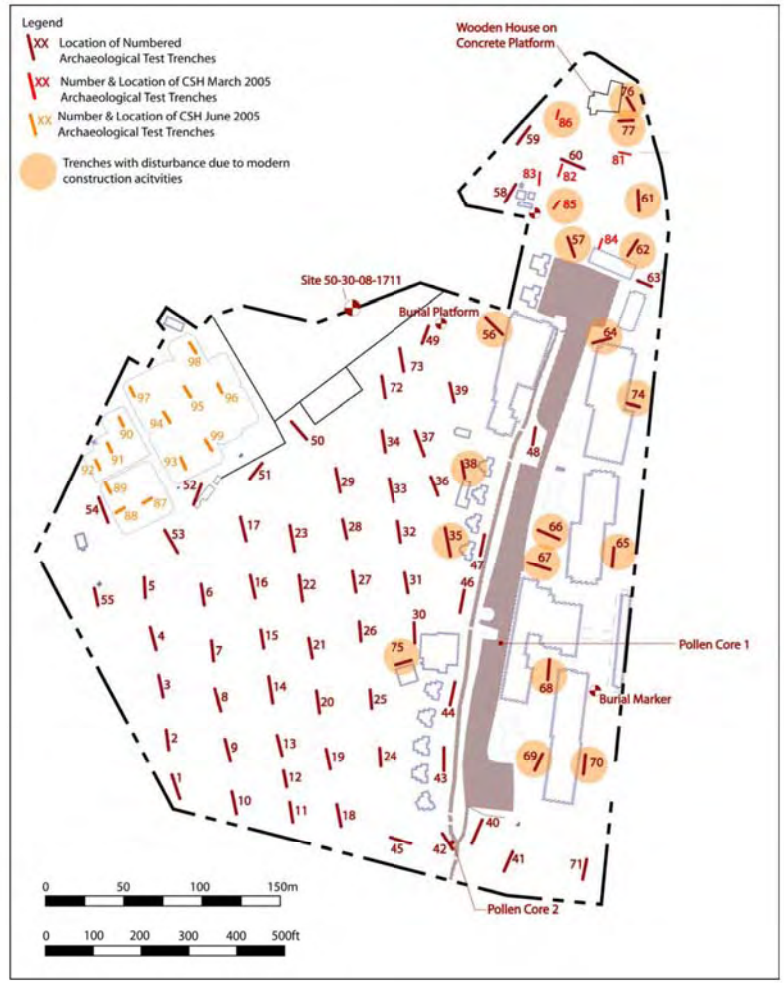

Figure 25. Diagram of Coco Palms Trenches 1-77, showing location of trenches with disturbed sediments, including Trench 70, from which two possible human bones were recovered

Table 5. Summary of Stratigraphy and Finds in Coco Palms AIS Trenches (from south to north)

Trench	Sediments encountered	Comments
71	2 strata of structureless (brown above yellow) fine sand to 210 cmbs	-
70	Brown structureless fine sand fill to 170 cmbs	Contained construction debris and 2 small bone fragments believed to be human
65	Yellowish brown medium sand fill to 220 cmbs	Contained construction debris to base of excavation
74	Brown structureless fine sand fill to 140 cmbs	-
63	Strong brown sandy loam to 100 cmbs above very dark gray silty clay loam (Gley I)	Water table at 115 cmbs
62	Very dark brown sandy loam above pale yellow fine sand	Water table at 105 cmbs
61	3 fill layers to 50 cmbs above olive fine compact sand Strat IVa	-
81	Possible fill to 60 cmbs above pale brown coarse beach sand	Water table at 140 cmbs
77	Red silty clay loam fill to 160 cmbs	Contained modern trash
76	Red clay loam fill to 170 cmbs	Contained modern trash

3.3 Background Summary and Predictive Model

The Wailua River, along both shores, was the of great importance to the Hawaiian *ali'i* in pre-contact times. This area was the royal center where the high chiefs and chiefesses carried on their business when they were not traveling about the island(s), and where they entertained visitors. The concentration of *heiau* on both sides of the river suggest that Wailua was the religious and political center of Kaua'i during ancient times.

The *makai* section of the Wailua Ahupua'a near the river mouth was the focus of daily life for the royal families. Some house sites were south of the river on the dunes (*makai* of the present highway), but the majority of house sites were on the north side of the river just *mauka* of the highway between the Coco Palms Resort and the river, an area immediately southwest of the current study area (see Figure 8).

Inland, along the floodplain, are remnants of the numerous *lo'i* parcels and house sites. There is archaeological evidence that agricultural use of the land stretched far *mauka* along the Wailua River and its tributaries, and supported a relatively large population at an earlier time (Ching 1968). Archaeological research also shows evidence of adze manufacture inland (Kikuchi 1987).

Based on background research, historic properties (i.e. archaeological sites) in the form of pre- and post-contact subsurface cultural deposits may be encountered during the archaeological inventory survey of the project area.

Historic research has identified numerous LCAs in the vicinity of the project area, suggesting indigenous Hawaiian land use in the form of habitation, agriculture, and aquaculture (see Figure 8 & Figure 15). Of note are references to a burial ground or cemetery located between Debora Kapule's fishponds (located on the grounds of the existing Coco Palm resort) and the sea, an area immediately north of the current study area. Previous archaeological research has provided evidence of indigenous Hawaiian land use in the vicinity of the study area through the documentation of pre-contact subsurface cultural layers (Buffum & Dega 2002; Dega & Powell 2003; Hoffman et al. 2005; Hammatt & Shideler 2007) and human burials (Kikuchi 1973; Elmore and Kennedy 2000; Dega & Powell 2003; Hoffman et al. 2005).

Historic research has also indicated the presence of the Lihue Plantation Company railroad right-of-way located just east of the study area (see Figure 15). Previous archaeological research has provided evidence of the Lihue Plantation Company railroad thru the documentation of a section of rail, a railroad spike and a three-link coupling chain near the intersection of Kūhiō Highway and Kuamo'o Road (Dega & Powell 2003).

Evidence of indigenous Hawaiian land use within the project area could include subsurface cultural deposits containing midden, artifacts, and/or human burials. Evidence of post-contact land use could include Lihue Plantation Company railroad infrastructure in the form of railroad tracks. Subsurface cultural deposits in the form of trash pits, privies, building foundations, and/or human burials could also be present.

Section 4 Results of Fieldwork

Jon Tulchin, B.A., Todd Tulchin, B.S., Geral Ida, B.A., and Missy Kamai, B.S., conducted the fieldwork effort, which required 6 person-days to complete. Fieldwork took place on February 19th, March 10th and 11th 2009 under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator). Fieldwork consisted of a 100 % pedestrian inspection of the project area, as well as a ground penetrating radar (GPR) survey and subsurface testing at a select 960 square foot study area located along the *mauka* (inland) side of Kūhiō Highway, approximately 32 m northeast of the intersection of Kuamo'o Road and Kūhiō Highway (Figure 26 & Figure 27). The study area is proposed as the starting point for the routing of the proposed electrical alignment underneath the Wailua River via micro-tunneling (see Figure 4 above).

4.1 Pedestrian Inspection

As discussed in the Methods Section, above, a brief 100 percent pedestrian inspection of the project area's surface confirmed that there were no surface historic properties present. As their were no surface historic properties, the inventory survey's historic property identification efforts focused on the identification of subsurface cultural deposits, which, based on background research, were likely present beneath the existing surface.

4.2 Ground Penetrating Radar

Fieldwork involved a GPR survey of a 960 square foot study area (see Figure 26). The study area was broken down into 6 test areas (TA 1-6) (Figure 28). Each test area measured approximately 15 ft by 10 ft with the exception of test area 2 (TA 2), which measured 10 ft by 6 ft.

A GPR survey consisting of single-run transects used to collected 2D depth profiles was conducted at each test area. Additionally, test areas 2, 3 and 5 (TA 2, 3, & 5) were subjected to a 3D GPR survey involving the collection of GPR data from X and Y transects, spaced 50 cm apart, forming a data grid which was utilized to generate 3D images of subsurface anomalies (Figure 29). A 3D GPR survey was not feasible at test areas 1, 4, and 5 (TA 1, 4, & 6) due to the presence of large palm trees and uneven ground surfaces.

4.2.1 Test Area 1

Test Area 1 (TA 1) consisted of an approximately 15 ft by 10 ft area that was relatively level, but contained a large palm tree and a utility pole anchor which hindered a 100% GPR survey of the test area (Figure 30). Four single-run transects (Transects 9-12) used to collected 2D depth profiles were conducted at TA 1 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 1 ranging from depths of 10 cm to 170 cm (Figure 31, Figure 32, Figure 33, & Figure 34). The observed anomalies may correspond to the tree roots of the numerous trees observed in the immediate area. However, the presence of cultural deposits, including human burials cannot be ruled out.

Figure 26. Aerial photograph showing the location of the study area (source: USGS Orthoimagery 2005

Figure 28. Site plan, with existing conditions indicated, showing the locations of GPR test areas (TA), 2D GPR transects, and 3D GPR survey areas

Figure 27.Site plan, with existing conditions indicated, showing the location of the study area which was subjected to GPR survey and subsurface testing (source: Wilson Okamoto Corporation)

Figure 29. Photograph of X and Y transect grids laid out over test areas 2, 3 and 5 (TA 2, 3, & 5), view to northeast

Figure 30. General view of Test Area 1 (TA 1), view to east

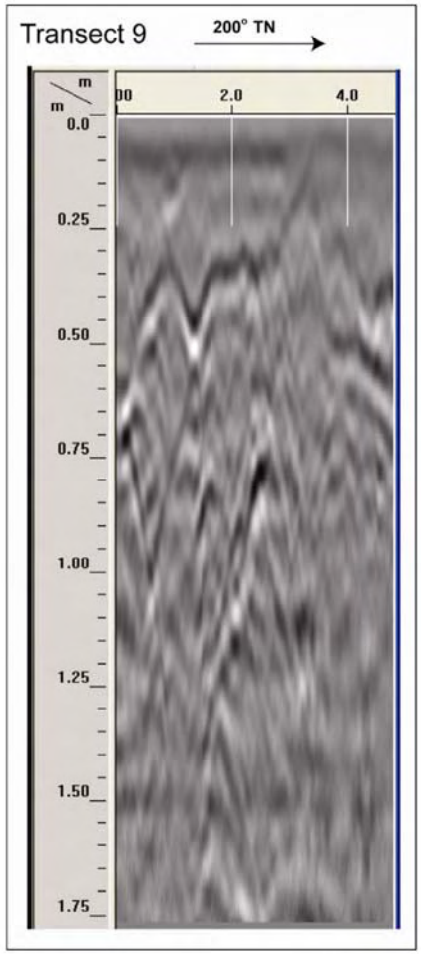

Figure 31. 2D depth profile of GPR Transect 9 collected from Test Area 1 (TA 1)

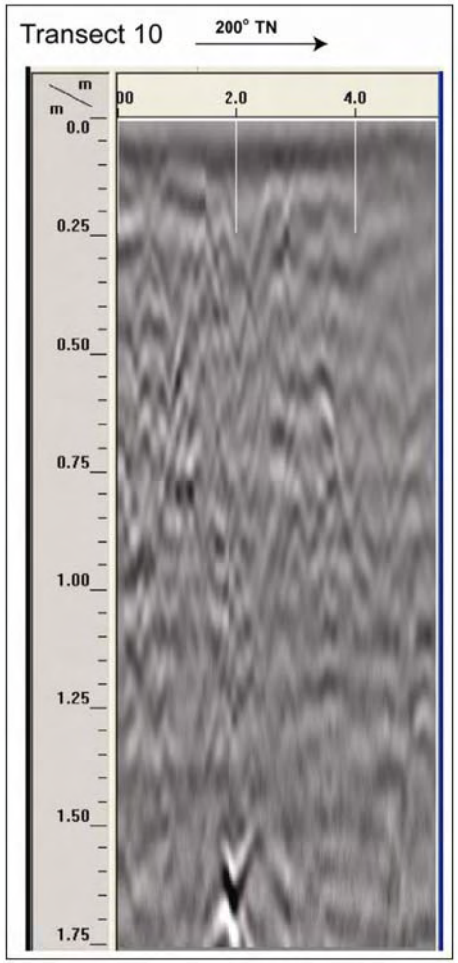

Figure 32. 2D depth profile of GPR Transect 10 collected from Test Area 1 (TA 1)

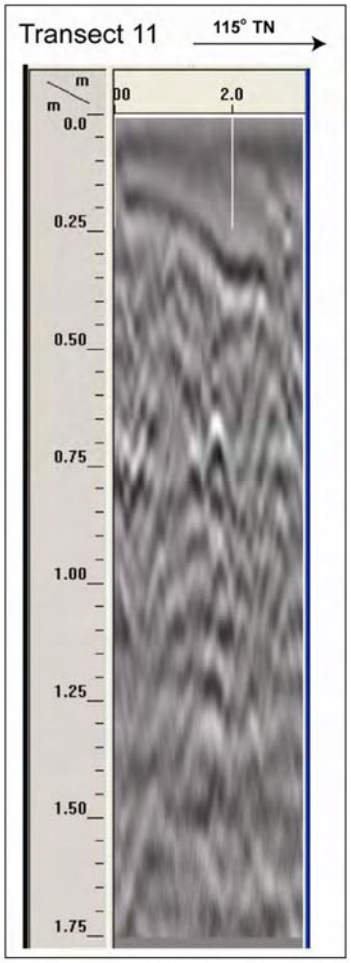

Figure 33. 2D depth profile of GPR Transect 11 collected from Test Area 1 (TA 1)

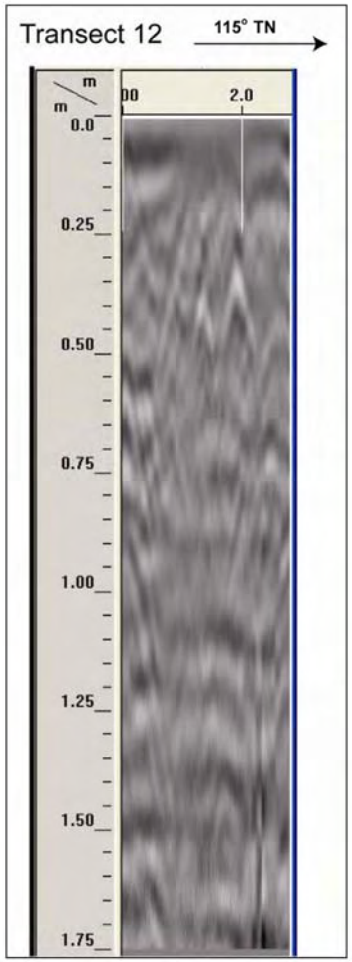

Figure 34. 2D depth profile of GPR Transect 12 collected from Test Area 1 (TA 1)

Also of note is the presence of a sloping stratigraphic layer observed in Transect 11 (see Figure 33). This may be an indication of a buried A horizon (former land surface) covered over during previous grading activities conducted in the area. This is of interest as buried A horizons are more likely to contain evidence of pre- and/or post-contact land use in the form of subsurface cultural deposits containing midden, artifacts, and human burials.

4.2.2 Test Area 2

Test Area 2 (TA 2) consisted of an approximately 10 ft by 6 ft area that was level and paved over by asphalt (Figure 35). Two single-run transects (Transects 7 & 8) used to collected 2D depth profiles were conducted at TA 2 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 2 ranging from depths of 20 cm to 30 cm (Figure 36 & Figure 37). The tight spacing of the anomalies observed within TA 2 are consistent with anomaly patterns associated with rebar in concrete slabs, suggesting that sediments within TA 2 may have been previously disturbed. However, the presence of cultural deposits, including human burials cannot be ruled out from this area.

Additionally, a 3D GPR survey (3D GPR Survey Area 1) was conducted at Test Area 2 (TA 2) (see Figure 28). 3D GPR images obtained from Test Area 2 (TA 2) indicated subsurface anomalies in the southwestern portion of the test area at an approximate depth of 20-30 cm and are consistent with the location of the anomalies observed during the 2D GPR survey, which were interpreted as rebar in concrete slabs (Figure 38 & Figure 39). The 3D GPR survey also identified subsurface anomalies at an approximate depth of 100 cm (Figure 40 & Figure 41). The anomalies were dispersed throughout the test area, were of various sizes, and had no consistent pattern.

4.2.3 Test Area 3

Test Area 3 (TA 3) consisted of an approximately 15 ft by 10 ft area that was level and paved over by asphalt (Figure 42). Three single-run transects (Transects 1-3) used to collected 2D depth profiles were conducted at TA 3 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 3 ranging from depths of 20 cm to 50 cm (Figure 43, Figure 44, & Figure 45). A review of Transect 1 indicates an abrupt break in stratigraphy at a depth of approximately 30 cm (see Figure 43). This may represent a trench outline from a previous excavation or be associated with a past fill event. Also of note is the tight spacing of anomalies observed within Transects 2 and 3 that are consistent with anomaly patterns associated with rebar in concrete slabs. All the observations from the 2D depth profiles suggest that sediments within TA 3 may have been previously disturbed. However, the presence of cultural deposits, including human burials cannot be ruled out from this area.

Additionally, a 3D GPR survey (3D GPR Survey Area 1) was conducted at Test Area 3 (TA 3) (see Figure 28). 3D GPR images obtained from Test Area 3 (TA 3) indicated subsurface anomalies focused in the central portion of the test area at an approximate depth of 80 cm (Figure 46 & Figure 47). The observed subsurface anomalies appear to be linear and may be associated with the presence of abandoned subsurface utilities or other linear debris.

Figure 35. General view of Test Area 2 (TA 2), view to east

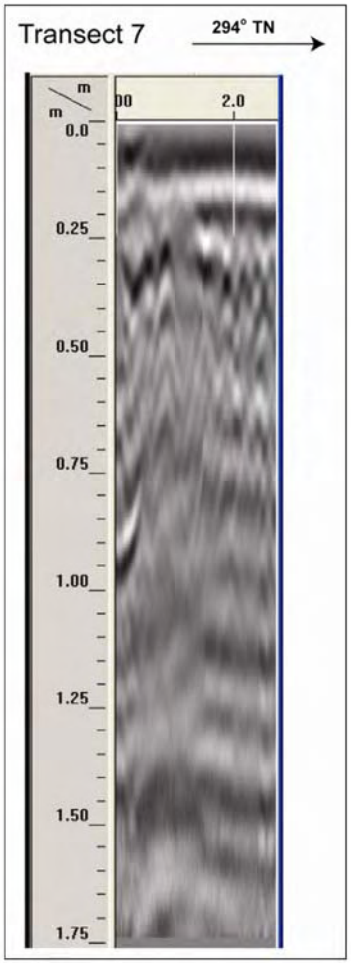

Figure 36. 2D depth profile of GPR Transect 7 collected from Test Area 2 (TA 2)

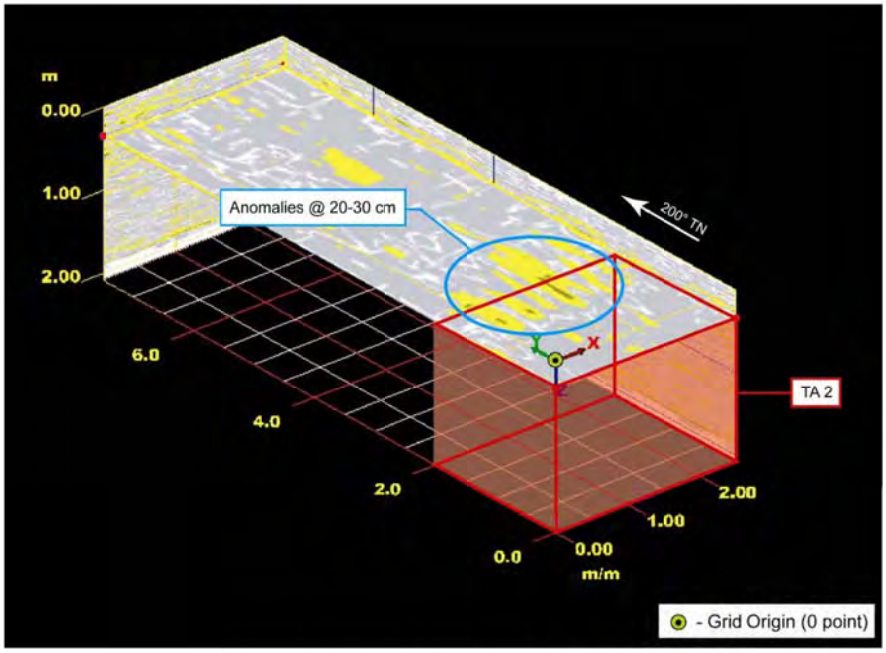

Figure 38. 3D image taken from 3D GPR Survey Area 1 showing anomalies at 20-30 cm within Test Area 2 (TA2)

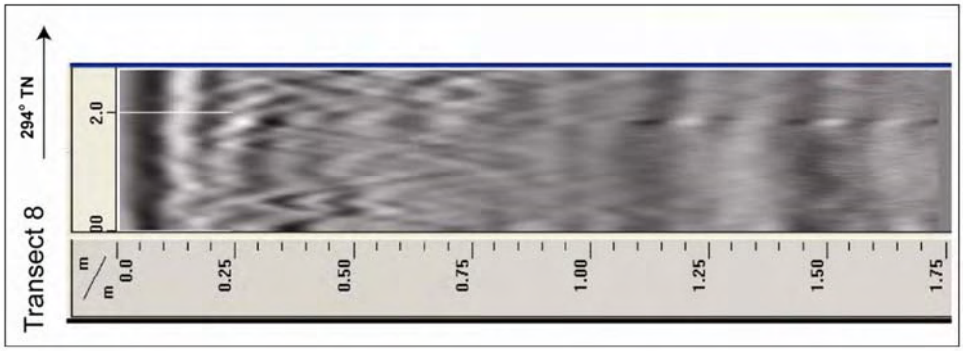

Figure 37. 2D depth profile of GPR Transect 8 collected from Test Area 2 (TA 2)

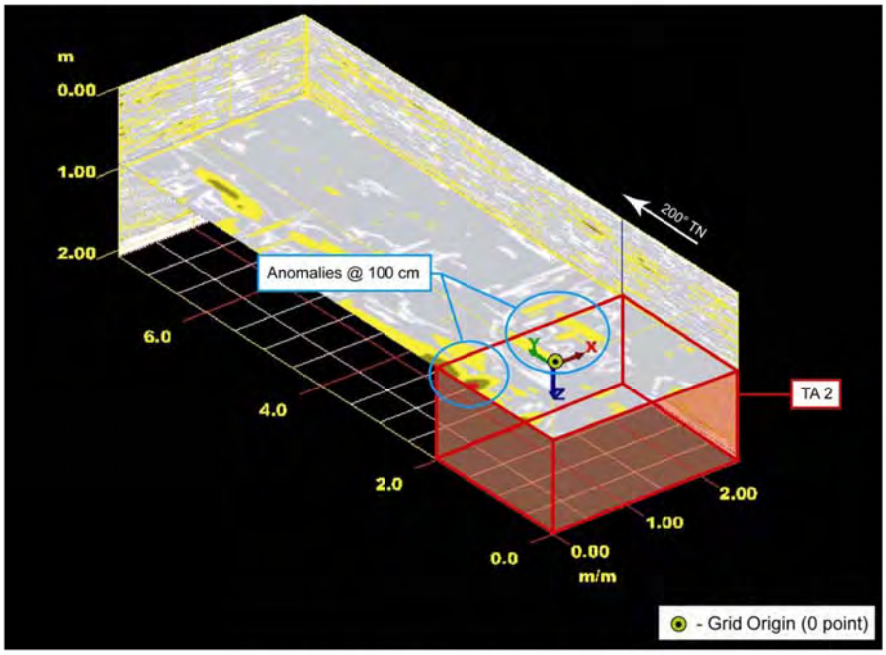

Figure 40. 3D image taken from 3D GPR Survey Area 1 showing anomalies at 100 cm within Test Area 2 (TA2)

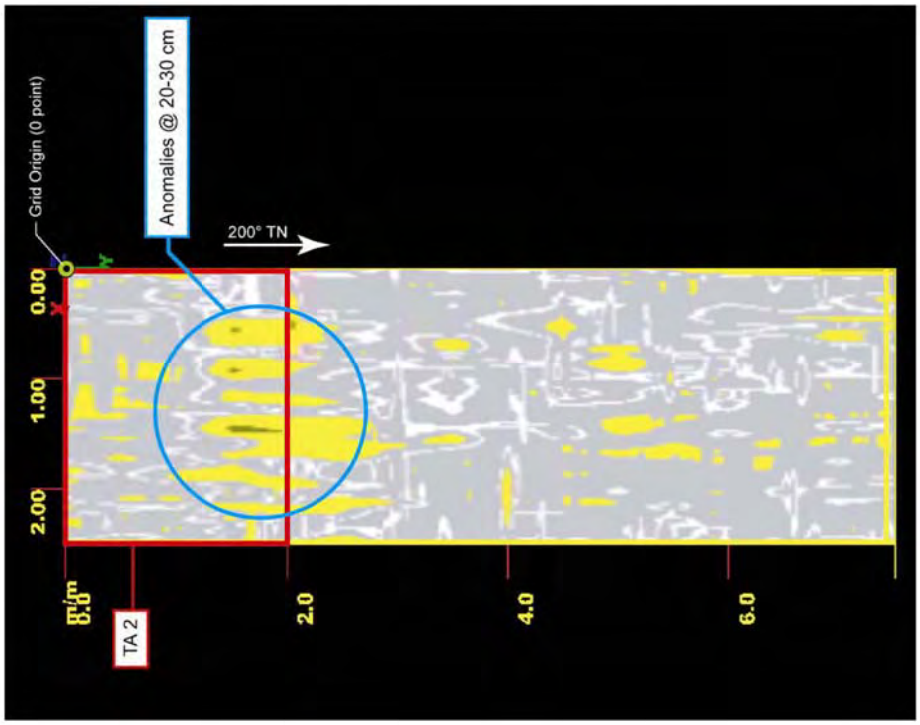

Figure 39. Plan view of Test Area 2 (TA 2) showing anomalies observed at 20-30 cm

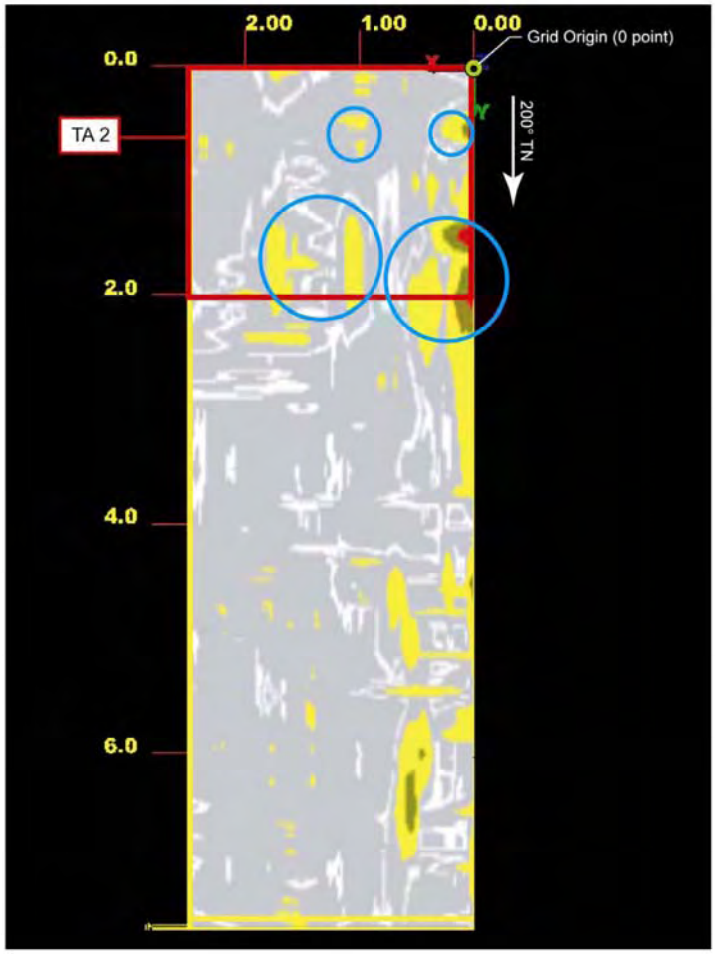

Figure 41. Plan view of Test Area 2 (TA 2) showing anomalies observed at 100 cm

Figure 42. General view of Test Area 3 (TA 3), view to northeast

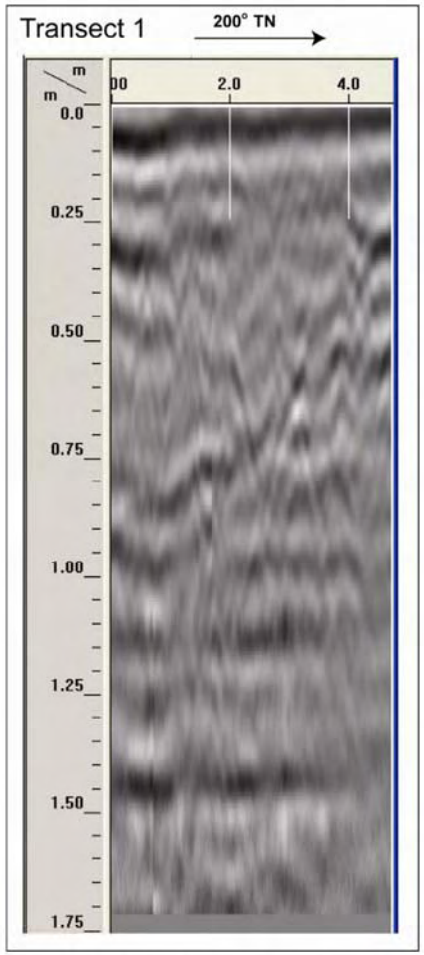

Figure 43. 2D depth profile of GPR Transect 1 collected from Test Area 3 (TA 3)

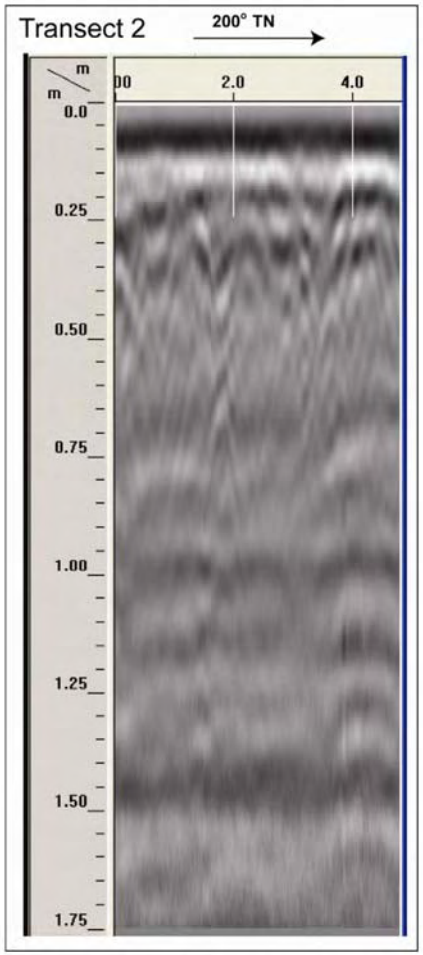

Figure 44. 2D depth profile of GPR Transect 2 collected from Test Area 3 (TA 3)

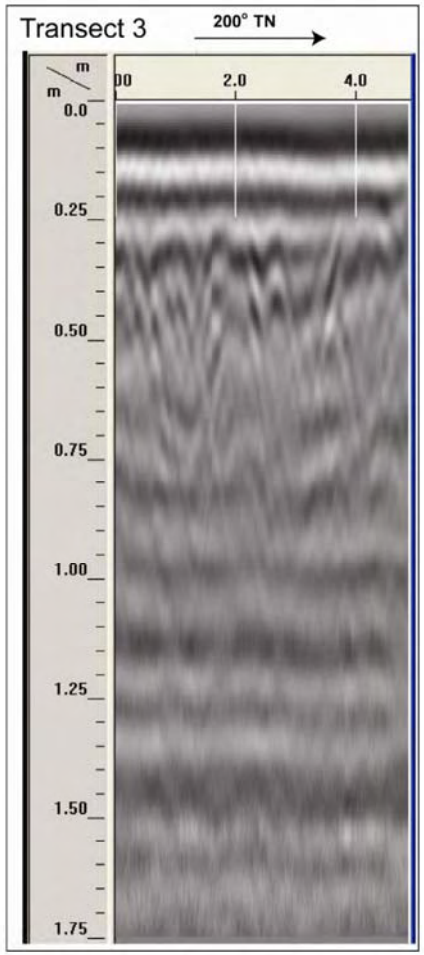

Figure 45. 2D depth profile of GPR Transect 3 collected from Test Area 3 (TA 3)

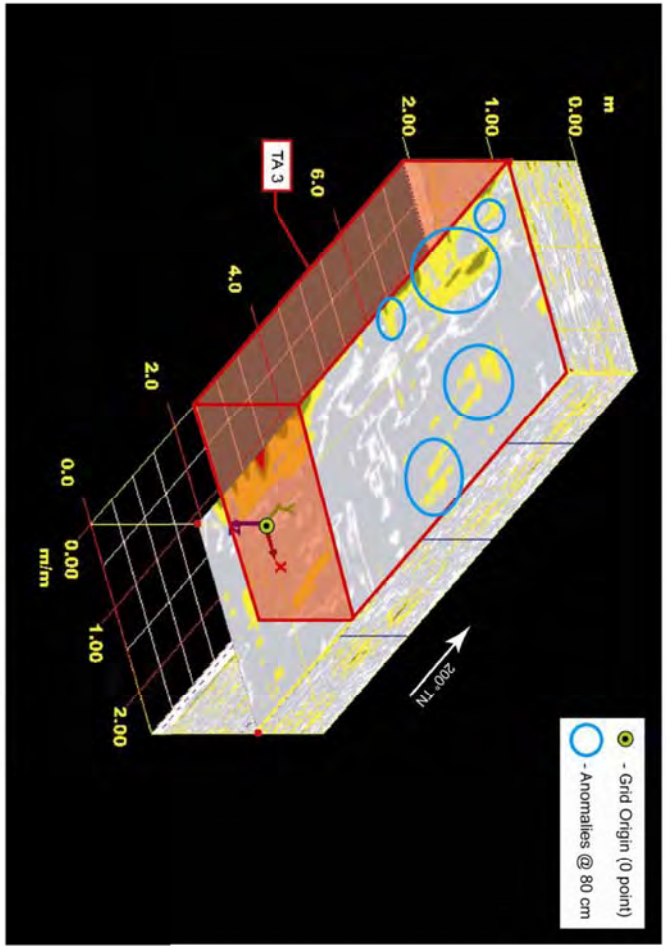

Figure 46. 3D image taken from 3D GPR Survey Area 1 showing anomalies at 80 cm within Test Area 3 (TA3)

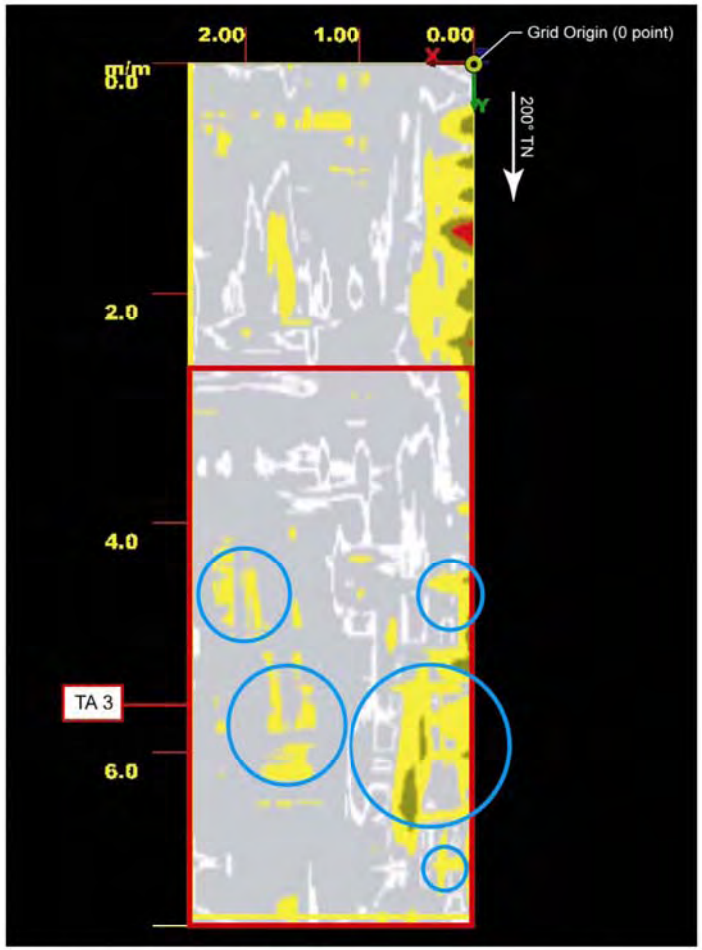

Figure 47. Plan view of Test Area 3 (TA 3) showing anomalies observed at 80 cm

4.2.4 Test Area 4

Test Area 4 (TA 4) consisted of an approximately 15 ft by 10 ft area that was relatively level, but contained a two large palm tree in the middle of the test area which hindered a 100% GPR survey of the test area (Figure 48). Four single-run transects (Transects 13-16) used to collected 2D depth profiles were conducted at TA 4 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 4 ranging from depths of 50 cm to 50 cm (Figure 49, Figure 50, Figure 51, & Figure 52). The observed anomalies may correspond to tree roots of the numerous trees observed in the immediate area. However, the presence of cultural deposits, including human burials cannot be ruled out.

Also of note is the loss of image clarity observed at an approximate depth of 1 m (see Figure 49, Figure 50, Figure 51, & Figure 52). This was observed in all 2D depth profiles for this test area and may correspond to the presence of water, a high salt content, or a dramatic change in stratigraphy (i.e. the presence of a clay deposit) all of which are know to weaken the effectiveness of ground penetrating radar.

4.2.5 Test Area 5

Test Area 5 (TA 5) consisted of an approximately 15 ft by 10 ft area that was level and paved over by asphalt (Figure 53). Three single-run transects (Transects 4-6) used to collected 2D depth profiles were conducted at TA 5 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 5 ranging from depths of 15 cm to 90 cm (Figure 54, Figure 55, & Figure 56). A review of Transect 4 indicates a sloping stratigraphic layer from an approximate depth of 55 cm to 95 cm (see Figure 54). This may be an indication of a buried A horizon (former land surface) covered over during previous grading activities conducted in the area. This is of interest as buried A horizons are more likely to contain evidence of pre- and/or post-contact land use in the form of subsurface cultural deposits containing midden, artifacts, and human burials.

Also of note is the tight spacing of anomalies observed within Transects 4-6 at an approximate of depth of 20 cm. These anomalies are consistent with anomaly patterns associated with rebar in concrete slabs and suggest the presence of subsurface disturbance within the top 20 to 50 cm of Test Area 5.

Additionally, a 3D GPR survey (3D GPR Survey Area 2) was conducted at Test Area 5 (TA 5) (see Figure 28). 3D GPR images obtained from Test Area 5 (TA 5) indicated linear subsurface anomalies at an approximate depth of 30 cm and 90cm (Figure 57, Figure 58, Figure 59, & Figure 60). The linear shape and strong visual presence (indicating the intensity of radar wave reflection off of an object) of these subsurface anomalies suggest that they may be metal objects associated with the presence of abandoned subsurface utilities or other linear debris.

Of particular interest are a number of amorphous subsurface anomalies observed at an approximate depth of 210 cm (Figure 61 & Figure 62). These anomalies may correspond to pre-contact indigenous Hawaiian burials due to their depth, random positioning, and roughly circular shape.

Figure 48. General view of Test Area 4 (TA 4), view to southwest

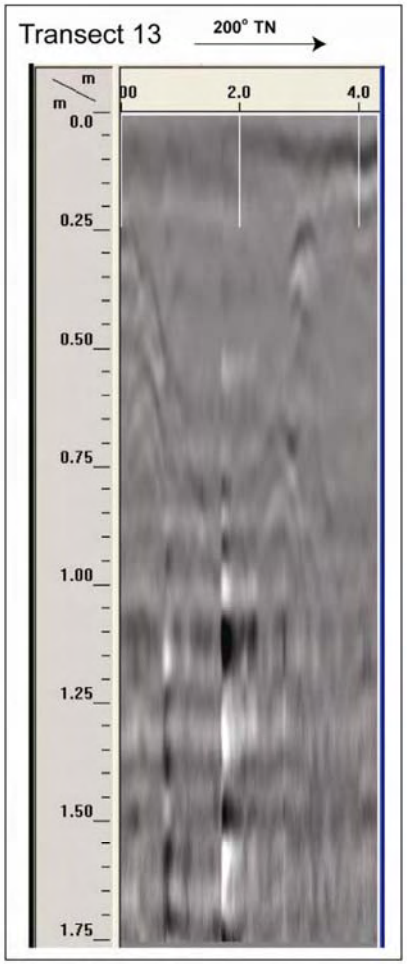

Figure 49. 2D depth profile of GPR Transect 13 collected from Test Area 4 (TA 4)

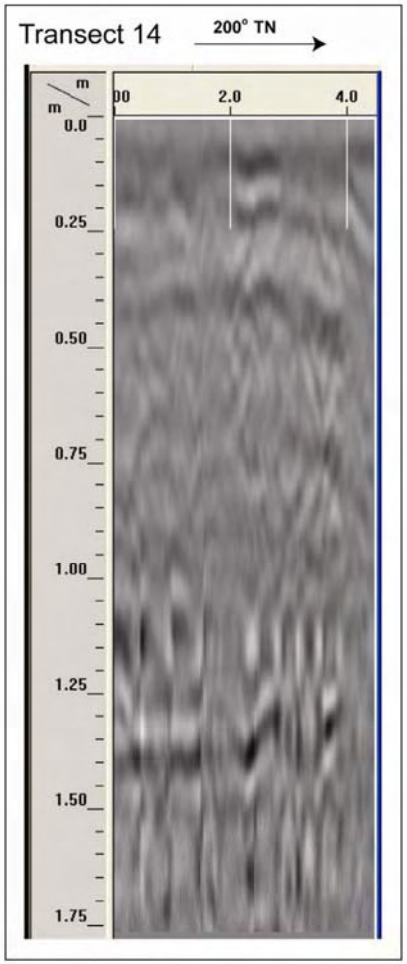

Figure 50. 2D depth profile of GPR Transect 14 collected from Test Area 4 (TA 4)

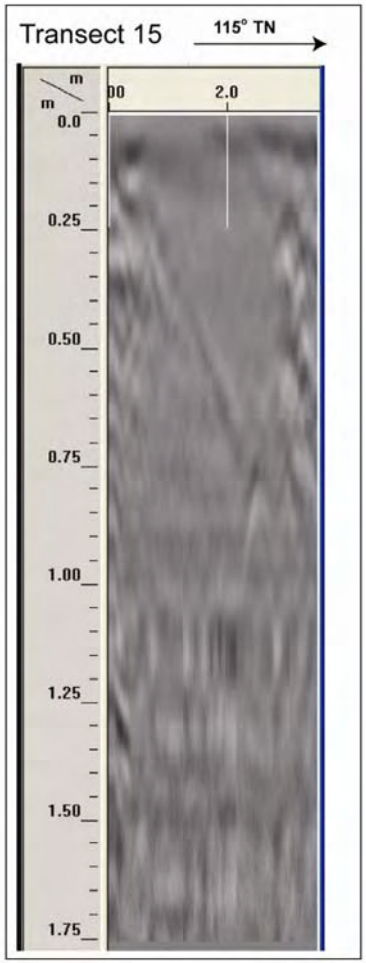

Figure 51. 2D depth profile of GPR Transect 15 collected from Test Area 4 (TA 4)

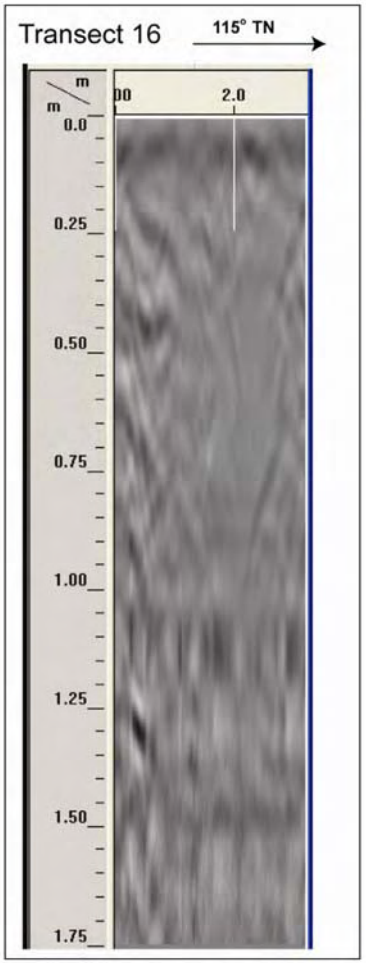

Figure 52. 2D depth profile of GPR Transect 16 collected from Test Area 4 (TA 4)

Figure 53. General view of Test Area 5 (TA 5), view to south

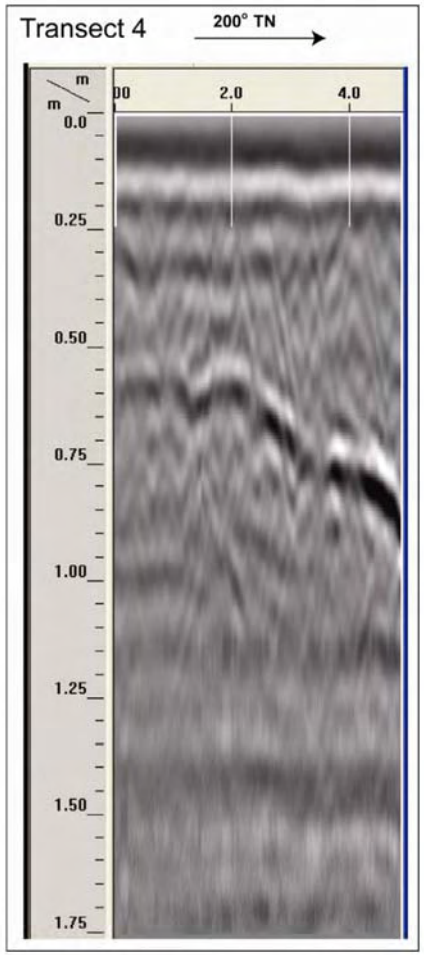

Figure 54. 2D depth profile of GPR Transect 4 collected from Test Area 5 (TA 5)

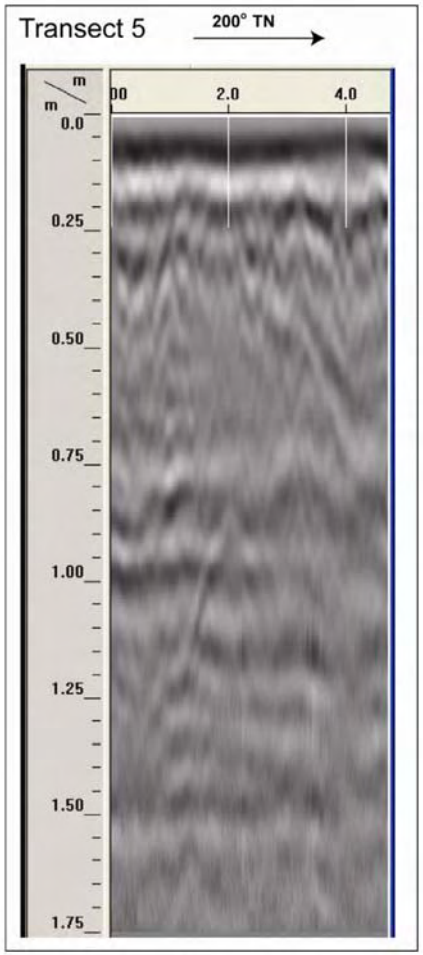

Figure 55. 2D depth profile of GPR Transect 5 collected from Test Area 5 (TA 5)

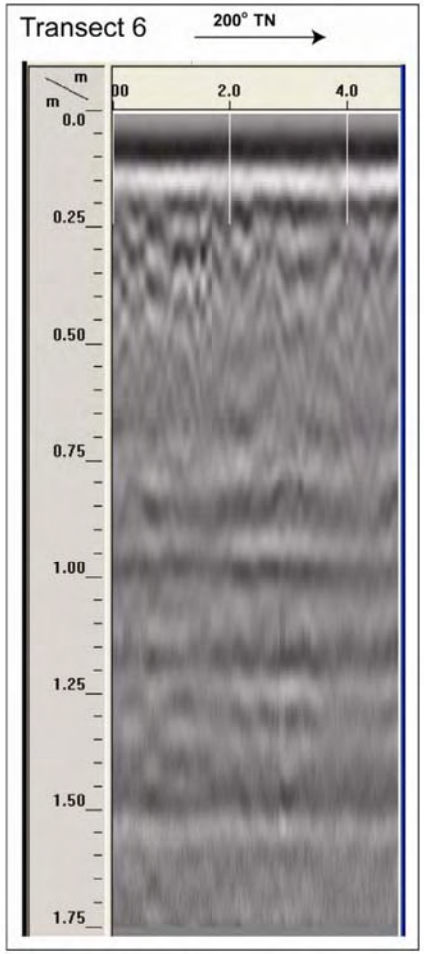

Figure 56. 2D depth profile of GPR Transect 6 collected from Test Area 5 (TA 5)

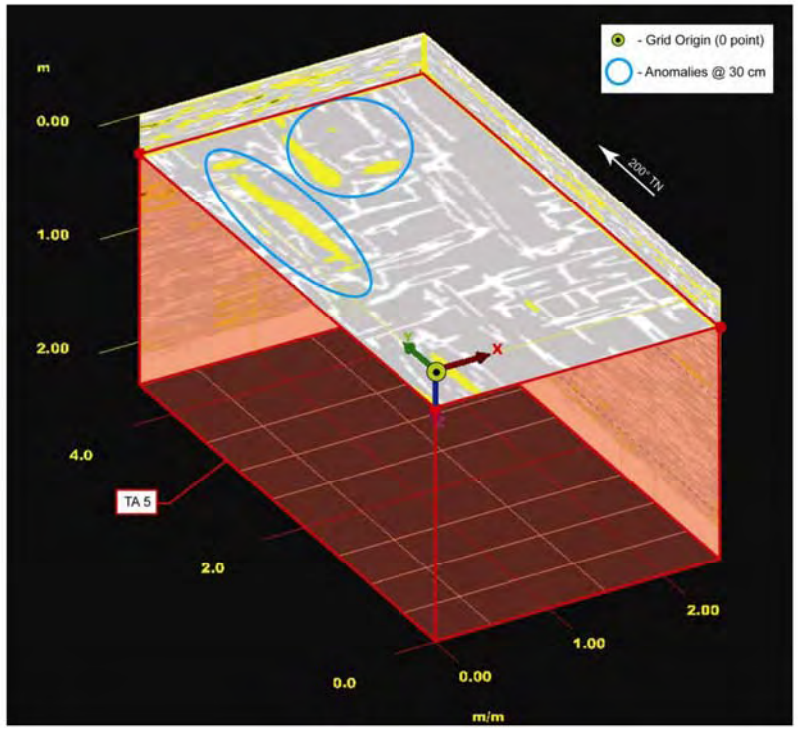

Figure 57. 3D image taken from 3D GPR Survey Area 2 showing anomalies at 30 cm within Test Area 5 (TA5)

Figure 58. Plan view of Test Area 5 (TA 5) showing anomalies observed at 30 cm

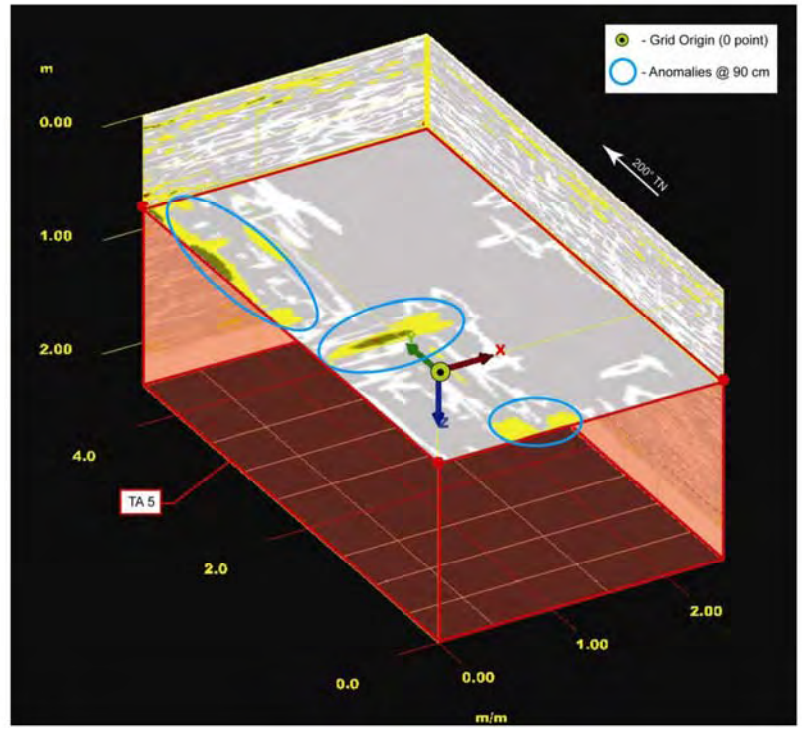

Figure 59. 3D image taken from 3D GPR Survey Area 2 showing anomalies at 90 cm within Test Area 5 (TA5)

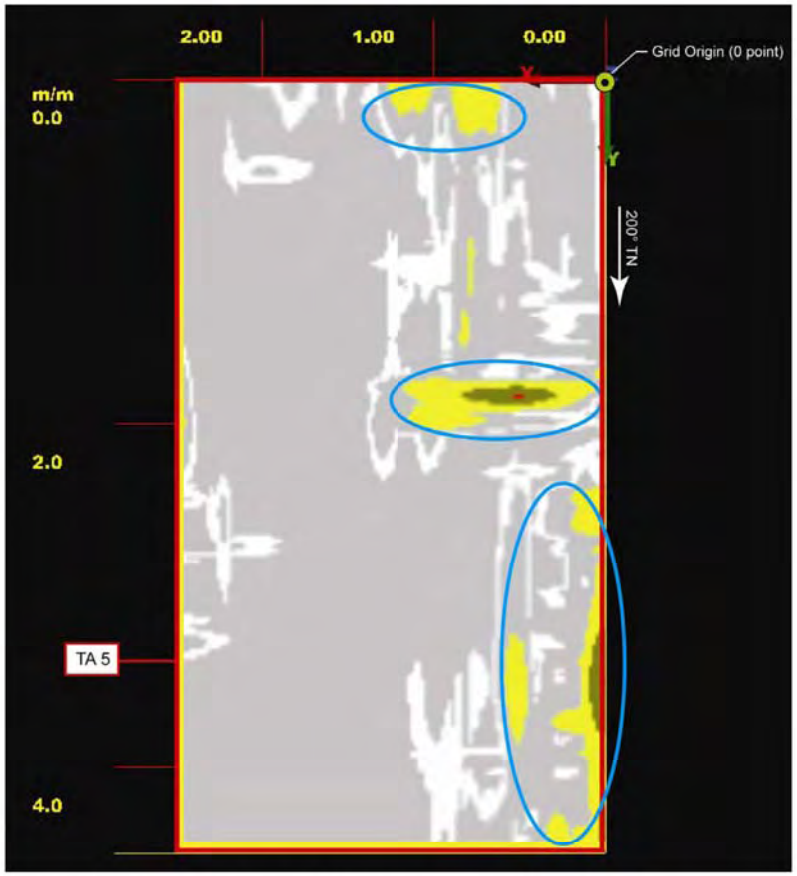

Figure 60. Plan view of Test Area 5 (TA 5) showing anomalies observed at 90 cm

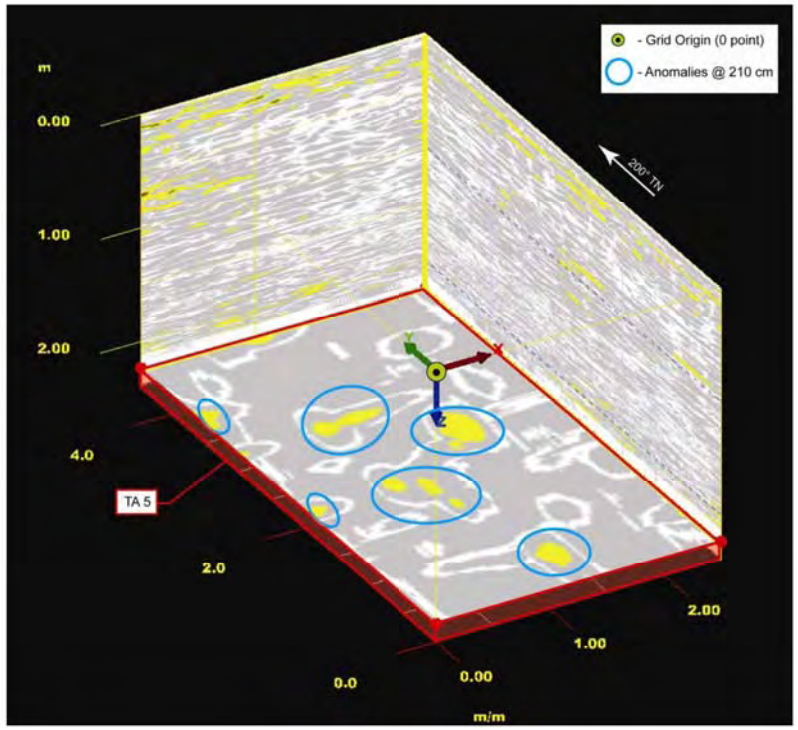

Figure 61. 3D image taken from 3D GPR Survey Area 2 showing anomalies at 210 cm within Test Area 5 (TA5)

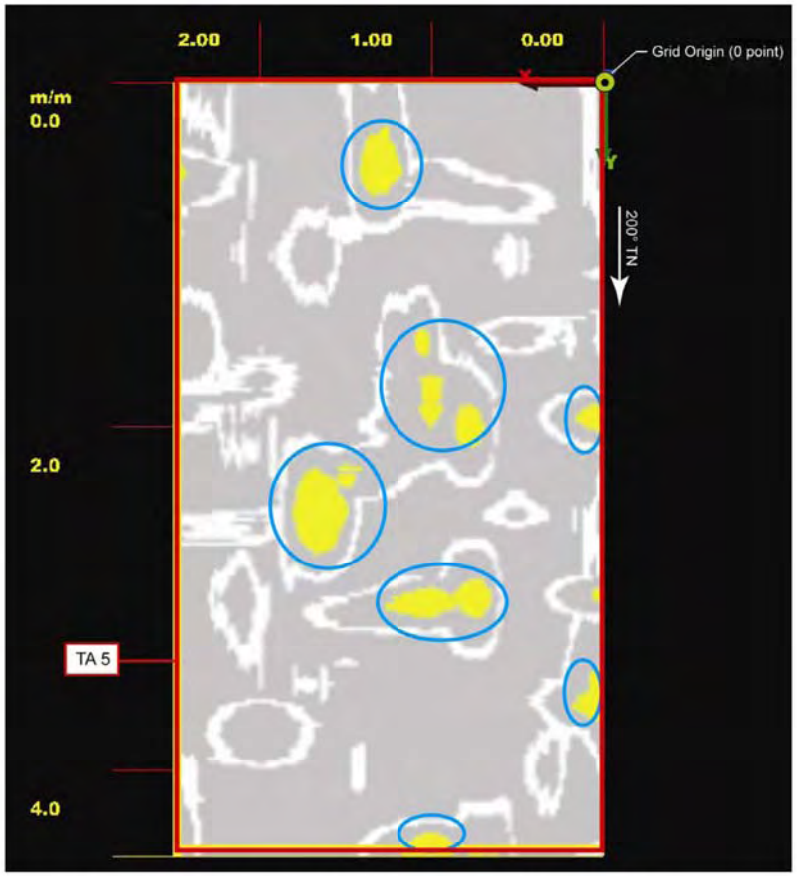

Figure 62. Plan view of Test Area 5 (TA 5) showing anomalies observed at 210 cm

4.2.6 Test Area 6

Test Area 6 (TA 6) consisted of an approximately 15 ft by 10 ft area that was relatively level, but contained a two large palm tree in the middle of the test area which hindered a 100% GPR survey of the test area (Figure 63). Three single-run transects (Transects 17-19) used to collected 2D depth profiles were conducted at TA 6 (see Figure 28). A review of 2D depth profiles generated from the GPR survey indicated numerous anomalies within TA 6 ranging from depths of 5 cm to 80 cm (Figure 64, Figure 65, & Figure 66). The observed anomalies may correspond to tree roots of the numerous trees observed in the immediate area. However, the presence of cultural deposits, including human burials cannot be ruled out.

4.2.7 GPR Summary

GPR survey identified numerous subsurface anomalies within the study area. Observed anomalies could be associated with tree roots, buried concrete slabs, subsurface utilities, and miscellaneous construction debris. The anomalies may also indicate the presence of cultural deposits; including human burials which are know to be present throughout the area.

The GPR survey also identified stratigraphic irregularities that may indicate previous subsurface disturbance and the presence of a buried A horizons (former land surfaces). Buried A horizons are of particular interest as they are more likely to contain evidence of pre- and/or post-contact land use in the form of subsurface cultural deposits containing midden, artifacts, and human burials.

The use of GPR provides no guarantees of potential findings or non-findings but can increase the probability of avoiding cultural materials by selecting certain locations for eventual excavation. A review of the data obtained from the current GPR investigation suggests that Test Area 5 has the highest potential for encountering subsurface cultural deposits, including human burials. However, it must be noted that test area's 1, 4, and 6 were not 100% surveyed by GPR due to the presence of large trees located in the middle of each of these test areas. Additionally, the large subsurface anomalies identified at approximately 30 cm depths in test area's 2 and 3 may have masked additional subsurface anomalies located at greater depths. Thus the presence of cultural deposits at test areas 1, 2, 3, 4, and 6 cannot be ruled out.

Figure 63. General view of Test Area 6 (TA 6), view to southwest

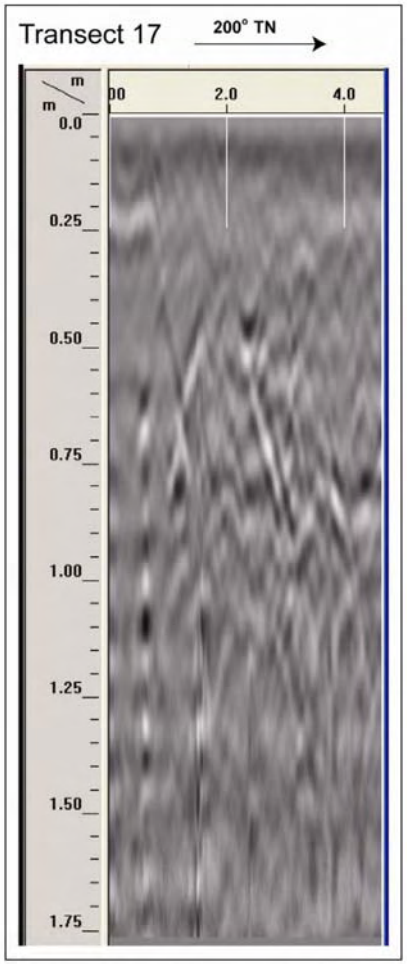

Figure 64. 2D depth profile of GPR Transect 17 collected from Test Area 6 (TA 6)

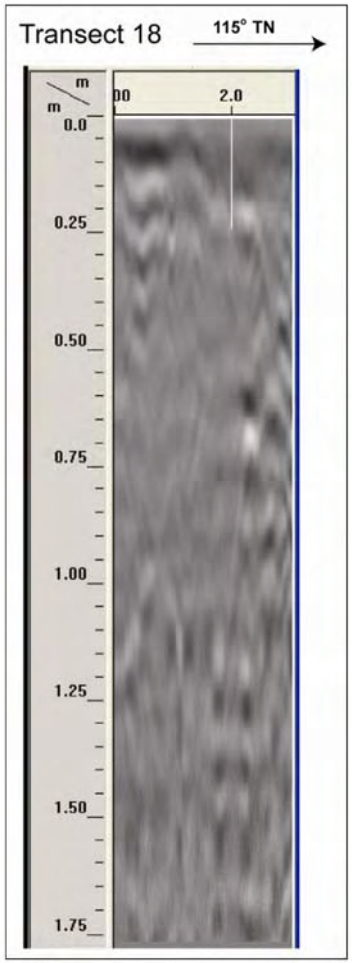

Figure 65. 2D depth profile of GPR Transect 18 collected from Test Area 6 (TA 6)

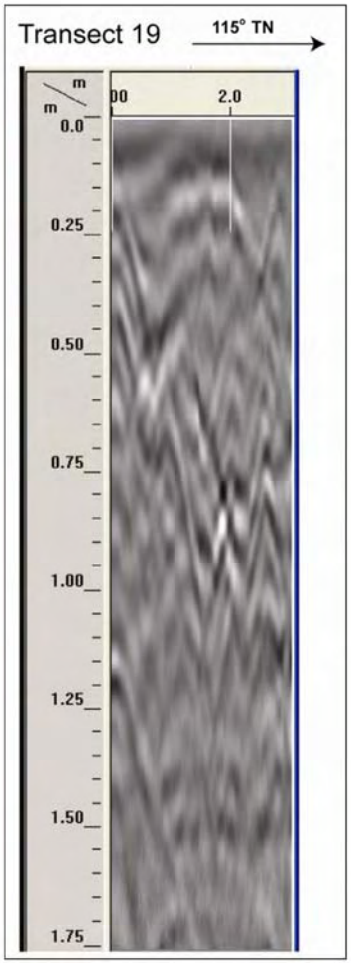

Figure 66. 2D depth profile of GPR Transect 19 collected from Test Area 6 (TA 6)

4.3 Subsurface Testing

4.3.1 Stratigraphic Summary

Five (5) backhoe trenches were placed throughout the study area, which was previously subjected to a GPR survey (see Figure 26 & Figure 67). Based on backhoe testing results, the stratigraphy within the study area is largely as expected. The following paragraphs provide an overview and summary of the backhoe testing results. For detailed information regarding each of the excavated trenches, please refer to the trench profiles, sediment descriptions, and photographs, which follow this more general summary discussion.

A stratigraphic profile was taken at each backhoe trench. In general the observed and documented stratigraphy consisted of naturally deposited sandy loam, disturbed by previous grading activities and/or prior subsurface utility installation, overlying naturally deposited marine sand. These observations agree with the USDA soil data for the project area and its vicinity (Foote *et al*. 1972). All excavations were backfilled after completion of stratigraphic documentation.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing. Additionally subsurface anomalies observed via GPR could not be conclusively correlated to specific objects or features in the ground. It is believed that a majority of the anomalies corresponded to tree roots, buried basalt boulders, and abandoned utilities observed during subsurface testing.

4.3.2 Trench Documentation

4.3.2.1 Backhoe Trench 1

Length:	16 m
Width:	1.5 m
Maximum Depth:	2.2 m
Orientation:	NE-SW

The stratigraphy of Backhoe Trench 1 (Figure 68, Figure 69, & Table 6) consisted of a naturally deposited, previously disturbed, sandy loam (Stratum I), a discontinuous buried A horizon (former land surface) (Stratum II), and naturally deposited jaucus sand (Stratum III). The disturbances observed in Stratum I are likely associated with previous grading, the planting of ornamental trees, and the installation of subsurface utilities.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing at Backhoe Trench 1.

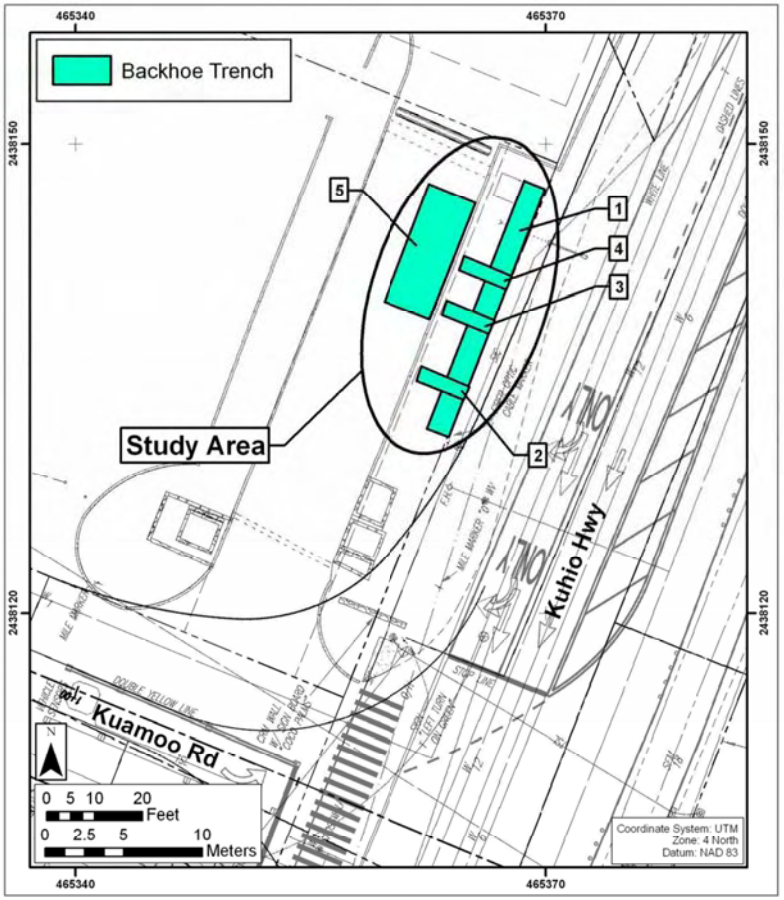

Figure 67. Site plan, with existing conditions indicated, showing the locations of backhoe trenches

Figure 68. Photograph of Backhoe Trench 1, profile of west sidewall, view to west

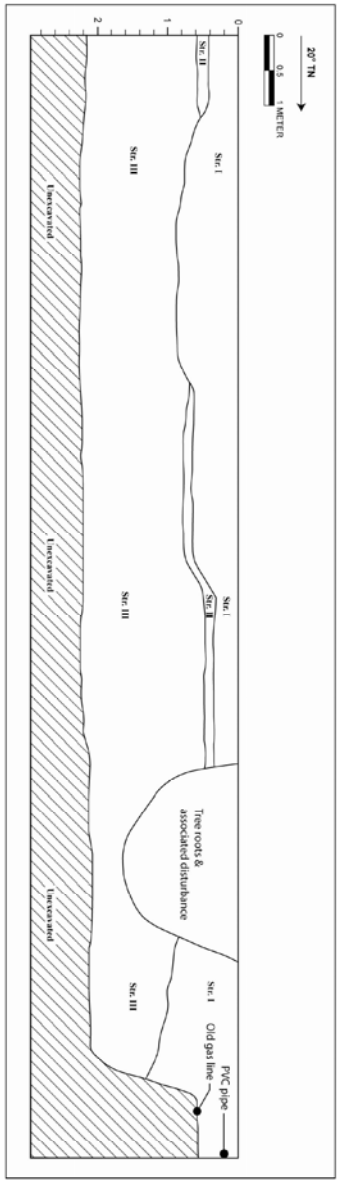

Figure 69. Profile of Backhoe Trench 1, west sidewall

Table 6. Strata Observed at Backhoe Trench 1

Stratum	Depth (cmbs)	Description
I	0-90	7.5 YR 3/3, dark brown; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; irregular topography. Stratum showed signs of disturbance associated with previous grading, the planting of ornamental trees, and the installation of subsurface utilities.
II	50-80	Buried A horizon (former land surface); 7.5 YR 2/1, black; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; broken topography. Former land surface truncated and broken due to prior land disturbance (i.e. grading)
III	50-220*	7.5 YR 6/4, light brown; sand, medium grain; structureless; dry loose consistency; non plastic; no cementation; marine origin Naturally deposited jaucus sand. Contained basalt cobbles and boulders in the upper portion of the stratum.

* Base of Excavation

4.3.2.2 Backhoe Trench 2

Length:	3 m
Width:	1 m
Maximum Depth:	2.2 m
Orientation:	E-W

The stratigraphy of Backhoe Trench 2 (Figure 70, Figure 71, & Table 7) consisted of naturally deposited, previously disturbed, sandy loam (Stratum I) overlying naturally deposited jaucus sand (Stratum II). The disturbances observed in Stratum I are likely associated with previous grading and the planting of ornamental trees.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing at Backhoe Trench 2.

4.3.2.3 Backhoe Trench 3

Length:	3 m
Width:	1 m
Maximum Depth:	2.2 m
Orientation:	E-W

The stratigraphy of Backhoe Trench 3 (Figure 72, Figure 73, & Table 8) consisted of a naturally deposited, previously disturbed, sandy loam (Stratum I), a discontinuous buried A horizon (former land surface) (Stratum II), and naturally deposited jaucus sand (Stratum III). The disturbances observed in Stratum I are likely associated with previous grading and the planting of ornamental trees.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing at Backhoe Trench 3.

Figure 70. Photograph of Backhoe Trench 2, profile of north sidewall, view to north

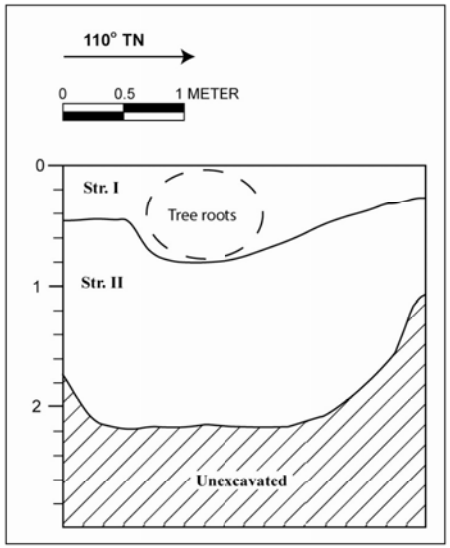

Figure 71. Profile of Backhoe Trench 2, north sidewall

Table 7. Strata Observed at Backhoe Trench 2

Stratum	Depth (cmbs)	Description
I	0-80	7.5 YR 3/3, dark brown; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; irregular topography. Stratum showed signs of disturbance associated with previous grading of the area and the planting of ornamental trees.
II	40-220*	7.5 YR 6/4, light brown; sand, medium grain; structureless; dry loose consistency; non plastic; no cementation; marine origin Naturally deposited jaucus sand. Contained basalt cobbles and boulders in the upper portion of the stratum.

* Base of Excavation

Figure 72. Photograph of Backhoe Trench 3, profile of south sidewall, view to south

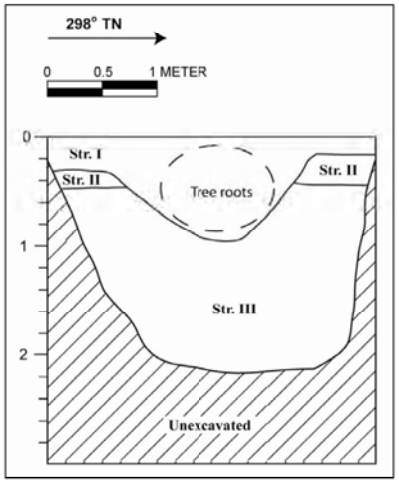

Figure 73. Profile of Backhoe Trench 3, south sidewall

Table 8. Strata Observed at Backhoe Trench 3

Stratum	Depth (cmbs)	Description
I	0-90	7.5 YR 3/3, dark brown; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; irregular topography. Stratum showed signs of disturbance associated with previous grading of the area and the planting of ornamental trees.
II	30-40	Buried A horizon (former land surface); 7.5 YR 2/1, black; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; broken topography. Former land surface truncated and broken due to prior land disturbance (i.e. grading)
III	40-210*	7.5 YR 6/4, light brown; sand, medium grain; structureless; dry loose consistency; non plastic; no cementation; marine origin Naturally deposited jaucus sand. Contained basalt cobbles and boulders in the upper portion of the stratum.

* Base of Excavation

4.3.2.4 Backhoe Trench 4

Length:	3 m
Width:	1 m
Maximum Depth:	2.1 m
Orientation:	E-W

The stratigraphy of Backhoe Trench 4 (Figure 74, Figure 75, & Table 9) consisted of a naturally deposited, previously disturbed, sandy loam (Stratum I), a discontinuous A horizon (existing land surface) (Stratum II), and naturally deposited jaucus sand (Stratum III). The disturbances observed in Stratum I are likely associated with previous grading and the planting of ornamental trees.

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing at Backhoe Trench 4.

4.3.2.5 Backhoe Trench 5

Length:	8 m
Width:	3 m
Maximum Depth:	2.2 m
Orientation:	NE-SW

The stratigraphy of Backhoe Trench 5 (Figure 76, Figure 77, & Table 10) consisted of asphalt (Stratum I), crushed coral fill (Stratum II), and naturally deposited jaucus sand (Stratum III).

No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing at Backhoe Trench 5.

Figure 74. Photograph of Backhoe Trench 4, profile of south sidewall, view to south

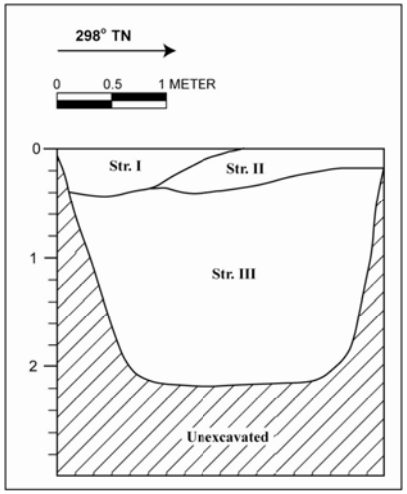

Figure 75. Profile of Backhoe Trench 4, south sidewall

Table 9. Strata Observed at Backhoe Trench 4

Stratum	Depth (cmbs)	Description
I	0-40	7.5 YR 3/3, dark brown; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; irregular topography. Stratum showed signs of disturbance associated with previous grading of the area and the planting of ornamental trees.
II	0-40	A horizon (existing land surface); 7.5 YR 2/1, black; sandy loam; weak fine granular structure; moist very friable consistency; non-plastic; weak cementation; mixed origin; abrupt boundary; broken topography. Existing land surface truncated and broken due to prior land disturbance (i.e. grading)
III	20-210*	7.5 YR 6/4, light brown; sand, medium grain; structureless; dry loose consistency; non plastic; no cementation; marine origin Naturally deposited jaucus sand. Contained basalt cobbles and boulders in the upper portion of the stratum.

* Base of Excavation

Figure 76. Photograph of Backhoe Trench 5, profile of west sidewall, view to west

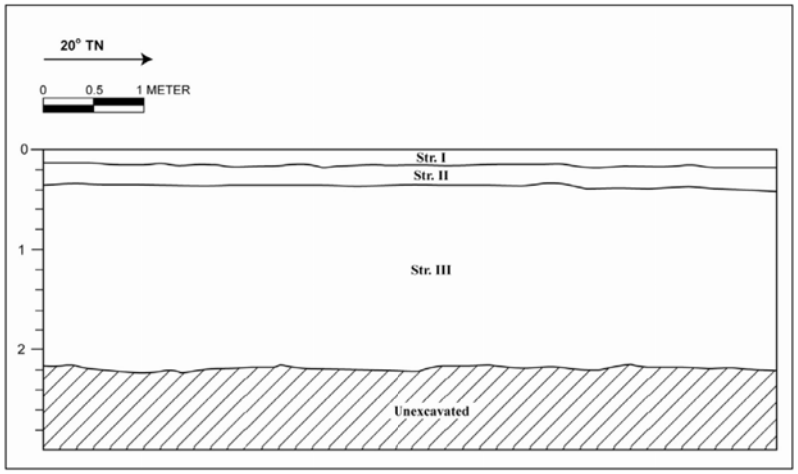

Figure 77. Profile of Backhoe Trench 5, west sidewall

Table 10. Strata Observed at Backhoe Trench 5

Stratum	Depth (cmbs)	Description
I	0-10	Asphalt
II	10-30	Crushed coral fill
III	30-220*	7.5 YR 6/4, light brown; sand, medium grain; structureless; dry loose consistency; non plastic; no cementation; marine origin Naturally deposited jaucus sand. Contained basalt cobbles and boulders in the upper portion of the stratum.

* Base of Excavation

Section 5 Summary and Interpretation

In compliance with and to fulfill applicable Hawai'i state historic preservation legislation, CSH completed what began as an archaeological inventory survey investigation of the project area, but because no archaeological historic properties were located, this investigation became an archaeological assessment, per the language of HAR Chapter 13-13-275-5.

As part of its inventory survey field effort, carried out between April 8 and 30, 2008, CSH conducted systematic pedestrian inspection of the project area. No surface historic properties were identified. Following the pedestrian inspection CSH conducted a GPR survey of a 960 square foot portion of the project area followed by a subsurface testing regimen consisting of the excavation of five (5) backhoe trenches to prospect for subsurface cultural deposits. No subsurface cultural deposits and/or human burials (i.e. historic properties) were observed during subsurface testing. Additionally subsurface anomalies observed via GPR could not be conclusively correlated to specific objects or features in the ground during the subsurface testing. It is believed that a majority of the anomalies corresponded to tree roots, buried basalt boulders, and abandoned utilities observed during subsurface testing.

These findings are largely in keeping with expectations, based on background research. While a review of LCA documentation indicates that lands in the vicinity of the project area were utilized for traditional Hawaiian habitation, agriculture, and aquaculture, the land modifications associated with the development of Kūhiō Highway would have destroyed any surface remains of pre-contact land use that may have been present. Previous archaeological research has identified pre-contact cultural layers and human burials in the immediate vicinity of the project area, suggesting that there is a probability of encountering subsurface cultural deposits and/or human burials during project related ground disturbance.

Section 6 Project Effect and Mitigation Recommendations

6.1 Project Effect

CSH's project specific effect recommendation is "effect, with proposed mitigation commitments." The proposed underground electrical alignment has the potential to adversely affect subsurface cultural resources, including human burials, which may be located within the project's APE. The recommended mitigation measures will reduce the project's effect to any cultural resources that may be located within the alignment of the proposed trunk sewer line and be pro-active in addressing possible community concerns.

6.2 Mitigation Recommendations

Background research has indicated that the area in the vicinity of the study area was intensively utilized by pre-contact Hawaiians for agriculture, aquaculture, and habitation. Thus it is probable that subsurface historic properties, associated with both pre- and post-contact land use, are present within the project area in the form of cultural layers and/or structural remnants buried by modern and/or historic fill layers. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Specifics of the archaeological monitoring will be addressed in the archaeological monitoring plan to be reviewed and approved by the State Historic Preservation Division. This monitoring program will facilitate the identification and proper treatment of any burials that might be discovered during project construction, and will gather information regarding the project's non-burial archaeological deposits, should any be discovered.

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