Draft Environmental Assessment

PROPOSED KAWELA BRIDGE REPLACEMENT, MOLOKA`I, HAWAI`I

Prepared for:

State of Hawai`i,
Department of Transportation

February 2009

MUNEKIYO HIRAGA, INC.

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Preface

The State of Hawai`i, Department of Transportation (HDOT) proposes to replace Kawela Bridge, located between Milepost 5.110 and Milepost 5.118 on Kamehameha V Highway (Route 450) on the island of Moloka`i, Hawai`i. The purpose of the project is to demolish the existing 66-year old bridge and construct a new bridge that conforms to current HDOT/American Association of State Highway and Transportation Officials (AASHTO) and Federal Highway Administration (FHWA) design standards.

Executive Summary

Project Name:	Proposed Kawela Bridge Replacement
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawai`i Revised Statutes National Environmental Protection Act (1966)
Agency Determination:	Anticipated Finding of No Significant Impact
Applicable Environmental Assessment Review "trigger":	Use of State owned lands and funds Work within State Land Use Conservation District Use of Federal Funds
Location:	Island of Moloka`i Kamehameha V Highway Milepost 5.110 to Milepost 5.118 (Detour route to be located on TMK (2) 5-04-01:27)
Proposing Agency:	State of Hawai`i Department of Transportation Highways Division 601 Kamokila Boulevard, Room 688 Kapolei, Hawai`i 96707 Contact: Vincent Llorin Phone No.: (808)692-7568
Approving Agency:	State of Hawai`i Department of Transportation Highways Division 601 Kamokila Boulevard, Room 688 Kapolei, Hawai`i 96707 Contact: Vincent Llorin Phone No.: (808)692-7568
Consultant:	Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawai`i 96793 Contact: Mich Hirano, AICP Phone No.: (808) 244-2015
Project Summary:	The State of Hawai`i, Department of Transportation (HDOT) proposes to replace Kawela Bridge, located between Milepost 5.110 and Milepost 5.118, on Kamehameha V Highway (Route 450) on the

island of Moloka`i, Hawai`i. The highway follows the southeastern coastline of Moloka`i from Kaunakakai to Halawa. The two-lane, undivided highway does not have a designated bike lane, however, it is used by cyclists and joggers. Currently, the bridge is hydraulically inadequate and does not conform to current HDOT/American Association of State Highway and Transportation Officials (AASHTO) design standards and Federal Highway Administration (FHWA) hydraulic standards. The purpose of the project is to demolish the existing bridge and construct a new bridge that will improve hydraulic capacity and conform to current HDOT/AASHTO and FHWA design standards. The current bridge is 44 feet long and 28 feet wide. The new bridge is proposed to be 56 feet long and 47 feet wide. The new bridge will be accessible by pedestrians and cyclists with a 10-foot wide shoulder on each side of the highway. The streambed under the new bridge will be lined with concrete to protect the banks from erosion and to facilitate maintenance. Stream bank improvements and a temporary detour route will be constructed makai of the new bridge. Traffic will be kept open during construction. The temporary route will affect Tax Map Key No. (2) 5-04-01:27, a privately owned parcel.

I. PROJECT OVERVIEW

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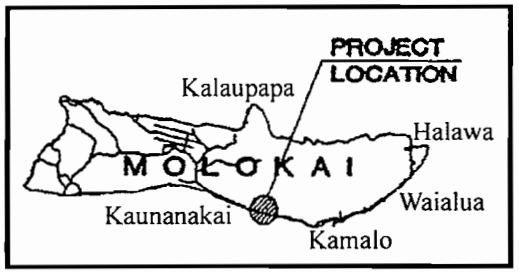
A. PROJECT LOCATION, EXISTING USE AND OWNERSHIP

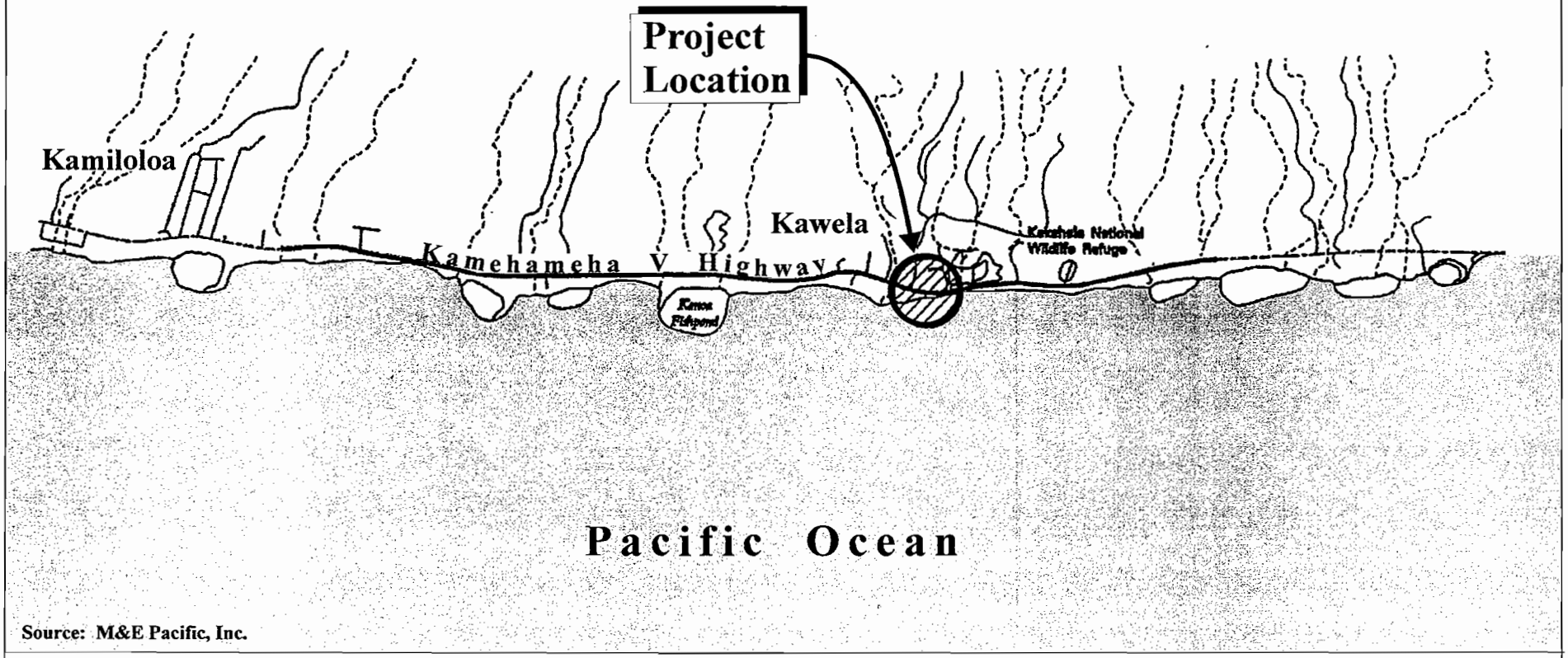
The State of Hawai`i, Department of Transportation (HDOT) proposes to replace Kawela Bridge, located between Milepost 5.110 and Milepost 5.118, on Kamehameha V Highway (Route 450) on the island of Moloka`i, Hawai`i. The highway follows the southeastern coastline of Moloka`i from Kaunakakai to Halawa. See **Figure 1** and **Figure 2**. The existing bridge is 44 feet long and 28 feet wide and does not have a dedicated pedestrian or bike lane.

The highway right-of-way is owned by the State of Hawai`i, Department of Transportation. Stream bank improvements and a temporary detour route will be constructed to the south of the bridge on property identified by TMK (2) 5-04-01:27 (Parcel 27). This portion of the parcel is presently undeveloped and contains a coastal pond. The parcel is owned by Pamela Phoebe Parker and Fred Ronald Parker. On the northern side of the bridge beyond the highway right-of-way, improvements will be carried out on lands identified by TMK (2) 5-04-01:023 (Parcel 23). The lands are currently undeveloped and owned by Molokai Properties Limited.

B. PROPOSED ACTION

The proposed project calls for the demolition of the existing bridge and construction of a new bridge that will improve hydraulic capacity of the bridge and conform to current HDOT American Association of State Highway and Transportation Officials (AASHTO) design standards and Federal Highway Administration (FHWA) standards. The proposed new bridge will be 56-feet long by approximately 47-feet wide with two (2) 12-foot wide lanes and bikeway/pedestrian walkway on each side. The new bridge will meet current HDOT/AASHTO and FHWA standards. The new bridge will be accessible by pedestrians and cyclists with a 10-foot wide shoulder on each side of the highway. See **Figure 3**. (The 47-foot width is the overall width measured from the outside edges of the concrete deck.) Improvements also include a new 20-foot approach slab at both ends of the bridge, guard rails and new concrete abutments. The replacement bridge will be constructed within the existing State right-of-way and the existing bridge elevation will be raised one (1) foot above the existing height.





Source: M&E Pacific, Inc.

Figure 1

Proposed Kawela Bridge Replacement

Regional Location Map

0 500 1000 2000 Feet

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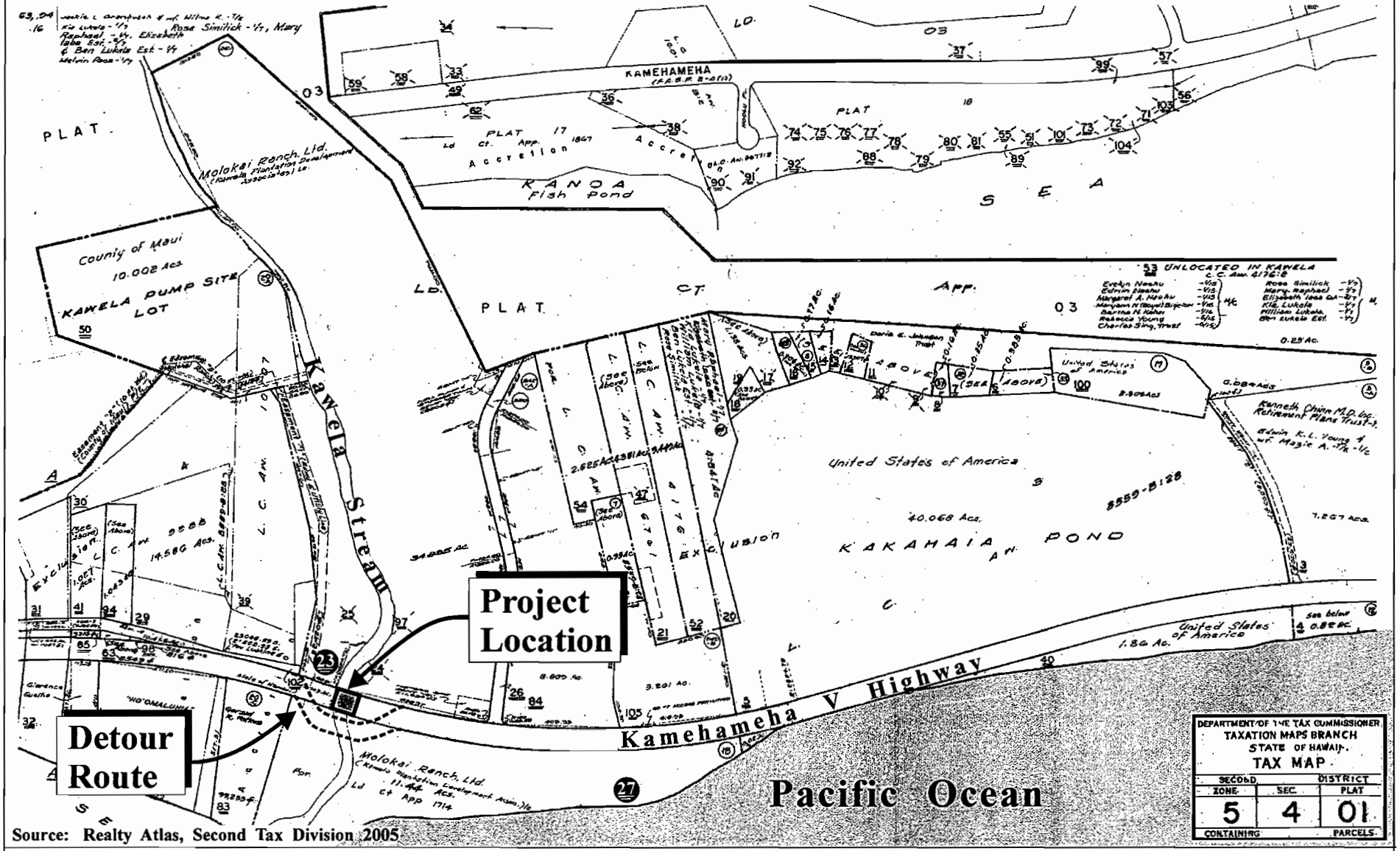
Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/regionalloca



Source: Realty Atlas, Second Tax Division 2005

Figure 2

Proposed Kawela Bridge Replacement

Project Location Map

NOT TO SCALE

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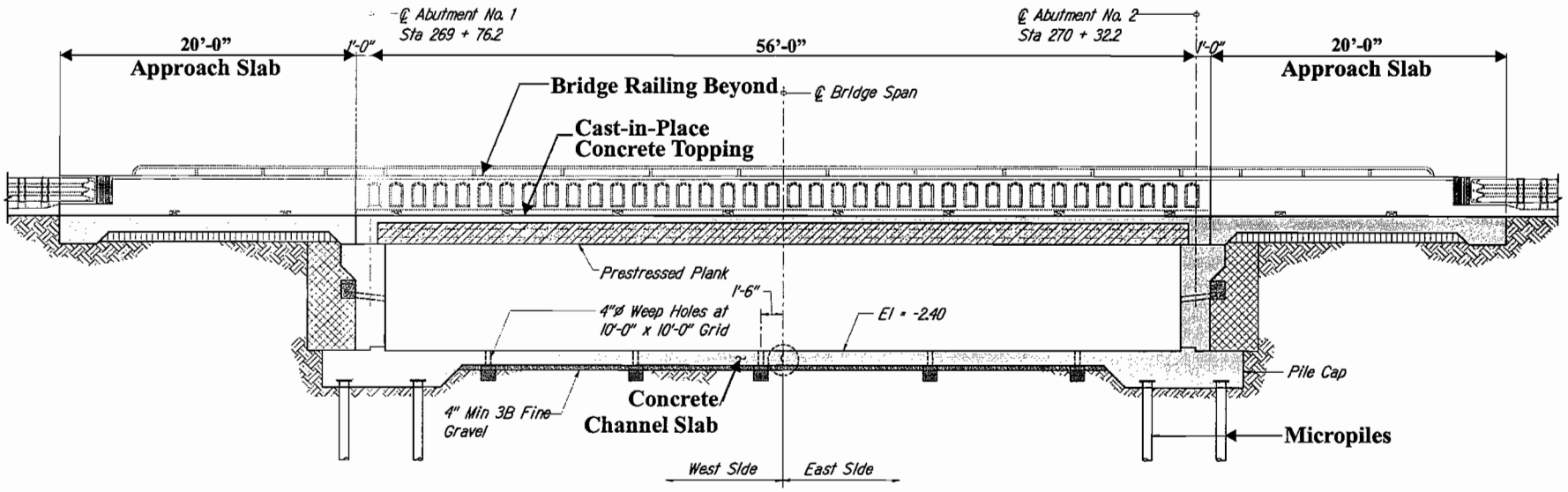
Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/projectlocat



Source: KAI Hawaii

Figure 3

Proposed Kawela Bridge Replacement

Longitudinal Section Along Base Line

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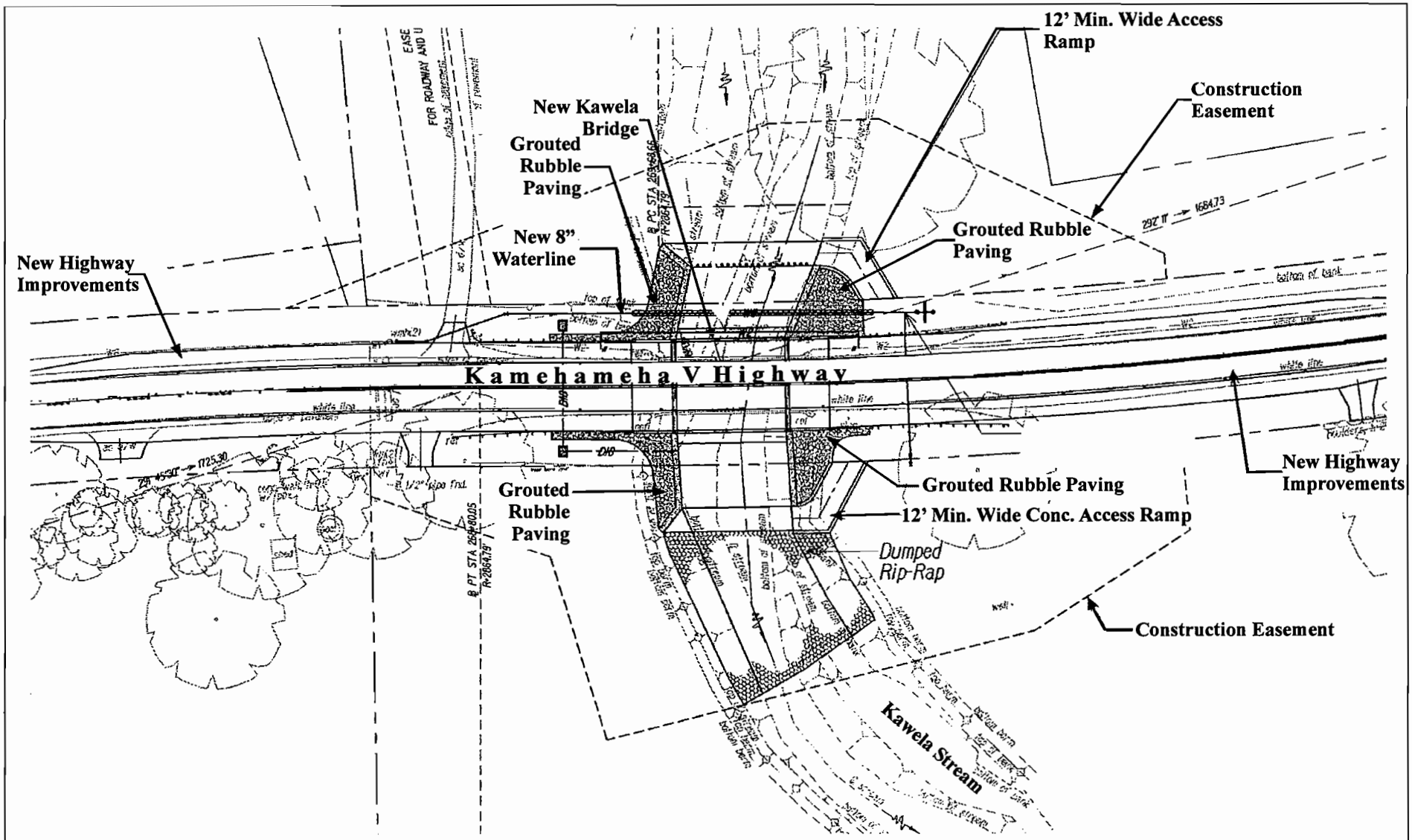
KAIHi/KawelaBridge/LongitudinalSectionAlongBaseLine

The stream channel under the bridge will be lined with concrete for maintenance purposes. An 2-inch existing waterline attached to the existing bridge will be replaced with either an 8-inch waterline crossing under the Kawela stream channel, or a 2-inch waterline and 3/4-inch waterline providing water service to the east side of Kawela Stream. It is noted that the development of the 8-inch waterline will depend on funding from the County Department of Water Supply or private landowners. If funding for the 8-inch waterline is not available then HDOT will construct the 2-inch and 3/4-inch waterline crossing under the Kawela Stream. Beyond the concrete liner, the stream embankment will be protected from erosion with grouted rock (GRP). See **Figure 4**. A 12-foot wide concrete access ramp for maintenance will be constructed on both sides of the bridge. Also, portions of the CRM wall, concrete access ramp, and concrete channel slab will be constructed on Parcel 27. A portion of the improvements upstream (north), consisting of the CRM walls, concrete access ramp, concrete channel slab, and 3-ft. high bollards, will be constructed on Parcel 23.

The center of the new bridge will coincide with the center of the existing bridge. Therefore, the approach roadway will maintain the existing alignment. A construction detour route will be installed on the makai side of the new bridge to allow traffic to flow around the construction area. Refer to **Figure 2**. The detour route will require a construction easement over private property (Parcel 27) and the removal of existing vegetation. The detour route will provide two (2) lanes of traffic. Therefore, both lanes of Kamehameha V Highway will be open for traffic during the construction period. The design of the detour road shall include the use of pipe culverts due to its cost efficiency. The detour route will be decommissioned upon completion of the new Kawela Bridge and the land restored to the original condition, as practicable.

Although not part of the HDOT action, the landowner of Parcel 27 proposes to build a new fence adjacent to the highway along the northern boundary of Parcel 27.

Given that State funds and State owned lands will be used for the proposed project and the proposed work will be carried out in the State Land Use Conservation District, this Environmental Assessment (EA) has been prepared in accordance with the provisions of Chapter 343, Hawai`i Revised Statutes and Department of Health Administrative Rule Chapter 200 of Title 11, Environmental Impact Statement Rules. Pursuant to Section 11-200-4, the approving agency for the EA is the HDOT.



Source: KAI Hawaii

Figure 4

Proposed Kawela Bridge Replacement

Bridge Layout Plan

NOT TO SCALE

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Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/BridgeLayoutPlan

C. NATIONAL ENVIRONMENTAL POLICY ACT COORDINATION

Since Federal funds will be used for the proposed Kawela Bridge replacement improvements, Federal EA requirements pursuant to the National Environmental Policy Act (NEPA) of 1969 will be triggered. Coordination with FHWA and the U.S. Environmental Protection Agency will be carried out to ensure that requirements of NEPA are fully addressed.

D. PROJECT NEED

The existing Kawela Bridge was constructed in 1940. Currently, the bridge is hydraulically inadequate and does not conform to current HDOT/AASHTO and FHWA standards. The existing bridge is 44 feet long by 28 feet wide and serves both inbound and outbound traffic on Kamehameha V Highway. The highway is not included in the National Highway System (NHS). It is classified as a major collector road. The posted speed limit on Kamehameha V Highway is 35 miles per hour (mph). The two lane, undivided roadway does not have a designated bike lane. However, it is currently used by cyclists and joggers.

During rainy seasons, Kawela Stream is known to overtop the bridge and flood surrounding areas (M&E Pacific 2002). A hydrology and hydraulics study was carried out for the bridge replacement project. See **Appendix "A"**. The 100-year water surface elevation at the existing bridge was determined to be 7.51 feet above mean sea level (amsl). The roadway elevation is approximately 4.9 feet msl. Therefore, the existing bridge will be overtopped by 2.6 feet during a 100-year flood. The proposed project will raise the elevation of the bridge and improve the hydraulic capacity of the stream channel.

E. PROJECT FUNDING AND SCHEDULING

The estimated cost of the proposed project is $7.4 million. It is estimated that the demolition of the existing bridge and construction of the new bridge will take approximately 12 months to complete. Construction of the temporary detour route would be completed and opened prior to the demolition of the existing Kawela Bridge.

II. DESCRIPTION OF THE EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

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A. PHYSICAL SETTING

1. Surrounding Land Uses

a. Existing Conditions

The Kawela Bridge is located between Milepost 5.110 and Milepost 5.118 on Kamehameha V Highway (Route 450) on the island of Moloka`i, Hawai`i. The highway follows the southeastern coastline of Moloka`i from Kaunakakai to Halawa.

The land in the immediate vicinity of Kawela Bridge is undeveloped and vegetated with kiawe, monkey pod and mangroves. Grazing land owned by Moloka`i Ranch lies to the north and east of Kamehameha V Highway and the bridge. There is one (1) single-family residence located to the west of Kawela Bridge adjacent to Parcel 27, where the detour route will be located. On Parcel 27 is a *muliwai* (coastal estuarine pond) that extends to the ocean shore.

b. Potential Impacts and Mitigation Measures

The proposed Kawela Bridge replacement will require an interim detour road to route traffic around the construction site while the new bridge is being constructed. The detour road will be constructed on the makai side of the bridge (TMK (2) 5-04-01:27) and will require a construction easement over private property and the removal of existing vegetation. The Right-of-Way Branch of the HDOT's Highways Division has been in discussions with private property owners to negotiate the acquisition of land, and/or rights of entry for topographic survey, site inspections and construction of a detour route. Upon completion, the detour route will be decommissioned and the land will be restored to the predevelopment conditions, as practicable.

Since the Kawela Bridge is an existing use, the new replacement bridge is not anticipated to adversely impact surrounding land uses.

2. Climate, Topography and Soils

a. Existing Conditions

Hawaii's tropical location results in uniform weather conditions throughout the year. Climatic conditions on Moloka`i are characterized by mild and consistent year round temperatures, moderate humidity and steady northeasterly tradewinds. Variations in Molokai's weather are attributable to regional topographic and climatic conditions.

The Kawela Bridge is situated on the south central coast of the island, near sea level. Average annual rainfall is approximately 15 inches near the coast. At the upper reaches of the watershed, there is greater rainfall, which averages approximately 75 inches per year. The months of October through March are typically the wetter periods of the year, with April through September being typically the drier months. Mean temperatures in the area range from 69 degrees Fahrenheit in January to 76 degrees Fahrenheit in August (Maui County Data Book, 2005).

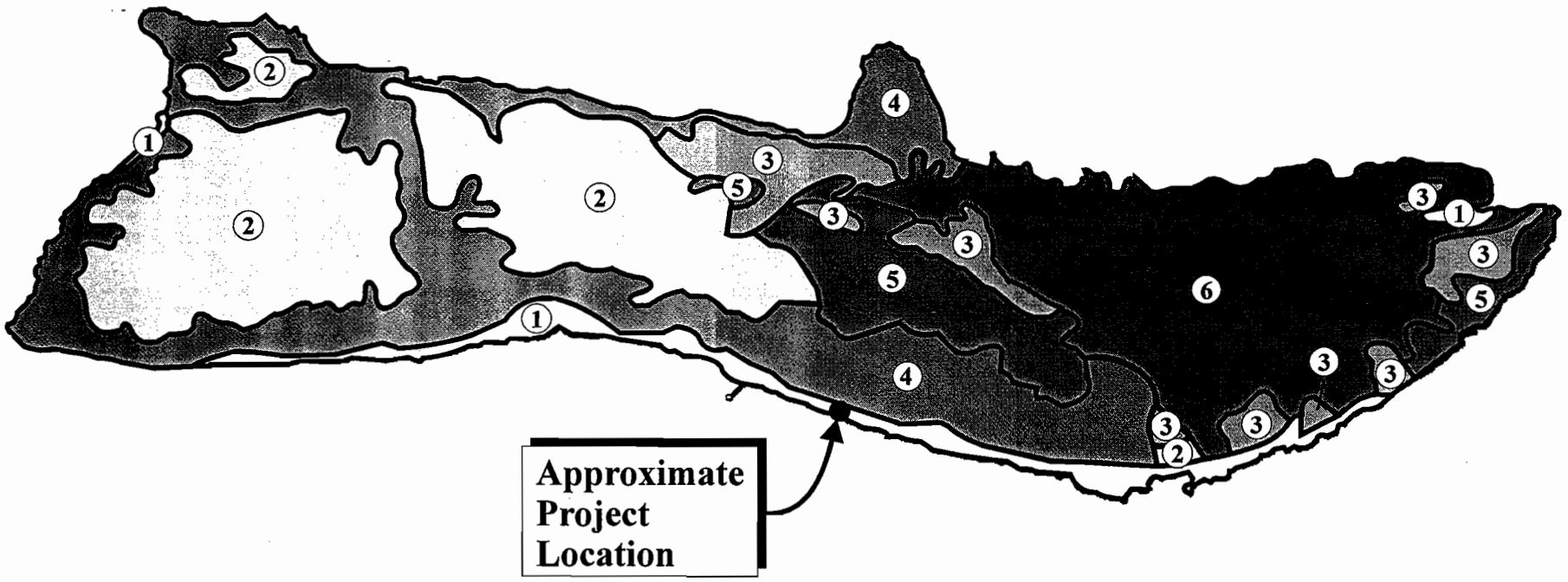
Wind conditions are predominantly characterized by northeasterly tradewinds. However, as these winds round the eastern tip of the island and veer west at the southern coast, they blow in an eastern direction.

Underlying the proposed project roadway are soils belonging to the Jaucas-Mala-Pulehu association. See **Figure 5**. The Jaucas-Mala-Pulehu association is characterized by deep, nearly level and gently sloping, excessively drainage soils that have a coarse-textured to fine-textured underlying material, common to alluvial fan areas and drainage ways.

The subject property contains underlying soils from the Pulehu clay loam, 0 to 3 percent slopes (PsA) soil classification. See **Figure 6**. This soil type is characterized by moderate permeability, slow runoff, and a slight erosion hazard. This soil is primarily used for sugar cane, truck crops, and pastures (U.S. Department of Agriculture Soil Conservation Service, 1972).

LEGEND

① Jaucas-Mala-Pulehu association
② Molokai-Lahaina association
③ Kahanui-Kalae-Kanepuu association
④ Very stony land-Rock land association
⑤ Rough broken land-Oli association
⑥ Rough moutainous land-Amalu-Olokui association



Source: USDA, Soil Conservation Service

Figure 5

Proposed Kawela Bridge Replacement

Soil Association Map

NOT TO SCALE

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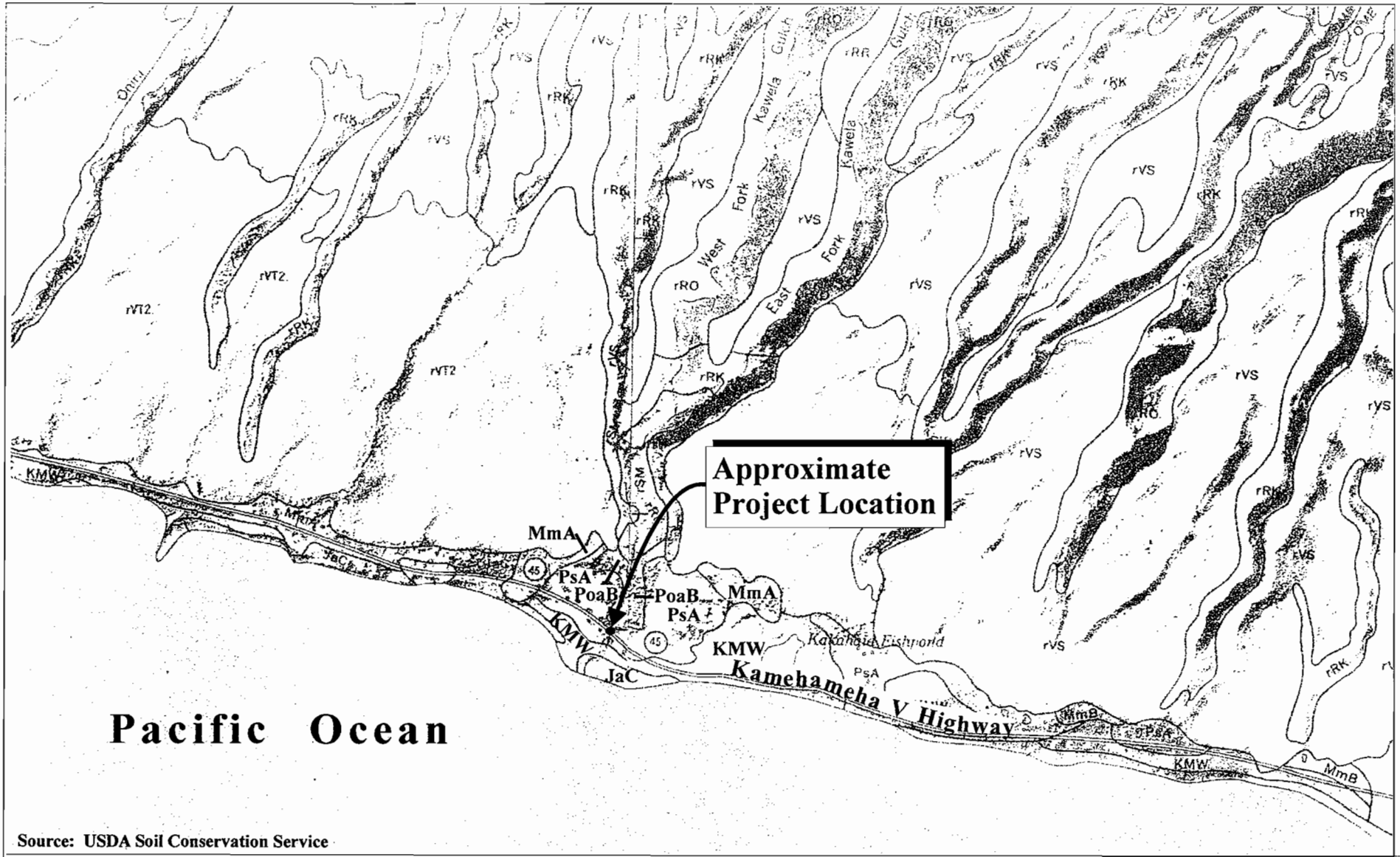
KAIHI/KawelaBridge/soilassoc



Source: USDA Soil Conservation Service

Figure 6

Proposed Kawela Bridge Replacement

Soil Classification Map

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MUNEKIYO & HIRAGA, INC.

KAIHi/KawelaBridge/SoilClass

The State Department of Agriculture has established three (3) categories of Agricultural Lands of Importance to the State of Hawai`i (ALISH). The ALISH system classifies lands into "Prime", "Unique", and "Other Important Agricultural Land". The remaining lands are "Unclassified". Utilizing modern farming methods, "Prime" agricultural lands have the soil quality, growing season, and moisture supply needed to produce sustained crop yields economically, while "Unique" agricultural lands possess a combination of soil quality, location, growing season, and moisture supply currently used to produce sustained high yields of a specific crop. "Other Important Agricultural Land" includes those which have not been rated as "Prime" or "Unique". The Kawela Bridge is located on the boundary between "Other Important Agricultural Land" and "Unclassified" lands. The detour route is located on lands "Unclassified" by the ALISH rating system. See **Figure 7**.

b. Potential Impacts and Mitigation Measures

The center of the new Kawela Bridge will coincide with the center of the existing bridge. Therefore, the approach roadway will maintain the existing alignment. The construction detour route will require the removal of existing vegetation. However, no major grading will be required and existing topography will not be altered. Upon completion of the new bridge construction, the detour route site will be restored to its natural condition, as practicable. The proposed action is not anticipated to adversely impact existing climatic, topographic features or soils.

3. Flood and Tsunami Conditions

a. Existing Conditions

The project site is located in Flood Zone A2, an area of 100-year flooding. See **Figure 8**. According to the Civil Defense Disaster Preparedness Information, the Kawela Bridge is located within the tsunami evacuation boundary, which extends approximately 200 feet mauka of Kamehameha V Highway. The existing hydraulic capacity of the Kawela Bridge is approximately 500 cubic feet per second (cfs). Refer to **Appendix "A"**. During heavy rains, the Kawela Stream overtops the existing bridge and floods the surrounding lands. The 100-year flood level at the bridge is estimated to be 7.51 feet msl. The existing roadway elevation is

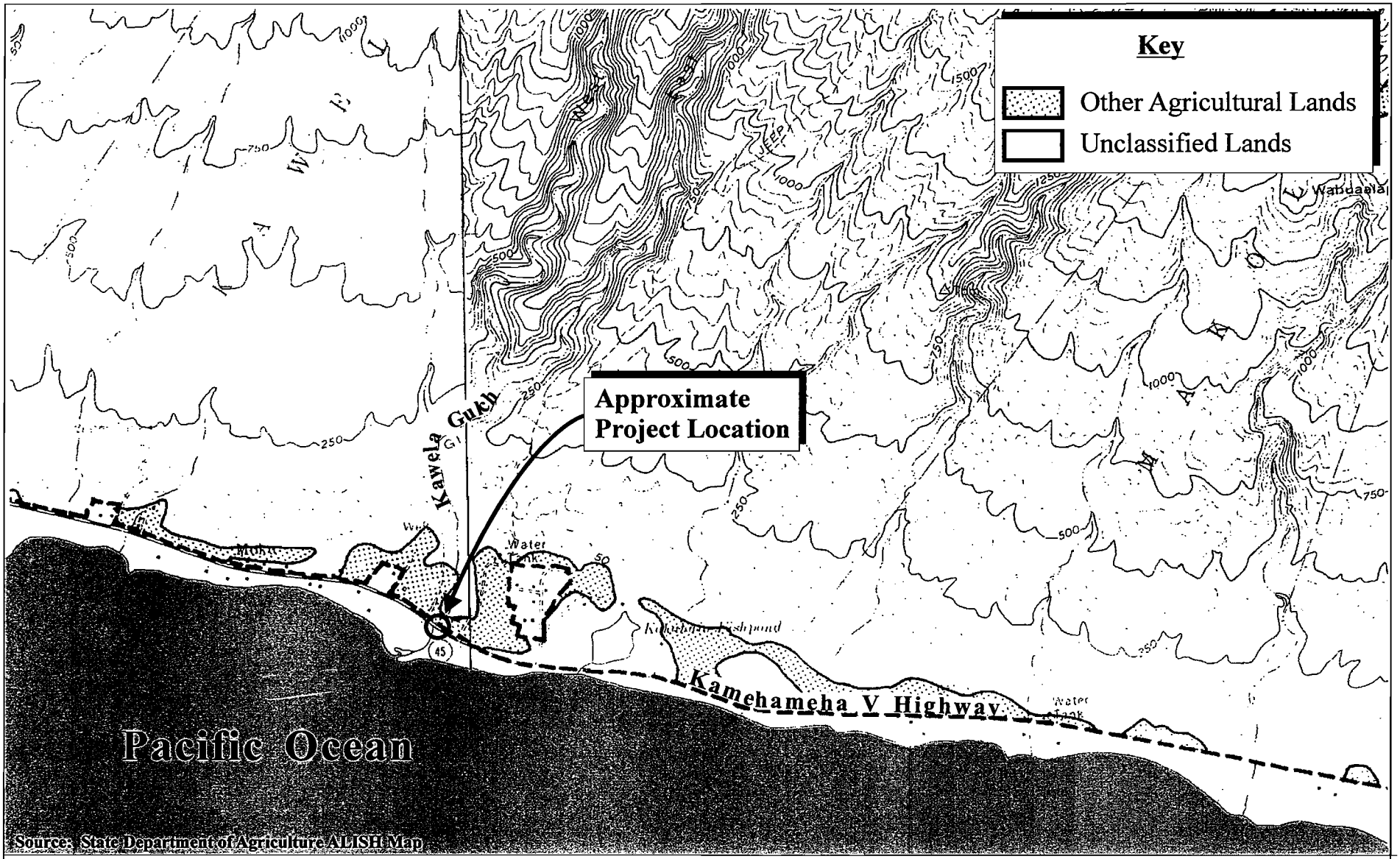

Figure 7

Proposed Kawela Bridge Replacement

Agricultural Lands of Importance to the State of Hawai`i

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KAIHi/KawelaBridge/ALISH

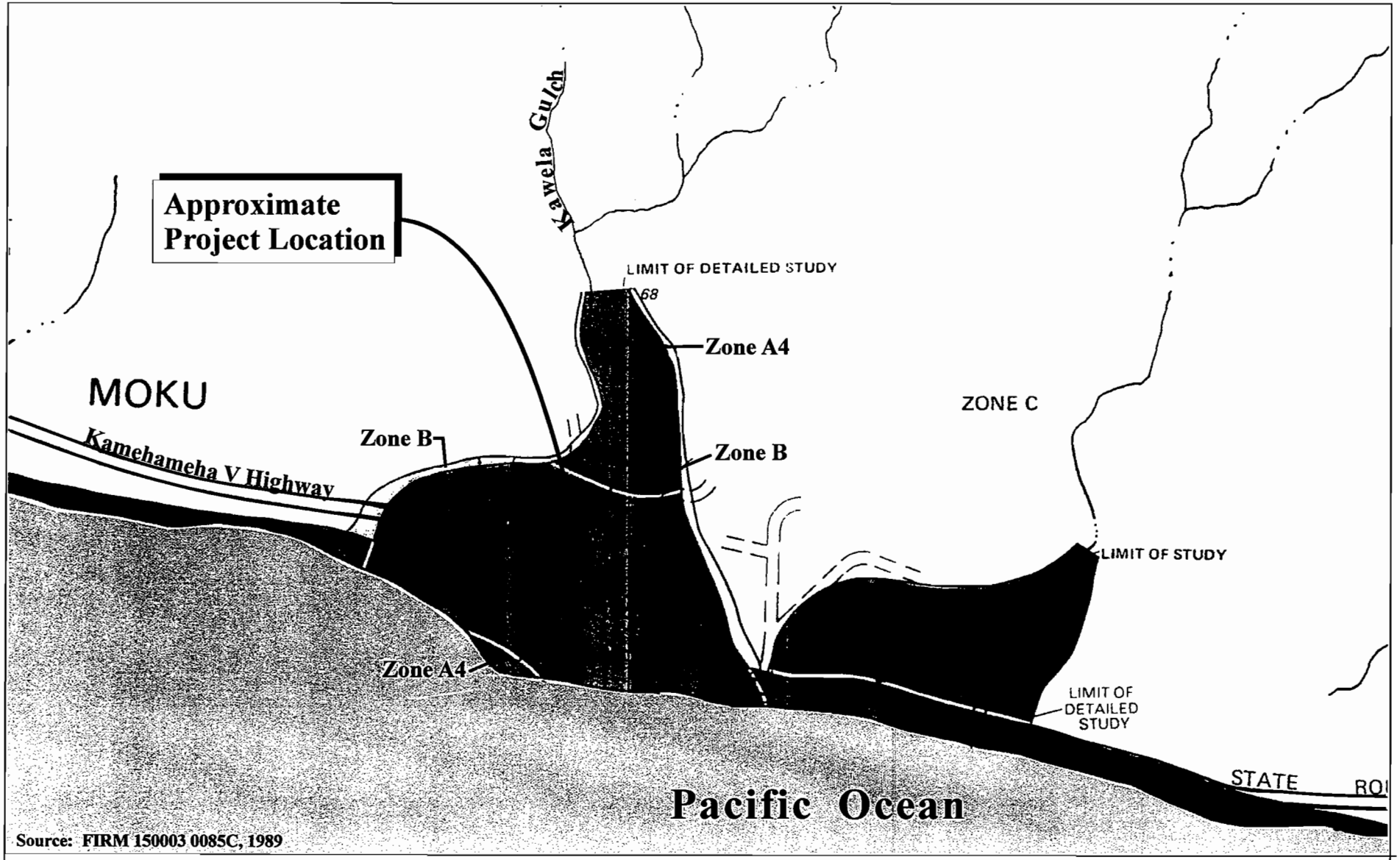

Figure 8

Proposed Kawela Bridge Replacement

Flood Insurance Rate Map

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KAHi/KawelaBridge/firm

approximately 4.9 feet msl. Therefore, the existing bridge will be overtopped by 2.6 feet during a 100-year flood.

b. Potential Impacts and Mitigation Measures

The new bridge will comply with HDOT/AASHTO design standards and improve hydraulic conditions of the Kawela Bridge. The proposed project will be built in compliance with regulations governing development within the flood zone.

4. Flora and Fauna

a. Existing Conditions

Vegetation in the vicinity includes kiawe, ilima, Java Plum, and various introduced grasses on the mauka side of the bridge. There is also an abundance of akulikuli-kai, kiawe and mangrove. There are no rare, threatened, or endangered plant species or habitats that have been identified within the project area.

Avifauna and mammals common to the project site and surrounding areas include introduced birds and feral animals (deer, goat, mongoose, wild pig).

The black-crowned night heron, or auku`u, was seen flying over the *muliwai* of Kawela Stream during the field survey. See **Appendix "B"**. The auku`u is an indigenous bird of Hawai`i and protected from hunting, capture or export. None of the observed species is listed as threatened or endangered. The Best Management Practices (BMPs) developed for the project will consider the use of the area by the auku`u to ensure they are not harmed during construction.

Water quality and biological surveys were conducted for Kawela Stream in the vicinity of the bridge. Refer to **Appendix "B"**. Native and introduced aquatic animals were observed in the *muliwai* (coastal estuarine pond) and isolated pool under the bridge. However, no Federally listed species were identified. Native fishes, such as `o`opu naniha, `o`opu akupa, and `o`opu nakea and native prawn such as `opae `oeha`a were observed. These species, in addition to other introduced fishes and prawns, are anadromous, meaning they migrate to and from the ocean but remain in the estuary or stream as

adult. Aholehole, `ama`ama mosquito fish and rainbow fish (guppy) were also observed (AECOS 2006).

b. Potential Impacts and Mitigation Measures

There are no known or identified habitats of rare or endangered species of flora, fauna, avifauna or aquatic animals located at the project site. The proposed bridge replacement is not anticipated to have an adverse impact upon the biological environment.

According to the water quality and biological surveys, if BMP's are used, the proposed bridge replacement will not significantly impact water quality in the *muliwai* or offshore.

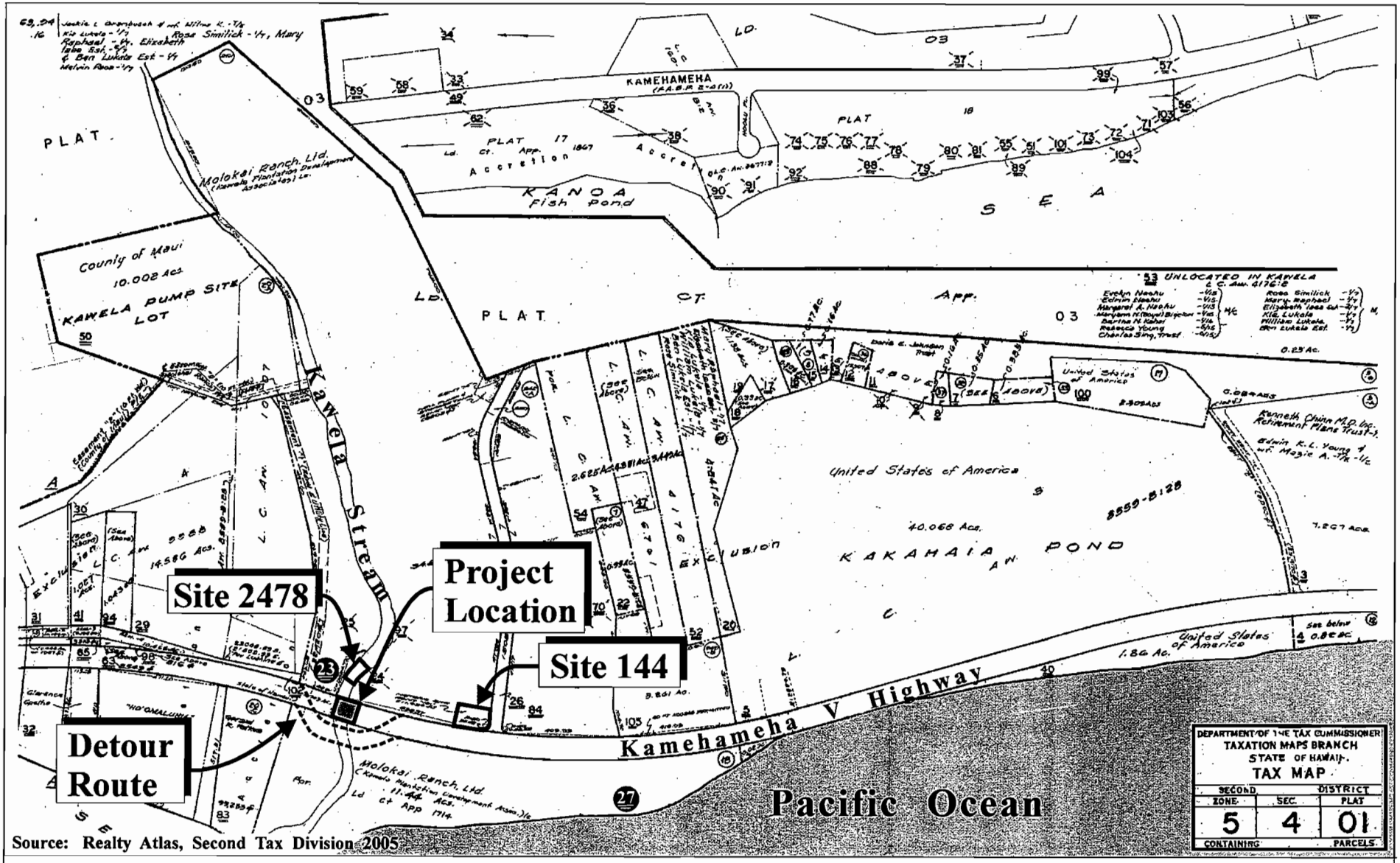
The design of the new bridge and temporary detour road should take into consideration the needs of migrating native aquatic animals. Temporary pipe culverts used for the detour road should be placed flush with the stream bed to allow passage by migrating fish and the ends of culverts should not hang over the stream bed (AECOS 2006).

5. Historical and Archaeological Resources

a. Existing Conditions

An archaeological assessment of the project site was conducted by Scientific Consultant Services (SCS). See **Appendix "C"**. The assessment involved historic background research, a pedestrian survey and laboratory work. The survey scope included land sections both mauka and makai of the present bridge, as well as areas to the east and west. Land needed for the detour road and the staging area for construction was also included in the assessment.

According to the Hawai`i State Register of Historic Places, there are a number of battlefields in the Kawela area. The Paliku battlefield is located to the east of and in close proximity to the project area. In addition, a burial mound containing the remains of some warriors (State Site 50-60-04-144) is nearby. See **Figure 9**. A pu'uhonua (place of refuge) or pu'ukaua (fortification), and a house site with an attached shrine were also listed in the



Source: Realty Atlas, Second Tax Division 2005

Figure 9

Proposed Kawela Bridge Replacement

Site 144 and 2478 Location Map

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Prepared for: State of Hawaii, Department of Transportation

KAIHi/KawelaBridge/site144

Register, but were located on the ridge away from the project area (SCS, 2006).

The archaeological inventory survey identified one (1) archaeological site consisting of three (3) features. Site 50-60-04-2478 is a series of three (3) terraces located along a tributary swale near the primary Kawela Stream drainageway to the north of the bridge. Refer to **Figure 9**. All three (3) of these features were interpreted as traditional agricultural features. Each feature was an eroded, short, rock-faced terrace that crossed the swale.

The archaeological site was evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five (5) criteria are classified below:

Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Site is associated with the lives of persons significant to our past

Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in prehistory or history

Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places.

Site 50-60-04-2478 was assessed as significant under Criterion D.

Since the Kawela Bridge was built in 1940 and is over 50 years old, it qualifies as a historic site. Coordination with the Architectural Branch of the State Historic Preservation Division was carried out regarding significance. The Architectural Branch indicated the plans of the bridge are available and no further work would be required.

In the report, State of Hawaii Historic Bridge Inventory and Evaluation, (2008) prepared for the Department of Transportation, Highways Division by

the Heritage Center, School of Architecture, University of Hawaii at Manoa, it is noted that Moloka`i does not have any bridges constructed prior to 1959, which have been categorized as "historic".

b. Potential Impacts and Mitigation Measures

No further archaeological work was recommended for the Site 50-60-04-2478. The site is located on the north (mauka) side of the bridge. No work is proposed on the north side of the bridge, therefore, potential adverse impacts on this site are not anticipated. However, given the project's close proximity to a battlefield and to Site 144, a burial mound, monitoring was recommended during ground altering activities. Prior to any ground altering activities within the project area, the applicant will prepare an Archaeological Monitoring Plan and submit it to State Historic Preservation Division (SHPD) for approval (SCS, 2006). No further archaeological work on Kawela Bridge was recommended.

Furthermore, should any archaeological remains or cultural materials be encountered during construction activities, all work in the vicinity of the find will cease and the SHPD will be contacted for establishment of appropriate mitigation measures in accordance with Chapter 6E, Hawai`i Revised Statutes.

6. Cultural Assessment

A cultural impact assessment was carried out by SCS. See **Appendix "D"**.

a. Existing Conditions

(1) Historical Overview

During the pre-contact era, the Moloka`i population base was primarily concentrated at the island's windward coasts. The area was rich in ocean resources and the deep valleys with perennial streams supported a lifestyle based on subsistence agriculture, primarily associated with intensive taro production.

The 18th century saw great upheaval on Moloka`i as the island became subject to the ambitions of the rulers of

neighboring islands. Political authority over Moloka`i passed back and forth between the chiefs of Maui and O`ahu throughout the century, only ceasing with the unification of all the islands under Kamehameha I.

With the onset of western contact, a western influence began to permeate through the island's social environment. The result was a reduced reliance on subsistence lifestyles and an increased dependence on a plantation and ranching-based economy. As a result, the island of Moloka`i experienced a westward population movement from the windward coast to the leeward side of the island.

Several important changes for Moloka`i occurred in the 19th century. Herd animals were introduced at this time: cattle in 1833, followed by deer and sheep 30 years later. Cattle had profound socio-economic and, thus, cultural impacts through ranching activities. Sheep, on the other hand, had a notably adverse impact on the landscape because of their grazing (Wiesler and Kirch). The Moloka`i Ranch was founded at the end of the century, purchasing lands formerly owned by Kamehameha V.

The 19th century also saw the creation of the Hansen's Disease colony on Moloka`i by the government. The first habitants arrived at Kalawao on January 6, 1866 to live on approximately 800 acres purchased by the kingdom (De Loach). The association of Moloka`i and leprosy remains to this day.

During the westward movement, the island's political and commercial center developed in accordance with the population movement. The first western town was established at Puko`o, which included a County seat, a court house, a wharf, and several small stores. In 1925, `Ualapue became the island's new major commercial center, where a new hospital was constructed. Finally in 1935, Kaunakakai was established as the political center and economic nucleus of the island.

In the 1920's, large pineapple plantations were established in the Maunaloa and Kualapu`u areas, further strengthening the westward movement. However, in the 1970's and 1980's, both plantations ceased operations and the island's economy became primarily dependent on diversified agriculture and

ranching activities with an emerging visitor industry (Moloka`i Community Plan, 2000).

In Kawela, habitation and agricultural structures were generally located on the lower ends of the ridges. Mauka of these structures were agricultural complexes that consisted of mounds and terraces. The Kawela Ahupua'a encompassed a broad coastal reef-flat providing its inhabitants with shellfish, crustacean, fish, limu (seaweed), and he'e (octopus). In addition, access to five (5) coastal fishponds was available. Dry land cultivation and ocean resources were important aspects of Kawela's traditional subsistence economy (SCS 2006). Kawela was also the site of a famous battle fought between Kapi`iohokalani of O`ahu and the chiefs of Moloka`i in the mid 1700's.

(2) Geopolitical Organization

Prior to Western contact in Hawai`i, land was divided into *moku*, or districts. Each of these was further subdivided into units called *ahupua'a.* Ideally, each *ahupua'a* was self-sufficient, running from *mauka*, the mountain, to *makai*, the ocean (MacKenzie). These divisions served as both cultural and settlement systems as traditional Hawaiian life was tied intimately to the land. Hunting, gathering, cultivation, and habitation took place within three (3) zones which characterized the *ahupua'a*: the *Mauka* Zone, the Agricultural Zone, and the Coastal Zone. The *Mauka* Zone provided access to a variety of trees, plants, and herbs for various needs, customs and practices. Planting of yams, sweet potato, sugar cane, taro, and other foods took place in the Agricultural Zone, where gradual slopes of land allowed terraces to be constructed for more efficient irrigation. The Coastal Zone and low-lying areas was where most of the *kauhale*, group of houses, were found, as well as temples, fishing shrines, and fishponds (Minerbi).

Moloka`i was traditionally divided into two (2) moku: Ko`olau district and Kona district, although there is some evidence of a third district having been used at some point (Wiesler and Kirch; Summers). The Ko`olau district was centered on the windward coast of the island, with the Kona district essentially comprising the remainder of Moloka`i. These *moku* were subdivided into *ahupua'a* which ranged in size from 79 to 46,500 acres (Summers). Moloka`i is noted

for having had some unusual *ahupua'a* which stretched from shore to shore, rather than the more usual *mauka* to makai; this is due to the shape of the central portion of the island (De Loach).

In 1859, the traditional *moku* divisions were eliminated and the entire island made into one district, called the Moloka`i district. Fifty years later, the island was redivided, this time into the Kalawao district, which is comprised of those areas known as Kalaupapa, Kalawao, and Waikolu and is administratively distinct from Maui County, and the remainder of the island, which is still designated as the Moloka`i district.

Western contact brought changes to the Hawaiian land system with the introduction of private ownership of land, a concept foreign to the native Hawaiians. A Board of Land Commissioners was established in 1845 to uphold or reject all private land claims of both foreigners and Hawaiians. The Commission adopted rules pertaining to the proof of claims, right of tenants, and commutation to the government in attempts to achieve the goal of totally partitioning undivided lands. All lands not claimed by February 1848 were to be forfeited to the government (MacKenzie).

Following the enactment of these rules, the *Mahele* division of 1848 divided all lands of Hawai`i between the king and chiefs. Two (2) years later the *Kuleana* act completed the *Mahele* process by authorizing the Land Commission to award fee simple titles to native tenants for their land. These *kuleana* parcels, also known as Land Commission Awards (LCA), were generally among the richest and most fertile in the islands and came from the king, government, or chief's land. All claims and awards were numbered and recorded in the *Mahele* Book (MacKenzie). In addition, government lands were sold as "Royal Patent Grants" or "Grants" in order to meet the increasing costs of government. These grants differed from LCAs, as it was not necessary for the recipients to obtain an award for their land from the Land Commission (Chinen).

(3) Stories and Traditions of Moloka`i

As is frequently the case with the islands, Moloka`i is the subject of multiple creation stories. Some say that all of the

islands were born of the god Wakea and his wives; Moloka`i being the off-spring of that god and his third wife, Hina, after his previous wives had given birth to Hawai`i, Maui, Kaho`olawe, and Lana`i. A separate tradition gives the formation of all the islands as having resulted from pieces of coral tossed back into the sea by the fisherman Kapuhe'euanui (Fornander).

The traditional history of Moloka`i is only extant in fragmentary form. It begins with Kamauaua, reputedly the first *ali'i-nui* of the island, who is thought to have lived sometime in the 13th century. There are subsequently many stories which suggest that the island was repeatedly subject to domination by the rulers of Hawai`i and Maui, with lordship over Moloka`i passing back and forth between the kings of the other two (2) islands, as well as intervening periods of autonomy (Summers).

The famous kahuna, Lanikaula, is thought to have lived in the 16th century. He is reputed to have lived in seclusion, but to have been frequently visited by peoples from all the islands in search of his advice. It is said that he had an *'aumakua* in the form of a small bird, who spoke to the wise man. Stories tell that Lanikula predicted the defeat of a powerful Mauian king who attempted to invade Hawai`i from Moloka`i.

At some point towards the late 18th century, Moloka`i acquired a reputation as being an *aina ho'omana*, a land of sorcery and the island was sometimes called *Moloka'i pule o'o*, "Moloka`i of the potent prayers" (De Loach, Summers). This reputation is connected with the *kalaipahoa*, the poison-tree gods, whose introduction to Moloka`i are the subject of several legends. The poison-trees and their associated gods were thought to be so deadly that the mere touch of their wood or sap led to instant death and the *kalaipahoa* could be used to invoke fatal illness in people; conversely, the *kahuna* associated with the *kalaipahoa* was granted great wealth from his *akua* (Summers).

(4) Traditional and Customary Rights

The traditional and customary rights of Native Hawaiians can be broken down into access rights, gathering rights, burial rights, and religious rights.

Access

Native Hawaiians generally share the same access rights as the general public. However, they have the unique access rights to *kuleana* parcels and between *ahupua'a*. Access to *kuleana* parcels may involve access via ancient trails or expanded access not limited to any route. Additionally, the *Kuleana* Act granted unobstructed access within the *ahupua'a* to obtain items necessary to make the *kuleana* parcel productive. Access rights between *ahupua'a* involve access through ancient or well established trails (MacKenzie).

Gathering

In terms of gathering rights, the Hawai`i Supreme Court has upheld gathering rights within an *ahupua'a* for firewood, house-timber, *aho* cord, thatch, and *ki*-leaf under three (3) conditions. The tenant must physically reside within the *ahupua'a*, the right to gather can only be exercised upon undeveloped lands within the *ahupua'a,* and the right must be exercised only for the purpose of practicing Native Hawaiian customs and traditions (MacKenzie).

Burial

According to traditional Hawaiian burial beliefs, following death, the *'uhane,* or spirit, must remain near *na iwi*, or bones. Burial sites are chosen by Hawaiians for symbolic purposes in places for safekeeping. Often, bones were hidden in caves, cliffs, sand dunes, or deposited in the ocean. Today, federal and state laws protect both unmarked and marked burial sites. Island Burial Councils assist the State Historic Preservation Division with inventory and identification of unmarked Hawaiian burial sites and determine the preservation or relocation of native Hawaiian burial sites (MacKenzie).

Religious

Hawaiian religion and beliefs were intimately tied to the land. While some practices and traditions were lost over the years, basic Hawaiian religious concepts remain. The terms *"aloha 'aina,"* love the land and *"malama 'aina,"* care for and protect the land, convey the unity of humans, nature, and the gods in Hawaiian philosophy (Minerbi). Furthermore, Hawaiians honored and worshiped *aumakua,* deities, and

akua, gods. There were numerous *akua* of farming, fishing, tapa making, dancing, sports, and any other activity of Hawaiian life. The concept of *mana* or sacred attachment to places, people, or things also remains as a significant aspect of Hawaiian religion (MacKenzie).

(5) Local Resident Interview

A telephone interview was held with Billy Grambush in order to obtain local cultural perspective of the project area and potential impact of the proposed project. Protection of the burial mound (Site 144) was identified as a paramount concern. The route of the detour road was also of concern because of the cultural significance of the area.

b. Potential Impacts and Mitigation Measures

The Kawela area was the site of a famous battleground where the Moloka`i chiefs fought off an invasion by Kapi`iohokolani of O`ahu in the 1750's. From a recent historical perspective, land in the vicinity of the Kawela Bridge site was primarily maintained for agricultural activities. No indications of cultural practices, such as gathering, access or religious traditions, are known to be associated with the project area.

With regard to the proposed Kawela Bridge replacement, no adverse impact to cultural resources, practices, and traditions is anticipated. The new bridge will replace the existing bridge. The approach roadway will maintain the existing alignment and within the existing right-of-way. The proposed project will not adversely impact access to kuleana parcels and between ahupua`a.

Archaeological monitoring will be carried out during all ground altering activities to ensure cultural and historical resources are not adversely impacted by the construction of the temporary detour road.

7. Air and Noise Quality

a. Existing Conditions

Due to the low level of residential and commercial development in the project vicinity, the lack of major point sources of air pollution, and the prevailing tradewind conditions, the region has good air quality. The primary source of emissions may be attributed to motor vehicles traversing Kamehameha V Highway. However, these mobile sources have no adverse influence on air quality.

There are no significant noise generators in the vicinity of the project area. Noise generated in this locale may be attributed to traffic along Kamehameha V Highway.

b. Potential Impacts and Mitigation Measures

Airborne particulates, including dust, may be generated during site preparation and construction activities. However, dust control measures, such as regular watering and sprinkling, will be implemented as needed to minimize wind-blown emissions.

In the long term, the Kawela Bridge replacement is not anticipated to adversely impact local and regional ambient air quality conditions.

As with air quality, ambient noise conditions will be temporarily impacted by construction activities. Heavy construction equipment, such as bulldozers, front end loaders, and dump trucks and trailers will be the dominant source of noise during site construction. Construction generated noise will be mitigated through Best Management Practices (BMPs), and construction activities will be limited to daylight work hours only. The contractor will coordinate with the State Department of Health to ensure that noise permits are obtained, as appropriate.

In the long term, the proposed project is not expected to adversely impact noise conditions.

8. Water Quality

a. Existing Conditions

The South Moloka`i Coast is listed as an impaired water body by the State of Hawai`i. This means that the water body does not meet the Hawai`i water quality standards. The pollutants for which this area is listed are nutrients, turbidity and suspended solids.

An assessment of the water quality at three (3) locations in the vicinity of the project was carried out for the proposed project. Refer to **Appendix "B"**. The one location was an isolated pool underneath the existing bridge, and the other two (2) locations were in the *muliwai* (coastal estuarine pond). The water quality of the *muliwai* of Kawela Stream shows marine water with fairly high total nitrogen and total phosphorous levels. The salinity measurements demonstrate that the *muliwai* had little, if any, fresh water influence at the time of sampling. The salinity of the isolated pool under the bridge was 10 ppt, demonstrating a significant fresh groundwater influence. The *muliwai* was supersaturated with dissolved oxygen (DO), which is the result of DO production by phytoplankton in the *muliwai*. The percent saturation of DO was low in the isolated pool, which reflects stagnant conditions. Throughout the *muliwai* area, the pH range was normal for estuaries.

b. Potential Impacts and Mitigation Measures

As a result of the impaired water listing of the South Moloka`i Coast, a study will be conducted prior to construction, to determine the total maximum daily load (TMDL) of pollutants that the nearshore waters of South Moloka`i Coast can accommodate without violating Hawai`i's Water Quality Standards. Section 401 Water Quality Certification monitoring will be carried out during the construction of the replacement bridge and temporary detour route across Kawela Stream. Best Management Practices (BMPs) will be carried out during the construction phase, such as silt curtains to prevent movement of soil from exposed banks and work areas. Construction will be phased to avoid periods when high stream flow will be likely. Following the BMPs plan during construction will ensure the bridge replacement project will not

have a significant effect on the quality of the water in the *muliwai* or off the shore.

9. Scenic and Open Space Resources

a. Existing Conditions

The project site is located between Milepost 5.110 and Milepost 5.118 on Kamehameha V Highway. The highway follows the southeastern coastline of Moloka`i from Kaunakakai to Halawa.

b. Potential Impacts and Mitigation Measures

The proposed project is not anticipated to have a substantial, adverse impact to existing view corridors, as it will replace an existing bridge structure. There are no anticipated adverse impacts to the visual resources of the surrounding environment as a result of the proposed project's construction.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population and Economy

a. Existing Conditions

The resident population of the island of Moloka`i (excluding Kalawao), as determined by the 1990 Census, was 6,587. In the year 2000, the resident population was 7,404, representing an increase of approximately 10 percent. Kaunakakai remains the population center of Moloka`i with 2,726 residents, followed by Kualapuu with 1,936 residents (Maui County Data Book, 2007).

On Moloka`i, there is still a large number of unemployed workers, compared to Lana`i and Maui. In October 2008, the unemployment rate (not seasonally adjusted) was 5.0 percent for the island of Maui, 4.4 percent for Lana`i. On Moloka`i it was 12.5 percent. In comparison, the unemployment rate for the State of Hawai`i was 4.4 percent (Hawai`i Workforce Informer, 2008). The unemployment rate increased since October 2007 when it was 5.4 percent on

the island of Moloka`i and 2.6 percent in the State (Hawai`i Workforce Informer, 2008).

In 2006, the total number of people employed in non-farming wage and salary jobs on Moloka`i was 1,900 and the total number in the private sector was 1,300. There were 600 people employed in government, 200 in retail, 350 in educational and health services, and 300 in leisure and hospitality (Maui County Data Book, 2007).

The visitor industry continues to provide a valuable contribution to the Moloka`i economy. In 2006, a total of 85,003 visitors traveled to Moloka`i by air. Of those visitors, 60,095 were domestic, while 24,908 visitors were from foreign countries. However, the Moloka`i tourism market has grown from 299 available rooms in 2003 to 451 available rooms in 2005. The average occupancy rate was 59.59 percent, and an average room rate of $119.94 per night in 2005. These figures are substantially lower than those of Maui, which had an average occupancy rate of 79.98 percent, and an average room rate of $256.07 in the same period (Maui County Data Book, 2007).

Despite comparatively higher unemployment and fewer jobs, Moloka`i has experienced continued population growth for decades. With the closing of Molokai Ranch, Ltd., however, Moloka`i is suffering from high unemployment.

b. <u>Potential Impacts and Mitigation Measures</u>

Short-term economic benefit associated with construction expenditures is anticipated. The proposed project is not a population generator. Thus, there are no anticipated long-term impacts on population parameters.

C. PUBLIC SERVICES

1. Police and Fire Protection

a. Existing Conditions

Police services on Moloka`i are provided by the Maui County Police Department. The Moloka`i station is located in the Mitchell Pauole Center in Kaunakakai.

Fire prevention, protection and suppression services are provided by the Maui County Department of Fire and Public Safety. The Fire Department maintains stations in Kaunakakai and Hoolehua, with a substation in Pukoo.

b. Potential Impacts and Mitigation Measures

The proposed Kawela Bridge replacement project is not anticipated to adversely impact police and fire protection services. In the long term, the proposed project will benefit police and fire protection services. The current bridge is hydraulically inadequate and the highway has been closed during times of heavy rains. The proposed bridge replacement would provide greater ability to respond to emergencies during heavy rainfall due to more adequate hydraulic specifications.

2. Medical Facilities

a. Existing Conditions

Moloka`i General Hospital, which is operated by the Queen's Health Systems, is the only major medical facility on the island. Licensed for 30 beds, the hospital located in Kaunakakai provides acute, emergency, and obstetrics care services. The hospital also houses the Women's Health Center, which offers mid-wife and maternity services to local residents.

Other medical facilities include the Moloka`i Family Health Center in Kaunakakai.

b. Potential Impacts and Mitigation Measures

The proposed action is not anticipated to have adverse impacts on existing medical facilities or services on Moloka`i. The proposed project is anticipated to provide positive benefits to medical facilities by allowing greater access to medical facilities and services during heavy rains which often overtop the existing bridge and close the highway.

3. Solid Waste

a. Existing Conditions

Except for remote areas, single family solid waste collection service is provided by the County of Maui once weekly.

Solid waste is collected by County refuse collection crews and disposed at the County landfill at Palaau. Commercial waste from private collection companies is also disposed of at the landfill.

b. Potential Impacts and Mitigation Measures

The proposed bridge replacement project is not anticipated to adversely impact existing solid waste services on Moloka`i. The existing bridge will be demolished and disposed at an approved solid waste facility.

4. Recreational Resources

a. Existing Conditions

The island of Moloka`i offers a wide range of recreational opportunities. Possible outdoor activities include bicycling, boating, camping, diving, fishing, golfing, hiking, horseback riding, hunting, surfing, swimming, tennis, and windsurfing.

b. Potential Impacts and Mitigation Measures

The proposed project is not anticipated to adversely impact the existing recreational facilities located in the vicinity. The new bridge will provide a

pedestrian/bicycle lane for joggers and cyclists currently using the highway shoulders.

5. Educational Facilities

a. Existing Conditions

There are five (5) public schools on Moloka`i. Four (4) are public elementary schools, Kaunakakai, Kilohana, Kualapuu, and Maunaloa, providing elementary school education for children from Kindergarten through Grade 6. There is one (1) secondary school, Moloka`i High and Intermediate School, located in Hoolehua. School capacity, enrollment and projected enrollment are summarized in **Table 1**.

Table 1. Enrollment Estimates for Moloka`i Schools

School	Capacity for 2007-2008 School Year	Enrollment 2007-2008 School Year	Projected Enrollment 2011-2012
Kaunakakai Elementary School (Grades K-6)	464	207	218
Kilohana Elementary School (Grades K-6)	209	97	87
Maunaloa Elementary School (Grades K-6)	121	57	51
Kualapuu Elementary School (Charter School-Grades K-6)	436	342	420
Moloka`i Intermediate School (Grades 7-8)	343	145	173
Moloka`i High School (Grades 9-12)	756	355	268
Source: State of Hawai`i, Department of Education, 2008.			

Private schools include Moloka`i Christian Academy (Grades K-12) and Moloka`i Mission School (Grades 1-8).

Moloka`i Education Center, a satellite facility of Maui Community College, offers post-secondary, vocational and technical credit courses, and is located at the intersection of Alanui Ka `Imi `Ike and Kamehameha V Highway.

b. Potential Impacts and Mitigation Measures

The proposed project is not a population generator. As such, it is not anticipated to adversely impact existing education facilities or services on Moloka`i.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

The State of Hawaii's Maunaloa Highway links Kaunakakai with the western portion of the island. Maunaloa Highway becomes Kamehameha V Highway at Kaunakakai and extends toward the shoreline, providing access to eastern portions of Moloka`i. Kawela Bridge is located between Milepost 5.110 and Milepost 5.118. The existing bridge is hydraulically inadequate and Kawela Stream overtops the bridge during periods of heavy rains, often causing road closures.

b. Potential Impacts and Mitigation Measures

As previously indicated, an interim detour road to route traffic around the construction site will be utilized while the new bridge is being constructed. The detour road will be constructed on the makai side of the existing bridge and will provide two (2) lanes of traffic. Therefore, both lanes of Kamehameha V Highway will be open for traffic during the construction period. Following completion of the new replacement bridge, the detour route will be decommissioned and site conditions restored.

In the long term, the proposed Kawela Bridge replacement will improve travel conditions along that portion of Kamehameha V Highway. The new bridge will include a 10-foot wide shoulder on each side of the highway for pedestrian and cyclist use. The new bridge will be hydraulically improved. Although Kawela Stream will overtop the new Kawela Bridge, road closure during heavy rains would be less frequent.

2. Water System

a. Existing Conditions

The County of Maui operates four (4) water systems on the island of Moloka`i. The water distribution system for Kawela-Kaunakakai consists of a 1.0 million gallon reinforced concrete reservoir at an elevation of 232 feet. It is located approximately 2,500 feet northwest of the site. A network of 12-, 8- and 6-inch waterlines transport water from the reservoir to residential and commercial areas of Kaunakakai.

An 8-inch County waterline is located within the Kamehameha V Highway on the mauka side. This waterline ends just before the Kawela Bridge on the Kaunakakai side. Coordination with the County Department of Water Supply (DWS) and adjacent landowners have been carried out by HDOT to determine if they will fund extension of the 8-inch waterline across Kawela Stream. The waterline will be installed under the Kawela Stream, protected by a concrete jacket under the concrete streamlining. If the DWS or private landowners do not fund the 8-inch waterline, HDOT will construct a 2-inch and 3/4-inch waterline under Kawela Stream to extend service to two (2) properties on the eastern side of Kawela Stream.

b. Potential Impacts and Mitigation Measures

The proposed bridge replacement is not expected to adversely impact water supply on the island. Care will be taken to protect the waterline in the vicinity of the project during construction of the new bridge and detour route in order to mitigate adverse impacts to the County water system. The extension of the 8-inch waterline across Kawela Stream will help extend County services or alternatively the 2-inch and 3/4-inch waterline extension will provide water service to two (2) landowners on the east side of Kawela Stream.

Appropriate Best Management Practices (BMPs) will be employed during construction in order to protect the integrity of groundwater and surface water resources in the vicinity of the project.

3. Wastewater System

a. Existing Conditions

The Kaunakakai Wastewater Treatment Plant, built in 1987, provides service to the Kaunakakai area. Residents within one (1) mile of the plant are linked to the wastewater system. The Kaunakakai facility has a capacity of 300,000 gallons per day (gpd) and a cumulative allocated capacity of 287,000 gpd.

Most regions of Moloka`i are not served by a wastewater treatment system. Residents situated beyond the Kaunakakai service area utilize either cesspools or septic systems. The County of Maui provides cesspool pumping services to readily accessible areas. There are no County of Maui wastewater system improvements in the vicinity of the Kawela Bridge.

b. Potential Impacts and Mitigation Measures

The proposed Kawela Bridge replacement is not anticipated to adversely impact wastewater conditions and/or infrastructure on Moloka`i.

4. Drainage

a. Existing Conditions

There are no drainage improvements in the vicinity of the Kawela Bridge. Storm water runoff sheetflows in a north to south direction from the roadway towards the ocean.

Kawela Stream is a multi-branched, interrupted stream that extends from the Moloka`i Forest reserve to the ocean. The total drainage area is approximately 5.75 square miles. Only the upper reaches of the west and east forks are perennial and much of the stream course is dry throughout the year. A hydrological study and model was carried out of the Kawela watershed for the bridge replacement project to determine hydraulic conditions of the stream and determine the flow capacity of the existing channel at the bridge location. Refer to **Appendix "A"**.

The 100-year peak discharge for the Kawela watershed is estimated to be 13,300 cubic feet per second (cfs). The main channel in the reach upstream of the bridge has an average depth of six (6) feet and average width of 85 feet. The total flow capacity in this reach prior to overbank flow is approximately 2,500 cfs. Using the peak discharge of the Kawela watershed and local topographic features of the Kawela Stream channel in the vicinity of the bridge, the hydraulic model indicated that the 100-year water surface elevation at the upstream face of the existing bridge will be 7.51 feet. This is approximately 2.6 feet above the elevation of the existing bridge. The current flow capacity of the existing bridge is 500 cfs.

b. Potential Impacts and Mitigation Measures

The proposed bridge replacement project will not adversely impact adjacent and downstream properties. The new bridge will be approximately 1,306 square feet larger in surface area than the existing bridge. The increase in storm water runoff from the larger new bridge will be negligible. The main benefit from the proposed new bridge will be an improved flow capacity from 500 cfs to approximately 550 cfs.

5. Electrical and Telephone Service

a. Existing Conditions

Electrical, telephone and cable services are provided via an extended overhead distribution system located along Kamehameha V Highway by Maui Electric Company, Ltd., Hawaiian Telcom and Oceanic Time Warner Cable, respectively.

b. Potential Impacts and Mitigation Measures

A power pole will be temporarily relocated during construction of the detour route. Upon completion of the project, the utility pole will be repositioned to its original location. In the long term, the proposed project will not adversely impact electrical, telephone, or cable services.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

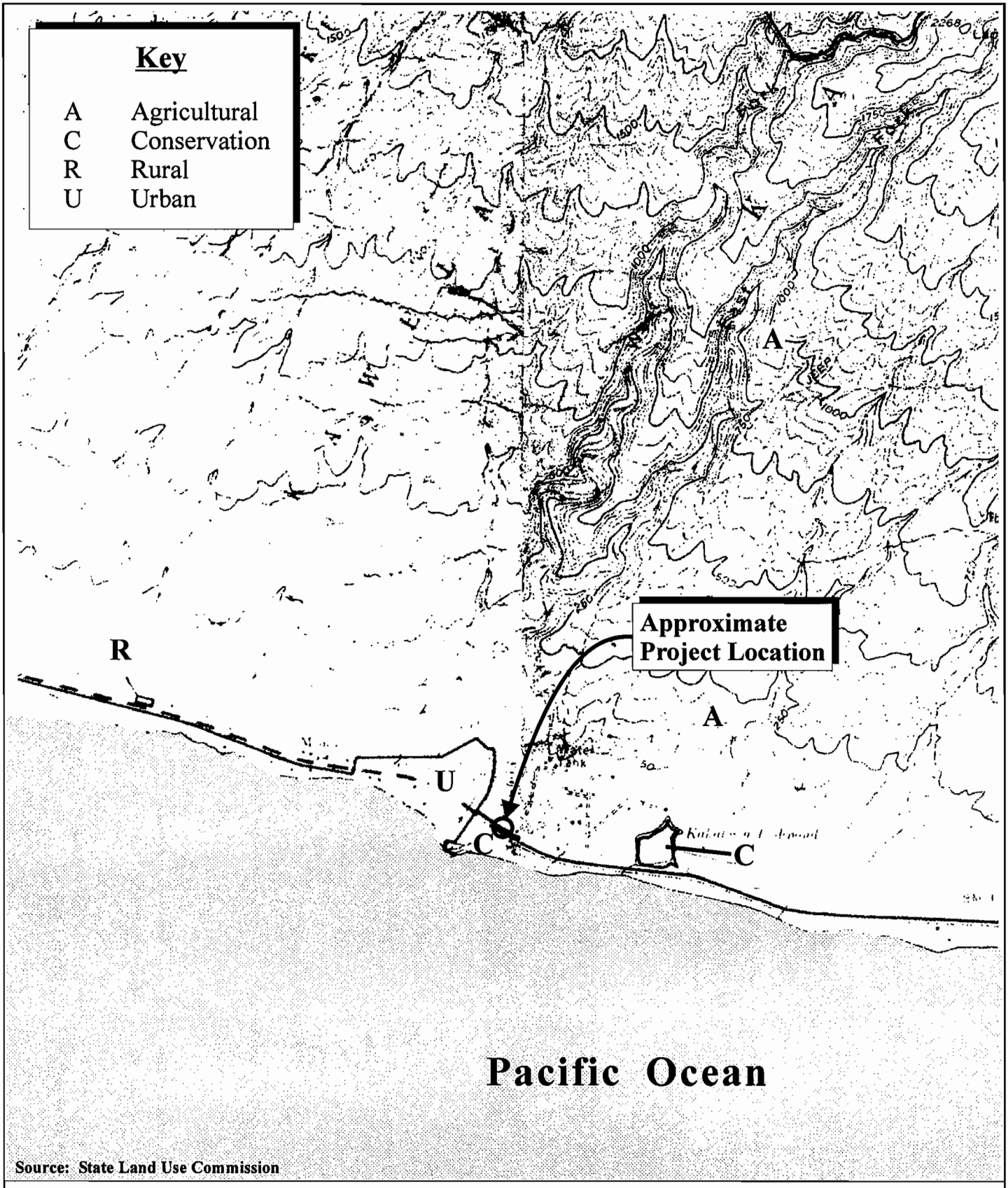
Chapter 205, Hawai'i Revised Statutes, relating to the Land Use Commission (LUC), establishes the four (4) major land use districts in which lands in the State are placed. These districts are "Urban", "Rural", "Agricultural", and "Conservation".

The proposed roadway improvement to the southwest of the bridge is located within the State "Conservation" district. See **Figure 10**. The proposed improvements to the Kawela stream channel located to the northeast of the highway is located in the Agricultural District. The proposed improvements in the Agricultural District are permitted pursuant to Chapter 205, HRS since they involve improvements to public roadway.

Lands within the State Conservation District are under the jurisdiction of the Department of Land and Natural Resources. Title 13, Hawai'i Administrative Rules, establishes rules and procedures which regulate land use in the Conservation District. Title 13 establishes subzones within the Conservation District. These subzones are designated "Protective" (P), "Limited" (L), "Resource" (R), "General" (G), and "Special" (S). The project site is located in the Limited subzone.

The subject project, which is considered an identified use within the Limited subzone of the Conservation district, requires a Board permit from the Board of Land and Natural Resources (BLNR). Accordingly, a Conservation District Use Application (CDUA) for the subject project has been prepared in accordance with Title 13.

Thus, with regard to the subject project's consistency with the purpose of the Conservation district, the following criteria is discussed:



Source: State Land Use Commission

Figure 10

Proposed Kawela Bridge Replacement

State Land Use Classifications

NOT TO SCALE

Prepared for: State of Hawaii, Department of Transportation

MUNEKIYO & HIRAGA, INC.

KAIHi/KawelaBridge/slud

1. **The proposed land use is consistent with the purpose of the Conservation District:**

The subject project is permissible within the Conservation District and is not contrary to the purpose of conserving, protecting and preserving important natural resources of the State. The proposed project entails replacing an existing bridge that is hydraulically inadequate. No additional right-of-way for the new bridge will be required.

2. **The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur:**

Pursuant to Section 13-5-23(a), identified land uses in the Limited subzone also include land uses in the Protective subzone which includes P-6 Public Purpose Uses undertaken by the State of Hawai`i to fulfill a mandated governmental function such as transportation systems.

3. **The proposed land use complies with provisions and guidelines contained in Chapter 205A, HRS, entitled "Coastal Zone Management," where applicable:**

The subject project complies with provisions and guidelines in Chapter 205A, HRS. An application for a Special Management Area (SMA) Use Permit for the subject project will be submitted to the County of Maui, Department of Planning. Evaluation of the proposed project with respect to the criteria pursuant to Chapter 205A, HRS is provided in Section F, below.

4. **The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area:**

During the construction phase, BMPs will be utilized to mitigate potential impacts to natural resources in the surrounding area. No long-term adverse impacts to existing natural resources within the surrounding area are anticipated.

5. **The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to physical conditions and capabilities of the specific parcel or parcels:**

The proposed action involves the replacement of an existing bridge structure. The new bridge will be longer and wider, and will conform to HDOT/AASHTO and FHWA standards. However, no significant changes to the environment within the Conservation district are anticipated as a result of the project. The temporary detour route aligned along the makai side of Kamehameha V Highway will be decommissioned after the bridge replacement work is completed. Restoration of the detour route will be undertaken to establish pre-construction conditions to the extent possible.

6. **The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable:**

The subject project will preserve the physical and environmental aspects of the existing landscape. The intent is to preserve the natural beauty and open space characteristics of the area. The new bridge will have a dedicated pedestrian/bike lane. As previously noted, the detour route will be decommissioned and will not adversely affect physical and environmental aspects of the land on a long-term basis.

7. **Subdivision of land will not be utilized to increase the intensity of land uses in the conservation district:**

The subject project does not involve the subdivision of land, nor does it increase the intensity of land uses within the Conservation District.

8. **The proposed land use will not be materially detrimental to public health, safety and welfare:**

No impacts to the public's health, safety and welfare are anticipated to result from the subject project. The proposed project will benefit public health, safety and welfare by providing a bridge crossing that will be hydraulically adequate.

B. CHAPTER 226, HRS, HAWAI`I STATE PLAN

Chapter 226, HRS, also known as the Hawai`i State Plan, is a long-range comprehensive plan which serves as a guide for the future long-range development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The proposed action is consistent with the following goals of the Hawai`i State Plan.

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.

- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

- Physical, social, and economic well-being, for individuals and families in Hawai`i, that nourishes a sense of community responsibility, of caring, and of participation in community life.

1. Objectives and Policies of the Hawai`i State Plan

The proposed action is consistent with the following objectives and policies of the Hawai`i State Plan:

Chapter 226-11, HRS, Objectives and Policies for the Physical Environment - Land-Based, Shoreline, and Marine Resources.

226-11(b)(3), HRS: Take into account the physical attributes of areas when planning and designing activities and facilities.

Chapter 226-14, HRS, Objectives and Policies for Facilities Systems – In General

226 -14(b)(1), HRS: Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

Chapter 226-17, HRS, Objectives and Policies for Facilities Systems – Transportation

226-17(b)(1), HRS: Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter.

226-17(b)(6), HRS: Encourage transportation systems that serve to accommodate present and future development needs of communities.

226-17(b)(10), HRS: Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment.

C. GENERAL PLAN OF THE COUNTY OF MAUI

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the -range development of the County. As stated in the Maui County Charter:

> *The general plan shall indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and needs of each island and region; shall explain the opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns, and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.*

The proposed action is in keeping with the following General Plan objectives and policies:

LAND USE

Objective:

To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.

Policy:

Identify and preserve significant historic and cultural sites.

ENVIRONMENT

Objective:

To use the County's land-based physical and ocean-related coastal resources in a manner consistent with sound environmental planning practice.

Policy:

Evaluate all land based development relative to its impact on the County's land and ocean ecological resources.

TRANSPORTATION

Objective:

To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

Policy:

Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

D. MOLOKA`I COMMUNITY PLAN

Within Maui County, there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a Community Plan which sets forth desired land use patterns, as well as goals, objectives, policies, and implementing actions for a number of functional areas, including infrastructure-related parameters.

The proposed project is located within the Moloka`i Community Plan region. Kamehameha V Highway does not have a land use designation in the community plan. However, Kawela Gulch, which the Kawela Bridge spans across, is designated as "Open Space". Parcel 27 is designated "Conservation" and the portion within Kawela Stream is designated "Open Space". The land to the northeast (mauka) of the bridge is designated "Open Space" and "Agriculture". See **Figure 11**. The proposed project replaces an existing bridge that is structurally inadequate. A temporary detour route will be constructed over a portion of

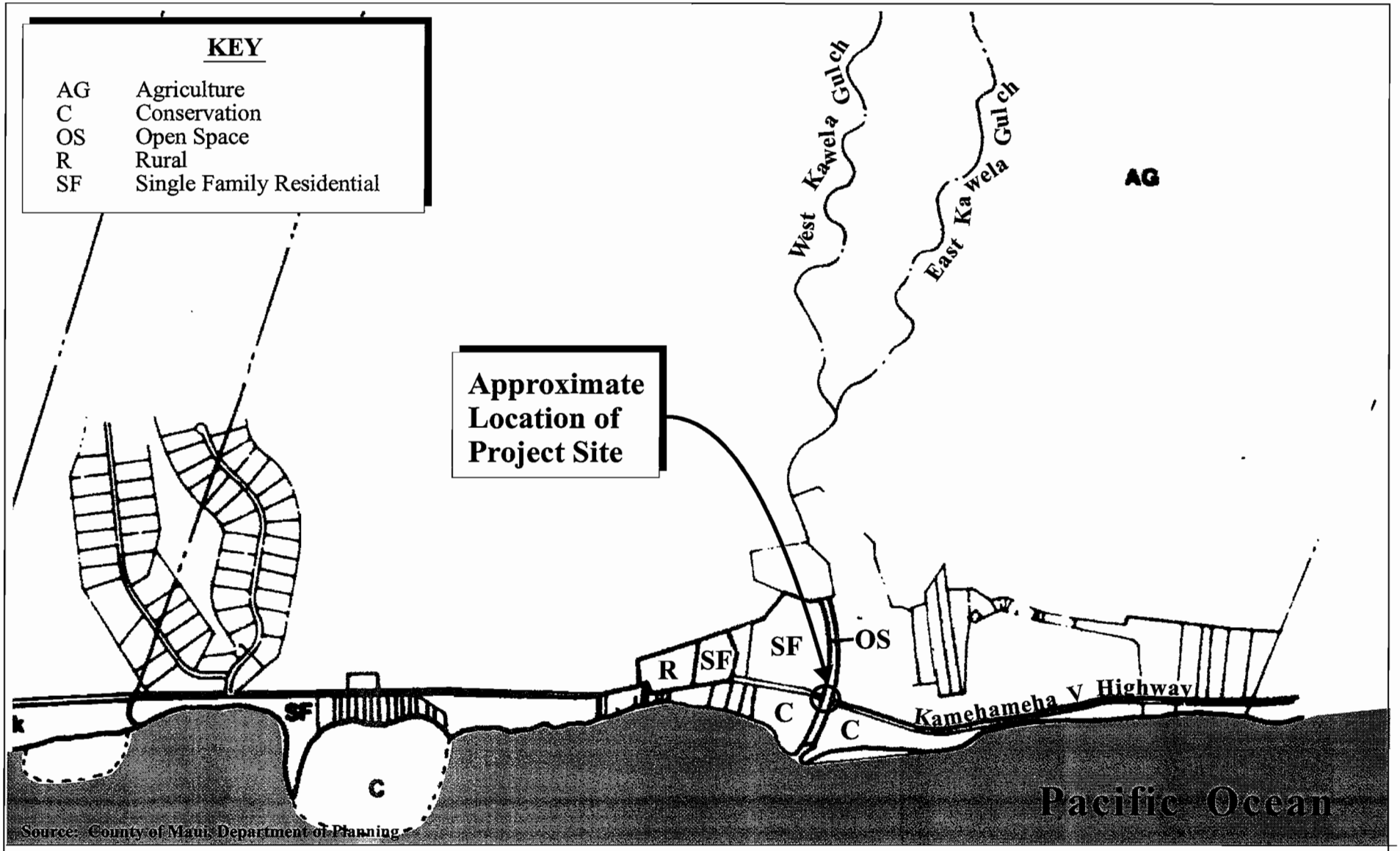


Figure 11

Proposed Kawela Bridge Replacement

Community Plan Land Use Designations

NOT TO SCALE

Prepared for: State of Hawaii, Department of Transportation

MUNEKIYO & HIRAGA, INC.

KAIHi/KawelaBridge/CPLUD

Parcel 27. The detour route will be temporary and the land will be restored to its natural condition to the extent possible, upon completion of the new bridge.

The proposed project is consistent with the following goals, policies, and objectives, of the Moloka`i Community Plan:

LAND USE

Goal:

Enhance the unique qualities of the island of Moloka`i to provide future generations the opportunity to experience rural and traditional lifestyles.

Objectives and Policies:

Require all zoning, discretionary land uses, and development approvals to be consistent with the Community Plan and be subject to public review.

INFRASTRUCTURE

Goal:

Culturally and environmentally sensitive infrastructure systems, developed and maintained in a timely fashion, which protect and preserve the safety and health of Moloka`i residents and visitors.

Objectives and Policies:

Provide and maintain safe pedestrian trails, bikeways, jogging paths and equestrian trails along highways.

E. ZONING

As a roadway, Kamehameha V Highway and Kawela Bridge are not zoned. Parcel 27 is located in the State Land Use Conservation district and is not zoned by the County of Maui County Code. Parcel 23 is zoned "Interim" and "Agricultural". Roadway improvements are permitted in the "Interim" and "Agricultural" zoning districts.

F. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

The Hawai`i Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of

natural resources of Hawaii's coastal zone. The proposed project lies within the County of Maui's Special Management Area (SMA).

This section addresses the project's relationship to applicable coastal zone management considerations, set forth in Chapter 205A, HRS.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

- (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
- (ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;
- (iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and a shorelines with recreational value;
- (iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
- (v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
- (vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;
- (vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and
- (viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural

resources, and county authorities; and crediting such dedication against the requirements of Section 46-6.

Response: The proposed project is not anticipated to result in adverse impacts to existing coastal or inland recreational resources. The project is not anticipated to limit or compromise any existing shoreline recreational activity. The proposed new bridge will have a dedicated pedestrian/bike lane and thereby provide safe passage for joggers and bicyclists over Kawela Stream.

2. **Historic Resources**

Objective:

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

Policies:

(A) Identify and analyze significant archeological resources;
(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: An archaeological assessment was conducted for the proposed project. Refer to **Appendix "C"**. One (1) archaeological site (Site 50-60-04-2478), a series of three (3) terraces used for agricultural purposes, was identified. The site was considered significant under Criterion D of the Hawai`i State Register of Historical Places, which states that the site has yielded or has the potential to yield information important to history or prehistory. No further archaeological work was recommended for Site 50-60-04-2478. However, due to the project's close proximity to a battlefield and Site 144, a burial mound, the applicant will prepare an Archaeological Monitoring Plan and submit it to SHPD for review and approval and monitor all ground altering activity.

Should any cultural or historical materials be uncovered during construction-related activities, work shall be halted in the area of the find and the State Historic Preservation Division shall be notified for determination of appropriate mitigation measures.

3. **Scenic and Open Space Resources**

Objective:

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

Policies:

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

Response: The site is not part of a scenic view corridor to the shoreline. No substantive adverse impacts to scenic or open space resources are anticipated to result from the proposed action.

4. **Coastal Ecosystems**

Objective:

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

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
(B) Improve the technical basis for natural resource management;
(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed project is not anticipated to result in substantive, adverse impacts to coastal ecosystems. Best Management Practices (BMPs) during the construction phase will mitigate potential impacts to the coastal environment. Water

quality monitoring will be carried out during construction to mitigate potential adverse impacts to the coastal marine environment. The proposed action will be constructed in compliance with Section 401 Water Quality Certification issued by the State Department of Health.

5. **Economic Uses**

Objective:

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

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

  (i) Use of presently designated locations is not feasible;
  (ii) Adverse environmental effects are minimized; and
  (iii) The development is important to the State's economy.

Response: Kamehameha V Highway is an integral component of Moloka`i's transportation network. The proposed action is important from a local economic standpoint as it will ensure that roadway closures attributed to storm events are minimized.

6. **Coastal Hazards**

Objective:

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

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
(D) Prevent coastal flooding from inland projects.

Response: The subject property is located in Flood Zone A2, an area of 100-year flooding. The new bridge will be designed to meet the development standards for projects located in the flood hazard zone. A Special Flood Hazard Development Permit will be acquired prior to construction. The Kawela Bridge is located within the tsunami evacuation zone, which extends 200 feet beyond Kamehameha V Highway. The project's objective of improving bridge hydraulics is deemed beneficial from a coastal hazards perspective.

7. Managing Development

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

Policies:

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

Response: A number of stakeholders and agencies were consulted as part of the Environmental Assessment process. Further public presentation will be made as part of the Environmental Assessment and regulatory permitting processes. Additionally, a SMA Use Permit application has been prepared and will be reviewed by the Moloka`i Planning Commission. The SMA permit will be reviewed at a public hearing by the Commission.

8. Public Participation

Objective:

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

Policies:

(A) Promote public involvement in coastal zone management processes;
(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and
(C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: Public awareness and participation are being facilitated through the Chapter 343, HRS process, as well as the County's permitting and review process as discussed above.

9. **Beach Protection**

Objective:

Protect beaches for public use and recreation.

Policies:

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

Response: The proposed project is not anticipated to affect natural beach processes.

10. **Marine Resources**

Objective:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

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

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

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

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

Response: Water quality and biological surveys were conducted for Kawela Stream in the vicinity of the bridge and highway. The survey determined that if BMPs are utilized, the bridge replacement will not have a significant effect on water quality in the *muliwai* (coastal estuarine) pond or off-shore. Water quality monitoring will be carried out during construction to mitigate potential adverse impacts to marine and coastal resources.

In addition to the foregoing objectives and policies, SMA permit review criteria pursuant to Act 224 (2005) provides that:

> No Special Management Area Use Permit or Special Management Area Minor Permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:
>
> (1) Directly illuminates the shoreline and ocean waters; or
>
> (2) Is directed to travel across property boundaries toward the shoreline and ocean waters.

Response: Artificial lighting is not part of the proposed scope of work.

G. DEPARTMENT OF ARMY PERMIT, SECTION 404, CLEAN WATER ACT

The Kawela Stream is classified as a waters of the United States, tributary to the Pacific Ocean. The temporary construction detour route across Kawela Stream will, therefore, trigger a Department of Army permit pursuant to Section 404 of the Clean Water Act.

The Clean Water Act was enacted to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 404 of the Clean Water Acts regulates the discharge of dredged and fill materials into the waters of the United States and establishes a permit process to ensure that such actions comply with environmental criteria used by the U.S. Army Corps of Engineers (COE) in evaluating all Section 404 permit applications.

The Section 404(b)(1) Guidelines direct COE to permit the least damaging practical alternative. Generally, this is the practicable alternative that either avoids waters of the U.S. or impacts the smallest areas. Minimization of impacts may occur where avoidance is not practical after due consideration of costs, existing technology, or logistics.

The alternatives evaluated included realignment of the highway and relocation of the bridge further upland from the existing bridge crossing. This alternative was more costly and would result in additional land acquisition for the right-of-way. There would be greater impacts associated with this alignment since it would involve construction and grading activity through undeveloped land.

While the detail design of the replacement bridge and detour route are yet to be completed, the corridor of the detour route has been surveyed and will involve the removal of some existing vegetation. Mitigation features to facilitate the migration of native aquatic species, both downstream and upstream along Kawela Stream, have been investigated and will be incorporated in the design, as appropriate. Continual monitoring of water quality and archaeological monitoring will be carried out during the construction activities to mitigate potential adverse impacts to these resources.

Further coordination will be undertaken with COE to prepare and process a Section 404 permit application. The Section 404 permit application will be completed concurrently with the bridge and detour route design and will conform to the Section 404(b)(1) Guidelines.

H. WATER QUALITY CERTIFICATION, SECTION 401, CLEAN WATER ACT

The application for a U.S. Department of Army COE permit will also trigger a Section 401 Water Quality Certification (WQC) application permit from the State of Hawai`i Department of Health and Coastal Zone Management (CZM) Consistency Assessment application permit from the Office of Planning, State Department of Business, Economic Development and Tourism. Therefore, coordination with respective departmental staff will be carried out to

prepare and process these applications. In preparation for the WQC and CZM applications, a water quality assessment and marine biological assessment were carried out on relevant physical parameters of Kawela Stream and the findings are included in this EA document.

I. STREAM CHANNEL ALTERATION PERMIT (SCAP)

The construction of the concrete lining of the Kawela Stream under the bridge and detour route across Kawela Stream will require a Stream Channel Alteration Permit (SCAP) from the Commission on Water Resource Management, Department of Land and Natural Resources. Coordination with the Commission on Water Resource Management staff will be carried out to prepare and process the SCAP.

J. SECTION 4(f), DEPARTMENT OF TRANSPORTATION ACT

Section 4(f) of the Department of Transportation Act of 1966 was enacted in an effort to preserve the natural resources of public park and recreation lands and historic sites in relation to Federal transportation plans and programs. As the Kawela bridge replacement project anticipates the use of Federal transportation funds, the following Section 4(f) assessment is provided.

The archaeological inventory survey carried out on the proposed project identified one (1) cultural feature, Site 50-60-04-2478, located a short distance up a side swale, on the mauka (toward the mountain) side of Kawela Bridge. Site 50-60-04-2478 includes three (3) features described as eroded, short, rock-faced terraces which have been interpreted as traditional agricultural features. It has been determined that sufficient information in the form of photographs and maps have been recovered from Site 50-60-04-2478 and that no further archaeological work is recommended. Adverse impacts to Site 50-60-04-2478 are not anticipated since no work will be carried out on the mauka side of the bridge.

The Kawela Bridge replacement project is in close proximity to a battlefield and a Burial Mound identified by Site 144. Refer to **Figure 9**. However, the limits of work will not affect Site 144. An archaeological monitoring plan will be submitted to the SHPD for review and approval prior to construction. The archaeological monitoring plan will be followed during ground altering activities in order to mitigate potential adverse impacts to historic and cultural resources.

There are no parklands in the vicinity of the proposed action, therefore, parklands will not be adversely impacted by the proposed project.

K. SECTION 106, NATIONAL HISTORIC PRESERVATION ACT

As the proposed project anticipates the use of Federal transportation funds, the requirements of Section 106 of the National Historic Preservation Act (1966) are in effect. Section 106 consultation with the State Historic Preservation Division has been initiated to process a Section 106 - Historic Preservation Review. See **Appendix "E"**.

IV. SUMMARY OF UNAVOIDABLE IMPACT ON THE ENVIRONMENT AND RESOURCES

IV. SUMMARY OF UNAVOIDABLE IMPACT ON THE ENVIRONMENT AND RESOURCES

Project construction will result in a certain amount of unavoidable construction-related impacts. These impacts include noise-generated impacts and air quality impacts associated with the operation of construction equipment. Air quality will also be impacted by dust generated from site work. The proposed project will also involve the temporary commitment of vacant, privately owned lands for the detour route. Some existing vegetation will have to be removed to construct the detour route. The removal of this vegetation is not anticipated to have an adverse impact on the biological resources of the environment. The construction-related impacts will be temporary and mitigated through implementation of appropriate BMPs. Water quality may also be potentially impacted during the construction of the temporary detour route. Water quality monitoring will be carried out during construction to mitigate potential adverse impacts to water quality. The project will be developed in compliance with Sections 404 and 401 of the Clean Water Act.

Based on the findings of the archaeological study and the Section 4(f) assessment, potential adverse impacts to cultural and historic sites and properties are not anticipated. The proposed project will not impact park land. Archaeological monitoring will be carried out during all ground altering activities to mitigate potential adverse impacts to cultural and historic resources. Coordination has been initiated with the State Historic Preservation Division pursuant to a Section 106 National Historic Preservation Act. If required, a Memorandum of Agreement with the State Historic Preservation Division will be undertaken to mitigate potential adverse impacts to cultural and historic properties.

The proposed action will involve a commitment of fuel, labor, funding, and material resources. However, the commitment of resources necessary to implement the proposed project will be justified, given the eventual benefits to be realized through the completion of the new bridge.

In the long term, the construction of the Kawela Bridge replacement is not anticipated to create any significant, long-term adverse environmental effects.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed project represents the preferred alternative based on hydraulic analysis which defines bridge design parameters. Refer to **Appendix "A"**. This alternative provides a cost-effective and a technically viable solution to address the current deficiencies of the existing Kawela Bridge.

B. NO ACTION ALTERNATIVE

The "no action" alternative would see the existing Kawela Bridge remain in its current substandard state. The no action alternative is considered inappropriate because the bridge does not meet current HDOT/AASHTO and FHWA standards.

C. HIGHWAY REALIGNMENT AND BRIDGE RELOCATION ALTERNATIVE

This alternative would see the existing Kamehameha V Highway realigned and a new bridge constructed upland of the existing Kawela Bridge. The new bridge would be longer and wider, and would conform to HDOT/AASHTO and FHWA standards. This alternative would eliminate the need to construct and later demolish a detour road and temporary bridge. However, the realignment of Kamehameha V Highway would go through several properties. Since the construction would involve development of a new section of highway on these properties, the community would feel the impact of realignment. Furthermore, the realignment of Kamehameha V Highway would require additional land acquisition for right-of-way purposes. For these reasons, this alternative was not considered to be the most desirable.

D. BRIDGE DESIGN ALTERNATIVES

HDOT assessed a number of bridge design alternates to improve hydraulic capacity of the bridge crossing. See **Appendix "F"**. The two (2) design alternatives considered included: (a) raising bridge height by an additional one (1) foot; and (b) raising the bridge height by

an additional six (6) feet. The existing bridge height was estimated to have a capacity of 500 cfs, i.e, the storm water discharge just before the roadway overtops to east of the bridge. Raising the bridge height by an additional one (1) foot would increase the capacity to 550 cfs. Raising the bridge height by an additional six (6) feet would increase the capacity to 2,700 cfs. The hydraulic model also indicated that raising the bridge height would directly impact the flood elevations upstream of the bridge. For example, raising the bridge height by one (1) foot would not have a significant impact on flood elevations, while raising the bridge height by six (6) feet would increase flood elevations for a distance of approximately 100 feet upstream. The bridge and the graded roadway approach to the bridge would act as a dam and hold water upstream of the roadway/bridge. Therefore, although raising the bridge would increase hydraulic capacity, it would also increase the flood elevation level and extent of flooding upstream. As a result of this analysis, HDOT decided that the optimum bridge design would be to increase the bridge elevation by approximately one (1) foot.

VI. FINDINGS AND CONCLUSIONS

VI. FINDINGS AND CONCLUSIONS

The significance criteria of Section 12, of the Administrative Rules of Title 11, Chapter 200, Environmental Impact Statement Rules, were reviewed and analyzed to determine whether the proposed project will have a significant adverse impact to the environment. The following analysis is provided.

1. **No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resources Would Occur as a Result of the Project**

   One (1) archaeological site was identified (Site 50-60-04-2478) and documented; no further archaeological work was recommended. Due to the close proximity of a battlefield and Site 144, a burial mound, an Archaeological Monitoring Plan will be prepared and submitted to SHPD for review and approval and monitoring will be carried out during ground altering activities. With the implementation of Best Management Practices (BMPs), adverse long-term impacts to stream or marine water quality conditions are not anticipated as a result of the proposed action.

2. **The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment**

   The project site is not anticipated to result in adverse environmental impacts. There will be no consequent curtailment of uses of the environment resulting from the proposed action.

3. **The Proposed Action Does Not Conflict with the State's Long-Term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawai`i Revised Statutes**

   The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawai`i Revised Statutes (HRS). The proposed action is in consonance with the policies and guidelines of Chapter 344, HRS.

4. **The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected**

The proposed action would provide a direct, short-term economic benefit to the community during the construction phase. There are no adverse long-term economic or social welfare impacts associated with the proposed action. The objective of the project is the improve public safety and welfare considerations for the traveling public by implementing an infrastructure component which meets current federal design standards.

5. **The Proposed Action Does Not Affect Public Health**

No adverse impacts to public health are anticipated to result from the proposed action. As noted above, the proposal represents a public safety improvement action.

6. **No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities are Anticipated**

The proposed action is not deemed a population generator. There are also no anticipated adverse effects upon public services, such as police, fire, medical, educational, or waste collection services.

7. **No Substantial Degradation of Environmental Quality is Anticipated**

During project implementation, appropriate measures will be utilized to mitigate potential adverse environmental impacts. The proposed action is not anticipated to substantially impact environmental quality. Upon decommissioning, the detour route will be restored to pre-construction conditions to the extent possible.

8. **The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects on the Environment**

The proposed action is not part of or linked to any larger action. The proposed project is not anticipated to create any considerable effect upon the environment.

9. **No Rare, Threatened or Endangered Species or Their Habitats Would Be Adversely Affected By the Proposed Action**

There are no identified rare, endangered, or threatened species or habitats within the project vicinity. Thus, impacts to rare, threatened or endangered species or their habitats from the proposed action are not anticipated.

10. **Air Quality, Water Quality or Ambient Noise Levels Would Not Be Detrimentally Affected by the Proposed Project**

During the construction of the new bridge and detour route, there may be short-term impacts to air and noise quality. Appropriate BMP's will be implemented to minimize these short-term impacts, which will not extend into the long term. No long-term adverse impacts to water quality are anticipated. Refer to **Appendix "B"**. The water quality monitoring will be carried out during construction to mitigate potential impacts to water quality.

11. **The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such as Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters**

Kawela Bridge is located in Flood Zone A2, an area of 100-year flooding and in the tsunami evacuation zone. The new bridge hydraulic standards will meet approval criteria of the FHWA and will be in compliance with development in special flood hazard areas.

12. **The Proposed Action Would Not Substantially Affect Scenic Views and Viewplanes Identified in County Plans or Studies**

The proposed action is not anticipated to result in substantive, adverse impacts to identified scenic vistas or viewplanes. There are no residences or public view areas on the adjoining mauka slopes which would have viewplanes impacted.

13. **The Proposed Action Would Not Require Substantial Energy Consumption**

The proposed action will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this is not

anticipated to result in any substantial consumption of energy. The new bridge will not impact energy consumption in the long term.

In conclusion, based on the foregoing findings, the proposed action is anticipated to result in a Finding of No Significant Impact (FONSI).

VII. LIST OF PERMITS AND APPROVALS

VII. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project.

County of Maui

1. Special Management Area Use Permit
2. Special Flood Hazard Area Development Permit
3. Construction Permits (Grubbing and Grading)
4. Stock Piling Permit

State of Hawai`i

1. Conservation District Use Permit
2. Department of Health Section 401 Water Quality Certification Permit and Section 404 Permit
3. Federal Coastal Zone Management Consistency Approval
4. Stream Channel Alteration Permit

Federal

1. U.S. Department of Army Permit

VIII. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

VIII. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Comment letters received, as well as responses to substantive comments are contained in this chapter.

1. Ranae Ganske-Cerizo, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawai`i 96793-2100

2. George Young
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Regulatory Branch
Building 230
Fort Shafter, Hawai`i 96858-5440

3. Paul Henson, Ph.D.
U. S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122, Box 50088
Honolulu, Hawai`i 96813

4. Ted Liu, Director
State of Hawai`i
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, Hawai`i 96804

5. Mary Lou Kobayashi, Planning Program Administrator
State of Hawai`i
Office of Planning
P.O. Box 2359
Honolulu, Hawai`i 96804

6. Patricia Hamamoto, Superintendent
State of Hawai`i
Department of Education
P.O. Box 2360
Honolulu, Hawai`i 96804

7. Ken Nomura
Complex Area Superintendent
Department of Education
54 High Street, 4th Floor
Wailuku, Hawai`i 96793

8. Denis Lau, Chief
Clean Water Branch
State of Hawai`i
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawai`i 96814

9. Herbert Matsubayashi, District Environmental Health Program Chief
State of Hawai`i
Department of Health
54 High Street
Wailuku, Hawai`i 96793

10. Peter Young, Chairperson
State of Hawai`i
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawai`i 96809

11. Melanie Chinen, Administrator
State of Hawai`i
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawai`i 96707

12. Barry Fukunaga, Director
State of Hawai`i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawai`i 96813

13. Clyde Namu`o, Administrator
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawai`i 96813

14. Carl Kaupololo, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, Hawai`i 96732

15. Vanessa Medeiros, Director
County of Maui
Department of Housing and Human Concerns
200 S. High Street
Wailuku, Hawai`i 96793

16. Jeffrey Hunt, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawai`i 96793

17. Tamara Horcajo, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoa Street, Unit 2
Wailuku, Hawai`i 96793

18. Thomas Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawai`i 96793

19. Milton Arakawa, Director
County of Maui
Department of Public Works and Environmental Management
200 South High Street
Wailuku, Hawai`i 96793

20. Don Medeiros, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawai`i 96793

21. Jeffrey Eng, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawai`i 96793

22. Neal Shinyama, Manager – Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawai`i 96733

23. Donna Haytko-Paoa, Coordinator
Moloka`i Community College
Moloka`i Education Center
375 Kamehameha V Highway
P.O. Box 440
Kaunakakai, Hawai`i 96748

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

DEC 1 2 2006

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

OFFICE OF BUSINESS SERVICES

December 8, 2006

Mr. Mich Hirano, Project Manager
Munekiyo & Hiraga Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Mr. Hirano:

SUBJECT: Early Consultation for Kawela Bridge Replacement, Moloka`i

The Department of Education has no comment to offer as early consultation for the proposal to replace the Kawela Bridge on the Kamehameha V Highway on Moloka`i.

If you have any questions, please call Heidi Meeker of the Facilities Development Branch at (808) 733-4862.

Sincerely yours,

Duane Y. Kashiwai
Public Works Manager

DYK:jmb

c: Superintendent's Office

DEC 19 2006

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

12043CEC.06

December 14, 2006

Mr. Mich Hirano, AICP
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Hirano:

Subject: Pre-Draft Environmental Assessment Preparation Consultation
Kawela Stream Bridge Replacement at Kamehameha V Highway
Island of Molokai - TMK: (2) 5-004-001

Thank you for the opportunity to review and provide comments on the subject bridge replacement construction project. The following are project related information:

"The purpose of the proposed project is to demolish the existing bridge and construct a new bridge that conforms to current HDOT/ASHTO and FHWA standards. The proposed scope of the project includes replacing the existing bridge with a 60-foot long by 44-foot wide bridge with two (2) 12-foot wide lanes and a bikeway/pedestrian walkway that will meet current HDOT/ASHTO and FHWA design standards. The new bridge will be accessible by pedestrians and cyclists with a 10-foot wide shoulder on each side of the highway.

The center of the new bridge will coincide with the center of the existing bridge. Therefore, the approach roadway will maintain the existing alignment. A detour route will be installed on the makai (toward the ocean) side of the new bridge to allow traffic to flow around the bridge construction area. The detour bridge will provide two (2) lanes of traffic. Therefore, both lanes of Kamehameha V Highway will be open for traffic during the construction period. The design of the detour road shall include the use of pipe culverts due to its cost efficiency. The contractor will be providing silt fences and other means of Best Management Practices to avoid sediments from entering the stream. It is estimated that the demolition of the existing bridge and construction of the new bridge will take approximately 12 months to complete.

Since the proposed project involves use of State owned lands and funds, an Environmental Assessment (EA) will be prepared in accordance with Hawai'i Revised Statutes, Chapter 343 and Chapter 200 of Title 11, Department of Health, Hawaii Administrative Rules, Environmental Impact Statement Rules. The Kawela Bridge is also located within the island of Moloka'i Special Management Area."

The Department of Health (Department), Clean Water Branch (CWB) has reviewed the limited information contained in your letter of December 4, 2006 and offers the following general comments:

1. The Honolulu Engineer District (HED) of the U.S. Army Corps of Engineers (COE) should be contacted at (808) 438-9258 for this project. Pursuant to Federal Water Pollution Control Act (commonly known as the "Clean Water Act" (CWA)), Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40, Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

   The downstream receiving State waters is classified by the Department as "Class AA, Marine Waters." An individual application for a Section 401 WQC will be required if the project is located within the section of Kawela Stream that is subject to daily tidal influence and any portion of the construction activity related discharges that require a Department of the Army (DA) CWA, Section 404, permit.

   Section 401 WQC application and guidelines may be picked up at our office or be downloaded from our website at:
   http://www.hawaii.gov/health/environmental/water/cleanwater/forms/forms/wqc-index.html

2. In accordance with HAR, Sections 11-55-04 and 11-55-34.05, the Director of Health may require the submittal of an individual application for a permit authorized under the National Pollutant Discharge Elimination System (NPDES).

   An application for an NPDES individual permit is to be submitted at least 180 days before the commencement of the construction activities and prior to discharge of treated effluent from, but not be limited to, the following activities:

   a. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land

area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.**

b. Discharges of hydrotesting water.

c. Discharges of construction dewatering effluent.

d. Discharges of treated effluent from drill shaft drilling activities.

The NPDES application forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

3. In accordance with HAR, Section 11-55-38, the applicant for an NPDES permit is required to either submit a copy of the new NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the Department that the project, activity, or application has been or is being reviewed by SHPD. If applicable, please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.

4. Any discharges related to project construction or operation activities, with or without a Section 401 WQC or NPDES permit coverage, shall comply with the applicable State Water Quality Standards as specified in HAR, Chapter 11-54.

To avoid noncompliance with or causing violation to the applicable HAR, Chapter 11-54 requirements, we recommend that:

a. A Site-specific construction Best Management Practices (BMPs) and effluent treatment (as appropriate) Plan shall be established and properly implemented for the subject bridge replacement construction activity. The BMPs measures shall be designed, implemented, operated, and maintained in a manner to properly **isolate and confine** the construction activities and to contain and prevent any potential pollutant(s) discharges from adversely impacting the State waters. It is the project owner's responsibility to ensure that the proposed construction work will not cause the applicable water quality criteria, as specified in HAR, Sections 11-54-4, 11-54-5, 11-54-6, and 11-54-8, to be violated in the receiving State waters, including Kawela Stream and Pacific Ocean.

b. Applicable receiving water quality monitoring and assessment plan shall be properly designed and implemented to ensure the adequacy of the implemented BMPs measures and to demonstrate that the project construction related activities do not cause applicable water quality criteria to be violated in the receiving State waters, if any.

c. To comply with toxic material control requirements, your attention is specifically directed to the requirements contained in HAR, Subsection 11-54-4(a)(4) and Paragraph 11-54-4(b).

As a reminder, Hawaii Revised Statutes, Subsection 342D-50(a) requires that "[n]o person, including any public body, shall discharge any water pollutants into state waters, or cause or allow any water pollutant to enter state waters except in compliance with this chapter, rules adopted pursuant to this chapter, or a permit or variance issued by the director."

If you have any questions or need assistance, please contact Mr. Edward Chen of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., ACTING CHIEF
Clean Water Branch

EC:cu

c: Regulatory Branch, HED, COE
CZM Program, Office of Planning, DBEDT
CWRM, DLNR
Chief, DEHP/Maui
EHS, Molokai

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Alec Wong, P.E., Chief
Clean Water Branch
State of Hawai`i
Department of Health
P.O. Box 3378
Honolulu, Hawai`i 96801-3378

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Wong:

Thank you for your comment letter of December 14, 2006 in response to our request for early consultation on the subject project.

We note that the South Moloka`i Coast is listed in the List of Impaired Waters in Hawai`i and, therefore, water quality studies will be carried out in accordance with DOH requirements. A Department of Army Section 404 Permit and a Section 401, Water Quality Certification Permit will also be required and coordination will be carried out with the Army Corps of Engineers and the Clean Water Branch, accordingly.

The project engineer will coordinate with the Clean Water Branch to determine if a National Pollution Discharge Elimination System (NPDES) permit will be required for this project and appropriate regulatory requirements.

Thank you again for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i, Department of Transportation
Michael Hunnemann, KAI Hawai`i
F:\DATA\KAIHi\KawelaBridge\dohresponse.ltr.wpd

DEC 21 2006

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M. D.
DIRECTOR OF HEALTH

LORRIN W. PANG, M. D., M. P. H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2102

December 19, 2006

Mr. Mich Hirano
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Mr. Hirano:

Subject: **Early Consultation for Proposed Kawela Bridge Replacement, Kamehameha Highway, Moloka`i, Hawai`i**

Thank you for the opportunity to participate in the early consultation process for the proposed Kawela Bridge replacement project. The following comments are offered:

National Pollutant Discharge Elimination System (NPDES) permit coverage may be required for this project. The Clean Water Branch should be contacted at 808 586-4309.

It is strongly recommended that the Standard Comments found at the Department's website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html be reviewed, and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please call me at 808 984-8230.

Sincerely,

Herbert S. Matsubayashi
District Environmental Health Program Chief

c: EPO
CWB

8

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Herbert S. Matsubayashi
District Environmental Health Program Chief
State of Hawai`i
Department of Health
54 High Street
Wailuku, Hawai`i 96793

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Matsubayashi:

Thank you for your comment letter of December 19, 2006 in response to our request for early consultation on the subject project.

The project engineer will coordinate with Clean Water Branch to determine if a National Pollution Discharge Elimination System (NPDES) permit will be required for this project.

As requested, Standard Comments of the State Department of Health have been reviewed and comments specifically applicable to this project will be adhered to. In this regard, we note that the South Moloka`i Coast is listed in the List of Impaired Waters in Hawai`i and, therefore, water quality studies will be carried out in accordance with DOH requirements. A Department of Army Section 404 permit and a Section 401, Water Quality Certification permit will also be required and coordination will be carried out with the Army Corps of Engineers and the Clean Water Branch, accordingly. As required by the Clean Air Branch, Best Management Practices (BMPs) will be carried out to control fugitive dust during construction activities.

Thank you again for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i, Department of Transportation
Michael Hunnemann, KAI Hawai`i
F:\DATA\KAIHi\KawelaBridge\dohmatsubayashiresp.ltr.wpd

JAN 1 1 2007

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR

DEAN NAKANO
ACTING 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
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 8, 2007

Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

Attention: Mich Hirano, AICP

Gentlemen:

Subject: Early Consultation for Proposed Kawela Bridge Replacement, Kamehameha V Highway, Molokai, Tax Map Key: (2) 5-4-1:portion of Kamehameha V Highway

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 the following DLNR Divisions for their review and comment:

Division of Aquatic Resources
Division of Water Resource Management
Land Division-Maui District

Other than the comments from Division of Aquatic Resources and the Division of Water Resource Management, 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,

Russell Y. Tsuji
Administrator

Cc: Central Files

AQUATIC RESOURCES: 06-62L

DIRECTOR	
COMM. FISH.	
AQ RES/ENV	
AQ REC	
PLANNER	
STAFF SVCS	
RCUH/UH	
STATISTICS	
AFRC/FED AID	
EDUCATION	
SECRETARY	
OFFICE SVCS	
TECH ASST	X
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CRH

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 7, 2006

RECEIVED
LAND DIVISION
2007 JAN -8 A 11:00

MEMORANDUM

TO: DLNR Agencies:

RECEIVED
DEC 13 2006
AQUATIC RESOURCES

- x Div. of Aquatic Resources
- __Div. of Boating & Ocean Recreation
- x Engineering Division
- __Div. of Forestry & Wildlife
- __Div. of State Parks
- x Div. of Water Resource Management
- __Office of Conservation & Coastal Lands
- x Land Division – Maui District

FROM: Russell Y. Tsuji
SUBJECT: Early consultation for Proposed Kawela Bridge Replacement
LOCATION: Kawela, Molokai, TMK: (2) 5-4-1:portion of Kamehameha V Highway
APPLICANT: Department of Transportation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by **December 21, 2006**.

A copy of the document is available for your review in Land Division office, Room 220.

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: 5 Jan. 07

12

STATE OF HAWAII
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES

MEMORANDUM

TO: Dan A. Polhemus, Administrator
FROM: Glenn R. Higashi, Aquatic Biologist GRH
SUBJECT: Early Consultation for Proposed Kawela Bridge Replacement
Comments Requested By: Russell Y. Tsuji Land Division
Date of Request: 12/7/06 Date Received: 12/21/06

Summary of Project

Title:	**Early Consultation for Proposed Kawela Bridge Replacement**
Project By:	**Department of Transportation**
	County of Maui
Location:	**Kawela, Molokai – TMK: (2) 5-4-1: portion of Kamehameha V Highway**

Brief Description:

The applicant, State of Hawaii, Department of Transportation, is proposing to replace Kawela Bridge which crosses Kawela Stream. The bridge is located on Kamehameha V Highway (route 450) on the southeastern coastline of the island of Molokai, between Kaunakakai and Halawa.

The existing Kawela Bridge was built in 1940. It is 46 feet long and 26 feet wide, being supported by two (2) abutments and one (1) center pier. The bridge serves both inbound and outbound traffic. Currently, the bridge is hydraulically inadequate and does not conform to current HDOT/Association of State Highway Transportation Officials (ASHTO) design standards and Federal Highway Administration (FHWA) hydraulic standards.

The purpose of the proposed project is to demolish the existing bridge and construct a new bridge that conforms to current HDOT/ASHTO and FHWA standards. The proposed scope of the project includes replacing the existing bridge with a 60-foot long by 44-foot wide bridge with two (2) 12-foot wide lanes and a bikeway/pedestrian walkway that will meet current HDOT/ASHTO and FHWA standards. The new bridge will be accessible by pedestrians and cyclists with a 10-foot wide shoulder on each side of the highway. The center of the new bridge will coincide with the center of the existing bridge. Therefore the approach roadway will maintain the existing alignment.

A temporary detour bridge will be constructed on the makai (toward the ocean) side of the existing bridge to accommodate traffic during the demolition and construction of the new bridge. The detour bridge will provide two (2) lanes of traffic. The design of the detour road shall include the use of pipe culverts due to its cost efficiency. The contractor will be providing silt fences and other means of Best Management Practices to avoid sediments from entering the stream. It is estimated that the demolition of the existing bridge and construction of the new bridge will take approximately 12 months to complete.

Comments:

The Division of Aquatic Resouces (DAR) considers Kawela Stream of biotic importance in that it provides habitat for more than 15 species of native macrofauna. These include native fish species such as *Lentipes concolor*, *Sicyopterus stimpsoni, Awaous guamensis*, *Stenogobius hawaiiensis*, *Eleotris sandwicensis*, *Mugil cephalus* and *Kuhlia* sp. It also provides habitat for 2 native freshwater crustaceans, *Atyoida bisulcata,* and *Palaemon debilis*; 2 native dragonflies *Anax sp.* and *Anax strenuous;* and 3 native damselflies, *Megalarion blackburni, Megalagrion calliphya* and *Megalagrion hawaiiense* (ref. DAR Aquatic Resources Database, Oct. 6, 2006).

The recruitment, migratory and reproductive natures of the 3 gobies and the native freshwater shrimp are dependent on the ocean, and therefore a continuous stream flow should be provided during all phases of construction. In the design of the detour road the pipe culverts should be level and conform with the stream channel bottom so as to not provide an overhang inhibiting upstream migration. Also, if the pipe culvert is a spiral rib design, it should be filled with cement to provide a smooth surface on the pipe bottom.

Other mitigative measures should be implemented during the construction and removal of the detour bridge and the demolition and construction of the new bridge to minimize the potential for erosion, siltation and pollution of the aquatic environment:

1) lands denuded of vegetation should be planted or covered as quickly as possible to prevent erosion;
2) scheduling site work (particularly the excavation and grading) during periods of minimal rainfall;
3) dewatering of excavated material to prevent the reintroduction of silt into the stream, and;
4) preventing construction materials, petroleum products, debris and landscaping products from falling, blowing or leaching into the aquatic environment.

Upon completion of the new bridge and its operation to accommodate traffic, the temporary bypass road should be removed and the stream channel restored to its original natural condition.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

DEAN A. NAKANO
ACTING DEPUTY DIRECTOR

RECEIVED
2006 DEC 20 P 3:25
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

December 19, 2006

REF:

TO: Russell Tsuji, Administrator
Land Division

FROM: Dean A. Nakano, Acting Deputy Director
Commission on Water Resource Management

SUBJECT: Proposed Kawela Bridge Replacement
Kawela, Molokai TMK: (2) 5-4-001:portion of Kamehameha V Highway

FILE NO.:

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at *http://www.hawaii.gov/dlnr/cwrm*.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Permits required by CWRM: Additional information and forms are available at *www.hawaii.gov/dlnr/cwrm/forms.htm*.

☐ 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.

☐ 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.

☐ 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☒ 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.

☐ 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ 13. We recommend that the report identify feasible altemative non-potable water resources, including reclaimed wastewater.

☐ OTHER:

If there are any questions, please contact Ed Sakoda at 587-0234.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 7, 2006

MEMORANDUM

TO: **DLNR Agencies:**
_x_ Div. of Aquatic Resources
__ Div. of Boating & Ocean Recreation
_x_ Engineering Division
__ Div. of Forestry & Wildlife
__ Div. of State Parks
_x_ Div. of Water Resource Management
__ Office of Conservation & Coastal Lands
_x_ Land Division – Maui District

RECEIVED
06 DEC 12 P1:43
COMMISSION ON WATER RESOURCE MANAGEMENT

FROM: Russell Y. Tsuji
SUBJECT: Early consultation for Proposed Kawela Bridge Replacement
LOCATION: Kawela, Molokai, TMK: (2) 5-4-1:portion of Kamehameha V Highway
APPLICANT: Department of Transportation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by **December 21, 2006**.

A copy of the document is available for your review in Land Division office, Room 220.

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: Edwin T Sakuda
Date: 12/15/06

17

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR

DEAN NAKANO
ACTING 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

2006 DEC 13 PM 1:06

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

December 7, 2006

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
__Div. of Forestry & Wildlife
__Div. of State Parks
x Div. of Water Resource Management
__Office of Conservation & Coastal Lands
x Land Division – Maui District

2007 JAN -8 A 11:08
RECEIVED

FROM: Russell Y. Tsuji
SUBJECT: Early consultation for Proposed Kawela Bridge Replacement
LOCATION: Kawela, Molokai, TMK: (2) 5-4-1:portion of Kamehameha V Highway
APPLICANT: Department of Transportation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by **December 21, 2006**.

A copy of the document is available for your review in Land Division office, Room 220.

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.
(X) We have no comments.
( ) Comments are attached.

Signed:
Date: 1/3/06

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Russell Y. Tsuji, Administrator
Land Division
State of Hawai`i
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawai`i 96809

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Tsuji:

Thank you for your letter of January 8, 2007 providing comments in response to our request for early consultation on the subject project. We wish to provided the following information in response to the comments by the Division of Aquatic Resources (DAR) and the Commission on Water Resource Management (CWRM).

1. Response to Comments from DAR

We note DAR's assessment regarding the biotic importance of Kawela Stream and the *muliwai*. An assessment of the terrestrial flora and fauna, marine resources and water quality was carried by AECOS, Inc. for the subject project. The report and findings are included in the Draft Environmental Assessment (EA). Appropriate mitigation measures, such as installation of the pipe culverts under the detour road with the stream bed, will be implemented to ensure that recruitment, migratory and reproductive natures of aquatic species are not adversely affected.

2. Response to Comments from CWRM

We note that a Stream Channel Alteration Permit will be required for the detour route across Kawela Stream. Upon completion of the EA process, the applicant, State of Hawai`i Department of Transportation, will be applying to the CWRM for a Stream Channel Alteration Permit.

Again, thank you for your Department's comment and participation in the early consultation process. A copy of the Draft EA will be forwarded to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i Department of Transportation
Michael Hunnemann, KAI Hawai`i
F:\DATA\KAIHi\KawelaBridge\DLNRresponse.ltr.wpd

DEC 21 2006

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

HRD06/2835

December 19, 2006

Mich Hirano, AICP
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street
Suite 104
Wailuku, HI 96793

RE: Early Consultation for Proposed Kawela Bridge Replacement, Kamehameha V Highway, Moloka'i, TMK: 5-4-001

Dear Mich Hirano,

The Office of Hawaiian Affairs (OHA) is in receipt of your December 4, 2006 request for comments on the above-referenced proposed project to replace the existing bridge, which does not meet federal or state hydraulic standards. The proposed, year-long project would include demolishing the existing bridge and building a conforming one in its place that will also include a 10-foot-wide pedestrian and bicycle lane on each side. OHA offers the following comments.

We note that an Environmental Assessment (EA) will be prepared in for this project. We therefore recommend that a "due diligence" study of the potential impact of this project on archaeological, historic, and cultural resources be included in the EA. We also recommend consultation with community members, including OHA's Moloka'i Community Resource Coordinator, Irene Kaahanui (address below) and Edward Halealoha Ayau. Given the potential sensitivity of any proposed undertaking on Moloka'i, we also recommend you post a legal notice in the largest circulation Moloka'i newspaper during the draft EA preparation.

OHA further requests assurances that if this project goes forward, should iwi kūpuna or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

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

Sincerely,

Clyde W. Nāmu'o
Administrator

C: Irene Kaahanui
Community Resource Coordinator
OHA – Moloka'i Office
P.O. Box 1717
Kaunakakai, HI 96748

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Clyde W. Nāmu`o, Administrator
State of Hawai`i
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawai`i 96813

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Namu`o:

Thank you for your comment letter of December 19, 2006 in response to our request for early consultation on the subject project. We would like to provide the following information in response to your comments.

A study of the potential impact of this project on archaeological, historical and cultural resources will be carried out and included in the Draft Environmental Assessment (EA) report. We will consult with community members, as requested, to get additional cultural perspectives on the proposed Kawela Bridge replacement project. We will contact the Moloka`i office of OHA to get contacts of knowledgeable people who may be able to provide personal information on cultural resources in and around the project area. In response to public notices of the Draft EA document, we note the EA will be prepared pursuant to Hawai`i Revised Statutes, Chapter 343 and in accordance with requirements of the Department of Health Administrative Rules, Chapter 200, Title 11, Environmental Impact Statement Rules. Availability of the Draft EA will be published by the Office of Environmental Quality Control in the Environmental Notice, and a copy of the Draft EA will also be available at the Moloka`i Library for public review. We note the project area is also located within the Special Management Area (SMA) of the island of Moloka`i and a SMA Use Permit will be required. A Notice of Application for the SMA will be published in the Maui News. Separately, the Notice of the Public Hearing of the SMA Use Permit application before the Moloka`i Planning Commission will be sent to landowners and lessees within 500 feet of the project area and published in the Maui News.

As recommended in the Archaeological Inventory Report prepared for the project, archaeological monitoring will be carried out during ground altering activities. Should *iwi kupuna* or native Hawaiian cultural or traditional deposits be found during ground

disturbance, work will cease and the State Historic Preservation Division will be contacted for proper protocols.

Again, thank you for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your office for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i, Department of Transportation
Michael Hunnemann, KAI Hawai`i
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DEC 0 8 2006

ALAN M. ARAKAWA
MAYOR

CARL M. KAUPALOLO
CHIEF

NEAL A. BAL
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE AND PUBLIC SAFETY

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 270-7561
FAX (808) 270-7919

December 6, 2006

Munekiyo & Hiraga, Inc.
Attention: Mich Hirano, AICP
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Early Consultation for Proposed Kawela Bridge Replacement, Kamehameha V Highway, Molokai, Hawaii

Dear Mr. Hirano,

Thank you for the opportunity to comment of the subject project. The only concern that we have at this time is the weight limit for the temporary bridge. Our heaviest truck is a water tanker that weighs 35 tons when full. We would hope that the temporary bridge can accommodate this weight.

Please feel free to contact myself at 270-7568 if there are any questions or concerns.

Sincerely,

Valeriano F. Martin
Captain
Fire Prevention Bureau

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Valeriano F. Martin, Captain
Department of Fire and Public Safety
County of Maui
200 Dairy Road
Kahului, Hawai`i 96732

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Captain Martin:

Thank you for your comment letter of December 6, 2006 in response to our request for early consultation on the subject project.

We note your comment regarding the weight limit of the temporary bridge and the 35 ton weight of your heaviest tanker truck. The pipe culverts that will be used for the temporary bridge construction will be of sufficient strength to support the weight of a 35 ton fire tanker truck.

Thank you again for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Lorin, State of Hawaii Department of Transportation
Michael Hunnemann, KAI Hawaii
F:\DATA\KAIHi\KawelaBridge\mfdresponse.ltr.wpd

DEC 21 2006

ALAN M. ARAKAWA
Mayor

GLENN T. CORREA
Director

JOHN L. BUCK III
Deputy Director

(808) 270-7230
Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2 , Wailuku, Hawaii 96793

December 13, 2006

Mr. Mich Hirano, AICP
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: Early Consultation for Proposed Kawela Bridge Replacement Kamehameha V Highway, Molokai, Hawaii

Dear Mr. Hirano:

We have reviewed the subject project and have no comments or objections to the proposed project.

Thank you for the opportunity to review and comment. Please contact me or Mr. Patrick Matsui, Chief of Planning and Development, at 270-7387 if there are any questions.

Sincerely,

GLENN T. CORREA
Director

GTC:PTM:do

c: Patrick Matsui, Chief-Planning and Development

DEC 2 2 2006

ALAN M. ARAKAWA
Mayor

GEORGE Y. TENGAN
Director

ERIC H. YAMASHIGE, P.E., L.S.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

December 20, 2006

Munekiyo & Hirano, Inc.
Attention: Mich Hirano, AICP
305 High Street, Suite 104
Wailuku, Hawaii 96793

RE: Early Consultation
Project: Proposed Kawela Bridge Replacement, Kamehameha V Highway, Molokai, Hawaii

Dear Mr. Hirano:

Thank you for the opportunity to comment on this Early Consultation.

The project site overlies the Kawela aquifer with a sustainable and developeable yield of 5 MGD (million gallons per day). In order to protect ground water resources, we encourage the applicant to adopt best management practices (BMPs) for construction to minimize infiltration and runoff. Please refer to the BMP "Source Water Protection Practices Bulletin - Managing Storm Water Runoff to Prevent Contamination of Drinking Water". We also encourage the applicant to use non-potable water for dust control during the construction phase.

The project is located in the "Maui County Planting Plan - plant zone 3 - warm to hot low elevations". Native plants adopted to the area conserve water and protect the watershed from degradation due to alien invasive species. Please refer to attachment which lists native plants suitable for plant zone 3.

Should you have any questions, please contact our Water Resources & Planning Division at 244-8550.

Sincerely,

George Y. Tengan, Director
ayi

"By Water All Things Find Life"

Enclosures: Source Water Protection Practices Bulletin - Managing Storm Water Runoff to Prevent Contamination of Drinking Water
Maui Planting Plan - plant zone 3 - warm to hot low elevations

c: Engineering Division
WRPD File
WRPD Reading File

In addition, the storm water rule for certain small MS4s requires post-construction storm water management controls. These local controls are in addition to existing federal regulations that require NPDES permits of all construction activities disturbing greater than one acre.

Recently, EPA developed a menu of BMPs that provides more than 100 fact sheets on measures that small MS4s could use to control urban storm water runoff. The menu is available from EPA's Web site at www.epa.gov/npdes.

FOR ADDITIONAL INFORMATION

These sources contain information on storm water management measures. All of the documents listed are available for free on the Internet. State departments of transportation or agriculture, whose contact information can be found on the Internet or in the phone book, are also good sources of information.

To pass local ordinances or regulations to affect storm water controls, contact city or county public works departments, zoning offices, permitting offices, or transportation departments, who typically have the authority to pass local ordinances. Contact local government authorities in your area to see if there are ordinances in place to manage storm water. Numerous examples of local source water protection-related ordinances for various potential contaminant sources can be found at http://www.epa.gov/r5water/ordcom/, http://www.epa.gov/owow/nps/ordinance/, and http://www.epa.gov/owow/nps/ordinance/links.htm.

The following resources provide information on selection and design of specific management measures:

The Center for Watershed Protection's Stormwater Manager's Resource Center (www.stormwatercenter.net) provides technical assistance storm water management issues.

Northern Arizona University offers a course on wet weather flow management, materials are available at http://jan.ucc.nau.edu/~dmh3/egr499/.

Texas Nonpoint SourceBOOK (www.txnpsbook.org) contains four manuals on storm water Best Management Practices, including "Urban Nonpoint Source Management," and an interactive BMP selector.

U.S. EPA, Office of Ground Water and Drinking Water. (September 1999). *The Class V Underground Injection Control Study. Volume 3: Storm Water Drainage Wells.* EPA/816-R-99-014c. Retrieved May 2, 2001, from the World Wide Web: http://www.epa.gov/safewater/uic/classv/stw-fact.pdf

U.S. EPA, Office of Science and Technology. (August 1999). *Preliminary Data Summary of Urban Stormwater Best Management Practices.* EPA-821-R-99-012. Retrieved February 7, 2001, from the World Wide Web: http://www.epa.gov/OST.

U.S. EPA, Office of Wastewater Management. (September 1992). *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs.* Retrieved February 6, 2001, from the World Wide Web: http://www.epa.gov/owm/sw/indguide/index.htm

U.S. EPA, Office of Wetlands, Oceans, and Watersheds. (January 1993). *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.* EPA-840-B-93-001c. Retrieved February 15, 2001, from the World Wide Web: http://www.epa.gov/OWOW

United States Environmental Protection Agency | Office of Water (4606) | EPA 816-F-01-020 July 2001

Source Water Protection Practices Bulletin

Managing Storm Water Runoff to Prevent Contamination of Drinking Water

Storm water runoff is rain or snow melt that flows off the land, from streets, roof tops, and lawns. The runoff carries sediment and contaminants with it to a surface water body or infiltrates through the soil to ground water. This fact sheet focuses on the management of runoff in urban environments; other fact sheets address management measures for other specific sources, such as pesticides, animal feeding operations, and vehicle washing.

SOURCES OF STORM WATER RUNOFF

Urban and suburban areas are predominated by impervious cover including pavements on roads, sidewalks, and parking lots; rooftops of buildings and other structures; and impaired pervious surfaces (compacted soils) such as dirt parking lots, walking paths, baseball fields and suburban lawns.

During storms, rainwater flows across these impervious surfaces, mobilizing contaminants, and transporting them to water bodies. All of the activities that take place in urban and suburban areas contribute to the pollutant load of storm water runoff. Oil, gasoline, and automotive fluids drip from vehicles onto roads and parking lots. Storm water runoff from shopping malls and retail centers also contains hydrocarbons from automobiles. Landscaping by homeowners, around businesses, and on public grounds contributes sediments, pesticides, fertilizers, and nutrients to runoff. Construction of roads and buildings is another large contributor of sediment loads to waterways. In addition, any uncovered materials such as improperly stored hazardous substances (e.g., household cleaners, pool chemicals, or lawn care products), pet and wildlife wastes, and litter can be carried in runoff to streams or ground water. Illicit discharges to storm drains (e.g., used motor oil), can also contaminate water supplies.

Parking lot runoff

Storm water is also directly injected to the subsurface through Class V storm water drainage wells. These wells are used throughout the country to divert storm water runoff from roads, roofs, and paved surfaces. Direct injection is of particular concern in commercial and light industrial settings (e.g., in and around material loading areas, vehicle service areas, or parking lots).

WHY IS IT IMPORTANT TO MANAGE STORM WATER RUNOFF NEAR THE SOURCES OF YOUR DRINKING WATER?

Impervious areas prohibit the natural infiltration of rainfall through the soil, which could filter some contaminants before they reach ground water. Also, impervious surfaces allow the surface runoff to move rapidly. Development reduces the amount of land available for vegetation, which can mitigate the effects of rapid runoff and filter contaminants. When the percentage of impervious cover reaches 10 to 20 percent of a watershed area, degraded water quality becomes apparent.

There are three primary concerns associated with uncontrolled runoff: (1) increased peak discharge and velocity during storm events resulting in flooding and erosion; (2) localized reduction in recharge; and (3) pollutant transport.

Erosion

When runoff is confined to narrow spaces, such as streets, the velocity at which water flows increases greatly with depth. This contributes to erosion in areas without vegetation cover, increased flooding in low lying areas, and sedimentation in surface water bodies. Sediment deposited in streams can increase turbidity, provide transport media for pathogenic bacteria and viruses, and decrease reservoir capacity. Sediments also smother aquatic species, leading to habitat loss and decreased biodiversity of aquatic species. The fast-running runoff is not afforded an opportunity to infiltrate into the subsurface, and ground waters are not recharged by rain events.

EPA considers nonpoint source pollution, including storm water runoff, to be one of the most important sources of contamination of the nation's waters. According to a nationwide study, 77 of 127 priority pollutants tested were detected in urban runoff. Some of the principal contaminants found in storm water runoff include heavy metals, toxic chemicals, organic compounds, pesticides and herbicides, pathogens, nutrients, sediments, and salts and other de-icing compounds. Some of these substances are carcinogenic; others lead to reproductive, developmental, or other health problems that are associated with long-term exposure. Pathogens can cause illness, even from short-term exposure, that can be fatal to some people.

Urban runoff is commonly collected in storm sewers and discharged to waterways untreated, so that any contaminants carried by the storm water are discharged to surface water bodies that are used as the sources of drinking water. In addition, about 20 percent of the population in the U.S. is served by combined sewer systems (for both sanitary waste and storm water) that, during heavy storm events, allow contaminants from sanitary sewage to discharge directly to waterways untreated.

AVAILABLE PREVENTION MEASURES TO ADDRESS STORM WATER RUNOFF

A variety of management practices, including pollution prevention and treatment devices, are available to abate storm water pollution. The most effective storm water pollution prevention plans combine these measures and reflect local soil, precipitation, and land use conditions. Some of the more widely-used management measures are described below.

Please keep in mind that individual prevention measures may or may not be adequate to prevent contamination of source waters. Most likely, individual measures should be combined in an overall prevention approach that considers the nature of the potential source of contamination, the purpose, cost, operational, and maintenance requirements of the measures, the vulnerability of the source waters, the public's acceptance of the measures, and the community's desired degree of risk reduction.

Pollution source control and prevention measures include public education to homeowners and business owners on good housekeeping, proper use and storage of household toxic materials, and responsible lawn care and landscaping; storm drain stenciling; hazardous materials collection; and eliminating illicit discharges. The incorporation of best management practices (BMPs) in building and site-development codes, if feasible, should be encouraged. On roadways, proper maintenance of rights-of-way, control of chemical and nutrient applications, street cleaning or sweeping, storm drain cleaning, use of alternative or reduced de-icing products, and equipment washing can reduce the pollutant content of runoff.

Without appropriate ***erosion and sedimentation control (ESC) measures***, construction activities can contribute large amounts of sediment to storm water runoff. Erosion can be controlled by planting temporary fast-growing vegetation, such as grasses and wild flowers. Covering top soil with geotextiles or impervious covers will also protect it from rainfall. Good housekeeping measures for construction sites include construction entrance pads and vehicle washing to keep sediment and soil on-site. Construction should be staged to reduce soil exposure, or timed to coincide with periods of low rainfall and low erosion potential, such as in the fall, rather than during spring rains. Other measures include sediment traps and basins; sediment fences; wind erosion controls; and sediment, chemical, and nutrient control.

If available, ordinances and regulations on construction activities can require plan reviews to ensure that erosion during construction is minimized or require ESC measures during construction. Inspections of ESC measures and repair of controls where needed will maintain the working order of these controls and maximize their benefit.

Local governments can use a variety of ***land use controls*** to protect source water from potential contamination. For example, subdivision controls help to ensure that expected development will not compromise drinking water quality or ground water recharge. Requiring proper storm water management in new developments and redevelopments will ensure that runoff does not become excessive as areas of paved surfaces increase. ***Low impact development*** incorporates maintaining pre-development hydrology, considering infiltration technology, and re-routing water to recharge the aquifer.

Minimizing directly connected impervious areas (DCIAs) is important to reducing the flow and volume of runoff. Planners should direct runoff from roofs, sidewalks, and other surfaces over grassed areas to promote infiltration and filtration of pollutants prior to surface water deposition. Porous design of parking lots also provides places for storm water to infiltrate to soils. ***Concrete grid pavement*** is typically placed on a sand or gravel base with void areas filled with pervious materials such as sand, gravel, or grass. Storm water percolates through the voids into the subsoil. Planting landscaped areas lower than the street level encourages drainage.

Concrete grid pavement

Structural designs are used to control runoff or temporarily store storm water on site. A number of structural devices have been developed to encourage filtration, infiltration, or settling of suspended particles. Some of the more commonly-used practices are described below.

Grassed swales are shallow, vegetated ditches that reduce the speed and volume of runoff. Soils remove contaminants by infiltration and filtration. Vegetation, or turf, prevents soil erosion, filters out sediment, and provides some nutrient uptake. Maintenance of grassed swales involves regular mowing, re-seeding, and weed control, along with inspections to check for erosion and ensure the integrity of the vegetative cover. To function properly, the inflow to the swale must be sheet flow from a filter strip or an impervious surface (i.e., not from the end of a pipe). Swales have demonstrated solids removals exceeding 80 percent. Apart from grassed swales, ***grassed waterways*** (wide, shallow channels lined with sod) are often used as outlets for runoff from terraces.

Buffer strips are combinations of trees, shrubs, and grasses planted parallel to a stream. Buffer strips should consist of three zones—about four or five rows of trees closest to the stream, one or two rows of shrubs, and a 20 to 24 foot wide grass zone on the outer edge. They decrease the velocity of runoff, thus moderating flooding and preventing stream bank erosion. The vegetation and soils also strain and filter sediments and chemicals. Buffer strips should be maintained by controlling weeds and mowing grasses once or twice annually. In the long term, each zone should be harvested and replanted. About 10 to 20 percent removal of solids has been demonstrated in buffer zones. These buffer strips, however, do not necessarily increase infiltration.


Filter strip

Filter strips are areas of close-growing vegetation on gently sloped land surfaces bordering a surface water body. They work by holding soils in place, allowing some infiltration, and filtering solid particles out of the runoff from small storms. Plants with dense root systems are preferred; the ideal species and mixes of vegetation are specific to the region. The width and length of the filter strip depends on the size and grade of the slope it drains. Maintenance activities include inspections, mowing, and removal of sediment build-up. Filter strips can remove nitrogen and phosphorus, but are less effective in filtering pesticides. They are most effective when water flow is even and shallow and if grass can regrow between rains.


Storm water pond

Storm water ponds (wet ponds) consist of a permanent pond, where solids settle during and between storms, and a zone of emergent wetland vegetation where dissolved contaminants are removed through biochemical processes. Wet ponds are usually developed as water features in a community, increasing the value of adjacent property. Other than landscape maintenance, only annual inspection of the outlets and shoreline is required. Vegetation should be harvested every 3 to 5 years, and sediment removed every 7 to 10 years. Wet ponds can achieve 40 to 60 percent phosphorus removal and 30 to 40 percent total nitrogen removal.

Constructed wetlands are similar to wet ponds, with more emergent aquatic vegetation and a smaller open water area. Storm water wetlands are different from natural wetlands in that they are designed to treat storm water runoff, and typically have less biodiversity than natural wetlands. A wetland should have a settling pond, or forebay, if significant upstream soil erosion

is anticipated. Coarse particles remain trapped in the forebay, and maintenance is performed on this smaller pool. Wetlands remove the same pollutants as wet ponds through settling of solids and biochemical processes, with about the same efficiency. Maintenance requirements for wetlands are similar to those of wet ponds.

Infiltration practices (basins and trenches) are long, narrow stone-filled excavated trenches, 3 to 12 feet deep. Runoff is stored in the basin or in voids between the stones in a trench and slowly infiltrates into the soil matrix below, where filtering removes pollutants. Infiltration devices alone do not remove contaminants, and should be combined with a pretreatment practice such as a swale or sediment basin to prevent premature clogging. Maintenance consists of inspections annually and after major rain storms and debris removal, especially in inlets and overflow channels. Infiltration devices and associated practices can achieve up to 70 to 98 percent contaminant removal.

Infiltration basin

Swirl-type concentrators are underground vaults designed to create a circular motion to encourage sedimentation and oil and grease removal. The currents rapidly separate out settleable grit and floatable matter, which are concentrated for treatment, while the cleaner, treated flow discharges to receiving waters. Swirl concentrators have demonstrated total suspended solids and BOD removal efficiencies exceeding 60 percent.

BMPs for Class V storm water drainage wells address siting, design, and operation of these wells. Siting BMPs for storm water drainage wells include minimum setbacks from surface waters, drinking water wells, or the water table. Storm water drainage wells may also be prohibited from areas of critical concern, such as source water protection areas, or from areas where the engineering properties of the soil are not ideal for their performance. Available design BMPs for storm water drainage wells include sediment removal devices (such as oil/grit separators or filter strips), oil and grease separators, and pretreatment devices such as infiltration trenches or wetlands (described above). Maintenance of these BMPs is crucial to their proper operation. Management measures related to operation include spill response, monitoring, and maintenance procedures. Source separation, or keeping runoff from industrial areas away from storm water drainage wells, involves using containment devices such as berms or curbs (see the fact sheets on vehicle washing and small quantity chemical use for more information on these devices).

EPA's National Pollutant Discharge Elimination System (NPDES) Permitting Program regulates storm water runoff from municipal separate storm sewer systems (MS4s) and industrial activity (including construction). The current rules establish permit requirements for more than 5,000 MS4s nationwide. NPDES storm water permits issued to MS4s require these MS4s to develop the necessary legal authority to reduce the discharge of pollutants in storm water to the maximum extent practicable and to develop and implement a storm water management program that includes:

- Structural and source control measures to reduce pollutants from runoff from commercial and residential areas, including maintenance, monitoring, and planning activities;
- Detection and removal of illicit discharges and improper disposal into the storm sewer;
- Monitoring and control of storm water discharges from certain industrial activities; and
- Construction site storm water control.

Washington State Department of Transportation. (February 1995). *Highway Runoff Manual.* M 31-16. Retrieved February 15, 2001, from the World Wide Web: http://www.wsdot.wa.gov/fasc/engineeringpublications/manuals/highway.pdf

Wyoming Department of Environmental Quality. (February 1999). *Urban Best Management Practices for Nonpoint Source Pollution.* Draft. Retrieved February 21, 2001, from the World Wide Web: http://deq.state.wy.us/wqd/urbbmpdoc.htm

University extension services are excellent sources for information on water quality issues, including storm water management. The Oregon Department of Agriculture offers comprehensive list of links to many of these on its Web site (http://www.oda.state.or.us/Natural_Resources/wq_ces.htm).

Following are examples of extension services that offer fact sheets on a variety of storm water management measures, including best management practices:

Iowa State University Extension (http://www.extension.iastate.edu/Pages/pubs/).

North Carolina Cooperative Extension Service (http://www.ces.ncsu.edu/resources/).

Oklahoma State University. Division of Agricultural Sciences and Natural Resources (http://agweb.okstate.edu/pearl/wqs).

Purdue University Cooperative Extension Service (http://www.agcom.purdue.edu/AgCom/Pubs/menu.htm).

Zone-specific Native and Polynesian plants for Maui County

Zone 3

TYPE: **F** Fern **G** Grass **Gr** Ground Cover **Sh** Shrub **P** Palm **S** Sedge **Tr** Tree **V** Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 3

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Bidens menziesii ssp. menziesii	ko'oko'olau	1'	3'		
Sh	Bidens micrantha ssp. micrantha	ko'oko'olau	1'	3'		
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Styphelia tameiameiae	puklawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Canthium odoratum	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Diospyros sandwicensis	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	Erythrina sandwicensis	wiliwili	20'	20'	sea to 1,000'	Dry
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 3

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Nesoluma polynesicum	keahi	15'	15'	sea to 3,00'	Dry
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Reynoldsia sandwicensis	'ohe makai	20'	20'	1,000' to 3,000'	Dry
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY
KYLE GINOZA

January 21, 2009

Jeff Eng, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Eng:

Thank you for your Department's comment letter of December 20, 2006 in response to our request for early consultation on the subject project. We would like to provide the following information in response to your comments.

We note the project site overlies the Kawela aquifer. Best Management Practices (BMPs) will be carried out during construction to minimize infiltration to groundwater and runoff to adjacent and downstream properties. Water quality monitoring will be carried out during the construction phase to mitigate potential adverse impacts to water quality.

The proposed project will replace the existing Kawela Bridge, which is hydraulically deficient. No landscaping improvements will be carried with the project.

To the extent practicable, non-potable water will be used for dust control during construction.

Again, thank you for participating in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawaii Department of Transportation
Michael Hunnemann, KAI Hawaii
F:\DATA\KAIHi\KawelaBridge\dwsresponse.ltr.wpd

DEC 21 2006

POLICE DEPARTMENT
COUNTY OF MAUI

ALAN M. ARAKAWA
MAYOR

OUR REFERENCE
YOUR REFERENCE ti

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

THOMAS M. PHILLIPS
CHIEF OF POLICE

GARY A. YABUTA
DEPUTY CHIEF OF POLICE

December 18 2006

Mr. Mich Hirano, AICP
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Hirano:

SUBJECT: Early Consultation for Proposed Kawela Bridge Replacement, Kamehameha V Highway, Molokai, Hawaii

Thank you for your letter of December 4, 2006, requesting comments on the above subject.

We have reviewed the information submitted for this project and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

AC Wayne T. Ribao

Assistant Chief Wayne T. Ribao
for: Thomas M. Phillips
Chief of Police

c: Michael Foley, Planning Department

Enclosure

COPY

TO	:	**THOMAS PHILLIPS, CHIEF OF POLICE, MAUI POLICE DEPARTMENT**
VIA	:	**CHANNELS**
FROM	:	**VICTOR K. RAMOS, CAPTAIN, MOLOKA'I DISTRICT**
SUBJECT	:	**EARLY CONSULTATION FOR PROPOSED KAWELA BRIDGE REPLACEMENT, KAMEHAMEHA V HIGHWAY, MP-5.1**

Sir,

I am familiar with the need to upgrade the existing Kawela Bridge. The Kawela Stream, flood the surrounding residential lots of Nalulua during times of continuous rain or during short periods of heavy rain.

If the proposed detour must be constructed makai of the existing bridge, I strongly recommend that the detour is raised high enough with ample drainage so that motorists will not be cut off during heavy precipitation and eventual flooding.

Respectfully,

Capt. Victor K. RAMOS
Maui Police Department
Moloka'i District
12/13/06 @ 1305 hours

CONCUR:
AC
12/18/06

MUNEKIYO & HIRAGA, INC.

January 21, 2009

Thomas M. Phillips, Chief of Police
Maui Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Chief Phillips:

Thank you for your Department's letter of December 18, 2006 in response to our request for early consultation on the subject project. We would like to provide the following information in response to your comments.

The existing Kawela Bridge is hydraulically inadequate and, therefore, will be replaced. A hydrological study and hydraulic analysis has been carried out to determine the 100-year flood limits and levels in the vicinity of the project. The elevation and surrounding drainage of the proposed detour route will be established to minimize flooding impacts during heavy rains.

Again, thank you for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i, Department of Transportation
Michael Hunnemann, KAI Hawai`i
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Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

DEC 22 2006

December 20, 2006

Munekiyo & Hiraga, Inc.
Attention: Mich Hirano, AICP
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Hirano,

Subject: Proposed Kawela Bridge Replacement
Kamehameha V Highway, Molokai, Hawaii

Thank you for allowing us to comment on the early consultation plans for the subject project.

In reviewing our records and the information received, Maui Electric Company (MECO) highly encourages the customer's consultant to submit detailed drawings and a project time schedule as soon as practical so that any electrical line/pole relocation can be performed on a timely basis. The customer should also contact Hawaiian TelCom and Time Warner Oceanic Cable to coordinate possible relocation of their facilities.

Should you have any questions or concerns, please call Ray Okazaki at 871-2340.

Sincerely,

for Neal Shinyama
Manager, Engineering

NS:ro

MUNEKIYO & HIRAGA, INC.

January 21, 2009

Greg Kauhi, Manager, Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawai`i 96733-6898

SUBJECT: Proposed Kawela Bridge Replacement Project,
Kamehameha V Highway, Moloka`i, Hawai`i

Dear Mr. Kauhi:

Thank you for your comment letter of December 20, 2006 in response to our request for early consultation on the subject project.

We confirm that the Project Engineer will coordinate with Maui Electric Company to ensure the electrical line/pole relocation can be performed on a timely basis. As noted, coordination will also be carried out with Hawaiian Telcom and Oceanic Time Warner Cable to coordinate the possible relocation of their facilities, if required.

Thank you again for your comments and participation in the early consultation process. A copy of the Draft EA will be sent to your Department for further review and comment.

Very truly yours,

Mich Hirano, AICP
Project Manager

MH:tn
cc: Vincent Llorin, State of Hawai`i Department of Transportation
Michael Hunnemann, KAI Hawaii
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IX. REFERENCES

IX. REFERENCES

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APPENDIX A.

Kamehameha V Highway Kawela Bridge Replacement Hydrology and Hydraulics Study

KAMEHAMEHA V HIGHWAY
KAWELA BRIDGE REPLACEMENT
HYDROLOGY & HYDRAULICS STUDY

Preliminary Report – December 2006

Prepared for:

State of Hawaii, Department of Transportation
Kapolei, Hawaii

KAI Hawaii
Honolulu, Hawaii

Austin, Tsutsumi & Associates, Inc.
Honolulu, Hawaii

Prepared by:

WEST Consultants, Inc.
San Diego, California

Kamehameha V Highway
Kawela Bridge Replacement
Hydrology & Hydraulics Study

Preliminary Report – December 2006

Prepared for:

State of Hawaii, Department Transportation
Design Branch
601 Kamokila Boulevard, Room 688
Kapolei, HI 96707

KAI Hawaii
31 N. Pauahi Street, 2nd Floor
Honolulu, HI 96817

and

Austin, Tsutsumi & Associates, Inc.
501 Sumner Street, Suite 521
Honolulu, HI 96817

Prepared by:

WEST Consultants, Inc.
16870 W. Bernardo Drive, Suite 340
San Diego, CA 92127

A. Jake Gusman, P.E.
Project Manager

This work was prepared by me or under my supervision.

Signature — *Expiration Date of License*: April 30, 2008

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APPENDICES

1 INTRODUCTION

1.1 Study Purpose

WEST Consultants, Inc. (WEST) was contracted by Austin, Tsutsumi & Associates (ATA) to conduct a hydrologic, hydraulic, and scour analysis for the bridge replacement study for the crossing of Kamehameha V Highway over Kawela Gulch in Molokai, Hawaii. KAI Hawaii is the prime contractor on this project for the State of Hawaii, Department of Transportation (HDOT).

This report describes the hydrologic analysis and existing hydraulic conditions. The 100-year discharge was determined by an HEC-HMS model completed by WEST and verified with stream gage data. The water surface elevation based on the 100-year discharge and the channel capacity of Kawela Gulch at the bridge was determined using the HEC-RAS hydraulic model.

A general location map is provided as Figure 1-1. A site location map is provided as Figure 1-2.

1.2 Data Collection and Review

1.2.1 Technical Data

Existing technical data such as previous flood studies, topographic data, floodplain maps, and hydrologic data were reviewed. Data sources included ATA, HDOT, KAI Hawaii, the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (Corps of Engineers), and the U.S. Geological Survey (USGS). Flood Insurance Study (FIS) backup data (i.e., effective hydraulic model, workmaps, etc.) for Kawela Gulch were requested from the FEMA Map Library. Although no hydraulic model was available, FEMA did provide a workmap for Kawela Gulch.

1.2.2 Field Reconnaissance

Mike Hunnemann (KAI Hawaii), Kent Morimoto (ATA), and Martin Teal (WEST) conducted a detailed field reconnaissance trip on October 17, 2006. The purpose of the site visit for WEST was to become familiar with the expected flow patterns at the project site and to record field data for the hydraulic and scour analysis. In general, Manning's roughness values for the channel and overbanks were estimated, field evidence of degradation was investigated, and the bridge structure was examined. Signs of aggradation were noted during the site visit in comparison to photos of the bridge site taken in 2005 by ATA.

1.3 Acknowledgments

Jake Gusman, P.E., served as WEST project manager. Christy Warren performed steady flow modeling. Kurt Baron provided Geographic Information Systems (GIS) services. Martin Teal, P.E., P.H., performed quality assurance reviews of the results and study report.

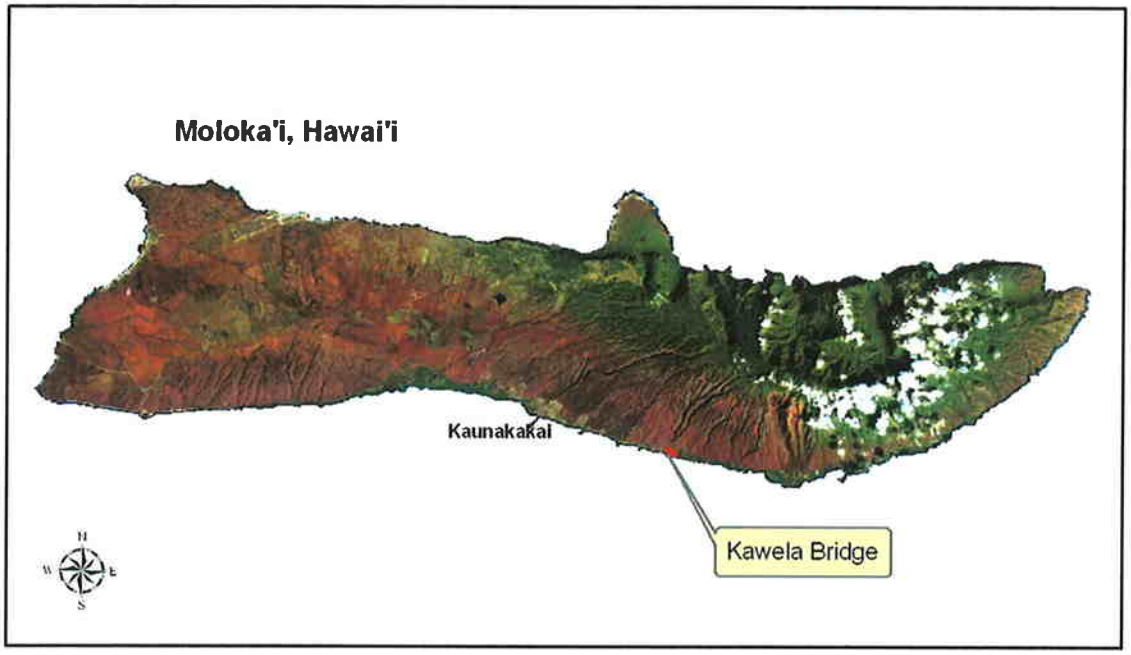


Figure 1-1. General Location Map.

Figure 1-2. Kawela Bridge Site Location Map.

2 HYDROLOGIC ANALYSIS

An HEC-HMS model for the Kawela watershed was developed by WEST. Stream gage data on Kawela Gulch was compared with the results of the HEC-HMS model to validate the computed flow rate.

2.1 Previous Studies

The FEMA Flood Insurance Study (FIS) for Maui County (FEMA, 2002) states that the 100-year peak discharge (17,000 cfs) was computed by the Corps of Engineers in a 1978 study. The FEMA Project Library could not locate a copy of this study.

2.2 HEC-HMS Model

An HEC-HMS (Hydrologic Modeling System), Version 3.0.1, model was developed to evaluate the hydrology for the 100-year event. The hydrologic modeling approach and assumptions are described below.

Subbasins were developed for the Kawela watershed using the ArcGIS extension HEC-GeoHMS. Sixteen subbasins were delineated. A USGS Digital Elevation Model (DEM) was obtained for the area and was used to delineate the subbasins. Figure A-1 in Appendix A provides a map of drainage basins overlaid on aerial imagery.

2.2.1 Soils, Vegetation, and Land Use Data

Soils data, which included hydrologic soil groups, were downloaded from the Soil Data Mart of the Natural Resources Conservation Service (NRCS) web site (NRCS, 2006). Figure A-2 in Appendix A shows the hydrologic soil group data for the modeled subbasins. Land use/land cover data were obtained from the NOAA Coastal Services Center (2001). Figure A-3 in Appendix A shows the land use/land cover data for the modeled subbasins.

2.2.2 Precipitation

An isopluvial map with precipitation values for the 100-year return interval with a 24-hour duration was obtained from the Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43 (U.S. Weather Bureau, 1962). This map was digitized using ArcGIS and a 100-year, 24-hour precipitation value was determined for each subbasin in the Kawela watershed. The rainfall pattern for the storm was taken from the SCS Type 1 distribution.

2.2.3 Loss Rates

The SCS Curve Number method was used to calculate loss rates. Most of the watershed is comprised of hydrologic soil group D, with a few areas containing groups B and C. The majority of the watershed is shrub type land use/vegetation with the upper portions being more forested. An SCS curve number was computed for each subbasin based on its corresponding soil group and land use based on standard SCS criteria (NRCS, 1986). A table showing subbasin parameters, including precipitation, loss rate and transform information (described in the following section) is given with Figure A-4.

2.2.4 Runoff Transform

The SCS Unit Hydrograph was used for the runoff transformation. Lag time was computed as a function of the total travel time (sheet flow, shallow concentrated flow, and channel flow).

2.2.5 Channel Routing

The Muskingum-Cunge routing method was used for channel routing. A representative trapezoidal channel was used since no channel survey data was available for the upper reaches of the watershed. The channel routing is a function of Manning's *n* and slope and length of the channel.

2.2.6 Computed Discharge

The 100-year peak discharge computed using HEC-HMS for Kawela watershed is 13,300 cfs.

2.3 Comparison with Streamgage Data

2.3.1 Stream Gage Data

There are two USGS gages located within the Kawela Gulch watershed. Gage #16415000, East Fork Kawela Gulch near Kamalo, Molokai, HI, has a drainage area of 0.45 square miles and a 25 year period of record spanning the years from 1947 to 1971. Gage #16415600, Kawela Gulch near Moku, Molokai, HI, has a drainage area of 5.3 square miles and a 4 year period of record spanning the years 2002 to 2005. The locations of these gages are shown in Figure A-1.

WEST used the HEC-FFA (Flood Frequency Analysis) computer program to develop a flood frequency curve for Gage #16415000. HEC-FFA uses techniques described in the revised Bulletin 17B *Guidelines for Determining Flood Flow Frequency* (USGS, 1982). The HEC-FFA output is presented in Appendix B. A period of record longer than 10 years is considered adequate to perform a flood frequency analysis; therefore, a frequency curve for Gage #16415600, with a period of record of only 4 years, was not developed.

The resulting 100-year peak flow for Gage #1641500 was determined to be 2,040 cfs.

2.3.2 HEC-HMS versus Stream Gage Data

Gage #16415000 is located at the outlet of subbasin R310W260. The 100-year flow computed by the HEC-HMS model at this subbasin outlet was 1,865 cfs. This is only a 9% difference from the 2,040 cfs computed by the flood frequency analysis on Gage #16415000. Since no other gage data in the Kawela watershed has a period of record long enough to perform a flood frequency analysis, the 100-year discharge computed by the HEC-HMS model of 13,300 cfs is considered appropriate. Also, the period of record for Gage #16415000 appears to span a wetter time period than more recent years. This conclusion is based on comparison with a gage in the area with a period of record spanning 1950 to 2000 and could be the reason for the higher discharge calculated from gage records versus the HEC-HMS model.

3 HYDRAULIC ANALYSIS

WEST performed hydraulic modeling to estimate the flood elevations for Kawela Gulch, and to determine the capacity of the existing channel at the bridge location. The U.S. Army Corps of Engineers' HEC-RAS (River Analysis System) computer program was used to compute flood elevations.

3.1 Model Input Data

3.1.1 Topographic Data

Two sources of topographic data were used in this study. Sources and descriptions of the data are provided below.

- 1-foot contour interval topography – created by ATA based on 2006 field surveys – covered the Kamehameha V Highway 2,000 feet to the east and west of Kawela Gulch, and Kawela Gulch 500 feet upstream and downstream of the Kamehameha V Highway.
- 10-foot contour interval topography from the FEMA workmap for the Island of Molokai (1979) was used for overbank areas not covered by the 1-foot topography.

The two data sets were combined into a single TIN (Triangulated Irregular Network) within the ArcView GIS program. All elevations in this study are referenced to the NGVD 1929 vertical datum.

3.1.2 Cross Sections

The HEC-GeoRAS extension to ArcView was used to cut cross sections from the TIN. These cross sections were imported into the HEC-RAS computer program, Version 3.1.3 (HEC, 2005), to create the hydraulic model. Cross sections in the vicinity of the bridge are shown in Figure 3-1.

3.1.3 Manning's Roughness

Manning's roughness values were selected based on field observations and engineering judgment, with guidance from Chow (1959). The channel at the bridge and downstream of the bridge was assigned a Manning's n of 0.045. The channel upstream of the bridge has larger stones and more trees on the banks, and was therefore assigned a Manning's n value of 0.06. The left and right overbanks (looking downstream) were assigned a Manning's n value of 0.10 based on the dense trees and brush there.

3.1.4 Existing Bridge

The existing two-lane Kawela bridge was built in 1940. As-built plans for the existing bridge were obtained. The roadway at the bridge does not have a designated bike lane, although it is used by cyclists and joggers. The existing river channel is about 50 feet wide at the bridge. The following dimensions and parameters were used to model the existing bridge in the HEC-RAS model:

- 43' length between vertical abutments; 28' width (in direction of flow)
- 1.25' thickness for bridge deck (not including barrier/railing)
- Concrete barrier on bridge deck: 2' height
- One square nose pier, 3' width
- Minimum low chord (at upstream left abutment): 3.29 feet elevation
- Maximum low chord (at downstream left abutment): 4.01 feet elevation

Ineffective flow limits were used to limit the flow to a reasonable expansion ratio as it exits the more confined upstream area of Kawela Gulch. These are shown in Figure 3-1.

3.1.5 Proposed Bridge

The proposed replacement bridge for Kawela Gulch will be modeled by WEST once proposed bridge plans are available. Potential scour at the proposed bridge will also be computed.

3.1.6 Downstream Boundary Conditions

The Mean Higher High Water (MHHW) elevation at the ocean was found to be approximately 0.94 feet (NGVD 29). This elevation is lower than critical depth for the channel. Given the mild slope and sand bed of the channel downstream of the bridge, it is not likely that the flow regime would be supercritical. Therefore, normal depth was used for the downstream boundary condition based on the bed slope, 0.008 ft/ft for bridge capacity and floodplain analyses. Critical depth will be used as the downstream boundary condition for the scour analysis as this produces a more conservative result.

3.2 Hydraulic Model Results

HEC-RAS hydraulic model results for the existing Kawela bridge are provided in Appendix C, including profile plot, output table, and model cross sections.

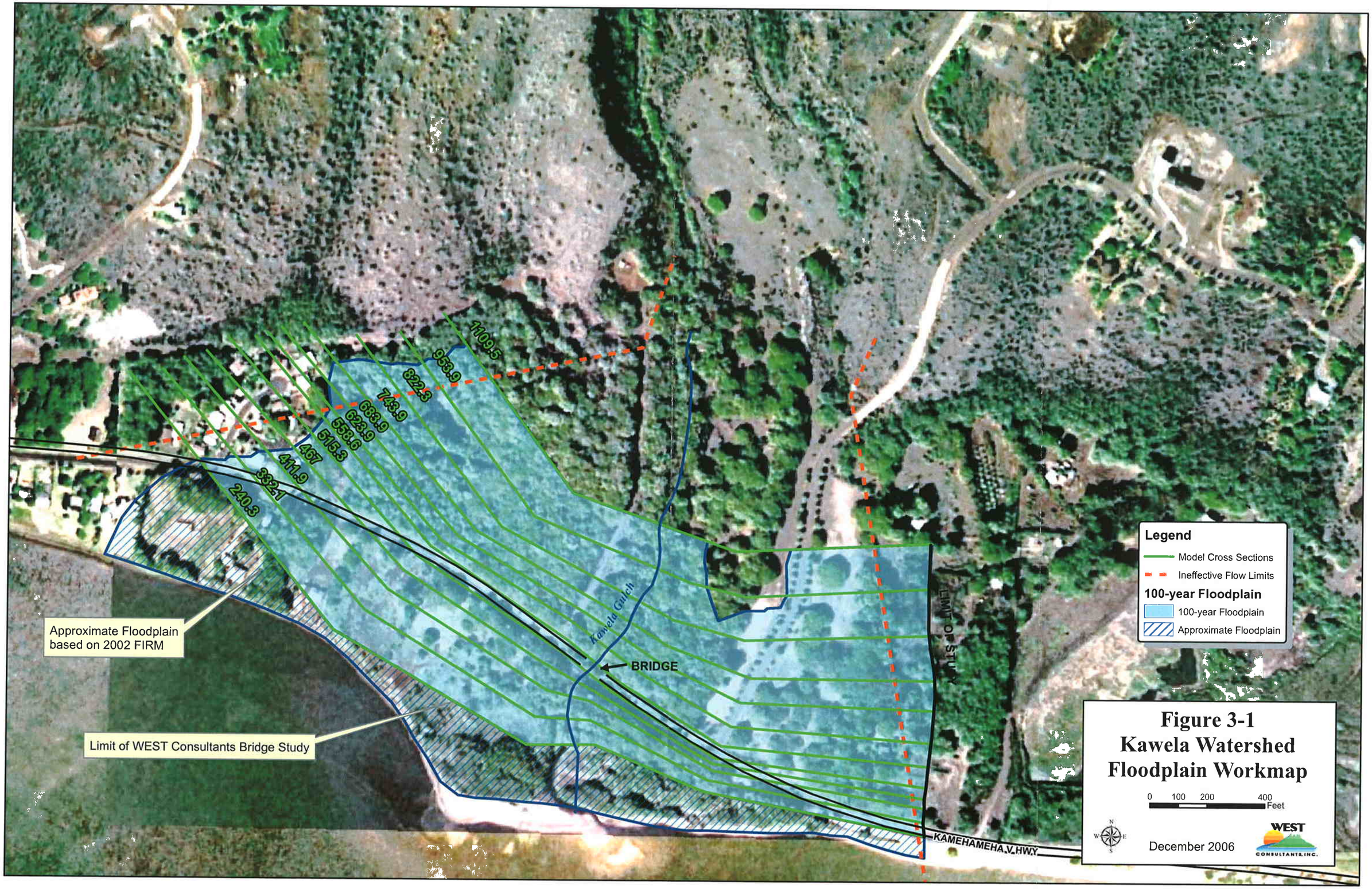
3.2.1 Capacity of Existing Channel

The main channel of Kawela Gulch in the reach downstream of the bridge and at the bridge has an average depth of 4 feet and average width of 60 feet. The flow capacity in this reach prior to overbank flow is approximately 1,200 cfs.

The main channel in the reach upstream of the bridge has an average depth of 6 feet and an average width of 85 feet. Within the banks of this reach, the gulch has two channels: the left channel is the main flow, and the right channel provides relief during higher flows. Because both channels are within the main banks of the gulch, the total flow capacity in this reach prior to overbank flow is approximately 2,500 cfs.

3.2.2 100-year Flood Elevations (Existing Bridge)

The 100-year water surface elevation at the upstream face of the existing bridge was determined to be 7.51 feet. The roadway elevation is approximately 4.90 feet. Therefore the existing bridge will be overtopped by 2.6 feet during a 100-year flood. Figure 3-1 outlines the extents of the 100-year floodplain.


1109.5
933.9
822.3
743.9
683.9
623.9
558.6
515.3
497
411.9
332.1
240.3
Approximate Floodplain based on 2002 FIRM
Limit of WEST Consultants Bridge Study
Kawela Gulch
BRIDGE
LIMIT OF STUDY
KAMEHAMEHA V HWY
Legend
Model Cross Sections
Ineffective Flow Limits
100-year Floodplain
100-year Floodplain
Approximate Floodplain
Figure 3-1
Kawela Watershed
Floodplain Workmap
0 100 200 400 Feet
December 2006
WEST CONSULTANTS, INC.

4 REFERENCES

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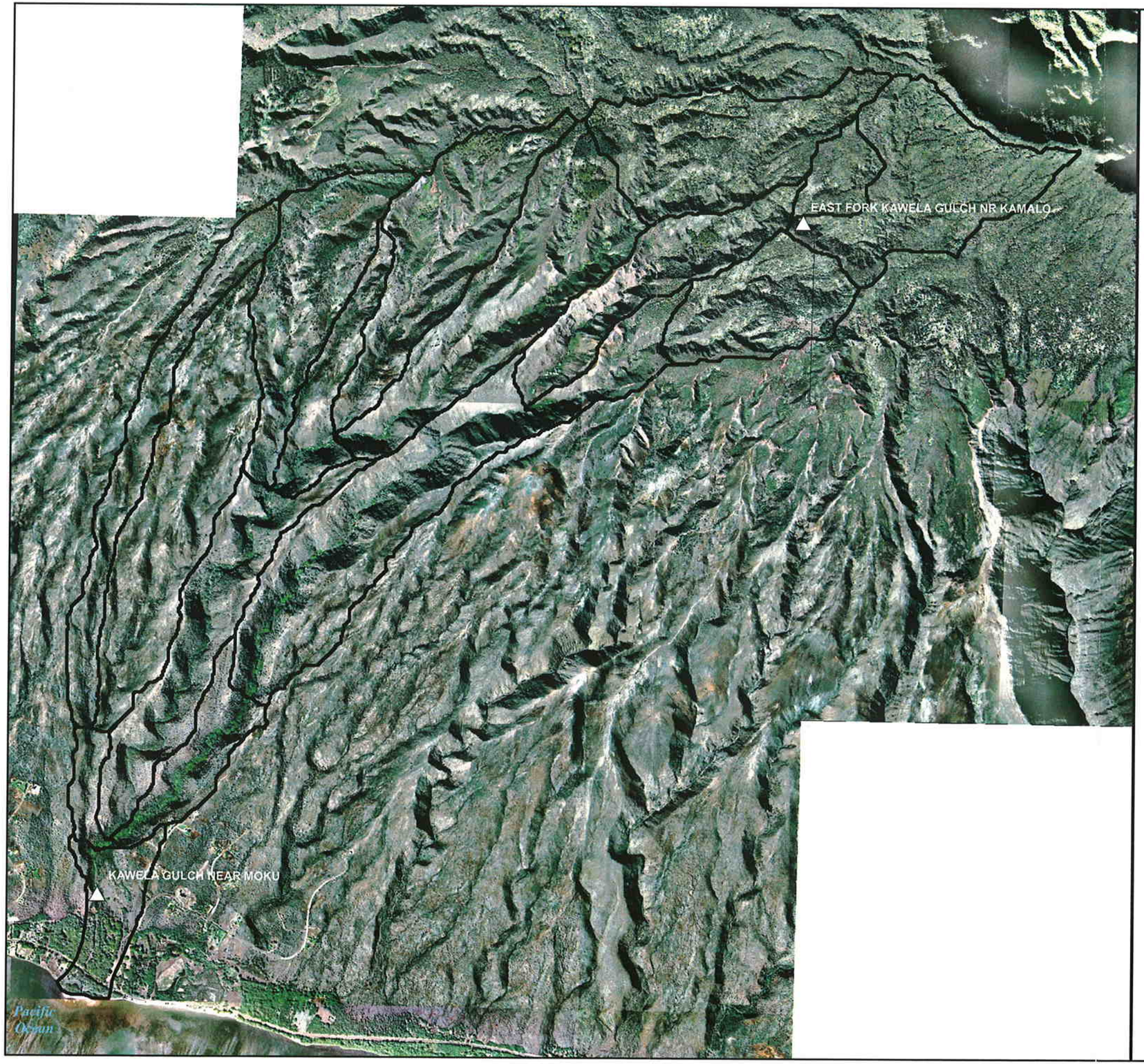
APPENDIX A

Kawela Gulch Watershed Data



Legend

- Stream Gage
- Subbasin Boundaries

Imagery Source: GlobeXplorer 2000

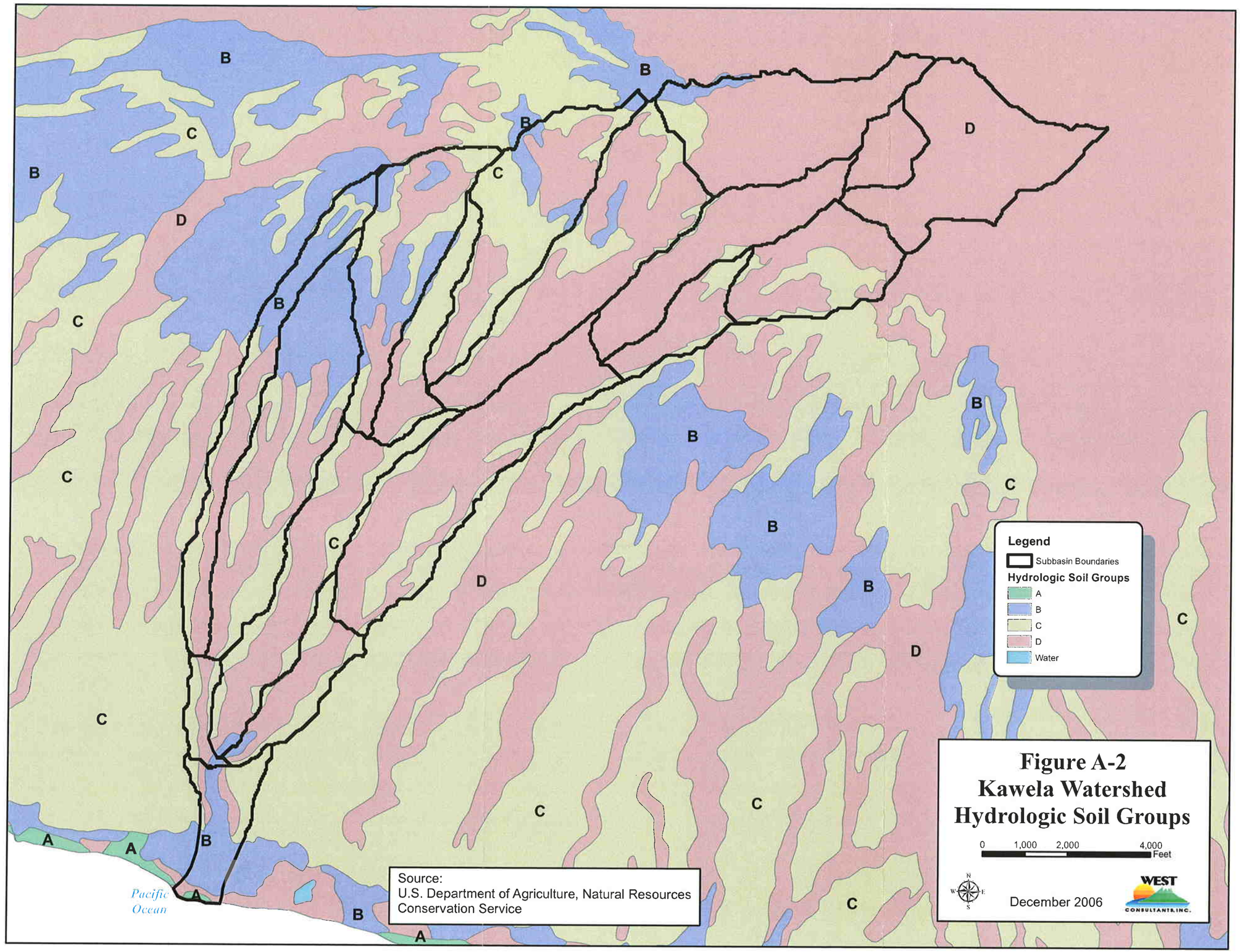
Figure A-1
Kawela Watershed
Aerial Imagery

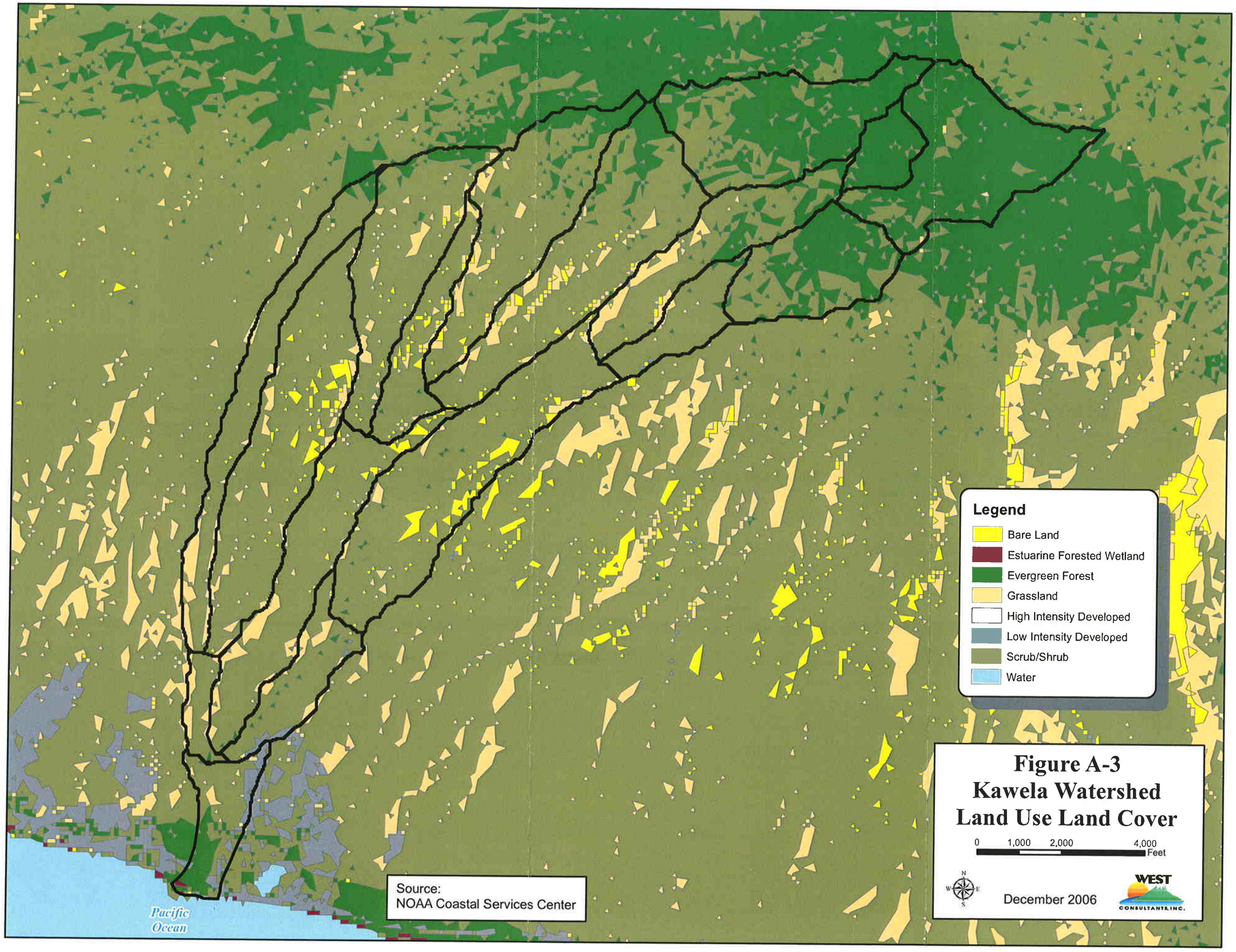
0 250 500 1,000 1,500 Meters

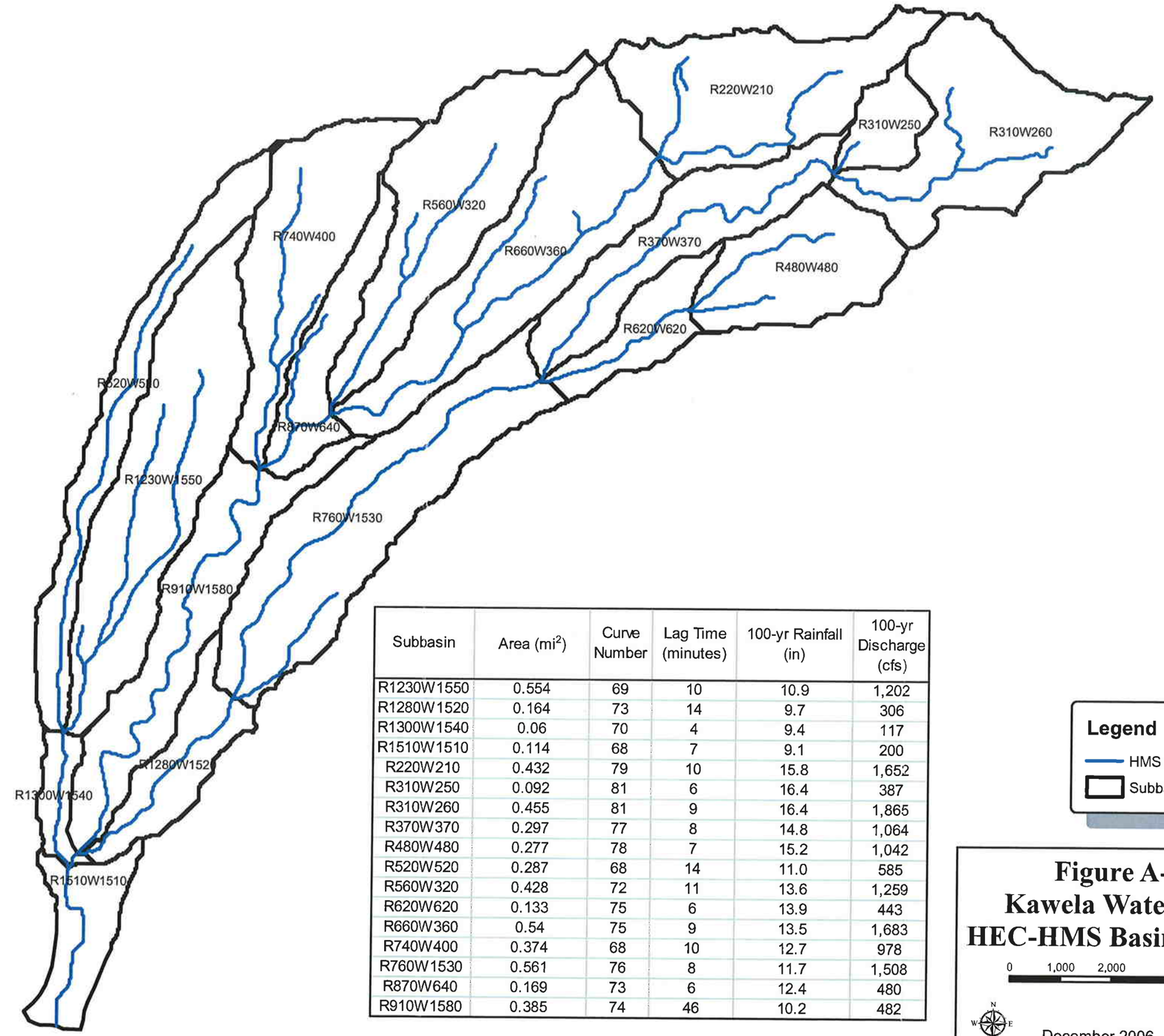
N W E S

December 2006

WEST CONSULTANTS, INC.


B
C
D
A
Pacific Ocean
Legend
Subbasin Boundaries
Hydrologic Soil Groups
A
B
C
D
Water
Source:
U.S. Department of Agriculture, Natural Resources Conservation Service
Figure A-2
Kawela Watershed
Hydrologic Soil Groups
0 1,000 2,000 4,000 Feet
N
W E
S
December 2006
WEST
CONSULTANTS, INC.


Legend
Bare Land
Estuarine Forested Wetland
Evergreen Forest
Grassland
High Intensity Developed
Low Intensity Developed
Scrub/Shrub
Water
Source:
NOAA Coastal Services Center
Pacific
Ocean
Figure A-3
Kawela Watershed
Land Use Land Cover
0
1,000
2,000
4,000
Feet
N
W
E
S
December 2006
WEST
CONSULTANTS, INC.



Subbasin	Area (mi^2)	Curve Number	Lag Time (minutes)	100-yr Rainfall (in)	100-yr Discharge (cfs)
R1230W1550	0.554	69	10	10.9	1,202
R1280W1520	0.164	73	14	9.7	306
R1300W1540	0.06	70	4	9.4	117
R1510W1510	0.114	68	7	9.1	200
R220W210	0.432	79	10	15.8	1,652
R310W250	0.092	81	6	16.4	387
R310W260	0.455	81	9	16.4	1,865
R370W370	0.297	77	8	14.8	1,064
R480W480	0.277	78	7	15.2	1,042
R520W520	0.287	68	14	11.0	585
R560W320	0.428	72	11	13.6	1,259
R620W620	0.133	75	6	13.9	443
R660W360	0.54	75	9	13.5	1,683
R740W400	0.374	68	10	12.7	978
R760W1530	0.561	76	8	11.7	1,508
R870W640	0.169	73	6	12.4	480
R910W1580	0.385	74	46	10.2	482

Legend

HMS River

Subbasin Boundaries

Figure A-4
Kawela Watershed
HEC-HMS Basin Layout

0 1,000 2,000 4,000 Feet

December 2006

WEST CONSULTANTS, INC.

APPENDIX B

HEC-FFA Results

```
**********************************      **********************************
*                FFA                 *      *                              *
*     FLOOD FREQUENCY ANALYSIS       *      *   U.S. ARMY CORPS OF ENGINEERS   *
*     PROGRAM DATE:  FEB 1995        *      * THE HYDROLOGIC ENGINEERING CENTER *
*          VERSION:  3.1             *      *         609 SECOND STREET        *
*     RUN  DATE   AND   TIME:        *      *      DAVIS, CALIFORNIA 95616     *
*        17 APR 06    14:19:17       *      *          (916) 756-1104          *
*                                    *      *                              *
**********************************      **********************************


 INPUT FILE NAME: kawela.dat
OUTPUT FILE NAME: kawela.out



**TITLE RECORD(S)**
TT   KAPAAKEA HOMESTEAD FLOOD REDUCTION STUDY
TT   Log-Pearson Type III Distribution
TT   Period of Record - 25 Years

**STATION IDENTIFICATION**
ID   16415000 EF Kawela Gulch nr Kamalo, Molokai, HI

**DSS WRITE PATHNAME**
ZW   /KAPAAKEA FLOOD REDUCTION/KAWELA GULCH/FREQ-FLOW//1946-1971//

**GENERALIZED SKEW**
     ISTN   GGMSE    SKEW
GS  15000    .000    -.05

**SYSTEMATIC EVENTS**
     25 EVENTS TO BE ANALYZED

**END OF INPUT DATA**
ED ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++


ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ   FINAL RESULTS   ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

-PLOTTING POSITIONS- 16415000 EF Kawela Gulch nr Kamalo, Molokai,
ÉÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
º       EVENTS ANALYZED      ³          ORDERED EVENTS          º
º                     FLOW    ³        WATER      FLOW   WEIBULL  º
º MON DAY  YEAR       CFS     ³  RANK  YEAR       CFS    PLOT POS º
ÇÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¶
º  10  10  1946       181.    ³     1   1948      2260.     3.85  º
º   1  26  1948      2260.    ³     2   1965      1100.     7.69  º
º   2   8  1949       220.    ³     3   1967       878.    11.54  º
º   8  15  1950       209.    ³     4   1962       461.    15.38  º
º  11  30  1950       418.    ³     5   1951       418.    19.23  º
º  10  30  1951       209.    ³     6   1959       330.    23.08  º
º  10  15  1952        88.    ³     7   1955       317.    26.92  º
º  12  27  1953       108.    ³     8   1958       317.    30.77  º
º  11  29  1954       317.    ³     9   1968       307.    34.62  º
º  12  21  1955       292.    ³    10   1971       298.    38.46  º
º  11  30  1956       118.    ³    11   1956       292.    42.31  º
º   2  28  1958       317.    ³    12   1963       272.    46.15  º
```

	1	17	1959	330.		13	1969	268.	50.00
	2	16	1960	220.		14	1961	224.	53.85
	1	26	1961	224.		15	1960	220.	57.69
	10	31	1961	461.		16	1949	220.	61.54
	3	26	1963	272.		17	1950	209.	65.38
	11	9	1963	79.		18	1952	209.	69.23
	4	13	1965	1100.		19	1947	181.	73.08
	10	12	1965	178.		20	1966	178.	76.92
	11	4	1966	878.		21	1970	168.	80.77
	1	16	1968	307.		22	1957	118.	84.62
	1	9	1969	268.		23	1954	108.	88.46
	12	28	1969	168.		24	1953	88.	92.31
	11	25	1970	298.		25	1964	79.	96.15

-OUTLIER TESTS -

HIGH OUTLIER TEST

BASED ON 25 EVENTS, 10 PERCENT OUTLIER TEST VALUE K(N) = 2.486

1 HIGH OUTLIER(S) IDENTIFIED ABOVE TEST VALUE OF 1753.

NOTE - COLLECTION OF HISTORICAL INFORMATION AND COMPARISONS
WITH SIMILAR DATA SETS SHOULD BE EXPLORED IF NOT
INCORPORATED IN THIS ANALYSIS.

LOW OUTLIER TEST

BASED ON 25 EVENTS, 10 PERCENT OUTLIER TEST VALUE K(N) = 2.486

0 LOW OUTLIER(S) IDENTIFIED BELOW TEST VALUE OF 41.6

-SKEW WEIGHTING -

BASED ON 25 EVENTS, MEAN-SQUARE ERROR OF STATION SKEW = .321
DEFAULT OR INPUT MEAN-SQUARE ERROR OF GENERALIZED SKEW = .302

FINAL RESULTS

-FREQUENCY CURVE- 16415000 EF Kawela Gulch nr Kamalo, Molokai,

COMPUTED CURVE FLOW IN CFS	EXPECTED PROBABILITY FLOW IN CFS	PERCENT CHANCE EXCEEDANCE	CONFIDENCE LIMITS .05 FLOW IN CFS	.95
3720.	5710.	.2	8830.	2150.
2660.	3620.	.5	5720.	1630.
2040.	2570.	1.0	4060.	1300.
1540.	1810.	2.0	2830.	1030.
1030.	1130.	5.0	1690.	729.

	731.	775.	10.0	1110.	543.
	496.	510.	20.0	693.	382.
	254.	254.	50.0	326.	196.
	142.	139.	80.0	185.	101.
	108.	104.	90.0	144.	73.
	88.	83.	95.0	120.	56.
	62.	56.	99.0	89.	36.

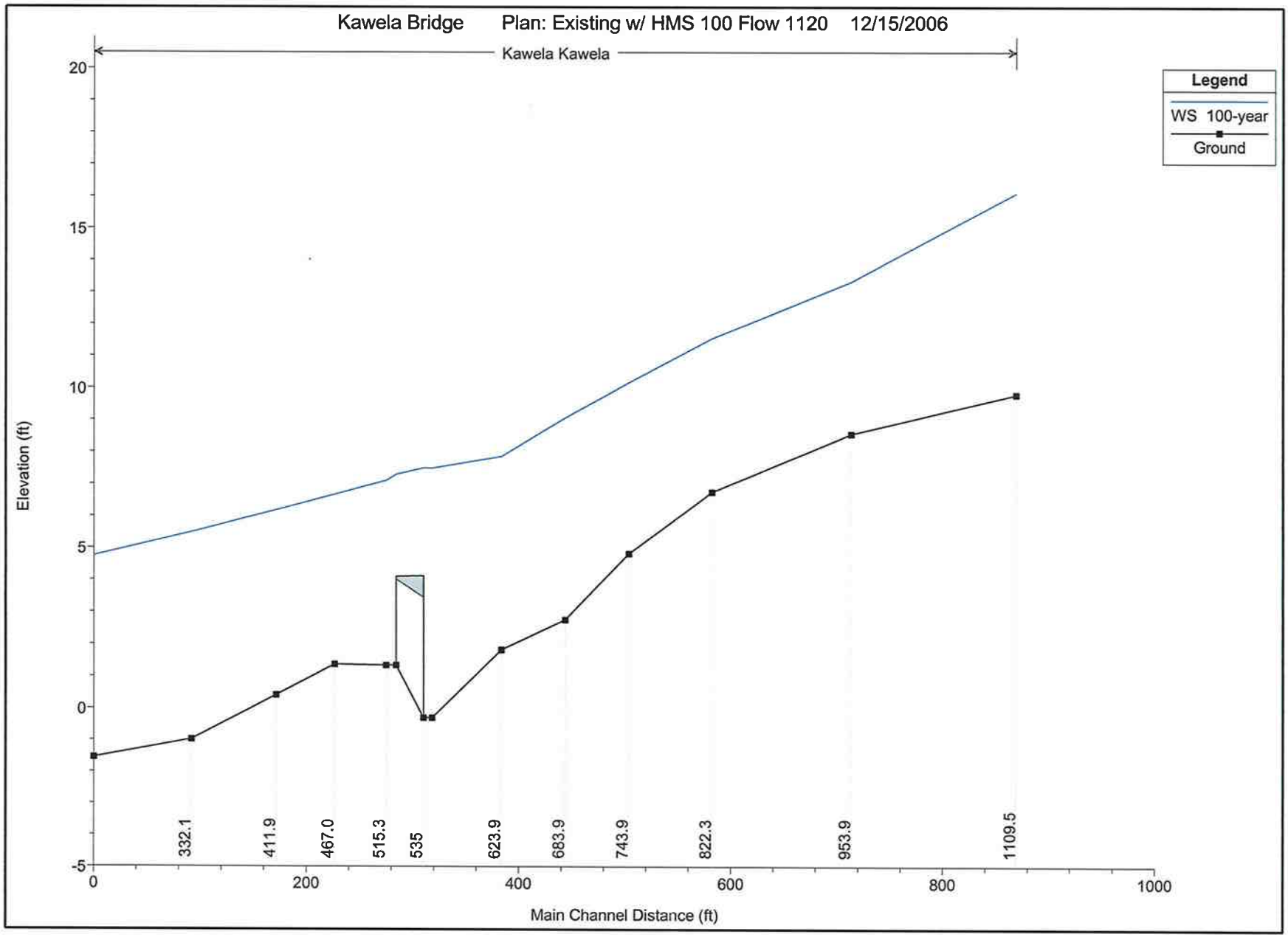
SYSTEMATIC STATISTICS

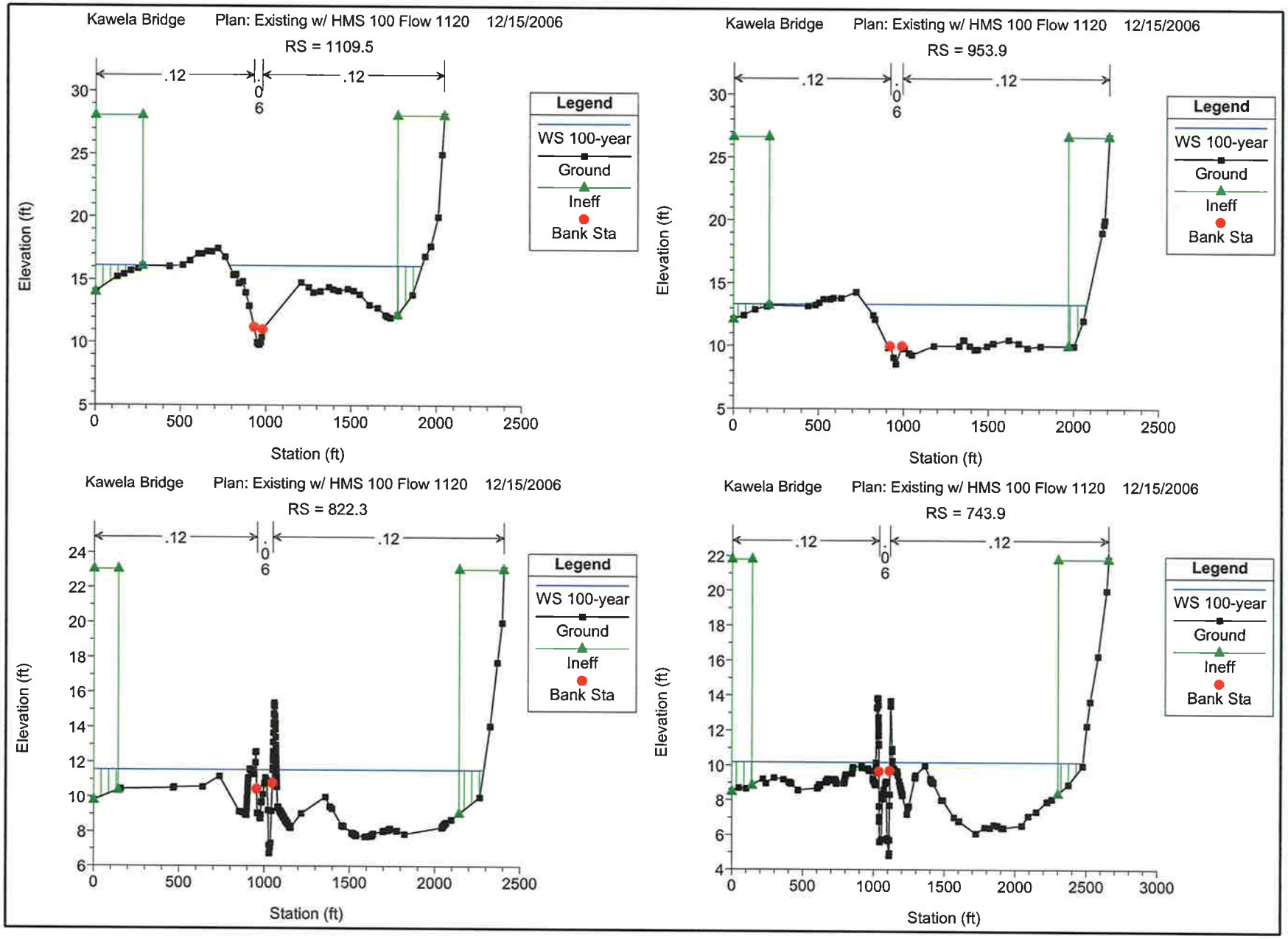
LOG TRANSFORM: FLOW, CFS		NUMBER OF EVENTS	
MEAN	2.4316	HISTORIC EVENTS	0
STANDARD DEV	.3267	HIGH OUTLIERS	0
COMPUTED SKEW	.9933	LOW OUTLIERS	0
REGIONAL SKEW	-.0500	ZERO OR MISSING	0
ADOPTED SKEW	.5000	SYSTEMATIC EVENTS	25

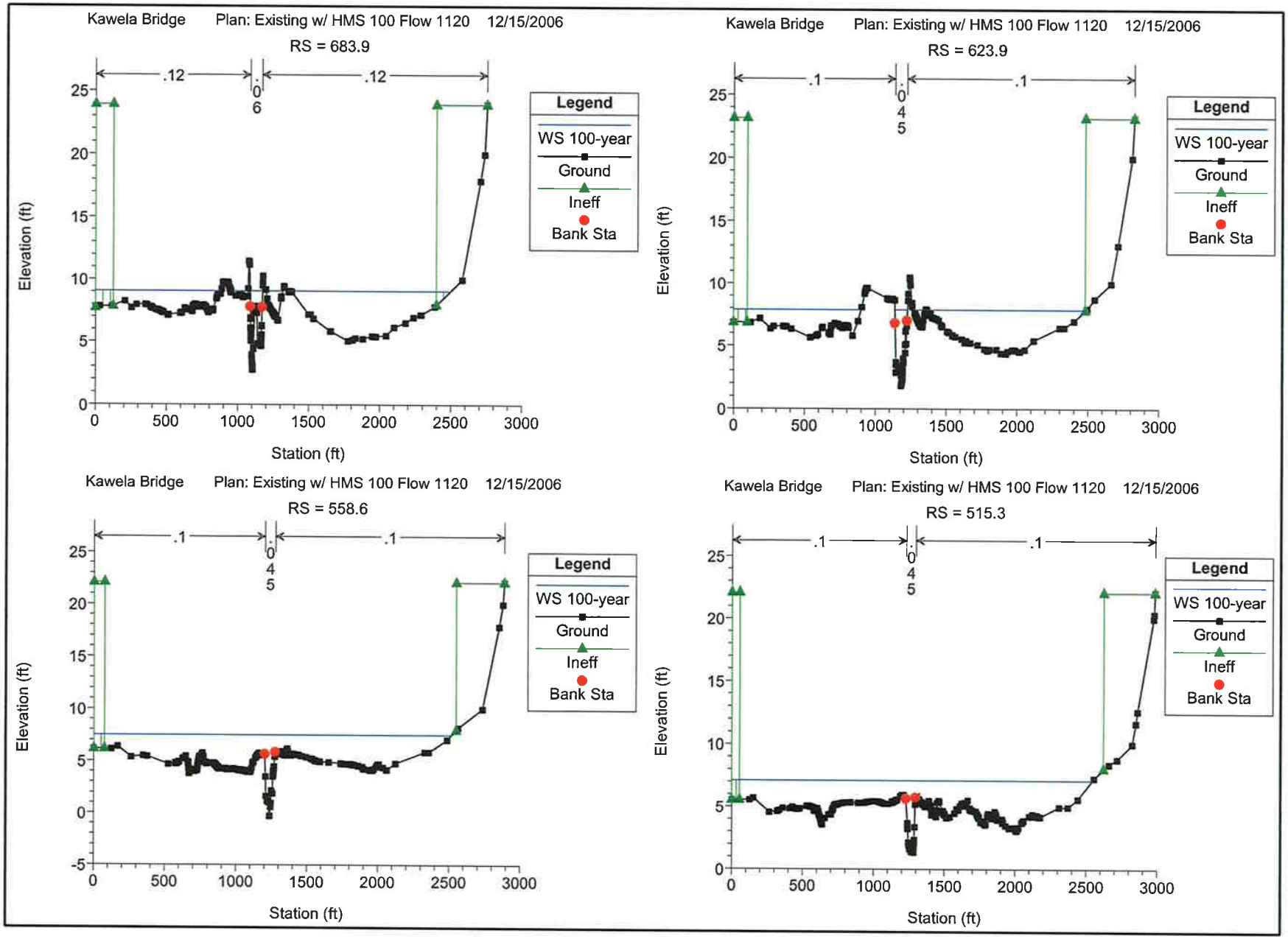
++++++++++++++++++++++++++
+ END OF RUN   +
+ NORMAL STOP IN FFA   +
++++++++++++++++++++++++++

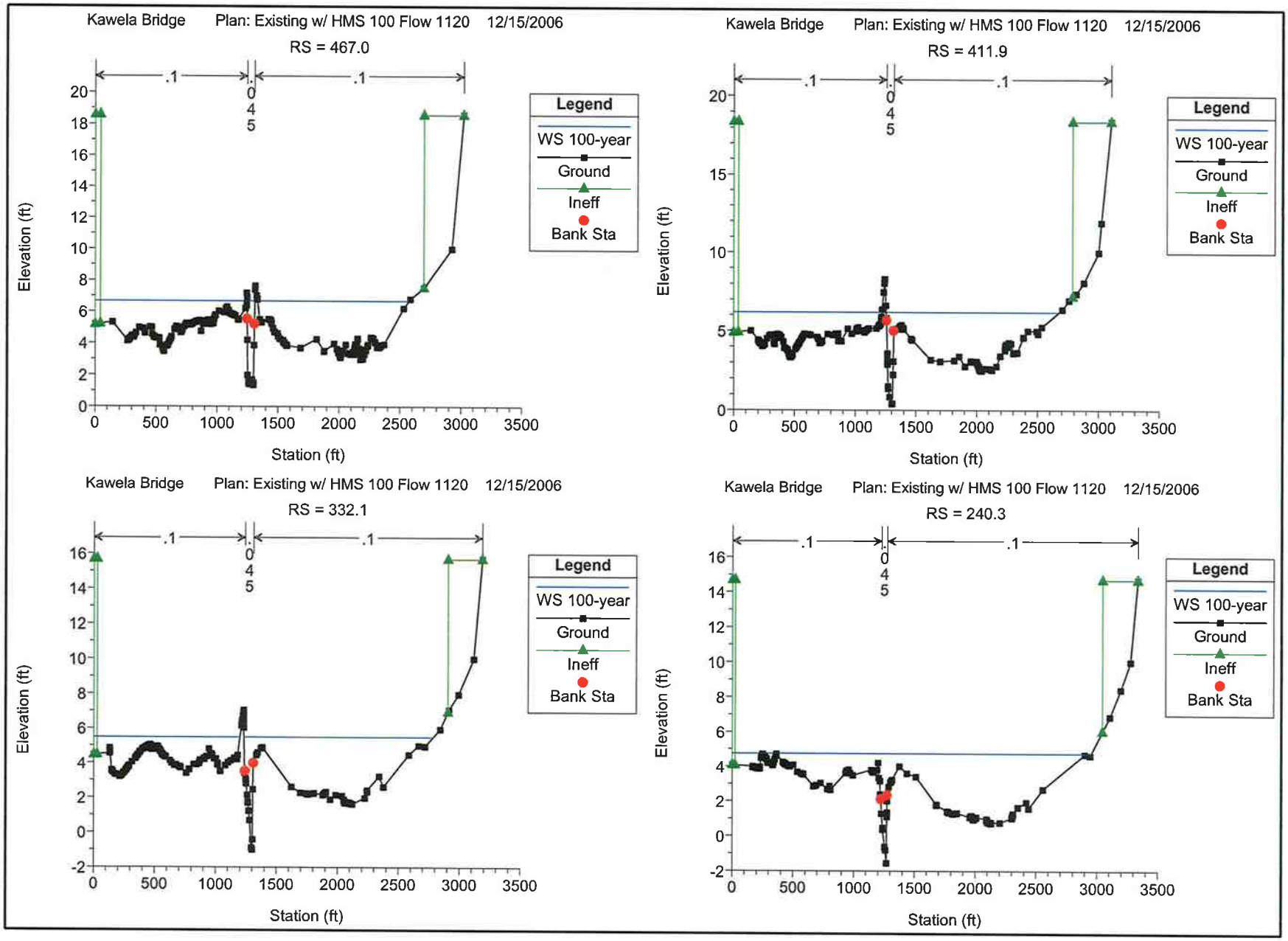
APPENDIX C

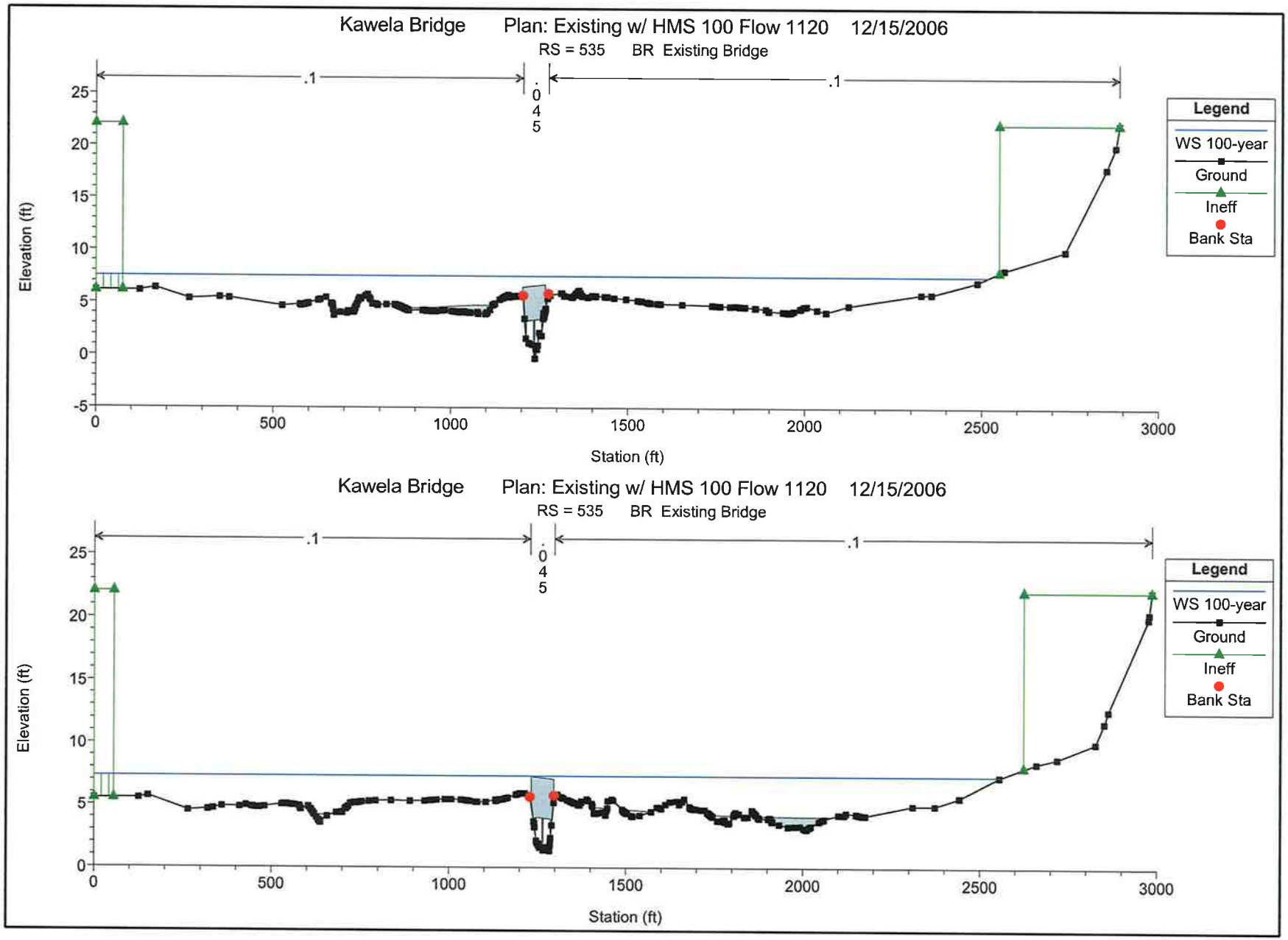
HEC-RAS Existing Bridge Results


Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
Kawela Kawela
Legend
WS 100-year
Ground
Elevation (ft)
20
15
10
5
0
-5
332.1
411.9
467.0
515.3
535
623.9
683.9
743.9
822.3
953.9
1109.5
0
200
400
600
800
1000
Main Channel Distance (ft)


Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 1109.5
.12
.12
0
6
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 953.9
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 822.3
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 743.9


Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 683.9
.12
.06
.12
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 623.9
.1
.045
.1
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 558.6
.1
.045
.1
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 515.3
.1
.045
.1
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 467.0
Elevation (ft)
Station (ft)
Legend
WS 100-year
Ground
Ineff
Bank Sta
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 411.9
Elevation (ft)
Station (ft)
Legend
WS 100-year
Ground
Ineff
Bank Sta
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 332.1
Elevation (ft)
Station (ft)
Legend
WS 100-year
Ground
Ineff
Bank Sta
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 240.3
Elevation (ft)
Station (ft)
Legend
WS 100-year
Ground
Ineff
Bank Sta


Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 535 BR Existing Bridge
.1
.045
.1
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
25
20
15
10
5
0
-5
0
500
1000
1500
2000
2500
3000
Kawela Bridge Plan: Existing w/ HMS 100 Flow 1120 12/15/2006
RS = 535 BR Existing Bridge
.1
.045
.1
Legend
WS 100-year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: Ex HMS 100 River: Kawela Reach: Kawela Profile: 100-year

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Kawela	1109.5	100-year	13300.00	9.81	16.11	16.11	17.11	0.028057	13.41	2699.91	1620.53	0.98
Kawela	953.9	100-year	13300.00	8.57	13.34	11.95	13.61	0.013565	7.35	3864.00	1795.39	0.64
Kawela	822.3	100-year	13300.00	6.75	11.57	10.16	11.74	0.015598	5.08	4383.84	2248.49	0.61
Kawela	743.9	100-year	13300.00	4.82	10.19	9.09	10.41	0.019104	6.83	4232.28	2436.91	0.70
Kawela	683.9	100-year	13300.00	2.75	9.08	8.22	9.32	0.017473	7.36	4308.88	2362.42	0.69
Kawela	623.9	100-year	13300.00	1.82	7.87	7.65	8.37	0.013972	10.00	3990.73	2199.45	0.86
Kawela	558.6	100-year	13300.00	-0.30	7.50	6.70	7.70	0.005086	7.02	6006.90	2518.17	0.54
Kawela	535		Bridge									
Kawela	515.3	100-year	13300.00	1.34	7.11	6.33	7.30	0.006407	7.12	5732.46	2544.30	0.59
Kawela	467.0	100-year	13300.00	1.37	6.68	6.07	6.93	0.008337	8.25	5232.02	2549.34	0.67
Kawela	411.9	100-year	13300.00	0.41	6.19	5.67	6.45	0.009357	8.46	5144.15	2641.99	0.71
Kawela	332.1	100-year	13300.00	-0.98	5.49	4.71	5.72	0.008579	7.87	5326.34	2750.86	0.67
Kawela	240.3	100-year	13300.00	-1.55	4.75	3.92	4.97	0.008003	8.24	5549.86	2953.35	0.66

APPENDIX B.

Water Quality and Biological Surveys of Kawela Stream, Kawela, Moloka`i, Hawai`i

Water quality and biological surveys of Kawela Stream, Kawela, Moloka'i, Hawai'i[1]

September 25, 2006 **Draft** *AECOS* No. 1124

Susan Burr
AECOS, Inc.
45-939 Kamehameha Highway, Room 104
Kaneohe, Hawai'i 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

On June 30, 2006, two *AECOS* biologists conducted a reconnaissance survey of Kawela Stream on the southern coast of East Moloka'i. (Figure 1). The purpose of the survey was to ascertain biological resources and assess water quality around the Kamehameha V Highway bridge, which is proposed for replacement. We documented the aquatic fauna found within the proposed project area and looked for sensitive native aquatic species and federally-listed species in the stream. This report presents findings of the survey

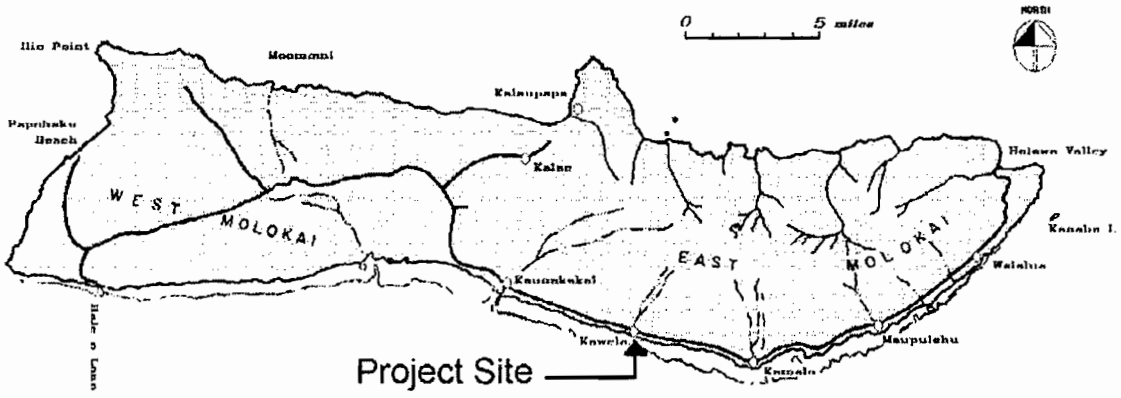


Figure 1. Project location on the Island of Moloka'i.

[1] This report was prepared for use by Kai Hawaii in an environmental assessment of the project. As such, it will become part of the public record for a government project.

General Site Description

The southern coast of Moloka'i has a characteristically dry climate and most streams are either perennial and interrupted at the coast, or are intermittent. Kawela Stream (State Perennial Stream ID No. 4-2-15) is a multi-branched, interrupted stream that extends from the Moloka'i Forest Reserve to the ocean near the town of Kawela (Figure 2). Only the upper reaches of the West and East Forks are perennial; much of the stream course is dry throughout the year. A *muliwai* (coastal estuarine pond) extends from the behind the ocean shore to the vicinity of the highway bridge.

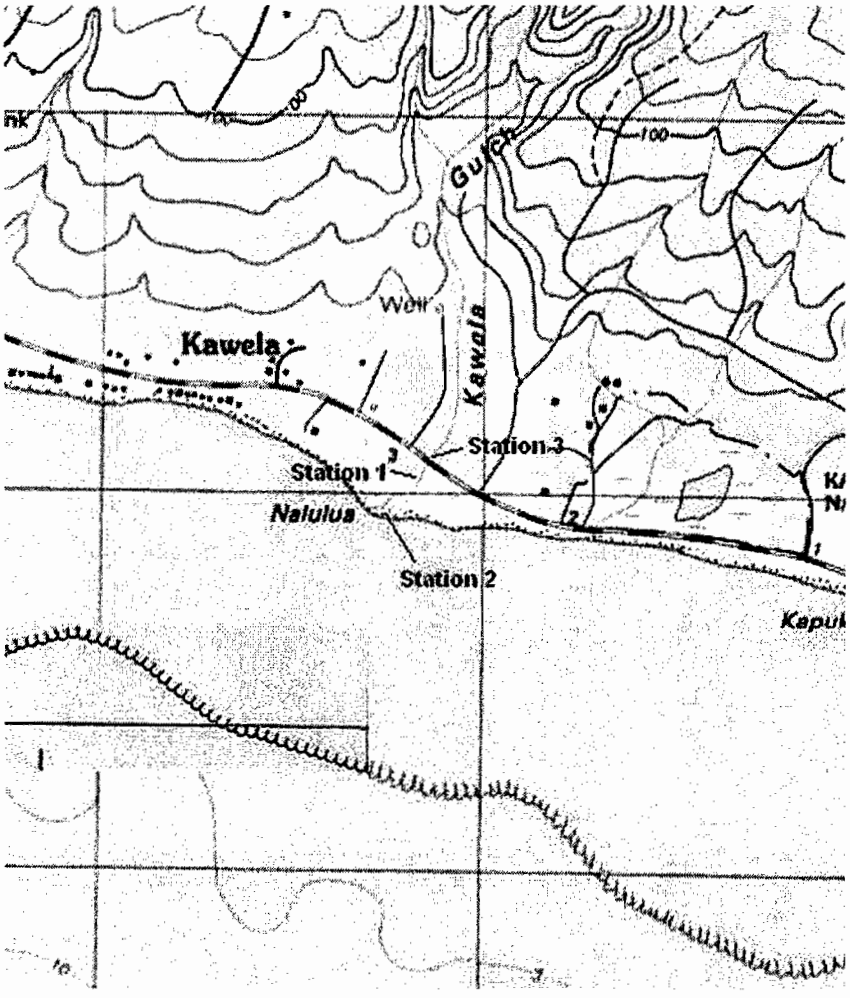


Figure 2. The project site where Kamehameha V Highway crosses Kawela Stream with water quality sampling locations indicated on map.

Kawela Stream arises (on the highest branch) above 365 m (1200 ft) along the crest of the East Molokai volcano. The two forks of the stream are deeply incised throughout until the coastal plain, not far upstream from the bridge, at which point the stream bed widens and is hardly at all incised (less than 2 m). Upstream from the bridge, the stream bed consists of fine sediments and rounded boulders, the banks are lined with monkeypod (*Samanea saman*) and Java plum (*Syzgium cumini*) trees, and the dry stream bed is vegetated with various ruderal (weedy) herbaceous plants (Figure 3).

Figure 3. The dry stream bed upstream from Kamehameha V Highway Bridge.

At the time of our survey there was a large isolated pool directly beneath the highway bridge (see Figure 5c). Our *in situ* water quality measurements of this pool indicate that the water is brackish and is maintained by groundwater seepage. Just downstream from the bridge, the banks are fairly steep and appear to have been augmented by the deposition of fill, possibly material dredged from the stream bed near the bridge.

The *muliwai* extends from about 30 m (100 ft) *makai* of the highway bridge to the ocean shore (see Figure 5a). Approximately 60 m (197 ft) downstream from the bridge there is a small dry channel entering the right (west) bank of the *muliwai*. The *muliwai* has a sediment bottom and is bordered by a wide floodplain in both directions. The mouth of the *muliwai* is blocked by a wide beach berm (Figure 4).

Figure 4. The mouth of the Kawela Stream *muliwai* blocked by a wide beach berm.

Java plum and monkey pod trees and various ruderal herbaceous plants are present on the banks and in the stream bed near the highway crossing. Mangroves (*Rhizophora mangle*) are the dominant vegetation downstream towards the mouth of the estuary. Pickleweed (*Batis maritima*) and kiawe (*Prosopis pallida*) dominate the floodplain near the beach. Other conspicuous plants present in the project area include Indian fleabane (*Pluchea indica*), lion's ear (*Leonotis nepetifolia*), sourbush (*Pluchea carolinensis*), *koa haole* (*Leucaena leucocephala*), and tree tobacco (*Nicotiana glauca*). The vegetation present near the highway are all introduced (non-native) species able to recover from periodic disturbance of the soil.

The introduced red mangrove (*Rhizophora mangle*) dominates much of the southwestern shoreline of Moloka'i. Offshore from the mangroves, the nearshore area around Kawela consists almost entirely of sandy reef flats. The coral reef off Kawela is part of a large fringing reef system that extends along the entire south coast of Moloka'i. This reef is very broad and shallow, with depths of only about 0.5 m (1.6 ft) across much of its expanse (*AECOS*, 1995).

A US Geological Survey (USGS) gage station (No. 16415600) is located on Kawela Stream at the 12 m (40 ft) elevation (USGS, 2006). The annual mean stream flow recorded in 2005 for this station is 3.08 cfs and a peak stream flow of 3,190 cfs was recorded in 2002. The stream rarely has any flow at this station during the dry season months.

Water Quality

On June 30, 2006, *AECOS* biologists collected water samples from two locations and measured certain field parameters at one additional location in Kawela Stream (see Figure 2). Station 1 was located in the *muliwai* approximately 30 m (98 ft) downstream from the highway (Figure 5a), Station 2 was located at the mouth of the *muliwai* (Figure 5b); and Station 3 was in an isolated pool of water beneath the highway bridge (Figure 5c). Some parameters were measured by field meter and others in water samples collected in appropriate containers and taken to the *AECOS* Laboratory in Kane'ohe, O'ahu the same day (*AECOS* Laboratory Log No. 21905). Table 1 lists field instruments and analytical methods used with these samples.

Table 1. Analytical methods and instruments used June 30, 2006 for water quality sampling of Kawela Stream, Moloka'i.

Analysis	Method	Reference	Instrument
Ammonia nitrogen	alkaline phenol	Karloeff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Chlorophyll-α	10200 H	Standard Methods 18th Edition (1992)	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 18th Edition (1992); EPA(1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100N Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.
EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.
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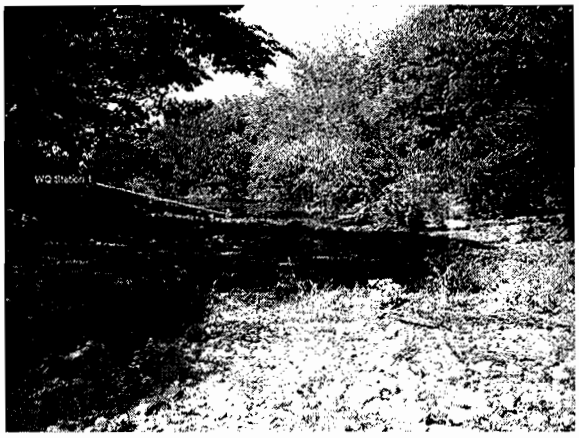
Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.
Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.



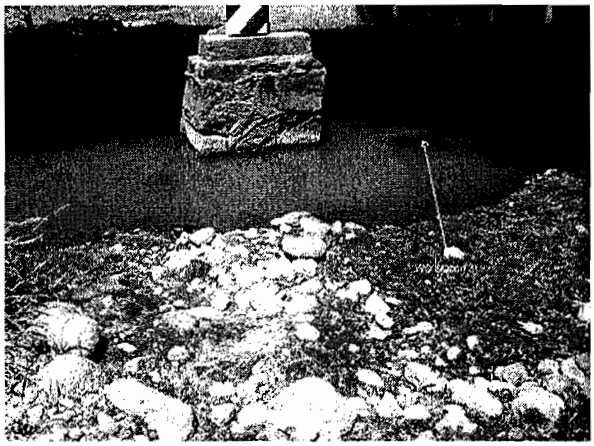


Figure 5a. (upper). Station 1 approximately 30 m downstream from the highway crossing. Figure 5b (middle). Station 2 at the mouth of the *muliwai.* Figure 5c. (lower). Station 3 in isolated pool underneath the highway bridge.

The primary purpose of these water quality measurements was to characterize the existing aquatic environment, not to set baseline values or determine compliance with Hawaii's Water Quality Standards. In fact, the State criteria for all nutrient measurements, turbidity, and chlorophyll α are based upon geometric mean values and a minimum of three separate samples per sampling location would be needed to compute a geometric mean (HDOH, 2004a). Nonetheless, our results can be evaluated against the water quality criteria for estuaries (Table 2) as long as limitations regarding a possible lack of representativeness are realized.

Table 2. State of Hawaii water quality criteria for estuaries (geometric mean values in the table) (HAR §11-54-05.2(d)(1)).

Total Nitrogen (µg N/l)	**Ammonia Nitrogen** (µg NH_4-N/l)	**Nitrate + Nitrite Nitrogen** (µg [NO_3+NO_2]-N/l)	**Total Phosphorus** (µg P/l)	**Chlorophyll-α** (mg/l)	**Turbidity** NTU
200.00	6.00	8.00	25.00	2.00	1.5

- pH - not vary 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 - not vary more than 1 °C from ambient.
- Salinity - not vary more than 10% from ambient

For the June 30, 2006 sampling event, the predicted high tide of 0.8 feet (lower high water, LHW) was at 07:41 am; the predicted morning low tide of 0.5 feet (higher low water or HLW) was at 11:58 am; and the predicted evening high tide of 2.0 feet (higher high water, HHW) was at 7:21 pm (NOAA/NOS, 2006). According to these tidal predictions, the morning sampling event represented a low tide.

The water quality data collected from the Kawela Stream *muliwai* on June 30, 2006 show marine water with fairly high total nitrogen and total phosphorus levels (Table 3). Most of the water quality parameters tested for will vary depending upon the time of day the samples are collected and the stage of the tide. Temperature, dissolved oxygen, and chlorophyll-α levels will show the greatest diurnal variation, whereas salinity, turbidity, and TSS will likely show the greatest tidal variation.

The temperature of the *muliwai* was relatively high, about 2 C° higher at the *mauka* end than the *makai* end, but 2 C° lower at the isolated pool than the *makai* end of the *muliwai*. The salinity measurements demonstrate that the *muliwai* had little, if any, freshwater influence at the time of sampling. However, the salinity of the isolated pool under the bridge was 10 ppt, demonstrating a significant fresh groundwater influence. The *muliwai* was supersaturated with dissolved oxygen (DO), but the percent saturation of DO was low in the isolated pool, a reflection of

stagnant conditions. Throughout the area, the pH range (7.34 - 8.13) was normal for estuaries.

Table 3. Water quality characteristics of the *muliwai* of Kawela Stream on June 30, 2006.

	Time	Temp. (°C)	Salinity (ppt)	DO (mg/l)	DO % sat	pH (pH units)	Turbidity (ntu)
Station 1	1140	29.3	35	10.56	168	8.05	24.2
Station 2	1155	26.9	35	7.68	124	8.13	47.4
Station 3 (isolated pool)	1125	25.2	10	4.41	57	7.34	--

	Time	TSS (mg/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	Chl. α (µg/l)
Station 1	1140	34	21	1	885	172	22.9
Station 2	1155	58.0	<1	1	593	244	15.6

Turbidity and TSS levels were high in the *muliwai*, but much lower than they would likely be during a period of terrestrial runoff from storm conditions (freshet flow). The high ammonia level measured at Station 1 is an indication of stagnant conditions at the *mauka* end of the *muliwai*. Nitrate + nitrite levels were low throughout, indicating that the remaining nitrogen in the total nitrogen measurements (593 - 885 µg/l) is organic nitrogen. The concentrations of total phosphorus and chlorophyll α were high throughout the *muliwai*. Thus, the high DO value here is the result of DO production by phytoplankton in the *muliwai*.

Aquatic Biota

During the June 30, 2006 survey, we observed both native and introduced aquatic animals in the *muliwai* and the isolated pool under the bridge, but no federally listed species (Federal Register, 1999a, b, 2001). Three species of native aquatic animals (the fishes *'o'opu naniha* or *Stenogobius hawaiiensis*, *'o'opu akupa* or *Eleotris sandvicensis*, and *'o'opu nakea* or *Awaous guamensis*, and the native prawn *'opae 'oeha'a* or *Macrobrachium grandimanus*) were observed. These fishes and prawn are anadromous, meaning that they migrate to and from the ocean but remain in the estuary or stream as adults. *Aholehole* (*Kuhlia xenura)* and schools of *'ama'ama* (*Mugil cephalus*) were abundant. *Aholehole* and *'ama'ama* reside in the estuary as juveniles and migrate into the ocean as they grow. Three species of introduced poecellids are common: Mexican molly (*Poecilia mexicana*) and mosquito fish (*Gambusia affins*) in the estuary, and rainbow fish or guppy (*Poecilia reticulata*) along with the molly in the pool beneath the bridge. The introduced Pacific prawn (*Macrobrachium lar*), also an amphidromous species, was observed in the isolated

pool. Table 4 is a listing with abundance categories given for the animals observed in Kawela Stream.

Table 4. Checklist of aquatic biota observed in Kawela Stream from observations made on June 30, 2006.

Species	Common name	Status	QC Code	Abundance	Location
	INVERTEBRATES				
ARTHROPODA, CRUSTACEA	(crustaceans)				
PALIEMONIDAE					
Macrobrachium grandimanus	*'opae 'oeha'a*	**End**	10	C	*muliwai*
Macrobrachium lar	Pacific prawn	Nat	10	O	pool
Palaemon debilis	grass shrimp	Nat	10	C	*muliwai*
ARTHROPODA, INSECTA	(insects)				
DIPTERA, EPHYDRIDAE	flies, gnats				
indet. species		?	10	C	*muliwai*
ODONATA, LIBULELLIDAE					
Orthemis ferruginea	dragonfly	Nat	10	U	*muliwai*
Pantala flavescens	globe skimmer	**Ind**	10	U	*muliwai*
	VERTEBRATES				
VERTEBRATA, PISCES	(fishes)				
ELEOTRIDAE					
Eleotris sandvicensis	*'o'opu akupa*	**End**	10	O	pool
GOBIIDAE					
Awaous guamensis	*'o'opu nakea*	**Ind**	10	C	pool
Stenogobius hawaiiensis	*'o'opu naniha*	**End**	10	A	*muliwai* & pool
KUHLIIDAE					
Kuhlia xenura	*aholehole*	**End**	10	A	*muliwai* & pool
MUGILIDAE					
Mugil cephalus	mullet, *'ama'ama*	**Ind**	10	A	*muliwai*
POECILIIDAE					
Poecilia mexicana	Mexican molly	Nat	10	C	*muliwai* & pool
Poecilia reticulata	rainbow guppy	Nat	10	C	pool
Gambusia affins	mosquito fish	Nat	10	O	*muliwai*
VERTEBRATEA, AVES					
Nycticorax nycticorax hoactili	black-crowned night-heron, *'auku'u*	**Ind**	10	R	Bridge

KEY TO SYMBOLS USED IN TABLE 4:

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.

QC Code:

10 - Observed in the field by aquatic biologist on June 30, 2006.

Abundance categories:

U - Uncommon - several to a dozen individuals observed.
O - Occasional - regularly encountered, but in small numbers.
C - Common - Seen everywhere, although generally not in large numbers.
A - Abundant - found in large numbers and widely distributed.

Location:

muliwai - estuary downstream of the bridge.
pool - isolated pool beneath the bridge.

The black-crowned night heron or *'auku'u* (*Nycticorax nycticorax hoactli*) was seen flying above the *muliwai* of Kawela Stream. The Department of Land and Natural Resources Division of Forestry and Wildlife lists the *'auku'u* as an indigenous bird of Hawai'i and is therefore protected from hunting, capture, or export under Hawai'i Administrative Rules Chapter 13-124. None of the observed species is listed as threatened or endangered, or otherwise would be considered rare or special by the State or Federal governments (DLNR, 1998; Federal Register, 2005; USFWS, 2005, 2006).

Project Assessments

The South Molokai Coast is listed as an impaired water body by the State, which means that the water body does not meet the Hawaii water quality standards. The geographic scope of listing is the nearshore waters from the shoreline out 5.5 m (18 ft), from the southwest point on Moloka'i to Waialua. The South Molokai Coast is listed on the Hawaii Department of Health, 2004 list of impaired waters in Hawaii, prepared under Clean Water Act §303(d) (HDOH, 2004b). The pollutants for which this area is listed are nutrients, turbidity, and suspended solids. As a result of this impaired listing, a study will be conducted to determine the total maximum daily load (TMDL) of pollutants that the nearshore waters of South Molokai Coast can accommodate without violating Hawaii's Water Quality Standards. Also, the Hawaii Department of Health (HDOH) may require more water quality testing than usual for the Section 401 Water Quality Certification monitoring that will be required for the replacement of the bridge across Kawela Stream.

The water quality of the *muliwai* of Kawela Stream is presently eutrophic but if proper best management practices (BMPs) are employed, the bridge replacement project will not have a significant effect on the quality of the water in the *muliwai* or off the shore. Best Management Practices (BMPs) to prevent sedimentation should be used during the construction phase, and construction should avoid, if possible, periods when high stream flow is likely. Silt curtains should be deployed to prevent movement of soils from off exposed banks and work areas during construction into the stream bed.

The design of both the new bridge and the temporary detour road should take into consideration the needs of migrating native aquatic animals. The scope of work for the project specifies that the design for the detour will include the use of pipe culverts due to its cost efficiency. The culverts should be placed flush with the stream bed to allow passage by migrating (amphidromous) fishes. Most important is that the ends of the culverts (especially the downstream ends) not hang out over the stream bed. Migrating native fauna will climb up wetted surfaces of escarpments, but cannot climb out to reach the lip of a hanging culvert.

The protected *'auku'u* is present the project area and their use of the area must be considered in devising BMPs for the construction phase of the project. This means only that the birds may not be harmed during the construction project. In general, this bird will avoid all on-going human activities at the construction site.

No wetlands were observed in the project area.

If the recommended BMPs are followed, this project is not anticipated to have any adverse impact on the water quality, flora, and fauna of Kawela Stream, the stream estuary (*muliwai*), and the nearshore reef flat.

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APPENDIX C.

Archaeological Inventory Report for the Kawela Bridge Replacement, Kawela Ahupua`a, Kona District, Moloka`i Island, Hawai`i

SCS Project Number 707-2

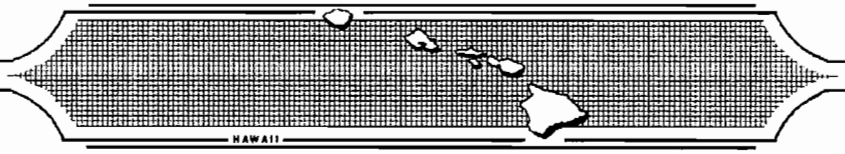
ARCHAEOLOGICAL INVENTORY REPORT FOR THE KAWELA BRIDGE REPLACEMENT, KAWELA AHUPUA`A, KONA DISTRICT, MOLOKA`I ISLAND, HAWAI`I [TMK 5-04-001]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

Revised December 2008

Prepared for:
Munekiyo and Hiraga, Inc.
and
Kai Hawaii, Inc.
31 N. Pauahi Street, Second Floor
Honolulu, HI 96817

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 975 Honolulu, Hawai`i 96813

ABSTRACT

Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey on land surrounding the Kawela Bridge in Kawela Ahupua`a, Kona District, Moloka`i Island (TMK: 5-04-001). One archaeological site was identified in a swale diverted from a larger drainage to the east. The site, State Site 50-60-04-2478, consisted of three features, all of which were rock-faced terraces that were interpreted as being agricultural in function. This site was assessed as significant under Criterion D of the Hawaii State Historic Preservation Division's criteria. However, Site 50-60-04-2468 has yielded sufficient information in the form of photographs and recorded information, therefore no additional archaeological work is recommended. Based on the project's close proximity to a known traditional battleground and Site 144, a Burial Mound, monitoring is recommended during ground altering activities.

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) was contracted by Kai Hawaii, Inc. to provide an Archaeological Inventory Survey surrounding the Kawela Bridge in Kawela Ahupua`a, Kona District, Moloka`i Island [TMK: 5-04-001] (Figures 1and 2). The survey covered approximately 96 m on each side of the bridge (*mauka/makai*), incorporated a portion of Kawela Gulch, and extended along Kamehameha V Highway approximately 305.0 m from the center of the bridge.

The Archaeological Inventory Survey of the project area was conducted to determine the presence/absence of archaeological features within the estimated impact area and to provide recommendations to the State Historic Preservation Division (SHPD) concerning site mitigation during planned development within the project area.

ENVIRONMENTAL SETTING

The project area was comprised of land sections both *mauka* and *makai* of the present Kawela Bridge, as well as areas abutting the bridge to the east and west (Figure 3). It included areas needed for a temporary detour road and bridge and the staging area for the construction parcel.

The proposed Kawela Bridge Replacement Project was located between milepost 5.110 and milepost 5.118 on Kamehameha V Highway (Route 450), in the Kona District, Kawela Ahupua`a, Moloka`i Island.

It is proposed that the present bridge be demolished and replaced with a longer and wider bridge that will conform to State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic Standards. According to the project assessment report provided by Kai Hawaii Inc., the new bridge will be accessible to bicycles and pedestrians and will be designed according to the Flood Insurance Study conducted by the Federal Emergency Management Agency for 100 year recurrence period (M & E Pacific, Inc. 2002). A detour is planned to allow traffic to flow around the bridge construction area and may include the use of pipe culverts, a concrete span, or possibly a new temporary bridge. All design considerations will meet current State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic Standards established by the State Department of Transportation and Federal Highway Administration.

It was noted that the Kawela Bridge was built in 1940, thus is over 50 years old and could possibly be categorized as an archaeological site. However, consultation with a historic architect at the State Historic Preservation Division established that as the bridge was built by the state, there are numerous detailed plans for its construction on file and no additional information was necessary.

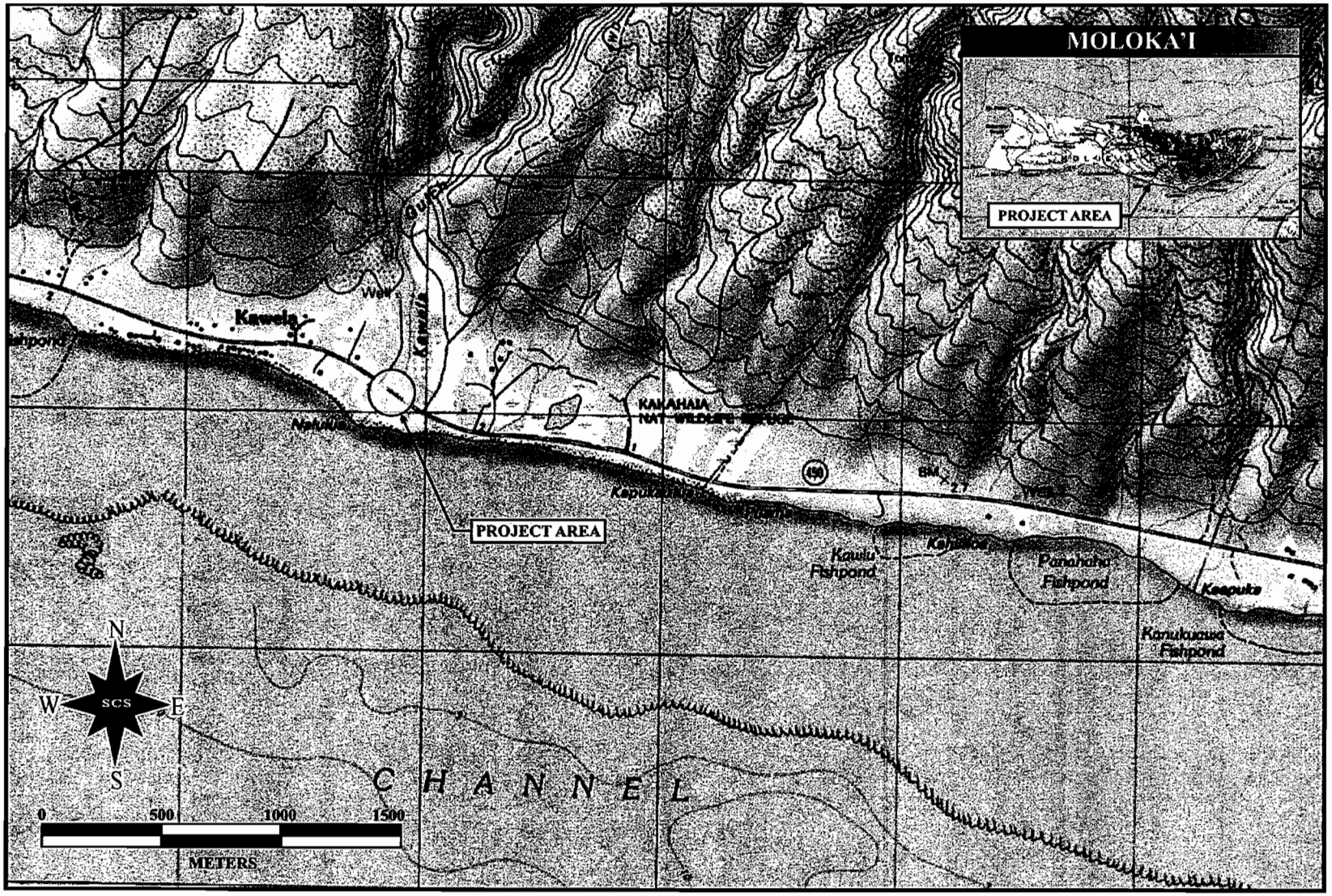

Figure 1: USGS Kaunakakai Quadrangle Showing Project Area.

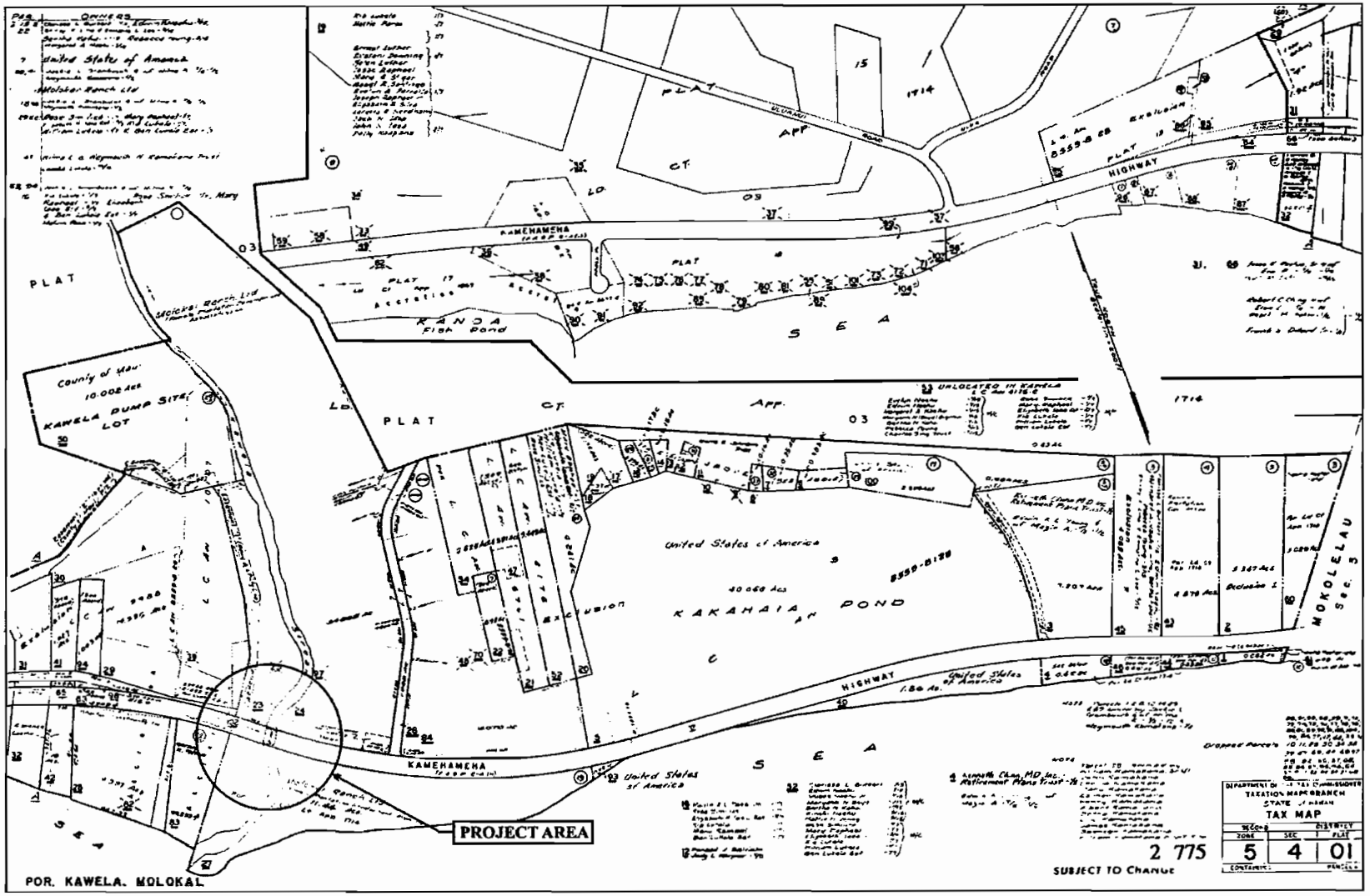

Figure 2: Tax Map Key [TMK] Showing Project Area.

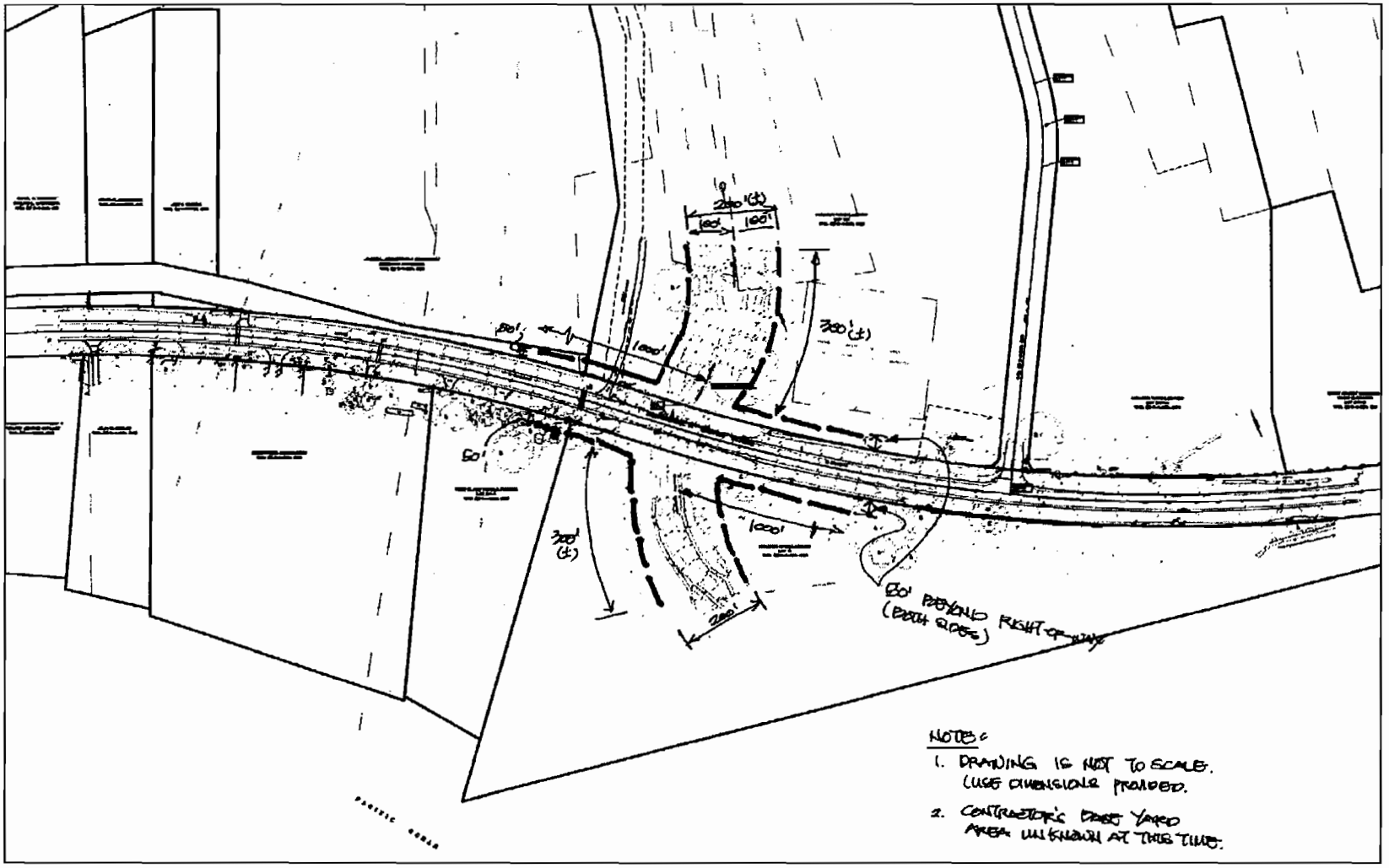

Figure 3: TMK Showing Approximate Area of Survey.

SOILS AND VEGETATION

Soils in the project area were in the Pelehu Series (Foote *et al.* 1972:Map Sheet 77) and consisted of well-drained soils on alluvial fans, stream terraces, and in basins (*ibid*:115). These soils were developed in alluvium and were washed from basic igneous rock. More specifically, the project area was covered with Pulehu stony sandy loam, effectively used for pasture and wildlife habitat. Weisler and Kirch described this soil as excellent for agricultural that produced high yields under irrigation from Kawela Gulch or other sources of fresh water along the coastal plain (1982, 1985). Annual rainfall amounts to 10 to 35 inches.

Dominant vegetation included *kiawe* (*Prosopis pallida*), some *`ilima* (*Sida fallax*), Java Plum (*Syzygium cumini*), and various introduced grasses on the *mauka* side (Figure 4). There was an abundance of *ākulikuli-kai* (*Batis maritime*, pickleweed), *kiawe*, and Mangrove (*Rhizophora mangle*) (Figure 5).

Figure 4: Photograph of *mauka* side of Kawela Bridge. View to North.

Figure 5: Photograph of *makai* side of Kawela Bridge. View to South.

CULTURAL HISTORICAL CONTEXT

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture which incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch 1985; Kirch and Sahlins Vol. 1, 1992:5, 119). During the span of A.D. 1100–1300, many new settlements were established in the previously unoccupied leeward regions; this is often referred to as the Expansion Period (Kirch 1985).

The concepts of the Hawaiian land system are helpful in understanding traditional land use in and around the project area. In general, several terms, such as *moku*, *ahupua`a*, *`ili* or

`ili `ā ina were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were, therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili* or *`ili `āina* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons: 33; Lucas 1995:40). The *mo`o `āina* were narrow strips of land within an *`ili*. The land holding of a tenant, or *hoa `āina*, residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61). The present project area was located in the *ahupua`a* of Kawela.

The island of Moloka`i consists of the Ko`olau and Kona Districts. Ko`olau district lands encompass the northern *ahupua`a* and consist of the wet, windward valleys that supported immense gardens of *lo`i kalo* (taro pondfields). The Kona District, located on the drier leeward coast, encompasses a fringing reef and an elaborate fishpond complex. A few small gulches east of Kawela contained *lo`i kalo* (Tomonari-Tuggle 1990:6, Summers 1971:2). Generally, however, the leeward side of the island was considered ideal for the dryland cultivation of sweet potato (*`uala* or *Ipomoea batatas*), gourds (*Lagenaria siceraria*) and yams (*Disoscorea alata*). In the Kona District of Moloka`i, sweet potato was planted along the southern, leeward shore. On *kula* lands (dry land, open country, pasture), sweet potato was still being planted into the1930s in some areas (Handy and Handy 1972).

In Kawela, habitation and agricultural structures were generally located on the lower ends of ridges (Weisler and Kirch 1985). Above these sites, to about 300 feet above mean sea level (amsl), were agricultural complexes that consisted of mounds and terraces. Kawela Ahupua`a encompassed a broad costal reef-flat providing the inhabitants of the area with shellfish, crustacea, fish, *limu* (seaweed), and *he`e* (octopus). In addition, access to five coastal fishponds containing *`ama`ama* (mullet, *Mugil cephalus*) was available. Both dry land cultivations and ocean resources were important aspects of Kawela's traditional subsistence economy. Initial use of the Kawela area was radiocarbon dated to approximately A.D. 1500 (Weisler and Kirch 1982).

WAHI PANA (SIGNIFICANT PLACES)

Scattered amongst the agricultural and habitation sites are other places of cultural significance to the *kama`aīna* of the region. According to the Hawai`i State Register of Historic Places, there are a number of battlefields in the Kawela area; however, only Paliku has been

specifically located. A burial mound containing the remains of some of the warriors (State Site 50-60-04-144) is nearby. Also listed is a *pu`uhonua* (place of refuge), or *pu`ukaua* (fortification), and a house site with an attached shrine. The latter two sites have been located on the ridge, away from the project area, but the battleground and burial mound are to the east in close proximity.

The National Register referred to these sites as the Kawela Complex and recorded:

> Feature 144 marks the location of an irregular-shaped burial mound at the Molokai Ranch's Kawela headquarters. As stated by Henry Meyer in 1965 (Summers 1971:95) burials were found just beyond the mango trees. The story was confirmed by Mr. Harry Otsuka, our guide, who pointed to a slight mound cut on the S by highway 45. He said that, at the time of highway construction, many burials were unearthed in the mound. No evidence of internment can't be seen now, as the mound is presently overgrown with grass. It is thus difficult to estimate the area of the burials, especially since the road construction removed and unknown part of the site. A 400-sq-m area would seem a reasonable estimate however. The "mound" is a sand dune, the origin of which may be partially natural and partly artificial (enlargement). No artifacts or midden were found. [On file, State Historic Preservation Division].

Summers quotes Cooke (1949) concerning the Paliku battleground in *Molokai: A Site Survey* (1971):

> The battlefield of Pakuhiwa was located midway between Kamiloloa and Kawela. . . . Most destructive battle of Kamehameha was fought in this coconut grove...Canoes are said to have been drawn up for four miles along the shore so that the battle could be fought to a finish [91].

In his book *Mololelo O Molokai*, Cooke adds:

> Near the east end of ranch property, the burial mound of warriors killed at the historic battle of Kawela is still evident. On a ridge separating east and west Kawela gulches and mauka of the shore at an elevation of two hundred feet, was a puu honua (a place of safety and refuge). This is a stone enclosure with high walls used as the main fortification [1949:110].

In spite of this claim by Cooke, there is no recorded evidence that Kamehameha ever fought a battle here nor has any record of it been found in any primary sources, such as Kamakau (1961), `I`i (1973), Malo (1951), Fornander (1980), or Desha (2000), when discussing Kamehameha's life and wars.

There is, however, a record of a battle fought between Kapi`iohokalani of O`ahu against the chiefs of Moloka`i that was supported by Alapa`inui of Hawai`i Island in the mid-1700s (Cordy 2002). Several accounts of this battle have been written.

Kamakau recorded:

> . . .He [Alapa`inui] sailed from Maui and landed and Puko`o. From Waialua to Kalua`aha the fleet of Hawaii extended. The fighting was in progress and Kamalo`o with Ka-pu-lei as the battlefield. There the forces of Hawaii, joined with those of Molokai, made a formidable array... The chief of Oahu, Ka-pi`i-oho-o-kalani, was encamped at Kalama`ula, and the country from Kaunakakai to Na`iwa was occupied by the chiefs and fighting men of Oahu. For four days the fighting went on with equal success on both sides, for Ka-pi`i-oho-o-kalani had drawn up his chiefs and fighting men side by side in the shape of a square like the threshold of a door. [With this formation he] drove into the opposing forces, while a right and left wing formed of lines of men one behind the other in the shape of a flying fish, made attacking and protecting wedges at the two sides. . . .On the fifth day at Kawela the decisive battle was fought. Every able-bodied man came out of his house to fight. The Molokai forces attacked from the hills, those of Hawaii from the sea, while a great number landed from the fleet and fought on land. The battle began in the morning and lasted until afternoon. The ruling chief of Oahu found himself surrounded by sea and by land and hemmed into a small space. Ka-pi`i-oho-o-kalani died at Kawela below Kamiloloa, and many chiefs and fighting men were slaughtered, but some escaped and sailed for Oahu [1961:70-71]

Fornander recounted the same story:

> . . . tidings arrived from Molokai [to Alapa`inui on Maui] that *Kapiiohokalani*, the son and successor of *Kualii*, the Moi of Oahu, had invaded the island of Molokai with a large force, and that several of the chiefs there were in great distress, having taken refuge in fortified mountain localities, while their possessions on the lowlands and their fishponds were ravaged and destroyed by the Oahu invaders, who were

said to have made their headquarters at Kalamaula and occupied the country from Kaunakakai to Naiwa.

When this intelligence reached *Alapainui*, having no occupation for his army and fleet on Maui, he concluded to go to Molokai to the assistance of the distressed chiefs there; the more so as some of them were his near relatives, being the sons and grandsons of *Keawe* of Hawaii with his Molokai wife, *Kanealai*. Leaving Maui, he crossed the Pailolo channel, and landed his fleet on the Molokai coast from Waialua to Kaluaaha. Having landed his army, he marched to Kamalo, and at Kapualei he met the forces of *Kapiiohokalani*. An obstinate fight ensued, which lasted for four days, without any decisive result; but as *Kapiiohokalani* retreated to Kawela, it is presumed that he suffered most. On the fifth day the battle was renewed at Kawela, extending as far as Kamiloloa. The Hawaiian troops being ranged along the seashore, and the auxiliary Molokai chiefs descending from the uplands with their men, *Kapiiohokalani* was hemmed in between them, and, after a severe fight from morning till far in the afternoon, he was completely routed with great loss of life, and himself slain. Those who escaped from the battle immediately evacuated Molokai and fled back to Oahu. [1969: 136-137]

This famous battlefield may still be seen in the place described, where the bones of the slain are the sports of the winds that sweep over that sandy plain, and cover or uncover them, as the case may be. The numerical strength of the two opposing armies is not mentioned in the legends, but to judge from the multitude of bones and the number of skulls that are bleaching in the sun when a strong north wind has removed their sandy covering, the numbers engaged on each side must have been reckoned by thousands (*ibid*:138)

HISTORIC PERIOD

Much knowledge of traditional land use patterns in the Hawaiian Islands is based upon written records scribed during the time of initial and early contact between native Hawaiians and the first European and American visitors to the islands. Early records, such as journals kept by travelers and missionaries, Hawaiian traditions that survived long enough to be written down, and archaeological investigations, have assisted archaeologists in understanding the past.

Although Moloka`i was observed by foreigners during Captain James Cook's return expedition to the islands in 1779, westerners did not make landfall on the island until 1786, with the arrival of Captain George Dixon (1789:92-93). Kamakau (1961:132-133; see also Fornander 1980 Vol. II:154) relates that at this time, Moloka`i was under the rule of Kahahana, a relative of Kahekili, the ruler of Maui Island and rival of Hawai`i Island chiefs. However, when Dixon

and his crew arrived on Moloka`i in 1786, Kahahana was dead and the island was under the control of Kahekili.

Kamehameha I, chief from Hawai`i Island, conspired to conquer Maui, O`ahu, and Kaua`i, and unify all of the major Hawaiian Islands under his sole proprietorship. After assuming control of Maui in 1790, Kamehameha proceeded to focus on uniting Moloka`i with the other islands under his rule. His plan was to procure the support of the Moloka`i chiefs against Kahekili, the powerful chief of Maui, who was then living on O`ahu. Kamehameha temporarily succeeded with this plan until he lost control of Maui. Kamehameha then returned to Hawai`i Island, having not secured authority over Moloka`i. Politically, Moloka`i was still under the control of Maui chiefs. In 1795, Kamehameha set out once more to broaden his kingdom. Summers relates that a fleet of canoes accompanying Kamehameha to Moloka`i were of such a great number that they extended along the coast from Kawela to Kalama`ula, which included the coast of Kaunakakai (1971:20). Kamehameha held council at Kaunakakai while his chiefs camped nearby at Kalama`ula. No battles were recorded as having been fought at this time, thereby suggesting that Moloka`i became a part of Kamehameha's kingdom through negotiation (Kamakau 1961).

In 1792, Vancouver recorded his impressions of Moloka`i while sailing along its southern coast towards O`ahu. Vancouver said of the eastern part of the island: "It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect" (Vancouver 1984). Archibald Menzies, a naturalist accompanying Vancouver's expedition, had a different impression. He was told by the natives of Moloka`i that "Kamehameha's descent upon it had desolated the country, and that it had not yet recovered its former state of population... desolating the country by destroying the fields and plantations of the inhabitants" (Menzies 1920:115, 118).

The settlement of missionaries along the southern coast of Moloka`i in 1832 attested to a large population in the region. A missionary census estimated the population here to be 8,000 people (Schmitt 1973:20). This information suggests that there were concentrated settlements near the project area.

THE GREAT *MĀHELE*

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was

forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great *Māhele* of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

Lunalilo, future king of Hawai`i, was given the *ahupua`a* of Kawela. Fifteen additional claims were made for *kuleana* in the *ahupua`a* during the *Māhele*, and nine LCAs were awarded. None are included in the project area. The LCA records included information during the early historic period most of which was a continuation of pre-Contact land use patterns. Most of the LCAs in Kawela clustered in the vicinity of the floodplain and delta and were *`ili* strips oriented *mauka/makai* (Weisler and Kirch 1985). To the immediate west of the project area, the *`ili* of Kanui in Kawela was awarded to Maunaloa in 1848 (LCA 10107). Foreign Testimony (234v15) added that he received the property from his parents who occupied the land from the time of Kamehameha I (Waihona `Aina Data Base 2006). The parcel was described as *kula* land, which was most conducive to dry land cultivars. Native testimony given by Ehu (148v6) concerning Maunaloa's land, referred to a "taro pasture in ili land of Kanui in Kawela." (*ibid.*).

Cattle were introduced 1832 quickly followed by sheep deer and goats. Pasture was needed for the cattle and lands acquired by Kamehameha V, including Kawela Ahupua`a, eventually formed the basis for the Moloka`i Ranch. The Ranch formed the American Sugar Company in the late 1800s; however, failure to procure the immense amount of fresh water needed for a successful cane crop soon ended the project (Summers 1971:24). With the collapse of the sugarcane industry, sheep and cattle ranching became the economic alternative for Moloka`i. Unfortunately, over grazing by cattle and other ungulates eventually let to the widespread destruction of native vegetation and the silting in of fishponds. By the 1920s, pineapple cultivation became another economic option in the drier sections of the island, and

many of the lands previously used for sweet potato were converted to pineapple plantations (Handy and Handy 1972).

PREVIOUS ARCHAEOLOGY

In the early 1900s, John Stokes (1909) spent 10 weeks on Moloka`i, surveying *heiau* (religious structures) and other notable sites. Kanoa Pond, Kakaha`ia Ponds and two other fishponds, were identified as belonging to Kawela Ahupua`a along, with the fishing grounds of Waiokama (Summers 1971). The battlefield of Pakuhiwa and the burial mound of the warriors were identified close to the project area. A *pu`uhonua* (place of refuge), or *pu`ukaua* (fortification) was recorded on the ridge separating the west and east sides of Kawela Gulch with a possible *heiau* on the west side of ridge (*ibid*). Petroglyphs were noted by Emory on a boulder situated on the ridge east of Kawela Gulch, around 300 feet amsl; a house site and family shrine are nearby (*ibid*)

Most of the archaeological studies have concentrated on the Kalama`ula-Kaunakakai area. This was the place of the *ali`i* as the *luakini heiau* and royal bath attest. However, Weisler and Kirch conducted a survey and excavation in Kawela during the 1980s (1982, 1985). The 1982 report concerned evaluations of the nature and significance of archaeological resources in the Kawela-Makakupa`ia region with recommendations for their long term protection and management. An archaeological survey of approximately 450 acres identified 79 previously unknown sites, including shrines, petroglyphs, platforms, L-, C-, U-shaped and linear shelters, enclosures, midden and lithic scatters, a dune habitation, terraces, modified outcrops and stone mounds, cairns, an *hōlua* slide, and natural shelters.

An archaeological survey and geomorphological study of Kakahai`a Pond was conducted in 1983 for the U.S. Fish and Wildlife Service (Weisler 1983). A four-stage model of shoreline change was presented, from the practice of slash-and-burn agriculture on the upland slopes, to the modern machine grading and upland road building, It was proposed that these modifications influenced human settlement, as well as the flora and fauna, and included the construction of a *pu`uone*, or inland pond, from the marshy environment that had been created by freshwater springs along the inland margin.

In 1985, an article was published in the *New Zealand Journal of Archaeology* by Weisler and Kirch discussing the structure of settlement space on Moloka`i was based on their 1985 survey and included residential complexes from a date range between A.D. 1650-1820. Their analysis confirmed that environmental, social, political, and semiotic elements were holistically the determinants of spatial organization.

ANTICIPATED SURVEY FINDINGS

Due to water erosion and flooding into adjacent land parcels, remains from previous activities were not expected to be recovered. The crossing is located in between the two sections noted for occupation, the lower ridges and the coast.

METHODOLOGY

FIELD METHODS

Leann McGerty, Senior Archaeologist for SCS, Elizabeth Pualani Pua`ai, and Lei`ilima Pua`ai conducted fieldwork on August 29, 2006. Portions of the project area were photographed with a digital camera. A pedestrian survey was conducted on both sides of the streambed and the immediate surrounding areas. On the *makai* side of the bridge, the remains of previous ranching activities were evident and included sections of fencing wire, rotten fence posts, and gates.

The identified archaeological site was marked with flagging tape and notes were taken describing the location, construction characteristics and excavation potential. During the Inventory Survey the identified features were mapped to scale using tape and compass and were photographed. Sites were recorded in sufficient detail to reflect their overall integrity, size, and location in the project area. The site was located with a hand-held GPS unit. The identified site was not tested as its location in a swale defined function and water flow would have affected the integrity of any remains not carried away to the sea.

LABORATORY METHODS

Laboratory work, conducted at SCS facilities in Honolulu, included digital drafting of the site location, its plan view for reporting purposes, and the digitizing of all photographs and maps for archival purposes. All documentation pertaining to this project is currently being curated at SCS facilities in Honolulu.

ARCHAEOLOGICAL INVENTORY SURVEY RESULTS

The pedestrian survey revealed the presence of one archaeological site consisting of three features.

SITE 50-60-04-2478 was a series of three terraces located a short distance up a side swale that extended along the main drainage and merged with it to continue under the bridge to the ocean (Figures 6 and 7). Based on site location and construction, all three of these features were interpreted as traditional agriculture features.

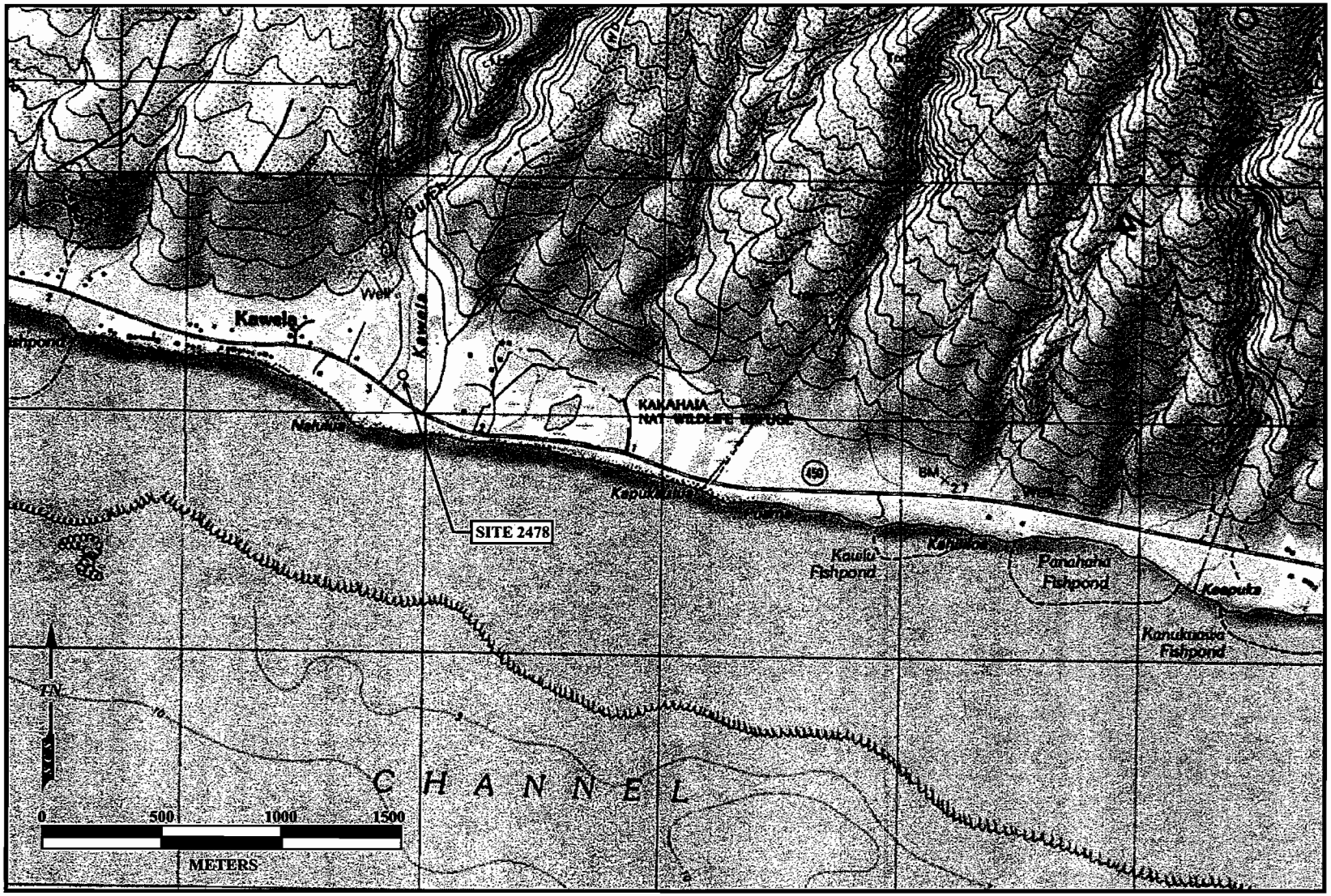

Figure 6: GPS Location of Site 50-60-04-2478.

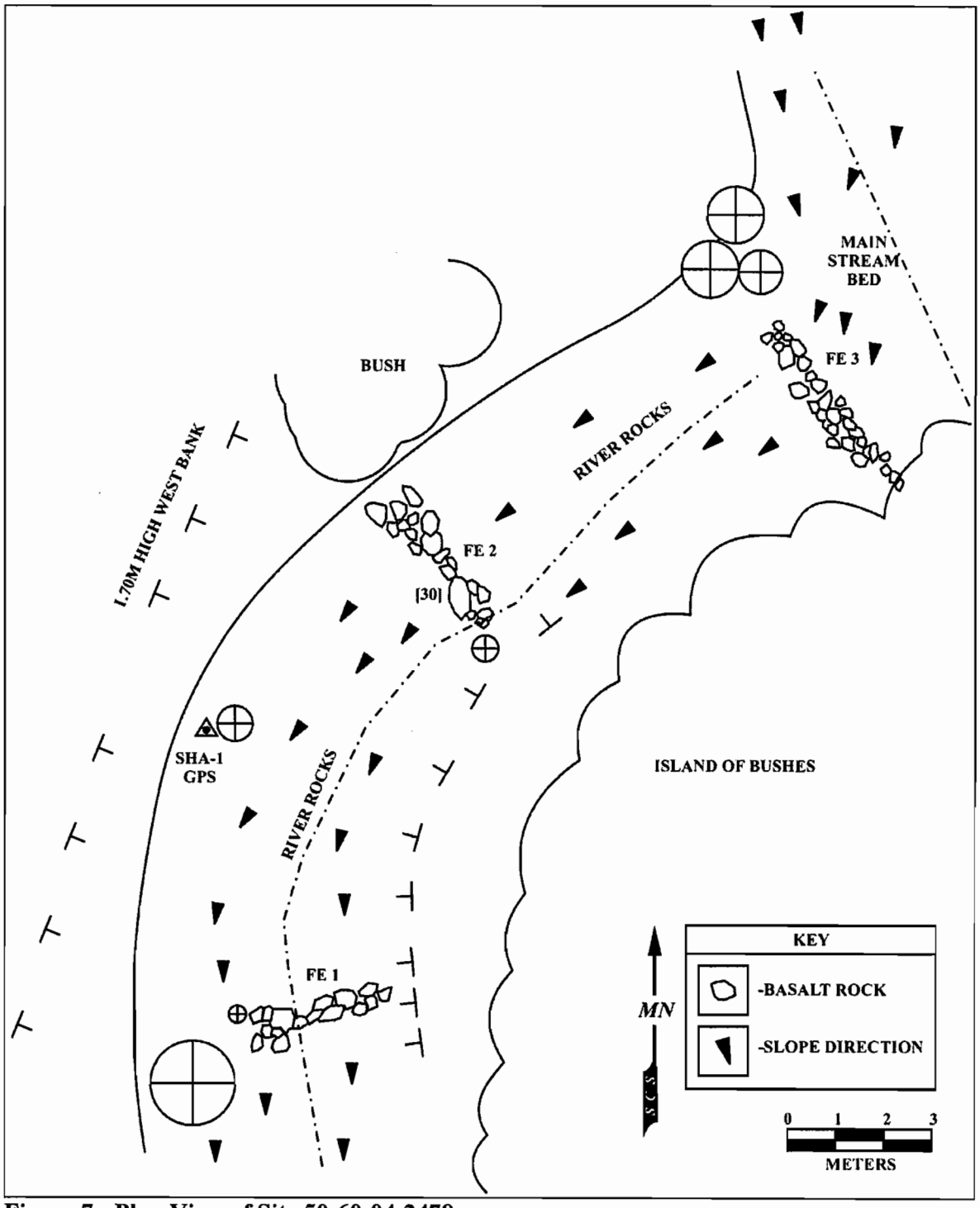

Figure 7: Plan View of Site 50-60-04-2478.

Feature 1 was an eroded, short, rock-faced terrace that crossed the swale (Figure 8). It measured approximately 3.00 m long by 0.35 m high. No width was defined as river rocks were spread along the length of the swale.

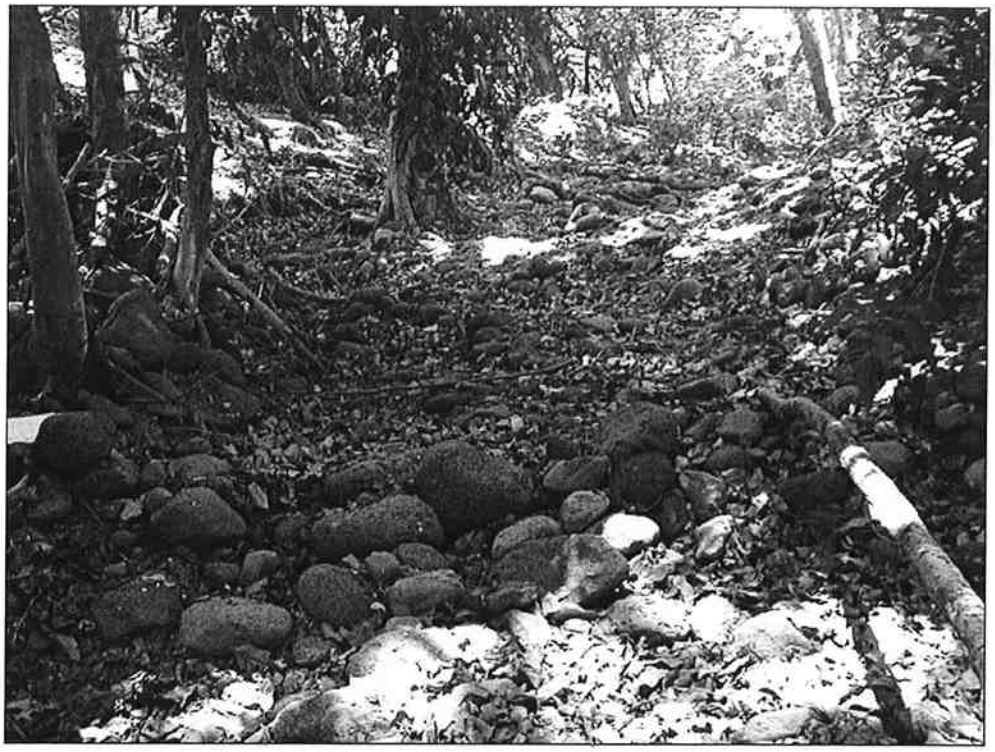

Figure 8: Feature 1 Terrace. View to North.

Feature 2 was an eroded, short, rock-faced terrace that crossed the swale several meters to the north of the Feature 1 Terrace (Figure 9). It measured 3.50 m long by 0.30 m high. No width was defined as river rocks were spread along the length of the swale.

Feature 3 was an eroded, short, rock-faced terrace that crossed the swale where it parted from the main drainage to curve to the south (Figure 10). It measured 5.00 m long by 0.23 m high. No width was defined as river rocks were spread along the length of the swale.

SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

One archaeological site was documented in the vicinity of the Kawela Bridge. This site has been evaluated for significance according to the criteria established for the Hawai`i State Register of Historic Places. The five criteria are classified below:

Figure 9: Feature 2 Terrace. View to North.

Figure 10: Feature 3 Terrace. View to Northeast.

Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Site is associated with the lives of persons significant to our past

Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction

Criterion D: Site has yielded or has the potential to yield information important in prehistory or history

Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places

Site 50-60-04-2478 has been assessed as significant under Criterion D. It has been determined that sufficient information in the form of photographs and maps have been recovered from Site 50-60-04-2478 and that no further archaeological work is recommended as further archaeological procedures would not contribute a significant volume of additional data to the interpretation of the history of the region. However, based on the projects close proximity to a battlefield and Site 144, a Burial Mound, monitoring is recommended during ground altering activities. Prior to any ground altering activities within the project area, an Archaeological Monitoring Plan must be prepared and submitted to the SHPD for approval. Once accepted, ground altering work may begin with the presence of an archaeological monitor.

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APPENDIX D.

A Cultural Impact Assessment for the Kawela Bridge Replacement, Kawela Ahupua`a, Kona District, Moloka`i Island, Hawai`i (TMK 5-04-001)

SCS Project Number 707-CIA-1

A CULTURAL IMPACT ASSESSMENT FOR THE KAWELA BRIDGE REPLACEMENT, KAWELA AHUPUA`A, KONA DISTRICT, MOLOKA`I ISLAND, HAWAI`I [TMK: 5-04-001]

Prepared by:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.
March 2007

Prepared for:
Mr. Mike Hunnemann
Kai Hawaii, Inc.
31 No. Pauahi St., Second Floor
Honolulu, HI 96817

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) was contracted by Kai Hawaii, Inc. to provide an Cultural Impact Assessment for the Kawela Bridge replacement in Kawela Ahupua`a, Kona District, Moloka`i Island [TMK: 5-04-001] (Figures 1and 2). The project area covers approximately 96 m on each side of the present bridge (*mauka/makai*), incorporates a portion of Kawela Gulch, and extends along Kamehameha V Highway approximately 305 m from the center of the bridge.

It is proposed that the present bridge be demolished and replaced with a longer and wider bridge that will conform to State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic Standards. According to the project assessment report provided by Kai Hawaii Inc., the new bridge will be accessible to bicycles and pedestrians and will be designed according to the Flood Insurance Study conducted by the Federal Emergency Management Agency for 100 year recurrence period (M & E Pacific, Inc. 2002). A detour is planned to allow traffic to flow around the bridge construction area and may include the use of pipe culverts, a concrete span, or possibly a new temporary bridge. All design considerations will meet current State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic Standards established by the State Department of Transportation and Federal Highway Administration.

The Constitution of the State of Hawai`i clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778" (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, "native Hawaiian rights...may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner" (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

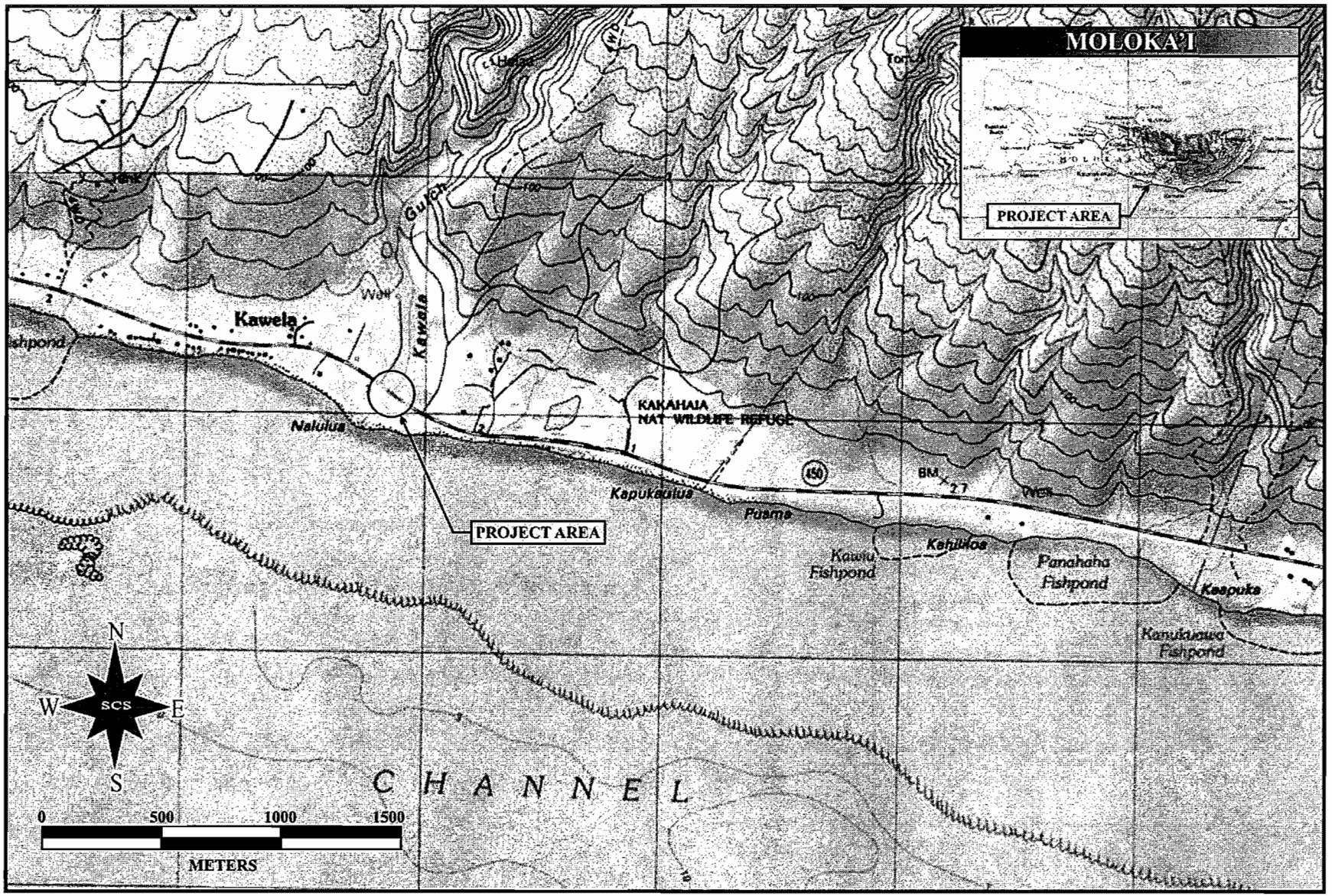

Figure 1: USGS Quadrangle Map Showing Project Area.

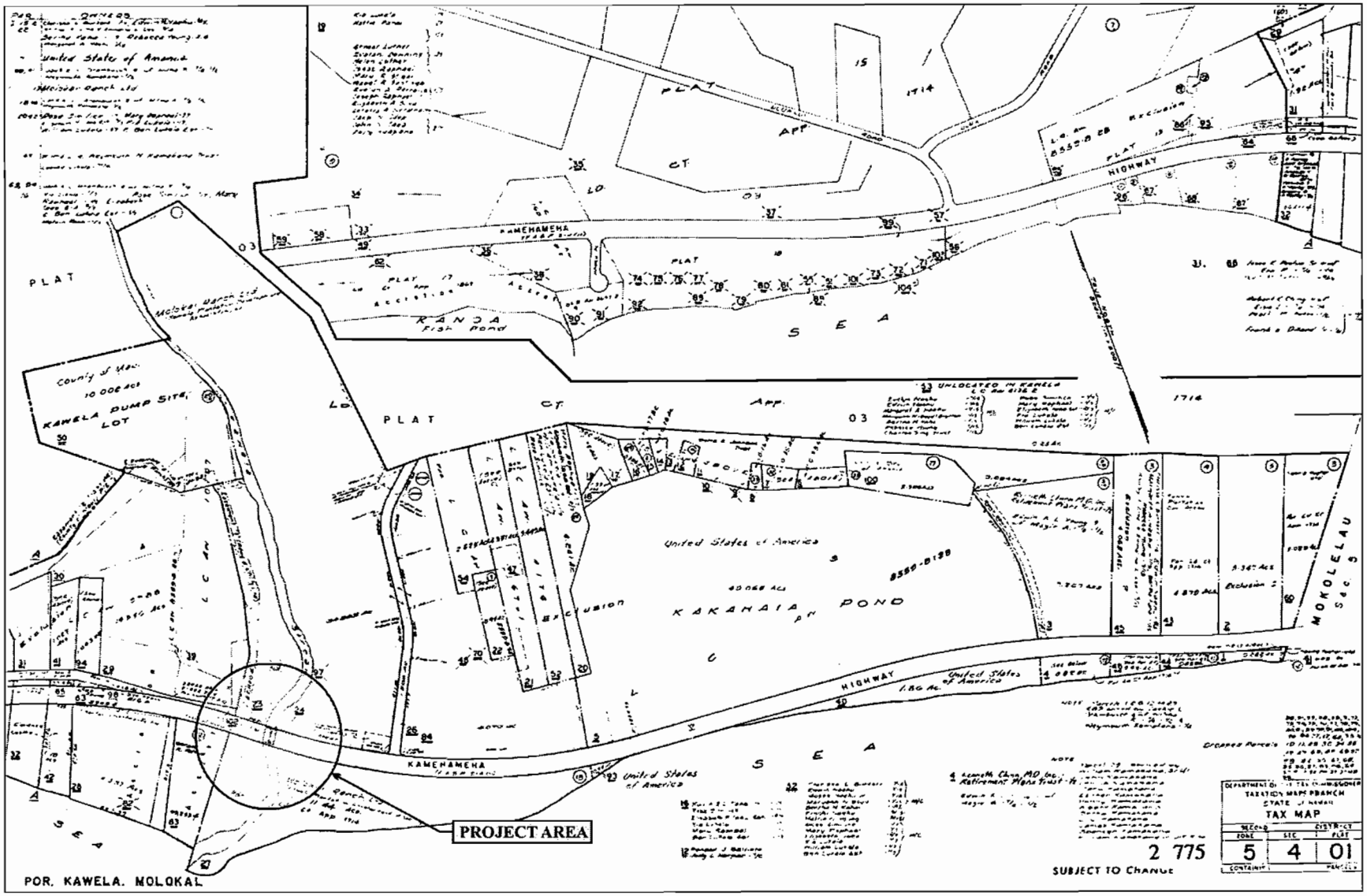

Figure 2: Tax Map Key [TMK] Showing Project Area.

Act 50, enacted by the Legislature of the State of Hawaii (2000) with House Bill 2895, relating to Environmental Impact Statements, proposes that:

> ...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights...[H.B. No. 2895].

Act 50 requires state agencies and other developers to assess the effects of proposed land use or shoreline developments on the "cultural practices of the community and State" as part of the HRS Chapter 343 environmental review process (2001). Its purpose has broadened, "to promote and protect cultural beliefs, practices and resources of native Hawaiians [and] other ethnic groups, and it also amends the definition of 'significant effect' to be re-defined as "the sum of effects on the quality of the environment including actions that are...contrary to the State's environmental policies...or adversely affect the economic welfare, social welfare, or cultural practices of the community and State" (H.B. 2895, Act 50, 2000). Thus, not only are properties evaluated for impact to Native Hawaiians, but also for other ethnic groups as well.

Act 50 requires an assessment of cultural practices to be included in the Environmental Assessments and the Environmental Impact Statements, and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, "the broad geographical area, e.g. district or *ahupua`a*" (OEQC 1997). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural which support such cultural beliefs.

This Cultural Impact Assessment involves evaluating the probability of impacts on identified cultural resources, including values, rights, beliefs, objects, records, properties, and stories occurring within the project area and its vicinity (H.B. 2895, Act 50, 2000).

METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the "Cultural Impact Assessment Methodology", the OEQC state:

> ...information may be obtained through scoping, community meetings, ethnographic interviews and oral histories...[1997].

This report contains archival and documentary research, as well as communication with organizations having knowledge of, or believed to have knowledge of, the project area, its cultural resources, and its practices and beliefs. This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997). The assessment concerning cultural impacts should address, but not be limited to, the following matters:

(1) a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints of limitations which might have affected the quality of the information obtained;

(2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;

(3) ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;

(4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;

(5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as

the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;

(6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;

(7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;

(8) an explanation of confidential information that has been withheld from public disclosure in the assessment;

(9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;

(10)

(11) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;

(12) the inclusion of bibliography of references, and attached records of interviews which were allowed to be disclosed.

Based on the inclusion of the above information, assessments of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological project reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws and guidelines. Individuals and/or groups who have knowledge of traditional practices and beliefs associated with a project area or who know of historical properties within a project area are sought for

consultation. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs, historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the information available for this study. When telephone interviews occur, a summary of the information is often sent for correction and approval, or dictated by the informant and then incorporated into the document. Key topics discussed with the interviewees vary from project to project, but usually include: personal association to the *ahupua`a*, land use in the project's vicinity; knowledge of traditional trails, gathering areas, water sources, religious sites; place names and their meanings; stories that were handed down concerning special places or events in the vicinity of the project area; evidence of previous activities identified while in the project vicinity.

In this case, letters, briefly outlining the development plans along with maps of the project area, were sent to organizations whose jurisdiction includes knowledge of the area with an invitation for consultation. Initially, consultation was sought from the Native Hawaiian Historic Preservation Council representative under the aegis of the Office of Hawaiian Affairs, Moloka`i Branch, Halona Kaopuiki; the Office of Hawaiian Affairs, O`ahu (Lance Foster); the Hawaiian Civic Club, Ho`olehua (Edwina Cacouliges, President); Hui Ho`okapakele `Āina, Walter Ritte, President, and Hinano Rodrigues, Cultuaral Historian for the State of Hawai`i Preservation Division. Halona Kaopuiki suggested the names of two family's closely associated with the project area for further inquirely. Another opportunity for comment and consultation will be offered to the community in the future when a public meeting will be held. This will occur before the Finale Draft is written and submitted so that any additional information can be included in the document.

PROJECT AREA AND VICINITY

The project area was comprised of land sections both *mauka* and *makai* of the present Kawela Bridge, as well as areas abutting the bridge to the east and west (Figure 3). It included

areas needed for a temporary detour road and bridge and the staging area for the construction parcel. The proposed Kawela Bridge Replacement Project was located between milepost 5.110 and milepost 5.118 on Kamehameha V Highway (Route 450), in the Kona District, Kawela Ahupua`a, Moloka`i Island.

CULTURAL HISTORICAL CONTEXT

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture which incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinaruma*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch 1985; Kirch and Sahlins Vol. 1, 1992:5, 119). During the span of A.D. 1100–1300, many new settlements were established in the previously unoccupied leeward regions; this is often referred to as the Expansion Period (Kirch 1985).

The concepts of the Hawaiian land system are helpful in understanding traditional land use in and around the project area. In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were, therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili* or *`ili `āina* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (Lyons: 33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant, or *hoa `āina*, residing in an *ahupua`a* was called a *kuleana* (Lucas 1995:61). The present project area was located in the *ahupua`a* of Kawela.

The island of Moloka`i consists of the Ko`olau and Kona Districts. Ko`olau district lands encompass the northern *ahupua`a* and consist of the wet, windward valleys that supported

immense gardens of *lo`i kalo* (taro pondfields). The Kona District, located on the drier leeward coast, encompasses a fringing reef and an elaborate fishpond complex. A few small gulches east of Kawela contained *lo`i kalo* (Tomonari-Tuggle 1990:6, Summers 1971:2). Generally, however, the leeward side of the island was considered ideal for the dryland cultivation of sweet potato (*`uala* or *Ipomoea batatas*), gourds (*Lagenaria siceraria*) and yams (*Disoscorea alata*). In the Kona District of Moloka`i, sweet potato was planted along the southern, leeward shore. On *kula* lands (dry land, open country, pasture), sweet potato was still being planted into the1930s in some areas (Handy and Handy 1972).

In Kawela, habitation and agricultural structures were generally located on the lower ends of ridges (Weisler and Kirch 1985). Above these sites, to about 300 feet above mean sea level (amsl), were agricultural complexes that consisted of mounds and terraces. Kawela Ahupua`a encompassed a broad costal reef-flat providing the inhabitants of the area with shellfish, crustacea, fish, *limu* (seaweed), and *he`e* (octopus). In addition, access to five coastal fishponds containing *`ama`ama* (mullet, *Mugil cephalus*) was available. Both dry land cultivations and ocean resources were important aspects of Kawela's traditional subsistence economy. Initial use of the Kawela area was radiocarbon dated to approximately A.D. 1500 (Weisler and Kirch 1982).

***WAHI PANI* (SIGNIFICANT PLACES)**

Scattered amongst the agricultural and habitation sites are other places of cultural significance to the *kama`aīna* of the region. According to the Hawai`i State Register of Historic Places, there are a number of battlefields in the Kawela area; however, only Paliku has been specifically located. A burial mound containing the remains of some of the warriors (State Site 50-60-04-144) is nearby. Also listed is a *pu`uhonua* (place of refuge), or *pu`ukaua* (fortification), and a house site with an attached shrine. The latter two sites have been located on the ridge, away from the project area, but the battleground and burial mound are to the east in close proximity.

The National Register referred to these sites as the Kawela Complex and recorded:

> Feature 144 marks the location of an irregular-shaped burial mound at the Molokai Ranch's Kawela headquarters. As stated by Henry Meyer in 1965 (Summers 1971:95) burials were found just beyond the mango trees. The story was confirmed by Mr. Harry Otsuka, our guide, who pointed to a slight mound cut on the S by highway 45. He said that, at the time of highway construction, many burials were unearthed in the mound. No evidence of

> internment can't be seen now, as the mound is presently overgrown with grass. It is thus difficult to estimate the area of the burials, especially since the road construction removed and unknown part of the site. A 400-sq-m area would seem a reasonable estimate however. The "mound" is a sand dune, the origin of which may be partially natural and partly artificial (enlargement). No artifacts or midden were found. [On file, State Historic Preservation Division].

Summers quotes Cooke (1949) concerning the Paliku battleground in *Molokai: A Site Survey* (1971):

> The battlefield of Pakuhiwa was located midway between Kamiloloa and Kawela. . . . Most destructive battle of Kamehameha was fought in this coconut grove...Canoes are said to have been drawn up for four miles along the shore so that the battle could be fought to a finish [91].

In his book *Mololelo O Molokai*, Cooke adds:

> Near the east end of ranch property, the burial mound of warriors killed at the historic battle of Kawela is still evident. On a ridge separating east and west Kawela gulches and mauka of the shore at an elevation of two hundred feet, was a puu honua (a place of safety and refuge). This is a stone enclosure with high walls used as the main fortification [1949:110].

In spite of this claim by Cooke, there is no recorded evidence that Kamehameha ever fought a battle here nor has any record of it been found in any primary sources, such as Kamakau (1961), `I`i (1973), Malo (1951), Fornander (1980), or Desha (2000), when discussing Kamehameha's life and wars.

There is, however, a record of a battle fought between Kapi`iohokalani of O`ahu against the chiefs of Moloka`i that was supported by Alapa`inui of Hawai`i Island in the mid-1700s (Cordy 2002). Several accounts of this battle have been written.

Kamakau recorded:

> . . .He [Alapa`inui] sailed from Maui and landed and Puko`o. From Waialua to Kalua`aha the fleet of Hawaii extended. The fighting was in progress and Kamalo`o with Ka-pu-lei as the battlefield. There the forces of Hawaii, joined with those of Molokai, made a formidable array... The chief of Oahu, Ka-pi`i-

> oho-o-kalani, was encamped at Kalama`ula, and the country from Kaunakakai to Na`iwa was occupied by the chiefs and fighting men of Oahu. For four days the fighting went on with equal success on both sides, for Ka-pi`i-oho-o-kalani had drawn up his chiefs and fighting men side by side in the shape of a square like the threshold of a door. [With this formation he] drove into the opposing forces, while a right and left wing formed of lines of men one behind the other in the shape of a flying fish, made attacking and protecting wedges at the two sides. . . .On the fifth day at Kawela the decisive battle was fought. Every able-bodied man came out of his house to fight. The Molokai forces attacked from the hills, those of Hawaii from the sea, while a great number landed from the fleet and fought on land. The battle began in the morning and lasted until afternoon. The ruling chief of Oahu found himself surrounded by sea and by land and hemmed into a small space. Ka-pi`i-oho-o-kalani died at Kawela below Kamiloloa, and many chiefs and fighting men were slaughtered, but some escaped and sailed for Oahu [1961:70-71]

Fornander recounted the same story:

> . . . tidings arrived from Molokai [to Alapa`inui on Maui] that *Kapiiohokalani*, the son and successor of *Kualii*, the Moi of Oahu, had invaded the island of Molokai with a large force, and that several of the chiefs there were in great distress, having taken refuge in fortified mountain localities, while their possessions on the lowlands and their fishponds were ravaged and destroyed by the Oahu invaders, who were said to have made their headquarters at Kalamaula and occupied the country from Kaunakakai to Naiwa.
>
> When this intelligence reached *Alapainui*, having no occupation for his army and fleet on Maui, he concluded to go to Molokai to the assistance of the distressed chiefs there; the more so as some of them were his near relatives, being the sons and grandsons of *Keawe* of Hawaii with his Molokai wife, *Kanealai*. Leaving Maui, he crossed the Pailolo channel, and landed his fleet on the Molokai coast from Waialua to Kaluaaha. Having landed his army, he marched to Kamalo, and at Kapualei he met the forces of *Kapiiohokalani*. An obstinate fight ensued, which lasted for four days, without any decisive result; but as *Kapiiohokalani* retreated to Kawela, it is presumed that he suffered most. On the fifth day the battle was renewed at Kawela, extending as far as Kamiloloa. The Hawaiian troops being ranged along the seashore, and the auxiliary Molokai chiefs descending from the uplands with their men, *Kapiiohokalani* was hemmed in between them, and, after a severe fight from morning till far in the afternoon, he was completely routed with great loss of life, and himself

> slain. Those who escaped from the battle immediately evacuated Molokai and fled back to Oahu. [1969: 136-137]

This famous battlefield may still be seen in the place described, where the bones of the slain are the sports of the winds that sweep over that sandy plain, and cover or uncover them, as the case may be. The numerical strength of the two opposing armies is not mentioned in the legends, but to judge from the multitude of bones and the number of skulls that are bleaching in the sun when a strong north wind has removed their sandy covering, the numbers engaged on each side must have been reckoned by thousands (*ibid*:138)

HISTORIC PERIOD

Much knowledge of traditional land use patterns in the Hawaiian Islands is based upon written records scribed during the time of initial and early contact between native Hawaiians and the first European and American visitors to the islands. Early records, such as journals kept by travelers and missionaries, Hawaiian traditions that survived long enough to be written down, and archaeological investigations, have assisted archaeologists in understanding the past.

Although Moloka`i was observed by foreigners during Captain James Cook's return expedition to the islands in 1779, westerners did not make landfall on the island until 1786, with the arrival of Captain George Dixon (1789:92-93). Kamakau (1961:132-133; see also Fornander 1980 Vol. II:154) relates that at this time, Moloka`i was under the rule of Kahahana, a relative of Kahekili, the ruler of Maui Island and rival of Hawai`i Island chiefs. However, when Dixon and his crew arrived on Moloka`i in 1786, Kahahana was dead and the island was under the control of Kahekili.

Kamehameha I, chief from Hawai`i Island, conspired to conquer Maui, O`ahu, and Kaua`i, and unify all of the major Hawaiian Islands under his sole proprietorship. After assuming control of Maui in 1790, Kamehameha proceeded to focus on uniting Moloka`i with the other islands under his rule. His plan was to procure the support of the Moloka`i chiefs against Kahekili, the powerful chief of Maui, who was then living on O`ahu. Kamehameha temporarily succeeded with this plan until he lost control of Maui. Kamehameha then returned to Hawai`i Island, having not secured authority over Moloka`i. Politically, Moloka`i was still under the control of Maui chiefs. In 1795, Kamehameha set out once more to broaden his kingdom. Summers relates that a fleet of canoes accompanying Kamehameha to Moloka`i were of such a great number that they extended along the coast from Kawela to Kalama`ula, which included the coast of Kaunakakai (1971:20). Kamehameha held council at Kaunakakai while his

chiefs camped nearby at Kalama`ula. No battles were recorded as having been fought at this time, thereby suggesting that Moloka`i became a part of Kamehameha's kingdom through negotiation (Kamakau 1961).

In 1792, Vancouver recorded his impressions of Moloka`i while sailing along its southern coast towards O`ahu. Vancouver said of the eastern part of the island: "It seemed to be well inhabited, in a high state of cultivation, and presented not only a rich but a romantic prospect" (Vancouver 1984). Archibald Menzies, a naturalist accompanying Vancouver's expedition, had a different impression. He was told by the natives of Moloka`i that "Kamehameha's descent upon it had desolated the country, and that it had not yet recovered its former state of population... desolating the country by destroying the fields and plantations of the inhabitants" (Menzies 1920:115, 118).

The settlement of missionaries along the southern coast of Moloka`i in 1832 attested to a large population in the region. A missionary census estimated the population here to be 8,000 people (Schmitt 1973:20). This information suggests that there were concentrated settlements near the project area.

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169–70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

Lunalilo, future king of Hawai`i, was given the *ahupua`a* of Kawela. Fifteen additional claims were made for *kuleana* in the *ahupua`a* during the Māhele, and nine LCAs were awarded. None are included in the project area. The LCA records included information during the early historic period most of which was a continuation of pre-Contact land use patterns. Most of the LCAs in Kawela clustered in the vicinity of the floodplain and delta and were *`ili* strips oriented *mauka/makai* (Weisler and Kirch 1985). To the immediate west of the project area, the *`ili* of Kanui in Kawela was awarded to Maunaloa in 1848 (LCA 10107). Foreign Testimony (234v15) added that he received the property from his parents who occupied the land from the time of Kamehameha I (Waihona `Aina Data Base 2006). The parcel was described as *kula* land, which was most conducive to dry land cultivars. Native testimony given by Ehu (148v6) concerning Maunaloa's land, referred to a "taro pasture in ili land of Kanui in Kawela." (*ibid.*).

Cattle were introduced 1832 quickly followed by sheep deer and goats. Pasture was needed for the cattle and lands acquired by Kamehameha V, including Kawela Ahupua`a, eventually formed the basis for the Moloka`i Ranch. The Ranch formed the American Sugar Company in the late 1800s; however, failure to procure the immense amount of fresh water needed for a successful cane crop soon ended the project (Summers 1971:24). With the collapse of the sugarcane industry, sheep and cattle ranching became the economic alternative for Moloka`i. Unfortunately, over grazing by cattle and other ungulates eventually let to the widespread destruction of native vegetation and the silting in of fishponds. By the 1920s, pineapple cultivation became another economic option in the drier sections of the island, and many of the lands previously used for sweet potato were converted to pineapple plantations (Handy and Handy 1972).

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort." However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters of inquiry were sent to organizations whose expertise would include the project area. Consultation was sought from the Native Hawaiian Historic Preservation Council representative under the aegis of the Office of Hawaiian Affairs, Moloka`i Branch, Halona Kaopuiki; the Office of Hawaiian Affairs, O`ahu (Lance Foster); the Hawaiian Civic Club, Ho`olehua (Edwina Cacouliges, President); Hui Ho`okapakele `Āina, Walter Ritte, President, and Hinano Rodrigues, Cultuaral Historian for the State of Hawai`i Preservation Division. Halona Kaopuiki suggested contacting members of the Grambush Family and Leimana Naki. Another opportunity for comment and consultation will be offered to the community in the future when a public meeting will be held. This will occur before the Finale Draft is written and submitted so that any additional information can be included in the document.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as I`i, Kamakau, Beckwith, Chinen, Kame`eleihiwa, Fornander, Kuykendall, Kelly, Handy and Handy, Puku`i and Elbert, Thrum, Sterling, and Cordy have contributed, and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2005 Data base.

CIA INQUIRY RESPONSE

As suggested in the "Guidelines for Accessing Cultural Impacts" (OEQC 1997), CIAs incorporating personal interviews should include ethnographic and oral history interview procedures, circumstances attending the interviews, as well as the results of this consultation. It is also permissible to include organizations with individuals familiar with cultural practices and features associated with the project area.

As stated above, consultation was sought from the Native Hawaiian Historic Preservation Council representative under the aegis of the Office of Hawaiian Affairs, Moloka`i Branch, Halona Kaopuiki; the Office of Hawaiian Affairs, O`ahu (Lance Foster); the Hawaiian Civic Club, Ho`olehua (Edwina Cacouliges, President); Hui Ho`okapakele `Āina, Walter Ritte, President, Hinano Rodrigues, Cultural Historian for the State of Hawai`i Preservation Division; the Rambusch Family; and Leimana Naki. A message was left at Mr. Leimana's home, however

there has been no response so far. Ms. Cacouliges, President of the Ho`olehua Hawaiian Civic Club, was going to request any information at their next meeting.

A telephone interview was held with Billy Grambush on February 9, 2007. His family (Kamakana) has lived in Kawela for generations and at one time owned the entire *ahupua`a*. Billy is well aware of the need for a new bridge and looks forward to finally seeing it in place. His main concerns are twofold. Protection of the burial mound (Site 144) is paramount, as no one really knows its boundaries. Second is placement of the bypass road that will be used during construction of the new bridge. Billy would very much like to meet with the DOT to consult with them on its location and would like them to either write to them or call to make arrangement for this meeting. TMK: 5-4-01:29 is family land and it is unclear which sections will be impacted by the bypass road.

Billy mentioned that to the east of the bridge, inland, is a grove of mango trees concealing the remains of an old elementary school. His great grandmother attended the school, and several community members remember it. Billy volunteered to contact older residents of the Kawela area who are most likely to have cultural information associated with the project area and its vicinity.

It was felt that there had not been enough time for all of those contacted to respond before the Draft CIA was submitted. Any additional information will be documented in the forthcoming Finale CIA which will be submitted after a public meeting is held and all those concerned have had an opportunity to respond.

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). To our knowledge, the project area has not been used for traditional cultural purposes within recent times. Based on historical research and the response from the above listed contacts, it is reasonable to conclude that Hawaiian rights related to gathering, access or other customary activities within the project area will not be affected and there will be no direct adverse effect upon cultural practices or beliefs.

No visual impact will occur other than what had been present since the old bridge was constructed.

CULTURAL ASSESSMEMNT

Based on organizational and individual response, and archival research, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities with in the project area. Any additional information will be included in the Finale CIA which will be submitted after a public meeting is held and all those concerned have had an opportunity to respond. Because there were no activities identified within the project area at this time, there are no adverse effects.

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APPENDIX E.

Section 106 Consultation for Kawela Bridge Replacement, Kawela Ahupua`a, Kona District, Moloka`i Island, Hawai`i (TMK 5-04-001)

SCS Project Number 707-106-1

SECTION 106 CONSULTATION FOR THE KAWELA BRIDGE REPLACEMENT, KAWELA AHUPUA`A, KONA DISTRICT, MOLOKA`I ISLAND, HAWAI`I [TMK: 5-04-001]

Prepared By:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.

March 2007

Prepared For:
KAI Hawaii, Inc.
31 N. Pauahi St., Second Floor
Honolulu, HI 96817

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INTRODUCTION

Scientific Consultant Services (SCS) is under contract with Kai Hawaii, Inc, to provide a Section 106 review for the State of Hawai`i, Department of Transportation (HDOT) Kawela Bridge Replacement Project, located in Kawela Ahupua`a, Kona District, Moloka`i Island [TMK:5-04-001: 23, 27] (Figures 1 and 2).

Section 106 refers to the Federal review process designed to ensure that historic properties are considered during Federal project planning and implementing. An historic property is any property listed in, or eligible for, the National Register of Historic Places. The review process is administered by the Advisory Council on Historic Preservation, an independent Federal Agency.

Congress established Section 106 as part of the National Historic Preservations Act of 1966 (NHPA) as the public was concerned about National historic resources not receiving adequate attention during government-funded projects. Since its inception, the NHPA has been strengthened and expanded by several amendments and has become the basis of the preservation policy (36 CFR Part 800; King and Nissley 2000).

Section 106 of NHPA requires that every Federal agency consider how each project could affect historic properties and allow a reasonable opportunity for comment from the Advisory Council. These Federal activities include construction, rehabilitation and repair projects, demolition, licenses, permits, loans, loan guarantees, grants, Federal property transfers, and other types of Federal involvement (*Ibid.*). Whenever one of these undertakings affects an historic property, the sponsoring agency is obligated to seek comments from the Advisory Council. It is the responsibility of the Federal agency involved in the proposed project to initiate and complete the Section 106 review process. The Agency Official may be a State, Local government official who has been delegated legal responsibility for compliance with section 106 in accordance with Federal law.

The National Register includes, buildings, structures, objects, sites districts, and archaeological resources. Many properties listed are significantly more important on the state and local level. It is also important to note that Section 106 protections cover properties that possess significance but have not yet been listed or formally determined eligible for listing. This includes undiscovered properties, such as archaeological sites that possess significance.

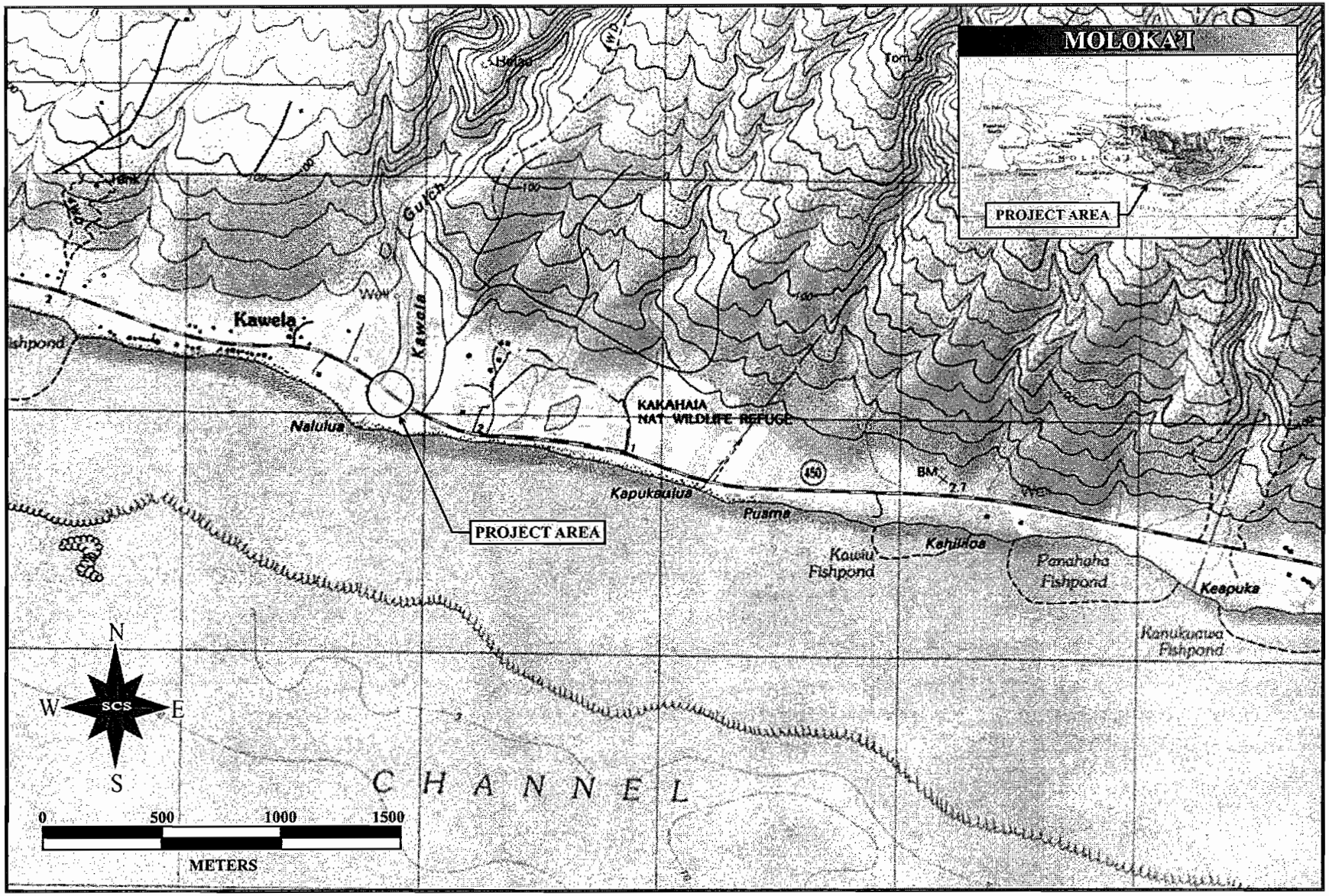

Figure 1: USGS Quadrangle Map Showing Project Area.

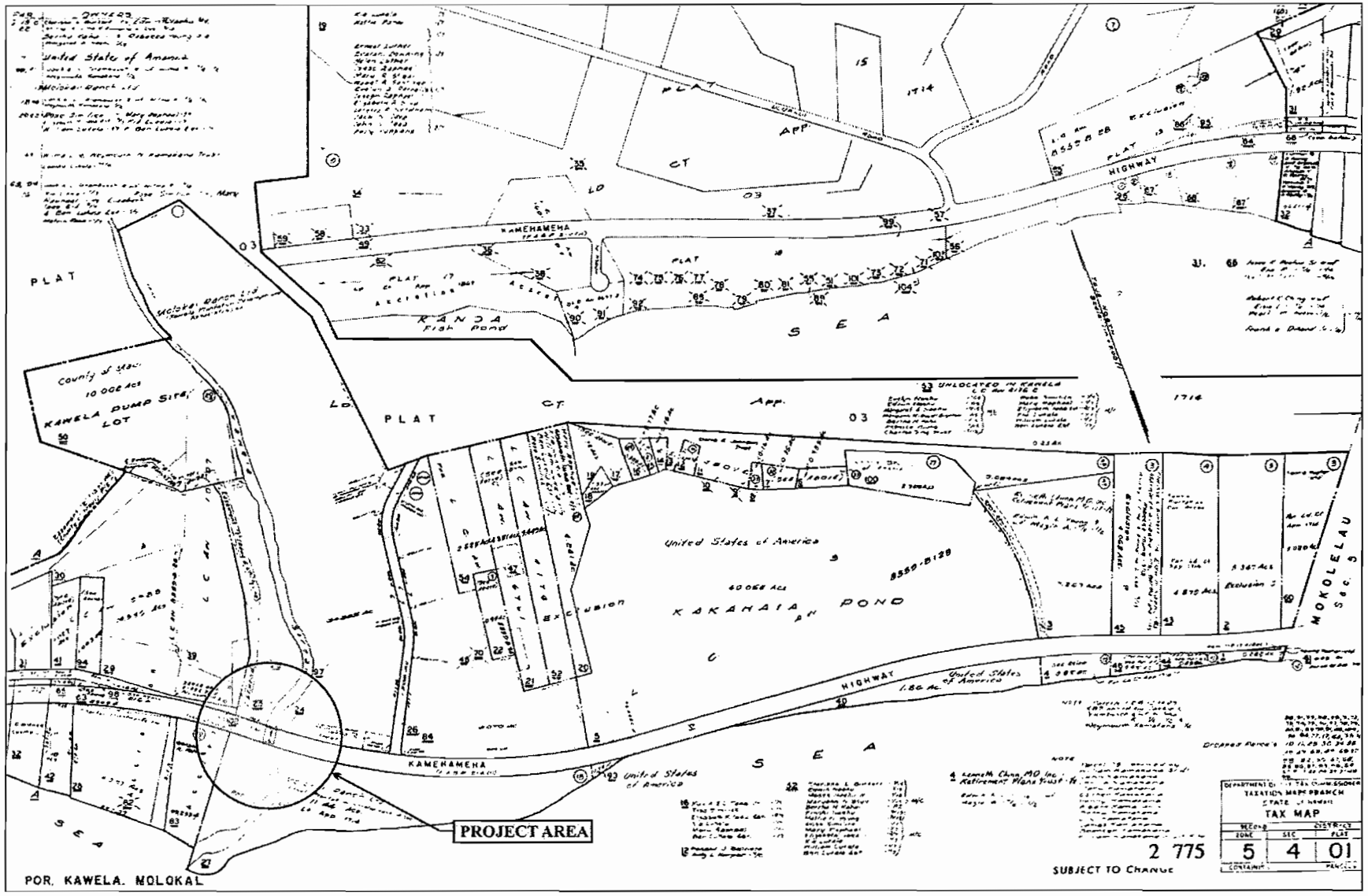

Figure 2: Tax Map Key [TMK] Showing Approximate Project Area.

Section 106 was conducted for the Kawela Bridge Replacement project to identify historic properties, prehistoric or historic sites, buildings, structures, objects, or districts listed in, or eligible for listing in, the regulations implementing Section 106 of the National Historic Preservation Act of 1966, as amended.

The Area of Potential Effects (APE) is considered the bridge crossing the Kamehameha V Highway and up to 800 feet either side of the old bridge structure. The visual APE is considered the area within which the bridge is visible from any historic property.

METHODOLOGY

The review process is defined in Federal regulations issued by the advisory Council on Historic Preservation. Entitled "Protection of Historic Properties," the regulations appear the U.S. Code of Federal Regulations at 36 CFR Part 800 and includes five basic steps (Advisory Council on Historic Preservation 1989):

1) Identify and evaluate historic properties. The Federal agency responsible for a project begins by identifying the historic properties that will possibly be affected. Background information is reviewed and consultation is conducted with the State Historic Preservation Division (SHPD), as well as others who may know of historic properties in the area. Based on the results of the review, it is determined what additional surveys, or other field studies are needed to be completed.

2) If historic properties that are eligible for inclusion or already listed on the National Register are found, the agency assesses what affect its project will have on them. This is done in consultation with the SHPD, as well as the views of others. From this consultation, one of three determinations can be made:

a.) No effect. The undertaking will not affect historic properties.

b.) No adverse effect. The undertaking will effect one or more Historic properties, but the effect will not be harmful.

c.) Adverse effect. The undertaking will harm one or more historic properties.

3): Consultation. If there is a finding of adverse effect, the agency consults with SHPD and others in an effort to find ways to make the undertaking less harmful. Others who are consulted, may include local governments, property owners, members of the public, and in this case, Native Hawaiian organizations (NHOs). According to the regulations, consultation should result in a Memorandum of Agreement (MOA), which outlines measures agreed upon and that the agency will take to reduce, avoid, or mitigate the adverse effect. The consulting parties may agree that mitigation measures are not possible, and that the adverse effects must be accepted in the public interest.

If an agreement can't be reached, the agency, or SHPD, or the Advisory Council may terminate consultation. The Federal agency must then submit appropriate documentation to the Advisory Council and request their comments.

4): The Advisory Council on Historic Preservation is a 19-member Council appointed by the President of the United States and whose day-to-day business involves Section 106 review. The Council may comment during Step 3 by actually contributing to the consultation. If not, the Federal agency must obtain Council comment by submitting to them the MOA for review and acceptance. The Council can then accept the MOA, request changes, or issue written comments. If the consultation has been terminated, the Advisory Council issues its comments directly to the Federal agency.

5) If a MOA is in place, the agency proceeds with the undertaking under the terms of the MOA. If there is no MOA, the head of the Federal agency must take into account the Advisory Council's comments in deciding whether and how to proceed.

CONSULTATION

The 1999 revised regulations implementing Section 106 clarifies terms referred to in the 1986 regulations. Consultation is built on an exchange of ideas, not simply providing information. King and Nissley have stated:

> The views of the public are essential to informed Federal decision making in the section 106 process. The Agency official shall seek and consider the views of the public in a manner that reflects the nature and complexity of the undertaking and its effects on historic properties...[2000:15]

Additional consulting parties refer to:

> Certain individuals and organizations with a demonstrated interest in the undertaking may participate as consulting parties due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties [*Ibid.*:14].

Section 101(d)(6)(B) of the Act requires consultation with Native Hawaiian organizations that attach religious and cultural significance to historic properties that may be affected by a project. Representatives of local government with jurisdiction over the area where effects may occur, are entitled to participate as a consulting party (*Ibid.*:12).

A records search will be conducted at the State Historic Preservation Division (SHPD), located in Kapole, O`ahu; and include a review of all recorded historic and prehistoric

archaeological sites within a 800 feet radius in the TMK of the project area, as well as a review of known cultural resource survey and excavation reports. In addition, there will be examination of the National Register of Historic Places, Hawai`i Register of Historic Places, and Inventory of Historic Places.

PROPOSED PROJECT

LOCATION

The proposed Kawela Bridge Replacement Project is located between milepost 5.110 and milepost 5.118 on Kamehameha V Highway (Route 450), in the Kona District, Kawela Ahupua`a, Moloka`i Island (see Figure 2).

PROJECT DESCRIPTION

The current Kawela Bridge is 46 feet long by 26 feet wide and serves both the inbound and outbound traffic on Kamhemeha V Highway. The present Kawela Bridge does not have a designated bike lane

It is proposed that the present bridge be demolished and replaced with a l9onger and wider bridge that will conform to State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic Standards. This new bridge will be accessible to bicycles and pedestrians, and will be designed according to the Flood Insurance Study conducted by the Federal Emergency Management Agency for 100-year recurrence period. A detour will be installed to allow traffic to flow around the bridge construction area and include the use of pipe culverts, a concrete span, or possibly a new temporary bridge. All design considerations will meet current State of Hawai`i Department of Transportation and Federal Highway Administration Design and Seismic standards established by the State Department of Transportation and Federal Highway Administration.

AREA OF POTENTIAL EFFECTS

The Area of Potential Effects (APE) is considered to be 800 feet and is defined as:

> . . .the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. [36 CFR 800.16(d)]

IDENTIFYING HISTORIC PROPERTIES

Information gathered from available data and in consultation with SHPD and any native Hawaiian organization that might attach religious and cultural significance to properties within the APE, provides the basis for the identification of historic properties. Background research, consultation, oral history interviews, sample field investigation and survey are all methods that are useful in gaining information concerning historic properties. Any confidential concerns raised by Native Hawaiian organizations or individuals during the identification process, will be respected.

Native Hawaiian organizations or individuals representing NHOs, including the Cultural Historian, Office of Hawaiian Affairs Moloka`i Branch, Halona Kaopuiki; the Office of Hawaiian Affairs, O`ahu (Lance Foster); the Hawaiian Civic Club, Ho`olehua (Edwina Cacouliges, President); Hui Ho`okapakele `Āina, Walter Ritte, President, and Hinano Rodrigues, Cultural Historian for the State of Hawai`i Preservation Division were consulted. Mr. Kaopuiki suggested the names of two families closely associated with the project area for further consultation. The State Historic Preservation Division, was consulted in order to identify potential or existing historic properties that may be affected by the bridge replacement. The Draft documents were submitted before a Public Meeting inviting consultation from the community could be held. The public meeting will take place in the future and any additional information will be included in the Finale report.

RESULTS

The results of consultation and the available data indicated that there was at least one archaeological site (Site 50-60-04-139) recorded within 800 feet in the TMK of the old bridge site. The site was identified as having been placed on the National Historic Register and the Hawai`i State Register of Historic Places in 1982 and was recorded as part of the Kawela Complex (50-60-04-139, Feature 144; Appendix A), but was listed with an individual site number: 50-60-03-716 and was listed as the Battlefield of Pakuhiwa.

According to the Hawai`i Register of Historic Places, there were a number of battlefields in the Kawela area, however this site was the only one that was precisely located. It consisted of a sand mound in which burials were said to be contained. The battlefield was listed with a pu`uhonua (place of refuge), or pu`ukaua (fortification), and an house site with attached shrine which became the Kawela Complex.

The National and Hawaiian Register documents described the site as:

> Feature 144 marks the location of an irregular-shaped burial mound at the Molokai Ranch's Kawela headquarters. As stated by Henry Meyer in 1965 (Summers 1971:95) burials were found just beyond the mango trees. The story was confirmed by Mr. Harry Otsuka, our guide, who pointed to a slight mound cut on the S by highway 45. He said that, at the time of highway construction, many burials were unearthed in the mound. No evidence of internment can be seen now, as the mound is presently overgrown with grass. It is thus difficult to estimate the area of the burials, especially since the road construction removed and unknown part of the site. A 400-sq-m area would seem a reasonable estimate however. The "mound" is a sand dune, the origin of which may be partially natural and partly artificial (enlargement). No artifacts or midden were found.

Consultation with several community members and organizations confirmed the knowledge of this site and concern for its protection.

ASSOCIATED HISTORY

Summers quotes Cooke (1949) concerning the battleground in *Molokai: A Site Survey* (1971):

> The battlefield of Pakuhiwa was located midway between Kamiloloa and Kawela. . . . Most destructive battle of Kamehameha was fought in this coconut grove...Canoes are said to have been drawn up for four miles along the shore so that the battle could be fought to a finish [1971:91].

In his book *Mololelo O Molokai*, Cooke added:

> Near the east end of ranch property, the burial mound of warriors killed at the historic battle of Kawela is still evident. On a ridge separating east and west Kawela gulches and mauka of the shore at an elevation of two hundred feet, was a puu honua (a place of safety and refuge). This is a stone enclosure with high walls used as the main fortification [1949:110].

In spite of this claim by Cooke, there is no evidence that Kamehameha ever fought a battle here and there is no record of it included in any primary sources, such as Kamakau, I`i, Malo, Fornander, or Desha when discussing Kamehameha's life.

There is, however, a record of a battle fought between Kapi`iohokalani of O`ahu and the chiefs of Moloka`i supported by Alapa`inui of Hawai`i Island in the mid 1700s (Cordy 2002). Several accounts of this battle have been written.

Kamakau recorded:

> . . .He [Alapa`inui] sailed from Maui and landed and Puko`o. From Waialua to Kalua`aha the fleet of Hawaii extended. The fighting was in progress and Kamalo`o with Ka-pu-lei as the battlefield. There the forces of Hawaii, joined with those of Molokai, made a formidable array... The chief of Oahu, Ka-pi1-oho-o-kalani, was encamped at Kalama`ula, and the country from Kaunakakai to Na`iwa was occupied by the chiefs and fighting men of Oahu. For four days the fighting went on with equal success on both sides, for Ka-pi`i-oho-o-kalani had drawn up his chiefs and fighting men side by side in the shape of a square like the threshold of a door. [With this formation he] drove into the opposing forces, while a right and left wing, formed of lines of men one behind the other in the shape of a flying fish, made attacking and protecting wedges at the two sides. . .On the fifth day at Kawela the decisive battle was fought. Every able-bodied man came out of his house to fight. The Molokai forces attacked from the hills, those of Hawaii from the sea, while a great number landed from the fleet and fought on land. The battle began in the morning and lasted until afternoon. The ruling chief of Oahu found himself surrounded by sea and by land and hemmed into a small space. Ka-pi`i-oho-o-kalani died at Kawela below Kamiloloa, and many chiefs and fighting men were slaughtered, but some escaped and sailed for Oahu [1961:70-71]

Fornander recounted the same story:

> . . . tidings arrived from Molokai [to Alapa`inui on Maui] that *Kapiiohokalani*, the son and successor of *Kualii*, the Moi of Oahu, had invaded the island of Molokai with a large force, and that several of the chiefs there were in great distress, having taken refuge in fortified mountain localities, while their possessions on the lowlands and their fishponds were ravaged and destroyed by the Oahu invaders, who were said to have made their headquarters at Kalamaula and occupied the country from Kaunakakai to Naiwa.
>
> When this intelligence reached *Alapainui*, having no occupation for his army and fleet on Maui, he concluded to go to Molokai to the assistance of the distressed chiefs there; the more so as some of them were his near relatives, being the sons and grandsons of *Keawe* of Hawaii with his Molokai wife, *Kanealai*. Leaving Maui, he crossed the Pailolo channel, and landed his fleet on the Molokai coast from Waialua to Kaluaaha. Having landed his army. He marched to Kamalo, and

> at Kapualei he met the forces of *Kapiiohokalani.* An obstinate fight ensued, which lasted for four days, without any decisive result; but as *Kapiiohokalani* retreated to Kawela, it is presumed that he suffered most. On the fifth day the battle was renewed at Kawela, extending as far as Kamiloloa. The Hawaiian troops being ranged along the seashore, and the auxiliary Molokai chiefs descending from the uplands with their men, *Kapiiohokalani* was hemmed in between them, and, after a severe fight from morning till far in the afternoon, he was completely routed with great loss of life, and himself slain. Those who escaped from the battle immediately evacuated Molokai and fled back to Oahu. [1969: 136-137]
>
> This famous battlefield may still be seen in the place described, where the bones of the slain are the sports of the winds that sweep over that sandy plain, and cover or uncover them, as the case may be. The numerical strength of the two opposing armies is not mentioned in the legends, but to judge from the multitude of bones and the number of skulls that are bleaching in the sun when a strong north wind has removed their sandy covering, the numbers engaged on each side must have been reckoned by thousands [*ibid.*:138

Consultation by telephone was held with Billy Grambush on February 9, 2007. His family (Kamakana) has lived in Kawela for generations and at one time owned the entire *ahupua`a*. Billy is well aware of the need for a new bridge and looks forward to finally seeing it in place. He is well aware of Site 144 and said protection of the burial mound was paramount, as no one really knows its boundaries. Several of the NHO contacted confirmed knowledge of, and concern for the protection of Site 144 (Edwina Cacouliges, President of the Hawaiian Civic Club, Ho`olehua; Walter Ritte, President, of Hui Ho`okapakele `Āina, and Halona Kaopuiki, Historic Preservation Council representative under the aegis of the Office of Hawaiian Affairs).

CONCLUSION

Based on archival data, individual and NHOs consultation, and prior to a public community meeting, one site, Site 144, has been identified within the APE. This site has already been registered on the National and State Register of Historic Places. It is now appropriate for the Federal agency to assess what affect, if any, its project will have on this site. If the project does not impact the site, there is a determination of no effect. If it there is impact and a finding of adverse effect by the Federal agency, consultation with the SHPD and NHOs should continue to determine mitigation methods which may take the form of a MOA, acceptable buffer zone, and/or monitoring plan.

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APPENDIX F.

Technical Memo (February 1, 2007) and Technical Memo (April 20, 2007)

WEST CONSULTANTS, INC.

TECHNICAL MEMO

Date: February 1, 2007

To: Kent Morimoto, P.E., ATA

From: A. Jake Gusman, P.E., and Christy Warren, P.E.

RE: **Capacity Analysis of Kawela Bridge Replacement, Molokai, Hawaii**

HYDROLOGY

The 2-yr, 5-yr, and 10-yr rainfall events were added to the existing HEC-HMS model. The resulting flows for Kawela Gulch at the outlet are as follows:

2-yr = 3,780 cfs
5-yr = 6,100 cfs
10-yr = 7,900 cfs
100-yr = 13,300 cfs

HYDRAULICS

The existing bridge was determined to have a capacity of approximately 500 cfs. This is the discharge just before the roadway overtops to the east of the bridge. This discharge corresponds to an event with a recurrence interval of less than 1-year.

Two proposed alternatives were modeled in HEC-RAS and the capacities of these alternatives were analyzed. Alternative 1 is a 65-ft clear span bridge and Alternative 2 is an 80-ft clear span bridge. Assumptions for the proposed alternatives are as follows:

- Maintain low chord elevations of existing bridge for proposed bridge alternatives. (Existing bridge low chord is 3.3 ft at upstream face, 3.8 ft at downstream face).
- Assume 2'-8" barrier with 1'-10" railing on top (4.5' total).
- Deck thickness – Alternative 1 (65-ft span), use thickness of 2.25'.
  Alternative 2 (80-ft span), use thickness of 2.75'.
- Assume a 1% grade on either side of the raised road at the bridge to existing centerline elevations.
- Assume 2H:1V sloped abutments.
- Channel improvements will extend only within the right-of-way, 40' both upstream and downstream of the bridge centerline.

Alternative 1, with a 65-ft span, was determined to have a capacity of approximately 600 cfs (see Table 1). Alternative 2, with an 80-ft span, increased the capacity by only 20 cfs, to a total of 620 cfs. The capacity of the bridge is only increased by less than 25% with either of the enlarged openings. The reason the capacity does not increase appreciably with the proposed bridge alternatives is most likely due to the fact that the water surface profile downstream of the bridge is higher than the low chord, as illustrated in Figure 1. The low chord elevations could be raised to provide a somewhat larger capacity through the proposed bridge opening. However, even if the bridge deck is raised, the channel downstream of the bridge (i.e. outside of the right-of-way) would still have a limited capacity of approximately 1,200 cfs (i.e. less than 2-year event). As a result, backwater from the downstream channel would limit the bridge capacity no matter how much the bridge is raised.

Table 1. Capacity of Bridge Alternatives.

Condition	Bridge Capacity (cfs)
Existing Bridge	500
Alternative 1 (65-ft span)	600
Alternative 2 (80-ft span)	620

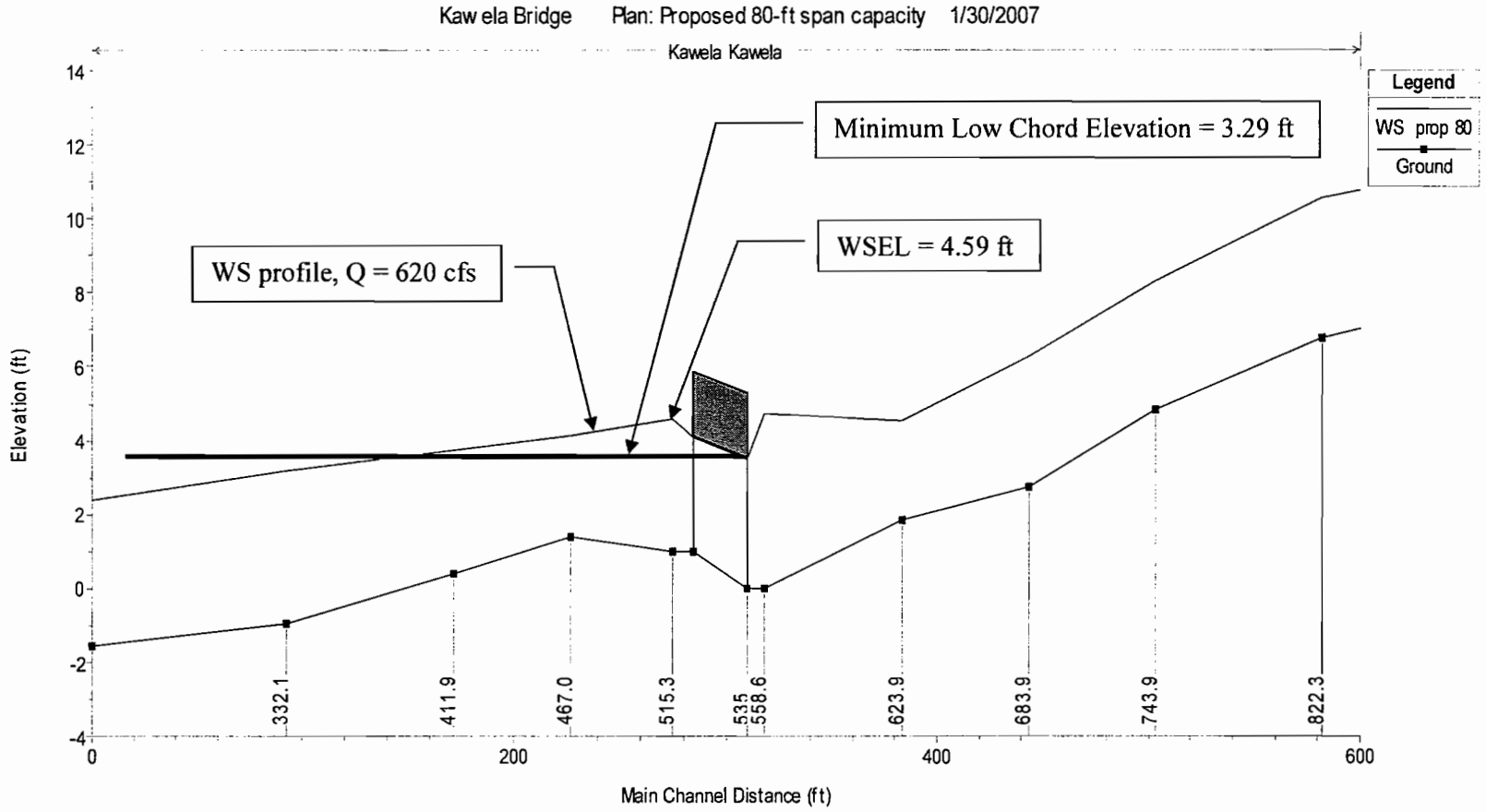


Figure 1. Water Surface Profile versus Bridge Low Chord.

WEST CONSULTANTS, INC.

TECHNICAL MEMO

Date: April 20, 2007

To: Kent Morimoto, P.E. (ATA) and Mike Hunnemann, P.E. (KAI Hawaii)

From: A. Jake Gusman, P.E.

RE: **Hydraulic Analysis of Kawela Bridge Replacement Alternatives**

The purpose of this technical memo is to provide the computed capacities of the two bridge alternatives, as well as the impact of each bridge during the 100-year flood event.

Bridge Capacities

The existing bridge was determined to have a capacity of approximately 500 cfs. This is the discharge just before the roadway overtops to the east of the bridge. This discharge corresponds to an event with a recurrence interval of less than 1-year.

Two proposed alternatives were modeled in HEC-RAS and the capacities of these bridges were analyzed. Alternative 1 is a 60-ft clear-span bridge with the roadway raised 1 foot compared to the existing roadway. Alternative 2 is a 60-ft clear-span bridge with the roadway raised 6 feet to provide better access for maintenance in the channel beneath the bridge.

Assumptions for the proposed alternatives are as follows:

- Barrier/railing: 3'-6"
- Deck thickness: 2.25'
- 2H:1V sloped abutments.
- Roadway profile based on plans provided by ATA.
- Channel improvements will extend only within the right-of-way, 40' both upstream and downstream of the bridge centerline.

Alternative 1, with the roadway raised 1 foot, was determined to have a capacity of approximately 550 cfs (see Table 1).

Alternative 2, with the roadway raised 6 feet, has a capacity of approximately 2,700 cfs. Although this is significantly more capacity than the existing bridge, it still represents less than the 2-year event (3,780 cfs). The capacity of the Alternative 2 bridge opening was estimated based on the assumption that the upstream channel could contain the entire 2,700 cfs and convey it to the bridge opening.

Table 1. Bridge Capacity Comparison.

Bridge	Capacity (cfs)
Existing	500
Proposed Alternative 1 (60-ft span, roadway raised 1 ft)	550
Proposed Alternative 2 (60-ft span, roadway raised 6 ft)	2,700

100-year Hydraulic Model Results – Alternative 1

Based on the hydraulic model results for the 100-year discharge (Table 2), Alternative 1 does not have a significant impact on flood elevations or channel velocities compared to existing conditions. Only one cross section (683.9) has a computed increase in the 100-year water surface elevation, and the amount is only 0.02 ft, or less than ¼-inch.

Table 2. Hydraulic Model Results (100-year Discharge) – Alternative 1 vs. Existing Bridge.

Cross Section	Plan	100-year WSEL (ft)	Change (ft)	Channel Velocity (ft/s)	Change (ft/s)
743.9	Existing	10.19		6.8	
743.9	Alt 1	10.19		6.8	
683.9	Existing	9.08		7.4	
683.9	Alt 1	9.10	0.02	7.3	-0.1
623.9	Existing	7.87		10.0	
623.9	Alt 1	7.82	-0.05	10.3	0.3
558.6	Existing	7.50		7.0	
558.6	Alt 1	7.46	-0.04	7.6	0.5
535	Bridge				
515.3	Existing	7.11		7.2	
515.3	Alt 1	7.01	-0.10	7.9	0.7
467	Existing	6.68		8.3	
467	Alt 1	6.68		8.3	

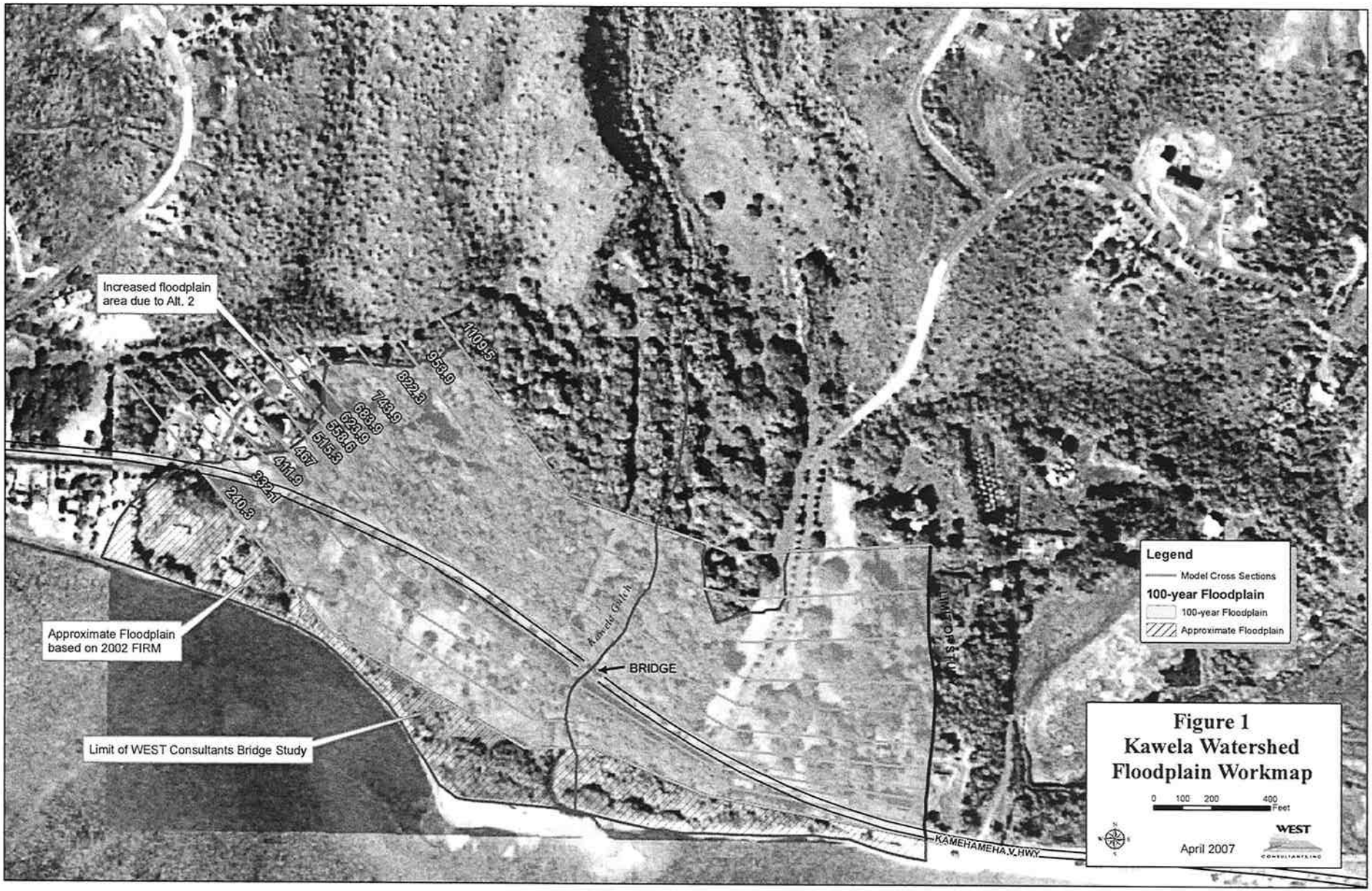
100-year Hydraulic Model Results – Alternative 2

Based on the hydraulic model results for the 100-year discharge (Table 3), Alternative 2 increases flood elevations for a distance of approximately 100 ft upstream of the bridge. At Cross Section 558.6, located immediately upstream of the bridge, the computed 100-year flood elevation would be increased by nearly 0.5 ft compared to the existing bridge. While the capacity of the Alternative 2 bridge opening is larger than the existing bridge, the built-up roadway and abutments would block a portion of the overbank flow during significant flood events. The result is an increase in flood elevations upstream of the bridge. The increase in flood elevation causes the 100-year floodplain width to increase by approximately 30 ft at Cross Section 558.6 (see Figure 1).

For the smallest, most frequent events (less than 2-year recurrence interval), flood elevations would decrease due to the increased capacity of the Alternative 2 bridge opening. However, once flow in the overbanks becomes significant – as is the case during larger flood events – flood elevations would begin to increase rather than decrease upstream of the bridge.

Table 3. Hydraulic Model Results (100-year Discharge) – Alternative 2 vs. Existing Bridge.

Cross Section	Plan	100-year WSEL (ft)	Change (ft)	Channel Velocity (ft/s)	Change (ft/s)
743.9	Existing	10.19		6.8	
743.9	Alt 2	10.19		6.8	
683.9	Existing	9.08		7.4	
683.9	Alt 2	9.03	-0.05	7.5	0.1
623.9	Existing	7.87		10.0	
623.9	Alt 2	8.16	0.29	8.6	-1.4
558.6	Existing	7.50		7.0	
558.6	Alt 2	7.95	0.45	6.1	-0.9
535	Bridge				
515.3	Existing	7.11		7.2	
515.3	Alt 2	7.01	-0.10	7.9	0.7
467	Existing	6.68		8.3	
467	Alt 2	6.68		8.3	


Increased floodplain area due to Alt. 2
1109.5
958.9
822.3
743.9
633.9
623.9
553.9
515.3
467
411.9
332.1
240.3
Approximate Floodplain based on 2002 FIRM
Limit of WEST Consultants Bridge Study
Kawela Gulch
BRIDGE
KAMEHAMEHA V HWY
Legend
Model Cross Sections
100-year Floodplain
100-year Floodplain
Approximate Floodplain
Figure 1
Kawela Watershed
Floodplain Workmap
0 100 200 400
Feet
April 2007
WEST