ENVIRONMENTAL ASSESSMENT

Federal Aid Number *BR-083-1(42)*

Kamehameha Highway

Replacement of South Punalu‘u Bridge

Punalu‘u, Ko‘olauloa, O‘ahu, Hawai‘i

Tax Map Key Numbers 5-3-04:01 (por), 5-3-03:01 (por) & 5-3-02:39 (por)

MARCH 2005

Prepared for:

STATE OF HAWAI‘I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

Prepared by:

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
APE	Area of Potential Effects
BWS	Board of Water Supply
CDDs	Community Development Districts
CFR	Code of Federal Regulations
COE	Corps of Engineers
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	Department of Business, Economic Development & Tourism
DLNR	Department of Land and Natural Resources
DOA	Department of the Army
DOH	Department of Health
DOI	US Department of the Interior
DOT	Department of Transportation
DPP	Department of Planning and Permitting
EA	Environmental Assessment
EPA	Environmental Protection Agency

ESA	Endangered Species Act
FHV	Flood Hazard Variance
FHWA	Federal Highways Administration
FWS	US Fish & Wildlife Service
FONSI	Finding of No Significant Impact
HAR	Hawai‘i Administrative Rules
HECO	Hawaii Electric Company
HRS	Hawai‘i Revised Statutes
HWY	Highways Division (DOT)
LUO	Land Use Ordinance
MGD	Million Gallon(s) Per Day
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPRSA	Marine Protection, Research and Sanctuaries Act
NCZMA	National Coastal Zone Management Act
NEPA	National Environment Protection Act
NGPC	Notice of General Permit Coverage
NHPA	National Historic Preservation Act
NOC	Notice of Cessation
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRC	“No-Rise” Certification
NWP	Nationwide Permit
OEP	Office of Environmental Planning
OP	Office of Planning

RHA	Rivers and Harbors Act
ROH	Revised Ordinance of Honolulu
SCAP	Stream Channel Alteration Permit
SCS	Soil Conservation Service
SHPD	State Historic Preservation Division
SMA	Special Management Area
SSA	Shoreline Setback Area
SSL	Shoreline Setback Line
SSV	Shoreline Setback Variance
UH	University of Hawai’i at Mānoa
USACE	US Army Corps of Engineers
USGS	US Geological Survey
WQ	Water Quality
WRRC	Water Resources Research Center
WQC	Water Quality Certification

CHAPTER 1—INTRODUCTION

1.1 PROJECT INFORMATION SUMMARY

Project Name:	Kamehameha Highway, Replacement of South Punalu‘u Bridge Federal Aid Project Number: BR-083-1(42)
Project Owner:	State of Hawai‘i, Department of Transportation, Highways Division 869 Punchbowl Street Honolulu, Hawai‘i 96813-5097 Contact: Vincent Llorin, Project Manager Phone: (808) 692-7568, Fax: (808) 692-7568
Accepting Authorities:	State of Hawai‘i, Department of Transportation US Department of Transportation, Federal Highway Administration
Location:	Kamehameha Highway, Route 83, Milepost 24.4 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 South Punalu‘u Bridge and construction of a temporary diversion bridge and a new, government agency-compliant replacement bridge with paved shoulders and shielded ADA-compliant walk/bikeway and bridge roadway approaches. A General Conceptual Plan for the project is shown in **Figure 3**.
Property Owner and TMK Designation:	Kamehameha Highway (FAP 3-E) 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 Tax Map Keys: Adjacent parcel to the west (1): 5-3-004:001 (Stephen W. Chung et al—Private) Adjacent parcel to the west (2): 5-3-003:001 (Bishop Estates Trustees) Adjacent parcel to the west (3): 5-3-002:039 (Cyril D. Williams et al—Private) Adjacent parcel to the east: 5-3-002 (State of Hawai‘i—Mouth of Punaluu Stream) A Tax Map Key Map of the site is attached for reference as **Figure 4**.
State Land Use District:	Agriculture/Urban 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: Adjacent parcel to the west (1): 100—Improved Residential Adjacent parcel to the west (2): 500—Agricultural Adjacent parcel to the west (3): 100— Improved Residential Zoning Code & Description: Adjacent parcel to the west (1): 05—R-5 Residential District Adjacent parcel to the west (2): 52—Ag-2 Agricultural District Adjacent parcel to the west (3): 05— R-5 Residential District 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 South Punalu‘u Bridge project site is located approximately at milepost 24.4 on Kamehameha Highway (Route 83), in the District of Ko‘olauloa on the northeastern coast of the island of O‘ahu, roughly 15 miles north of Kāne‘ohe (or 7 miles from Kualola Ranch and Park) towards Kahuku and about 3 miles south of Kahuku (or 5 miles from BYU Hawai‘i/Polynesian Cultural Center) towards Kāne‘ohe. The existing South Punalu‘u Bridge (Bridge Number 9) spans Punalu‘u Stream in a northwest-southeast alignment and is located at approximately 250 feet northwest of Punalu‘u Beach Park, which is owned by the State of Hawai‘i. The bridge is located just about at the estuary formed by Punalu‘u Stream and the Pacific Ocean. The existing bridge was built in 1926 and is 126 feet in length, 26.4 feet in width and 12 feet in height. The bridge is a seven-spanned reinforced

concrete slab structure that rests on concrete piers. A 5′-wide, shielded wooden walkway is located on the *mauka* side of the bridge for pedestrian travel. South Punalu‘u Bridge is an important transportation link between windward communities, servicing both northbound and southbound traffic on Kamehameha Highway.

The State of Hawai‘i, Department of Transportation (DOT), Highways Division (HWY) is proposing to demolish the existing bridge and replace it with a new bridge 54-feet wide and 160-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 of compliance 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 Punalu‘u. The proposed project will also involve the construction of a temporary diversion bridge and new bridge roadway approaches. The proposed replacement bridge will consist of two vehicular travel lanes for 2-way traffic, paved shoulders and a shielded walk/bikeway compliant with the latest Americans with Disabilities Act (ADA) guidelines.

The existing deteriorating bridge does not meet current live load and seismic requirements of regulating agencies. The proposed project will construct a bridge to a standard design that meets government agency guidelines and requirements and to widen the bridge to span the entire width of the roadway right-of-way and provide shielded access about 5′-wide with railings dedicated solely to the safe use of 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 $14.5 million in which 80% will be from Federal funding and 20% from State funding. The construction work is anticipated to begin in early 2006 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. Shoreline Setback Variance (SSV)
    3. 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)
    4. Assessment and Federal Consistency Determination
  - Department of Health (DOH), Clean Water Branch (CWB)
    5. National Pollutant Discharge Elimination System (NPDES) General Permit—Notice of Intent (NOI) Form C—*Storm Water Associated with Construction Activity*
    6. NPDES General Permit—NOI Form F—*Hydrotesting Waters*
    7. NPDES General Permit—NOI Form G—*Construction Activity Dewatering Effluent*
    8. Clean Water Act (CWA) Section 401 Water Quality Certification (WQC)
  - DLNR, State Historic Preservation Division (SHPD), US EPA & US Advisory Council on Historic Preservation (ACHP)
    9. Section 106 of National Historic Preservation Act (NHPA) Compliance
- Federal Government
  - United States (US) Department of the Army (DOA), Corps of Engineers (COE)
    10. CWA Section 404 Permit
  - US DOI Fish and Wildlife Service (FWS)
    11. Endangered Species Act (ESA) Section 7 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, SSV and 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, Punalu‘u 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, DOT Project Number BR-083-1(42), Kamehameha Highway, Replacement of South Punalu‘u Bridge, Punalu‘u, Ko‘olauloa, O‘ahu, Hawai‘i,* dated October 2003, by M&E Pacific, Inc.

1.3.1.2 Shoreline Setback Variance

The Shoreline Setback Area (SSA) is the area between the shoreline and the Shoreline Setback Line (SSL). Most SSLs are set at 40 feet from the shoreline (the upper reaches of the wash of waves, usually evidenced by the edge of vegetation growth or the upper line of debris left by the wash of waves), although in some places the shoreline setback boundaries extend further inland. Counties have the authority to set deeper setbacks. Structures or construction activities are not permitted in the SSA without a variance.

The SSV is regulated under Chapter 205A—*Coastal Zone Management* and Chapter 343—*Environmental Impact Statements* of the Hawai‘i Revised Statutes (HRS);

ROH Chapter 23—*Shoreline Setbacks*; and the DPP document, *Rules Relating to Shoreline Setbacks and the Special Management Area* et seq.

A Shoreline Setback Map of the region encompassing the project site is attached for reference as **Figure 8**. According to the map, part of the construction work for the proposed action will be within the SSA; therefore, an SSV application for this project has been prepared and is in the final stages of processing. Although the final, replacement bridge will be located completely out (*mauka*) of the SSV, a portion of the temporary diversion bridge will be located within the SSV. The diversion bridge will be temporary and in-place until the final bridge construction is completed and functional.

1.3.1.3 Special Management Area Permit

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 and has been prepared for the proposed work. The DPP allows for this permit to be processed in conjunction with the SSV; thus, a combined application for the SMP and SSV has been prepared and is in its final stages of processing. 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.

1.3.2 STATE OF HAWAI‘I

The regulating agencies for the State of Hawai‘i include DBEDT-OP-CZM, DOH-CWB and DLNR. An assessment and determination of Federal Consistency is required by DBEDT-OP-CZM. Four items are required from the DOH-CWB: three different types of NPDES General Permits and Section 401 WQC. 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); thus, a review of project work for its consistency with Hawai‘i’s CZM Program will be conducted. 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 DOT-HWY has submitted Notice of Intent (NOI) forms for review and approval by the DOH in order to obtain a Notice of General Permit Coverage (NGPC) for project construction work. Different types of discharges will require different NOI forms.

The NPDES Permit is regulated under CWA et seq, HRS Chapter 342D, 40 CFR Parts 122 to 125 and HAR 11-55.

Construction work for the proposed project will necessitate a few different types of NPDES NGPCs and an NPDES permit application for all applicable permit types for this project will be prepared. Form C—*Storm Water Associated with Construction Activity* has been submitted to cover general runoff on the site from rainfall to a State surface water (Punalu‘u Stream) for the duration of the project. Form F—*Hydrotesting Waters* has been submitted to cover the installation of new potable water lines for the realignment of existing BWS pipelines at the site. Form G—*Construction Activity Dewatering Effluent* has been submitted to cover dewatering discharge resulting from the construction of bridge abutments and center piers for both the replacement and temporary diversion bridges. Forms C and G require best management practices (BMPs) to control and treat the discharge, while Form F requires a DOH-acceptable form of effluent treatment. The BMPs and methods of discharge treatment for the proposed project are discussed in Chapter 2. At the end of the project, Notice of Cessation (NOC) forms will be submitted to the CWB to terminate coverage of the issued permits. DOT-HWY is in the final stages of processing the NOIs.

1.3.2.3 CWA Section 401 Water Quality Certification

Water Quality Certification pursuant to the Federal Clean Water Act of 1977 et seq, 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 the 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 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 instreaming 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 stream bank abutments, center piers and concrete support structures for both the temporary diversion and replacement bridges; thus, a SCAP is required by the project. DOT-HWY is in the final stages of processing a SCAP for this project.

1.3.2.5 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, near the project site. 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 and preconsultation (**Appendix C**), an APE was established as shown in **Appendix D**, that roughly encompasses the area disturbed by project work. This area consists primarily of the 50-foot roadway easement width, the length of the existing bridge and the approximately 250-foot length of each proposed bridge approach roadway. The APE also consists of a roughly trapezoidal shaped area that extends about 40-feet *makai* of the row that accounts for the temporary diversion bridge and roadway. Areas disturbed for the replacement and diversion bridge abutments, center piers and concrete support structures are included as part of the APE.

Other projects near the site have located historic properties. The potential for the existence of historic sites, especially burial 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 Report of the Geotechnical Drilling for the South Punalu‘u Bridge Replacement Project, Kamehameha Highway, Punalu‘u, Ahupua‘a, Ko‘olauloa District, Island of O‘ahu* by Cultural Surveys Hawai‘i, Inc., which has been reviewed and approved by the SHPD. This document is included

with this report as **Appendix E**. 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 E**. Thus, an MOA is not required and will not be developed between the FHWA, DOT-HWY and SHPD.

Should 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 RHA Section 10 Permit and a CWA Section 404 Permit are 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 DOA 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) Insure that US water resources are safeguarded;
(2) Insure that water resources in the US are used in the best interest of the people; and
(3) Insure 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.

Preapplication consultation was accomplished with the USACE to confirm USACE jurisdiction and construction BMPs that could minimize potential adverse environmental effects, and to ascertain permitting requirements. The appropriate DOA permit applications to be prepared and filed for this project as per receipt of determination from the USACE are RHA Section 10 and CWA Section 404 Permits.

The 404 CWA Permit is regulated under Section 404 of the Clean Water Act (33 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. Consultation with the USACE indicated that 404 CWA Permit requirements may be satisfied through Nationwide Permit (NWP) 14 and 33 Coverage. Nationwide Permit 14 covers *Linear Transportation Projects* and NWP 33 covers *Temporary Construction Access and Dewatering*. As previously mentioned, a 401 WQC is required prior to the issuance of a 404 CWA Permit.

1.3.3.2 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 **Appendix H**.

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 South Punalu‘u Bridge, which is situated across Punalu‘u 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 diversion road complete with diversion bridge,
    - Temporary diversion bridge with separate *makai* pedestrian footwalk,
    - Stream bank widening and stabilization,
    - Replacement bridge approach roadways,
    - Replacement bridge with shielded *mauka* pedestrian walk/bikeway,
    - Temporary and permanent lighting,
    - Realignment/replacement of existing BWS waterlines,
    - Temporary removal and replacement of an existing bus stop,
    - Traffic control,
    - Archaeological monitoring, and
    - Environmental protection and BMPs.

The project site is located in a small, rural residential community. Single-family home residences are located adjoining the site to the south of the bridge and small commercial businesses and residences are situated adjoining the site to the north of the bridge. The land at the mouth of Punaluu Stream is property of the DLNR. 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, Punalu‘u, 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 diversion bridge and roadway with sufficient lighting *makai* of the existing South Punalu‘u Bridge;
- Relocation & replacement of an existing City and County of Honolulu, Board of Water Supply (BWS) 12-inch potable water fire hydrant line suspended beneath the existing bridge wooden walkway and effective protection, as required, of existing buried BWS 30-inch and 36-inch potable water lines on the *mauka* and *makai* sides of the bridge, respectively;
- Demolition of the existing bridge;
- Widening and hardening of stream banks beneath the existing bridge;
- Construction of a new bridge with appropriate lighting;
- Reconstruction of replacement bridge approach roadways;
- Demolition and removal of the temporary diversion bridge, roadway and lighting;
- Final grading and landscaping; and
- Removal of the temporary BMPs.

For the protection of nearby businesses, residences, beachgoers and bridge users both temporary and permanent BMPs will be used for the project. 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. Temporary BMPs will consist of earthen berms and silt fences along the perimeter of the project site, and sandbags and turbidity barriers installed along the stream banks for erosion control. Oil boom floats may be used periodically during in-stream activities to contain any fluids introduced into the area from construction equipment.

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 Punalu‘u 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 detailed with the measures to restore the area to its original condition, or better, with the approval of the Engineer, subsequent to 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 diversion bridge will be 36′-wide and roughly 180′-long (single span), with an approximate vehicle travel surface elevation of 7.54′. The bridge will be crowned at its centerline and will contain a 5′-wide shielded *mauka* footwalk. The footwalk will provide the pedestrians with a totally separate access that is level with the main deck and abutment. This bridge and footwalk will be located completely outside of and offset *makai* from the existing 50′-wide Kamehameha Highway right-of-way. An asphaltic concrete temporary diversion bridge and roadway will be constructed. Temporary lighting for the diversion bridge and roadway will be provided. The brightness of the lights will not exceed existing so as not to disorient any wildlife.

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 has been developed.

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.

The construction parcels provided by DOT-HWY are areas directly related to construction activities, that is, the area required to perform bridge replacement construction and implementation of the detour roadway. 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 and safety purposes around the work and staging areas.

Existing utilities at the site include the following items:

- A 12-inch BWS potable water fire hydrant line suspended beneath the existing walkway;
- A buried BWS 30″ potable water line that runs parallel to Kamahameha Highway on the *mauka* side of the bridge;
- A buried BWS 36″ that runs parallel to Kamahameha Highway on the *makai* side of the bridge; and
- Overhead Hawaiian Electric Company, Inc. (HECO) power lines.

The 12″ waterline will be temporarily realigned and then replaced. The 30″ and 36″ waterlines will be protected by measures, such as, concrete jacketing, sheet piling, shoring and bracing, as required, for the duration of the construction work. Subsequent to project work, the protective structures will be removed. 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 diversion bridge and roadway are in place, the existing South Punalu‘u 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 South Punalu‘u Bridge will commence. The new replacement bridge will be a three-spanned concrete structure 54′-wide, 160′-long and 8′-high, supported by two center piers and abutments at both ends. In comparison with the existing bridge, the widening is as follows:

- Existing length: 126 feet
- Proposed abutment-to-abutment length: 160 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. A shielded walk/bikeway will be located along the *mauka* side of the bridge. 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 temporary diversion bridge, roadway and 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 South Punalu‘u Bridge to satisfy government agency standards and regulations. The replacement of the South Punalu‘u 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 South Punalu‘u 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* was 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 diversion 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 protection of waterlines at the site was coordinated with the BWS.
• Provisions for pedestrians and bicyclists:	The final structure will provide a shielded ADA-compliant travelway for use by both pedestrians and bicyclists.

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 piers 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, Replacement of South Punaluu Bridge, Project No. BR-083-1(42), Punaluu, Oahu, Hawaii*, dated October 17, 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 (*South Punaluu Bridge Replacement, Hydraulic and Scour Analysis*, dated October 2003) for the existing, diversion and replacement bridges have been 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 (seven spans) of the existing bridge. In addition, the stream will be widened during the project and the banks will be hardened for stabilization 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 12-inch cast iron hydrant waterline suspended along the *mauka* side of the South Punalu‘u Bridge will need to be temporarily relocated for attachment to the diversion bridge and subsequently attached to the final replacement bridge. Since the majority of the project work will be conducted 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 need to be upgraded for the wider permanent roadway. Lighting will also be provided for the temporary diversion road.

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 between 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, DOT Project Number BR-083-1(42), Kamehameha Highway, Replacement of South Punalu‘u Bridge, Punalu‘u, Ko‘olauloa, O‘ahu, Hawai‘i*, dated October 2003) based on the hydrology study. Runoff along the roadside will be intercepted from the highway into Punalu‘u Stream. Bridge deck drainage alternatives using corrosion-resistant materials for drain inlets, scuppers and downspouts will be evaluated. The design flows will 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.

Geolabs, Inc. has produced a report, *Pavement Justification Report, Kamehameha Highway, Replacement of South Punaluu Bridge, Project No. BR-083-1(42), Punaluu, Oahu, Hawaii*, dated December 16, 2003, that supports the pavement design for the project.

Numerous Mahele-era Land Court Award residential lots exist along the *mauka* side of the Kamehameha Highway near South Punalu‘u Bridge; thus, the simplest alignment for the proposed temporary diversion road is *makai* of South Punalu‘u Bridge. This alignment will allow the project to be conducted without significantly affecting 24-hour access to the existing residences and businesses. The existing pedestrian access across South Punalu‘u Bridge will be redirected to the footwalk on the *makai* side of the diversion bridge during the demolition of the

existing bridge and construction of the new, replacement bridge. An existing *makai* bus stop, near the site, will be temporarily out of service. 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 structural design for the proposed replacement bridge will be based on 100-year storm and applicable seismic standards. The existing bridge meets neither 100-year storm requirements nor seismic regulations. 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 seven-span South Punalu‘u Bridge will be replaced with a three-span bridge and the bank beneath the bridge will be widened and hardened for erosion stability. 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 new 54′-wide bridge will be a reinforced concrete structure with an approximate length of 160 feet. The deck will consist of cast-in-place reinforced concrete over precast, prestressed concrete girders or tees.

The temporary diversion bridge will be Prefabricated Steel Truss Bridge (PSTB) panel-type modular bridging system. The temporary 36′-wide bridge will be a steel truss-based structure with an approximate length of 180 feet. Concrete pads on reinforced concrete piles will be constructed for launching and landing abutments at the bridge ends (noses). The PSTB will be single-spanned and 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 the use of the replacement bridge, temporary diversion bridge and approach roadways.

The existing vegetation on the *makai* side of the road provides a windbreak for the residences on the *mauka* side and provides shade for the current bus stops. 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 diversion 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, the settling tank and sedimentation pond with filtering rock berm and geotextile fabric for dewatering effluent will be built, and the containment treatment pond for hydrotesting effluent will be constructed. In-stream BMPs, such as, sandbags, turbidity barriers, and vinyl sheet piles will be installed and a temporary diversion bridge 36′-wide with 5′-wide footwalk, and 180′-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 settling tank and sediment pond. Hydrotesting will be performed as required with pumps and storage trucks, which will transport the water to the containment treatment pond. Bridge approach roadways about 250-feet long will be constructed on each end of the existing bridge and a diversion roadway connecting to these bridge approach roadways will be installed to provide vehicular access to the temporary bridge. Upon completion of the diversion roadway, the existing bridge will be demolished and replaced with a new, three-span bridge 160′-long and 54′-wide, which

will occupy the entire width of the established highway ROW. 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, two 8′-wide paved shoulders, one 5’-wide walk/bikeway lane on the *mauka* side of the bridge and 4’-wide cantilevered extension to accommodate the 12-inch waterline. 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 on the existing South Punalu‘u Bridge is undertaken. 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.

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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 diversion 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 minimal.

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 Punalu‘u 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 diversion 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 outcry and resistance to the State’s acquisition of private land to accommodate the new bridge and roadway, 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 South Punalu‘u 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 South Punalu‘u Bridge* by Sea Engineering, Inc. and AECOS Consultants, Inc., and is included as **Appendix F**. 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 the 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 adjacent to the project site.

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

Station	Average Annual Maximum Temperature (ºF)	Average Annual Minimum Temperature (ºF)	Average Annual Total Precipitation (inches)
‘Ōpae‘ula	78.1	63.2	56.5
Kāne‘ohe 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 Ko‘olau 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. When reviewed against past, present and reasonably foreseeable future actions no cumulative effects on geology and topography are expected.

3.2.3 WATER RESOURCES AND HYDROLOGY

3.2.3.1 Surface Water

Existing Conditions

The following information details Punalu‘u Stream:

Location:	Latitude 21º33′33″, longitude 157º54′06″, on the left bank at the Punalu‘u ditch diversion dam, 1.4 miles west of Kahana and 1.8 miles southwest of Punalu‘u
Drainage Area:	About 2.78 square miles
Average Discharge:	16.8 cubic feet per second (cfs) or 12,180 acre-feet per year (acre·ft/yr), from 46 years of recorded data from 1954 through 1999)
Extremes for Period of Record:	Maximum discharge, 6,900 cfs, March 20, 1991

Average Empirical Seasonal Flow Data for Punalu‘u Stream is included as **Figure 12**.

A preliminary hydrology study indicates approximately 5,860 cfs (recurrence period estimated at 12 years) will flow under bridge with approximately one foot of freeboard, or approximately 7,520 cfs (recurrence period estimated at 28 years) will flow through bridge with no freeboard.

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 (seven spans) of the existing bridge. In addition, the stream will be widened during the project and the banks will be hardened for stabilization against erosion and scour. The cross-sectional flow area of the replacement bridge will exceed that of the existing bridge; thus, the hydraulic conductivity and capacity of the replacement bridge will be greater than the existing bridge. The project is anticipated to present a “no-rise” effect on Punalu‘u Stream. As pointed out earlier, per HAR regulations, an application for a SCAP permit that will cover in-stream work, such as, bank widening and stabilization, will be submitted to the DLNR-CWRM.

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)	01 (Ko‘olauloa)	116	30601116	12211	7, 8, 11
Lower	3 (O‘ahu)	06 (Windward)	01 (Ko‘olauloa)	121	30601121	12213	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 flank—horizontally extensive lavas. 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 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 Punalu‘u Stream and the Pacific Ocean, and are classified as Class 2a, Perennial Non-impaired Inland Waters out to the shoreline and Class A Marine Waters from the shoreline out to the 600-foot (100-fathom) contour 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 15A** and an Island of O‘ahu, Perennial Stream Classification Map is attached as **Figure 15B**. The two classes of waters are protected in very similar manners.

Class 2a Inland Waters are protected for use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish and wildlife, and with recreation in and on these waters. These waters will not act as receiving waters for any discharge that has not received the best degree of treatment or control compatible with the criteria established for this class.

Class A Marine Waters are protected for recreational purposes and aesthetic enjoyment. Any other use will be permitted as long as it is compatible with the protection and propagation of fish, shellfish and wildlife, and with recreation in and on these waters. These waters will not act as receiving waters for any discharge that has not received the best degree of treatment or control compatible with the criteria established for this class.

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.

Table 3-3 below summarizes results of a specific water quality sampling performed on Punalu‘u Stream in 1999.

Table 3-3 Water Quality Characteristics of Punalu‘u Stream from Sample Obtained June 22, 1999

Time	Temperature (ºC)	pH	DO (mg/L)	DO (Percent Saturation)	Sodium (mg/L)
1220	21.5	8.3	9.4	107	10
Chloride (mg/L)	**Fluoride (mg/L)**	**Ammonia (mg/L)**	**Nitrite (mg/L)**	**Total Phosphorus (mg/L)**	**Solids Dissolved (mg/L)**
12	< 0.1	< 0.02	< 0.01	0.024	90

Source: B.R. Hill, R.A. Fontaine, R.I. Taogoshi, P.C. Teeters. *USGS Water Resource Data Hawai‘i and Other Pacific Areas,* Water Year 1999, Volume 1. Hawai‘i, Water-Data Report HI-99-1, State of Hawai‘i DLNR, CWRM and other agencies.

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 bank 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. 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 a SCAP permit to undertake the in-stream work will be submitted to the DLNR-CWRM.

3.2.5 SOILS

Existing Conditions

The surface soil beneath and to the east and west of South Punalu‘u Bridge is predominantly sand, rocks and other material and debris from Punalu‘u 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 area between 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 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.

South Punalu‘u Bridge is located in a drainage way of a floodplain at just about the estuary interface of Punalu‘u Stream and the Pacific Ocean. Punalu‘u 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 15003C0155 E (November 20, 2000) of the Federal Emergency Management Agency’s (FEMA’s) Flood Insurance Rate Maps (FIRMs) indicates that the site is designated as within flood zone VE. Zone VE areas are special flood hazard areas inundated by 100-year floods and are susceptible to coastal flooding with velocity hazard (wave action). A base flood elevation of ten (10) feet has been determined. This elevation is relative to reference mark RM13 of 6.588 feet NGVD (National Geodetic Vertical Datum) that is a stainless steel (SS) disk, 4.35 miles northwest along State Highway 83 from the post office at Ka‘a‘awa, 17.6 feet northeast of the centerline of the highway, 10 feet southeast of the extended centerline of an asphalt road southwest, 28.8 feet west of a coconut tree which is in front of a hat stand, 50.2 feet east and across the highway from power pole 388, 53.2 feet east and across the highway from a fire hydrant, and set in the top of a concrete post 0.1 feet underground. 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 seven spans with six piers and the new bridge will be three-spanned with two center piers and abutments 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 will be 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 South Punalu‘u 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, causing 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 Punalu‘u Stream flow and widened and hardened 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 prone 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 South Punalu‘u Bridge does not meet DOT Zone 2 seismic requirements established 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

Similar to most O‘ahu beaches, the beach in Punalu‘u area is formed predominantly by carbonate sand derived from offshore reefs. In addition to this sand, a gravel bar is present at the Punalu‘u Stream mouth and gravel beach cusps are evenly spaced along Punalu‘u beaches. The gravel is of terrestrial origin and is evidently deposited by the stream. The project site is characterized by a deep channel that extends offshore and a large steam delta (typical of estuaries) that lies at the head of Punalu‘u Stream where the stream enters the ocean. The nearshore region off the stream mouth is almost devoid of corals, and the intertidal region formed by the delta has low species diversity due to widely fluctuating salinity.

In general, the windward shorelines, including Punalu‘u beaches, have experienced extensive erosion, and coastal locations near the project site contain irrefutable evidence of a history of erosion. However, aerial photographic and beach profile studies indicate that the project site itself has been stable over the long term. The presence of the stream delta and the central location of the site in the local embayment probably contribute to this shoreline stability.

According to *Coastal and Environmental Evaluation for the Proposed Replacement of South Punalu‘u Bridge* (May 2002) 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 –0.1 feet from the Mean Sea Level Water datum (MSL) to about 1.0 foot MSL.

- Storm tides: Up to 4 feet MLLW with 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 Punalu‘u 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. According to the preliminary design, a portion of the temporary bridge will extend into shoreline setback area, which requires a SSV permit per ROH Chapter 23-1. After the replacement bridge has been constructed and in use, the temporary bridge and associated structures will be removed. The replacement structure and its associated structures will be completely outside (*mauka*) the shoreline setback line. Project structures will be located behind the present vegetation line and above the Mean Higher High Water (MHHW) elevation; thus, they are not anticipated to adversely impact the shoreline.

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 hardening and revegetation with native or similar 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, *Final Environmental Impact Statement for the Proposed Punalu‘u Shore Project* by Environmental Communications, Inc., 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 in Support of the South Punalu‘u Bridge Replacement Project, Kamehameha Highway, Punalu‘u Ahupua‘a, Ko‘olauloa District, Island*

of O‘ahu, by Cultural Surveys Hawai‘i, Inc. the types of flora inhabiting the project area include hau trees (Hibiscus tilaceaus), sea grapes (Coccoloba uvifera) and tropical almonds (Terminalia catappa).

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 diversion road, and will affect the existing landscaping at the mouth of Punaluu Stream. 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 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. 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 Punalu‘u Stream. The species include native *‘ōpa‘e kala‘ole* (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 *‘o‘opu* in the stream. The varieties are *‘O‘opu naniha*, *‘O‘opu nopili*, *‘O‘opu akupa* and *‘O‘opu nakea*.

Punalu‘u stream is one of the most preserved and natural remaining stream systems in O‘ahu according to information provided by DLNR-DAR. All of the native *‘o‘opu, ‘ōpae* and *hīhīwai* can be found in this stream. Major spawning runs of *‘o‘opu nākea* have also been documented in its lower reaches. During DLNR’s last survey conducted in the mid to lower section of Punalu‘u stream in the early 90's, they found *‘o‘opu naniha* (Stenogobius Hawaiiensis), *‘o‘opu ‘akupa* (Eleotris sandwicensis), *‘o‘opu nākea* (Awaous guamensis), *‘o‘opu nōpili* (Sicyopterus stimpsoni) and *‘o‘opu ‘alamo‘o* (Lentipes concolor). *Hapawai* (Neritina vespertina) and *‘ōpae ‘oeha‘a* (Macrobrachium grandimanus) were also observed. The mountain *‘ōpae,* also known as *‘ōpae kala‘ole* (Atyoida bisulcata) and the *hīhīwai* (Neritina granosa) are also undoubtedly present in this stream at higher elevations. Additional surveys in this stream were not conducted because the entire watershed is privately owned, and permission to survey the upper reaches could not be obtained.

The estuary and Pacific Ocean at Punalu‘u Stream contain an array of marine fish, plants and benthic crustaceans.

Anticipated Effects and Mitigative Measures

No significant effects are anticipated on stream life forms in Punalu‘u 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. 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.

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 (**Appendix G**) with Hawai‘i Natural Heritage Program of the University of Hawai‘i at Mānoa, 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 3-4 Endangered Fauna Species in Project Vicinity Area

Species	Status	Last Observation
Anas wyvilliana (Hawaiian Duck)	List Endangered	1990
Fulica alai (Hawaiian Coot)	List Endangered	1993
Gallinule chloropus sandvicensis (Hawaiian Gallinule)	List Endangered	1993
Himantopus mexicanus knudseni (Hawaiian Stilt)	List Endangered	1993

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 diversion bridge and road and associated structures will involve construction work within the undeveloped area at the mouth of Punaluu Stream. Thus, some potential for disturbance of existing biological habitats, including the aforementioned endangered species, exists for the temporary diversion

roadway. Since the aforementioned endangered species were last observed at least nine years ago, and the physical construction associate with the temporary diversion roadway 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 diversion roadway 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 DLNR State Historic Preservation Division and the *Archaeological Monitoring Plan in Support of the South Punalu‘u Bridge Replacement Project, Kamehameha Highway, Punalu‘u Ahupua‘a, Ko‘olauloa District, Island of O‘ahu,* by Cultural Surveys Hawai‘i, Inc. 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. There has been little previous archaeology in the vicinity of the project area, with the exception of several inadvertently discovered human burials. Recent discoveries of some twenty-seven burials in the Windward Mains Board of Water Supply project at Punalu‘u and review of existing documents, including the Archaeological Monitoring Report produced by Cultural Surveys Hawai‘i, Inc. for a waterline from Hau‘ula to Lā‘ie (Masterson, et al. 1996), indicates a high likelihood of 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 Punalu‘u Land Commission Awards (LCAs) near the project area are displayed in **Figure 20**. Information on the archaeological 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 Final Environment Impact Statement for Windward O‘ahu Regional Water System Improvements done by BWS, City and County of Honolulu in 1988 did not identify any historical sites in the project site and nearby area.

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 or nearby vicinity. However, human burials may exist in the construction work area. Several burials have been uncovered during a BWS 36″ waterline installation project near the project site.

Table 3-5 Archaeological Finds Near the Site

	Site #/Source	***Site Type***	***Age***	***Significance***
1.	*50-80-06-295*	*Kaumaka‘ula‘ula Heiau*	*Pre-contact*	*One of the most sacred temples in Ko‘olauloa—reported destroyed*
2.	*50-80-06-3764* *C&C Medical Examiner’s Report*	*Burial*	*Pre-contact*	*Possible association with LCA 6954, 4330, 6955, 4372, 8447, 5243, 4370, 4437, (LC App 1123?)*
3.	*50-80-06-3977* *Smith, Bath & Masse 1988*	*Historic trash pit, fire pit/imu, three human burials, canid burial*	*Trash pits contain late 19th Century bottles and glass. Two of the burials are Pre-contact, one is Post-contact. No other dates indicated.*	*Possible association with LCA 5243, 4370, 3574, 4363*
4.	*50-80-06-5132* *Colin & Hammatt 2000*	*Burial, two sets of human remains & a weak cultural layer*	*Pre-contact*	*Possible association with LCA 435 or 4435*
5.	*Hammatt et al.* *(in progress)*	*Burial, twenty-seven sets of human remains & a weak cultural layer*	*Both Pre-contact and Post-contact*	*Possible association with a number of LCA*

Table 3-6 Punalu‘u Land Commission Awards Near the Site

	Claim Number	***Awardee***	***‘Ili***	***Land Use***	***Landscape Features***	***Amount***
1.	*3874*	*Paia*	*Lonokuakua*	*2 taro lo‘i, a kula, house lot*	*Sea Beach, River*	*3.85 acres*
2.	*4364*	*Kukaumi umi*	*Po‘opoe*	*5 taro lo‘i, 2 kula, house lot*	*Seaside, Stream*	*1.5 acres including 4 other lele lands*
3.	*4365*	*Kuolulu*	*Holu*	*6 taro lo‘i, a kula, house lot*	*Sea Beach*	*2.4 acres including lele land*
4.	*6962*	*Kukeawe*	*Kamaloa*	*23 taro lo‘i, a kula, house lot*	*Watercourse, Seaside*	*1.1 acres*

As mentioned in Section 1.3.3.2, an NHPA Section 106 review process is being conducted for the project. The SHPO, O‘ahu Island Burial Council, Punalu‘u 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.

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 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.

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 3-7 summarizes the maximum permissible sound levels for various noise durations.

Table 3-7 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 3-8. The noises 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 3-8 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 3-9 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/m³ (4.5 ppm)
	1-hour Average	35 ppm (40 mg/m^3)	Primary	10,000 µg/m³ (9 ppm)
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Primary & Secondary	70 µg/m³
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/m³ (0.08 ppm)
Lead (Pb)	Quarterly Average	1.5 µg/m^3	Primary & Secondary	1.5 µg/m³
Particulate (PM 10)(1)	Annual Arithmetic Mean	50 µg/m^3	Primary & Secondary	50 µg/m³
	24-hour Average	150 µg/m^3	Primary & Secondary	150 µg/m³
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/m³ (0.025 ppm)
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	0.03 ppm (80 µg/m^3)	Primary	80 µg/m³ (0.03 ppm)
	24-hour Average	0.14 ppm (365 µg/m^3)	Primary	365 µg/m³ (0.14 ppm)
	3-hour Average	0.50 ppm (1300 µg/m^3)	Secondary	1,300 µg/m³

(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. About 20 one- or two-story houses exist on the *mauka* side of the road, including a grocery store. No relatively tall buildings are located relatively near the site. The project site is dominated by direct, uninhibited mountain-ocean view occasionally obstructed by residential houses. Aesthetics of the South Punalu‘u Bridge are judged to be poor according to the bridge survey information provided by the SHPO.

Anticipated Effects and Mitigative Measures

Short-term disturbance of existing visual quality near South Punalu‘u Bridge is expected due to necessary vegetation removal, construction equipment, stockpiling of material, etc. For example, the boom of the construction crane and the diversion 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. Visual blocks caused by temporary construction will be removed at the end of the project and cleared and grubbed areas will be revegetated with plants similar, if not identical, 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 Punalu‘u 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, drainage system and traffic signs. The HECO electrical lines are overhead on the *mauka* side of Kamehameha highway and BWS waterlines run underground. A 12″ BWS waterline is suspended beneath the walkway of the existing South Punalu‘u Bridge.

Anticipated Effects and Mitigative Measures

Although electrical facilities will be unaltered by the project, the relocation of some utilities including waterlines and bus stops, 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.

The existing bus stop on the *mauka* side of the Kamehameha Highway will remain in service. However, the existing bus stop approximately 100 feet to the south of the bridge on the *makai* side of will be temporarily out of service for the duration of construction.

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 transportation will also cause a slight increase in local traffic congestion; however, continual traffic will be permitted along Kamehameha Highway throughout the project. Once the temporary diversion bridge and roadway are in-place, the existing South Punalu‘u Bridge will be blocked off from both vehicular and pedestrian travel with barriers. Traffic and pedestrians along Kamehameha Highway will be diverted to the diversion road. 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 diversion roads in approach to the diversion bridge will be started approximately 250 feet away from each end of this bridge. This may affect the access to *mauka* residences, however, the contract documents will require the contractor to ensure the safe and convenient access to these houses 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 ensure safety.

3.5.3 RECREATIONAL FACILITIES

Existing Conditions

According to the document *Coastal and Environmental Evaluation of the Proposed Water Main Bypass at North Punalu‘u Bridge*, Sea Engineering, Inc., March 2000, the project area is not heavily utilized, nor is it dominated by residential houses. Within half a mile south of the project site is Punalu‘u Beach Park on the *makai* side of the road. Access to the park 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.

During construction, public access to the beach area near the project site will remain unimpeded; thus, 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 Punalu‘u Community Association are being consulted regarding the identification of historic property locations, if any, within or near the project site, and are being further consulted as to the proper handling of any such recorded or identified archeological and burial features. The proposed project will incorporate an 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. Upon completion of the project, the safety factor of the South Punalu‘u 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 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 Punalu‘u 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 South Punalu‘u 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 plants and grassed earthen berms will be installed.

The replacement bridge will have a larger cross sectional area for Punalu‘u 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 South Punalu‘u Bridge.

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

The South Punalu‘u 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 South Punalu‘u 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 eight years 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 diversion bridge and roadway will occupy a small portion of undeveloped land at the mouth of Punaluu Stream. The diversion road and 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. Noise from traffic along Kamehameha Highway is 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 Punalu‘u Stream flow. The final bridge will have widened and stabilized banks and less in-stream support piers than the existing bridge. 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 hardened for 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 diversion 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 post construction lighting demand will be similar to the illumination requirements of the existing bridge and approach roadways.

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
  - Division of State Parks

- 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.
- Mitsunaga &Associates, Inc.
- PBR Hawaii, Inc.
- Punalu‘u Community Association
- Ronald N.S. Ho & Associates, Inc.
- Sea Engineering, Inc.
- WEST Consultants, Inc.

CHAPTER 6—REFERENCES

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

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

10. *Coastal and Environmental Evaluation for the Proposed Replacement of South Punalu‘u Bridge,* Sea Engineering, Inc. and AECOS Consultants, Inc., 2000.

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13. *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.

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16. *Final Environmental Impact Statement for the Proposed Punalu‘u Shore Protect, Punalu‘u, Ko‘olauloa District, Island of O‘ahu.* Environmental Communications, Inc. April 1981.

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

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

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

20. *In Gardens of Hawai‘i,* Marie C. Neal, Bishop Museum Press, 1965.

21. *Geotechnical Engineering Exploration, Kamehameha Highway, Replacement of South Punaluu Bridge, Project No. BR-083-1(42), Punaluu, Oahu, Hawaii*, Geolabs, Inc., October 17, 2003.

22. *Hydrology and Hydraulic Report, DOT Project Number BR-083-1(42), Kamehameha Highway, Replacement of South Punalu‘u Bridge, Punalu‘u, Ko‘olauloa, O‘ahu, Hawai‘i,* M&E Pacific, Inc., October 2003.

23. *Pavement Justification Report, Kamehameha Highway, Replacement of South Punaluu Bridge, Project No. BR-083-1(42), Punaluu, Oahu, Hawaii*, Geolabs, Inc., December 16, 2003.

24. *South Punaluu Bridge Replacement, Hydraulic and Scour Analysis,* West Consultants, Inc., October 2003.

25. *Kamehameha Highway, South Punalu‘u Bridge Replacement, Hydrologic Study, Hydraulic Analysis & Scour Evaluation, Punalu‘u, Island of O‘ahu, Hawai‘i,* M & E Pacific, Inc., October 2002.

26. *Project Assessment Report for Kamehameha Highway South Punalu‘u Bridge Replacement, District of Ko‘olauloa , Island of O‘ahu.* State of Hawai‘i, Department of Transportation Highways Division, 1999.

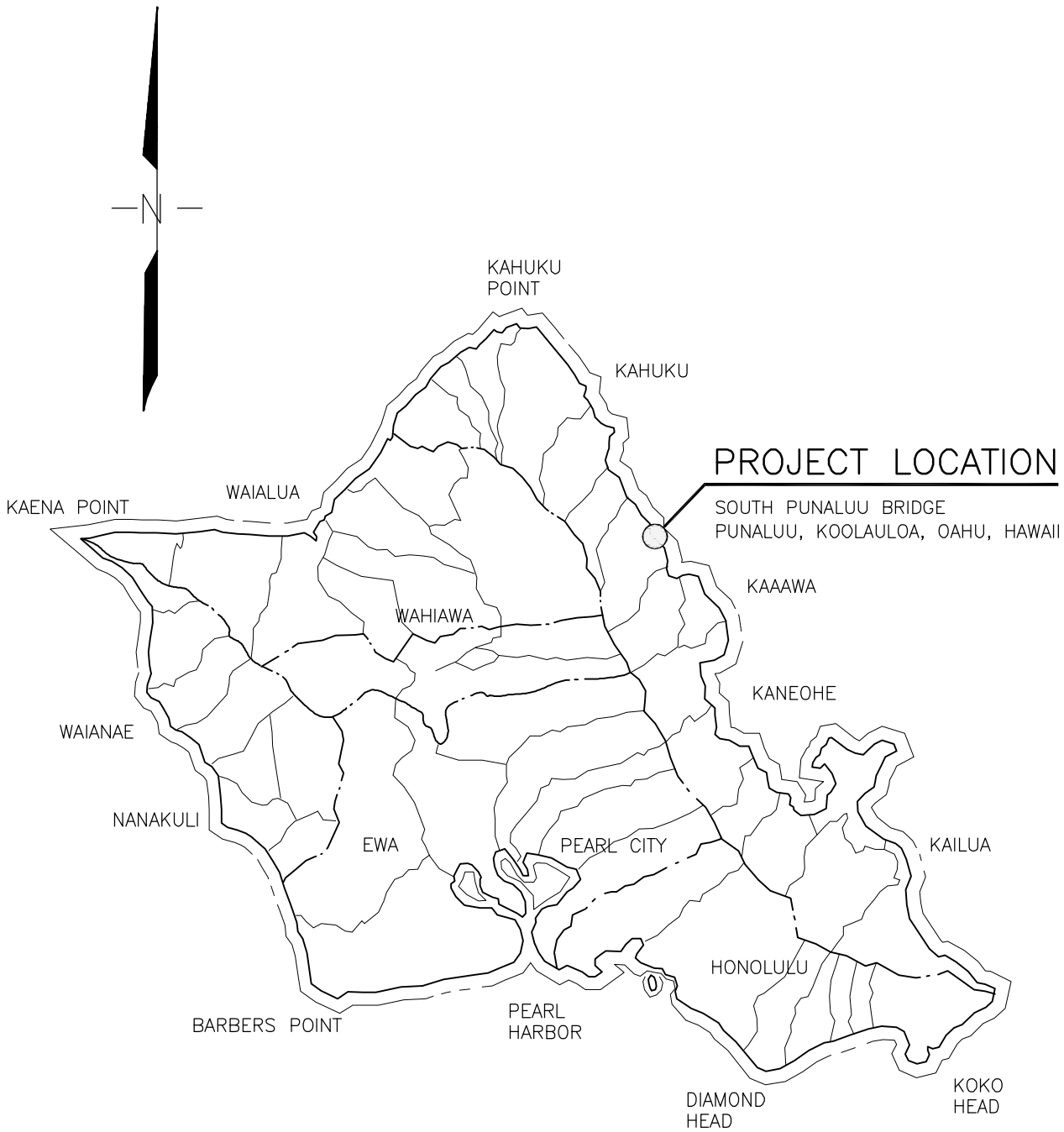
27. *Soil Survey of Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i and Lana‘i, State of Hawai‘i,* US Department of Agriculture Soil Conservation Service, 1972.

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

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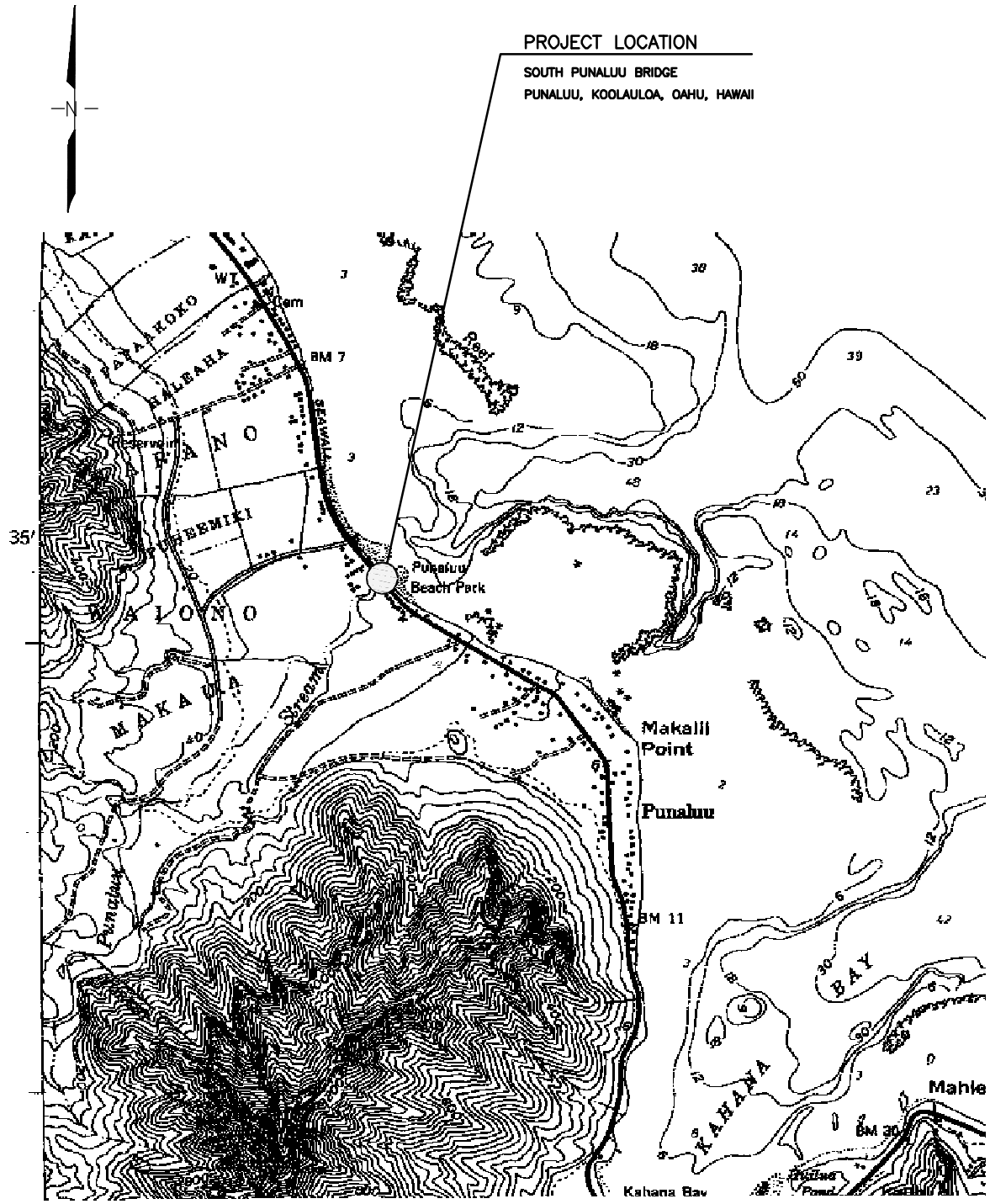
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 1
VICINITY MAP



SOURCE: USGS 7.5 MINUTE QUAD MAP, KAHANA, HAWAII, 1983.

GRAPHIC SCALE:

2000' 0 2000' 4000'

1" = 2000'

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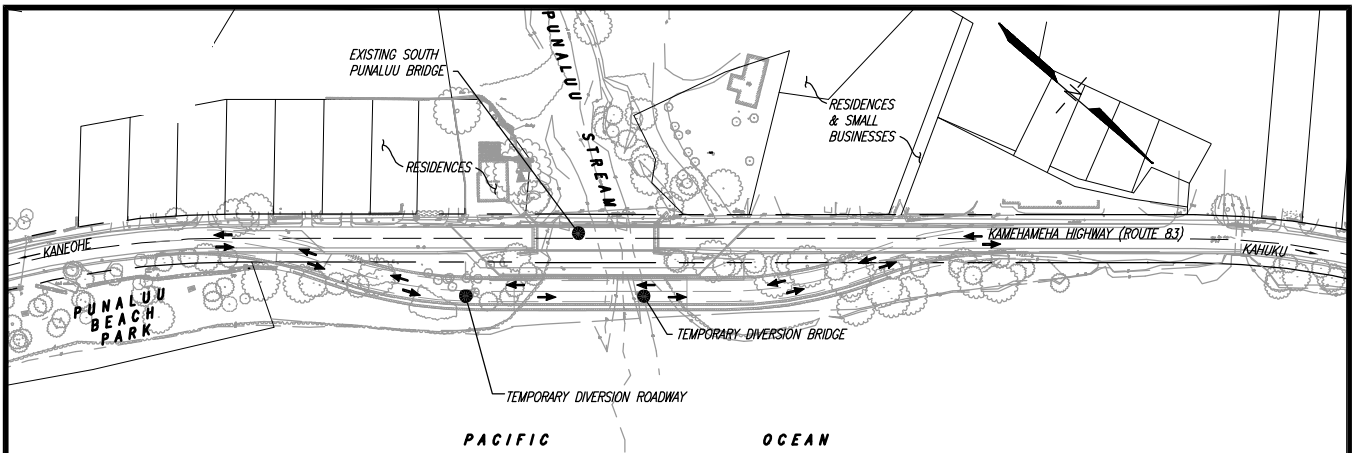
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 2
LOCATION MAP



DIVERSION PLAN
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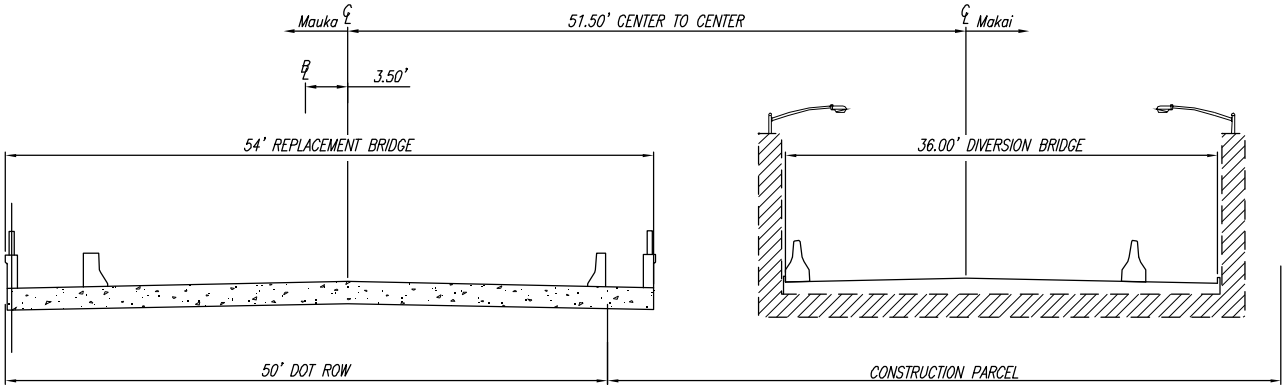

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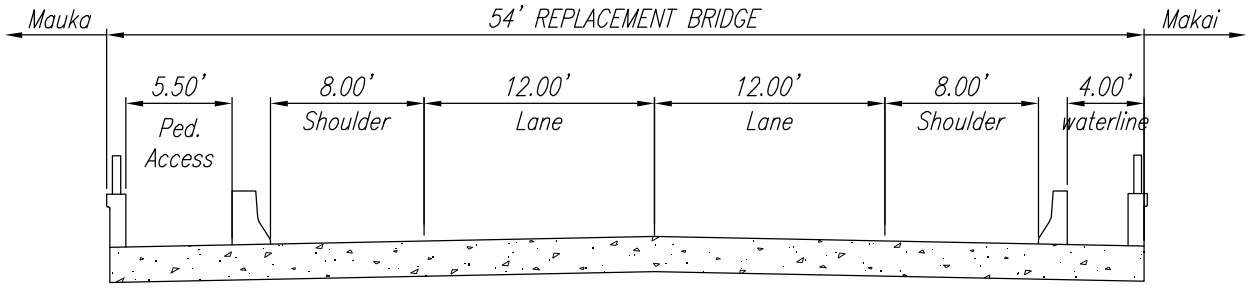

REPLACEMENT SECTION
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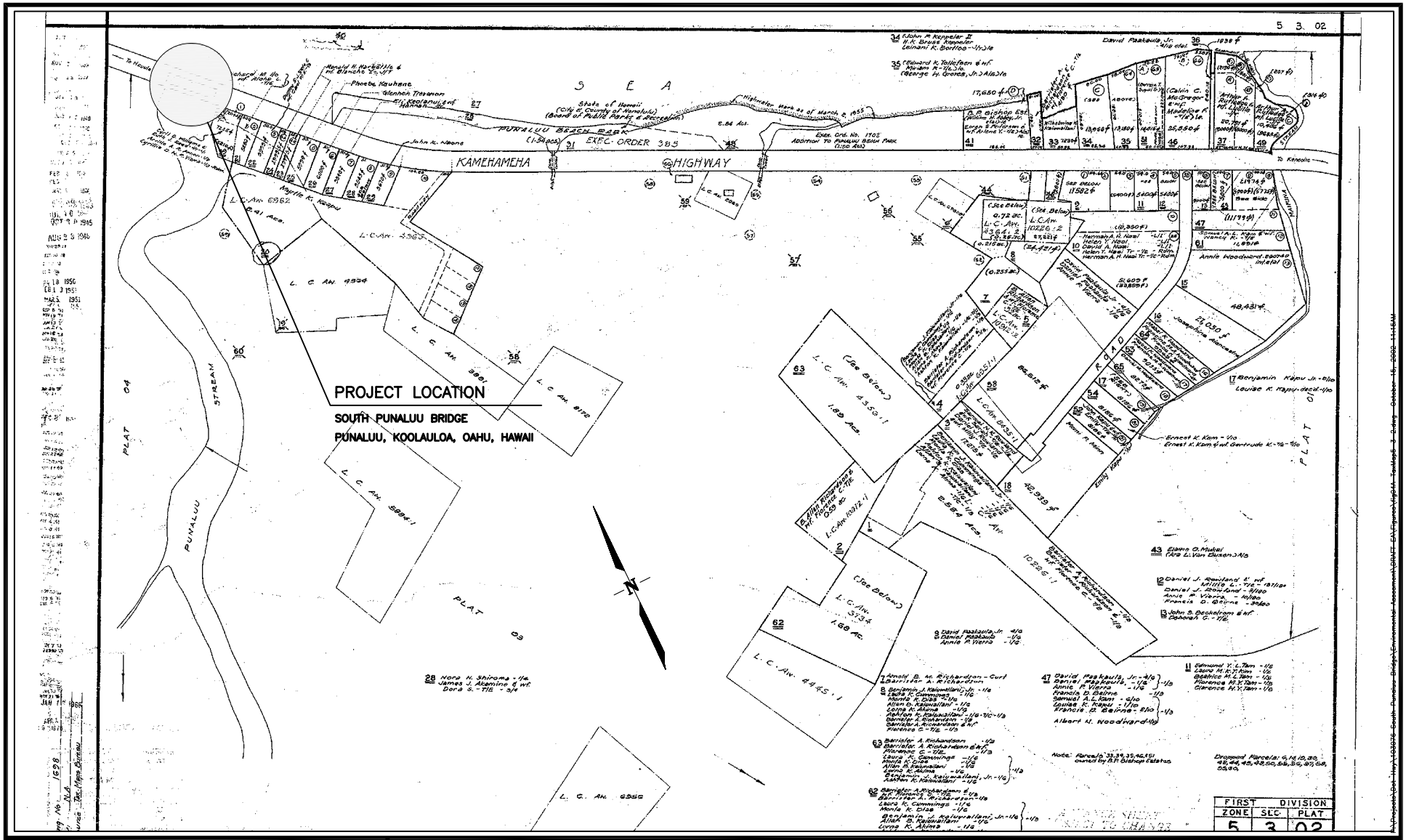
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 3
GENERAL CONCEPTUAL DESIGN



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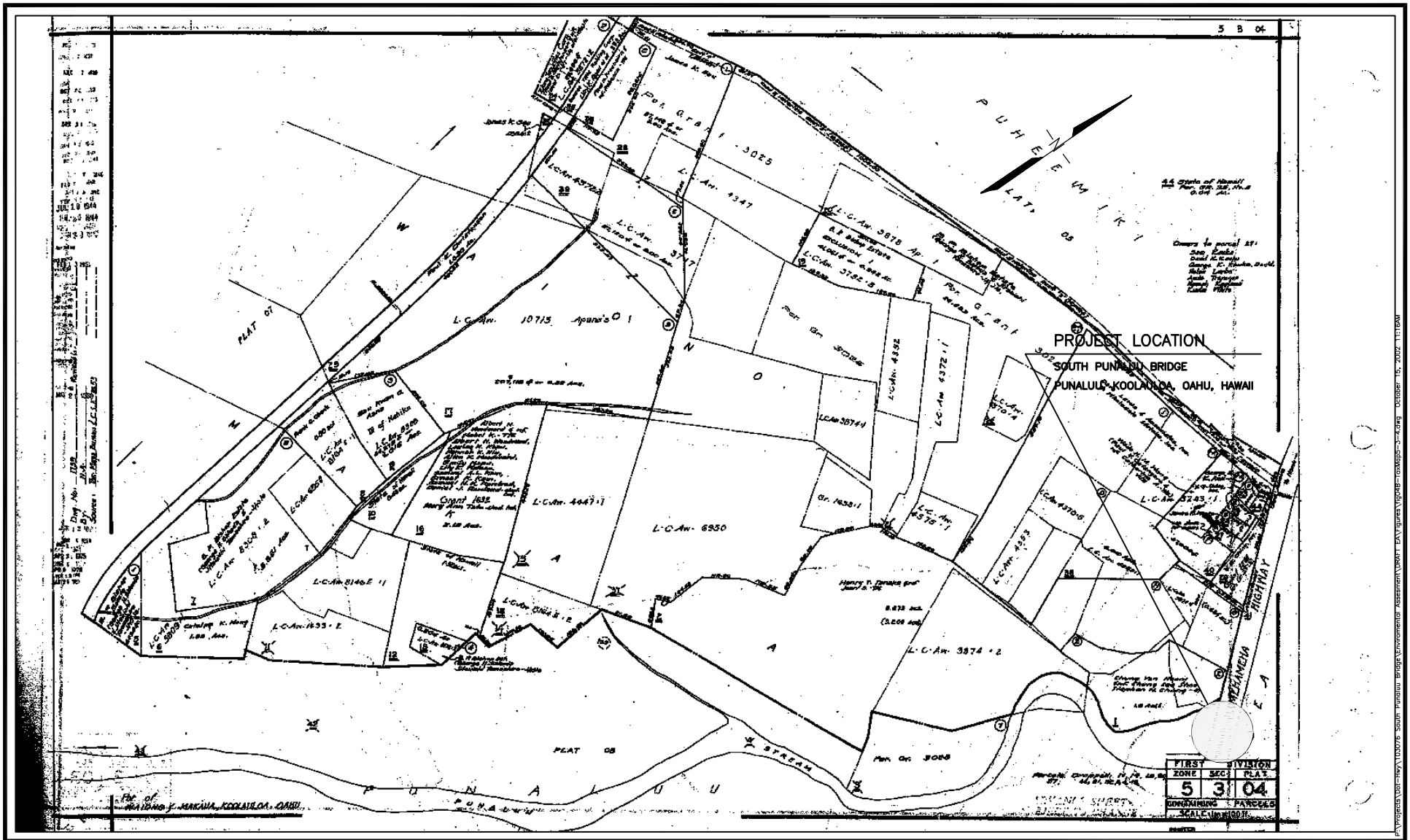
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 4A
TAX MAP KEY MAP 1 (5-3-002)



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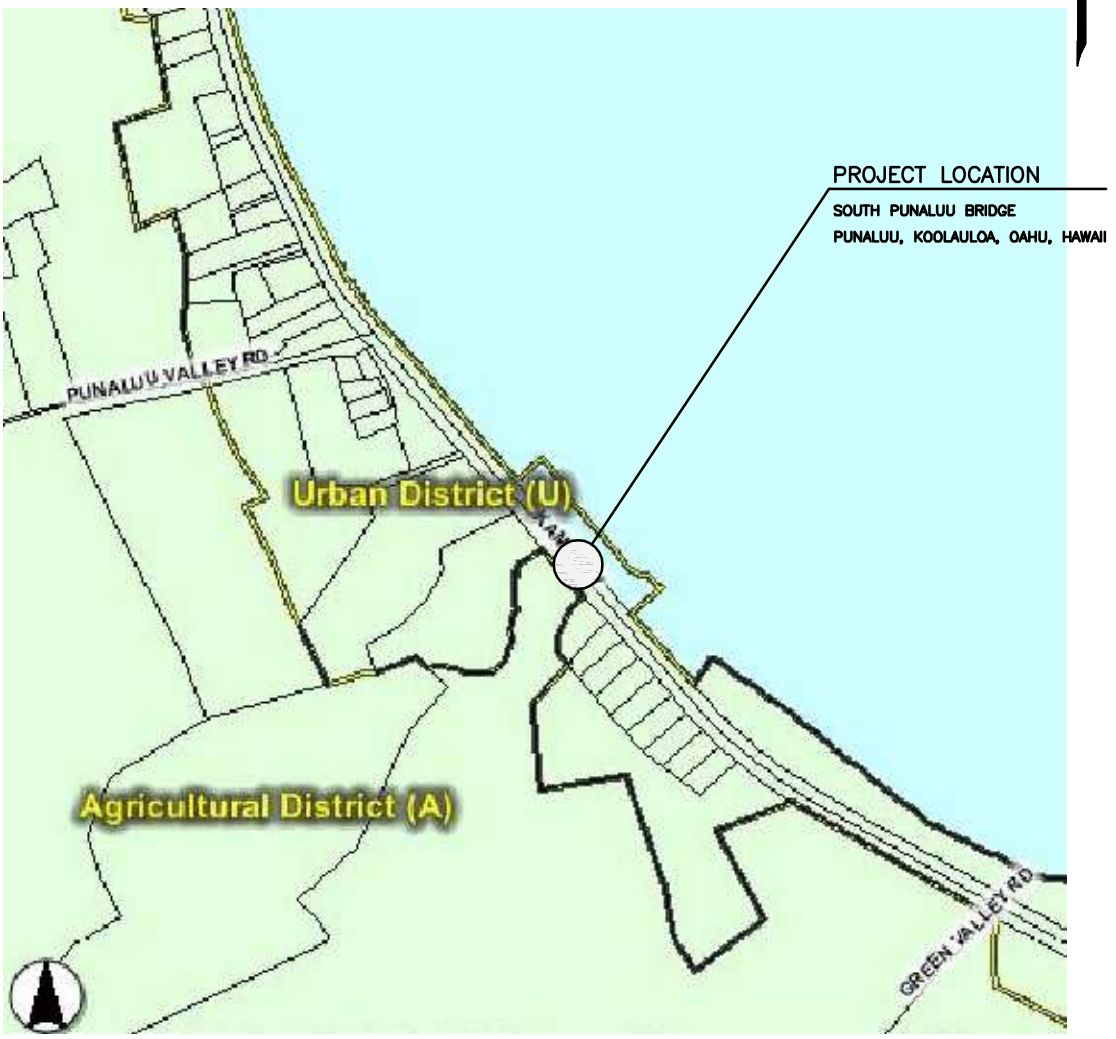
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 4B
TAX MAP KEY MAP 2 (5–3–004)



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1" = 400' SCALE FEET

SOURCE: CITY AND COUNTY OF HONOLULU DEPARTMENT OF PERMITTING AND PLANNING WEBSITE, 2005

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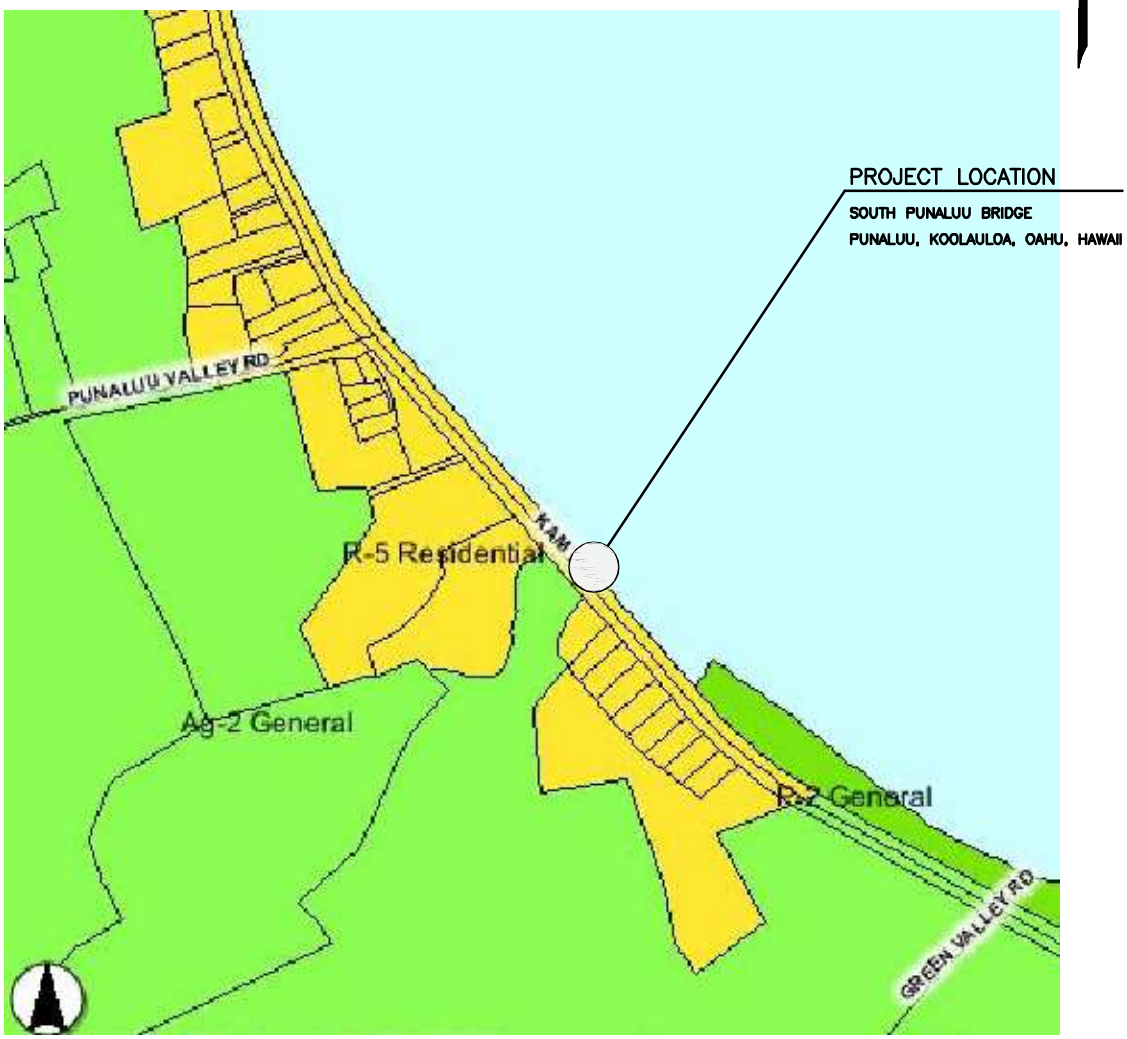
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 5
CITY DPP GIS STATE LAND USE MAP



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1" = 400' SCALE FEET

SOURCE: CITY AND COUNTY OF HONOLULU DEPARTMENT OF PERMITTING AND PLANNING WEBSITE, 2005

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KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 6
CITY DPP GIS ZONING MAP

SPECIAL MANAGEMEN

KOOLAULOA

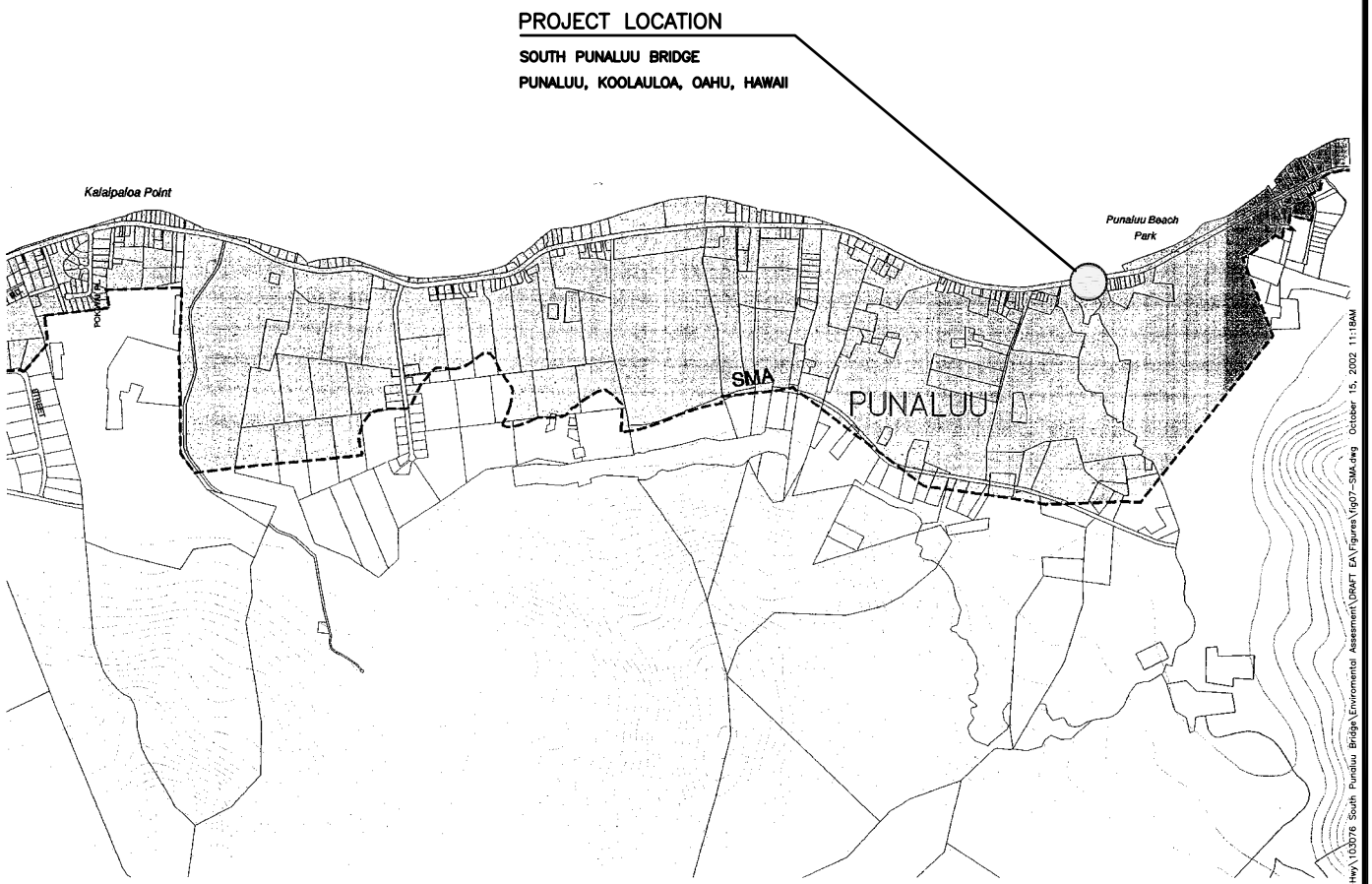
LEGEND

- SPECIAL MANAGEMENT AREAS
- NOT IN SMA
- SMA BOUNDARY LINE
- DP BOUNDARY LINE
- PARCELS
- COUNTOUR LINES

Notes:

The SMA includes:

1. Those lands on the island of Oahu which lie between the shoreline and the SMA boundary line.
2. The islands within three (3) miles offshore of Oahu, including but not limited to those shown on the SMA maps.



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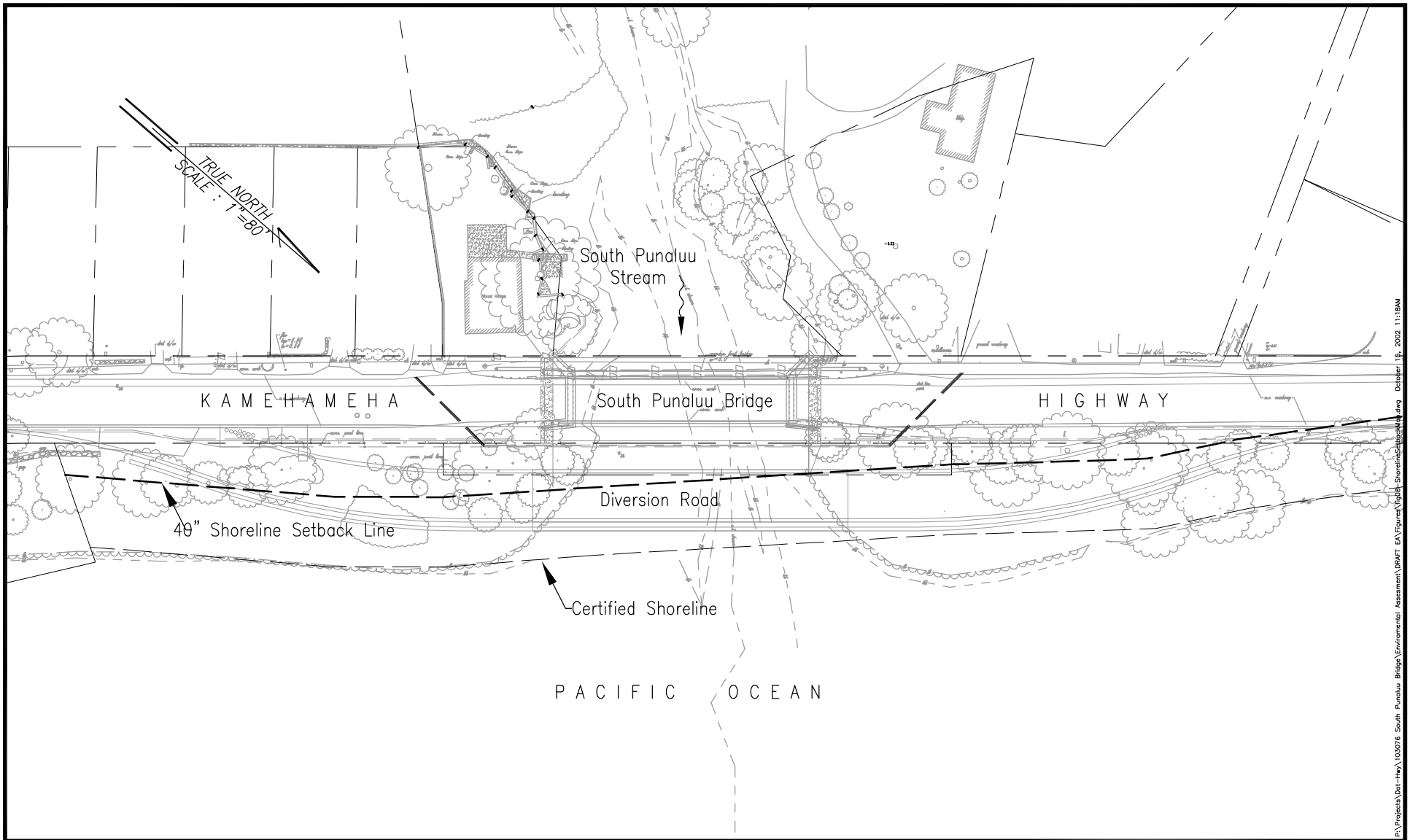
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 7
SPECIAL MANAGEMENT AREA MAP



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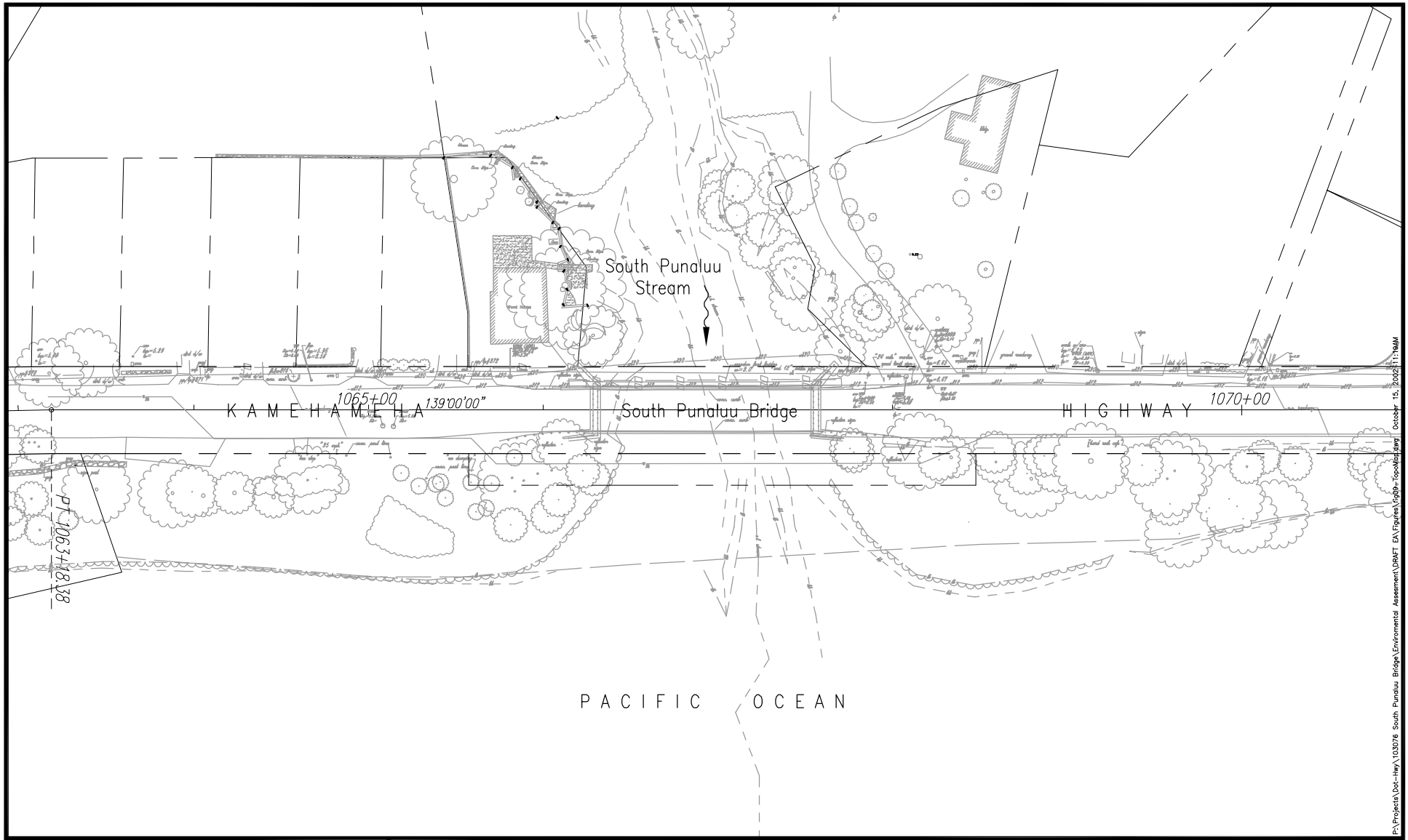
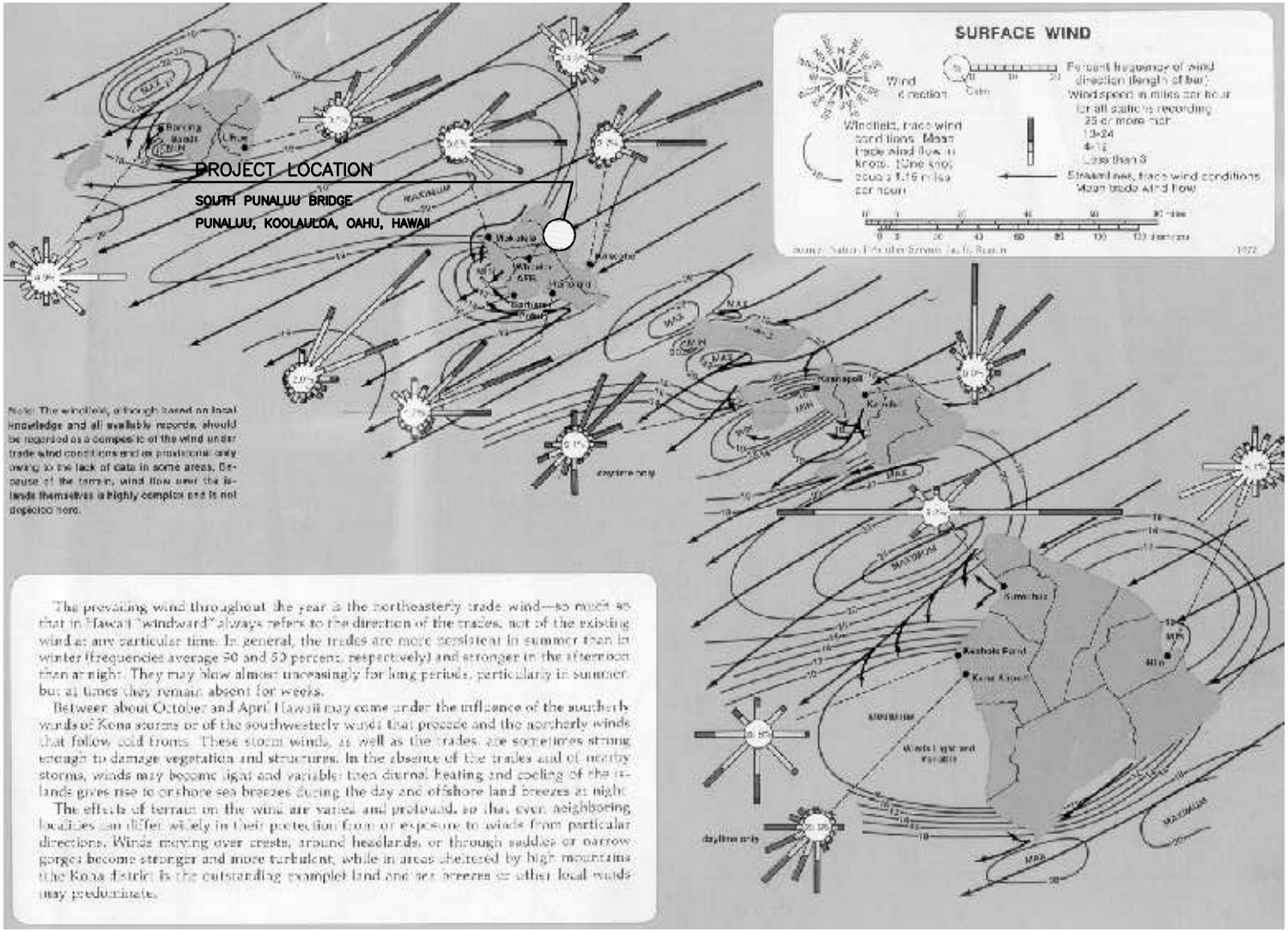
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 8
SHORELINE SETBACK MAP



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 SOUTH PUNALUU BRIDGE PUNALUU, KOOLAULOA, OAHU, HAWAII	FIGURE 9 TOPOGRAPHICAL SURVEY OF EXISTING CONDITION



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

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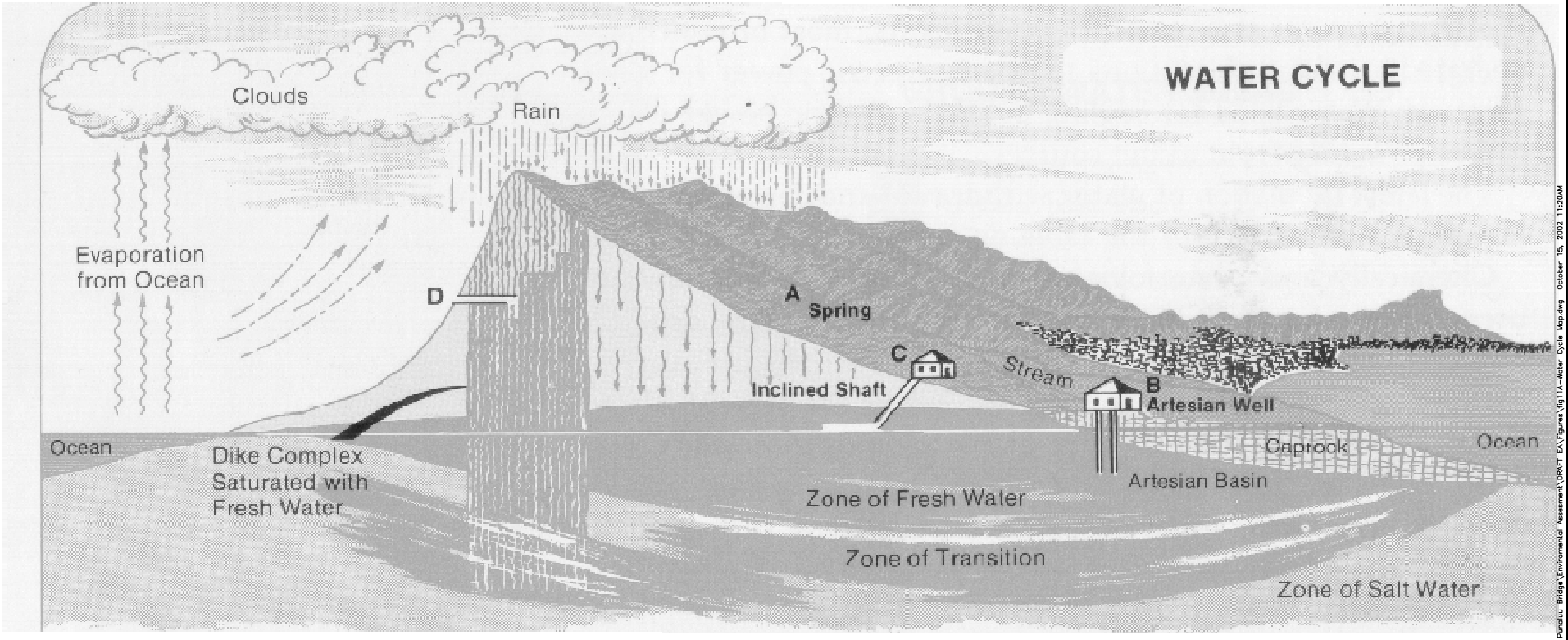
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 10
SEASONAL SURFACE WIND MAP



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

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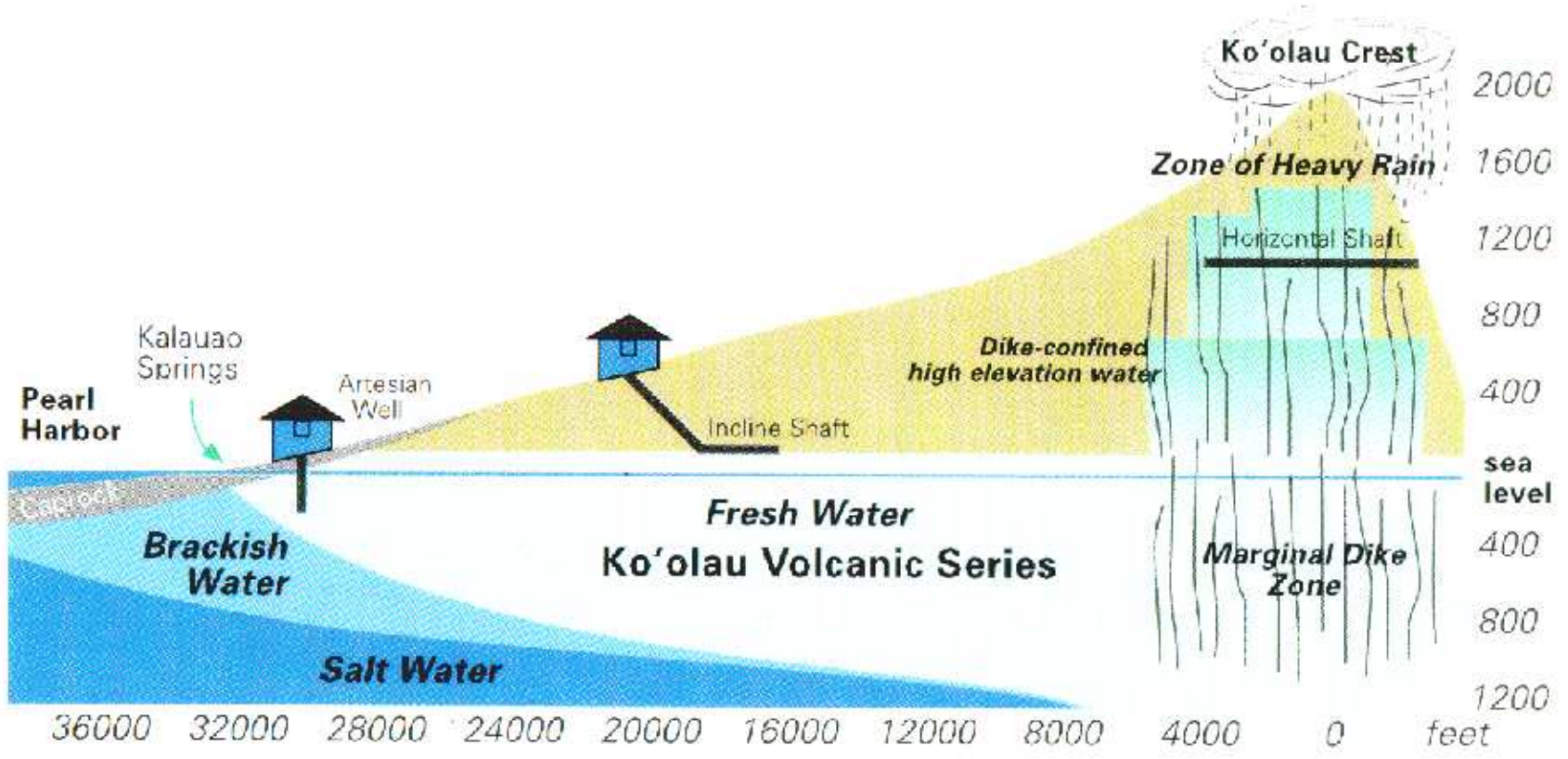
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 11A
OAHU HYDROLOGIC WATER CYCLE MAP 1



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REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 11B
OAHU HYDROLOGIC WATER CYCLE MAP 2

HAWAII, ISLAND OF OAHU

16303000 PUNALUU STREAM NEAR PUNALUU

LOCATION.--Lat 21°33'33", long 157°54'06", Hydrologic Unit 20060000, on left bank at Punaluu ditch diversion dam, 1.4 mi west of Kahana, and 1.8 mi southwest of Punaluu.

DRAINAGE AREA.--2.78 mi^2.

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1569: Drainage area. WRD Hawaii 1974: 1971-72(P), 1973(M). WDR HI-78-1: 1954(M), 1955-70(P).

GAGE.--Gage destroyed by flood of March 20-21, 1991 was restored and water-stage recorder installed on March 29, 1993. Masonry control and elevation of gage is 212 ft above mean sea level (from topographic map). Prior to March 29, 1993, datum 2.00 ft higher.

REMARKS.--Records computed by Roy Taogoshi. Records fair, except for estimated daily discharges, which are poor. Records do not include flow of Punaluu ditch (see station 16302000).

AVERAGE DISCHARGE.--46 years (water years 1954-99), 16.8 ft^3/s (12,180 acre-ft/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,900 ft^3/s, March 20, 1991, gage height, 10.02 ft, from rating curve extended above 170 ft^3/s on basis of slope-area measurements at gage heights 7.77 ft and 9.60 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 930 ft^3/s and maximum (*).

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Jan. 7	2345	*1,160	*5.75	No other peaks greater than base discharge.			

Minimum discharge, no flow on several days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	4.4	7.2	10	10	3.5	13	e10	2.0	3.8	1.6	1.7
2	4.8	11	2.3	9.1	4.9	3.8	e16	e10	4.2	4.5	2.7	3.4
3	5.1	15	13	8.7	8.9	2.9	e28	e11	5.4	3.6	3.9	4.8
4	5.5	33	12	8.7	11	5.2	e14	e11	6.3	4.5	2.6	2.5
5	5.7	38	21	8.9	11	4.8	e7.8	e11	5.8	2.5	4.5	.58
6	7.0	18	16	9.3	7.0	8.2	e30	e10	7.4	2.1	4.6	1.2
7	7.0	14	28	55	3.5	15	e15	e10	8.3	2.8	3.1	1.5
8	6.6	16	32	82	7.1	11	e18	e9.0	5.3	3.3	.86	2.3
9	e9.5	13	18	17	6.4	12	e14	e8.3	2.2	2.7	2.8	1.6
10	e8.0	11	7.3	5.1	5.7	5.4	e12	e6.2	4.0	.24	4.4	.17
11	e7.0	10	5.1	5.1	9.4	3.5	e13	2.6	5.2	1.3	5.2	1.1
12	e6.0	6.9	5.4	5.4	18	6.6	e19	4.1	6.6	3.4	3.1	2.4
13	e18	18	6.9	7.1	6.9	5.3	e26	5.4	7.1	2.9	1.0	3.0
14	e11	17	5.6	8.6	2.2	12	e19	6.0	5.5	.44	1.9	3.5
15	7.6	9.6	10	9.9	5.7	14	e8.0	7.9	1.4	1.9	2.9	4.5
16	5.5	4.5	9.7	15	3.7	15	e6.0	24	2.3	4.7	5.4	2.2
17	5.2	12	9.3	13	4.2	14	e6.4	20	3.0	7.4	1.2	.44
18	12	36	9.0	12	9.6	13	e12	22	4.1	5.6	1.1	1.0
19	9.2	12	6.9	15	16	13	e11	19	6.2	5.5	6.9	5.5
20	5.5	7.8	2.1	13	20	14	e24	2.9	7.1	19	5.9	.58
21	5.5	5.3	5.5	8.0	38	4.5	e43	1.5	7.7	6.7	2.4	2.6
22	.24	10	5.5	41	27	7.1	e13	3.7	8.4	5.1	2.2	3.2
23	.65	11	7.6	14	7.2	9.9	e9.0	5.2	5.8	1.6	2.4	3.2
24	1.4	11	4.2	5.5	5.9	11	e7.0	3.0	4.5	2.6	3.5	4.2
25	2.1	11	14	14	5.7	3.9	e5.0	2.8	6.2	5.3	4.5	6.4
26	.80	11	11	26	6.2	3.5	e5.0	5.0	5.8	5.3	2.4	8.2
27	2.0	15	11	16	6.6	11	e1.0	5.8	3.0	7.8	1.2	.37
28	2.7	11	34	15	6.3	13	e5.0	6.6	8.4	8.5	2.4	1.2
29	3.7	14	18	15	---	16	e6.0	7.9	8.7	8.4	1.5	1.9
30	3.8	15	9.5	13	---	11	e8.0	14	5.8	4.1	5.5	2.9
31	4.2	---	24	19	---	13	---	6.0	---	.94	3.9	---
TOTAL	180.63	412.5	378.6	498.6	271.9	286.2	421.4	262.5	171.7	138.32	95.16	80.44
MEAN	5.83	13.8	12.2	16.1	9.71	9.23	14.0	8.47	5.72	4.46	3.07	2.68
MAX	18	38	34	82	38	16	43	24	8.8	19	6.9	8.2
MIN	.24	4.4	2.1	5.1	2.2	2.5	1.0	2.8	1.4	.24	.86	.17
AC-FT	358	818	751	989	539	568	836	521	341	274	189	160

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1999, BY WATER YEAR (WY)

MEAN	13.7	20.2	20.4	20.9	21.1	21.7	21.4	16.9	11.5	12.0	11.2	10.2
MAX	54.7	74.7	64.5	40.3	78.3	73.1	84.6	64.9	35.4	35.0	36.9	30.0
(WY)	1959	1994	1955	1988	1969	1982	1983	1965	1953	1974	1982	1994
MIN	.28	4.58	.23	3.52	.56	3.19	2.37	1.00	.000	.002	.31	.43
(WY)	1958	1960	1960	1962	1964	1993	1954	1961	1953	1951	1961	1961

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.

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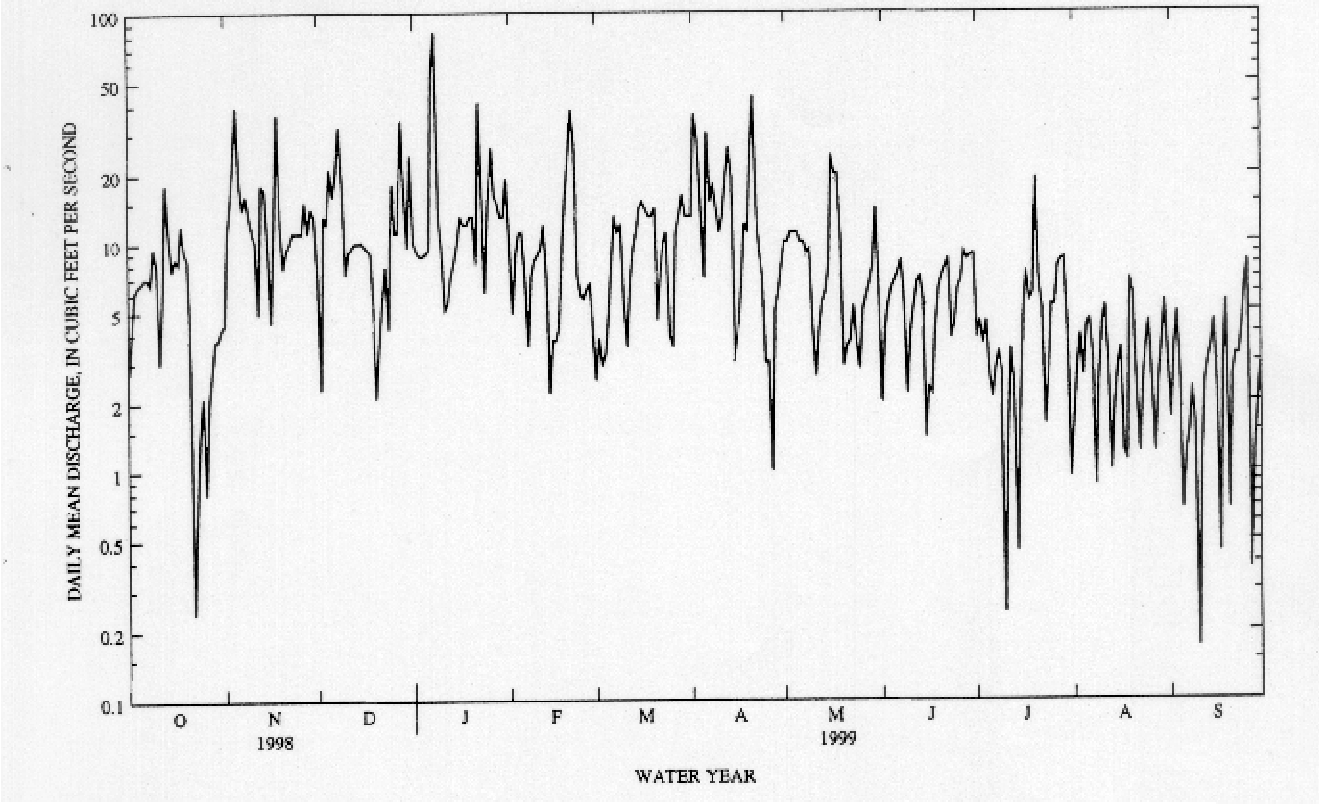
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

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

HAWAII, ISLAND OF OAHU

16303000 PUNALUU STREAM NEAR PUNALUU--Continued

SUMMARY STATISTICS	FOR 1998 CALENDAR YEAR		FOR 1999 WATER YEAR		WATER YEARS 1953 - 1999	
ANNUAL TOTAL	2348.41		3198.01			
ANNUAL MEAN	8.08		8.76		16.8	
HIGHEST ANNUAL MEAN					35.4	1982
LOWEST ANNUAL MEAN					7.27	1961
HIGHEST DAILY MEAN	198	Jan 1	83	Jan 8	1010	Apr 15 1963
LOWEST DAILY MEAN	.04	Sep 27	.17	Sep 10	.00	Jun 1 1953
ANNUAL SEVEN-DAY MINIMUM	1.4	Oct 22	1.2	Sep 5	.00	Jun 1 1953
ANNUAL RUNOFF (AC-FT)	5850		6340		12180	
10 PERCENT EXCEEDS	14		16		30	
50 PERCENT EXCEEDS	6.6		6.9		12	
90 PERCENT EXCEEDS	2.3		2.1		2.6	



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.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 12B
AVERAGE EMPIRICAL SEASONAL FLOW DATA FOR PUNALUU STREAM – GRAPH

WATER-QUALITY DATA, WATER YEAR OCTOBER 1998 TO SEPTEMBER 1999

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	OXYGEN, DIS-SOLVED (MG/L) (00300)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
JUN 22...	1220	8.2	107	9.4	123	21.5	6.2	4.9	.7

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
JUN 22...	10	37	45	12	<.1	28	1.5	<.02	<.1

DATE	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
JUN 22...	.1	<.05	<.01	.041	.03	.024	90	45	3

DATE	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	PH WATER FILTERED FIELD (STAND-ARD UNITS) (99900)
JUN 22...	.5	.2	3	8.3

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.

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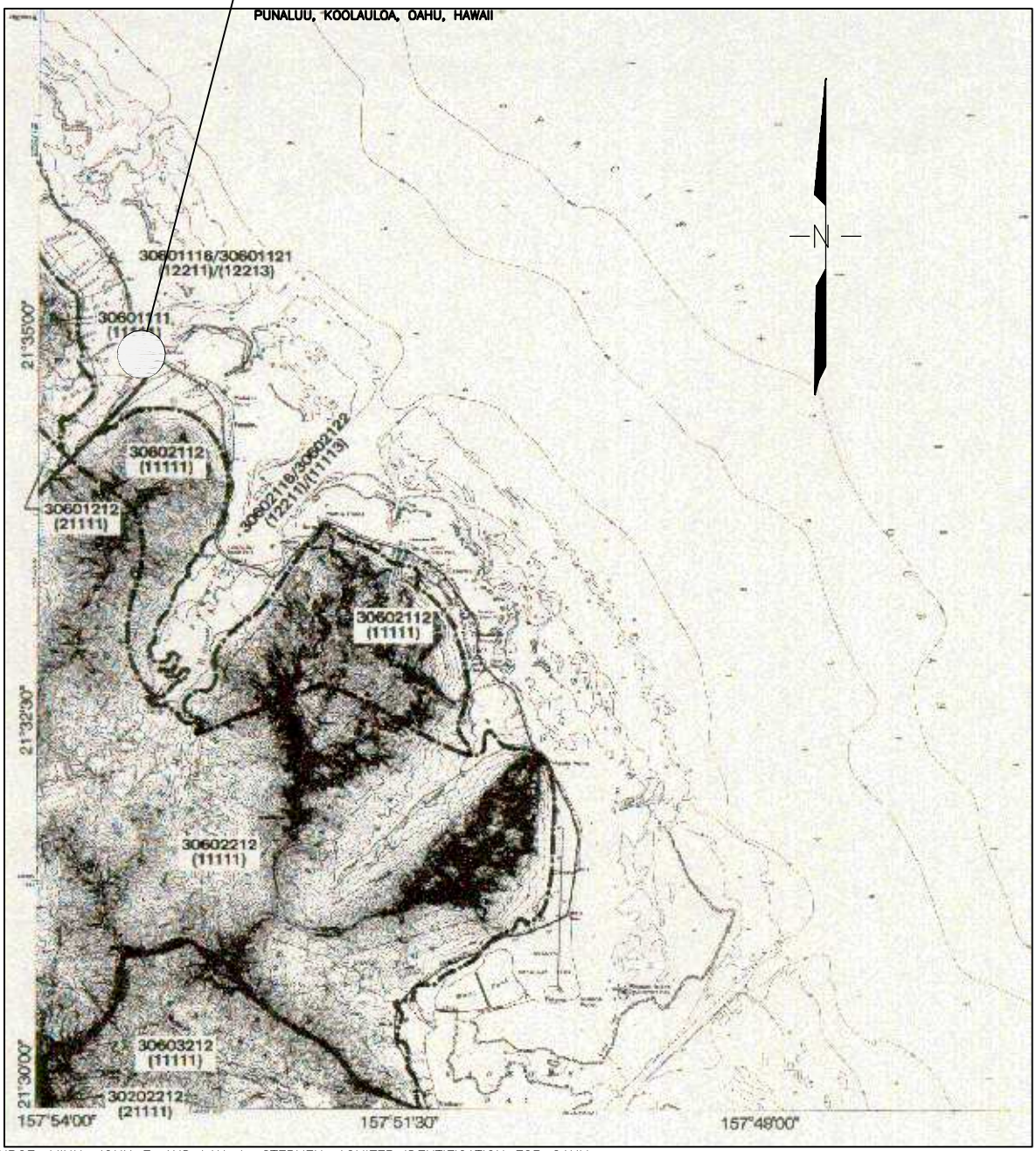
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 12C
AVERAGE EMPIRICAL SEASONAL FLOW DATA FOR PUNALUU STREAM – WATER QUALITY DATA



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

GRAPHIC SCALE:

1" = 2500'

2500' 0 2500' 5000'

P:\Projects\Dot-Hwy\103076 South Punaluu Bridge\Environmental Assesment\DRAFT EA Figures\Fig13-Aquifer Classification Map.dwg October 15, 2002 11:21AM

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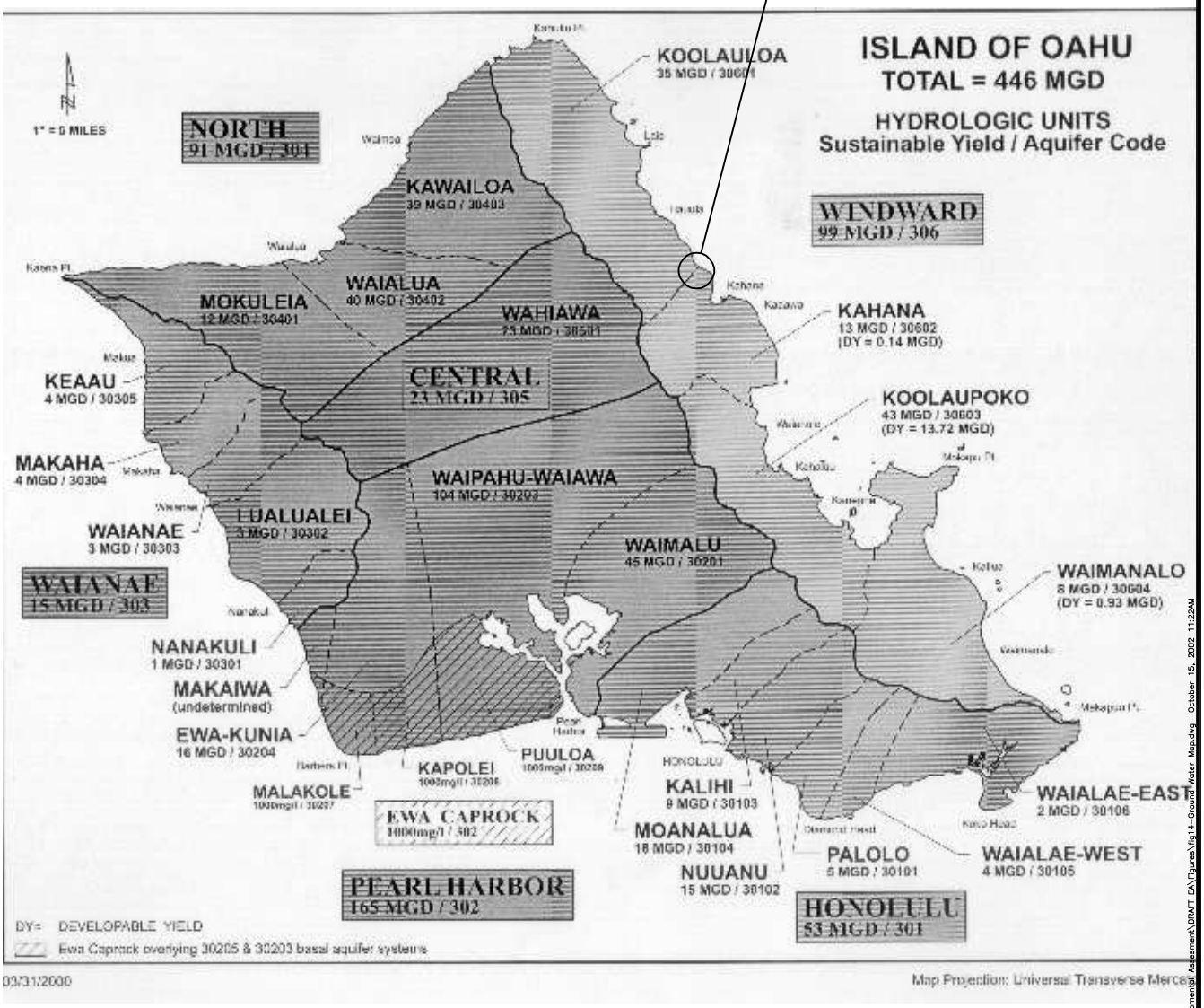
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 13
AQUIFER CLASSIFICATION MAP



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

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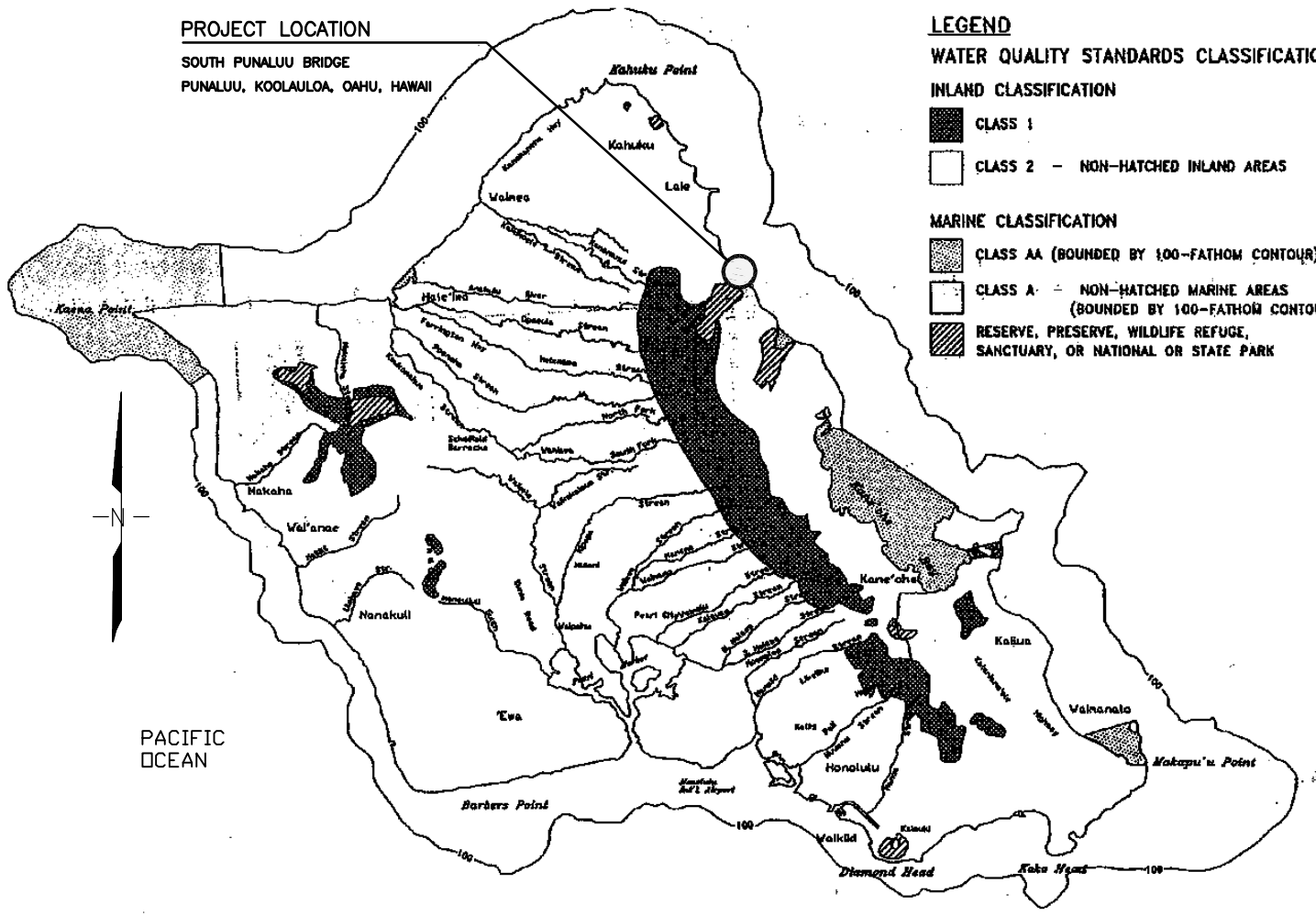
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 14
HYDROLOGIC UNIT MAP FOR THE ISLAND OF OAHU



NOT TO SCALE

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

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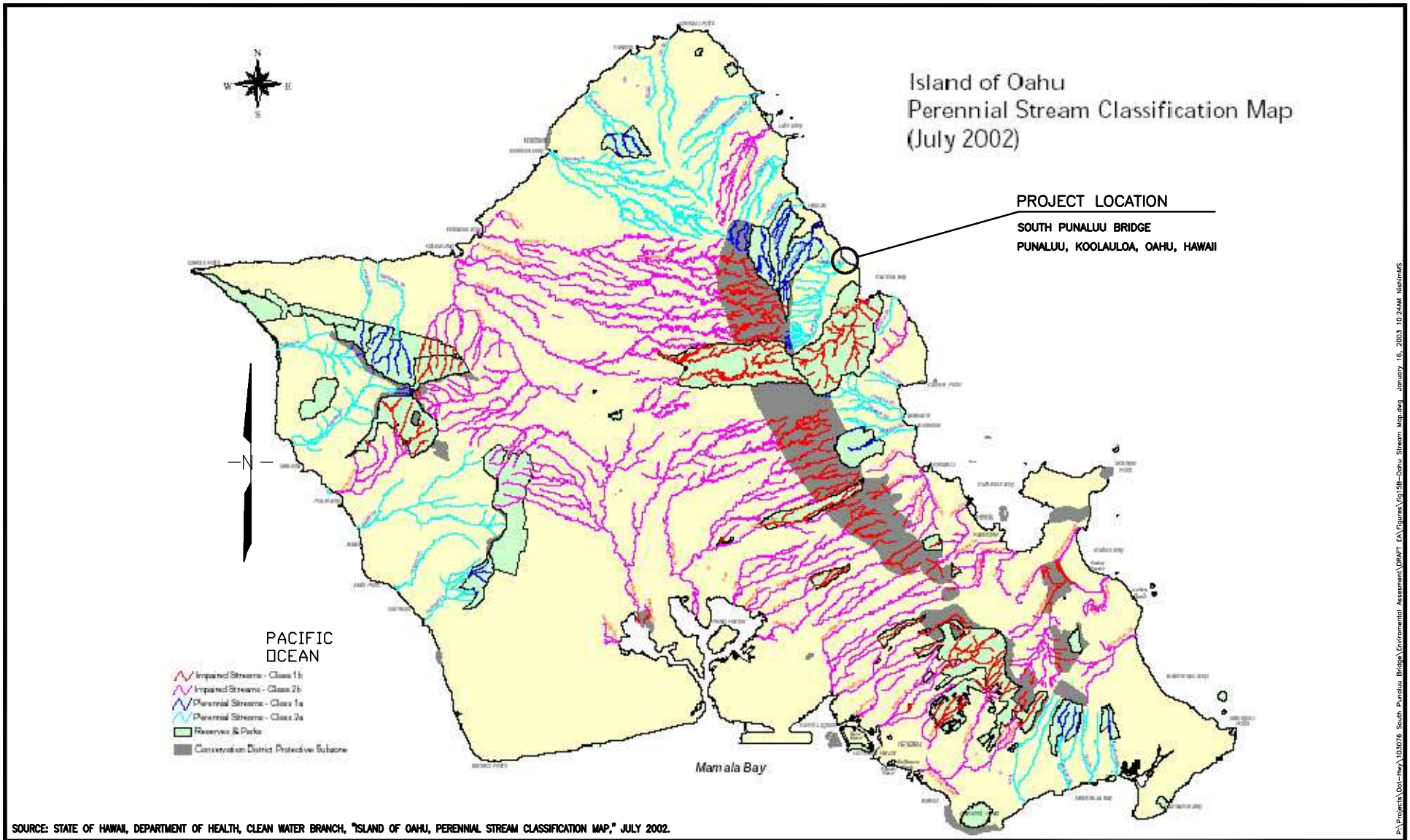
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 15A
WATER QUALITY MAP



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REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 15B
ISLAND OF OAHU PERENNIAL STREAM CLASSIFICATION MAP

GRAPHIC SCALE:

1" = 2000'

2000' 0 2000' 4000'

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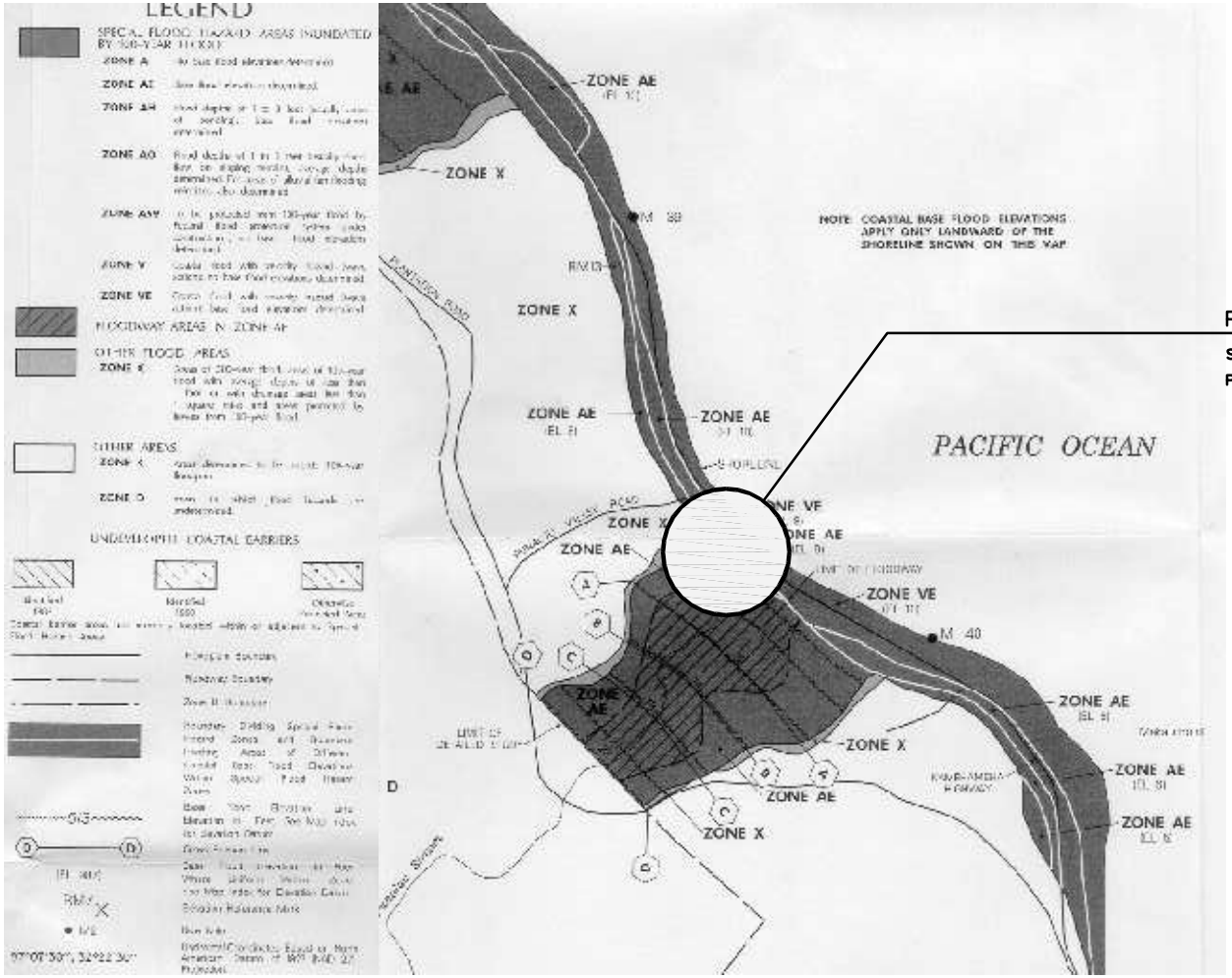
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 16
SOIL DESIGNATION MAP



SOURCE: Panel 155 of 395, Map Number 15003C0155 E
Flood Insurance Rate Map, City and County of Honolulu, Hawaii
National Flood Insurance Program, Federal Emergency Management Agency
November 20, 2000

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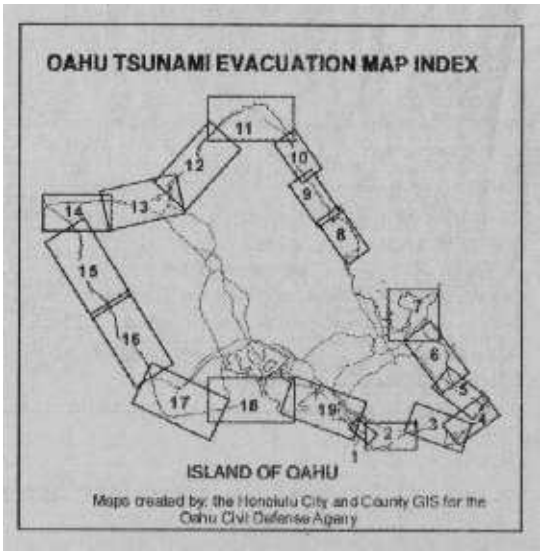
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

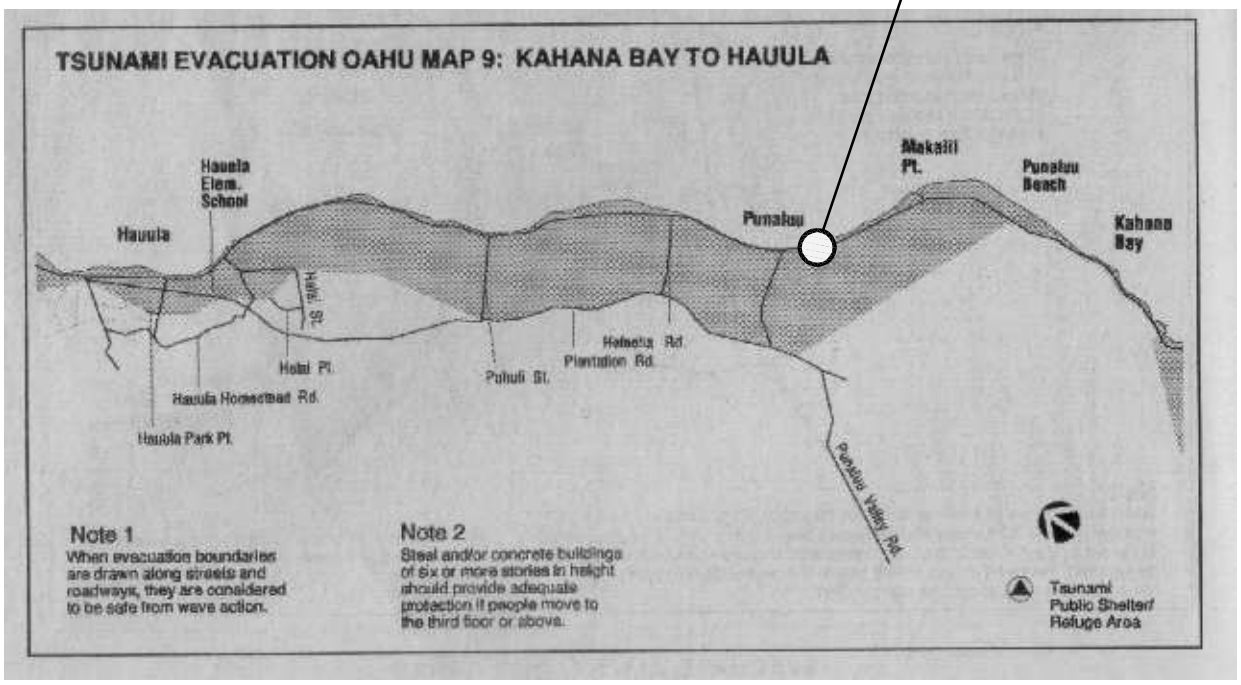
FIGURE 17
FEMA FLOOD INSURANCE RATE MAP



PROJECT LOCATION

SOUTH PUNALUU BRIDGE

PUNALUU, KOOLAULOA, OAHU, HAWAII



SOURCE: VERIZON HAWAII WHITE PAGES, AUGUST 2001

P:\Projects\Dot--Hwy\103076 South Punalu Bridge\Environmental Assesment\DRAFT EA\Figures\Fig18-TsunamiEvacuationOahuMap9.dwg October 15, 2002 11:23AM

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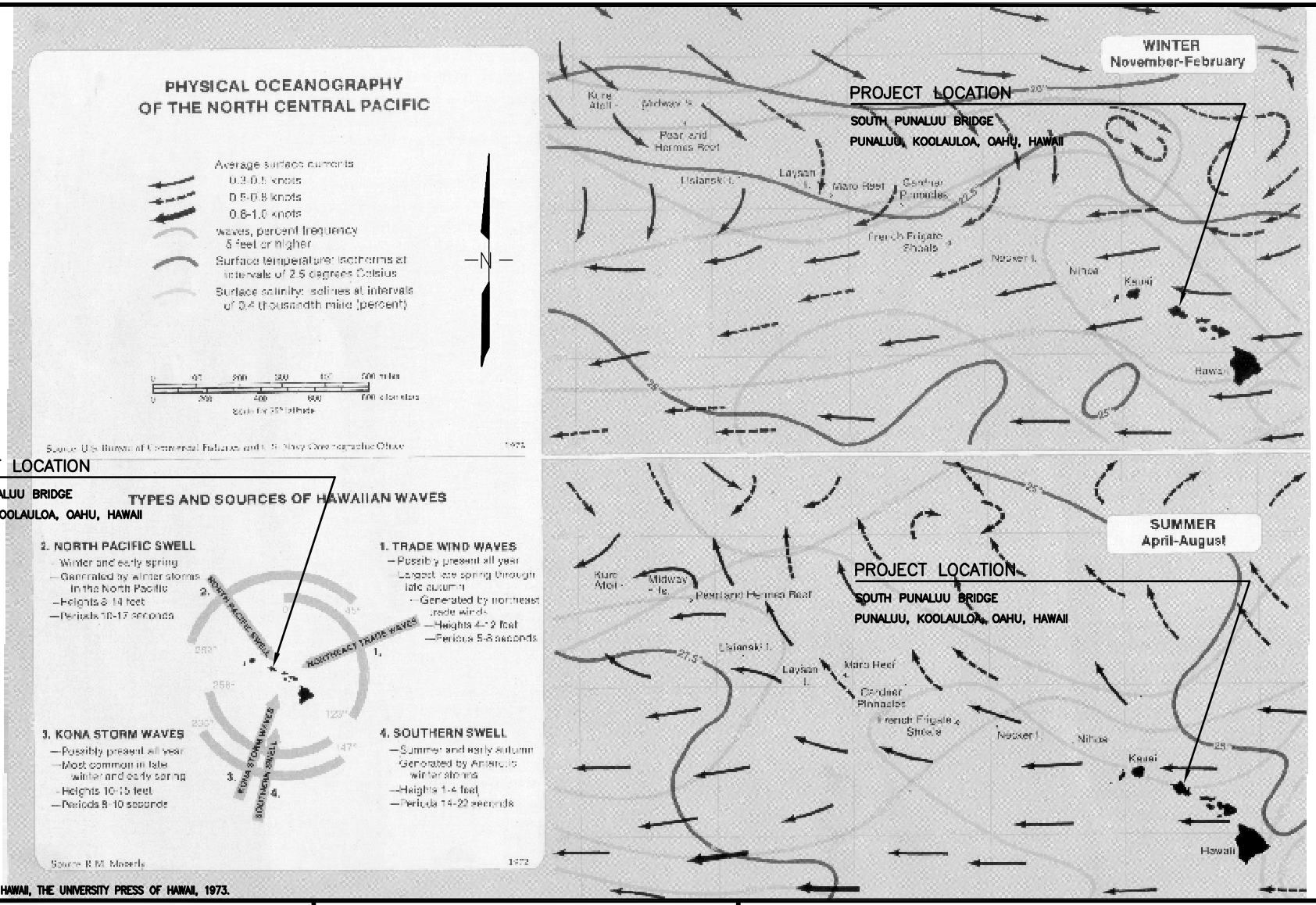
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 18
TSUNAMI EVACUATION OAHU MAP 9: KAHANA BAY TO HAUULA



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

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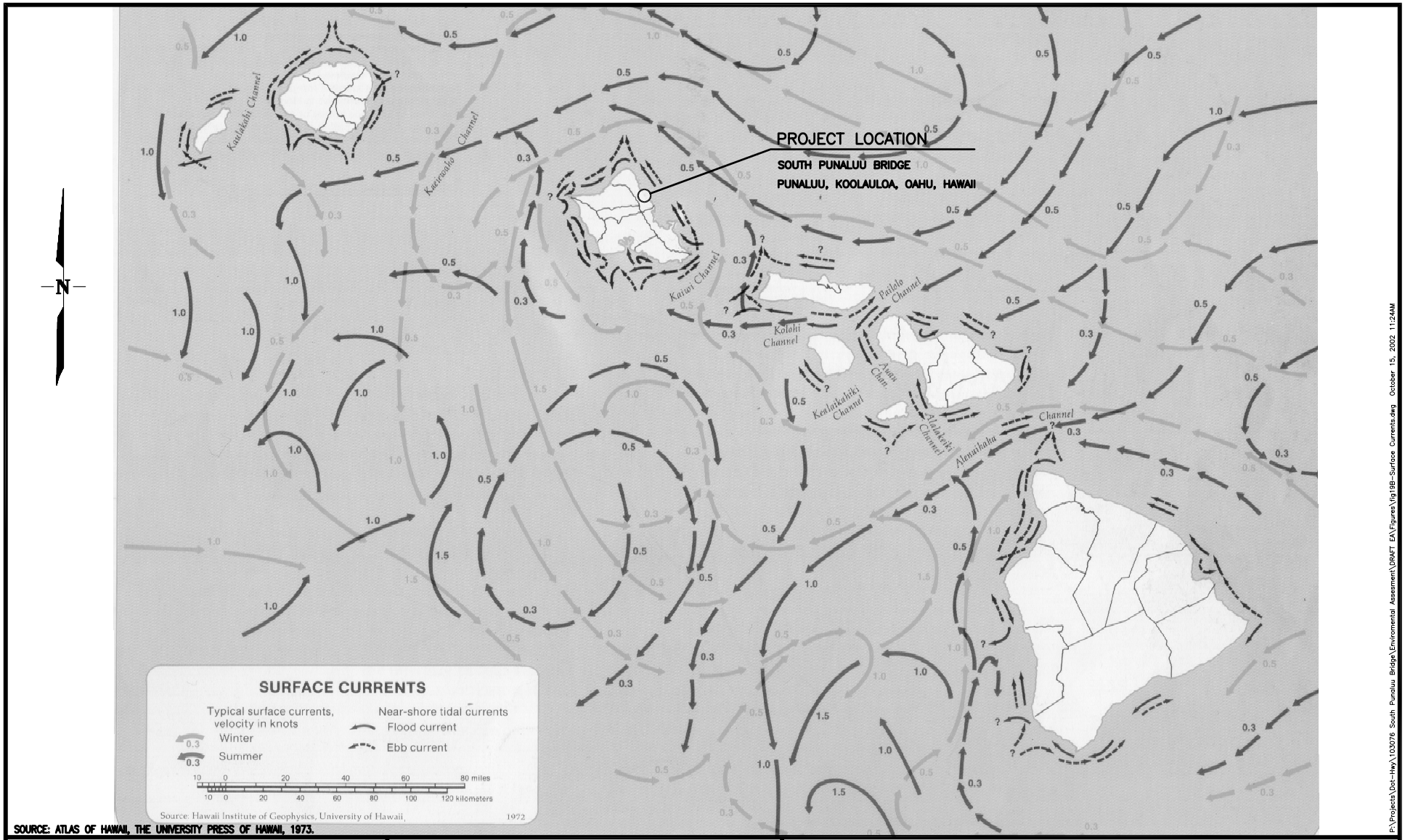
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 19A
SEASONAL OCEAN SURFACE CURRENT MAP 1



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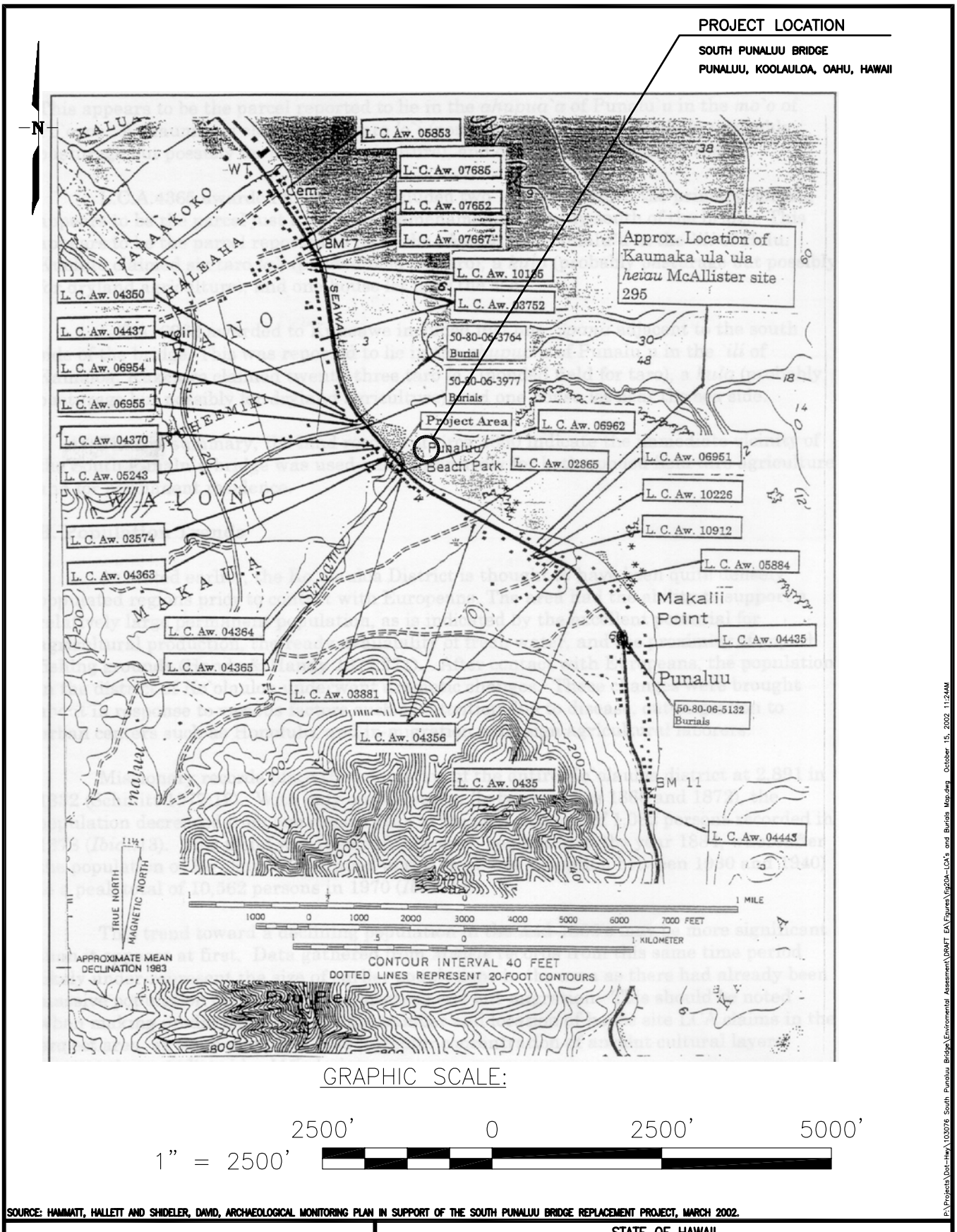
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION

KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 19B
SEASONAL OCEAN SURFACE CURRENT MAP 2



GRAPHIC SCALE:

2500' 0 2500' 5000'

1" = 2500'

SOURCE: HAMMATT, HALLETT AND SHIDELER, DAVID, ARCHAEOLOGICAL MONITORING PLAN IN SUPPORT OF THE SOUTH PUNALUU BRIDGE REPLACEMENT PROJECT, MARCH 2002.

P:\Projects\Dot-Hwy\103076 South Punaluu Bridge\Environmental Assesment\DRAFT EA\Figures\fig20A-LCA's and Burials Map.dwg October 15, 2002 11:24AM

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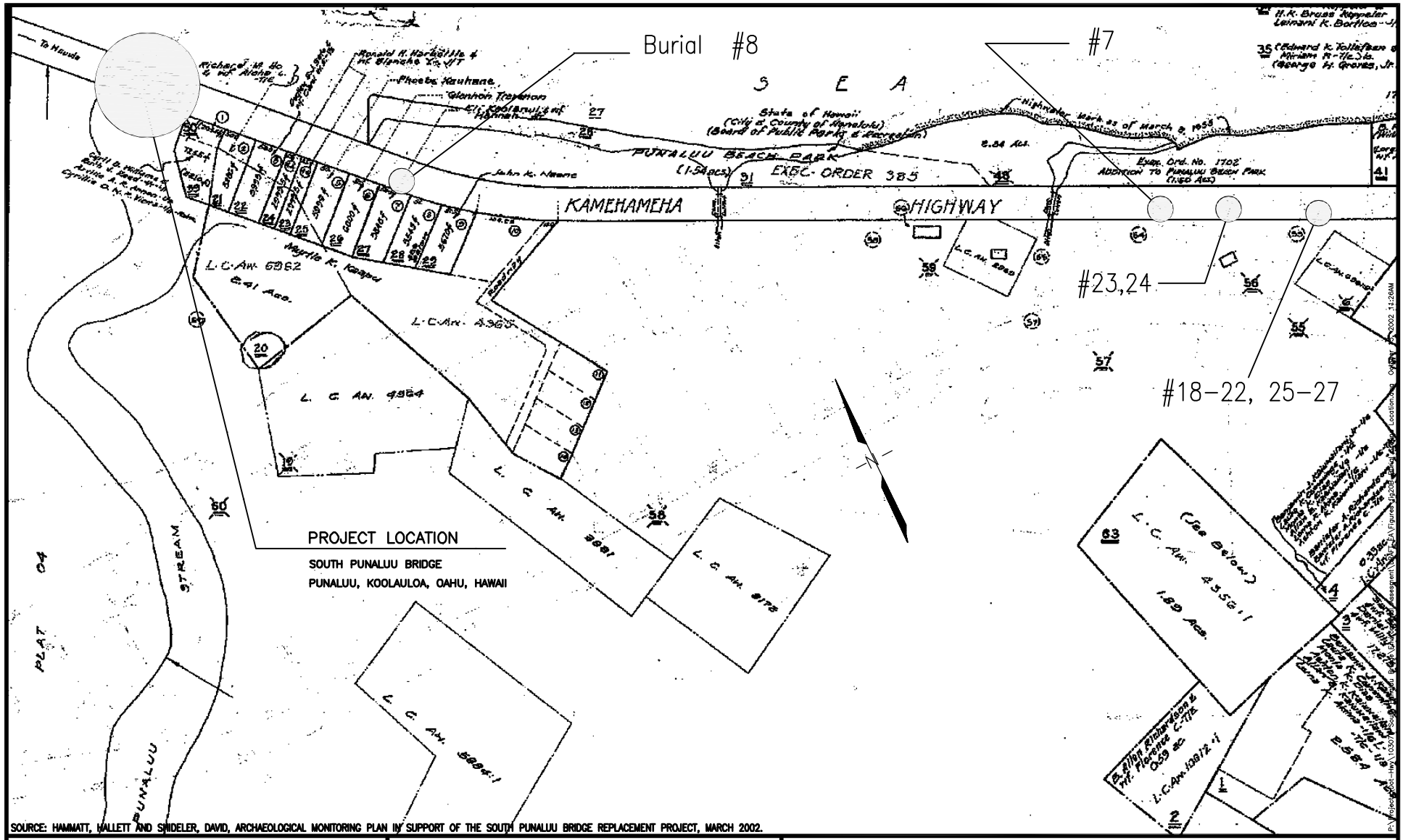
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 20A
MAP OF ARCHAEOLOGICAL SITES AND PUNALUU LAND COMMISSION AWARDS



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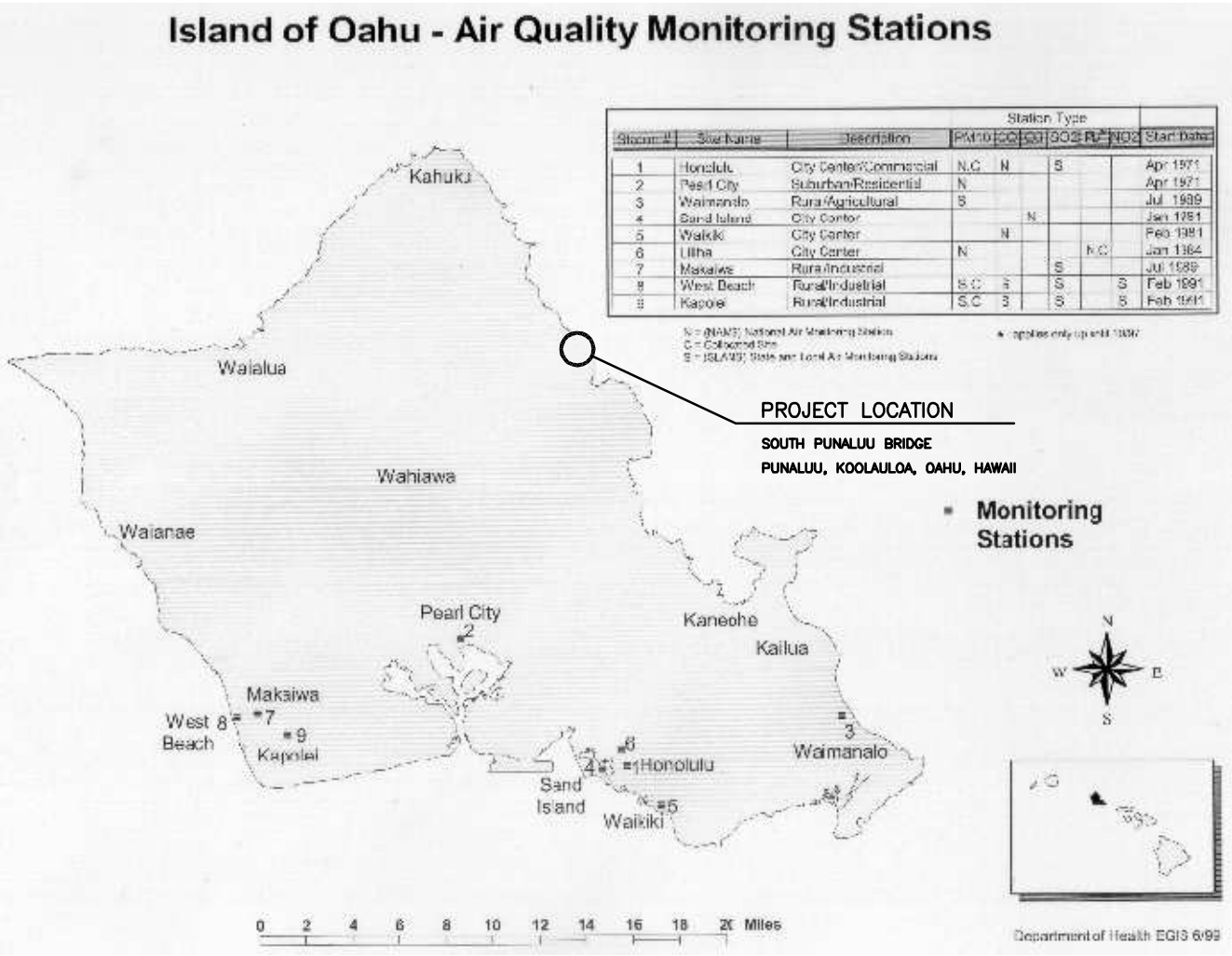
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII

FIGURE 20B
MAP OF BURIALS ENCOUNTERED DURING BWS WINDWARD MAINS PROJECT



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

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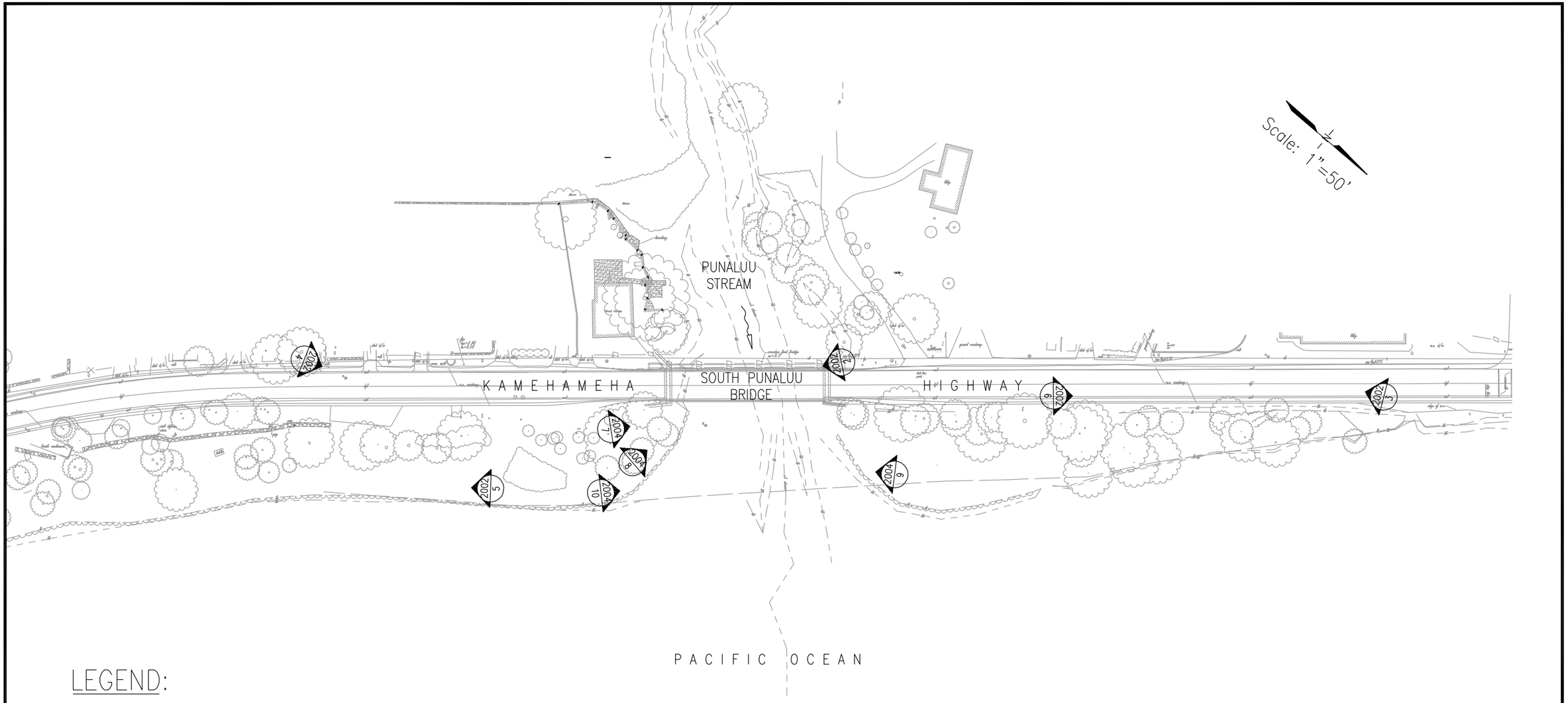
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
FIGURE 21
MAP OF AIR QUALITY MONITORING STATIONS – ISLAND OF OAHU

PHOTOGRAPHS

LIST OF PHOTOS



LEGEND:

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION – HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY
REPLACEMENT OF SOUTH PUNALUU BRIDGE
PUNALUU, KOOLAULOA, OAHU, HAWAII
PROJECT PHOTOGRAPHS
PHOTO KEY MAP

PHOTO: SOUTH PUNALUU BRIDGE-*MAKAI*

PHOTO 2: SOUTH PUNALUU BRIDGE-*MAUKA*

PHOTO 3: BRIDGE APPROACH-KAHUKU SIDE

PHOTO 4: BRIDGE APPROACH-KANEOHE SIDE

PHOTO 5: SHORELINE-KANEOHE SIDE

PHOTOT 6: SHORELINE-KAHUKU SIDE

PHOTO 7: MOUTH OF SOUTH PUNALUU STREAM

PHOTO 8: SOUTH PUNALUU BRIDGE AT THE MOUTH OF PUNALUU STREAM

PHOTO 9: MOUTH OF PUNALUU STREAM-KANEOHE SIDE

PHOTO 10: MOUTH OF PUNALUU STREAM-KAHUKU SIDE

APPENDICES

LIST OF APPENDICES

APPENDIX A

NHPA Section 106 Base Investigatory Letter

Date

«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 South Punalu‘u Bridge, Punalu‘u, Ko‘olauloa, O‘ahu, Hawai‘i
DOT and Federal Aid Number BR-083-1(42)

Dear «Title» «FirstName» «LastName»:

The State of Hawai‘i, Department of Transportation (DOT), Highways Division (Hwy) is proposing to replace the existing South Punalu‘u Bridge adjacent to Punalu‘u Beach Park in Ko‘olauloa, O‘ahu, Hawai‘i. The bridge is situated at the estuary formed between Punalu‘u 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.

The bridge currently poses a serious safety threat to all of its users due to its age-driven deterioration; nonconformance with live load and seismic standards; and lack of a pathway compliant with the Americans with Disabilities Act (ADA). The project involves the construction of a temporary bypass bridge across Punalu‘u 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 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.

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): 5-3-002:031 5-3-002:039 5-3-004:001

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 historical 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 or we will assume you have no knowledge of any historical or cultural properties that may be affected by this project. Include in this response whether you are interested in becoming a consultant for this project.

If historical or cultural materials are discovered during ground disturbing activities, work in the area will cease immediately and the State of Hawai‘i, Department of Land and Natural Resources (DLNR), State Historic Preservation Division (SHPD) will be notified of the discovery and consulted as to the appropriate course of action. Any burial finds will be treated in accordance with Chapter 6E-43.6 of the Hawai‘i Revised Statutes and Chapter 12-300 of the Hawai‘i Administrative Rules, and the DLNR—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.

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. Henry Kennedy, Project Manager, at 692-7550, Technical Design Services Office, Design Branch, Highways Division.

Very truly yours,

GLENN M. YASUI
Administrator
Highways Division

GMY:msn

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

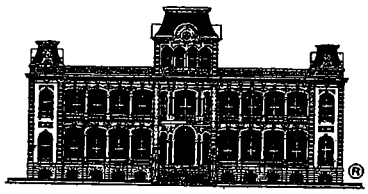
cc: M & E Pacific, Inc. (M. Nishimura)
HWY—DS (HK)

APPENDIX B

NHPA Section 106 Investigatory Letter Database of Addresses

APPENDIX C

NHPA Section 106 Responses to Preconsultation



THE FRIENDS OF 'IOLANI PALACE

Post Office Box 2259 Honolulu, Hawai'i 96804 Telephone (808) 522-0822 FAX (808) 532-1051

December 12, 2001

Kelie Feng
M & E Pacific, Inc.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawai'i 96813-3588

Dear Kelie Feng,

Thank you for your letter of December 6 requesting information concerning possible historical properties adjacent to the proposed replacement bridge in Punalu'u.

Your questions should be directed to the State Historic Preservation Office. Sarah Collins, O'ahu Archaeologist (SHPO) may be reached at 692-8026. It may be that a historical architect from that office should be consulted as well.

With regard to further input from the community you should also contact the Punalu'u Community Association. David Mykoncyzk is President; his address is: 1088 Bishop Street Suite 1202, Honolulu 96813 (Tel. 533-0773). Creighton Mattoon is Vice President; his address is 53-392 Kamehameha Highway, Hau'ula 96717 (FAX 293-5612, Tel. 293-5612).

Sincerely yours,

Corinne Chun Fujimoto

Corinne Chun Fujimoto
Curator

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	P O Box 2809	Honolulu	HI	96803
Mr.	Ike K.	Kaʻaihue	Pelekikena (President)	Association of Hawaiian Civic Clubs	Oʻahu District Council	1773-B Pūowaina Street	Honolulu	HI	96813
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
Mr.	Randall	Fujiki	Director	City and County of Honolulu, Department of Planning and Permitting	Municipal Building	650 South King Street, 8th Floor	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, MD	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	Hale O Na Aliʻi ʻO Hawaiʻi / ʻAhahui Poʻo	Post Office Box 2477		Honolulu	HI	96804-2477
Ms.	Leona	Tupou	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	Director	Historic Hawaiʻi Foundation	Post Office Box 1658		Honolulu	HI	96806
Mr.	Joe I. K.	Kamalu	Founder	Hui ʻO Aikāne	1723-A Lehua Street		Honolulu	HI	96819

Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
Mr.	Kunani	Nihipali	Poʻo	Hui Mālama I Na Kupuna ʻO Hawaiʻi Nei	Post Office Box 190		Haleʻiwa	HI	96712-0190
Ms.	Debbie	Hilweh	President	Kaʻaʻawa Community Association	Post Office Box 620		Kaʻaʻawa	HI	96730
Ms.	Jolene	Peapeaʻale	President	Kahana Community Association	Post Office Box 163		Kaʻaʻawa	HI	96730
Ms.	Kawaikaulaʻau	Aona-Ueoka	Mgr Director	Kapa Aloha Perpetuation Association (KAPA)	Post Office Box 20		Kaʻaʻawa	HI	96730
Ms.	Gladys	Shiroma	Pelekikena (President)	King Kamehameha Hawaiian Civic Club	1823 Skyline Drive		Honolulu	HI	96817
Ms.	Gladys K.	Pualoa	Pelekikena (President)	Koʻolauloa Hawaiian Civic Club	55-545 Naniloa Loop		Lāʻie	HI	96762
Ms.	Annette	Ostrem	Chair	Koʻolauloa Interagency Community Council	56-490 Kamehameha Highway		Kahuku	HI	96731
Ms.	Elizabeth	Pa Martin	Executive Director	Native Hawaiian Advisory Council	417H Uluniu Street		Kailua	HI	96734
Ms.	Eunice	Kalahele	Paralegal	Native Hawaiian Legal Corporation	1164 Bishop Street	Suite 1205	Honolulu	HI	96813
Ms.	Danielle Ululani	Beirne	President	Native Hawaiian Protocol & Consultant Service	Post Office Box 653		Kāneʻohe	HI	96744
Mr.	A. Van Horn	Diamond	Chair	Oʻahu Island Burial Council	c/o SHPD Kakuhihewa Building, Room 555	601 Kamokila Boulevard	Kapolei	HI	96707
Mr.	David	Mikonczyk	President	Punaluʻu Community Association	Post Office Box 239		Hauʻula	HI	96717
Mr.	Wally	Lau	Kūʻauhau Nui	Royal Order of Kamehameha I	Post Office Box 30681		Honolulu	HI	96820
Ms.	Keahi	Allen	Executive Director	State Council on Hawaiian Heritage	Post Office Box 3022		Honolulu	HI	96802

Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
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
Mr.	Kai	Markell	Director	State of Hawai‘i, Department of Land and Natural Resources, State Historic Preservation Division	Burial Sites Program, Kakuhihewa Building, Room 555	601 Kamokila Boulevard	Kapolei	HI	96707
Mr.	Raynard C.	Soon	Chairman	State of Hawai‘i, Department of Hawaiian Home Lands, Hawaiian Homes Commission	Post Office Box 1879		Honolulu	HI	96805
Mr.	Nathan	Napoka	Branch Chief	State of Hawai‘i, Department of Land and Natural Resources	History and Culture Branch	33 South King Street, 6th Floor	Honolulu	HI	96817
Mr.	Harry M.	Yada	Acting Administrator	State of Hawai‘i, Department of Land and Natural Resources	Land Division	Post Office Box 621	Honolulu	HI	96809
Mr.	Colin	Kippen, Jr.	Deputy Administrator	State of Hawai‘i, Office of Hawaiian Affairs, Office of the Administrator	711 Kapi‘olani Boulevard	Suite 500	Honolulu	HI	96813-5249
Ms.	Davianna	McGregor		State of Hawai‘i, University of Hawai‘i at Mānoa, Ethnic Studies Department	1859 East West Road		Honolulu	HI	96822
Mr.	Francis Daniel	Beirne							
Mr.	Donald	Beirne							
Mr.	Daniel	Beirne							
Mr.	Clayton	Beirne							
Ms.	Ululani	Beirne							

Title	First Name	Last Name	Job Title	Company	Address 1	Address 2	City	State	Postal Code
Ms.	Puanani	Beirne							
Ms.	Cy	Bridges							
Mr.	Kaliko	Choy							
Ms.	Charlene	Chun							
Ms.	Deldrene	Herron							
Ms.	Thalia	Kaleimamalu							
Mr.	Reid	Kamauoha							
Ms.	Pola	Kanoa							
Ms.	Iwalani	Kealoha							
Mr.	Tommy	Leota							
Mr.	Aiuao	Leota							
Ms.	Danette Kaliko	Leota-Pascual							
Mr.	Ahi	Logan							
Ms.	Dansette Puanani	Martinez							
Mr.	Buron	Martinez							
Mr.	Gordon	Martinez							
Ms.	Kathleen	Mattoon							
Ms.	Malia	Mattoon							
Ms.	Napua	Naki							
Mr.	Samuel	Rowland							
Ms.	Lena	Salivan							
Mr.	Leterina	Santiago							
Mr.	Ben	Shafer							
Ms.	Kapua Ka‘apu	Sproat-Fonoimoana							
Ms.	Mahi Mahealani	Trevenen							
Mr.	Louis	Wallace							
Ms.	Sherrilyn	Wallace							
Mr.	Clyde	Wallace							
Ms.	Anna	Wilkins							

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

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

December 13, 2001

The Honorable Kelie Feng
M & E Pacific, Inc.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813-3588

Dear Ms. Feng:

Subject: Request for Public Feedback - Oahu South Punaluu Bridge Replacement, Hauula, HI
TMK 5-3-02:39, 5-3-02:50, 5-3-04:1

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

If you have any questions, please call Mr. Darrell Yagodich at 586-3836.

Aloha,

Darrell Yagodich

for Raynard C. Soon, Chairman
Hawaiian Homes Commission

RECEIVED DEC 14 2001

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 31, 2001

HRD01/428

Mr. Bruce Wade
M & E Pacific, Inc.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, HI 96813-3588

Dear Mr. Wade:

Subject: Proposed Punalu`u Bridge Replacement, Punalu`u, O`ahu

This letter is provided as a response to your early consultation letter and materials of December 6, 2001, concerning the above referenced project. OHA offers the following comments relating to project:

As part of your HRS 343 compliance, OHA reminds SDOT that it must complete a cultural impact statement so that information may be gathered about cultural practices and cultural features that may be affected by actions subject to Chapter 343. OHA recommends that SDOT seek as broad a consultation as possible with knowledgeable Native Hawaiian organizations and individuals to complete the required cultural impact assessment.

For Section 106 consultation, OHA recommends that SDOT seek as broad a consultation as possible with knowledgeable Native Hawaiian organizations and individuals. This consultation should include the incorporation of the contacts listed below to assist you and SDOT in identifying cultural and historic resources, cultural practices and significance, evaluating cultural places implicated by this project, assessing adverse effects to them, and developing appropriate mitigation and alternatives (where necessary):

- Local Hawaiian civic clubs
- Local chapters of the royal societies
- Oahu Island Burial Council
- Individuals familiar with cultural practices of the areas affected by your undertaking

Thank you for the opportunity to comment and provide concerns in this phase of the proposed project. If you have any questions, please contact Wayne Kawamura, Policy Analyst at 594-1945, or email him at: waynek@oha.org.

Sincerely,

Colin Kippen, Jr.
Deputy Administrator

cc: BOT
ADM

PUNALU`U COMMUNITY ASSOCIATION
P.O. Box 239
Hau`ula, Hawai`i 96717

January 24, 2002

Kelie Feng
M & E PACIFIC, INC.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, HI 96813-3588

Re: Request for Public Feedback
O`ahu – South Punalu`u Bridge Replacement, Hau`ula, Hawai`i

Dear Kelie Feng:

Thank you for notifying our community about the proposed construction of a replacement bridge over Waiono Stream in Punalu`u. As you may know, we have been severely impacted by the Board of Water Supply waterline project along Kamehameha Highway. We are greatly disappointed that Board of Water Supply and Department of Transportation have not coordinated the bridge and waterline projects so as to minimize the impacts on our homes, our lives, and the environment.

Our comments on the proposed bridge replacement project are, unfortunately, limited because of the limited information available to us. Without having the opportunity to view any plans showing metes and bounds of the project site, we would be unable to assess specific impacts on the area. Therefore, our comments and questions would necessarily be of a very general nature.

1. How will the replacement bridge affect the adjoining properties? There is concern that there be safe access to residential and business properties at all times.
2. What impacts will the project have on Waiono Stream, estuary, and near-shore waters? Due to previous illegal stream diversion and alteration the estuary has accumulated a large amount of silt and vegetation growth. What is the anticipated impact on the stream life forms?
3. What impact can we expect on vehicular traffic? What mitigating measures will be taken?
4. How long will the project disrupt the community?
5. How will the shoreline be affected? If vegetation is removed what is the re-vegetation plan?
6. Where will construction equipment and materials be stored?

7. Where will any excavated material be stockpiled?
8. What will be the daily work hours for the project?
9. Will the new bridge design seek to minimize the serious impact on the community from flooding caused by the Waiono Stream when trees and debris create a beaver dam effect?

The Board of Water Supply waterline project has uncovered over 20 sets of iwi kupuna, burial remains, along Kamehameha Highway and it is highly probable that the bridge replacement project will also uncover more iwi. This is of great concern to the families in this community. We would hope that this would be a primary concern of all who are involved in this project.

Please provide our community with the proposed bridge plans so that they may be presented at our next meeting for discussion and brought on for further community input.

Sincerely,

Creighton Wiseman, V.P.

for David Mikonczyk
President

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

January 27, 2002

HRD01/403

Mr. Bruce Wade
M & E Pacific, Inc.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, HI 96813-3588

Dear Mr. Wade:

Subject: Proposed South Punalu`u Bridge Replacement, Hauula, O`ahu

This letter is provided as a response to your early consultation letter and materials concerning the above referenced project. OHA offers the following comments relating to the project:

As part of your HRS 343 compliance, OHA reminds SDOT that it must complete a cultural impact statement so that information may be gathered about cultural practices and cultural features that may be affected by actions subject to Chapter 343. OHA recommends that SDOT seek as broad a consultation as possible with knowledgeable Native Hawaiian organizations and individuals to complete the required cultural impact assessment.

For Section 106 consultation, OHA recommends that SDOT seek as broad a consultation as possible with knowledgeable Native Hawaiian organizations and individuals. This consultation should include the incorporation of the contacts listed below to assist you and SDOT in identifying cultural and historic resources, cultural practices and significance, evaluating cultural places implicated by this project, assessing adverse effects to them, and developing appropriate mitigation and alternatives (where necessary):

- Local Hawaiian civic clubs
- Local chapters of the royal societies
- Oahu Island Burial Council
- Individuals familiar with cultural practices of the areas affected by your undertaking

Thank you for the opportunity to comment and provide concerns in this phase of the proposed project. We look forward to reviewing your Draft EA when available. If you have any questions, please contact Wayne Kawamura, Policy Analyst at 594-1945, or email him at: waynek@oha.org.

Sincerely,

Colin Kippen Jr.

Colin Kippen, Jr.
Deputy Administrator

cc: BOT
ADM

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

January 28, 2002

Kelie Feng
M & E Pacific, Inc.
Pauahi Tower, Suite 500
1001 Bishop Street
Honolulu, Hawaii 96813-3588

LOG NO: 29030 ✓
DOC NO: 0201EJ15

Dear Mr. Feng:

SUBEJCT: **Chapter 6E-8 Historic Preservation Review – Information Request for the South Punalu`u Bridge Replacement Project**
Punalu`u, Ko`olauloa, O`ahu
TMK: (1)-5-3-002

Thank you for the opportunity to comment during the preparation phase for an Environmental Assessment of the South Punalu`u Bridge Replacement Project. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the project areas.

A review of our records shows that there are no known historic sites at the location of the existing bridge or in the vicinity of the proposed temporary By-pass Bridge. However, historic sites including buried cultural layers associated with habitation deposits and human burials have been located in the sand substrate along Kamehameha Highway in nearby areas. In addition, archaeological monitoring, currently being conducted in conjunction with the Board of Water Supply 36" Waterline installation in Punalu`u, has uncovered several burials in the vicinity. To date, the closest human burial find is located 325 feet to the south of the current bridge. We believe that it is highly likely that the proposed project has a high probability for encountering subsurface historic sites, including human burials and as such this project may have an "adverse effect" on significant historic sites.

Since the subject action has the potential to have an "adverse effect" on significant historic sites, we recommend that archaeological monitoring be conducted to identify and document any significant historic sites that might be found and to appropriately mitigate any adverse effect this project would have on such historic sites.

Normally an acceptable monitoring plan (scope) would be prepared and submitted to this office for review and acceptance prior to beginning any ground disturbance. An acceptable archaeological monitoring plan has the following components:

> An archaeological monitoring plan must contain the following eight specifications: (1) The kinds of remains that are anticipated and where in the construction area the remains are likely to be found; (2) How the remains and deposits will be documented; (3) How the expected types of remains will be treated; (4) The archaeologist conducting the monitoring has the authority to halt construction in the immediate area of a find in order to carry out the plan; (5) A coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; (6) What laboratory work will be done on remains that are collected; (7) A schedule for report preparation; and (8) Details concerning the archiving of any collections that are made.

If an acceptable archaeological monitoring plan is prepared, and if the plan is implemented, then we believe that the proposed undertaking will acceptably identify and mitigate any impacts of this project on significant historic sites.

Our architectural staff has already commented to you that the bridge has lost its historic integrity and is not considered significant.

Should you have any questions regarding archaeological concerns, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027. For architectural concerns please call Carol Ogata at 692-8032.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

c: Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
Mr. Kai Markell, Burial Sites Program

Date: 1/29/2002 10:48 AM
Sender: Mike_N_Yamamoto@exec.state.hi.us
To: Kelie Feng
Priority: Normal
Subject: Punaluu Stream Animals

Dear Kelie,

As I indicated over the phone, all of our native oopu can be found in Punaluu Stream. During the last survey we conducted in the mid to lower section of this stream in the early 90's, we found oopu naniha (Stenogobius hawaiiensis), oopu akupa (Eleotris sandwicensis), oopu nakea (Awaous guamensis), oopu nopili (Sicyopterus stimpsoni) and oopu alamoo (Lentipes concolor). We also observed hapawai (Neritina vespertina) and opae oehaa (Macrobrachium grandimanus). The mountain opae, also known as opae kalaole (Atyoida bisulcata) and the hihiwai (Neritina granosa) are undoubtably also present in this stream at higher elevations.

We were unable to conduct additional surveys in this stream because the entire watershed is privately owned, and permission to survey the upper reaches could not be obtained.Based on what we do know of Punaluu Stream, we consider it to be one of the best remaining streams on Oahu.

Mike Yamamoto
Aquatic Biologist
Division of Aquatic Resources

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

February 12, 2002

LOG/784/418/808/682/568
PUNALUUBRIDGE.RCM

LD-NAV

M&E Pacific, Inc.
Kelie Feng, Engineer
1001 Bishop Street, Suite 500
Honolulu, Hawaii 96813-3588

Dear Mr. Feng:

SUBJECT:

Review:	Pre-Consultation for Preparation of a Environmental Assessment(FONSI)
Applicant:	Department of Transportation (State of Hawaii)
Project:	Kamehameha Highway Replacement of South Punaluu Bridge
Consultant:	M&E Pacific, Inc.
Location:	Punaluu, Koolauloa, Island of Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39 & 50 and 5-3-4: 01

Thank you for the your pre-consultation letter dated January 29, 2002 informing the Department of Land and Natural Resources' (DLNR) Land Division of the Department of Transportation's Kamehameha Highway Replacement of South Punaluu Bridge Project.

A copy of your letter and description of the proposed project was transmitted to the following DLNR Divisions for their review and comment:

Division of Aquatic Resources - Division of Forestry & Wildlife - Division of State Parks - Division of Boating & Ocean Recreation - Historic Preservation Division - Commission on Water Resource Management - Land Division Engineering Branch Land Division Planning and Technical Services and Oahu District Land Office

Attached is a copy of the Division of Aquatic Resources, Commission on Water Resource Management and Land Division Engineering Branch comments.

The DLNR has no other comment to offer at this time. Should you have any questions, please feel free to contact Nick Vaccaro of the DLNR Land Division Support Services Branch at 587-0438.

Very truly yours,

HARRY M. YADA
Acting Administrator

c: Oahu District Land Office

RECEIVED
LAND DIVISION

2002 FEB -7 P 5:05

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

DIVISION OF AQUATIC RESOURCES

DIRECTOR	/	Suspense Date:	
COM FISHERIES		Draft Reply	☐
		Reply Direct	☐
		Comments	☐
		Information	☐
		Comp Act & File	☐
STATISTICS		Return to:	
		Copies to:	
EDUCATION		Remarks:	
SECRETARY			
OFFICE SVCS		02-90	
RS	X		

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

MY

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

RECEIVED
FEB 1 2002
DIV. AQUATIC RESOURCES

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT:

Review:	Pre-Consultation Document
Applicant:	Department of Transportation (SOH)
Consultant	M&E Pacific, Inc.
Project:	South Punaluu Bridge Replacement
Location:	Punaluu, Koolauloa, Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39, 50 - 5-3-4: 01

Please review the project summary document covering the subject matter and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

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.

Signed: [signature]
Date: 2-6-02

Ref.: PUNALUUBRIDGE.COM

State of Hawaii
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES
February 6, 2002

MEMORANDUM

To: Harry M. Yada, Acting Administrator
Land Division
From: William Devick, Administrator
Division of Aquatic Resources
Subject: Comments on __x__ Pre-consultation Document

Comments Requested By: Nick Vaccaro

Summary of Project

Title: South Punaluu Bridge Replacement
Proj. By: Department of Transportation SOH
Location: Punaluu, Koolauloa, Oahu, Hawaii

Brief Descripion:

Proposed is the construction of a replacement bridge along Kamehameha Highway in Punaluu, Oahu. The existing bridge, which is in a deteriorated condition, will be demolished and replaced with the new bridge which will be 50 feet wide and 160-180 feet long. During construction, a temporary bypass bridge about 33 feet wide will be built makai of the existing bridge structure.

Comments:

Punaluu stream is one of the best remaining stream systems on Oahu. All of the native oopu, opae and hihiwai can be found in this stream. Major spawning runs of oopu nakea have also been documented in its lower reaches.

Appropriate mitigative measures must be taken to minimize erosion and siltation to the extent possible. Precautions should 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. Finally, in-stream work should not be scheduled during late August through October when the largest spawning runs of oopu nakea typically occur.

RECEIVED
LAND DIVISION

2002 FEB 11 A 11:28

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT:

Review:	Pre-Consultation Document
Applicant:	Department of Transportation (SOH)
Consultant	M&E Pacific, Inc.
Project:	South Punaluu Bridge Replacement
Location:	Punaluu, Koolauloa, Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39, 50 - 5-3-4: 01

Please review the project summary document covering the subject matter and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

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.

Signed: Andrew M. Monden
Date: 2/8/02

ANDREW M. MONDEN, CHIEF ENGINEER

DLNR-LAND DIVISION
ENGINEERING BRANCH

COMMENTS

For the proposed construction of replacement and temporary bypass bridges and their related improvements, we offer the following suggestions:

1. The proposed construction work should be done according to all applicable County Flood Ordinances, related to work within a flood zone.

2. 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.

3. A scour analysis should be conducted to ensure that the design of the structure will minimize erosion at the foundation. If the channel opening at the structure is widened, evaluate downstream reaches to provide for adequate capacity and erosion.

4. The proposed bridges should not impede the storm water carrying capacity of the body of water it crosses.

For your information, the shoreline areas of the proposed project site, according to FEMA Map Number 15003C0155 E, is located in Zone VE. Zone VE is an area within the 100-year flood plain, where coastal flooding occurs with velocity hazard (wave action), and base flood elevations determined. Areas immediately adjacent are located in Zone AE. Zone AE is an area within the 100-year flood plain, with base flood elevations determined.

RECEIVED
LAND DIVISION

2002 FEB -5 A 10:55

DEPT OF LAND & NATURAL RESOURCES STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT:

Review:	Pre-Consultation Document
Applicant:	Department of Transportation (SOH)
Consultant	M&E Pacific, Inc.
Project:	South Punaluu Bridge Replacement
Location:	Punaluu, Koolauloa, Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39, 50 - 5-3-4: 01

Please review the project summary document covering the subject matter and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

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.

Signed:
Date: 2/4/02

RECEIVED
LAND DIVISION

2002 FEB -5 A 8:27

DEPT OF LAND & NATURAL RESOURCES STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

MEMORANDUM:

From ~~To:~~

XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

TO: ~~FROM:~~ Harry M. Yada, Acting Administrator
Land Division

SUBJECT:

Review:	Pre-Consultation Document
Applicant:	Department of Transportation (SOH)
Consultant	M&E Pacific, Inc.
Project:	South Punaluu Bridge Replacement
Location:	Punaluu, Koolauloa, Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39, 50 - 5-3-4: 01

Please review the project summary document covering the subject matter and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

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.

Signed:
Date: 2/4/02

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
XXX Division of Boating and Ocean Recreation
XXX Historic Preservation Division
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Oahu District Land Office

FROM: Harry M. Yada, Acting Administrator
Land Division

SUBJECT:

Review:	Pre-Consultation Document
Applicant:	Department of Transportation (SOH)
Consultant	M&E Pacific, Inc.
Project:	South Punaluu Bridge Replacement
Location:	Punaluu, Koolauloa, Oahu, Hawaii
TMK:	1st/ 5-3-2: 21, 39, 50 - 5-3-4: 01

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(X) We have no comments.

( ) Comments attached.

Signed:
DOFAW Administrator
Date: 1/31/02

RECEIVED
LAND DIVISION

2002 FEB 11 A 11:25

DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

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___ADMINISTRATOR
___ASST ADMIN
___DEV BR
___PLAN BR
___RES MGT BR
___CLERICAL
___ADMIN ASST
___INTERP BR

___CIRC/POST/STAFF RM
___COMMENTS & REC
___DRAFT REPLY
___FILE
___FOLLOW UP
___INFO
___RUN COPIES
___RUSH DUE
___SEE ME
___FAX/SEND COPY TO

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(✓) We have no comments.

( ) Comments attached.

Signed: [signature]
Date: 2/4/02

STATE OF HAWAII

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

FEB - 8 2002

TO: Mr. Harry Yada, Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Pre-Construction Document South Punaluu Bridge Replacement, 5-3-2: and 5-3-4: Various Parcels.

FILE NO.: PUNALUUBRIDGE.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

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

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[X] OTHER: This project requires a stream channel alteration permit pursuant to Hawaii Revised Statutes §174C-71.

If there are any questions, please contact David Higa 587-0249.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii
January 31, 2002

LD-NAV/LOG568
Ref.: PUNALUUBRIDGE.COM

Suspense Date: 2/12/02

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FROM: Harry M. Yada, Acting Administrator
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SUBJECT:

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Applicant:	Department of Transportation (SOH)
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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.

Signed:
Date:

DIR 1748

November 27, 2002

Brian K. Minaai
Director of Transportation
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

RE: *Replacement of South Punaluu Bridge, Kamehameha Highway, Oahu, HI. - BR-083-1(42).*

Dear Mr. Minaai:

On November 21, 2002, we received your notification and supporting documentation regarding the adverse effects of the referenced project, a property eligible for inclusion in the National Register of Historic Places. Based upon the information you provided, we do not believe that our participation in consultation to resolve adverse effects is needed. However, should circumstances change, please notify us so we can re-evaluate if our participation is required. Pursuant to 36 CFR 800.6(b)(iv), you will need to file the Memorandum of Agreement, and related documentation at the conclusion of the consultation process. The filing of this Agreement with the Council is necessary to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions, please contact Jane Crisler at 303/969-5110 or via eMail at jcrisler@achp.gov.

Sincerely,

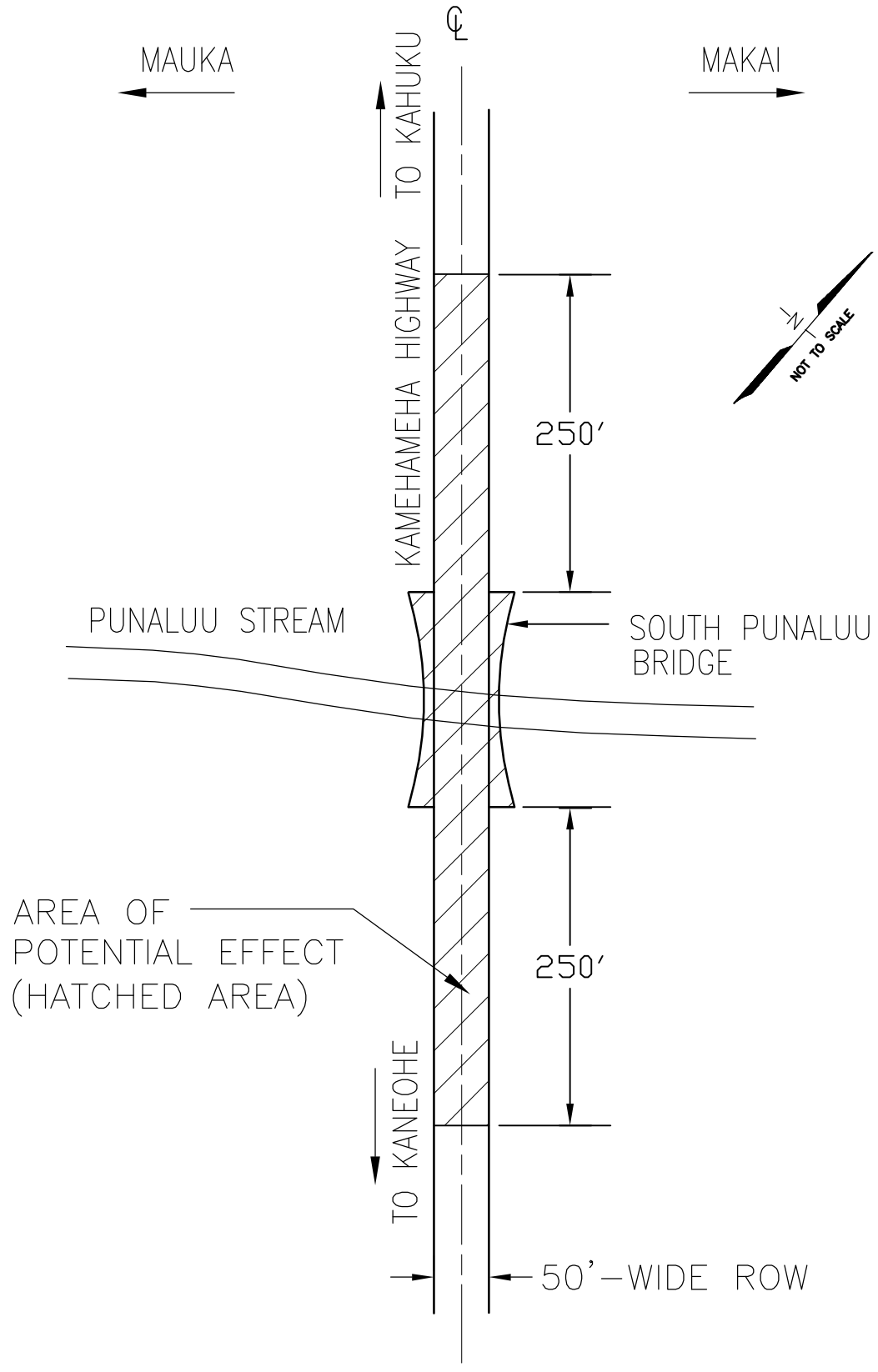
Nancy Kochan

Nancy Kochan
Office Administrator/Technician
Western Office of Federal
Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION
12136 West Bayaud Avenue, Suite 330 • Lakewood, Colorado 80228
Phone: 303-969-5110 • Fax: 303-969-5115 • achp@achp.gov • www.achp.gov

APPENDIX D

NHPA Section 106 Area of Potential Affects



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Attachment 3	KAMEHAMEHA HIGHWAY REPLACEMENT OF SOUTH PUNALUU BRIDGE **AREA OF POTENTIAL EFFECT**

APPENDIX E

Archaeological Monitoring Report

ARCHAEOLOGICAL MONITORING PLAN IN SUPPORT OF THE SOUTH PUNALU`U BRIDGE REPLACEMENT PROJECT, KAMEHAMEHA HIGHWAY, PUNALU`U *AHUPUA`A*, KO`OLAULOA DISTRICT, ISLAND OF O`AHU (TMK 5-3-02)

by

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

Prepared for

M & E Pacific

Cultural Surveys Hawaii

March 2002

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I. INTRODUCTION

At the request of M & E Pacific, Cultural Surveys Hawaii, Inc. (CSH) has developed an archaeological monitoring plan in support of the Replacement of South Punalu`u Bridge Project along Kamehameha Highway, Punalu`u *Ahupua`a*, Ko`olauloa District, Island of O`ahu (Figures 1 & 2). The existing concrete bridge spanning Punalu`u Stream, which includes two 11-foot wide lanes, two 2-foot shoulders, and a 5-foot wide walkway, was built in 1925 and does not meet current requirements.

This bridge replacement project will begin with geotechnical engineering exploration which will involve approximately nine borings to include a minimum of two borings drilled at each of the north and south abutment locations, one at the center pier location and four along the approaches to the bridge. These borings will vary from 20 to 180 feet deep. Final structural engineering decisions may await analysis of the geotechnical engineering exploration but as presently envisioned the new bridge structure will be of concrete construction spanning approximately 160 to 180 feet long and 50 feet wide providing two 12-foot lanes, two 8-foot shoulders and a 6-foot shielded pedestrian walkway/bike lane. This replacement bridge will be of two or more spans (depending on storm flow analysis) with supporting abutments at both ends and one or more piers in the stream channel. Because of the need to provide continuing 24-hour access to two-way traffic, pedestrians and bicycles during construction and because there is no reasonable existing detour route, the new structure will be built in longitudinal halves. As presently envisioned, a 32-foot wide temporary bypass section will be built on the seaward side of the existing bridge. This will allow for continuing traffic while work on the landward half of the structure is undertaken. When this work is completed the seaward portion of the temporary bypass may be demolished.

While final structural engineering decisions may await analysis of the geotechnical engineering exploration it seems likely that the major subsurface impact to potential culture bearing sediments will result from foundation work for the abutments and piers which will be approximately 50 feet wide across the Kamehameha Highway right-of-way and extending an additional 20 feet seaward.

There has been little previous archaeology in the vicinity of the project area, with the exception of several inadvertently discovered human burials. Recent discoveries of some twenty-seven burials in the Windward Mains Board of Water Supply project at Punalu`u and review of existing documents, including the Archaeological Monitoring Report produced by CSH for a waterline from Hau`ula to La`ie (Masterson, *et al.* 1996), indicates a high likelihood of encountering human burials, associated cultural layers and possibly historic and prehistoric habitation sites in the course of this proposed bridge replacement work.

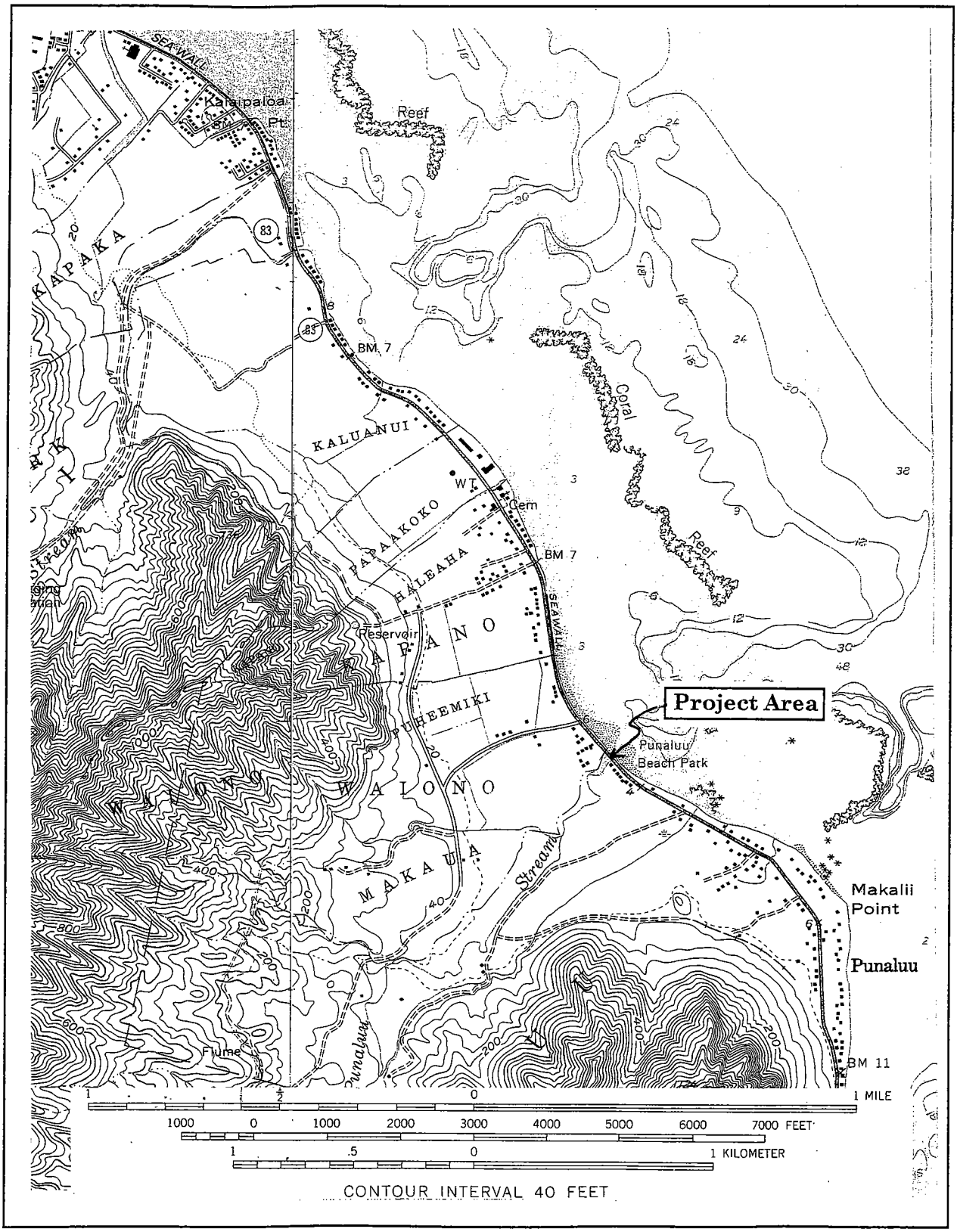

Figure 1. Portions of USGS Topographic 7.5 Minute Series, Kahana and Hau`ula Quadrangles, Showing Location of Project Area.

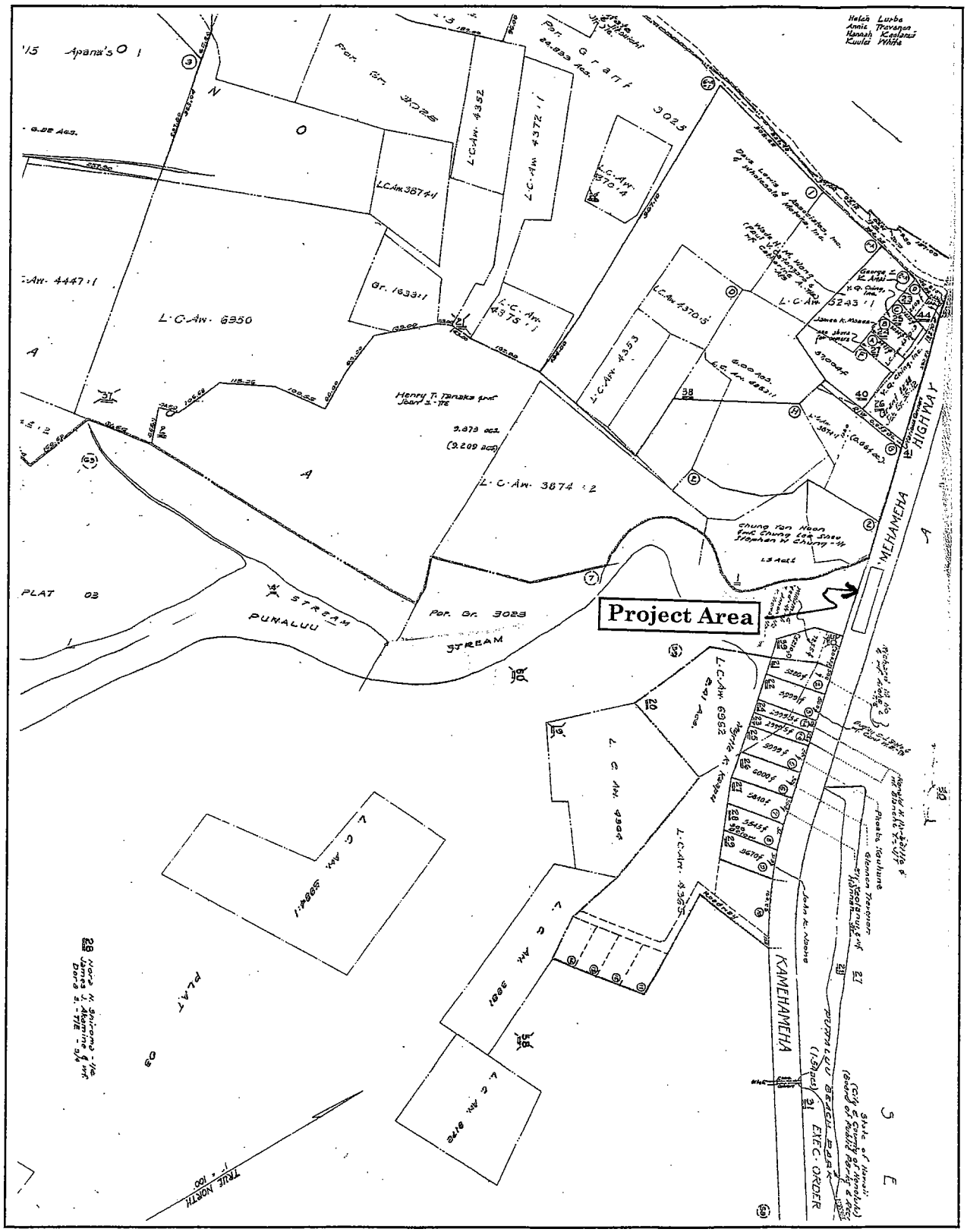

Figure 2. Portions of Tax Map Keys 5-3-02 and 5-3-04 Showing Project Area.

II. PROJECT AREA DESCRIPTION

In the vicinity of the mouth of Punalu`u Stream, Kamehameha Highway lies almost immediately adjacent to the coast. The amount of land lying seaward of the stream crossing depends upon the vagaries of storm and season. Jaucas Sand (0-15% slopes) comprises the soil for some distance on both sides of the mouth of Punalu`u Stream extending well inland of Kamehameha Highway. The Jaucas Series:

> ". . . consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. These soils occur on all the islands . . . . They developed in wind- and water-deposited sand from coral and seashells. They are nearly level to strongly sloping. Elevations range from sea level to 100 feet . . . . The annual rainfall amounts to 10 to 40 inches. (Foote *et al.* 1972:48)

Annual rainfall averages in the project area lie in the 60-80 inch range with the rainfall gradient rising rapidly to the west reaching 260 inches at the Ko`olau summit (Juvik & Juvik 1998:56).

The vegetation in coastal Ko`olauloa, prior to human settlement, is classified as Lowland dry and Mesic forest, Woodland, and Shrubland (Juvik & Juvik 1998:122). Sandalwood exploitation occurred in lowland mesic forests in the early 1800's. In the low grasslands, *Pili* grass was harvested for thatch, and medicinal plants and hard woods were gathered. These areas were also used extensively for dryland *kalo* (taro) and *`uala* (sweet potato) agriculture (*Ibid.*:127). In contrast, the area today has been transformed by human activity and is populated by predominantly non-native plant species (*Ibid.*:123). The project area, being located close to the coastline, does not traverse forested areas; rather, it traverses agricultural areas that were likely used for crops such as taro, sweet potato, and sugarcane. Vegetation in the vicinity of the present project area includes *hau (Hibiscus tiliaceus*), sea grape (*Coccoloba uvifera*), and Tropical almond.(*Terminalia catappa*).

The existing concrete bridge spanning Punalu`u Stream built in 1925 includes two 11-foot wide lanes, two 2-foot shoulders, and a 5-foot wide walkway.

III. CULTURAL AND HISTORICAL DOCUMENTATION

The settlement patterns at Punalu`u *Ahupua`a* follow typical Hawaiian patterns documented throughout the Islands. Permanent habitations were located along the sandy shoreline and the agriculture was practiced further upland and along streams and near springs. Punalu`u Valley through which the project area passes was extensively used for agriculture (taro) and the offshore reefs and bays were ideal for fishing. 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.

A. *Māhele* Record

Māhele era (*ca.* 1850) data provide valuable information regarding pre-contact settlement patterns and land use, as well as detailing patterns from the mid-1800's. Figures 2 and 3 show the extensive Land Commission Awards (L.C.A.s) in coastal Punalu`u and in particular near the mouth of Punalu`u Stream. Virtually adjacent to the mouth of Punalu`u Stream were LCA 3874 *`Āpana* 1 & 2, 4364, 4365,6962. Detailed information on these four land claims is presented in the appendix and is summarized below.

Table 1 Punalu`u Land Commission Awards Adjacent to the Project Area

Claim No.	Awardee	*`Ili*	Land Use	Landscape features	Amount
3874	Paia	Lonokuakua	2 taro *lo`i*, a *kula*, house lot	sea beach, river	3.85 acres
4364	Kukaumiumi	Po`opoe	5 taro *lo`i*, 2 *kula*, house lot	seaside, stream	1.5 acres incl. 4 other *lele* lands
4365	Kuolulu	Holu	6 taro *lo`i*, a *kula*, house lot	sea beach	2.4 acres incl. *lele* land
6962	Kukeawe	Kamaloa	23 taro *lo`i*, a *kula*, house lot	water course, sea side	1.1 acres

L.C.A. 3874, awarded to Paia, included two *`āpana* (*`Āpana* 1 & 2) on the north side of the mouth of Punalu`u stream. These are reported to lie in the *ahupua`a* of Waiono in the *`ili* of Lonokuakua. Paia claimed two taro *lo`i* (ponded field for taro), or three patches in two pieces, one *kula `ili* (probably pasturage but possibly for dryland agriculture), and one house lot near the sea.

L.C.A.4364 awarded to Kukaumiumi included four *`āpana* of which the primary holding appears to be the parcel just back from Kamehameha Highway south of the bridge.

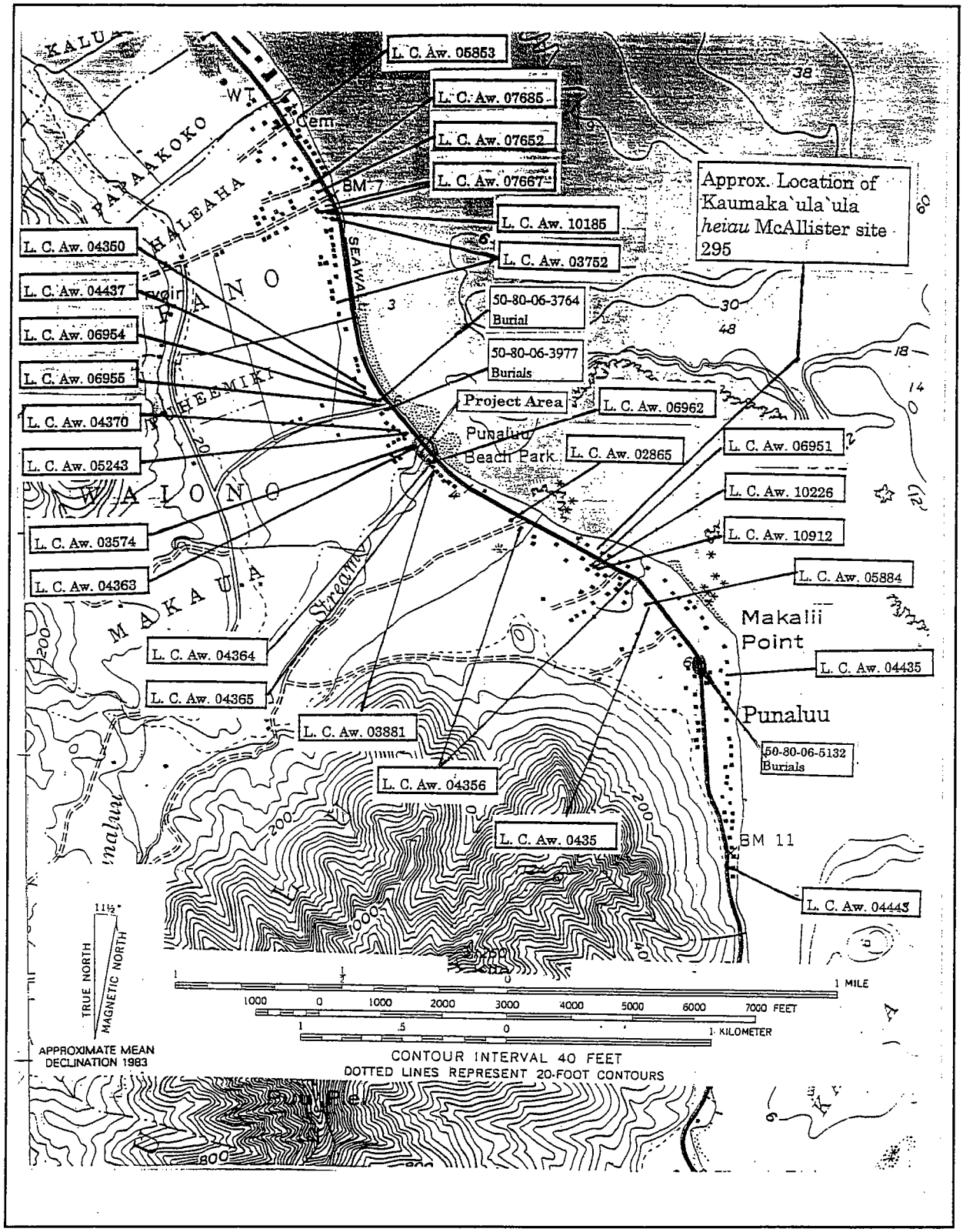

Figure 3. Portion of USGS Topographic 7.5 Minute Series, Kahana Quadrangle, Showing Locations of Known LCAs and Burials in Coastal Punalu`u *Ahupua`a* (See Figure 4 for Recent Board of Water Supply Burial Data

This appears to be the parcel reported to lie in the *ahupua`a* of Punalu`u in the *mo`o* of Po`opoe. Kukaumiumi claimed five taro *lo`i* (ponded field for taro), two *kula* (probably pasturage but possibly for dryland agriculture), and one house lot near the sea.

L.C.A.4365 awarded to Kuolulu included two *`āpana* of which the primary holding appears to be the parcel just back from Kamehameha Highway south of the bridge. This appears to be the parcel reported to lie in the *ahupua`a* of Punalu`u in the *`ili* of Holu. Kuolulu claimed six taro *lo`i* (ponded field for taro), a *kula* (probably pasturage but possibly for dryland agriculture), and one house lot near the sea.

L.C.A. 6962 awarded to Kukeawe included just one *`āpana* adjacent to the south side of the bridge. This was reported to lie in the *ahupua`a* of Punalu`u in the *`ili* of Kamaloa. Kukeawe claimed twenty-three taro *lo`i* (ponded field for taro), a *kula* (probably pasturage but possibly for dryland agriculture), and one house lot near the sea side.

Thus in summary, the land records of circa 1850 indicate the immediate vicinity of the South Punalu`u bridge was used quite intensively for both ponded field taro agriculture and for permanent residence.

B. Population Trends

As stated earlier, the Ko`olauloa District is thought to have been quite densely populated regions prior to contact with Europeans. The area had the ability to support a relatively large permanent population, as is indicated by the excellent potential for agricultural production, the ready availability of fresh water, and the proximity of superb fishing grounds (Handy & Handy 1972:271). After contact with Europeans, the population in the district of Ko`olauloa underwent dramatic changes. 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).

This trend toward a declining population in the mid-1800's may be more significant than it appears at first. Data gathered from *Māhele* records from this same time period likely under-represent the size of earlier populations in the area as there had already been massive population decline owing to diseases and out-migration. This should be noted when making predictions based on the number and location of house site LCA claims in the project area, as there may in fact be a greater concentration of ancient cultural layers present than predicted by *Māhele* data.

IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

Previous archaeological research in the *ahupua`a* of Punalu`u, indicates the presence of much prehistoric and historic habitation, agricultural uses, animal husbandry, religious shrines and *heiau*. Below is a table of previously identified sites near Kamehameha Highway in Punalu`u (Figure 3).

Table 2 Previous Archaeological Finds in coastal Punalu`u

Site #/ Source	Site Type	Age	Significance
50-80-06-295	Kaumaka`ula`ul a *Heiau*	Pre-contact	One of the most sacred temples in Ko`olauloa - reported destroyed
50-80-06-3764 C & C Medical Examiner's Report	Burial	Pre-contact	Poss. assoc. with LCA 6954, 4330, 6955, 4372, 8447, 5243, 4370 4437, (LC App. 1123?)
50-80-06-3977 Smith, Bath & Masse 1988	Historic trash pit, fire pit/*imu*, three human burials, canid burial	Trash pits contain late 19th Century bottles and glass. Two of the burials are pre-contact, one is post-contact. No other dates indicated	Poss. assoc. with LCA 5243, 4370, 3574, 4363
50-80-06-5132 Colin & Hammatt 2000	Burial, two sets of human remains & a weak cultural layer	Pre-contact	Poss. assoc. with LCA 435 or 4435
Hammatt *et al.* (in progress)	Burial, twenty-seven sets of human remains & a weak cultural layer	Both Pre-contact and Post-contact	Poss. Assoc. with a number of LCA

The coastal areas of Punalu`u *ahupua`a, mauka* of Kamehameha Highway, show indications of significant historic disturbance. The area was planted in sugarcane, extensively used by the military during WWII, and was partially bulldozed to clear areas for pasture (Denison 1975:5). One of the most sacred temples in Ko`olauloa, Kaumaka`ula`ula *Heiau* (McAllister site 295), was located on the shoreline in Punalu`u somewhere between the present beach park and Maipuna stream (Sterling & Summers 1978: 167). This *heiau* has apparently been completely destroyed and there is no reference to it in any of the reports of archaeological excavations in the area. A pier built near the mouth of Waiono Stream has been referenced as a favorite stopping place for ships plying the coast of O`ahu (Clark 1977:152).

In the course of monitoring of the Board of Water Supply Windward Mains project, Cultural Surveys Hawaii recovered twenty-seven burials in coastal Punalu`u between May 2000 and October 2001. While these were encountered over a long expanse of Punalu`u, twelve of these burials were encountered in a 450 m stretch just south of Punalu`u Bridge (Figure *) and much of this stretch still remains to be excavated at the time of writing. This project suggests relatively high burial densities may be anticipated in the general vicinity of the Punalu`u Stream mouth.

In 1996, CSH completed a monitoring project for the extension of the waterline from Hau`ula to La`ie, along Kamehameha Highway to the north of the present project area (Masterson, *et al.* 1997). During this project, numerous prehistoric sites were uncovered including cultural layers, the remains of permanent habitation and agricultural sites, and eighteen human burials. The report detailing the discovery and treatment of these sites and human remains provides a foundation for future excavation along the remainder of Kamehameha Highway in Ko`olauloa.

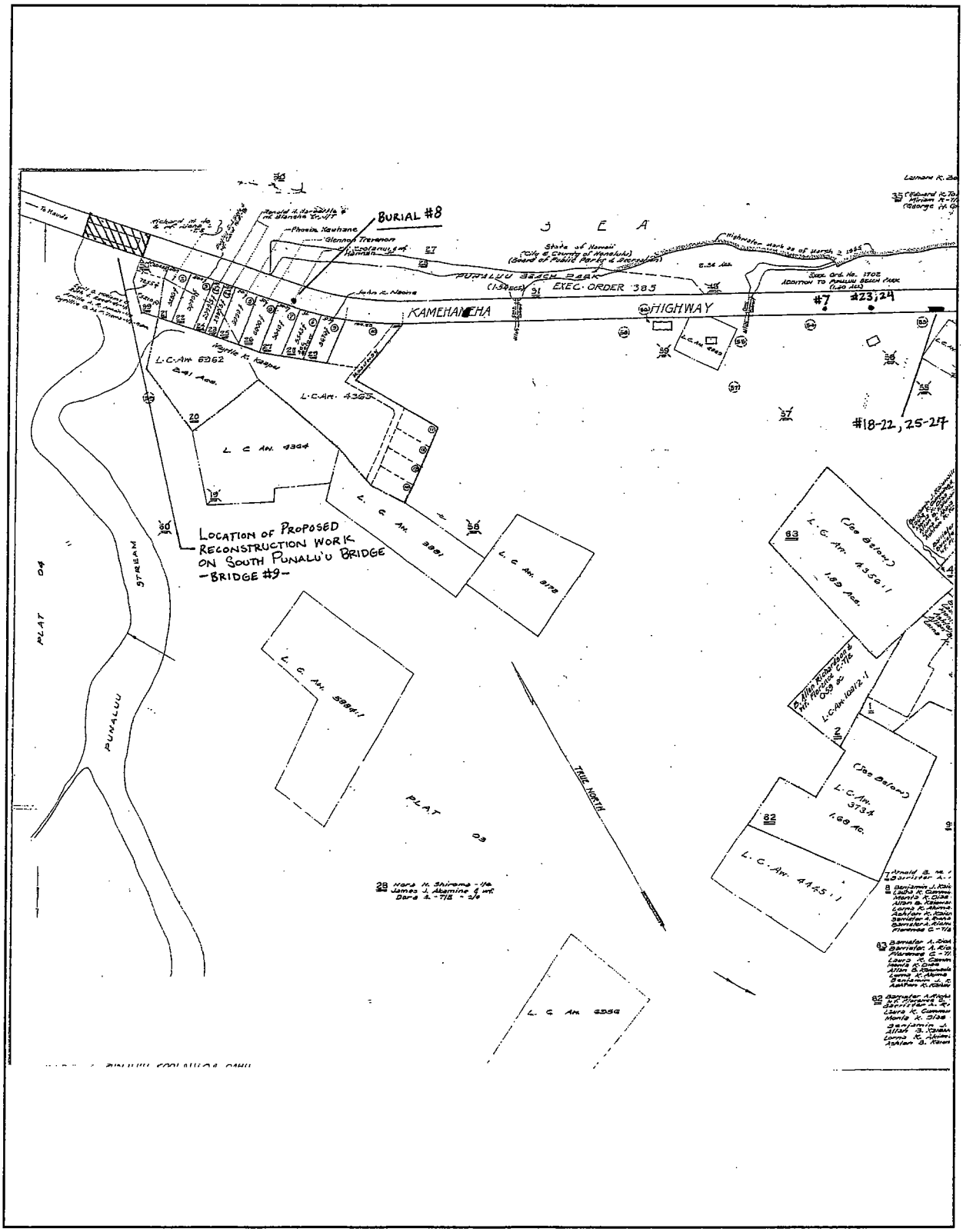

Figure 4. Portion of TMK 5-3-02 Showing Location of Burials Encountered During the Board of Water Supply Windward Mains Project Near South Punalu`u Bridge (to 2/28/2002)

V. ARCHAEOLOGICAL MONITORING PROVISIONS

Given the likelihood of cultural deposits and/or burials an archaeological monitor will be on-site during all ground disturbance activities associated with the South Punalu`u Bridge project. This is to include monitoring of the initial geotechnical testing of areas with a likelihood of having cultural deposits and/or burials. It is anticipated that human burials or cultural materials will be encountered in the course of this project. The following points list the expected finds, and procedures for response to particular finds and events associated with the construction activities. If it is determined that any portion of the project area which has been recommended for constant monitoring, in fact requires less intense monitoring, SHPD will be contacted prior to any departure from, or modification of, the monitoring plan.

1. Possible finds: There is a possibility that human burials (pre-historic or historic) and cultural deposits (pre-historic or historic) may be encountered. Recent work in the area has encountered relatively high burial densities inland of Punalu`u Beach Park just to the south of Punalu`u Stream. There were numerous LCAs in the immediate vicinity including agricultural plots (lo`i) and house sites. Remnants of this permanent habitation and intensive agriculture may be encountered.

2. Treatment of remains encountered: If cultural deposits or human skeletal remains are encountered during ground disturbing activities, work will be stopped immediately in that area and the archaeologist will notify the SHPD/DLNR of the nature of the discovery. Burial finds will be treated according to HRS 6E-43.6 Burial Law and Administrative Rules Chapter 13-300. SHPD/DLNR will determine the appropriate treatment of the remains and any associated cultural material in consultation with any recognized descendants and the appropriate island burial council. No remains will be removed without an SHPD/DLNR determination. If any associated materials are encountered with an inadvertent human burial, all material will be treated according to SHPD/DLNR determination. If other cultural materials are encountered, not in association with a human burial, including an intact cultural layer, charcoal, artifacts or midden deposits, or any disturbed objects or deposits, then select sorted samples of charcoal, and bulk samples of midden material will be collected and standard documentation conducted (i.e. scale maps and stratigraphic profiles, photographs, detailed descriptions, and interpretation). Reburial plans will be made in consultation with SHPD/DLNR and the appropriate island burial council.

3. The monitoring archaeologist has the authority to halt construction in the immediate area of the find in order to carry out the plan. The field archaeologist will make it clear to construction personnel with whom he/she is working that the archaeologist has the authority to halt work when it is appropriate.

4. Pre-construction conference between the archaeologist and the construction crew. Before work commences on the project the on-site archaeologist will explain to the entire construction crew what materials may be encountered and the procedures to

follow if historical and archeological materials are encountered, as well as the role of the archaeologist. The 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.

5. Laboratory work to be done on remains collected. If remains are encountered, the SHPD/DLNR will decide if it is appropriate to remove the human skeletal remains and if osteological analysis of human remains is warranted. If removal is appropriate the remains may be stored temporarily at a facility designated by SHPD/DLNR for the purpose of completing bone inventory. The remains may continue to be stored at that facility or transferred to another facility (designated by SHPD/DLNR) until reburial plans are made. Artifactual material will be catalogued and analyzed along with samples of midden material, if collected. Charcoal and other datable materials will be submitted for dating, if in situ well-documented samples are obtained from a clearly pre-historic context which has not mixed with historic materials.

6. Schedule for Reports. A draft Archaeological Monitoring Report will be submitted within 90 days of completion of monitoring fieldwork to the SHPD/DLNR for review and approval.

7. Archiving of Collections. All burial materials will be given to SHPD/DLNR for storage. Materials not associated with burials will be temporarily stored at a facility designated by SHPD/DLNR until an appropriate curation facility is available. Disposition of any cultural materials, including artifacts, not associated with a human burial shall occur only after written concurrence of the landowner and in consultation with the SHPD/DLNR.

VII. REFERENCES

City and County, Medical Examiner's Report
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APPENDIX DATA ON LAND COMMISSION AWARDS

Waihona 'Aina

Claim Number: **04365**
Claimant: **Kuolulu**
Other claimant:
Other name:
Island: **Oahu**
District: **Koolauloa**
Ahupuaa: **Punaluu**
Ili: **Holu, Mahiki 2**

Apana:	**2**	Awarded:	**Yes**
Loi:	**6**	FR:	
Plus:		NR:	**173v4**
Mala Taro:		FT:	**58v10**
Kula:	**1**	NT:	
House lot:	**1**	RP:	**1288**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:	**1**	Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	

MISC: sea fishery on north, 3 houses on house lot

CLAIM: No. 4365, Kuolulu, Punaluu, Oahu, January 8, 1848
N.R. 273vr

To the Land Commissioners, Greetings: I, Kuolulu hold land at Holu. There are six taro lo`i and a kula, bounded on the north by a sea /fishery/, on the east by Papaiki, on the west by Mahiki, on the south by Pukolalalo. A lele lo`i is at Mahiki 2, one lo`i and a kula wauke. My house is together with the mo`o. The /length/ time is from the time of Kamehameha /I?/
KUOLULU X his mark

F.T. 58v10
Claim 4365, Kuolulu

Pahakae, sworn, says he knows the land of Kuolulu in Punaluu. It consists of 6 kalo patches all in one piece.

Bounded:
On the East by the land of Makaiva
South by Paupau's land
West by Kukaumiumi's land
North by the house lot of claimant.

The house lot of claimant is near the sea side.
It is bounded:
On one side by a stone wall running along the sea beach
and the kalo land of claimant bounds it mauka.
There are 3 houses on it.

Claimant who is an old man has occupied this place since his youth.

Oopa, sworn, says he knows the land of claimant. There are six kalo patches and a house lot, as described by the last witness.

The konohiki had no objection to make to this claim.

[Award 4365; R.P. 1288; Punaluu Koolauloa; 1 ap.; 2.4 Acs]

Glossary

BACK

Waihona 'Aina

Claim Number: **03874**
Claimant: **Paia**
Other claimant:
Other name:
Island: **Oahu**
District: **Koolauloa**
Ahupuaa: **Waiono**
Ili: **Lonokuakua**

Apana:	**2**	Awarded:	**Yes**
Loi:	**3**	FR:	
Plus:		NR:	**184v4**
Mala Taro:		FT:	**72v10**
Kula:	**1**	NT:	
House lot:		RP:	
Kihapai/Pakanu:		Number of Royal Patents:	
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**Yes**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**Yes**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	

Miscellaneous:

Text:
No. 3874, Paia, Waiono, Oahu, January 7, 1848
N.R. 184v4

To the Land Commissioners, Greetings: I, Paia, am a claimant in the `ili of Lonokuakua. There are two taro lo`i and the kula, one `ili. The boundaries are: north, Kapahi's /land/, east, Makaua, West, the konohiki, south, Makaua. The occupation has been from the time of Kalamoku.
PAIA

F.T. 72v10
Claim 3874, Paia

Koai, sworn, says he knows the land of claimant in Waiono. It consists of 3 kalo patches, forming two pieces.

The first containing 2 patches is bounded on:
Hauula side by Koo's land
Makai by Kaluhiai's land
Kaneohe side and Mauka by the line of Makaua.

The second piece of one patches [sic] is bounded on:
Hauula side by Kekipi's land
Makai by Koai's land
Kaneohe side by a stream
Mauka by the konohiki.

Claimant has a house lot also, near the sea, enclosed.
It is bounded:
Makai by the sea beach
Kaneohe side by the river
Mauka by Koai's land
Hauula side by the konohiki.

Claimant has held this place since 1847.

Kipi, sworn, says he knows the land and house lot of Paia. They are as described by last witness.

The konohiki had no objection to make to this claim. Claimant has no kula land.

[Award 3874; no R.P. Waiono Koolauloa; 3 ap.; 3.85 Acs]

Back

Waihona 'Aina

Claim Number: **04364**
Claimant: **Kukaumiumi**
Other claimant:
Other name:
Island: **Oahu**
District: **Koolauloa**
Ahupuaa: **Punaluu**
Ili: **Kanaialae, Pukoa, Lamaloa, Kuai**

Apana:	**4**	Awarded:	**Yes**
Loi:	**5**	FR:	
Plus:		NR:	**272v4**
Mala Taro:		FT:	**35v10**
Kula:	**2**	NT:	
House lot:	**1**	RP:	**1294**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**Yes**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**Yes**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:	**1**	Other Trees:	

Waihona 'Aina

LCA Number: **06962**
Claimant: **Kukeawe**
Other Claimant:
Other Name:
Island: **Oahu**
District: **Koolauloa**
Ahupuaa: **Punaluu**
Ili: **Kamaloa,Kamaloa 2,Makaupuhi,Kaulapapala**

Apana:	1	Awarded:	Yes
Loi or Moo:	23	Foreign Register:	
Plus:		Native Register:	406v5
Mala Taro:		Foreign Testimony:	40v10
Kula:	1	Native Testimony:	
House Lot:	1	Royal Patent:	1283
Kihapai / Pakanu:		Number of Patents:	1
Salt Lands:		Koele / Poalima:	No
Wauke:	3	Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea / Shore / Dunes:	No
Sweet Potatoes:		Auwai / Ditch:	No
Irish Potatoes:		Edifice:	No
Bananas:		Spring / Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Other Mammal:	No
Coffee:		Road / Path:	No
Oranges:		Burial / Graveyard:	No
Bitter Melon / Gourd:		Wall / Fence:	No
Sugar Cane:		Stream / Muliwai / River:	No
Tobacco:		Pali:	No
Koa / Kou Trees:		Disease:	No
Other Trees:		Claimant Died:	No
Other Plants:	1	:	

Miscellaneous:
8 mala `awa, 3 wai o`opu

Text:
No. 6962, Kukeawe
N.R. 406v5

To the Land Commissioners, Greetings to you all; I hereby state my claim for land in the `ili of Kamaloa, Ahupua`a of Punaluu, District 5, Division 3, Island of Oahu. There are twenty-three taro lo`i, twelve weed-grown lo`i, one kula and one house lot; also, in the `Ili of Kamaloa 2 are one taro lo`i and two weed-grown lo`i; again, in the `ili of Makaupuhi are four taro lo`i; again, in the `ili of Kaulapapala are eight mala of `awa, three mala of wauke, and three wai `o`opu /places to catch fresh-water shrimp/. It is a true right from the konohiki, in the reign of Kamehameha III. That is my petition on this 7th day of January, A.D. 1848, at Punaluu, Koolauloa.
KUKEAWE X

F.T. 40v10
Claim 6962, Kukeawe

Oopa, sworn, says he knows the land claimed by Kukeawe in Punaluu. It consists of 13 kalo patches, six only of which are cultivated at present.

The whole forms but one piece bounded:
Makai by Kukaumiumi's land
On Kaneohe side by the konohiki
Mauka and Hauula side by a water course.

Claimant has a house lot also. It is near the sea side, bounded:
By the sea on one side
Mauka by the kalo land of claimant
On Kaneohe side by Kuolulu's house lot
On Hauula side by the river.

Claimant and his ancestors have held this land since the time of Kamehameha I.

Hahia, sworn, says he knows the land of claimant. There are 13 patches, as described by the last witness. He also knows the house lot of claimant, and confirms the testimony of Oopa.

Kawana, the konohiki, made no objection to this claim.

[Award 6962; R.P. 1283; Punaluu Koolauloa; 1 ap.; 1.1 Acs]

Back

MISC: noni and similar things, wooded upland, `awa

CLAIM: No. 4364, Kukaumiumi, Punaluu, Oahu, January 8, 1848
N.R. 272v4

To the Land Commissioners, Greetings: I, Kukaumiumi, hold land in the mo`o of Poopoe. There are five lo`i, two kula and my house, bounded on the north by Holu, on the east by Kaulu, on the west by a stream, on the south by Kalihi. There are some lele lands: At Kanaialae is a kula. At Pukoa is also a kula, and a wooded upland. At Lamaloa is an upland with `awa and wood. At Kuai is a mala of noni and similar things. My right of occupancy is from the time of Kamehameha I.
KUKAUMIUMI

F.T. 35v10
Claim 4364, Kukaumiumi

Kawelo, sworn, says she knows the land of claimant. It consists of five kalo patches in one piece, bounded:

On the Kaneohe side by Kuolulu's land
Makai by the same
Hauula side by Kukeawe's land
Mauka by Paupau's land.

Claimant has a house lot also, near the sea side. It is not enclosed. There is but one house on it. Claimant and his ancestors have held it since the days of Kamehameha I.

Kuolulu, sworn, says he knows the five kalo patches of claimant, and confirms the testimony of Kawelo in relation thereto. He thinks the house lot belongs to Waipu.

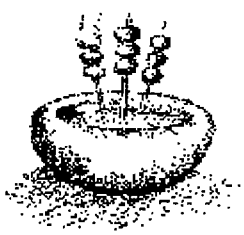
(The Commissioners could find no claim from Waipu in the Punaluu file).

Kawana, the konohiki, made no objection to this claim.

[Award 4364; R.P. 1294; Punaluu Koolauloa; 2 ap.; 1.5 Acs]

Glossary

BACK



LINDA LINGLE
GOVERNOR OF HAWAII

M

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
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FORESTRY AND WILDLIFE
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LAND
STATE PARKS

December 3, 2002

RECEIVED DEC - 5 2002

Glenn M. Yasui, Administrator
Highways Division
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

LOG NO: 31191
DOC NO: 0211EJ15

Dear Mr. Yasui:

SUBJECT: **National Historic Preservation Act Section 106 Review - Project Notification and Potential Adverse Effect Determination Kamehameha Highway, Replacement of South Punalu`u Bridge Project NO. BR-083-1(42)**
Punalu`u, Ko`olauloa, O`ahu
TMK: (1) 5-3-002:031, 039; 5-3-004:001

We provided initial comment on this project in January 2001. Our comments stated that we believed that this project has a high probability for encountering subsurface historic sites, including human burials and as such this project may have an "adverse effect" on significant historic sites. We recommended that archaeological monitoring be conducted to identify and document any significant historic sites that might be found and to appropriately mitigate any adverse effect this project would have on such historic sites. We have reviewed and accepted a monitoring plan submitted for this project (*Archaeological Monitoring Plan in Support of the South Punalu`u Bridge Replacement Project, Kamehameha Highway, Punalu`u Ahupua`a Ko`olauloa District, Island of O`ahu,* (Hammatt and Shideler, March 2002).

Thus, we concur with your determination of "adverse effect" and we further concur with your finding of "no adverse effect" with the condition that archaeological monitoring be conducted and believe that the monitoring plan previously submitted and accepted provides responsible guidelines for archaeological activities, and that successful implementation of the AMP as written and approved, will mitigate the adverse effect this project may have on significant historic sties.

Should you have any questions, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Gilbert Coloma-Agaran
State Historic Preservation Officer

EJ:jk

c: Mr. Mike Nishimura, M & E Pacific, Inc., Pauahi Tower, Suite 500, 1001 Bishop Street, Honolulu, Hawaii 96813-3588
Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
Mr. Kai Markell, Burial Sites Program

APPENDIX F

Coastal and Environmental Evaluation for the Proposed Replacement of South Punaluu Bridge.

COASTAL AND ENVIRONMENTAL EVALUATION FOR THE PROPOSED REPLACEMENT OF SOUTH PUNALU‘U BRIDGE

May, 2002

Prepared for:

M&E Pacific, Inc.
1001 Bishop Street, Suite 500
Honolulu, Hawai‘i 96813

Prepared by:

Sea Engineering, Inc.
Makai Research Pier
Waimānalo, Hawai‘i 96795

and

AECOS Consultants, Inc.
45-939 Kamehameha Hwy. Room 104
Kāne‘ohe, Hawai‘i 96744

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EXECUTIVE SUMMARY

The State of Hawai‘i Department of Transportation is planning to replace the South Punalu‘u Bridge on Kamehameha Highway on the windward side of O‘ahu. The new bridge will be wider than the existing bridge, and will have a footprint extending 13 feet *makai* of the present structure. A temporary by-pass road will be built for traffic diversion during construction that will extend 32 feet *makai* of the present structure. The bridge crosses Punalu‘u Stream, one of the major streams on the windward side of O‘ahu. The site is characterized by a deep channel that extends offshore, and a large stream delta that lies at the head of the stream where it enters the ocean. The region has a history of coastal erosion, and there are locations near the project site that show this. However, aerial photographic studies and beach profile studies indicate that the project site itself has been stable over the long term. The presence of the stream delta and the central location of the site in the local embayment probably contribute to the shoreline stability. Project structures will be located behind the present vegetation line and above the MHHW elevation, and are therefore not expected to adversely impact the shoreline. Removal of significant amounts of vegetation will be required for the project. Replacement of native trees and shrubs removed during construction is recommended. The nearshore region off the stream mouth is almost devoid of corals, and the intertidal region formed by the delta has low species diversity due to the widely fluctuating salinity. Impacts of the project on the nearshore environment are expected to be minimal, but will be even less if construction proceeds during dry summer months. Impacts to the estuary under the bridge will be short-term.

SOUTH PUNALU‘U BRIDGE COASTAL ASSESSMENT

1. INTRODUCTION

1.1 Project Location and General Description

The State of Hawai‘i Department of Transportation, Highways Division, proposes to replace South Punalu‘u Bridge (Bridge no. 9) on Kamehameha Highway (State of Hawai‘i DOT Project No. Br-083-1(42). The project site is located on the windward, or northeast, coast of the island of O‘ahu, north of, and adjacent to, Punalu‘u Beach Park. The bridge crosses Punalu‘u Stream, one of the major streams on the windward side of the island. The stream is also known as Waiōno Stream (see Clark, 1977). Figures 1 and 2 are a map and aerial photograph showing the project location and physical geographic features of the site.

The watershed of Punalu‘u Valley is large, comprising some 4,287 acres (Geographic Decision Sys. Int. & Dashiell, 1994). Punalu‘u Stream drains Punalu‘u Valley and is a continuously flowing, perennial stream given State ID No. 3-1-16. In the project area, Punalu‘u Stream forms a *muliwai,* or estuary, just behind the shore (Figure 4). Outflow from the stream appears to keep the *muliwai* open most of the time. There is a substantial deposit of sediment, or stream delta, composed of basalt cobbles, boulders, and sand off the stream mouth, and at times of low summer flow, a temporary sand barrier may form across the mouth of the stream *makai*, or seaward, of the highway bridge. The bridge carries Kamehameha Highway across the *muliwai* of the stream not far inland from the ocean. The *mauka* or inland side of the highway is occupied by private residences. The area comprising the banks of the stream is relatively small at the bridge, but expands somewhat upstream.

1.2 Proposed Action

The present bridge will be removed and replaced. The footprint of the final structure will be 19 feet wider than the existing bridge, with 13 feet of the expansion being on the *makai* side. A temporary bypass road and bridge will also be constructed on the *makai* side of the coastal highway. During construction, the temporary bypass road will take an additional 19 feet of space on the seaward side. Figure 3 shows the *makai* alignments of both the temporary by-pass road and the final structure.

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.

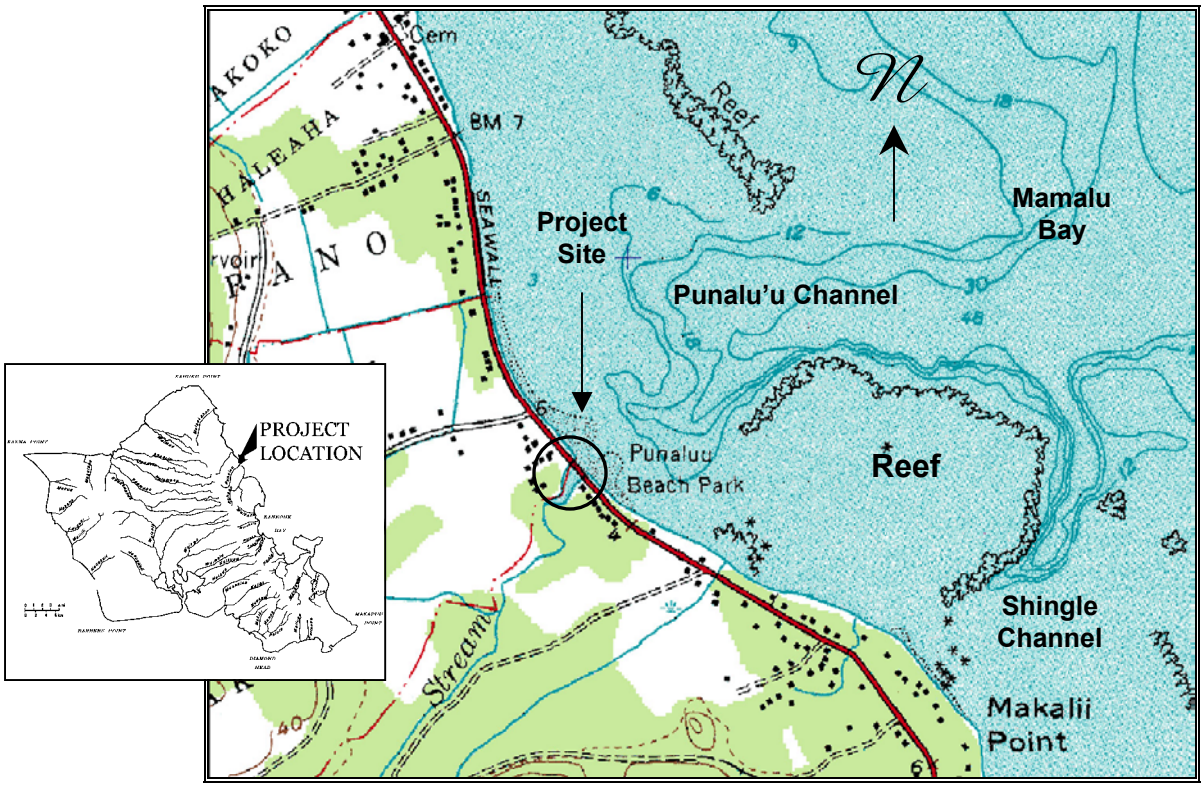
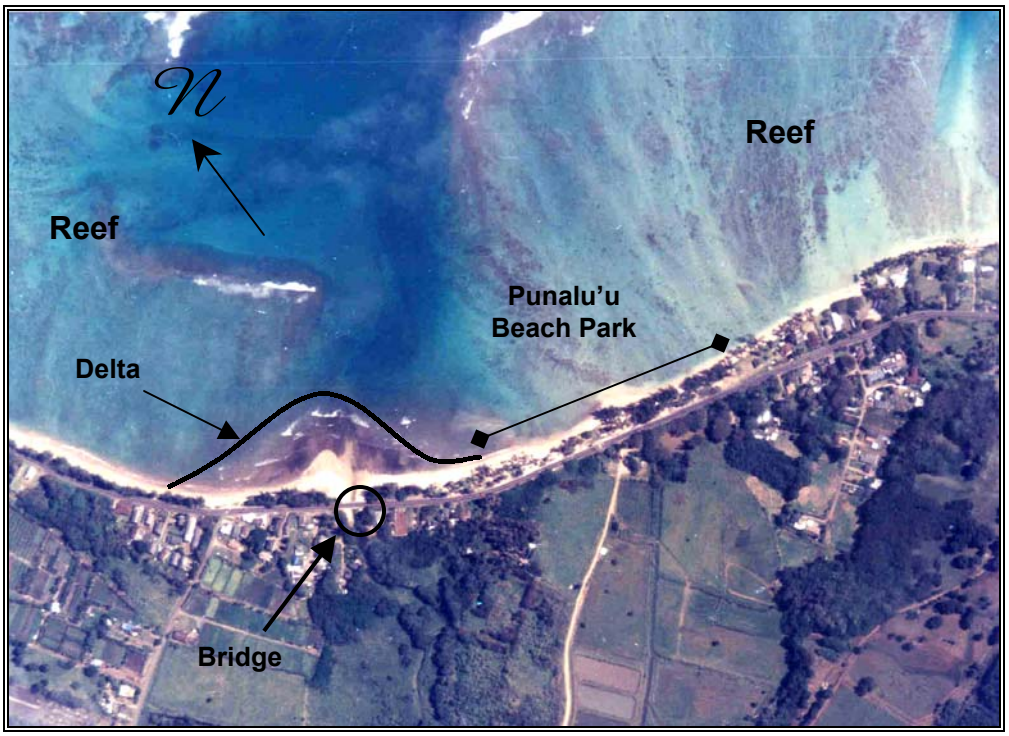
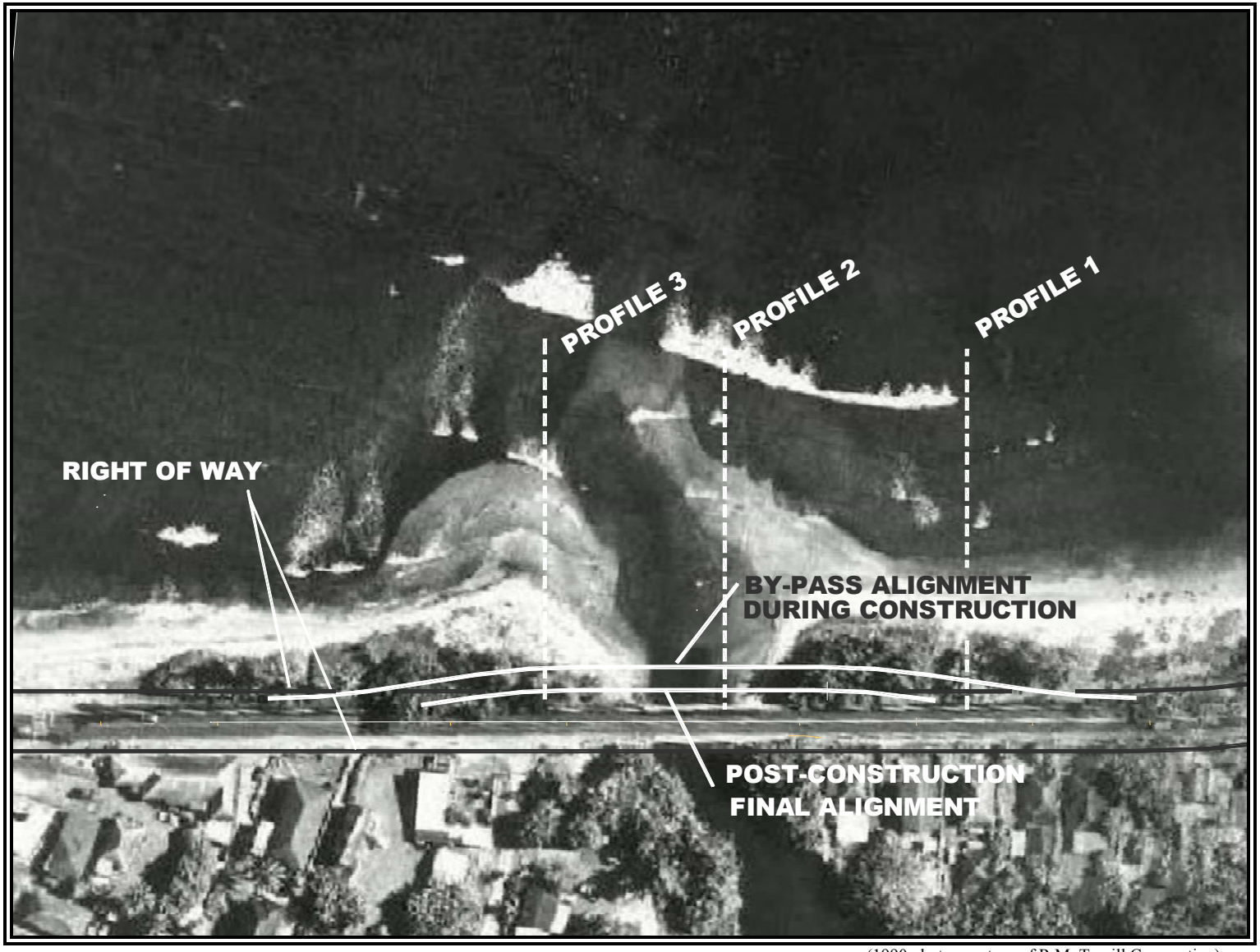


Figure 1. Project Location on O'ahu



(2000 photo courtesy of Air Survey Hawai'i, Inc.)

Figure 2. Aerial Photograph of the Project Site



(1990 photo courtesy of R.M. Towill Corporation)

Figure 3. Aerial Photograph Showing *Makai* Alignments and Profile Location

2. COASTAL ENVIRONMENTAL SETTING.

2.1 Bathymetry and Coastline

The project site is located on the windward shore of the island, directly exposed to tradewinds and tradewind-generated waves. It lies at the head of a shallow embayment of the coast, bounded by Makaliʻi Point to the southeast and Haleʻaha to the northwest. The region is characterized by substantial offshore fringing reefs. A unique feature of the area is a deep channel system incised into the offshore region by fluvial processes that occurred during ancient low sea level stands. The modern era has produced a large delta formation composed of basalt cobbles and boulders that lies at the mouth of the stream. The underwater outline of the delta can be seen in the aerial photograph, Figure 2. The channel is about 15 to 30 feet deep, while depths on the delta formation are shallow for several hundred feet, causing it to bare at low tide.

The region has a history of coastal erosion. The vegetated strip between the highway and the shoreline is narrow and there are no structures on the *makai* side of the highway in the vicinity of the bridge. There are several erosion "hot spots" in the area, where emergency shore protection has been placed to protect the highway. A 600-ft reach about 0.5 miles north of the project site was designated to receive an emergency shore protection revetment in 1995. However, construction of the project was delayed, and the revetment has yet to be built. Private properties near Makaliʻi Point, about 0.5 miles southeast of the project site, are protected by seawalls and have lost all the sand beach that previously existed in front of their homes.

2.2 Winds

The wind climate in Hawaiʻi is characterized by two distinct seasons, primarily defined by the annual variation in persistence of the northeast tradewinds. During the summer months around 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 Kāneʻohe 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). 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 gusts for the 2-year, 5-year, 10-year and 25-year events are 23.7, 29.9, 34.2 and 39.5 m/s, respectively. 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 Punalu'u 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 Hawai'i.

The Scripps Institution of Oceanography has a wave buoy deployed 4.5 miles southeast of Mōkapu Point, O'ahu 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 Kāneʻohe Bay MCAS

STATION : KĀNEʻOHE 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 Kāneʻohe Bay MCAS (Data Period: 1945 - 1995)

Month	Most Freq. Direction (Dir./ %)	Average Wind Speed (knts)	Maximum Peak Gust (knts)	Estimated Max. Speed (knts)	
				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 (Kāneʻohe Bay MCAS)

Return Period (years)	Peak Gust (knts)
2	46.0
5	58.1
10	66.4
25	76.8

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 Hawai‘i, they do occasionally pass near the islands. Notable recent examples are Hurricane Iwa, which passed within 30 miles of Kaua‘i in 1982, and Hurricane ‘Iniki, which passed directly over Kaua‘i 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 O‘ahu 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 O‘ahu Hurricane Vulnerability Study* (Sea Engineering, Inc., 1990) prepared for State of Hawai‘i 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 O‘ahu. 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.

Table 2.4 Annual Percent Frequency Distribution for Waves at the Mōkapu 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.

The Punalu‘u coast characteristically has broad fringing reefs, over 2000 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 such as the delta in front of the project site. Waves will tend to wrap around the delta and dissipate through the breaking process. In this way, the delta serves as excellent natural shore protection in the immediate vicinity of the bridge.

2.4 Tide and Water Level Rise

The tides in Hawai‘i are semi-diurnal with pronounced diurnal inequalities; that is, there are two tidal cycles per day with unequal water level ranges. *Tide Tables 2001,* based on tide data from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey (2000), shows that the mean tide range is 1.2 ft. and the diurnal range is 2.0 feet at Moku o‘Loe Island, Kāne‘ohe Bay, the nearest station to the Punalu‘u 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	-0.4
Mean Lower Low Water	0.0	-0.1

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 ʻIniki over Port Allen Harbor on the island of Kauaʻi, a National Weather Service tide gauge recorded a water level rise of 4.9 feet above the predicted tide elevation.

In the *Windward Oʻahu Hurricane Vulnerability Study* (SEI 1990), the maximum water level rise in the Punaluʻu 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.

As noted previously, 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 erosion and overtopping of the Kamehameha Highway to occur in "hot spot" areas because of both the increased wave height and increased accessibility of the shore to wave attack 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 at varying locations in Hawaiʻi ranging from 4 to 60 feet. The tsunami wave height at any given Hawaiʻi coastline location during a given occurrence varies greatly. 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 site are 12 feet for both the 1946 and the 1960 tsunamis (Loomis, 1976).

Tables and methods in the *Manual for Determining Tsunami Runup Profiles on Coastal Areas of Hawaiʻi* (M&E Pacific, Inc., 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 5.8 feet, and the 100-year height is 10 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 the Zone VE boundary to be approximately 400 feet inland from the mouth of the stream, with a base flood elevation of 8 ft. The Zone VE is a "Coastal High Hazard Area where wave action and/or high velocity water can cause structural damage in the 100-year flood," and is primarily identified as an area where a 3-foot or greater wave height could occur (FEMA, 1995). There is no record of bore formation in this area of Oʻahu, 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.

3. 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, directly exposed to tradewinds and tradewind-generated waves. On a regional scale, the shoreline faces northeast with the coast trending northwest. However, the bridge is at the head of a shallow embayment of the coast, so that the shoreline trends more east–west on the beach park side, and more north-south on the other side.

Bridge No. 9 crosses Punalu‘u 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. The most prominent part of the channel system, known as Mamalu Bay, is 1,000 feet wide and cuts obliquely across the fringing reefs in an east west direction (Figure 1). A dog-leg close to shore and to the project site is called the Punalu‘u Channel, which lies directly off the beach park. Another dog-leg, called Shingle Channel, branches from the main channel over 2,000 feet offshore.

The channel is bounded both north and south by extensive shallow fringing reefs that are over 2,000 feet in width. These offer protection from incident waves by forcing waves to break and dissipate energy far from the coastline. However, waves that are small enough not to break, and the reformed remnants of the larger waves, will propagate to the shoreline and play an important role in the sediment transport processes that can both build and erode the beach.

The Punalu‘u Stream has constructed a large shallow delta on the shoreline fronting the bridge. Primarily composed of basalt cobbles, the delta forms a bell-shaped reef that is about 400 feet across at the shoreline and extends out a maximum of approximately 300 feet from shore (Figure 2).

The beaches in the vicinity of the project site tend to be low and narrow. They are therefore susceptible to erosion from wind waves and swells that re-form across the reef. High water level conditions in particular will increase the wave size that can reach the shoreline and increase accessibility of the waves to higher portions of the beach.

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.

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. The opposite pattern will emerge for tradewind conditions. Because north swells and north winds are winter phenomena, the erosion and accretion patterns can be viewed as seasonal changes. Climate variations, i.e. - strength and duration of tradewinds, tradewind direction, frequency of north swells, frequency and intensity of north winds- can therefore be expected to play a major role in the configuration and stability of the shoreline.

3.2 Coastal Hazards History

The region has a history of coastal erosion. The vegetated strip between the highway and the shoreline is narrow and there are no structures on the *makai* side of the highway in the vicinity of the bridge. Figure 5, 500 feet north of the bridge, shows a threatened section of the highway with only a small berm preventing inundation. This section of road is probably over-topped during combined high wave and water level events. There are several erosion "hot spots" in the area where emergency shore protection rip-rap has been placed to protect the highway. The closest such spot is 1,700 feet northwest of the project site near Bridge No. 10. Further north, a 600-ft reach about 0.5 miles from the project site was designated to receive an emergency shore protection revetment in 1995.

Figure 4. *Muliwai* of Punalu‘u Stream
Looking Upstream from the Highway Bridge

Figure 5. Erosion “Hot Spot” 500 feet North of the Project Site

A previous study by Sea Engineering (SEI, 1989) quantified the shoreline changes in the region between 1949 and 1988 using changes in the vegetation line position as mapped from aerial photographs. The results showed periods of both accretion and erosion. The most recent trend at the project site at that time was 18 feet of accretion that occurred 350 feet northwest of the bridge. However, during the same time period (1975 to 1988), a transect southeast of the beach park, near Makali‘i Point, showed a loss of 58 feet.

A more recent study by SEI for a private homeowner updated the previous work to 2001 in the region west of the beach park toward Makali‘i Point. Between 1967 and 2001, the area experienced 75 feet of recession, for an average of 2.2 feet per year. The most recent data examined, between 1988 and 2001, were consistent with this trend. The rate of erosion slows to the west, with erosion on property adjacent to the park occurring at a rate of about one foot per year. The erosion continues for about 300 feet into the beach park to the west, where the data show a stable shoreline with slight accretion. However, the beach park has also had periods of erosion, and large basalt boulders on the beach at the park were initially placed there as *ad hoc* shore protection.

A recent comprehensive study of Hawaiian beaches conducted by the U.S. Geological Survey (Gibbs, *et al*, 2001) measured cross-shore profiles in the middle of Punalu‘u Beach Park between August 1994 and July 1999. Their results showed episodes of both accretion and erosion, with a variation in shoreline position of about 30 feet, and no apparent seasonal correlation.

The pattern that emerges from these studies is that the central part of the Punalu‘u embayment occupied by the project site appears to be stable over the long term. Reaches north and southeast of the project site appear to be experiencing a long-term erosion trend.

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. Three cross-shore profiles were measured in the vicinity of the bridge: one south of the bridge, one in the channel, and one north of the bridge (Figure 6). Profile locations are shown on Figure 3.

All three profiles show the flat offshore slope caused by the presence of the delta. Profiles 1 and 3 show typical beach profile features including the presence of the beach toe, and two beach berms at different levels. Profile 2 is a combination of both beach features and fluvial features. The lower beach berms on profiles 1 and 2 were caused by recent wave uprush, and the higher beach berms are relicts from more intense wave and storm conditions. Both berms are at higher elevations on the south side of the stream, indicating that more wave energy is reaching the south side than the north side.

The estimated *makai* alignments of the new road and the temporary by-pass road are plotted on the cross-sections, and are shown to be well behind the present vegetation line and above the MHHW (mean higher high water) elevation. The vegetation line is an indication of

shoreline position during extreme prevailing conditions such as a typical strong winter storm. In general, structures placed behind the vegetation line are removed from beach processes unless a low probability extreme event, such as a hurricane or unusually large north swell, causes major erosion or re-configuration of the beach. Also, if a shoreline is experiencing progressive erosion, the beach and vegetation line will retreat and back-shore structures may eventually be at risk.

All studies to date indicate that the shoreline near the bridge has been stable over the long term. However, shoreline escarpments on both sides of the bridge show signs of erosion. Figure 7 is a photograph of the erosion escarpment taken about 200 feet north of the bridge. The escarpment along this stretch is about 1.5 feet in height. Areas of bare soil and the escarpment steepness indicate recent formation. The escarpment was probably constructed by high north swell conditions over the previous winter.

South of the bridge (Figure 8), the escarpment at the vegetation line is about one foot in height and is less pronounced and fresh looking than the escarpment on the north side. These field observations, coupled with the long-term studies, show that the site is subject to short term fluctuations in the shoreline position, and that encroachment on the shoreline by permanent structures should be minimized.

Figure 9 is a panoramic photograph showing the stream outlet and delta formation. A plan view of the delta, with a characteristic bell-shaped curve outlined, is shown in the aerial photograph in Figure 2. Figure 10 is another view of the delta formation and the consequent wide intertidal zone. The delta is primarily composed of a matrix of basalt cobbles in-filled with sand. Cobble size increases somewhat in the offshore direction, and occasional small boulder-sized stones (up to 1.5 feet nominal diameter) can be seen when swimming offshore. These cobbles and boulders are stable, i.e. resistant to transport, in all but the most extreme wave conditions, and consequently act to stabilize this stretch of shoreline.

Drifts of sand occur in the channel and on both sides of the channel (Figures 2 and 3). They are highly variable in plan-form, and are the result of long-shore sand transport and migration into the channel, and subsequent redistribution due to fluvial processes. During periods of low stream flow the channel will fill with migrating sand, which will then be blown out by increased flow during periods of increased rainfall. This sand is predominately carbonate beach sand, with only a small fraction derived from terrigenous upland sources.

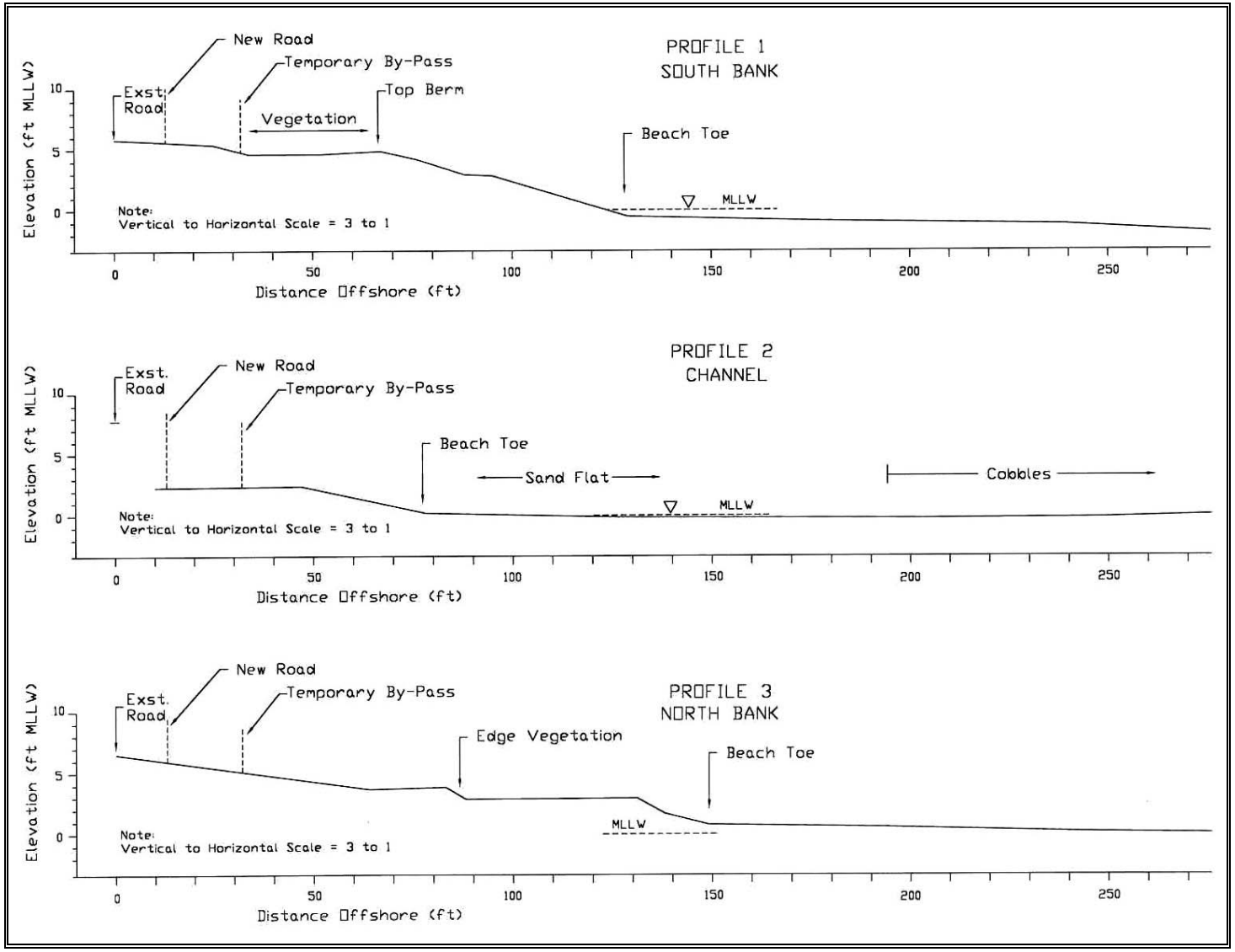


Figure 6. Beach Survey Profiles

Figure 7. Vegetation Line and Erosion Scarp, 200 feet North of the Bridge

Figure 8. Vegetation Line and Erosion Scarp South of the Bridge

Figure 9. Panorama of the Stream Outlet

Figure 10. Close-up View of the Stream Delta

3.4 Vegetation

A complete listing of plant species present and their relative abundances was generated during the field survey in April 2002 (see Table 3-1). Because of the small area and close proximity to the ocean where sandy soil and salty conditions tend to limit the number of species able to colonize, a relatively small number of species (37) were found. These are mostly non-native, weedy or ruderal species growing along the maintained edges of the highway (approximately 20 species, including "lawn" grasses). The narrow strip of sandy soil between the highway and the beach is characterized by ironwood trees (*Casuarina equisetifolia*), false *kamani* (*Terminalia catappa*), pandanus or *hala* (*Pandanus tectorius*), *naupaka* (*Scaevola sericea*), beach pea or *nanea* (*Vigna marina*), spider lily (*Crinum asiaticum*), and wedelia (*Wedelia trilobata*). Closer to and spreading onto the beach occur seashore rushgrass (*Sporobolus virginicus*) and beach morning-glory (*Ipomoea pes-caprae*).

It was noted during the survey that vehicles driving on the beach and grounds-keepers with weed-whackers and hand tools were damaging the native beach plants such as the *pohuehue*. These plants are important for shoreline stabilization and should be encouraged to flourish.

The riparian vegetation of the *muliwai*, essentially limited to stream banks upstream of the bridge, is dominated by *hau* (*Hibiscus tiliaceus*) and California grass (*Brachiaria mutica*) or, where recently disturbed, several of the ruderal species listed.

Of the 37 species of plants identified, 7 are considered native to the Hawaiian Islands (including several brought to Hawai‘i during early Polynesian migrations from elsewhere in the Pacific). The ratio of native to non-native species gives 19% as native. This value is high compared with more inland windward O`ahu locations (*AECOS* Consultants, 2002) and lowland O‘ahu sites generally where the original vegetation has been completely removed or greatly disturbed. Typically the value is between 6 and 12% native plant species. The high percentage of native species is due to the proximity of the project to the ocean shore, where more aggressive alien plants tend not to do as well as native strand plants. Note, however, that all are either Polynesian introductions or indigenous (found elsewhere in the Pacific) species.

Table 3.1 Checklist of Plants Found in the Vicinity of the Kamehameha Highway Bridge Over Punalu‘u Stream, Windward O‘ahu

Species	Common name	Status	ABUNDANCE
	FERNS		
POLYPODIACEAE			
Microsorium scolopendrium (Burm.) Copel	*laua`e*	nat.	R
	FLOWERING PLANTS		
	DICOTYLEDONES		
ASTERACEAE (COMPOSITAE)			
Bidens pilosa L.	Spanish needle	nat.	U
Emilia fosbergii Nicolson	Flora’s paintbrush	nat.	R
Sonchus oleraceus L.	*pualele*, sow thistle	nat.	R
Wedelia trilobata (L.) Hitchc.	Wedelia	nat.	C
CASUARINACEAE			
Casuarina equisetifolia L.	ironwood tree	nat.	A
COMBRETACEAE			
Terminalia catappa L.	false kamani	nat.	C
CONVOLVULACEAE			
Ipomoea pes-caprae (L.) R. Br.	*pohuehue*	**ind.**	C
EUPHORBIACEAE			
Ricinus communis L.	castor bean, *pa'aila*	nat.	R
FABACEAE			
Alysicarpus vaginalis (L.) DC	alysicarpus	nat.	R
Crotalaria sp.	rattlepod	nat.	R
Desmodium incanum DC	Spanish clover	nat.	O
Leucaena leucocephala (Lam.) deWit	*koa-haole*	nat.	R
Mimosa pudica L.	sensitive plant	nat.	R
Vigna marina (J. Burm.) Merr.	*nanea*, beach pea	**ind.**	O
GOODENIACEAE			
Scaevola sericea Vahl.	*naupaka kahakai*	**ind.**	C

Species	Common name	Status	ABUNDANCE	
MALVACEAE				
Hibiscus tiliaceus L.	*hau*	**pol.**	C	*
PLANTAGINACEAE				
Plantago lanceolata L.	narrow-leaved plantain	nat.	U	
Plantago major L.	common plantain	nat.	R	
PORTULACACEAE				
Portulaca oleracea L.	pig weed	ind.	U	
PRIMULACEAE				
Anagallis arvensis L.	scarlet pimpernel	nat.	O	
MONOCOTYLEDONES				
ARECACEAE				
Cocos nucifera	*niu*, coconut palm	**pol.**	C	
COMMELINACEAE				
Commelina diffusa L.	*honohono*	nat.	R	
CYPERACEAE				
Cyperus gracilis R. Br.	McCoy grass	nat.	U	
Kyllinga nemoralis (J.R.&G. Forster) Dandy ex Hutch.& Dalz.	*kili`o`opu*	nat.	R	
LILIACEAE				
Crinum asiaticum L.	spider lily	nat.	O	
PANDANACEAE				
Pandanus tectorius S. Parkison. ex Z	*hala*	**pol.**	A	
POACEAE (GRAMINEAE)				
Brachiaria mutica (Forssk.) Stapf	California grass	nat.	C	*
Cenchrus echinatus L.	sandbur	nat.	R	
Coix lachryma-jobi L.	Job's tears	nat.	R	
Cynodon dactylon (L.) Pers.	Bermuda grass	nat.	C	
Digitaria insularis (L.) Mez ex Ekman	sourgrass	nat.	R	
Eragrostis cf. *tenella* (L.) R & S	lovegrass	nat.	U	
Eleusine indica (L.) Gartn.	beach wiregrass	nat.	U	
Panicum maximum Jacq.	Guinea grass	nat.	U	
Sporobolus virginicus (L.) Kunth	seashore rushgrass	**ind.**	A	
Stenotaphrum secundatum (Walt.) Ktze.	buffalo grass	nat.	U	

Table 3.1 Legend:

Status = distributional status
- **end**. = endemic; native to Hawai'i and found naturally nowhere else.
- **ind**. = indigenous; native to Hawai'i, but not unique to the Hawaiian Islands.
- nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
- orn. = exotic, ornamental; plant not naturalized at this location (not well-established outside of cultivation).
- **pol**. = Polynesian introduction before 1778.

Abundance = occurrence ratings for plants
- 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.

✱ -- Plant is characteristic of site habitats, but found generally outside of project area in this survey.

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. However, Waiono or Punalu‘u Stream is ranked as "Outstanding" for resource value by the State (Hawai‘i Cooperative Park Service Unit, 1990), with several native aquatic species reported present or abundant in DLNR surveys: *‘o‘opu nakea* (*Awaous guamensis*), *‘o‘opu nopili* (*Sicypoterus stimpsoni*), and *hihiwai* (*Neritina granosa*). A survey of the *muliwai* revealed the following aquatic species: melanid snail (*Melanoides tuberculata*), unidentified tilapia (*Sarotherodon* cf. *melanotheron*), *aholehole* (*Kuhlia sandvicensis*), and *‘o‘opu nakea* (*Awaous guamensis*) as resident in the estuarine waters of Waiōno Stream.

Punalu‘u Beach Park harbors a population of *ohiki* or ghost crabs (*Ocypode ceratopthalmus*) on the beach. No corals are found close to shore, but the channel offshore provides habitats for a variety of fishes, hermatytpic corals and other marine invertebrate forms. The nearshore environment directly off the project site is characterized by an especially broad intertidal zone because of the stream mouth delta deposit. This deposit is depauperate in comparison with the nearshore area off the beach park because regular exposure and widely fluctuating salinity caused by the tides are limiting factors. Infaunal (living in burrows under the sediment surface) species are expected to be present. A number of different marine algal species occur on the inner reef flat, but macrothallic species (algae with large growth forms) show a sparse, scattered distribution. Algal abundance was reported to be substantial in the past (*AECOS*, 1979). A few coral heads (mostly *Pocillopora*) occur perhaps within 20 m (60 ft) off the stream mouth. Overall coverage by live coral is much less than 1% of the bottom for at least 100 m (330 ft) offshore of the *muliwai* in the project area (*AECOS*, 1979).

3.6 Water Quality

The waters of Punalu‘u Stream are diverted in numerous places upstream, so outflow is much reduced from former times (Clark, 1977; Timbol & Maciolek, 1978).

A series of basic water quality measurements were made on April 23, 2002 in the *muliwai* around the bridge to characterize this body of water. The results are summarized in Table 3.2. All measurements were made with a field instrument by wading out into the shallow *muliwai* and lowering a probe to about mid-depth. The measurements represent a series from the seaward (*makai*) side of the bridge to the landward (*mauka*) side and are arranged in Table 2 from *makai* most to *mauka* most.

Because this part of the stream is an estuary, where stream flow and coastal marine waters mix, all of the parameters measured can be expected to vary over time as the tide moves water in and out of the *muliwai* and as stream flow increases and decreases dependent upon rainfall in Punalu‘u Valley. The results for the morning of April 23, corresponding in time

with an ebbing tide approximately midway between lower low water (LLW) and lower high water (LHW) demonstrate a gradient of decreasing water temperature and salinity moving into the *muliwai* as expected. Note that salinity *makai* of the bridge is given in parts per thousand (ppt). From just seaward of the bridge inward, this parameter is measured as conductivity, a more sensitive measurement in waters of very little salt content. Note that where both salinity and conductivity were measured near the bridge, a salinity of 0.1 ppt corresponded to a conductivity reading of 178 μS. The next station *makai* (salinity also 0.1 ppt) gave a varying conductivity reading between 190 and 300 μS. The outermost salinity reading (3.6 ppt) represents water that is only about 1 part sea water and 9 parts fresh water. Thus, outflow from Punalu‘u Stream dominates the water quality over the shallow stream delta, but this situation certainly changes rapidly as high tide covers the area.

Table 3.2. Field measurements of basic water quality in the *muliwai* of Punalu‘u Stream measured on April 23, 2002.

TEMP	CONDUCTIVITY (μS)	DO (mg/l)	TIME (4/23)	DEPTH (M)	NOTES
23.0	3.6 ppt	8.42	11:05	0.30	16 m out from bridge at mid-channel
22.0	0.2 ppt	8.42	11:06	0.40	12 m out from bridge at mid-channel
22.0	0.1 ppt	8.42	11:08	0.60	6 m out from bridge at mid-channel
22.1	178 (0.1 ppt)	8.43	11:10	0.70	2 m out from bridge at mid-channel
					BRIDGE
22.4	187.4	8.14	10:47	<0.10	1 m upstream, off left bank just upstream of bridge structure
22.2	196	8.14	10:49	0.25	4 m upstream, 2.5 m off left bank
21.8	188	8.32	10:51	0.30	4 m upstream at mid-channel
21.8	182	8.32	10:52	0.40	5 m upstream at mid-channel

The dissolved oxygen (DO) readings are different on either side of the bridge and may represent spurious data (i.e., a calibration problem after the meter was moved to the *makai* side of the bridge) or complexities in the water masses that are mixing in this area. The values are high, representing oxygen saturations greater than 90%. Even the somewhat higher values measured *makai* of the bridge represent saturations close to 100%, and this suggests that they could well be valid numbers despite the disparity that appears between the inside and outside values.

A single sample was analyzed for a standard list of inorganic constituents by U.S. Geological Survey in 1999 (USGS, 2000). Collected from further up in the valley than the project site, the analyses did not reveal anything particularly unusual or troublesome with regard to water quality in Punalu‘u Stream.

4. POTENTIAL IMPACTS

4.1 Shoreline Impacts

Although the project site is in a region characterized by short term shoreline instability and localized erosion "hot spots," the presence of the large alluvial delta in front of the site, and its location at the head of the regional embayment, make the site the most stable stretch along that shoreline. There is a wide buffer zone between the new permanent bridge structure and the beach vegetation line. Both the new bridge and the temporary by-pass road will be located above the MHHW elevation.

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 wave action. This is unlikely to happen as the project shoreline has been shown to be stable in the long term since 1949.

4.2 Impacts on Biota

The number of plant species in the project area is 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. 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, 1986; Federal Register, 1999, 2001).

The bridge proposed for this site would be wider that the existing structure, and owing to the fact that the existing right-of-way on the *mauka* side is narrow and abuts residential properties, most of the new width will come out of the *makai* parcel. This will require the removal of ironwood, false *kamani*, and young coconut trees, as well as several mature *hala*. The larger plants on the parcel, particularly the coconut, *hala*, and false *kamani* comprise significant visual elements contributing to the view experienced by persons traveling north and south along Kamehameha Highway as well as users of the nearby beach park. Although perhaps only the coconut trees could be moved to another location, planning for the new structure should include replacement of the native trees and shrubs removed by construction.

Vegetation also contributes to shoreline stability. It is therefore good practice to encourage vegetation growth between the shoreline and the highway even in this case where a wide buffer zone exists.

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 around the construction area. If construction is scheduled for dry months (summer period) and the *muliwai* 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.

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APPENDIX G

Draft Environmental Assessment Comments and Responses

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
Email: oeqc@health.state.hi.us

February 21, 2003

Mr. Harry Kennedy
State of Hawai'i - Department of Transportation
601 Kamokila Boulevard, Room 602
Honolulu, Hawai'i 96707

Mr. Michael Nishimura
M & E Pacific, Inc.
1001 Bishop Street, Suite 500
Honolulu, Hawai'i 96813

Dear Messrs. Kennedy and Nishimura:

Having reviewed the draft environmental assessment (DEA) for the South Punalu'u Bridge Replacement, Tax Map Key 5-3-002, parcels 31 (portion), 39 (portion), and 5-3-004, parcel 1 (portion), in Ko'olauloa, the Office of Environmental Quality Control offers the following comments for your consideration and response in the final environmental assessment.

1. **ELABORATION OF ALTERNATE MAKAI ROUTE:** Please disclose in detail the physical and cultural impacts of the alternate temporary makai route being used, especially with respect to it being proximal to the certified shoreline, and in the conservation district (submerged lands).

2. **GUIDELINES FOR SUSTAINABLE BUILDING DESIGN IN HAWAI'I**: We ask that you consider implementing some of the techniques discussed in the enclosed guidelines for sustainable building design.

3. **USE OF RECYCLED GLASS**: To promote the use of recycled materials in-state as found in section 103D-407, Hawai'i Revised Statutes, we ask that you consider using materials with minimum recycled glass content in the design.

4. **INDIGENOUS AND POLYNESIAN INTRODUCED PLANTS FOR USE IN PUBLIC LANDSCAPING**: We ask that you consider the use of native, indigenous and polynesian introduced plants in your landscaping.

If you have any questions concerning this letter, please call Leslie Segundo, Environmental Health Specialist, at (808) 586-4185; alternatively, you may send electronic mail to him at lsegund@mail.health.state.hi.us. Thank you for the opportunity to comment.

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON

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-DS 2.6282

December 15, 2004

DEC 23 2004

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

FROM: RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: *DRAFT ENVIRONMENTAL ASSESSMENT (DEA) RESPONSE TO COMMENTS*
STATE OF HAWAI'I, DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION
KAMEHAMEHA HIGHWAY, REPLACEMENT OF SOUTH PUNALUU BRIDGE
FEDERAL AID PROJECT NO.: BR-083-1(42)
PUNALUU, KO'OLAULOA, O'AHU, HAWAI'I
Tax Map Keys 5-3-2: por. 31 & 39 and 5-3-4: por. 1

We would like to provide the following responses to the comments contained in your letter dated February 21, 2003.

Comment 1: *ELABORATION OF ALTERNATIVE MAKAI ROUTE: Please disclose in detail the physical and cultural impacts of the alternate temporary makai route being used, especially with respect to it being proximal to the certified shoreline, and in the conservation district (submerged lands).*

Response 1: The physical and cultural impacts of the alternate temporary makai route have been disclosed in Chapter 3 of the revised Environmental Assessment. This project is located within a State Land Use Designated Agricultural and Urban District. It is not within a Conservation District.

Comment 2: *GUIDELINES FOR SUSTAINABLE BUILDING DESIGN IN HAWAII: We ask that you consider implementing some of the techniques discussed in the enclosed guidelines for sustainable building design.*

Response 2: Several techniques discussed in the *Guidelines for Sustainable Building Design in Hawaii* have been implemented in the bridge replacement design. The pavement design utilizes recycled glass. A reusable prefabricated steel truss bridge has been proposed for the temporary detour bridge. Minimal disturbance of existing ground to preserve the site and ecosystem was implemented in the design. All disturbance areas will be restored to match the existing conditions or better.

Comment 3: *USE OF RECYCLED GLASS: To promote the use of recycled materials in-state as found in section 103D-407, Hawaii Revised Statutes, we ask that you consider using materials with minimum recycled glass content in the design.*

Response 3: Glassphalt concrete base course will be used in the pavement structure.

Comment 4: *INDIGENOUS AND POLYNESIAN INTRODUCED PLANTS FOR USE IN PUBLIC LANDSCAPING: We ask that you consider the use of native, indigenous and Polynesian introduced plants in your landscaping.*

Response 4: The landscaping will include native plants.

The final EA has been revised to reflect the responses to the comments as discussed above and will be published in the OEQC bulletin.

If there are any questions, please contact Mr. Vincent Llorin at 692-7568, Technical Design Services Office, Design Branch, Highways Division.

c: M & E Pacific, Inc. (Alan Y. Tomita)
FHWA (KaiNani Kraut)

APPENDIX H

FWS Endangered Species Act, Section 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

In Reply Refer To:
1-2-2005-I-007

NOV 19 2004

Vincent Llorin
State of Hawaii, Department of Transportation
Highways Division, Design Branch
601 Kamokila Boulevard, Room 688
Kapolei, Hawaii 96707

Dear Mr. Llorin:

Thank you for your request of October 1, 2004 for our concurrence under section 7 of the Endangered Species Act (Act) with your determination regarding the proposed replacement of South Punaluu Bridge in Punaluu, Oahu, Hawaii (Federal Aid Project Number BR-083-1(42)). 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 South Punaluu Bridge. We received your letter on October 7, 2004.

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 Eric A. VanderWerf, Hawaiian Bird Recovery Coordinator (phone: 808/792-9400; fax: 808/792-9580).

Sincerely,

for Gina M. Shultz
Acting Field Supervisor

TAKE PRIDE IN AMERICA