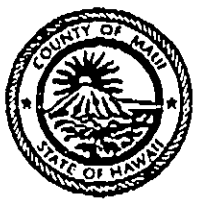
LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

January 2, 1997

Mr. Gary Gill
Director
STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 South Beretania Street, Room 702
Honolulu, HI 96813

SUBJECT: PAPA'AHAWAHAWA BRIDGE REPLACEMENT
FEDERAL AID PROJECT NO. BR-0900(49)
FINAL ENVIRONMENTAL ASSESSMENT
NEGATIVE DECLARATION
TMK: 1-5-06:1 AND 1-5-07:1
HANA, MAUI, HAWAII

Dear Mr. Gill:

We are pleased to submit herewith four (4) copies of the subject Final Environmental Assessment and Negative Declaration in compliance with Chapter 343 of the Hawaii Revised Statutes. The document includes a determination of no significant impact based upon the significance criteria set forth in Title 11 Chapter 200 of the Department of Health Hawaii Administrative Rules. Also enclosed is a completed OEQC Document Publication form. We ask that notice of this filing be published in the January 23, 1997 issue of your Environmental Notice.

Sincerely,

Charles Jencks
Director of Public Works and Waste Management

CY:mku(ED97-02)
G:\ENG\ALL\BR0900-49.OEQ

Enclosures

cc: Mr. Myron Okubo, Wilson Okamoto & Associates, Inc.

1997-01-23-MA-FEA-
Papaahawahawa Bridge
Replacement

Papaahawahawa Bridge Replacement
Final Environmental Assessment

Prepared for:

County of Maui Department of Public Works
and Waste Management

Prepared by:

Wilson Okamoto & Associates, Inc.

December 1996

Papaahawahawa Bridge Replacement

Final
Environmental Assessment
(Negative Declaration)

Prepared for:
County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Maui, 96793

Prepared by:
Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

December 1996

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I. INTRODUCTION

The County of Maui, Department of Public Works and Waste Management (DPWWM), administers a program to modify or replace functionally or structurally deficient bridges to achieve current standards for roadway widths and load capacities as specified by the American Association of State Highway and Transportation Officials (AASHTO) for Rural Collector Roads. The Papaahawahawa Bridge was among the bridges which were prioritized for improvement by the DPWWM for the current fiscal year.

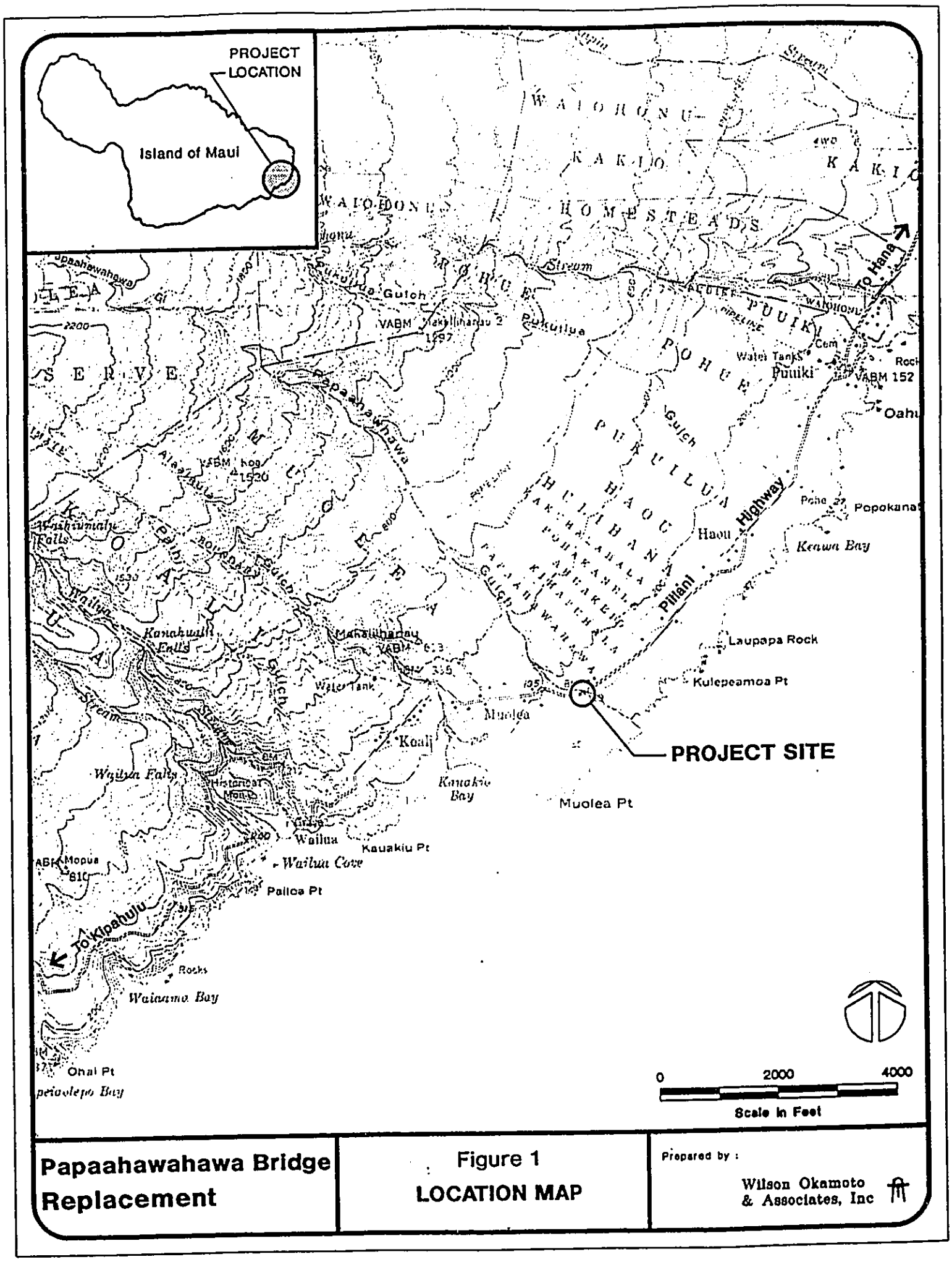
This Environmental Assessment was prepared to satisfy the requirements of Chapter 343, Hawaii Revised Statutes relative to the use of County funds for the replacement of Papaahawahawa Bridge. The proposed action is not anticipated to generate significant adverse impacts on the environment.

II. DESCRIPTION OF THE PROPOSED ACTION

A. Project Location

The Papaahawahawa Bridge carries Piilani Highway over Papaahawahawa Gulch in the Hana District of Maui (See Figure 1). Situated approximately 4 miles southwest of Hana Town, the bridge is located within Tax Map Key 1-5-06:01 and 1-5-07:01. Lands on either side of the bridge are owned by the Hanahuli Association. The surrounding vicinity is sparsely developed with single family residences, one of which is situated adjacent to the bridge's east approach embankment on Piilani Highway. More single family residences are also located about one-half mile west of the bridge along Piilani Highway.

Vehicular access to the project site is provided only by Piilani Highway, which is an extension of Hana Highway. Extending from the Hana Town to Kipahulu, Piilani Highway is a moderately traveled, narrow and winding roadway with numerous bridge crossings. The roadway varies in width from two lanes along



Papaahawahawa Bridge Replacement	Figure 1 **LOCATION MAP**	Prepared by : Wilson Okamoto & Associates, Inc

most stretches of the road, to one lane (carrying two-way traffic) at most bridge approaches, as with the Papaahawahawa Bridge. Piilani Highway at the approach to Papaahawahawa Bridge is a 17-foot wide, single-lane roadway with an asphalt concrete surface.

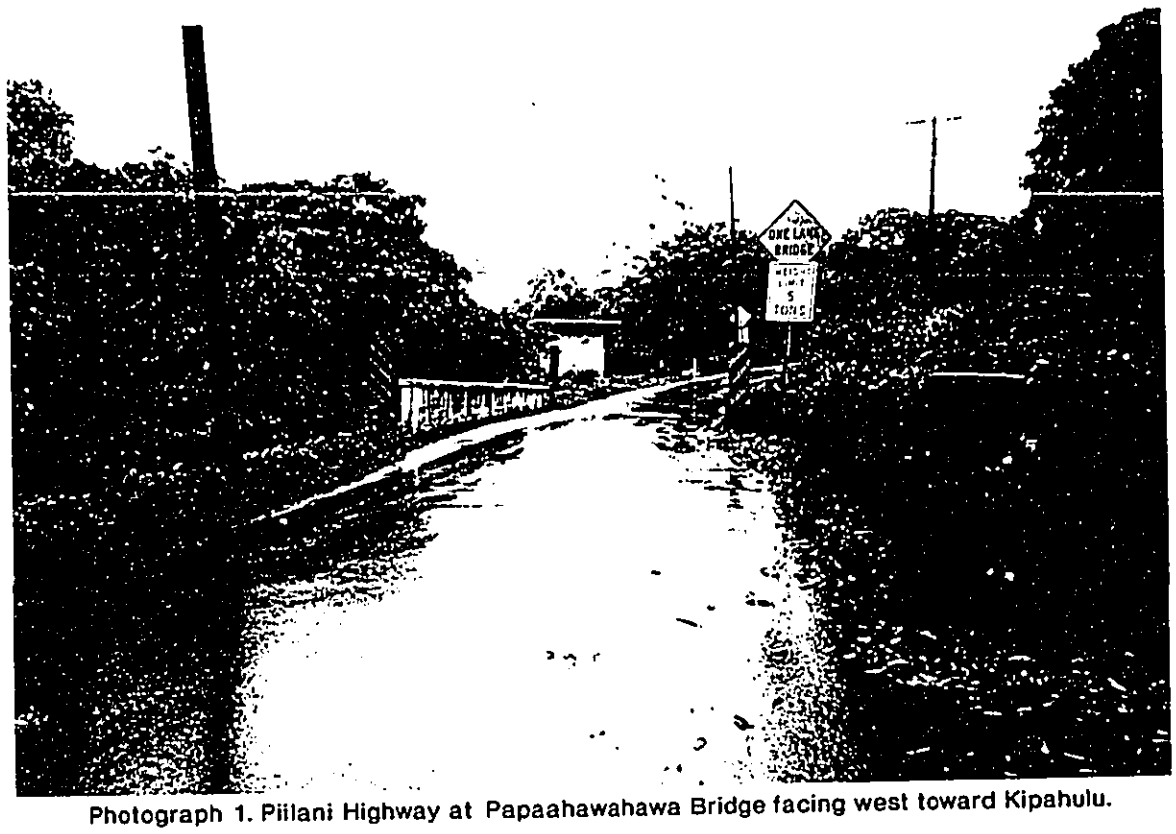
Constructed in 1915, the existing one-lane bridge structure measures 16 feet wide by 41 feet long, and has a posted weight limit of five tons. Currently, the bridge does not meet minimum strength requirements to accommodate non-geometric requirements for standard highway truck loads, or two lanes of traffic. The bridge is constructed of a concrete tee beam, concrete deck, concrete guardrails on either side, and is supported by concrete rubble masonry (CRM) abutments and a single concrete center support within Papaahawahawa Gulch (See Photographs 1 through 7).

Periodic bridge inspections are conducted by the DPWWM to assess the structural integrity of all county bridges. The latest inspection report for the Papaahawahawa Bridge was prepared in August 1995 (See Appendix A). The following summary is an excerpt from the report.

> "This bridge is in structurally poor condition. The structure is on a 12 month inspection cycle. The underside of the deck is severely spalled, but has increased at a slower rate than in the previous inspection cycle... A replacement structure is in the design stage, and this bridge will be monitored closely."

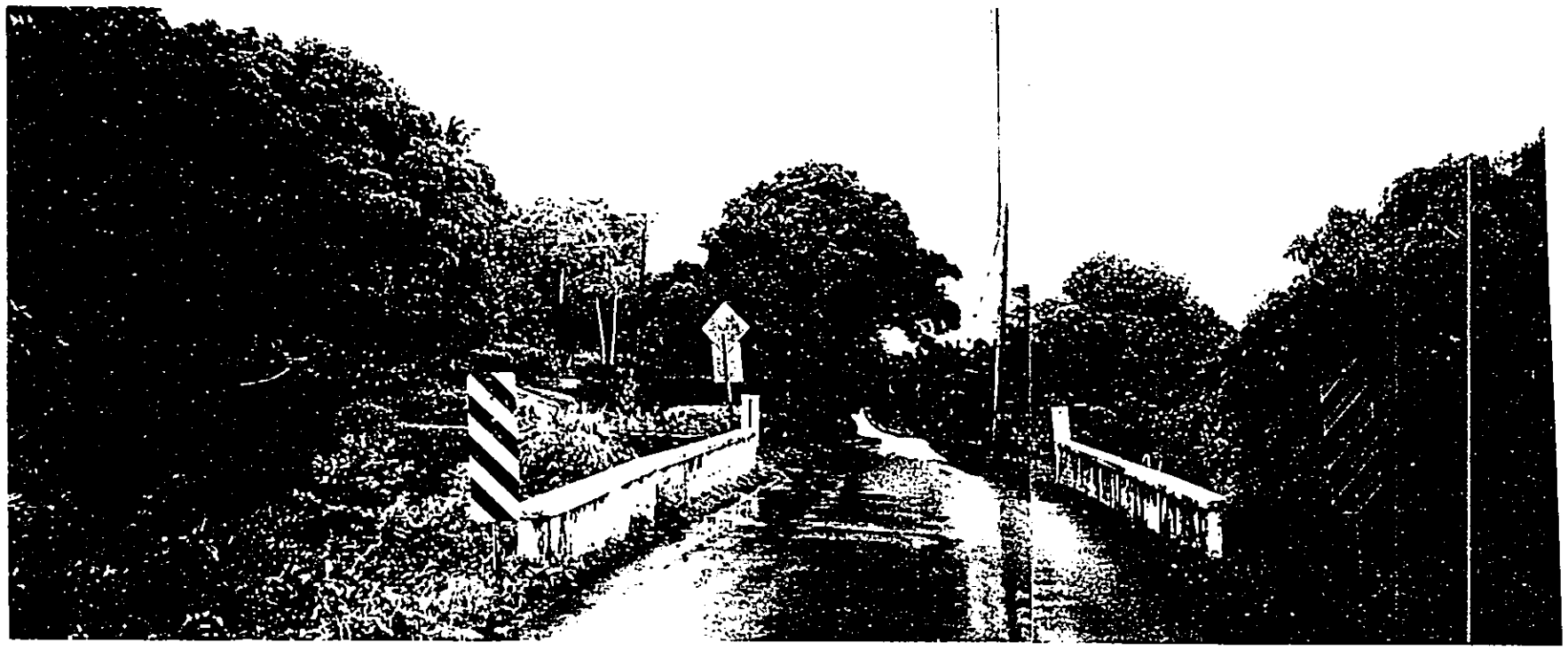
B. Project Description

Measuring approximately 35 feet wide by 40 feet long, the proposed replacement bridge will cross Papaahawahawa Gulch, makai of and adjacent to the existing bridge (See Figure 2). The new bridge will be comprised of a cast-in-place concrete deck supported by five precast, prestressed concrete girders, and

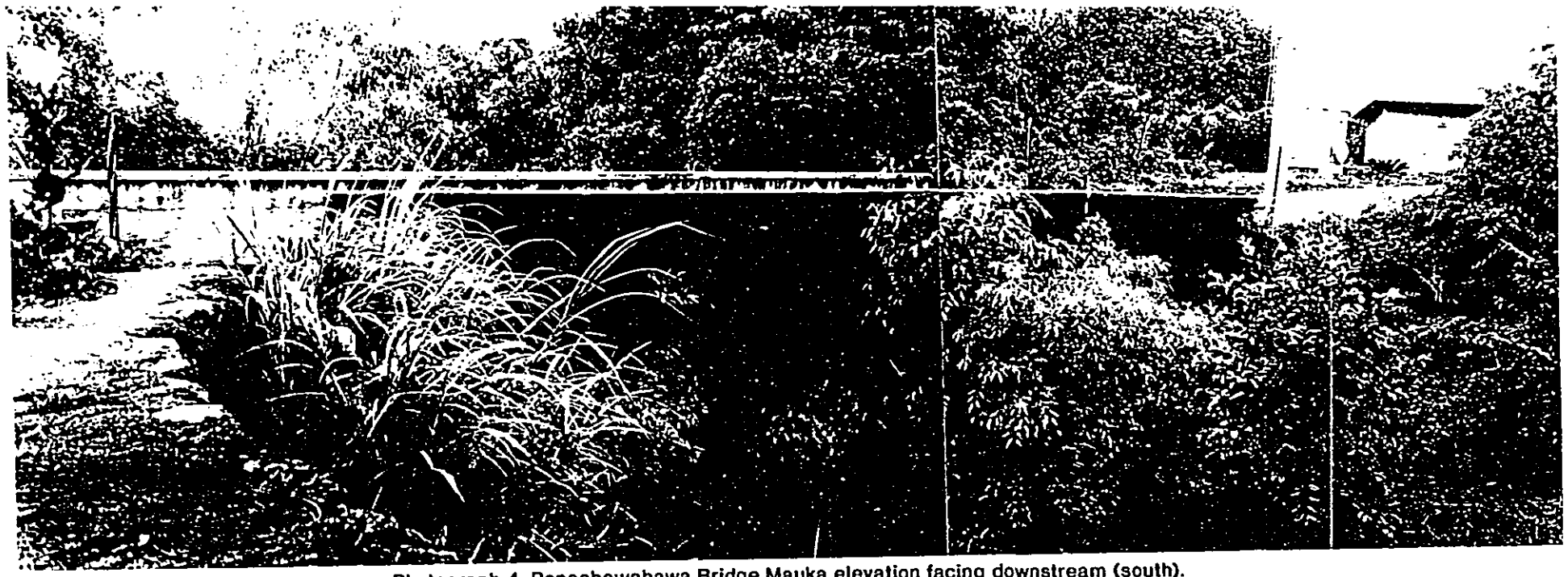


Photograph 1. Piilani Highway at Papaahawahawa Bridge facing west toward Kipahulu.

Photograph 2. Piilani Highway at Papaahawahawa Bridge facing east toward Hana.



Photograph 3. Papaahawahawa Bridge facing east towards Hana.

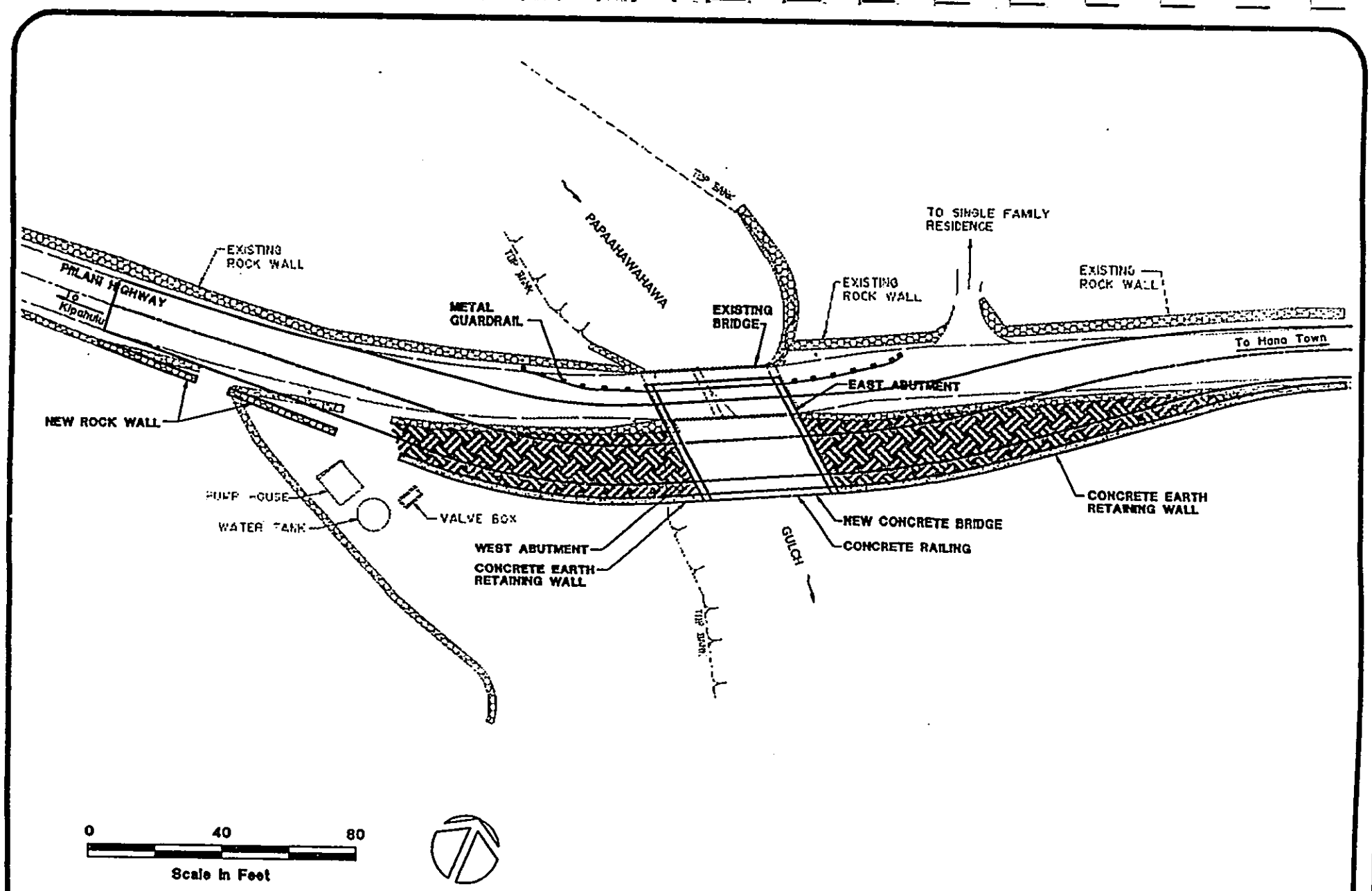


Photograph 4. Papaahawahawa Bridge Mauka elevation facing downstream (south).

Photograph 5. Papaahawahawa Bridge makai elevation facing upstream (north).

Photograph 6. Papaahawahawa Bridge mauka elevation facing downstream (south).

Photograph 7. Papaahawahawa Stream facing downstream from bridge.



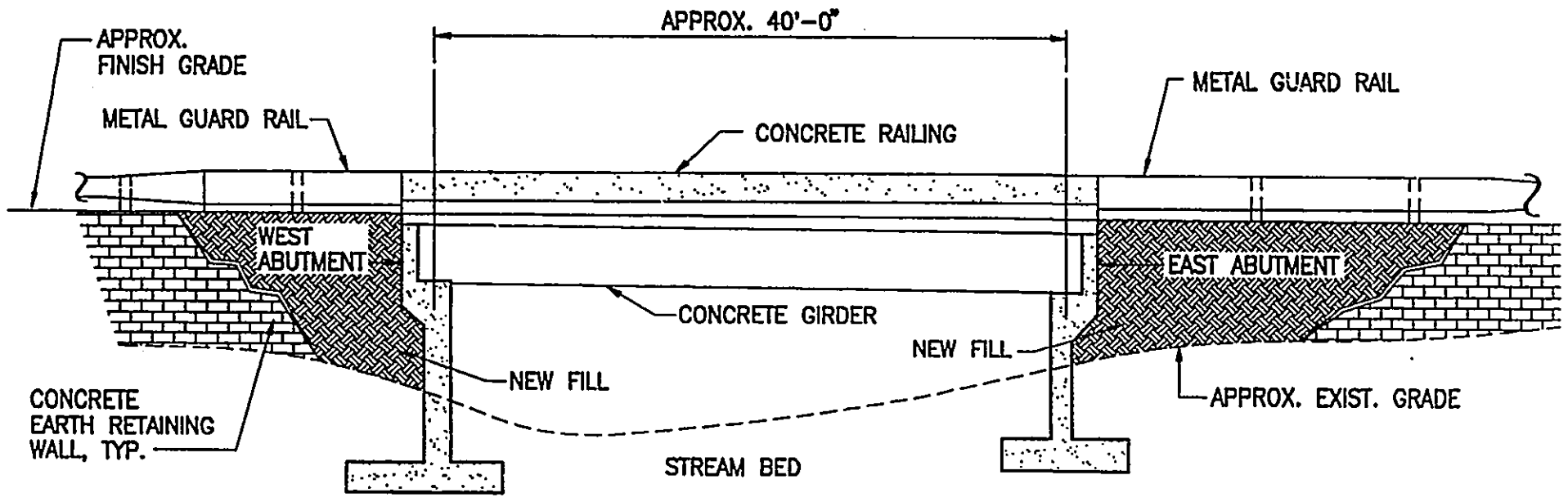
Papaahawahawa Bridge Replacement	**Figure 2** **Existing & Proposed Site Plan**	Prepared by : Wilson Okamoto & Associates, Inc

cast-in-place concrete abutments and spread footings. A new mechanically stabilized (MSE) earth retaining wall will also be constructed to support the grade difference along the downstream side of the approach embankments. Approximately 3-foot high concrete railings will flank either side of the bridge, while 3-foot metal guardrails will flank the approaches to the bridge (See Figure 3).

Construction will be completed in two phases. The first phase will involve construction of the makai (eastbound) lane and the MSE retaining wall. During this phase, the existing bridge will remain open to accommodate crossing vehicles. During the second phase of construction, the existing bridge, including its center concrete support, will be dismantled, while a portion of the bridge abutments will be abandoned in-place. Once the existing bridge is removed, its mauka (westbound) lane will be constructed. The present alignment of Piilani Highway to the old bridge will also be modified to account for the wider bridge. Vehicular access during phase two will be accommodated by the newly constructed eastbound lane.

Structural design of the bridge is based on the "Standard Specifications for Highway Bridges" 15th Edition, 1992, prepared by the American Association of State Highway and Transportation Officials (AASHTO) and State Department of Transportation (DOT) design criteria. Civil design specifications are in compliance with DOT Highways guidelines including 1986 Standard Plans and Hawaii Statewide Uniform Design Manual for Streets and Highways, 1980 Edition.

The preliminary cost estimate for this project is $1,015,000. The construction period is anticipated to span approximately nine months. Acquisition of a new roadway right-of-way easement will be required for the replacement bridge and roadway approaches.



0 10 20

Scale in Feet

Papaahawahawa Bridge Replacement

Figure 3

Proposed Longitudinal Section

Prepared by :

Wilson Okamoto & Associates, Inc

III. EXISTING ENVIRONMENT AND ANTICIPATED IMPACTS

A. Soils and Topography

In August 1995, a Geotechnical Site Reconnaissance Report was prepared by Fewell Geotechnical Engineering, Ltd. (FGE) for the bridge replacement project. Excerpts from the survey report are included herein, while the report in its entirety is reproduced as Appendix B.

Basalt is exposed throughout most of the streambed and along its banks as well as on the adjacent slopes on the downstream side of the bridge approach embankments. Numerous surface boulders overlie the basalt within the streambed. A thin soil mantle, approximately one foot thick, covers both stream banks with outcrops of massive basalt. The existing bridge approaches are probably underlain by up to five feet of fill over basalt.

Excavation of the surface, or near-surface basalt will be required to accommodate the bridge abutments and footings along the banks of the gulch. Due to the lower elevations on the downstream side of the stream, approach embankments measuring approximately 170 feet long by about 8 to 10 feet high will be required. Mechanically Stabilized Earth (MSE) retaining walls are proposed to support the grade differences along the downstream side of the approach embankments.

B. Hydrology and Water Quality

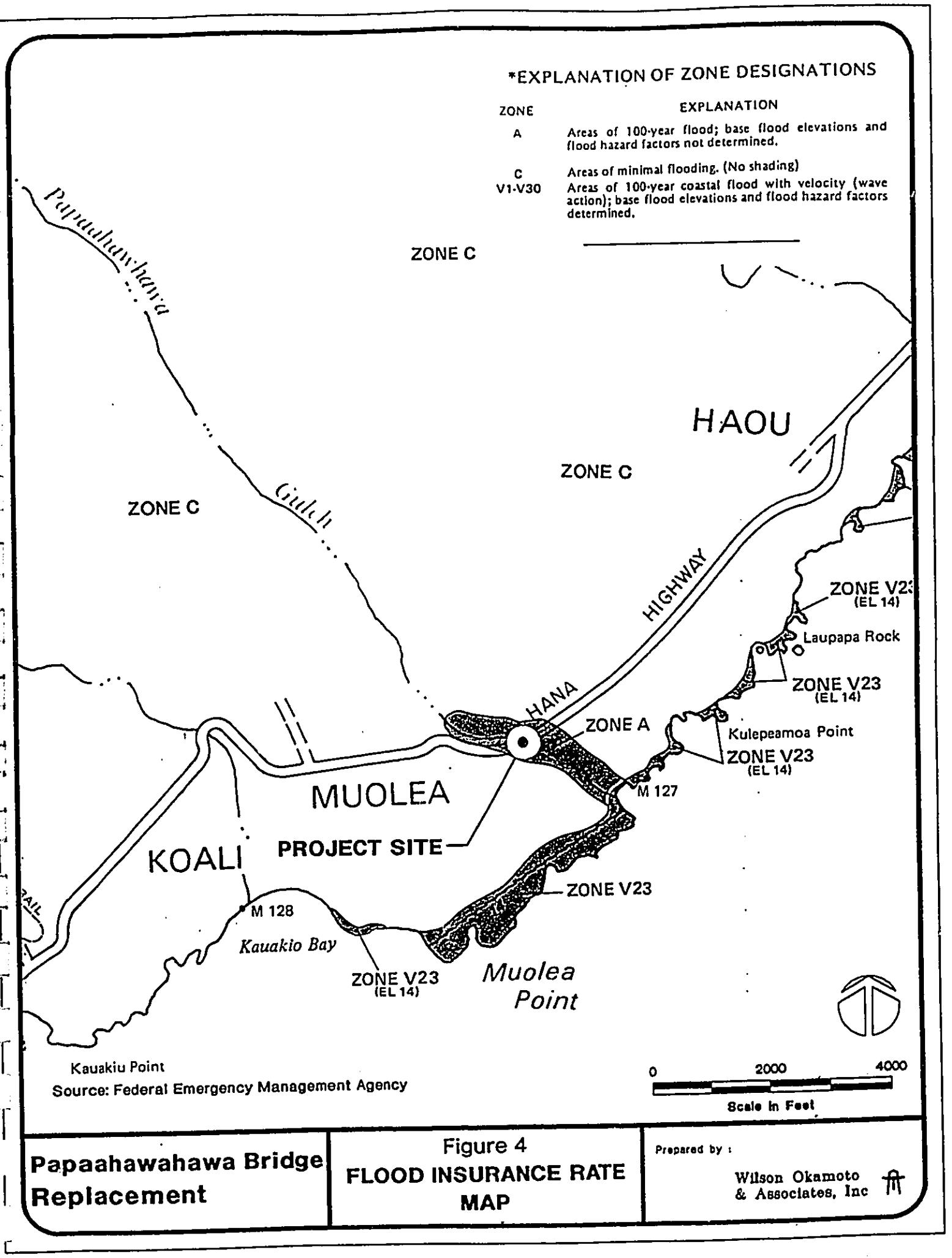
Papaahawahawa Gulch is the only surface water body in proximity to the project site. The gulch extends from approximately the 2,100-foot elevation to the coastline which is located approximately 1,000 feet from the project site. The stream is defined as intermittent by the U.S. Geological Survey maps.

The lower reach of Papaahawahawa Gulch where the project is located, flows only during freshets generated from high rainfall events. Depressions in the basalt surface of the streambed hold water arising from either infrequent freshets or local rainfall. There are many pools ranging in size from a few decimeters to one to two meters.

In conjunction with an Environmental Reconnaissance Survey prepared by AECOS, Inc. for the project, a water quality sample was taken at one location directly under the existing bridge for the purpose of characterizing stream water quality. Results of these samples showed no significant evidence of water quality problems. (See Appendix C).

It is anticipated that water quality impacts during the short-term construction-period will be minimal. Unlike the existing bridge structure, the proposed bridge structure does not require a center support system and footing. Therefore, construction will be confined to the stream bank area, and will not be required within the stream bed. This will minimize the potential for impacts to water quality. Since flows in the stream rarely occur, construction will likely be unaffected by storm-generated flows. Nevertheless, appropriate precautions will be taken to minimize water quality impacts in the event of a major storm.

According to the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency, the project lies within Zone A which is defined as an area of a 100-year flood, for which base flood elevations and flood hazard factors are not determined (See Figure 4). The new bridge is design to accommodate up to 100-year storm event and is not anticipated to adversely impact the hydrology of the stream.



Papaahawahawa Bridge Replacement	Figure 4 **FLOOD INSURANCE RATE MAP**	Prepared by : Wilson Okamoto & Associates, Inc

C. Flora and Aquatic Fauna

The Environmental Reconnaissance Survey conducted by AECOS, Inc. also included an assessment of flora and aquatic fauna resources occurring near the vicinity of the bridge. Excerpts from the survey report are included herein, while the report in its entirety is reproduced as Appendix C.

From the bridge toward the upslope direction, the stream bed cuts through a forest comprised of: guava (*Psidium guajava*), java plum (*Syzygium cumini*), kukui (*Aleurites moluccana*), African tulip (*Spathodea companulata*), mango (*Mangifera indica*), coffee (*Coffea arabica*), shoebutton ardesia (*Ardesia elliptica*), 'awapuhi ginger (*Zingiber zerumbet*), basket grass (*Oplismenus hirtellus*), and sweet potato vine (*Ipomoea batatas*). Several varieties of fern also grow on the larger trees beside the stream. Common weeds growing in cracks of the basalt stream bed in the vicinity of the bridge include niruri (*Phyllanthus debilis*), partridge pea (*Chamaecrista nictitans*), Guinea grass (*Panicum maximum*), and smut grass (*Sporobolis sp.*). A single specimen of primrose willow (*Ludwigia octovalvis*), a wetland plant, was observed in this area.

Downslope of the bridge, the stream bed widens into grassy slopes and thickets of Christmasberry (*Schinus terebinthifolius*) and lehua haole (*Calliandra emarginata*), and several species of grass and shrub.

Aquatic faunal species are limited to insects within the small pools of Papaahawahawa Gulch in the vicinity of the project. Most abundant in the area above the bridge are the common forest day mosquito (*Aedes albopictus*) or southern house mosquito (*C. quinquefasciatus*). Other pools upstream from the bridge were occupied by bee flies (*Syrphidae*) and water treaders (*Microvelia*). Water skimmers (*Pantala flavescens*) and lavendar dragonflies (*Family Libellulidae*) were also observed in the project vicinity. A single specimen of the endemic damselfly genus, *Megalagrion*, was briefly observed a short distance

upstream from the bridge, however, no damselfly naiads were observed in any of the pools examined. No mollusks, crustaceans, or aquatic vertebrates were observed around the lower reach of the gulch.

Complete lists of plant and aquatic animal species identified from the survey area are provided in Tables 2 and 3, respectively, of the report. No State or Federal proposed or listed threatened or endangered species of plant or animal were found in the project area.

No adverse impacts on aquatic resources are anticipated as a result of the proposed project. The gulch does not support native aquatic fauna in the project area, and the proposed new bridge structure will not impair migratory (amphidromous) habits of native aquatic biota in the event that any such populations exist in more pristine areas upstream of the project site. The replacement bridge will not have a center support and foundation within the stream, unlike the existing bridge.

D. Air Quality

With the exception of several residences and a water pumping station, no other development is located in the project vicinity. The sparsity of development and exposure to trade winds promote good air quality in the project area. The only identifiable source of pollution is the light volume of traffic using the bridge.

During the short-term construction period, occasional and minor emissions of fugitive dust, and exhaust emissions from construction equipment will insignificantly degrade air quality in the project vicinity. In the long-term, traffic volumes and associated exhaust emissions along the roadway is not anticipated to increase significantly as a result of the project. Moreover, with vehicles moving more freely over the widened bridge, exhaust emissions may decline, since vehicles will not be required to queue at either approach to the bridge.

E. Noise

In the rural setting of the project site, ambient noise levels are relatively low. The primary source of noise is from light vehicular traffic along Piilani Highway. During the short-term construction period, noise levels at the project site will temporarily increase as a result of construction equipment and activities. Noise-sensitive land uses in the immediate vicinity include the nearby residences. All equipment, however, shall be fitted with muffling devices to mitigate noise impacts. No long-term adverse noise impacts are anticipated.

F. Scenic and Visual Resources

Piilani Highway offers scenic views from many locations along its route. From the project area, however, ocean and mountain views are obscured by dense vegetation. The scenic quality of the area will not be significantly affected by the new bridge as it also is designed with a low profile comparable to that of the existing bridge.

G. Historical and Archaeological Resources

An archaeological assessment was prepared by Cultural Resources Hawaii in December 1995 (See Appendix D). The only archaeological/historic site encountered during the investigation was the existing bridge of Papaahawahawa, as listed in the 1990 Inventory of Historic Bridges for Maui and Molokai. The bridge is classified as a Category III (of three categories) bridge which is considered to have little significance.

No other archaeological sites were encountered in the vicinity of the existing bridge. Thus, the replacement of the bridge is not anticipated to have archaeological impacts. However, if, in the unlikely event that any

archaeological remains are encountered during construction, work will cease in that area and the State Historic Preservation Division (SHPD) will be contacted.

Prior to construction, the project will require approvals under Section 106 of the National Historic Preservation Act and Chapter 6E, Hawaii Revised Statutes for demolition of the existing bridge. The project is currently in the process of addressing these requirements with the SHPD.

Pursuant to consultations between the SHPD and DPWWM, three measures were agreed upon to mitigate the historic impact to the Papaahawahawa Bridge, including:

- Photographic documentation of the bridge which was conducted in accordance with the Historic American Buildings Survey and Historic American Engineering Record (HABS HAER) specifications set forth by the National Park Service;

- Bridge construction plans of Papaahawahawa Bridge which were reviewed and approved by the SHPD; and

- A preservation plan for County-owned bridges to be prepared prior to any subsequent replacement of a County bridge along Hana Highway. The DPWWM will work cooperatively with the SHPD toward preparing a preservation plan acceptable to both agencies. The plan will evaluate the treatment of all bridges along this highway that are within the County's jurisdiction as a whole by prioritizing bridges and thereby avoiding their piece-meal replacement.

Two of these measures, including photographic documentation of the bridge, and design review of the bridge construction plans, were conducted. Both the photographic documentation and design of the bridge were reviewed and approved by the SHPD.

IV. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

A. Existing State and County Designations

Pursuant to Chapter 205, Hawaii Revised Statutes (HRS), all lands in the State of Hawaii are classified into one of four land use designations: Urban, Rural, Agricultural, and Conservation. The Papaahawahawa Bridge is within the State Agricultural District.

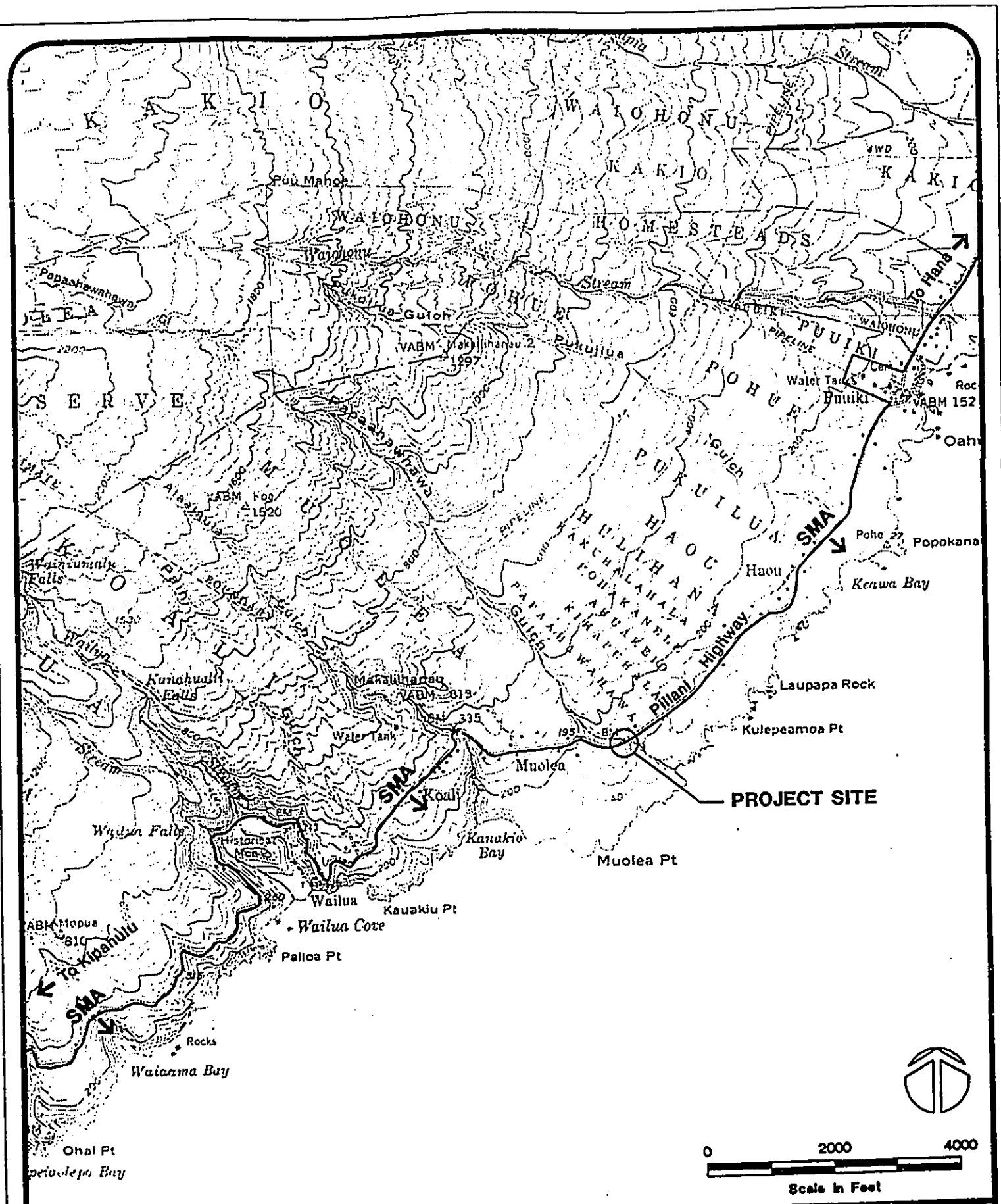
The Hana Community Plan is the primary decision making tool used by the County for implementing the County General Plan. According to the Hana Community Plan land use map the bridge is located within lands designated as Agriculture. The use of the site to improve the existing bridge is in accord with its designation. The proposed improvements will provide safer access over the Papaahawahawa Gulch to adjacent areas.

There is no county zoning in the area. The project is located within the Special Management Area, with the mauka boundary defined by Piilani Highway, as illustrated in Figure 5 (Consultation with County of Maui, Planning Department, July 26, 1995).

D. Required Permits and Approvals

1. Federal

A Department of the Army Nationwide Permit for Road Crossings is required under Section 404 of the Clean Water Act (Consultation with Corps of Engineers, August 8, 1995), as construction of the replacement bridge will require dredge and fill activities below the high water mark as defined by the Corps of Engineers. An application for a nationwide permit was submitted to the Corps of Engineers for their review and approval.



Papaahawahawa Bridge Replacement	Figure 5 **SPECIAL MANAGEMENT AREA BOUNDARY MAP**	Prepared by : Wilson Okamoto & Associates, Inc

According to the Federal Highway Administration, a Federal Environmental Assessment, administered under the National Environmental Policy Act, is not required as the project qualifies for a Categorical Exclusion under Code of Federal Regulation 23 Chapter 1 Part 771.117(d)(3).

2. State of Hawaii

A Stream Channel Alteration Permit (SCAP) is required for the project according to the Department of Land and Natural Resources Commission on Water Resource Management (Consultation with DLNR, July 27, 1995). Although no structure will be constructed within the stream bed, the SCAP is required as the concrete footings and abutments of the replacement bridge will alter the condition of the stream banks. A SCAP was approved for the project on July 23, 1996.

Pursuant to Section 401 of the Clean Water Act, a Water Quality Certification from the Department of Health is required in conjunction with the Department of the Army Nationwide Permit. The certification was approved for the project on September 19, 1996. In addition, a National Pollutant Discharge Elimination System (NPDES) general permit for construction dewatering activities is currently being process for the project.

An approval will also be sought for demolition of the existing bridge from the Department of Land and Natural Resources, State Historic Preservation Division under Section 106 of the National Historic Preservation Act, in conjunction with the Department of the Army Nationwide Permit, as well as funding requirements of the Federal Highways Administration. In addition, an approval will be required under Chapter 6E, Hawaii Revised Statutes in conjunction with the use of county

funds for implementation of the project. Both approvals are currently being coordinated with the Department of Land and Natural Resources State Historic Preservation Division.

V. ALTERNATIVES TO THE PROPOSED ACTION

A. No Action Alternative

Under the no action alternative, no new bridge replacement or repair would be pursued. Environmental impacts would be avoided, construction costs spared, and the need for permits precluded. The traffic will remain limited to the existing capacity of the one-lane bridge carrying two-way traffic. Resources will continue to be required for the inspection and regular maintenance of the bridge to maximize its useful life. In addition, future access to areas beyond the bridge would be restricted by the existing five-ton load limit. In the long-term, the bridge would continue to degrade, and in time, may need to be closed should it no longer provide safe vehicular support.

B. Alternative 1: Rehabilitate Existing Bridge

Rehabilitation of the existing bridge in its current location was considered. In this alternative the bridge would likely remain substandard with regard to minimum width and load capacity. Access would remain limited to a single lane carrying two-directional traffic. Additional supports and reinforcements could increase the load capacity of the bridge. However, in order to achieve standard load requirements, the bridge abutments would likely need replacement. On-going maintenance of the bridge would also be required to ensure its safety.

C. Alternative 2: Alternative Project Location

This alternative would involve construction of a detour road to provide permanent access over Papaahawahawa Gulch. The existing bridge would remain intact, to be used for vehicular access during the short-term construction period. The new bridge would circumvent the project site on the makai side of Piilani Highway. At the bridge approach, the road would detour from Piilani Highway and rejoin

it beyond the existing bridge. An advantage to this alternative is that the bridge could be constructed in its entirety without phasing to accommodate traffic during construction. In addition, vehicles would travel around the construction site rather that through it. This alternative was not viable, however, because approaches to the new bridge would require drivers to negotiate additional curves in order to cross the bridge. In the long-term, such road curvature could potentially create a safety hazard for motorists. This alternative would also be more expensive to construct than the proposed project.

D. Alternative 3: Construct Temporary Detour Bridge

This alternative is a variation of the proposed project. Instead of retaining the existing bridge for access during construction, a temporary crossing downstream of the construction site would be constructed first. Vehicles will be detoured to the temporary crossing while the existing bridge is demolished and the new bridge constructed. The advantages to this alternative are that phasing would not be necessary, and drivers would not be required to negotiate through an active construction area. This alternative was not selected, however, because it would require extensive filling of the gulch to construct the temporary detour road. In order to accommodate flows under the detour road, a 48-inch drain pipe would be required, although such a drain pipe would not be sufficient to accommodate a 100-year storm event. Therefore, construction would have been limited to the dry season to avoid the potential for creating a flood hazard and road washout in the event of heavy rainfall. This alternative would also be more expensive to construct than the preferred alternative.

VI. DETERMINATION

Based on this Environmental Assessment, it is anticipated that the project will not have a significant effect on the environment, as defined by Section 11-200-12, Hawaii Administrative Rules, Department of Health. An environmental impact statement is not anticipated to be prepared for this project.

The proposed project will not have any significant, long-term adverse impacts on the environment, since grubbing, grading, and construction for the road and bridge widening will be limited to the immediate project site. A replacement bridge built to current FHWA standards is needed to assure the safe movement of vehicles along Piilani Highway.

Pursuant to consultations between the SHPD and DPWWM, three measures were agreed upon to sufficiently mitigate the historic impact to the Papaahawahawa Bridge, including:

1. Photographic documentation of the bridge which was conducted in accordance with the Historic American Buildings Survey and Historic American Engineering Record (HABS HAER) specifications set forth by the National Park Service;

2. Bridge construction plans of Papaahawahawa Bridge which were reviewed and approved by the SHPD; and

3. A preservation plan for County-owned bridges to be prepared prior to any subsequent replacement of a County bridge along Hana Highway. The DPWWM will work cooperatively with the SHPD toward preparing a preservation plan acceptable to both agencies.

As aforementioned in Section III.G., two of these measures have been fulfilled by the DPWWM and accepted by the SHPD.

In all other areas of environmental concern, this environmental assessment indicates that the proposed project will not:

Affect any rare or endangered species of flora or fauna;

Result in significant impacts to the environment;

Negatively affect the economic or social welfare of the community;

Have detrimental effects on the public's health; and

Curtail beneficial uses of the environment.

Based on the preceding, it has been determined that the proposed project will not have any significant adverse effects on the environment and, accordingly, the need for an Environmental Impact Statement is not anticipated.

VII. PREPARERS OF THE ENVIRONMENTAL ASSESSMENT

Wilson Okamoto and Associates, Inc.

Myron Okubo, P.E.	Project Manager/Engineer of Record
Earl Matsukawa, AICP	Senior Planner
Brian Moon, P.E.	Structural Engineer
Sarie Uechi, P.E.	Structural Engineer
Laura Mau	Planner

AECOS, Inc.

Eric Guinther	Water Quality and Environmental Consultant

Cultural Surveys Hawaii

Hallett H. Hammatt, Ph.D.	Archaeology/Historic Sites
Brian Colin	Archaeologist
William Folk	Archaeologist

Fewell Geotechnical Engineering, Ltd.

Tim Cavanaugh, P.E.	Soils Engineer

R.T. Tanaka Engineers, Inc.

Kirk Tanaka, P.E.	Principal In Charge
Rogelio Hidalgo, P.E.	Project Engineer

VIII. LIST OF AGENCIES AND PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT

The following agencies were consulted during the pre-assessment phase of the Environmental Assessment:

Federal

Army Corps of Engineers

State of Hawaii

Department of Business, Economic Development and Tourism, Land Use Commission
Department of Health, Clean Water Branch
Department of Land and Natural Resources, Historic Preservation Division
Department of Land and Natural Resources, Water Resources Management Division

County of Maui

Department of Public Works and Waste Management
Planning Department

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Department of Land and Natural Resources, Water Resources Management Division

County of Maui

Department of Public Works and Waste Management
Planning Department

IX. LIST OF AGENCIES AND PARTIES COMMENTING ON THE DRAFT ENVIRONMENTAL ASSESSMENT

The agencies, organizations, and individuals listed below were sent copies of the Draft EA with a request for their comments on the project. Of those who formally replied, some had no comments while others provided substantive comments as indicated by the ✓ and ✓✓, respectively. All written comments and responses are reproduced herein.

Federal

✓✓ U.S. Army Corps of Engineers
✓ U.S. Department of Agriculture - Natural Resources Conservation Service
✓✓ U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of Transportation - Federal Highways Administration

State

✓ Department of Accounting and General Services
Department of Agriculture
✓ Department of Business, Economic Development and Tourism - Land Use Commission
✓ Department of Hawaiian Home Lands - Planning Office
✓✓ Department of Land and Natural Resources - State Historic Preservation Division
Department of Land and Natural Resources - Commission on Water Resource Management
✓✓ Department of Health - Environmental Management Branch
✓ Department of Transportation
✓✓ Office of Environmental Quality Control
Office of State Planning
✓ Office of Hawaiian Affairs
✓ University of Hawaii - Water Resources Research Center
University of Hawaii - Environmental Center

Maui County

✓✓ Board of Water Supply
✓ Department of Parks and Recreation
✓ Planning Department
Economic Development Agency

Other

✓ Maui Electric Company, Ltd.
Mr. Samuel Eason
Ms. Dolores Mai-Lou Etal.
Estate of Agnes Kaeka (Koali Ranch Inc.)
Hana Community Association
Hanahuli Association, Ltd. (c/o Cades Schutte Fleming & Wright, Attorneys at Law)
✓✓ Ms. Lisa Hamilton
✓✓ Mr. John Blumer-Buell

3350-01

50 f
File

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P. O. Box 50004
Honolulu, HI
96850-0001

February 6, 1996

Mr. Cary Yamashita, Assistant Division Chief
Department of Public Works and Waste Management
Engineering Division
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

Subject: Draft Environmental Assessment (DEA) - Papaahawahawa Bridge Replacement, Hana, Maui, HI

We have reviewed the above-mentioned document and have no comments to offer at this time.

We thank you for the opportunity to review this document.

Sincerely,

ACTING

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. Gary Gill, Office of Environmental Quality Control, State of Hawaii, 220 South King Street, 4th Floor, Honolulu, HI 96813
Mr. Earl Matsukawa, Project Planner, Wilson Okamoto & Associates, Inc., 1907 South Beretania Street, Suite 400, Honolulu, Hawaii 96826

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Kenneth M. Kaneshiro
State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96850-0001

Dear Mr. Kaneshiro:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 6, 1996 indicating that you have no comments regarding the project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

388

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT. SHAFTER, HAWAII 96858-5440

RECEIVED
COUNTY OF MAUI

REPLY TO
ATTENTION OF

February 7, 1996

'96 FEB 12 P2:33

Planning and Operations Division

ENGINEERING DIV.
DEPT. OF PUBLIC WORKS

Mr. Cary Yamashita
Assistant Division Chief
County of Maui
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Papaahawahawa Bridge Replacement Project, Hana, Maui (TMK 1-5-6: 1 and 1-5-7: 1). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act:

a. Based on a consultation meeting held on August 8, 1995, a DA permit will be required for the project. Please contact our Regulatory Section at 438-9258 for further information.

b. The flood hazard information provided on page 13 of the DEA is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning
and Operations Division

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Paul Mizue, P.E., Acting Chief
Planning and Operation Division
Department of the Army
Pacific Ocean Division, Corps of Engineers
Ft. Shafter, HI 96858-5440

Dear Mr. Mizue:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 7, 1996 commenting on the project. An application for Nationwide Permit for Roadway Crossings (Paragraph 14) was filed with your Regulatory Section on March 29, 1996. We appreciate your verification that the flood hazard information provided in the Draft EA is correct.

Your time and effort in reviewing the Draft EA are also appreciated.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3108
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

In Reply Refer To: MRL

FEB 15 1996

Ms. Cary Yamashita
Assistant Division Chief
County of Maui
Department of Public Works and Waste Management
Engineering Division
200 South High Street
Wailuku, HI 96793

Re: Papaahawahawa Bridge Replacement, Draft Environmental Assessment.

Dear Ms. Yamashita:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment for bridge replacement at Papaahawahawa Gulch. The project sponsor is the County of Maui Department of Public Works and Waste management. The purpose of the project is to replace the existing bridge that carries Piilani Highway over Papaahawahawa Gulch. The new bridge will be constructed makai of and adjacent to the existing bridge. The new bridge will consist of a cast-in-place concrete deck supported by five precast concrete girders and cast-in-place concrete abutments and spread footings. An earth retaining wall will be constructed to support the grade difference along the downstream side of the approach embankments. Once the new bridge is complete, the old bridge will be dismantled and removed, with only a portion of its abutments remaining in place.

Based on the information provided in the Draft Environmental Assessment for the project, we do not anticipate significant adverse impacts to fish and wildlife resources to result from the proposed project. However, the Service recommends that areas not in the immediate vicinity of the existing and new bridge remain in their natural states. The Service also recommends that areas where vegetation will be removed during construction be revegetated upon completion of the project and that the applicant contact the Natural Resources Conservation Service on Maui at 808/244-3729 for assistance in identifying suitable plants for erosion control. Finally, the Service is concerned that the proposed project may cause indirect adverse impacts to the water quality of Papaahawahawa Gulch and associated fish and wildlife resources and habitats. Therefore, the Service recommends that the following measures to minimize the degradation of water quality be incorporated into the permit conditions:

a. No construction materials should be stockpiled in the aquatic environment;

b. All construction-related materials should be placed or stored in ways to avoid or minimize disturbance to the aquatic environment;

c. All construction-related materials should be free of pollutants;

d. No contamination of the aquatic environment (from trash, debris disposal, etc.) should result from construction activities;

e. Dewatering of excavated materials should be done in a manner that will minimize the reintroduction of silt into the aquatic environment.

The Service appreciates the opportunity to comment. We look forward to seeing the final environmental assessment. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Michael Lusk at 808/541-3441.

Sincerely,

for Brooks Harper
Field Supervisor
Ecological Services

cc: DAR, Maui
DAR, Honolulu
DLNR, Honolulu
CZMP, Honolulu
OEQC, Honolulu
Wilson Okamoto & Associates, Honolulu

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS
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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Brooks Harper, Field Supervisor
Ecological Services
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3108
Honolulu, Hawaii 96813

Dear Mr. Harper:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 15, 1996 (Ref. MRL) indicating that you do not anticipate significant adverse impacts to fish and wildlife resources as a result of the project. Please be assured that areas not in the immediate proximity of the proposed bridge construction site will remain undisturbed. Areas which are disturbed during construction will be revegetated as soon as possible to mitigate erosion. We have forwarded a copy of your recommended permit conditions to the U.S. Army Corps of Engineers for their consideration in processing the Nationwide Permit which is required for the project.

We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
U.S. Army Corps of Engineers
County of Maui, Department of Public Works and Waste.Management

3358.01

MGO ✓
SO
LM

University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

24 January 1996

County of Maui
Department of Public Works and Waste Management
Engineering Division
200 South High Street
Wailuku, Hawaii 96793

Attn: Cary Yamashita, Asst. Division Chief

Gentlemen:

SUBJECT: Papaahawahawa Bridge Replacement Draft Environmental Assessment

We have reviewed the subject Draft Environmental Assessment and have no comments to offer at this time.

Thank you for the opportunity to testify.

Sincerely,

Roger S. Fujioka,
Director, WRRC

RSF:jmn

cc: Office of Environmental Quality Control
Wilson Okamoto & Assoc., Inc. ✓

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Roger S. Fujioka, Ph.D., Director
Water Resources Research Center
University of Hawaii
2540 Dole Street
Holmes Hall, Room 283
Honolulu, HI 96822

Dear Dr. Fujioka:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of January 24, 1996 indicating that you have no comments regarding the project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

3358-01

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

January 26, 1996

Mr. Charles Jencks, Director
County of Maui
Department of Public Works and
Waste Management
Engineering Division
200 South High Street
Wailuku, Hawaii 96793

Attn.: Cary Yamashita, Asst. Division Chief

Dear Mr. Jencks:

Subject: Papaahawahawa Bridge Replacement - Draft Environmental Assessment

The Department of Business, Economic Development & Tourism has referred the subject Draft Environmental Assessment (DEA) to our office for review.

We have reviewed the subject DEA and confirm that the project site, identified as TMK: 1-5-06: por. 1 and 1-5-07: por. 1, is within the State Land Use Agricultural District.

We have no further comments to offer at this time.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: OEQC
Mr. Earl Matsukawa
DBEDT (Dir. Ref. No. 96-212-J)

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Ms. Esther Ueda, Executive Officer
Land Use Commission
Department of Business, Economic Development and Tourism
P.O. Box 2359
Honolulu, HI 96804-2359

Dear Ms. Ueda:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of January 26, 1996 (Dir. Ref. No. 96-212-J) verifying that the project site comprised by TMK parcels 1-5-6:1 (por.) and 1-5-7:1 (por.) is within the State Land Use Agricultural District.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

336

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

January 30, 1996

Mr. Cary Yamashita, Assistant Division Chief
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

We wish to submit for your response (required by Section 343-5(b), Hawaii Revised Statutes) the following comments on a draft environmental assessment for the Papahawahawa Bridge Replacement prepared by Wilson Okamoto & Associates, January 1996. Notice of this draft environmental assessment was published in the January 23, 1996, edition of the *Environmental Notice*.

1. The increase from one to two lanes will increase the carrying capacity of the bridge, thus leading to increased traffic. Please discuss in the final environmental assessment the secondary or indirect impacts (i.e., increased population density, possible urbanization as a result of increased population, etc.) resulting from this increase in capacity.

2. We understand that some streams on East Maui contribute to a ditch system. Please indicate whether the Papahawahawa Stream was a perennial stream at one time and whether its waters contribute to a ditch system. If in the future, water is restored to the Papahawahawa Stream, please indicate what effects such restoration may have on the proposed bridge.

3. Please discuss the alternative of constructing the bridge without encroaching on the stream itself.

If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist, toll-free at 1-800-468-4644, extension 64185.

Sincerely,

GARY GILL
Director

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Gary Gill, Director
State of Hawaii
Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, HI 96813

Dear Mr. Gill:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of January 30, 1996 commenting on the subject project. The following responses are offered in the respective order of your comments:

1. The proposed project will increase the width of the bridge from one to two lanes, however, this will not result in increased traffic. Traffic volume is a function of demand created by destination. The proposed bridge will not generate traffic. To some degree there may be a latent demand if roadway capacity impinges on the realization of this demand. Roadway capacity along Hana Highway is not determined solely by the capacity of this bridge. There are a number of other bridges and miles of intervening roadway. Further, the proposed project will not increase population density or urbanization of the area, which are driven by the provision of additional housing and development resources.

2. Papaahawahawa Stream is located in southeast Maui where extensive diversions of streams for agriculture have not occurred. Some streams in this area may include small diversions for drinking water and stock watering supplied to ranches (the primary agricultural activity in the region). However, we are unaware of any diversions of Papaahawahawa Stream and do not believe the stream was perennial in the historic past.

3. An alternate bridge design which would avoid the stream banks entirely would require an increase in the length of the bridge. To accommodate such an extended span, larger support girders and abutments, complex geometric bridge constraints (due to the road curvature and bridge alignment), and a grade change on the roadway approaches to access a higher bridge deck would be required. These additional requirements would make the bridge access prohibitively expensive to construct. The current bridge design offers a cost-effective structure which addresses hydrology and safety requirements.

WILSON
OKAMOTO
& ASSOCIATES, INC.

We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: County of Maui, Department of Public Works and Waste Management

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

3358.01 EM — MGP ✓

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

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

Do

LM

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

February 9, 1996

The Honorable Charles Jencks
Director
County of Maui
Department of Public Works and
Waste Management
Engineering Division
200 South High Street
Wailuku, Hawaii 96793

Attention: Cary Yamashita, Assistant Chief Engineer

Dear Mr. Jencks:

Subject: Papaahawahawa Bridge Replacement
Draft Environmental Assessment
(Negative Declaration Anticipated)
Tax Map Keys: 1-5-06:01 (por)
1-5-07:01 (por)
Hana, Maui, Hawaii

The proposed bridge replacement will have no adverse impacts upon the programs or projects of the Department of Hawaiian Home Lands.

Based upon information provided in the subject report, we have no objections to a Negative Declaration for the project.

If you have any questions, please call Joe Chu of our Planning Office at 586-3838.

Warmest aloha,

Kali Watson

Kali Watson, Chairman
Hawaiian Homes Commission

c: OEQC
Wilson Okamoto & Associates, Inc.

3906L13

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-02
August 19, 1996

Mr. Kali Watson, Chairman
Hawaiian Homes Commission
Department of Hawaiian Home Lands
P.O. Box 1879
Honolulu, HI 96805

Dear Mr. Watson:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 9, 1996 (Ref. 3906L13) commenting that the project will not impact DHHL programs or projects, and that you have no objections to a Negative Declaration being filed for the subject project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

3357-01

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

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

IN REPLY REFER TO:

HWY-PS
2.9104

FEB 13 1996

RECEIVED
FEB 22 1996
WILSON OKAMOTO & ASSOC., INC.

Mr. Cary Yamashita
Assistant Division Chief
Engineering Division
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

Subject: Papaahawahawa Bridge Replacement, Draft Environmental Assessment, Hana, Maui, Hawaii; TMK: 1-5-06: 01 and 1-5-07: 01

Thank you for requesting our review of the subject document.

Replacement of Papaahawahawa Bridge may require approval from the State Historic Preservation Division. The project will not impact our State highway system.

Very truly yours,

~~KAZU~~ HAYASHIDA
Director of Transportation

c: Office of Environmental Quality Control
State of Hawaii
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

✓Wilson Okamoto & Associates, Inc.
1907 South King Street, Suite 400
Honolulu, Hawaii 96826

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Dear Mr. Hayashida:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 13, 1996 (Ref. HWY-PS 2.9104) commenting that the project will not impact State highway facilities. We concur that the project is subject to permit approvals from the Department of Land and Natural Resources, State Historic Preservation Division. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

3358-01 MLC EM LM SO MF

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

February 16, 1996

96-017/epo

County of Maui
Department of Public Works
and Waste Management
Engineering Division
200 South High Street
Wailuku, Maui, Hawaii 96793

ATTENTION: Gary Yamashita
Assistant Division Chief

Dear Mr. Yamashita:

Subject: Draft Environmental Assessment
Papaahawahawa Bridge Replacement
Hana, Maui, Hawaii
TMK: 1-5-06:01 (por.) and 1-5-07:01 (por.)

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Water Pollution

A National Pollutant Discharge Elimination System (NPDES) permit is required for any discharge to waters of the State including the following:

1. Storm water discharges relating to construction activities for projects equal to or greater than five acres;

2. Storm water discharges from industrial activities;

3. Construction dewatering activities;

4. Cooling water discharges less than one million gallons;

5. Ground water remediation activities; and

6. Hydrotesting water.

Any person wishing to be covered by the NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 90 days prior to commencement of any discharge to waters of the State.

Any questions regarding this matter should be directed to Mr. Denis Lau of the Clean Water Branch at 586-4309.

Polluted Runoff Control

Proper planning, design, and use of erosion control measures and management practices will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from nonpoint source pollution. The following measures are suggested steps that can be taken to minimize erosion during construction:

1. Conduct grubbing and grading activities during the low rainfall months.

2. Replant or cover bare areas as soon as grading or construction is completed. New plantings will require soil amendments, fertilizers, and temporary irrigation to become established. Use high planting and/or seeding rates to ensure rapid stand establishment.

3. Properly dispose of sediment and debris from construction activities.

4. Minimize amount of construction time spent in the stream beds.

If you should have any questions on this matter, please contact Mr. Randall Rush of the Environmental Planning Office at 586-7550.

Sincerely,

Lawrence Miike
Director of Health

c: OEQC
Wilson Okamoto & Associates

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
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FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Lawrence Miike, Director
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, HI 96801

Dear Mr. Miike:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 16, 1996 (Ref. 96-017/epo) commenting on the subject project. We appreciate the information you provided regarding the National Pollutant Discharge Elimination System (NPDES) permit requirements, and have submitted our application for Construction Dewatering Activities for your review. Your recommended runoff control measures will be implemented to the extent practicable during project construction. For your information, a Best Management Practices Plan and water quality monitoring plan were submitted to your office for review in conjunction with an application for Water Quality Certification.

We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

461

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

February 16, 1996

County of Maui
Attn: Gary Yamashita
Dept. of Public Works and Waste Management
Engineering Division
200 South High Street
Wailuku, HI 96793

Dear Mr. Yamashita:

Thank you for the opportunity to review the Draft Environmental Assessment for the Papaahawahawa Bridge Replacement, Maui County, Hawaii. The Papaahawahawa bridge carries Piilani highway over Papaahawahawa gulch in the Hana District.

After a careful review of the plan and supporting documentation, the Office of Hawaiian Affairs (OHA) has no objections to the proposed bridge replacement. Furthermore, OHA acknowledges the efforts of the preparers to address and develop measures to mitigate potential impacts if any on water quality, flora and fauna, and historical and archaeological resources. Please contact me, or Linda K. Delaney, the Land and Natural Resources Division Officer (594-1938), or Luis A. Manrique (594-1935), should you have any questions on this matter.

Sincerely yours,

Linda M. Colburn
Administrator

LM:lm

3358-01
August 19, 1996

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
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PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

Ms. Linda M. Colburn, Administrator
State of Hawaii
Office Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, HI 96813-5249

Dear Ms. Colburn:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 16, 1996 indicating that you have no objections to the subject project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

IV-40

3358-01

(P)1125.6

FEB 20 1996

RECEIVED
FEB 22 1996
WILSON OKAMOTO & ASSOC., INC.

Engineering Division
Department of Public Works
and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Attention: Mr. Cary Yamashita
Assistant Division Chief

Gentlemen:

Subject: Papaahawahawa Bridge Replacement
Hana, Maui, Hawaii
Draft Environmental Assessment

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 586-0488.

Very truly yours,

GORDON MATSUOKA
State Public Works Engineer

RY:jk
cc: OEQC
Wilson Okamoto & Associates, Inc.

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& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Gordon Matsuoka
State Public Works Engineer
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Matsuoka:

Subject: *Draft Environmental Assessment (EA)*
Papaahawahawa Bridge Replacement

Thank you for your letter of February 20, 1996 (Ref. (P)1129.6) indicating that you have no comments regarding the project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

MGO

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

March 14, 1996

Mr. Myron Okubo
Wilson Okamoto & Associates, Inc.
1907 S. Beretania St.
Honolulu, HI 96826

LOG NO:16763
DOC NO:9603tm04
Architecture

Dear Mr. Okubo:

SUBJECT: **Papaahawahawa Bridge Replacement**
Draft Environmental Assessment
TMK: 1-5-006:001 and 1-5-007:001, Hana, Maui

Thank you for submitting the Draft Environmental Assessment for the replacement of the Papaahawahawa Bridge in Hana. While this bridge may have individually been classified as a category III bridge (of little significance), Hana is looked upon as a district of bridges strung together along the highway and each historic bridge contributes to the character of the drive to Hana. We are concerned that the bridges along Hana will be demolished one by one and Hana Highway will lose its historic character. Therefore, we believe that a preservation plan for the Hana Highway bridges should be initiated before we can concur with the demolition of the Papaahawahawa Bridge. Part of the plan will note key bridges that will be maintained and bridges that do need to be replaced.

Once the preservation plan is in place, the consultation process for future bridge replacement will be much simpler. Without a preservation plan, demolition of any categorized bridge will be considered an "adverse effect" and a Memorandum of Agreement must be executed. While it is not necessary to include a preservation plan in the environmental assessment, it should be noted that a preservation plan will be a condition of this office's concurrence with the replacement of the bridge.

Thank you for the opportunity to comment. Should you have any questions, please call Tonia Moy at 587-0005.

Aloha,

DON HIBBARD, Administrator and
State Historic Preservation Officer

TM:smf

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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
December 30, 1996

Mr. Don Hibbard, Ph.D., Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, HI 96813

Dear Dr. Hibbard:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of March 14, 1996 (Ref. Log No: 16763, Doc No: 9603tm04) commenting on the subject Draft EA. Hana District bridges which are under Maui County jurisdiction include those along Piilani Highway, which extends from approximately two miles south of Hana Town to Kaupo. The bridges along the remainder of Hana Highway extending north through Hana Town towards Kahului are under the jurisdiction of the State Department of Transportation. The County will not be undertaking any bridge replacements along the portion of Hana Highway under State jurisdiction.

For bridges within their jurisdiction, the County's overall responsibility is to raise the safety levels of all substandard bridges through bridge replacements and modifications. Current County bridge replacement plans in the Hana District include Papaahawahawa, Kaholopo, and Poopoo. Beyond these project however, the scheduling/funding of additional replacements has not been determined.

Nevertheless, DPWWM acknowledges your concern regarding the historic significance of these bridges and are aware that the project is subject to historic consultation and review pursuant to Section 106 of the National Historic Preservation Act as well as Chapter 6E of the Hawaii Revised Statutes. As stated in our letter to your office dated August 26, 1996 regarding the Section 106 process the DPWWM has agreed to the following:

1. Photographic documentation of the bridge in accordance with the Historic American Buildings Survey and Historic American Engineering Record (HABS HAER) specifications set forth by the National Park Service;

2. Review and approval of bridge construction plans by the SHPD; and,

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& ASSOCIATES, INC.

3. Preparation of a preservation plan for County-owned bridges prior to any subsequent replacement of a County bridge along Piilani Highway. The plan will evaluate the treatment of all bridges along this highway that are within the County's jurisdiction as a whole by prioritizing bridges and thereby avoiding their piece-meal replacement. The DPWWM will work cooperatively with the SHPD toward preparing a preservation plan acceptable to both agencies.

Two of these measures, including photographic documentation of the bridge, and design review of the bridge construction plans, have been completed. Both the photographic documentation and design of the bridge were reviewed and approved by your office. The third measure will be completed prior to the replacement of the next County bridge in this area, as stipulated.

We hope this satisfactorily addresses the concerns expressed in your letter. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

3358-01 ~LM

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C Kaahumanu Avenue, Wailuku, Hawaii 96793

LINDA CROCKETT LINGLE
Mayor
HENRY OLIVA
Director
ALLEN SHISHIDO
Deputy Director

(808) 243-7230
FAX (808) 243-7934

January 25, 1996

MEMO TO: Charles Jencks, Director
Department of Public Works

F R O M: Henry Oliva, Director

SUBJECT: *Draft Environmental Impact Assessment For Papaahawahawa* Bridge Replacement

We have reviewed the draft environmental impact assessment for the above referenced project and have no comments to submit. Thank you for the opportunity to review and comment on this matter

c: OEQC
Wilson Okamoto & Associates, Inc.

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& ASSOCIATES, INC.

ENGINEERS
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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Henry Oliva, Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, HI 96793

Dear Mr. Oliva:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of January 25, 1996 indicating that you have no comments regarding the subject project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

LINDA CROCKETT LINGLE
Mayor

DAVID W. BLANE
Director

GWEN OHASHI HIRAGA
Deputy Director

COPY

COUNTY OF MAUI
PLANNING DEPARTMENT
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

February 2, 1996

Mr. Cary Yamashita, Assistant Division Chief
Department of Public Works and
Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

RE: Papaahawahawa Bridge Replacement

Thank you for the opportunity to comment on the *Papaahawahawa Bridge Replacement Draft Environmental Assessment*.

The proposed action is in keeping with the County of Maui's program to modify or replace functionally or structurally deficient bridges to achieve current standards for roadway widths and load capacities as specified by the American Association of State Highway and Transportation Officials (AASHTO) for Rural Collector Roads.

The Papaahawahawa Bridge was among the bridges which were prioritized for improvement by the Department of Public Works and Waste Management for the current fiscal year. The bridge is scheduled for complete replacement by a cast-in-place concrete structure situated in the same location as the existing bridge.

The review of the Draft Environmental Assessment for the proposed bridge replacement has not identified any significantly adverse impacts based on the significance criteria listed in §11-200-12 of the Environmental Impact Statement Rules. Therefore, the Planning Department has no further comments on this project.

If additional clarification is required, please contact Don Schneider of this office at 243-7735.

Very truly yours,

DAVID W. BLANE
Planning Director

DWB:ds
cc:Colleen Suyama
OEQC
Wilson Okamoto & Associates, Inc
Don Schneider

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& ASSOCIATES, INC.

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1907 S. BERETANIA STREET
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FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. David W. Blane, Director
Planning Department
County of Maui
250 South High Street
Wailuku, HI 96793

Dear Mr. Blane:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 2, 1996 indicating that you have no comments regarding the subject project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

February 21, 1996

County of Maui
Department of Public Works & Waste Management
Engineering Division
200 South High Street
Wailuku, HI 96793
Attn: Cary Yamashita, Assistant Division Chief

RE: Papaahawahawa Bridge Replacement; Draft Environmental Assessment & anticipated Negative Declaration;
TMKs 1-5-6: por. 1 & 1-5-7: por.1

Dear Mr. Yamashita,

Thank you for the opportunity to comment on the proposed project.

We forward for your information a map indicating approximate alignment of a fire protection improvement planned in the distant future for the area. We would appreciate if this bridge could be constructed with adequate structural strength to accommodate possible future pipeline crossing and addition of pipe supports. Please contact our Engineering Division at 243-7835 if you require more information for possible coordination.

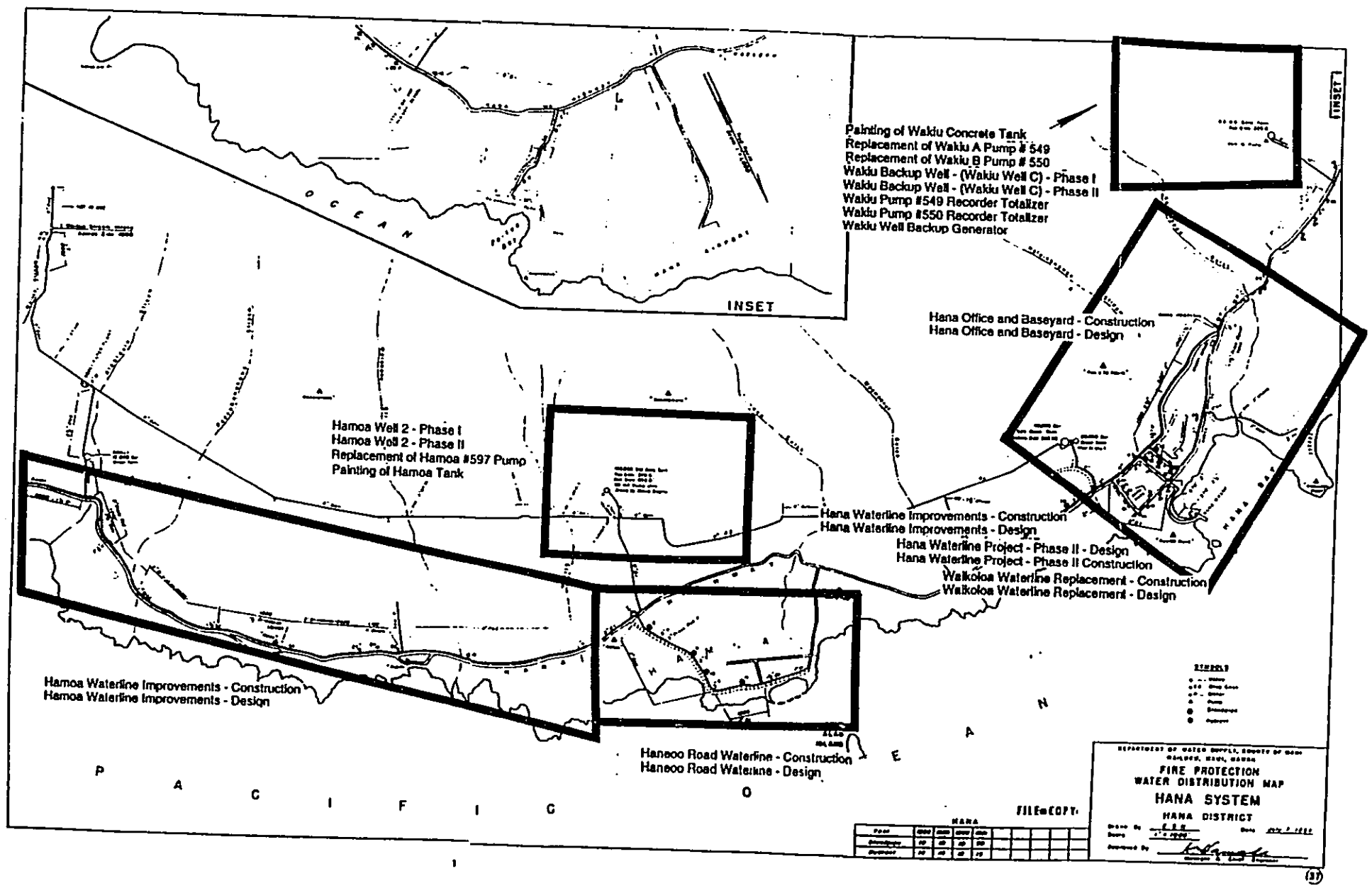
We request that precautionary measures be taken during construction to prevent petroleum products, construction materials and debris, and eroded soils from entering the stream.

West Maui Watershed Coordinator, Dr. Wendy Wiltse, may also have some insights to offer regarding protection of stream ecosystems during construction. She can be reached at 661-7856.

Sincerely,

for David Craddick
Director

cc: Earl Matsukawa, Project Planner, Wilson Okamoto & Associates, Inc.
Honorable Gary Gill, Director, OEQC


Painting of Wakiu Concrete Tank
Replacement of Wakiu A Pump # 549
Replacement of Wakiu B Pump # 550
Wakiu Backup Well - (Wakiu Well C) - Phase I
Wakiu Backup Well - (Wakiu Well C) - Phase II
Wakiu Pump #549 Recorder Totalizer
Wakiu Pump #550 Recorder Totalizer
Wakiu Well Backup Generator
INSET
OCEAN
Hana Office and Baseyard - Construction
Hana Office and Baseyard - Design
Hamoa Well 2 - Phase I
Hamoa Well 2 - Phase II
Replacement of Hamoa #597 Pump
Painting of Hamoa Tank
Hana Waterline Improvements - Construction
Hana Waterline Improvements - Design
Hana Waterline Project - Phase II - Design
Hana Waterline Project - Phase II Construction
Waikoloa Waterline Replacement - Construction
Waikoloa Waterline Replacement - Design
Hamoa Waterline Improvements - Construction
Hamoa Waterline Improvements - Design
Hanaoo Road Waterline - Construction
Hanaoo Road Waterline - Design
PACIFIC OCEAN
FILE COPY
FIRE PROTECTION
WATER DISTRIBUTION MAP
HANA SYSTEM
HANA DISTRICT

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& ASSOCIATES, INC.

ENGINEERS
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Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. David Craddick, Director
Board of Water Supply
County of Maui
P.O. Box 1109
Wailuku, HI 96793-7019

Dear Mr. Craddick:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 21, 1996 commenting on the subject project. We appreciate the information you provided regarding BWS planned projects. The bridge can be designed to accommodate the loads for a new 8-inch water line, assuming it will be comprised of ductile iron material. As there are various methods to support the pipe along the bridge, please furnish desired details for the supports and approximate water line alignment and profile. The costs and responsibilities for inspection of the work during construction must be coordinated between BWS and DPWWM. During construction, measures will be taken to prevent petroleum products, construction materials and debris, and eroded soils from entering the stream.

We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96732-0398 • (808) 871-8461

FM-
LM

February 15, 1996

RECEIVED
FEB 21 1996
WILSON OKAMOTO & ASSOC. INC.

Mr. Cary Yamashita
Assistant Division Chief
County of Maui
Department of Public Works and Waste Management
Engineering Division
200 So. High Street
Wailuku, HI 96793

Dear Mr. Yamashita:

Subject: Papaahawahawa Bridge Replacement Draft Environmental Assessment
(Negative Declaration Anticipated)
TMK: 1-5-06:01 (por.) and 1-5-07:01 (por.)
Hana, Maui, Hawaii

Thank you for allowing us to comment on the above subject.

In reviewing the information transmitted and our records, Maui Electric Company at this time has no objections to the subject project.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Edward Reinhardt

Edward Reinhardt
Manager, Engineering

FO:rt

cc: Mr. Gary Gill (SOH - Office of Environmental Quality Control)
Mr. Earl Matsukawa (Wilson Okamoto & Associates, Inc.)

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& ASSOCIATES, INC.

ENGINEERS
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Mailing address:
P.O. Box 3530
Honolulu, Hawaii 96811

3358-01
August 19, 1996

Mr. Edward Reinhardt, Manager
Engineering Department
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, HI 96732-0398

Dear Mr. Reinhardt:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 15, 1996 indicating that you have no objections to the subject project. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

502

RECEIVED
COUNTY OF MAUI (2)

'96 FEB 22 7:13

RECEIVED
MAR 14 1996
WILSON OKAMOTO & ASSOCIATES

February 20, 1998

'96 FEB 21 A7:26

To: Department of Public Works,
Charles Jencks, Director
Via: fax number 243-7955
From: Lisa Hamilton, Hana District resident.
Voice and fax: 248-8001

ENGINEERING DIV.
COUNTY OF MAUI
PUBLIC WORKS

Re.: Papaahawahawa Bridge Replacement, Environmental Assessment.

Dear Mr. Jencks:

This EA is inadaquate. The value of the historic bridge which is to be destroyed has not been adaquately reviewed.

The relatively recently adopted Hana Community Plan Update, calls for, (PHYSICAL INFRASTRUCTURE (page 20), Goal) "...(E)nvironmentally sensitive ....maintenance of infastructure systems".

The Plan calls for "preservation of Hana regions' historic bridges".

The proposal to build a new bridge at Papaahawahawa gulch, about four miles east of Hana Town would destroy the existing one lane, 16 foot wide, 1915-built, historic Papaahawhahwh Bridge, replacing it with a 35 foot wide bridge, built to roadway width and load capacity standards as specified by the American Association of State Highway and Transportation Officials for Rural Collector Roads.

Hana Plan Objectives and Policies call for inclusion of "Native Hawaiian and community participation in all infrastructure planning".

Neither group was contacted to participate to my knowledge.

The Maui County Cultural Resources Commission which has noted the cultural worth and need to preserve Hana's bridges and is mandated to be involved in this planning process was not contacted I understand.

Implementing Actions in the Hana Plan call for preparation of a "Hana Highway and Pi'ilani Highway roadway management plan which identifies: (1) significant natural and structural features to be preserved."

This management plan is in progress at the very moment. How then can this EA be considered adaquate, prior to the completion of this study?

Finally, this project is one of a series of bridge replacements planned for the Hana District. Two additional bridges are prioritized for destruction and replacement in this fiscal year: the 79 year old Kaholopo Bridge which crosses Hancoo stream near Hamoa and Poo Poo Bridge located between Ulupalakua and Kaupo.

The Papahawhahwh Bridge Replacement Draft Environmental Assessment partially reviews one component of a larger unexamined project: a program to replace bridges and widen and realign the Hana and Pi'ilani Highways as it encircles East Maui in the Hana District.

page 2 - Hana Bridge EA comment

The possibility for repair of these bridges is inadequately considered. Yet the essential characteristic of Hana's world famous tourist attraction, the narrow, twisting highway with quaint, historic bridges will be destroyed unless care is taken to preserve Hana's historic bridges.

Further, these narrow bridges serve as valves to slow down traffic, which as this road is paved becomes more necessary for safty.

I request that the Office of Environmental Quality Control require an EIS with review of the Hana Plan mandated "management plan for Hana's bridges" a prerequisite and with active involvement of the Hana community in the process, particularly the Hana Community Association and the Hana Advisory Committee.

Thank you for your attention to this request.

Sincerely,

Lisa Hamilton

Lisa Hamilton, Hana District resident.
S.R. Box 190, Hana. 248-8001

1) Hana Community Plan Update, 1993
2) Cultural Resources Commission, Kalani English, chair
3) Hana Highway and Pi'ilani Highway Roadway Management Plan, Spencer Leinweber, architect, 808-536-3636.

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& ASSOCIATES, INC.

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1907 S. BERETANIA STREET
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PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

3358-01
December 30, 1996

Ms. Lisa Hamilton
S.R. Box 190
Hana, HI 96713

Dear Ms. Hamilton:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 20, 1996 commenting on your concerns regarding the subject project. The Department of Public Works and Waste Management (DPWWM) has been in consultation with various agencies regarding the project including the Department of Land and Natural Resources, Department of the Army Corps of Engineers, and Maui County Planning Department. As such, we regret the delay in responding to your concerns. We have prepared the following response in the respective order of your comments:

1. *"The value of the historic bridge which is to be destroyed has not been adequately reviewed".*

   As noted on Page 17 of the EA, Papaahawahawa Bridge was included in the *1990 Inventory of Historic Bridges for Maui and Molokai*, prepared by Hawaii Heritage Center in September 1990 for the Department of Transportation. A total of 110 bridges were inventoried, researched, and evaluated to identify bridges that may qualify for nomination to the National Register of Historic Places. According to the report, the bridge is classified as a Category III bridge which is the lowest of three categories. The report is currently being updated by Spencer Mason Architects in consultation with the State Department of Transportation and Department of Land and Natural Resources State Historic Preservation Division (SHPD).

   In addition, the SHPD was consulted during the preparation of the Draft EA as well as during the public comment period. During an August 25, 1996 meeting with our office, SHPD noted that this particular bridge, in and of itself, was not of significant historic character relative to other bridges along Hana/Piilani Highway. However, both SHPD and DPWWM recognize the significance of the bridge in the context of the Hana District. Pursuant to consultations between the two agencies, three measures were agreed upon to mitigate the historic impact to the Papaahawahawa Bridge, including:

- Photographic documentation of the bridge in accordance with the Historic American Buildings Survey and Historic American Engineering Record (HABS HAER) specifications set forth by the National Park Service;

- Review and approval of bridge construction plans by the SHPD; and,

- Preparation of a preservation plan for County-owned bridges prior to any subsequent replacement of a County bridge along Piilani Highway in the Hana District. The DPWWM will work cooperatively with the SHPD toward preparing a preservation plan acceptable to both agencies. The plan will evaluate the treatment of all bridges along this highway that are within the County's jurisdiction as a whole by prioritizing bridges and thereby avoiding their piece-meal replacement.

Two of these measures, including photographic documentation of the bridge, and design review of the bridge construction plans, have been completed. Both the photographic documentation and design of the bridge were reviewed and approved by the SHPD. The third measure will be completed prior to the replacement of the next County-owned bridge in this area, as stipulated.

2. *"The relatively recently adopted Hana Community Plan Update, calls for, (PHYSICAL INFRASTRUCTURE (page20), Goal) '... environmentally sensitive ... maintenance of infrastructure systems.*

   The Plan calls for 'preservation of Hana regions' historic bridges".

   We concur that the project must be approached in an environmentally sensitive manner, and maintain that this responsibility is being adequately fulfilled through the EA review process, pursuant to Chapter 343 Hawaii Revised Statutes.

   Please note that according to the full citation from the Hana Community Plan Update, infrastructure systems must also "... protect and preserve the safety and health of the Hana region's residents and visitors, including the provision of ... effective transportation systems which meet the needs of residents and visitors while protecting the region's rural character." For bridges within the County's jurisdiction, the overall responsibility is to raise the safety levels of all substandard bridges through bridge replacements or modifications. However, the County recognizes the need to balance traffic flow and safety requirements with the preservation of certain historic bridges and, as aforementioned, agreed to the three measures in consultation with the SHPD.

3. *"Hana Plan Objectives and Policies call for inclusion of 'Native Hawaiian and community participation in all infrastructure planning.*

Neither group was contacted to participate to my knowledge."

The opportunity for agency and individual feedback was facilitated through this Draft EA public comment period. The Draft EA was distributed to twenty-six (26) agencies, organizations, nearby residents and the landowner. A total of eighteen (18) comment letters, including yours, was received during the comment period. For your information, the Office of Hawaiian Affairs (OHA), Department of Hawaiian Home Land (DHHL), and the Hana Community Association were included among the twenty-six reviewing parties. The OHA and DHHL had no significant objections to the project. To date, we have not received any comments from the Hana Community Association or the three nearby residents to whom copies of the EA were sent.

4. *"The Maui County Cultural Resources Commission which has noted the cultural worth and need to preserve Hana's bridges and is mandated to be involved in this planning process was not contacted I understand".*

We understand that the project was discussed at a June 6, 1996 CRC meeting. A representative of the DPWWM was present at the meeting to respond to questions regarding the project. Further, we note that copies of the Draft EA were sent to the County of Maui Planning Department which oversees the CRC, and were also available for general public review. In addition, notice for the Draft EA was published in the January 23, 1996 Office of Environmental Quality Control Environmental Notice which is regularly sent to various agencies including the County of Maui Planning Department.

5. *"Implementing Actions in the Hana Plan call for preparation of a 'Hana Highway and Pi'ilani Highway roadway management plan which identifies: (1) significant natural and structural features to be preserved'."*

"This management plan is in progress at the very moment. How then can this EA be considered adequate, prior to the completion of this study?"

We note that other implementing actions cited in this section of the Hana Community Plan which are being implemented by the DPWWM also include:

" 2. Improve Hana Highway to allow safe passage of two-way vehicular traffic;
3. Improve Pi'ilani Highway as an alternative route to Hana while protecting and preserving the integrity of natural landforms and historic structures; and
4. Improve walkways and roads within residential areas to ensure safe passage for pedestrians and vehicular traffic."

We are not aware of any in-progress management plan. As aforementioned, the County is committed to coordinating with the SHPD in preparing a preservation plan for County-owned bridges. Nevertheless, the completion of such a management plan is not a prerequisite to preparation of Environmental Assessments pursuant to Chapter 343, Hawaii Revised Statutes.

6. *"Finally, this project is one of a series of bridge replacements planned for the Hana District. Two additional bridges are prioritized for destruction and replacement in this fiscal year: the 79 year old Kaholopo Bridge which crosses Haneoo Stream near Hamoa and Poo Poo Bridge located between Ulupalakua and Kaupo.*

The Papaahawahawa Bridge Replacement Draft Environmental Assessment partially reviews one component of a larger unexamined project: a program to replace bridges and widen and realign the Hana and Pi'ilani Highways as it encircles East Maui in the Hana District."

The Papaahawahawa Bridge replacement is the third of three bridge replacements planned by the County in the Hana District. We concur that this bridge is part of a program to replace unsafe bridges, however, it is not the County's intention to realign Piilani Highway. For your information, the Hana Highway falls within the jurisdiction of the State Department of Transportation, and we are not aware of any program to widen and realign the highway. Beyond these three bridge replacements in the Hana District, the scheduling and funding of additional bridge replacements has not been determined. As mentioned previously, the DPWWM has agreed to prepare a historic preservation plan prior to undertaking the next bridge replacement in the Hana District.

7. *The possibility for repair of this bridge is inadequately considered. Yet the essential characteristic of Hana's world famous tourist attraction, the narrow, twisting highway with quaint, historic bridges will be destroyed unless care is taken to preserve Hana's historic bridges."*

   The Papaahawahawa Bridge is currently structurally defunct and, as such, poses a safety hazard for motorists crossing it. To simply repair the existing bridge would be a short-term solution, as it is likely that the bridge would soon require additional repair and maintenance. From the County's perspective it is economically more prudent in the long-term to replace the bridge than to repair it, particularly since it can largely be accomplished using Federal funding as opposed to County funds. To qualify for Federal support, the project must comply with standard design criteria required by the Federal Highways Administration. These design standards dictate the width of the bridge as well as other design features.

   As aforementioned, photographic documentation of the existing bridge and design of the proposed bridge have been approved by the SHPD. In addition, the Maui DPWWM and the SHPD will work in concert to prepare a preservation plan for County bridges along Piilani Highway in the Hana District.

8. *"Further, these narrow bridges serve as valves to slow down traffic, which as this road is paved becomes more necessary for safety."*

   The replacement of the bridge is being proposed specifically for the purposes of safety. Relying on a bridge structure to control roadway speed is improper since it could create hazardous driving conditions. The new bridge is designed according to vehicle speeds and volumes at the bridge approaches.

9. *"I request that the Office of Environmental Quality Control require an EIS with review of the Hana Plan mandated 'management plan for Hana's bridges' a prerequisite and with active involvement of the Hana community in the process, particularly the Hana Community Association and the Hana Advisory Committee".*

   As discussed previously, the County of Maui has fulfilled the requirements of Chapter 343, Hawaii Revised Statutes regarding the provision of opportunities for agency and public imput. Furthermore, the measures agreed to by the SHPD and DPWWM will adequately mitigate the historic impact to the existing bridge. Therefore, the County has determined that a Negative Declaration is appropriate, and an EIS is not required.

We hope this satisfactorily addresses the concerns expressed in your letter. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

508

February 22, 1996

RECEIVED
COUNTY OF MAUI
'96 FEB 23 P1:32
ENG.
DEPT. OF PUBLIC WORKS

RECEIVED
MAR 14 '96
WILSON OKAMOTO & ASSOCIATES

County of Maui
Department of Public Works
Charles Jenks, Director
Fax # 243-7955
Department of Engineering
Cary Yamashita
Fax # 243-7975

RE: Environmental Assessment for
Papaahawahawa Bridge, Hana.

Dear Mr. Jenks and Mr. Yamashita

Please be advised that I believe the Environmental Assessment (EA) for Papaahawahawa Bridge in Hana is inadequate for the following reasons:

1) the proposed project appears to be part of a larger project of systematic bridge replacement of historic Bridges in Maui County. I would like to see a full discussion of the overall project.
2) the Hana Hui Association is declared the owner of adjoining lands that will need

to be acquired to develop a new bridge. These lands are the subject of dispute, at this time.

3) the EA does not consider the Hana Community Plan, which would actively seek input from the community. There should be a public hearing in Hana.

4) the one lane condition of the bridge is a positive, not a negative. The single lane helps control speeding traffic coming down the hill toward the bridge.

5) what is the logic of creating a wider bridge that connects to a narrow road? This may be relevant to question # 1.

6) the immediate residents of the area, including my family, have not been informed of the project and consulted.

7) what is the logic of destroying historic bridges and a narrow road that are famous worldwide and a plus

for tourism?

8) What are the options for repair, if needed, for the bridge?

9) Has any land owner from Punalu'u to Kaaliu requested the bridge replacement?

Please prepare a full EIS if it is your intention to proceed with the proposed project.

Mahalo

John Blumer-Buell
R.R. 111
Hana Maui 96713

3358-01
December 30, 1996

WILSON
OKAMOTO
& ASSOCIATES, INC.

ENGINEERS
PLANNERS

1907 S. BERETANIA STREET
HONOLULU, HAWAII 96826
PH: (808) 946-2277
FAX: (808) 946-2253

Mailing address:
P. O. Box 3530
Honolulu, Hawaii 96811

Mr. John Blumer-Buell
S.R. 111
Hana, HI 96713

Dear. Mr. Blumer-Buell:

Subject: Draft Environmental Assessment (EA)
Papaahawahawa Bridge Replacement

Thank you for your letter of February 22, 1996 commenting on your concerns regarding the subject project. The Department of Public Works and Waste Management (DPWWM) has been in consultation with various agencies regarding the project including the Department of Land and Natural Resources, Department of the Army Corps of Engineers, and Maui County Planning Department. As such, we regret the delay in responding to your concerns. The following are offered in the respective order of your comments:

1. *"The proposed project appears to be part of a larger project of systematic bridge replacement of historic bridges in Maui County. I would like to see a full discussion of the overall project."*

   The County determines its bridge repair and maintenance needs based upon an annual review of the physical condition and structural integrity of the bridges on an island-wide basis. Bridge repairs and replacement projects are pursued based upon the degree of concern for public safety as well as the availability of funding.

   Current County bridge replacements planned in the Hana District include Papaahawahawa, Kaholopo, and Poopoo. Beyond these projects, however, the scheduling/funding of additional replacements has not been determined.

2. *"The Hanahuli Association is declared the owner of adjoining lands that will need to be acquired to develop a new bridge. These lands are the subject of dispute at this time."*

   We have not been informed of any dispute regarding landownership in the project area, however, we will take your comment under advisement as we proceed with acquiring a right-of-way for the replacement bridge.

3. *"The EA does not consider the Hana Community Plan, which would actively seek input from the community. There should be a public hearing in Hana."*

The opportunity for agency and individual feedback was facilitated through this Draft EA public comment period. The Draft EA was distributed to twenty-six (26) agencies, organizations, nearby residents and the landowner. A total of eighteen (18) comment letters, including yours, was received during the comment period. For your information, the Office of Hawaiian Affairs (OHA), Department of Hawaiian Home Land (DHHL), and the Hana Community Association were included among the twenty-six reviewing parties. The OHA and DHHL had no significant objections to the project. To date, we have not received any comments from the Hana Community Association or the three nearby residents to whom copies of the EA were sent.

We understand that the project was discussed at a June 6, 1996 Cultural Resources Commission meeting. A representative of the Department of Public Works and Waste Management (DPWWM) was present at the meeting to respond to questions regarding the project. A public hearing was also held by the DLNR Commission on Water Resource Management on July 17, 1996, during which a Stream Channel Alteration Permit was approved by the Commission.

We note that copies of the Draft EA were available for general public review. In addition, notice for the Draft EA was published in the January 23, 1996 Office of Environmental Quality Control Environmental Notice which is sent to various agencies on a regular basis.

4. *"The one lane condition of the bridge is a positive, not a negative. The single lane helps control speeding traffic coming down the hill toward the bridge."*

The replacement of the bridge is being proposed specifically for the purposes of safety. Relying on a bridge structure to control roadway speed is improper since it could create hazardous driving conditions. The new bridge is designed according to vehicle speeds and volumes at the bridge approaches.

5. *"What is the logic of creating a wider bridge that connects to a narrow road? This may be relevant to question #1."*

The project will be partially funded by the Federal Highways Administration and as such, must comply with their standard criteria for the design and safety of roadways and bridges. The 35-foot width proposed for the replacement bridge will accommodate two traffic lanes, which is consistent with the existing roadway approaches to the bridge. Additionally, two shoulders will be provided along the bridge as per standard specifications.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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6. *"The immediate residents of the area, including my family, have not been informed of the project and consulted".*

   As aforementioned copies of the Draft EA were sent to three nearby residents as well as the landowner. The Hana Community Association was also mailed a copy of the document.

7. *"What is the logic of destroying historic bridges and a narrow road that are famous worldwide and a plus for tourism?"*

   For bridges within the County's jurisdiction, the overall responsibility is to raise the safety levels of all substandard bridges through bridge replacements or modifications. Nevertheless, the County recognizes the need to balance traffic flow and safety requirements with the preservation of certain historic bridges. In this regard the DLNR State Historic Preservation Division (SHPD) was consulted during the preparation of the Draft EA as well as during the public comment period. During an August 25, 1996 meeting with our office, SHPD noted that this particular bridge, in and of itself, was not of significant historic character relative to other bridges along Hana/Piilani Highway. However, both SHPD and DPWWM recognize the significance of the bridge in the context of the Hana District. Pursuant to consultations between the two agencies, three measures were agreed upon to mitigate the historic impact to the Papaahawahawa Bridge, including:

   - Photographic documentation of the bridge in accordance with the Historic American Buildings Survey and Historic American Engineering Record (HABS HAER) specifications set forth by the National Park Service;

   - Review and approval of bridge construction plans by the SHPD; and,

   - Preparation of a preservation plan for County-owned bridges prior to any subsequent replacement of a County bridge along Piilani Highway in the Hana District. The DPWWM will work cooperatively with the SHPD toward preparing a preservation plan acceptable to both agencies. The plan will evaluate the treatment of all bridges along this highway that are within the County's jurisdiction as a whole by prioritizing bridges and thereby avoiding their piece-meal replacement.

   Two of these measures, including photographic documentation of the bridge, and design review of the bridge construction plans, have been completed. Both the photographic documentation and design of the bridge were reviewed and

approved by the SHPD. The third measure will be completed prior to the replacement of the next County-owned bridge in this area, as stipulated.

8. *"What are the options for repair, if needed, for the bridge?"*

To simply repair the existing bridge would be a short-term solution, as it is likely that the bridge would soon require additional repair and maintenance. From the County's perspective it is economically more prudent in the long-term to replace the bridge than to repair it, particularly since it can largely be accomplished using Federal funding as opposed to County funds. To qualify for Federal support, the project must comply with standard design criteria required by the Federal Highways Administration. These design standards dictate the width of the bridge as well as other design features.

9. *"Has any land owner from Puuili to Koali requested the bridge replacement?"*

Such requests from residents have not been documented. However, as previously noted, the County does not necessarily determine its bridge repair and maintenance needs based on community requests, but rather considers the structural integrity of the bridges, the degree of concern for public safety, and availability of funding.

10. *"Please prepare a full EIS if it is your intention to proceed with the proposed project."*

As discussed previously, the County of Maui has fulfilled the requirements of Chapter 343, Hawaii Revised Statutes and has determined that a Negative Declaration is appropriate. Therefore, the proposed project does not require an EIS.

We hope this satisfactorily addresses the concerns expressed in your letter. We appreciate your time and effort in reviewing the Draft EA.

Very truly yours,

Myron Okubo, Project Manager

cc: Office of Environmental Quality Control
County of Maui, Department of Public Works and Waste Management

X. REFERENCES

County of Maui Planning Department, *Hana Community Plan of the County of Maui*, July 1982.

Federal Emergency Management Agency, *Flood Insurance Rate Map, Maui County, Hawaii, Community-Panel Number 150003 0225 B*, June 1, 1981.

State of Hawaii Department of Business, Economic Development & Tourism Land Use Commission, *Land Use District Boundary Maps - Haiku Quadrangle*, 1983.

U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, in cooperation with the University of Hawaii, Agricultural Experiment Station, August 1972.

U.S. National Parks Service Western Region Natural Resources and Research Division Hawaii Cooperative Park Service Unit, *Hawaii Stream Assessment - A Preliminary Appraisal of Hawaii's Stream Resources Report R84*, Prepared for the State of Hawaii Department of Land and Natural Resources Commission on Water Resource Management, December 1990.

APPENDIX A

Bridge Inspection Report for Papaahawahawa Bridge

County of Maui
Department of Public Works and Waste Management

August 1995

NBI SI&A sheet 10/07/93

Sufficiency Rating = 002.0
Status = Structurally deficient

********** IDENTIFICATION **********
1 State : Hawaii 159
8 STRUCTURE NUMBER: 009003600904636
Inventory Route : on 141000360
Highway Dist. : 20
County Code: 009 4 Place code:
6 Features Intrsct: PAPAHAWAHAWA STRM #28
7 Facility Carried: HANA HWY.
9 Location : 2.57MI S/RD TO HAMOA
11 Milepoint : 046.360
16 Lat: 20deg 41.4' 17 Long: 156deg 0.8'
98 Border Br State :
99 Border Br Stru #:

****** STRUCTURE TYPE & MATERIAL ******
43 Stru Main Material- Concrete
Type- Tee beam 104
44 Stru App Material- Other
Type- Other 000
45 # of Main Spans : 002
46 # of App Spans : 0000
107 Deck Stru - 1
108 Wearing Surf/Protective Sys type
A Wearing Surface - Bituminous 6
B Membrane - Buile-up 1
C Deck Protection - Other 9

********** AGE & SERVICE **********
27 Year Built : 1915
106 Year Reconstructed : 0000
42 Type of Service on -Highway
under: Waterway 15
Lanes On Stru: 01 Under Stru: 00
ADT : 002000
30 Yr of ADT : 89 109 Truck ADT : %
19 Bypass, Detour Length (miles) 99

********** GEOMETRIC DATA **********
48 Length of Max Span (ft) : 0022
49 Structure Length (ft) : 000041✓
50 Curb/Sidewalk Width L: 00.0 R: 00.0
51 Bridge Width, Curb-to-Curb :014.5ft
52 Deck Width, out-to-out :016.0ft✓
32 Approach Rdwy Width : 017ft
33 Bridge median - No median 0
34 Skew : 00 deg 35 Stru Flared: 0
10 Inventory Rt Min Vert Clrn : 99'99"
47 Inv. Rt Total Horz Clrn : 14.5ft
53 Min Vert Clrn over Rdwy : 9999
54 Min Vert Underclearance :N0000ft
55 Min Lateral R Underclrnc : N000ft
56 Min Lateral L Underclrnc : 999ft

********** NAVIGATION DATA **********
38 Navigation Control : N
111 Pier Protection-functioning:
39 Navigation Vert Clrn : 000ft
116 Vert Lift Br Min Clrn : ft
40 Navigation Horz Clrn : 0000ft
Recorded 10/07/93

********* CLASSIFICATION *********
112 NBIS Bridge Length : Y
104 Hwy System of Inventory Rt: 8
26 Functional Classification : 06
100 Defense Hwy Designation : 0
101 Parallel Stru Designation : N
102 Direction of Traffic : 3
103 Temperary Stru Designation:
110 Designated Natl Network : 0
20 Toll : 3
21 Main - :County highway : 02
22 Owner- County highway : 02
37 Historical Significance : 4

********** CONDITIONS **********
58 Deck : 4
59 Superstructure : 3
60 Substructure : 5
61 Channel Protection : 5
62 Culverts : N

****** LOAD RATING & POSTING ******
31 Design Load - H 10 : 1
64 Operating Rating : 105
66 Inventory Rating : 102
70 Posting - Unknown : 4
41 Stru Open/Posted/Closed: P
- Posted for load

********** APPRAISAL **********
67 Structure Evaluation : 3
68 Deck Geometry : 6
69 Underclearance Vert/Horz : N
71 Waterway Adequacy : 8
72 Approach Roadway Alignmen : 3
36 Traffic Safty Features :0000
113 Scour Critical Bridges : 6

****** PROPOSED IMPROVEMENTS *****
75 Type of Work : 000
76 Length of Stru Imprvmt : 000000
94 Bridge Improvement Cost: 000000
95 Roadway Imprvmnt Cost : 000000
96 Total Project Cost (K) : 000000
97 Year of Imprvmnt Cost Est. :
114 Future ADT : 000000
115 Year of Future ADT :

********* INSPECTIONS **********
90 Insp Date: 8/.95 91 Freq: 12mo
92 Critical Feature Insp 93 Date
A Frac. Crit Detail :N /
B Underwater Insp :N /
C Other Special Insp:Y 12 10/91
Upload to Mainframe / /

County of Maui
Department of Public Works
Engineering Division

BRIDGE INSPECTION REPORT

Date of Inspection 8/16/95
Bridge Number 009003600904636 Bridge Name PAPAAHAWAHAWA
Number of Spans 2
Location: Island MAUI Route No. SR-31 Highway HANA HWY
Feature Intersected PAPAAHAWAHAWA STREAM
Bridge Material: Superstructure CONC Substructure CONC

36	TRAFFIC SAFETY FEATURES	Indicate if feature meets currently acceptable standards. 0–No 1–Yes 2–Not Applicable
1.	Bridge Railings	N
2.	Transitions	
3.	Approach Guardrail	
4.	Approach Guardrail Ends	

		CONDITION RATING	REMARKS
58	**DECK**		
1.	Wearing Surface	9	
2.	Deck – Structural Condition	4	NUMEROUS SPALLS, REIN EXP, SECT LOSS UNDERSIDE DECK
3.	Curbs	N	
4.	Median		
5.	Sidewalks		
6.	Parapet	6	MINOR SPALLS, DEFECTS, HONEYCOMBS
7.	Railing	N	
8.	Paint		
9.	Drains		
10.	Lighting Standards		
11.	Utilities	6	4" DRISOL 23'L DOWNSTREAM
12.	Joint Leakage	N	
13.	Expansion Joints or Devices	N	
	INSP COND RATING	4	SPAN 1 UNDERSIDE HEAVILY DEFECTED
59	**SUPERSTRUCTURE**		
1.	Bearing Devices	N	
2.	Stringers	N	
3.	Girders, Beams, or Arches	3	TYPICAL DEFECTS THRU SPAN - 1
4.	Floor Beams and Diaphragms	N	
5.	Trusses – General		
	– Portals		
	– Bracing		
6.	Paint		
7.	Machinery (Movable Spans)		
8.	Rivets and /or Bolts		
9.	Welds – Cracks		
10.	Rust		
11.	Timber Decay		
12.	Concrete Cracking and /or Spalling	3	SPAN-1 TYPICAL
13.	Collision Damage	3	
14.	Deflection Under Load	7	
15.	Alignment of Members	7	
16.	Vibrations Under Load	7	
17.	Flat Slab	7	

Date of Inspection 8/16/95
Bridge Number 009003600904636 Bridge Name PAPAAHAWAHAWA

93	CRITICAL FEATURE INSPECTION DATE

1. Fracture Critical Details Y12
2. Underwater Inspection N
3. Other Special Inspection Y12

	CONDITION RATING	REMARKS
RESTRICTIONS:		
1. Posted Loading	7	5 TON LIMIT
2. Legibility	7	ONE LANE BRIDGE
3. Visibility	7	RM-4's AT 4 CRNG

REPAIRS AND IMPROVEMENTS: – SEE ATTACHED

1. List all work done to this bridge since the last inspection including cost.

2. Indicate proposed and /or recommended improvements including estimated cost.

3. List any existing temporary conditions.

REMARKS AND RECOMMENDATIONS:

1. Does this bridge require inspection by Bridge Design Section? Yes ✓ No ____

2. Remarks: Describe defects. Use sketches, diagrams, and /or photographs where possible.

Inspected by: Signature Steven P. Hunter
Title SUPV BNSP

BRIDGE SCOUR SCREENING

Photo: roll: _____
frame: _____
Date: 8/16/95

Bridge Name: PAPAAHAWAHAWA #28
Bridge No.: 009003600904636
District: HANA

A. Structure Data:		
Year Built 1915	Bridge Length:	41'-0"
No. of Spans 2	No. of piers:	1
As-builts available?	yes	(no)
B. Is bridge constructed over water?	(yes)	no
If yes, Is it		
(a. Intermittant)		
b. Small stream w/ continuous flow		
c. River (large)		
d. Tidal		
Is underwater inspection required?	yes	(no)
C. Abutment	LEFT	RIGHT
1. Type of Abutment	(Vertical)	(Vertical)
	Stub	Stub
	Other _____	Other _____
2. Any signs of scour?	None	None
	(Minor)	(Minor)
	Severe	Severe
3. Scour protection in place?	yes (no)	yes (no)
If so, what type?		
4. Abutment in streambed?	(yes) no	(yes) no
5. Abutment inundated by high flow?	yes (no)	yes (no)
6. Overall Condition	Good	Good
	(Requires Repair)	(Requires Repair)
7. Comments HEAVY SPALLING TO U/S DECK RIEN. Ext.		
D. Piers		
1. Any signs of scour?	(yes)	no
2. Scour protection in place?	yes	(no)
If so, what type? _____		
3. Is it on piles?	yes	(no)
If so, length of piles = _____		
4. Overall Condition	(Good)	(Good)
	Requires Repair	Requires Repair
5. Comments _____		

BRIDGE SCOUR SCREENING (page 2)

E. Channel Bottom

1. Shifting	yes	(no)
2. Aggredation	yes	(no)
3. Degredation	yes	(no)
4. Type material of channel bottom	(Solid Rock) (Rocky) Concrete Lined	Sand Earth

F. Overall Comments _____

G. Analysis

Is analysis required?	(yes)	no
If yes, who will do analysis?	In-House	Consultant
Is topo required?	yes	(no)

If no, provide sketch and take measurements

H. Scour Analysis Code ____ ____ ____

I. SI&A, Item 113 Code 6

COUNTY OF MAUI
Dept. of Public Works
Engineering Division

PAPAAHAWAHAWA #28

SUMMARY OF RECOMMENDATIONS

This bridge is in structurally poor condition. The structure is on a 12 month inspection cycle. The underside of deck is severly spalled, but has increased at a slower rate than in the previous inspection cycle. County of Maui highways crews have cleared out all debris. A replacement structure is in the design stage, and this bridge will be monitored closely.

County of Maui
Department of Public Works
Engineering Division

Cost of Improvements

PAPAAHAWAHAWA #28 TMK 1-5-08 District: S. HANA

Description	Quantity	Unit	Unit Cost	Total
Repair cracks	20.00	LF	87.40	1748.00
Repair spalls	260.00	SF	287.50	74750.00
Underpin abutment & pier	2.00	CY	350.00	700.00
Waterproof parapets & exterior girders	710.00	SF	4.03	2861.30
Install guardrails	50.00	LF	74.75	3737.50
				0.00
				0.00
				0.00
				0.00
*Remove vegetation growth				
*Post signs				
	Subtotal			83796.80
	20% Contingency			16759.36
	Total			100556.16
* Indicates work to be done by County Maintenance forces.	Say			100600.00

Prepared By: Steven Newhouse *SW* 8/1/95 Title: Supervising Inspector

Date: 8/28/95

Reviewed By: Carey Yamashita Title: Asst. Chief Engineer

County of Maui
Department of Public Works
Engineering Division

PAPAAHAWAHAWA #28
REPAIRS & IMPROVEMENT

1. Work completed since last inspection.

a. NONE

2. Proposed or recommended improvements.

a. Install "One Lane Bridge" signs per standard plan TE-67.

b. Repair all concrete defects as recommended on attached sheets.

c Install approach guardrails per Std. Details R-22, R-23, and R-24.

Inspected by: Steven P. Newburn

Title: SUPV INSP

Reviewed by: _____

Title: _____

BRIDGE INVENTORY

DEFECTS CODING GUIDE

Material	Code No.	Description of Defect
Concrete	1	Hairline Cracks in Concrete
Concrete	2	Cracks in Concrete
Concrete	3	Spalled Concrete
Concrete	4	Spalled Concrete with reinforcing exposed
Concrete	5	Scaling
Concrete	6	Honeycomb Voids
Concrete	7	Efflorescence
Concrete	8	Rust Stains
Concrete	9	Weathered/Waterstained
Timber	10	Split Timber
Timber	11	Decayed Timber
Timber	12	Crushed Timber
Timber	13	Splintered Timber
Timber	14	Weathered/Worn Timber
Timber	15	Insufficient Nailing or Bolting
Steel	16	Rusted Steel
Steel	17	Corroded Steel
Other	18	Erosion
Other	19	Undermining
Other	20	Footing exposed
Other	21	Settlement of Pavement
Other	22	Vegetation Growth
Other	23	Debris
Other	24	Scour
Other	25	Cracks on Pavement

Recommended Repair of cracks and spalls in concrete

Cracks

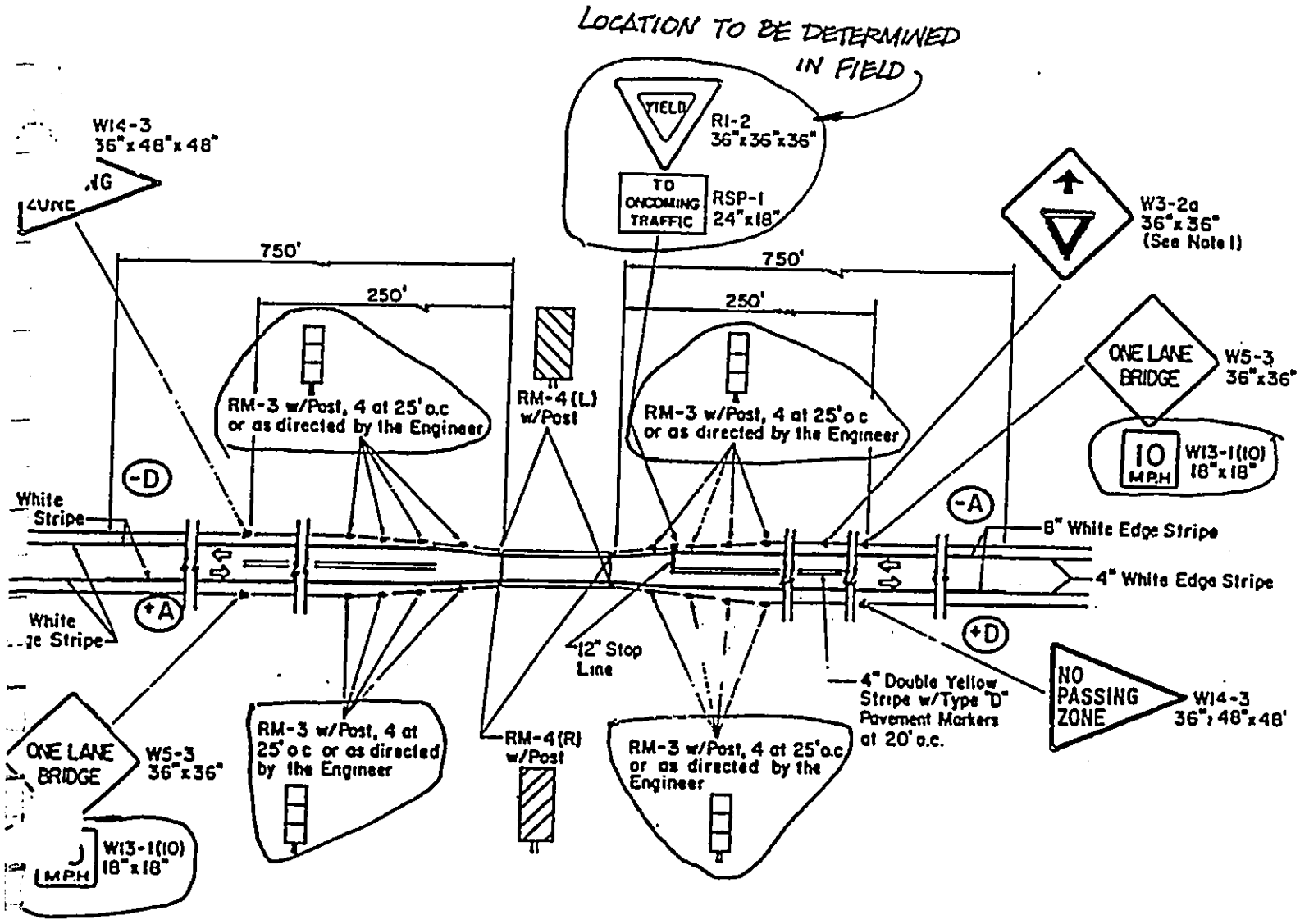
1. Rout crack with concrete saw or chipping tools
2. Flush out crack with water or solvent
3. Allow surface to dry (use hot-air jet, if required)
4. Drill 3/4" ø holes, approximately 3/4" deep @ 6" to 12" o.c., into crack.
5. Surface seal crack with joint sealant & install epoxy injection valves in 3/4" ø holes, secured with epoxy bonding compound.
6. Inject epoxy bonding compound into crack until the compound flows out of the adjacent sections of the crack or begins to bulge out of the surface seals.

Spalls

1. Remove all unsound, damaged and undersirable concrete.
2. If reinforcing is exposed, remove undesirable concrete around reinforcing, to a sound substrate. Clean reinforcing steel free of rust, scales, oils, and other foreign matter deleterious to bonding. (Sandblasting is desireable).
3. Clean surface to be joined free of moisture, dust, rust, etc.
4. Apply epoxy bonding compound to surface to be joined.
5. Apply lean, stiff mix concrete to repair area. If form work is involved, new concrete can be applied pneumatically.

Papaahawahawa Bridge

STRUCTURE NO.: 28	FEATURES INTERSECTED: Papaahawahawa Stream	COUNTY of MAUI DEPT. of PUBLIC WORK
ISTRICT: Hana		INVENTORY OF BRIDGE
LOCATION (T.M.K.): 1-5-06		



TYPICAL ONE LANE BRIDGE DELINEATION

NOTES:

1. YIELD AHEAD sign (W3-2a) shall be installed only on approaches to a YIELD sign (R1-2) that is not visible for a sufficient distance to permit a driver to bring his vehicle to a stop at the YIELD sign. Final location will be determined in the field by the Engineer.

2. Stop line and YIELD signs shall be installed on the approach that has the longer or better sight distance. Final location will be determined in the field by the Engineer.

3. Signs shall be spaced a minimum of 125 feet apart in the same direction of traffic.

reatment

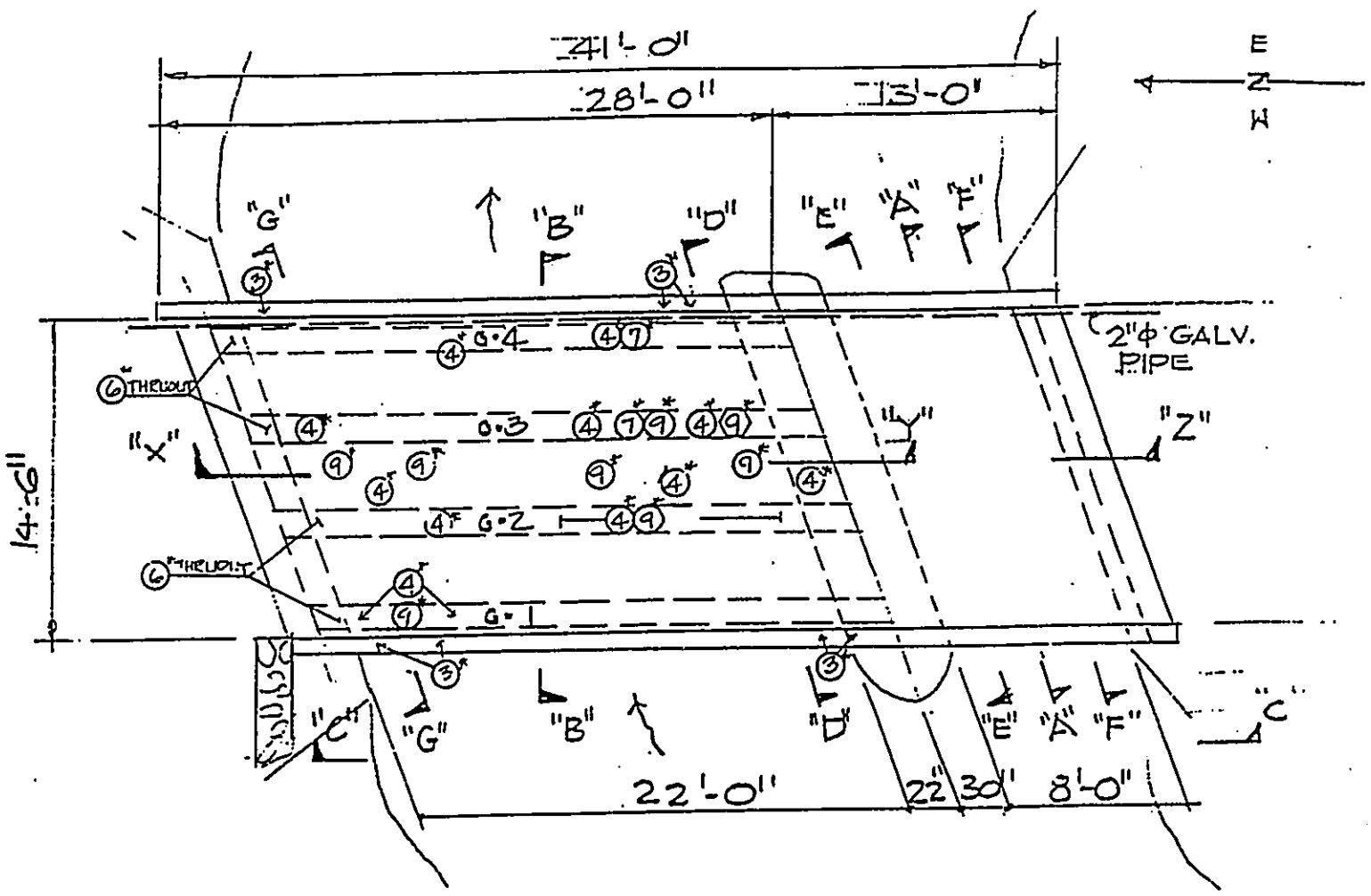
DATE	REVISION	APP'D

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLAN TE-67

DELINEATION AND PAVEMENT MARKINGS AT BRIDGES

Eiichi Tanaka — APPROVED
2/28/86 — DATE

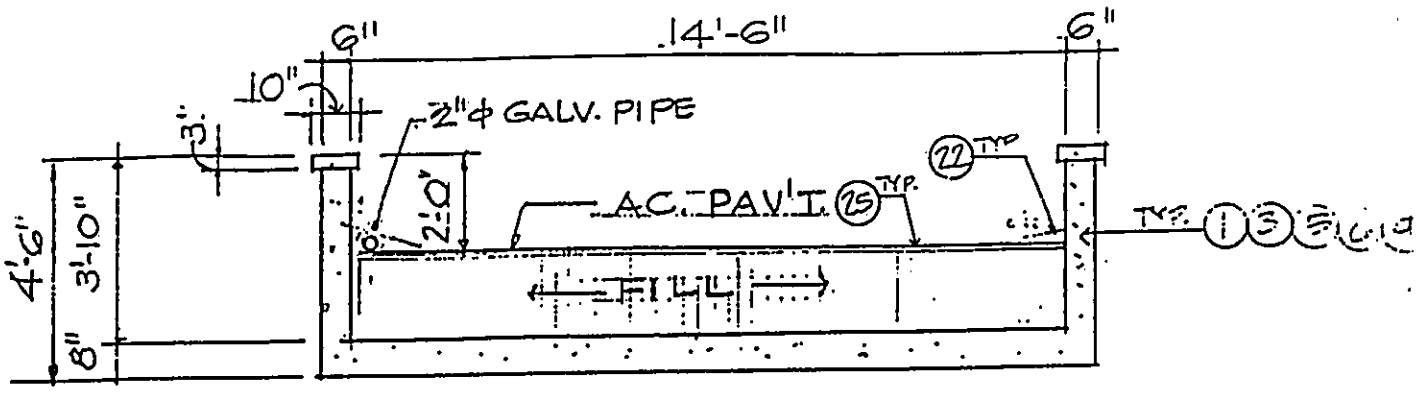


PLAN

SCALE: 1/8" = 1'-0"

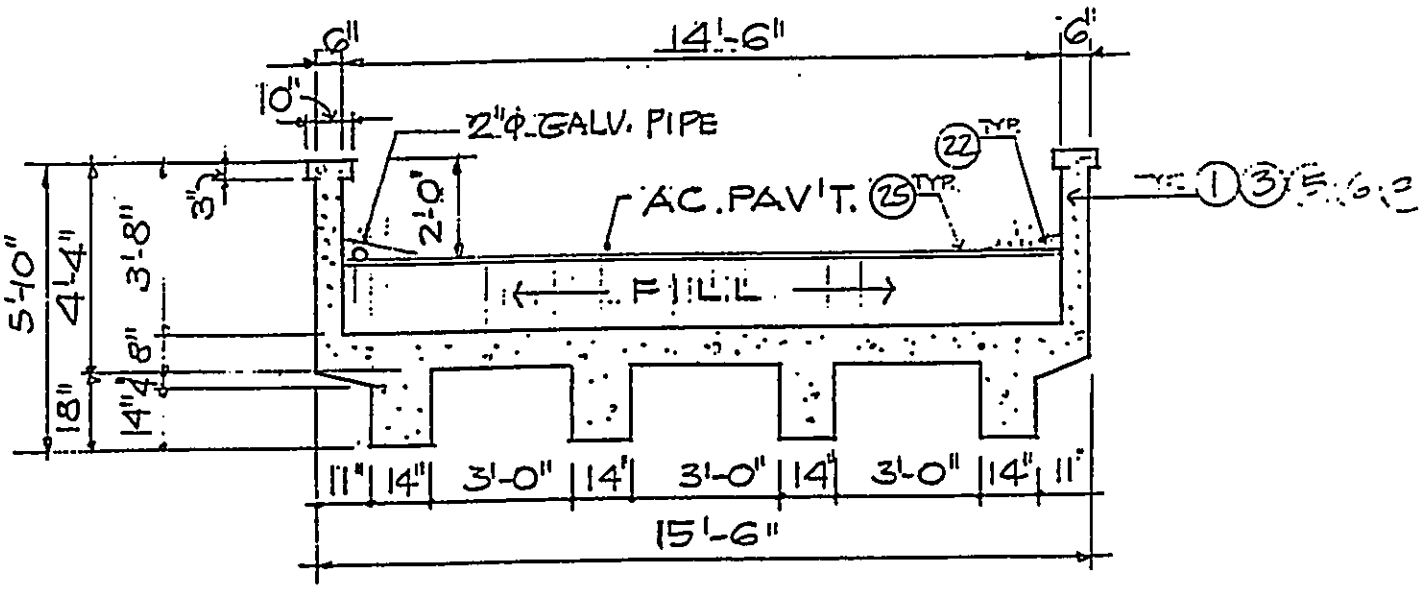
PAPAAHAWAHAWA BRIDGE @ HANA HWY / PAPAAHAWAHAWA STREAM

STRUCTURE NO.: 28	FEATURES INTERSECTED: PAPAAHAWAHAWA STREAM	COUNTY of MAUI DEPT. of PUBLIC WORKS
DISTRICT: S. HANA		INVENTORY OF BRIDGES
LOCATION (T.M.K.): 1-5-06		



SOUTH BRIDGE CROSS-SECTION "A-A"

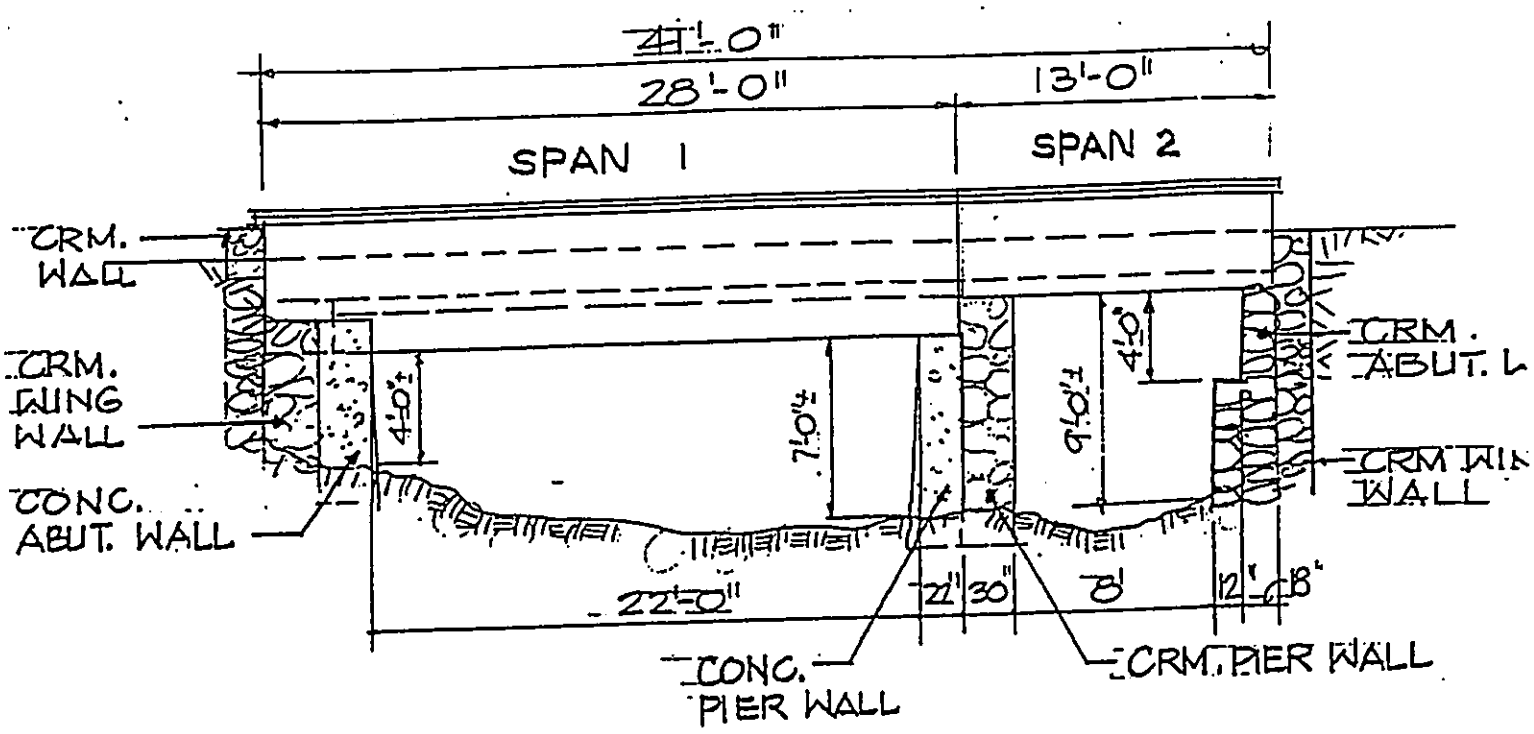
SCALE: 1/4" = 1'-0"



NORTH BRIDGE CROSS-SECTION "B-B"

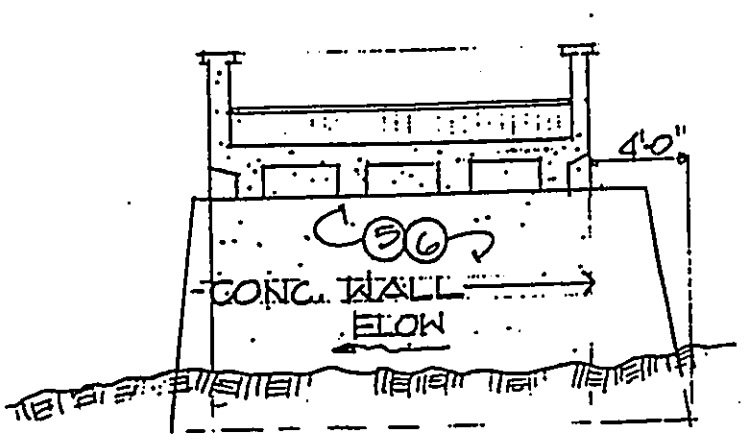
SCALE: 1/4" = 1'-0"

STRUCTURE NO.: 28	FEATURES INTERSECTED: PAPAAHAWAHAWA STREAM	COUNTY of MAUI DEPT. of PUBLIC WORKS
DISTRICT: S. HANA		INVENTORY OF BRIDGES
LOCATION (T.M.K.): 1-5-06		

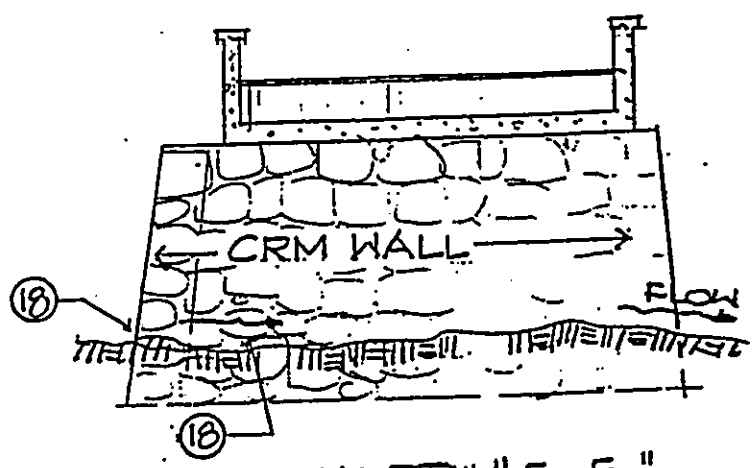


WEST ELEVATION "C-C"

SCALE: 1/8" = 1'-0"



LOOKING SOUTH "D-D"



LOOKING NORTH "E-E"

PIER SECTIONS

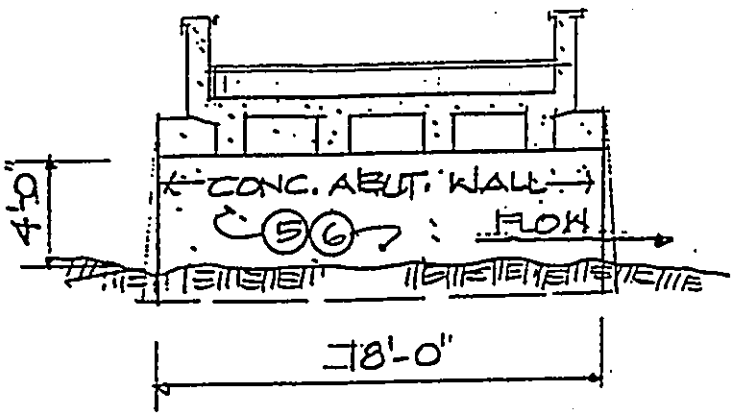
SCALE: 1/8" = 1'-0"

PAPAAHAWAHAWA BRIDGE

STRUCTURE NO.: 28	FEATURES INTERSECTED: PAPAAHAWAHAWA STREAM
DISTRICT: S. HANA	
LOCATION (T.M.K.): 1-5-06	

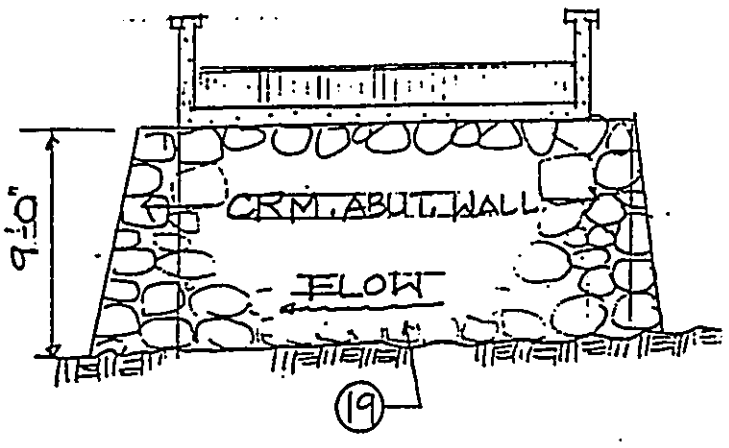
COUNTY of MAUI
DEPT. of PUBLIC WORK

INVENTORY OF BRIDGE



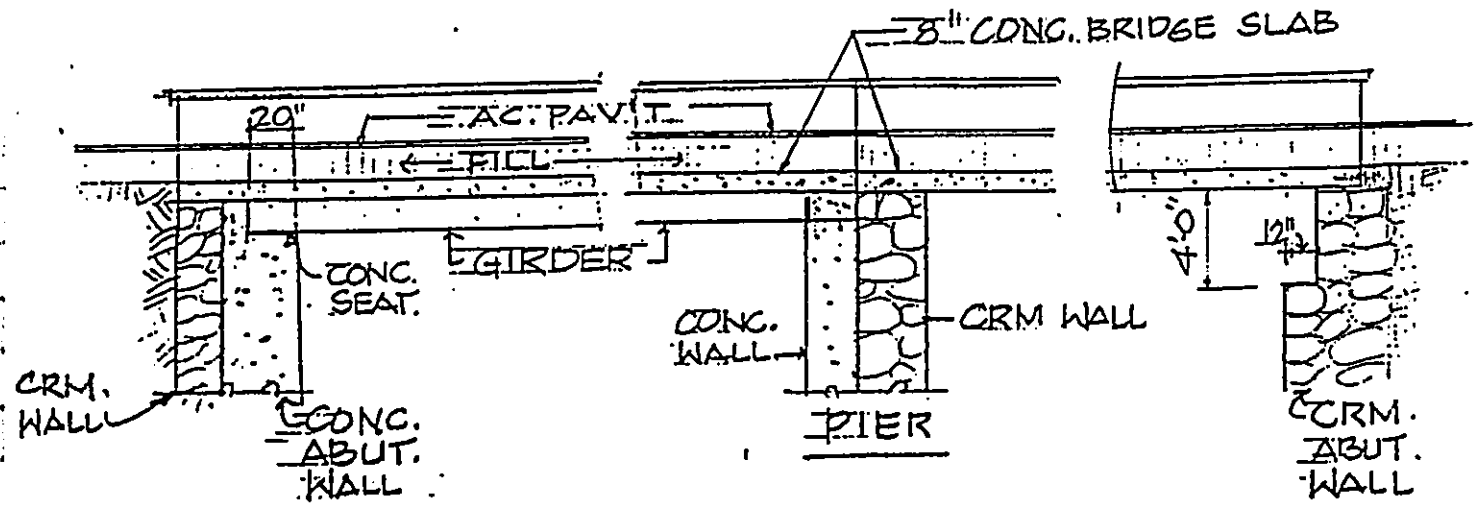
NORTH ABUT. SECTION "G-G"

SCALE: 1/8" = 1'-0"



SOUTH ABUT. SECTION "F-F"

SCALE: 1/8" = 1'-0"



NORTH ABUT. "X" | PIER "Y" | SOUTH ABUT. "Z"

ABUTMENT & PIER DETAILS "H-H"

SCALE: 1/8" = 1'-0"

STRUCTURE NO.: 28	FEATURES INTERSECTED: PAPAAHAWAHAWA STREAM	COUNTY of MAUI DEPT. of PUBLIC WORKS
DISTRICT: S. HANA		INVENTORY OF BRIDGES
LOCATION (T.M.K.): 1-5-06		

☐ ARCHITECTURAL
☒ STRUCTURAL
☐ CIVIL
☐ PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY BVH
CHECKED BY
DATE AUG 1980

PAPAAHAWAHA STREAM
28

PROJECT C2365-01
SHEET NO. 1 OF 2 SHEETS

2 SPAN CONCRETE SLAB/GIRDER BRIDGE

INVENTORY
$f_c = 800$ psi
$n = 15$
$f_s = 18000$ psi

OPERATING
$f_c = 1100$ psi
$f_s = 25000$ psi

CHECK 0'-0" SPAN = CONCRETE SLAB:

$t = 8"$ $d = 8" - 2.5 = 5.5"$ $A_s = .01(5.5)(12) = .66 in^2$

$\frac{12kd^2}{2} = 15(.66)(5.5 - kd) = 0$

$kd^2 + 1.65kd - 9.08 = 0$

$kd = 2.3"$ $jd = 4.73"$

$M_s = \frac{18}{12} \times 4.73 \times .66 = 4.68^{k-1}$ $M_c = \frac{.8}{2} \times 2.3 \times 4.73 = 4.35^{k-1}$

DEAD LOAD:

$8/12 \times 144 = 24$ #/ft

$20/12 \times 120 = 200$

$8/12 \times 150 = 100$

324 #/ft

$M = \frac{.324(9)^2}{8} = 3.28^{k-1}$

INVENTORY
$M_{INV} = 4.35 + 3.28 = 1.07^{k-1}$

OPERATING
$5.98 - 3.28 = 2.70^{k-1}$

H$_S$ 20 LOADING

$M = 900 \times 9 \times 1.3 = 10.5^{k-1}$

INVENTORY
$\frac{1.07}{10.5} \times 20 = H\ 2.04$

OPERATING
$\frac{2.70}{10.5} \times 20 = H\ 5.14$

POSTED GVW
$\frac{5.14}{1.05} = 5$ TONS

☐ ARCHITECTURAL
☒ STRUCTURAL
☐ CIVIL
☐ PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

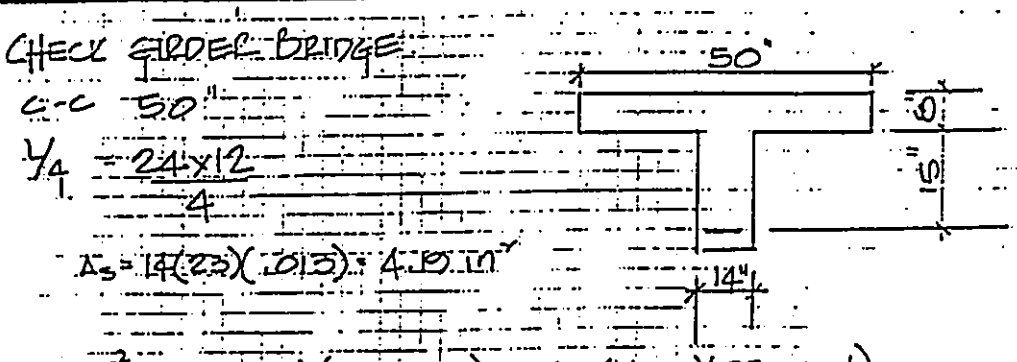
COMPUTED BY EKH
CHECKED BY
DATE AUG 1980

PAPAAHAWAHA STREAM
#26

PROJECT C2368-01

SHEET NO. 2 OF 2 SHEETS

CHECK GIRDER BRIDGE



c-c 50"

$y_4 = \frac{24 \times 12}{4}$

$A_s = 14(23)(.013) = 4.19 \text{ in}^2$

$\frac{14kd^2}{2} + 30(8)(kd-4) = 15(4.19)(23-kd)$

$kd^2 + 50.12kd - 371.08 = 0$

$kd = 6.55" \quad jd = 20.82"$

$M_s = \frac{18}{12} \times 20.82 \times 4.19 = 130.85^{k-1}$

$M_c = \frac{.8}{2} \times 6.55 \times 20.82 \times \frac{50}{12} = 227.27^{k-1}$

DEAD LOAD

$\frac{2}{12} \times 144 = 24$

$\frac{18}{12} \times 120 = 180$

$\frac{8}{12} \times 150 = 100$

$304^{\#/ft} \times 4.17 + 1.17 \times 1.17 \times .150 = 1.47^{k/'}$

$M = \frac{1.47(24)^2}{8} = 106.06^{k-1}$

$M_{INV} = 130.85 - 106.06 = 24.79^{k-1} \qquad M_{OPER} = 181.74 - 106.06 = 75.68^{k-1}$

CHECK HS 20 LOADING

$P = 16 \times 1.3 \times \frac{4.17}{6} = 14.46^{k} \qquad M = \frac{14.46(24)}{4} = 86.74^{k-1}$

INVENTORY

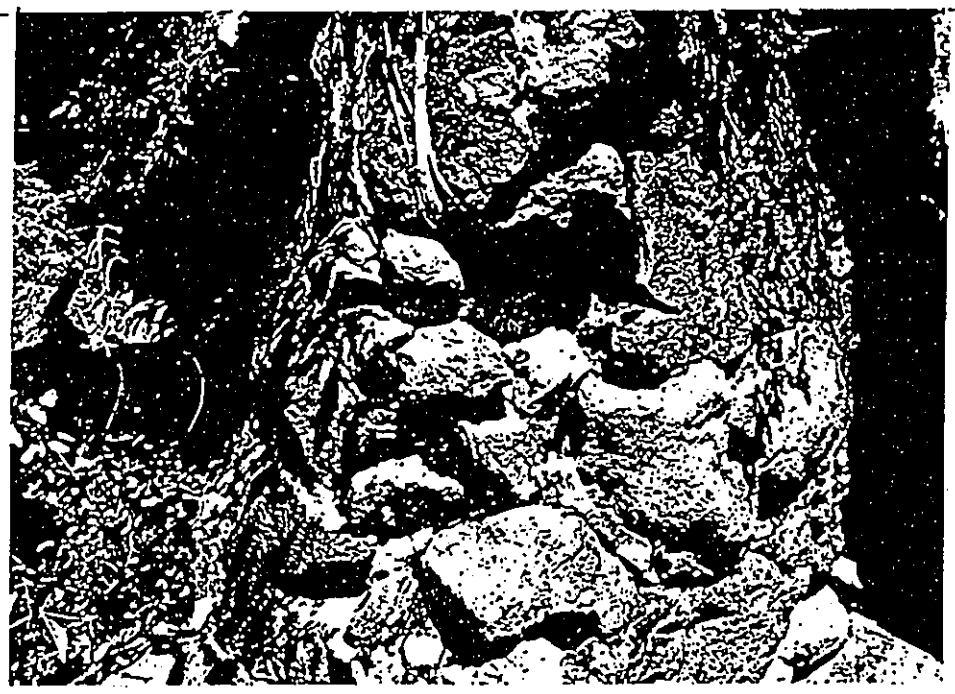
$\frac{24.79}{86.74} \times 20 = \text{H } 5.72$

OPERATING

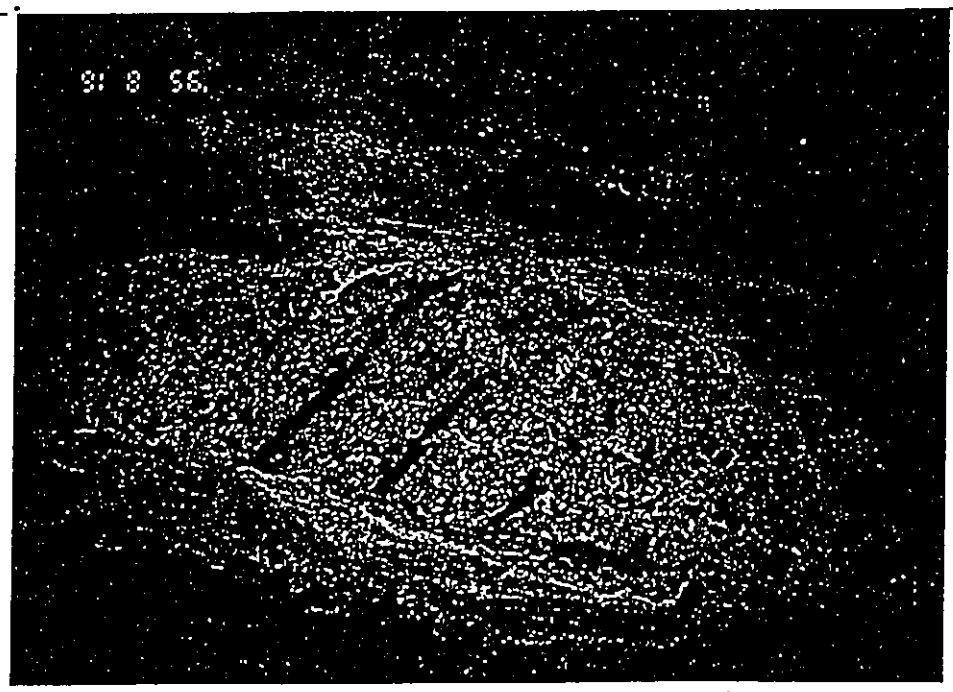
$\frac{75.68}{86.74} \times 20 = \text{H } 17.45$

County of Maui
Department of Public Works
Engineering Division

Photo's and Description
PAPAAHAWAHAWA #28



7. Upstream, nose of CRM pier, section loss.



8. Underside deck, Hana span, spall w/ rein. exposed.

Prepared by: Steven P. Newhouse

Title: Supv. Const. Insp.

County of Maui
Department of Public Works
Engineering Division

Photo's and Description
PAPAAHAWAHAWA #28

5. Downstream, Kaupo CRM abutment, section loss.

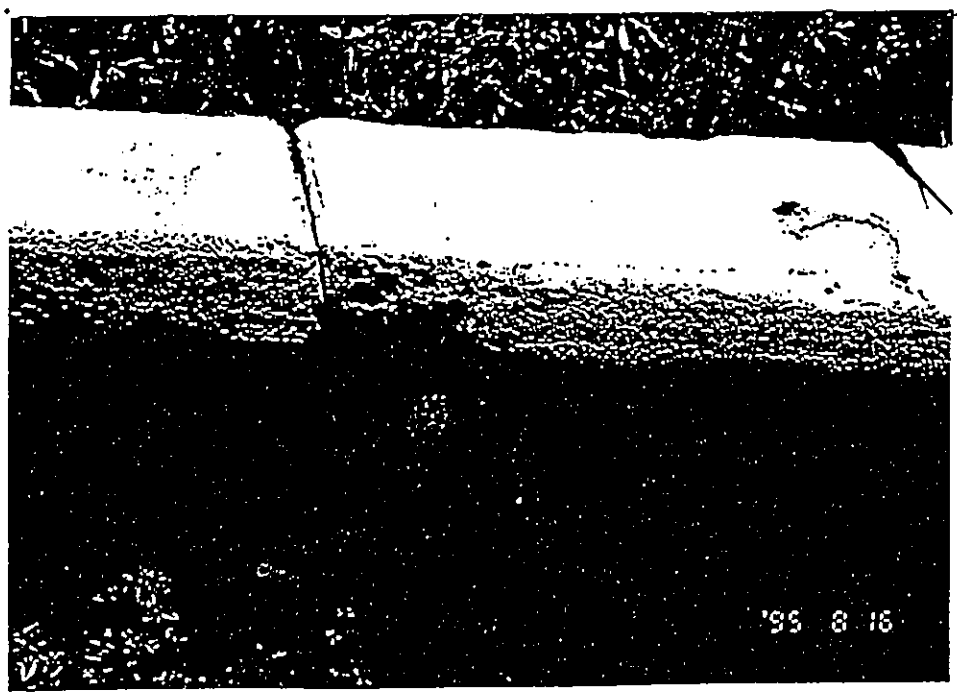
6. Hana span, section loss, rein. exposed, typical to all girders.

Prepared by: Steven P. Newhouse
Title: Supv. Const. Insp.

County of Maui
Department of Public Works
Engineering Division

Photo's and Description
PAPAAHAWAHAWA #28

3. Downstream parapet, 4" Driscoll waterline attached to parapet.



4. Downstream parapet, honeycomb, and scaling to chamfer of parapet.

Prepared by: Steven P. Newhouse

Title: Supv. Const. Insp.

County of Maui
Department of Public Works
Engineering Division

Photo's and Description
PAPAAHAWAHAWA #28

1. Approach, looking toward Kaupo.

2. Elevation, looking upstream.

Prepared by: Steven P. Newhouse

Title: Supv. Const. Insp.

APPENDIX B

Geotechnical Site Reconnaissance Report for Papaahawahawa Bridge Replacement

Fewell Geotechnical Engineering, Inc.

December 1995

FEWELL
GEOTECHNICAL
ENGINEERING, LTD.

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FAX (808) 456-7062

Maui Office
251 Lalo Place, Unit G-2
Kahului, Maui 96732
(808) 873-0110
FAX (808) 873-0906

Kauai Office
4180 Rice Street, #106B
Lihue, Kauai 96766
(808) 245-8982
FAX (808) 245-8982

File 1434.01
August 28, 1995

Wilson Okamoto & Associates, Inc.
1907 South Beretania Street, 4th Floor
Honolulu, Hawaii 96826

Attention: Mr. Myron Okubo
Senior Project Manager

Subject: **Geotechnical Site Reconnaissance Report**
Papaahawahawa Stream Bridge Replacement
Hana, Maui, Hawaii

We have completed a geotechnical site reconnaissance for the proposed Papaahawahawa Stream Bridge Replacement in Hana, Maui, Hawaii. This report summarizes our findings and conclusions, and presents geotechnical recommendations for the design and construction of the proposed bridge replacement. This work has been completed in general accordance with our October 24, 1994 Proposal and your Subconsultant Agreement of Services, executed on July 26, 1995.

Project Description - The site of the existing bridge crossing Papaahawahawa Stream is at milepost 46.4 along the Hana Highway. The general area is shown on the attached Project Location Map, Figure 1.

Papaahawahawa Stream is a shallow intermittent stream on the eastern flank of Haleakala south of Hana. At the current bridge crossing, the stream is about 8 feet below the bridge deck and is about 40 feet wide. A small water treatment facility is on the downstream-Kahului side of the stream, and the approach embankments on this side drop off in the downstream direction at a slope of about 2 Horizontal to 1 Vertical (2H:1V) for heights of 6 to 8 feet. The upstream side of both bridge approaches are relatively level for distances of 15 to 30 feet adjacent to the road, then slope upward at slopes ranging from approximately 3H:1V to 2H:1V.

The existing bridge crossing the stream is a single-lane bridge about 16 feet wide by approximately 40 feet in length. It has a concrete deck supported on concrete abutments and a single intermediate pier. The existing abutments are founded on the existing streambed and act as retaining walls to elevate the bridge and roadway approaches above the stream.

The preliminary drawings by Wilson Okamoto & Associates, Inc. indicate that the new bridge will be a two-lane, single-span bridge, which will be constructed immediately adjacent to the downstream side of the existing bridge, so that the existing bridge can remain open during the new construction. The alignment of the bridge and its related approaches is shown on the attached Site Plan, Figure 2.

The new bridge will be a concrete bridge measuring 36 feet wide by about 36 feet long. Reinforced concrete retaining wall abutments, between 9 and 12 feet high, will be used to elevate the road and the bridge approaches above the stream. The deck elevation of the bridge will vary from Elev. 126.5 at the eastern abutment, to Elev. 127.7 on the western side of the bridge. The preliminary loading information indicates that the wall loads of the abutments will be about 12 kips per linear foot.

Due to the lower elevations on the downstream side of the stream, approximately 170-foot long by about 8 to 10 feet high approach embankments will be required on both sides of the bridge to re-route the road to the new bridge location. Mechanically Stabilized Earth (MSE) retaining walls are proposed to support the grade differences along the downstream side of the approach embankments.

Site Reconnaissance - A site reconnaissance of the existing bridge crossing was performed on August 15, 1995. The observations of the site reconnaissance indicate that the existing bridge foundations are bearing on massive basalt exposed at the bottom of the steam, which was flowing at the time of our reconnaissance. The existing bridge approaches are likely underlain by up to 5 feet of fill over basalt.

Basalt is exposed throughout most of the streambed and along its banks and the adjacent slopes on the downstream side of the bridge approach embankments. Numerous surface boulders overly the basalt within the streambed. A thin soil mantle, averaging about 1 foot in thickness, covers the banks on both sides of the stream with outcrops of massive basalt exposed in the stream banks.

The available geologic information indicates that the basalt originated from the Kula Volcanic Series, a series of older Aa flows which average about 18 to 20 feet in thickness.

Discussion - Our site reconnaissance indicates that the proposed bridge replacement is underlain by massive surface, or near-surface basalt which should provide excellent support for the proposed construction.

The major geotechnical concerns associated with the proposed construction is the anticipated difficulties in excavating the intact rock. Our site reconnaissance and review of the available geologic information indicate that the basalt is hard, massive and will be extremely difficult to excavate. The use of heavy rock-excavating equipment, such as large, trackhoe-mounted hoerams, will be required for most of the rock excavation.

The preliminary information indicates that MSE retaining walls, such as a Reinforced Earth wall, a Genesis block wall using Tensar Geogrids, or equivalent, will be used to support the new approach embankments. Although over-excavation of the existing approach embankments would be necessary, these retaining walls can be constructed concurrently with the wall backfill and are probably less expensive than concrete retaining walls, considering the remote location of the site.

Due to the lengths of reinforcing generally required near the bottom of the wall, larger and deeper excavation of the existing embankment would be required to install the MSE wall than with a standard concrete wall. Smaller equipment and special grading procedures would be required for the MSE construction to protect the reinforcing strips from damage from the construction equipment.

Although the intact basalt supporting the abutment retaining walls should not be susceptible to scour from the stream flows, the granular backfill behind the MSE walls can wash out during heavy stream flows and some type of erosion protection will likely be required for the lower portions of the MSE walls.

MSE walls are generally proprietary products and should be designed by the manufacturer and constructed in accordance with their recommendations. Should MSE walls be used in conjunction with the embankment construction, the material and compaction requirements of the approach embankments should be revised, where necessary, to conform to the manufacturer's requirements.

Recommendations

Site Preparation - Prior to the start of the actual construction, the areas designated to receive the new construction should be cleared and grubbed in accordance with Section 201 of the State of Hawaii Standard Specifications for Road, Bridge, and Public Works Construction (Standard Specifications). All organics, above-ground vegetation, rubbish, and other deleterious material should be wasted off-site.

Areas to receive fill which are steeper than 4H:1V, including those areas where the new bridge approach embankments will tie into the slopes of the existing road embankment, should be benched with a series of horizontal terraces prior to fill placement. The benches should extend through any loose surface materials into compacted fill.

Site Grading - Once the site has been properly prepared, grading operations may begin to generate the finished grades. The preliminary design scheme indicates that the proposed construction will include only minor excavations and, therefore, imported fill will be required to backfill the abutment walls and to construct the proposed approach embankments.

Heavy rock-excavating equipment, such as trackhoe-mounted hoerams, will be required to complete the excavations for the abutment foundations. The excavated rock material will likely consist of rock fragments greater than 6 inches in diameter which is unsuitable for use as fill or backfill. The excavated rock material should be properly disposed of off-site.

Imported fill used to backfill behind the abutment walls should consist of a granular material with no more than 15 percent passing the No. 200 sieve, and which also conforms to Structure Backfill A requirements of Section 703.20 of the Standard Specifications. Imported fill used to construct the reinforced section of the MSE approach embankments should conform to the requirements for Aggregate Subbase, as indicated in Section 703.17 of the Standard Specifications, but should have a maximum particle size of 3 inches.

Imported fill for use as general embankment fill, behind the reinforced zone of the MSE walls, should be low-expansion soil (less than 3 percent swell when tested in accordance with AASHTO T-193, Interim 1991), free of organics, deleterious material, and rocks or soil clods greater than 3 inches in diameter, with a sand equivalency of 15 or more. Additionally, fill and backfill used to construct the upper 3 feet of the roadway embankments should have a California Bearing Ratio (CBR) of at least 12.

Should areas designated to receive fill or backfill be underlain by soil, they should be scarified, moisture-conditioned to within 3 percent of the optimum moisture content, and uniformly compacted to at least 90 percent of the soil's maximum dry density as determined

by Laboratory Compaction Test AASHTO T-180, for a minimum depth of 6 inches. Where the existing ground to receive fill or structural units is within 3 feet of the road subgrades, the ground should be similarly scarified and moisture-conditioned and uniformly compacted to at least 95 percent relative compaction, as determined by the above-referenced Subsection, for an area extending at least 3 feet beyond the edge of the roadbed.

Should soil be encountered at the pavement subgrade level where the new approach embankments tie into the existing embankments, it should be overexcavated down to rock and the resulting depression backfilled with material conforming to, and placed and compacted in accordance with, these recommendations.

Fill and backfill should be placed in maximum lifts of 8 inches in loose thickness, moisture-conditioned to within 3 percent of its optimum moisture content, and uniformly compacted to at least 90 percent relative compaction as determined by AASHTO T-180. Fill placed within the upper 3 feet of the road subgrade, should be compacted to at least 95 percent relative compaction.

Abutment Retaining Walls - The non-yielding abutment retaining walls should be designed for an at-rest lateral earth pressure of 50 pounds per cubic foot (p.c.f.) for granular wall backfill which conforms to the requirements of Structure Backfill A of the Standard Specifications and has less than 15 percent passing the No. 200 sieve. This pressure is given in terms of equivalent fluid pressure and does not include surcharge, foundation, or hydrostatic pressures, which must be added where appropriate.

The wall backfill behind the abutments should be placed and compacted in accordance with the Grading recommendations using light compaction equipment. The compaction of the wall backfill below a depth of 3 feet beneath the finish road grade should not exceed 95 percent relative compaction to reduce the lateral pressures against the walls.

The bridge abutments may be supported on shallow, continuous foundations bearing within the basalt where they may be designed for maximum allowable bearing pressures of 10,000 pounds per square foot. This value may be increased by one-third for short-term wind and seismic loads.

The abutment foundations should be embedded at least 6 inches into the massive basalt and should have a minimum base width of 3 feet. A friction factor of 0.6 may be used between the bottom of the foundation and the underlying basalt, to resist sliding. The bottom of the footing excavations should be cleaned out of all loose material prior to the placement of reinforcing steel or concrete.

The bottom of the abutment foundations should be probed to a depth equal to two times the footing width, but no greater than 10 feet below the bottom of the foundation to evaluate the presence of voids, cavities, or layers of loose ash within the basalt. The probes should be drilled near the center footing, measured along the footing's width, at horizontal intervals of no more than 10 feet, as measured along the length of the footing. Any voids or cavities encountered in the probing operations should be backfilled with lean concrete.

Adequate drainage, in the form of weepholes or transverse drains, should be provided behind the walls to minimize the build-up of hydrostatic pressures. Transverse drains should consist of perforated pipe surrounded by 6 inches of filter material, or ASTM D448 No. 6 Gravel (3B Fine) wrapped in non-woven filter fabric. Should weepholes be used, a continuous drainage blanket of filter material, or 3B Fine wrapped in non-woven filter

fabric, at least 12 inches in width, should be placed behind the wall and weepholes, up to within 12 inches of the finish subgrade. Filter material should conform to Section 703.18 of the Standard Specifications. The non-woven filter fabric should conform to Section 712.56 of the specifications.

Since the temporary build-up of hydrostatic pressures behind the abutment walls probably cannot be avoided during high stream flows, the walls should be designed to withstand the hydrostatic pressures associated with the stream's high water level.

Steel reinforcement of the walls and their foundations should be provided as recommended by the Project Structural Engineer. Negligible total and differential settlements are anticipated for the abutment foundations under the design loads indicated under the Project Considerations section of this report.

MSE Retaining Walls - MSE retaining walls should use Aggregate Subbase conforming to Section 703.17 of the Standard Specifications within the reinforced zone behind the MSE wall. The backfill within the MSE reinforced zone should be placed and compacted in accordance with the manufacturer's requirements.

For reinforced backfill consisting of Aggregate Subbase, a friction angle of 34 degrees and a moist unit weight of 136 p.c.f. may be used for the preliminary design. The proposed fill material should be tested prior to the actual construction, to verify these design parameters.

The reinforced zone behind the MSE wall should be founded on level ground. The area of the reinforced zone and the MSE wall should be excavated such that there is a minimum lateral distance of 4 feet between the lower outside edge of the wall and the compacted slope face.

The leveling pad beneath the facing units of the MSE wall should consist of at least 6 inches of lean concrete bearing upon the massive basalt. Adequate erosion protection should be provided at the toe of the MSE wall to minimize the potential for the granular reinforced wall backfill being washed out from behind the wall during heavy stream flows.

The design of MSE walls may use either steel or polymeric reinforcement and should conform to Section 5.8 of the AASHTO Standard Specifications for Highway Bridges. For cost estimating purposes, our preliminary analysis indicates that for a 10-foot high MSE wall reinforced with geogrids possessing long-term design strengths of at least 1,500 pounds per foot, 8-foot long geogrids spaced at an average vertical interval of 2 feet will be required.

Pavements - Provided the grading recommendations of this report have been followed, the subgrade beneath the pavement sections of the bridge approaches should consist of either intact basalt, Aggregate Subbase, or imported granular material exhibiting a CBR of at least 12.

No design traffic information is currently available to us and we have assumed the following design traffic parameters for the lightly traveled rural highway.

1. Average Daily Traffic of 1,000 vehicles per day over a 20-year design period.

2. Two percent truck traffic consisting of HS-20-type trucks.

For the above subgrade conditions and the assumed design traffic, our analysis indicates that a pavement section consisting of 2.5 inches of Asphalt Concrete Pavement over 5 inches of Asphalt Concrete Base and 8 inches of Aggregate Subbase placed over the compacted subgrade, should provide adequate pavement support. Should the actual design traffic differ from that indicated above, FGE, Ltd. should be notified so that these recommendations can be reviewed and revised if necessary.

The Asphalt Concrete Pavement and the Asphalt Concrete Base should conform to the applicable requirements of the Standard Specifications. The pavement subgrade should be sloped to drain and compacted to at least 95 percent relative compaction as determined by AASHTO T-180 for minimum depth of 6 inches prior to the placement of the Asphalt Concrete Base Course layer.

The above recommended pavement section was evaluated in general accordance with the State of Hawaii Department of Transportation's (HDOT) design guidelines for flexible pavements except for the following:

1. The permeable base course layer and the pavement subdrains were omitted from the pavement recommendations.

2. The minimum 6-inch thickness required by HDOT for base course layers was omitted to conform to the County of Maui Standards.

Miscellaneous - Utility backfills should be placed and compacted in accordance with the grading recommendations and the applicable sections of the Standard Specifications. Adequate cushion materials should be provided around the subsurface utilities to prevent point loads from the intact basalt.

Drainage provisions should be included into the design of the project to preclude the ponding of water adjacent to or beneath the structure and its foundations.

All site excavations should be sloped back or adequately shored and braced by the contractor in accordance with the applicable government regulations.

The Uniform Building Code, 1988 edition, indicates that the site is in Seismic Zone 2B. The Site Coefficient S1 applies to the site's subsurface profile.

Quality Control - The site grading and backfilling operations should be monitored by FGE, Ltd. Intermittent density tests should be taken to determine whether the specified levels of compaction are consistently obtained in the fills and backfills.

Samples of the proposed imported fill materials should be submitted to FGE, Ltd. no less than 7 working days prior to their intended jobsite delivery to allow adequate time for testing, evaluation, and approval.

The foundation excavation and the foundation probing operations should be monitored by FGE, Ltd. prior to the placement of the reinforcing steel to verify that the anticipated bearing materials have been encountered and that the foundation excavations have been properly prepared in accordance with the foundation recommendations. The recommendations given herein are contingent upon adequate construction monitoring by FGE, Ltd.

Limitations - This report has been prepared for the exclusive use of **Wilson Okamoto & Associates, Inc.** for the proposed **Papaahawahawa Stream Bridge Replacement** in Hana, Maui, Hawaii. No warranty, expressed or implied, is made.

The recommendations of this report are based upon a visual site reconnaissance and the assumption that the subsurface conditions do not deviate from those observed. The recommendations of this report are contingent upon verification of the subsurface conditions during construction.

If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the present time, FGE, Ltd. should be notified so that supplemental recommendations can be given. The conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

FGE, Ltd. should be provided the opportunity for general review of the final design drawings and specifications in order to verify that the earthwork and foundation recommendations have been properly interpreted and implemented in the design and specifications. If FGE, Ltd. is not accorded the privilege of making this recommended review, it can assume no responsibility for misinterpretations of the recommendations.

FGE, Ltd. should also be retained to provide periodic soil engineering services during construction. This is to observe compliance of the design concepts, specifications, and recommendations and to allow design changes in the event the subsurface conditions differ from that anticipated prior to construction.

Should you have any questions pertaining to any aspect of this report, or if we can be of further assistance to you, please do not hesitate to contact us.

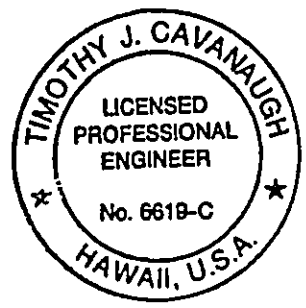
Respectfully submitted,

FEWELL GEOTECHNICAL ENGINEERING, LTD.

By Timothy J. Cavanaugh, P.E.

TJC:ajs/tjc

Enclosures



LEGEND:

PROJECT LOCATION

SCALE: 1"= 2000'

GENERAL AREA:

HANA, MAUI, HAWAII

REFERENCE:

KIPAHULU QUADRANGLE
U.S.G.S. TOPOGRAPHIC MAP

F.G.E. Ltd.

PROJECT LOCATION MAP

Papaahawahawa Stream Bridge Replacement
Hana, Maui, Hawaii

File: 1434.01

Date: August 1995

Figure 1

APPENDIX C

Environmental Reconnaissance Survey for Papaahawahawa Bridge

AECOS, Inc.

December 1995

AECOS No. 805B

Environmental Reconnaissance Survey for the Papaahawahawa Bridge on Piilani Highway, Hana, Maui

Prepared for:

Wilson Okamoto & Associates, Inc.
1907 So. Beretania St., Suite 400
Honolulu, Hawaii 96826

Prepared by:

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PAPAHAWAHAWA STREAM

INTRODUCTION

This report presents the results of a site survey conducted on November 28, 1995 at the proposed location of new road bridge over Papahawahawa Gulch (Hana District, Maui) located approximately 5 miles (8 km) south of the town of Hana, East Maui. The proposed bridge would replace the existing Papaahawahawa Bridge at this same location on Piilani Highway and would be built by the County of Maui. The correct name for the stream and gulch appears to be Papahawahawa (Pukui, Elbert, & Mookini, 1974; Geographic Decision Systems International, 1994), but the name Papaahawahawa is used in County records for the bridge (and is stenciled on the structure) and appears on the USGS 7.5-minute series topographic sheet (Kipahulu Quadrangle, 1983) and in the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990). Papahawahawa will be used here for the stream and gulch and Papaahawahawa in reference to the bridge in order to maintain consistency with existing records.

The field reconnaissance survey encompassed Papahawahawa Gulch from a point approximately 325 ft (100 m) upstream of Piilani Highway (State Rte. 31) to the coastal outlet approximately 800 ft (250 m) downstream of the highway. During the field visit aquatic resources were surveyed, a list of riparian vegetation made, stream/wetland boundaries at the proposed bridge crossing point assessed, and a single water sample collected. Permission to enter areas off the State highway was granted by the property owner, Hanahuli Association, Ltd.

STREAM DESCRIPTION

Papahawahawa Gulch is located on the southeast slope of Haleakala (East Maui), south of Hana town, near Muolea (Figure 1). The drainage basin for this stream extends to about the 2100-ft (640 m) elevation, being one of a number of small streams and gullies in the area that have had their drainages pirated (intercepted over geological time) by the streams in Waiho'i Valley to the north. The overall area of the Papahawahawa watershed is calculated at 1,070 acres (Geographic Decision Systems International, 1994). The uppermost part of this watershed is indicated as a wetland along the south side of the gap into Waiho'i Valley, where Papahawahawa is shown to arise very close to Waiohonu Stream. This wetland area below Pu'u Ho'olio drains into Papahawahawa Gulch. It is marked on National Wetland Inventory Maps (USFWS, 1984) as "unclassified."

Within the area of the survey, Papahawahawa Gulch is a normally dry stream bed of mostly dense basalt, the surface smoothed, pocked, and grooved. This substratum

supports a sparse flora of herbs and shrubs rooted in surface cracks and depressions with some accumulated soil. From the vicinity of the bridge in the upslope direction, the stream bed cuts through a forest of mostly guava, kukui, and Java plum. Larger trees overhang the stream which is heavily shaded. Below the bridge, the stream bed widens and the land opens up with pasture, thickets of Christmasberry, and a variety of coastal plants scattered over the windswept slopes leading to a cliffed coastline.

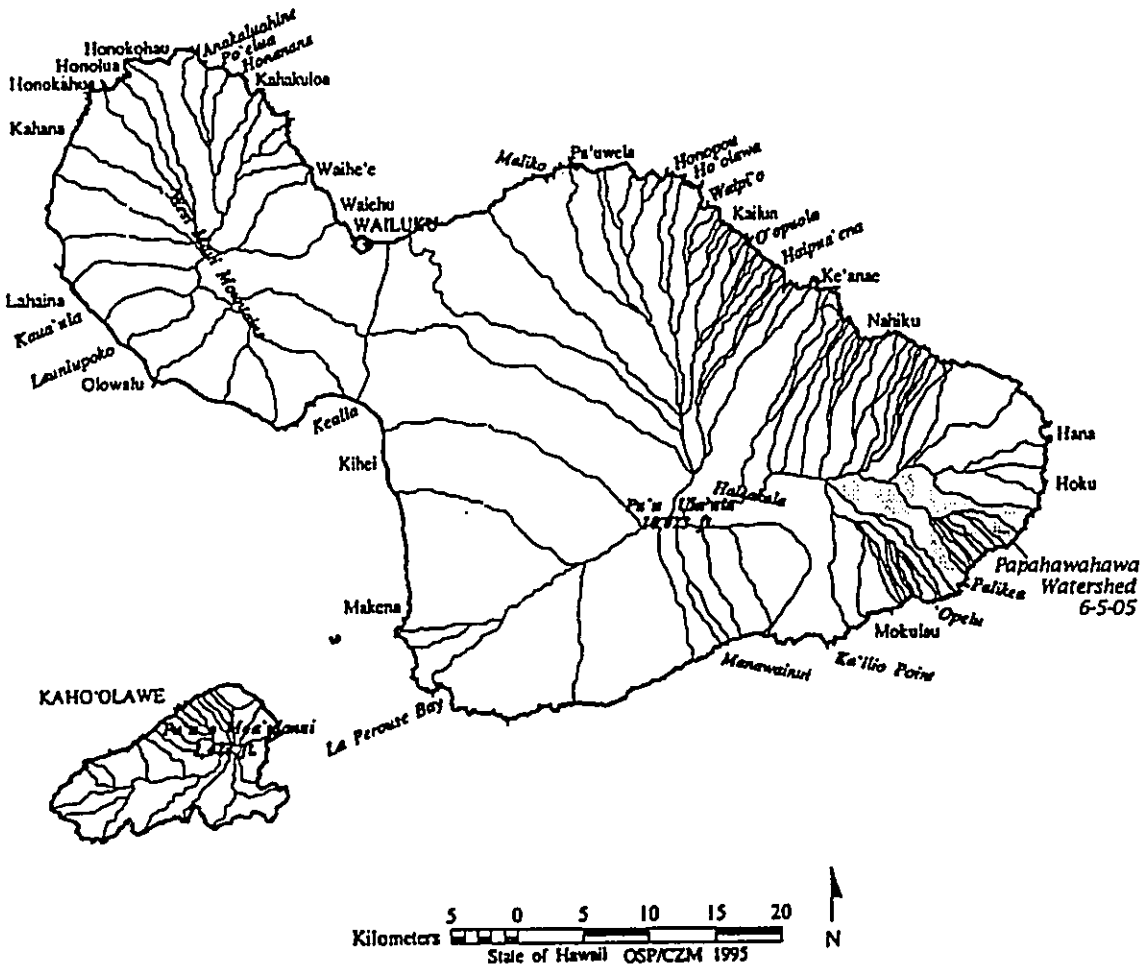

Figure 1. The islands of Maui and Kaho'olawe showing drainage basins as delimited by OSP (1994). The area described in Table 1 is shaded on this map. The Papahawahawa drainage basin is shown in darker shading.

Depressions in the basalt surface hold water arising from either infrequent freshets or local rainfall, and thus there are dozens of pools from a few tens of centimeters to one or two meters in length, and from a few to perhaps 20 cm deep. These pools were very numerous in late November, but may not be present at all during drier months. A

segment of the stream above the highway bridge is a boulder-strewn bed, but most everywhere else, and particularly from the bridge to the ocean shore, the stream bed is dense basalt with very little loose material present. Downstream from the Papaahawahawa Bridge, the swath of exposed basalt widens noticeably from a width of under 25 ft (8 m) at the bridge to 65 ft (20 m) or more near the coast. Some braiding of the channel between is evident. The stream bed terminates in a cliff some 25 to 30 ft (8 to 10 m) high above a boulder ('ili'ili) beach.

This lowest reach of Papahawahawa Stream at the highway bridge is intermittant in the extreme, flowing only during freshets generated from high rainfall events, a characteristic shared by most of the streams in the Hana area (*AECOS*, 1992). Table 1 presents a summary of information concerning the bridge project stream and all other streams in the same general area. A similar table was prepared in a report on a stream along the Hamakua Coast of the Big Island (*AECOS*, 1994) and for Kaupakalua Bridge in the Ha'iku area of East Maui (AECOS, 1995). The table represents a systematic approach to listing streams and gulches in an area which combines map and tabular information.

Streams and gulches are listed in order as they appear along the coast for the island segment defined as the wedge-shaped land area between two major drainage basins, which includes Papahawahawa Gulch (see Figure 1). The listing starts with Waiho'i Valley and Waiohonu Stream in the Hana (north) direction and extends (southwestward) to Kipahulu Valley (Palikea Stream and Oheo Gulch). Every stream and gulch that can be readily recognized as such *at the coastline* on the 7.5-minute series, topographic map (mostly the USGS Kipahulu Quadrangle) is listed, some as unnamed features. In the first column, stream names are in italics, while gulch names appear in regular type (a style adapted from USGS topographic maps). Although gulches are generally considered dry much of the time, while streams would be flowing much or all of the time, the distinction here is simply one established by USGS in mapping and not meant to imply a particular class (see column 4). The listing of features from north to south is continued in the arrangement of tributaries given for each outlet.

Column 2 provides vertical and horizontal bars for stream systems, showing the relationships between tributaries. Four stream systems are indicated in the table. Papahawahawa Gulch is not part of a complex system with stream branches and is therefore not marked with lines in this column. For Waiohonu Stream, a vertical dashed line identifies the root stream (discharging to the sea). Tributaries are then joined by a solid vertical line (north and south branches, in this case). The jog in the vertical line at "south branch" indicates that "unnamed" is a tributary of south branch. The point at which the north and south branches join is the elevation of 1980 ft. in column 5 indicated in parentheses. Bold type identifies the Papahawahawa gulch as the subject of this report.

Table 1. Summary of stream relationships, characteristics, and other pertinent information for East Maui streams and gulches near Papahawahawa Gulch.

Stream / Gulch	Code	Class[1]	"Headwaters" Elevation[2]	Aquatic Resources[3]	Survey Data
↑ Hana					
Waiohonu	6-5-04	Pi (*I*)	(1980)		
north branch		*I*	~4500		
south branch		*I*	~4600		
unnamed		*I*	~5600		
unnamed	--	*I*	~400		
unnamed	--	*I*	320		
Pukuilua	--	*I*	1800		
Papahawahawa	6-5-05	Pi (*I*)	2100		
Ala'alaula	6-5-06	P (*I*)	2540		
Wailua	6-5-07	P (*I*)	~3500	O	1980
Paihi		*I*	~2400		
Honolewa	6-5-08	P (*I*)	3600	O	1980
unnamed	--	*I*	~1200		
unnamed	--	*I*	~2600		
Waieli	6-5-09	P (*I*)	3800	O	1980
Kakiweka	6-5-10	P (*I*)	3300	O	1990
Hahalawe	6-5-11	P (*I*)	~4000	O	1990
Maluhianaiwa		*I*	1780		
Pua'alu'u	6-5-12	P (*I*)	2500	O	1984
Oheo	6-5-13	P (*I*)	(470)	O	1980
Pipiwai			3800		
Palikea			~7000		
Kipahulu ↓					

NOTES:

1 - P= perennial; I = intermittant; c = continuous; i = interrupted. Where given in *italics*, the class is inferred from topographic sheet by solid, dash-dotted, or no blue line.

2 - In feet, estimated (from topographic sheets) upper elevation of drainage basin; generally somewhat higher than headwaters. Blank indicates name change to tributary listed in next row; elevation in () indicates name change to tributary in next row at indicated elevation. *d* = diversion at indicated elevation.

3 - Summary from Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990); aquatic rankings: M = moderate; O = outstanding; S = substantial; U = unknown

Column 3 (Code) lists the State code number for perennial streams. Codes have been assigned by DLNR only to perennial streams and not intermittent streams. The table lists both types of stream features. The same basic coding system is used by the Office of

State Planning (OSP, 1994) for delineating watersheds based upon the USGS system of watershed unit codes. Thus, the Papahawahawa watershed would be designated 20020000:5-05. However, because the Hawaii Stream Assessment considered only selected streams and assigned consecutive numbers, many smaller watersheds are left without a code. In this area, these are indicated by "--" in column 3.

Column 4 (Class) presents type of stream feature: "P" for perennial stream and "I" for intermittant stream. A lower case "i" indicates an interrupted stream, usually one which is perennial at higher elevations but intermittent at lower elevations. A few of the streams extend above 5,000 ft (1,500 m) where the climate is generally dry and stream flow intermittant. A "c" indicates continuous flowing to the sea. A code given in italics is one determined from the USGS topographic sheet only. Where given in parentheses, the determination from USGS disagrees with either field observation or the Hawaii Stream Assessment class designation. For example, Papahawahawa is listed as an interrupted, perennial stream (Pi) in the latter source, but shown as intermittant (*I*) on the quad sheet.

Column 5 gives the elevation of the "headwaters" in feet above sea level. The value is estimated by examination of the 7.5-minute series topographic map, and represents an attempt to determine the highest elevation at which a distinct channel for the stream is probably present. Usually, this is higher than the upper end of the quad sheet's blue line, but lower than the highest point in the particular drainage basin. Where this value was particularly difficult to determine because of numerous small tributaries or a lack of channel down-cutting to an extent that would be evident from a 40-foot contour interval, the value is preceded by a "~". An elevation in parentheses indicates that no headwater exists for the stream or gulch name.

Column 6 summarizes the aquatic resources rankings from the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990). A number of the streams in this part of Maui are ranked as outstanding (O) for aquatic resources. Column 7 gives references to previous studies on streams in the area or the date last surveyed according to Department of Land and Natural Resources (DLNR) records.

PREVIOUS SURVEYS

No East Maui streams were included in the statewide survey of modified-channel streams by Timbol and Maciolek (1978). Very little information about Papahawahawa Gulch is presented in the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990). The gulch is not flagged as having a "special area" wetland, despite indication on the USGS quad sheet of a sizable wetland near the headwaters of the gulch. No native forest occurs along this stream. Archaeological information of moderate sensitivity is

associated with this watershed, which is translated to a "substantial" cultural resource in the Resource Assessment Summary. However, it may be worth noting that the summary of all surveyed streams in Hawaii under cultural resources failed to assign a single "moderate" and assigned very few "limited" ranks for any stream from the four-point scale. Recreational resources were deemed "substantial" with hiking, hunting, and scenic views listed as opportunities, and the stream was given a "substantial" ranking under Recreation in the Resource Assessment Summary (Hawaii Cooperative Park Service Unit, 1990).

FIELD SURVEY

RIPARIAN VEGETATION

A listing of the species of plants identified from the dry stream bed and along the bottom of Papahawahawa Gulch in the project vicinity is given as Table 2. From the bridge in the upslope direction, the stream bed cuts through a forest of mostly guava (*Psidium guajava*), Java plum (*Syzygium cumini*), kukui (*Aleurites moluccana*), African tulip (*Spathodea companulata*), and mango (*Mangifera indica*). The larger trees overhang the stream and much of the bed is heavily shaded. The understory along the banks is characterized by coffee (*Coffea arabica*), shoebutton ardesia (*Ardesia elliptica*), 'awapuhi ginger (*Zingiber zerumbet*), basket grass (*Oplismenus hirtellus*), and sweet potato vine (*Ipomoea batatas*). Several ferns (*Phymatosorus scolopendria, Phlebodium aureum,* and *Pleopeltis thunbergianus*) grow on the larger trees beside the stream. The basalt substratum of the stream bed supports only scattered fern growth (mostly *Christella dentata, Sphenomeris chinensis,* and *Nephrolepis exaltata*). These plants are all small, indicating either new growth on rocks scoured by stream flow in the not too distant past, or slow growth in the minimal soil. Common weeds growing in cracks of the basalt stream bed in the vicinity of the bridge include niruri (*Phyllanthus debilis*), partridge pea (*Chamaecrista nictitans*), Guinea grass (*Panicum maximum*), smut grass (*Sporobolis* sp.), and a nutgrass (*Cyperus* sp.). A single specimen of primrose willow (*Ludwigia octovalvis*), a wetland indicator plant, was observed in this area.

Below the bridge, the stream bed widens and the riparian forest gives way to grassy slopes and thickets of Christmasberry (*Schinus terebinthefolius*). A number of coastal plants are scattered over the slopes above the cliffed coastline. In this more open environment, the cracks and areas of accumulated soil on the basalt of the stream bed are dominated by grasses (Poaceae and Cyperacea), weedy forbs (*Chamaesyce hirta* and *C. hypercifolia*), and tick clover (*Desmodium triflorum*). Shrubs in and beside the stream bed include sour bush (*Pluchea symphytifolia*), Christmasberry, and lehua haole (*Calliandra emarginata*). The latter is a common hedge plant grown in the area. At the "mouth" of Papahawahawa Stream, the vegetation beside the stream changes from dry

forest and pasture to one of species typical of the coastal environment: thickets of beach naupaka (*Scaevola sericea*) and scattered milo (*Thespesia populnea*), noni (*Morinda citrifolia*), an unidentified tree (Fabaceae), candlebush (*Senna alata*), and false kamani (*Terminalia catappa*).

Table 2. Plant species listing for Papahawahawa Stream (mouth at coast to 200 m upstream of Piilani Highway)

Species	Common name	Status		Abundance
┌─FERN ALLIES─┐				
PSILOTACEAE				
Psilotum nudum (L.) Griseb.	*moa*	ind.	FACU-	Uncommon
┌─FERNS─┐				
BLECHNACEAE				
Blechnum occidentale L.		nat.	UP	Uncommon
ADIANTACEAE				
Adiantum raddianum	common maidenhair	nat.	FACU	Uncommon
LINDSAEACEAE				
Sphenomeris chinensis (L.) Bedd.	lace fern	ind.	FAC	Uncommon
NEPHROLEPIDACEAE				
Nephrolepis exaltata (L.) Schott	common sword fern	ind.	FAC*	Uncommon
POLYPODIACEAE				
Phlebodium aureum (L.) J. Sm.	hare's foot fern	nat.	UP	Uncommon
Phymatosorus scolopendria (Burm.) Pic.-Ser.	*laua'e*	nat.	FACU	Occasional
Pleopeltis thunbergianus .	*pakahakaha*	ind.	UP	Uncommon
THELYPTERIDACEAE				
Christella ?dentata	wood fern	nat.	UP	Occasional
┌─DICOTYLEDONES─┐				
AMARANTHACEAE				
Alternantheria sessilis (L.) DC	sessile joyweed	nat.	FAC	Uncommon
Amaranthus spinosus L.	spiny amaranth	nat.	FACU-	Occasional
ANACARDIACEAE				
Mangifera indica L.	mango	nat.	FACU	Occasional
Schinus terebinthifolius Raddi	Christmasberry	nat.	FACU-	Occasional
ASTERACEAE (COMPOSITAE)				
Ageratum conyzoides L.	*maile hohono*	nat.	FAC*	Uncommon
Conyza bonariensis (L.) Cronq.	hairy horseweed	nat.	UP	Uncommon
Emilia fosbergi Nicolson	flora's paintbrush	nat.	UP	Uncommon
Pluchea symphytifolia (Mill.) Gillis	sour bush	nat.	FAC*	Occasional

Table 2 (continued).

Species	Common name	Status		Abundance
BEGONIACEAE				
Begonia hirtella Link	begonia	nat.	UP	Occasional
BIGNONIACEAE				
Spathodea companulata P. Beauv.	African tulip tree	nat.	UP	Common
CARYOPHYLLACEAE				
Drymaria cordata (L.) Willd. ex Roem. & Schult.	*pipili*	nat.	FAC	Occasional
COMBRETACEAE				
Terminalia catappa L.	false *kamani*	nat.	UP	Uncommon
CONVOLVULACEAE				
Ipomoea batatas (L.) Lam.	*'uala*, sweet potato	pol.	UP	Occasional
EUPHORBIACEAE				
Aleurites moluccana (L.) Wild.	*kukui*	pol.	UP	Common
Chamaesyce hirta (L.) Millsp.	garden spurge	nat.	FACU	Abundant
Chaemaesyce hypercifolia (L.) Millsp.	graceful spurge	nat.	FACU	Common
Phyllanthus debilis Klein ex Willd.	*niruri*	nat.	UP	Abundant
FABACEAE				
Calliandra emarginata (Humb. & Bonpl.) Benth.	*lehua haole*	nat	UP	Common
Canavalia cathartica Thouars	*maunaloa*	nat.	FACU	Occasional
Chamaecrista nictitans (L.) Moench	partridge pea	nat.	Ni	Abundant
Desmodium triflorum (L.) DC	tick clover	nat.	FACU*	Abundant
Desmodium incanum DC	Spanish clover	nat.	UP	Uncommon
Leucaena leucocephala (Lam.) de Wit	*koa haole*	nat.	UP	Occasional
Mimosa pudica L.	sensitive plant	nat.	FACU	Uncommon
Senna alata (L.) Roxb.	candle bush	nat.	FACU	Uncommon
Senna sp.	tree	nat.	–	Occasional
uniden.		nat.	–	Occasional
GOODENIACEAE				
Scaevola sericea Vahl	beach *naupaka*	ind.	FACU	Occasional
MALVACEAE				
Thespesia populnea (L.) Sol. ex Corrêa	*milo*	?ind.	FAC+	Uncommon
MELASTOMATACEAE				
Clidemia hirta (L.) D. Don	Koster's curse	nat.	FACU	Uncommon
MORACEAE				
Ficus microcarpa L. fil.	Chinese banyan	nat.	UP	Uncommon
MYRSINACEAE				
Ardesia elliptica Thunb.	shoebutton ardesia	nat.	FACU	Abundant

Table 2 (continued).

Species	Common name	Status		Abundance
MYRTACEAE				
Psidium guajava L.	common guava	nat.	FACU	Abundant
Syzygium cumini (L.) Skeels	Java plum	nat.	FACU	Abundant
OXALIDACEAE				
Oxalis corymbosa DC	pink wood sorrel	nat.	UP	Uncommon
ONAGRACEAE				
Ludwigia octovalvis (Jacq.) Raven	primrose willow	?pol.	OBL	Uncommon
PASSIFLORACEAE				
Passiflora edulis Sims	passion fruit vine	nat.	UP	Occasional
RUBIACEAE				
Coffea arabica L.	Arabian coffee	nat.	UP	Common
Morinda citrifolia L.	*noni*	pol.	Ni	Uncommon
SOLANACEAE				
Solanum americanum Mill.	*popolo*	?ind.	FACU	Uncommon
VERBINACEAE				
Clerodendrum philippinum Schauer	*pikake hohono*	nat.	FAC	Uncommon
Stachytarpheta urticifolia (L.) Vahl	vervain	nat.	FAC*	Abundant
┌─MONOCOTYLEDONES─┐				
AGAVACEAE				
Agave sisalana Perrine	sisal	nat.	UP	Occasional
ARECACEAE				
Cocos nucifera L.	coconut palm	pol.	FACU	Occasional
COMMELINACEAE				
Commelina diffusa N. L. Burm.	*honohono*	nat.	FACW	Uncommon
CYPERACEAE				
Cyperus sp.				Abundant
uniden.				Occasional
uniden				Abundant
PANDANACEAE				
Pandanus tectorius S. Parkinson ex Z.	hala	?ind	FAC	Occasional
POACEAE (GRAMINEAE)				
? *Digitaria ciliaris* (Retz.) Koeler	Henry's crabgrass	nat		Common
Echinochloa crus-galli (L.) P. Beauv.	barnyard grass	nat.	FACW	Uncommon
Oplismenus hirtellus (L.) P. Beauv.	basketgrass	nat.	FACU	Common
Panicum maximum	Guinea grass	nat	FACU	Occasional
Paspalum sp.		nat.	FAC+	Uncommon
Pennisetum purpureum Schumach.	elephant grass	nat.	FACU	Uncommon
Sporobolus sp.	smut grass	nat.		Occasional

Table 2 (continued).

Species	Common name	Status	Abundance
ZINGIBERACEAE			
Zingiber zerumbet (L.) Sm.	*'awapuhi*	pol. FACU*	Common

KEY:

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

Status = USFWS wetland indicator status (1988)
- OBL = obligate wetland species; usually found only in a wetland; (>99% probability) indicative of wetlands.
- FAC = facultative; equally likely to occur in wetlands (34% - 64%) or nonwetlands.
- FACW = facultative wetland species; grows in wetlands (67% - 99%) and non-wetland situations, may be indicative of wetlands.
- FACU = upland species; not usually indicative of wetlands (1% - 33%).
- NI = insufficient information available to determine indicator status.
- UP = Species not included in USFWS (1988) presumably because species does not occur in wetlands in Hawaii.
- + / - = indicates frequency is (+) more towards wetland occurrence or less towards wetland occurrence in facultative species.
- * = status considered tentative.

Abundance = abundance ratings are for this site only.
- Uncommon - a plant found less than five times;
- Occasional - a plant that was found between five and ten times;
- Common - a plant considered an important part of the vegetation and observed numerous times.
- Abundant - plants found in large numbers, dominant or locally dominant.

STREAM BIOTA

Within the general area of the Papaahawahawa Bridge, the rocky stream bed holds (when surveyed) numerous small pools and puddles of water. These pools attract insects that are considered aquatic since the pre-adults (juveniles or larvae) are found in fresh water. Most abundant in the area above the bridge are mosquitos. Adults formed dense "clouds" around the survey team within the shaded reach of the stream. These mosquitos appeared to be the common forest day mosquito (*Aedes albopictus*) which breeds in the forest in water retained by tree holes and leaf axils (Nishida and Tenorio, 1993). Many of the pools in the stream bed were dense with larvae and pupae of mosquitos. Specimens were brought back to the laboratory and found to belong to the genus *Culex*. Adults were obtained and identified as *C. quinquefasciatus*, the southern house mosquito. Isolated stream pools are the preferred breeding environment for this species.

Other puddles in the bed upstream from the bridge attracted bee flies (Syrphidae). These pools usually contained lots of leaf litter, and the small, distinct larvae of *Eristalis* sp. were evident among the leaves and detritus on the bottom of the pools. Larger pools at and above the bridge attracted numbers of water-treaders (*Microvelia*).

Large dragonflies were observed flying up and down the stream both above and below the bridge. Most common were skimmers (*Pantala flavescens*) and lavender dragonflies (Family Libellulidae). However, some very large blue darners (*Anax* sp., probably *A. junius*) were present. Naiads were evident in many of the larger pools. Skin casts that were returned to the laboratory for examination proved to be *P. flavescens*. A single specimen of the endemic damsefly genus, *Megalagrion*, was observed a short distance above the highway bridge. The coloration resembled *M. hawaiiense* (black, except for the thorax and last abdominal segment, which were mostly magenta). The individual was observed only briefly.

Table 3. Checklist of aquatic animals observed or reported from Papahawahawa Stream.

Species	Common name	Status	Abundance
	┌─INVERTEBRATES─┐		
ARTHROPODA, INSECTA			
DIPTERA, CULICIDAE			
Aedes ?albopictus	day mosquito (adults)	nat.	Abundant
Culex quinquefasciatus	southern mosquito (larvae)	nat.	Abundant
DIPTERA, SYRPHIDAE			
? *Eristalis* sp.	bee flies (adults, larvae)		Common
HEMIPTERA, VELIIDAE			
Microvelia sp.	water-striders (adults, juv.s)		Common
ODONATA, AESHNIDAE			
Anax cf. *junius* (Drury)	*pinao*, darner (adults)	ind.	Occasional
ODONATA, COENAGRIONIDAE			
Megalagrion sp.	damselfly (adult)	end.	Uncomnon
ODONATA, LIBELLULIDAE			
Pantala flavescens (Fabricius)	skimmer (adults, naiads)	ind.	Common
uniden.	dragonfly	nat.	Common

KEY

STATUS:

end. = native to and originally found only in the Hawaiian Islands.
ind. = native to the Hawaiian Islands as well as other areas.
nat. = naturalized; adventive or introduced (exotic) species, now established in stream or reservoir.

No mollusks (snails), crustaceans (shrimp), or aquatic vertebrates (fishes and amphibians) were observed around the lower reach of Papahawahawa Stream. The aquatic fauna was limited to a variety of insects, reflecting the very temporary nature of a majority of the pools that were present. Adults of these insect species are usually riparian (attracted to the terrestrial environment associated with the stream) or able to fly in search of ephemeral pools used for breeding. Although this insect fauna shows a mixture of native and exotic species, of most interest is the endemic damselfly of the genus *Megalagrion*. No damselfly naiads were observed in any of the the pools examined closely.

WATER QUALITY

A single water sample was collected from the largest pool located directly under (downslope side) of the Papaahawahawa Bridge (sampled at 1405 hrs on November 28). Table 4 summarizes the methods used to analyze the water from the pool. Water samples from isolated pools are difficult to interpret because each pool is a microcosm with inputs and chemical reactions proceeding more or less independent of other pools in the area. The water quality of any one pool may not be particularly representative or indicative of stream water quality once the flow divides into isolated bodies of water. Even the source of the water, in this case, is uncertain. The pools could have come from flow in the stream bed, or as direct rainfall. The single sample reported here is meant only to provide a sense of the types of values that might be found in this environment. The sampled pool was observed to harbor mosquito larvae (*Culex*) and water-striders (*Microvelia*).

The results of the water quality analyses are given in Table 5. Temperature, conductivity, turbidity, and total suspended solids (TSS) values were generally in line with anticipated stream values. This pool was somewhat shaded by the Papaahawahawa Bridge, and might not experience the extremes that pools in more exposed locations would. The pH was measured as 6.85. This is a normal value, although the measurement was made long after the hold time and therefore not reported in Table 5. The dissolved oxygen (DO) in the pool was low (24.6% of saturation), but not unusual given the stagnant water and shaded location. The high ammonia content also indicated stagnant conditions. A value of 97 µg N/l (micrograms nitrogen per liter) nitrate + nitrite was not exceptionally elevated and of little or no concern. The total nitrogen (total N) and total phosphorus (total P) values were unusually high, probably attributable to organic matter from decomposing vegetation (leaf litter) in the pool.

Table 4. Methods and instruments used in the analyses of a water sample from Papahawahawa Gulch.

Analysis List	Method	Reference	Instrument
Ammonia	alkaline phenol	Koroleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Conductivity	Method 2510B (EPA 120.1)	Standard Methods 18th Edition (1992); EPA (1979)	Hydach pH/conductivity meter
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 57 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
Temperature	thermister calibrated to NBS cert. thermometer (EPA 170.1)	EPA (1979)	YSI Model 57 DO meter
Total Nitrogen	persulfate digestion /EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion /EPA 365.1	Koroleff in Grasshoff et al. (1986) / EPA (1993)	Technicon AutoAnalyzer II
Suspended Solids	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.
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Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.
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Table 5. Basic water quality characteristics of an isolated pool in Papahawahawa Gulch (November 1995).

STATION	Temp (°C)	DO (mg/l)	Cond. (µmhos/cm)	Turbidity (ntu)	TSS (mg/l)	Nitrate + nitrite (µg N/l)	Ammonia (µg N/l)	Total N (µg N/l)	Total P (µg P/l)
Sta. 1	24.2	2.06	123	4.04	4.0	97	327	1910	194

THREATENED OR ENDANGERED SPECIES

No State of Hawaii or Federally proposed or listed threatened or endangered species of plant or animal (USFWS, 1994a,b) were found in the project area. However, the single specimen of damselfly (*Megalagrion*) observed could be a species presently being considered for listing. At least three of the eight species of *Megalagrion* found on Maui are candidate species (USFWS, 1994a).

DISCUSSION

The immediate area of the proposed new bridge is the lowermost reach of Papahawahawa Stream (this stream does not have an estuarine reach). The stream here is downcutting slowly through a dense basalt formation which continues downslope to the sea. The banks of the stream are fairly well defined by the exposure of this rock material. Some vegetation is present in the channel, growing out of cracks and in depressions with accumulated soil, but the vegetation cover above the margins is dense in most places, providing a sharp boundary between rock and soil and the best field estimate of the ordinary high water mark (OHWM). This line defines the U.S. Army Corps jurisdiction over navigable waters under Section 404 of the Clean Water Act (See CFR 33 §328.3(e) and §329.11(a)(1)). With respect to weland status, the dominant substratum is rock and only 3 of the 63 species of plants identified in the immediate area of the stream are wetland species, that is, obligate (OBL) or facultative wetland (FACW - found most often in wetlands) species. Each of these potential wetland indicators was uncommon in the survey area. Every indication in the field suggests a stream that flows only during infrequent periods of exceptionally heavy rainfall.

The highly pocked surface of the dense basalt in the stream bed provides numerous depressions that hold water. The aquatic environment is represented here by an extensive system of small, isolated pools. These pools are also ephemeral: perhaps present throughout much of the wet season, but absent during long dry periods. The ephemeral nature of the pools, and perhaps extremes in water quality characteristics, discourage habitation by most aquatic animals. However, the pools provide breeding areas for insects with a partially aquatic lifestyle, and a number of such species were observed during the survey.

The uppermost reach of Papahawahawa drains a wetland according to the USGS. topographic maps. This wetland is outlined in the USFWS Wetlands Inventory Maps but is not classified. The location, at the 2,100-ft (640-m) elevation along the lower part of the gap called Waiho'i Valley, is an important area with respect to native flora and fauna. Thus, the wetland must be assumed to be at least biologically interesting in the absence of any direct survey data. This wetland is at least two miles (3.2 km) upslope from the Papaahawahawa Bridge, and the construction project will have no direct impacts on the wetland.

The existing Papaahawahawa Bridge includes end supports and a center support column, all located within (or defining) the OHWM. The proposed replacement of the Papaahawahawa Bridge with a wider (two-lane), concrete structure will not have any adverse impacts on either the local aquatic resources, aquatic resources in more distant areas upslope and downslope, or water quality. The subject stream appears not to

support native aquatic fauna in the project area with the exception of insects. The proposed new bridge structure would not impair migratory (amphidromous) habits of native aquatic biota in the event that any such populations exist in perennial stream areas far upstream of the project site. Habitats for native aquatic insects will not be destroyed.

The new bridge would be built as a single span supported by the end abutments. These abutments will be placed in nearly the same locations as the existing bridge supports. The new span would shade a larger area of the stream bed (at least double the area now shaded). An existing CRM center post supporting the old bridge would be removed. The overall result will be a somewhat greater cross-sectional area for the stream channel. The stream bed would be left as the natural basalt substratum. Since a channel restriction such as the one presented by the existing structure can increase the velocity of the water passing under the bridge and promote erosion, enlargement of the channel would be a positive impact. A Stream Channel Alteration Permit (SCAP) will be applied for from DLNR.

Lower Papahawahawa Stream is intermittent. Water quality impacts generated by the construction should be minimal. Stream flow is unlikely to occur or occur only rarely during the bridge construction phase. A Best Management Practices (BMP) plan and water quality monitoring plan will be prepared in order to comply with Section 401 of the Clean Water Act. After construction, the new structure will have no impact on water quality in Papahawahawa Gulch.

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APPENDIX D

Archaeological Assessment of the Proposed Bridge Replacement Site at Papaahawahawa, Hana District

Cultural Surveys Hawaii

December 1995

Archaeological Assessment of the Proposed Bridge Replacement Site at Papaahawahawa, Hana District, Island of Maui

by

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Prepared for

Wilson Okamoto & Associates

Cultural Surveys Hawaii
December 1995

ABSTRACT

At the request of Wilson Okamoto and Associates, Cultural Surveys Hawaii conducted and archaeological assessment of the proposed bridge replacement site at Papaahawahawa, Maui. The site is located at the existing Papaahawahawa Bridge which is situated on the Piilani Highway between Hana and Kipahulu, where the highway crosses the Papaahawahawa gulch. An archaeological survey was conducted of the area surrounding the existing Papaahawahawa Bridge. The present bridge is concrete tee beam over two spans and is scheduled for immediate replacement through the Department of Public Works and Waste Management, County of Maui.

A complete survey of the bridge and surrounding area was conducted on foot to determine the presence or absence of cultural remains that would be impacted by the replacement of the bridge. Research was also conducted to determine if the bridge qualified or could qualify for placement on the historic register. No archaeological sites were encountered in the area of the bridge. The bridge itself was determined to be not significant in a 1990 study of historic bridges on Maui. However, based on a recently updated bridge evaluation (still in draft form), and a meeting with Dr. Don Hibbard of the Department of Land and Natural Resources, State Historic Preservation Division (DLNR/SHPD), the bridge may be significant in the context of the Hana District of Historic Bridges. However, the bridge replacement is a distinct possibility and could be mitigated with proper photographic documentation. A general treatment plan for the Bridges of the Hana District may be requested by DLNR/SHPD. This replacement may be conditional upon preparation of a general treatment plan and an Memorandum of Agreement (MOA) among various parties.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

ABSTRACT

At the request of Wilson Okamoto and Associates, Cultural Surveys Hawaii conducted and archaeological assessment of the proposed bridge replacement site at Papaahawahawa, Maui. The site is located at the existing Papaahawahawa Bridge which is situated on the Piilani Highway between Hana and Kipahulu, where the highway crosses the Papaahawahawa gulch. An archaeological survey was conducted of the area surrounding the existing Papaahawahawa Bridge. The present bridge is concrete tee beam over two spans and is scheduled for immediate replacement through the Department of Public Works and Waste Management, County of Maui.

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INTRODUCTION

Project Area Description

The project area is located in east Maui within the district of Hana, in Papaahawahawa Gulch where the Piilani Highway crosses the Papaahawahawa Bridge. The gulch of Papaahawahawa is the boundary between the *ahupua'a* of Papaahawahawa and Muolea. The *ahupua'a* of Papaahawahawa is narrow and relatively small in comparison to Muolea. Muolea is bounded along its *mauka* extent by Puu Hoolio and Puu Mahoe.

At the time of the survey the stream bed was completely dry but it was relatively clear of brush and weeds therefore implying that the stream flows intermittently. The vegetation surrounding the bridge and along the stream bed embankments consisted of various grasses, guava (*Psidium guajava*), christmas berry (*Schinus terebinthifolius*), banyan (*Ficus microcarpa*) and mango (*Mangifera indica*).

Scope of Work

The scope of work called for; 1) a complete ground survey of the entire project area for the purpose of site inventory. All archaeological sites were located, described, and mapped with evaluation of function, interrelationship, and significance. Documentation included photographs and scale drawings of all sites and complexes. 2) Historical background research on the project area identified previously reported sites and areas of historical interest, 3) An evaluation of the historical significance of the existing bridge structure was checked against the historical inventory of Maui Bridges, 4) A report detailing the results of the first three items included an evaluation of potential archaeological impact of bridge replacement in the study area as well as mitigation if appropriate.

Methods

Field work was conducted by a qualified archaeologist in one day. Field work consisted of a 100% ground survey, on foot, of the area underneath the bridge and the surrounding area within a 30 meter radius of the existing bridge structure, including the road, stream bed, and the stream embankments. Photographic documentation of the bridge and surrounding area was also conducted during the survey.

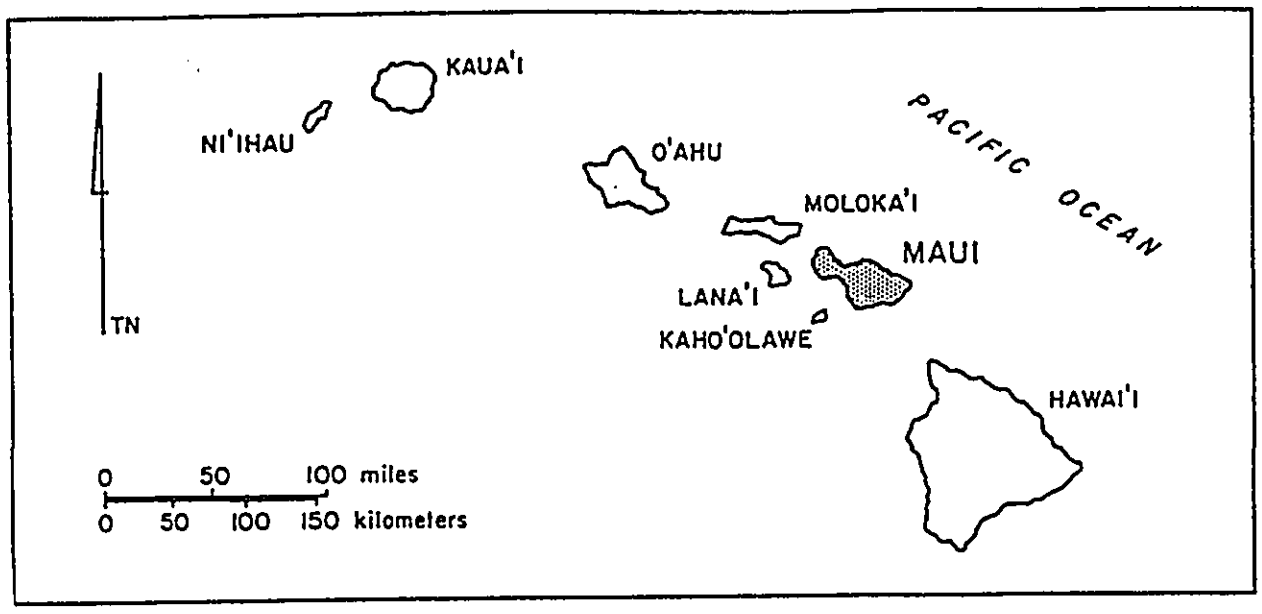

Figure 1 State of Hawai'i

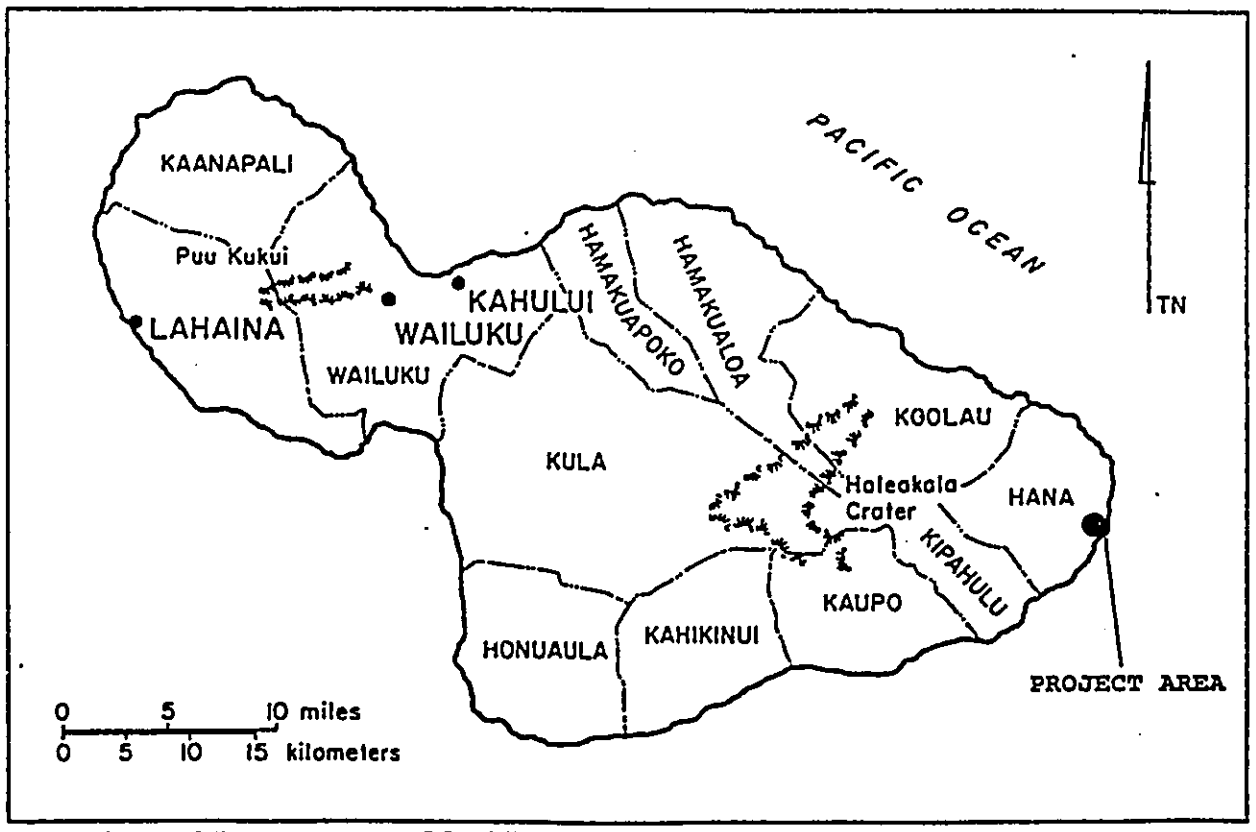

Figure 2 General Location Map, Maui Island

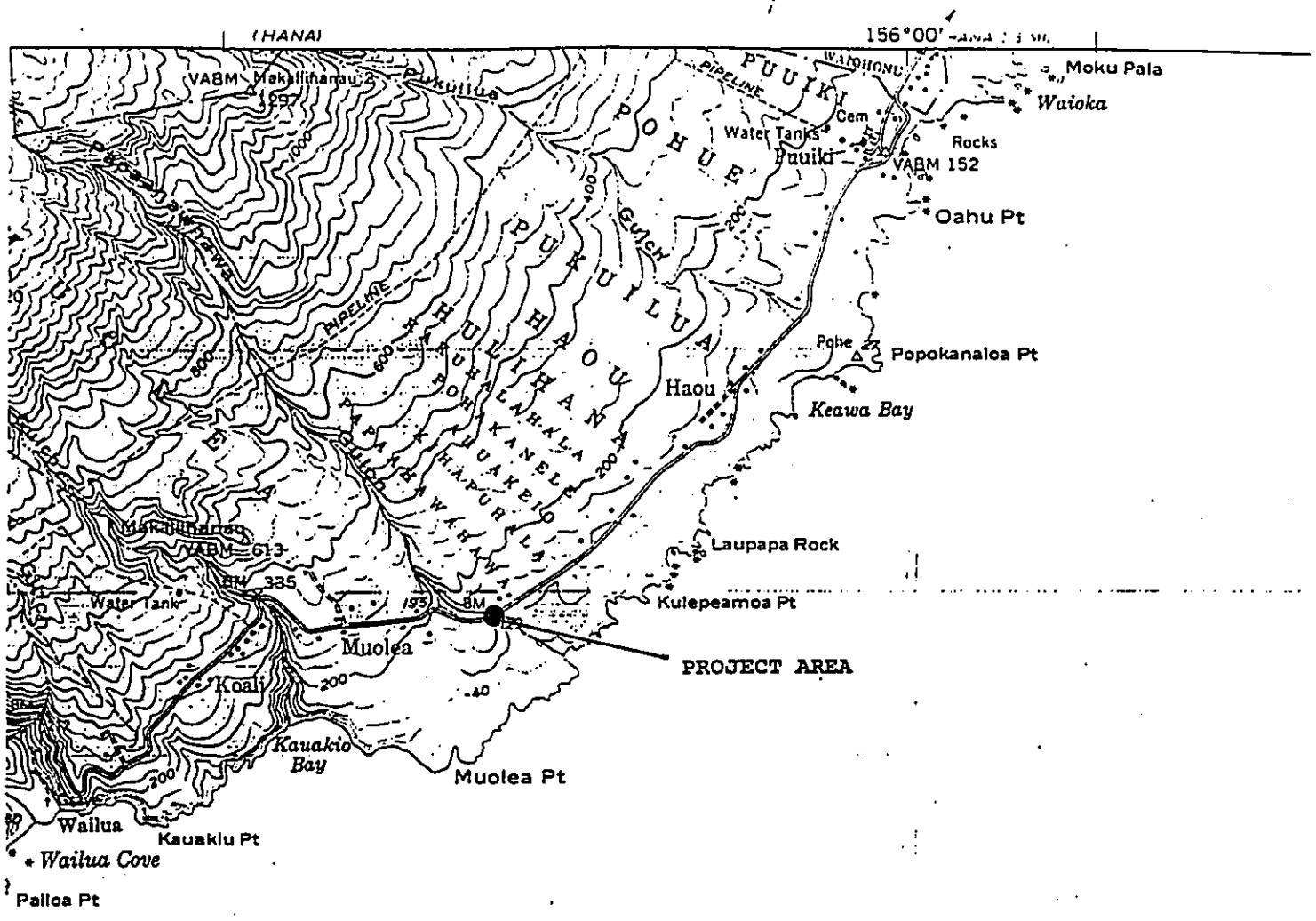

Figure 3 Portion of USGS 7.5 minute series, Kipahulu Quad, displaying the project area

HISTORIC BACKGROUND

The present study parcel is situated along the boundary of the *ahupua'a* of Muolea and Papaahawahawa, Hana District of Maui. Historical documentation by E.F. Craighill Handy and Elizabeth Handy outline likely general patterns in this region:

> "The Hawaiian homesteads at Maka'alae, Waiohonu, Pu'uiki, Pohue, Pukuilua, Haou, Hulihana, Muolea, and Koali have extensive plantations but only a small proportion of the cultivation is devoted to dry taro. There is no evidence of wet-taro cultivation in Hana District north of Koali. Here, however, both above and below the road, there were small groups of terraces in 1934, some of which were still used for wet taro.

The Handys' observations appear to indicate that the area encompassing the project area at one time contained a sizeable population at least large enough to warrant extensive plantations.

During the *mahele* the *ahupua'a* of Muolea was awarded to Ane Keohokalole the mother of King Kalakaua, as a portion of her Land Commission Award #8452. The *ahupua'a* of Papaahawahawa was awarded to Victoria Kamamalu but was surrendered to the government in lieu of commutation (Indices 1925).

The Papaahawahawa Bridge was built in 1915 by the County of Maui during the paving of the Hana and Piilani Highways. The bridge is approximately 41 feet long and is constructed of concrete and stone and mortar (Hawaiian Heritage Center 1990:163). The construction type is the concrete tee beam over two spans (County of Maui Bridge Inspection Report 1993).

During County-wide evaluations of bridges Papaahawahawa bridge received a Historic Significance rating of 17 out of a maximum of 40 points (Figure 4). This rating is considered poor and places the bridge in Category III (Table 1, Category Types) the lowest category of the bridges that are considered to have historical significance (the cut off for Category II is 20 points) (Ibid.:17-18). It must be noted that the Department of Land and Natural Resources and the Department of Transportation, through Spencer Mason

Architects is in the process of re-evaluating all of the bridges within the state through comparison on a state-wide basis rather than a county-wide basis. The preliminary results of this study are available only in draft form and the report has not yet been finalized.

Table 1: Category Types

Category Types (taken from Historic Bridge, Inventory and Evaluation, Islands of Maui and Molokai, September 1990).

1. Category I: This is for bridges with a total point spread of 25-29 points, and rated good.
2. Category II: This is for bridges with a total point spread of 20-24 points, and rated fair.
3. Category III: This is for bridges with a total point spread of 8-19 points. These are considered as having little local, state or national significance.

Bridge No. 97
Name of Bridge PAPAAHAWAHAWA STRM
Structure type: CONCRETE/TEE BEAM
Structure No. 009000310904636

Factors Comprising the Evaluation Criteria for Historic Significance of Maui and Molokai Bridges

	Points	Comments
ENVIRONMENTAL (65%) or 26 pts max		
1. INTEGRITY		
A. Location and setting	0-3	3
B. Workmanship	0-3	2
C. Design	0-3	1
D. Feeling and association	0-3	3
E. Material	0-3	2
	15 pts max	11
2. AESTHETICS		
A. Poor	0	0
B. Average	2	2
C. Excellent	3	0
	3 pts max	2
3. HISTORY		
A. Poor	0	0
B. Average	4	0
C. Excellent	8	0
	8 pts max	0
		13 Sub Total
DOCUMENTATION (17.5%) or 7 pts max		
1. BUILDER/DESIGNER		
A. Unknown	0	0
B. Known	1	0
C. Known, Prolific	2	0
D. Known, Noted	3	0
	3 pts max	0
2. CONSTRUCTION DATES (original)		
A. 1936 - 1940	1	0
B. 1926 - 1935	2	0
C. 1911 - 1925	3	3
D. Pre 1910	4	0
	4 pts max	3
		3 Sub Total
TECHNOLOGY (17.5%) or 7 pts max		
1. TECHNICAL		
A. Spans (no.) more than 1	1	1
B. Span lengths (varying)	1	0
C. Height (over 25')	1	0
D. Special features	1	0
	4 pts max	1
2. GEOMETRIC CONFIGURATION		
A. Unique	3	0
B. Unusual	2	0
C. Typical	0	0
	3 pts max	0
		1 Sub Total
		17 Grand Total

HHC/DOT CC N 17986
11/20/86

Figure 4 Papahawahawa's Bridge Evaluation (Hawaiian Heritage Center 1990:162)

PREVIOUS ARCHAEOLOGICAL RESEARCH

No archaeological investigations have been conducted within the project area. The shoreline area, *makai* of the project area was passed through during the 1930s by Winslow Walker and during the 1970s Department of Land and Natural Resources statewide archaeological inventory.

A single site (State site 50-50-17-128) was recorded near the project area (approximately 70 meters from the Papaahawahawa Gulch and 80 meters from Piʻilani Highway) within the *ahupuaʻa* of Muolea (Figure 5). The site was described as a *hooulu ʻai heiau* by the name of Kawaloa. The following is a description of the type of *heiau* as a "category of temples known as *unuunu hoʻoūlu ʻai (unuunu* being a reduplication of *unu*); these are temples 'to increase food crops' (*hoʻoūlu ʻai*) (1964:33) where the first fruits of the land are offered" (Valeri 1985:175-176).

No other archaeological work appears to have been conducted in the vicinity of the project area.

FINDINGS AND RECOMMENDATIONS

The only archaeological/historic site encountered during this investigation was the existing bridge of Papaahawahawa. The *heiau* of Kawaloa is situated approximately 70-80 meters away from both the highway and the gulch of Papaahawahawa and there will be no impact to the site by any activity around the bridge. No other archaeological sites of any sort were encountered in the area of or surrounding the existing bridge. Thus, the replacement of the bridge would have no impact on archaeological sites.

This bridge was classified as Category III in the 1990 Inventory of Historic Bridges for Maui and Molokai. Category III bridges include those structures which are considered to have little local, State or National significance.

More recently, the bridges of East Maui were re-evaluated as part of a District which includes all the bridges of the Hana District. Because of potential changes in the status of this bridge as a result of more recent study, a meeting was arranged with Dr. Don Hibbard of the SHPD on August 25, 1995. Dr. Hibbard stated that the significance of the bridge may have to be reevaluated in the context of the Hana Bridge District. If this is the case, photographic documentation may be required to mitigate the impact of replacement. A Memorandum of Agreement (MOA) between various parties may be

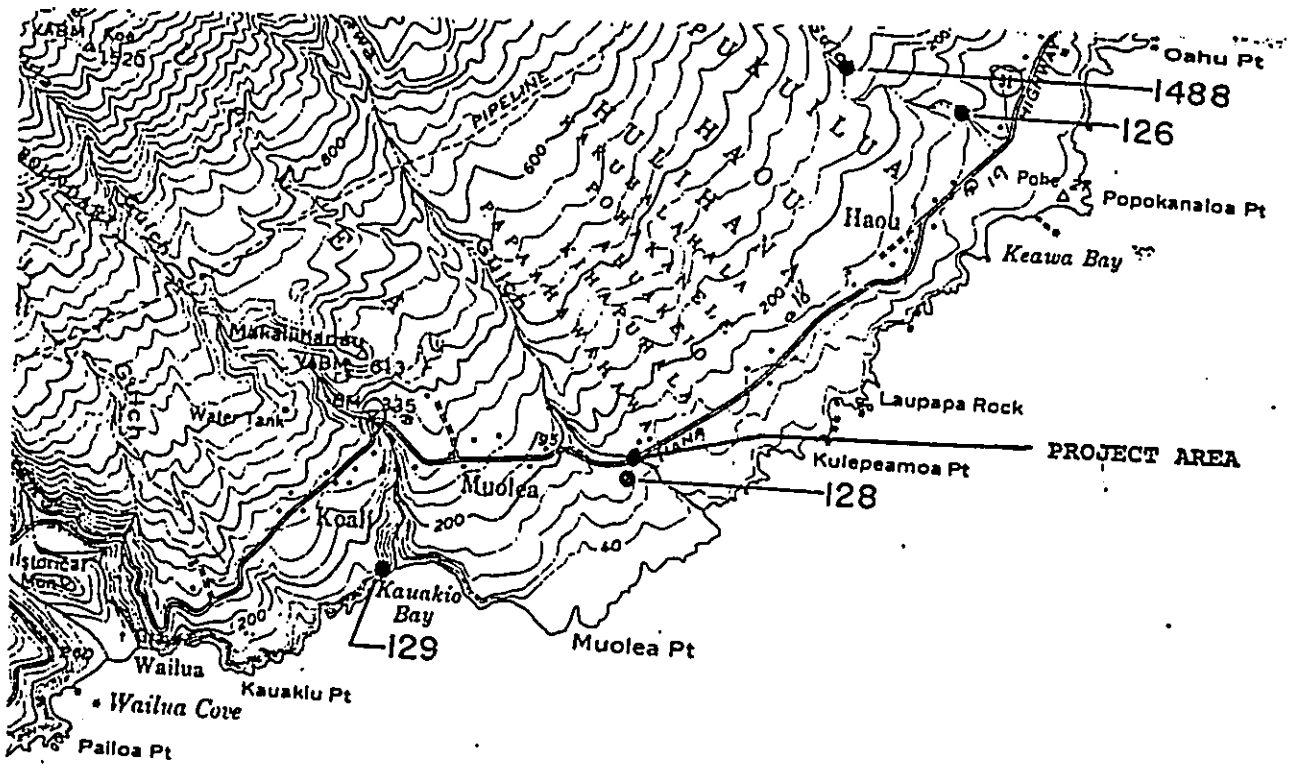

Figure 5 Portion of USGS 7.5 minute series, Kipahulu Quad, showing archaeological site 50-50-17-128

requested. by DLNR. If, in the unlikely event, any archaeological remains are encountered during construction, work should be halted in that area and State Historic Preservation Division (SHPD) should be contacted at 587-0047 to determine appropriate treatment.

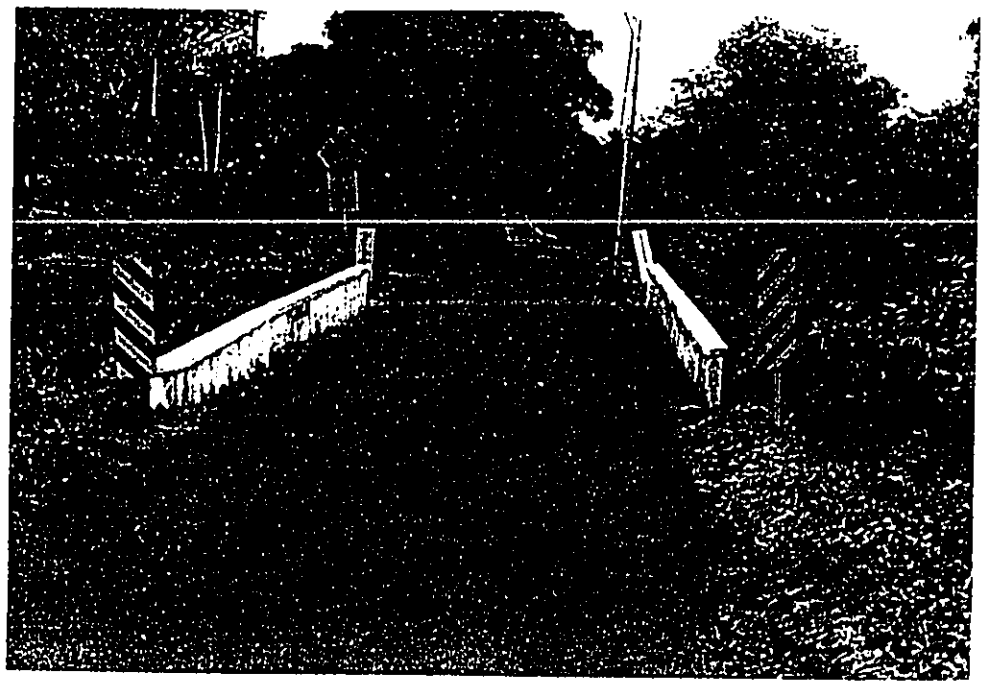

Figure 6 Papaahawahawa Bridge, view towards Hana

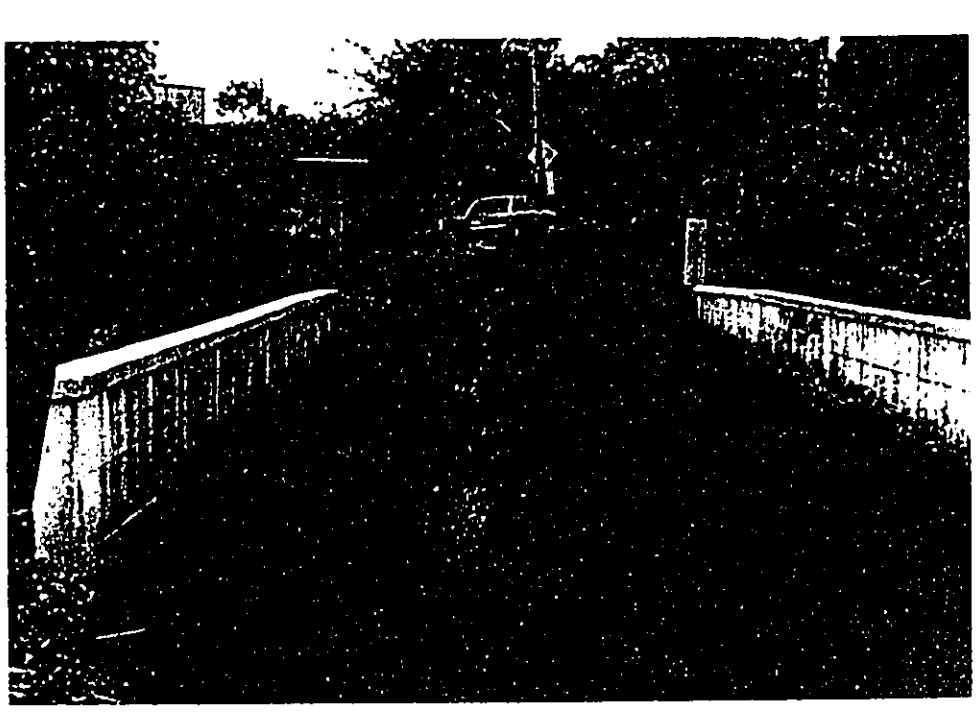

Figure 7 Papaahawahawa Bridge, view towards Kipahulu

Figure 8 Underside of Papaahawahawa Bridge, view to *mauka*

Figure 9 Underside of Papaahawahawa bridge, view to *makai*.

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