LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:
HWY-DB 2.7086

MAR 30 2005

TO: GENEVIEVE SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
DEPARTMENT OF HEALTH

FROM: RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: FINDING OF NO SIGNIFICANT IMPACT (FONSI)
KAMEHAMEHA HIGHWAY, REPLACEMENT OF NORTH KAHANA BRIDGE, FEDERAL-AID PROJECT NO. BR-083-1(53)

The Hawaii State Department of Transportation (HDOT), Highways Division has reviewed the comments on the draft Environmental Assessment (EA) for the subject project, TMK 5-2-002:001 and 5-2-005:003, Kahana, Koolauloa, Oahu, Hawaii, received during the 30-day public comment period, which began on September 8, 2003.

The HDOT has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the next available OEQC Environmental Notice.

We have enclosed a completed OEQC publication form, four copies of the final EA, and the project summary in both hardcopy form and on disk.

If there are any questions, please contact Mr. Dean Takiguchi at 692-7614, Bridge Design Section, Design Branch, Highways Division.

Enclosures

ENVIRONMENTAL ASSESSMENT

Federal Aid Number: *BR-083-1(53)*

Kamehameha Highway

Replacement of North Kahana Bridge

Kahana, Ko'olauloa, O'ahu, Hawai'i

Tax Map Key Numbers *5-2-002:001 (por) & 5-2-005:003 (por)*

NOVEMBER 2004

Prepared for:

STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

Prepared by:

M&E Pacific, Inc.
Davies Pacific Center
Suite 1900
841 Bishop Street
Honolulu, Hawai'i 96813

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AMP	Archaeological Monitoring Plan
APE	Area of Potential Effects
BMP(s)	Best Management Practice(s)
BWS	City and County of Honolulu, Board of Water Supply
CDD(s)	Community Development District(s)
CDUA	Conservation District Use Application
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWB	Clean Water Branch
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DA	US Department of the Army
DAG	US Department of Agriculture
DAR	Division of Aquatic Resources
DBEDT	State Department of Business, Economic Development & Tourism
DLNR	State Department of Land and Natural Resources
DOH	State Department of Health
DOI	US Department of the Interior
DOT	State Department of Transportation
DPP	City and County of Honolulu, Department of Planning & Permitting
DSP	Division of State Parks
EA	Environmental Assessment
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
FHV	Flood Hazard Variance

CHAPTER 1—INTRODUCTION

1.1 PROJECT INFORMATION SUMMARY

Project Name:	Kamehameha Highway, Replacement of North Kahana Bridge Federal Aid Project Number: BR-083-1(53)
Project Owner:	State of Hawai'i, Department of Transportation, Highways Division 869 Punchbowl Street Honolulu, Hawai'i 96813-5097 Contact: Dean Takiguchi, Project Manager Phone: (808) 692-7614, Fax: (808) 692-7617
Accepting Authorities:	State of Hawai'i, Department of Transportation US Department of Transportation, Federal Highway Administration
Location:	Kamehameha Highway, Route 83, between Mileposts 26.35 & 26.39 District of Ko'olauloa, Island of O'ahu Vicinity and Location Maps are attached for reference as Figures 1 and 2, respectively.
Proposed Action:	The proposed action involves demolition of the existing North Kahana Bridge and construction of a temporary bypass bridge and a new, government agency-compliant replacement bridge with paved shoulders and bridge roadway approaches. A General Conceptual Plan for the project is shown in Figure 3.
Property Owner and TMK Designation:	Kamehameha Highway State of Hawai'i, Department of Transportation Site is located within a 50'-wide roadway easement in favor of the State of Hawai'i for Kamehameha Highway, Route 83, completely surrounded by Ahupua'a O Kahana State Park. Tax Map Keys: Southwest adjacent parcel: 5-2-002:001 (State of Hawai'i—Private and public: detached dwellings, community center, campground, wooden residence and Ahupua'a O Kahana State Park) Northeast adjacent parcel: 5-2-005:003 (State of Hawai'i—Public: Ahupua'a O Kahana State Park) A Tax Map Key Map of the site is attached for reference as Figure 4.

State Land Use District:	Conservation A State Land Use Designation Map is attached for reference as Figure 5.
Existing County Zoning:	The project site is contained within Zoning Map 20: Hau'ula-Punalu'u-Ka'a'awa. Land Use Code & Activity: Southwest adjacent parcel: 56—Public Recreation (Such As, Public Golf Courses) Northeast adjacent parcel: 56—Public Recreation (Such As, Public Golf Courses) Zoning Code & Description: Southwest adjacent parcel: 61—P-1 Restricted Preservation Northeast adjacent parcel: 61—P-1 Restricted Preservation A City Land Use Zoning Map is attached for reference as Figure 6.
Development Plan Land Use Designation:	Public Facility (50'-wide roadway easement in favor of the State of Hawai'i for Kamehameha Highway, Route 83)
Special Designation:	City & County of Honolulu Special Management Area (SMA) A Special Management Area Map is attached for reference as Figure 7.
Preparer of This Environmental Assessment:	M & E Pacific, Inc. Davies Pacific Center 841 Bishop Street, Suite 1900 Honolulu, Hawai'i 96813 Contact: Mike Nishimura, Project Engineer Phone: (808) 521-3051, Fax: (808) 524-0246
Determination:	Finding of No Significant Impact (FONSI)

1.2 OVERVIEW OF PROPOSED PROJECT

The proposed Kamehameha Highway, Replacement of North Kahana Bridge project site is located approximately between mileposts 26.35 and 26.39 on Kamehameha Highway (Route 83), in the District of Ko'olauloa on the northeastern coast of the island of O'ahu, roughly 14 miles north of Kāne'ohe (or 6 miles from Kualola Ranch and Park) towards Kahuku and about 4 miles south of Kahuku (or 6 miles from BYU Hawai'i/Polynesian Cultural Center) towards Kāne'ohe. The existing North Kahana Bridge (State of Hawai'i, Department of Transportation (DOT) Bridge Number 8) spans the northern fork of Kahana Stream in a southeast-northwest, almost east-west, alignment and is located immediately northwest of the beach park side of Ahupua'a O

Kahana State Park, which is owned by the State of Hawai'i. The bridge is located just about at the estuary formed by the northern fork of Kahana Stream and the Pacific Ocean. The existing North Kahana Bridge (NBIS Bridge Number 003000830302624) was built in 1927 and is a five-span, continuous slab bridge with a total length of 92 feet and a curb-to-curb width of 23.7 feet. The depth between top of deck (at the curb) and bottom of soffit is 14 inches. The bridge has no skew and no provisions for pedestrian access. North Kahana Bridge is an important transportation link between windward communities, servicing both northbound and southbound traffic on Kamehameha Highway.

The State of Hawai'i DOT, Highways Division (HWY) is proposing to demolish the existing bridge and replace it with a new bridge 43-feet wide and 120-feet long. The proposed replacement bridge will be a three-spanned concrete structure supported by two center piers and abutments at both ends. The necessity of the proposed replacement arises from age, deterioration and a lack in compliancy with current live load, seismic and safety requirements. The purpose of this project is to provide a safe facility for all motorists, pedestrians and bicyclists using Kamehameha Highway in Kahana. The proposed replacement bridge will consist of two vehicular travel lanes for 2-way traffic and paved shoulders. The proposed project will also involve the construction of a temporary bypass bridge and new bridge approach roadways.

Kamehameha Highway in the area of the North Kahana Bridge is a 2-lane, undivided highway classified as a Primary Rural Highway. The highway consists of two 11'-wide lanes with 3'-wide paved shoulders and no provisions, such as, bike lanes or sidewalks, for pedestrian access. Kamehameha Highway in the area of the existing bridge is in need of rehabilitation—the pavement is raveling; alligator cracking is forming in sections; the roadway surface has been overlain many times such that the elevation of the asphaltic concrete cover has risen; the shoulders are narrow in comparison with current standards; and the inbound and outbound posted speed limits are 35 miles per hour. The new widened bridge approach roadways will replace existing portions of Kamehameha Highway to use 43' of the existing roadway right-of-way at the replacement bridge connections and will transition down to the existing highway width.

The existing aged bridge does not meet current live load and seismic requirements of regulating agencies. The proposed project will conform the bridge to a standard design that meets government agency guidelines and requirements and to widen the bridge to include two 8'-wide shoulders to permit use by pedestrians and bicyclists. The project will improve the bridge portion of the coastal highway so that it may continue to be used safely for vehicular transportation.

The estimated construction cost for this project is about $10.0 million in which 80% will be from Federal funding and 20% from State funding. The construction work is anticipated to begin in late 2005 and last approximately 18 months.

1.3 REQUIRED PERMITS AND CLEARANCES

Various City and County of Honolulu, State of Hawai'i and Federal permits, variances, approvals and clearances are required for the proposed project. These items include the following types:

- City and County of Honolulu
    - Department of Planning and Permitting (DPP)
        1. "No-Rise" Certification
        2. Special Management Area Permit
- State of Hawai'i
    - Department of Business, Business, Economic Development and Tourism (DBEDT), Office of Planning (OP), Coastal Zone Management (CZM)
        3. Assessment and Federal Consistency Determination
    - Department of Health (DOH), Clean Water Branch (CWB) & United States (US) Environmental Protection Agency (EPA)
        4. National Pollutant Discharge Elimination System (NPDES) Individual Permit
            - CWB-NPDES Signatory and Certification Statement to NPDES Permit Applications and Guidelines
            - CWB-Individual NPDES Form **C**—*Application for HAR, Chapter 11-55—NPDES Individual Permit Authorizing Discharges of Storm Water Associated With Construction Activities*

- CWB-NOI Form G— *Notice of Intent for HAR, Chapter 11-55, Appendix G—NPDES General Permit Coverage Authorizing Discharges Associated With Construction Activity Dewatering*
- EPA Form 3510-**1**—*General Information, Consolidated Permits Program*
- EPA Form 3510-**2D**—*New Sources and New Dischargers: Application for Permit to Discharge Process Wastewater*

5. Section 401 Water Quality Certification (WQC)

- Department of Land and Natural Resources, Office or Conservation and Coastal Lands (OCCL)

6. Conservation District Use Application (CDUA) Permit

- DLNR, Commission on Water Resource Management (CWRM)

7. Stream Channel Alteration Permit (SCAP)

- DLNR, State Historic Preservation Division (SHPD), US EPA & US Advisory Council on Historic Preservation (ACHP)

8. Section 106 of National Historic Preservation Act (NHPA) Compliance

- Federal Government
  - US Department of the Army (DA), Corps of Engineers (USACE)

9. Section 404 Permit

  - US Department of the Interior (DOI), National Park Service (NPS)

10. Temporary Non-Conforming Use of LWCF Act Section 6(f)(3) Property

  - US DOI Fish and Wildlife Service (FWS)

11. Endangered Species Act (ESA) Section 7 Evaluation

  - US DOT Federal Highway Administration (FHWA)

12. Nationwide Selection DOT Act Section 4(f) Evaluation

1.3.1 CITY AND COUNTY OF HONOLULU

The regulating agency for the City and County of Honolulu is the DPP. A "No-Rise" Determination and an SMA permit are required for this project from the DPP.

1.3.1.1 "No-Rise" Certification

Flood hazard requirements and "No-Rise" Certifications are regulated under the US National Flood Insurance Act of 1968 (Public Laws 90-448 and 91-152), as amended; US Flood Disaster Protection Act of 1973 (Public Law 93-234), as amended; and Chapter 21—*Land Use Ordinance* of the Revised Ordinances of Honolulu (ROH), 1990.

Since the project involves the replacement of a bridge along a publicly-traveled highway and work within a floodway, Kahana Stream, a "No-Rise" Certification is required to demonstrate that the new bridge structure will not increase the anticipated water level at the bridge, which would affect flood levels upstream of the bridge and increase the flood hazard of the area.

Certification for "no-rise" in the anticipated water level at the new bridge is contained within the document, *Hydrology and Hydraulic Report, Federal Aid Project Number BR-083-1(53), Kamehameha Highway, Replacement of North Kahana Bridge, Kahana, Ko'olauloa, O'ahu, Hawai'i*, dated October 2003, by M&E Pacific, Inc.

1.3.1.2 Special Management Area Permit & Shoreline Setback Variance

The SMA is land extending inland from the shoreline, as established in ROH Chapter 25—*Special Management Area*, and delineated on the SMA maps adopted by the City and County of Honolulu, City Council. The SMA maps are located at the Honolulu City Council and DPP offices. The SMA Permit covers any uses, activities or operations that are defined as being part of "development" within the SMA. Uses, activities and operations not considered to be associated with "development" are exempt from SMA requirements. The definition of "development" and exemptions are contained in ROH Chapter 25.

Any "development"-related uses, activities or operations within the SMA requires either an SMA *Minor* Permit or an SMA Use Permit (SMP), depending on the total cost and environmental impact of the proposed project. Generally, an SMA Minor Permit may be processed if the total cost of the proposed development is less than $125,000 and will have no substantial adverse environmental or ecological impacts. If the project has a total value that exceeds $125,000 and/or

results in substantial adverse impacts, including potential cumulative impacts, on the environment, an SMP (SMA *Major* Permit) is required.

No developments can occur in the SMA unless the appropriate agency first approves and issues an SMA Permit. The DPP is the reviewing agency for both SMA Minor Permits and SMPs; however, the approving agency depends on the type of SMA Permit. For SMA Minor Permits, the approving agency is the DPP, while for SMPs, the approving agency is the Honolulu City Council. For projects in Community Development Districts (CDDs), the approving agency is the DBEDT-OP.

The SMA Use Permit is regulated under HRS Chapters 205A and 343; ROH Chapter 25; and the DPP document, *Rules Relating to Shoreline Setbacks and the Special Management Area* et seq.

As previously mentioned, an SMA Map of the region encompassing the project site is attached for reference as Figure 7. According to the map, the entire project area is located within the SMA. In addition, the total cost for this project exceeds $125,000. Thus, an SMP is required for the proposed work and is in the final stages of processing by the DOT-HWY. This project is not located within a CDD; thus, the reviewing agency for the project will be the DPP and the approving agency will be the Honolulu City Council.

Both North Kahana Bridge and the temporary detour bridge are located above the Shoreline Setback Area (SSA) as defined and governed by the Hawai'i Administrative Rules, Title 1, Subtitle 1, Chapter 2, *Rules Governing Special Management Areas and Shoreline Areas Within Community Development Districts and Practice and Procedures Before the Office of Planning* and currently administratively attached to the DBEDT, and as demarcated by the Shoreline Setback Map of the project vicinity shown in Figure 8. Thus, a Shoreline Setback Variance (SSV) is not required for the subject project.

1.3.2 STATE OF HAWAI'I

The regulating agencies for the State of Hawai'i include DBEDT-OP-CZM, DOH-CWB (in conjunction with the EPA) and DLNR. An assessment and determination of Federal Consistency

is required by DBEDT-OP-CZM. Five items are required from the DOH-CWB & EPA: an NPDES Signatory and Certification Statement, three different parts to an NPDES Individual Permit and Section 401 WQC. A CDUA permit is required from DLNR-OCCL. and a SCAP is required from DLNR-CWRM.

1.3.2.1 Coastal Zone Management Program Assessment and Federal Consistency Determination

A project needing any federal permit or license may require an assessment and review for consistency with Hawai'i's CZM Program. A project needing a permit specifically from the USACE requires this assessment and review for consistency. Federal activities, including projects financially-assisted by the federal government, that directly affect Hawai'i's coastal zone, including all land, waters and marine waters, require reviews for consistency with Hawai'i's CZM Program.

The CZM program assessment and federal consistency determination is regulated under Section 307 (§1456)—*Coordination and Cooperation* of the National Coastal Zone Management Act (NCZMA) of 1972, as amended (16 USC 1451, et seq); HRS Section 205A-3(3), "the lead agency shall review federal programs, federal permits, federal licenses and federal development proposals for consistency with the coastal zone management program"; and Code of Federal Regulations (CFR), Title 15, Part 930—*Federal Consistency with Approved Coastal Management Programs*, US Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA).

This project occurs in a coastal zone and is partially funded by the Federal government—Federal Highway Administration (FHWA). As discussed later, a US Department of the Army (DA), Corps of Engineers (USACE) 404 DA Permit is required for this project; thus, a review of project work for its consistency with Hawai'i's CZM Program is needed. NCZMA Section 307(C) requires a determination of consistency with the CZM Act for this project before the project gets approved. Therefore, the responsible agency—DOT-HWY—has made a determination of consistency and is in the final stages of requesting concurrence from the State CZM Program administrated by DBEDT-OP-CZM.

1.3.2.2 National Pollutant Discharge Elimination System Permit

The DOH is delegated by the EPA to administer the National Pollutant Discharge Elimination System Permit program in Hawai'i. The NPDES permit program is described in and administered through Chapter 11-55—*Water Pollution Control* of the Hawai'i Administrative Rules (HARs). The NPDES Permit is regulated under CWA et seq, HRS Chapter 342D, 40 CFR Parts 122 to 125 and HAR 11-55.

The waters at and near the project site are classified as Class 1b Impaired Inland and Class AA Marine Waters and the site is located in a State Park preserve. Construction work discharges near or at these types of land and water designations cannot be covered under general NPDES permit coverage; thus, project construction work will require NPDES Individual Permit Coverage (IPC) for review approval by the EPA.

The proposed project will generate different types of discharge, which require different EPA IPC 3510 forms. The CWB-NPDES *Signatory and Certification Statement to NPDES Permit Applications and Guidelines*, *Individual NPDES Form C—Application for HAR, Chapter 11-55—NPDES Individual Permit Authorizing Discharges of Storm Water Associated With Construction Activities*, NOI Form G— *Notice of Intent for HAR, Chapter 11-55, Appendix G—NPDES General Permit Coverage Authorizing Discharges Associated With Construction Activity Dewatering* and EPA Form 3510-1—*General Information, Consolidated Permits Program* was completed and submitted for the project. In addition, all applicable EPA 3510-2 forms were prepared for each type of discharge.

CWB *Individual NPDES Form C—Application for HAR, Chapter 11-55—NPDES Individual Permit Authorizing Discharges of Storm Water Associated With Construction Activities* was completed to cover storm water associated with construction activity generated during the project. Storm water associated with construction activity includes general runoff within the site from rainfall that ultimately enters Kahana Stream—a State surface water—for the duration of the project. Best management practices (BMPs) and/or DOH-acceptable forms of effluent treatment will be established during the project to control and treat this type of discharge. The BMPs and methods of discharge treatment for the proposed project are discussed in Chapter 2.

CWB-NOI Form G— *Notice of Intent for HAR, Chapter 11-55, Appendix G—NPDES General Permit Coverage Authorizing Discharges Associated With Construction Activity Dewatering* was completed to cover discharges associated with construction activity dewatering during the project. Dewatering effluent will also result during the project from the construction of bridge abutments and center piers for both the replacement and temporary bypass bridges during the project. This water will either be pumped to a holding/storage truck, which will transport the water to an off-site area for land application disposal or pumped directly to an on-site treatment system. Best management practices (BMPs) and/or DOH-acceptable forms of effluent treatment will be established during the project to control and treat this type of discharge. The BMPs and methods of discharge treatment for the proposed project are discussed in Chapter 2.

EPA Form 3510-2D—*New Sources and New Dischargers: Application for Permit to Discharge Process Wastewater* was completed to cover dewatering effluent generated during the project. BMPs and/or DOH-acceptable forms, as discussed above, of dewatering effluent treatment will be established during the project to control and treat this type of discharge. As mentioned earlier, the BMPs and methods of discharge treatment for the proposed project are discussed in Chapter 2.

DOT-HWY is in the final stages of processing the IPC.

The coverage of the issued permit will terminate upon completion of all project work.

1.3.2.3 CWA Section 401 Water Quality Certification

Water Quality Certification pursuant to the Federal Clean Water Act of 1977 et seq (CWA) Section 401 is required of any applicant for a federal license or permit to conduct any activity in State waters that would include, but not be limited to, the construction or operation of facilities that may result in any discharge into navigable waters. The applicant must provide the licensing* or permitting agency with a certification from the State in which the discharge originates or will originate.

A common permit contingent upon the requirement of a 401 WQC is the USACE 404 DA Permit (to be discussed later). The lack of requirement for a 401 WQC negates the need for a 404 DA Permit; however, a 401 WQC may be required in some instances that do not necessitate a 404 DA (primarily in State waters that are not considered to also be federal navigable waters).

Section 401 WQC is regulated under the CWA, HRS Chapter 342D—*Water Pollution* and HAR Chapter 11-54—*Water Quality Standards*.

This project involves work that would result in discharge to State waters in a coastal area adjacent to federal navigable waters; thus, the project requires a 401 WQC, and as a result, a 404 DA. DOT-HWY is in the final stages of processing both a 401 WQC and a 404 DA for this project.

1.3.2.4 Conservation District Use Application Permit

Any use of lands within a Conservation District, as established by the State Land Use Commission, requires a CDUA Permit. Conservation Districts include large areas of mountain and shoreline lands, virtually all traditional Hawaiian fishponds, and most submerged offshore lands and outlying small islands. Maps showing boundaries of Conservation Districts are available at the DLNR.

The CDUA Permit is regulated by HAR Title 13, Chapter 5—*Conservation Districts* and HRS 183C—*Conservation District*.

As previously mentioned, a State Land Use Designation Map of the region encompassing the project site is attached for reference as Figure 5. According to the map, this project, in its entirety, involves work within the State-designated Conservation District; thus, the project requires a CDUA Permit. DOT-HWY is in the final stages of processing a CDUA for this project.

1.3.2.5 Stream Channel Alteration Permit

Stream channels are protected by law from alteration, whenever practicable, to provide for fishery, wildlife, recreational, aesthetic, scenic and other beneficial instream uses. No stream channel can be altered until an application for a SCAP to undertake the work has been filed and a permit has been issued by the CWRM.

The SCAP is regulated by HAR Title 13, Subtitle 7, Chapter 169—*Protection of Instream Uses of Water* and HRS 174C—*State Water Code.*

The project involves a number of tasks that affect the existing condition of the stream, including the installation of construction BMPs and construction of abutments, center piers and concrete support structures for the replacement bridge; thus, an SCAP is required by the project. DOT-HWY is in the final stages of processing a SCAP for this project.

1.3.2.6 National Historic Preservation Act Section 106 Review and Consultation

The use of Federal funds and the requirement of Federal permits for the project triggers the need for NHPA Section 106 compliance; Federal involvement in the project subjects the project to the NHPA Section 106 review process. The purpose of the NHPA Section 106 review process is to evaluate the potential for effects on existing historic sites, if any, resulting from the project.

The NHPA Section 106 review process encompasses a "good faith effort" in ascertaining the existence and location of historic properties near and within the project site, establishing an Area of Potential Effects (APE) of the project, identifying whether a potential for "adverse affects" on historic properties by the project exists, and developing a reasonable and acceptable resolution in the monitoring and treatment of any historic sites that is agreed upon by the agency, Hawai'i State Historic Preservation Officer (State of Hawai'i, Department of Land and Natural Resources, Historic Preservation Division [SHPD]), and consulting government agencies, community associations, and native Hawaiian organizations and families. This resolution is in the form of the legal document "Memorandum of Agreement" (MOA) should the potential for "adverse effects" be determined to exist from the project. The review process also affords the

Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment and provide consultation on the project.

For the project, an initial investigatory letter was distributed to government agencies, community associations, the SHPD and native Hawaiian organizations and families. The letter described the project undertaking and requested information on any historic properties existing near and within the project site. The native Hawaiian families, to which the letter was sent, have recognized familial ties to identified cultural sites, specifically ancestral remains, a couple of miles away from the project site in Punalu'u. The base investigatory letter that was distributed to the aforementioned parties is included as Appendix A and the database of parties to which the letter was sent is included as Appendix B. Based upon the responses to the investigatory letter, an APE was established as shown in Appendix C, that roughly encompasses the area disturbed by project work. This area consists primarily of the 50-foot roadway easement width and approximately 240-foot length of each proposed bridge approach roadway, and a combined width of the existing bridge and the temporary bypass bridge (about 90 feet) and a length of about 120 feet along Kamehameha Highway that is centered on the existing bridge. Area disturbed for the replacement and bypass bridge abutments, center piers and concrete support structures are included as part of the APE.

According to the report *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement, Kahana, Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1)* by Cultural Surveys Hawai'i, Inc., (Appendix D), Kahana is believed to have supported a substantial permanent population and once served as a center for economic, social, political and religious activities. Agriculture was common in the *mauka* portions of Kahana Valley. The project site and surrounding areas are anticipated to have been subjected to intensive use over a millennium of the Hawaiian past, and have this use manifested in a variety of subsurface historical features, such as, *imu*, fire pits and burials. Approximately twenty archaeological studies have been undertaken within the entire *Ahupua'a* of Kahana that have identified the presence of over 100 historic sites.

The Bernice Pauahi Bishop Museum, DLNR State Parks Division and BWS conducted separate archaeological testings at sites near, adjacent to and partially including the project area in 1973, 1980 and 2002, respectively. The DLNR State Parks Division archaeological testing was part of a buried electrical line installation project, which provided power for facilities and houses along Kahana Valley Road just inland of Kamehameha Highway adjacent to North Kahana Bridge. The BWS archaeological testing was part of their on-going Windward Mains Project, which involves the installation of waterlines along Kamehameha Highway on the northeastern coast of O'ahu. All testings revealed near total absence of any historical evidence. Nonetheless, the potential for the existence of historic sites, and adverse effects on these properties, exists for the project.

Adverse effects on historic properties will be mitigated through an Archaeological Monitoring Plan (AMP), contained within the document *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement, Kahana, Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1)* by Cultural Surveys Hawai'i, Inc., which has been reviewed and approved by the SHPD. Monitoring for historic sites in accordance to this AMP shall be implemented throughout the duration of the project. The SHPD has recognized the AMP to be adequate in rendering a "no adverse effect" classification for the project as summarized in their determination letter contained in Appendix D. Thus, an MOA is not required and will not be developed between the FHWA, DOT-HWY and SHPO.

In the unlikely event that historical or cultural materials be discovered during ground disturbing activities, work in the area will cease immediately and the SHPD will be notified of the discovery and consulted as to the appropriate course of action. Burial finds will be treated in accordance with HAR 12-300 and HRS 6E-43.6. The SHPD will determine the appropriate treatment of the remains and any associated historical or cultural material in consultation with recognized descendants, if any, and the O'ahu Island Burial Council.

1.3.3 UNITED STATES GOVERNMENT

The regulating agencies for the Federal government include the USACE and EPA. A Section 404 Permit is required from USACE and concurrence of compliance with NHPA Section 106 is required from the EPA.

1.3.3.1 CWA Section 404 Permit

Since 1890, the USACE has been regulating activities in the nation's waters. Until the 1960's, the primary purpose of the USACE regulatory program was to protect navigation; however, since then, the program has been broadened as a result of laws and court decisions to consider the interest of the full public for both the protection and utilization of water resources. In compliance with the CWA 404(b), the EPA and DA specify that any individual, firm or agency (including federal, state and local governmental agencies) that plans to do work in the water under jurisdiction of the US must obtain a permit from the USACE. The objectives of the permit program are to:

(1) Ensure that US water resources are safeguarded;
(2) Ensure that water resources in the US are used in the best interest of the people; and
(3) Ensure that environmental-social-economic concerns of the public are considered.

The USACE has jurisdiction over "dredge and fill" actions in US waters. Certain discharges specified in 33 CFR Part 330 are permitted under a "Nationwide" permit system, while other categories require regional and individual permits.

The 404 CWA Permit is regulated under Section 404 of the Clean Water Act (33 United States Code [USC] 1344); The Federal Register, Regulatory Programs of the Corps of Engineers, Final Rule, November 13, 1986 (33 CFR 2 Parts 320 through 330); and The Federal Register, Nationwide Permit Program Regulations and Issue, Reissue and Modify Nationwide Permits, Final Rule, November 22, 1991 (33 CFR Part 330). The 404 CWA Permit may be affected by laws, including the National Environmental Policy Act, Coastal Zone Management Act, Fish and Wildlife Coordination Act, Endangered Species Act, National Historic Preservation Act,

Deepwater Port Act, Federal Power Act, Marine Mammal Protection Act, Wild and Scenic Rivers Act, and National Fishing Enhancement Act of 1984.

As mentioned earlier, this project involves work that results in discharge to State waters in a coastal area adjacent to Federal navigable waters and thus, requires both a 401 WQC and 404 CWA Permit. Preapplication consultation was held to confirm USACE jurisdiction and construction BMPs that could minimize potential adverse environmental effects, and to ascertain permitting requirements. A 401 WQC is required prior to the issuance of a 404 CWA Permit. DOT-HWY is in the final stages of processing both a 401 WQC and a 404 DA for this project.

1.3.3.2 Land & Water Conservation Fund Compliance

The Land & Water Conservation Fund (LWCF) program provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high-quality recreation areas and facilities and to stimulate nonfederal investments in the protection and maintenance of recreation resources across the United States.

Once LWCF monies are used to acquire, develop or improve an area or facility, post-completion compliance responsibilities apply. Each area or facility for which Land and Water Conservation Fund assistance is obtained, regardless of the extent of program participation in the assisted area or facility and consistent with the contractual agreement between the NPS and the State. The State is responsible for compliance and enforcement of these provisions for both State and locally-sponsored projects. Responsibilities cited in Title 36, Part 59 in the *US Code of Federal Regulations* apply to the area described on the 6(f)(3) boundary map and/or as described in other project documentation approved by the DOI. One provision for compliance consists of purchasing or replacement (exchange) of any land by the entity owning a project involving the permanent take of LWCF land. If the land use is temporary, any facilities or structures compromised by the project needs to be replaced and the land must be restored to its original condition, or better, with the approval and consent of local (DLNR-DSP) and/or federal LWCF authorities.

Portions of Ahupua'a O Kahana State Park have been improved through the use of LWCF funds, including most recently, the addition of new picnic tables and outdoor shower facilities. The LWCF boundary map owned by the DLNR-DSP indicates that the entire portion of the park *makai* of the highway falls under LWCF jurisdiction; thus, the project is subject to LWCF requirements. Since the project involves the replacement of a publicly-used facility and the LWCF land will be used only for temporary construction measures, DOT-HWY is in the final stages of consultation and coordinating with LWCF authorities for a Temporary Non-Conforming Use of LWCF Act Section 6(f)(3) Property approval. Copies of correspondence with the LWCF authorities are contained in the appendix of this report.

1.3.3.3 Endangered Species Act Evaluation

Congress passed the Endangered Species Preservation Act in 1966. This law allowed listing of only native animal species as endangered and provided limited means for the protection of species so listed. The Departments of Interior, Agriculture and Defense were to seek to protect listed species, and insofar as consistent with their primary purposes, preserve the habitats of such species. Land acquisition for protection of endangered species was also authorized. The Endangered Species Conservation Act of 1969 was passed to provide additional protection to species in danger of "worldwide extinction." This Act called for an international ministerial meeting to adopt a convention on the conservation of endangered species.

In 1973, the Endangered Species Act was passed, which considerably strengthened the provisions of its predecessors, and broke some new ground. Its principal provisions are as follows:

- US and foreign species lists were combined, with uniform provisions applied to both [ESA Section 4];
- Categories of "endangered" and "threatened" were defined [ESA Section 3];
- Plants and all classes of invertebrates were eligible for protection, as they are under the Conservation on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [ESA Section 3];

- All Federal agencies were required to undertake programs for the conservation of endangered and threatened species, and were prohibited from authorizing, funding, or carrying out any action that would jeopardize a listed species or destroy or modify its "critical habitat" [ESA Section 7];
- Broad taking prohibitions were applied to all endangered animal species, which could apply to threatened animals by special regulation [ESA Section 9];
- Matching Federal funds became available for States with cooperative agreements [ESA Section 6];
- Authority was provided to acquire land for listed animals and for plants listed under CITES [ESA Section 5]; and
- US implementation of CITES was provided [ESA Section 8].

Significant amendments have been enacted in 1978, 1982, and 1988, while the overall framework of the 1973 Act has remained essentially unchanged.

Since the project is partially-funded by the federal government, it must be in compliance with ESA Section 7 requirements. Information was obtained from the University of Hawai'i at Mānoa, Center for Conservation Research and Training (CCRT), Hawai'i Natural Heritage Program (HNHP) regarding threatened and endangered species in the project vicinity, and was evaluated by the US DOI FWS along with plans of the proposed project and the DEA. A letter was received from the US DOI FWS officially stating their concurrence with the DEA determination of "no adverse effect" on any federally-listed threatened or endangered species, or proposed or designated critical habitats. A copy of this letter is included in the appendix of this report.

1.3.3.4 Department of Transportation Act Evaluation

Section 4(f) of the Department of Transportation Act was enacted in 1966 and originally set forth in Title 49, US Code (USC), Section 1653(f) at about the same time a similar provision was added to Title 23, USC, Section 138. The Federal-Aid Highway Act of 1968 was enacted to make these two sections substantially consistent, and in January 1983, as part of an overall

recodification of the DOT Act, Section 4(f) was amended and codified in 49 USC, Section 303. The wording in Section 303 states:

(a) It is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

(b) The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Developments, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities.

(c) The Secretary may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation areas or wildlife and waterfowl refuge, or land of an historic site of national, State or local significance (as determined by the Federal, State or local officials having jurisdiction over the park, recreation areas refuge or site) only if:

(1) There is no prudent and feasible alternative to using that land; and

(2) The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuges or historic site resulting from the use.

Since the project is partially-funded by the federal government and occurs adjoining a public park, it must be in compliance with DOTA Section 4(f) requirements. FHWA authorities were given the opportunity to review the project plans and documents, and through consultation and coordination with these authorities, an official letter was obtained that summarized the FHWA determination that the project complies with the Nationwide Section 4(f) Evaluation. A copy of this letter is included in the appendix of this report.

1.4 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) is prepared pursuant to Chapter 343 of the HRS and DOH, HAR Title 11-200, *Environmental Impact Statement Rules*. This document will serve as a written evaluation of the potential physical and social effects on the environment by the proposed project, as well as, mitigative measures wherever necessary.

CHAPTER 2—PROJECT DESCRIPTION AND ALTERNATIVES CONSIDERED

2.1 PROJECT DESCRIPTION AND BACKGROUND

The DOT-HWY proposes to replace the existing North Kahana Bridge, which is situated across the northern fork of Kahana Stream on the northeastern coast of the island of O'ahu. The scope of work for the proposed project includes the following items:

- Topographic survey;
- Subsurface exploration;
- EA;
- Various permits, variances, approvals and clearances;
- Hydraulic and hydrologic studies;
- Scour analysis; and
- Civil, structural, electrical and landscaping design for items to include, but not be limited to:
    - Temporary bypass bridge
    - Temporary bypass bridge detour approach roadways,
    - Stream bank widening and stabilization,
    - Replacement bridge approach roadways,
    - Replacement bridge,
    - Temporary and permanent lighting,
    - Cutting/plugging of an existing BWS Waterline,
    - Relocation of existing bus stops,
    - Restoration of the Kahana Valley Road intersection with Kamehameha Highway,
    - Traffic control, and
    - Environmental protection and BMPs.

The project site is located in a rural, relatively undeveloped area. North Kahana Bridge is surrounded by State-owned public park land characterized by lush greenery. The beach park portion of Ahupua'a O Kahana State Park lies to the east and northeast (*makai*) of the bridge while the valley park portion of Ahupua'a O Kahana State Park lies to the west and southwest

(*mauka*) of the bridge. According to the DBEDT *State of Hawai'i Data Book 2002*, the population of the Ko'olauloa District was about 14,200 in April 1980, 18,500 in April 1990 and 18,900 in April 2000. Thus, the rate of population growth has dramatically decreased over the past several years. Nonetheless, the population is continuing to grow and Kamehameha Highway needs to be maintained to support this growth. Kamehameha Highway is the primary thoroughfare for local residents and tourists on east O'ahu, and in most places, such as, Kahana, it is the only thoroughfare. Kamehameha Highway is the main artery that connects cities and towns on the windward side of O'ahu, such as, Kahuku, Lā'ie, Hau'ula, Punalu'u, Kahana, Ka'a'awa, Waikāne, Wāiahole, Kahalu'u, 'Ahuimanu and Kāne'ohe.

The scope of work for construction includes the following tasks:

- Installation of BMPs for environmental protection;
- Clearing and grubbing;
- Construction of a temporary bypass bridge and detour roadway with sufficient lighting *makai* of the existing North Kahana Bridge for rerouting traffic;
- Cutting/plugging of an existing BWS 20-inch potable water line attached to the *mauka* side of the bridge and effective protection, as required, of existing buried BWS 30-inch potable water line just *makai* of the bridge (a buried BWS 30-inch waterline exists just *mauka* of the bridge and has been abandoned in-place);
- Demolition of the existing bridge;
- Widening and stabilization of stream banks beneath the existing bridge;
- Construction of a new bridge with appropriate lighting;
- Construction of replacement bridge approach roadways;
- Restoration of the intersection between Kahana Valley Road and Kamehameha Highway just northwest of the bridge;
- Replacement of the bus stops on both the *mauka* and *makai* sides of Kamehameha Highway just northwest of the bridge;
- Demolition of the bypass bridge and removal of the detour roadway and temporary lighting;

- Final grading and landscaping; and
- Removal of the temporary BMPs.

For the protection of nearby park users, residences, beachgoers and bridge users both temporary and permanent BMPs will be used for the project. Storm water runoff and wind will carry sediment from exposed areas to Kahana Stream and areas adjoining the project site. Any accumulated dirt and debris from construction activities will be cleaned, as required, from public roadways and neighboring driveways to keep the surroundings clean and safe. Soil loss due to storm events will be controlled with the use of temporary BMPs consisting of earthen berms, silt fences and dust screens along the perimeter of the project site; mulch, fast-growing groundcover and periodic watering on exposed areas; and sandbags, gravel, sheet piles and turbidity barriers installed along the stream banks for erosion control. These BMPs will be removed upon completion of the project construction work.

Grouted sheet piles with gravel, grouted and concrete bases and dewatering pumps will be used for work on bridge abutments and supports. Dewatered stream water will either be completely stored in the vessel of a transfer truck for transport to an off-site treatment system, or diverted directly to an on-site treatment system, consisting of a settling tank and a sedimentation pond with filtering rock berm and geotextile fabric, before reentry into Kahana Stream. Water quality samples of the stream ambient conditions at the dewatering effluent treatment system discharge location, the dewatering effluent and the stream conditions after discharge from the dewatering effluent treatment system commences will be taken to monitor and control adverse effects upon the environment of the discharge, if any. A small amount of suspended solids and fine silt may leach out of the isolation area through the gravel bed and underlying sand or through small cracks between driven sheet piles.

A dewatering plan will be developed by the Contractor, with the approval of DOT-HWY, that includes the size and location of the sedimentation pond, and the extent of the site preparation required, such as, clearing, grubbing, grading and BMPs. Also included in this plan should be details on the measures to restore the area to its original condition, or better, with the approval of the Engineer, subsequent of dewatering activities.

During demolition and new concrete work, a substructure or fine-meshed fabric netting will be suspended beneath the entire area of work to contain debris. These BMPs will be removed upon completion of the project construction work. Any exposed ground within the project area will be mulched and watered periodically, and dust screens will be installed around the perimeter of the project site, as required, to keep adjacent areas free from dust nuisance. Permanent BMPs will consist of natural berms and swales formed just upstream and downstream of the bridge, grouted riprap shoreline stabilization around the new bridge abutments, and grassing of exposed banks and the installation of native (indigenous) and/or adopted Polynesian-introduced species of plants. These BMPs will remain in-place indefinitely. Construction equipment will be maintained regularly to minimize fluid discharge from normal operation.

A demolition plan was developed by the Structural Engineer, and the anticipated equipment to be used in the demolition of the existing bridge and associated structures include:

- Jackhammers;
- Sawcutters;
- Boom crane; and
- Backhoe.

Dismantling and removal of the temporary BMPs all have the potential to temporarily generate debris and cause temporary increases in stream turbidity due to soil disturbance; however, the disturbance is anticipated to be relatively small and of short, insignificant duration.

The temporary bypass bridge will be 36′-wide and roughly 120′-long (single span), with an approximate vehicle travel surface elevation of 8.85′. The bridge will be crowned at its centerline and will be located completely outside of and offset *makai* from the existing 50′-wide Kamehameha Highway right-of-way. An asphaltic concrete temporary bypass bridge detour roadway will be constructed. Since the bypass bridge and detour roadway will be *makai* of the existing North Kahana Bridge and Kamehameha Highway, a portion of the bypass bridge and detour roadway will encroach upon the southwestern edge of the beach park portion of Ahupua‘a

O Kahana State Park. The bridge and detour roadway will be located only on the *mauka* side of the beach park; thus, shoreline activities and access for the beach will not be impeded. Temporary lighting for the bypass bridge and detour roadway will be provided. The brightness of the lights will not exceed existing so as not to disorient any wildlife. The lights will be turned off when not in use.

Fill material estimated for the temporary bypass roadway is approximately 1,800 cubic yards. Requirements for fill material are contained in the Spec 203—*Roadway Excavation and Embankment* contained in the State of Hawai'i, Department of Transportation, Highways Division, *Special Provisions, Proposal, Contract and Bond* standard document.

A plan for revegetation of the project-disturbed area in the beach park was developed through coordination with the DLNR-DSP. The inventories for tree removal and replacement are as follows:

Tree Removal Inventory	Tree Replacement Inventory
17 False Kamani	3 Hala
15 Ironwood	6 Kou
1 Dead Tree	7 True Kamani
1 Plum	

Finish grades shall be restored to match existing grades. Detailed strategies to restore the adjacent areas affected by project construction activities to their original condition, or better, will be required of the Contractor in his development of a site-specific, construction BMP plan with the approval of the DOT-HWY.

Construction parcels are limited to areas directly related to construction activities, that is, the area required to perform bridge replacement construction and implementation of the detour roadway. Generally, the detour roadway represents roughly 8% of just the beachside portion of the Ahupua'a O Kahana State Park. The Contractor will be responsible for coordinating and establishing his staging and storage area.

At the discretion of the Contractor and approval of the Engineer, temporary wooden or chain link construction fencing with or without fabric about 6-feet tall may be erected for security purposes around the work and staging areas.

Existing utilities at the site include the following items:

- An aboveground BWS 20″ potable water line attached to the *mauka* edge of the bridge;
- A buried, abandoned BWS 30″ potable water line that runs parallel to Kamahameha Highway on the *mauka* side of the bridge;
- A buried, concrete-jacketed BWS 30″ potable water line that runs parallel to Kamahameha Highway on the *makai* side of the bridge; and
- Overhead Hawaiian Electric Company, Inc. (HECO) power lines.

The 20″ waterline will be cut and plugged. The 30″ *makai* waterline is not anticipated to conflict with neither the detour bridge nor new bridge construction. However, if the disturbance of the 30" waterline occurs, it will be protected by measures, such as, concrete jacketing, sheet piling, shoring and bracing, as required, for the duration of the construction work. The 30″ *mauka* waterline will not be protected in any way and will be removed in areas of conflict with project work. The overhead HECO powerlines and associated support structures and facilities will not be affected by this project. No other utilities, such as, synthetic natural gas lines, sewerlines and storm drainage structures, exist at the site nor will be affected by this project.

After the temporary bypass bridge and detour roadway are in place, the existing North Kahana Bridge will be demolished and all waste material generated from the demolition of the bridge will be disposed of by the Contractor. After the existing bridge and its foundations have been completely removed, the stream banks will be widened and stabilized, and construction of the new North Kahana Bridge will commence. The new, replacement bridge will be a three-spanned concrete structure 43′-wide, 120′-long and 9′-high, supported by two center piers and abutments at both ends. In comparison with the existing bridge, the widening is as follows:

- Existing length: 92 feet
- Proposed abutment-to-abutment length: 120 feet

The existing concrete abutments will be cut at the mudline and GRP will be installed on a bank sloping down from the face of the new bridge abutments to the back of the existing abutments. The estimated excavation amount to accommodate the new abutments and wingwalls is roughly 400 cubic yards. Surplus excavation will be hauled off-site and disposed of in a location approved by the Engineer.

The cross section of the final bridge will be crowned at the highway centerline. Asphaltic concrete replacement bridge approach roadways consisting of a segment approximately 250′-long on both the north and south ends of the replacement bridge will be constructed. Permanent lighting will be provided for all new, permanent structures. The brightness of the lights will not exceed existing so as not to disorient any wildlife.

Once the permanent structures are constructed and in-place, the bypass bridge, detour roadway and temporary lighting will be demolished and removed. All waste material generated from the demolition will be disposed of by the Contractor. Subsequent to the demolition of the temporary structures, the temporary BMPs will be removed after confirmation that the permanent BMPs are properly and completely established.

The proposed project will increase the safety of Kamehameha Highway users by improving the North Kahana Bridge to satisfy government agency standards and regulations. The replacement of the North Kahana Bridge is in accordance with the mission of the DOT-HWY: provide a safe, efficient and accessible highway system through the utilization of available resources in the maintenance, enhancement and support of land transportation facilities; the establishment and upkeep of highways and associated structures within right-of-ways dedicated to the State of Hawai‘i for the safe use of all users, and the renovation or replacement of facilities that lack compliance with government agency design standards.

The FHWA is financially aiding the improvement and replacement of a number of bridges, including the North Kahana Bridge, along Kamehameha Highway in an effort to improve the safety of the highway users in accordance to their mission: meet the public's need for improved access and for safe comfortable, convenient and economical movement of people and goods; be an environmentally conscious organization that practices active leadership in working with their partners to protect and enhance the natural and human environment; improve the delivery and quality of their transportation programs and products; develop, transfer and implement technology through alliance with their partners and the international community; and improve surface transportation safety through a coordinated effort to reduce fatalities, injuries, property damage and hazardous material spills.

2.2 PROJECT APPROACH

The *Guidelines for Sustainable Building Design in Hawai'i* were considered to minimize the impact of the project on the environment while making practicable use of Hawai'i's natural resources. Some characteristics of the project in favor of the guidelines include:

• Best Management Practices:	Dust nuisance, erosion and pollution will be controlled with various temporary and permanent measures.
• Archaeological Monitoring Plan:	A SHPD-approved AMP was established to ensure the protection and proper handling of historic properties, should they be encountered.
• Minimization of impact on environment:	Drainage will be improved through widening and stabilization of stream banks. A single-span temporary bypass bridge will be used to minimally impact the stream. Native (indigenous) and/or adopted Polynesian-introduced species of plants will be used for landscaping. Final structures will be flat to avoid hindering any visual resources.
• Use of recycled material:	Glassphalt will be used.

• Coordination with utility agencies:	The project was coordinated with the future plans for service in the area of various utility agencies. The abandonment and protection of waterlines at the site was coordinated with the BWS.

2.2.1 TOPOGRAPHIC SURVEY

The existing roadway, right-of-way (ROW), properties, easement lines, improvements, shoreline, stream channel, vegetation, utilities, baselines, elevation data, etc, in and near the project site were surveyed for analysis and design. The results are displayed in the Topographical Survey of Existing Condition shown in Figure 9.

2.2.2 SUBSURFACE EXPLORATION

The proposed bridge will consist of three spans. Borings from the original design extended between 65 feet to 110 feet deep and did not extend into bedrock. Borings are proposed at each abutment and the center pier to depths of about 100 to 120 feet, or 20 feet into bedrock. Deep foundations will be required to withstand the high structural vertical and lateral loads, poor near-surface soil conditions and potential scour. While driven piles are generally appropriate when hard end-bearing subsurface formations are available, boulders in the deep alluvial deposits are anticipated to make this more difficult. Potential deep scour during storm events could expose the piles and reduce the required foundation lateral resistance for this structure. Therefore, drilled shafts may be more cost-effective for these site conditions. Shallow sheet pile cut-off walls for the abutments may be helpful to minimize adverse water quality effects during construction. A soils report (*Geotechnical Engineering Exploration, Kamehameha Highway (Route 83), North Kahana Stream Bridge Replacement, Project No. BR-083-1(42), Kahana, Oahu, Hawaii*, dated May 30, 2003) summarizing the geotechnical exploration has been developed by a geotechnical engineer licensed in the State of Hawai'i—Geolabs, Inc.

2.2.3 HYDRAULIC AND HYDROLOGIC STUDIES

A hydrologic analysis (*North Kahana Bridge Replacement, Hydraulic and Scour Analysis*, dated September 2004) for both the existing and proposed bridges and the temporary bypass bridge was conducted in accordance with FHWA requirements by WEST Consultants, Inc. The analysis used stream flow data from the DLNR and the University of Hawai'i at Mānoa (UH), Water

Resources Research Center (WRRC). This information was then used to develop a velocity profile, which was used to determine the extent of erosion and potential scour at the proposed bridge. The proposed bridge will have a thicker deck than the existing bridge in order to meet government agency design guidelines; however, the replacement bridge will have two center piers (3 spans) as opposed to the six in-stream supports (five spans) of the existing bridge. In addition, the stream will be widened during the project and the banks will be stabilized against erosion and scour. The cross-sectional flow area of the replacement bridge will exceed that of the existing bridge; thus, the hydraulic capacity of the replacement bridge will be greater than the existing bridge.

Grubbing activities for the project will expose banks and make them susceptible to scour and erosion. Soil loss during project work will be controlled through the use of mulch, earthen berms, silt fences, sandbags and turbidity barriers. Erosion and scour mitigative measures were discussed in Section 2.1.

2.2.4 UTILITY RELOCATIONS

The existing BWS 20-inch waterline attached along the *mauka* side of the North Kahana Bridge will be cut and plugged. The BWS 30-inch water transmission main on the makai side of the bridge is not anticipated to conflict with the temporary nor new bridge. However, if the disturbance of the 30-inch waterline occurs, it will be protected by measures, such as, concrete jacketing, sheet piling, shoring and bracing, as required, for the duration of the construction work. Portions of the BWS 30-inch waterline on the *mauka* side of the bridge may be removed due to its interference with the replacement bridge foundations. Since project work will be conducted mostly on the *makai* side of the road, the overhead electric, telephone and cable lines, which are on the *mauka* side of the road, will be left undisturbed. Precaution will be taken to avoid disturbing the 30-inch water main or touching the lines with drilling masts, pile driving hammers and other construction equipment until the lines have been successfully realigned. Street lighting will be upgraded for the wider permanent roadway. Lighting will also be provided for the temporary bypass bridge.

Memorandum of Understandings (MOUs) are in their final stages of development and processing with companies and agencies (BWS, Oceanic Time Warner Cable, Hawaiian Electric Co, Inc. [HECO], and Verizon Hawaii) that have utilities within or near the project area. These MOUs officially summarize coordination with the utility companies and agencies regarding the project and its effects and repercussions on their facilities in the area.

2.2.5 CIVIL DESIGN

A drainage report complete with hydraulic calculations was completed by M&E Pacific, Inc. (*Hydrology and Hydraulic Report, Federal Aid Project Number BR-083-1(53), Kamehameha Highway, Replacement of North Kahana Bridge, Kahana, Ko'olauloa, O'ahu, Hawai'i*, dated October 2004) based on the hydrology study. Runoff along the roadside will be intercepted from the highway into Kahana Stream. The design flows were be based on existing data and guidelines from the DOT-HWY, FHWA, WRRC, US Geological Survey (USGS) and DLNR for the 1,800-acre drainage basin.

The simplest alignment for the proposed temporary bypass bridge is *makai* of North Kahana Bridge since the vegetative growth on the *makai* side of the bridge is less dense than on the *mauka* side. This alignment will allow the project to be conducted without significantly affecting 24-hour use of Kamehameha Highway and access to the nearby existing parks. Temporary and permanent signings, striping, pavement markings, end treatments and lighting will be provided.

An executive order from the Governor's office is required to transfer land from the DLNR to the DOT-HWY for a construction easement.

2.2.6 STRUCTURAL DESIGN

The proposed bridge structure will be designed to withstand a 100-year storm. Details of and considerations for bridge design to withstand exposure to natural hazards are discussed further in Section 3.2.6. The structural design of the proposed bridge is based on FHWA and DOT standards. The existing five-span North Kahana Bridge will be replaced with a three-span, reinforced concrete structure with an approximate length of 120 feet, and the bank beneath the bridge will be widened and stabilized against erosion. Pier and abutment skew is anticipated to

be between 0 and 15 degrees. Precast pier caps and a combination of a precast/cast-in-place abutment system will be utilized to minimize construction time, as well as, the potential of water quality effects. The deck will consist of cast-in-place reinforced concrete over precast, prestressed concrete girders or tees. The new bridge, at a width of 43-feet, will consist of two 12′ travel lanes and two 8′ shoulders. The 8-foot shoulders will serve as a walkway/bikelane for pedestrians and bicyclists. An option to include a separate pedestrian walkway was also evaluated. As a result of low pedestrian counts (no pedestrians during a 6-hour period) and the considerable impact it would have on the roadway alignment, the pedestrian walkway was removed from consideration for the bridge layout.

The temporary bypass bridge will be a Prefabricated Steel Truss panel-type modular bridging system. The temporary 36′-wide bridge will be a steel truss-based structure with an approximate length of 120 feet. Launching and landing abutment rollers atop concrete pads at the bridge ends (noses) and construction rollers at 25′ offset on-center will be used behind the launching and landing rollers for stability. No in-stream pier towers will be installed to support the temporary bridge.

2.2.7 LANDSCAPING

Landscaping will maximize the aesthetic appearance of the replacement bridge and approach roadways in addition to aiding the drainage properties of the area. Existing drainage patterns will remain as unaltered as possible. Landscaping will conform to applicable codes and guidelines, and will complement the surrounding area. Landscaping will not infringe upon views from any direction and use of the replacement bridge, temporary bypass bridge and approach roadways. Although the existing vegetation will be left untouched as much as possible, part of the existing vegetation will be removed or be transplanted further seaward of their existing locations to accommodate the temporary bypass bridge and approach roadways. Exposed areas will be mulched and planted with hardy, fast-growing ground cover for erosion control. The project site will be revegetated at the final phase of construction with plants similar to the existing ones. Groundcover and plants will be perennial and tolerant of relatively harsh ambient conditions by being able to withstand drought and relatively high wind, ultraviolet exposure and salinity. The

plants will be native and/or adopted species of trees, palms, bushes and shrubs that require low maintenance. The plants will not be intrusive upon or detrimental to existing habitats.

2.3 CONSTRUCTION PLAN

At the beginning of construction, a staging area for the contractor will be established and mobilization will commence. Best management practices will be installed, the site will be cleared and grubbed, and the containment treatment pond for dewatering material and will be constructed upstream of the existing bridge. In-stream BMPs, such as, sandbags, turbidity barriers and vinyl sheet piles will be installed and a temporary bypass bridge 36-wide by 120′-long will be built *makai* of the existing bridge structure. Any realignment or relocation of existing structures and utilities will be conducted. Dewatering will be performed as required with pumps and storage trucks, which will transport the water to the upstream containment treatment pond. Bridge approach roadways about 250-feet long will be constructed on each end of the existing bridge and a detour roadway connecting to these bridge approach roadways will be installed to provide vehicular access to the temporary bridge. Upon completion of the bypass bridge, the existing bridge will be demolished and replaced with a new, 3-span bridge 120′-long and 43′-wide bridge. The stream banks beneath the new bridge structure will be widened and stabilized against erosion. The new bridge structure will consist of two 12′-wide paved vehicular lanes and two 8′-wide paved shoulders. Final landscaping will include grading and the installation of vegetation, such as, groundcover and native plants. Refer to Figure 3 for a General Conceptual Plan of the project. A detailed construction plan will be developed by the contractor prior to construction commencement.

2.4 ALTERNATIVES CONSIDERED

2.4.1 NO ACTION

The "No Action" alternative entails the lack of any type of rehabilitation, repair or replacement work undertaken on the existing North Kahana Bridge. Therefore, no physical or social effects on the environment are incurred and immediate costs for planning and development is required of neither the State nor Federal governments.

The project is proposed because the existing bridge does not meet current live load and seismic requirements. If no type of repair or replacement work is performed on the bridge, the condition of the existing bridge will continue to deteriorate, and may eventually fail. Bridge failure could result in a loss of its usability and accidents and injury of its users. Bridge failure would then involve equivalent, if not more, government expenditure for remediation.

The "No Action" alternative represents a postponement in government expenditure and constitutes added risk for government agencies. The lack of action and subsequent bridge failure could incur larger environmental effects and greater capital expenditure than the environmental effects and investment associated with immediate bridge replacement work. Therefore, the "No Action" alternative is not considered to be a feasible option.

2.4.2 REHABILITATION ALTERNATIVE

The "Rehabilitation" alternative consists of restoring and renovating portions of the existing bridge to meet current live load and seismic requirements. This alternative could possibly eliminate the need for a temporary bypass bridge and new bridge approach roadways. Another main advantage of this alternative is that construction work and the environmental effects of the overall rehabilitation work can be divided up into a number of smaller, short-term projects that will minimize disturbance of most existing utilities, properties and vegetation. In addition, effects on the existing shorelines will be minimized.

Several drawbacks to the "Rehabilitation" alternative exist. These disadvantages include:

- The sufficiency rating of the existing bridge is less than 50, which qualifies the bridge for replacement.
- The width of the existing bridge is 24 feet, which is substandard, and could limit possible future expansion and widening of Kamehameha Highway.
- The bridge, as currently designed, has experienced damage due to debris flowing down the stream. The location of existing bridge piers in the stream makes the bridge susceptible to debris damage.

- The existing construction materials of the bridge are aged and could represent the "weak points" in rehabilitation in comparison with the new material.
- The comprehensive cost of the overall rehabilitation work will exceed the investment for replacement of the entire bridge.
- The comprehensive duration of the overall rehabilitation work will exceed the duration for bridge replacement and will prolong risk of the bridge users, and subsequently the risk for State and Federal government agencies.

The "Rehabilitation" alternative represents a temporary resolution. The prolonged action and stretched-out timeframe over which the bridge is rehabilitated leads to greater capital expenditure, prolonged risk and longer construction time than the investment, risk and construction duration associated with immediate bridge replacement work. Therefore, the "Rehabilitation" alternative is not considered to be as favorable as the "Replacement" option.

2.4.3 ALTERNATE ALIGNMENT

The "Alternate Alignment" alternative involves building a new bridge and approach roadways at another location upstream (*mauka*) of the present Kahana Stream crossing and realigning Kamehameha Highway to connect to the new roadways. This alternative could require the acquisition or condemnation of privately owned lands in order to accommodate the bridge, approach roadways and realigned highway, and would necessitate the redefinition of lands currently detailed on existing tax base maps and the re-establishment of the highway ROW to encompass the realignment.

Although the "Alternate Alignment" alternative eliminates the need for a temporary bypass bridge, and could nullify the requirement to demolish the existing bridge and alter existing utilities, time and money still has to be invested for the realignment of Kamehameha Highway and the acquisition of private land. This alternative involves greater environmental effects than the "Replacement" alternative since the area affected by the project is larger and consists of work on relatively undeveloped land.

Due to inevitable public resistance to the State's acquisition of private land to accommodate the new bridge and roadways, relatively more significant environmental impacts, and relatively larger capital investment and project duration, the "Alternate Alignment" alternative is not considered to be as favorable as the "Replacement" option.

2.4.4 CONCLUSION

Taking cost, risk, safety, environmental impact, public opinion, project duration and hydraulic factors into consideration, replacement of the bridge is considered to be the best resolution to remediate all existing deficiencies of North Kahana Bridge.

CHAPTER 3—AFFECTED ENVIRONMENT, ANTICIPATED EFFECTS AND PROPOSED MITIGATIVE MEASURES

3.1 INTRODUCTION

The environmental review process is regulated under Hawai'i's Environmental Impact Statement Law (HRS 343), which ensures that appropriate consideration is given to all environmental concerns regarding the proposed project. Part of the process requires identification and a summary of potential environmental effects from the proposed action and all considered mitigative measures to avoid or minimize the effects, which include both "primary" and "secondary" effects, as well as, "cumulative" "short-term" and "long-term" effects.

A "primary" or "direct" effect refers to an effect caused by an action, in this case a construction activity, and occurs, immediately, at the same time and place as the instigating action.

A "secondary" or "indirect" effect refers to an effect caused by an action that occurs, later in time or farther removed in distance from the instigating action, but is still reasonably foreseeable.

A "cumulative" effect refers to a comprehensive, built-up effect comprised of the incremental effects of an immediate, instigating action adding to effects of other past, present and reasonably foreseeable future actions, regardless of the agency or person who undertakes such other actions.

A "short-term" effect is an effect of relatively short duration and generally refers to a project construction work-related effect.

A "long-term" effect is an effect of relatively long and lasting duration and generally refers to an effect that remains after completion of the project construction work.

"Mitigation" refers to procedures followed and activities undertaken during the project to alleviate and minimize any negative effects and impacts of the project work.

The following sections describe the existing physical and social environments within the project site and surrounding areas, and explore the potential effects anticipated from the proposed action and the practical mitigative measures for any adverse impacts. All project-related work shall be assessed in compliance with State and County policies.

3.2 PHYSICAL ENVIRONMENT

3.2.1 CLIMATE

Existing Condition

An evaluation of the environmental setting for the region encompassing the project site is contained within the document *Coastal and Environmental Evaluation for the Proposed Replacement of North Kahana Bridge* (May 2003) by Sea Engineering, Inc. and AECOS Consultants, Inc., and is included as Appendix E. The climate of an area consists of a composite, or frequency distribution, of various kinds of weather within a relatively large region. The outstanding features of Hawai'i's climate include mild temperatures throughout the year, moderate humidity, persistence of northeasterly trade winds, significant differences in rainfall within short distances, and infrequent severe storms. For most of Hawai'i, there are only two seasons: "summer," between May and October and "winter," between October and April. Summer is generally drier and warmer and winter is wetter and cooler.

According to the *Environmental Assessment for the Punalu'u to Kualoa Park Transmission Pipeline, Ko'olauloa, Ko'olaupoko, O'ahu* (April 1999) by George A. L. Yuen & Associates for the BWS, windward coastal temperatures vary little over the annual weather cycle. At the Kahuku monitoring station, the average temperature for the coolest month is 71.6 degrees Fahrenheit (°F) and for the warmest month is 78.8 °F. Rainfall peaks during cooler months from November to March and is lower for warmer months (May to September).

As indicated in the *Atlas of Hawai'i*, Third Edition (1998) by the Department of Geography, University of Hawai'i at Hilo, prevailing wind pattern over O'ahu follows a southwesterly direction. A Seasonal Surface Wind Map is included as Figure 10. These trade winds that approach the island at an average speed of about 14 to16 miles per hour are laden with moisture from traveling over the Pacific Ocean. The mountainous relief of the Ko'olau mountain range

alters the wind direction and speed—slowing it in some areas and accelerating it in others. Moist air blowing against the steep slopes is forced to rise sharply, which results in sudden cooling and saturation and the subsequent formation of clouds and precipitation. This orographic process occurs on the windward side of the mountain range, of which the project site is a part. An O'ahu Hydrologic Water Cycle Map is attached as Figure 11. Average rainfall in project area is about 70 inches per year. This area also experiences periodic northwesterly "Kona" winds and storms, especially in the winter season, which bring cooling relief to the southeastern coast of the island.

Table 3-1 contains information provided by the *Western Regional Climate Center* that was obtained from the two weather stations near the project site.

Table 3-1 Climatic Information for Weather Stations Adjacent to the Site

Station	Average Annual Maximum Temperature (°F)	Average Annual Minimum Temperature (°F)	Average Annual Total Precipitation (inches)
ʻŌpaeʻula	78.1	63.2	56.5
Kāneʻohe Mauka	79.8	68.8	76.0

Anticipated Effects and Mitigative Measures

No short-term, long-term or cumulative adverse effects are anticipated to the climatic conditions in the project area; therefore, no mitigative measures are proposed.

3.2.2 GEOLOGY AND TOPOGRAPHY

Existing Conditions

As indicated by the August 1988 document *Final Environmental Impact Statement for Windward O'ahu Regional Water System Improvements*, by the BWS, the project site is located on the northern half of the Koʻolau Shield Volcano, along the windward (northeastern) shoreline of O'ahu. Windward O'ahu is the remnant of a deeply eroded basaltic shield volcano. During glacial and interglacial phases, O'ahu underwent a series of submergences and emergences due to ocean level changes, which may have resulted in substantial subsidence of this island. The combined effects of fluvial erosion and wave erosion of cliffs may have caused the height of

Ko'olau Shield to reduce as much as 1,000 feet. The Ko'olau volcano was primarily composed of a series of thin, overlapping, gently sloping basaltic lava flows. Following one million years of dormancy, the Ko'olau volcano resumed volcanism on the southeastern end of the Ko'olau Range. These post-erosion eruptions are known as Honolulu Volcanic Series. Flows of the Honolulu Volcanic Series overlie only a minor portion of windward O'ahu.

Anticipated Effects and Mitigative Measures

Although construction work will involve earthwork, the finish grades within the construction limits will match the existing condition upon completion of the project. Therefore, no long-term effects are anticipated to the geology and topography within the project area. No cumulative effects on geology and topography are expected when reviewed against past, present and reasonably foreseeable future actions.

3.2.3 WATER RESOURCES AND HYDROLOGY

3.2.3.1 Surface Water

Existing Conditions

The following information details Kahana Stream:

Location:	Latitude 21°32′37″, longitude 157°53′07″, Hydrologic Unit 20060000, on the right bank 600 feet upstream from Kawa Stream, 1.1 miles southwest of Kahana and 2.2 miles southwest of Swanzy Beach Park in Ka'a'awa.
Drainage Area:	About 3.74 square miles
Average Discharge:	36.3 cubic feet per second (cfs) or 26,300 acre-feet per year (acre·ft/yr), from 41 years of recorded data from 1960 through 2000)
Extremes for Period of Record:	Maximum discharge, 6,250 cfs, March 20, 1991

Average Empirical Seasonal Flow Data for Kahana Stream is included as Figure 12.

Anticipated Effects and Mitigative Measures

No long-term and cumulative adverse effects are anticipated on the hydrologic and hydraulic properties of the surface water resources from the proposed project. As mentioned previously in Section 2.2.3, the proposed bridge will have a thicker deck than the existing bridge in order to meet government agency design guidelines; however, the replacement bridge will have two center piers (3 spans) as opposed to the six in-stream supports (five spans) of the existing bridge. In addition, the stream will be widened during the project and the banks will be stabilized against erosion and scour. The cross-sectional flow area of the replacement bridge will exceed that of the existing bridge; thus, the hydraulic capacity of the replacement bridge will be greater than the existing bridge. The project is anticipated to present a "no-rise" effect on Kahana Stream. As pointed out earlier, per HAR regulations, an application for an SCAP permit that will cover in-stream work, such as, bank widening and stabilization, will be submitted to the DLNR-CWRM after Section 401 WQC is obtained from the DOH-CWB for the proposed project.

3.2.3.2 Groundwater

Existing Conditions

Windward O'ahu is underlain by Ko'olau basalt, which is saturated with basal water. The basal water is rainfall that flows seaward from its *mauka* origin by seeping through the Ko'olau basalt under artesian pressure. At low elevations, a coastal plain consisting of alluvial and marine sediments behave as a leaky caprock, and covers the basal aquifer below a surface elevation of about ten feet. The basal aquifer, under artesian pressure, discharges into the sediments, preferentially flowing through fossil coral strata, and ultimately drains into the Pacific Ocean. In the absence of coral, the artesian leakage saturates clayey sediments to the level of the ground surface.

According to the University of Hawai'i, Water Resources Research Center, Technical Report No. 179—*Aquifer Identification and Classification for O'ahu: Groundwater Protection Strategy for Hawai'i* (Revised February 1990) by Mink and Lau, the hydrogeology at the site consists of a dual aquifer-type formation that conforms to the information contained in the table below.

Table 3-2 Hydrogeology at the Site

Aquifer	Island	Aquifer Sector	Aquifer System	Aquifer Type	Aquifer Code	Status Code	Quadrangle Number
Upper	3 (O'ahu)	06 (Windward)	02 (Kahana)	116	30602116	12211	7, 8, 11
Lower	3 (O'ahu)	06 (Windward)	02 (Kahana)	122	30602122	11113	7, 8, 11

The two aquifers are very similar in detail. The upper aquifer consists of unconfined basal water in sedimentary, nonvolcanic lithology. It is currently used (development stage), is ecologically important for utility purposes, has a low salinity of 250–1,000 mg/L Cl^-, is of irreplaceable uniqueness and has a high vulnerability to contamination. The lower aquifer consists of confined basal water in geological dikes—aquifers in dike compartments. It is currently used (development stage) for drinking utility purposes, has a freshwater salinity of less than 250 mg/L Cl^-, is of irreplaceable uniqueness and has a low vulnerability to contamination. Basal water is freshwater in contact with seawater; an unconfined aquifer is defined where the water table is the upper surface of the saturated aquifer; and a confined aquifer is bounded by impermeable or poorly permeable formations, where the top of the saturated aquifer is below the groundwater surface. An Aquifer Classification Map is attached as Figure 13.

The groundwater of the island of O'ahu has a total yield of approximately 446 million gallons per day (mgd), of which about 99 mgd is located in Windward O'ahu and roughly 35 mgd is situated in the Ko'olauloa District. According to the DLNR, the sustainable yield for the Ko'olauloa Aquifer (aquifer code 30601) is 35 mgd and for the Kahana Aquifer (aquifer code 30602) is 13 mgd with a developable yield of 0.14 mgd. According to the BWS *O'ahu Water Management Plan* (July 1998) by Wilson Okamoto & Associates, Inc. and the BWS *O'ahu Water Plan* (July 1982), the permitted water use for the Ko'olauloa Aquifer is roughly 18.5 mgd, the potable water use is about 10 mgd and the nonpotable water use is approximately 2.5 mgd. The permitted water use for the Kahana Aquifer is roughly 1.5 mgd, the potable water use is about 1 mgd and the nonpotable water use is approximately 0 mgd. The water demand for the Ko'olauloa Developmental Planning area is about 2 mgd for a BWS-served population of about 11,500. Thus, most of the water drawn from the Ko'olauloa Aquifer is exported away from the Ko'olauloa Developmental Planning area. The projected BWS-served population in the

Ko'olauloa Developmental Planning area served by the Ko'olauloa Aquifer for the year 2020 is 20,500 with a predicted demand of approximately 3 mgd. A Hydrologic Unit Map for the Island of O'ahu is attached as Figure 14.

Anticipated Effects and Mitigative Measures

No potable water production wells or injection wells are located near the site. In addition, the project will not involve any activities that would present any potential impacts on hydrogeological formations at or near the site. Thus, no short-term, long-term or accumulative effects are anticipated on the groundwater resources from the proposed project and no mitigative measures are proposed.

3.2.4 WATER QUALITY

Existing Conditions

The waters at and near the project site consist of Kahana Stream and the Pacific Ocean, and are classified as Class 1b Impaired Inland Waters out to the shoreline and Class AA Marine Waters from the shoreline out to the 600-foot (100-fathom) contour in a Reserve, Preserve, Wildlife Refuge, Sanctuary, or National or State Park area under the classification of water uses for inland and marine waters outlined in HAR 11-54, *Water Quality Standards*. A Water Quality Map from the DOH Office of Environmental Planning (OEP) is attached as Figure 15. The two classes of waters are protected in very similar manners.

Class 1 Inland Waters are to remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, the wilderness character of these areas shall be protected. Waste discharge into these waters is prohibited. Any conduct which results in a demonstrable increase in levels of point or nonpoint source contamination in Class 1 Inland Waters is prohibited. Class 1**b** Inland Waters are specifically protected for domestic water supplies, food processing, protection of native breeding stock, the support and propagation of aquatic life, baseline references from which human-caused changes can be measured, scientific and educational purposes, compatible recreation, and aesthetic enjoyment. Public access to these waters may be restricted to protect drinking water supplies.

Class AA Marine Waters are to remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected. No zones of mixing shall be permitted in this class. The extent of Class AA Marine Waters is considered out to a depth less than 18 meters (ten fathoms) within a defined reef area, and a distance of 300 meters (one thousand feet) off shore if there is no defined reef area and if water depth is greater than 18 meters (ten fathoms). Class AA Marine Waters are protected for oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. The classification of any water area as Class AA shall not preclude other uses of the waters compatible with these objectives and in conformance with the criteria applicable to them.

Winter precipitation and storm waves (seasonal stream flooding and high surf) result in increased sediment transport and necessitate the need for protective erosion measures. According to the *Atlas of Hawai'i*, Third Edition (1998) by the Department of Geography, University of Hawai'i at Hilo, the site is located within a coastal area subject to long-term erosion.

Anticipated Effects and Mitigative Measures

No long-term and cumulative adverse effects are anticipated on the surface water resources from the proposed project; however, a potential for short-term effects due to in-stream activities, such as, dewatering for and construction of center piles and bridge supports, installation of abutments, stream widening and bank stabilization, are foreseen. Therefore, mitigative measures by way of BMPs, such as, sheet piles, sandbags and turbidity barriers, will be used. Existing bridge abutments will be left in place and concrete or gravel beds will be laid upbank of the abutments to help control bank erosion during the construction of the new bridge abutments. Subsequent to completion of the new bridge abutments and supports, the existing abutment structures will be cut at the mudline and GRP will be installed up to the new abutments for bank stabilization. Sediment transport runoff and erosion resulting from terrestrial construction activities will be controlled through earthen berms and silt fences. Dust screens, periodic watering and mulching, and fast-growing groundcover will be used to control dust generation. Public roadways and driveways will be cleaned of accumulated dirt and debris from construction activities as needed

to maintain a clean, safe environment. Per recommendation from DLNR—Division of Aquatic Resources (DAR), extra precautions will be taken to prevent oil, gas, lubricants and other toxic substances associated with the use of heavy machinery from spilling or leaching into the water. As stated previously, per HAR regulations, an application for an SCAP permit to undertake the in-stream work will be submitted to the DLNR-CWRM after Section 401 WQC is obtained from the DOH-CWB for the proposed project.

3.2.5 SOILS

Existing Conditions

The surface soil beneath and surrounding North Kahana Bridge is predominantly sand, rocks and other material and debris from Kahana Stream and Pacific Ocean erosion deposits.

According to the *Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i and Lana'i, State of Hawai'i* (August 1972) prepared by the US Department of Agriculture (DAG), Soil Conservation Service (SCS), the soil at the project site is composed of Jaucas sand, 0 to 15 percent slopes (JaC). A Soil Designation Map has been attached as Figure 16. In most places, JaC soil does not exceed 7 percent. This soil consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. They developed in wind- and water-deposited sand from coral and seashells. Elevations range from sea level to about 100 feet. The annual rainfall amounts to 10 to 40 inches and the mean annual soil temperature is 75°F. The natural vegetation consists of kiawe, koa haole, bristly foxtail, Bermuda grass, fingergrass and Australian saltbrush. The JaC soil is used for pasture, sugarcane, truck crops, alfalfa, recreational areas, wildlife habitat and urban development.

In a representative profile, JaC soil is single grain, pale brown to very pale brown, sandy and more than 60-inches deep. In many places, the surface layer is dark brown as a result of an accumulation of organic matter and alluvium. This soil is neutral to moderately alkaline throughout the profile. Permeability is rapid and runoff is very slow to slow. The hazard of water erosion is slight; but, wind erosion is a severe hazard where vegetation has been removed. The available water capacity is 0.5 to 1.0 inch per foot of soil. In places, roots penetrate to a depth of 5 feet or more. Workability is slightly difficult because the soil is loose and lacks stability for use

of equipment. Soil types of adjacent areas include Ka'ena stony clay (KaeB) and Pearl Harbor clay (Ph).

Anticipated Effects and Mitigative Measures

No short-term, long-term or cumulative adverse effects are anticipated on soils at the project area; therefore, no mitigative measures are proposed.

3.2.6 NATURAL HAZARDS

Natural hazards in Hawai'i include floods, tsunamis, hurricanes and earthquakes. Existing conditions about these natural hazards and potential effects on these hazards due to proposed project are described as follows.

3.2.6.1 Floods

Existing Conditions

According to the document *Floods in Punalu'u-Hau'ula Area, O'ahu, Hawai'i,* Thomas M. Ushijima and Charles J. Ewart, 1973, the windward area in the vicinity of Punalu'u and Hau'ula in the District of Ko'olauloa is subject to flooding and lies behind a natural beach berm that runs parallel to the coastline. This berm varies in height from 6 to 9 feet above mean sea level. To the west of the berm is lowland with elevations between 1 and 7 feet, where cane growth is predominant. There are several streams and ditches and many bridges and culverts in this area through which flows discharge to the ocean. However, shifting sand and debris clog these outlets frequently. High runoff from the Ko'olau Range, heavy precipitation in the lowland area, relatively low-elevation flat land and clogged outlets are major factors that cause flooding in the region of the project area. A combination of all these factors occurred on February 4, 1965, and a heavy flood ensued.

North Kahana Bridge is located in a drainageway of a floodplain at just about the estuary interface of the northern fork of Kahana Stream and the Pacific Ocean at the beach park portion of Ahupua'a O Kahana State Park. Kahana Stream is a perennial stream that serves as the main artery for drainage water from an upland complex network of surface water branches and

tributaries formed from *mauka* precipitation in the Ko'olauloa area. The bridge is situated at the final outlet of the Ko'olauloa drainage system to the Pacific Ocean.

Community Panel Map Number 15003C0165 E (November 20, 2000) of the Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Maps (FIRMs) indicates that the project site is designated to be within the floodway area of flood zone AE. Zone AE areas are special flood hazard areas inundated by 100-year floods with determined base flood elevations. A base flood elevation of eight (8) feet has been determined. This elevation is relative to reference mark RM38 of 44.908 feet NGVD (National Geodetic Vertical Datum) that is a coast and geodetic survey (C&GS) benchmark disk, 8.6 miles northwest along State Highway 83 from the post office at Kāne'ohe, 0.1 mile south of Chang's Service Station, in the top and 1.5 feet north of the south end of the east concrete headwall of a 36-inch pipe culvert, 17.8 feet east of the centerline of the highway, 7.9 feet west of a fence, 12.5 feet north of power pole 120-301, 4.85 miles southeast of Ka'a'awa, and approximately 1 foot lower than the highway. A copy of the FIRM that encompasses the project site is attached as Figure 17.

Anticipated Effects and Mitigative Measures

Although the proposed project is not intended to improve the existing drainage condition, the design plan will be made such that the existing drainage condition will not be subject to negative effects from the proposed action. Existing drainage patterns will remain as unaltered as possible and the finish surface grades of the new bridge will match existing ones. In addition, the existing bridge has five spans with six piers and the new bridge will be three-spanned with two center piers and abutment at both ends. Under the new design, there will be more open area in the bridge's cross section for flow, which will alleviate possible damming from floating material relative to the existing condition. As mentioned before, a drainage report has been completed based on hydrology study. Runoff along the roadside will be intercepted from the highway into the stream. The replacement bridge will increase the ability of North Kahana Bridge to withstand a 100-year storm. No further mitigative measures are anticipated to be required.

3.2.6.2 Tsunami

Existing Conditions

A tsunami is a series of waves generated by an impulsive disturbance in the ocean or in a small, connected body of water. On O'ahu, tsunamis are generally caused by underwater earthquakes, which could occur very close to O'ahu, within Hawaiian waters or even at relatively distant locations. Tsunami waves are capable of traversing the ocean for relatively long distances and could cause severe damage to property, injury and even casualty in coastal communities once land is reached. Underwater earthquakes often are generated through tectonic plate movement of the earth below the ocean floor.

Almost all coastal areas, including the project area of O'ahu are within tsunami zones. As shown in Figure 18 the project site lies within a tsunami inundation zone. Should a tsunami, or any other storm-generated event hit the area, flow would be in the *mauka* direction. More information about tsunamis and evacuation is available at the O'ahu Civil Defense Agency.

Anticipated Effects and Mitigative Measures

The structural design of the new bridge is based on a hydraulic study and will ensure the bridge can withstand the wave force under most tsunami events. No adverse effect is anticipated on the potential of tsunami caused by the proposed project; therefore, no further mitigative measures are anticipated to be required.

3.2.6.3 Hurricanes

Existing Conditions

Hurricanes form in areas of enhanced thunderstorms over warm, tropical oceans and are the most destructive type of storms on Earth. The destructive fury of hurricanes comes from a combination of high winds, heavy rains and abnormally high waves and storm tides.

Hurricanes are relatively rare events in the Hawaiian Islands; however, records show that strong windstorms have struck all major islands in the Hawaiian Island chain since the beginning of history. The first officially recognized hurricane in Hawaiian waters was Hurricane Hiki in August of 1950. Since then, five hurricanes or tropical storms have caused serious damage in

Hawai'i. The maximum hurricane occurrence in Hawai'i happens during the late summer when the ocean surface is warmest.

Hurricane season begins in June and lasts through November in the Hawaiian Islands. These storms bring large amount of rain with high winds to all islands. Heavy rain, high wind and storm surges cause flooding in the Ko'olauloa area.

Anticipated Effects and Mitigative Measures

No adverse effect is anticipated on the potential of hurricane by the proposed project. The replacement bridge will be designed to withstand tsunamis, 100-year storms and wind loadings. The new bridge will also have a larger cross sectional area for Kahana Stream flow and widened and stabilized banks for improved and increased hydraulic capacity and conductivity. No mitigative measures are anticipated to be required.

3.2.6.4 Earthquakes

Existing Conditions

Earthquakes in Hawai'i are closely linked to volcanism. They are an important part of the island-building processes that have shaped the island of Hawai'i and the other Hawaiian Islands. Thousands of earthquakes occur every year beneath the island of Hawai'i. However, O'ahu Island is designated to be in Seismic Zone 2, which indicates the second lowest potential of ground motion caused by seismic activity in the State of Hawai'i. The seismic zoning for the Hawaiian Islands are Zone 4—Hawai'i; Zone 3—Maui, Kaho'olawe, Lana'i and Moloka'i; Zone 2—O'ahu; and Zone 1—Kaua'i. Structures within the different seismic zonings are to be designed to withstand different intensities of seismic activity, with Zone 1 areas designated as being prone to lower intensity activities and Zone 4 being prong to higher intensity activities.

Anticipated Effects and Mitigative Measures

No adverse effect is anticipated on the potential of earthquake caused by the proposed project. The existing North Kahana Bridge does not meet Zone 2 seismic requirements as established by the DOT for O'ahu facilities. The replacement bridge will be designed to safely withstand Seismic Zone 2 activity with accelerations of 18% of gravity, or 0.18g. No mitigative measures are anticipated to be required.

3.2.7 SHORELINE

Existing Conditions

The beach in the Kahana area, being located on the windward shore of the island, is directly exposed to tradewinds and resulting waves; however, existing fringing reefs and deeply recessed bay morphology present significant protection from wave action. North Kahana Bridge crosses the flood channel of Kahana Stream, one of the major streams on the windward side of O'ahu. Fluvial processes that occurred during ancient low sea level stands constructed a deep channel system that is incised into the offshore region.

Kahana Bay is bound both to the north and south by extensive shallow fringing reefs that are over 6,000 feet wide, which offer protection from incident waves by causing the waves to break far from the coastline, effectively dissipating their energy prior to them reaching the shore. These fringing reefs, in addition to the deep recession of bay traps that contains sand between two prominent headlands, and orthogonal propagation of incident waves caused by the headland and bay morphology that minimizes longshore sediment transport, contributes to an uncommonly stable condition of the beach in Kahana Bay.

In general, these 3 factors minimize erosion of the beach at Kahana Bay. Sand has filled the channel *makai* of the bridge and is only breached during extreme flood conditions. Normally, drainage occurs only at the South Kahana Bridge. Kahana Bay beach is set in a wide crescent that gradually tapers to the south stream location. The widest part of the beach is at the North Kahana Bridge location. The highest point on the beach (the berm crest) is a conspicuous and unbroken feature produced by past wave uprush and sediment deposition, indicative of normal high water levels (spring tides) and wave conditions (average tradewind-generated waves).

During unusually high tides or large waves, wave uprush could overtop the existing berm and modify the beach profile.

Generally, beaches eventually orient to face incident wave direction, and waves that are incident at an angle to the shoreline would tend to cause longshore transport of beach sand. Therefore, varying wave directions would cause adjustments in the beach plan shape. At Kahana Bay, however, the recessed bay morphology limits the angle of wave exposure to the beach; thus, beach erosion and sediment transport is minimized, resulting in an unusually stable planform of the shoreline.

According to *Coastal and Environmental Evaluation for the Proposed Replacement of North Kahana Bridge* (May 2003) prepared by Sea Engineering, Inc., the range of water levels that occur at the project site are as follows:

- Normal tides: Approximately 0.0 feet from the Mean Lower Low Water datum (MLLW) to approximately 2.0 feet MLLW; about –1.0 feet from the Mean Sea Level Water datum (MSL) to about 1.0 foot MSL.

- Storm tides: Typically, up to 3 feet MLLW for a large north swell and up to 7.8 feet MLLW for the worst-case scenario hurricane.

Typical offshore surface and nearshore flood and ebb tidal currents for the site tend to follow a current circulation pattern that is generally in the north, northwest direction along the shoreline. This direction is typically held by all currents at the site year-round throughout both the winter (October through April) and summer (May through October) months. A Seasonal Ocean Current Map is attached as Figure 19. Rip currents are possible in the area. Rip currents are narrow intense currents flowing seaward through the surf zone. Rip currents usually occur at points, groins, jetties, etc. of irregular beaches, and at regular intervals along straight, uninterrupted beaches. The flow direction of Kahana Stream is always *makai* with larger flows generally during the wetter winter months and smaller flows during the drier, summer months.

Anticipated Effects and Mitigative Measures

The shoreline setback area extends 40 feet landward from the existing shoreline. As shown in Figure 8, both proposed bridge and temporary bridge are outside of the shoreline setback area, thus a SSV Permit per ROH Chapter 23-1 is not required and the project structures will not have any adverse impacts on the shoreline. After the replacement bridge has been constructed and put back in use, the temporary bridge and associated structures will be removed.

Construction work will involve in-stream activities and stream bank activities, including, clearing and grubbing, widening and bridge abutment installation. Thus, project activities may temporarily increase the erosion susceptibility of the stream banks during project work. To minimize and control stream bank erosion during construction work, temporary BMPs, such as, vinyl sheet piles, gravelling, turbidity curtains, sandbags, mulching and fast-growing groundcover, will be utilized during the project and removed at or prior to the end of the project. To permanently minimize and control stream bank erosion, long-term BMPs, such as, bank stabilization and revegetation with native (indigenous) and/or adopted Polynesian-introduced species of plants, will be implemented. Project BMPs were discussed in Sections 2.1 and 3.2.4.

No short-term or long-term effects on the existing shoreline are expected and no mitigative measures are proposed.

3.2.8 FLORA AND FAUNA

3.2.8.1 Flora

Existing Conditions

According to the *Environmental Assessment for the Punalu'u to Kualoa Park Transmission Pipeline, Ko'olauloa, Ko'olaupoko, O'ahu* (April 1999) by George A. L. Yuen & Associates for the BWS, the *Final Environmental Impact Statement for Windward O'ahu Regional Water System Improvements* (August 1988) by the BWS, and information provided by the Hawai'i Natural Heritage Program of the University of Hawai'i at Mānoa, no Federal or State listed candidates for threatened or endangered plant species are known to exist within the vicinity of the project site. Introduced species of plants used for landscaping can be found along Kamehameha Highway. Typical vegetation in or near the project area include the kamani tree

(Terminalia catappa), ironwood tree (Casuarina equisetifolia), Norfolk pine tree, coconut tree, spider lily (Crinum asiaticum), croton, hibiscus, fern hao, plumeria aloe, widelia (Widelia trilobata), various palm trees, taro vine and various plants.

According to the *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement, Kahana Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1)* by Cultural Surveys Hawai'i, Inc., the types of flora inhabiting the project area consists of introduced species exclusively, as vegetation in the entire project area has been modified during the construction of the highway and the valley park facilities. On the *makai* side of the highway and bridge is a large grove of ironwood trees. On both sides of the bridge, *hau* thickets (Hibiscus tilaceus) exist on the water edges. Various exotic grasses grow in the immediate vicinity.

According to the *Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i and Lana'i, State of Hawai'i* (August 1972) prepared by the United States Department of Agriculture, Soil Conservation Service, the natural vegetation at and near the site consists of kiawe trees (Prosopis pallida), koa haole, bristly foxtail, Bermuda grass, fingergrass and Australian saltbrush.

Anticipated Effects and Mitigative Measures

The proposed project will necessitate some vegetation transplant and removal during construction, especially on the *makai* side of the detour road, and will affect the existing landscaping of the Ahupua'a O Kahana State Park beach side. However, the area will be revegetated at the final phase of construction with plants similar to existing ones. Groundcover and plants will be perennial and tolerant of relatively harsh ambient conditions by being able to withstand drought and relatively high wind, ultraviolet exposure and salinity. The plants will be native (indigenous) and/or adopted Polynesian-introduced species of trees, palms, bushes and shrubs that require low maintenance. The plants will not be intrusive upon or detrimental to existing habitats. No long-term or cumulative effects are expected on flora in project area are anticipated; therefore, no further mitigative measures are proposed.

3.2.8.2 Stream Fauna

Existing Conditions

Four species of marine biota exist in abundance at elevations between 20 and 400 feet for Kahana Stream. The species include native *ʻōpaʻe kalaʻole* (Atyoida bisulcata), introduced Tahitian prawn (Macrobrachium lar), introduced stream guppies and mollies (Poecilia spp.) and introduced swordtail fish (Xiphorus helleri). The DLNR—DAR identifies the presence of four varieties of *ʻoʻopu* in the stream. The varieties are *ʻOʻopu naniha*, *ʻOʻopu nopili*, *ʻOʻopu akupa* and *ʻOʻopu nakea*.

According to the information provided by DLNR—DAR, Kahana Stream is one of the most preserved and natural remaining stream systems in Oʻahu. All of the native *ʻoʻopu*, *ʻōpae* and *hīhīwai* can be found in this stream. Major spawning runs of *ʻoʻopu nākea* have also been documented in its lower reaches. The mid to lower sections of Kahana Stream are home to *ʻoʻopu naniha* (Stenogobius Hawaiiensis), *ʻoʻopu ʻakupa* (Eleotris sandwicensis), *ʻoʻopu nākea* (Awaous guamensis), *ʻoʻopu nōpili* (Sicyopterus stimpsoni) and *ʻoʻopu ʻalamoʻo* (Lentipes concolor). *Hapawai* (Neritina vespertina) and *ʻōpae ʻoehaʻa* (Macrobrachium grandimanus) were also observed. The mountain *ʻōpae*, also known as *ʻōpae kalaʻole* (Atyoida bisulcata) and the *hīhīwai* (Neritina granosa) are also probably present in this stream at higher elevations.

The estuary and Pacific Ocean at the Ahupuaʻa O Kahana State Park beach contain an array of marine fish, plants and benthic crustaceans, including native anadromous prawns and fishes, such as, *ʻama ʻama* and *aholehole*. The Kahana Stream estuary is an important nursery area for juveniles of both marine and stream life.

Anticipated Effects and Mitigative Measures

No significant effects are anticipated on stream life forms in Kahana Stream since the stream will not be diverted or dammed up during construction process. Turbidity barriers, sand bags and vinyl sheet piles will be installed relatively close to the stream banks and will not inhibit fish and other biota movement in the stream. Sheet piles will be isolated to the center of the stream and will also allow unimpeded stream life travel. Thus, stream life spawning runs will be unhindered throughout the project. Appropriate mitigative measures will be taken to minimize erosion and siltation to the maximum possible extent. Precautions will be taken to prevent oil, gas, lubricants and other toxic substances associated with the use of heavy machinery from spilling or leaching into the water. In addition, in-stream work will not be scheduled during late August through October when the largest spawning runs of *'o'opu nākea* typically occur. As mentioned earlier, the hydraulic capacity of the replacement bridge will be slightly greater than the existing bridge due to widening and hardening of the stream banks to minimize flooding hazard potential. The bridge is in a location where the stream does not normally reach the ocean; thus, normal spawning runs will not be affected by the project.

3.2.8.3 Fauna and Avifauna

Existing Conditions

According to the *Environmental Assessment for the Punalu'u to Kualoa Park Transmission Pipeline, Ko'olauloa, Ko'olaupoko, O'ahu* (April 1999) by George A. L. Yuen & Associates for the BWS, terrestrial animals at and near the site include introduced animal species, such as, dogs, cats, mongooses, rats, mice, chickens, cattle, horses, sandpipers, mynahs, sparrows, doves, cardinals, pigeons and bulbuls. None of these are on nor are candidates for the Federal or State list of threatened or endangered species.

Typical mammals in the project site include the Polynesian rat (Rattus Exulans), Roof rat (Rattus rattus), House mouse (Mus musculus) and small Indian mongoose (Herpestes auropuctatus). The avifauna (birds) in the project area typically include urban adapted species like the Cardinal, Spotted Dove, Barred Dove, *'Elepaio*, *I'iwi*, Common Mynah, *Pueo*, Ricebird, House sparrow and the Japanese White-eye. These birds can be found throughout the island of O'ahu.

In addition, per correspondence with Hawai'i Natural Heritage Program of the University of Hawai'i at Mānoa, Kahana Stream is identified as an "outstanding" rare natural Hawaiian continuous perennial stream community by the Hawai'i Stream Assessment. The Hawai'i Rare Species Database contains four faunal species listed as Federal endangered species within 0.5 miles from the project site. The following table provides the information about these species.

Table 3-3 Endangered Fauna Species in Project Vicinity Area

Species	Status	Last Observation
Sealife		
Chelonia Myadas (Green Turtle, *Honu*)	Listed Endangered	January 9, 1991
Waterbirds		
Anas Wyvilliana (Hawaiian Duck, *Koloa*)	Listed Endangered	May 21, 1978
Fulica Alai (Hawaiian Coot, *'Alae Ke'oke'o*)	Listed Endangered	January 16, 1986
Gallinula Chloropus Sandvicensis (Hawaiian Gallinule, *'Alae-'Ula*)	Listed Endangered	October 26, 1968

Anticipated Effects and Mitigative Measures

The final bridge, approach roadways and their associated structures will occupy the existing established highway ROW and replace existing structures on developed land; thus, they are not anticipated to present any disturbance to existing biological habitats. The temporary bypass bridge, detour road and associated structures will involve construction work within the *mauka* edge of the beach park portion of Ahupua'a O Kahana State Park. Thus, some potential for disturbance of existing biological habitats, including the aforementioned endangered species, exists for the temporary bypass and detour structures. Since the aforementioned endangered species were last observed at least eleven years ago, and the physical construction of the temporary bypass and detour structures for the proposed project will be limited to within a relatively small area, the possibility that the habitats of the endangered and any other species will be disturbed is very small. In addition, the bypass and detour structures will be temporary and

will be removed at the end of the project. No negative effects from this project on endangered and other species are expected and, consequently, no mitigative measures are proposed.

3.2.9 ARCHAEOLOGICAL AND CULTURAL RESOURCES

Existing Conditions

According to the report *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement, Kahana Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1)* by Cultural Surveys Hawai'i, Inc., approximately twenty archaeological studies have been undertaken within the *Ahupua'a* of Kahana that have identified the presence of over 100 historic sites. A study by J. G. McAllister in 1933 noted three sites of historical significance in the vicinity of the project area. These sites are summarized below.

1) Kapa'ele'ele fishing shrine (*koa*), which is approximately 24 feet by 14 feet in size and composed of basalt stones. The *koa* was for the *akule* (big-eyed or goggle-eyed scad fish—*Trachurops crumenophthalumus*), a local fish commonly caught for consumption, and is located approximately ½ mile to the northwest of the project area.
2) Kauninio fishing shrine, which is composed of a single, low-lying, large stone visible only at low tide. The *koa* is located approximately ½ mile to the northeast of the project area.
3) Huilua Fishpond, which is currently being rebuilt and reused. The fishpond is located approximately ½ mile to the east-southeast of the project area.

A study by Robert Hommon and William M. Berrera, Jr. in 1971 noted a single site of historical significance in the vicinity of the project area. The site is described as being a stone-lined ditch or canal (*'auwai*) about 500 feet west and *mauka* of the existing North Kahana Bridge. The *'auwai* is about 3-feet wide and 17-feet long, with a channel roughly 2 feet in width and 10 inches in depth. The *'auwai* starts in a silted-in streambed and terminates abruptly with a cross wall.

A study by Martha Yent in 1980 noted a shallow (less than 2-feet deep) human burial about 23 feet east of the orientation center, not far from the project area. Yent indicated that the

probability of historic deposits related to the Mary Foster era exists for the project site and surrounding areas and mentioned the prior existence of a guard shack on the *mauka* side of Kamehameha Highway near Kahana Valley Road.

A number of human burials have been identified and documented in the vicinity of the project area, mostly on the Ka'a'awa side of Kahana Bay near Huilua Fishpond. Due to these burials and relative abundance of archaeological evidence discovered in the rest of the Kahana area, the potential exists for encountering human burials, associated cultural layers and possibly historic and prehistoric habitation sites in the course of the proposed bridge replacement project. Archaeological sites and Kuleana Land Commission Awards (LCAs) near the project area are displayed in Figure 20. Information on the documented burial sites and LCAs are contained in Tables 3-5 and 3-6, respectively. In conjunction with the use of federal funds and various required Federal permits, the proposed project is subject to Section 106 regulations of the NHPA safeguarding against potential adverse effects on historic properties. The requirements and details of the NHPA Section 106 review process were discussed in Section 1.3.2.6. The SHPO, O'ahu Island Burial Council, Kahana Community Association and other agencies, organizations, groups and individuals are being consulted for advice regarding their concerns towards any historical, archaeological and cultural resources in the project area.

According to the DLNR State Historic Preservation Division and the *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement, Kahana, Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1)*, the project should have no effect on any known historic resources. No historic sites or cultural resources are known to exist at the project site that are listed on the Hawai'i or National Register of Historic Places. The Final Environment Impact Statement for the Windward O'ahu Regional Water System Improvements project carried out by BWS in 1988 did not identify any historical sites in the project site and nearby areas. In addition, based upon the information provided by the SHPO, the bridge itself no longer retains its historic integrity and no registered Native Hawaiian or National Historic Place have been identified to exist within the project site.

Table 3-4 Documented Burial Finds Near the Site

	Site #/Source	Site Type	Age	Location
1.	50-80-06-1505 Hommon & Barrera 1971	Stone pavement, possible burial	Uncertain	North side just above valley floor
2.	50-80-06-1546 Hommon & Bevacqua 1973	Burial	Prehistoric (?)	Huilua Fishpond, Kahana
3.	50-80-06-1688 Hommon & Barrera 1971	Rock mound, possible burial	Uncertain	North side of valley floor
4.	50-80-06-1689 Hommon & Barrera 1971	Rock mound, possible burial	Uncertain	North side of valley floor
5.	50-80-06-1690 Hommon & Barrera 1971	Rock mound, possible burial	Uncertain	North side of valley floor
6.	50-80-06-4132 Yent 1980b	Burial	Historic (?)	Kahana
7.	50-80-06-4698 Kam & Ota 1981	Burial	Prehistoric (?)	Huilua Fishpond, Kahana
8.	50-80-06-4814 Yent 1993	Historic graves	Historic	Huilua Fishpond, Kahana
9.	50-80-06-4815 Yent 1993	Burial	Prehistoric	Huilua Fishpond, Kahana

Table 3-5 Kuleana Land Commission Awards Near the Site

	Claim Number	Awardee	'Ili	Land Use	Landscape Features	Amount
1.	4367	Kekui	Kāloa	7 lo'i & fish pond (2 pieces), 1 kula (potato), house site (1 house) & wooded kula	stream	2 ap.; 3.94 acres
			Kepahu			2 ap.; 0.35 acres
2.	5220	Kāpapa		1 lo'i & 1 house site in 2 kula pieces	pali	2 ap.; 5.2 acres
3.	5231	Kāpena	Kūka'a Hanakūkai	10 lo'i in 2 kula pieces	path, ditch pali, ditch & scatter lands consolidated for claims	2 ap.; 1.55 acres
4.	5702	Kukūholāholā/ Kukuiholāholā		11 lo'i, 1 kula & 1 house site (1 house)		2 ap.; 2.65 acres
5.	5706	Kuamo'o	Pāhoa 1 Lo'ike'e	6 lo'i, 4 kula, muliwai & 1 house site	road, bridge & 'auwai	
6.	5807	Aiawahia/ Kaiawahia		9 lo'i, 1 or 4 kula (potato), 1 house site (2 houses) & 1 wai o'opu	wooden fence	3 ap.; 4.67 acres
7.	6043	Aiohi	Nomokunui	4 or 5 lo'i, 1 kula & 1 house site (1 house) makai	stone wall & stream	2 ap.; 2.1 acres
8.	6167 & 6067	Ho'oliliamanu		2 lo'i in 2 pieces, 1 house site (2 houses)	next to house	1 ap.; 2.1 acres
9.	7651	Kalau'uhina	Kapaele'ele	5 lo'i in 2 pieces, 2 kula & 1 house site	sea beach	3 ap.; 2.725 acres
10.	10978	Wahea		7 lo'i (names adjacent 'ili), kula & 1 house site (1 house)	watercourse	2 ap.; 2.59 acres

Anticipated Effects and Mitigative Measures

To avoid the potential effects on human burials, an archaeological monitoring plan, which has been approved by SHPO, will be implemented by Culture Surveys Hawai'i during construction work. If any cultural material, particularly human burials, is discovered during construction, work will be stopped immediately and the SHPO, Division of State Parks and the residents of Kahana will be notified of the discovery. Burial finds will be treated in accordance with HRS Chapter 6E-43 *Prehistoric and historic burial sites*. SHPO will determine the appropriate treatment of the burials and any associated cultural material in consultation with recognized descendants and the O'ahu Island Burial Council. The Division of State Parks has recommended that the final disposition of recovered artifacts and cultural remains should be with the Division of State Parks for future research and park exhibits. Procedures and reinterment sites have been identified for the park

No adverse effect is anticipated on archeological and cultural resources from the proposed project; therefore, no further mitigative measures are expected to be required.

3.2.10 NOISE CONDITIONS

According to HAR Title 11 Chapter 46, *Community Noise Control*, "noise" means any sound that may produce adverse physiological effects or interfere with individual or group activities, including, but not limited to, communication, work, rest, recreation or sleep. "Noise pollution" means noise emitted from any excessive noise source in excess of the maximum permissible sound levels. The accepted unit of measure for noise levels is the decibel (dB) because it reflects the way humans perceive changes in sound amplitude. Sound levels are easily measured, but human response and perception of the wide variability in sound amplitude is subjective.

Existing Conditions

Noise from vehicular traffic along Kamehameha Highway is the primary source of ambient noise in this area. On weekdays, vehicular activity is sporadic and contributes relatively insignificant levels of noise with the exception of occasional trucks, vans or buses. During weekends, noise levels increase with the influx of recreational beach and park users.

The DOH monitors noise issues in accordance with HRS 19-342F and the Director issues noise permits only when excessive noise levels are expected. The Occupational Safety and Health Act (OSHA) of 1970 was established to "assure the safe and healthy working conditions for working men and women." OSHA regulations established a maximum noise level of 90 A-weighted decibels (dBA) for a continuous 8-hour exposure (typical work day) with higher maximum noise levels for shorter duration periods. Table 3-6 summarizes the maximum permissible sound levels for various noise durations.

Table 3-6 Permissible Noise Exposure Levels

Duration (Hours / Day)	Permissible Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1 to 1½	102
1	105
½	110
¼ or less	115

Source: 29 CFR 1910.95.

Anticipated Effects and Mitigative Measures

Intermittent elevated noise levels from certain types of construction activities are inevitable. However, they are expected to be short-term and minor. Typical heavy construction equipment noise levels are listed in Table 3-7. The noise generated from the construction equipment that are anticipated to be used for the project are lower than the permissible sound levels; therefore, no significant noise effects are expected from the proposed project. No mitigative measures are proposed. All construction work will be scheduled at daytime in accordance with HRS 342-F-1.

Table 3-7 Heavy Construction Equipment Noise Levels at 50 Feet

Equipment Type	Generated Noise Level (dBA)
Bulldozer	88
Backhoe (rubber tire)	80
Front Loader (rubber tire)	80
Dump Truck	75
Concrete Truck	75
Concrete Finisher	80
Crane	75
Asphalt Spreader	80
Roller	80
Flat-Bed Truck (18 Wheel)	75
Scraper	89
Trenching Machine	85

Source: US Army Corps of Engineers, Construction, Engineering Research Labs, 1978.

3.2.11 AIR QUALITY

In order to protect public health and welfare and to prevent the significant deterioration of air quality, per requirement of the Clean Air Act, last amended in 1990, the US Government Environmental Protection Agency (EPA) has established the National Ambient Air Quality Standards (NAAQSs) for certain harmful pollutants using two standards. The *Primary* standards set limits to protect public health, including the health of "sensitive" populations, such as, asthmatics, children and the elderly. The *Secondary* standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings. The DOH has also established ambient air quality standards to regulate the air quality statewide. The following table summarizes the national and state ambient air quality standards.

Table 3-8 National and State Ambient Air Quality Standards

Pollutant		NAAQSs		SAAQSs
		Standard Value	Standard Type	
Carbon Monoxide (CO)	8-hour Average	9 ppm (10 mg/m^3)	Primary	5,000 µg/m^3 (4.5 ppm)
	1-hour Average	35 ppm (40 mg/m^3)	Primary	10,000 µg/m^3 (9 ppm)
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Primary & Secondary	70 µg/m^3
Ozone (O_3)	1-hour Average	0.12 ppm (235 µg/m^3)	Primary & Secondary	-
	8-hour Average	0.08 ppm (157 µg/m3)	Primary & Secondary	157 µg/m^3 (0.08 ppm)
Lead (Pb)	Quarterly Average	1.5 µg/m^3	Primary & Secondary	1.5 µg/m^3
Particulate (PM 10)(1)	Annual Arithmetic Mean	50 µg/m^3	Primary & Secondary	50 µg/m^3
	24-hour Average	150 µg/m^3	Primary & Secondary	150 µg/m^3
Particulate (PM 2.5)(2)	Annual Arithmetic Mean	15 µg/m^3	Primary & Secondary	-
	24-hour Average	65 µg/m^3	Primary & Secondary	-
Hydrogen Sulfide (H_2S)	1-hour Average	-	-	35 µg/m^3 (0.025 ppm)
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	0.03 ppm (80 µg/m^3)	Primary	80 µg/m^3 (0.03 ppm)
	24-hour Average	0.14 ppm (365 µg/m^3)	Primary	365 µg/m^3 (0.14 ppm)
	3-hour Average	0.50 ppm (1300 µg/m^3)	Secondary	1,300 µg/m^3

(1) *Particles with diameters of 10 micrometers or less*
(2) *Particles with diameters of 2.5 micrometers or less*

Existing Conditions

At present there are nine (9) Air Quality Monitoring Stations in the island of O'ahu; however, none of them is adjacent to the project site. The closest station is located at Pearl City, which is about 14 miles away (straight-line distance). In general, the air quality at the project site is considered to be good since the prevalent trade winds on windward O'ahu contribute to favorable climatic conditions and air quality. A Map of Air Quality Monitoring Stations for the Island of O'ahu is attached for reference as Figure 21.

The ambient air quality in the area is relatively pristine due to the lack of industrial pollutions, the relatively small population and the dense growth of vegetation. Air quality on the windward

coast of O'ahu is generally affected by vehicular traffic. The general lack of high volumes of traffic plus the flow of normal trade winds mitigate the effects of vehicular traffic on air quality.

Anticipated Effects and Mitigative Measures

Temporary construction-related air quality effects will be unavoidable due to fugitive dust from excavation or other construction activities and exhaust from the operation of construction instrumentation. However, normal trade winds are expected to disperse polluting emissions effectively. Dust control measures and BMPs, such as, water sprinkling and mulching, will be applied during construction activities. No long-term air quality effects are anticipated from the proposed action. Upon the completion of the project, the air quality at the project site will return to its existing condition.

3.2.12 VISUAL RESOURCES

Existing Conditions

Development is sparse around the project area. No relatively tall buildings are located near the site. The project site is dominated by direct, uninhibited mountain-ocean views occasionally obstructed by foliage. Aesthetics of the North Kahana Bridge itself are judged to be poor according to the bridge survey information provided by the SHPO.

Anticipated Effects and Mitigative Measures

Short-term disturbance of the existing visual quality near North Kahana Bridge is expected due to necessary vegetation removal, construction equipment, stockpiling of material, etc. For example, the boom of the construction crane and the bypass bridge will disrupt views of the beach and stream. However, these visual impediments are temporary for the duration of construction activities and will be controlled within acceptable limits by appropriate construction timing and phasing. Temporary construction visual blocks will be removed at the end of the project and cleared and grubbed areas will be revegetated with plants similar to the existing vegetation. The new bridge will be no taller than the existing bridge and will be relatively flat; thus, no permanent visual blocks are anticipated by the permanent structures. As a result, no long-term negative effect or loss of visual quality is anticipated. No other Federal, State, City and County of Honolulu or community projects have been identified in the vicinity of the project site.

Therefore, when reviewing past, present and reasonably foreseeable future actions, no cumulative effects are anticipated.

3.3 SOCIO-ECONOMIC ENVIRONMENT AND DEMOGRAPHICS

Existing Conditions

According to *the State of Hawai'i Data Book 2000,* in 1900, the district of Ko'olauloa had a population of 14,340 in 3,614 houses with median income of $35,283 and percent college graduates of 22.2%. The island of O'ahu had a population of 836,231 in 265,625 houses with median income of $40,581 and percent college graduates of 24.6%

Anticipated Effects and Mitigative Measures

The proposed bridge replacement project should not induce nor hinder economic or population growth in the Kahana area. Nor will it change the existing lifestyles in the long-term. All construction work will take place only during normal working hours on weekdays. Therefore, no socio-economic short-term or long-term effects resulting from the proposed project are expected.

No other Federal, State, City and County of Honolulu or community projects have been identified in the vicinity of the project site. Therefore, when reviewing past, present and reasonably foreseeable future actions, no cumulative effects are anticipated. No further mitigation measures are expected to be required.

3.4 ENVIRONMENTAL JUSTICE

Anticipated Effects and Mitigative Measures

On February 11, 1994, President Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.* This order for Environmental Justice promotes the fair treatment of people of all races, income and culture with respect to the development, implementation and enforcement of environmental laws, regulations and policies. It requires federal agencies to take necessary steps to identify and avoid any disproportionate negative effects on minority and low-income population. Since the proposed project is mostly federally funded, compliance to EO 12898 is required.

The proposed project involves the replacement of an existing bridge, which has equal importance to and equal impact on the entire population around the project area. Kamehameha Highway is a major traffic route in the Ko'olauloa District, and the entire population in that area will be using the new bridge once it is constructed. Therefore, it is not expected that any minority or low-income populations will experience disproportionate short-term or long-term adverse effects from the proposed project.

No other Federal, State, City and County of Honolulu or community projects have been identified in the vicinity of the project site. Therefore, when reviewing past, present and reasonably foreseeable future actions, no cumulative effects are anticipated. No further mitigation measures are expected to be required.

3.5 PUBLIC FACILITIES AND SERVICES

3.5.1 UTILITIES AND INFRASTRUCTURE

Existing Conditions

Existing utility lines and infrastructure in the vicinity of project site includes electrical lines and poles, telephone and cable lines, waterlines with fire hydrants and traffic signs. The HECO electrical lines are overhead on the *mauka* side of Kamehameha highway and BWS waterlines run underground. A 20″ BWS waterline is attached along the *mauka* edge of the existing North Kahana Bridge and a buried, concrete-jacketed 30″ BWS waterline runs parallel to Kamehameha Highway just *makai* of the bridge. An abandoned 30″ buried BWS waterline runs parallel to the highway just *mauka* of the bridge.

Anticipated Effects and Mitigative Measures

Although electrical facilities will be unaltered by the project, the relocation and replacement of some utilities, including waterlines and highway signs, as previously mentioned, will be unavoidable during construction. Clear and visible signs indicating the relocation of the utilities will be used whenever necessary.

3.5.1.1 Wastewater and Solid Waste

Existing Conditions

No wastewater or solid waste facilities exist within the project site.

Anticipated Effects and Mitigative Measures

No short-term, long-term or cumulative effects resulting from the proposed project are expected; therefore, no mitigative measures are proposed.

3.5.2 TRANSPORTATION FACILITIES

Existing Conditions

Kamehameha Highway (Route 83) is a critical traffic corridor in windward O'ahu that serves as the main transportation route between Hale'iwa and Kāne'ohe. The highway is maintained by the State with a 50-foot right-of-way, and has an 11-foot travel paved lane in each direction. The posted speed limit is 35 miles per hour for most of this highway.

Anticipated Effects and Mitigative Measures

Disruption on transportation is expected to be short-term and occur mainly during and initial and final stages of construction work when construction equipment is moved to and from the project site (mobilization and demobilization). During project construction, periodic material transport will also cause a slight increase local traffic congestion; however, continual traffic will be permitted along Kamehameha Highway throughout the project. Once the temporary bypass bridge and detour roadway are in-place, the existing North Kahana Bridge will be blocked off from both vehicular and pedestrian travel with barriers, and traffic along Kamehameha Highway will be diverted along the detour roadway and bypass bridge. Pedestrians will be redirected to the detour roadway and bypass bridge as well. Nevertheless, the overall local traffic pattern should not be altered significantly by the proposed action; however, it is expected that some periodic minor delays will happen during peak traffic hours. The detour roads leading to both ends of the bridge will be started approximately 250 feet away from each end of the bridge. This may affect the access to the existing parks and roads on both the *mauka* and *makai* sides of Kamehameha Highway. However, the contract documents will require the contractor to ensure the safe and convenient access to these areas at all times throughout the construction phase.

No other Federal, State, City and County of Honolulu or community projects have been identified in the vicinity of the project site. Therefore, when reviewing past, present and reasonably foreseeable future actions, no cumulative effects are anticipated.

Mitigation to reduce potential traffic effects will include use of signage, traffic controls and flagmen in project area. The existing bus stops will be temporarily relocated to a location out of the work area and as close to their existing locations as practicable to ensure safety.

3.5.3 RECREATIONAL FACILITIES

Existing Conditions

Based on a visual reconnaissance of the project site and its surrounding areas, the project area is minimally developed. The area is not heavily utilized, nor is it dominated by residential houses. Surrounding the project site *mauka* and *makai* are valley and beach portions of Ahupua'a O Kahana State Park. Access to the parks is free. No surfing sites are located near the site and only a few snorkeling and diving spots are recognized due to monotonous underwater terrain and high turbidity. However, the beach is good for walking since it is relatively long and uninterrupted. Camping and picnicking are predominant at the beach park.

During construction, public access to the beach area near the project site will remain unimpeded; thus, beach park and ocean recreational activities will not be disturbed or altered from their present condition. Views of scenic areas, such as, the ocean and stream, may be blocked temporarily by construction machinery; however, equipment and temporary structures will be removed upon completion of the project and permanent scenic areas will not be altered, as previously discussed in Section 3.2.12.

Anticipated Effects and Mitigative Measures

Twenty-four-hour access to existing properties and facilities will be maintained throughout construction work. No short-term, long-term or cumulative effects are anticipated on existing recreational facilities; therefore, no mitigative measures are proposed.

CHAPTER 4—FINDINGS AND DETERMINATIONS

The proposed action was preliminarily evaluated based on the thirteen (13) "Significance Criteria" of Title 11, Chapter 200-12 of the DOH Administrative Rules to determine if the proposed project will have a significant effect on the environment. A "Finding of No Significant Impact" (FONSI) is anticipated for this project based on the following reasoning against the thirteen (13) criteria.

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

The proposed project is not anticipated to cause irrevocable loss or destruction to any significant natural or cultural resources in vicinity area. Knowledgeable agencies such as SHPD, the O'ahu Island Burial Council and the Kahana Community Association have been consulted regarding the identification of historic property locations, if any, within or near the project site, and have been further consulted as to the proper handling of any such recorded or identified archeological and burial features. The proposed project will incorporate the SHPD-approved archeological monitoring program during all construction activities.

2. *Curtails the range of beneficial uses of the environment;*

The proposed action will not curtail the range of beneficial uses of the environment. Although a portion of the project will encroach upon an inland portion of the beach park, access to the park and beach will not be impeded and recreational activities will not be affected during project construction. Project use of Ahupua'a O Kahana State Park land is temporary, only for the duration of the project, after which it will revert back to recreational use. Upon completion of the project, the safety factor of the North Kahana Bridge will be significantly enhanced.

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

The proposed action does not conflict with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders. The proposed action is consistent with the environmental goals and objectives of the State of Hawai'i as described in the Hawai'i State Planning Act, HRS Chapter 226. The project is of short-term duration and BMPs will be used throughout the duration of the project to mitigate and control the effects of construction activities. Permanent BMPs in the form of native (indigenous) and/or adopted Polynesian-introduced species of plants and grassed earthen berms will be installed.

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

The economic or social welfare of the community or State will not be substantially affected by the proposed project. The project is anticipated to provide some short-time, construction-related employment, which will have a marginal positive effect on the local economy. The project will provide a safe bridge for public use that meets government agency regulations and standards along Kamehameha Highway, the major thoroughfare that links communities on the windward side of O'ahu. The replacement of the bridge will demonstrate that the FHWA and DOT-HWY are upholding their mission to maintain safe, structurally sound public roadways and facilities.

5. *Substantially affects public health;*

Short-term, construction-related noise, water quality and air quality effects will occur during the project, but will be controlled and mitigated by BMPs in accordance with applicable State and County laws and regulations so that the public health will not be substantially affected. The project will increase public safety by replacing an existing, deteriorated bridge with a new, wider, structurally sound structure that will be compliant with government agency standards and regulations, and will be able to withstand exposure to seismic activity, floods, tsunamis and high

wind loading while supporting vehicular and pedestrian travel. The replacement bridge will have a larger cross sectional area for Kahana Stream flow than the existing bridge by having fewer in-stream center piers and widened, stabilized banks. Thus, the project will decrease the frequency of flooding in the area by increasing the capacity and hydraulic conductivity of the North Kahana Bridge. This reduction in flooding frequency increases public health and safety by reducing the potential for local flood-induced damage and harm.

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

The project is not anticipated to have substantial secondary effects, such as, population impacts and effects on public facilities. The project will primarily replace an existing State highway bridge with a safer structure, which adheres to government agency standards and regulations. Should the project necessitate the relocation of existing public facilities, the facilities will be restored to their existing conditions, or better, to meet the applicable standards by the State or County.

7. *Involves a substantial degradation of environmental quality;*

No substantial degradation of environmental quality is anticipated as a result of the project. Short-term, construction-related water quality and air quality effects, such as, increased sediment-laden runoff and dust and equipment emissions, will occur during the project, but will be controlled and mitigated by BMPs throughout the duration of the project in accordance with applicable State and County laws and regulations to mitigate and control the effects of construction activities so that environmental quality will not be substantially affected. Permanent BMPs in the form of native (indigenous) and/or adopted Polynesian-introduced species of plants and grassed earthen berms will be installed.

The replacement bridge will have a larger cross sectional area for Kahana Stream flow than the existing bridge by having fewer in-stream center piers and widened, stabilized banks. Thus, the

project will decrease the frequency of flooding in the area by increasing hydraulic capacity of the North Kahana Bridge.

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

The North Kahana Bridge replacement project is anticipated to have no cumulative effect on the environment. Effects on the environment and public health will be controlled and mitigated throughout the project through the use of temporary BMPs, and after the project by permanent BMPs. Effects on the environment and public health will be project-specific for the replacement of North Kahana Bridge and will not combine with or exacerbate the adverse effects of other nearby projects. The project, for the most part, involves the replacement of existing structures—primarily an existing bridge and approach roadways—thus, no new structures will be constructed and impacts will be minimally different from the existing condition. Existing bridge use, drainage patterns and the local landscape will be preserved, if not slightly improved. No larger actions are required.

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

No rare, threatened or endangered species are anticipated to be substantially affected by the project. No rare, threatened or endangered biota are known and recognized to exist in the vicinity of the project site other than the four identified endangered species identified by the University of Hawai'i at Mānoa that were last observed more than a decade ago. The final replacement bridge and approach roadways will occupy the same plot of developed land in which the existing bridge and approach roadways are situated. Thus, effects, if any, on existing habitats by the final, permanent structures are anticipated to be minimal. The bypass bridge and detour roadway will occupy a small portion of land on the *makai* side of the beach park portion of Ahupua'a O Kahana State Park, which is relatively undeveloped. These bypass and detour structures will be established for only the short-term and will be removed upon completion of the project. Thus, impacts of the temporary facilities on existing habitats are anticipated to be minimal. The use of

temporary BMPs throughout the duration of the project and permanent BMPs after the project will control and minimize any effects on existing biota and their established habitats.

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

No long-term and minimal short-term air, water quality or ambient noise effects are anticipated from the proposed project. The use of temporary and permanent BMPs will control and minimize any adverse effects that construction activities may have on ambient air and water quality during and after the project, respectively. Noise generation from construction vehicles are anticipated to be within established DOH allowable thresholds. The noise from traffic along Kamehameha Highway are expected to be at typical, normal levels throughout the project. Upon completion of the project, air and water qualities and ambient noise levels are expected to return to their existing conditions.

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

The project site rests in an environmentally sensitive location susceptible to floods, tsunamis, storms, earthquakes and erosion. The project will not alter the area's vulnerability to tsunamis, storms, earthquakes and erosion; however, the replacement bridge will improve the local flood frequency of the surrounding areas by having a larger cross sectional area for Kahana Stream flow. The final bridge will have less in-stream support piers than the existing bridge, will have widened, and stabilized banks. Drainage patterns will primarily be unaltered by the project. Unlike the existing bridge that fails to meet government agency regulations, the replacement bridge will be designed to withstand tsunamis, excessive rain and wind exposure, and seismic activity. The stream banks beneath the final bridge will be stabilization against erosion. Effects on the environment due to natural hazards during construction work will be controlled and mitigated throughout the project through the use of temporary BMPs, and after the project by permanent BMPs.

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

The proposed project is not anticipated to substantially affect scenic vistas and viewplanes identified in county or state plans or studies. Any visual resource effect will be short-term construction-related, such as, ocean and stream view blocks from the bypass bridge and crane boom. Existing views will be restored upon completion of the project. The final bridge, approach roadways and associated facilities are flat and no taller than the existing bridge and associated structures.

13. Requires substantial energy consumption.

The proposed action will not require substantial energy consumption. Energy requirements will primarily be directly related to construction activities; therefore, extra energy will not be needed upon completion of the project. The postconstruction lighting demand will be similar to the illumination requirements of the existing bridge and approach roadways.

The draft version of this EA was submitted to the State of Hawai'i, Office of Environmental Quality Control (OEQC) on August 25, 2003, for review and comment, and public notice of the project was printed in the semimonthly OEQC bulletin, *The Environmental Notice*, on September 8, 2003. A reminder notice that the 30-day public comment period was to conclude on October 8, 2003, was printed in the September 23, 2003, issue of the OEQC bulletin. The draft EA was also submitted to the Kahuku Public & School Library on July 17, 2003, and public notice was printed in the March 2003 and April 2003 issues of the State of Hawai'i, Office of Hawaiian Affairs' (OHA) *Ka Wai Ola o OHA* monthly publication for public review and comment. Comments on the draft EA are included as Appendix F.

CHAPTER 5—CONSULTED AGENCIES AND PARTICIPANTS DURING THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

The following Federal, State and City and County agencies, as well as, private and community organizations, were consulted during the preparation of this document. Only those who have responded to our consultation are listed here. This environmental assessment will subject to public review for a 30-day period pursuant to HAR Chapter 11-200.

5.1 FEDERAL AGENCIES

- Advisory Council on Historic Preservation
- Department of Army
  - Army Corps of Engineers, Pacific Ocean Division
- Federal Highway Administration
- Fish and Wildlife Service
  - Pacific Islands Ecoregion

5.2 STATE OF HAWAI'I

- Department of Business, Economic Development and Tourism
- Department of Education
  - Public Library System
- Department of Hawaiian Home Lands
- Department of Health
  - Clean Water Branch
- Department of Land and Natural Resources
  - Aquatic Resources Division
  - Commission on Water Resource Management
  - Forestry and Wildlife Division
  - Land Division
  - State Historic Preservation Division
- Department of Transportation
  - Highways Division

  - Structure Design (HWY-DB)
  - Design Service (HWY-DS)
  - Design Section (HWY-DD)
- Office of Environmental Quality Control
- Office of Hawaiian Affairs
- University of Hawai'i at Mānoa
  - Hawai'i Natural Heritage Program

5.3 CITY AND COUNTY OF HONOLULU

- Board of Water Supply
- Department of Planning and Permitting
- Ko'olauloa Neighborhood Board

5.4 PRIVATE AND COMMUNITY ORGANIZATIONS

- AECOS Consultants, Inc.
- Cultural Surveys Hawai'i, Inc.
- The Friends of 'Iolani Palace
- Geolabs, Inc.
- Kahana Community Association
- Mitsunaga &Associates, Inc.
- PBR Hawaii, Inc.
- Ronald N.S. Ho & Associates, Inc.
- Sea Engineering, Inc.
- WEST Consultants, Inc.

CHAPTER 6—REFERENCES

1. *Ambient Air Quality Standards*, Chapter 59, Title 11, Hawai'i Administrative Rules, Department of Health, State of Hawai'i, August 28, 2001.

2. *Aquifer Identification and Classification for O'ahu: Groundwater Protection, Strategy for Hawai'i,* John F. Mink and L. Stephen Lau, University of Hawai'i at Mānoa Water Resource Research Center, November 1987.

3. *Archaeological Monitoring Plan for the Kamehameha Highway North Kahana Stream Bridge Replacement Kahana Ahupua'a, Ko'olauloa District, Island of O'ahu (TMK: 5-2-05-3 and 5-2-02-1),* Cultural Surveys Hawai'i, Inc., June 2002.

4. *Archaeology of O'ahu,* J. Gilbert McAllister, Bernice P. Bishop Museum Bulletin 104.

5. *Atlas of Hawai'i*, R. Warwick Armstrong, Editor and Project Director, Department of Geography, University of Hawai'i, Honolulu: The University Press of Hawai'i, 1973.

6. *Basis of Design, Federal-Aid Project Number BR-083-1(53), Kamehameha Highway, Replacement of North Kahana Bridge, Kahana, Ko'olauloa, O'ahu, Hawai'i,* M&E Pacific, Inc., October 2004.

7. *BWS O'ahu Water Management Plan,* Wilson Okamoto & Associates, Inc., July 1998.

8. *BWS O'ahu Water Plan,* Board of Water Supply, City and County of Honolulu, 1982.

9. *Coastal and Environmental Evaluation for the Proposed Replacement of North Kahana Bridge,* Sea Engineering, Inc. and AECOS Consultants, Inc., 2000.

10. *Coastal and Environmental Evaluation of the Proposed Water Main Bypass at North Punalu'u Bridge*, Sea Engineering, Inc., May 2003.

11. *Community Noise Control,* Chapter 46, Title 11, Hawai'i Administrative Rules, Department of Health, State of Hawai'i, August 28, 2001.

12. *Draft Environmental Assessment for Kamehameha Highway Drainage Improvements: Vicinity of Kahuku Hospital and Replacement of Kii Bridge*, R.M. Towill Corporation, Honolulu, Hawai'i, October 2001.

13. *Draft Environmental Assessment for Waianae Coast Emergency Access Road, Waianae, Island of O'ahu, Hawai'i,* Townscape Inc., December 2001.

14. *Environmental Assessment for the Punalu'u to Kualoa Park Transmission Pipeline Ko'olauloa , Koolaupoko, O'ahu.* George A. L. Yuen & Associates, April 1999.

15. *Exemption(s) from Design Guideline(s), Kamehameha Highway, Replacement of North Kahana Bridge, Fed. Aid Proj. No.: BR-083-1(53), District of Koolauloa, Island of Oahu,* M&E Pacific, Inc., October 2004.

16. *Final Environmental Impact Statement for Windward O'ahu Regional Water System Improvements.* Board of Water Supply, City and County of Honolulu, 1988.

17. *Flood Insurance Rate Map, Honolulu County, Hawai'i,* National Flood Insurance Program, Federal Emergency Management Agency, November 20, 2000.

18. *Floods in Punalu'u-Hau'ula Area, O'ahu, Hawai'i,* Thomas M. Ushijima and Charles J. Ewart, 1973.

19. *Geotechnical Engineering Exploration, Kamehameha Highway (Route 83), North Kahana Stream Bridge Replacement, Project No. BR-083-1(42), Kahana, Oahu, Hawaii,* Geolabs, Inc., May 30, 2003.

20. *Guidelines for Sustainable Building Design in Hawai'i*, Office of Environmental Quality Control, Department of Health, State of Hawai'i, adopted by the Environmental Council on October 13, 1999.

21. *Hydraulic and Scour Analysis, North Kahana Bridge Replacement*, West Consultants, Inc., September 2004.

22. *Hydrology and Hydraulic Report, Federal Aid Project Number BR-083-1(53), Kamehameha Highway, Replacement of North Kahana Bridge, Kahana, Ko'olauloa, O'ahu, Hawai'i*, M&E Pacific, Inc., October 2004.

23. *In Gardens of Hawai'i*, Marie C. Neal, Bishop Museum Press, 1965.

24. *Kamehameha Highway, North Kahana Bridge Replacement, Hydrologic Study, Hydraulic Analysis & Scour Evaluation, Kahana, Island of O'ahu, Hawai'i*, M & E Pacific, Inc., October 2002.

25. *Pavement Justification Report, Kamehameha Highway (Route 83), North Kahana Stream Bridge Replacement, Project No. 83D-01-01, Kahana, Oahu, Hawaii*, Geolabs, Inc., March 17, 2003.

26. *Project Assessment Report for Kamehameha Highway North Kahana Stream Bridge Replacement, District of Ko'olauloa , Island of O'ahu.* State of Hawai'i, Department of Transportation Highways Division, October 2000.

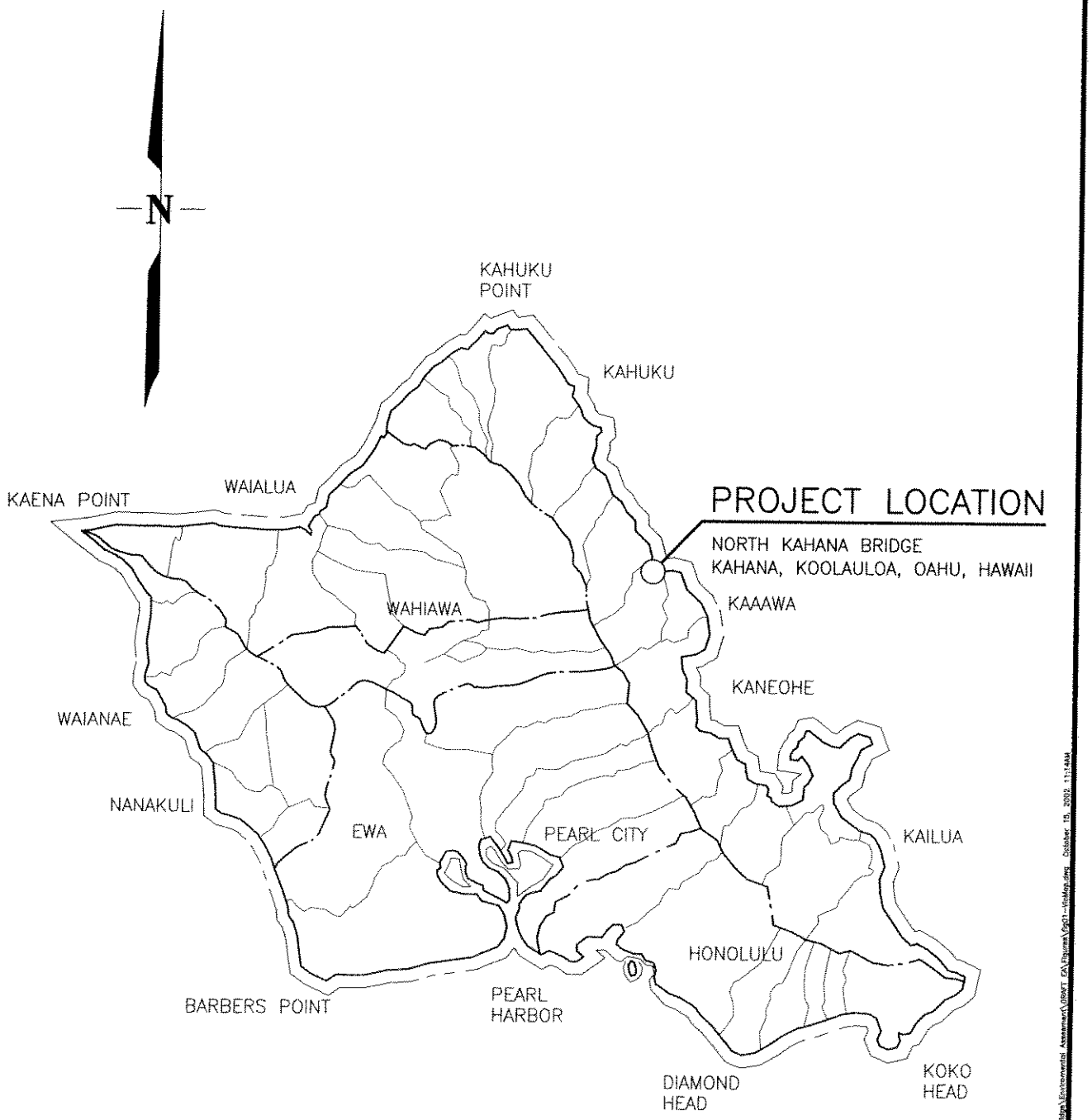
27. *Soil Survey of Islands of Kaua'i, O'ahu, Maui, Moloka'i and Lana'i, State of Hawai'i*, US Department of Agriculture Soil Conservation Service, 1972.

28. *State of Hawai'i Data Book 2002,* State of Hawaii Department of Business, Economic Development & Tourism, 2002.

29. *USGS Water Resource Data Hawai'i and Other Pacific Areas,* B.R. Hill, R.A. Fontaine, R.I. Taogoshi, P.C. Teeters, Water Year 1999, Volume 1, Hawai'i, Water-Data Report HI-99-1, State of Hawai'i DLNR, Commission on Water Resource Management and with other agencies.

FIGURES

LIST OF FIGURES

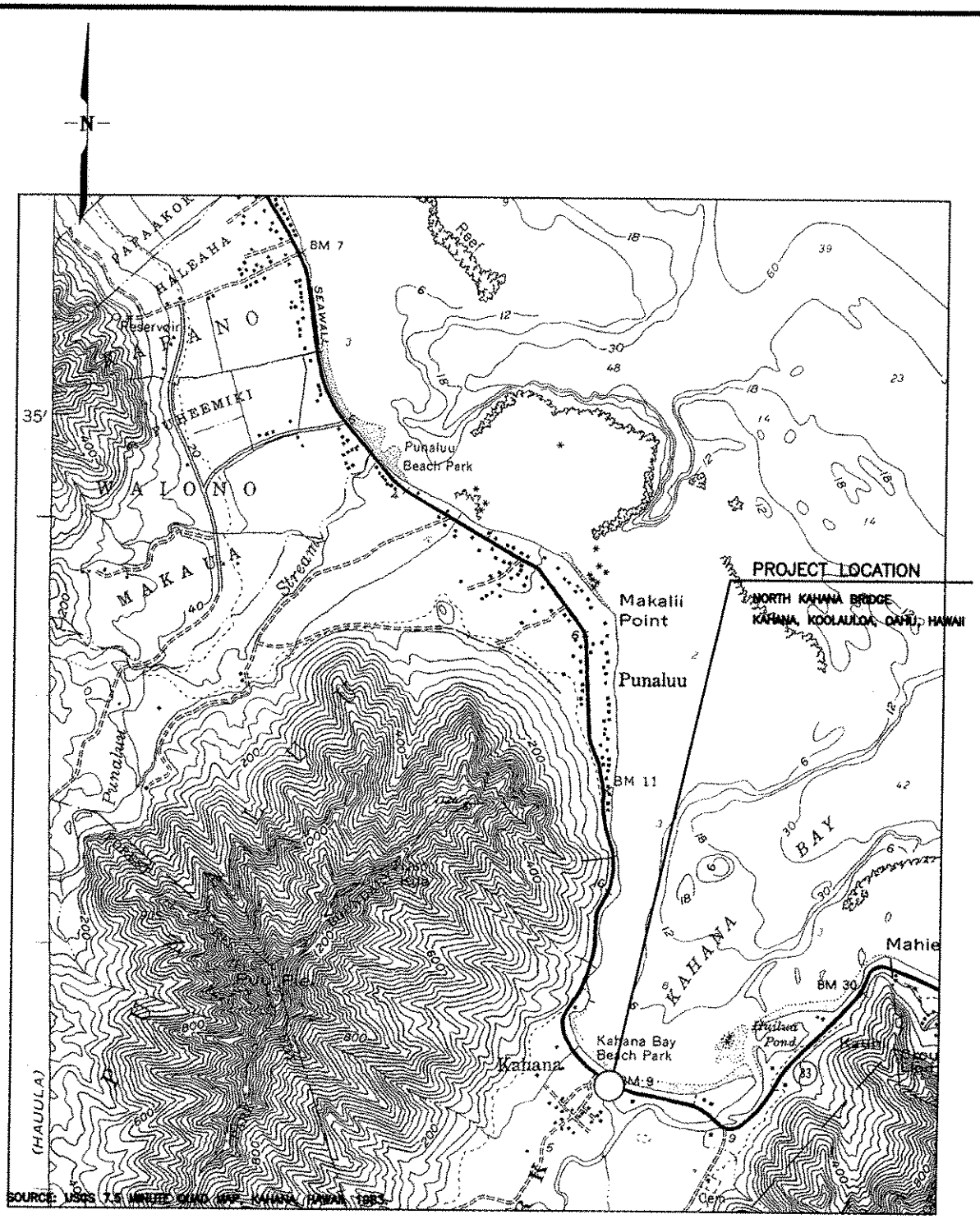


ISLAND OF OAHU

Not to Scale

M&E Pacific, Inc.
Davies Pacific Center
841 Bishop Street
Suite 1900
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII
FIGURE 1
VICINITY MAP



GRAPHIC SCALE:

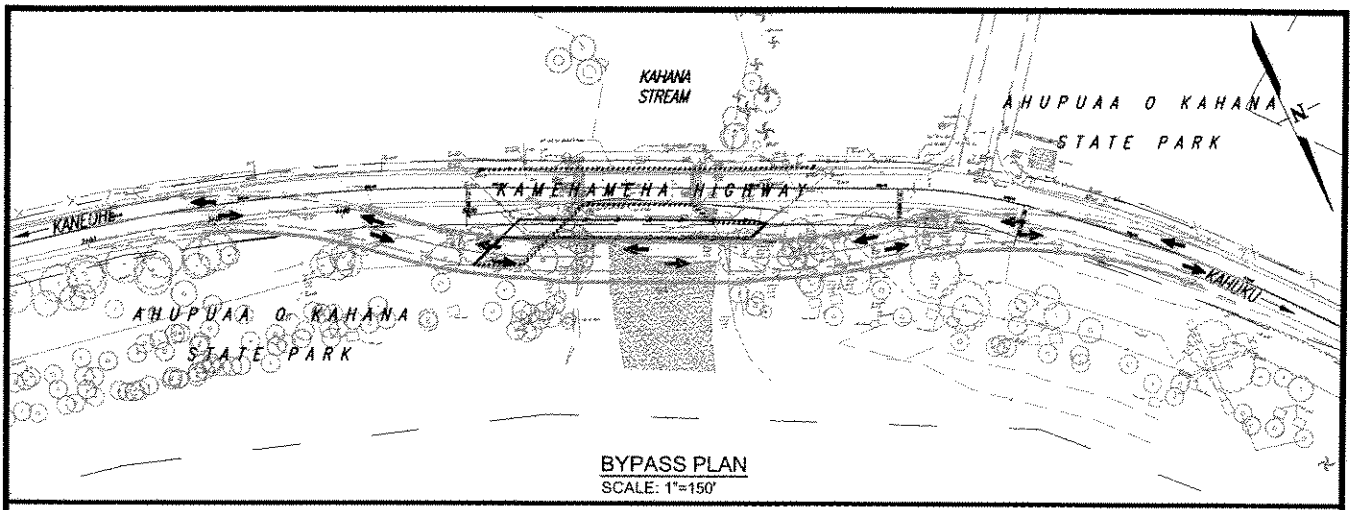
2000' 0 2000' 4000'

1" = 2000'

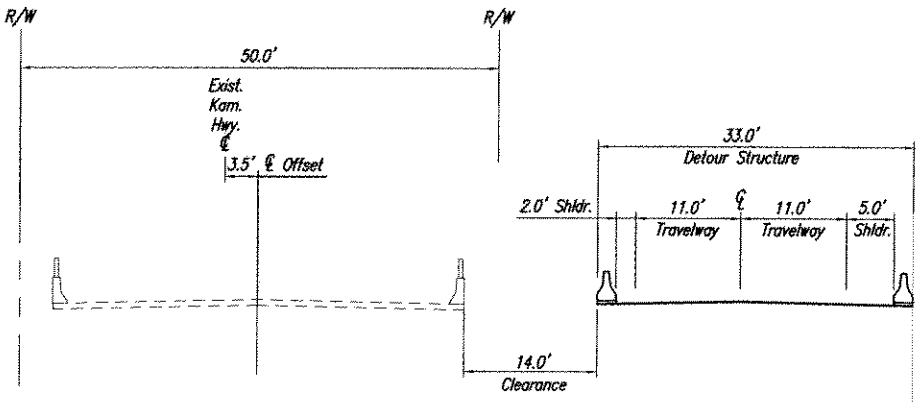
M&E Pacific, Inc.
Davies Pacific Center
841 Bishop Street
Suite 1900
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

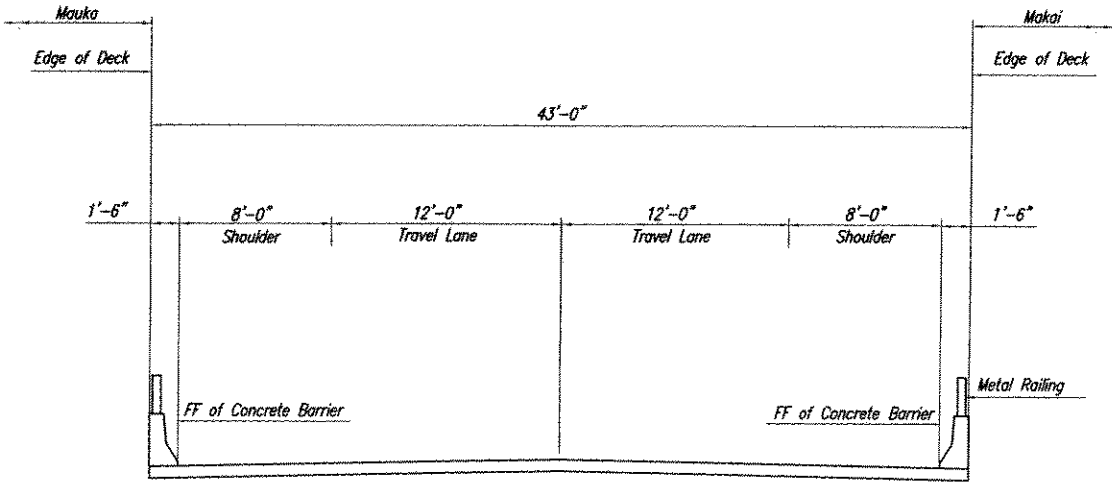
FIGURE 2
LOCATION MAP



BYPASS PLAN
SCALE: 1"=150'



BYPASS SECTION
SCALE: 1"=10'

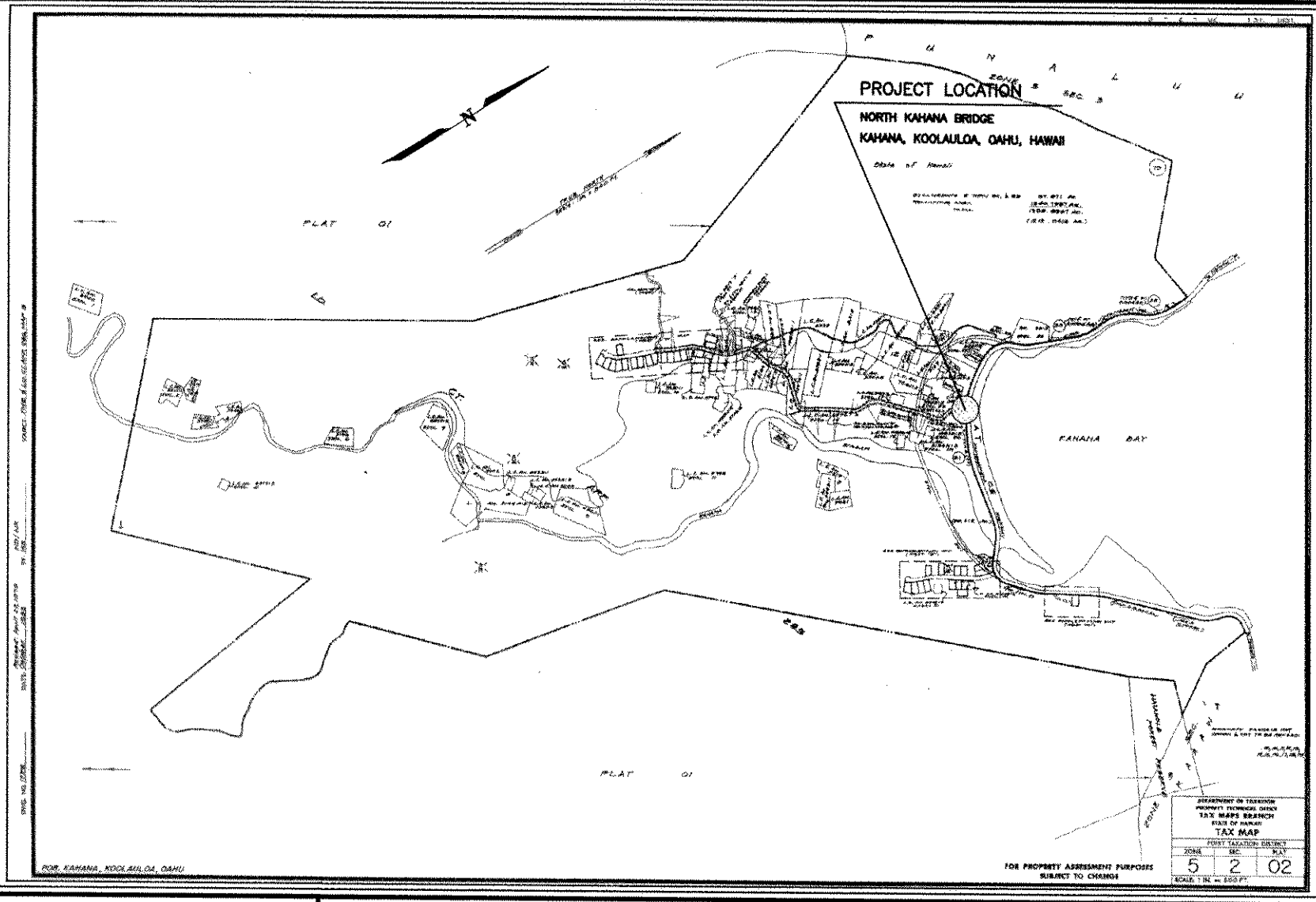


REPLACEMENT SECTION
SCALE: 1"=10'

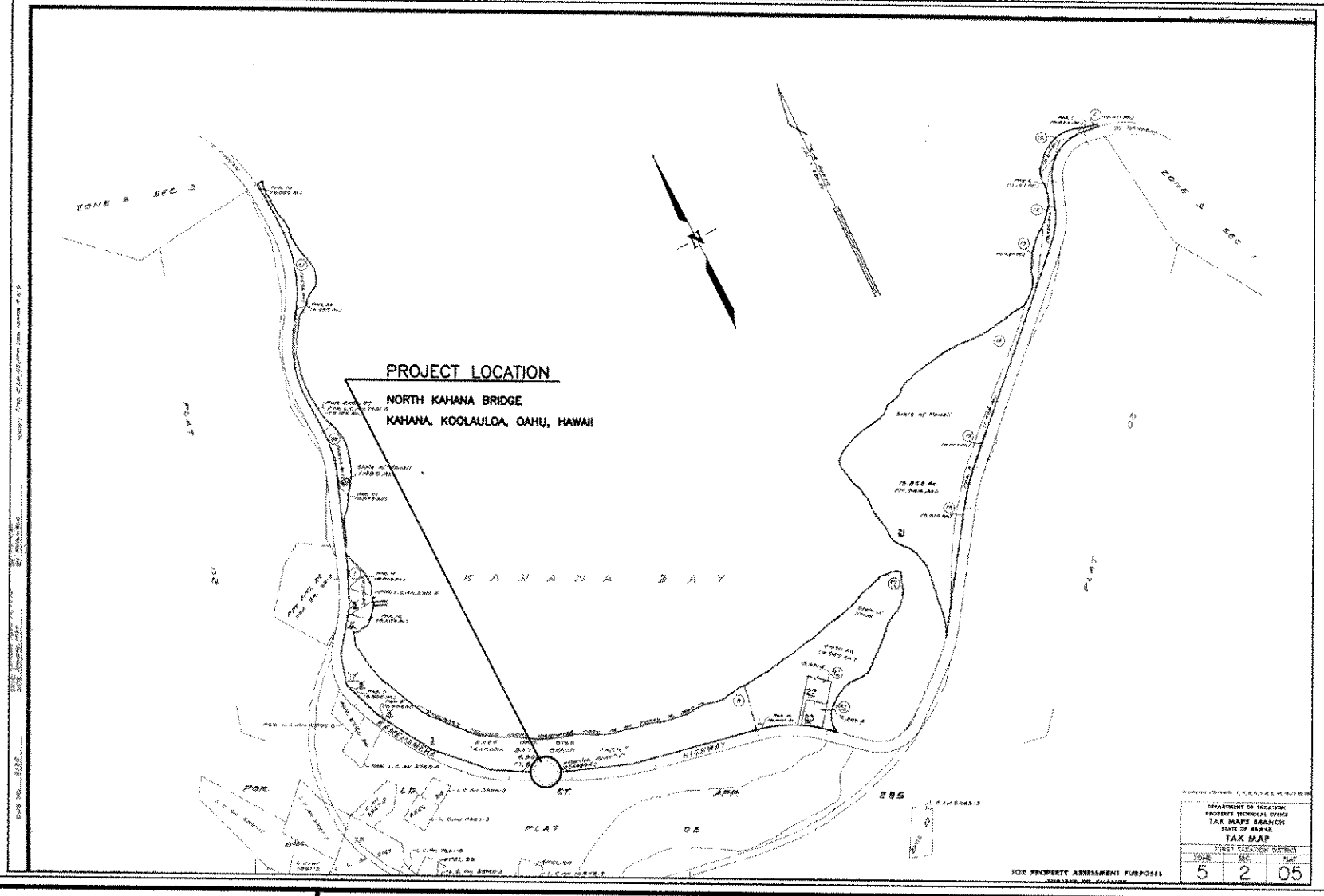
M&E Pacific, Inc.
Davies Pacific Center
841 Bishop Street
Suite 1900
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 3
GENERAL CONCEPTUAL DESIGN



M&E Pacific, Inc. Davies Pacific Center 841 Bishop Street Suite 1900 Honolulu, Hawaii 96813	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION KAMEHAMEHA HIGHWAY REPLACEMENT OF NORTH KAHANA BRIDGE KAHANA, KOOLAULOA, OAHU, HAWAII	FIGURE 4A TAX MAP KEY MAP 1 (5–2–002)

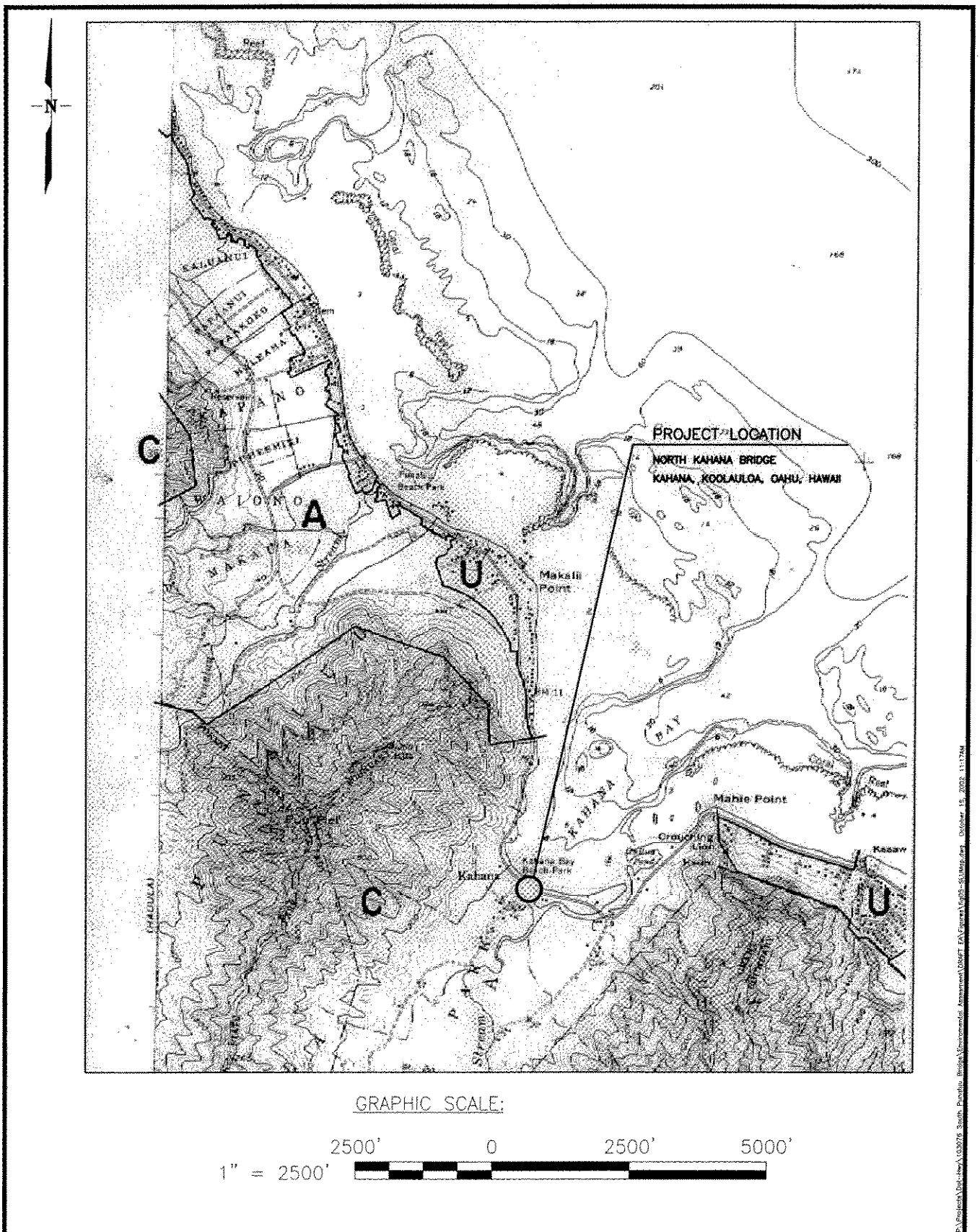


M&E Pacific, Inc.
Davies Pacific Center
841 Bishop Street
Suite 1900
Honolulu, Hawaii 96813

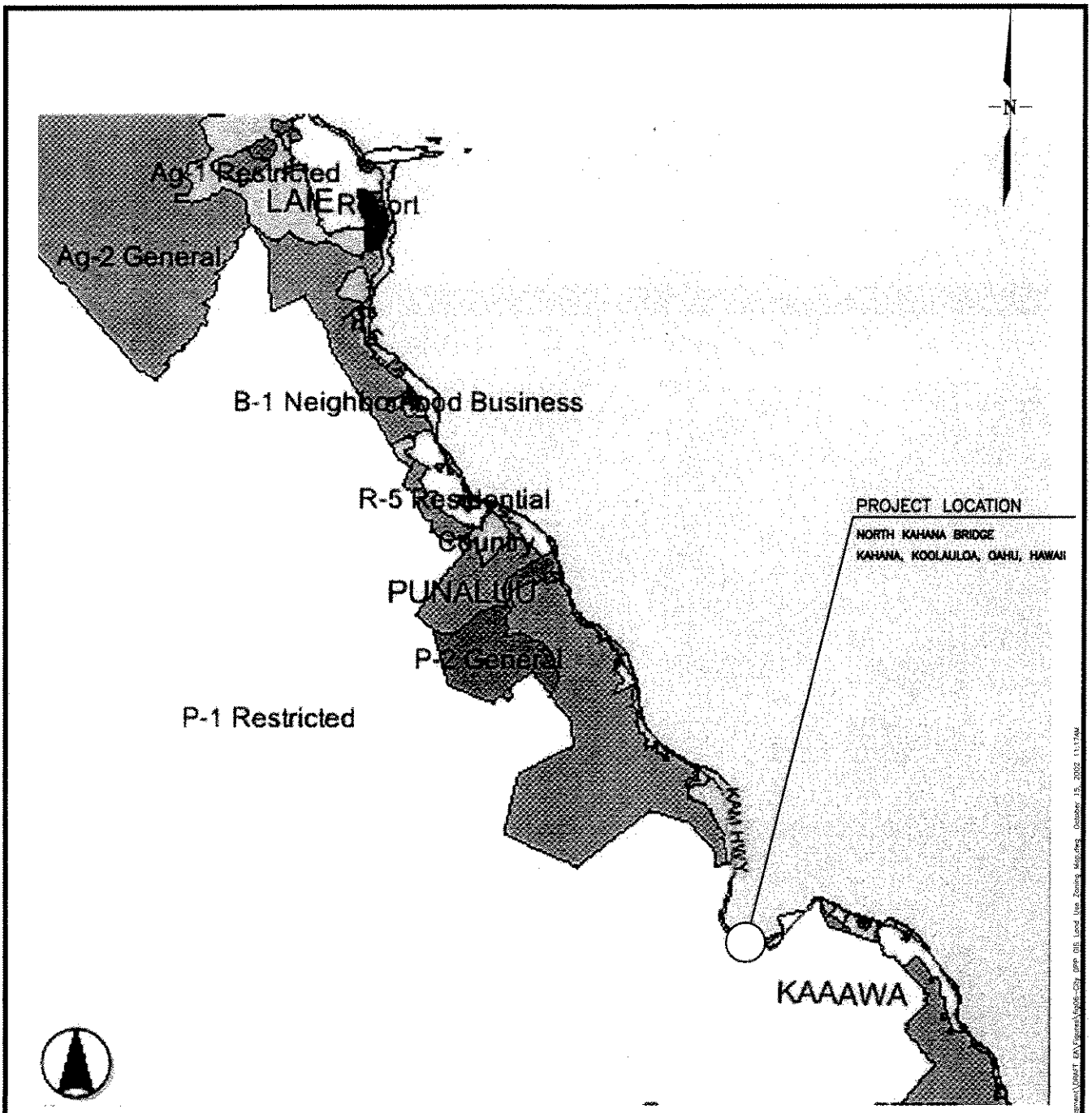
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 4B
TAX MAP KEY MAP 2 (5–2–005)



M&E Pacific, Inc. Davies Pacific Center 841 Bishop Street Suite 1900 Honolulu, Hawaii 96813	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION KAMEHAMEHA HIGHWAY REPLACEMENT OF NORTH KAHANA BRIDGE KAHANA, KOOLAULOA, OAHU, HAWAII FIGURE 5 STATE LAND USE DESIGNATION MAP

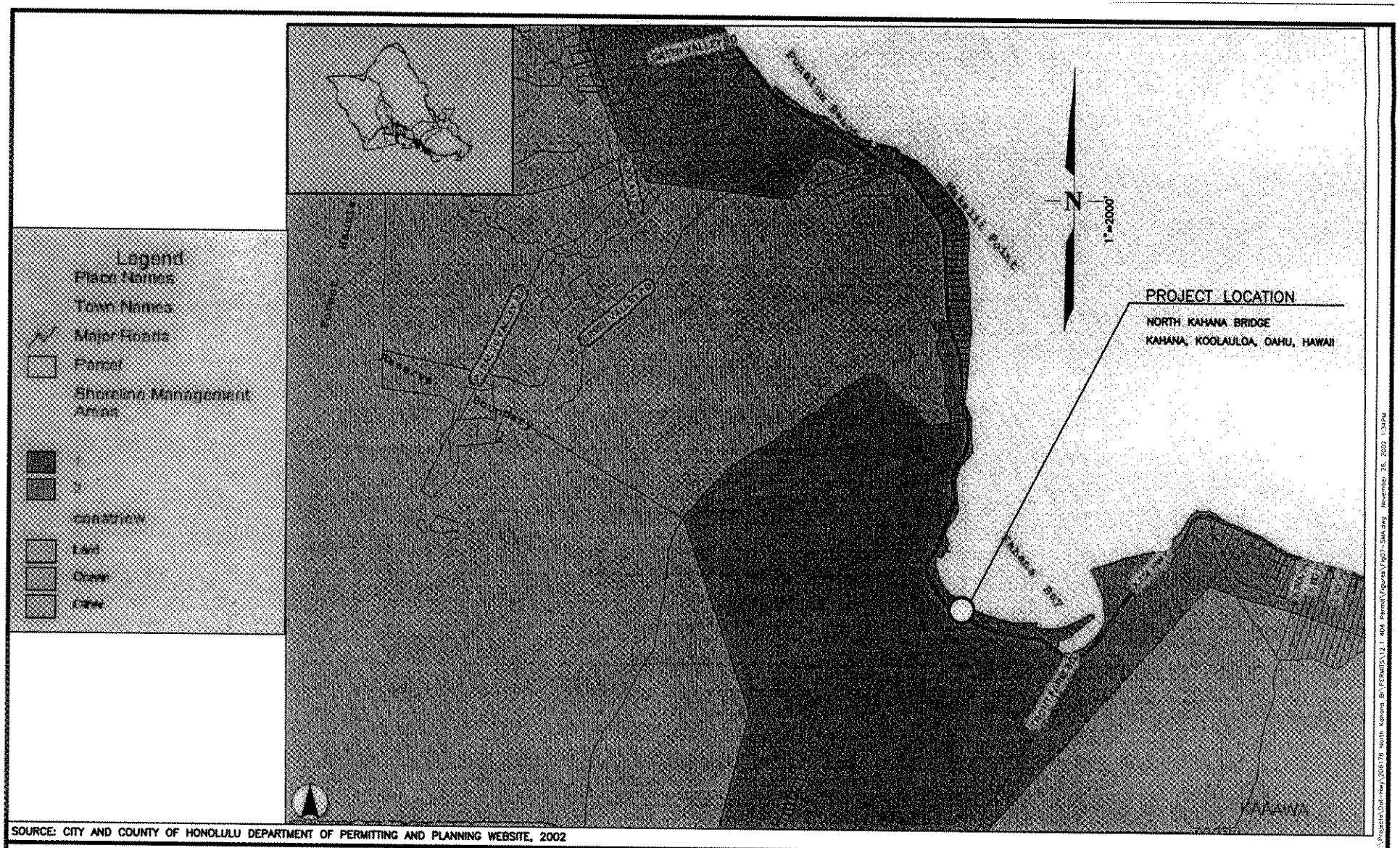


SOURCE: CITY AND COUNTY OF HONOLULU DEPARTMENT OF PERMITTING AND PLANNING WEBSITE, 2002

M&E Pacific, Inc.
Davies Pacific Center
841 Bishop Street
Suite 1900
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 6
CITY DPP GIS LAND USE ZONING MAP: LAIE–PUNALUU–KAAAWA



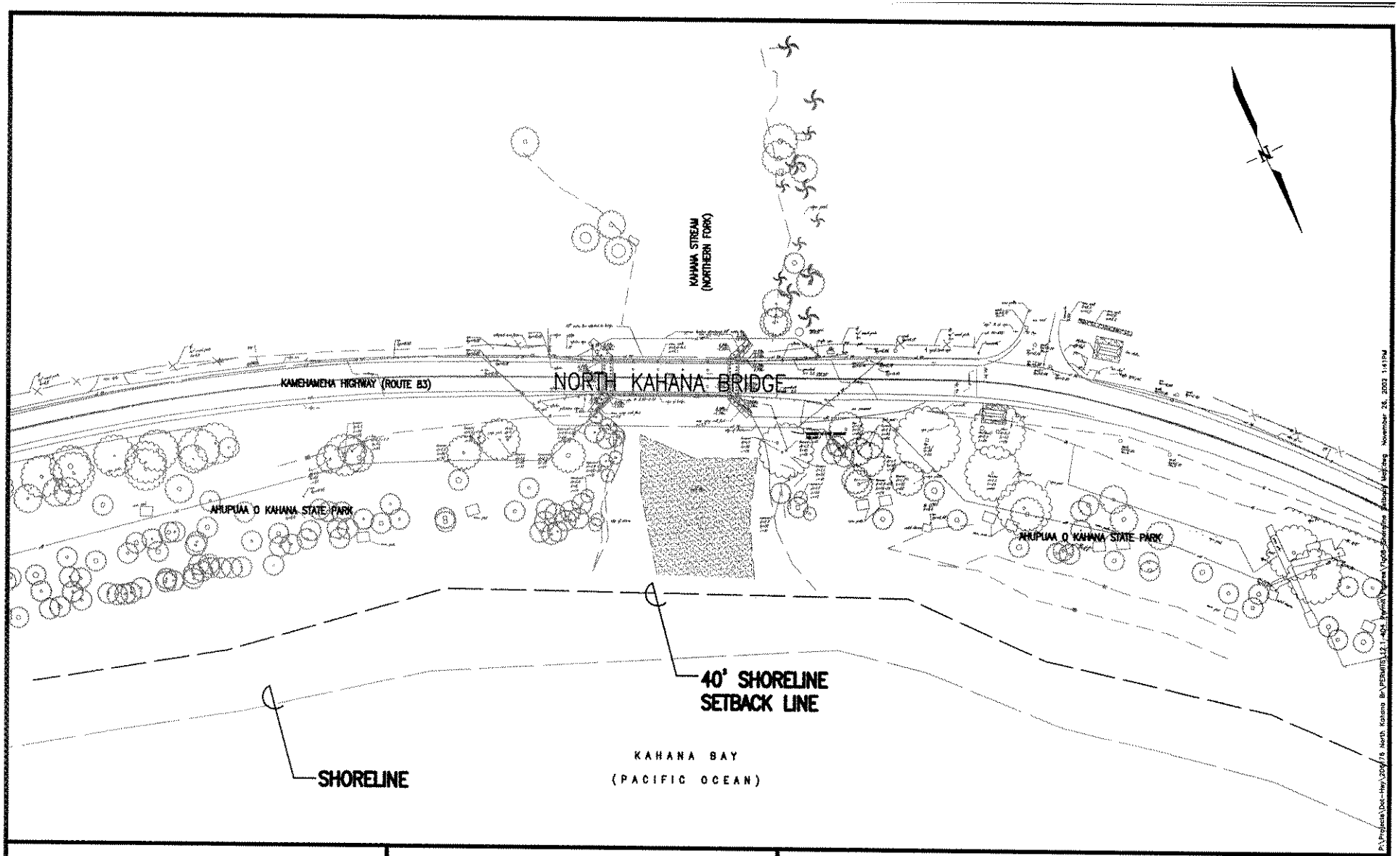
SOURCE: CITY AND COUNTY OF HONOLULU DEPARTMENT OF PERMITTING AND PLANNING WEBSITE, 2002

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

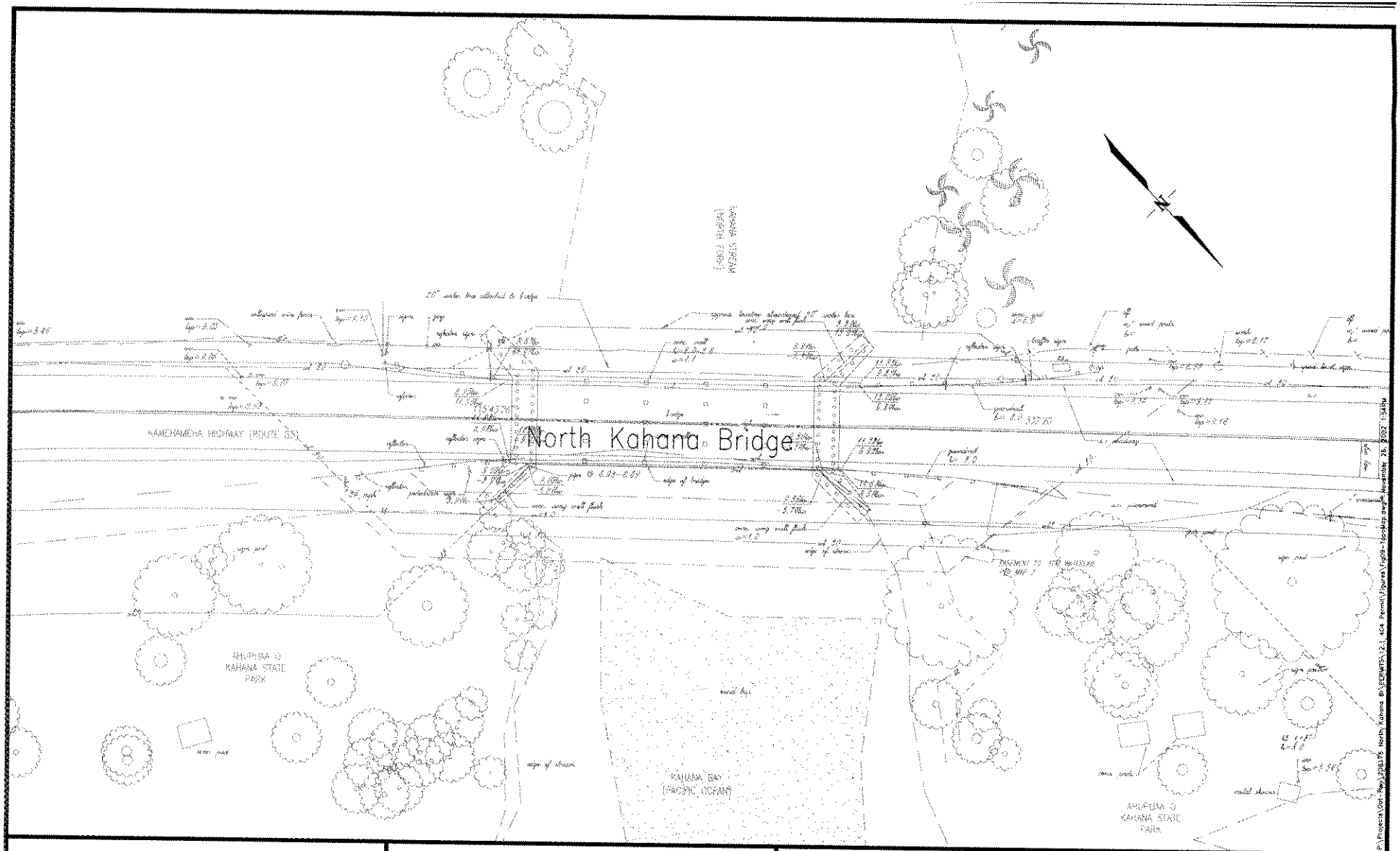
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 7
SPECIAL MANAGEMENT AREA MAP



M&E Pacific, Inc. Bishop Square Pauahi Tower, Suite 500 1001 Bishop Street Honolulu, Hawaii 96813	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION KAMEHAMEHA HIGHWAY REPLACEMENT OF NORTH KAHANA BRIDGE KAHANA, KOOLAULOA, OAHU, HAWAII	FIGURE 8 SHORELINE SETBACK MAP

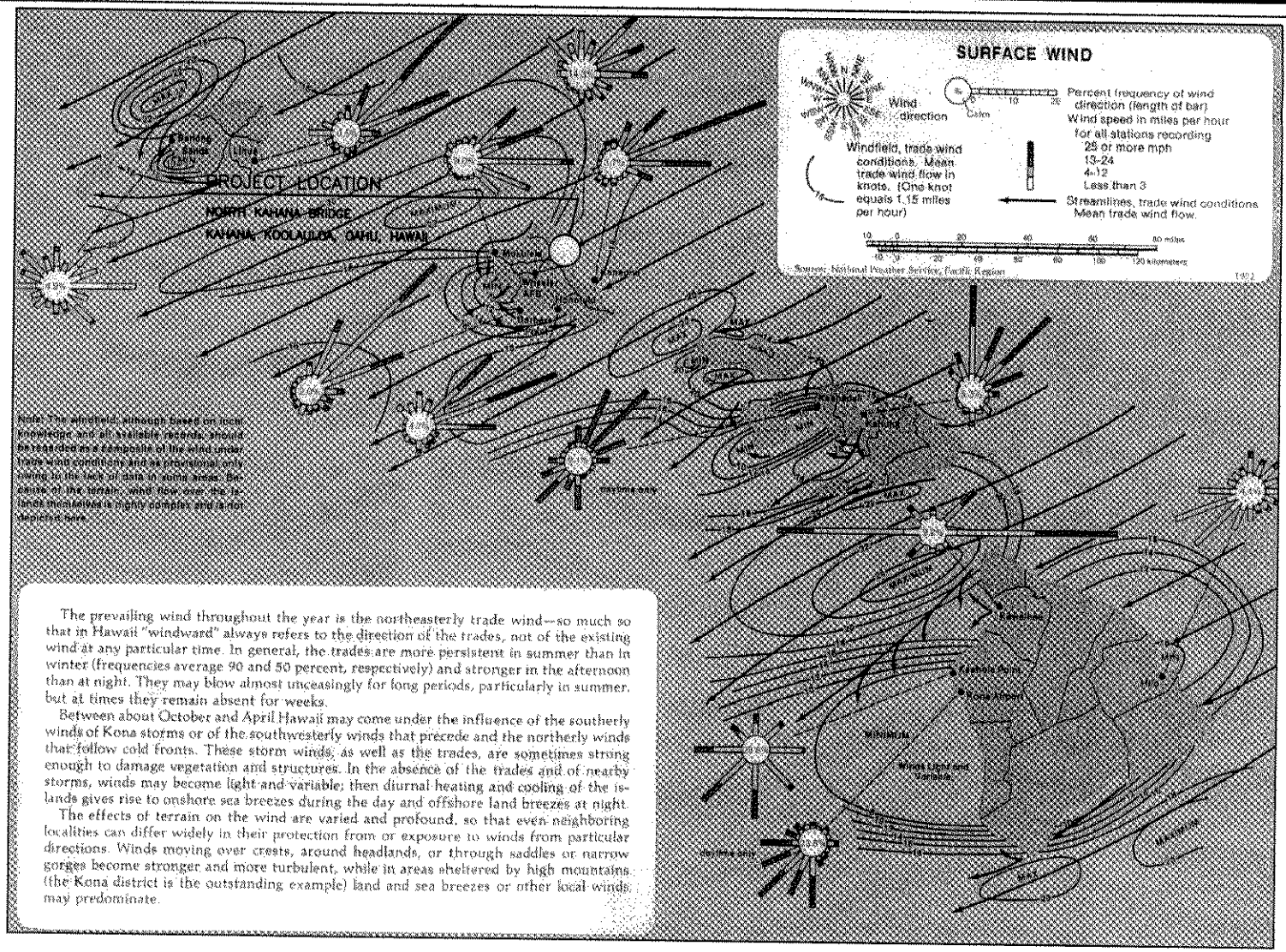


M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 9
TOPOGRAPHICAL SURVEY OF EXISTING CONDITION



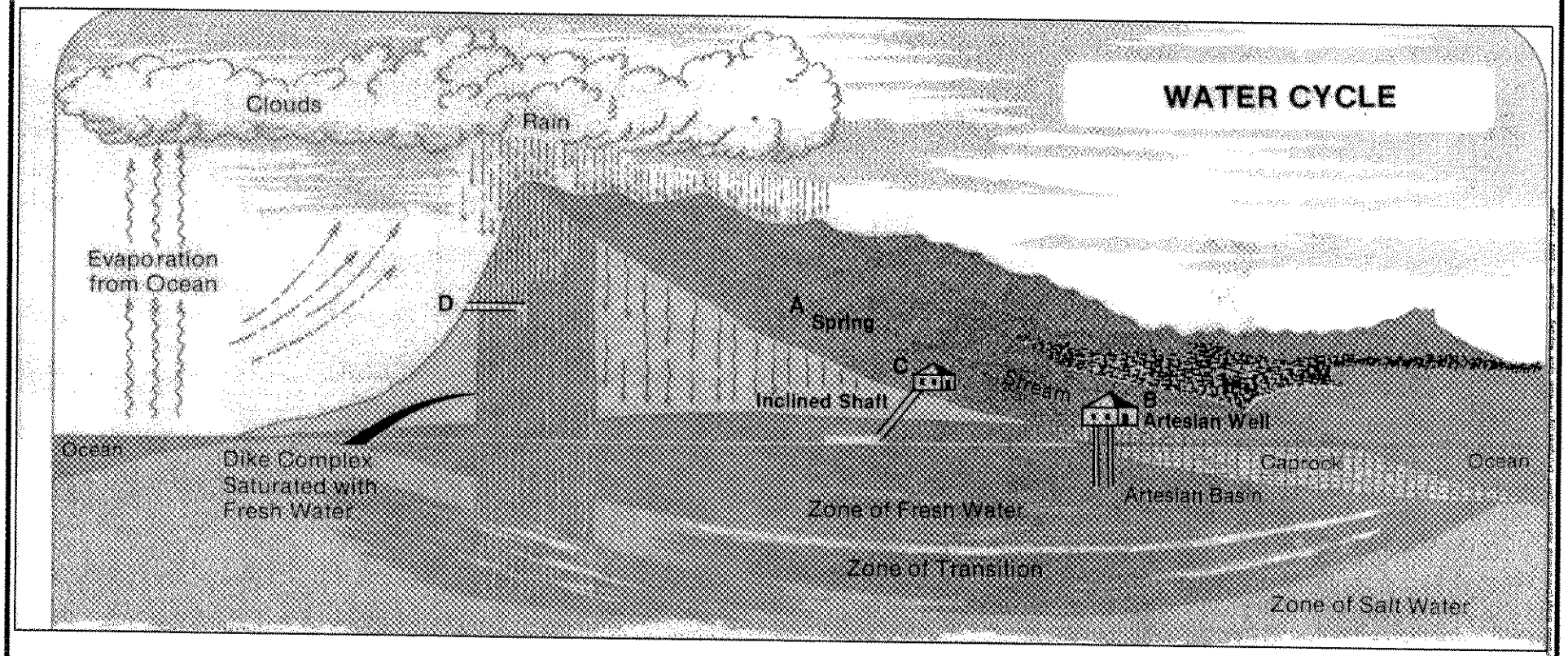
SOURCE: ATLAS OF HAWAII, THE UNIVERSITY PRESS OF HAWAII, 1973.

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 10
SEASONAL SURFACE WIND MAP



SOURCE: ATLAS OF HAWAII 3RD EDITION, JUVIK AND JUVIK, 1998.

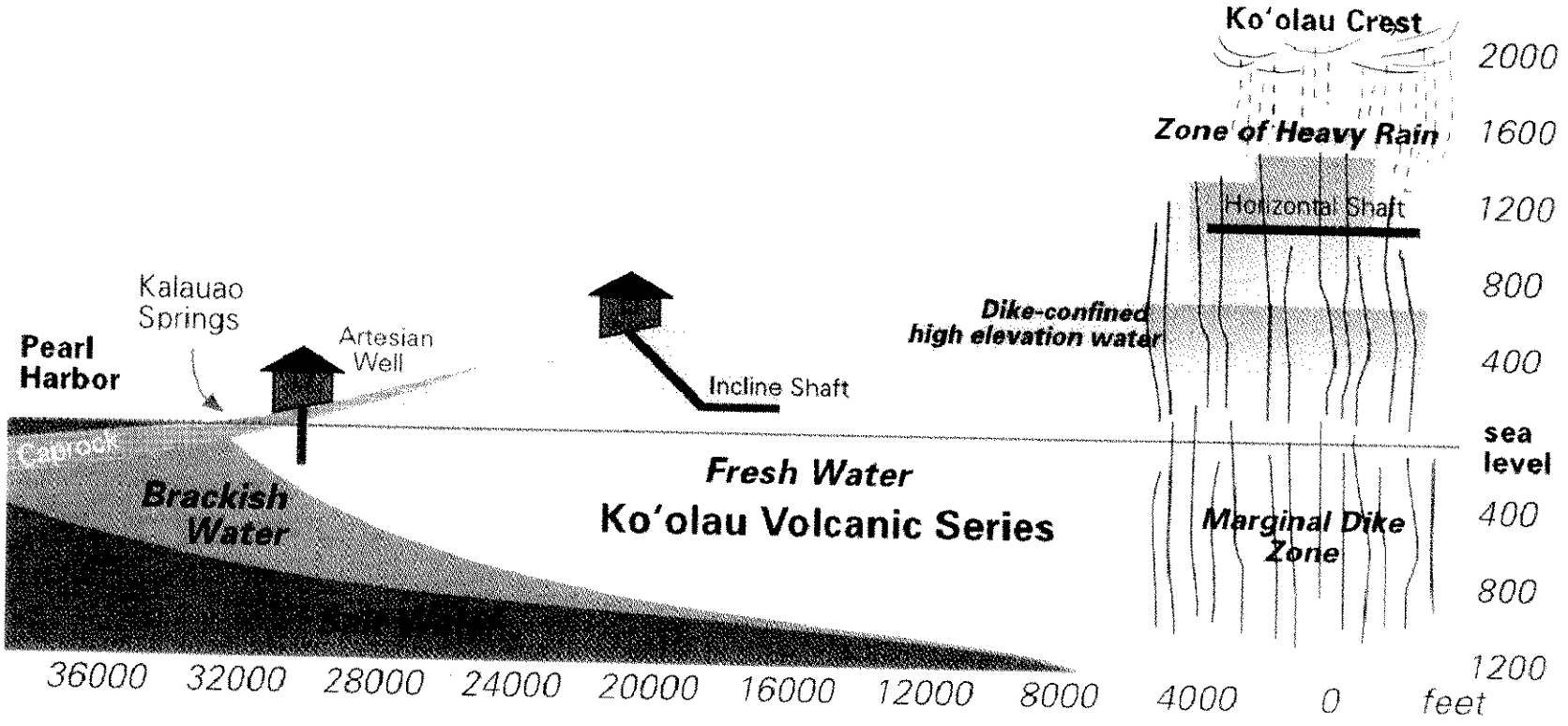
M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 11A
OAHU HYDROLOGIC WATER CYCLE MAP 1

O'ahu Water Resources



SOURCE: ATLAS OF HAWAII 3RD EDITION, JUVIK AND JUVIK, 1998.

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 11B
OAHU HYDROLOGIC WATER CYCLE MAP 2

164

HAWAII ISLAND OF OAHU

16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA

LOCATION.--Lat 21°32'37", long 157°53'07", Hydrologic Unit 20060000, on right bank 600 ft upstream from Kawa Stream, 1.1 mi southwest of Kahana, and 2.2 mi southwest of Swanzy Beach Park in Kaaawa.

DRAINAGE AREA.--3.74 mi^2.

PERIOD OF RECORD.--December 1958 to current year.

REVISED RECORDS.--WSP 1937, 1959-60.

GAGE.--Water-stage recorder and concrete-masonry control. Elevation of gage is 30 ft above mean sea level (from topographic map).

REMARKS.--Records computed by Ben Shimizu. Records fair except for estimated period which is poor. Waiahole tunnel diverts water from tributaries and tunnels upstream of station. Elevation of the Waiahole tunnel is 800 ft (from topographic map). Recording rain gage located 50 ft from the streamgage at an elevation of 80 ft.

AVERAGE DISCHARGE.--41 years (water years 1960-2000), 36.3 ft^3/s (26,300 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,250 ft^3/s, March 20, 1991, gage height, 8.60 ft, from rating curve extended above 530 ft^3/s on basis of computation of peak flow over submerged weir; minimum, 9.9 ft^3/s, June 5, 2000.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,600 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 10	2145	1,680	4.87	Aug. 20	1830	*2,230	*5.48
Jan. 19	1545	2,080	5.32				

Minimum discharge, 9.9 ft^3/s, June 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	17	58	20	30	14	77	16	11	20	20	23
2	15	17	101	19	20	14	97	15	11	16	27	22
3	14	26	27	18	20	14	47	15	11	21	21	21
4	13	126	22	18	19	14	30	15	11	17	18	20
5	13	32	54	18	19	14	24	15	10	15	21	27
6	15	22	23	17	18	14	21	15	10	15	93	49
7	25	24	22	16	18	14	26	15	16	14	44	65
8	14	22	19	16	18	14	24	14	14	13	25	62
9	13	26	31	16	18	14	54	14	12	13	22	41
10	13	25	129	17	18	14	45	13	11	13	20	31
11	12	18	185	16	18	14	11	14	13	42	19	49
12	12	36	108	18	17	13	26	17	14	34	18	669
13	15	19	122	38	16	13	26	20	12	29	18	643
14	14	18	59	67	16	13	23	16	15	18	18	945
15	14	17	37	39	16	13	22	13	13	28	17	e35
16	13	16	32	61	16	13	22	12	12	91	17	e30
17	13	16	37	27	16	13	23	13	12	43	18	e26
18	13	16	117	36	15	12	21	12	13	153	20	e27
19	56	16	51	376	16	12	20	12	12	81	17	e27
20	21	19	33	228	15	12	19	11	12	73	217	e32
21	23	22	30	52	15	12	19	11	22	40	45	e27
22	18	16	33	39	16	12	18	12	15	42	26	e25
23	16	54	34	33	15	13	18	11	13	29	29	24
24	16	24	27	29	15	12	18	11	15	25	24	23
25	59	18	25	27	15	11	19	11	14	23	21	22
26	21	17	35	31	15	16	18	12	26	23	19	21
27	21	17	25	25	15	19	19	11	17	26	77	128
28	18	16	23	23	14	13	17	11	15	22	37	129
29	17	17	21	22	14	16	17	11	14	21	56	47
30	16	16	21	21	---	14	17	12	15	19	29	36
31	24	---	20	21	---	43	---	11	---	21	26	---
TOTAL	591	740	1535	1396	493	449	858	412	413	951	1072	1218
MEAN	19.1	24.7	49.5	45.0	17.0	14.5	28.6	13.3	13.8	30.7	34.6	40.6
MAX	59	126	185	376	30	43	97	20	26	153	217	129
MIN	12	16	19	16	14	11	17	11	10	13	17	20
AC-FT	1170	1470	3040	2770	978	891	1700	817	819	1890	2130	2420

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 2000, BY WATER YEAR (WY)

MEAN	32.1	44.6	38.0	37.4	35.5	43.5	44.9	37.6	26.9	32.3	36.2	29.7
MAX	55.1	170	101	94.9	141	178	137	102	56.5	80.6	73.7	84.7
(WY)	1992	1991	1988	1988	1969	1982	1961	1965	1978	1987	1978	1994
MIN	12.6	14.5	14.5	12.9	13.2	12.6	15.5	13.3	13.8	15.9	13.6	13.3
(WY)	1985	1963	1978	1977	1978	2000	1992	2000	2000	1984	1984	1975

e Estimated

SOURCE: B. R. HILL, R. A. FONTAINE, R. I. TAOGOSHI, P. C. TEETERS, USGS WATER RESOURCE DATA HAWAII AND OTHER PACIFIC AREAS WATER YEAR 1999, VOLUME 1, HAWAII 2000
WATER-DATA REPORT HI-99-1, STATE OF HAWAII, DEPARTMENT OF LAND AND NATURAL RESOURCES, COMMISSION ON WATER RESOURCE MANAGEMENT AND OTHER AGENCIES.

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

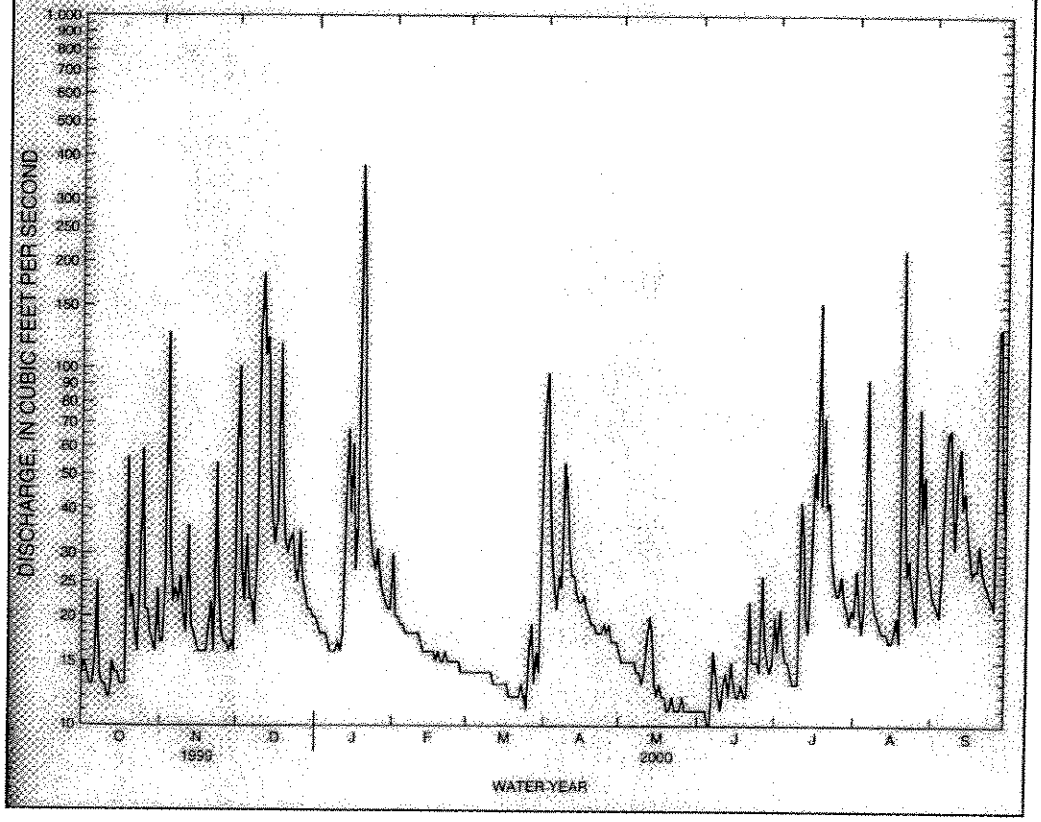
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 12A
AVERAGE EMPIRICAL SEASONAL FLOW DATA FOR KAHANA STREAM – MEAN FLOW VALUES TABLE

HAWAII ISLAND OF OAHU

16296500 KAHANA STREAM AT ALTITUDE 30 FT, NEAR KAHANA--Continued

SUMMARY STATISTICS	FOR 1999 CALENDAR YEAR		FOR 2000 WATER YEAR		WATER YEARS 1959 - 2000	
ANNUAL TOTAL	9850		16128			
ANNUAL MEAN	27.0		27.7		24.3	
HIGHEST ANNUAL MEAN					67.2	1982
LOWEST ANNUAL MEAN					10.1	1984
HIGHEST DAILY MEAN	185	Dec 31	376	Jan 19	1750	Apr 15 1963
LOWEST DAILY MEAN	11	Jun 12	10	Jun 5	10	Jun 5 2000
ANNUAL SEVEN-DAY MINIMUM	12	Jun 2	11	May 31	11	May 31 2000
ANNUAL RUNOFF (AC-FT)	19540		20090		26300	
10 PERCENT EXCEEDS	45		47		53	
50 PERCENT EXCEEDS	19		18		23	
90 PERCENT EXCEEDS	13		12		15	

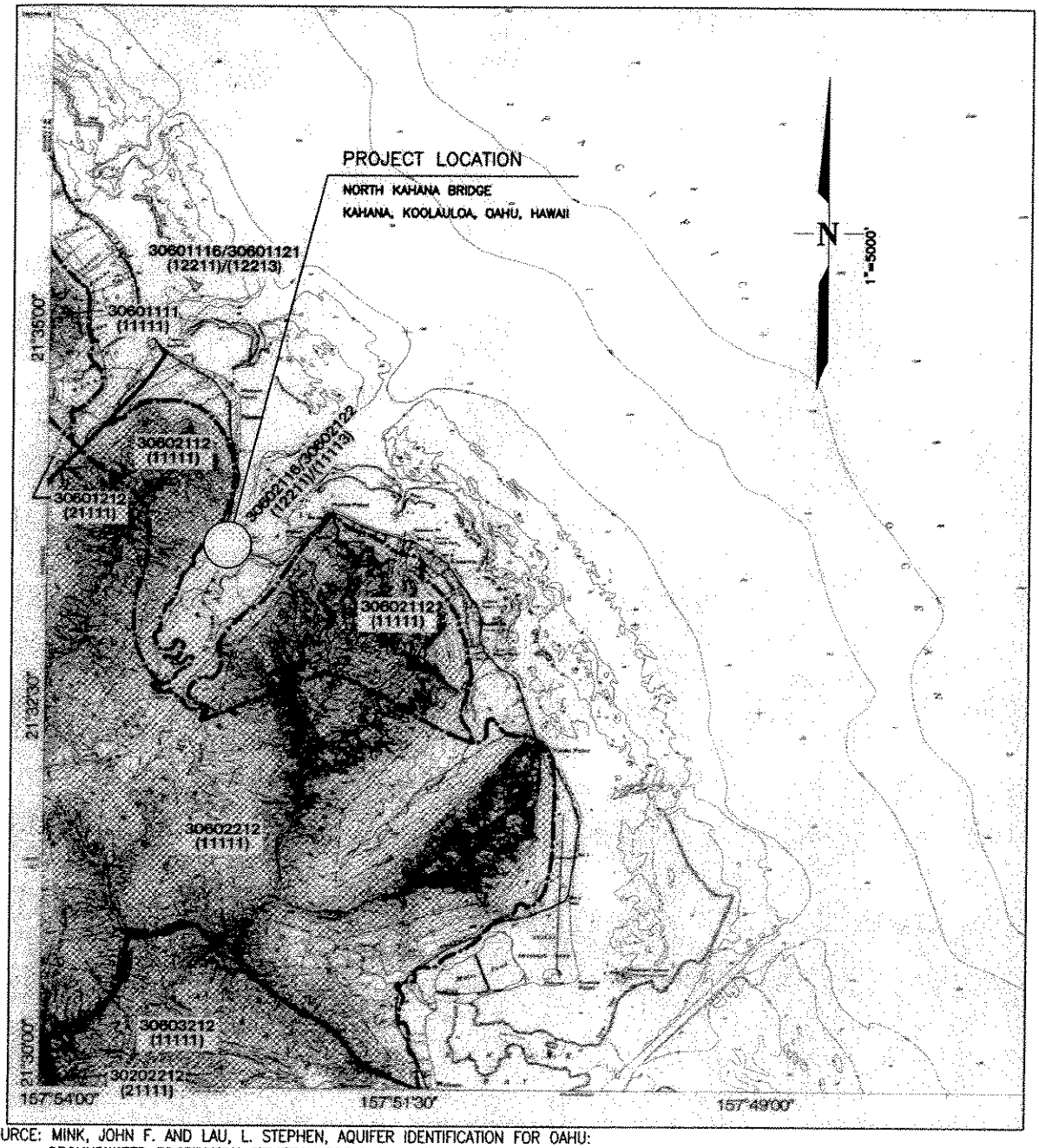


SOURCE: B. R. HILL, R. A. FONTAINE, R. I. TAOGOSHI, P. C. TEETERS, USGS WATER RESOURCE DATA HAWAII AND OTHER PACIFIC AREAS WATER YEAR 1999, VOLUME 1, HAWAII 2000
WATER-DATA REPORT HI-99-1, STATE OF HAWAII, DEPARTMENT OF LAND AND NATURAL RESOURCES, COMMISSION ON WATER RESOURCE MANAGEMENT AND OTHER AGENCIES.

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 12B
AVERAGE EMPIRICAL SEASONAL FLOW DATA FOR KAHANA STREAM – GRAPH



SOURCE: MINK, JOHN F. AND LAU, L. STEPHEN, AQUIFER IDENTIFICATION FOR OAHU: GROUNDWATER PROTECTION STRATEGY FOR HAWAII, FEBRUARY 1990.

GRAPHIC SCALE:

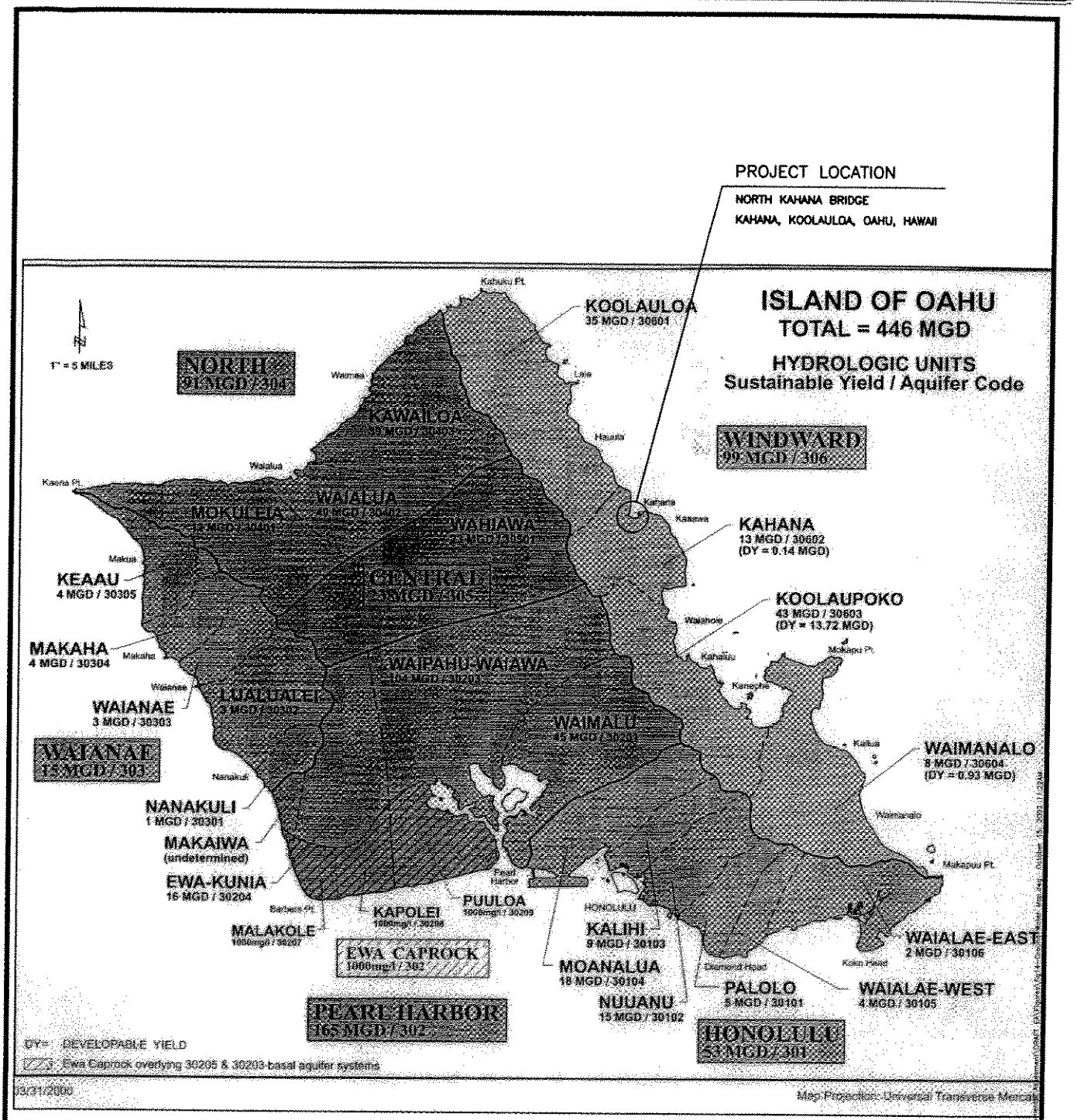
2500' 0 2500' 5000'

1" = 2500'

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII
FIGURE 13
AQUIFER CLASSIFICATION MAP

P:\Projects\Oahu-misc\206176 North Kahana BA\PERMITS\12-1 404 Permit\Figures\Fig13-Aquifer Classification Map.dwg November 29, 2002 2:27PM

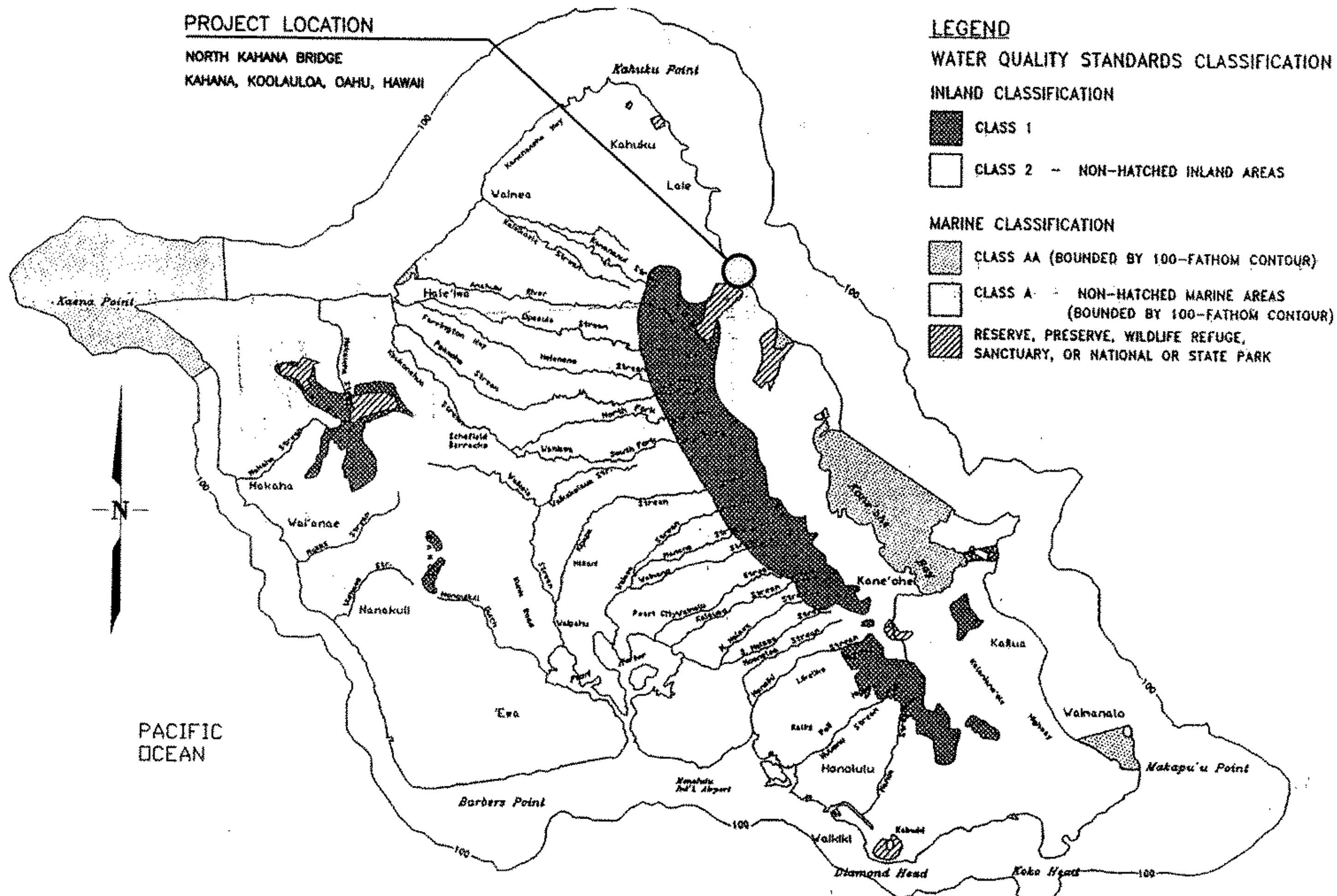


SOURCE: WATER RESOURCE MANAGEMENT DIVISION, DEPARTMENT OF LAND AND NATURAL RESOURCES, STATE OF HAWAII

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

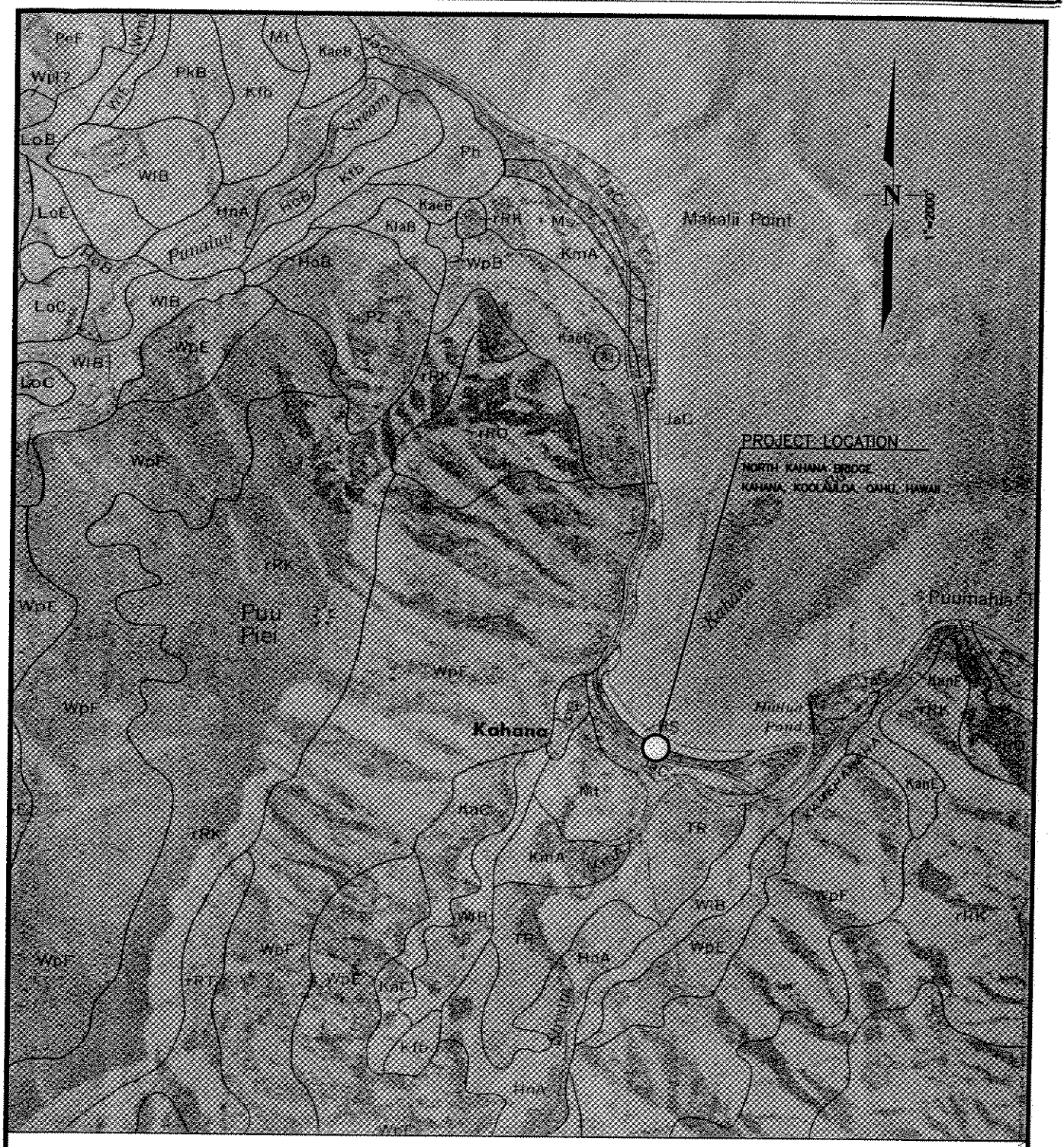
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 14
HYDROLOGIC UNIT MAP FOR THE ISLAND OF OAHU



SOURCE: STATE OF HAWAII, DEPARTMENT OF HEALTH, WATER QUALITY STANDARDS MAP OF THE ISLAND OF OAHU, 1987.

M&E Pacific, Inc. Bishop Square, Pauahi Tower, Suite 500, 1001 Bishop Street, Honolulu, Hawaii 96813	STATE OF HAWAII DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION KAMEHAMEHA HIGHWAY REPLACEMENT OF NORTH KAHANA BRIDGE KAHANA, KOOLAULOA, OAHU, HAWAII	FIGURE 15 WATER QUALITY MAP



GRAPHIC SCALE:

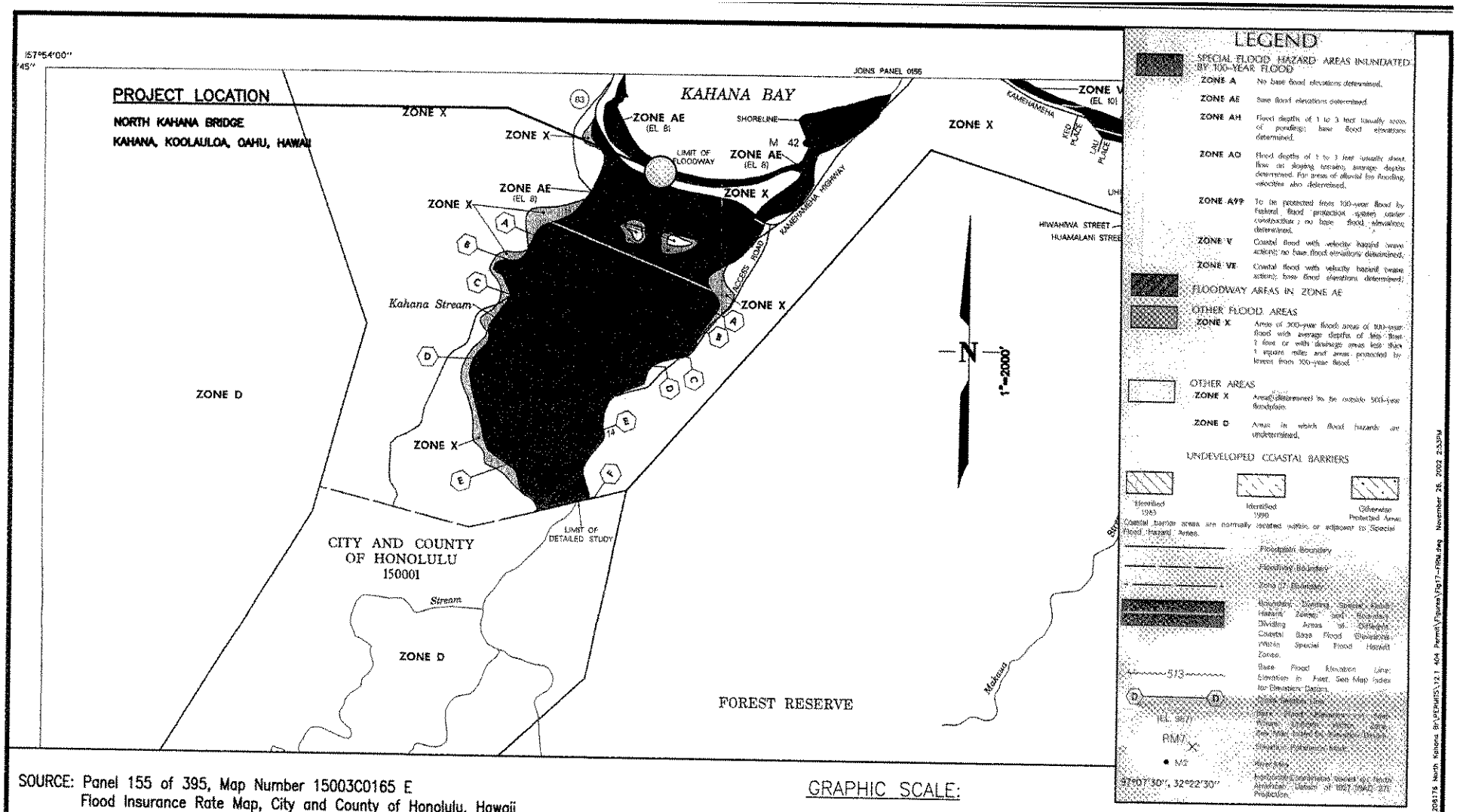
1" = 2000'

2000' 0 2000' 4000'

M&E Pacific, Inc.

Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII
FIGURE 16
SOIL DESIGNATION MAP



SOURCE: Panel 155 of 395, Map Number 15003C0165 E
Flood Insurance Rate Map, City and County of Honolulu, Hawaii
National Flood Insurance Program, Federal Emergency Management Agency
November 20, 2000

GRAPHIC SCALE:

1" = 2000'

2000' 0 2000' 4000'

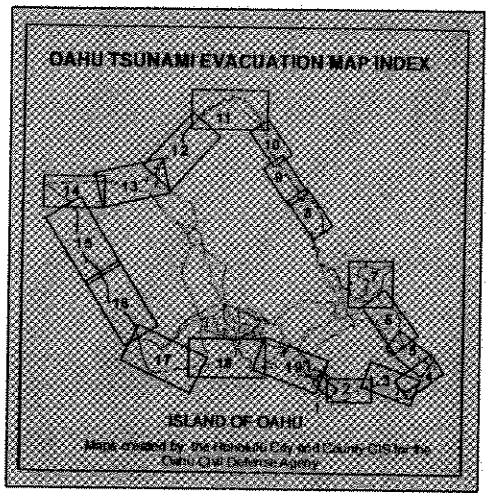
P:\Projects\Dot-Hwy\208179 North Kahana BR\PERMITS\1217 404 Permit\Figures\Fig17-FIRM.dwg November 26, 2002 2:53PM

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

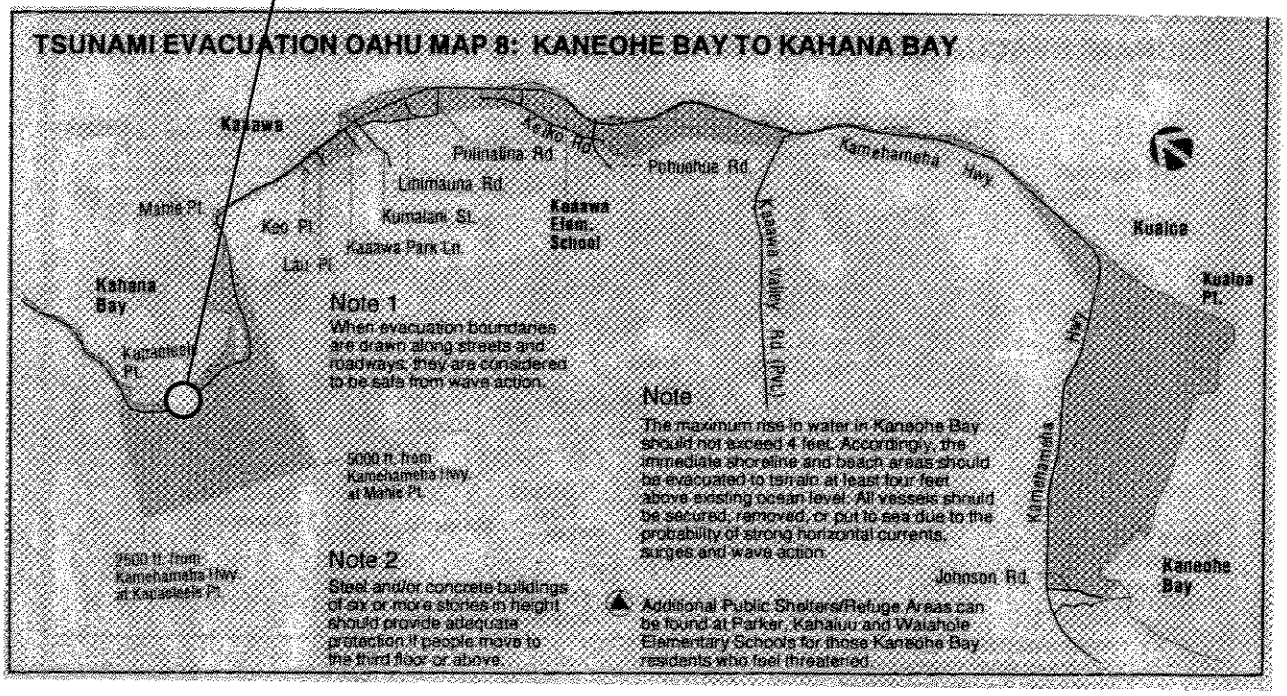
FIGURE 17
FEMA FLOOD INSURANCE RATE MAP



PROJECT LOCATION

NORTH KAHANA BRIDGE

KAHANA, KOOLAULOA, OAHU, HAWAII

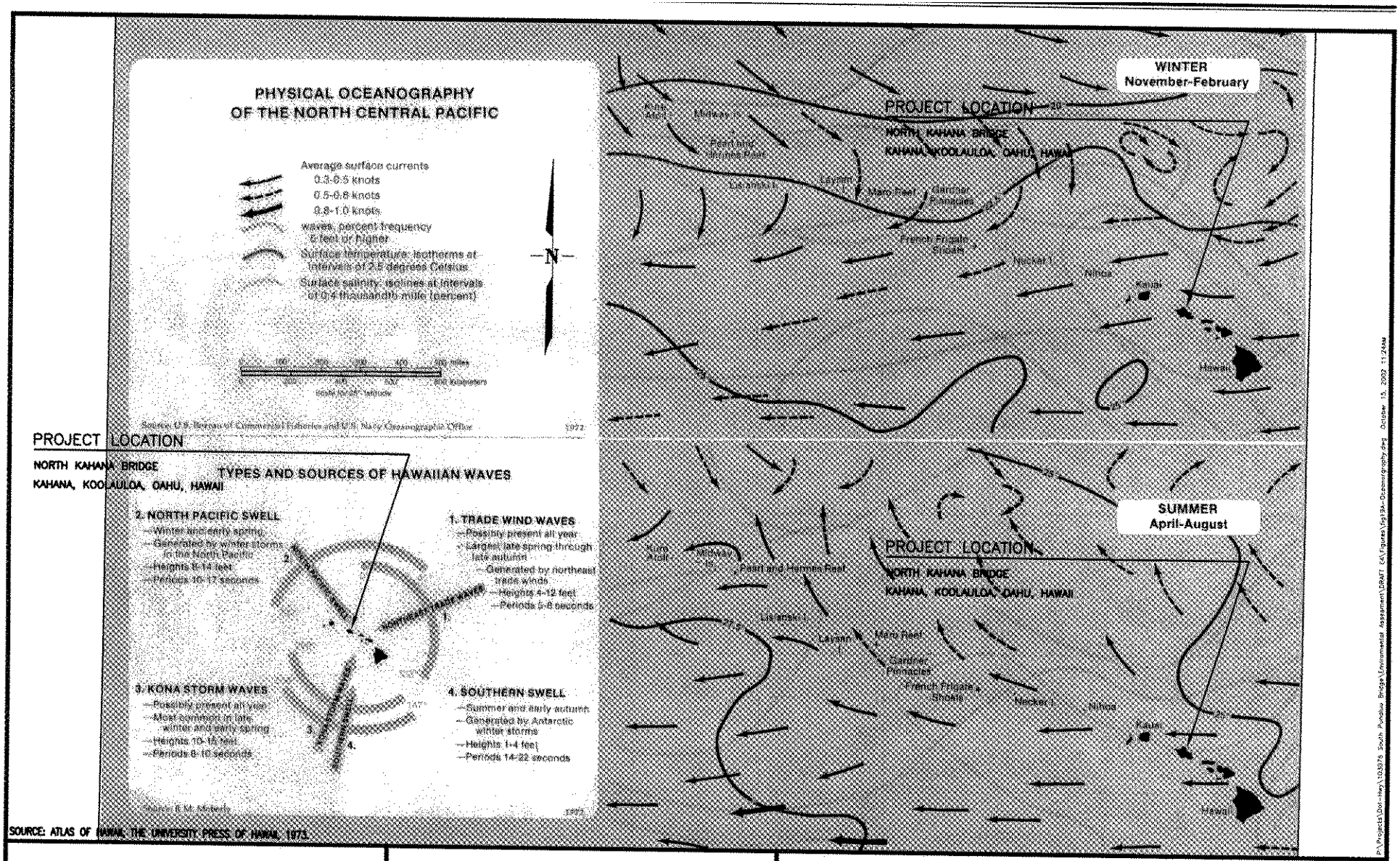


SOURCE: VERIZON HAWAII WHITE PAGES, AUGUST 2001

P:\Projects\Kat-Hwy\100078 South Kunaiu Bridge\Environmental Assessment\DRAFT EA Figures\Fig18--TsunamiEvacuationOahuMap8.dwg October 15, 2002 11:03AM

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII
FIGURE 18
TSUNAMI EVACUATION OAHU MAP 8: KANEOHE BAY TO KAHANA BAY



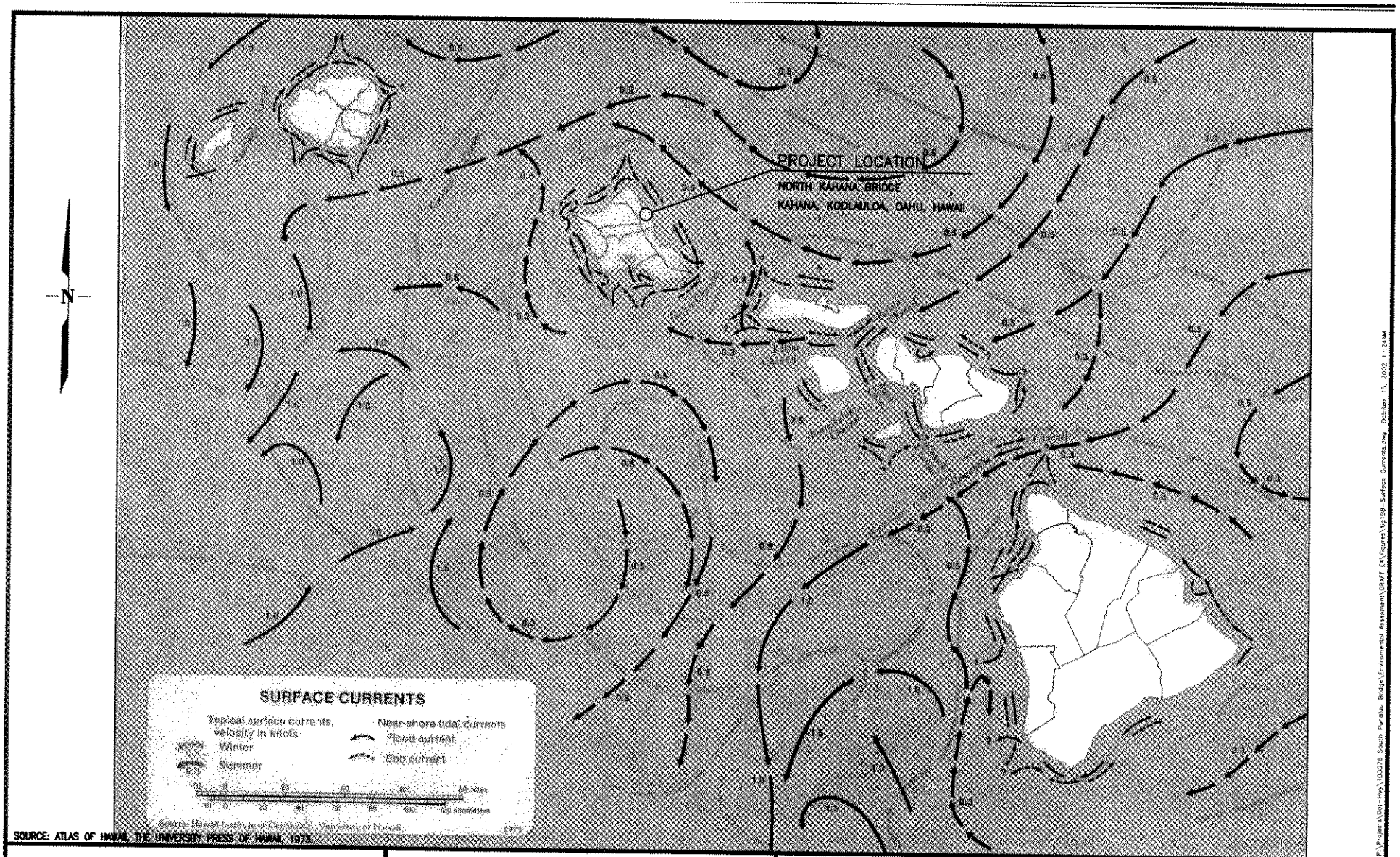
SOURCE: ATLAS OF HAWAII, THE UNIVERSITY PRESS OF HAWAII, 1973.

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION -- HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 19A
SEASONAL OCEAN SURFACE CURRENT MAP 1



M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 19B
SEASONAL OCEAN SURFACE CURRENT MAP 2

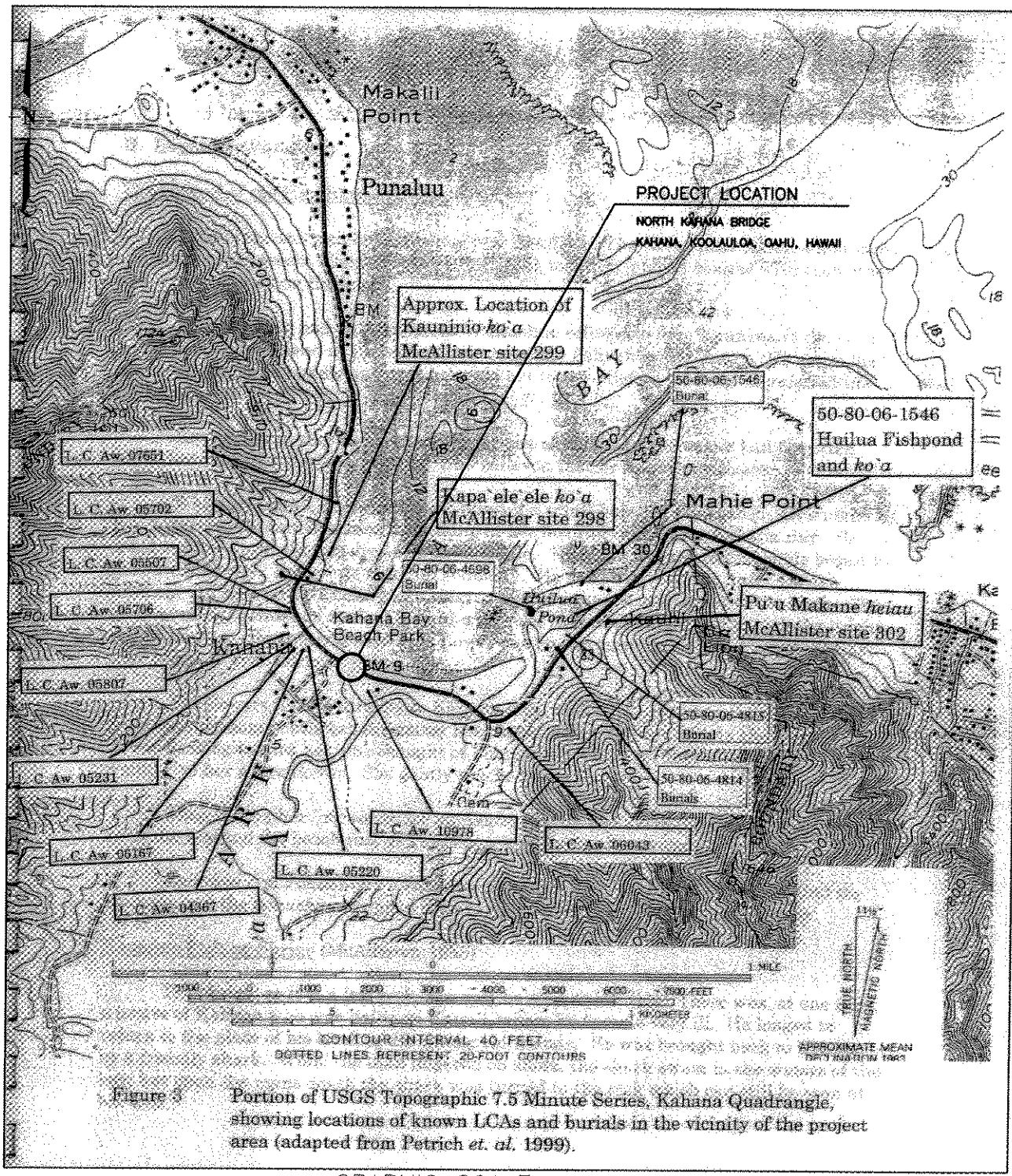


Figure 3 Portion of USGS Topographic 7.5 Minute Series, Kahana Quadrangle, showing locations of known LCAs and burials in the vicinity of the project area (adapted from Petrich *et. al.* 1999).

GRAPHIC SCALE:

2500' 0 2500' 5000'

1" = 2500'

SOURCE: HAMMATT, HALLETT AND SHIDELER, DAVID, ARCHAEOLOGICAL MONITORING PLAN FOR THE KAMEHAMEHA HIGHWAY NORTH KAHNA STREAM BRIDGE REPLACEMENT, JUNE 2002

M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

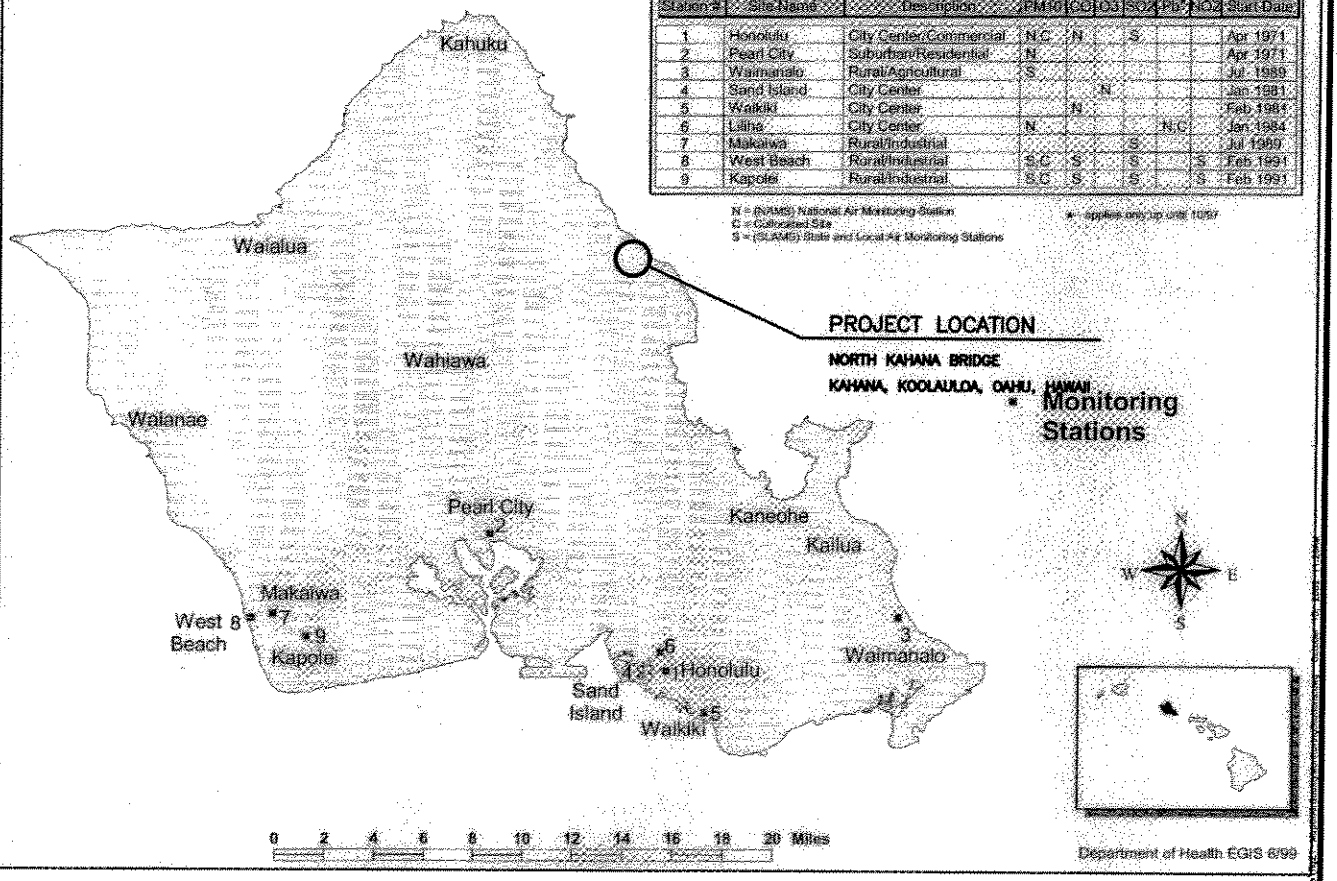
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII
FIGURE 20
MAP OF ARCHAEOLOGICAL SITES AND KULEANA LAND COMMISSION AWARDS

Island of Oahu - Air Quality Monitoring Stations

Station #	Site Name	Description	Station Type: PM10	CO	O3	SO2	Pb	NO2	Start Date
1	Honolulu	City Center/Commercial	N,C	N		S			Apr 1971
2	Pearl City	Suburban/Residential	N						Apr 1971
3	Waimanalo	Rural/Agricultural	S						Jul 1989
4	Sand Island	City Center			N				Jan 1981
5	Waikiki	City Center		N					Feb 1984
6	Lilha	City Center	N				N,C		Jan 1984
7	Makaiwa	Rural/Industrial				S			Jul 1989
8	West Beach	Rural/Industrial	S,C	S		S		S	Feb 1991
9	Kapolei	Rural/Industrial	S,C	S		S		S	Feb 1991

N = (NAMS) National Air Monitoring Station
C = Collocated Site
S = (SLAMS) State and Local Air Monitoring Stations

* applies only up until 1/97



SOURCE: STATE OF HAWAII, DEPARTMENT OF HEALTH, AIR QUALITY MONITORING STATIONS OF THE ISLAND OF OAHU, JUNE 1999.

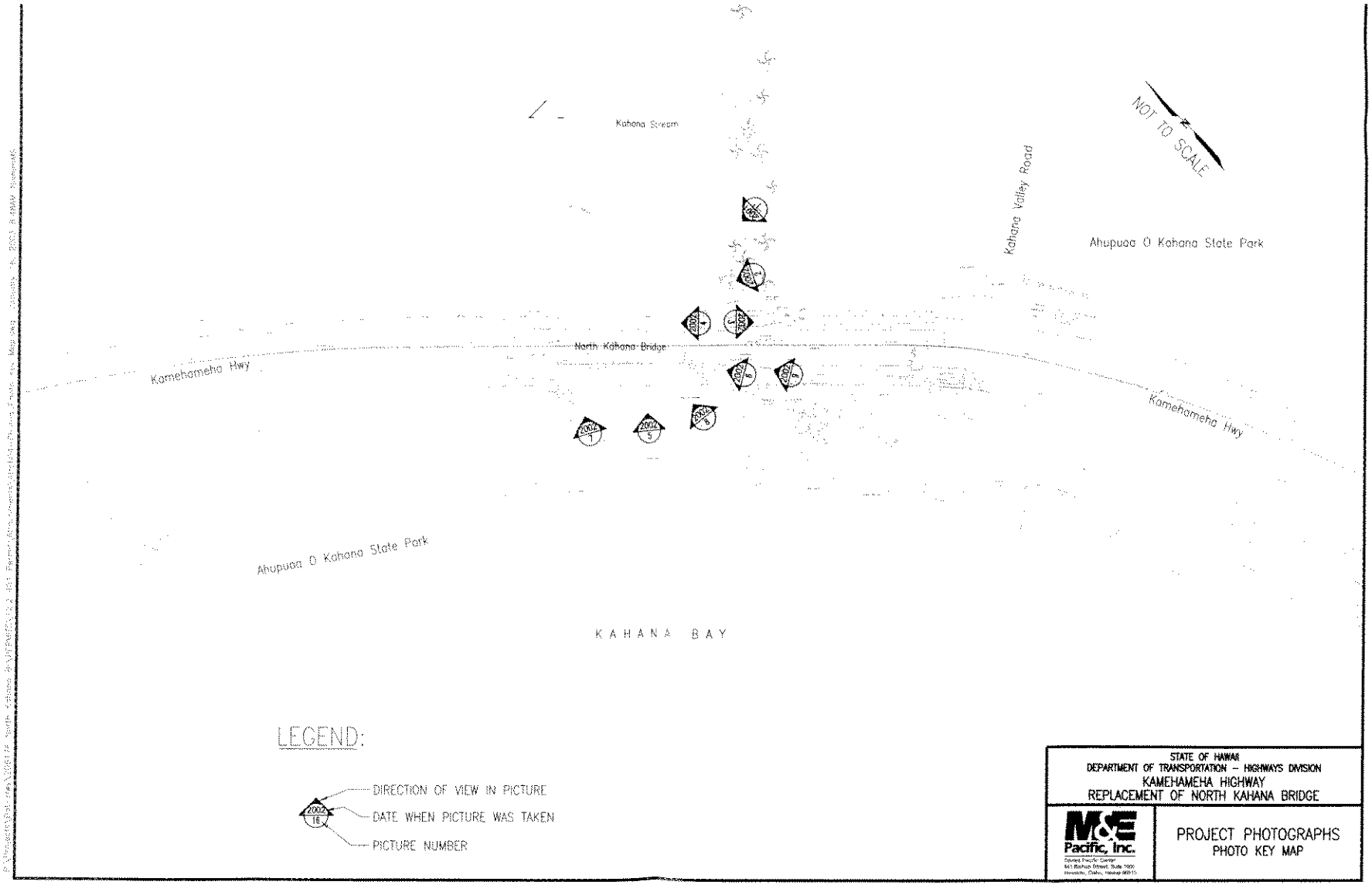
M&E Pacific, Inc.
Bishop Square
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE
KAHANA, KOOLAULOA, OAHU, HAWAII

FIGURE 21
MAP OF AIR QUALITY MONITORING STATIONS – ISLAND OF OAHU

PHOTOS

LIST OF PHOTOS



LEGEND:

2002 / 16 — DIRECTION OF VIEW IN PICTURE; DATE WHEN PICTURE WAS TAKEN; PICTURE NUMBER

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE

M&E Pacific, Inc.
Dillingham Pacific Center
841 Bishop Street, Suite 1600
Honolulu, Oahu, Hawaii 96813

PROJECT PHOTOGRAPHS
PHOTO KEY MAP

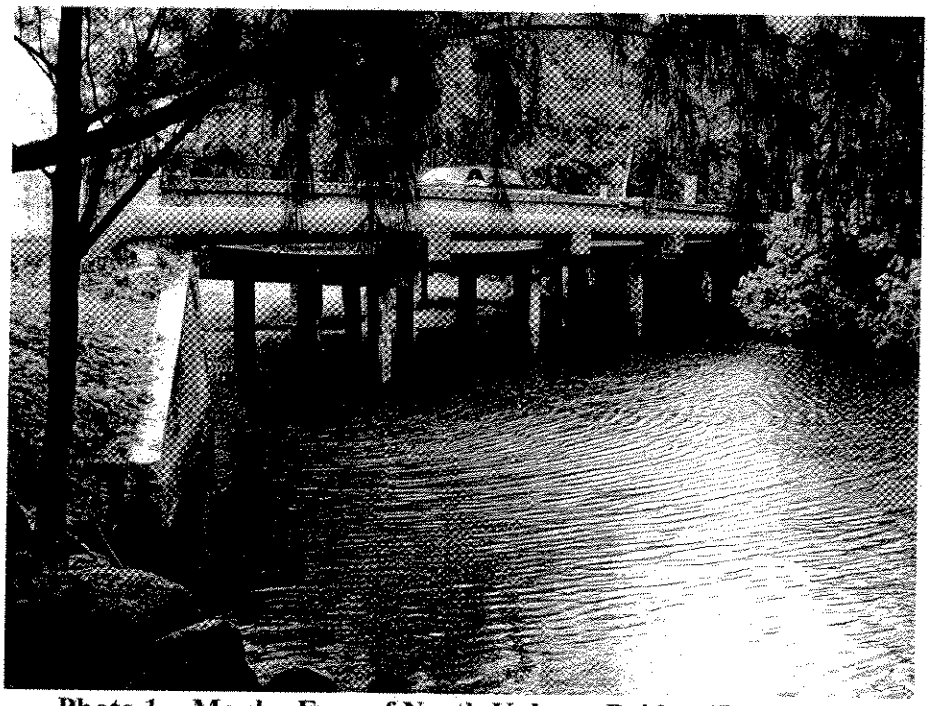


Photo 1—Mauka Face of North Kahana Bridge (June 2002)

Looking downstream upon *mauka* face of North Kahana Bridge. Note lush foliage on sides and *makai* of Kahana Stream, rippled yet seemingly unflowing condition of the stream water, and 20-inch, steel City and County of Honolulu, Board of Water Supply (BWS) pipeline attached along *mauka* edge of bridge.

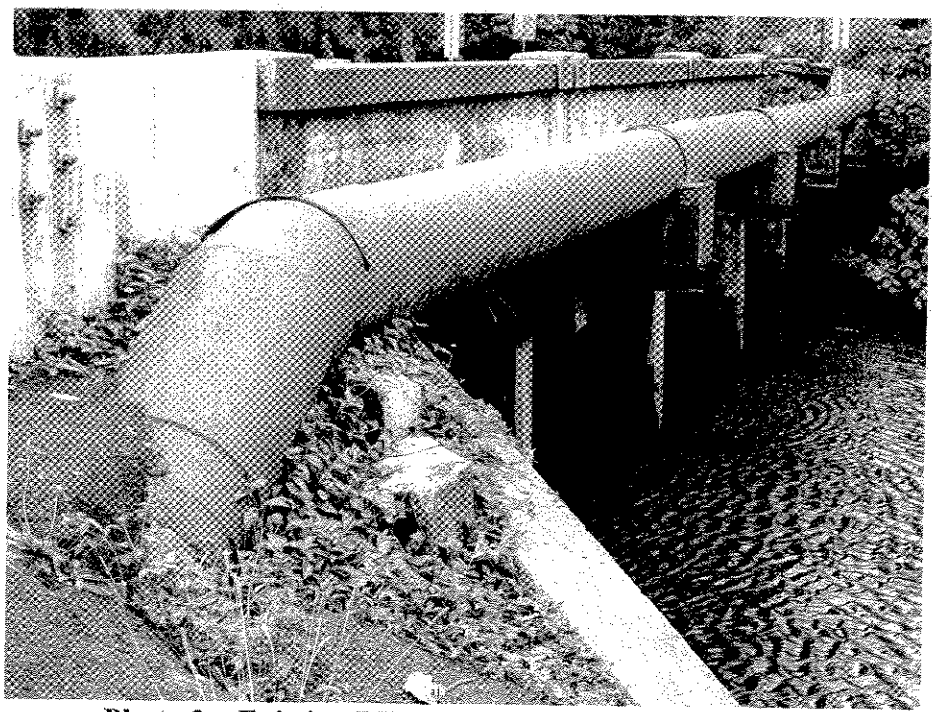


Photo 2—Existing BWS 20″ Water Main (June 2002)

Mauka side of North Kahana Bridge. In foreground, BWS 20″ transmission main to be relocated for the replacement of the bridge.

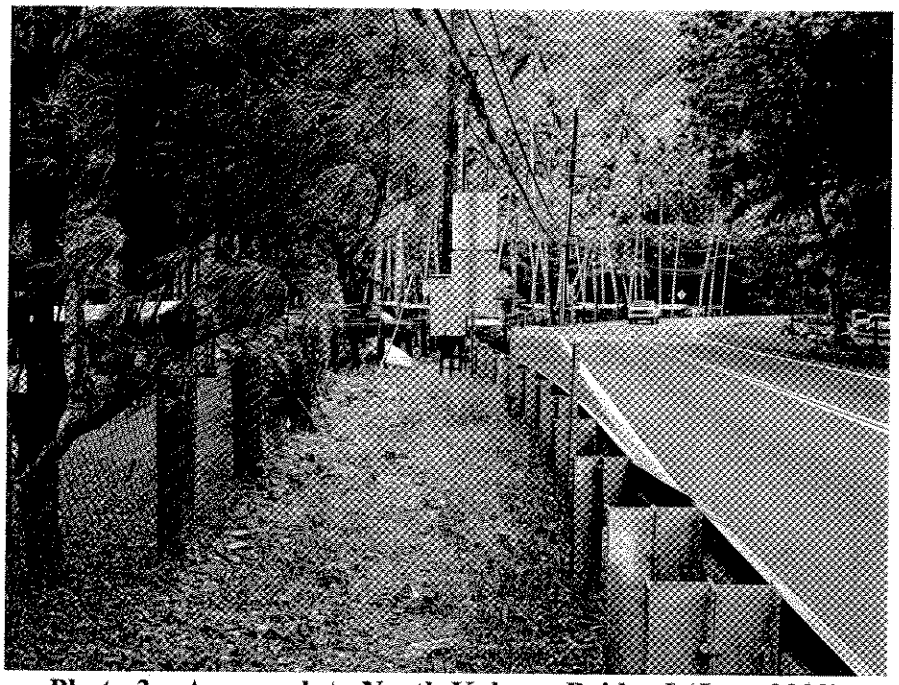


Photo 3—Approach to North Kahana Bridge I (June 2002)
Kamehameha Highway (Route 83). Approach roadway adjoining North Kahana Bridge from the northwest (facing in Punalu'u direction). Ahupuaa O Kahana State Park on the left. and right. Note outward flaring roadway guardrails and lack of established pedestrian walkway.

Photo 4—Approach to North Kahana Bridge II (June 2002)
Kamehameha Highway. Approach roadway adjoining North Kahana Bridge from the southeast (facing in Ka'a'awa direction). Note lush greenery, 20″ BWS water main along *mauka* edge of the bridge, overhead utility poles and streetlights only on the *mauka* side of Route 83.

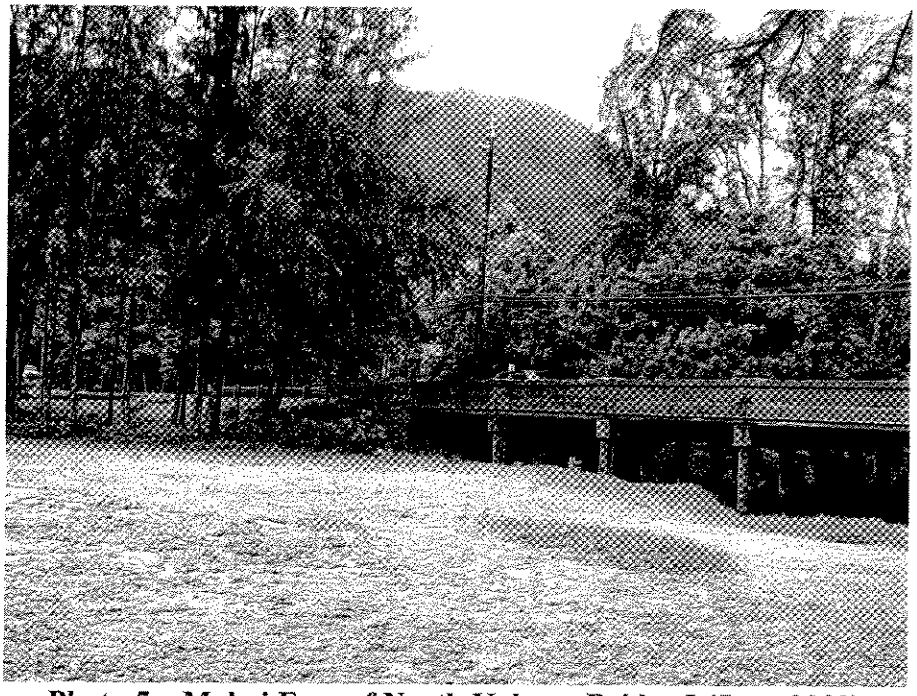


Photo 5—Makai Face of North Kahana Bridge I (June 2002)
Area *makai* (downstream) of North Kahana Bridge. Note berm in foreground with groundcover that separates the northern fork of Kahana Stream (Class 1b Inland Water—Impaired Stream), which the bridge crosses, and Kahana Bay (Class AA Marine Water).

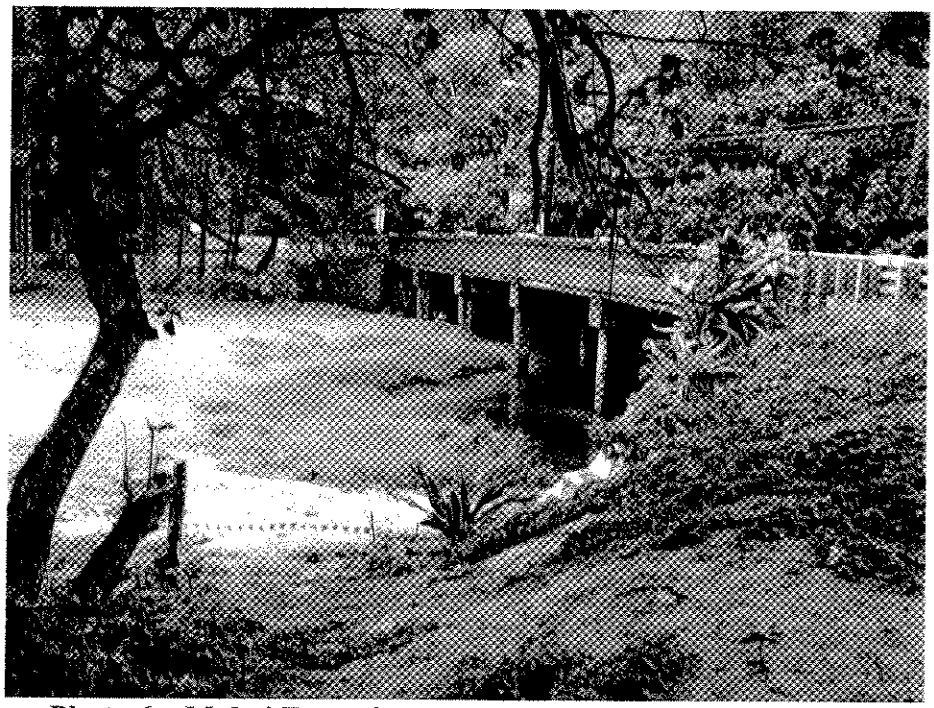


Photo 6—Makai Face of North Kahana Bridge II (June 2002)
Area *makai* of North Kahana Bridge. Note the standing stream water beneath the bridge due to the sand/earthen berm between the bridge and the ocean, and the lush greenery of the downstream and surrounding environment.

Photo 7—Piles and Beam (June 2002)

Concrete piles and supports beneath North Kahana Bridge. Facing *mauka*. Note sandy stream bed, standing condition of stream water, surrounding greenery, aged condition of bridge structures, and watermarks on piles from times of higher stream flow.

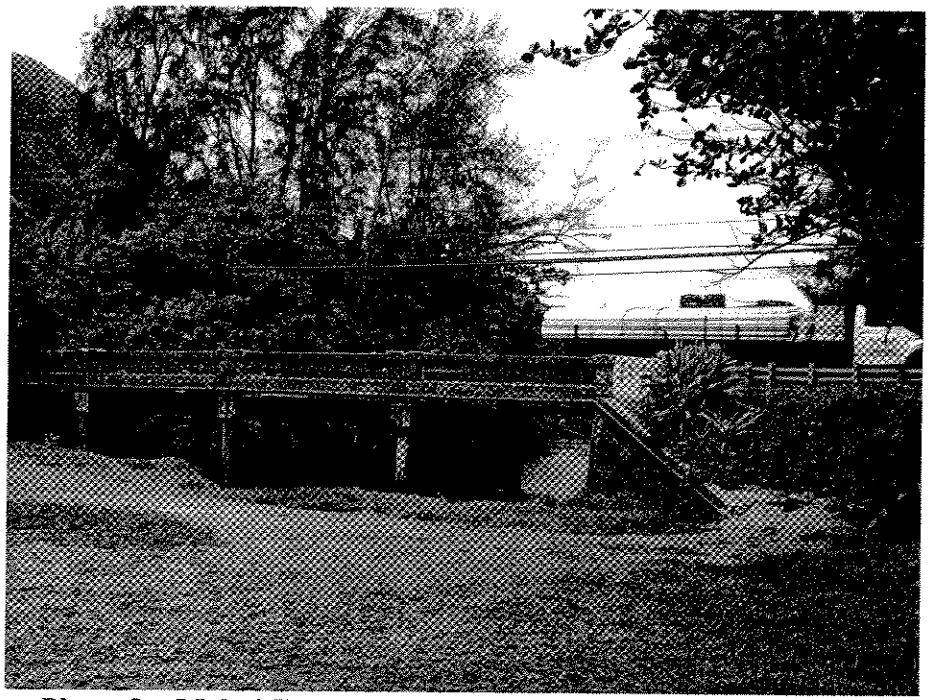


Photo 8—Makai Face of North Kahana Bridge III (June 2002)

Facing *mauka* upon the *makai* face of North Kahana Bridge. Note the lush greenery of the downstream and surrounding environments, the sand/earthen berm that separates the stream from the ocean, standing stream water in the background, retaining wall-type bridge abutment that lacks any form of pedestrian access, and large truck typical of travel over the bridge.

Photo 9—Kamehameha Highway Towards Kāne'ohe (June 2002)

Kamehameha Highway atop North Kahana Bridge. Facing toward Ka'a'awa. Note lush greenery, aged and weathered condition of the bridge, damaged condition of the bridge approach roadway guardrail in the foreground, overhead utility poles and streetlights only on the *mauka* side of Route 83, and lack of established pedestrian access along the highway and across the bridge.

APPENDIX A

NHPA Section 106 Base Investigatory Letter

APPENDICES

LIST OF APPENDICES

November 1, 2004

«Company»
«Title» «FirstName» «LastName»
«JobTitle»
«Address1»
«Address2»
«City», «State» «PostalCode»

Re: Request for Public Feedback and Consultation in Compliance with NHPA Section 106
Kamehameha Highway, Replacement of North Kahana Bridge, O'ahu, Hawai'i
Federal Aid Number 83D-01-01

Dear «Title» «FirstName» «LastName»:

The State of Hawai'i, Department of Transportation (DOT), Highways Division (Hwy) is proposing to replace the existing North Kahana Bridge located on Kamehameha Highway, near the Kahana Valley State Park entrance in the district of Ko'olauloa, O'ahu, Hawai'i. The bridge is situated at the estuary formed between Kahana Stream and the Pacific Ocean and is an integral part of Kamehameha Highway, which serves as the sole thoroughfare linking coastal communities on the northeastern portion of the Island. A location map has been enclosed with this letter for clarity as Attachment 1.

Based on the guidelines in the FHWA "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges" the existing North Kahana Stream Bridge has a Sufficiency Rating of 30 and is eligible for replacement under the FHWA Highway Bridge Replacement and Rehabilitation Program. The project involves the construction of a temporary bypass bridge across Kahana Stream and the replacement of the existing deteriorating bridge with a new bridge that provides a shielded bike/pathway and meets all government agency design requirements and regulations. A conceptual plan sketch of the proposed project is enclosed for reference with this letter as Attachment 2. The proposed replacement bridge will drastically increase the safety for all Kamehameha Highway users.

This project is partially funded by the Federal government and requires the preparation of an Environmental Assessment (EA). An EA is currently being developed for the project.

The following Tax Map Key numbers encompass the project site or might be affected by the construction work.

State of Hawai'i, 1st Division (O'ahu): 5-2-02:001 5-2-05:003

At this early stage in project development, we are evaluating the opinions and concerns of the public surrounding the aforementioned project. We are in the process of discerning whether the project will affect any historic or cultural properties as outlined by Section 106 of the National Historic Preservation Act of 1966 (NHPA). Please respond within thirty (30) days of the date of this letter to express concerns or interests you may have in the proposed project. Please include any or all of the following information:

- Any historic or cultural properties that may be affected by this project;
- Whether you are interested in becoming a consultant on historic or cultural properties for the proposed project; and
- Any other individuals, families, groups or organizations that may have concerns or interests regarding the proposed project.

We appreciate your review of the subject material and any subsequent development and submittal of opinions or comments. Should you know of any other individual or organization that might be knowledgeable or provide concerns regarding this project or if any questions develop, please contact Mr. Dean Takiguchi, Project Manager, at 692-7614, Bridge Design Branch, Highways Division.

Very truly yours,

GLENN M. YASUI
Administrator
Highways Division

Enclosures: (1) Attachment 1—Project Location Map
(2) Attachment 2—Conceptual Project Plan

bc: M & E Pacific, Inc. (M. Nishimura)
HWY—DS (DT)

APPENDIX B

NHPA Section 106 Investigatory Letter Database of Addresses

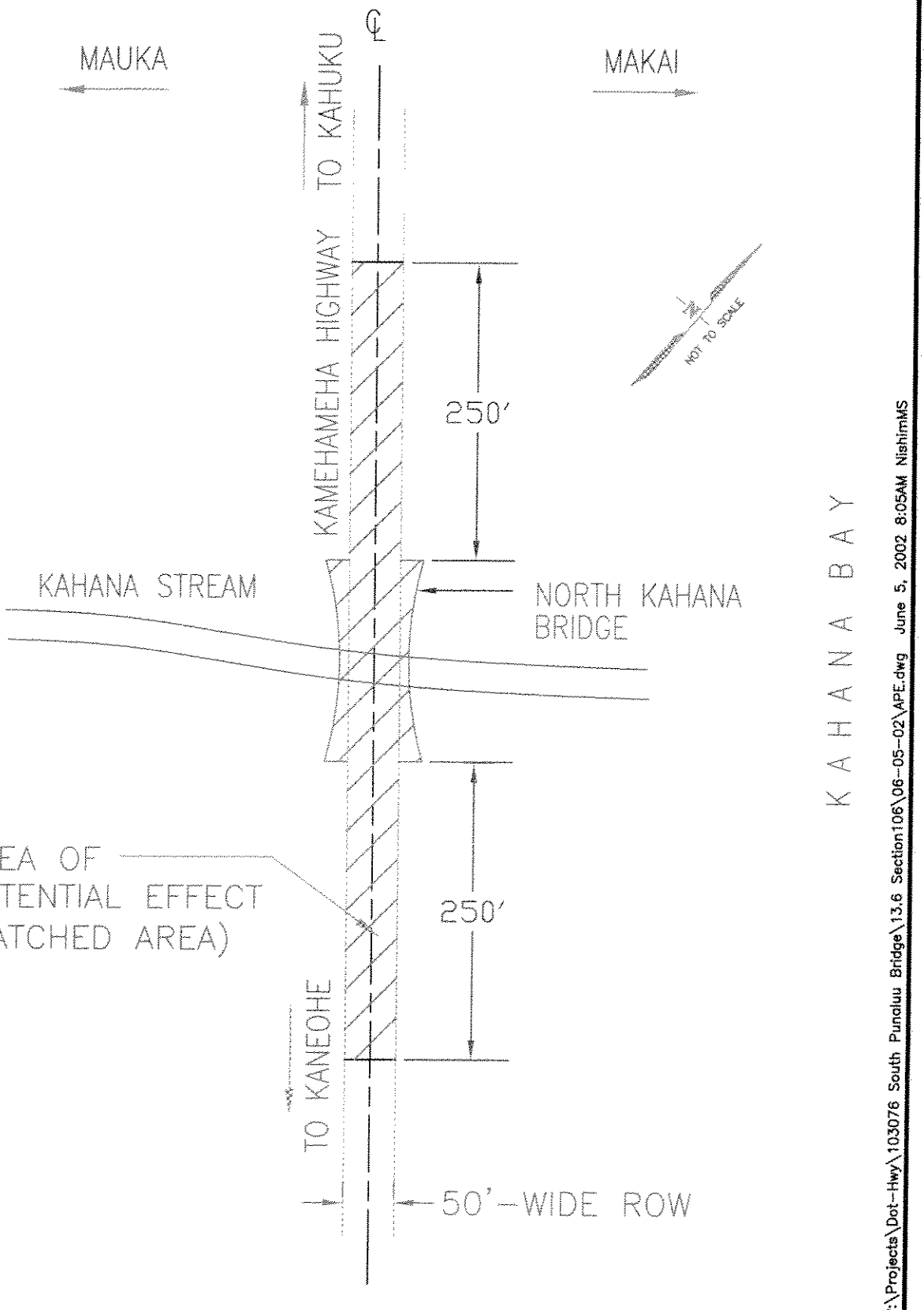
Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
Ms.	Mary Ann	Hutchinson	Pelekikena (President)	ʻAhahui Kaʻahumanu Society Chapter I—Honolulu	Post Office Box 2809		Honolulu	HI	96803
Mr.	Charlie	Rose	Pelekikena (President)	Association of Hawaiian Civic Clubs	Post Office Box 1135		Honolulu	HI	96807
Ms.	Sandi L.	Halualani	Office Manager	Bernice Pauahi Bishop Museum	Native Hawaiian Culture & Arts Program	1525 Bernice Street	Honolulu	HI	96817-2704
The Honorable	Steve	Holmes	Chair	City and County of Honolulu City Council	Honolulu Hale Room 202	530 South King Street	Honolulu	HI	96813
Ms.	MaryAnne	Long	Chair	City and County of Honolulu Koʻolauloa Neighborhood Board Number 28	Post Office Box 418		Hauʻula	HI	96717
Dr.	Chiyome Leinaʻala	Fukino	President	E Ola Mau	1329 Lusitana Street	Suite 704	Honolulu	HI	96813
Ms.	Corinne	Chun Fujimoto	Curator	The Friends of ʻIolani Palace	Post Office Box 2259		Honolulu	HI	96804
Mr.	Hailana	Farden	Ikū Haʻi / ʻAhahui Poʻo	Hale O Na Aliʻi ʻO Hawaiʻi	608D Judd Street		Honolulu	HI	96817
Ms.	Leona	Tupou	Pelekikena (President)	Hauʻula Community Association	Post Office Box 264		Hauʻula	HI	96717
Ms.	Barbara E.	Dunn	Administrative Director	Hawaiian Historical Society	560 Kawaiahaʻo Street		Honolulu	HI	96813
Mr.	David	Scott	Executive Director	Historic Hawaiʻi Foundation	Post Office Box 1658		Honolulu	HI	96806
Mr.	Kunani	Nihipali	Poʻo	Hui Mālama I Nā Kūpuna ʻO Hawaiʻi Nei	Post Office Box 190		Haleʻiwa	HI	96712
Mr.	Joe I. K.	Kamalu	Founder	Hui ʻO Aikāne	1723-A Lehua Street		Honolulu	HI	96819
Dr./Ms.	Debbie/DeeDee	Hilweh/Letts	Pelekikena (President)	Kaʻaʻawa Community Association	Post Office Box 620		Kaʻaʻawa	HI	96730
Ms.	Jolene	Peapeaʻale	Pelekikena (President)	Kahana Community Association	Post Office Box 163		Kaʻaʻawa	HI	96730
Ms.	Kawaikaulaʻau	Aona-Ueoka	Managing Director	Kapa Aloha Perpetuation Association (KAPA)	Post Office Box 20		Kaʻaʻawa	HI	96730

Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
Ms.	Cathleen Pi'ilani	Mattoon	Pelekikena (President)	Ko'olauloa Hawaiian Civic Club	Post Office Box 532		Hau'ula	HI	96717
Ms.	Annette	Ostrem	Chair	Ko'olauloa Interagency Community Council	56-490 Kamehameha Highway		Kahuku	HI	96731
Ms.	Elizabeth Ho'oipo	Pa Martin	Executive Director	Native Hawaiian Advisory Council	417H Uluniu Street		Kailua	HI	96734
Ms.	Mahealani	Kamau'u	Executive Director	Native Hawaiian Legal Corporation	1164 Bishop Street	Suite 1205	Honolulu	HI	96813
Ms.	Danielle Ululani	Beirne	Pelekikena (President)	Native Hawaiian Protocol & Consultant Service	Post Office Box 653		Kāne'ohe	HI	96744
Mr.	A. Van Horn	Diamond	Chair	O'ahu Island Burial Council	c/o SHPD Kakuhihewa Building Room 555	601 Kamokila Boulevard	Kapolei	HI	96707
Mr.	David	Mikonczyk	Pelekikena (President)	Punalu'u Community Association	Post Office Box 239		Hau'ula	HI	96717
Mr.	Wally	Lau	Ku'auhau Nui	Royal Order of Kamehameha I	Post Office Box 30681		Honolulu	HI	96820
Ms.	Betty K.	Jenkins	Pelekihena (President)	Royal Order of Kamehameha I Women's Auxiliary Chapter I	Post Office Box 758		Waialua	HI	96741
Ms.	Keahi	Allen	Executive Director	State Council on Hawaiian Heritage	Post Office Box 25142		Honolulu	HI	96825
Mr.	Raynard C.	Soon	Chairman	State of Hawai'i Department of Hawaiian Home Lands	Post Office Box 1879		Honolulu	HI	96805
Mr.	Dan	Quinn	Administrator	State of Hawai'i Department of Land and Natural Resources Division of State Parks	Post Office Box 621		Honolulu	HI	96809
Ms.	Dierdre	Mamiya	Administrator	State of Hawai'i Department of Land and Natural Resources Land Division O'ahu District Land Office	1151 Punchbowl Street	Room 220	Honolulu	HI	96813

Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
Mr.	Kai	Markell	Director of Burial Sites Program	Mr. Don Hibbard, Administrator State of Hawai'i Department of Land and Natural Resources, State Historic Preservation Division	Kakuhihewa Building Room 555	601 Kamokila Boulevard	Kapolei	HI	96707
The Honorable	Colleen	Meyer	State House Representative, Assistant Minority Leader	State of Hawai'i Hawai'i State Legislature House of Representatives 46th Representative District	Hawai'i State Capitol Room 333	415 South Beretania Street	Honolulu	HI	96813
The Honorable	Bob	Nakata	State Senator	State of Hawai'i Hawai'i State Legislature Senate 23rd Senatorial District	Hawai'i State Capitol Room 231	415 South Beretania Street	Honolulu	HI	96813
Mr.	Ronald	Mun	Deputy Administrator	Mr. Clyde Nomo'o, Administrator State of Hawai'i, Office of Hawaiian Affairs Office of the Administrator	711 Kapi'olani Boulevard	Suite 500	Honolulu	HI	96813
			Pelekikena (President)	Wāiahole Community Association c/o City and County of Honolulu Ko'olauloa Neighborhood Board Number 28	Post Office Box 418		Hau'ula	HI	96717
			Pelekikena (President)	Waikāne Community Association c/o City and County of Honolulu Ko'olauloa Neighborhood Board Number 28	Post Office Box 418		Hau'ula	HI	96717

APPENDIX C

NHPA Section 106 Area of Potential Affects



P:\Projects\Dot-Hwy\103076 South Punaluu Bridge\13.6 Section106\06-05-02\APE.dwg June 5, 2002 8:05AM NishimMS

Appendix

C

KAMEHAMEHA HIGHWAY
REPLACEMENT OF NORTH KAHANA BRIDGE

AREA OF POTENTIAL EFFECT

APPENDIX D

Archaeological Monitoring Report

and "No Adverse Effect" Determination Letter from the SHPD

ARCHAEOLOGICAL MONITORING PLAN FOR THE KAMEHAMEHA HIGHWAY NORTH KAHANA STREAM BRIDGE REPLACEMENT KAHANA *AHUPUA`A*, KO`OLAULOA DISTRICT, ISLAND OF O`AHU (TMK: 5-2-05-3 AND 5-2-02-1)

by

Melanie M. Mann, B.A.,

David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.

Prepared for

M & E Pacific, Inc.

Cultural Surveys Hawai`i, Inc.

July 2003

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

A. Project Description

At the request of M and E Pacific, Inc., Cultural Surveys Hawai`i, Inc. has prepared this archaeological monitoring plan for the Kamehameha Highway, North Kahana Stream Bridge Replacement Project, Kahana *Ahupua`a*, Ko`olauloa District, Island of O`ahu (TMK: 5-2-05-3 and 5-2-02-1) (Figures 1 and 2). Proposed construction activities include the demolition and replacement of the existing North Kahana Stream Bridge, roadway rehabilitation, shoulder improvements, and relocating utilities such as the existing waterline crossing. The existing bridge was built in 1927, and is a five span continuous slab bridge with a total bridge length of 92 ft. Construction of the new replacement bridge will meet or exceed current State and Federal design regulations, and further include the installation of ADA compliant pedestrian and bike pathways, which are currently nonexistent. In order to minimize delays to traffic, the project shall include a temporary detour road with a stream crossing on either the *mauka* or *makai* side of the existing bridge.

B. Project Area Description

The project area is located on Kamehameha Highway (Route 83), between milepost 26.35 and 26.39, near the entrance to Kahana Valley State Park (TMK: 5-2-05-3 and 5-2-02-1). The existing North Kahana Stream Bridge is bounded on all sides by Kahana Valley State Park under the jurisdiction of the State of Hawaii, Department of Land and Natural Resources, State Parks Division. Lands seaward of Kamehameha Highway were owned by the City and County until circa 1992 when, as part of a parks exchange, these lands were transfered to State Parks.

The bridge crosses the smaller northwestern drainage of Kahana Stream. Kahana Stream is a perennial stream with a daily mean flow of about 27 cfs. (based on USGS data for 37 years of record)(DOT *Final Project Assessment Report* 2000). The North Kahana Stream Bridge is located on one of two major outlets for Kahana Stream with the other outlet being crossed by the South Kahana Stream Bridge. Annual rainfall average in the project area is 60-80 inches for the coastal Kahana project area (Juvik and Juvik 1998: 56). The rainfall gradient rises markedly reaching 240 inches at the Ko`olau Range summit approximately 5 kilometers to the southwest.

Vegetation consists of introduced species exclusively, as vegetation in the entire project area has been modified during the construction of the highway and the Kahana Valley State Park facilities. On the *makai* side of the highway and bridge is a large grove of ironwood trees (*Casuarina equisetifolia*). On both sides of the bridge, *hau* (*Hibiscus tiliaceus*) thickets exist along the water edges. Various exotic grasses grow in the immediate vicinity.

The project area soil is exclusively Jaucus (JaC), pale to very pale brown single grain sand (Foote *et al.* 1972). It occurs in areas usually not exceeding 7% in slope. Permeability is rapid, with very slow to slow runoff. Wind erosion can be severe, though water erosion hazard is slight. Sand deposits have been shown to contain human burials and cultural deposits throughout the Hawaiian Islands.

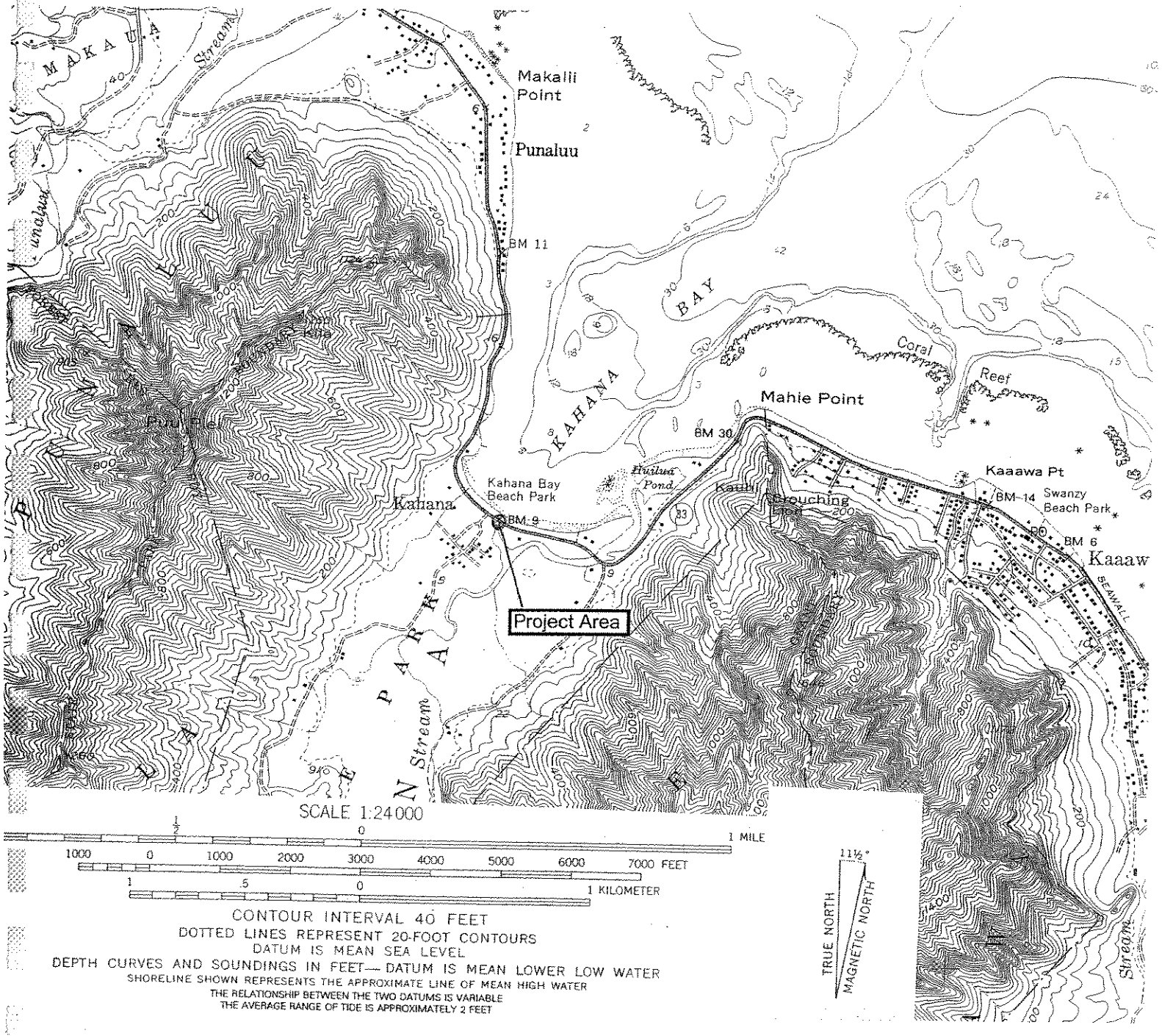


Figure 1 Portion of USGS Topographic Map, Kahana Quadrangle, Showing Project Area.

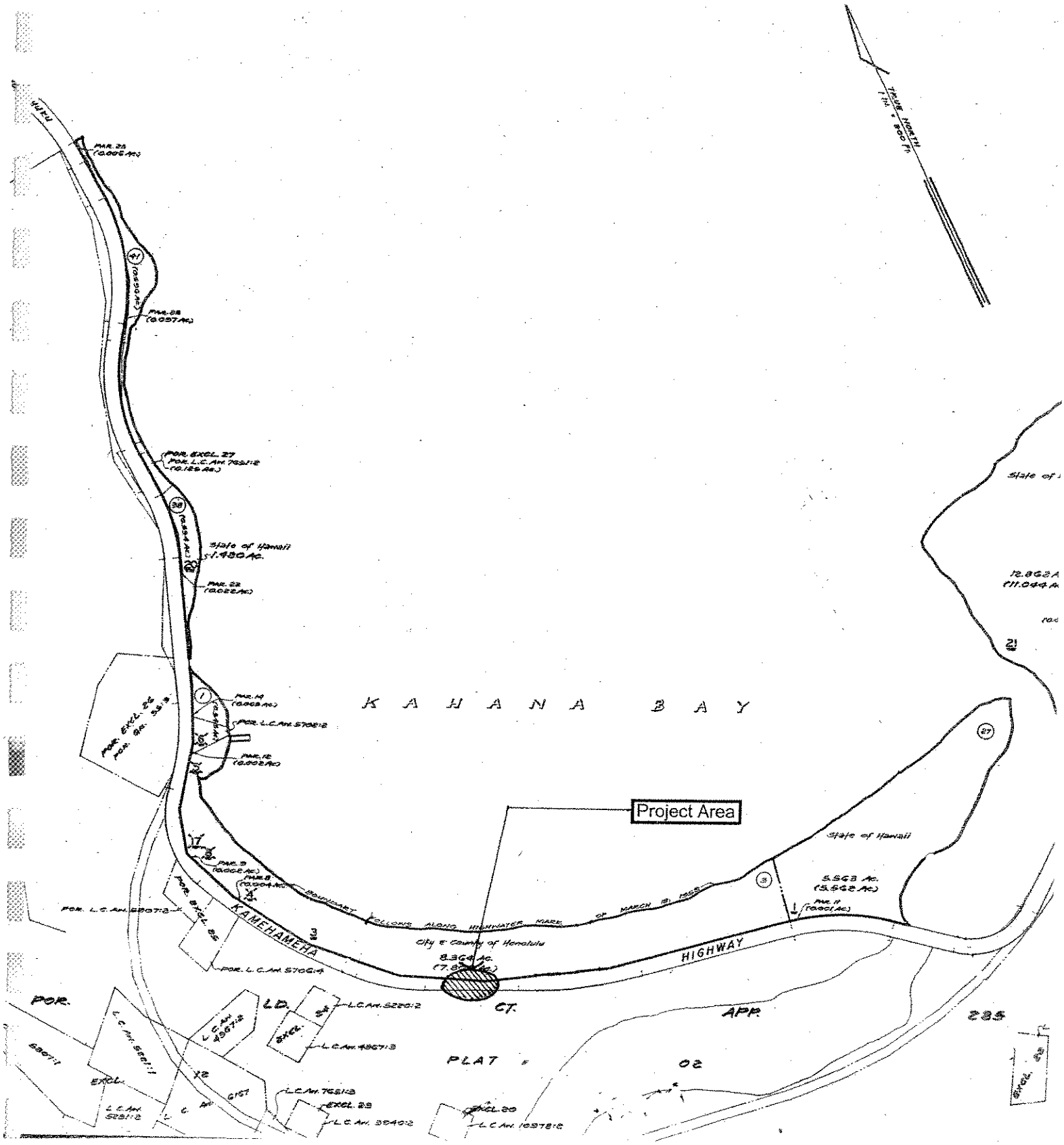


Figure 2 Portion of Tax Map 5-2-05, Showing Project Area.

II. CULTURAL AND HISTORICAL DOCUMENTATION

A. Pre-Contact to 1800

It is likely that this Ko`olau region of O`ahu was settled early and was an area of dense population (Handy & Handy 1972:271). Kirch (1985:69) comments that:

> For the early Polynesians with their mixed horticultural and fishery subsistence base, the windward O`ahu valleys were an ideal locus in which to establish permanent settlements.

Elspeth Sterling (1978) describes the vicinity of the project area as follows:

> Nearer the sea, a group of small terraces, apparently watered by springs, is under cultivation between the highway and the mountain east of Huilua Fishpond. From this point up the mouth of the valley for some distance there appear to be terrace flats under the guava and remains of cane plantings. Along the base of the western side of the valley, from a quarter to a half mile up from the sea, the old terraced levels are plainly marked under the grass and cut cane (Sterling and Summers, 1978).

A sand dune locality near Huilua fishpond along the eastern shore of Kahana Bay (State Site 50-80-06-1546) appears to date back to the eighth century (Hommon & Bevacqua 1973).

It is believed that Kahana supported a substantial permanent population and served as a center for economic, social, political, and religious activities (Yent 1992:1). It is proposed that in pre-contact to early historic times, agriculture was not extensive on Kahana's alluvial plain, perhaps due to susceptibility to flooding. It is also suggested that the low-gradient of the alluvial plain impaired the flow of water and was not suitable for taro cultivation. Rather, much of the agriculture was located further up the valley.

B. 1800 - 1900

After contact with Europeans, the population in the districts of Ko`olauloa and Ko`olaupoko underwent dramatic changes (Handy & Handy 1972:271). These changes were brought about in response to various factors such as: attrition due to disease, out-migration to urban centers such as Honolulu, and in-migration of foreign agricultural laborers.

Missionary records place the population of the entire Ko`olauloa district at 2,891 in 1832 (Schmitt 1977:12). With only one exception (between years 1866 and 1872), the population decreased from one census year to the next to a low of 1,082 persons recorded in 1878 (*Ibid.*:13). This trend was reversed, however, beginning in the year 1884, whereafter the population of Ko`olauloa continued to rise (with one exception between 1930 and 1940) to a peak total of 10,562 persons in 1970 (*Ibid.*:14).

During historic times, the sandy coastal areas were used for *`uala* (sweet potato) cultivation (Yent 1992:8).

C. *Māhele* Records

Māhele era (*ca.* AD 1850) data provide valuable information regarding pre-contact settlement patters and land use, as well as detailed patterns from the mid-1800s. Within 100 m of Kahana Bay, a total of 11 *kuleana* Land Commission Awards (LCAs) were granted, six of which were immediately adjacent to Kamehameha Highway near the project area. The majority of the coastal LCAs are situated *mauka* (north and west) of the highway, further inland. The sheer number of LCAs in proximity to the project area suggests substantial habitation and settlement close to the coast.

Kuleana claim, LCA 5706, awarded to Kuamoo, is shown here as a representative sample of what LCAs in the Kahana Valley area were being utilized for:

> No. 5706 Kuamoo
>
> To the Land Commissioners, Greetings: I hereby state my claim for land in the *'Ili* of *ahupua`a* of Kahana, District 5, Ko`olauloa, Island of O`ahu. There are six taro *lo`i*, seven weed-grown *lo`i*, four *kula*, one *muliwai*, one house site. One *kula* adjoins the *`Ili* of Pahoa[.] One *lo`i* and one *kula* adjoin Loikee. That is my petition on this 10th day of January, 1848. It is a true right from the *Konohiki*.
> KUAMOO X, his mark
> Kahana, January 10, 1848

Table 1 following summarizes the LCAs in the vicinity of the Kahana Bridge project area Figures 2 & 3 show the location of LCAs in the vicinity):

Table 1: LCAs in the vicinity of the Kahana Bridge project area

LCA #	Claimant	`Ili	Land Use	Landscape feature(s)	Amt.
4367	Kekui	Kaloa Kepahu	7 *lo`i* & fish pond (2 pieces), 1 *kula* (potato),house site (1 house); wooded *kula*	stream	2 ap.; 3.94 Acs. 2 ap.; 0.35 Ac.
5220	Kapapa		1 *lo`i*, & 1 house site in 2 *kula* pieces	*pali*	2 ap.; 5.2 Acs.
5231	Kapena	Kukaa Hanakukai	10 *lo`i* in 2 pieces *kula*	path, ditch *pali*, ditch, scatter lands consolidated for claims	2 ap.; 1.55 Acs.
5702	Kukuholahola/ Kukuiholahola		11 *lo`i*, 1 *kula*, 1 house site (1 house)		2 ap.; 2.65 Acs.
5706	Kuamoo	Pahoa 1 Loikee	6 *lo`i*, 4 *kula*, *muliwai*, 1 house site	road, bridge, *`auwai*	
5807	Aiawahia/ Kaiawahia		9 *lo`i*, 1 or 4 *kula* (potato), 1 house site (2 houses) one *wai o`opu*	wooden fence	3 ap.; 4.67 Acs.
6043	Aiohi	Nomokunui	4 or 5 *lo`i*, 1 *kula* house site (1 house) *makai*	stone wall, stream	2 ap.; 2.1 Acs.
6167 & 6067	Hooliliamanu		2 *lo`i* in 2 pieces, 1 house site (2 houses)	next to house	1 ap.; 2.1 Acs.
7651	Kalauuhina	Kapaele`ele	5 *lo`i* in 2 pieces, 2 *kula*, 1 house site	sea beach	3 ap.; 2.725 Acs.
10978	Wahea		7 *lo`i* (names adj. *`ili*), *kula*, 1 house site (1 house)	watercourse	2 ap.; 2.59 Acs.

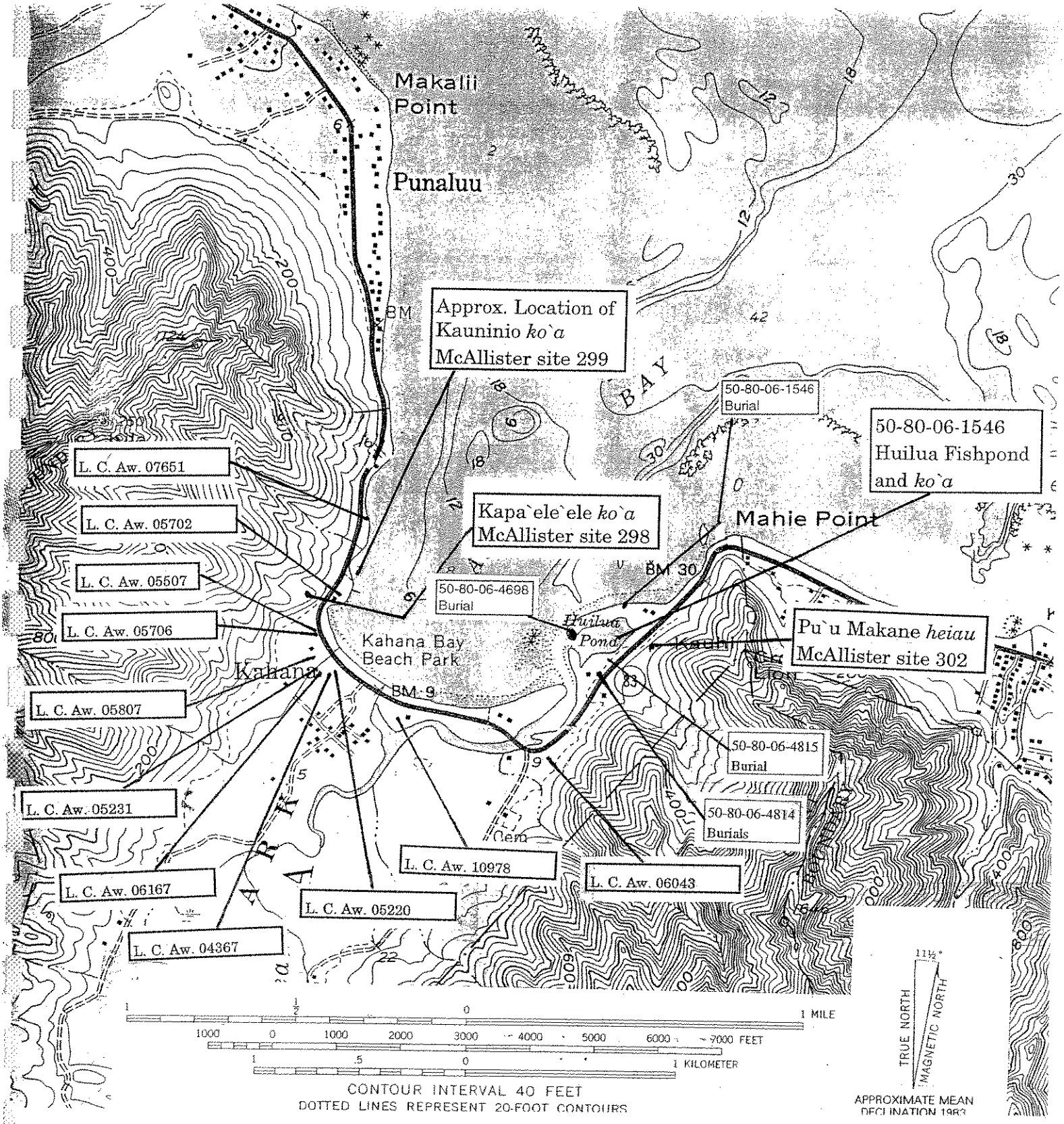


Figure 3 Portion of USGS Topographic 7.5 Minute Series, Kahana Quadrangle, showing locations of known LCAs and burials in the vicinity of the project area (adapted from Petrich *et. al.* 1999).

D. Legends (Folklore)

The Legend of the Hau Blossom (Alameida, 1997)

This is the story about Pohuehue and Kaunaoa. They lived near Kahana and loved each other very much. They always went fishing together, played *konane* with each other, and took walks along the beach.

One day they had an arguement. Pohuehue refused to take Kaunaoa to the *hula ho`ike* of her best friend in the village that evening. Pohuehue was angry. He got in his canoe and began to paddle as far as he could out to sea. Before too long, he reached the island of Lana`i.

Kaunaoa was very sad. After many years she thought Pohuehue had forgotten about her. But she waited patiently. She believed that he would return soon.

While on Lana`i, Pohuehue built himself a small *hale* near the beach. One night he had a dream. He saw Kaunaoa swimming in her favorite beach near Kahana Bay. He could see her dark, shining eyes and sweet smile. Then her warm face and smile began to fade away slowly. Pohuehue woke up suddenly. He looked around the *hale*. He saw nothing. All he heard was the gecko singing a happy tune in one corner of the room. The next morning, Pohuehue walked toward a grove of *hau* trees. He began to pick the bright yellow flowers. He gently tossed each flower one by one onto the waves. He watched as they began to drift toward O`ahu.

The flowers floated directly to Kahana Bay, where Kaunaoa was swimming. She felt a *hau* blossom gently brush against her cheek. She was startled. As she picked each flower floating toward her, she thought of Pohuehue. Whenever they went to the beach, he would give her a hau flower. She gently touched each flower.

Then calling her *`aumakua* for guidance, she walked along the path of hau flowers until she reached the beach just as Pohuehue was leaving his canoe.

Kaunaoa and Pohuehue's love for each other was eternal. Today you can find the *kaunaoa* and the *pohuehue* wrapped around each other along many island beaches.

Kauninio Fishing Shrine (McAllister, 1933)

The shrine, as it is a low rock, can only be seen at low tide. There was, at one time, a native of Kahana who was living on Kaua`i, where he became very ill. He longed to return to the place of his birth to die among old friends. He was brought back to Kahana by a friendly shark. While the man lingered on shore, the shark swam in the waters of the bay; but upon the mans death the shark was turned to the rock which can still be seen at low tide.

E. 1900 to Present

In the early 1900's portions of Kahana Valley had started to be developed with various endeavors (*Honolulu Star-Bulletin & Advertiser*, 1988). The Mormon Church built a church within the valley. Chinese immigrants began to farm rice and built a rice mill. Japanese immigrants farmed cane in the valley.

During WWII, the back of Kahana Valley was used as a military jungle training area. "Residents agreed that military personnel took care of the roads and trails, but after the war, things became overgrown." (*Honolulu Star-Bulletin & Advertiser*, 1988).

The State of Hawaii bought the entire valley in 1965 from the heirs of Mary Elizabeth Robinson Foster (of the Kaua`i Robinson family)to save it from private development and answer O`ahu's need for more public recreation space (*Honolulu Star-Bulletin & Advertiser*, 1988). Most of the inherited tenants had expected to be evicted. These tenants cited ties to the Hawaiians who owned the lands before the Robinsons. Finally, after much public debate, in 1970, Governor John Burns directed the Land Department to take steps to allow the tenants to remain as active participants in a "living park" (*Ibid.*).

Figure 4 1936 Oblique Aerial View of Kahana Valley, Project Area at Right of Center, Showing Agricultural Endeavors (Rice and Sugar Cane Farming).

III. PREVIOUS ARCHAEOLOGICAL RESEARCH

McAllister noted three sites in the vicinity of the project area (McAllister 1933). McAllister Site 298 is the Kapa`ele`ele fishing shrine (*koa*), approximately 24 by 14 ft. composed of basalt stones, located approximately 800 m to the northwest of the project area. The shrine was for the *akule*. McAllister Site 299 is Kauninio fishing shrine (*koa*), composed of one large stone, just offshore approximately 800 m to the northeast of the project area. Kauninio fishing shrine could only be seen at low tide (c. 1931) as it is a low rock. McAllister Site 301 is Huilua Fishpond. Huilua Fishpond lies approximately 800 m to the east-southeast of the project area and is presently being rebuilt and reused.

Approximately twenty archaeological studies have been undertaken within the *Ahupua`a* of Kahana. These studies are summarized in Table 2 (below) with a subsequent discussion of those studies most germane to the project area.

Table 2: Previous Archaeological Studies in Kahana *Ahupua`a*

Study	Location	Historical Research	Findings
Hommon and Barrera 1971	Kahana Valley	Archaeological Survey	114 sites with 465 features mapped and described.
Hommon and Bevaqua 1973	Kahana Valley	Excavations widely scattered	Testing at 6 sites and 2 test areas.
Rothwell, Madden, Kelly, and Sinoto 1980	Huilua Fishpond	Prestabilization Survey	n/a
Yent and Griffin 1978	Kahana Valley	Results and Recommendations of the walk-through Reconnaissance	Relocates 4 sites and describes additional features.
Sinoto 1979	Huilua Fishpond	Assessment with 6 backhoe trenches	Discusses fishpond chronology.
Yent and Griffin 1979	Kahana Valley	Archaeological Investigations	Test pits and corings identified cultural deposits.

Study	Location	Historical Research	Findings
Dobyns 1980	Proposed Reservoir, Kahana Valley	Archaeological Reconnaissance Survey	Notes an *`auwai*, Site 50-80-06-1590.
McCoy and Oshima 1980	Kahana	Historic Burials	n/a
Yent 1980a	Kahana Valley State Park	Examination of Human Burial Material	n/a
Yent 1980b	Electrical Line at Kahana Valley State Park, Lower central valley	Archaeological Monitoring Project During Trenching	Notes burial 40-50 cm deep 7 m east of orientation center.
Kam 1981	Huilua Fishpond, Kahana Bay, O`ahu	Report on Human Skeletal Remains	Human remains (1) in fish pond.
Yent 1981a	Proposed Well Sites (3) in Kahana Valley State Park., east side of valley	Archaeological Reconnaissance	Discusses previously identified Site 1555 enclosure & B - 1556 ag. terracing.
Yent 1981b	Huilua Fishpond, Kahana Valley State Park	Field Inspection of Eroding Cultural Deposit.	5 test pits identified multiple cultural strata - Site 1546.
Nagata 1982	Board of Water Supply Well Sites in Kahana Valley, 300 ft. contour	Archaeological Inspection	Concludes lack of arch. resources in area.
Price-Beggerly 1990	Kahana Valley	Ph.D. dissertation:	Posits settlement *ca* 430-30 BC on basis of marine shell dating; posits abandonment from 30 BC - 1200 AD when there was a second wave of settlers.
Yent 1992	Proposed Housing Areas (2) in Kahana Valley State Park	Archaeological Survey	Notes general lack of archaeological sites in study areas.

Study	Location	Historical Research	Findings
Carpenter and Nagata 1994	Huilua Fishpond near Kamehameha Highway	Human Remains Recovered	Single burial with lithic debitage and midden.
Carpenter, and Yent 1993	Huilua Fishpond	Archaeological Investigations - 8 test trenches	Provides historical overview, describes existing conditions.
Yent 1993	Huilua Fishpond	Burial Investigation	Bone fragments - original location uncertain.

The archaeological survey by Hommon and Barrera Jr. (1971) remains the most thorough study of Kahana's archaeology. Of the 114 sites designated, only Site -1687 a stone lined *`auwai* is within the vicinity of the project area (Figure 5). The site is described as:

> A stone-lined *`auwai* 54 meters long, with total width of 1 meter; the channel width was 60 cm and its depth was 25 cm. One end started in a silte-in streambed; the other end terminated abruptly with a cross wall. (Hommon and Barrera Jr. 1971:26)

The B. P. Bishop Museum followed up on this initial work with a program of archaeological testing. An area inland of the present project area (Test Area 2, Figure 6) was chosen because it was adjacent to the mouth of a branch of Kahana Stream and it was thought likely to have been a place of early settlement (Hommon and Bevaqua 1973:8). However, no cultural evidence was found in either test area leading the authors to conclude "No pre-contact cultural activity was concentrated in these areas." (1973:9).

In the course of on-going archaeological monitoring for the Windward Mains Board of Water Supply project, considerable excavation has been monitored by CSH recently just to the northwest of the North Kahana Stream Bridge near Kahana Valley Road. There has been opportunity to view many meters of deep exposures and the absence of a cultural layer (predating modern trash) or man-made features has been quite striking. Like Hommon and Bevaqua we would have anticipated intensive use of this area over a millennium of the Hawaiian past with this intensive use manifest in a variety of subsurface features (*imu*, fire pits, burials, *etc.*) Like Hommon and Bevaqua, CSH has been surprised at the near total absence of any such evidence.

In informal discussions with the State Historic Preservation Division regarding this seemingly anomalous absence of archaeology, Dr. Sara Collins suggested the possibility of relatively recent sand accretion at Kahana Bay Beach. This may indeed be the case, however, an examination of the pre-WWII aerial photographs in Price-Beggerly's (1990) Ph.D. dissertation did not indicate any substantial sand accretion in the past fifty years.

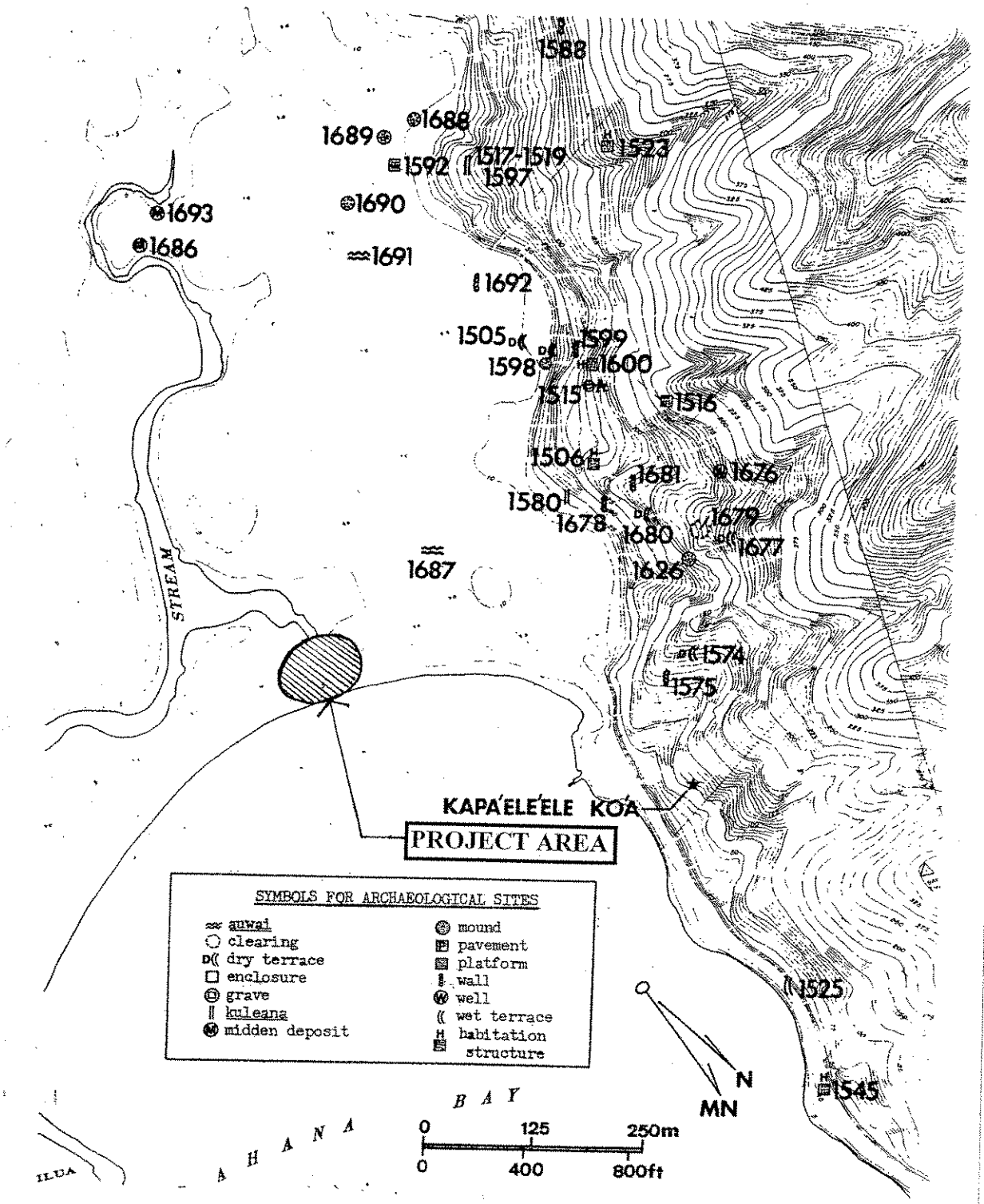


Figure 5 Map of Previously Identified Archaeological Sites Near the Present Project Area (from Hommon and Barrera Jr., 1971)

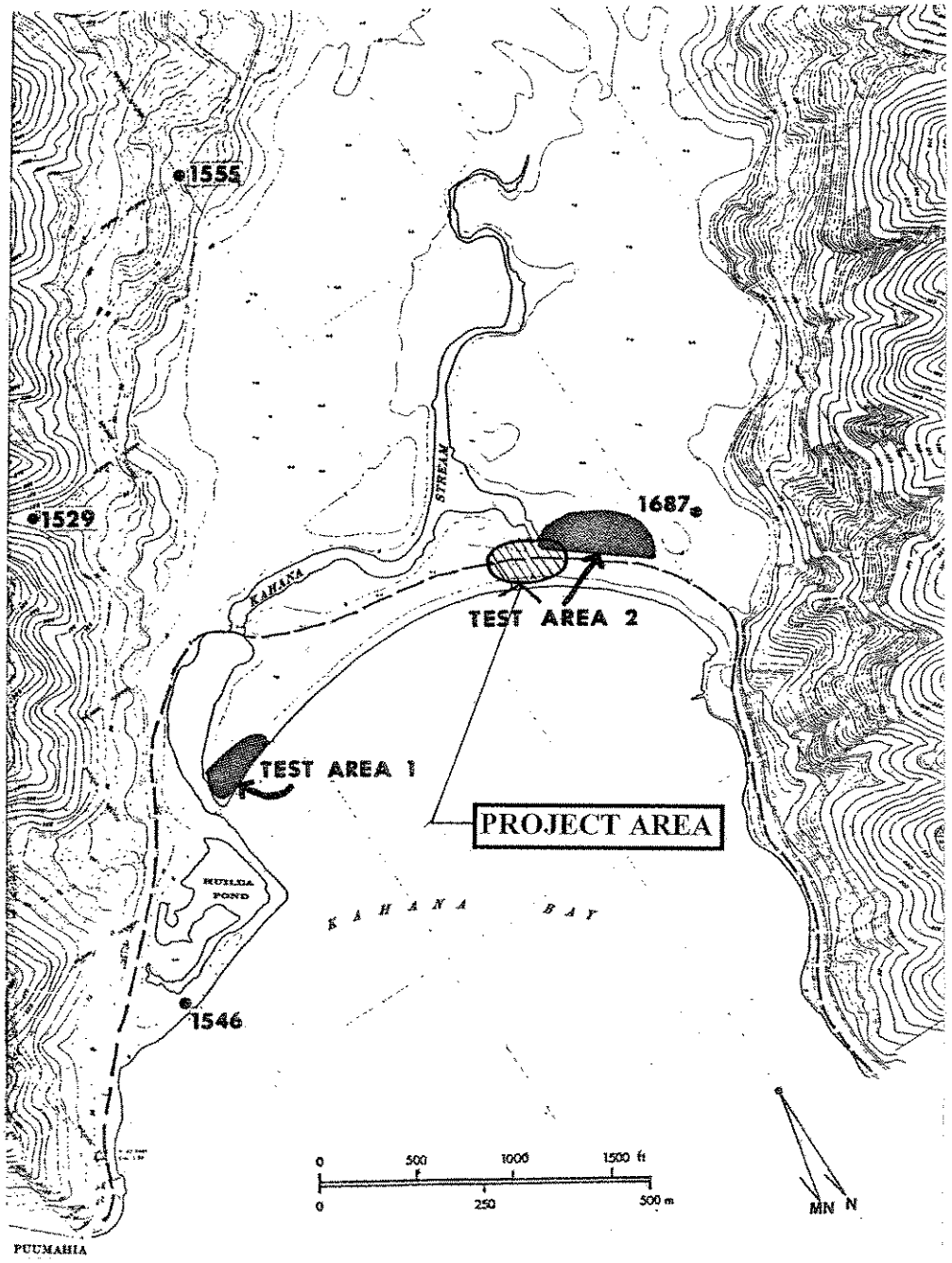


Figure 6 Map of Lower Kahana Valley Showing Location of Hommon & Bevacqua (1973) Test Area 2 in Relation to the Present Project Area

State Parks (Yent and Griffin 1979, Yent 1980b) carried out archaeological studies associated with trenching for an electrical line to service facilities and houses along Kahana Valley Road just inland from Kamehameha Highway. Again, the absence of cultural deposits was noted: "the only cultural deposit found thus far in Areas A, B, and C is a historic one dating to the twentieth century" (Yent 1980b). However, a human burial (designated Site 50-80-06-4132) was encountered at a shallow depth of 40 - 50 cm., 7 m. east of the orientation center, not far from the present study area. Martha Yent (1980b:6) comments: It seems fair to say that in any excavations into layer 2 (fine sand) within the *makai* portion of Kahana Valley, there is a fair chance that a burial will be encountered at some point.

She goes on to recommend archaeological monitoring in the vicinity (Yent 1980b:7). In a follow-up telephone conversation with Martha Yent (personal communication of April 29, 2002) she indicated her on-going concern for burials in the vicinity of the North Kahana Stream Bridge. She noted the probability of historic deposits related to the Mary Foster era and noted the prior existence of a guard shack on the *mauka* side of Kamehameha Highway near Kahana Valley Road. She asked that State Parks be kept informed of developments with the bridge replacement project.

A number of human burials have been identified and documented in the vicinity of the project area, and are summarized in Table 3 below. Most of these known burials have been reported from the Ka`a`awa side of Kahana Bay near Huilua Fishpond, northeast of the project area.

Table 3: Documented Burials in the vicinity of Kahana Bridge

Site #	Site Type	Location	Age	Source
50-80-06-1505	Stone pavement, possibly a burial	North side just above valley floor	Uncertain	Hommon & Barrera 1971
50-80-06-1546	Burial	Huilua Fishpond, Kahana	Prehistoric (?)	Hommon & Bevacqua 1973
50-80-06-1688	Rock mound, possible burial	North side of valley floor	Uncertain	Hommon & Barrera 1971
50-80-06-1689	Rock mound, possible burial	North side of valley floor	Uncertain	Hommon & Barrera 1971
50-80-06-1690	Rock mound, possible burial	North side of valley floor	Uncertain	Hommon & Barrera 1971
50-80-06-4132	Burial	Kahana	Historic (?)	Yent 1980b

50-80-06-4698	Burial	Huilua Fishpond, Kahana	Prehistoric (?)	Kam and Ota 1981
50-80-06-4814	Historic graves	Huilua Fishpond, Kahana	Historic	Yent 1993
50-80-06-4815	Burial	Huilua Fishpond, Kahana	Prehistoric	Yent 1993

Huiula Fishpond Burial Sites 50-80-106-1546, 4698,4814, and 4815

Huilua Fishpond (McAllister Site 301) is a large, stone enclosed, coastal fishpond situated on the Ka`a`awa side of Kahana Bay. A *ko`a* was associated with this site (McAllister 1933: 164). Huilua Fishpond dates from prehistoric times and was used until 1960. Huilua Fishpond includes four designated sites which have included human remains.

Bishop Museum (Hommon and Bevacqua 1973) located an isolated human humerus along the northeastern wall (designated State Site 50-80-06-1546).

An isolated human cranium was reported from within the pond wall (Kam and Ota 1981) and was designated State Site 50-80-06-4698.

Martha Yent (1993) noted the presence of three graves marked by alignments of basalt bounders (designated State Site 50-80-06-4814) on the southern side of the pond approximately 40 m. northwest of Kamehameha Highway.

Martha Yent (1993) documented a "*Burial Investigation: Huilua Fishpond, Kahana Valkley State Park, Ko`olauloa, O`ahu*" involving one fragmentary burial at the southeast corner of the pond along the base of the interior pond bank, 20-25 m. *makai* (northeast) of the edge of Kamehameha Highway (designated State Site 50-80-06-4815).

Possible Burials Along North Side of Valley Floor Sites 50-80-06-1505, 1688, -1689 & -1690

Hommon & Barrera (1971) documented four possible burial sites in a relatively small area of the north floor of Kahana Valley and immediately adjacent slope 500 m west of the present project area. One was a stone pavement and three were rock mounds.

Burials Near the North Kahana Stream Bridge

The only human burial we are aware of within 200 m of the North Kahana Stream Bridge project area is that reported (Martha Yent 1980b) at a shallow depth of 40 - 50 cm., 7 m. east of the orientation center (designated Site 50-80-06-4132) previously discussed.

IV. ARCHAEOLOGICAL MONITORING PROVISIONS

Based upon the present background research and the results of previous archaeological studies, the following ten provisions are recommended for archaeological monitoring of the Kamehameha Highway, North Kahana Stream Bridge Replacement project.

1) Extent of archaeological monitoring: Because of the minimal nature of impact, geotechnical testing (typically involving borings 5" in diameter) appears not to be warranted. All ground disturbance associated with subsurface demolition and excavation will be monitored on-site by a qualified archaeologist. Any departure from this (possibly justified on the basis of field observations) will only follow consultation with and concurrence from the State Historic Preservation Division.

2) Potential Location of Finds: Intact burials and cultural materials may be present within soil matrices which have not undergone modern disturbance due to infrastructure improvements. Disturbed partial burials may be present within soils that have been previously reworked by construction activities.

3) Treatment of Finds:

   A. If burials are found, work will be stopped immediately in that area. The State Historic Preservation Division (SHPD) O`ahu archaeologist and the SHPD Burial Program staff will be notified immediately. No remains will be removed without a SHPD determination. Burial finds will be treated according to HRS6E Burial law and Administrative Rules Chapter 13-300. Once likely ethnicity is established, appropriate treatment can move forward.

   B. If deposits are found, the SHPD O`ahu archaeologist must be contacted immediately, in order to determine the significance of finds, and so that mitigation needs can be agreed upon. If intact cultural layers, charcoal, artifacts, midden deposits, or any disturbed objects are encountered, then select sorted samples of charcoal, and bulk samples of midden material will be collected and standard documentation conducted (i.e. scale maps, photographs, detailed descriptions, and interpretation). Subsurface features, if found, will be documented by stratigraphic profiles and photographs with collection of appropriate samples, especially charcoal for subsequent dating analysis. The standard stratigraphic sequence will be documented for the trenching where the open trenches can be easily observed. Where cultural layers are present, stratigraphic profiles of the entire length of exposed cultural layers shall be made.

4) Archaeologist's Role and Coordination Meeting: The on-site archaeologist will have the authority to stop work immediately in the area of any findings so that documentary work can be conducted and appropriate treatment can be determined. Before work commences on the project the on-site archaeologist shall contact State Parks and keep them apprised of progress and any significant finds. Before work commences on the project the on-site archaeologist shall emphasize that all historic finds, including objects such as bottles, are the property of the landowner and may not be taken or otherwise disposed of without the written consent of the landowner and the State Historic Preservation Division. At this time it will be made clear that the archaeologist must be on site during all subsurface excavations.

5) Anticipated Finds: Based on the fact that the present project area lies on the outskirts of an area where human remains have been discovered in the past, there is the possibility that sub-surface excavations could expose additional remains. These could be either traditional Hawaiian interments or historic period coffin interments. Additionally traditional Hawaiian and historic period cultural deposits may be present.

6) Laboratory work: Laboratory analysis of non-burial related finds, if any, will include standard artifact and midden recording as follows: Artifacts will be documented as to provenance, weight, length, width, type of material and presumed function. Midden will be sorted down to species, when possible, then tabulated by provenance, and presented in table form. Radiocarbon analysis will be conducted if sufficient quantities of datable material are available from the field samples.

7) Burial treatment: If human remains are encountered, the consulting parties (SHPD/DLNR, Honolulu County, and the O`ahu Island Burial Council) will decide the appropriate treatment measures. If removal is deemed appropriate, the remains will be stored temporarily at the SHPD O`ahu office until reburial mitigation is established.

8) Archiving of any Finds: All burial materials will be given to SHPD/DLNR for storage. Materials not associated with burials will be temporarily stored at the contracted archaeologist's facilities until an appropriate curation facility is selected, in consultation with Honolulu County and the State Historic Preservation Division.

9) Report: One of the primary objectives of the report will to present a stratigraphic overview of the project area which will allow for predictive assessments of adjacent properties, which may be the subject of future development. The report will contain a section on stratigraphy; description of archaeological findings, including burials; monitoring methods; results of laboratory analyses, and recommendations for future work in the area. A draft report will be submitted within two months after the completion of the construction activity.

V. BIBLIOGRAPHY

Alameida, Roy Kakulu
1997 *Na Mo`olelo Hawai`i o Ka Wa Kahiko - Stories of Old Hawai`i,* The Bess Press, Honolulu, HI.

Carpenter, Alan and Ralston Nagata
1994 *Human Remains Recovered from Huilua Fishpond, Kahana Valley State Park, Ko`olauloa, O`ahu*

Carpenter, Alan and Martha Yent
1993 *Archaeological Investigations at Huilua Fishpond, Kahana Valley, Ko`olauloa, O`ahu TMK 5-2-05:21,* DLNR, Division of State Parks, Honolulu HI.

Department of Transportation (DOT), State of Hawai`i
2000 *Final Project Assessment Report for Kamehameha Highway North Kahana Stream Bridge Replacement Route 83 District of Ko`olau Loa, Island of O`ahu* October 2000

Dobyns, Susan
1980 *Archaeological Reconnaissance Survey for Proposed Reservoir, Kahana Valley, Oahu.* B.P. Bishop Museum, Honolulu, HI.

Foote, Donald E., E.L. Hill, S. Nakamura and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii,* U.S. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment,* B.P. Bishop Museum Bulletin 233, B.P. Bishop Museum, Honolulu, HI.

Hommon, Robert, and William M. Barrera Jr.
1971 *Archaeological Survey of Kahana Valley, Ko`olauloa District, Island of O`ahu* Division of State Parks, DLNR, Honolulu, HI.

Hommon, Robert and Robert Bevaqua
1973 *Excavations in Kahana Valley, O`ahu,* 1972, Departmental Report Services 73-2, B.P. Bishop Museum, Honolulu, HI.

Juvik, Sonia P. and James O. Juvik, Editors, Chief Cartographer, Thomas R. Paradise
1998 *Atlas of Hawai`i,* Third Edition, Sonia P. Juvik and James O. Juvik, Editors, Chief Cartographer, Thomas R. Paradise University of Hawaii Press, Honolulu, HI.

Kam, Wendell
1981 *Report on Human Skeletal Remains at Huilua Fishpond, Kahana Bay, O`ahu* State of Hawaii DLNR, Historic Preservation Office, Honolulu, HI.

Kirch, Patrick V.
1985 *Feather Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*,University of Hawaii Press, Honolulu, HI.

Lynch, Kay
1988 "Kahana: A Paradise Awaits", *The Sunday Star-Bulletin & Advertiser*, March 6, 1988, Honolulu, HI.

McAllister, J.G.
1933 *Archaeology of O`ahu*, Bishop Museum, Bulletin 104, Honolulu, HI.

McCoy, Patrick and Neal Oshima
1980 *Kahana Historic Burials.*B.P. Bishop Museum, Honolulu, HI.

Nagata, Ralston
1993, *Request for Approval to Continue Restoration Activities at Huilua Fishpond, Kahana Valley, Ko`olauloa, O`ahu.*DLNR, State Parks, Honolulu, HI.

Nagata, Ralston
1982 *Archaeological Inspection of the Board of Water Supply Well Sites in the Kahana Valley, Ko`olauloa, Oahu.*DLNR, State Parks, Honolulu, HI.

Neal, Marie C.
1965 *In Gardens of Hawaii*, Bernice P. Bishop Museum Special Publication 50, Bishop Museum Press, Honolulu, HI.

Petrich, Matthew, David W. Shideler, and Hallett Hammatt
1999 *Archaeological Monitoring Plan for the Windward Mains Project, Punalu`u, Kahana, Ka`a`awa and Kualoa Ahupua`a, Ko`olauloa and Ko`olaupoko Districts, Island of O`ahu (TMK Zone 5: (Punalu`u) 5-3-01, 02, 03, 05 & 06; (Kahana) 5-2-05; (Ka`a`awa) 5-1-01, 02, 03, 04, 05, 07, 08 & 09)*, Cultural Surveys Hawaii, Kailua, HI.

Price-Beggerly, Patricia
1990 *Kahana Valley, Hawai`i, a Geomorphic Artifact: Study of the Interrelationships among Geomorphic Structures, Anatural Processws, and Ancient Hawaiian Technology, Land Use, and Settlement Patterns.* Ph. D. dissertation, University of Hawai`i at Mānoa

Rothwell, Guy N., William D. Madden, Marion Kelly and Aki Sinoto,,
1980 *Prestabilization Survey of Huilua Fishpond, Kahana Bay, O`ahu, Hawai`i,* The Oceanic Institute, Honolulu, HI.

Sinoto, Aki
1979 *Archaeological Pre-Stabilization Assessment of Huilua Fishpond, Kahana, O`ahu Island* Bishop Museum, Honolulu, Hi.

Sterling, Elspeth P. and Catherine C. Summers
1978 *Sites of O`ahu,* Bishop Museum Press, Honolulu, HI.

Yent, Martha
1993 *Burial Investigation Huilua Fishpond, Kahana Valley State Park, Ko`olauloa, O`ahu* Division of State Parks, SHPD/DLNR, Honolulu, HI.

Yent, Martha
1992 *Archaeological Survey: Proposed Housing Areas in Kahana Valley State Park, Kahana, Ko`olauloa, O`ahu.* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha
1981a *Archaeological Reconnaissance of Proposed Well Sites in Kahana Valley State Park.* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha
1981b *Field Inspection of Eroding Cultural Deposit at Huilua Fishpond, Kahana Valley State Park, Ko`olauloa, O`ahu.* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha
1980a *Examination of Human Burial Material at Kahana Valley State Park, Ko`olauloa, O`ahu.* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha
1980b *Archaeological Monitoring Project During the Trenching for the Electrical Line at Kahana Valley State Park, O`ahu.* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha and Agnes Griffin
1979 *Archaeological Investigations in Kahana Valley, O`ahu, Hawai`i* Division of State Parks, DLNR, Honolulu, HI.

Yent, Martha and Agnes Griffin
1978 *Results and Recommendations of the Walk-through Reconnaissance Conducted at Kahana Valley, Ko`oluloa, O`ahu, Hawai`i.* Division of State Parks, DLNR, Honolulu, HI.

APPENDIX E

Coastal and Environmental Evaluation

COASTAL AND ENVIRONMENTAL EVALUATION FOR THE PROPOSED REPLACEMENT OF NORTH KAHANA BRIDGE

May 2003

Prepared for:

State of Hawaii
Department of Transportation
DOT Project No. BR-083D-01-01
Kamehameha Highway, Replacement of North Kahana Bridge

Submitted by:

Sea Engineering, Inc.
Makai Research Pier
Waimanalo, Hawaii 96795

and

AECOS Consultants, Inc.
45-939 Kamehameha Highway
Kaneohe, Hawaii 96744

Table of Contents

Table of Figures

List of Tables

EXECUTIVE SUMMARY

The State of Hawaii Department of Transportation is planning to replace the North Kahana Bridge on Kamehameha Highway on the windward side of Oahu. The bridge crosses the north branch of Kahana Stream, which flows only during flood conditions. The new bridge will be about 14 feet wider than the present structure, with 12 feet of the new footprint on the ocean, or *makai*, side of the existing bridge. The new bridge will have a span of 121 feet, abutment to abutment, about 32 feet longer than the existing bridge. A temporary by-pass road will be built for traffic diversion during construction that will extend approximately 56 feet *makai* of the present structure.

Project structures will be located behind the present vegetation line and above the Mean Higher High Water (MHHW) elevation, and are therefore not expected to adversely impact the shoreline. However, removal of significant amounts of vegetation will be required for the project. Most of the vegetation is now dominated by non-native Australian ironwood. The removal can be viewed as an opportunity to replace the existing vegetation with more desirable strand trees and shrubs, such as *naupaka (Scaevola sericea), kamani (Calophyllum inophyllum), hala (Pandanus tectorius),*and *niu* or coconut, which are indigenous and early Polynesian introductions.

Due to the protection afforded by the natural morphology of Kahana Bay, the sandy beach at the project site is unusually stable and not likely to be adversely affected by the project. There is no drainage from the project area except during rare flood occurrences, so the project is not likely to have any impact on offshore areas.

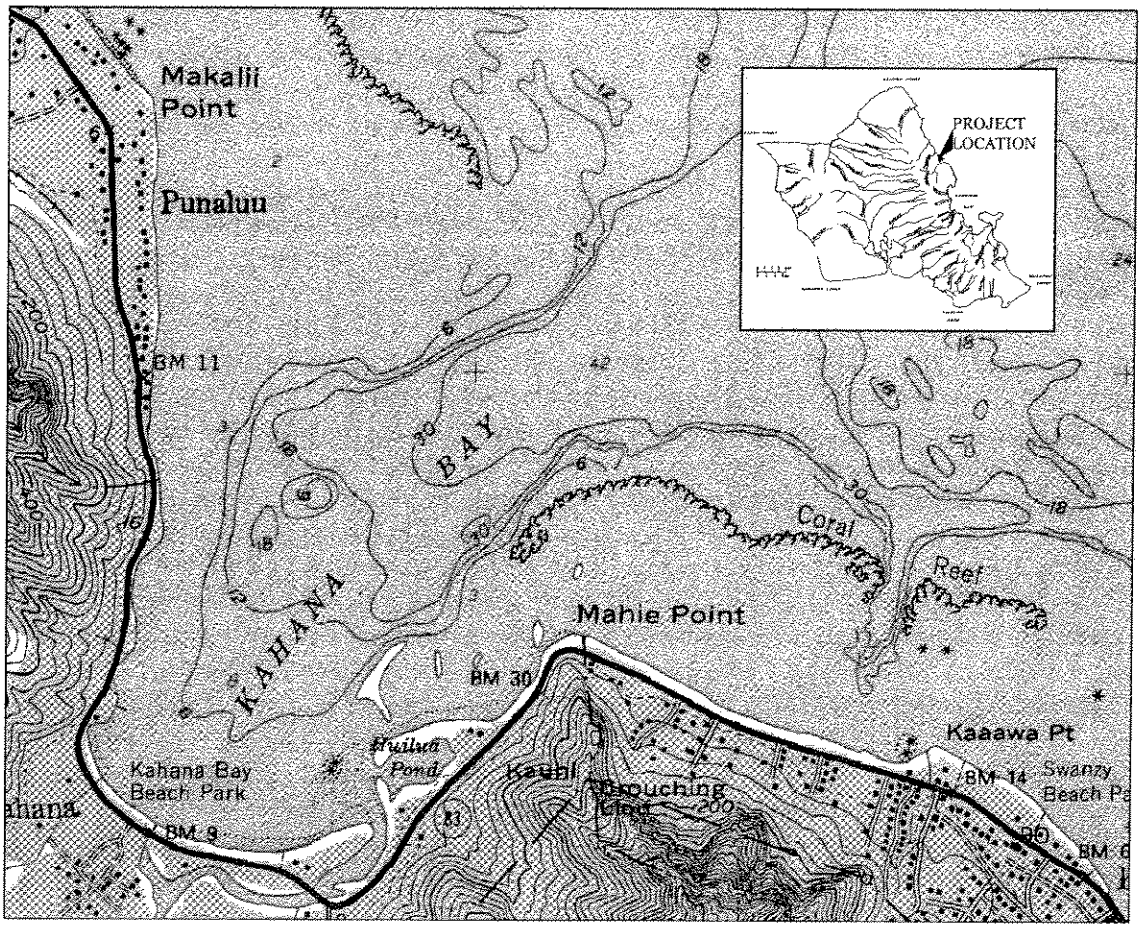


Figure 1. Project location on the northeast shore of Oahu

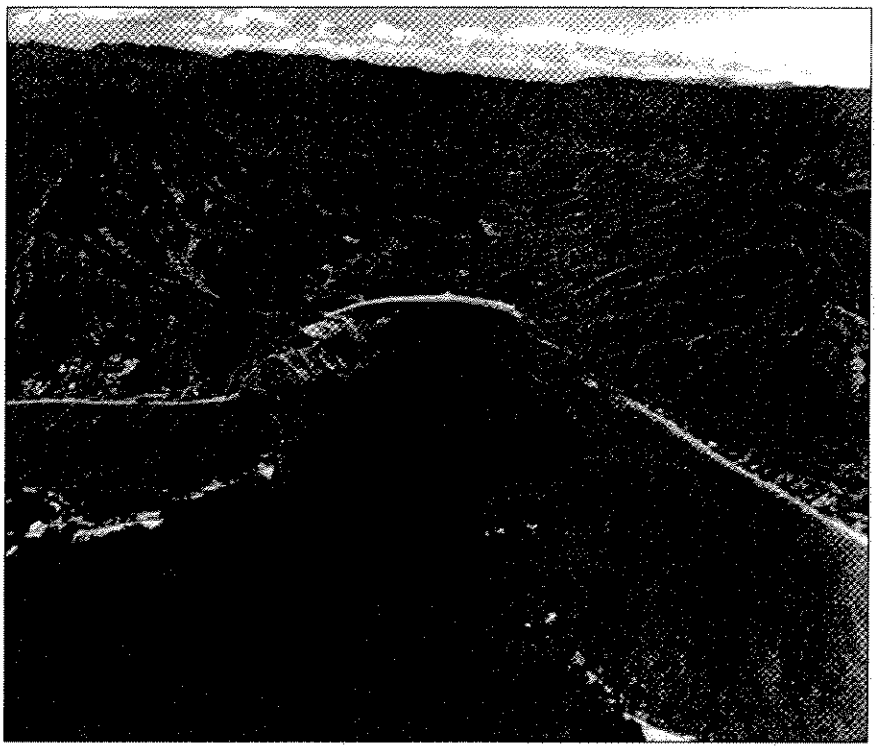


Figure 2. Oblique Photograph of Kahana Bay
(Courtesy of Air Survey Hawaii)

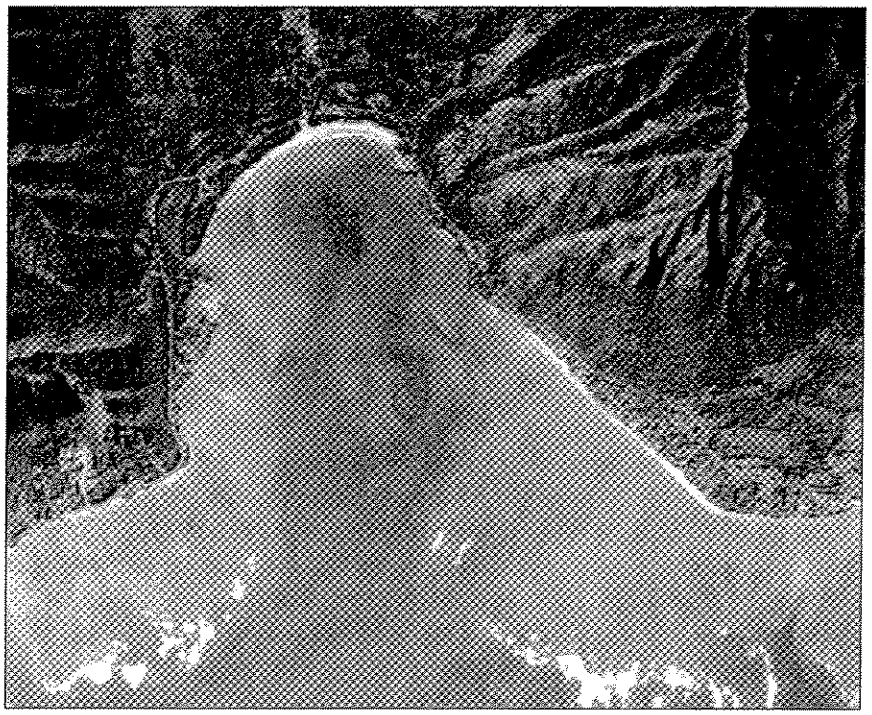


Figure 3. Plan view of Kahana Bay showing broad fringing reefs
(Courtesy of Air Survey Hawaii)

Figure 4. Looking west at inactive channel and sand plug on the makai side of the existing North Bridge, 5-12-03. Note changes from 4-23-02 (Figure 11)

Figure 5. Looking east across the inactive channel at the muliwai on the the mauka side of the existing North Bridge.

1.2 Proposed Action

The present bridge will be removed and replaced. The footprint of the final structure will be 17 feet wider than the existing bridge, with 12 feet of the expansion being on the *makai* side. A temporary bypass road and Acrow bridge will also be constructed on the *makai* side of the coastal highway. The total span of new bridge, 121 feet from abutment to abutment, will be about 32 feet greater than that of the existing bridge. During construction, the temporary bypass road will take an additional 56 feet of space on the seaward side. The close-up aerial photograph in Figure 6 is marked with the approximate alignments of both the temporary by-pass road and the final structure, and shows that the construction will be well behind the existing vegetation line.

1.3 Study Objectives

Construction projects in the coastal zone can generate undue negative impacts on the natural shoreline environment, and can also be at risk themselves from exposure to natural elements and shoreline processes. This study has been conducted to assess the existing shoreline and nearshore environment, and to evaluate potential impacts of the project. Major topics include:

- Physical environmental setting, including oceanographic parameters that affect the site.
- Existing biological environment: flora and fauna around the site, including the *muliwai* and nearshore.
- Existing coastal erosion hazards.
- Assessment of potential impacts.

2.0 COASTAL ENVIRONMENTAL SETTING.

2.1 Bathymetry and Coastline

The project site is located on the windward shore of the island. The regional shoreline is directly exposed to tradewinds and tradewind-generated waves, but the project site itself is well protected by the bay morphology. The incised bay is bounded by the headlands of Makalii Point to the north and Pu'u Mahie Point to the south. Above water, similar morphology continues into the Kahana Valley, which extends to the Koolau Mountains (See Figure 2). The floor of the bay is relatively flat and composed of sand. Most of Hawaii's beaches are composed entirely of carbonate sand produced by ocean-dwelling organisms. The sand at Kahana Bay is roughly 20% terrigenous sediment that is derived from the stream outflow (Coulbourn, 1971). The sand at Kahana Bay is contained in a relatively straight and flat channel that gently slopes between the fringing reefs to at least the 60-foot depth. The margins of the channel rise almost vertically to the reef flats (Coulbourn, 1971). The reef flats extend for about 6,000ft offshore at both Makalii Point and Pu'u Mahie Point, and are part of an extensive system of fringing reefs along the regional coastline. The beach at Kahana Bay is gently curved and is about 2,000 feet in length. It is unusually uniform in appearance, with an unbroken berm crest extending the length of the beach.

While much of the windward shoreline is threatened by an eroding shoreline, Kahana Bay has remained stable for at least the last 40 years.

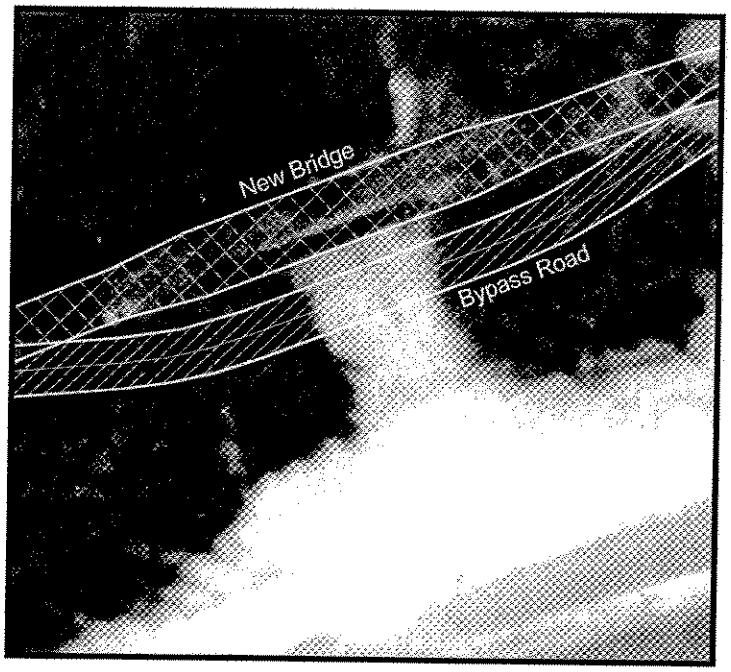


Figure 6. Approximate footprint of the new bridge and bypass road at the project site.

2.2 Winds

The wind climate in Hawaii is characterized by two distinct seasons, primarily defined by the annual variation in persistence of the northeast tradewinds. During the summer months of about May through September, the tradewinds predominate, blowing out of the northeast 80 to 90 percent of the time with speeds generally from 10 to 25 mph. The winter season, from about November through March, is characterized by a weakening of the tradewind persistence and the occurrence of southerly or westerly winds as a result of localized low pressure and frontal systems. The months of October and April are generally considered to be transitional periods between seasons.

Table 2.1 is a histogram of the annual distribution of wind speeds and direction collected at the Kaneohe Bay Marine Corps Air Station (KBMCAS) between 1945 and 1995. The measurement location is approximately 12 miles southeast of the project site and has similar exposure. The data are provided by the International Station Meteorological Climate Summary (ISMCS, 1996), jointly produced by the Fleet Numerical Meteorology and Oceanography Detachment, the National Climatic Data Center, and the USAFETAC OL-A. The data are based on two minute averages taken hourly for a 24-hour day.

Over 70 percent of the annual winds were tradewinds from the northeast through east-southeast sectors with an average speed of approximately 10 knots. The easterly tradewinds were most frequent in summer months.

Table 2.2 summarizes the monthly wind conditions, including average winds, peak gusts, and estimated 1-minute and 10-minute wind speeds. Annual peak gusts were used to determine the statistical peak gusts for given return periods, using Gumbel's asymptotic distribution. The predicted peak gusts were further converted to the 1-minute and 10-minute wind speeds based on methodology described in *Shore Protection Manual* (1984).

The predicted gusts for the 2-year, 5-year, 10-year and 25-year events 46.0, 58.1, 66.4, and 76.8 kts, respectively. Corresponding 1-minute wind speeds are 37.9, 47.8, 54.8, and 63.2 kts, and 10-minute speeds are 30.5, 38.5, 43.9, and 50.7 kts. The results are summarized in Table 2.3.

During Hurricane Iwa in November 1982, the peak gust recorded at KBMCAS was 80 knots which is greater than the 25-year peak gust. During Hurricane Iniki, in September 1992, the peak gust was 55 knots, which is close to the 5-year peak gust.

2.3 Waves

The prevailing Hawaiian wave climate can be described by four primary wave types: northeast tradewind waves, North Pacific swell, south swell and Kona storm waves. The project area at Kahana Bay is sheltered from south swell and Kona storm waves by the island, and is exposed only to North Pacific swell and northeast tradewind waves.

Northeast tradewind waves may be present in Hawaiian waters throughout the year, but are most frequent in summer months, when they dominate the wave climate on windward shores. They result from the strong and steady tradewinds blowing from the northeast quadrant over long fetches of open ocean. Typical deepwater tradewind waves have periods of 5 to 8 seconds and heights of 3 to 10 feet.

North Pacific swell is produced by severe winter storms in the Aleutian area of the North Pacific and by mid-latitude low-pressure systems. North swell may arrive in Hawaiian waters throughout the year, but it is largest and most frequent during the winter months of October through March. The North Pacific swell approach direction is from the west through north, with periods of 13 to 20 seconds and typical deepwater wave heights of 4 to 10 feet. Some of the largest waves reaching the Hawaiian Islands are of this type. The windward shoreline is partially sheltered from the approach of North Pacific swell, and only the more northerly of these swells arrive at the site.

In addition to the two primary wave types, infrequent tropical cyclones may generate large waves, which can impact any coastal area of Hawaii.

The Scripps Institution of Oceanography has a wave buoy deployed 4.5 miles southeast of Mokapu Point, Oahu that has been measuring waves since August 9, 2000. This buoy provides wave data directly applicable to the project site, since the exposure at the two sites is the same. Data used were collected for the 10-month period between August 2000 and June 2001.

TABLE 2.1. ANNUAL PERCENT FREQUENCY DISTRIBUTION FOR WINDS AT KANEOHE BAY MCAS

STATION : KANEOHE BAY MCAS ,HI,US
LOCATION: LAT 21 27N, LONG 157 47W, ELEV 6(m)

PERCENT FREQUENCY (%)
(1945 - 1995)

16 PT. DIR.	SPEED (KNOTS) 1 - 3	4 - 6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	48-55	>=56	TOTAL	MEAN
N	.3	.9	1.0	.6	.1	*	0	0	0	0	0	2.8	7.8
NNE	.5	1.8	3.3	1.7	.2	*	*	0	0	0	0	7.5	8.5
NE	.7	3.0	7.2	5.5	.5	.1	*	0	0	0	0	17.5	9.5
ENE	1.0	4.7	11.8	11.4	1.4	.1	*	0	0	0	0	30.5	10.1
E	.7	2.9	6.9	6.9	.9	.1	*	0	0	0	0	17.9	10.1
ESE	.3	.8	1.8	1.7	.2	*	*	0	0	0	0	5.1	9.8
SE	.2	.4	.3	.1	*	*	0	0	0	0	0	1.1	7.2
SSE	.4	.4	.3	.1	*	*	*	0	0	0	0	1.2	6.3
S	.9	.7	.4	.2	.1	*	*	*	0	0	0	2.2	5.5
SSW	.9	.7	.4	.2	.1	*	*	*	0	0	0	2.4	6.2
SW	.7	.5	.3	.2	*	*	*	*	*	0	0	1.9	6.2
WSW	.6	.4	.2	.1	*	*	*	*	0	0	0	1.3	5.4
W	.4	.4	.2	.1	*	*	*	0	0	0	0	1.1	4.6
WNW	.2	.3	.2	.1	*	*	*	0	0	0	0	.8	5.9
NW	.2	.3	.2	.1	*	*	0	0	0	0	0	.9	7.8
NNW	.2	.5	.4	.3	.1	*	*	0	0	0	0	1.6	8.5
VAR	0	0	0	0	0	0	0	0	0	0	0	0	0
CLM	0	0	0	0	0	0	0	0	0	0	0	4.6	0
TOTAL	8.4	18.8	34.6	29.3	3.8	.4	*	*	*	0	0	100	8.8

* = PERCENT < .05
# = EXCESSIVE MISSING DATA - VALUE NOT COMPUTED
THE TOTAL NUMBER OF DATA = 128321

TABLE 2.2. MONTHLY WIND CONDITIONS AT KANEOHE BAY MCAS

(Data Period: 1945 - 1995)

Month	Most Freq. Direction (Dir./ %)	Average Wind Speed (kts)	Maximum Peak Gust (kts)	Estimated Max. Speed (kts)	
				1-Minute Speed	10-Minute Speed
January	ENE (14)	15.0	83	68.4	54.8
February	ENE (17)	15.7	65	53.7	43.2
March	ENE (26)	18.1	54	44.5	35.8
April	ENE (32)	18.7	52	43.0	34.4
May	ENE (38)	17.9	38	31.5	25.3
June	ENE (38)	18.3	36	29.5	23.7
July	ENE (42)	18.7	40	33.0	26.4
August	ENE (41)	18.3	46	37.9	30.5
September	ENE (35)	16.1	55	45.3	36.4
October	ENE (29)	15.6	37	30.5	24.5
November	ENE (29)	16.5	80	65.9	52.9
December	ENE (24)	16.1	56	46.1	36.9
Overall	ENE (31)	17.1	83	68.4	54.8

TABLE 2.3. RETURN PERIODS VERSUS WIND SPEEDS (KANEOHE BAY MCAS)

RETURN PERIOD (YEARS)	PEAK GUST (kts)	1-MINUTE WIND SPEED (KTS)	10-MINUTE WIND SPEED (KTS)
2	46.0	37.9	30.5
5	58.1	47.8	38.5
10	66.4	54.8	43.9
25	76.8	63.2	50.7

Table 2.4 shows the annual percent frequency distributions for waves measured at the buoy location. The wave height is a spectrally based significant wave height, which is derived from the reported energy spectrum. The wave period is associated with the highest energy in the reported spectrum.

During the 10-month duration, wave periods ranged from 4.0 to 22.2 seconds. The largest waves occurred in February and August with wave periods ranging from 8 to 10 seconds, with the highest wave height of 14.8 feet recorded in August. In general however, larger and longer period waves were recorded in the winter months than in the summer months. Approximately 90 percent of waves had a wave period less than 12 seconds, indicating almost 90 percent of the reported waves were locally generated seas, and only 10 percent were swell (long period waves produced by distant storms).

2.3.1 Hurricane Waves

In any given year, one or more hurricanes can be expected to occur in the central North Pacific Ocean. Although hurricanes occur only infrequently in the immediate vicinity of Hawaii, they do occasionally pass near the islands. Notable recent examples are Hurricane Iwa, which passed within 30 miles of Kauai in 1982, and Hurricane Iniki, which passed directly over Kauai in 1992. Because hurricanes directly impact the Hawaiian Islands at such infrequent intervals, it is difficult to calculate a statistically meaningful return period.

Wave hindcasts of Hurricanes Iwa and Iniki for the project area on the windward coast of Oahu indicated that the waves generated in those hurricanes approached from the southeast through the west (clockwise), preventing those waves from directly approaching the project site. A report *Windward Oahu Hurricane Vulnerability Study* (Sea Engineering, Inc., 1990) prepared for State of Hawaii Department of Defense and U.S. Army Corps of Engineers, Pacific Ocean Division, considered the impact of four hurricane scenarios on the windward coast of Oahu. The conditions considered included two hurricane intensities, typical and worst-case, and two approach directions, east-southeast and south-southwest, for a total of four scenarios. Calculated deepwater wave conditions for the coast under these scenarios varied from 18.8 feet with a period of 9.5 seconds to a worst cast of 40.1 feet, with a period of 14.0 seconds.

Storms with hurricane intensity rarely pass directly north of the Hawaiian Islands. The most recent historical hurricane passing north of the islands was Hurricane Hiki in 1950.

2.3.2 Nearshore Wave Heights

As deepwater waves propagate toward shore, they begin to encounter and be transformed by the ocean bottom. The process of wave shoaling generally steepens the waves and increases the wave height. The refraction phenomenon will cause wave crests to bend and may locally increase or decrease the wave heights. Wave breaking occurs when the wave shape becomes too steep to be maintained. This typically occurs when the ratio of wave height to water depth is about 0.8, and is a mechanism for dissipating the wave energy.

The coastline on either side of Kahana Bay has broad fringing reefs, over 6,000 feet in width, that extend from the shoreline and protect the coast from direct wave impact. Waves propagating from deep water break on the fringing reefs, thereby dissipating the wave energy. The waves will re-form as they approach the shore, but with a smaller wave height. These waves in shallow water are termed "depth-limited" because their maximum size is governed by the water depth.

2.3.3 Nearshore Wave Patterns

There are two primary directions of wave incidence at the site. Tradewind waves approach from the northeast through east, and north swells approach from the northwest through west. The approach directions are modified in shallow water by the process of wave refraction, by which waves typically bend to become more parallel to the shore. Nevertheless, waves due to north swells and north winds will tend to cause erosion of the shoreline northwest of the bridge and accretion on the southeast side. This pattern is reversed for tradewind conditions.

The wave refraction process causes waves to focus on submerged promontories and wrap around shallow structures. Waves will tend to wrap into the curved reef system at Kahana Bay and dissipate through the breaking process. Even waves that approach directly from the northeast (head-on to the bay) will lose some of their energy due to wave breaking at the sides of the bay.

2.4 Tide and Water Level Rise

The tides in Hawaii are semi-diurnal with pronounced diurnal inequalities; that is, there are two tidal cycles per day with unequal water level ranges. *Tide Tables 2003,* based on tide data from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey (2002), shows that the mean tide range is 1.2 ft. and the diurnal range is 2.0 ft at Moku o'Loe Island, Kaneohe Bay, the nearest station to the Kahana Bay project site. Tidal data are as follows:

Table 2.5. Tidal Data

	MLLW Datum (ft)	MSL Datum (ft)
Mean Higher High Water	2.0	1.0
Mean High Water	1.6	0.6
Mean Tide Level	1.0	0.0
Mean Low Water	0.4	-0.6
Mean Lower Low Water	0.0	-1.0

During severe storm events a "super elevation" of the water level at the shore may occur. The rise in stillwater level along the shore during a hurricane or other storm event is due to a combination of the astronomical tide, wave setup, and storm surge due to reduced atmospheric pressure and wind stress.

During storm wave attack the nearshore water level may be elevated above the tide level by the action of breaking waves offshore. This water level rise, termed wave setup, may be as much as 10 to 12% of the breaker height. Thus, the water level could be elevated an estimated 1 to 2 feet during severe storm wave conditions. Local bathymetric conditions and shoreline contours may also play a part in creating resonant surges that increase water levels during wave activity.

During hurricane conditions an additional water level rise due to wind stress and reduced atmospheric pressure can occur. This storm surge can potentially add another 1 to 2 feet to the stillwater level. For example, during the 1992 passage of Hurricane 'Iniki over Port Allen Harbor on the island of Kaua'i, a National Weather Service tide gauge recorded a water level rise of 4.9 feet above the predicted tide elevation.

In the *Windward Oahu Hurricane Vulnerability Study* (SEI 1990), the maximum water level rise in the Kahana area for a worst-case scenario hurricane is 5.6 to 5.8 feet above the tide level. More typically, however, a large north swell may produce a water level rise on the order of 1 to 1.5 feet above the tide level.

2.4.1 Stillwater Level And Nearshore Wave Heights (Discussion)

As noted above, nearshore wave heights are limited by the water depth. Water level rise due to wave setup or storm surge, added to high tide levels, will therefore increase the size of nearshore waves. For example, during a condition of spring high tide coupled with high north swell or tradewind waves, one can expect beach changes to occur because of both the increased wave height and the increased accessibility of the shore due to higher water levels.

2.5 Tsunamis

The Hawaiian Islands have a history of destructive tsunamis. Since 1819, 22 severe tsunamis have occurred, with wave heights ranging from 4 to 60 feet. The resultant tsunami wave height at the Hawaii coastline during a given occurrence varies greatly from location to location. The height is affected by a number of factors including offshore bathymetry, coastal configuration, and exposure to the generating area. Historical tsunami wave heights near the project location reached 8 feet during the 1960 tsunami (Loomis, 1976).

Tables and methods in the *Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawaii* (U.S. Army Corps of Engineers, Pacific Ocean Division, 1978) show the predicted 10-year tsunami wave height for the project area is 3.0 feet above mean sea level at a point 200 feet inland of the coastline. The calculated 25-year height is 5.1 feet, and the 100-year height is 7.5 feet, again assuming a theoretical measurement 200 feet inland. The methodology in the manual has been used to develop the Flood Insurance Rate Maps (FIRM) for the state. The FIRM map for the region shows a base flood elevation of 8 feet with no VE Zone (area where wave action and/or high velocity water can cause structural damage). There is no record of bore formation in this area of Oahu, so the tsunami can be expected to take a form of a rapidly rising and falling tide, with a wave period of approximately 10 to 15 minutes.

TABLE 2.4. ANNUAL PERCENT FREQUENCY DISTRIBUTION FOR WAVES AT THE MOKAPU POINT BUOY

SITE : MOKAPU POINT BUOY
WATER DEPTH: 330 FEET MLLW

HEIGHT (Ft)	WAVE PERIOD (SEC.) 2.0- 4.0	4.0- 6.0	6.0- 8.0	8.0-10.0	10.0-12.0	12.0-14.0	14.0-16.0	16.0-18.0	18.0-20.0	20.0-22.0	22.0-24.0	TOTAL
0 - 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 - 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 - 3	0.00	0.00	0.36	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
3 - 4	0.00	0.25	2.44	1.97	0.58	0.26	0.11	0.03	0.00	0.00	0.00	5.64
4 - 5	0.00	2.54	4.86	5.14	2.61	1.19	0.38	0.11	0.06	0.02	0.01	16.92
5 - 6	0.00	2.81	5.75	8.61	2.48	1.19	0.54	0.10	0.13	0.02	0.00	21.63
6 - 7	0.00	1.51	6.34	8.54	2.17	0.70	0.61	0.25	0.14	0.01	0.00	20.28
7 - 8	0.00	0.20	5.22	6.67	1.22	0.38	0.78	0.20	0.14	0.00	0.00	14.82
8 - 9	0.00	0.07	2.97	4.59	1.34	0.25	0.49	0.24	0.06	0.00	0.00	10.01
9 - 10	0.00	0.00	0.92	2.87	1.22	0.20	0.13	0.11	0.00	0.00	0.00	5.45
10 - 11	0.00	0.00	0.20	1.29	1.19	0.09	0.01	0.01	0.00	0.00	0.00	2.80
11 - 12	0.00	0.00	0.05	0.59	0.63	0.02	0.00	0.00	0.00	0.00	0.00	1.29
12 - 13	0.00	0.00	0.02	0.24	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.47
13 - 14	0.00	0.00	0.00	0.09	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.16
14 - 15	0.00	0.00	0.00	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.11
TOTAL	0.00	7.38	29.15	40.75	13.73	4.29	3.06	1.06	0.52	0.06	0.01	100.00

THE TOTAL NUMBER OF DATA = 14156
THE RANGE OF WAVE HEIGHTS (Ft) : 2.2 - 14.7
THE RANGE OF WAVE PERIODS (SEC.) : 4.0 - 22.2

THE WAVE HEIGHT IS THE SPECTRALLY BASED SIGNIFICANT WAVE HEIGHT.
THE WAVE PERIOD IS THE PERIOD ASSOCIATED WITH THE SPECTRAL PEAK.

3.0 EXISTING SHORELINE CONDITIONS

3.1 Description of the Project Shoreline and Coastal Processes

The project site is located on the windward shore of the island, and is directly exposed to tradewinds and tradewind-generated waves, although the fringing reefs and deeply recessed bay morphology offer significant protection from wave action.

Bridge No. 8 crosses the flood channel of Kahana stream, one of the major streams on the windward side of Oahu. Fluvial processes that occurred during ancient low sea level stands constructed a deep channel system that is incised into the offshore region.

The bay is bounded both north and south by extensive shallow fringing reefs that are over 6,000 ft. in width. These offer protection from incident waves by forcing waves to break and dissipate energy far from the coastline.

There are a number of factors that make the sand beach at Kahana Bay unusually stable:

- Wave breaking on the fringing reefs reduces the amount of wave energy reaching the shore.
- The deep recession of the bay traps sand between two prominent headlands.
- The headland and bay morphology forces incident waves to be orthogonal to the beach, so there is minimal longshore transport of sediment.

As a result, there do not appear to be any erosion problems at Kahana Bay in the vicinity of the north bridge. Sand has filled in the channel on the ocean side of the bridge, so that it is breached only during extreme flood conditions. At all other times, drainage occurs only at the south bridge and stream location. The beach at Kahana Bay is set in a wide crescent that slowly tapers to the south stream location (see Figures 2 and 3). The widest part of the beach is at the project area. The highest point on the beach, the berm crest, is a conspicuous and unbroken feature on this beach. It is produced by wave uprush and sediment deposition, and as such, is indicative of normal high water levels and wave conditions (i.e. spring tides, and average tradewind-generated waves). During extreme tides or very large waves, one should expect wave uprush to overtop the existing berm and modify the beach profile.

As a general rule, beaches will orient to face the incident wave direction. Waves that are incident at an angle to the shoreline will tend to cause longshore transport of the beach sand. Changing wave directions will therefore cause adjustments of the beach plan shape to be made. However, the recessed bay morphology of Kahana Bay limits the angle of exposure of the beach to incident waves, and the beach planform is therefore unusually stable.

3.2 Coastal Hazards History

The beach at Kahana Bay is unusually stable. Because it is known to be a stable shoreline, a published shoreline history is not available for Kahana Bay. However, a beach profile near the project site from 1963 (Moberly and Chamberlain, 1964) appears similar to one measured during

the recent SEI site visit. In the 1964 report, the authors report that the beach was cut back 100 ft. during a storm in 1963, but half that loss was recovered 3 months later. The established shoreline vegetation is robust, with no signs of root exposure or other indications of erosion. Cross-shore profiles measured by SEI seven months apart showed that the beach at the project site had accreted by at least 15 feet. Therefore, although the beach is apparently stable, there are short-term dynamic changes.

3.3 Site Visit

SEI and AECOS Consultants conducted a visit to the project site on April 23, 2002 to assess the shoreline conditions and coastal processes at the site. SEI conducted a follow-up visit on December 3, 2002, and AECOS conducted a follow-up visit on May 12, 2003. One cross-shore profile was measured from the existing bridge into the water. The profile is shown in Figure 7. The profile was located at the first span of the bridge.

The profile in Figure 7 shows a long slow rise over 200 feet to the berm crest. During the April 23 visit, the area between the bridge and the berm crest was covered by low vegetation (Figure 8). The berm crest was a well-defined and continuous feature along the stretch of beach near the project site. The presence of vegetation was an indication that the sandy area between the bridge and the beach berm crest had been stable for a long period of time (on the order of a year). Figure 9 was taken on April 23 and shows the vegetation behind the berm crest. Figure 10, taken on December 3 shows almost no vegetation in the same area. A pace traverse of the site during the December visit indicated that the berm crest was at least 15 feet further seaward than it had been in April. A very large swell from the northeast had occurred within a week of the visit, and the fresh sand surface that replaced the vegetation was an indication of substantial wave overwash and consequent deposition of sandy sediment. The sand plug next to the bridge on 4-23-02 is shown in Figure 11. Changes seen in the May, 2003 visit (Figure 4), include lack of vegetation on the sand and encroachment of the *muliwai* on the *makai* side of the bridge.

Although the sandy area between the bridge and the beach berm is apparently quite stable, the fact that it does not support permanent vegetation indicates that it is in fact a dynamic zone subject to both flooding and wave inundation. The sandy beach berm will likely breach during rare extreme flood conditions, and overwash during high wave and water level conditions.

3.4 Vegetation

Given that the area of natural environment surrounding the stream mouth is rather limited, a complete listing of plant species present and their relative abundance was generated during field surveys in April 2002 and May 2003 (see Table 3.1).

Because of the small project area and proximity to the ocean where sandy soil and salty air tend to limit the number of species able to survive, a relatively small total number of species (39) were recorded. Further, the area around the existing bridge is mostly maintained as lawn and parking. Species present are generally non-native grasses and weedy or ruderal species growing on park lawns, the parking area, and maintained edges of the highway. The sandy soil between the highway and the beach is dominated by ironwood trees (*Casuarina equisetifolia*), false

kamani (*Terminalia catappa*), spider lily (*Crinum asiaticum*), and a lawn dominated by buffalo or St. Augustine grass (*Stenotaphrum secundatum*). Areas on the mauka side are similar, except that the dominant tree is a grove of coconut (*Cocos nucifera*).

In *makai* areas less shaded by trees and out across the (upper) sand beach occur seashore rushgrass (*Sporobolus virginicus*), beach morning-glory or *pohuehue* (*Ipomoea pes-caprae*), and beach pea or *nanea* (*Vigna marina*). It seems evident that at least once between the first survey in April 2002 and the more recent survey in May 2003, that the sand plug had been overtopped by floodwater or storm waves and the sand and vegetation removed. In April 2002 this area was covered by grasses; in April 2003 the sand was mostly bare with strand plants sparse (mostly seashore rushgrass), but slowly reclaiming the area.

The edges of the estuary on the *makai* side of the bridge were generally barren of vegetation in May 2003. Previously this area had supported seashore paspalum (*Paspalum vagnatum*). Some *'ae'ae* (*Bacopa monnieri*) was observed along the shore in 2003. A few seedlings of red mangrove (*Rhizophora mangle*) were also present. The area most different in terms of shore vegetation is on the southeast side of the existing bridge, where *hau* (*Hibiscus tiliaceus*) dominates. This type of shore is, however, very typical of the shoreline of the lower reach of Kahana Stream upstream of the highway.

Table 3.1. Checklist of plants found in the vicinity of the Kamehameha Highway North Kahana Stream Bridge, windward O`ahu.

Species	Common name	Status	ABUNDANCE
FLOWERING PLANTS			
DICOTYLEDONES			
APIACEAE			
Centella asiatica (L.) Urb.	Asiatic pennywort	nat.	P
ASTERACEAE (COMPOSITAE)			
Bidens alba (L.) DC	beggar's tick	nat.	R
Conyza cf. *bonariensis* (L.) Cronq.	hairy horseweed	nat.	R
Parthenium hysterophorus L.	false ragweed	nat.	R
Pluchea carolinensis (Jacq.) G. Don	sourbush	nat.	R
Sonchus oleraceus L.	*pualele*, sow thistle	nat.	R
Sphagneticola trilobata (L.) Pruski	wedelia	nat.	C
CASUARINACEAE			
Casuarina equisetifolia L.	ironwood tree	nat.	C
COMBRETACEAE			
Terminalia catappa L.	false kamani	nat.	C
CONVOLVULACEAE			
Ipomoea pes-caprae (L.) R. Br.	*pohuehue*	ind.	O
EUPHORBIACEAE			
Chamaesyce hirta (L.) Millsp.	garden spurge	nat.	P

Species	Common name	Status	ABUNDANCE
FABACEAE			
Medicago lupulina L.	black medic	nat.	P
Mimosa pudica L.	sensitive plant	nat.	U
Vigna marina (J. Burm.) Merr.	*nanea*, beach pea	**ind.**	O
GOODENIACEAE			
Scaevola sericea Vahl. (seedling)	*naupaka kahakai*	**ind.**	R
MALVACEAE			
Hibiscus tiliaceus L.	*hau*	**pol.**	C
Malvastrum coromandelianum (L.) Garcke	false mallow	nat.	P
OXALIDACEAE			
Oxalis corniculata L.	*'ihi 'ai*	**pol.**	U
PLANTAGINACEAE			
Plantago lanceolata L.	narrow-leaved plantain	nat.	O
Plantago major L.	common plantain	nat.	C
PORTULACACEAE			
Portulaca oleracea L.	pig weed	nat.	P
PRIMULACEAE			
Anagallis arvensis L.	scarlet pimpernel	nat.	P
RHIZOPHORACEAE			
Rhizophora mangle L. (seedlings)	red mangrove	nat.	R
RUBIACEAE			
Spermacoce assurgens Ruiz & Pavon	buttonweed	nat.	P
SCROPHULARIACEAE			
Bacopa monnieri (L.) Wettst.	*'ae 'ae*	**ind.**	O
MONOCOTYLEDONES			
ARECACEAE			
Cocos nucifera	*niu*, coconut palm	**pol.**	C
CYPERACEAE			
Cyperus alternifolius L.	umbrella sedge	nat.	R
Cyperus gracilis R. Br.	McCoy grass	nat.	P
Cyperus rotundus L.	nut grass	nat.	R
Kyllinga nemoralis (J.R.&G. Forster) Dandy ex Hutch.& Dalz.	*kili'o'opu*	nat.	P
LILIACEAE			
Crinum asiaticum L.	spider lily	nat.	O
POACEAE (GRAMINEAE)			
Brachiaria mutica (Forssk.) Stapf	California grass	nat.	P
Chloris barbata (L.) Sw.	swollen fingergrass	nat.	P
Cynodon dactylon (L.) Pers.	Bermuda grass	nat.	U
Eleusine indica (L.) Gartn.	beach wiregrass	nat.	O
Paspalum vaginatum Sw.	seashore paspalum	nat.	R
Sporobolus virginicus (L.) Kunth	seashore rushgrass	**ind.**	C
Stenotaphrum secundatum (Walt.) Ktze.	buffalo grass	nat.	AA

Species	Common name	Status	ABUNDANCE
indet. lawn grass	--	nat.	A

Table 3.1 Legend:
Status = distributional status
end. = endemic; native to Hawaii and found naturally nowhere else.
ind. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

orn. = exotic, ornamental; plant not naturalized at this location (not well-established outside of cultivation).
pol. = Polynesian introduction before 1778.
Abundance = occurrence ratings for plants
P – Present - recorded in April 2002; not seen in May 2003 survey.
R – Rare - only one or two plants seen.
U - Uncommon - several to five plants observed.
O - Occasional - found between five and ten times; not abundant anywhere.
C - Common - considered an important part of the vegetation and observed numerous times.
A - Abundant - found in large numbers; may be locally dominant.
AA - Abundant - abundant and dominant; defining vegetation type.

3.5 Aquatic Biota

Observations during this survey were limited to the vicinity of the Kamehameha Highway Bridge and the *muliwai* for a short distance upstream and downstream of the bridge. Kahana Stream is ranked as "Outstanding" for aquatic resource value by the State (Hawaii Cooperative Park Service Unit, 1990), with two native aquatic species reported present or abundant in DLNR surveys: *'o'opu nakea* (*Awaous guamensis*) and *'o'opu nopili* (*Sicypoterus stimpsoni*).

Our brief survey of the inactive channel part of the estuary revealed (Table 3.2) quite a few aquatic species present in just a small part of the estuary with sand bottom and a few boulders along the shore. The native prawn and fishes are anadromous, meaning that they migrate to and from the ocean. The estuary is a gathering point for the juvenile 'o'opu, which will migrate upstream as they grow larger. *'O'opu akupa* and *'opae 'oeha'a* are common native residents (remain as adults) in the estuarine environment. On the other hand, the *'ama'ama* and *aholehole* reside in the estuary as juveniles and migrate into the ocean as they grow. It is clear from our list of species alone that the Kahana estuary is an important nursery area where juveniles of both stream and sea creatures start their early life.

Table 3.2. Checklist of aquatic biota observed in the inactive channel of Kahana Estuary at the North Kahana Kamehameha Highway Bridge.

Species	Common name	Status	QC Code	Abundance
	INVERTEBRATES			
ARTHROPODA, CRUSTACEA	(crustaceans)			
GRAPSIDAE				
Metapograpsus thukuhar	*'alamihi*	**ind**	10	O
PALIEMONIDAE				
Macrobranchium grandimanus (Randall)	*'opae 'oeha 'a*	**end**	20	C
Palaemon debilis (Dana)	grass shrimp	nat	20	C
	VERTEBRATES			
VERTEBRATA, PISCES	(fishes)			
CICHLIDAE				
Sarotherodon sp.	tilapia	nat	10	O
ELEOTRIDAE				
Eleotris sandwicensis (Vallant & Sauvage)	*'o 'opu 'akupa*	**end**	10	U
GOBIDAE				
Awaous guamensis (Valenciennes)	*'o 'opu nakea*	**ind**	10	A
KUHLIIDAE				
Kuhlia sandvicensis (Steindachner)	*aholehole*	**end**	10	C
MUGILIDAE				
Mugil cephalus L.	*'ama 'ama*	**ind**	10	A
POECILIIDAE				
Xiphophorus helleri Heckel	green swordtail	nat	10	U

KEY TO SYMBOLS USED IN TABLE 3.2:

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 May 12, 2003.
20 – Collected; identified in the laboratory; specimen(s) not saved.

Abundance categories:

R – Rare – only one or two individuals seen.
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.
P – Present – noted as occurring, but quantitative information lacking.

3.6 Water Quality

The waters of Kahana Stream are diverted in numerous places upstream, so outflow is much reduced from former times (Timbol & Maciolek, 1978). The US Geological Survey (USGS) has a continuous gage station (16296500) located at 30 ft elevation on Kahana Stream. Based upon 41 years of data from this station (1959 - 2000), the annual mean flow of Kahana Stream is 36.3 ft^3/s (USGS, 2001). According to provisional data, on May 12, 2003 the minimum flow measured was 15 ft^3/s, the mean was 47.0 ft^3/s, and the maximum was 407 ft^3/s (USGS, 2003).

Basic water quality measurements were made on May 12, 2003 in two places in the estuary around the North Kahana Bridge to characterize this body of water. The results are summarized in Table 3.3. The measurements were made with a field instrument (YSI 85) by wading a short distance from the left bank into the shallow water and lowering a probe to about mid-depth. One measurement was taken from the *makai* side of the bridge and one measurement was taken from the *mauka* side.

Table 3.3. Field measurements of basic water quality in the estuary of North Kahana Stream measured on the afternoon of May 12, 2003.

TEMP (°C)	CONDUCTIVITY (µS)	DO (mg/l)	DO % sat	TIME (May 12)	NOTES
24.7	3640 (1.9 ‰)	6.49	79	15:25	Northwest side of bridge
					BRIDGE
24.2	3309 (1.7 ‰)	6.25	75	15:30	Southwest side of bridge

Because this part of the stream is an estuary where stream flow and coastal marine waters can mix, all of the parameters measured can be expected to vary over time as the tide rises and falls and as stream flow increases and decreases dependent upon rainfall in Kahana Valley. The results for the afternoon of May 12 correspond in time with a flooding tide, just after the higher high water (HHW) of 1.47 ft (Anon, 2003).

The salinity and conductivity levels were very low. The estuary receives some influence from the nearby bay, but the water quality of the estuary in the project area is dominated by outflow from Kahana Stream. The temperature and dissolved oxygen (DO) levels measured are appropriate for these waters. These levels may change depending upon the stream flow, time of day, and amount of sunlight.

The Hawaii Department of Health (DOH) collected water samples along the coastline of Kahana Bay from 1973 to 1998 and analyzed them for temperature, dissolved oxygen, pH, salinity, total suspended solids, nutrients and bacteria. Sometime prior to 2002, based upon the department's review of these data and visual observations, Kahana Bay (out to the 30 ft depth contour) was determined to violate the water quality standards for turbidity and total suspended solids and the bay was placed on the List of Impaired Waterbodies (DOH, 2002). In 2002, DOH reanalyzed existing data (collected from 1995 - 2001) and revised the list based upon a new methodology with standard listing and delisting criteria to assess data (DOH, 2002). The entire Kahana Bay remains on the list as impaired for turbidity and total suspended solids (because sufficient data have not been collected throughout the bay to warrant its delisting) and Kahana Bay Station No. 1 (located next to the boat ramp on the north side of the bay) has been added to the list of impaired waterbodies for violation of turbidity, bacteria, and nutrient criteria (DOH, 2002). Kahana Bay and Station No. 1 are given a "low" priority for Total Maximum Daily Load (TMDL) development (DOH, 2002).

From 1976 - 1985 DOH collected bottom sediments from the mouth of Kahana Stream and analyzed them for pesticides and metals (USEPA, 1998). The sediments do not appear to have been contaminated with any of the pesticides or metals tested for, but the detection limits of the analyses appear to be well above the sediment quality criteria established by the US Environmental Protection Agency (USEPA, 2003)[1].

[1] Method numbers and detection limits are not reported in Storet and values are reported as actual numbers, not as a "not detected" or "less than" values. However, because the values for each parameter over the time period remained the same, we assume that the reported value is the detection limit and none of the parameters were detected in the Kahana samples.

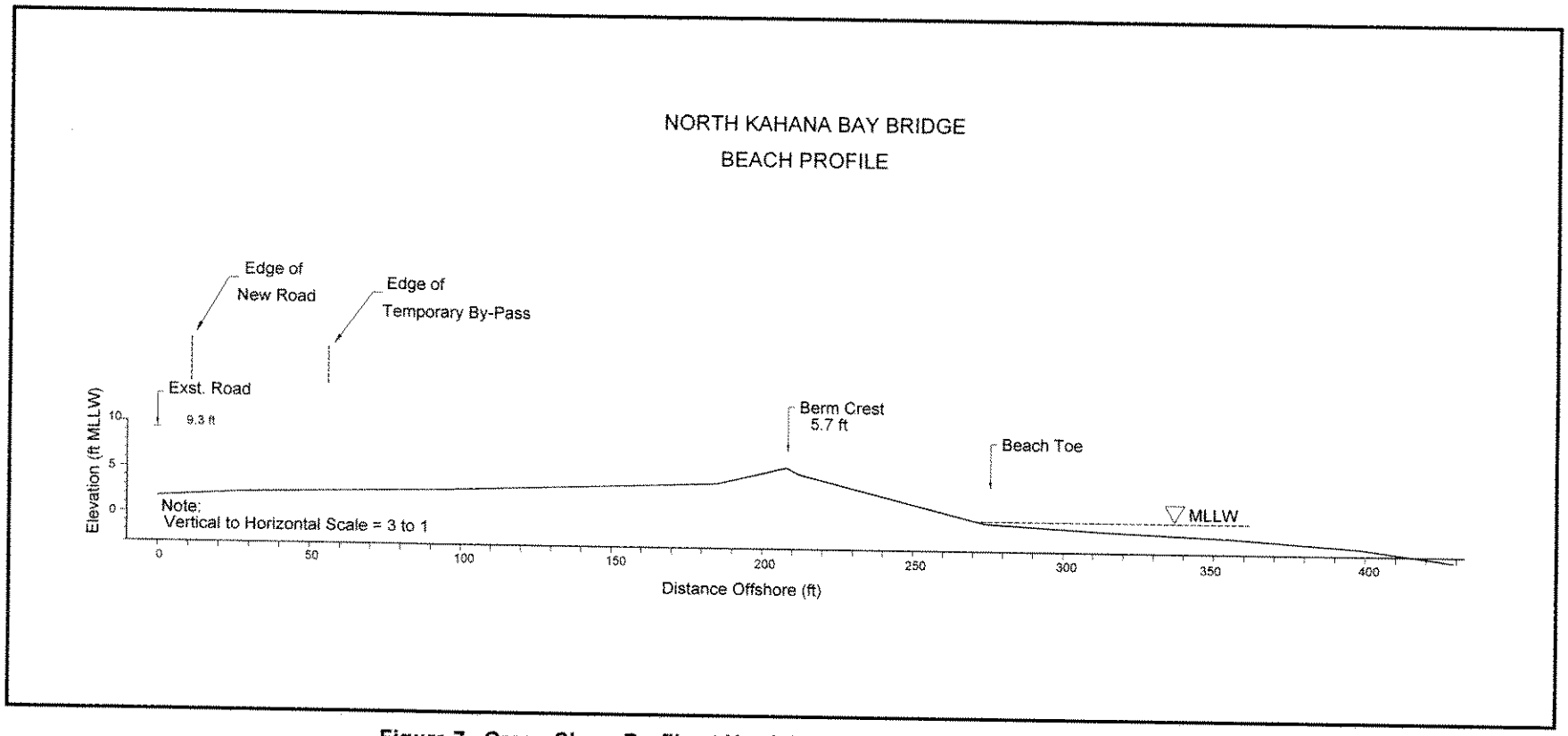


Figure 7. Cross-Shore Profile at North Kahana Bay Bridge Measured 4/23/02

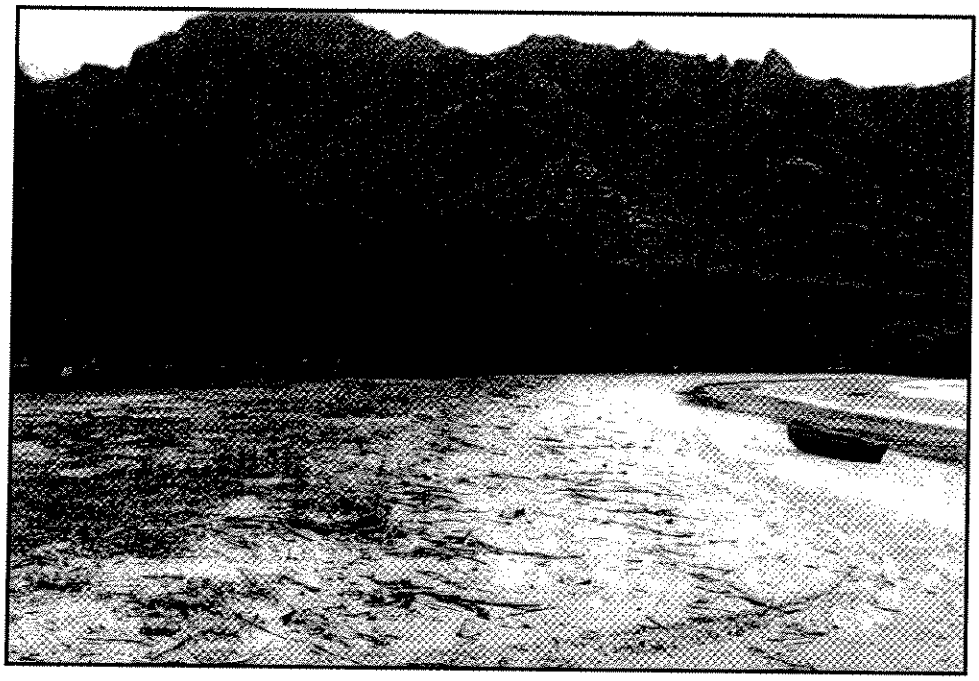


Figure 8. Crescent shaped beach and well established berm crest (4/23/02)

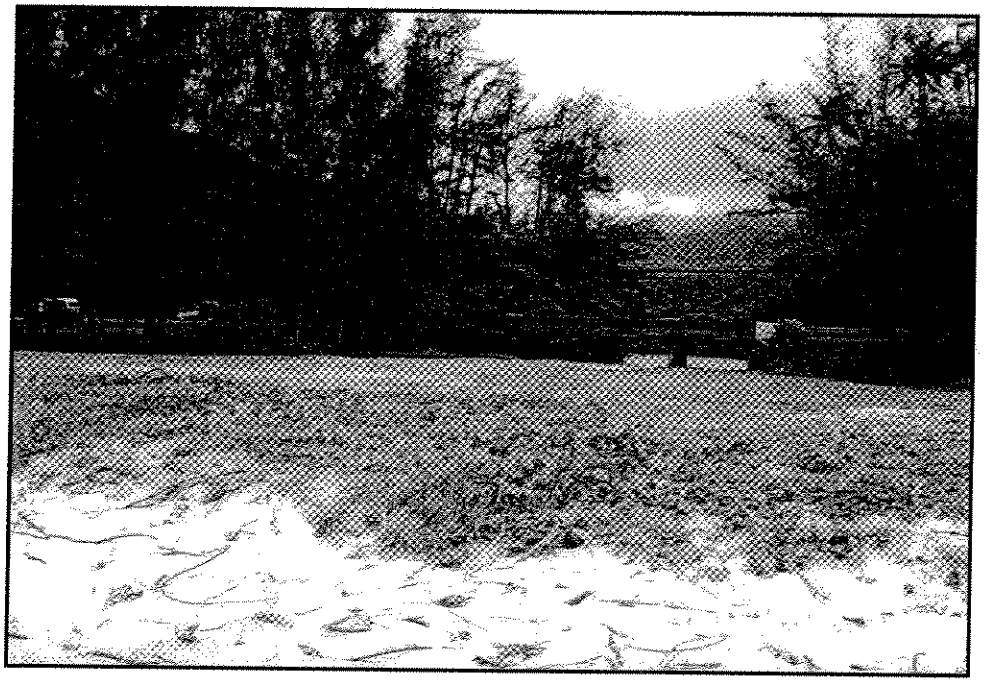


Figure 9. Berm crest with beach vegetation, 4/23/02

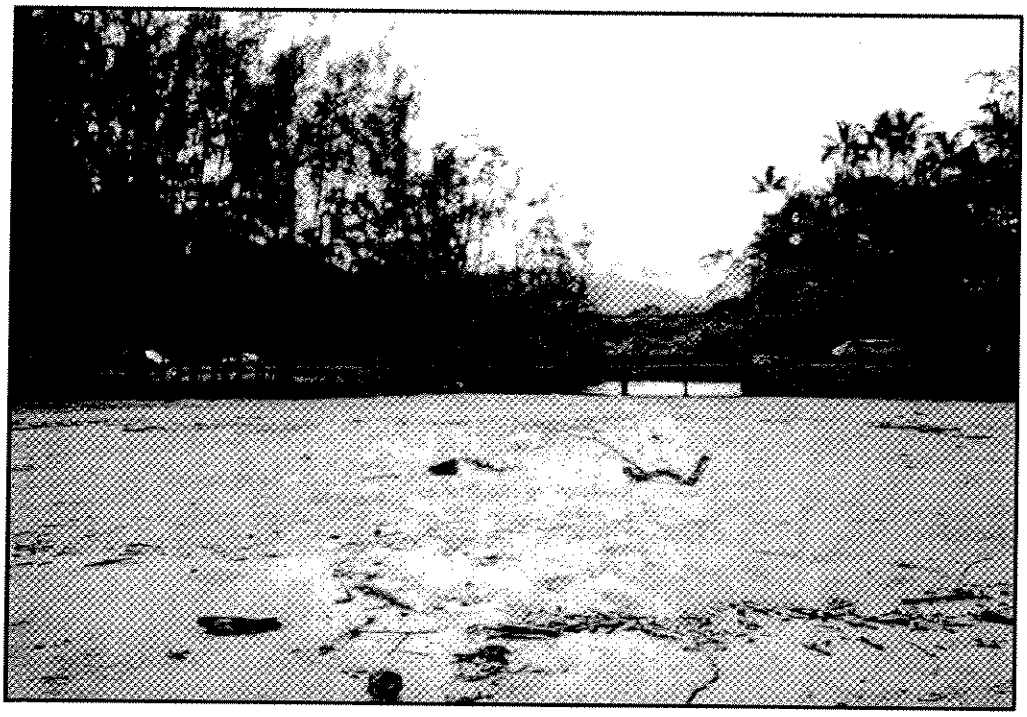


Figure 10. Results of overwash,12/3/02

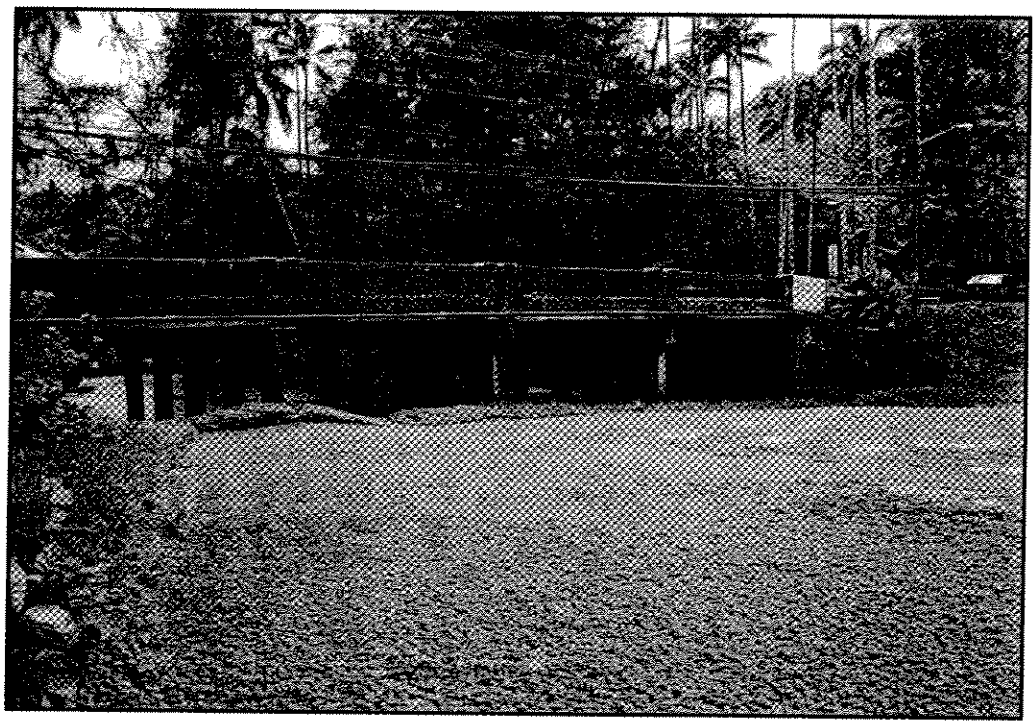


Figure 11. Sand plug and *muliwai*, 4/23/03

4.0 POTENTIAL IMPACTS

4.1 Shoreline Impacts

Although approximately 14 feet wider than the existing structure, the new bridge is far removed from active coastal processes, and is therefore not likely to impact the beach. The temporary by-pass road will be built almost 60 feet closer to the shoreline, but there will still be 140 feet of sand beach between it and active beach processes as delineated by the beach berm crest. Impacts on beach processes occur when structures become accessible to the action of ocean waves, thereby causing scouring, wave reflection and offshore transport or other impounding of coastal sediments. Direct impacts will therefore not occur as long as erosion and shoreline retreat do not place the project structures in a position accessible to sustained wave action. This is unlikely to happen as this shoreline has a history of unusual stability.

Rare events, including wave overwash of the berm crest, and breaching of the berm by flooding, could cause some damage to the by-pass road. These possibilities should be kept in mind for the structure design and construction. Light armoring of the road could prove useful to minimize any damage from these rare events.

An extensive amount of vegetation will necessarily be removed for construction of the by-pass road. Removing vegetation from a shoreline threatened by erosion is often not a good idea, as the vegetation can help stabilize the shoreline embankments. In this case, however, the vegetation to be removed is in the backshore area far from active beach processes. In addition, at least 40 feet of well-established vegetation will remain between the bypass road and the existing vegetation line.

Some fishing occurs just off the shore in this area which has good public access. The primary recreational activities here are camping, relaxation on the beach, and swimming. The area is a beach park and regularly used by beach-goers, although is only crowded during summer camping season.

4.2 Impacts on Biota

The number of plant species in the project area is relatively small and dominated by roadside weeds and coastal strand species, many of the latter being indigenous (native plants that occur generally throughout the Pacific islands) or early Polynesian introductions. In fact, 20% of the species recorded are considered native (all indigenous or early Polynesian introductions). These are species generally common near the shore around O'ahu, particularly on the wetter, windward side. None of these 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, 1999a, b, 2001).

The bridge proposed for this site will be wider that the existing structure; most of the new width will come out of the *makai* parcel. The temporary bypass road will also be built *makai* of the existing road. This will require the removal of ironwood and false *kamani* trees. The larger

plants on the parcel, particularly the ironwood and false *kamani* comprise significant visual elements contributing to the ambiance of Ahupua'a o Kahana State Park and motorists traveling north and south along Kamehameha Highway. However, none of the trees in the way of the widened bridge and clearly in the way of a proposed temporary bypass road are special. Their removal should be viewed as an opportunity to replace the existing vegetation dominated by Australian ironwood with more desirable strand trees and shrubs, such as *naupaka* (*Scaevola sericea*), *kamani* (*Calophyllum inophyllum*), *hala* (*Pandanus tectorius*), and *niu* or coconut. These are indigenous and early Polynesian introductions more appropriate to the cultural values of the State Park. A negative impact would be the loss of shade in the middle of the park until the bypass road is removed, new plantings established, and these grown to a size to provide shade comparable to that presently available. As long as adequate shaded areas remain in other parts of this large shoreline park, the tradeoff to acquire native strand trees should be acceptable.

4.3 Water Quality Impacts

The sandy nature of the substratum at the project site suggests water quality problems could be minimal from pushing beach sand in the construction area. If construction is scheduled for dry months (summer period) and the estuary and construction area are suitably isolated from the ocean, water quality impacts to the nearshore environment can be largely avoided. Impacts to the estuary are unavoidable in the project area, although would be entirely short-term if a bridge structure similar to the existing one is built.

5.0 REFERENCES

Anonymous. 2003. WWW Tide and Current Predictor website. Honolulu, Oahu (Hawaii). [URL: www. http://tbone.biol.sc.edu/tide].

Clark, J. R. K. 1977. *Beaches of Oahu.* The University Press of Hawaii, Honolulu. 193 pp.

Coulbourne, W.T., 1971. *Sedimentology of Kahana Bay, Oahu, Hawaii.* Hawaii Institute of Geophysics Report HIG-71-14 (UNIHI – Sea Grant –TR-71-03), University of Hawaii at Manoa

Federal Emergency Management Agency (FEMA), 1995. *Guidelines and Specifications for Wave Elevation Determination and V Zone Mapping.* Federal Emergency Management Agency, Federal Insurance Administration.

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

Federal Register. 1999b. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions. *Federal Register*, 64 (205 (Monday, October 25, 1999)): 57534-57547.

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

Geographic Decision Systems International, and E. P. Dashiell. 1994. *State definition and delineation of watersheds.* Prep. for State of Hawaii, Office of State Planning, Coastal Zone Management Program. Geographic Decision Systems International.

Haraguchi, P., 1984. *Hurricanes in Hawaii*, Prepared for Department of the Army, Pacific Ocean Division, Corps of Engineers.

Hawaii Cooperative Park Service Unit. 1990. *Hawaii stream assessment. A preliminary appraisal of Hawaii's stream resources.* Prep. for State of Hawaii, Commission on Water Resource Management. National Park Service, Hawaii Cooperative Park Service Unit, Rept. No. R84: 294 pp.

ISMCS, 1966. *International Station Meterological Climate Summary, ver. 4.0*: CD-ROM jointly produced under authority of: Commander, Naval Meteorology and Oceanography Command, Federal Climate Complex Asheville.

Lighthouse Press, 2001. *Tide Tables 2002.*

Loomis, H.G. 1990; *Tsunami Wave Runup Heights in Hawaii.* Hawaii Institute of Geophysics, Report No. HIG-76-5

M&E Pacific, Inc. 1978. *Manual For Determining Tsunami Runup Profiles on Coastal Areas of Hawaii*, Prepared for Department of the Army, Pacific Ocean Division, Corps of Engineers.

Sea Engineering, Inc., 1990. *Windward Oahu Hurricane Vulnerability Study, Determination of Coastal Inundation Limits*, Prepared for State of Hawaii Department of Defense and U.S. Army Corps of Engineers, Pacific Ocean Division.

Sea Engineering, Inc., 1989. *Oahu Shoreline Study, Part1: Data on Beach Changes (1989),* Prepared for the City and County of Honolulu Dept. of Land Utiization.

State of Hawaii - Department of Health (DOH). 2002. *Final 2002 list of impaired waters in Hawaii; prepared under Clean Water Act §303(d).* Environmental Planning Office. 61 pp

State of Hawaii - Department of Land and Natural Resources (DLNR). 1986. *Indigenous wildlife, endangered and threatened Wildlife and plants, and introduced wild birds.* Department of Land and Natural Resources. State of Hawaii. Administrative Rule dated 28, August 1986.

Timbol, A. S., and J. A. Maciolek. 1978. *Stream channel modification in Hawaii. Part A: Statewide inventory of streams, habitat factors, and associated biota.* U. S. Fish and Wildlife Service, FWS/OBS - 78/16, 157 p.

U.S. Environmental Protection Agency (USEPA). 2003. *National Sediment Water Quality Survey; Appendix D - Screening values for chemicals evaluated.* 19 pp.

U.S. Environmental Protection Agency (USEPA). 1998. Storet Legacy Data Center. [URL: www.epa.gov/storpubl/legacy/query.htm].

U.S. Geological Survey (USGS). 2001. *Water resources data, Hawaii and other Pacific Areas, Water Year 2000. Volume 1. Hawaii.* U.S. Geological Survey. HI-00-1: 379 pp.

U.S. Geological Survey (USGS). 2003. *NWISWeb data for Hawaii web site. Real-time data for USGS 16296500 Kahana Stream.* [URL: http://waterdata.usgs.gov/hi/nwis/uv?16296500].

U.S. Geological Survey (USGS). 2000. *Water resources data, Hawaii and other Pacific Areas, Water Year 1999. Volume 1. Hawaii.* U.S. Geological Survey. HI-99-1: 399 pp.

APPENDIX: WATER QUALITY MONITORING PLAN

Kahana Stream Bridge Replacement on Kamehameha Highway
Kahana, Oahu, Hawaii
WATER QUALITY MONITORING PLAN

File No. WQC 0000____

Prepared by *AECOS*, Inc.
May 15, 2003

Introduction

The State of Hawaii Department of Transportation, Highways Division, proposes to replace North Kahana Bridge (Bridge no. 8) on the Kamehameha Highway (State of Hawaii DOT Project. No. Br-83D-01-01).

The project site is located on the windward, or northeast, coast of the island of Oahu at the head of Kahana Bay. The lower part of Kahana Stream meanders along the valley floor before exiting into the ocean through two outlets. A permanently open channel exists on the eastern corner of the bay, and a channel opened only during extreme flooding is located in the center of the bay. Bridge No. 8 is located across this second channel. Depending on tidal stage and the water level of the main stream, the water may stop at or flow up to 30 feet *makai* (downstream) of the existing highway bridge where it is blocked by a large volume of sand that is over 200 feet in width. The sand plug is breached only during severe flood conditions.

The present highway bridge will be removed and replaced. The footprint of the final structure will be 17 feet wider than the existing bridge, with 14 feet of the expansion being on the *makai* side. A temporary bypass road bridge will also be constructed on the *makai* side of the coastal highway. During construction, the temporary bypass road will take an additional 56 feet of space.

MONITORING PARAMETERS

Receiving water quality parameters to be measured include those suggested by the General Monitoring Guideline for Section 401 Water Quality Certification Projects. pH, dissolved oxygen (DO), turbidity, total suspended solids (TSS), salinity, and temperature will be monitored. Visual observations of physical characteristics of the project area, such as whether the stream has breached the sand plug, tidal stage (ebbing or rising), appearance and odor, will be recorded.

Daily visual inspection of the construction site shall be performed by the contractor to ensure that the construction activities do not result in adverse impacts. Information provided (but not limited to) will include: whether there is water in the stream, the description of the construction activity, date, time, and other ongoing activities not related to the construction activities, which may impact water quality.

SAMPLING LOCATIONS

Three stations will be monitored during pre-construction and post construction sampling. Four stations will be monitored during construction. There will be two control stations located 15 meters from the upper and lower edge of the project and two impact stations located 1 meter above and below the project. The *makai* impact station and control station may not have any water. Photographs will be taken on sampling days when there is no water.

SAMPLING FREQUENCY

Pre-construction sampling

Samples will be collected once a month for ten sampling events at both of the control stations and in the vicinity of the *mauka* impact station. If time does not allow, samples may be collected at lesser time intervals (twice a month, weekly, 3 times a week, daily, etc.). All parameters will be measured.

During Construction Sampling

The four stations (two control and two impact) will be sampled for the first ten days of construction and then once every other week (the project is expected to take longer than one year to complete) at the sampling locations. All parameters will be measured. At the stations where there is no water, photographs will be taken.

Post-Construction Sampling

Post-construction sampling will occur two weeks after the construction is completed and all silt containment devices are removed. The two control stations and the impact station will be sampled daily for one week (five sampling events). If there is no water at the *makai* control station, photographs will be taken. However, if there are no observable impacts during construction, then post-construction monitoring may be waived. Approval to for-go post-construction monitoring must be requested from the Hawaii Department of Health Clean Water Branch.

SAMPLING AND ANALYTICAL METHODS / QUALITY ASSURANCE

Weather conditions and relevant observations will be noted daily by the contractor's assigned individual and anything out of the ordinary will be logged in a field notebook. Visual inspections of water quality by this individual will be made at least daily as long as in water work is occurring. This will ensure that no physical change in the character of the receiving water occurs due to construction, or if any change is noted, that modification to existing Best Management Practices (BMPs) are implemented in a timely manner. Results of the visual inspections will also be noted in the field notebook. These notes will be provided to *AECOS* for use in assessing impacts to water quality.

All water quality parameters will be measured from grab samples collected by an *AECOS* field technician or an individual assigned by the contractor and trained by laboratory personnel. The

sampler(s) will also note any unusual site conditions and condition of any treatment device or facility at the time of collection, and will record the time and location of each sample.

Prior to collecting a sample, each plastic bottle will be pre-rinsed with the water to be sampled. The samples will be collected right below the surface by facing the plastic bottle upcurrent to fill. A one liter plastic bottle will be used at each monitoring station. Within 15 minutes of collection the samples will be measured for pH and then placed on ice in a cooler and returned to the laboratory for turbidity and TSS analysis. Salinity, DO, and temperature will be measured *in situ*. Table 1 lists the analytical methods and instrumentation to be used in the monitoring program.

Table 1. Analytical methods and instruments to be used for the Project's water quality monitoring program.

Analysis	Method	Reference	**Instrument***
DO (mg/L)	EPA 360.1	EPA (1979)	YSI Model 85 or 550 DO meter
pH (pH units)	EPA 150.1	EPA (1979)	Hanna or Orion pocket pH meter
Salinity (‰)	refractive index or salinity	---	temperature compensating refractometer or YSI Model DO meter
Temperature (°C)	EPA 170	EPA (1979)	YSI Model 85 or 550 thermister calibrated annually to NST thermometer
Turbidity (ntu)	EPA 180.1	EPA (1993)	2100 Hach Turbidimeter
Total Suspended Solids (mg/L)	Method 2540D (EPA 160.2)	Standard Methods 18th Ed. (1992); EPA (1979)	Mettler H31 balance

* Typical instruments are listed; other manufacturers may be substituted.

AECOS will participate in any DOH and Environmental Protection Agency (EPA) sponsored quality assurance (QA) programs available for all analyses conducted as part of this monitoring program. This presently should include EPA's Water Supply, DMR-QA, and/or Water Pollution performance evaluation programs. Relevant quality assurance/quality control (QA/QC) results will be provided to DOH upon request.

AECOS will retain, in its records, the analytical procedures used and any relevant QA/QC and instrument calibration information pertaining to the specific analysis. All analytical results and field notes will be entered into a notebook or file established for this purpose, and provided in a final report prepared for the monitoring program. This file will be available for inspection by DOH-authorized personnel during normal business hours.

REPORTS/ASSESSMENT

Results of sample testing will be available via facsimile from the laboratory upon completion of the analyses, usually within 48 hours for all measurements. A brief report for submittal to DOH-CWB will be prepared within two weeks of receipt of results. In addition to analytical results, the report will include time and date of sampling, name of the person who collected the samples, date each analysis was conducted, and identification of the laboratory and analyst(s) that conducted the work.

The reports will have a running statistical summary for each phase of the project. A pre-construction monitoring report will assess and compare baseline data to applicable State water quality standards.

A final report and water quality assessment will be prepared upon completion of the monitoring program. This report will be submitted to DOH-CWB within 60 days following post-construction monitoring. If post-construction monitoring is not required, the report will be submitted 60 days after construction is completed. The final report will identify the methods and procedures for analytical measurements and include all data collected as well as statistical summaries of results by station and activity phase (pre-construction, construction and post-construction). This report will also assess whether water quality was impacted by the construction activity. Upon completion of the monitoring program, the original data and field notebook will be retained by *AECOS* for a minimum of five years.

APPENDIX F

NHPA Section 106 Response and Comments

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

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

December 10, 2002

To: Glenn M. Yasui, Administrator
Highways Division
Department of Transportation

From: for Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Kamehameha Highway, Replacement of North Kahana Bridge, Oahu, Hawaii

Thank you for the opportunity to comment on the subject project. The Department of Hawaiian Home Lands has no comment to offer.

If you have any questions, please call the Planning Office at 586-3836.

April 7, 2003

Dean Takiguchi
601 Kamokila Blvd.
Room 611
Kapolei, Hawaii 96707

Dear Dean Takiguchi:

I would like to formally request that the name and address of the following be included in the North Kahana Bridge, Koolauloa, and Oahu Federal Aid Number 83D-01-01 correspondence. This request should include all inquiries, proposals, recommendations, and actions to be taken as well as those taken.

Ben Shafer	52-210 Kamehameha Highway Kahana Bay, Hawaii 96717	808)237-8464
Lena Soliven	52-210 Kamehameha Highway Kahana Bay, Hawaii 96717	(808)237-1144
Ululani Beirne	P.O. Box 653 Kaneohe, Hawaii 96744	(808)237-8856

I would also like to know the names of all other parties interested in this site as I do believe this is public record.

If there are any questions that I could be of assistance, please feel free to contact me anytime at 222-3138.

Cordially,

Benjamin D. Shafer

Benjamin D. Shafer

52-210 KAMEHAMEHA HIGHWAY
KAHANA BAY, HAWAII 96717

BISHOP MUSEUM

A HAWAI'I NONPROFIT CORPORATION

RECEIVED
DEC 13 12 47 PM '02
DEPT. OF TRANSPORTATION
HIGHWAYS DIVISION

December 11, 2002

Mr. Glenn Yasui
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawai`i 96813

RE: Public Feedback

Aloha Glenn:

This is in reference to the enclosed letter that you had recently sent. For your information, this letter was passed on to Dr. Guy Kaulukukui. For any future request, please refer them to him at Bishop Museum, 1525 Bernice Street, Honolulu, Hawai`i 96818.

Sincerely yours,

Sandi Halualani

Enclosure: One copy of letter received 12/10/02.

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

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

RECEIVED OCT -9 2003

October 7, 2003

Mr. Rodney K. Haraga, Director
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawai'i 96813

Dear Mr. Haraga:

Subject: Draft Environmental Assessment for the North Kahana Bridge Replacement, O'ahu

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

1. Kahana Stream is one of the most preserved and natural remaining stream systems in O'ahu. Please describe how the widening and hardening of the stream banks beneath the existing bridge would change the stream hydrology and affect the spawning runs.

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

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: M & E Pacific

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

December 19, 2002

Glenn M. Yasui
Administrator
Highways Division
State of Hawaii, Dept. of Transportation
869 Punchbowl St.
Honolulu, HI 96813-5097

Dear Mr. Yasui,

Subject: Request for Public Feedback and Consultation in compliance with NHPA Section 106, Kamehameha Highway, Replacement of North Kahana Bridge, Oahu, HI DOT and Federal Aid Project No. BR-083-1 (42).

OHA is in receipt of the above referenced request for feedback and consultation. We offer the following comments.

Kahana Valley is significant both for its history and for its current use as State Cultural Park. OHA believes the entire ahupua`a is eligible for listing on the National Register of Historic Places.

To gather more information about the valley, and about the bridge area in particular, you should contact the families living in Kahana, and the Koolauloa Hawaiian Civic Club. Also, as burials were found at other bridge replacements along Kamehameha Highway, we encourage you to present your project to the O`ahu Island Burial Council and to develop a Burial Treatment Plan prior to any ground moving activities.

Thank you for the opportunity to comment on this project. If you have further questions please contact Pua Aiu at 594-1931 or e-mail her at paiu@oha.org.

Sincerely,

Ernest Kimoto
Acting Director
Hawaiian Rights Division

APPENDIX G

FWS ESA 7

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard
Room 3-122, Box 50088
Honolulu, Hawai`i 96850

FILE COPY

In Reply Refer To:
1-2-2003-I-138

JUN 2 8 2004

Dean Takiguchi
Hawaii Department of Transportation
Highways Division, Bridge Section
601 Kamokila Boulevard, Room 611
Kapolei, Hawaii 96707

Dear Mr. Takiguchi:

Thank you for your request of May 27, 2003 for our concurrence under section 7 of the Endangered Species Act (Act) with your determination regarding the proposed replacement of North Kahana Bridge in Kahana, Koolauloa, Oahu, Hawaii (Federal Aid Project Number 83D-01-01). We understand that, acting on behalf of the Federal Highways Administration, you have determined that the proposed project will not affect federally listed threatened or endangered species. The proposal is to demolish and replace the existing North Kahana Bridge. We received your letter on June 2, 2003 and an additional copy on June 24, 2004. We misplaced your original letter and apologize for the delay in our response.

Under Section 7 of the Act, it is the action agency's responsibility to determine if their project will affect any listed species or proposed species, or proposed or designated critical habitat. This determination includes an evaluation of effects that may be beneficial, insignificant, or discountable. If the action agency determines that the proposed action has no likelihood of effect, our concurrence is not required under the Act. However, at your request, we have reviewed the proposed project and concur that no federally listed species will be affected by the proposed project. In addition, there is no critical habitat in the project area.

We appreciate your efforts to conserve endangered species. If you have any questions, please contact Marilet A. Zablan, Vertebrate Conservation Program Leader (phone: 808/792-9400; fax: 808/792-9580).

Sincerely,

Nicole Alt
Acting Field Supervisor

APPENDIX H

FHWA DOTA 4(f)

Determination and Approval:

Description/Location of Project: **Kamehameha Highway, Replacement of North Kahana Bridge Kahana, Ko'olauloa, O'ahu, Hawai'i**

Federal Project Number: BR-083-1(53)
Route: Kamehameha Highway (Route 83, FAP 3-E) Termini: Mileposts 26.35 & 26.39
County: Honolulu Name of Resource: Ahupua'a O Kahana State Park

Based on the environmental documentation, the results of public and agency consultation and coordination as evidenced by the attachments to the Hawai'i Department of Transportation's attached letter, the FHWA has determined that:

The project meets all applicable criteria in the Nationwide Section 4(f) Evaluation and Approval for the Federally-Aided Highway Projects with Minor Involvements with Public Parks, Recreation Lands, and Wildlife and Waterfowl Refuges approved December 23, 1986.

That alternatives set forth in the Findings section of the above Nationwide Section 4(f) Evaluation have been fully evaluated and are clearly applicable to this project. Based on those findings, it is determined there is no feasible and prudent alternatives to the use of lands from the subject resource.

The project complies with the Measures to Minimize Harm Section of the above Nationwide Section 4(f) Evaluation and there are assurances that the measures to minimize harm will be incorporated in the project.

The coordination called for in the above Nationwide Section 4(f) Evaluation has been successfully completed.

Accordingly, the FHWA approves the proposed use of the subject lands under the above Nationwide Selection 4(f) Evaluation issued on December 23, 1986.

10/26/2004
Date Approved

Federal Highway Administration

cc: State of Hawai'i, Highways Division

NOTES:

APPENDIX I

LWCF 6(f)(3)

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:
L3217(PWR-PP)

February 28, 2005

Mr. Peter T. Young, Chairperson & LWCF State Liaison Officer
Hawaii Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809

Re: North Kahana Bridge Replacement; LWCF #15-00137

Dear Mr. Young,

We received Ming Ding's memo dated December 14, 2004 regarding the replacement of the North Kahana Bridge in which he presented a revised proposal for land required for permanent encroachments, and requested reconsideration of our previous finding for conversion.

In our letter dated November 23, 2004, we stated our finding, based upon your previous submittal, that 5,020 square feet requested by the HDOT for a permanent easement would result in a conversion of Land and Water Conservation Fund Act protected land and therefore would require replacement with similarly suitable park land of at least equal appraised value in accordance with §6(f)(3) of the Act. Our finding at that time was based upon the issue of control; that either a grant of easement or a transfer of title would convey the right to change the surface characteristics and uses of the land to a non-park agency, whose purpose is not public outdoor recreation. The area in question was needed for a permanent easement, as stated in the plans: "... as a result of construction activity for proposed project—to encompass elements of the roadway and bridge (i.e. bus lift pad, roadway daylight limits, stream bank stabilization limits, and roadside slope grading)."

In Ming Ding's most recent request, the encroachment acreage has been reduced to 681 square feet, to include the relocated ADA accessible bus pad (469 square feet) and two subsurface drainage outlets (212 square feet). Regarding these elements, we find according to LWCF Manual §675.9.3A.(5) as follows: The relocated bus pad built to ADA standards enhances the outdoor recreation usefulness of the parkland by making it accessible to more people. Therefore, we do not consider the area covered by the bus pad a conversion. The two subsurface drainage outlets qualify as underground utilities. Since it appears that they will have no significant impacts on the recreational utility of the park, we find that they will not constitute a conversion.

In a message dated February 3, 2005, Ming Ding explained that the reduction in the area required for a permanent easement reflects design changes that include a steeper slope tying into the existing grade, and installation of a longer guardrail post. This "...revised design ensures that the roadway daylight and grading are to be within the DOT right-of-way, thus a permanent easement is not required and DOT does not need to control those areas."

Based upon the design changes referenced above, we therefore find that the improvements to the North Kahana Bridge and associated roadway will not constitute a conversion of use of the previously identified 5,020 square feet of LWCF §6(f)(3) protected public park land.

Sincerely,

David P. Siegenthaler
Outdoor Recreation Planner

Cc Martha Yent, Hawaii DLNR
Ming Ding, M&E Pacific, Inc.

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

RECEIVED
'04 NOV 29 A8 :19

PY

IN REPLY REFER TO:
L3217(PWR-PP)

DEPT OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

November 23, 2004

Mr. Peter T. Young
State Liaison Officer – LWCF
Hawaii Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809

RECEIVED
STATE PARKS DIV
'04 NOV 30 P3 :1
DEPT OF LAND
NATURAL RESOUR

Re: Determination on your Request for Temporary Non-Conforming Use and Conversion of 6(f)(3) Property at Kahana Bay Beach Park, LWCF #15-00137.

Dear Mr. Young,

Thank you for your letter of October 8, 2004 in which you explained the need to replace the North Kahana Bridge across an estuary of Kahana Stream, and your plan to construct a detour road along the *makai* side of the existing bridge. We understand that the detour road will extend into the Land and Water Conservation Fund (LWCF) Act §6(f)(3) protected land within Kahana Bay Beach Park. This project raises three issues: the temporary use of §6(f)(3) protected land for the construction project, the designation of a roadway easement for the portion of the road that currently exists, and the designation of additional roadway easement to cover expansion of the road into a new alignment.

With regard to the temporary use of the land for the construction project, we find the analysis you submitted pursuant to LWCF Manual §675.9.3(A)(5)(c) sufficient to determine that the use you indicate meets every test of a "temporary non-conforming use" with the exception of the anticipated duration of the project. Current policy does not allow for approval of temporary non-conforming uses for more than six (6) months. Due to the outdoor recreation benefits to be derived from the project, the necessity of bridge replacement due to safety issues, and the lack of acceptable alternatives, we find that this project may go forward under the provisions for such activities as provided for in the Manual. We therefore grant up to six (6) months for the performance of this project under the provisions for "temporary non-conforming use." This period will commence on the day ground-disturbing activity is begun. A report should be submitted to our office by the end of the fifth month of this project so that we can assess its progress.

The second issue you raise regards designation of roadway easements for the road that currently exists within the park. Since the road existed well before the 1997 LWCF Act grant that placed park land under §6(f)(3) protection, and it is clear that the existing 1927 bridge encroaches

beyond the property line boundary, we find that it is likely the original 6(f)(3) map was in error in not showing the existing roadway. It is further found that this area is not presently used for recreational facilities, and that DOT's exercise of its purpose in this area will not adversely impact the recreational utility and viability of Kahana Beach Park . Therefore, we will allow an administrative correction of the 6(f)(3) map to include the 50 foot easement (5,208 square feet) for the road's present alignment.

For the 5,020 square feet requested for additional roadway easement for the new alignment, the LWCF program makes no distinction between a transfer of fee title and a "grant of easement;" both are considered conversions of use. In either case the right to change the surface characteristics and uses of the land in question are conveyed to an agency other than that which administers the park area and whose purpose is not public outdoor recreation (see LWCF Manual §675.2.11 and §675.9.3.D(6)). We understand that the expansion of the roadway right-of-way into an existing public park is deemed necessary by the state Department of Transportation, and that this determination has the concurrence of the Federal Highways Administration and the State Department of Land and Natural Resources.

Accordingly, we are willing to consider a request for conversion of the 5,020 square feet of LWCF 6(f)(3) protected parkland in accordance with the conversion requirements of the Land and Water Conservation Fund Act and 36 CFR §59 (copies attached). These conversion requirements include compensation with replacement property of at least equal fair market value and reasonable equivalence in usefulness and location. We also ask that you send us a copy of the Environmental Assessment for this project. Since we understand that this document has already been prepared, you may send it in advance of your request for conversion.

Thank you for your assistance in protecting the public's investment in land dedicated to outdoor recreation through the Land and Water Conservation Fund. If you have any questions, please feel free to contact me at (510) 817- 1324.

Yours sincerely,

David Siegenthaler
Outdoor Recreation Planner

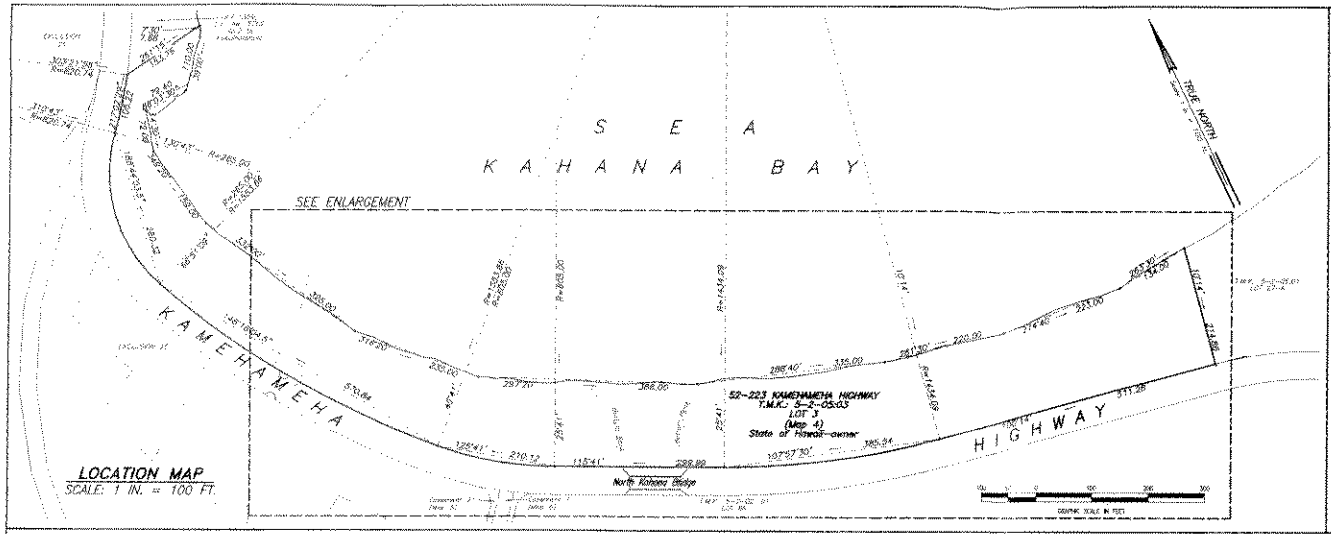
cc: Martha Yent
Attachments

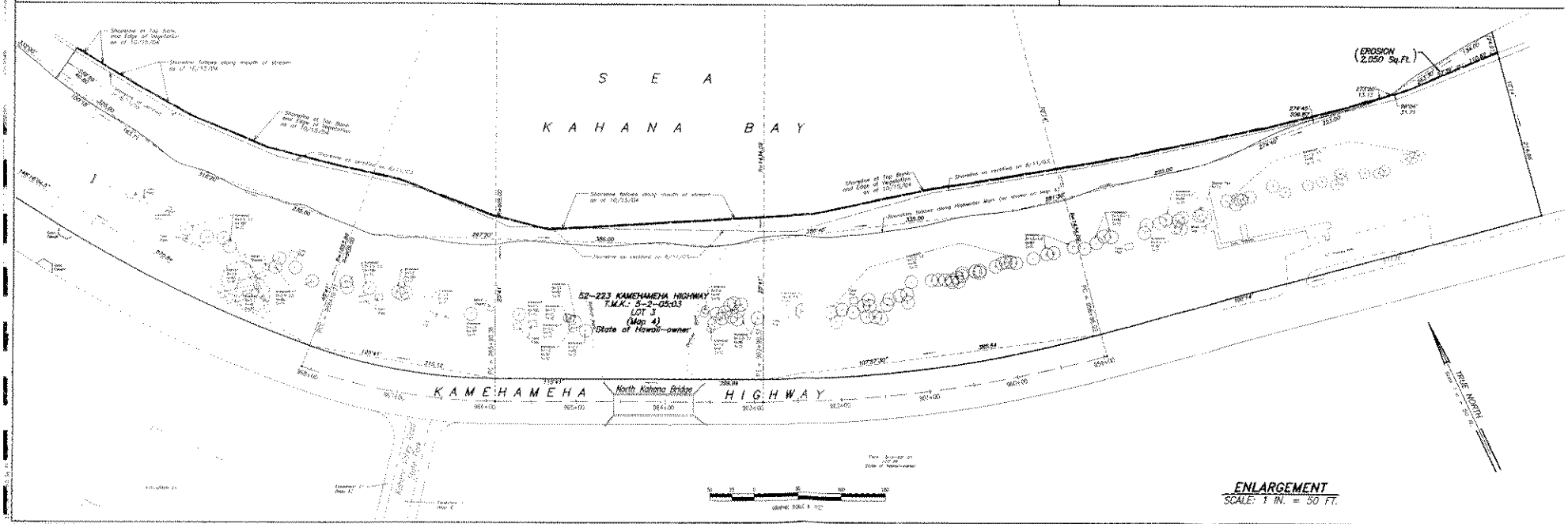
APPENDIX J

Shoreline Certification Map

SHORELINE SURVEY AFFECTING
PORTION LOT 3, LAND COURT APPLICATION 285
52-223 KAMEHAMEHA HIGHWAY

KAHANA, KOOLAULOA, OAHU, HAWAII
TAX MAP KEY: (1ST DIV.) 5-2-05: PORTION 03





94-1 Waipio Street
Honolulu, Hawaii
November 2, 2004

LICENSED PROFESSIONAL LAND SURVEYOR No. 9355 HAWAII, U.S.A.

M. & E. Pacific, Inc.
"This work was prepared by me or under my supervision and correctly represents the survey done on 10/15/04"

Licensed Professional Land Surveyor
Certificate No. 9355 Exp. 4/30/06

OWNER: STATE OF HAWAII
DEPT. OF LAND & NATURAL RESOURCES
LAND DIVISION

ADDRESS: 1151 PUNCHBOWL STREET, ROOM 220
HONOLULU, HAWAII 96813

The shoreline as shown hereon is hereby certified as the shoreline as of

Chairperson, Board of Land and Natural Resources

MAE PACIFIC, INC.
Engineers & Surveyors

22" x 36" = 5.5 Sq.Ft.

APPENDIX K

Draft Environmental Assessment Comments and Responses

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 27, 2003

DOTKAHANABRIDGE.RCM

LD-NAV

RECEIVED OCT 28 2003

Michael S. Nishimura
M&E Pacific, Inc.
1001 Bishop Street, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Nishimura:

SUBJECT: Draft Environmental Assessment – Kamehameha Highway
Replacement of North Kahana Bridge, Oahu, Hawaii
Federal Aid Number 83D-01-01

Thank you for the opportunity to review and comment on the subject matter

A copy of the document pertaining to the proposed project was transmitted or made available to the following Department of Land and Natural Resources' Divisions for their review and comment.

- Division of Aquatic Resources
- Division of Forestry & Wildlife
- Division of State Parks
- Engineering Division
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Land-Oahu District Land Office

Attached is a copy of the State Parks and Engineering Division comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0384.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: ODLO

LINDA LINGLE
GOVERNOR OF HAWAII

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

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 7, 2003

MEMORANDUM:

TO: Dierdre S. Mamiya, Administrator
Land Division

FROM: Daniel S. Quinn, State Parks Administrator

SUBJECT: Draft Environmental Assessment for Kamehameha Highway Replacement of North Kahana Bridge, Ko'olauloa, O'ahu

This project by the State Department of Transportation (DOT) proposes to replace the existing North Bridge in Kahana that was constructed along Kamehameha Highway in 1927. The replacement involves construction of a by-pass road and bridge on the *makai* side of the existing bridge, demolition of the existing bridge, and construction of a wider bridge to accommodate pedestrians and bicycles.

Ahupua'a 'O Kahana State Park abuts Kamehameha Highway on both sides of the highway in the project area (this is the correct name for the park on both the *makai* and *mauka* sides of the highway). However, there was limited consultation with State Parks during the preparation of the DEA. As a result, we do not believe that the impacts on the park have been adequately addressed, including the facilities (parking, picnicking and camping areas) and the park entry at Kahana Valley Road. The project will affect park residents, staff, and visitors for the duration of the 18-month project.

Park Facilities and Recreational Use

Section 3.5.3 indicates that public use of the park and recreational activities will not be impacted. While the public will still be able to use the park, Figures 3, 8, and 9 show the by-pass road in close proximity to picnic and camping sites where increased noise and vehicle traffic will affect the park experience. It is recommended that a vehicle barrier, such as guardrails, be installed along the *makai* side of the road for safety of the park users and to prevent vehicle access into the park. In addition, the by-pass road intersects the corner of a parking lot which may require some modifications of the lot for safe ingress and egress by park users. Likewise, the park entry at Kahana Valley Road may need to modified and marked with signage. A more detailed plan outlining actions to be taken to accommodate park use and traffic during this project should be prepared for State Parks' review. The lack of a scale on the figures makes it difficult to assess the exact proximity of the by-pass road to park facilities.

Vegetation and Landscaping

The DEA indicates the need to remove some of the existing vegetation in the project area, mostly ironwood trees, false *kamani*, and *hau*, and the need for some plantings to stabilize the ground surface during the construction period. This is acceptable with the understanding that the clearing does not extend beyond the project area. The restoration of the site after removal of the by-pass road and bridge should use native plants, such as *milo* and *kou* trees. State Parks would like to the opportunity to review and approval a re-vegetation/landscaping plan for this project.

Archaeological Monitoring Plan

Consideration of the following is requested:

As indicated in the plan, we would not anticipate cultural remains in conjunction with this project. However, in the event that artifacts and cultural remains are recovered, the final disposition of these materials should be with the Division of State Parks for future research and park exhibits.

If burials are uncovered during the project, State Parks and the residents of Kahana should be consulted. Procedures and reinterment sites have been identified for the park.

The State Parks archaeologist, along with the State Historic Preservation Division, should be notified immediately of any cultural finds. A copy of the archaeological report should also be submitted to State Parks.

cc: Historic Preservation Division

LINDA LINGLE
GOVERNOR OF HAWAII

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

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
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

September 29, 2003
LD/NAV
Ref.: DOTKAHANABRIDGE.CMT

Suspense Date: 10/8/03

MEMORANDUM:

TO: XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
Na Ala Hele Trails
XXX Division of State Parks
XXX Engineering Division
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
**XXX Office of Conservation and Coastal Lands
**XXX Oahu District Land Office

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
2003 OCT -3 P 4:15
RECEIVED LAND DIVISION

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment - Kamehameha Highway Replacement of North Kahana Bridge, Oahu, Hawaii
Federal Aid Number 83D-01-01

Please review the Draft Environmental Assessment covering the subject matter and submit your comments (if any) on Division letterhead within the time requested above.

****NOTE:** **One (1) copy of the DEA is available for your review in the Land Division Office, Room 220.**

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(X) We have no comments.

( ) Comments attached.

Date: OCT 1 - 2003

Name:

Signed: MICHAEL G. BUCK, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

LINDA LINGLE
GOVERNOR OF HAWAII

'03 SEP 30 AM 10:52 ENGINEERING

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

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
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

September 29, 2003
LD/NAV
Ref.: DOTKAHANABRIDGE.CMT

Suspense Date: 10/8/03

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
Na Ala Hele Trails
XXX Division of State Parks
XXX Engineering Division
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
**XXX Office of Conservation and Coastal Lands
**XXX Oahu District Land Office

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
2003 OCT 10 P 3:55
RECEIVED LAND DIVISION

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment - Kamehameha Highway
Replacement of North Kahana Bridge, Oahu, Hawaii
Federal Aid Number 83D-01-01

Please review the Draft Environmental Assessment covering the subject matter and submit your comments (if any) on Division letterhead within the time requested above.

****NOTE: One (1) copy of the DEA is available for your review in the Land Division Office, Room 220.**

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Name: ERIC T. HIRANO, CHIEF ENGINEER

Signed: Eric T. Hirano

Date: 10/10/03

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/NAV
Ref: DOT KAHANA BRIDGE - CONT

COMMENTS

(✓) We confirm that the project site according to the Flood Insurance Rate Map (FIRM) is located in Zone AE.

( ) Please note that the project site according to the Flood Insurance Rate Map (FIRM) is located in Zone ___.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is _____.

(✓) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP), whenever work is required within a flood zone. If there are questions regarding the NFIP, please contact the State Coordinator, Mr. Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, please call the applicable County coordinators below:

(✓) Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.

( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.

( ) Mr. Wallace Kudo at (808) 241-6620 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive building permit and/or water meter.

( ) The applicant should provide the water demands and calculations to the Engineering Division so that it can be included in the State Water Projects Plan Update.

(✓) Additional Comments: See Attached

( ) Other: _____

Should you have any questions, please call Mr. Andrew Monden of the Planning Branch at 587-0229.

Signed: Eric T. Hirano
ERIC T. HIRANO, CHIEF ENGINEER

Date: 10/10/23

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LA/NAV
Ref.: DOTKAHANABRIDGE.CMT

ADDITIONAL COMMENTS

For the proposed construction of a bridge replacement and temporary bypass road, and their related improvements, we offer the following suggestions:

1. If utilities (sewer, gas, water, etc.) are to be suspended along the bridge structure, they should be located and constructed to minimize flood damage, leakage and prevent snagging of debris.

2. A scour analysis should be conducted to ensure that the design of the structure would minimize erosion foundation. If the channel opening at the structure is widened, evaluate downstream reaches to provide for adequate capacity and erosion.

3. The proposed bridge should not impede the storm water carrying capacity of the body of water it crosses.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 29, 2003
LD/NAV
Ref.: DOTKAHANABRIDGE.CMT

Suspense Date: 10/8/03

MEMORANDUM:

TO: XXX Division of Aquatic Resources
**XXX Division of Forestry & Wildlife
Na Ala Hele Trails
XXX Division of State Parks
XXX Engineering Division
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
**XXX Office of Conservation and Coastal Lands
**XXX Oahu District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment - Kamehameha Highway
Replacement of North Kahana Bridge, Oahu, Hawaii
Federal Aid Number 83D-01-01

RECEIVED
LAND DIVISION
2003 OCT 10 A 11:11
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

Please review the Draft Environmental Assessment covering the subject matter and submit your comments (if any) on Division letterhead within the time requested above.

****NOTE: One (1) copy of the DEA is available for your review in the Land Division Office, Room 220.**

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments.

( ) Comments attached.

Name: Robert M. Ing

Signed:

Date: 10-10-03

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HWY-DB 2.6306

December 13, 2004

TO: DIERDRE S. MAMIYA, ADMINISTRATOR
LAND DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: GLENN M. YASUI, ADMINISTRATOR
HIGHWAYS DIVISION
DEPARTMENT OF TRANSPORTATION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA) RESPONSES TO COMMENTS FOR KAMEHAMEHA HIGHWAY, REPLACEMENT OF NORTH KAHANA BRIDGE
TMK 5-2-002:001 (POR) AND 5-2-005:003 (POR)
FEDERAL AID PROJECT NO. BR-083-1(53)

We would like to provide responses to comments made by the Department of Land and Natural Resources (DLNR), State Parks and Engineering Division as received in your letter dated October 27, 2003.

The final Environmental Assessment (EA) has been revised to reflect the responses to the comments and is expected to be published in the Office of Environmental Quality Control (QEQC) bulletin in the coming weeks.

If you have any questions please call the Project Manager, Mr. Dean Takiguchi at 692-7614 of our Bridge Design Branch, Highways Division.

Enclosures

DIVISION OF STATE PARKS
Daniel S. Quinn
State Parks Administrator

Draft Environmental Assessment (DEA) Response to Comments
State of Hawai'i, Department of Transportation, Highways Division (DOT-HWY)
Kamehameha Highway, Replacement of North Kahana Bridge
Federal Aid Project No.: BR-083-1(53)
Kahana, Ko'olauloa, O'ahu, Hawai'i
Tax Map Keys 5-2-2: por. 1 and 5-2-5: por. 3

We would like to provide the following responses to the comments.

Park Facilities and Recreational Use: The *makai* side of the detour road will be lined with concrete barriers to shield park users from vehicles. Although a portion of the detour road occupies a corner of the parking lot it will remain safely accessible for use. Modifications to the access of Kahana Valley Road have been incorporated into the traffic control layout which includes the installation of roadside devices (i.e. concrete barriers and traffic cones), as well as, temporary striping. These modifications have been developed to ensure that the construction activities will not impede vehicle access to the highway and park.

A full sized traffic control plan has been attached.

Vegetation and Landscaping: The project revegetation plan has been developed to incorporate comments and recommendations made by DLNR-Division of State Parks upon review of the preliminary revegetation plans. The revegetation will consist of regrassing, as well as, planting Hala, Kou and True Kamani trees.

Archeological Monitoring Plan: The Environmental Assessment has been revised to include these comments.

ENGINEERING DIVISION
Eric T. Hirano
Chief Engineer

Draft Environmental Assessment (DEA) Response to Comments
State of Hawai'i, Department of Transportation, Highways Division (DOT-HWY)
Kamehameha Highway, Replacement of North Kahana Bridge
Federal Aid Project No.: BR-083-1(53)
Kahana, Ko'olauloa, O'ahu, Hawai'i
Tax Map Keys 5-2-2: por. 1 and 5-2-5: por. 3

We would like to provide the following responses to the comments.

1. No utilities are being proposed to be suspended along the bridge structure.

2. A scour and analysis have been performed. The channel opening at the structure is widened but the bridge deck is thickened as compared to the existing bridge. As a result, the carrying capacity of the structure is slightly increased, however, will not cause any future erosion due to the small amount of increased flow and the decreased velocity with widened downstream reaches.

3. The proposed bridge will slightly increase the storm water carrying capacity of the body of water it crosses.

DIR 1841

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4414 • FAX: (808) 527-6743 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

ERIC G. CRISPIN, AIA
DIRECTOR

BARBARA KIM STANTON
DEPUTY DIRECTOR

RECEIVED '03 DEC -5 AM 9:34 DIRECTOR'S OFFICE DEPT OF TRANSPORTATION

2003 DEC -1 A 8:47

RECEIVED DEC 1

2003/ELOG-3139(ST)

NOvember 25, 2003

DEPT OF TRANSPORTATION
2003 DEC -2 P 1:41
HIGHWAYS DIVISION

Mr. Rodney K. Haraga, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Haraga:

Draft Environmental Assessment (DEA): Kamehameha Highway
North Kahana Bridge Replacement Project
Kahana, Koolauloa, Oahu
Tax Map Keys 5-2-2: por. 1 and 5-2-5: por. 3

We have reviewed the DEA for the above-referenced project received on September 29, 2003, and provide the following comments:

We confirm that the project requires the approval of a Special Management Area (SMA) Use Permit, pursuant to Chapter 25, Revised Ordinances of Honolulu (ROH). Because a Final Environmental Assessment (FEA) is the primary document used in processing an application for an SMA, the DEA must be revised to provide greater detail on the following:

Bypass Roadway - Estimates on the amount of fill material (i.e., cubic yards) required to construct the temporary bypass roadway should be provided. Because the approaches are proposed on Jaucus Sand (JaC) soils of Kahana Beach Park and require the removal of number of existing mature ironwood trees, the type and source of fill material to be imported should be discussed, as well as what will become of the trees removed. The FEA should also describe how much of the park will be closed during construction, and what measures will be used to secure the construction area. Additional detail should also be provided on measures to restore the area once the project is completed.

DEC 4

Dewatering - If on-site dewatering is to be conducted (versus off-site truck transfer), the size and location of the sedimentation pond should be disclosed, as well as the extent of site preparation will be required (grading, grubbing, etc.). There should also be a description of the restoration work proposed once the dewatering activities are complete.

Demolition - Please clarify how the existing bridge will be demolished (e.g., blasting, pneumatic jackhammers, etc.). Although typical construction equipment is listed in Section 3.2.10, relative to noise levels, it is not clear which types of equipment will actually be utilized for this project.

Bridge Construction - A more complete description of stream bank widening should be provided (i.e., present versus proposed width). Please clarify what type of stream bank stabilization is proposed (e.g., a rubble revetment, fabric underlayment, etc.), as well as provide estimates on the amount of excavation necessary, and discuss what will be done with surplus materials.

Recreational Resources - The FEA should disclose the area (i.e., square foot) of the beach park will be utilized for the bypass roadways and whether construction staging areas (Section 2.3) will be located within the park. The FEA should clarify how construction areas will be secured from park users (i.e., chain-link fencing, etc.).

Avifauna Impacts - Because endangered waterbirds may frequent the project site, the FEA (Section 3.2.8.3) should describe what mitigative measures will be taken to minimize possible "bird strikes" due to the disorienting affect of night lighting, both construction and permanent.

Should you have any questions, please contact Steve Tagawa of our Land Use Approvals Branch at 523-4817.

Sincerely yours,

ERIC G. CRISPIN, AIA
for Director of Planning
and Permitting

EGC:pl

cc: Office of Environmental Quality Control
doc. 260204

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Director
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HWY-DB 2.5982

NOV 2 3 2004

Mr. Eric G. Crispin, Director
Department of Planning and Permitting
City and County of Honolulu
Municipal Building, 7th Floor
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Crispin:

Subject: Special Management Area Permit Application
Kamehameha Highway, Replacement of North Kahana Bridge
TMK 5-2-002:001 (POR) and TMK 5-2-005:003 (POR)
Federal Aid Project No. BR-083-1(53)

We would like to provide the following responses to the comments contained in your letter dated November 25, 2003.

Comment 1: "Bypass Roadway – Estimate on the amount of fill material (i.e., cubic yards) required to construct the temporary bypass roadway should be provided. Because the approaches are proposed on Jaucus sand (JaC) soils of Kahana Beach Park and require the removal of number of existing mature ironwood trees, the type and source of fill material to be imported should be discussed, as well as what will become of the trees removed. The Final Environmental Assessment (FEA) should also describe how much of the park will be closed during construction, and what measures will be used to secure the construction area. Additional detail should also be provided on measures to restore the area once the project is completed."

Response 1: Bypass Roadway - The estimated amount of fill material is approximately 1,800 cubic yards. The requirements of fill material are discussed in detail in the "State of Hawaii; DOT-HWY; Special Provisions, Proposal, Contract and Bond; Section 203-Roadway Excavation and Embankment" document. The State Department of Land and Natural Resources (DLNR) Parks Division was consulted to review and provide input on the revegetation plan of the State Park. The type and number of trees reflect and satisfy requests made by State Parks.

Tree Removal Inventory:
17 - False Kamani
15 - Ironwood
1 - Dead Tree
1 - Plum

Tree Replacement Inventory:
3 - Hala
6 - Kou
7 - True Kamani

Detailed strategies to return adjacent areas affected by construction activities to their original condition or better will be required from the Contractor in the development of the Site Specific BMP's.

Comment 2: "Dewatering – If on-site dewatering is to be conducted (versus off-site truck transfer), the size and location of the sedimentation pond should be disclosed, as well as the extent of site preparation will be required (grading, grubbing, etc.). There should also be a description of the restoration work proposed once the dewatering activities are complete."

Response 2: Dewatering – A Department of Health (DOH), Clean Water Branch, National Pollutant Elimination Discharge System (NPDES), Notice of Intent (NOI) Form G General Permit Coverage Authorizing Discharges Associated with Construction Activity Dewatering has been submitted for approval. A dewatering system has been designed to treat the dewatering effluent. The Contractor is required to submit a "Site-Specific Dewatering System Maintenance Plan" including maintenance and management for DOH approval before the start of dewatering activities.

Comment 3: "Demolition – Please clarify how the existing bridge will be demolished (e.g., blasting, pneumatic jackhammers, etc.). Although typical construction equipment is listed in Section 3.2.10, relative to noise levels, it is not clear which types of equipment will actually be utilized for this project."

Response 3: Demolition - A demolition plan is being developed and the anticipated equipment to be used in the demolition of the existing bridge and associated structure include jackhammers, saw cutters, boom crane and backhoe, etc.

Comment 4: "Bridge Construction – A more complete description of stream bank widening should be provided (i.e., present versus proposed width). Please clarify what type of stream bank stabilization is proposed (e.g., a rubble revetment, fabric underlayment, etc), as well as provide estimates on the amount of excavation necessary, and discuss what will be done with surplus materials."

Response 4: Bridge Construction – The existing bridge will be lengthened from 92-feet to 120 feet. The existing concrete abutments will be cut at the mud line and GRP will be installed sloping down from the face of the new abutments to the back of the existing abutment. The estimated amount of excavation for bridge abutments and wingwalls is 400 cubic yards.

Comment 5: "Recreational Resources – The FEA should disclose the area (i.e., square foot) of the beach park will be utilized for the bypass roadways and whether construction staging areas (Section 2.3) will be located within the park. The FEA should clarify how construction areas will be secured from park users (i.e., chain-link fencing, etc.)."

Response 5: Recreational Resources - The detour roadway area will occupy approximately eight percent of the beach side of the State Park. Construction parcels have been outlined and are being negotiated by DOT. These parcels account for areas directly related to construction activity, i.e. area to perform bridge replacement construction and implementation of detour roadway. The Contractor will be responsible for determining the location and performing the negotiations for construction staging and storage areas.

Comment 6: "Avifauna Impacts – Because endangered water birds may frequent the project site, the FEA (Section 3.2.8.3) should describe what mitigative measures will be taken to minimize possible "bird strikes" due to the disorienting affect of night lighting, both construction and permanent."

Response 6: Avifauna Impacts - The brightness of the lights will not exceed the existing so as not to disorient any wildlife.

The final Environmental Assessment (EA) has been revised to reflect the responses to the comments as discussed above, and is expected to be published in the OEQC bulletin in the coming weeks.

If you have any questions or need more information, please contact Dean Takiguchi at 692-7614. In response, please reply to the attention of Mr. Dean Takiguchi of our Bridge Design Section, Design Branch, Highways Division and reference letter number HWY-DB 2.5982 as shown above.

Very truly yours,

for RODNEY K. HARAGA
Director of Transportation

Enclosures