STATE HISTORIC BRIDGE INVENTORY & EVALUATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HAWAII STATE
HISTORIC BRIDGE INVENTORY AND EVALUATION

Prepared for
STATE OF HAWAII
Department of Transportation
Highways Division

Prepared by
MKE Associates LLC
Fung Associates, Inc.

November, 2013

Title Page Images:
1. Umauma Bridge (Hawaii Island)
2. Honolii Stream Bridge (Hawaii Island)
3. Ihiihilauakea Stream (Oahu Island)
4. Kealakaha Stream Bridge (Hawaii Island)
5. Koukouai Gulch Bridge (Maui Island)

Glenn M. Okimoto, Ph.D.
Director of Transportation
State of Hawaii
Department of Transportation

FEB 13 2014
Date

Abraham Wong
Division Administrator
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U.S. Department of Transportation

3/13/14
Date

ACRONYMS & ABBREVIATIONS

AASHO	-	American Association of State Highway Officials (before 1973)
AASHTO	-	American Association of State Highway Transportation Officials (1973 to Present)
ACHP	-	Advisory Council on Historic Preservation
BPR	-	Bureau of Public Roads
CFR	-	Code of Federal Regulations
CLG	-	Certified Local Government
CPL	-	Commissioner of Public Lands
DLNR	-	Department of Land and Natural Resources
DOT	-	Department of Transportation (Federal)
DPW	-	Department of Public Works
FAP	-	Federal Aid Primary (route)
FDR	-	Franklin Delano Roosevelt
FHWA	-	Federal Highway Administration
HAER	-	Historic American Engineering Record
HDOT	-	State of Hawaii, Department of Transportation, Highways Division
HHF	-	Historic Hawaii Foundation
HRS	-	Hawaii Revised Statutes
HSRHP	-	Hawaii State Register of Historic Places
H-1	-	Hawaii Interstate Freeway, designation H-1
H-3	-	Hawaii Interstate Highway, designation H-3
IHS	-	Interstate Highway System
KHPRC	-	Kauai Historic Preservation Review Commission
LFRD	-	Load and Resistance Factor Design
MCRC	-	Maui Cultural Resources Commission
MOA	-	Memorandum of Agreement
NBI	-	National Bridge Inventory

NCHRP	-	National Cooperative Highway Research Program
NEPA	-	National Environmental Policy Act
NHPA	-	National Historic Preservation Act
NR	-	Not Rated
NRHP	-	National Register of Historic Places
PRA	-	Public Roads Administration
SAFETEA-LU	-	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHPD	-	State Historic Preservation Division
SHPO	-	State Historic Preservation Officer
SPW	-	Superintendent of Public Works
STURAA	-	Surface Transportation and Uniform Relocation Assistance Act
THD	-	Territorial Highway Department
TMK	-	Tax Map Key
USC	-	United States Codes and Statutes

EXECUTIVE SUMMARY

This project is to identify which of the 708 bridges built before 1968 in the State of Hawaii are eligible for listing on the Hawaii State Register of Historic Places (HSRHP) or National Register of Historic Places (NRHP). It should be noted that this bridge inventory does not identify any archaeological or cultural issues and does not propose treatment for each bridge.

The goal for State of Hawaii, Department of Transportation (HDOT) will be to utilize this inventory to develop a Programmatic Agreement with the State Historic Preservation Division (SHPD), the Advisory Council on Historic Preservation (ACHP), and Federal Highways Administration (FHWA) to aid in future consultation with respect to facilitating/stream-lining the approval process for various construction projects. This report is an update of a draft 2008 Inventory and Evaluation completed by The Heritage Center, School of Architecture at the University of Hawaii at Manoa under the supervision of Spencer Leineweber of Honolulu, Hawaii. The scope of work did not involve re-visiting the already acceptable historic contexts developed previously and other major elements of the draft 2008 report. This report is based largely on the draft 2008 inventory. County bridges have been added to this inventory as well as bridges built between 1959 and 1968, to reflect bridges that have come of historic age (50 years old or more) since the last report was completed, and those that may be deemed eligible for listing by the year 2018. County bridges were added to the inventory since the Counties fall under the political subdivision category and must follow the same laws and guidelines as HDOT.

It should be noted that while the project team will try to be as comprehensive as possible, there may be bridges that have been missed. These bridges, when discovered, should be added to the inventory in subsequent reports. The goal of HDOT is to update the inventory and the Programmatic Agreement every 5 years.

ROLE OF THE COMMUNITY

As HDOT realizes that community input into the assessment of these bridges is crucial in the future consultation process, private citizens from each county active in the preservation community were encouraged to join the Bridge Committee. Community members who live and work in the various counties were vital to the identification and evaluation process to note local significance for the overall team beyond the visual architectural significance.

INVENTORY SUMMARY

HDOT provided an inclusive list of 1,351 bridges that are included on the National Bridge Inventory (NBI). A number of bridges were excluded from evaluation in this report for one or more of the following reasons:

a) The structure did not meet the standard definition of a bridge;
b) The bridge's date of construction occurred less than 45 years ago (i.e., later than 1968);
c) It is privately owned with no access and is thus unavailable for evaluation; and
d) It is located along Hawaii Interstate Freeway H-1 and is excluded because of the ACHP adoption of the *Section 106 Exemption Regarding Effects to the Interstate Highway System*. It should be noted that bridges or tunnels crossing the H-1 which were constructed prior to 1968 were included in the inventory.

The final number of bridges evaluated in this report totals 708 bridges.

The following table summarizes the number of bridges in each of the preservation categories. The criteria for each category are discussed in Section III, *Summary of Identification and Evaluation Methods.*

Island	Eligible	High Preservation Value	Non-Contributing	Not Eligible	Program Comments	*Total*
Maui District	15	49		10	13	***87***
Maui County	4	16	4	7		***31***
Kauai District	7	14	4	8	20	***53***
Kauai County	4	12		3		***19***
Oahu District	48	37	1	31	67	***184***
Oahu County	38	14		15	77	***144***
Hawaii District	30	23		10	34	***97***
Hawaii County	30	43	1	10	8	***92***
TOTAL	**176**	**208**	**10**	**94**	**219**	***708***

Historic bridge districts are enumerated below.

Island	Register Listing	Historic District Name	Proposed Historic District Name	Bridges in District
Hawaii	State	Old Mamalahoa Highway		42
Hawaii	n/a		Post-War Hawaii Belt Road, Multiple Property	13
Hawaii	State	Steel Trestle Bridges, Multiple Property		6
Kauai	National	Kauai Belt Road		8
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chapter 1

introduction

I. GENERAL

OVERVIEW

The HDOT is tasked with maintaining and managing the roads and bridges between properties in the State of Hawaii. Many of these roads and bridges now meet or are approaching the age criteria for evaluation as historic properties. Federal funding and the State of Hawaii Revised Statutes (HRS) ensure that HDOT and its political subdivisions consider alternatives that are feasible and prudent before adversely affecting an historic site through undertakings that may include alterations, repair, and/or replacement. Federal funding cannot be distributed to a project until all alternatives have been thoroughly considered prior to initiating undertakings that may adversely affect a bridge eligible for listing on the NRHP. As there are hundreds of bridges in the HDOT inventory, it was concluded that an efficient process was needed to identify the bridges that are eligible for listing on the State and National Registers of Historic Places. The intent of this report is to evaluate the historic significance of bridges listed in the HDOT inventory.

The goal for the HDOT will be to utilize this inventory to aid in future consultation with respect to facilitating/streamlining the approval process for various construction projects with the SHPD and the ACHP. Note that this bridge inventory does not include archaeological or cultural concerns and does not propose treatment for each bridge.

This report is an update of a document titled *State of Hawaii Historic Bridge Inventory and Evaluation*, completed by The Heritage Center in 2008 under the supervision of Spencer Leineweber of Honolulu, Hawaii. The current scope of work did not involve re-visiting the already acceptable historic contexts previously developed and other major elements of the draft 2008 inventory. This report is based largely on the draft 2008 inventory. This 2013 inventory has been updated to include County bridges and all bridges identified with a construction date prior to 1968; the previous report included bridges constructed in 1941 or earlier. County bridges were added to the inventory since the Counties fall under the political subdivision category and must follow the same laws, statutes (for example, HRS, Chapter 6E as noted in the following section), and guidelines as HDOT.

REGULATORY BACKGROUND

STATE LAW

Hawaii Revised Statutes (HRS), Chapter 6E (1976). Chapter 6E of the HRS regulations requires the "development of a statewide survey and inventory to identify and document historic properties."[1] The State Historic Preservation Officer (SHPO) is required to coordinate the activities of the political subdivisions of the state in accordance with the state plan for historic preservation. Further, HRS §6E-8, *Review of effect of proposed State and County projects*, requires HDOT to provide the SHPD with an opportunity for review and must receive a written concurrence before a project can proceed.[2] In HRS §6E-2, a "project" is defined as any activity directly undertaken by the State or its political subdivisions or supported in whole, or in part, through appropriation, contracts, grants, subsides, loans, or other forms of funding assistance from the State or its political subdivisions or involving any lease, permit, license, certificate, land use change, or other entitlement for use issued by the State or its political subdivisions (Hawaii Senate Bill SB 3010).

[1] State of Hawaii, *§6E-3 Historic Preservation Program,* under Hawaii Revised Statutes Chapter 6E, http://www.state.hi.us/dlnr/hpd/hpfctsht.htm (accessed April 1, 2013).
[2] State of Hawaii, *§6E-8 Review of effect of proposed State and County projects,* under Hawaii Revised Statutes Chapter 6E, http://www.state.hi.us/dlnr/hpd/hpfctsht.htm (accessed March 28, 2013).

FEDERAL LAW

Since the 1960s, Congress has passed various federal laws to protect cultural resources. The laws that impact the HDOT process of protecting Hawaii's cultural resources are summarized below.

National Historic Preservation Act (NHPA) of 1966 (as amended) (16 United States Codes and Statues (U.S.C.) §470). NHPA recognizes the Nation's historic heritage and establishes a national policy for the preservation of historic properties. The act contains several sections, each specifying procedures and mechanisms for developing and implementing historic preservation programs. Section 106 notes that any project involving Federal monies to obtain permitting, licensing, and approval must follow an established review process to ensure historic partners an opportunity to comment. Section 110 notes the responsibility of Federal government to maintain an inventory of their historic property.

Department of Transportation Act (DOT Act) of 1966. This act includes a special provision - *Section 4(f)* - which stipulates that the FHWA and other DOT agencies cannot approve the use of land from publicly-owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent alternative to the use of land, and
- The action includes all possible planning to minimize harm to the property resulting from use.

"Use" of a property protected under Section 4(f) may be defined as a) permanent incorporation of land, b) temporary occupation of land if that temporary occupancy meets certain criteria, or c) by effect of proximity where noise, visibility, or other like conditions substantially impair the protected features of the property.

In 2005, as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, Public Law 109-59, Aug. 10, 2005), Congress amended Section 4(f) to provide an alternative method of approving the use of protected resources where the impact is *de minimis*. The *de minimis* impact determination provides the basis for U.S. DOT to approve the minor use of a Section 4(f) property without identifying and evaluating avoidance alternatives—thus streamlining the approval process. The new regulations were also codified, for the first time, in a stand-alone section of the regulations—23 Code of Federal Regulations (C.F.R.) Part 774.

National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §§4321-4347). NEPA requires Federal agencies to identify and consider the environmental impacts of Federal actions and includes consideration of impacts on cultural resources. As required by the NHPA and NEPA, every Federal agency must provide for the identification and consideration of historic properties prior to undertaking any action that may potentially affect these resources. This applies to state agencies that receive Federal funds.

***Surface Transportation and Uniform Relocation Assistance Act of 1987* (*Public Law 100-17, April 2, 1987*).** This bill, which addresses highway improvement, planning and research throughout the United States, also declares that States are required to identify historic bridges listed in the National Bridge Inventory. Furthermore, it requires the Transportation Research Board to review and develop rehabilitation standards for historic bridges, as well as setting forth minimum allocations for each state for the purposes of transportation planning and research.

Advisory Council on Historic Preservation, Program Comment Issued for Streamlining Section 106 Review for Actions Affecting Post-1945 Concrete and Steel Bridges, 2012. The Program Comment issued by the ACHP addresses undertakings which affect a number of common concrete and steel bridges located throughout the nation and whose construction was generally standardized in the years after 1945. Although federal agencies must still complete the Section 106 review process for the identification of historic properties and effects of actions upon said properties, the Program Comment was issued for the following reasons: 1) It allows a federal agency to comply with Section 106 for a category of undertakings in lieu of conducting reviews for each individual proposed action, 2) It recommends state FHWA divisions develop a list of readily recognizable exceptional common bridges that may be excluded from the Program Comment, and encourages transportation agencies to update their historic bridge

inventories, and 3) It encourages the resolution of adverse effects that may result from potential replacement of existing common bridges.

SCOPE OF SURVEY

The updated 2013 bridge inventory includes State- and County-owned bridges that are listed on the National Bridge Inventory (NBI). The Federal government defines a "bridge" as a structure erected over a depression or an obstruction with a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or springlines of arches (23 C.F.R. 650.403). This definition is used as a criterion for eligibility to use Federal funds and includes all bridges that are inspected every two years. Due to this definition, HDOT does not maintain the same records for the bridges or culverts less than 20 feet. Pedestrian and other non-vehicular bridges were sometimes included in the inventory when listed on the NBI. Counties can opt to place a pedestrian bridge on the NBI to qualify for Federal funding.

The 2013 study involved the initial analysis of 708 potentially historic bridges constructed between 1894 and 1968, on the islands of Oahu, Hawaii, Maui, Molokai and Kauai. These bridges were first identified in the following reports: *Historic Bridge Inventory: Island of Oahu* prepared by Bethany Thompson in June 1983; *Historic Bridge Inventory and Evaluation: Island of Hawaii*, prepared by Patricia Alvarez in July 1987; *Historic Bridge Inventory: Island of Kauai* prepared by Spencer Mason Architects in October 1989; and *Historic Bridge Inventory and Evaluation: Islands of Maui and Molokai* prepared by The Hawaii Heritage Center in September 1990. The islands of Lanai and Niihau, although inhabited, have no bridges that meet the criteria. The statewide inventory and evaluation completed in 2008 by The Hawaii Heritage Center combined these reports to form a comprehensive perspective across the islands.

In general, this inventory does not include privately- or federally-owned bridges; however, some privately-owned bridges cross public roads and are maintained by the County or State. In such cases, only those private bridges already listed on the NBI were included in this 2013 report.[3]

SCOPE OF WORK

The *State of Hawaii Historic Bridge Inventory and Evaluation* was prepared in May of 2008 by The Heritage Center. A half decade later, this report provides an updated inventory with a focus on restructuring the evaluation system originally utilized to determine which bridges should be considered significant historic resources. The historic contexts developed in 2008 continue to be relevant to the statewide inventory and are referenced in this document where necessary. The updated inventory includes both State-owned bridges and County-owned bridges.

It should also be noted that since the previous inventory was taken, there are many more bridges that should be included for evaluation, especially as the first Interstate Highway H-1 approaches the 50-year age criteria mark to be considered an historic resource. Though the ACHP adopted the *Section 106 Exemption Regarding Effects to the Interstate Highway System* (IHS) on March 10, 2005, which effectively excludes the majority of the 46,700-mile highway system from consideration as an historic property under Section 106 of the NHPA, Interstate Highway H-3 is listed as exceptionally significant. In addition, the SAFETEA-LU includes a provision (Section 6007) that exempts the bulk of the IHS from consideration as an historic resource under Section 4(f) of the Department of Transportation Act.

With these two exemptions in place, Federal agencies are no longer required to consider the vast majority of the IHS as historic property under Section 106 and Section 4(f) requirements. Excluded from these respective exemptions are elements of the IHS that are exceptional in some way or meet a national level of significance under the criteria for the National Register of Historic Places, such as the already determined exceptional H-3. H-1 is excluded from consideration as an historic resource. However, all overpasses along H-1 built prior to 1968 are evaluated in this inventory.

[3] See "Meeting Agenda, Hawaii Statewide Bridge Inventory and Evaluation," for Oahu, Maui, Kauai, and Hawaii islands, July 2013.

RESEARCH

- Project team gathered reports from other states and reviewed previous inventories of and information pertaining to bridges located in the State of Hawaii
- Project team reviewed various national reports and guidelines pertaining to the preservation and significance of historic bridge structures

GATHER COMMUNITY AND PRESERVATION PARTNER INPUT

- Bridge committees were formed with the help of the SHPD, Historic Hawaii Foundation (HHF) and the appropriate Certified Local Government (CLG), which is identified as the Kauai Historic Preservation Review Commission (KHPRC) or the Maui Cultural Resources Commission (MCRC).
- Committees include a representative from each County Department of Public Works (DPW), as well as community members, such as representatives from Hanalei Roads Committee or Friends of Hana.
- A Facebook page was established and distributed through Historic Hawaii Foundation, HDOT and community members to provide outreach beyond the Bridge Committee.

EVALUATION

- Historic bridges were assessed for their potential significance with respect to criteria employed by the NHRP. The NRHP criteria identifies historic resources as buildings, structures, objects, sites, and districts over fifty years of age (unless they are properties of exceptional importance, in which case they may be considered for listing at an earlier age) with sufficient historical integrity to be eligible for listing on the NRHP.
- Bridges were further evaluated for high preservation value to aid the HDOT in future planning. Evaluation criteria are fully outlined in the "Summary of Identification and Evaluation Methods" in Section III of this report.

REPORT PREPARATION

- The final draft report of the *Statewide Historic Bridge Inventory* (2013) will be printed in hard copy and bound in a three ring folder for HDOT use and updating. Additional copies will be provided in electronic format.
- The final in electronic pdf format will include minutes of various bridge committee meetings.
- Inventory details will be input into the HDOT Access database, which will be available to committee members. General public may access this computer database through the SHPD or HDOT.

II. METHODOLOGY

PROJECT PERSONNEL

This project was prepared under the direction and supervision of Tonia S. Moy, AIA, who meets the standards for Architectural Historian and Historic Architect as outlined in National Park Service Standard 36 CFR 61 Appendix A.

Preparation of the original 2008 draft report, which included fieldwork, research, and report writing, was conducted in two phases. The first phase of research spans the period of development and bridge construction from 1894 until 1941 and was completed by Spencer Leineweber, Barbara Shideler, and Ann Yoklavich. The second phase of research details mid-century infrastructure development in Hawaii from 1941 until 1959 and was completed by Spencer Leineweber and graduate assistants from The Heritage Center at the University of Hawaii at Manoa.

Fieldwork and research for the 2013 project report and inventory update was conducted by HDOT, Don Hibbard, Tonia Moy, Mayu Ohama, Michelle Cheang, and Alison Chiu. Data input was led by Mayu Ohama and Michelle Cheang from Fung Associates, Inc. and Neil Hasegawa from HDOT.

INVESTIGATION METHODS

The methodology of work for this project falls into three major categories: background research, data analysis, and community outreach as discussed below.

BACKGROUND RESEARCH/DATA COLLECTION

- Reviewed Sample Bridge Inspection Reports and previous bridge inventory for adequate information. The team also assessed existing information in previous community meeting minutes.
- Provided direction for evaluating and protecting significant historic resources with a statewide approach.
- Only information obtained through HDOT records was collected. Extensive archival research was not conducted.
- The majority of photographs were provided from HDOT records.

DATA ANALYSIS

- Some field work was completed for identification, historic assessment and documentation of basic character defining features of those that may be considered a district, such as Pali Highway or Kamehameha Highway and are not already listed on the Hawaii or National Registers of Historic Places. Fieldwork was performed and verified by HDOT in 2012. The primary purpose of field investigations was to photograph bridges for evaluation (except those that were unsafe to photograph) and to experience the connection between bridges in historic districts.

- Developed Inventory Data sheets from Bridge Inspection Reports for 708 bridges built before 1968 (i.e., those bridges over 45-years-old in 2013). Appropriate information includes the following:
    - Year Built/Builder/Designer
    - Map location/Tax Map Key (TMK) adjacent to include stream and road names
    - Federal Bridge identification number
    - Color photographs
    - Sketch plan and elevations, if available
    - Date(s) of renovations/repairs

- Character defining features include (but are not limited to):
    - Type of Construction
    - Deck
    - Railings
    - Setting
    - Historic integrity

COMMUNITY OUTREACH

- The project team worked with various oversight and CLG groups to establish bridge committees for each island or one committee with representatives from each county. Consultation involved a myriad of input from committee members, and/or island and County members depending on the focused outreach activity. Approvals were sought at several steps along the way, including: methodology, inventory sheet format, matrix development, and validation regarding which bridges are considered to have high preservation values.
- Members of the committees included individuals from:
    - HDOT
    - County DPWs
    - FHWA
    - SHPD
    - HHF
    - KHPRC
    - MCRC
    - Big Island community member
- A list of participating members involved with the Historic Bridge Committee may be found at the end of section 1.2. Approval from these committee members is documented in a sign-off sheet and meeting minutes

DOCUMENTARY RESEARCH METHODS

The following depositories were researched for materials specific to the bridges:

- State of Hawaii, Department of Transportation, Highways Division
- State of Hawaii, Department of Land and Natural Resources (DLNR), SHPD
    - Previous Inventory Reports
    - Nominations to the Hawaii and National Registers of Historic Places
- Resources provided by the HDOT and FHWA
- Internet Resources

Because the goal of this report is ultimately to provide an updated bridge inventory, the extent of additional research was limited to developing a brief historic context on bridges built after 1959, notably development of Interstate H-1 and Pali Highway. The bulk of historical context that appears in this report was provided by and should be attributed to past reports prepared by Spencer Mason Architects. See past reports for references and footnotes.

Field notes, maps, plans and other relevant materials used in the compilation of this report will be on file with the HDOT.

HISTORIC BRIDGE COMMITTEE

The Historic Bridge Committee was convened to act in an advisory position for this project. Members include the following individuals:

OVERALL

- Misako Mimura, *Project Manager*, HDOT, Environmental Permitting and Project Compliance Section, Highways Division
- Paul Santo, HDOT, Bridge Design Section, Highways Division
- Neil Hasegawa, HDOT, Bridge Design Section, Highways Division
- Domingo Galicinao, Federal Highway Administration Hawaii Division
- Meesa Otani, Federal Highway Administration Hawaii Division
- Kiersten Faulkner, Historic Hawaii Foundation
- Angie Westfall, DLNR, State Historic Preservation Division
- Michael Gushard, DLNR, State Historic Preservation Division
- PROJECT TEAM
    - Glenn Miyasato, MKE Associates LLC
    - Brian Kung, MKE Associates LLC
    - Tonia Moy, *Project Manager*, Fung Associates Inc
    - Mayu Ohama, Fung Associates Inc
    - Michelle Cheang, Fung Associates Inc
    - Alison Chiu, Fung Associates Inc

CITY AND COUNTY OF HONOLULU

- Chris Takashige, City and County of Honolulu, Department of Design and Construction, Civil Division
- Mark Yonamine, City and County of Honolulu, Department of Design and Construction, Civil Division
- Michael K.H. Yee, City and County of Honolulu, Department of Design and Construction, Civil Division
- Stanley Katsura, City and County of Honolulu, Department of Design and Construction, Civil Division, Design Branch Bridges and Structures Section
- Pratt Kinimaka, HDOT, Highways Division, Oahu District
- George Abcede, HDOT, Highways Division, Oahu District

COUNTY OF HAWAII

- Salvador Panem, HDOT, Highways Division, Hawaii District
- Robert Yanabu, County of Hawaii, Department of Public Works, Engineering Division
- Cres Rambayon, County of Hawaii, Department of Public Works, Engineering Division
- Geoffery S. Mowrer, Community Member
- Ron Terry, Community Member
- Carolyn Witcher, Pulama ia Kona Heritage Preservation Council

COUNTY OF MAUI

- Ferdinand Cajigal, HDOT, Highways Division, Maui District
- Fred Gutierrez, HDOT, Highways Division, Maui District
- Annalise Kehler, County of Maui, Department of Planning, Cultural Resources Commission
- Cary Yamashita, County of Maui, Department of Public Works Engineering Division
- Ty Takeno, County of Maui, Department of Public Works Engineering Division

COUNTY OF KAUAI

- Raymond J. McCormick, HDOT, Highways Division, Kauai District
- Fred Reyes, HDOT, Highways Division, Kauai District
- Stanford Iwamoto, HDOT, Highways Division, Kauai District
- Edmond Renaud, County of Kauai, Department of Public Works, Roads Division
- Wallace Kudo, County of Kauai, Department of Public Works, Engineering Division
- Kuppusamy Venkatesan, County of Kauai, Department of Public Works, Engineering Division
- Lee Steinmetz, County of Kauai, Planning Department
- Barbara Robeson, Hanalei Roads Committee
- Pat Griffin, Kauai Historic Preservation Review Commission

Sign Off Sheets

Members were asked to sign an agreement to the findings of the report. The signed sheets are noted in Addendum A. Ron Terry from the County of Hawaii, cited a conflict of interest and resigned from the committee on January 9, 2014.

III. SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

INITIAL SELECTION OF HISTORIC BRIDGES FROM THE DRAFT 2008 REPORT

The draft 2008 report first examined the multiple property listings for Historic Highway Bridges of Hawaii (1894 – 1941) which is based upon inventory surveys completed for each county between 1983 and 1990.[4] The county surveys identified and evaluated 379 bridges constructed prior to 1941 (127 on Oahu, 119 on Hawaii Island, 51 on Kauai, and 82 on Maui.) The bridges were ranked, based on numerical ratings, under one of the following categories:

Category I – those with high historical significance

Category II – those bridges that have considerable historic significance but not enough research available to warrant being placed in Category I, or

Category III – those bridges with little, or no, historical significance.

Previous county surveys were each completed by a different consultant to the State Department of Transportation and utilized a different rating system, which resulted in apparent inconsistencies. For example, only 3% of Maui county bridges were placed in Category I, while the Kauai inventory included 31% of its bridges in Category I. Criteria for evaluation were revised for improved consistency, and the bridges were re-evaluated within a statewide historical context in the draft 2008 inventory. The initial field of bridges for re-evaluation utilized new statewide criteria.

CURRENT SELECTION OF HISTORIC BRIDGES FROM THE 2013 INVENTORY REPORT

Upon request from the HDOT and in response to the ACHP's Program Comments regarding Section 106 Review for bridges constructed after 1945, the current 2013 inventory utilized information provided in the draft 2008 report and revised selected information to reflect a more detailed current analysis of historic bridge resources in Hawaii. From the draft 2008 report, approximately 550 additional bridges were added to the overall inventory to include County-owned bridges and bridges built prior to 1968. Community members were asked for their input to help identify bridges that may have historical significance and they provided valuable insight into the final selection of bridges determined to be eligible and of high preservation value.

A bridge matrix was developed which categorizes 708 bridges by degree of preservation value. The matrix includes a description of character-defining features (if any) for each bridge and evaluation. Significance of the historic bridges was organized into three basic categories:

- ***Eligible – High Preservation Value***: Bridges within this category include those that are generally unique or possess characteristics of a type and exhibit high degrees of historic integrity. These are recommended for listing on the Hawaii or National Register of Historic Places. HDOT must consider all feasible and prudent alternatives as required by Section 4F for the treatment of historic bridges deemed "eligible" and "high preservation value."

[4] Patricia Alvarez, *Historic Bridge Inventory and Evaluation: Island of Hawaii* (Honolulu, 1987); Hawaii Heritage Center, *Historic Bridge Inventory and Evaluation: Islands of Maui and Molokai* (Honolulu, 1990); Bethany Thompson, *Historic Bridge Inventory: Island of Oahu* (Honolulu, 1983); Spencer Mason Architects, *Historic Bridge Inventory: Island of Kauai* (Honolulu, 1989).

- ***Eligible***: Bridges which fall under this category include those that are not the best example of a type and are not unique. HDOT should consider maintaining bridges in this category as through attrition, these may become rare examples of a type at some point in time.

- ***Not Eligible***: Bridges considered not eligible for listing include those that have lost considerable historic integrity or do not exhibit any quality that relays historic significance.

The following section explains the criteria used to evaluate eligibility or high preservation value for individual bridges.

DEVELOPMENT OF EVALUATION CRITERIA

To develop the evaluation criteria for the 2013 Hawaii State Historic Bridges Inventory, the team first set up the base line of eligibility based on the National Register of Historic Places criteria. The National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation* was used as a guide.[5] Similar reports from other states and the four inventories completed for each county in Hawaii were examined.[6] While the previous report focused on developing a numerical rating system, the committee concurred that the best way to approach eligibility for the 2013 inventory was to focus on the National Register criteria. To further aid the HDOT in future planning, a second tier of eligibility for high preservation value was established and is discussed below. Bridges and districts already on the NRHP were automatically given high preservation value.

The following table identifies bridges listed on, or determined eligible for listing on, the Hawaii State and/or National Registers of Historic Places, as of 2013. Please note that the following list does not include those bridges which fall within the boundaries of special design districts.

BRIDGE NAME	**ISLAND**	**HAWAII REGISTER**	**NATIONAL REGISTER**
Steel Trestle Bridges on the Hamakua Coast (6)[7]	HAWAII	08/14/2010	
Kapaia Swinging (Pedestrian) Bridge	KAUAI	08/23/2008	
Puuopae Bridge	KAUAI	09/18/2004	05/25/2005
Kauai Belt Road – North Shore Section (10)[8]	KAUAI	3/29/2003	2/11/2004
Opaekaa Road Bridge	KAUAI	11/19/1982	03/28/1983
Naniloa Drive Overpass Bridge	MAUI	07/30/2005	
Hana Belt Road (59)[9]	MAUI	4/20/2001	6/15/2001
Waiale Drive Bridge	MAUI	07/19/1997	10/30/1998
Oheo Gulch Bridge (as part of the Kipahulu Historic District)	MAUI		1977 *Eligible*

[5] U.S. Department of Interior, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (Washington D.C.: National Park Service, Interagency Resources Division, 1991).
[6] Pennsylvania (Commonwealth), *Historic Highway Bridges of Pennsylvania* (Pennsylvania Department of Transportation, 1986); Bruce Clovette and M. Roth, *Connecticut's Historic Highway Bridges* (Connecticut Department of Transportation, 1991).
[7] Refer to Chapter 6, Section 2.
[8] Refer to Chapter 3, Section 2.
[9] Refer to Chapter 5, Section 2.

Kalakaua Avenue Bridge	OAHU		10/28/1985 *Eligible*
North King Street-Nuuanu River Bridge (as part of the Chinatown Historic District)	OAHU		01/17/1973

Rather than rate all bridges numerically, each bridge was looked at holistically, with guidance from the committee and with consideration given to its significance and integrity using the criteria below.

NATIONAL REGISTER CRITERIA

For a bridge or district to be considered eligible for listing on the NRHP, it must meet at least one of the criteria below and have enough integrity to convey its significance. For a bridge or district to be considered to have high preservation value, it must meet the NRHP criteria in the higher standard noted and display a high amount of historic integrity, which will be described in the following paragraphs.

EVENTS (National Register Criterion A)

This criterion overlaps the Historic American Engineering Record (HAER) Standards No. 1 and No. 2 which relate to the property's contributions to the economic or industrial development of an area and its significance in the history of a branch of engineering. A bridge that was a significant contribution to state or local transportation patterns, an area's broad history (economic, industrial, or other trend), or where a specific significant event occurred and/or was important in the history of bridge engineering, would be considered eligible under this criterion if the bridge is documented to have existed at the time of these events. If there were no important events linked or known to be linked with a bridge, no consideration was given under this criterion.

> **High preservation value** was given to a bridge if the bridge has a clear association with a significant pattern in history that profoundly affected the development of Hawaii, such as railroad development for the sugarcane industry, or if it is associated with a well-known event in the timeline of our State's history, such as the bombing of Pearl Harbor.

PERSONS (National Register Criterion B)

If the bridge is uniquely and directly associated with an historic person during the person's productive life and reflects the time period in which he or she achieved significance, it may be considered eligible under Criterion B. Under this criterion, a significant person must be demonstrably important within a local, national or international context, and the property must be demonstrably associated with said person(s). Properties shall illustrate, not commemorate, a person's significant achievements.

Few bridges in the state are known to be linked with famous historical figures. Among these bridges, none of them are associated with the person's most productive period, and it was determined that none of these bridges have acquired significance through attrition as the sole remaining example of work. Thus this criterion was not used for bridge significance. Bridges designed by known builders are discussed in the "Work of a Master" paragraph under Design/Construction (National Register Criterion C).

DESIGN/CONSTRUCTION (National Register Criterion C)

> ***Distinctive Characteristics of:***
>
> Type, period, and method of construction are inter-related criteria. A bridge type is usually an example of a given time period and method of construction.
>
> > **Type:** Type categorization of bridges was based largely on structural designations given by the HDOT. This criterion is similar to the first part of HAER Standard No. 5 regarding a "sole remaining example" and also mentions "representative" examples of specific types, even when multiple examples exist. **High preservation value** was given if a bridge is the only

remaining example of its structural type in the state or county. If it is one of many structurally similar bridges, integrity considerations further refined determination whether the bridge is considered to be of high preservation value, eligible, or not eligible.

Period: Where structural or maintenance concerns affect the level of integrity or quality of a bridge, that bridge was deemed of average preservation value but still eligible for National Register listing. Bridges that are unable to convey a time period or which have such an uncertain date for its period of construction were not considered eligible under this criterion. **High preservation value** was given to bridges that are excellent or distinctive examples of a period of bridge construction.

Method of Construction: This criterion constitutes the main technological component of State of Hawaii bridge evaluations. The most critical dimensions are the maximum span (distance between supports), length of the bridge, and height of the bridge over the bed (typically a stream, but occasionally a road or railroad.) This data was obtained from the HDOT. Depending on bridge type, the span and dimensions of each bridge were taken into consideration and analyzed to determine significance and value. Engineering complexity of a bridge was related to the above dimensions but also took into account other factors such as period of design and construction. Eligibility was given to bridges that were considered to display a standard level of engineering for the period of construction. **High preservation value** was given to a bridge that utilized patented technology, was innovative or complex for its time, and/or had a longer span/length than was typical for its type.

Work of a Master: If the designer and/or builder were well-known within the state or county and the bridge retained a level of historic integrity, the bridge was considered eligible under this criterion. There does not appear to be any bridges in Hawaii designed by engineers of national renown. **High preservation value** was given to a bridge if it was considered an exemplary work by the designer's hand. Bridges by undocumented designers and builders may be considered eligible under different criteria.

High Artistic Value: This criterion is related to a bridge's overall design or certain ornamental elements. Typically, the design and pattern of the railing is considered the most ornamental part of the bridge; sometimes the piers, end posts or other component of the bridge has aesthetic appeal. **High preservation value** was given to a bridge if it displays overall high artistic value of design. Bridges with plain, utilitarian designs and low artistic value are not considered to fall within the category of high preservation value under this criterion.

Distinguishable Entity Whose Components Lack Individual Distinction: This criterion applies to districts such as Hana Highway (Route 360) or Kuhio Highway (Route 560) where multiple bridges strung together make a district that conveys a greater sense of an historic association. Each bridge is interrelated to the same historic context and may be of average to high preservation value in and of itself, but when strung together, all bridges holistically attain **high preservation value**, provided that the district maintains a high level of historic integrity.

INFORMATION CONTENT (National Register Criterion D)

While this criterion is generally used for archeological sites, use within this category is typically reserved for preservation of unique information that is only attainable by retention of the existing site. Determination of the research potential of a bridge may include noting specific construction techniques that are otherwise unusual and not documented in another manner. Bridges deemed unlikely to yield unique important information not otherwise obtainable from documents and other sources are not considered under this criterion. All of the bridges identified in the 2013 inventory were constructed under the jurisdiction of the Territory or State government; thus, they are well documented and none fall under this criterion.

INTEGRITY CRITERIA

Historic integrity criteria determines how well the bridge or property conveys its significance. The seven integrity criteria are described below. Each integrity criterion relates to each other and affects the overall integrity of association and feeling. It is rare to be able to judge a property on any singular criterion. Hence, a more holistic approach is necessary when evaluating a site for integrity.

Integrity of Location: Integrity of location relates to whether the bridge has been moved from the original site. The relationship between a bridge and its location is necessary in understanding the historical development of transportation and commerce in an area. Due to the nature of historic concrete and masonry bridges, this criterion rarely affects consideration of eligibility. Alternatively, the "very nature of early [steel] truss fabrication and erection enabled [metal bridges] to be conveniently moved to other sites as crossings were upgraded."[10] However, it should be noted that for the location to have no effect on the metal truss bridge, the setting should be similar. There are rare cases in Hawaii that the setting could be similar enough for the move of a metal truss bridge to have no effect on its integrity of location.

Integrity of Design: Integrity of design is associated with the continuance of a bridge's original design elements. Alterations that have occurred during the period of significance of an historic property are considered part of the design history of the resource. If design elements such as proportion, scale, shape, dimensions, style and ornament remain, a bridge may be considered to retain a high level of integrity. Modifications that range from slight (e.g., addition of removable guardrails) to major (e.g., additions and replacement) may affect consideration of eligibility.

***Integrity of Setting*:** Integrity of setting concerns the character of environment surrounding the resource, and whether changes in the setting compromise the relationship of the bridge to its surroundings. Physical features that form the setting of a bridge can be man-made or natural, including nearby period buildings for urban bridges and topographic features for both urban and rural bridges. An example of substantial change in setting is the rerouting of a water course such that a bridge no longer spans the topographical feature that originally required its construction.

***Integrity of Materials*:** Integrity of materials evaluates whether materials originally used in bridge construction have been substantially altered by deterioration or replacement. If multiple periods of construction exist for a particular structure, for instance if the abutments are older than the superstructure, the materials of each period may be considered of value if the respective periods are deemed historically significant. This criterion does not reflect the structural condition of a bridge, but only the "intactness" of the material from an historic point of view.

***Integrity of Workmanship*:** Integrity of workmanship concerns type and level of craftsmanship as well as methodology of assembly. Evidence of an artisan's labor and skill may reflect vernacular methods of construction as well as highly sophisticated configurations and ornamental detailing. Developments in technology, aesthetic principles, and local, regional or national applications of construction practices may be addressed under this criterion.

***Integrity of Feeling*:** Integrity of feeling addresses the embodiment of a historical expression of time and whether that quality or character is communicated by a structure. While this is among the most subjective of the criteria, it is typically related to the physical appearance or dimensions of a bridge. It is further affected by additional integrity criteria because lack of design or material integrity can affect the "feel" or ambience of a structure.

[10] William P. Chamberlain, *Historic Bridges – Criteria for Decision Making*, National Cooperative Highway Research Program Synthesis of Highway Practice 101 (Washington D.C.: Transportation Research Board, 1983), 16.

***Integrity of Association*:** Integrity of association relates to the interpretation of a structure and its direct link to specific historic periods, trends, or events. The presence of physical features is required to convey association, but this criterion, like Integrity of Feeling, is also a subjective determination. Because feeling and association are each dependent upon individual interpretation, these two criteria alone are insufficient to support eligibility.

NATIONAL REGISTER CRITERIA CONSIDERATIONS

Bridges that have been relocated or reconstructed, are commemorative, or have achieved significance in the past fifty years, are generally not considered for listing on the National Register. They can, however, be listed if they meet certain criteria considerations. Applicable Criteria Considerations are described as follows:

MOVED PROPERTIES (National Register Criteria Consideration b)

If a bridge has been moved from its original location but is significant for its architectural value or is the only surviving structure associated with a significant historic event or person, it may be considered eligible for listing on the National Register. Steel truss bridges, which are often moved, may be considered eligible under this criterion. For example, the wrought-iron Wailua River Bridge, the first bridge built on Kauai between 1894-1895, was dismantled in 1919; parts of the original bridge were relocated and used for construction of the Opaekaa Road Bridge.

RECONSTRUCTED PROPERTIES (National Register Criteria Consideration e)

If a bridge has been accurately reconstructed in a suitable environment (characterized as one that reflects the physical context provided by an historic district or an appropriate interpretive scheme) and is presented as part of a larger restoration plan, and when no other suitable examples exist, it may be considered eligible for listing. An accurately reconstructed bridge may be considered a contributing feature to the historic district in which it belongs.

COMMEMORATIVE PROPERTIES (National Register Criteria Consideration f)

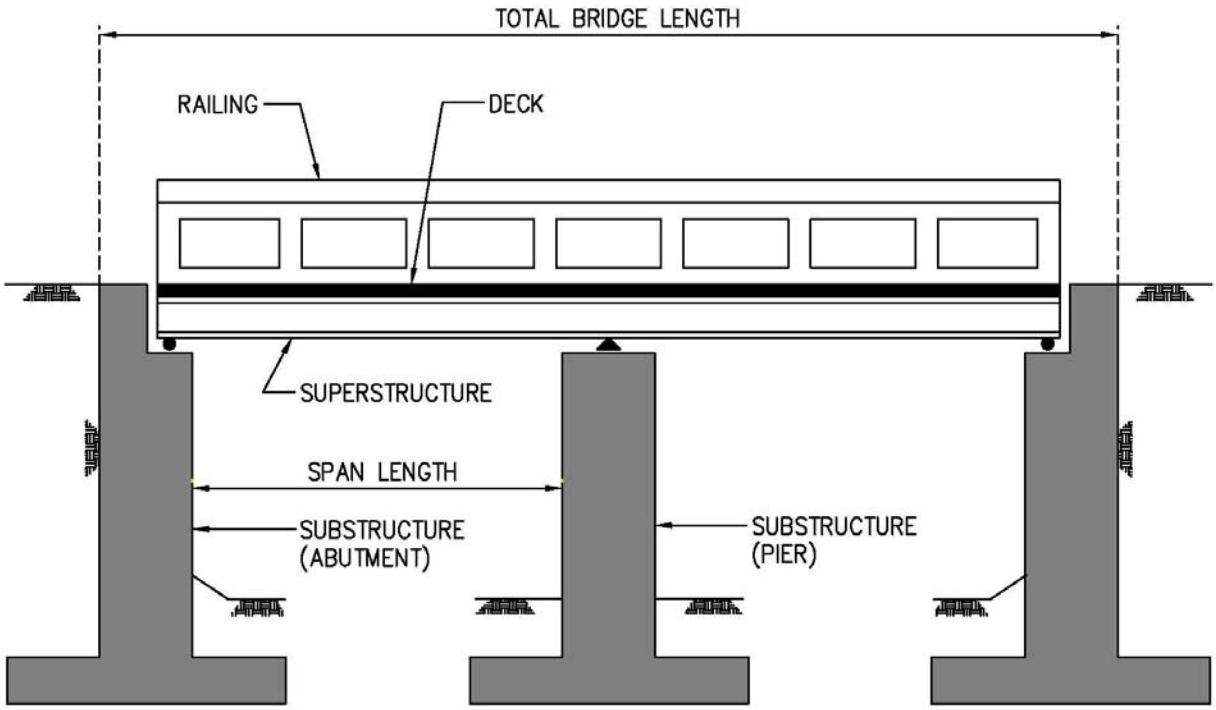
A commemorative bridge may be considered eligible for listing if it displays exceptional significance or great symbolic value to the public.

ACHIEVING SIGNIFICANCE WITHIN THE PAST 50 YEARS (National Register Criteria Consideration g)

A bridge may be considered eligible if it has achieved significance in the past 50 years and if it is determined to be of exceptional importance.

IV. BRIDGE IDENTIFICATION

IDENTIFICATION OF BRIDGE COMPONENTS[11]



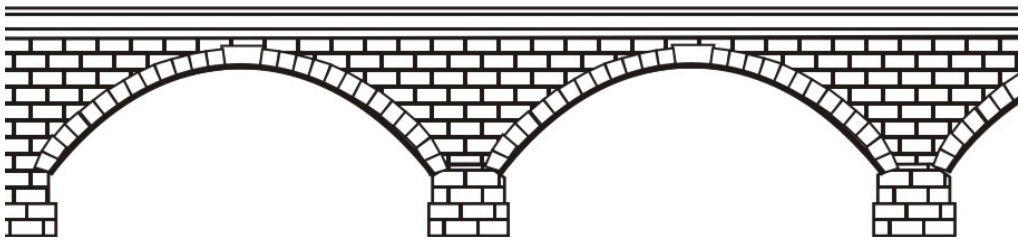
[11] Drawing provided by MKE Associates LLC, 2013.

SUMMARY OF BRIDGE TYPES

Bridge type is defined by the form or method in which the structure functions. It is not exclusively determined by any of the following: materials, method of connection, type of span, or if the bridge structure exists above or below the grade. However, many bridge systems were patented with the material type and/or form detail.

The historic bridges of Hawaii are composed of several different material and structural types: masonry arch bridges (frequently constructed of local basalt, often referred to as "lava-rock"); steel truss and stringer bridges; timber stringer bridges; and concrete solid-and open-spandrel arch bridges, deck girder bridges including tee beam types, flat slab bridges, and rigid-frame bridges. The most prevalent construction material for Hawaii's existing bridges is reinforced-concrete since the corrosive nature of the salt air from the Pacific Ocean and the presence of insects makes the maintenance of steel and wooden bridges less practical than in the mainland United States. Stone, sand, gravel, and lime are found in abundance in the islands; however, reinforcing steel was generally imported from the U.S. mainland.

MASONRY ARCH BRIDGES

Masonry Arch[12]	

DESCRIPTION

Unreinforced masonry arch bridges is the most common remaining nineteenth-century bridge building technology, and was among the first permanent bridge type constructed in the islands. Masonry arch bridges were constructed in Hawaii from approximately 1840, when the first recorded bridge was built, to 1904, when the Territory made it standard practice to use reinforced-concrete for bridge building. These bridges were generally constructed in residential areas over small or intermittent streams along important transportation arteries. The remaining masonry arch bridges in Hawaii are generally small, single-span circular arches with solid spandrels, a span of fifteen to thirty feet and a relatively low-rise over the stream bed. Although usually quite narrow (eight to twelve feet) for wagon traffic, some examples are quite wide (such as the thirty-foot wide Mamalahoa-Pukihae Bridge and Mamalahoa-Kalalau Bridge), demonstrating forethought uncommon for its time. Masonry arch bridges in Hawaii are constructed of local basalt also known as “lava rock.” This material was commonly used as basalt rubble set in an ashlar pattern for the spandrel walls and parapets. Occasionally, carefully cut blocks with dressed margins were utilized for the parapets. Coursed blocks, twelve to twenty-four inches in diameter, were used for the arch ring, although rare examples of concrete or brick arch rings remain.

[12]Parsons Brinckerhoff, and Engineering and Industrial Heritage, “A Context For Common Historic Bridge Types,” prepared for The National Cooperative Highway Research Program, Transportation Research Council, National Research Council (October 2005), 3-51.

SIGNIFICANCE

Stone was abundant in Hawaii, and stone arches at Nuuanu and Waikiki on the island of Oahu were among the first bridges constructed by the Kingdom of Hawaii's Interior Department in the 1840s. However, no known bridges constructed by the Kingdom remain. Masonry arch bridges continued to be constructed by the Republic of Hawaii, which was established between the overthrow of the Hawaiian monarchy and the annexation of Hawaii by the United States (1893-1898), and by the early territorial government prior to the establishment of the county governments (1898-1904). The nineteenth-century bridges, built by the Republic of Hawaii, were generally constructed by prison labor and were part of the up-grading of the Hawaii belt roads that had begun in King Kalakaua's reign (1874-1892). After annexation in 1898, the practice of letting contracts to professional builders was used more widely in the islands.

Several masonry arches remain along the Mamalahoa Highway on the island of Hawaii, and on the Hana Highway on Maui. These routes were once the primary transportation arteries in their regions. The Mamalahoa and Hana Highways are characterized by narrow, winding lanes and innumerable streams and gulches. The Mamalahoa Highway was by-passed by the construction of a new belt road in the 1930s, leaving intact a high concentration of historic bridges. The numerous single-lane bridges of the Hana district have been preserved due to the lack of development along this remote region of Maui.

Unlike timber, or later concrete and steel bridges, masonry-arch bridges utilized locally available construction materials. However, construction of stone bridges, which employed arch building technology imported from the United States and Europe, required skilled labor which was scarce in the islands. The Hawaiians were skilled in laying stone and had a long tradition of dry masonry-rubble construction, a technique utilized for *heiau* (temples), house platforms, walls, and agricultural terraces. Unfortunately by the mid-1800s, the decimation of the native population by disease resulted in a chronic shortage of labor. After 1885 imported labor, particularly Portuguese and Japanese masons, oversaw the construction of masonry arch bridges.

Important builders involved in the construction of masonry arch bridges include Louis M. Whitehouse and John H. Wilson. Whitehouse was one of Hawaii's most prolific early contractors. In partnership with Wilson (who later served six terms as Mayor of Honolulu), he built the first section of the Nuuanu-Pali Road on Oahu, part of the Belt Road on the island of Hawaii, and several masonry arch bridges, including the Mamalahoa-Pukihae, Mamalahoa - Laupahoehoe and Nuuanu Avenue arch bridges. With another partner named Hawxhurst, he built the 1903 Waiakea and Wailuku River steel bridges in Hilo (both since replaced).

Masonry arch bridges are generally eligible under National Register Criterion A and C. Masonry arch bridges are eligible under Criterion C as notable examples of the use of vernacular building materials and the artisanship of local craftsmen. The local basalts which compose the lava-rock used in bridge construction are unique to Hawaii and the islands of the Pacific; thus these masonry arch bridges may be the only representatives of this type in the United States.

ELIGIBILITY REQUIREMENTS

The bridge must retain its integrity of location. Since masonry arch bridges were constructed as permanent structures, all extant examples are in their original location. The setting of the bridge must remain relatively unchanged; by-passing the original transportation artery with a new highway does not necessarily exclude a property if the bridge’s immediate surroundings retain its historic qualities.

The design of the bridge, particularly the arch sub-structure and the spandrel walls, must also retain its integrity. Alterations that may be considered acceptable include those that occurred early in the bridge’s history (i.e. within the period of significance) and in such a way that the alterations are reversible without diminishing the significant historic characteristics of the original bridge (by widening or lengthening the bridge by the construction of an adjacent concrete culvert, for example).

The bridge's original materials, particularly the basalt or brick used in the arch ring and vault, must not be adversely affected by alterations or additions. The quality of the original workmanship must remain apparent, with substantial evidence of artisan's labor and skill. The bridges must retain a high degree of historic feeling and their associations must be apparent to the informed or casual observer.

HIGH PRESERVATION VALUE REQUIREMENTS

Specific considerations for high preservation value under Criterion A include:

1. **Bridges that contributed in a *meaningful* way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or been significantly integral to the development of an effective transportation system,** such as the Hana Highway on Maui or the Mamalahoa Highway on the Island of Hawaii. The most significant early road and bridge building projects in the islands were located at important crossings or associated with belt road construction efforts. The narrow, winding belt roads cut across the innumerable streams and precipitous gulches along the coastline of the major islands and provided access to previously isolated communities.

2. **Early and/or prominent product of the Republic of Hawaii (1893-1898) or the early territorial governments (1898-1904).** Masonry arch bridges are the oldest and only remaining bridges from these important early periods and are very rare.

3. **Bridges associated with major historical events or natural disasters.** Due to its unique location in the center of the Pacific Basin, Hawaii is susceptible to tsunami (seismic sea wave) inundation from nearly every direction. Earthquakes generated in the Aleutian Islands, South America, and Japan have swept large, destructive ocean waves onto Hawaiian shores with a great loss of life and property. Several bridges have survived these onslaughts of nature.

4. **Bridges associated with the primary economic endeavor of the islands - sugar production (c. 1850-1950).** Sugar production facilitated changes in the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor - primarily for irrigation, cultivation, and transportation of sugar cane - changed the face of the islands forever. Many of the bridges constructed along belt roads were intended to aid in the overland transport of raw cane to the mills for processing, as well as to provide reasonable access for workers to the sugar lands.

Specific considerations for high preservation value under Criterion C include:

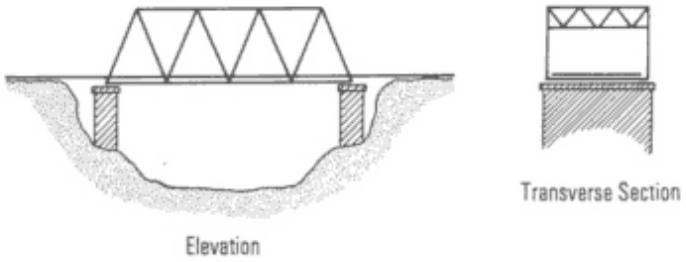
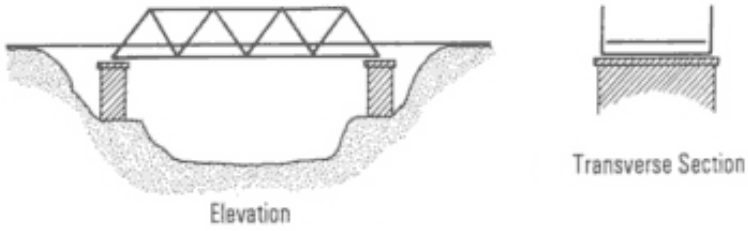
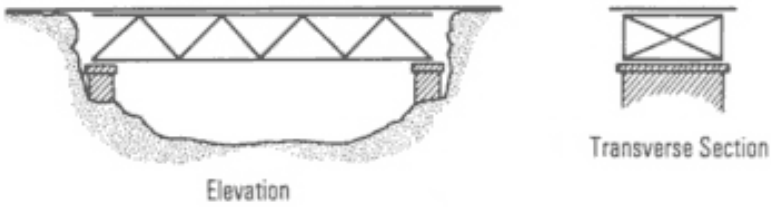
1. **Rare survivor of a once common type.** The construction of masonry arch bridges was initially promoted for their permanence and many examples were constructed throughout the islands. However, the important transportation routes these bridges were generally constructed along were among the first to be up-graded for modern traffic needs. Consequently, the majority of these bridges were replaced with modern structures.

2. **Example of vernacular materials or craftsmanship.** Masonry arch bridges are notable for their use of vernacular building materials and the high quality of craftsmanship by local artisans. The local basalts which compose the lava-rock used in bridge construction are unique to Hawaii and the islands of the Pacific; these masonry arch bridges may be the only examples of this type in the United States.

3. **Exceptional work by an important engineer, architect, or builder.** This survey has identified several individuals (and their companies) who were very important to the construction of masonry arch bridges in Hawaii.

4. **Bridges of exceptional aesthetic merit.** Masonry arch bridges, such as the Mamalahoa-Pukihae Bridge, stand out by virtue of individual design or because of the quality of craftsmanship displayed in their construction.

METAL BRIDGES

Through Truss[13]	
Pony Truss[14]	
Deck Truss[15]	
Pratt Truss (Diagonal)[16]	
Warren Truss[17]	
Howe Trusses[18]	

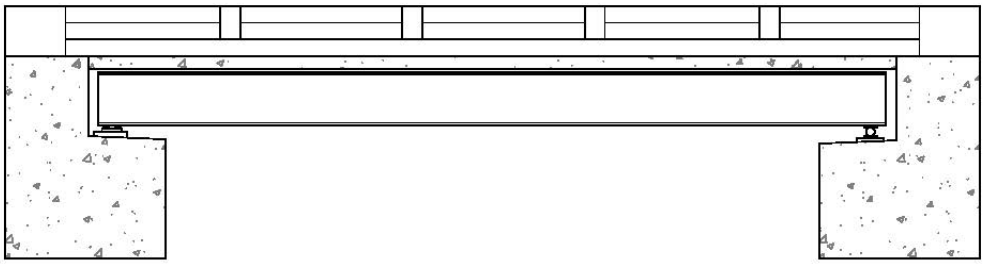
[13] "Bridge Types," Historic Bridge Foundation, http://historicbridgefoundation.com/?page_id=8 (accessed January 30, 2013).
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Ibid.

DESCRIPTION

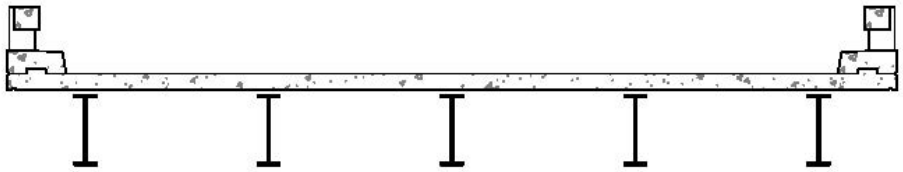
Although metal bridge construction was prevalent in Hawaii around the turn of the century, only steel stringer bridges continued to be built through the first half of the twentieth century. Due to the extremely corrosive nature of the marine environment in Hawaii, there are only a handful of metal bridges that remain. These extant metal bridges are of three basic types: steel and wrought iron trusses, steel stringer bridges, and steel trestle railroad bridges.

Steel and Iron Trusses: Steel and wrought iron trusses were commonly utilized in Hawaii until 1904, when the territorial government advocated the construction of more durable concrete bridges. Metal trusses were fabricated by British and American manufacturers and shipped to the islands to be erected by local contractors. Consequently, truss types were similar to those found in the United Kingdom and the United States (Pratt, Warren and Howe types). The Pratt trusses are distinguished by thick vertical members acting in compression and thin diagonal members in tension. This design reduced the length of the compression members to prevent them from bending or buckling. The Warren design is basically triangular with the diagonals alternately in compression and tension. A *through truss* carries its traffic load level with the bottom chords of the truss. A *pony truss* is a through truss with no lateral bracing between the top chords.

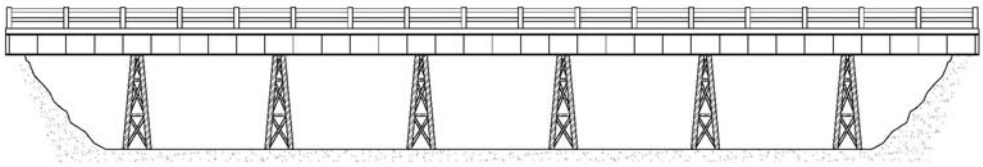
In 1884, ten metal truss bridges were shipped to Hawaii by the Pacific Bridge Company, with offices in Portland and San Francisco, for erection in the Hilo district on the island of Hawaii. The islands' largest and most expensive nineteenth-century metal truss bridge was erected at the mouth of the Wailua River on Kauai in 1890. The bridge was manufactured by Alex Findlay & Co. of Motherwell, Scotland. In 1919, one Warren truss segment of this bridge was utilized to construct the Opaekaa Stream Bridge #1 on Kauai. The Opaekaa Stream Bridge #1, listed on the NRHP in 1983, is the only remaining iron truss bridge of British manufacture in the United States. Only two twentieth-century trusses remain in the state: the 1932 Karsten Thot Bridge, a Warren truss erected in Wahiawa, Oahu; and a Pratt truss segment from the 1924 Wailuku River Railroad Bridge which was scavenged for reuse in the Kolekole Highway Bridge after the 1946 *tsunami* in Hilo. The 1912 Hanalei Bridge, a twentieth-century Pratt truss that crosses the Hanalei River on Kauai, was rehabilitated in 2003 in accordance with the Secretary of the Interior's Standards for Rehabilitation; this bridge remains on the NRHP as a contributing resource of the Kauai Belt Road.

Steel Stringer Elevation[19]	

[19] Drawing provided by MKE Associates LLC, 2013.

Steel Stringer Section[20]	

Steel Stringer: Steel stringers were constructed in Hawaii primarily for industrial and railroad bridges. Ornamentation, if any, is usually limited to the pattern of the railings. The two extant examples from the period of significance were constructed over railroad lines in Maui and Kauai. One is the Lihue Mill Bridge on Kaumualii Highway in Lihue, Kauai and the other is the Waiale Drive Bridge on Kaahumanu Avenue in Wailuku, Maui. Both bridges were constructed with U.S. Works Program Grade Crossing funding, which provided federal money without the usual match requirement, to build bridges separating railroad and road grades. The use of steel, uncommon in Hawaii due to the extreme marine environment, may reflect the requirements of the U.S. Grade Crossing Program. Since very little steel is used for bridge construction in Hawaii, this may be considered an unusual structural type. It should be noted that there are numerous steel stringer bridges that feature wood plank decks and wood railings. These bridges are addressed as timber bridges since their appearance to the general public is wood.

Steel Trestle Bridge[21]	

Steel Trestle Railroad Bridges: Fourteen steel trestle railroad bridges were constructed in 1911 for the Hilo Railroad Company. Five of these (Hakalau, Nanue, Kapue, Paheehee, and Umauma) were reconstructed as territorial highway bridges between 1951 and 1953, the remaining nine were salvaged for use in the reconstruction. The reconstructed steel trestle structures are topped with a concrete and asphalt highway deck. During their conversion, the bridges were widened for highway use by the addition of members from other railroad bridges. The simple horizontal concrete railings were added during the 1951-53 renovations.

SIGNIFICANCE

The period of significance for metal truss and stringer bridges begins in 1912, when the earliest remaining example was erected, and ends in 1957. The period of significance for steel trestle railroad bridges begins in 1911, when they were first constructed, and ends in 1953, after their conversion to highway bridges. Metal bridges are eligible under Criterion A if they contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or been significantly integral to the development of an effective transportation system. Metal truss bridges in Hawaii are significant as representative examples of the expanding capital investment and control that American manufacturers had gained over their British and German rivals as a consequence of the U.S. annexation of the islands in 1898. The steel stringer bridges are significant for their association with the railroads of the sugar industry. They were built with U.S. Works Program Grade Crossing funding which provided federal money, without the usual match requirement, to build bridges

[20] Ibid.
[21] Ibid.

separating railroad and road grades. The erection of metal truss and stringer bridges was a deliberate effort by the territorial government to construct permanent public works improvements requiring the latest technology.

The remaining metal truss and stringer bridges are eligible under Criterion C as rare survivors of a once common bridge type and as representative examples of the work of important engineers and builders. These include: Joseph H. Moragne of the Kauai Department of Public Works, who oversaw the construction of the Hanalei River Pratt Truss in 1912 (replaced in 2003). James L. Young was responsible for building the Karsten Thot Warren truss over the North Fork of the Kaukonahua Stream in Wahiawa, Oahu in 1932. Young, the founder of J. L. Young Engineering Company, was "in the literal sense of the phrase, a builder of Hawaii."[22] Young was trained as a civil engineer and an architect. He designed and constructed the first two reinforced-concrete fireproof buildings in Honolulu, the Pantheon Block and the laboratory building at the Bishop Museum. Between 1922 and 1925, Young built over forty-one buildings in Honolulu, including Palama Settlement, the Library of Hawaii (Hawaii State Library), and the "new library building at the University of Hawaii" (George Hall).[23] He also constructed buildings on many military bases, including Fort Shafter, Fort Ruger, Fort Kamehameha and Schofield Barracks. The most significant steel stringer bridges were designed by William Bartels, chief designer for the Territorial Highways Department, in 1936. Bartels arrived in Hawaii from Germany in 1932, working as a bridge engineer for the Territory until his retirement in 1952. He was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time.

The converted steel trestle and girder railroad bridges have National Register significance under criterion A, B, C, and D. The railroad line played a major role in the development of the Hilo and the Hamakua Coast by providing transportation to the harbor for the island's sugar production. The Hilo Railroad Company was founded by Benjamin Franklin Dillingham and figures significant in the history of the Hawaiian Islands. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawaii."[24] Another commentator noted that the completion of the railroad marked nothing less than "an era in the development of the Islands."[25] In addition, the converted railroad bridges are the remains of the only standard gauge rail line erected in the islands and can tell us much about early twentieth century steel manufacturing. The bridges represent the Work of a Master: John Mason Young, designer of the original railroad line and bridges; as well as William R. Bartels, of the Territorial Highways Department, who engineered their conversion from railroad to highway use in the 1950s.

ELIGIBILITY REQUIREMENTS

Metal truss, stringer and trestle bridges must retain their integrity of location. However, relocation of the structure within the period of significance is interpreted as part of the history of the bridge. The design of the bridge, particularly the superstructure and connections, must also retain its integrity. Alterations may be considered acceptable if they were completed early in the bridge's history (within the period of significance) and they are reversible without diminishing the significant historic characteristics of the original bridge (e.g. the addition of a completely independent additional truss to support the weakened original structure or widening with members salvaged from identical spans). The setting of the bridge must remain relatively unchanged; by-passing or realignment of the original transportation artery does not necessarily exclude a property if the bridge's immediate surroundings retain its historic qualities. The bridge's original materials must not be obscured by alterations or additions. The quality of the original workmanship must remain apparent, particularly from a technical rather than aesthetic standpoint, with substantial evidence of the builder's labor and skill. The bridges must retain a high degree of historic feeling and their associations must be apparent to the informed or casual observer.

[22] George F. Nellist, "The Story of Hawaii and Its Builders," *Honolulu Star-Bulletin*, 1925, 911-12.
[23] Ibid.
[24] *Paradise of the Pacific,* December 1924, 14.
[25] Thomas Thrum, *Hawaiian Almanac and Annual* (Honolulu: Hawaiian Gazette Company, 1914), 142.

HIGH PRESERVATION VALUE REQUIREMENTS

Specific considerations for eligibility under Criterion A include:

1. **Bridges that contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or were significantly integral to the development of an effective transportation system, such as a belt road or homestead road**. The most significant early road and bridge building projects in the islands were associated with belt road construction. Many early metal truss bridges were imported to the islands to accommodate the construction of the belt roads, such as those at Hanalei and Wailua on Kauai. Homestead roads made possible the settlement and development of the rural areas in which they are located.

2. **Early and/or prominent product of private enterprise.** The converted highway bridges are among the few remaining examples of bridges constructed by private enterprise. The Hilo Railroad Company (which later became the Hawaii Consolidated Railroad) was a significant economic force on the Island of Hawaii during the early twentieth-century.

3. **Representative of a significant engineering endeavor**. The railroad construction project was a daring engineering feat that crossed numerous gorges and streams with large steel bridges at the valley mouths and required massive earth cuts (and tunneling) for completion of the comparatively straight road bed. This was in direct contrast to the more conservative government policy of winding roads and small concrete or timber bridges in the backs of valleys or down sharp grades to sea level.

4. **Bridges associated with the primary economic endeavor of the islands (c. 1850 -1950) - sugar production.** Sugar production changed the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor - primarily for irrigation, transportation, and cultivation of sugar cane - changed the face of the islands forever. Many of the metal bridges were constructed to aid in the overland transport of raw cane to the mills for processing, such as the steel railroad trestles erected along the Hamakua coast of the island of Hawaii, as well as to provide reasonable access for workers to the sugar lands.

5. **Bridges associated with major historical events or natural disasters.** Due to its unique location in the center of the Pacific Basin, Hawaii is susceptible to *tsunami* (seismic sea wave) inundation from nearly every direction. Earthquakes generated in the Aleutian Islands, South America and Japan have swept large, destructive ocean waves onto Hawaiian shores with a great loss of life and property. The railroad bridges were damaged and/or partially destroyed but survived the devastating tsunami of 1946. This disaster forced the closure of the rail line and resulted in the acquisition of these bridges by the Territorial Highways Department.

Specific considerations for eligibility under Criterion B include:

1. **Bridges associated with the lives of persons significant in our past.** The steel trestles railroad bridges were an integral part of the Hilo Railroad Company founded in 1899 by entrepreneur Benjamin F. Dillingham; Lorrin Thurston, the Minister to Washington during the Republic of Hawaii and a former Interior Minister under the monarchy; and Mark Robinson, the former Queen Liliuokalani's Minister of Foreign Affairs.

Specific considerations for eligibility under Criterion C include:

2. **Rare survivor of a once common type.** The construction of metal truss and stringer bridges was initially promoted for their permanence and many examples were constructed throughout the islands. The use of steel for bridges was phased out after the territorial government advocated the construction of durable, low-maintenance concrete bridges in 1904. The few remaining metal truss and stringer bridges are rare surviving examples of this once common bridge type.

3. **Example of a rare structural type.** The steel trestle bridges are the remains of the only standard gauge rail line erected in the islands. In addition, they are a rare example of steel construction, since the majority of other railroad trestles were constructed of wood.

4. **Exceptional work by an important engineer, architect, or builder.** Important engineer/designers include Joseph Moragne of the County of Kauai Engineer's Office and William R. Bartels, Chief Designer for the Territorial Highway Department. The original railroad bridges were designed by John Mason Young in 1910-1911. Important local builders of steel truss and stringer bridges include Honolulu Iron Works, Hawaiian Contracting Company and John L. Young. The steel trestle railroad bridges were erected by W.W. Beers, a New York engineer. Important steel fabricators include Hamilton and Chambers of New York, U. S. Steel Products, and the American Bridge Company.

5. **Bridges of exceptional aesthetic merit.** The steel trestle railroad bridges are spectacularly sited along the ocean at the mouths of steep, verdant valleys. The height of the bridges over the stream bed and quality of craftsmanship displayed in their steel construction contributes to their aesthetic value.

Specific considerations for eligibility under Criterion D include:

1. **Bridges that have yielded, or may yield, information important in prehistory or history.** Analysis of metal bridges may potentially yield information about early twentieth-century steel manufacture and construction. The steel trestle bridges may yield information regarding the only standard gauge railway in the islands.

CONCRETE ARCH BRIDGES

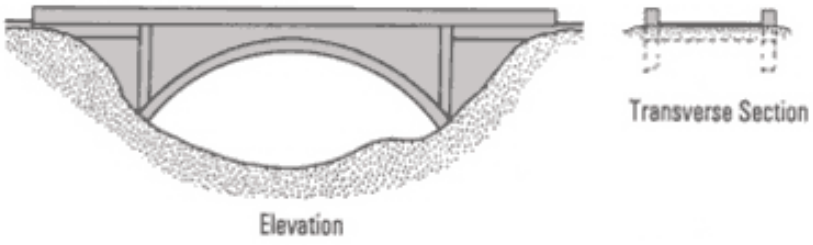
DESCRIPTION

Concrete arches constructed in Hawaii are of two basic types: *solid*- and *open*-spandrels. The solid spandrel type is generally *arch deck* bridges, in which the traffic deck sits upon the arch. These were generally constructed in two periods in Hawaii: the early solid-spandrel arch bridges date from c.1904 to 1915, and the later solid-spandrel arch bridges date from c.1916-1929. There are two types of open spandrel arch bridge construction: the most common is the arch deck open-spandrel, first constructed on Maui in 1911; the second type is the Rainbow or Marsh arch, a *through-arch* constructed during the 1920s and 1930s, in which the traffic deck is suspended from the bottom or lateral chord of the arch.

The first reinforced-concrete bridge in America was built in 1889, but the material remained in an experimental phase until the early 1900s. Reinforced-concrete arch bridges were built in Hawaii after 1904, when the territorial government made it their policy to erect strong, low-maintenance bridges. Concrete could be produced locally from crushed coral or stone aggregate and lime produced by burning the coral reefs. Other materials like cement and reinforcing steel were imported.

South Hilo Road Supervisor Norman K. Lyman voiced public opposition to the Territorial DPW policy of building concrete arch culverts. He was quoted in the *Hilo Tribune* as saying that he "would rather have a stone bridge than a concrete culvert as the former would give employment to more voters, whereas the cement and other materials required for concrete work was all imported from the [west] coast."[26] The newspaper bolstered his argument by pointing out that "stone is plentiful near Hilo and just the kind for bridges and culverts."[27]

This conservative policy was not adopted. In fact, the last known mention of stone arch culverts or bridges is in a 1903 letter of Assistant Superintendent of Public Works, Merton Campbell, with regard to the Mamalahoa-Pukihae Bridge in Hilo. While stone was cheap and locally available, construction of stone arches was labor intensive and seemed to have died quickly with the advent of concrete. This corresponds to developments in the U.S. mainland where concrete had largely replaced masonry by the turn of the century. Further confirmation that concrete was the prevailing bridge material of the era is apparent in the decision made by the Loan Fund Commission, set up in 1911 to oversee a special construction fund established by the Legislature. The commission announced that "Steel was unanimously discarded. Concrete will be used as far as funds permit, the absence of repairs offsetting the large first cost, but it is possible that wood may be used on some spans over forty feet, if funds get low."[28]

Closed Spandrel Arch[29]	

[26] *Hilo Tribune*, November 14, 1905, 2.
[27] Ibid.
[28] *Hilo Tribune*, January 16, 1912, 2.
[29] "Bridge Types," Historic Bridge Foundation.

The various types of concrete arch bridges are described as follows:

Closed (Solid-Spandrel) Concrete Arch Bridges: Reinforced-concrete solid-spandrel arch bridges were constructed in two periods in Hawaii. The earliest all-concrete bridges were built in 1904-1906 to standardized plans as a result of territorial policy, although extant examples of solid-spandrel arches of this type date from as late as 1912 (Mamalahoa-Pahoehoe Bridge on the Hawaii Belt Road). Since the first concrete arches echoed the design and form of earlier masonry arch bridges, these utilize concrete, a new material, in a fairly conservative manner from an engineering perspective. Nonetheless, reinforced-concrete was a material requiring skilled designers and builders.

These first reinforced-concrete arch bridges were constructed in lieu of masonry arches, generally in residential areas over small or intermittent streams bisecting major transportation arteries. The arches of these early bridges are circular and earth-filled. The rise of the arch is typically eight feet and the span approximately thirty-two feet. The parapets are of reinforced cast concrete, approximately four to six inches thick and three feet high, with a peaked concrete rail cap. The bridges are quite narrow, usually twelve or thirteen feet. Important examples of early concrete arch bridges include a series of concrete arch bridges in Hilo and Pepeekeo, such as the Mamalahoa-Kapue Bridge with its fifty-six foot span, and the Mamalahoa-Puuokalepa Bridge.

Concrete, previously used for the arch ring of masonry bridges or the capping of parapets, was used for bridge construction after the territorial government made construction of strong, low-maintenance bridges its stated policy shortly after annexation. Previously bridges had been built of timber, stone or metal, but the new Superintendent of Public Works (SPW), C.S. Holloway, strongly recommended concrete arches for small spans. His assistant, J.H. Howland, sent prints of several of these types of bridges to Hawaii Road Engineer G.H. Gere to encourage the Hawaii Road Boards to adopt this type of bridge.

> *I strongly recommend that concrete arches be built wherever the span is not too great and that particular attention be paid to the foundations for the piers and abutments, so that whatever work is undertaken, will be of a permanent nature and capable of standing heavy pressures due to excessive flow of water during the rainy season...I would avoid as far as possible the construction of steel bridges, especially on the windward sides of the Islands and near the sea. Bridges of wooden construction will last much longer and require less maintenance. Several of the steel bridges are in exceedingly bad condition*.[30]

According to the 1905 report of the Assistant SPW, the foundations of all bridges and culverts, were to be "constructed that they are good for all time."[31] The report went on to state that:

> *Wherever practicable, bridges have… been built of concrete, and where the span was too great so as to make the cost excessive, timber bridges (treated with creosote) have been designed preferably to steel structures which we have found...to be the most expensive to maintain and keep in repair*.[32]

Between 1904 and 1906, contracts were let for the construction of at least six concrete arches, including those in Ewa and Waianae (both on Oahu), Mamalahoa-Puuokalepa and Mamalahoa-Waiaama, and the Chong Drive-Waipahoehoe Avenue Bridge on the Saddle Road in Hilo on the island of Hawaii. Holloway was correct in his assessment of their longevity, in that, all but one of these original concrete arches still stands today. The construction of solid-spandrel concrete arches was the first step towards modern transportation infrastructure;

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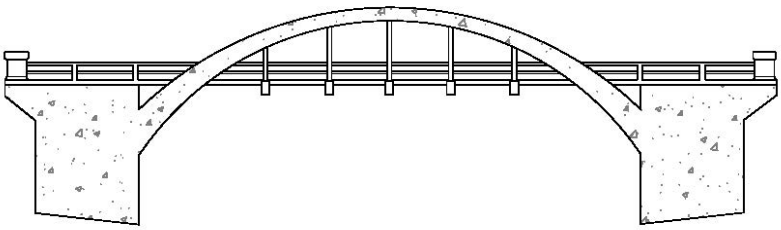
[30] *Hilo Tribune,* March 19, 1904, 4.
[31] *Fifth Annual Report of the Superintendent of Public Works to the Governor of the Territory of Hawaii for the Year Ending June 30, 1905*, Hawaii (Territory), Department of Public Works (Honolulu: Honolulu Publishing Co., Ltd., 1905), 72.
[32] Ibid.

the development of open-spandrel arches pushed the engineering limits of the new material and construction technology.

The second period of reinforced-concrete solid-spandrel arch construction occurred, between 1916 and 1929, simultaneously with the development of the technologically innovative open-spandrel arch. Later solid-spandrel arch bridges achieved greater spans and further refinement of detail and ornamentation, particularly at parapets and end rails, than earlier examples. Art-deco styling and neo-classical detailing, such as scrolled volutes, embossed diamond-shaped panels, resulted in the construction of the most ornate bridges in the state. These later solid-spandrel arches were intended to be significant civic statements reflecting Hawaii's aspirations for beautiful and urbane public works projects. The World's Colombian Exposition in Chicago in 1893 served as the inspiration for the City Beautiful movement and the ensuing neo-classical revival in the United States. The City Beautiful movement reached its height on the U.S. mainland between 1900 and 1910, but affected Hawaii somewhat later. This movement is characterized by an attempt to create beautiful and functional cities. Aesthetic principles such as beauty, order, system, and harmony found physical realization in urban design. Architecture and public works projects, such as road and sewer systems, became civic statements which strengthened the identification of Hawaii to the U.S. mainland. The improved physical environment would persuade urban dwellers, many of them recent immigrants to Hawaii from Asia, to become imbued with civic patriotism and better disposed toward community needs.

Open Spandrel Arch[33]	
Rainbow Arch Bridge[34]	

Open-Spandrel Concrete Arch Bridges were technologically innovative and are considered to be engineering break-throughs. Open-spandrel bridges do not contain fill material and deck loads are carried to the arch ribs by spandrel columns. The first open-spandrel bridges were constructed along the Mamalahoa Highway at Honolii on the Island of Hawaii and along the Hana Highway at Koukouai (Kaukauai) on Maui in 1911. The open-spandrel bridge, with its technical innovations, was capable of spanning hundreds of feet. Island engineers had multiplied their arch-spanning capacity by a factor of ten and refined the casting of concrete to create slimmer, lighter-

[33] Parsons Brinckerhoff, "A Context For Common Historic Bridge Types," 3-68.
[34] Drawing provided by MKE Associates LLC, 2013.

looking structures. They retain their historic associations and feeling due to their rural location, ornamental nature and now uncommon structural type.

Rainbow Arch Bridges, also known as "Marsh Arches" after their designer and patentee - James B. Marsh, are a sub-set of the open-spandrel arch type. This distinctive form of reinforced through-arch bridge construction was also used extensively in portions of the mid-west from 1912 (the patent date) through the early 1930s. Many Marsh arch bridges were constructed in Hawaii at important crossings over major rivers in populated regions. However, only two examples remain: 1) A double-span arch with reinforced-concrete top lateral bracing was constructed over the Anahulu Stream in Haleiwa on Oahu in 1921, and 2) A single-span, pony through-deck arch, was erected over the Wailuku River in Hilo on the island of Hawaii in 1938. Marsh arches were capable of spanning several hundred feet, however the prohibitive cost of large single-spans resulted in the construction of several individual or multiple span arches.

SIGNIFICANCE

The period of significance for reinforced-concrete arch bridges begins in 1904, when the first example was constructed, and ends in 1938 when the last concrete arch bridge was constructed. Concrete arch bridges are eligible under Criterion A if they contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or have been significantly integral to the development of an effective transportation system. The construction of reinforced-concrete bridges in place of timber and metal bridges is representative of the commitment of the territorial and county governments to implement permanent public works improvements. The construction of these bridges required the mobilization of skilled labor and significant public funds. Many of these bridges were often extremely prominent, both in style and location, and made a significant "civic statement" regarding the technical and aesthetic sophistication of the communities in which they were built. In addition, some of these bridges have survived significant historic preservation battles between the concerned citizenry and governmental transportation agencies or private developers.

Reinforced-concrete arch bridges are eligible under Criterion C as the earliest examples of concrete bridge construction in the state. They also represent a span of engineering innovation and a visual timeline of construction technology. Concrete arch bridges often evidence a high degree of detailing and workmanship and are examples of exceptional work by important local builders. The few remaining examples are rare survivors of this once common bridge type. Reinforced-concrete arch bridges also serve as examples of exceptional work by an important engineer, architect, or builder. Prominent designers include: William H. Chun, En Leong Wung, both of County of Hawaii Engineer's Office; and William R. Bartels, chief designer for the Territorial Highways Department. The builders of these important early structures include: Louis M. Whitehouse, Peter and Charles Arioli, Hisato Isemoto, and Moses Akiona.

EILIGIBILITY REQUIREMENTS

Since reinforced-concrete arch bridges were constructed as permanent structures, the bridge must retain its integrity of location in order to be considered eligible. The design of the bridge, particularly the arch sub-structure, the spandrel walls and parapets, must also retain its integrity; although alterations early in the bridge's history (i.e. within the period of significance) and in such a way that the alterations are reversible without diminishing the significant historic characteristics of the original bridge (by widening or lengthening the bridge by the construction of an adjacent concrete culvert, for example) are acceptable. The setting of the bridge must remain relatively unchanged; by-passing the original transportation artery with a new highway does not necessarily exclude a property if the bridge's immediate surroundings retain its historic qualities. The bridge's original materials must not be adversely affected by alterations or additions. The quality of the original workmanship must remain apparent, with substantial evidence of the artisan's labor and skill. The bridge must retain a high degree of historic feeling, and its associations must be apparent to the informed or casual observer.

HIGH PRESERVATION VALUE REQUIREMENTS

Specific considerations for eligibility under Criterion A include:

1. **Early and/or prominent product of the Territory of Hawaii.** Bridges constructed as permanent public works improvements by the territorial government required the latest technology and mobilization of skilled labor.

2. **Bridges associated with the primary economic endeavor of the islands (c. 1850 -1950) - sugar production.** Sugar production facilitated changes in the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor - primarily for irrigation, transportation, and cultivation of sugar cane - changed the face of the islands forever. Many of the bridges constructed along belt roads were intended to aid in the overland transport of raw cane to the mills for processing, as well as to provide reasonable access for workers to the sugar lands.

3. **Bridges constructed as a civic statement in urban centers, such as Honolulu and Hilo.** The construction of the Panama Canal in 1915 coincided with changing social conditions in Hawaii. Honolulu was eager for the expected economic growth through shipping, trade, and tourism. These prospects mobilized community leaders to increase promotion for Hawaii, improve transportation, and further the identification between Hawaiian communities and American cities. Arched bridges in particular make a dramatic statement.

Specific considerations for eligibility under Criterion C include:

1. **Earliest use of a material.** Solid-spandrel concrete arch bridges were among the first use of this material in Hawaii. Since the first concrete arches echoed the design and form of earlier masonry arch bridges, these utilize a new material, concrete, in a fairly conservative manner from an engineering perspective. The development of open-spandrel arches pushed the engineering limits of the new material and construction technology.

2. **Rare survivor of a once common type.** The construction of concrete arch bridges was initially promoted for their permanence and many examples were constructed throughout the islands. However, the important transportation routes these bridges were generally constructed along were among the first to be up-graded for modern traffic needs. Consequently, the majority of these bridges were replaced with modern structures. The remaining rare survivors are often located on little used or by-passed roads.

3. **Exceptional work by an important engineer, architect, or builder.** Significant early designers include William H. Chun, En Leong Wung and William R. Bartels. Important builders include Louis M. Whitehouse, John H. Wilson, Peter Arioli, Hisato Isemoto, and Moses Akiona.

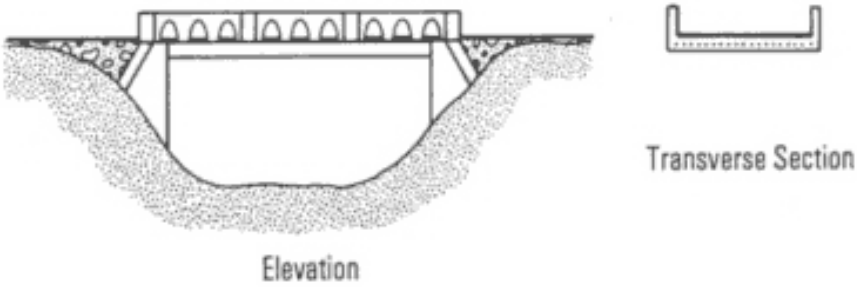
4. **Bridges of exceptional aesthetic merit.** Most arched bridges in the islands stand out by virtue of their design or because of the quality of craftsmanship displayed in their construction. The interrelationship of the bridge and its site may also have aesthetic value.

CONCRETE DECK BRIDGES

DESCRIPTION

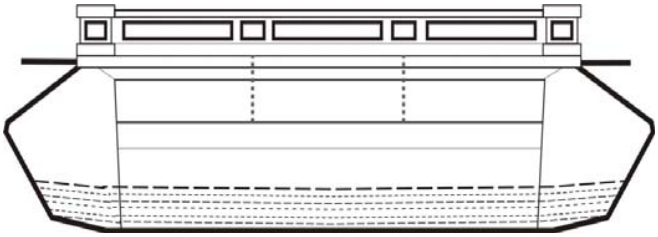
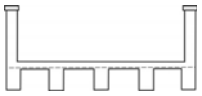
Concrete construction technology rapidly advanced in the early decades of the twentieth-century. Early twentieth century bridges built with county funds often consisted of new simple concrete decks built over the original nineteenth-century stone abutments. Slab bridges are known to have been used in Hawaii since about 1908. However, concrete girders and tee beam types came to dominate Hawaii's early twentieth-century bridge designs. As their strength and economy became apparent, concrete deck girders replaced concrete arches and open-spandrel arches for short spans. Like their contemporary flat slab bridges, early concrete girder bridges tend toward plain solid parapets and little or no ornamentation. Simple girder bridges were constructed as late as 1935 for short spans on secondary roads, since they did not have the load carrying capacity of the more recently developed concrete tee beam bridges.

This common bridge type built after 1945 is the subject of the program comment discussed in Chapter 1 under Regulatory Background, Federal Law.

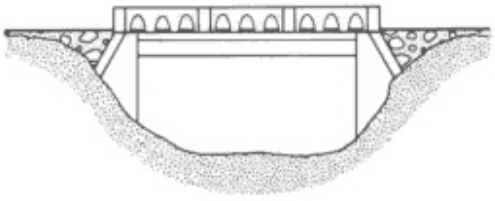
Flat Concrete Slab[35]	

Flat Slab: Simple reinforced-concrete slab bridges were an alternative to metal or timber stringer structures. Concrete flat slab bridges were constructed in Hawaii from 1908, when the oldest remaining example was built (Mokulehua Bridge on the Hana Highway), until approximately 1937, when moment-resisting concrete rigid-frame bridges became common. Early flat slab bridges built with county funds often consisted of new simple concrete decks built over the original nineteenth century stone abutments. The slabs were cast on site, with formwork built by local carpenters. The plain appearance of this functional design was augmented by a variety of railings, which ranged from solid parapets to open balustrades. These bridges typically had spans of twelve to sixteen feet. However, the 1911 Waioli Bridge was constructed with a maximum span of twenty-eight feet; a technological achievement that would not be surpassed until the Keaiwa Stream Bridge (replaced in 2001), in Kau on the island of Hawaii, was built in 1937 with a span of thirty-feet.

[35] "Bridge Types," Historic Bridge Foundation.

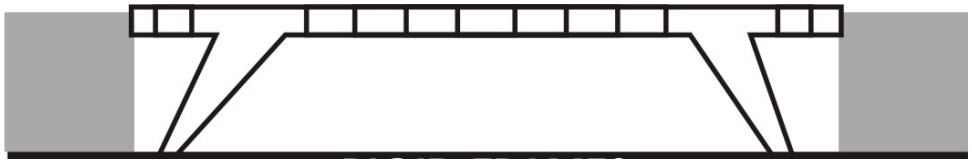
Concrete Girder elevation[36]	  Transverse Section

Concrete Girder: Another common early concrete bridge type utilized cast concrete girders in order to extend the length of the spans. As their strength and economy became apparent, concrete deck girders replaced concrete arches and open-spandrel arches for short spans. Many of these inexpensive bridges were built by the county governments c. 1911-1912 and numerous examples of this bridge type remain along the Hana Highway on Maui and the Mamalahoa Highway on the island of Hawaii. The most notable early concrete girder bridge is the 200 foot long Hanapepe Bridge built in 1911. Like their contemporary flat slab bridges, early concrete girder bridges tend toward plain solid parapets and little or no ornamentation. Simple girder bridges were constructed as late as 1935 for short spans on secondary roads, since they did not have the load carrying capacity of the more recently developed concrete tee beam bridges.

Concrete Girder (T-Beam)[37]	 Elevation  Transverse Section

Concrete Tee Beam: The concrete tee beam is the most common remaining type of pre-WWII bridges in the state of Hawaii. Although, the majority of concrete tee beam bridges were built by the Territorial Highways Department using local contractors after 1925, many early examples, dating from 1911-12, remain throughout the islands. These bridges are virtually indistinguishable from concrete girder bridges in appearance, differing only by the number of longitudinal beams and the pattern of steel reinforcing. Later tee beam bridges achieved remarkable spans and are among the longest and highest bridges in the state. This height and length was achieved by utilizing continuous tee beam sections. Continuity allowed for greater spans and the elimination of expansion joints in the deck. They typically feature one of the several standard rail patterns used by the Territorial Highway Department, either "Greek-cross," arched, or simple rectangular voids and a reinforced-concrete rail cap.

[36] Ibid.
[37] Ibid.

Concrete Rigid Frame[38]	

Concrete Rigid Frame: The most sophisticated of the pre-WWII bridges, from an engineering perspective, are those utilizing rigid-frame technologies. Concrete frame bridges are characterized by the construction of abutments and deck as one solid piece of concrete. This milestone design eliminated the need for steel bearings between deck and abutments and was more economical than plain slab construction. It also enabled the slab bridge to double or triple its previous span of 20 feet. Rigid-frame construction was a very economical and swift method for building bridges where costs had to be minimized. The earliest rigid-frame bridges were built in the United States between 1922 and 1930. However, this technology was not used in Hawaii until 1936, when William Bartels of the Territorial Highway Department developed the plans for the Wahiawa Bridge on Kauai and the Kaahumanu-Naniloa Overpass in Wailuku, Maui. These were followed the next year by the construction of two concrete rigid-frame bridges in the Kau District on the island of Hawaii and another on Oahu. Rigid-frame bridges are generally single-span structures and utilize the standard rail patterns of the Territorial Highways Department.

SIGNIFICANCE

The period of significance for reinforced-concrete deck bridges begins in 1908, when the first example was constructed, and ends in 1968, the cut-off date for the survey. Concrete deck bridges are eligible under Criterion A if they contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or been significantly integral to the development of an effective transportation system. Concrete deck bridges are representative of important public works projects initiated by the territorial and county governments. They were generally constructed at important crossings along a major transportation route or belt road. Many of the later concrete deck bridges were constructed with federal work relief programs funds during the Depression era. The early flat slab and girder bridges are an excellent example of the early period of twentieth-century bridge design when new materials and design methods were being tried. Concrete flat slab and girder bridges are early examples of the progressive Territorial Highway System in Hawaii and among the first use of formal engineering expertise in bridge making by the new territorial government, shortly after the annexation of Hawaii by the United States. The road bridges played a major role in the development of each county's belt road plan by connecting previously isolated communities with a paved highway.

Reinforced-concrete deck bridges are eligible under Criterion C if they are the earliest, sole surviving, longest span, or most intact example of their type, or if they exhibit notable engineering or decorative details. They may also serve as examples of exceptional work by an important engineer, architect, or builder. Later concrete bridges, such as tee beams and rigid-frames, demonstrate the rapid advances in engineering technology in the early decades of the twentieth century.

Prominent designers include: Joseph H. Moragne of the Kauai DPW, who oversaw the construction of the early slab and girder bridges built in the Hanalei area of Kauai in 1911-12; and William Bartels, chief designer for the Territorial Highway Department (THD), who was responsible for the design of many later concrete bridges, such as tee beam and rigid-frames. Important builders include: George Ewhart, George Freitas, George Mahikona, and the Hawaiian Contracting Company. See information on these designers in Appendix B.

[38] Parsons Brinckerhoff, "A Context For Common Historic Bridge Types," 3-97.

ELIGIBILITY REQUIREMENTS

Since reinforced-concrete deck bridges were constructed as permanent structures, the bridge must retain its integrity of location. The design of the bridge, particularly the sub-structure, the spandrel walls and parapets, must also retain its integrity. Alterations may be considered acceptable if they were completed early in the bridge's history (i.e. within the period of significance) and in such a way that they are reversible without diminishing the significant historic characteristics of the original bridge. The setting of the bridge must remain relatively unchanged; by-passing the original transportation artery with a new highway does not necessarily exclude a property if the bridge's immediate surroundings retain its historic qualities. The bridge's original materials must not be adversely affected by alterations or additions. The quality of the original workmanship must remain apparent, particularly from a technical rather than aesthetic perspective, with substantial evidence of a builder's labor and skill. The bridges must retain a high degree of historic feeling and their associations must be apparent to the informed or casual observer.

HIGH PRESERVATION VALUE REQUIREMENTS

Concrete deck bridges are generally eligible under Criterion A and C. Specific considerations for eligibility under Criterion A include:

1. **Bridges contributing in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or been significantly integral to the development of an effective transportation system.** The most significant early road and bridge building projects in the islands were associated with belt road construction. Early concrete deck bridges were constructed along narrow, winding roads cut across innumerable streams and precipitous gulches along the coastline of the major islands. Later concrete bridges were built on new highways in an effort to straighten older roads and accommodate modern automobile traffic.

2. **Bridges associated with major historical events or natural disasters.** Due to its unique location in the center of the Pacific Basin, Hawaii is susceptible to *tsunami* (seismic sea wave) inundation from nearly every direction. Earthquakes generated in the Aleutian Islands, South America and Japan have swept large, destructive ocean waves onto Hawaiian shores with a great loss of life and property. The Hawaiian Islands have also suffered devastating hurricanes and the ravages of lava flows from central volcanic peaks.

3. **Bridges associated with the primary economic endeavor of the islands (c. 1850 -1950) - sugar production.** Sugar production facilitated changes in the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor - primarily for irrigation, transportation, and cultivation of sugar cane - changed the face of the islands forever. Many of the bridges constructed along belt roads were intended to aid in the overland transport of raw cane to the mills for processing, as well as to provide reasonable access for workers to the sugar lands.

Specific considerations for eligibility under Criterion C include the following:

Reinforced-concrete deck bridges are eligible under Criterion C if they are the earliest, sole surviving, longest span, or most intact example of their type, or if they exhibit notable engineering or decorative details. They may also serve as examples of exceptional work by an important engineer, architect, or builder.

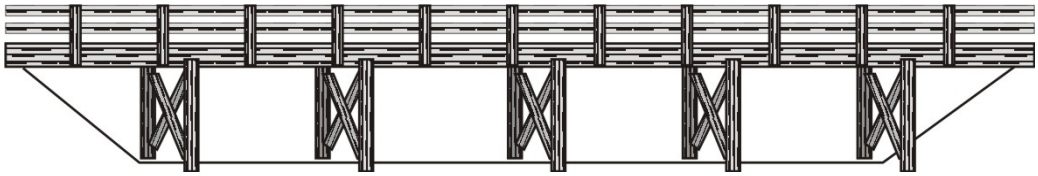
1. **Design utilizing new technology.** Rigid-frame construction and the use of continuity in girder design contributed to the increase length of spans for later concrete deck bridges.

2. **Exceptional work by an important engineer, architect, or builder.** Significant early designers include Joseph Moragne and William R. Bartels. Important builders include George Ewhart, George Freitas, George Mahikona, and the Hawaiian Contracting Company. Design of some portions of the early Interstate Highway system also received input from noted engineers and architects such as Law & Wilson, and Vladimir Ossipoff.

3. **Bridges of exceptional aesthetic merit.** Most early concrete deck girder bridges in the islands are strictly utilitarian structures. Occasionally, however, a structure stands out by virtue of its design or because of the quality of craftsmanship displayed in its construction. The interrelationship of the bridge and its site may also have aesthetic value.

4. **Bridges part of an historic district.** Many of these concrete deck bridges may not individually exhibit an exceptional aesthetic. However, strung together they may form a cohesive and aesthetically pleasing historic district, such as the Pali Highway.

TIMBER STRINGER BRIDGES

Timber Stringer[39]	

DESCRIPTION

Simple timber stringer spans constitute the only extant wood bridge type in Hawaii. Timber had been used for bridge construction since 1840 when the first bridges were built in the islands. Timber bridges were susceptible to washouts and decay, thus the earliest surviving bridge dates from 1924. The remaining examples of wood bridges are constructed of timber girders, often with masonry (basalt) pier footings and abutments, wood cribbing or trestles, and open horizontal wood board railings. Stringer spans usually measure twenty-five feet or less. Larger timber stringer bridges are generally located in the dryer areas over deep gulches and date from the immediate pre- and post-WWII period (c. 1937 to 1947). The failure of the Territorial Legislature to match federal funds led to a significant reduction in funds available for bridge construction by the end of the decade. Consequently, less expensive wood bridges were built. The older, smaller wood bridges were generally constructed on secondary roads. Very few of these timber bridges remain in the islands as a result of a deliberate policy by the THD and county DPWs to replace timber bridges with permanent, low-maintenance concrete structures.

SIGNIFICANCE

The period of significance for timber stringer bridges begins in 1924, when the first remaining example was constructed, and ends in 1949, when the last timber bridge was constructed. Timber bridges are eligible under Criterion A if they have contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or were significantly integral to the development of an effective transportation system. Timber stringer bridges are representative of public works efforts by the territorial and county governments for transportation infrastructure primarily located in rural homestead areas.

The majority of Hawaii's timber was (and still is) fir or pine imported from the Pacific Northwest, although early records show a preference for rare local tropical hardwoods. During the early twentieth-century, older timber bridges were periodically replaced with simple concrete spans in efforts to upgrade the highways. The relative impermanence of timber, compared to other bridge types, diminished the desirability of timber bridges. However, timber was frequently used for small bridges on little-traveled roads because this material was less expensive in the short run. Budget constraints impacted bridge construction beginning in 1937, when the Territory no longer matched incoming federal funds. Bridges built around this period were often of inexpensive timber with fairly short spans. Further, concrete and steel were in short supply due to the military construction boom as World War II approached. During this time, locally abundant masonry (“lava-rock”), which was not previously used on Federal Aid bridges, made an appearance in footings and abutments. Today, the governmental transportation agencies no longer construct timber bridges and, in fact, are reluctant to maintain existing ones. Consequently, the few remaining timber stringer bridges stand as rare survivors of this once common bridge type. Because these bridges have few character defining features, those timber bridges that feature superstructures re-constructed with concrete or steel girders at a later date do not meet integrity criteria.

[39] Ibid.

ELIGIBILITY REQUIREMENTS

Timber bridges must retain their integrity of location. The design of the bridge, particularly the wood sub-structure, must also retain its integrity. Alterations within the period of significance that do not diminish the significant historic characteristics of the original bridge (such as material replaced in-kind) are acceptable. The setting of the bridge must remain relatively unchanged. By-passing the original transportation artery with a new highway may not necessarily exclude a property if the bridge's immediate surroundings still retain their historic qualities. The bridge's original materials must not be adversely affected by alterations or additions. The quality of the original workmanship must remain apparent, particularly from a technical rather than aesthetic perspective. The bridges must retain a high degree of historic feeling and their historic associations must be apparent to the informed or casual observer.

HIGH PRESERVATION VALUE REQUIREMENTS

Specific considerations for eligibility under Criterion A include:

1. **Bridges that have contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through a region, or that have been significantly integral to the development of an effective transportation system.** The most significant early road and bridge building projects in the islands were associated with belt road construction. Timber stringer bridges were constructed along narrow, winding roads that cut across the streams and gulches of island coastlines. Later concrete bridges were built on new highways in an effort to straighten the older roads and accommodate modern automobile traffic.

Specific considerations for eligibility under Criterion C include:

1. **Rare survivor of a once common type.** A timber bridge may be considered of high preservation value if it is the earliest, sole surviving, longest span, most intact example of its type, or if it exhibits notable engineering or decorative details. The governmental transportation agencies no longer construct timber bridges and, in fact, are reluctant to maintain existing ones. Consequently, the majority of these bridges were replaced with modern structures. The remaining rare survivors are often located on little used or by-passed roads. They may also serve as examples of exceptional work by an important engineer, architect, or builder

2. **Exceptional work by an important engineer, architect, or builder.** The majority of remaining timber stringer bridges was designed by unknown engineers in the County Engineer's Office. However, several later, large timber bridges constructed during the Depression were designed by the THD chief engineer, William R. Bartels.

BRIDGE PARAPET/RAILING TYPES

SOLID PARAPET DESIGN	
Concrete Solid	 Farrington Highway, Hunehune Stream Bridge (1941) County of Honolulu: 003924001100001
Concrete Solid with Cap	 Hanapepe Bridge (1911) County of Kauai: 007190071119004

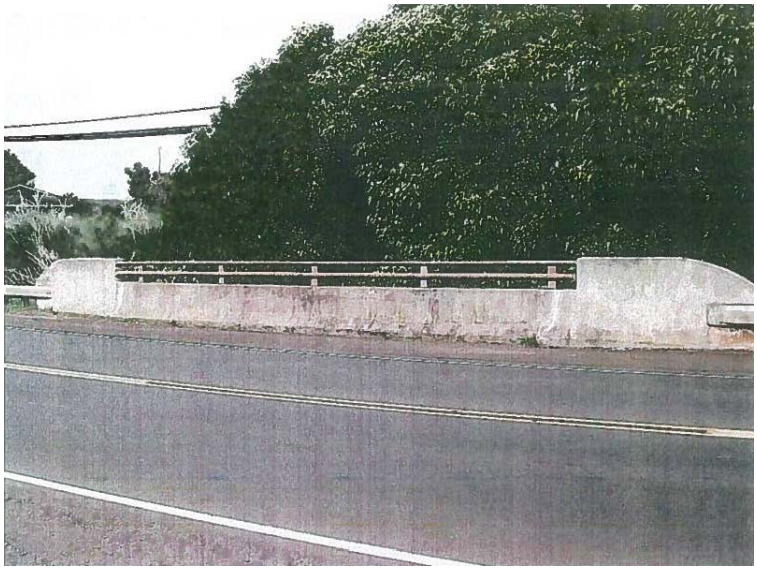
Concrete Solid Panel	 Hanamaulu Stream (Maalo Road) Bridge (1927) Kauai State: 007005830500004
Concrete Solid Panel with Cap	 Waikomo Stream (Koloa Road Bridge) (1928) County of Kauai: 007270100828001

Concrete Solid Decorative	 Ala Wai Canal County of Honolulu: 003083181400074
Masonry Rock	 Kawa Stream Bridge (1939) Oahu State: 003063001400065

Masonry Rock with Cap	 Nuuanu Stream Bridge County of Honolulu: 003083471400113

OPEN PARAPET DESIGN	
Concrete Open Horizontal	 Mana Bridge No. 1 (1900) County of Kauai: 007120061112002
Concrete Open Vertical	 Kapalaau Stream Bridge (1940) Oahu State: 003009300501414

Concrete Open Arched	 Waihohonu Stream Bridge (1934) Kauai State: 007000500302613
Concrete Open Greek Cross	 Waimea River (1940) Kauai State: 007000500301039

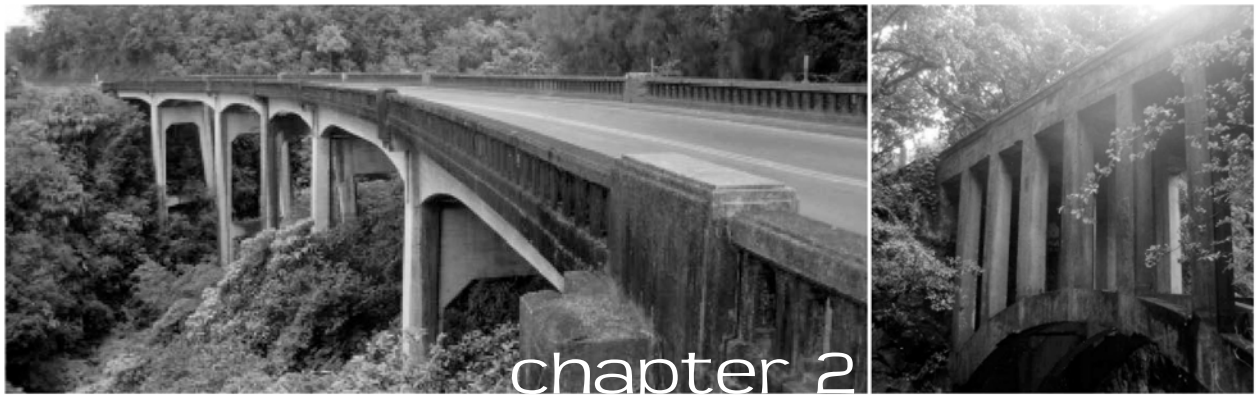
Concrete Open Decorative	 Puuhaoa No. 22 Bridge (1910) County of Maui: 009003600904386
Concrete and Metal	 Gulch (Kailua) Structure No. 50 (Sam Kalama) (1930) County of Maui: 009003650700070

Concrete and Metal Picket	 Palolo Stream Bridge County of Honolulu: 003083531400155
Concrete and Metal Decorative	 Kapalama Canal (1938) County of Honolulu: 003062081400134

Metal Horizontal	 Kula Kolea Pedestrian Overpass (1960) Oahu State: 003000630000234
Metal Picket	 Vineyard Blvd (Central Intermediate Pedestrian Overpass) (1957) Oahu State: 003098001400116

Metal Thrie Beam	 Anakaluahine Stream Bridge No.69 (1924) Maui State: 009000300303899
Metal Decorative	 Keolu Drive Bridge-Hele Drainage Channel (1957) County of Honolulu: 003427001100001

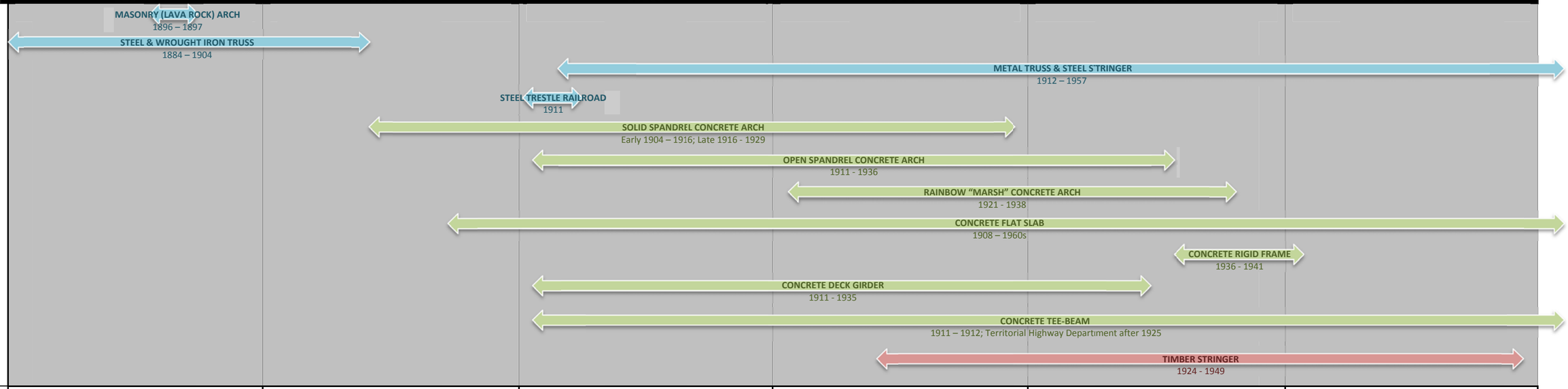
Wood	 Maili Stream Bridge (1900, replaced in kind in 1974) County of Hawaii: 001260001100003
No Railing/Parapet	 Opaekaa Bridge (1900) County of Kauai: 007420151142001

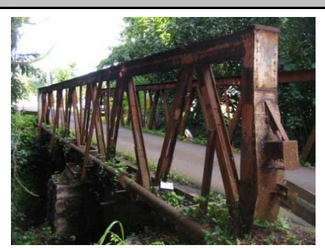
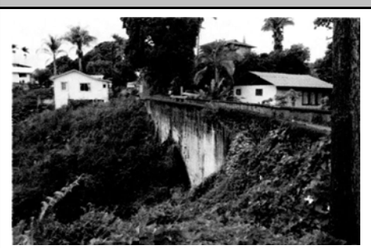
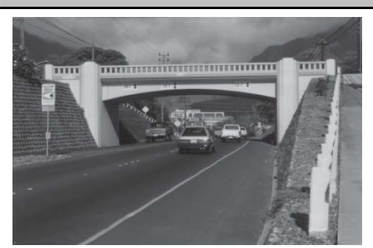


chapter 2

historic contexts

I. INTRODUCTION TO THE ISLANDS



HAWAII EVENTS	**1893** Overthrow of Hawaiian monarchy **1894 – 1898** Republic of Hawaii **1898** United States annexed Hawaii	**1900** Organic Act abolished Department of Interior and replaced it with Office of Superintendent of Public Works • Loan commission appointed to oversee fund expenditures **1904** Territorial Gov't advocated durable concrete bridges **1905** Territorial legislature established • County gov't established on islands		**1920s** Bridges were financed through loan fund and legislative appropriation **1925** Federal Aid Program initiated	**1930s** Bridges were financed through loan fund and legislative appropriation **1932 – 1952** William R. Bartels tenure as chief designer with Territorial Highways Department marked shift to large deck girder and rigid frame bridges **1937** Territory no longer matched incoming federal funds	**1941** Hawaii enters WWII **1944** Federal Aid Highway Act
BRIDGE DETAILS	**1899** Rubble masonry (lava rock) parapet		**1911** Loan fund commission road width requirement of 18' but 16' was common in rural areas **1910s** • Bridges on belt roads designed by County Engineers Office until 1925 • Notable people: J. H. Moragne (Kauai), En Leong Wung, and William Hoy Chun (Hamakua Coast, Hawaii)	**1920s** Road width requirement changed to 20'	**1936** Most significant timber stringer bridges were designed by Bartels in 1936 **1930s** • Block-like end piers • Sidewalks added on one side of bridge **Late 1930s** Concrete and steel shortage due to military construction for WWII • Lava rock masonry footings and abutments	**1940s** • Sidewalks added on both sides of many bridges
BIDGE PHOTOGRAPH EXAMPLES	 **1896 STEEL TRUSS** OPAEKAA (KAUAI COUNTY)	 **1904 SOLID CONC ARCH** PUKIHAI (HAWAII COUNTY)	 **1911 CONC TEE-BEAM** HANAPEPE (KAUAI COUNTY)	 **1921 RAINBOW "MARSH"** ANAHULU (OAHU COUNTY)	 **1936 CONC RIGID FRAME** KAAHUMANU (MAUI COUNTY)	 **1940 TIMBER STRINGER** NNOLE (HAWAII STATE)

	1950s	1960s
BRIDGE STYLES	**METAL TRUSS & STEEL STRINGER** 1912 – 1957 **STEEL TRESTLE RAILROAD** 1911 – 1953 **CONCRETE FLAT SLAB** 1908 – 1960s **CONCRETE DECK GIRDER** 1945+ **CONCRETE TEE-BEAM** 1911 – 1912; Territorial Highway Department after 1925	
HAWAII EVENTS	**1950 – 1953** Korean War **1952** Nimitz Highway opened **1956** Federal Aid Highway Act & Highway Revenue Act **1959** Hawaii admitted as 50th state of the United States	**1960** State Department of Transportation established • Interstate Highway System extended to State of Hawaii thus allowing Federal Interstate Highway Fund to be applied to Hawaii highway and bridge constructions • Construction of bridges and roads linked to needs of National Defense & military establishment in the Pacific • Interstates H1, H2, and H3 were proposed to connect military bases on Oahu
BRIDGE DETAILS		
BIDGE PHOTOGRAPH EXAMPLES	 **1953 CONC FLAT SLAB** MANOA (OAHU COUNTY)	 **1961 CONC GIRDER** MALIKO (MAUI STATE)

II. DESIGN AND CONSTRUCTION OF BRIDGES AND ROADS IN THE HAWAIIAN ISLANDS, PRE-CONTACT TO 1960s

OVERVIEW

The Hawaiian Archipelago is a chain of rugged islands, coral reefs, and rocky shoals located in the North Pacific Ocean. The archipelago consists of approximately twenty islands and islets curving more than 1,600 miles southeast to northwest. The archipelago extends over a vast area of the Pacific Ocean, but has limited land area. This chain is crossed by the Tropic of Cancer and is located 2,100 nautical miles west of the mainland of the United States. The islands of Hawaii are the worn tops of volcanoes which first erupted from the bottom of the ocean millions of years ago. The land mass that makes up the Hawaiian Islands is comprised almost entirely of basaltic rock. Stream erosion, resulting from the island's copious rainfall, and the constant action of the sea have carved large amphitheater-headed valleys and great sea cliffs, called *pali*, thousands of feet high in some places. This mountainous terrain drops steeply to a plain which slopes gradually to the shore. The steep mountains, deep valleys and circuitous coastline of the islands, have resulted in the completion of many dramatic bridge construction projects. The State of Hawaii is composed of eight principal islands; only the four largest (Hawaii, Maui, Oahu and Kauai) have the geography and population necessary for significant bridge construction. Due to the intensive development experienced in the Hawaiian Islands in the post-war period, few stretches of roadway retain a significant concentration of earlier historic bridges; the Hana Highway on Maui, Kuhio Highway on the north shore of Kauai and the Old Mamalahoa Highway on the Island of Hawaii with their numerous spans remain exceptions. The Pali Highway on Oahu has a significant concentration of historic bridges from the 1950s to 1969.

HISTORICAL BACKGROUND

Hawaii's socio-political history may be divided into five general divisions:

1. Polynesian (Pre-western contact; 500 AD. to 1778).
2. European Discovery (1778 - 1810).
3. Hawaiian Monarchy (King Kamehameha 1810 to Queen Liliuokalani 1893).
4. Provisional Government - Republic of Hawaii - Territorial Status (1893 to 1959).
5. Statehood to present (1959 – present)

Initially, road and bridge-building in Hawaii developed in conjunction with the westernization of the islands in the early nineteenth century. Examination of the archival materials and government documents of the Hawaiian Kingdom reveals very limited information. Considering the dramatic social and political upheavals of Hawaiian history, it is not surprising that few early records about bridge building were retained. After the overthrow of the Hawaiian monarchy in 1893, the Independent Republic of Hawaii looked to the United States for annexation and Hawaii became an American territory in 1898. Several bridges remain from this transitional period, including masonry arches built by the Republic of Hawaii – such as the Mamalahoa-Kalalau, Mamalahoa-Kaumoalii, and Mamalahoa-Laupahoehoe Bridges on the Island of Hawaii. The majority of the remaining historic bridges in Hawaii were constructed by the county and Territorial governments. Hawaii achieved Statehood in 1959, resulting in a shift in policy and procedure for highway and bridge construction throughout the state.

BRIDGE AND ROAD CONSTRUCTION IN THE KINGDOM OF HAWAII TO 1893

NATIVE ROADS (PRIOR TO 1810)

Traditionally, the Hawaiians had highly developed canoe-making and paddling skills, and the preferred means of travel was by water. Although there are few direct accounts by early Hawaiian informants discussing pre-contact trails or roads, physical evidence of a rudimentary native trail system remains. In addition to native footpaths constructed parallel to the coastline, there were less traveled routes to the uplands within each *ahupuaa* (a pie-shaped native land division stretching from the mountains to the sea) and shortcuts over the mountains. Occasionally, more substantial roads were built by Hawaiian chiefs for warfare and as a symbol of their unifying power, including the "King's Highway" near Makapuu Point on Oahu and Maui's Kiha-a-Piilani "Highway" which ran all the way from Wailuku to Hana, a distance of approximately sixty miles. The latter was laboriously constructed of hand-fitted, adze-trimmed basalt blocks about two feet on a side, and laid in a mosaic to form paths four to six feet wide. There is no remaining evidence of ancient Hawaiian bridge construction, although carved steps which may date from pre-contact Hawaii are found on several valley walls, such as those adjacent to the Koukouai Gulch Bridge in Kipahulu, Maui.

KINGDOM OF HAWAII (1810 to 1893)

Prior to 1846, the islands lacked a comprehensive system of interior roads or paths which made overland travel difficult and necessitated travel by sea. The Reverend Titus Coan, an early missionary, wrote "for many years after our arrival (in 1835) there were no roads, no bridges, and no horses… and all my tours were made on foot."[40] A typical highway was "a simple trail, winding in a serpentine line, going down and up precipices, some of which could only be descended and ascended by grasping the shrubs and grasses."[41] Reverend Coan went on to enumerate the several ways he used to ford the streams and rivers; these included wading, jumping from rock to rock with the help of a stick, riding the shoulders of a strong Hawaiian, throwing a rope to the other side, and holding on to the shoulders of a chain of Hawaiian men stretched across the water.

The introduction of horses to the islands in 1803 aided land transportation. By the mid-nineteenth century, the increasing use of horses and wagons necessitated a better system of interior roads. In 1846, the Kingdom of Hawaii established the Department of the Interior with a Superintendent of Internal Improvements (later Public Works) to oversee the construction and maintenance of piers, harbors, government buildings, roads, and bridges. The expenditures of the Bureau of Internal Improvements or of the Department of the Interior as a whole were, with only a few exceptions, the largest item in the Kingdom's budget. The governors of the various islands were charged with carrying out the king's wishes by using prisoners or those liable for the labor tax. This tax required all able-bodied male Hawaiians who were "vassals or tenants of a landlord or without an art or profession" to work on any of the king's road or bridge projects on certain designated days or to pay a commutation fee of 12 1/2 cents per day.[42] However, the Kingdom's road building, according to noted historian Kuykendall, consisted of little more than clearing a right of way, doing a little rough grading and putting up wooden bridges which were routinely washed away during heavy rains. Most of the Kingdom's scarce funds were absorbed by the repair and maintenance of existing roads.

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[40] Ralph S. Kuykendall, *The Hawaiian Kingdom, Vol. II, 1854-1874; Twenty Critical Years* (Honolulu: University of Hawaii Press, 1953), 31.

[41] Ibid., 31-32.

[42] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in *Historic Bridge Inventory and Evaluation: Island of Hawaii and a History of Road and Bridge Development on the Island of Hawaii*, Prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, Honolulu, 1987a, 8.

Historian Ralph Kuykendall faulted the government for "the lack of general understanding of the importance of good roads, the lack of over-all planning and co-ordination between different districts, the lack of engineering skill and competent supervision, and the lack of funds with which to finance a thorough-going road program."[43] These conditions prevailed until the last decades of the nineteenth century. As late as 1886, Minister Charles Gulick had to admit:

> *A country like ours, for the most part mountainous and cut by deep gorges, which in the wet season are filled with impossible torrents, and widely separated districts with sparse population, present at a glance the most prominent difficulties in the way of substantial road making in this Kingdom. In other words, to speak comparatively, we have a hundred dollars' worth of work to be done and, say, ten dollars to do it with. This general condition has not materially changed since the first public highway was built in the kingdom...*[44]

In 1887, King David Kalakaua transferred much of the Kingdom's responsibility for internal improvements to local road boards financed by a road tax. These boards were semi-autonomous and charged with the construction of public highways in their taxation districts. Generally, road construction was undertaken by prisoners and day laborers. The public works system of the Hawaiian Kingdom remained undisturbed by the overthrow of the monarchy in 1893, and no major changes were noted until the time of annexation by the United States in 1898.

THE FIRST BRIDGES (1840-1893)

The first reference to bridge construction, over the Nuuanu Stream along the present Beretania Street in urban Honolulu, appears in 1840. In an article describing "Improvements and Changes in and about Honolulu," *The Polynesian* reported:

> *Then we leave Rev. L. Smith's new church [Kaumakapili Church, then located on Beretania Street between Maunakea Street and Nuuanu Avenue]… with a causeway, crossing the river and low ground in the vicinity. [The bridge's] expense exceeded $1200, and it has proved of great utility, being a great thoroughfare… instead of the long ride through the water as was formerly the case*.[45]

Other bridge construction projects followed quickly, although none of these early bridges remain today. In 1845, the first published annual report of the Minister of the Interior noted that "some improvements have been made on the bridges and roads of [Oahu] and other islands."[46] Timber and stone were the prevailing bridge construction materials at this time. Stone was abundant in Hawaii, and among the first bridges built by the Department of the Interior were stone bridges at Nuuanu and Waikiki. But construction of stone bridges required skilled labor, which was scarce in the islands. Wood was the cheapest material and many types were available. R.A.S. Wood, the Superintendent of Internal Improvements in the mid-1850s, evaluated the types of wood used in a report to the Minister:

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[43] Ralph S. Kuykendall, *The Hawaiian Kingdom: Vol. I, 1778-1854; Foundation and Transformation* (Honolulu: University of Hawaii Press, 1965), 26.
[44] *Biennial Report of the Minister of the Interior to the Legislative Assembly of 1886*, Hawaii (Kingdom), Department of the Interior (Honolulu: P.C. Advertiser Steam Print, 1886), 16.
[45] *The Polynesian* (Honolulu), October 17, 1840, 74.
[46] *Biennial Report of the Minister of the Interior to the Legislative Assembly for the Year Ending May 21st, 1845,* Hawaii (Kingdom), Department of the Interior (Honolulu, 1846), 10.

> *The bridges heretofore built by the government prove beyond all doubt the unworthiness of Oregon pine or fir timber for this purpose. All, with scarcely an exception, are in such a state of decay as to require rebuilding. Our own* ohia *[a native hardwood], for bridge or wharf purposes, is infinitely superior to Oregon pine. Though somewhat more expensive at the first outlay its durability will warrant using it*.[47]

These pioneering bridges were unfortunately vulnerable to floods. On April 1, 1847 heavy rain storms struck Kauai and "all the bridges on the island were carried away."[48] Within the week Oahu suffered the same fate. In 1858, the Oahu Road Supervisor reported that nine bridges were destroyed in his district by a freshet. Twenty years later, the *Report of the Minister of the Interior to the Legislative Assembly* noted that "the bridges of Hawaii and Kauai were swept away last year."[49] The 1882 Department of the Interior Report carried the lament that "in some districts, owing to the exceptionally wet season, causing heavy freshets in the streams, a good many bridges have been carried away."[50]

In an attempt to provide low-cost, permanent replacements for timber bridges, ten steel Pratt-truss bridges, manufactured by the Pacific Bridge Company in Portland, were ordered by the Kingdom for the Island of Hawaii as early as 1884. For shorter spans, concrete slabs were the preferred solution, but at this date, concrete bridges that could achieve longer spans were beyond the available engineering and construction technology. Nonetheless, maintaining steel bridges proved too costly in Hawaii's corrosive marine environment and they were soon rejected for government roads. None remain from this early steel period.

BRIDGE AND ROAD CONSTRUCTION IN HAWAII: 1894 to 1941

BRIDGE CONSTRUCTION DURING THE REPUBLIC OF HAWAII (1893-1898)

During the period of the Kingdom, road and bridge construction was undertaken by day laborers and prisoners. However, in 1896-97, contracts were let for a belt road on the Island of Hawaii, the first time such a system was used extensively, resulting in the construction of hundreds of miles of roads on that island. The masonry (cut basalt or lava-rock) arch spans constructed along the Hamakua coast of the island of Hawaii under these contracts are the oldest remaining bridges in the islands. Other significant nineteenth-century bridges include the Opaekaa Stream Bridge which was built from portions of one span of a three-span bridge manufactured in Scotland in 1890 and erected over the mouth of Kauai's Wailua River in 1896. This bridge is significant as the only known British-made iron bridge in the United States and was listed on the National Register of Historic Places in March 1983.

BRIDGE CONSTRUCTION DURING THE EARLY TERRITORIAL PERIOD (1898-1924)

The Hawaiian Islands were annexed by the United States in 1898. The Organic Act of 1900 abolished the Department of the Interior and replaced it with the Office of the SPW, which had responsibility for expending territorial funds on road and bridge work. Five years later, the Territorial Legislature established the county governments on the separate islands, granting them taxing and spending powers in their jurisdictions. After the counties were granted independent taxing powers, they still relied on legislative appropriations to supplement

[47] *Report of the Minister of the Interior to the Legislative Assembly*, Hawaii (Kingdom), Department of the Interior (Honolulu, 1855), 9.
[48] *The Polynesian* (Honolulu), April 10, 1847, 191.
[49] *Report of the Minister of Finance to the Legislature of 1878*, Hawaii (Kingdom) (Honolulu, 1878), 10.
[50] *Report of the Minister of the Interior to the Legislative Assembly*, Hawaii (Kingdom), Department of the Interior (Honolulu, 1882), 49.

county funds for internal improvements, thus the history of county road-building was closely tied to Territorial and Federal government largesse. Consequently, throughout much of the early twentieth century, the counties' road and bridge-building could not keep up with the islands' economic development and infrastructure needs. In some cases, government funds were so scarce that public roads were maintained by private business so as not to impede their productivity. For example, the belt road on the windward coast of Maui was maintained by the East Maui Irrigation Company and the roads in Haiku, Maui were maintained by the Haiku Fruit and Packing Company. Increased automobile traffic and damage from heavy rains increased the maintenance cost of these roads and in the 1920s, private planters demanded that the county administration shoulder the burden of the road upkeep.

In response to a chronic shortage of funds for road construction, the 1911 Legislature recommended the issuance of territorial bonds for belt road construction. A Loan Commission, consisting of the SPW, the county Chairman of the Board of Supervisors, and three county residents, was appointed to oversee the fund expenditures. In the 1920s and 1930s, bridge building continued to be financed through the loan fund and legislative appropriation. Prior to the initiation of the Federal Aid Program in 1925, bridges along the belt roads were generally designed by the county engineers using Territorial Loan Funds. Each county had its own bridge design department located within the County Engineer's Office. Many of the bridge engineers were technologically skilled and evidenced high aesthetic sensitivity. J. H. Moragne, on the Island of Kauai, was responsible for the most technologically innovative work of his time. En Leong Wung and William Hoy Chun of the County of Hawaii designed scores of technologically simple, yet aesthetically sophisticated, bridges along the Hamakua Coast of that island. These bridges were generally short span reinforced-concrete arch, deck girder or flat slab structures.

As horses and carriages gave way to automobiles, trucks, and buses, wider and more durable roads were needed to service these vehicles. Originally, bridges were just wide enough to let one horse and buggy cross at a time and no sidewalks were provided for pedestrians, even in urban areas. A Hilo newspaper writer pointed out that "strictly speaking, a pedestrian has no rights which any one is bound to respect."[51] Bridges on plantation roads were often as narrow as eight or nine feet, those on public roads averaged fourteen or sixteen feet in the first decade of the century. The Loan Fund Commission established eighteen feet as its required road width in 1911, although sixteen feet was commonly used in rural areas. These specifications prevailed until the 1920s when they were expanded to twenty feet. Sidewalks were generally not added until the 1930s, first on one side, then on both sides by the end of the decade.

Bridge railings are another indication of a bridge's period of construction. The earliest bridge railings were rubble masonry (lava rock) constructions, such as those at the Mamalahoa-Kalalau Bridge built on Hawaii Island in 1899. These were followed by simple concrete railings, or parapets, which were generally less than three feet high and capped on top. Examples of these earliest parapets include the Mamalahoa-Puuokalepa Bridge on Hawaii Island, and the Waioli and Waipa Bridges on Kauai. Decorative rectangular inset panels were added to concrete parapets by 1919, such as those of the Waikamoi and Haipuaena Bridges on Maui. In the 1920s, railings became post and beam constructs, usually with a rectangular configuration, such as those found on many of the county-built bridges along the Hana Highway. Occasionally, the railings rose to an artistic level with Italianate posts, such as the Ainako Stream-Waianuenue Avenue Bridge in Hilo. Block-like end piers were added in the 1930s, smaller versions of the decorative pylons which appear on the continental United States bridges of this period. These were typically found on Federal Aid bridges constructed by the Territory of Hawaii. Art Deco motifs and streamlined design, like those found on the Date Street Bridge in Honolulu, were also common to 1930s-era bridges.

[51] Alvarez (1987a), 63.

From 1900 to 1940, the Hawaiian Islands witnessed rapid economic and population growth. During this time, the population of the islands more than doubled, primarily due to the importation of laborers for the sugar and pineapple plantations, which meant increasing demand for housing, schools, utilities and physical infrastructure. Only the remote rural areas traditionally isolated by a lack of good roads, such as the Hana district on Maui, Waipio Valley on the Island of Hawaii or Kalalau on Kauai, witnessed a decline in population during this period. The construction of the Panama Canal in 1914 coincided with changing social conditions in Hawaii. Honolulu was eager for the expected economic growth through shipping, trade, and tourism. These prospects mobilized community leaders to increase promotion for Hawaii, improve transportation, and further identification between Hawaiian communities and American cities. The World's Columbian Exposition in Chicago in 1893 served as the inspiration for the City Beautiful movement and the ensuing neo-classical revival in the United States. The City Beautiful movement reached its height on the U.S. mainland between 1900- 1910, but affected Hawaii somewhat later. This movement is characterized by an attempt to create beautiful and functional cities. Aesthetic principles such as beauty, order, system, and harmony found physical realization in urban design. Architecture and public works projects, such as road and sewer systems, became civic statements which strengthened the identification of Hawaii to the U.S. mainland. The improved physical environment would persuade urban dwellers, many of them recent immigrants to Hawaii from Asia, to become imbued with civic patriotism and better disposed toward community needs.

During this period, Hawaii was on the receiving end of mainland technology and the history of its bridge development parallels that of the United States mainland, albeit with some delay. As on the mainland, there was an evolution of bridge types constructed due to changing economic factors and technology. Records for length and sophistication of design were continuously changing; accolades such as "the longest" and "the first" were used repeatedly over the decades to describe the latest achievements.[52] Although Hawaii lagged behind the mainland United States in technological development, it still had its share of landmark and historic bridges.

The bridges constructed with Territorial Loan Funds are among the early examples of the progressive Territorial Highway system in Hawaii. These bridges are also an example of one of the first uses of formal engineering expertise in bridge making by the new territorial government after the annexation of Hawaii by the United States. The bridges played a major role in the development of each county's belt road plan which connected previously isolated communities with a paved highway and a series of steel-reinforced concrete, timber, or steel bridges. The construction of improved modern vehicular roads, especially the up-to-date replacement of older, weak timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated communities. The new roads and bridges shortened distances connecting each island's villages, farms and plantations. Supplies, services, and scenic and recreational areas were reached more easily, and the improved transportation stimulated new competition with shipping at each coastal town's pier and landing.

Homesteading, another important movement in Hawaiian history, was also intended to create smaller communities in Hawaii.[53] After the overthrow of the Hawaiian monarchy in 1893, the new provisional government leased out vast tracks of prime government land to sugar plantations. When these thirty-year leases expired in the 1920s, the territorial government made this land available for homesteaders. The counties began to develop new lands for homesteading by installing the needed infrastructure, such as roads and utilities. Construction of roads and bridges was limited by the small and intermittent funding mechanism of assessing homesteaders as they bought the lots. The SPW remained responsible for homestead roads and bridges until 1917 when the responsibility for homestead

[52] William H. Wilson, *The City Beautiful Movement* (Baltimore: The Johns Hopkins University Press, 1989), 1.
[53] Spencer Mason Architects, *Historic Bridge Inventory: Island of Kauai*, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu: 1989), 249.

roads was transferred to the Territorial Commissioner of Public Lands (CPL). In actuality, the County Engineer's Offices remained responsible for the construction of most of the roads and bridges until 1925, because the CPL was "not provided with an engineering force necessary for the direct handling of this work."[54]

BRIDGE CONSTRUCTION AND THE FEDERAL AID PROGRAM (1925-1941)

The Federal Aid Highway System in Hawaii consists of three types:

1. the Interstate and Defense Highways;
2. the Federal Aid Primary System; and
3. the Federal Aid Secondary System.

Beginning in 1916, in anticipation of its entry into World War I, the United States Congress appropriated funds to assist States in developing their transportation networks. Federal Aid funded roads were intended to upgrade existing highways by providing good drainage, clearly marked lanes, improved alignment, grades that could be negotiated in high gear, wide shoulders, safe and wide bridges, and safe bridge approaches. Belt roads, which circled the island, or roads that linked a seaport to federal property (such as military bases or national parks) were usually selected for Federal Aid in Hawaii. Maintenance of federal roads was to be done by the States from their own funds. Because it was not yet a state, Hawaii was initially excluded from the Federal Aid system although its citizens paid federal taxes. The Hawaiian Legislature passed a Bill of Rights in 1923, demanding equal benefits with the nation's States; this bill was signed into law by President Calvin Coolidge in March 1924.

Hawaii received its first federal funds in 1925 and created the THD to oversee the expenditure of the funds as required by the Federal Road Aid Act. Designs for new bridges on designated Federal Aid primary roads were hereafter prepared by this department. Also in 1925, Congress voted to give Hawaii the federal highway funds it had missed since 1917. In the mid-1930s, yearly federal contributions rose to the million dollar mark with the passage of the New Deal road aid measures such as the National Industrial Recovery Act, the Emergency Relief appropriations Act and aid for secondary road systems. By 1940, approximately sixty-five percent of Hawaii's roads had been built with federal funds.

Bridges were a special concern of the federal highway system, and the THD began a systematic replacement of narrow and hazardous bridges. With ample funds, the THD began to straighten out the belt roads and build long, high bridges across the mouths of the valleys. The federal government started funding secondary or feeder roads in the late 1930s. These were required to be outside of municipalities and be farm-to-market roads or other rural roads of community value which connect with important highways or the Federal Aid primary system. Bridges constructed with Federal Aid dollars have longer spans and were more decorative than county financed bridges. Reinforced-concrete tee beam bridges dominate this period, although a few rare examples of open-spandrel concrete arches remain. Rail design was standardized into a few patterns, such as the "Greek-cross void", enabling easy recognition of THD bridges. Notable examples include the Hanapepe Highway Bridge on Kauai and the Kipapa Franklin Delano Roosevelt (FDR) Bridge on Oahu.

[54] Ibid., 4.

BRIDGE AND ROAD CONSTRUCTION IN HAWAII: 1941 to 1960s

BRIDGE CONSTRUCTION DURING WORLD WAR II AND THE POST-WAR PERIOD AND THE NATIONAL DEFENSE HIGHWAY SYSTEM (1941-1960s)

After the outbreak of World War II in December 1941, the military constructed many miles of roads in Hawaii. However, as a Territory of the United States, Hawaii was not entitled to the same level of federal funding given to other continental States for highway building projects, based on the 1944 Interstate Highway System Act. In 1941, the War Department designated all Oahu's principal highways as part of a "strategic network of highways." The term "strategic network of highways" implicates principle highway traffic routes were of military importance in the Territory of Hawaii. Civilian construction virtually halted as manpower and equipment was requisitioned by the military. The military establishment quickly became the largest employer of civilian workers in the Territory. Highway and bridge construction was restricted to only those projects which materially aided the National Defense System.

Hawaiian delegates used the Department of Defense's designation as "strategic" to argue that Hawaii's military bases and highway networks were key to National defense. In the early 1960's, the Korean War increased National Defense activity in Hawaii due to rising tensions in the Pacific area. This need, as well as the increased use of motor vehicles and the islands' tourism industry collectively increased pressure to meet growing transportation needs. In 1956, Territorial Highway Engineer Ben E. Nutter provided a "Progress Report on Highways" to the Legislature that detailed highway deficiencies in excess of 50 million dollars - or more than ten times the annual construction budget. The report indicated that the 1954 Hawaii Federal Aid Highway System was still about 10 years behind in providing modern highways of adequate design and capacity. In the post-war era a sophisticated survey of the island's roads was completed by the THD. This survey rated roads and bridges on a mathematical "sufficiency rating system."[55] Fewer than half of the Federal Aid system's roads got a passing grade.

In 1959 Hawaii was admitted as the fiftieth state of the United States. The "Hawaii Statehood Transition Bill" of 1959 made millions of federal dollars available for highway improvement and development. The HDOT was established in January 1960. At that time, there were about 633.93 miles of roads to build to fill the gaps in the Federal Aid Highway System. Later, in July 1960, the Interstate Highway System was extended to the State of Hawaii, which allowed the new Federal Interstate Highway fund to be applied to Hawaii's highway and bridge constructions. With Hawaii's significant role in the National defense system, the Interstate Highway fund was intended to serve both military needs and civilian interstate traffic needs. Hawaii continued to benefit from regular federal aid, such as the Highway Beautification Act of 1965 and aid for secondary roads.

The construction of roads and bridges in Hawaii can be directly linked to the needs of the National Defense system and the military establishment. With adequate federal funds in the post-war era, bridges were usually built as part of large public projects, such as for the construction of new Nimitz Highway and H-1, Trans-Koolau Range projects, and the Seismic Wave Damage Rehabilitation Project. These projects played an important role, tying together military bases and civilian residential districts settled all over the islands. Bridges of this period can be easily recognized by the distinctive post-war style railing, the prevailing decoration for bridges at the time. This railing style is composed of a reinforced concrete balustrade penetrated with horizontal rectilinear voids with concrete rail caps. Other bridges from this period began the first use of metal in guardrail designs. However, during the implementation of these federally sponsored projects, many earlier, historic bridges were demolished and replaced by modern constructions.

[55] *Progress Report on Highways*, The Territorial Highway Department (December 7, 1956), 80.

III. THE HANA HIGHWAY, MAUI: PRE-CONTACT TO 1960s

HISTORICAL BACKGROUND

Before about 1450AD, Maui was divided into two separate kingdoms, one with a court at Lahaina and one with a court at Hana. The two were constantly at war, but eventually Piilani of the Maui Ulu line at Lahaina conquered the east and south parts of the island. His rule is remembered as one of peace, prosperity, and the construction of public works, including the largest *heiau*, or temple, in the Hawaiian Islands. Called Piilanihale, it was built near Honomaele and incorporated massive yet un-mortared stone walls, some up to fifty feet high, as well as an immense stone platform covering nearly five acres. Of greater importance to his reign and to his subjects was the creation of a network of unpaved roads extending throughout Maui, a process that symbolized his unifying power. Each road was laboriously constructed of hand-fitted, adze-trimmed basalt blocks about two feet on a side, and laid in a mosaic to form paths four to six feet wide. One of these roads ran all the way from Wailuku to Hana - a distance of approximately sixty miles. In circa 1490AD, Piilani's son, Kihaapiilani, had the road extended beyond Hana, through Kaupo Gap, and across Haleakala Crater.

The original route to Hana was well maintained for over 250 years, because it was the only land link between the two ends of the island. Around 1759, the king of the Big Island, Kalaniopuu, captured Hana and held it for more than twenty years. During this time, the road fell into disrepair and was purposely closed to thwart incursions from the north. Nonetheless, in about 1780 Kahekili, the King of north Maui (or Maui Iki) retook Hana and reopened the road, which by then needed extensive repairs. Not only was the road cleared, but where stream canyons were deepest wooded bridges were built to replace the old, treacherous staircases painstakingly carved into the cliffs centuries prior. Even so, the roads could support no more than foot traffic, and much of it served that function until 1900, though by then Hana had become a thriving sugar plantation community.

In 1848 Kamehameha III declared the *Great Mahele*, releasing one third of all Hawaiian lands to the common people. Foreigners were allowed to own private property in the islands for the first time. Among them was George Wilfong, a Caucasian sea captain. He capitalized on the needs of the 1849 California gold rush miners by planting sixty acres of sugar cane in Hana, harvesting it with exploited local laborers, and milling it with contract workers in nearby Kauiki. All of the sugar was shipped from Hana Bay, and despite the booming business, there was still no substantial overland trading between the north and south parts of Maui. Prior to this enterprise Kipahulu and its adjoining districts of Hana and Kaupo had retained their traditional Hawaiian culture.

In 1877 fifteen miles of unpaved road was constructed from central Maui to Kailua in order to build the Haiku Ditch, a remarkable engineering feat that watered new cane land on the central Maui plateau. In 1899 the Nahiku Rubber Company planted thousands of experimental rubber trees on the *makai* (toward the ocean) side of the old road. This enterprise pushed the unpaved road another fifteen miles to Nahiku. East Maui's potential tourism value gave the county a strong incentive to promote the idea of a belt highway to Hana. As early as 1900 the *Maui News* editorialized in favor of a good wagon road connecting Hana and central Maui. This prompted the building of the first stretch of improved roadway, which followed the old road from Keanae to Nahiku, in 1900. The ancient footpath was widened to sixteen feet, to accommodate horse-drawn wagons, and was surfaced with cinders. Because of the extreme difficulty of the terrain, however, its cost was prohibitive and the roads were inadequate for frequent automobile traffic. The 1905 SPW report stated that “very rough country is encountered in these districts.

On account of the great expenses of road construction, the road has been made as narrow as possible in order to construct, with the money available, the maximum length of road."[56]

The new road segment functioned so well that there were soon calls to extend it from Kailua all the way to Kipahulu, well past Hana. The Territorial Legislature however, was unimpressed and in 1903 refused to fund the project. Undaunted, commercial entrepreneurs from Paia to Hana lobbied the legislature heavily, resulting in yet another section being improved, from Kailua to Keanae in 1904. This stretch met significant construction problems, including jungle encroachment, torrential streams and landslides, all of which doubled the original $50,000 cost.

Between 1905 and 1908 concrete bridges were built in the ditch country near Nahiku. Bridge building on Maui surged in 1911, when the Territorial Legislature established a Loan Fund Commission to oversee a special fund for belt roads. Out of the $1,270,000 appropriated by the Commission in 1911, Maui received $370,000. This made possible the building of twenty-one Maui bridges: four on the Hana Belt Road, four on the Piilani Highway south of Hana, six in the upcountry district, six in Central Maui and one in West Maui. Work on the belt road continued depending on the extent of funding. A narrow road with several bridges was built from Kailua to Keanae by 1912 with territorial funds. From Hana, contractors Wilson and McCandless had completed the Nahiku-Keanae section of road by 1915. This road did not link up with the Kailua extension, but instead dead-ended in the Koolau Forest Reserve. The lack of a continuous paved road prompted one Maui legislator to complain that "Maui is the only island on which you cannot traverse by road around it."[57]

In 1914, inspired by the dramatic expansion of the sugar industry at Hana, the County of Maui Board of Supervisors unanimously agreed to press the Territorial Legislature for funding to improve the rest of the old road at least as far as Kipahulu and entertained ambitions to eventually circle the entire island. The road to Hana became part of a grander vision, called the Belt Road. Unfortunately, Territorial Governor Lucius Pinkham was adamantly opposed to the project, and consequently it took until 1923 before belt road planning was resurrected and modifications to the ancient route were given serious consideration.

Until this time, the journey to Hana was made partly over unpaved wagon roads and horse trails, often rendered impassable by damage from frequent rains. An alternative route through the island's south side took the traveler through the drier ranch country ending at Kipahulu. Since both land routes were arduous and slow, the most common means of travel to Hana was by steamer ship. Writer Robert Wenkam states that:

> *When Hana was without a road, and the coastal steamer arrived on a weekly schedule, Hana-bound travelers unwilling to wait for the boat drove their car to the road's end at Kailua, rode horseback to Kaumahina ridge, then walked down the switchback into Honomanu Valley. Friends carried them on flatbed taro trucks across the Keanae peninsula to Wailua cove. By outrigger canoe it was a short ride beyond Wailua to Nahiku landing where they could borrow a car for the rest of the involved trip to Hana. Sometimes the itinerary could be completed in a day. Bad weather could make it last a week.*[58]

[56] Report to the Governor, Territory of Hawaii by the Superintendent of Public Works or the Year Ending June 30, 1905, Hawaii (Territory), Department of Public Works (Honolulu, 1905).
[57] "Roads First Need View of Fassoth," *Maui News* (February 11, 1921).
[58] Robert Wenkam, *Maui: the Last Hawaiian Place* (San Francisco: Friends of the Earth, 1970), 65-66.

He adds:

> *The road was little more than a wide mud and gravel path for many years until paved by a young Hawaiian contractor, Johnny Wilson, who later became Mayor of Honolulu. Even when paved, mudslides plagued the road. The Keanae Chinese store offered overnight rooms to stranded motorists at first, but later it became accepted practice to wait at the mudslide for a car to appear from the opposite direction, then slosh across the intervening gap and offer to exchange cars with the complete stranger on the other side. A handshake would make the temporary trade official, and both parties would agree to meet the next day when the mud had been removed by county work crews, who usually arrived on horseback within a few hours.*
>
> *Ranchers from the other side of the island also benefited by the road. The ranchers and their friends knew the land well from horseback, but the automobile offered a much easier way to treat guests to a grand tour of the Hana coast. A one-day trip was now possible and small hotels in Hana began receiving their first tourists. The Hana road soon earned a reputation of its own - not as a road to go somewhere on, but as a destination in itself.*[59]

By 1922 Hana was the site of the large Kaeleku sugar plantation and mill. The plantation's manager, Mr. Joseph Herscherr, favored the proposed Hana Belt Road as "a wonderful tourist asset." Most of Maui's business interests also favored the construction of a road to Hana but disagreed about the route and means of financing. [60] County Engineer A.P. Low estimated in 1923 that the Hana Belt Road would cost about $692,000. Citing the highway's high cost, Maui businessman A.F. Tavares instead urged funding for a less expensive Kipahulu-Kaupo belt road around Maui's south side. But Maui businessmen objected to all financing proposals which included either county bonds or a special road tax.

Despite its prohibitive cost, the county eventually decided to complete the paved road to Hana. In May 1923, a total of $50,000 was appropriated from the Territorial Legislature for road work, despite the fact that less than twenty years earlier an equal amount had proved inadequate for a much shorter length of road, and that an additional $200,000 had been needed to overcome similar construction difficulties. The more heavily traveled sections from Keanae to Paia, were at least partially paved by 1926, but farther south the road remained unpaved. The worst of the construction problems lay ahead, between Kailua and Kopiliula Falls. Here, the earth would not cooperate as easily as farther north because of a drastic change in soil conditions. The surface soils are highly organic and unstable, so that even very minor roadway excavations trigger mud slides. In July 1926, a massive landslide covering more than thirty acres halted further work. Floods during the winter of 1926-27 washed out embankments constructed not two months earlier. Overruns associated with the already constructed portions left the Territorial Legislature in no position to continue funding the road. Despite these obstacles, Federal Aid funds were made available to Hawaii in 1925 which provided the necessary relief, and the project pushed its way towards Hana.

To lower costs, the county administration established a prison camp at Keanae, and pressed the hardest criminals into road gangs that eventually turned the remaining barely passable trails leading to Hana into a cinder-paved highway that could handle trucks and cars. Following the road's completion, a celebration was held, one that included a great luau and exuberant schoolchildren waving small American flags and marching down to the old cannery site on Hana Bay.

[59] Ibid.
[60] "Belt Road Bonds Can Be Taken Up," *Maui News*, May 5, 1922.

Keeping the road maintained and open, especially along the perilously unstable area between Nahiku and Kaeleku, was a major undertaking. The Territory, and later the state, hired numerous residents in and around Hana as seasonal workers dedicated to repairing the damage wrought by mud slides, rockfalls, downed trees and erosive floods. Makeshift bridges, often composed of inferior materials, were continually washed out. Forces were enlisted to maintain the road to Hana on a routine basis, and the remaining early wood bridges were replaced by the present-day reinforced concrete bridges. Even so, most of the road remained unpaved or only nominally surfaced. Road construction and maintenance was a fact of life for Hana residents:

> *The territorial and, later, state departments of transportation became major employers, supplying cash-jobs residents needed to augment their subsistent lifestyles. The county or state remained a major source of the jobs residents needed to augment their subsistent farming and ranching efforts. Men were anxious to work for the county or state road departments*.[61]

A boost for the roadway came in 1934, with the creation of the Hana Coast Civilian Conservation Corps, one of FDR's job programs designed to combat the effects of the Great Depression. By 1940, the highway was substantially complete. In 1946, the Hana Ranch developed the first hotel in Hana to accommodate tourists who made the journey to this previously isolated community by road.

A journalist driving through the ditch country at the time called the Hana Belt Road a "paved trail following the line of the ditch through the wild jungle."[62] It wasn't until 1962 that a reluctant state legislature, still in its infancy, agreed that the newly-created HDOT had to take responsibility for the care of the road. An unheard-of $2.2 million was allocated for widening, paving and restoring the highway from beginning to end. When the job was finished in 1964, the "highway" was at last negotiable by even the heaviest vehicles, at least in good weather. Since 1985, a well-planned maintenance program has preserved the road as one of Hawaii's most scenic and treasured drives. Residents have resisted a major upgrading of the roadway since improvements would "result in a tidal wave of visitors and would destroy the fragile balance between being fed by tourism and being consumed by it."[63]

Today, the sixty-mile road to Hana from Wailuku, State Highway 360, offers residents and tourists alike one of the most spectacularly scenic automobile routes in Hawaii.

[61] Leonard Lueras, and R. Youngblood, *On the Hana Coast: being an accounting of adventures, past and present, in a land where the hand of man seems to rest lightly* (Honolulu: Emphasis International, 1983), 77.
[62] "Writer Takes You Around the Isle - Maui This Time," *Honolulu Advertiser* (Honolulu, HI), April 27, 1940.
[63] Lueras, 81.

IV. THE OLD MAMALAHOA HIGHWAY, HAWAII ISLAND: PRE-CONTACT TO 1960s

HISTORICAL BACKGROUND

The Mamalahoa Highway takes its name from the edict of King Kamehameha, the great Hawaiian conqueror who united the Hawaiian islands. *Mamala hoe* (lit. "the way or law of the broken canoe paddle"), popularly known as the "Law of the Splintered Paddle", guaranteed the safety of the highways to all travelers. During his travels on the Island of Hawaii, Kamehameha and his men came upon a fishing village in the Keaau region of the island; one of the fishermen, defending his territorial rights, hit the king with a wooden canoe paddle, shattering it into pieces. The king subsequently issued an edict that all men should be free to travel the roads of the islands unimpeded. An alternative interpretation suggests that *Mamalahoa* (lit. "law of the friend") refers to the death of Kamehameha's guard at the hands of the king's supporters after failing to protect Kamehameha from the assault. The guard was killed by pulling a spear back and forth through his body, thus simulating the movement of a canoe paddle. Kamehameha, stricken by the death of his friend, consequently issued the famous edict. Kamehameha's edict established a precedent for contemporary state laws which ensure free access to areas traditionally accessible in pre-contact Hawaii, such as upland trails and coastal beaches.

The Old Mamalahoa Highway was built roughly along the route of an ancient Hawaiian footpath (*Ala Kahakai*) that was to become a nineteenth century horse trail. Pre-contact Hawaiians preferred travel by canoe; however, the coastal trails were used in bad weather and rough seas.

Historian Russell Apple suggests that the coastal trail was the path taken by the ancient Hawaiians during the *Makahiki* celebration. The annual *Makahiki* season, which runs approximately from October to February, was an event of major religious, economic, and political importance. During the *Makahiki*, the image of the god Lono was carried through each island district by priests, and offerings (some suggest "taxes") were collected for the king.

In 1823 the Reverend William Ellis and his party were the first westerners to complete a circuit of the island of Hawaii. Ellis' journal, first published in Boston in 1825, chronicled this trip with detailed observations of geology, botany, population, social and religious customs, political structure, history and legends. Generally, Ellis' trip followed the Hawaiian *Makahiki* trail, although some portions, such as the rugged, ravine-cut section between Hilo and Laupahoehoe, were traversed by canoe.

In 1873, the Victorian traveler and writer Isabella L. Bird made the journey from Hilo to Waipio on horseback; she describes the trip in length in a series of letters written to her sister between January and August of that year.[64] Leaving Hilo, she writes:

> *The track crosses the deep, still Wailuku river on a wooden bridge, and then after winding up a steep hill… hangs on the verge of lofty precipices which descend perpendicularly down to the sea, dips into tremendous gulches, loses itself in the bright fern-fringed torrents which have cleft their way down from the mountains… Then the track goes down with a great dip [after passing through the sugar plantation of Kaiwiki], along which we slip and slide in the mud to a deep broad stream… Our accustomed horses leaped into a ferry-scow provided by the Government… and leaped out on*

[64] Isabella L. Bird, *Six Months in the Sandwich Islands* (Honolulu: University of Hawaii Press, 1966).

the other side to climb a track cut on the side of the precipice, which would be steep to mount on one's own feet.[65]

Continuing beyond Onomea, where Isabella Bird stopped at the plantation of the Austin family, she describes her journey onto Waipio Valley on the north-east shore of the island:

The dimpling Pacific was never more than a mile from us as we kept the narrow track in the long green grass, and on our left the blunt snow-patched peaks of Mauna Kea rose from the girdle of forest… The track for twenty-six miles is just in and out of gulches, from 100 to 800 feet in depth, all opening to the sea, which sweeps into them in three booming rollers.

All the gulches for the first twenty-four miles contain running water. The great Hakalau gulch we crossed early yesterday, has a river with a smooth bed as wide as the Thames at Eton. Some have only small, quiet streams, which pass gently through ferny grottoes. Others have fierce torrents dashing between abrupt walls of rock, among immense boulders into deep abysses, and cast themselves over precipice after precipice into the ocean… A few are crossed on narrow bridges, but the majority are forded…[66]

Bird claims that the "worst *pali* of all [was] the south side of Laupahoehoe." She states that "Mr. Brigham in his valuable monograph on the Hawaiian volcanoes… appears as much impressed with these gulches as I am."[67] She quotes Brigham in her journal:

The road from Hilo to Laupahoehoe, a distance of thirty miles, runs somewhat inland, and is one of the most remarkable in the world. Ravines, 1,800 or 2,000 feet deep, and less than a mile wide, extend far up the slopes of Mauna Kea. Streams, liable to sudden and tremendous freshnets, must be traversed on a path of indescribable steepness, winding zig-zag up and down the beautifully-wooded slopes or precipices, which are ornamented with cascades of every conceivable form. Few strangers, when they come to the worst precipices, dare to ride down, but such is the natures of the rough steps, that horse or mule will pass them with less difficulty than a man on foot who is unused to climbing. No less than sixty-five streams must be crossed in a distance of thirty miles.[68]

After leaving the area north of Laupahoehoe, Bird happily claims: "There are no large gulches on today's journey. The track is mostly through long grass, over undulating uplands…"[69] Forty years later, in 1913, after the establishment of the Territory of Hawaii and the county government's initial efforts to improve the road, Henry Walsworth Kinney describes the same journey along the Hamakua coast. Kinney, writing tourism copy for the Hilo Board of Trade, claims that:

No visitor to the Island of Hawaii should neglect to see the road which leads north from Hilo to the Hamakua district. One of the most beautiful roads in the island, it presents, as it winds through scores of tropical gulches, a constantly changing panorama of unsurpassable beauty.

[65] Ibid.
[66] Ibid.
[67] William T. Brigham, *Notes on the Volcanoes of the Hawaiian Islands with a History of their Various Eruptions*, from the memoirs of William T. (Cambridge, Massachusetts: Riverside Press, 1868).
[68] Bird, 87.
[69] Ibid.

To autoists the road is a delightful experience, and the ease of the grades and careful construction of the somewhat sharp turns will call forth his unstinted admiration of the road builders of the scenic isle.[70]

Between 1900 and 1905, the Territory undertook the laborious process of obtaining the necessary rights of way for the "Relocating and Reconstruction of the Main Road" and contracts were let for the construction of new concrete bridges and culverts to replace older, weak timber bridges in various locations along the North Hilo and Hamakua coast. In what one historian has termed a deliberate plan to wrest power for the Hawaiian and away from the American Territorial government, county governments were established by the Legislature of 1905. The counties were given the power to appropriate and expend funds through a county Board of Supervisors. However, the counties suffered chronic shortage of funds for road construction, even though money previously allotted to the state departments were being divided amongst the counties of Honolulu, Hawaii, Maui, and Kauai. The governor's message to the 1911 Legislature suggested the issuance of territorial bonds for belt road funding, and $600,000 was subsequently made available to the Big Island from bonds that were floated. Utilizing these funds, the county began the systematic improvement of the island's belt road and bridges.

The first contract from this fund was awarded in 1912 to A.A. Wilson, the Hilo contractor who had worked on Hilo Railroad's Hakalau Extension. His contract was for the reconstruction of the belt road from Wainaku, just outside of Hilo, to Hakalau and included an unspecified number of bridges and culverts. His winning low bid was $98,698.35. The second contract was won by Territorial Senator John Brown the same year. He was to rebuild the belt road and bridges (with the exception of one long span in good condition) from Hakalau to Pohakupuka for $99,587. A third contract went to Lord and Young of Honolulu for the stretch between Kaawalii and Kealakekua, south of Kona, for $106,514.35. Not surprisingly, there were complaints voiced about the expenditure of the funds, the loudest emanating from the Board of Supervisors whose authority was being superseded. Many expected the $600,000 to build a whole new belt road, rather than the short, expensive pieces of road that resulted. Another bond issue in 1917 provided an additional $265,000 for Big Island roads, but the costs and difficulties of construction did not allow for the completion of the belt road until 1933.

At the beginning of the twentieth-century, the Hamakua Coast was the site of several major sugar plantation communities with tens of thousands residents. The Mamalahoa Highway was the main transportation link between the small plantation communities located along this coastline. The rugged terrain of the coast would not allow for the transportation of cane by road, thus elaborate flume systems were devised to get the sugar from the fields to the mills located along the coastline. Sugar was then processed at mills and off-loaded onto barges docked at the few landings for shipment to Honolulu or the Mainland. In many cases, the steep coastal bluffs made landing a ship impossible and necessitated the use of cable and pully systems to load the sugar into the holds of the ships. In 1911-12, the Hawaii Consolidated Railroad established a rail line to Paauilo and sugar was transported to Hilo for shipment from its harbor. The rail line brought many changes to the Hamakua coast, including the relocation of many of the mills away from the coast to access the rail service. Trucking sugar to Hilo along the narrow, winding government road (the Old Mamalahoa Highway) was not an economical alternative to the relatively straight run along the rail line.

BRIDGES ALONG OLD MAMALAHOA HIGHWAY

The suggested area for a proposed Mamalahoa Highway Historic Bridge District is comprised of forty-four bridges and thirteen culverts along approximately sixty miles of the Old Mamalahoa Highway on the island of Hawaii. The highway, also noted as the "Old Government Road" begins north of the Wailuku River in Hilo and passes through the districts of South Hilo, North Hilo and Hamakua. It terminates near the town of Kamuela at mile point 52 of the

[70] Henry Walsworth Kinney, *The Island of Hawaii* (Hilo: Hilo Board of Trade, 1917), 24.

Hawaii Belt Road. The highway was the principle belt road linking the small towns and sugar plantations along the Hamakua coast of the Island of Hawaii. The bridges in this proposed district include the oldest and rarest, as well as the most ornamental and scenic spans in the state.

The first road around the island was begun by the kingdom's Department of the Interior in 1847, however it remained little more than a horsepath until the time of King Kalakaua. During Kalakaua's reign (1874-1891) appropriations for public works improvements escalated, and many steel and timber bridges were constructed. Unfortunately none of these early bridges remain. Roadway and bridge construction was not significantly affected by the overthrow of the monarchy and the establishment of the Republic of Hawaii in 1893. However, after the annexation of Hawaii by United States in 1898, public works improvements, particularly bridge and road construction, became a priority on all islands. The fifty-seven bridges of the proposed Mamalahoa Highway Historic Bridge District were constructed between 1894 and 1933 and date from the Republic and early Territorial periods.

The earliest bridges are the masonry and solid-spandrel concrete arches constructed by the Republic - and later Territory - of Hawaii prior to the establishment of the county governments in 1905 (of which there are nine extant examples). Between 1911 and 1933, the County of Hawaii began to appropriate Territorial Loan Funds for the systematic upgrading of the island's roads and bridges. The highest priority was placed on belt road improvement, and a series of reinforced concrete bridges were planned for stream crossings along the old Government Road. The bridges were designed by the County Engineer's Office and built by local contractors. These county bridges were of two primary types: simple reinforced concrete girder or flat slab bridges for short spans (thirty-three examples); and more ornate and technologically sophisticated open- and solid-spandrel concrete arch bridges for longer, more visible spans (seven examples). The remaining bridges are inexpensive timber girder bridges built during the Depression years (eight examples).

Generally, one parapet end of the reinforced concrete county bridges is inscribed with a number indicating the island district in which it was built followed by the bridge number. The date of construction is inscribed on the other parapet end. The remaining bridges in South Hilo district are numbered from one to twenty-nine; those in North Hilo district are numbered from 103 to 126; and remaining bridges in the Hamakua district are numbered from 209 to 251. This marking system is unique to the bridges of the Old Mamalahoa Highway. The last county bridge was constructed on the Old Mamalahoa Highway in 1933. Between 1932 and 1958, the THD began to construct a new highway around the island. The modern highway, called the Hawaii Belt Road, became part of the Federal Aid Primary (FAP) highway system. The new road straightened out, bisected, and often bypassed the circuitous Old Mamalahoa Highway.

NARRATIVE STATEMENT OF SIGNIFICANCE

The bridges in the proposed Mamalahoa Highway Historic Bridge District are significant for their contributions to engineering and transportation in Hawaii. The development of the Old Mamalahoa Highway contributed to the economic development of the island by linking the small towns and sugar plantations along the Hamakua coast with the island's principal port in Hilo. The bridges in the proposed Mamalahoa Highway Historic Bridge District are eligible under Criterion A as prominent products of the Republic of Hawaii and representative of Territorial and County public works efforts. The construction of the bridges was a deliberate investment in permanent public works improvements requiring the mobilization of skilled labor and significant public funds. Thus, these bridges were often constructed at important crossings along major transportation routes. The bridges served as important links in the circum-island transportation system, aiding in the commercial and residential development of Hilo and the Hamakua Coast. Reinforced concrete arch bridges were constructed to replace earlier timber and metal bridges. Many of these bridges were visually prominent, both in style and location, and made significant civic statements regarding the technical and aesthetic sophistication of the communities in which they were built. Concrete deck

bridges are eligible under Criterion A for their associations with of the first use of formal engineering expertise in bridge making by the new county governments shortly after the annexation of Hawaii by the United States. These road bridges played a major role in the development of County of Hawaii's belt road plan by connecting previously isolated communities with a paved highway.

The bridges are eligible under Criterion C since they represent a visual timeline of bridge construction technology in Hawaii. Nearly every historic bridge type remaining in the islands is represented along the Old Mamalahoa Highway. The masonry arch bridges are notable examples of the use of vernacular building materials and local craftsmen. Masonry and concrete arch bridges often evidence a high degree of detailing and workmanship and the few remaining examples are rare survivors of these once common bridge types. Furthermore, the reinforced concrete arch bridges constructed along the Mamalahoa Highway are among the earliest examples of reinforced concrete bridge construction in the state. Concrete deck bridges, including flat slab, girder and tee beam spans, are representative of the most common historic bridge type found in the islands. The majority of county built bridges, such as the Maili and Kaiwiki Bridges, were of this type as were the subsidiary spans on Mamalahoa-Honolii Bridge. Moreover, many of the bridges are examples of exceptional work by important local builders (the "work of a master") such as Louis M. Whitehouse, Johnny Wilson, Peter and Charles Arioli, and Hisato Isemoto. Prominent designers include William H. Chun and En Leong Wung.

The fifty-seven bridges and culverts that make-up the proposed Mamalahoa Highway Historic Bridge District are evaluated as a group. Together these bridges form an area encompassing the entire sixty miles of the Mamalahoa Highway. Individually, the bridges in this proposed district range from technologically simple timber and masonry arch bridges to the more complex concrete deck girder and flat slab bridges. Together these bridges form a cohesive group built in a relatively short time period that document the evolution of style, methods and bridge building technology in Hawaii. This group of bridges played a critical role in the development of belt road transportation for the island of Hawaii.

V. HAWAII BELT ROAD, HAWAII ISLAND: PRE-CONTACT TO 1960s

HISTORICAL BACKGROUND

Many railroads were established in the Hawaiian Islands during the Kingdom, Republic and early territorial periods by private interests in the sugar industry. For the most part, these sugar trains were narrow gauge lines; however a unique standard gauge rail line was established on the Island of Hawaii to carry sugar cane along the rugged Hamakua coast to ports in Hilo. Fourteen large steel trestle railroad bridges were built in 1911-12; in 1950-53, five of these were modified by the Territorial Department of Transportation for use as highway bridges and another was constructed utilizing trusses from the span over the Wailuku River.

The plantations of South Hilo, North Hilo, and Hamakua districts were producing raw sugar within a few years after the Reciprocity Treaty of 1876. The treaty allowed Hawaiian sugar to be exported to the American mainland duty-free. The treaty was later expanded to include a clause that allowed the United States to build a Naval Station at Pearl Harbor on Oahu. The sugar industry developed rapidly in the islands; and by 1900, one-quarter of the sugar produced in the Territory was grown on the Hamakua coast. The land above the steep coastal bluffs, at the base of the dormant Mauna Kea volcano, was gently sloping and fertile. Most plantations were from two to three miles deep, their altitudes ranging from 250 feet closest to the sea to 2,000 feet at their upper boundaries; their ocean frontage varied from two to six miles. The rain which produced sugar had also produced the myriad gulches that had for so long kept the area isolated. The only road to Hilo's harbor was the government wagon trail that was almost impassable in the rainy season and which suffered from constant bridge washouts. As an alternative to using the road, some plantations had railroads with either locomotive or animal power; others used flumes or cable railways to move cut cane from the high fields to the mills which were usually close to the sea. The mills employed a cumbersome method of derricks and pulleys at various landings high above the coast to load their produce on to ships for market.

Hilo was located at the southern end of the long string of sugar plantations on Hawaii's east coast. Large tracks of prime agricultural land lay to the south of the town, awaiting development by entrepreneurs with vision and capital. In 1898, Benjamin Franklin Dillingham, a noted Hawaiian businessman, drew up plans for a large sugar mill at Olaa, eight miles south of Hilo in the previously uncultivated Puna district. Then he applied for a charter for the railroad that would be needed to transport the raw sugar to the wharf in Hilo. The Hilo Railroad Company was incorporated in 1899 by Dillingham; Lorrin Thurston, the Minister to Washington during the Republic of Hawaii and a former Interior Minister under the monarchy; and Mark Robinson, Minister of Foreign Affairs for Queen Liliuokalani. The charter for the Hilo Railroad, granted by the Republic of Hawaii, was issued on March 28, 1899. Under its charter, the Hilo Railroad was authorized — for a period of fifty years — to build a railroad anywhere on the island of Hawaii, with free use of government lands for the right-of-way, yards, or station areas. Dillingham had just completed a three-foot gauge common carrier on Oahu and was aware that the popularity of narrow-gauge for trunk lines was on the wane; he announced that the Hilo Railroad would be built to standard gauge (4'-8 1/2" wide) — the first and only standard-gauge railroad in the islands.

The railroad barons determined that the wharf in Hilo was inadequate to attract the business of large shipping lines. Freighters anchored in deep water had to use lighters, and the whole operation was relatively unprotected from heavy seas during the storm season. A new wharf, sheltered from the sea by a breakwater, was proposed; but its construction was beyond the means of either the railroad or the Territory of Hawaii. The breakwater, designed by the U.S. Army Corps of Engineers, was financed by the U.S. Congress, leaving the railroad with the responsibility for building the wharf. One of the conditions imposed by the government for the improvement of

Hilo's harbor was that the railroad company extend its railroad line north along the coast to service the sugar plantations of Hamakua.

The railroad construction project was a daring engineering feat that crossed the numerous gorges and streams with large steel bridges at the valley mouths and required massive earth cuts for the completion of the comparatively straight road bed. This was in direct contrast to the more conservative government policy of winding roads and small concrete or timber bridges in the backs of valleys or down sharp grades to sea level. The high cut in the north wall of Hakalau gulch remains as an example of the degree of earth moving accomplished by the railroad engineers. Work on the first section — 12.7 miles from Hilo to the Hakalau Mill — began in 1908 and was completed in 1911. Construction of the second phase — from Hakalau to Paauilo — continued through 1912, with costs of $106,000 per mile, for a total of $3,500,000. The company succeeded in erecting fourteen steel bridges, five wood and steel combination bridges, and twenty-four wooden trestles. These bridges, along with two tunnels and expensive grading, gave the Hilo Railroad "one of the highest per-mile construction costs of any railroad under the Stars and Stripes."[71]

The specifications and design for the bridges were drawn up by John Mason Young, the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawaii). Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawaii. The bridges' components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kauai the same year) and were erected by W.W. Beers, described by the *Hilo Tribune* as a New York engineer. All of the steel trestle bridges erected by the railroad were of the same type, deep steel girders with 66 to 72 foot spans set on wide steel trestles and masonry (lava-rock) abutments. The bridges were assembled at the Waiakea railroad yards and shipped out to their sites on railroad cars.

The Hakalau trestle, built in 1911 during the railroad's second phase of construction, was one of the most impressive bridges built by the Hilo Railroad. At 775 feet long and sitting on seven steel towers, the Hakalau Bridge was the second longest bridge on the line, outdistanced only by the Maulua Bridge at more than 1000 feet. After the Maulua Bridge was taken down, Hakalau was converted for use as a highway bridge and was, for several years, the longest highway bridge in the territory until the Kalihiwai Bridge on Kauai and the Pearl City Viaduct on Oahu were built. Hakalau was also among the tallest with a height of 171 feet, only 30 feet shy of the tallest bridge over Nanue Stream. As late as 1981, Nanue was the highest bridge in the state at 207 feet. A higher bridge had been built at Maliko Gulch on Maui, but it was dynamited in 1967.

In addition to the steel trestles built by the Hilo Railroad, two multi-span steel truss bridges were constructed over the Wailuku and Wailoa Rivers. These bridges suffered from their positions close to sea level and were the most problematic for the railroad to maintain. The Wailoa drawbridge was destroyed in 1923 by a tidal wave and was remounted on concrete piers. The Wailuku railroad bridge suffered several mishaps. While it was being erected in 1909, a Porter tank engine slipped over its edge into the river. Fifteen years later, "it collapsed in a mysterious manner," its piers folding like dominos.[72] The collapse was attributed to the 1923 tidal wave and earthquake, and was precipitated by the passage of a loaded passenger train. In 1924, the Wailuku Bridge was replaced by a metal truss bridge of three spans, mounted on concrete piers. These bridges only lasted in place until the 1946 *tsunami*.

[71] John B. Hungerford, *Hawaiian Railroads* (Reseda, California: Hungerford Press, 1963), 55.
[72] Thomas Thrum, *Hawaiian Almanac and Annual* (Honolulu: Hawaiian Gazette Company, 1924), 94.

Burdened with debt and unable to meet its obligations, the Hilo Railroad Company was forced into receivership in 1916 and plans for the expansion of the line were abandoned. The railroad was sold for $1,000,000 to the bondholders, and reorganized as the Hawaii Consolidated Railway. In 1920, the new owners bought three additional passenger coaches as part of a program aimed at catering to the tourist business. In cooperation with the steamship companies, sightseeing specials, operating under the name of *Scenic Express*, were run on the Hamakua Division when passenger ships were in port. Author Gerald Best described his experience traveling along the coast: "We had seen waterfalls cascading down the slopes of Mauna Kea, passed through magnificent groves of tropical trees and entrancing fields of flowers, and looked upon a completely unforgettable vista of sea and mountains. No wonder the tourists who rode the *Scenic Express* years ago recalled it as the highlight of their visit to Hawaii."[73]

In the 1930s the Depression affected the tourist trade and passenger business dropped off to a low of 16,681 in 1936. Passenger cars were retired, and some cars were converted to haul *bagasse* (sugar cane after the juice has been pressed out) to the cane manufacturing plant in Hilo. During World War II, passenger business picked up due to gas rationing, and several old coaches were used to transport servicemen from Hilo to Paauilo, en route to the U.S. Marine Corp training camp at Waimea. By the end of 1945, the railroad was making money and would soon be out of debt for the first time in its existence.

On April 1, 1946, a tsunami hit Hilo at 7:01 AM. The Hawaii Consolidated Railroad suffered irreparable damage. Freight cars were floated inland, all of the track along the waterfront was washed out, the Hilo station and the adjacent buildings were in shambles, and the first span of the Wailuku River bridge, a steel truss, was washed hundreds of feet up the river. In spite of the breakwater, freight cars on the docks were washed into the bay, some floating out to sea and others thrown up on shore. Twelve miles north of Hilo, the railroad bridge at the mouth of the Kolekole Stream lost its center span. Facing an estimated repair cost of $500,000, the railroad asked shippers to determine whether they would use the line if it were rebuilt or were intending to ship their raw sugar by truck. Only Theo H. Davies Ltd. voted to retain the railroad; the rest voted to use the existing highways, despite their poor condition. Hawaii Consolidated then offered its entire right-of-way, including all bridges and tunnels, to the THD and to the County of Hawaii supervisors. Both agencies declined the railroad's offer.

The entire railroad was sold as scrap to Gilmore Steel & Supply Company of San Francisco for $81,000. About the time the scrappers had finished pulling up the rails and begun dismantling the steel bridges, the THD decided that the Hawaii Belt Road, along the Hamakua Coast, should be improved by relocating it along the railroad right-of-way and utilizing the railroad trestles as highway bridge supports. In great haste, it made a deal with Gilmore Steel & Supply to buy those bridges still in place, as well as the parts of bridges already trucked to Hilo, for $303,723.53 - nearly four times the amount the scrappers had paid to Hawaii Consolidated for the entire railroad.

In 1950, the THD, under the direction of William R. Bartels, and the Independent Iron Works of Oakland, California undertook the "Seismic Wave Damage Rehabilitation Project." Plans were developed to adapt the existing steel railroad trestles into highway bridges. Utilizing remnants of railroad trestles and trusses, the road beds were widened and strengthened. The Hakalau Bridge, for example, utilized steel girders scavenged from the Kealakaha, Laupahoehoe, and Kaula trestles; the steel bents were taken from the Maulua Bridge. A macadamized concrete deck was laid and concrete rails installed along both sides of the new highway bridges. The two remaining truss spans of the Wailuku River Railroad Bridge were incorporated into the reconstruction of the Kolekole Highway Bridge. Two concrete piers from the truss bridge remain in use under the present Wailuku Bridge which carries the Hawaii Belt Road (designated FAP 19) over the river.

[73] Gerald M. Best, *Railroads of Hawaii* (San Marino, California: Golden West Books, 1978), 155.

The steel railroad bridges built by the Hilo Railroad Company lasted the life of the railroad and beyond. However, even after their reconstruction, they have proved to be expensive to maintain. A Department of Transportation maintenance team, the "High Bridge Crew", is dedicated solely to the upkeep of the five remaining steel trestle bridges, while another crew is able to maintain all the other state bridges on the island.

THE HILO-HAMAKUA HERITAGE COASTLINE

The windward part of the Big Island (once known as The Sugar Coast) is a continuous series of plantations linked from Hilo to Honokaa. A railroad hauled sugar to the Hilo piers and provided a lifeline for transporting people and supplies. High trestles spanned the gulches of this part of the island.

This region is Hawaii's wet district, starting at Upolu Point, the northern tip of the island, and running through Hamakua and into the Hilo District, which supported many large sugar plantations. From Niulii in North Kohala, the coast is a series of canyons with rivers pouring out of the Kohala Mountains or off of Mauna Kea. Travel was problematic closer to the coast.

After the tsunami of 1946, construction of the new Hawaii Belt Road (FAP 19) was accelerated. The new road was an engineering feat, containing fifty-six bridges in forty-two miles.

The THD's first post-war priority on the Big Island was the Hamakua Coast Highway. There were several reasons for this immediate attention. The upgrade of the existing roads had been interrupted by the war, and what existed was piecemeal. In addition, the Hawaii Consolidated Railway service to sugar plantations was terminated and plantations were forced to truck their sugar to Hilo on the narrow winding Belt Road. This method was dangerous for the large trucks as there were many hairpin turns and periodic bridge washouts.

Some of the components of the defunct railroad bridges were reused for the upgraded two-lane highway between Hilo and Honokaa. The complete reconstruction of these forty miles of highway was quite expensive, since it was "Hawaii's most bridged highway" with more than one bridge per mile. The original cost estimate for the road was twelve million dollars and included a "Highline" portion of the highway from Pepeekeo to Ookala. The existing route consisted of 340 curves with narrow bridges varying from 12' to 18' wide. The proposed highline portion would have realigned this twenty-four miles of dangerous highway at a higher elevation where the gulches were less wide. The Hamakua "Highline" proposal was subsequently not adopted, and the cost of this section of highway grew to 17.5 million dollars by the mid-fifties.

Roughly two-thirds of the Hamakua road was finished (a total of thirty-five bridges) during the tenure of Highway Commissioner Robert M. Belt, from 1952-1958.[74]

POST-WAR HAWAII BELT ROAD BRIDGES

There are a number of significant bridges constructed after World War II along the Post-War Hawaii Belt Road; thirteen of these bridges represent the best examples of post-war bridges in the state of Hawaii. Along the same stretch of road, there are an additional 6 trestle bridges built during the same post-war time period, which are listed on the HSRHP. (See Hawaii Belt Road Map, Chapter 6.) The Post-War Hawaii Belt Road is not considered as a district, but bridges are significant as a group of post-war bridges on the Belt Road.

[74] Alvarez, *Historic Bridge Inventory and Evaluation: Island of Hawaii*, 79-80.

Additionally, many of these bridges are the work of a person of significance - William R. Bartels, Chief Engineer for the THD, who was responsible for all major territorial bridge projects from 1932-1956. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the THD in 1932. He designed most of the territorial bridges from then until 1957.

Bartels was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time and there was a marked shift to large deck girder and rigid frame bridges. Bartels was considered a "cracker-jack" engineer who enjoyed the challenge of a difficult assignment, and his work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges show refined aesthetic sensibility which makes them distinctive from work of other engineers. He ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard age of retirement, but he was kept on by special permission and out of necessity as his abilities were so great. Bridges designed by Bartels have often been hailed for their accomplishment of engineering as well as aesthetics.

VI. THE PALI HIGHWAY, OAHU: PRE-CONTACT TO 1960s

HISTORICAL BACKGROUND

Plans to build a tunnel to link Honolulu and the windward side of Oahu were discussed prior to World War II, but the war forced a postponement. Later, the rapid growth of the city's population, the development of residential areas on the windward side, as well as the needs of the armed services during World War II convinced public officials that building a tunnel through the Koolau Range was inescapable. With each passing year, it became more and more obvious that the existing, narrow Nuuanu Pali road no longer met the transportation needs of the rapidly growing communities on the windward side, as between 1940 and 1950 Kailua's population increased four hundred percent, going from 1,400 to more than 7,000.

The only question which remained to be answered was where to place the tunnel. This proved to be not a simple question to answer, as the City and County of Honolulu and the Territory of Hawaii had different thoughts on this matter, the former advocating a tunnel through the Koolau Mountains via Kalihi valley, while the latter preferred following a route through Nuuanu valley. While the City & County was moving ahead with plans for Kalihi valley, Territorial SPW Robert Belt in December 1947, unveiled two alternative plans for converting the existing Pali Road into a four lane highway which in the eyes of Nuuanu residents was, "a 'four lane speedway' running through their neighborhood."[75] In addition, to Nuuanu residents, the City & County led by Mayor John Wilson, also expressed opposition to the highway plans, as they saw them as competing for limited federal funds, which the Mayor hoped to obtain for the construction of the county proposed highway through Kalihi. In the ensuing years the pros and cons of each alternative were repeatedly raised, traffic counts were made, population growth was studied, military opinion was solicited, and financial programs were analyzed in an effort to settle upon one of the routes and throughout the process both governments steadfastly advocated for their proposal. Eventually both highways were built; however, it took over a decade of bickering, courtroom fighting, delays, and squabbling to attain the result.

The issue of choosing between the Kalihi and Nuuanu tunnel routes appeared to be finally settled when the Federal Bureau of Public Roads (BPR), on December 1, 1949, approved federal funding for the Territory of Hawaii's proposed Nuuanu valley tunnel project. The decision came at the end of a two week, on-site study by the Bureau's Western Region Chief L. I. Hughes, Division 7 Engineer Charles C. Morris, and District Engineer Frank F. Carlson. In their report the federal officials based their finding on the fact that the current Nuuanu Pali road was, "now close to the possible capacity of the highway."[76] The report went on to state that no federal aid would be made available until the Territory of Hawaii and City and County of Honolulu came to a resolution on the highway route between Country Club Road and Reservoir No. 4, as the City & County Planning Commission had refused to amend the City's Master Plan to include the Territory of Hawaii's proposal for a new, realigned Pali Highway. Governor Stainback resolved this issue by executive order three days after the release of the federal report, when on December 3, 1949 he set aside the City & County's master plan with regards to the Pali Highway.

Federal officials also noted that when granting their approval for the proposed highway running up the Ewa side of Nuuanu valley, they did so with the understanding the section of the existing Pali Road between the Carter residence and the Halfway House on the windward side of the island would remain undisturbed as a scenic

[75] "City Will Protest Nuuanu Road and Ask Fund Delay," *Honolulu Star-Bulletin* (Honolulu, HI), December 17, 1947.
[76] "Federal Officials Approve Nuuanu Valley Tunnel Plan," *Honolulu Star-Bulletin* (Honolulu, HI), December 1, 1949.

alternate or detour for tourist or sight-seeing traffic. The report also indicated the Bureau of Public Roads would look favorably upon a request to provide federal aid to a spur road in Kalihi Valley which would run from School Street to the Forest Reserve. The City and County would need to fund any service roads connecting to the federally assisted spur road. Also the report noted that while assisting in the development of the Kalihi valley road, that proposed project "should not impair other necessary federal aid construction, that is, the Pali Highway."[77] In conclusion the report noted, "when future traffic needs warrant, this Kalihi route shown by the Planning commission survey will be considered for inclusion in the federal aid system."[78]

As a prelude to the construction of the new Pali Highway, the Territorial DPW opened bids on December 21, 1949 for a new four lane highway which would run from the Kaneohe Ranch office building at the foot of the Pali to the Kailua-Waimanalo Junction. J. M. Tanaka secured the contract for the new, 1.86 mile highway, with a bid of $963,319. Considered to be "one of the territory's most modern highways" the new four lane divided highway replaced an existing narrow, two lane road, a segment of which is now known as Auloa Road.[79] The new highway followed a completely new alignment, and although only three tenths of a mile shorter than the existing road, eliminated twenty two curves, supplanting them with two curves, each with a broad radius.

To facilitate this more direct, straight line route, a hillside was cut resulting in the excavation of over 600,000 cubic yards of dirt, and two bridges were constructed, one over Maunawili Stream and the other over Kahanaiki Stream. In constructing the Kahanaiki Stream Bridge a new technology, involving the driving of sand drains was employed. In order to overcome the fifteen to forty feet of mud in the stream bed, a sand-filled, fifty-foot-long steel pipe, twenty inches in diameter, with a mushroom like cap at the bottom, was driven into the stream bed. As the pipe was removed the sand inside filled the hole. Over two hundred of these sand drains were placed in the six hundred foot stretch of road crossing the Kahanaiki Swamp. The drains allowed settlement, which usually required ten years, to occur within 120 days. In addition, Maunawili swamp was cleared of three to four feet of mud and filled with sand with dirt placed on top and left to settle while other parts of the road were constructed. A pile driver, using an S-8 hammer, drove the Maunawili Stream Bridge piles at the rate of 26,000 foot pounds per blow, with 55 blows a minute. Apparently the sand drains did not perform as well as expected. On November 1, 1951 Harvey A. Jerome, in a letter to the editor of the *Star-Bulletin*, complained that one of the two new Kailua bridges were under repair following a day and night of heavy rain.

In addition to the Kaneohe Ranch to Waimanalo junction project, the THD let a $371,221 contract to E. E. Black for a four lane highway between the Kailua-Waimanalo junction and the Kawainui Bridge in Kailua, expediting Kailua residents' journeys to the base of the Pali. With the opening of the two projects on September 3, 1951, Governor Oren E. Long declared the roadway, "the first step in the completion of the road over the pali."[80] He predicted it would encourage many more people to establish homes in Kailua.

The opening of the new roadway increased windward residents' demands for the construction of the new Pali Highway, as a bottleneck formed at the Kaneohe Ranch office where motorists had to merge from two lanes to one. During the morning rush hour between 7 and 8 a.m., 914 automobiles crossed the mountain, including 149 from Kaneohe which merged with the Kailua traffic, causing further delays. Traffic counts revealed that during the course of a 24 hour day 4,090 Honolulu-bound vehicles made the ascent up and over the Pali. In an effort to reduce the bottleneck a policeman was placed at the bottom of the Pali Highway to direct the traffic coming from

[77] Ibid.
[78] Ibid.
[79] "New Highway to Kailua Will Have Four Lanes, Cost Million Dollars," *Honolulu Advertiser* (Honolulu, HI), August 6, 1950.
[80] "New Kailua Highway Opens for Traffic," *Honolulu Star-Bulletin* (Honolulu, HI), September 3, 1951.

Kaneohe, and an older section of the Pali Highway, which entered the existing road at the Halfway House, was closed to Kaneohe motorists during rush hour. By September 1953 the steep, twisty, windy road was carrying over 11,000 vehicles a day, as compared to about 7,700 in 1951, and 2,899 in 1938. By 1957 this number had climbed to 16,000. According to federal standards, the existing road was considered adequate and safe to handle only 4,000 vehicles a day.

Shortly after the opening of the new Kailua Highway, the Territorial DPW took the first step in its incremental construction of the Pali Highway. Using federal aid moneys matched by the Territory of Hawaii's vehicle fuel tax, the THD awarded contracts as money allowed, thereby not putting the government in debt. The first contract, for $514,373, was awarded to Moses Akiona, who commenced work in February 1952 on the stretch of road between the Kaneohe Ranch office and the old roadway's hairpin turn. This new 1.4 mile section of road would have only three curves including a sweeping horseshoe, as opposed to the existing twenty-two. No bridges were in this section, but there was much cutting and filling, with 560,000 cubic yards of excavation anticipated. Akiona's company dynamited and cut through solid rock, graded down hillsides and filled in deep canyons to develop a smooth roadway. The cuts through the mountain were deep ones, with one going 150 feet deep into the hillside. To avoid slides, three of the slopes were carved out in stepped terraces, a process known as benching. Delayed by inclement weather, as well as proposed re-designs, this segment of the highway was not completed until December 1953.

The second increment of the highway to be built was a one mile segment of the four lane highway from Reservoir No. 4 through the Forest Reserve up to where a proposed tunnel would go through the mountain under the Pali Lookout. In March 1954, J. M. Tanaka, under a $600,000 contract, commenced construction on this fairly straight-forward segment and completed construction in April 1955.

Several months after J.M. Tanaka completed Nuuanu Valley's *mauka*-most segment of the Pali Highway, the THD, on June 22, 1955, awarded the company a second contract, for $1,979,059.90 to construct two tunnels, measuring twenty two feet high and twenty nine feet wide, with one running 1,000 feet in length under the Pali Lookout and the other being a 500 foot bore through a ridge further toward Kailua. In addition the contract included a bridge to connect the two tunnels. These two tunnels were the first of four to be built and were intended to carry town bound traffic up the Pali and into Nuuanu, thereby alleviating as quickly as possible the steep grade for uphill travelers. The contract was the largest, up to that time, ever awarded by the THD.

Planning for the tunnels had commenced several years prior, as in March 1953 the Territorial DPW awarded a $21,900 contract to Samson & Smock to undertake substrata testing between the hairpin turn and Reservoir No. 4 to determine the nature of the soil and rock through which the new highway had to go. Using a water-cooled, diamond bit the firm drilled thirty three holes to gather sufficient materials for analysis, with most of the cores being on the windward portion of the route.

Approximately twenty months after a cave-in had claimed the lives of five men working on excavating the future Likelike Highway's Wilson Tunnel, J.M. Tanaka started work on the Pali Tunnel project on August 1, 1955. In light of the earlier tragedy, contractors bidding on the project had to complete a twelve-page questionnaire to indicate their competency to do the job safely and well.

First an access road to the Kailua side portal of the smaller tunnel had to be cleared and graded. This portal was chosen as the place to begin excavations as the only practical dumping area for excavated materials was on this side. Work on the tunnels was further complicated by a ban on having primed explosives transported to the site via the Pali Road. As a result the dynamite was hauled up the face of the mountain via an overhead conveyor from

the valley below. Blasting started on the 500-foot Pali tunnel on October 26, 1955. The tunnels were designed by Anatol Eremin, a civil engineer who worked for the California State Department of Public Works. He authored *Highway and Railroad Bridges with Simple Continuous Spans* (1956), and following the completion of the Pali tunnels, *Tunnels, Underground Structures and Air raid Shelters* (1958). In addition, a number of engineers monitored the tunnel and its progress. Bung Y. Hee was the contractor's engineer, and Charles Peterson was the contractor's tunnel superintendent. Erwin F. Morrison was the Territory's chief tunnel engineer, and Charles Boerner served as a tunnel advisor. Boerner administered the structural engineering branch of the Navy Public Works office's Engineering Division and previously was the engineer in charge of the construction of the Navy's underground fuel storage facility in Red Hill.

Three crews worked around the clock, advancing approximately forty feet a day. Following a routine of detonating seventy five pound dynamite packs and then clearing the debris with shovels the workers breached the far side of this shorter tunnel on November 26, 1955. To build the tunnels, the "Top Heading" method was used. First two "drifts," smaller tunnels dug within the intended tunnel, were bored. These allowed the side walls of the tunnel to be built before the entire tunnel was dug out. Once both the drifts breached the far side of the tunnel, concrete footings were poured, which formed the bases for the tunnels barrel vaulted, steel arched ceiling. Working from an elevated platform mounted on a truck, the workers next cut out the top portion of the tunnel and installed supports before finally removing the central core of the tunnel. In the 1,000 foot long tunnel, workers were confronted with solid rock for the first 550 feet, before hitting softer dirt as they neared the leeward portal.

On May 22, 1956 workers digging from both sides of the longer tunnel, shook hands after shoveling through the last few feet of dirt and rock. Work on the two tunnels, except for the asphalt paving of their roadways was completed by December 13, 1956. Work then commenced on the second set of tunnels, with break through occurring on June 18, 1958. The second set of tunnels was opened to traffic on December 30, 1960. With their opening, the segment of the old road from the Pali Lookout down to the Hairpin Turn was closed off and permanently abandoned, as two ridges on which it sat were cut away.

While J. M. Tanaka was busy at work on the tunnels, a $323,688 contract was awarded to Oahu Construction Company on March 1955 to build the segment of the Pali Highway between Country Club Road to Carter's Corner, a distance of approximately a half mile. This work essentially widened the present road from two to four lanes divided by a median strip. This rather straight-forward segment was completed on May 14, 1956. Another contract for the highway segment from Country Club Road down to Laimi was let to J. M. Tanaka and was completed by July 25, 1957, and the segment between Laimi and Coelho Lane went out to bid at that time.

At the end of 1955, J. M. Tanaka, who already held the $1,979,059 contract for the tunnel section, was the low bidder, at $677,415.80, for the half mile, two lane segment of the new highway from the hairpin turn to the entry of the smaller tunnel. This segment included the excavating of over 30,000 cubic yards of material with several small ridges blasted and bulldozed. In addition, a series of five bridges, supported by poured in place, reinforced concrete piers, some as high as 77 feet, were constructed to bring motorists up to the tunnel entrances. To pour the concrete, mixers had to stop on the existing Pali Road, and from this vantage point pump the concrete down to fill the waiting forms. Looking up from the Pali Golf Course, Gordon Morse declared, "the series of bridges curving up the side of the sheer Pali look like something out of Walt Disney's Fairyland."[81] Making the scene more impressive was his knowing that every three feet of roadway carried by the bridges weighed two tons.

[81] "Need for Pali Tunnel Cited Here Century Ago," *Honolulu Advertiser* (Honolulu, HI), December 2, 1956.

With the completion of the bridges, the windward side of the Pali Highway opened on May 11, 1957 and was declared an "engineering masterpiece" by the newspaper because the new route involved only two sweeping curves instead of the series of former turns.[82] The newspapers noted that motorists would be surprised to not have to shift into second to climb the grade, and they would feel like they were "traveling a flat, straight city boulevard but with scenery and without congestion."[83]

Honolulu bound traffic cruised up the mountain, through the tunnels and into Nuuanu valley before bottle necking at Reservoir No. 4. Windward bound traffic drove up Nuuanu valley over segments of two and four lane road to the base of the Pali Lookout where drivers ascended up to the lookout and then down the old road until it intersected the new near the horseshoe turn.

With the first pair of tunnels open and the second under construction, the THD turned its attention to the segment of the new highway which ran from Country Club Road to Reservoir No. 4. Work had been long delayed on this segment as the Territory became embroiled in a contentious legal battle with Lester and Elizabeth Marks over the condemnation of 2.2 acres of their 17 acre estate. The case began in 1949 when the Territory filed a suit in Circuit Court to condemn the property with a condemnation price of $12,000. The case made its way to the Territorial Supreme Court, was remanded to the lower courts and again made its way to the Territorial Supreme Court. While the case still simmered in court, with both sides intimating they intended to go beyond the Territorial Supreme Court, windward drivers agitated for the construction of the new segment as it bypassed a section of their daily commute now known as Nuuanu Pali Drive, which included Morgan's Corner, a dangerous bend in the road. Between December 1949 and June 1955, 187 accidents occurred on this two mile stretch of road, with 66 injuries and two deaths that both occurred at Morgan's Corner.

Consequently, the Territorial Attorney General authorized the Territorial DPW to negotiate with Marks for the entire seventeen acre parcel. Finally in December 1956 an agreement was reached where Marks retained ten acres on the west side of the proposed highway, while the Territory purchased the other seven acres, including the Marks' residence for $624,750. The settlement opened the way for the awarding of a $1,370,014 contract to James W. Glover for the important segment between Country Club Road and Reservoir No. 4. This two-mile stretch of highway included 4,000 feet of two-level road, as Kailua-bound motorists traveled about thirty feet below the parallel Honolulu-bound lanes. A relatively new design concept for Hawaii, it served two purposes: economy by reducing the amount of excavating on the upslope side of the valley, which alleviated the need for benching to reduce the chance of landslides. The Highway Department also pointed out the advantage of this design to reduce driver fatigue by not having to face on-coming headlights. This two-level highway concept previously had been used on Kamehameha Highway between Kipapa and Wheeler Field, which was completed in 1950.

To handle the wet environment of this part of the valley, this new section of the Pali Highway included eight foot wide drainage gutters of each side of the highway, and required the construction of thirteen box culverts under the highway to permit the water rushing off the Nuuanu cliffs to go its normal way into run-off gullies. In addition, twenty catch basins were built. The largest box culvert was twelve feet by ten feet and drained 240 acres Ewa of the highway. This segment of the highway was completed on March 31, 1959. Two months later, on May 11, 1959, the Kailua-bound tunnels were opened to travelers.

[82] "New Road Opens A New World," *Honolulu Advertiser* (Honolulu, HI), May 11, 1957.
[83] "Straightening the Hair Pin," *Honolulu Advertiser* (Honolulu, HI), August 2, 1953.

The final stretch of the Pali Highway to be completed was the segment which connected it to the downtown area between Coelho Lane and the intersection of Bishop Street and Beretania Street. Planning for this segment had begun as early as 1953, and at that time Nuuanu Avenue was slated to become a one way street into Honolulu. Bishop would be extended to connect with Fort Street at Kukui Street, and Fort would become one way in a *mauka* direction up to Wylie. This preliminary proposal for the Pali Highway's downtown connection underwent revisions, and when presented to the City and County Planning Commission in 1955 for inclusion in the City & County's master plan, it was adopted. In the final proposal Nuuanu Avenue was no longer to be widened as a connector, and instead Fort Street was expanded into a four lane roadway. Bishop Street became one way moving in a *makai* direction, while Alakea Street was made one way heading *mauka*. Fort Street merged with a new highway segment above the Honpa Hongwanji.

The Honpa Hongwanji, whose property was bisected by the proposed new segment, requested three of its buildings be relocated and a pedestrian underpass be constructed under the new highway to connect the temple with its school premises. The new segment ran close to the lower slope of Pacific Heights and crossed Nuuanu Stream via a bridge just above Kapena Falls. The project also included over- or under-passes at Wyllie, Pauoa, and School streets, as well as a cloverleaf to allow Nuuanu Avenue traffic to access the new highway just above Wyllie Street. Moses Akiona received the contract for the segment of the highway between Kuakini Street and Wyllie Street and commenced construction.

In addition, a contract was awarded to Hawaiian Dredging & Construction on April 2, 1959 for $3,034,000. This included the section of the Pali from Kuakini to Bishop and Beretania streets and also included the Lunalilo Freeway between Nuuanu Stream and Pele Street. At the time of its issuance this was the largest contract ever let by the THD. This segment included the Islands' first three level grade separation, designed by Law & Wilson, to link the Pali with downtown and the Lunalilo Freeway. The Lunalilo Freeway was to carry the bottom level of traffic, while the top level was an off ramp from the Honolulu-bound lanes of the Pali Highway to the Kaimuki-bound lanes of the Lunalilo Freeway, with the Pali Highway in the middle. It was estimated the new alignment into downtown would save the Territory over two million dollars in rights-of-way expenses when compared with the initial proposal to expand Nuuanu Avenue to Coelho Way.

With the completion of these final links, the Pali Highway officially opened on August 1, 1961. Running from the Kaneohe Ranch Office to Bishop and Beretania, the 7.9 mile highway allowed speeds up to 45 miles per hour, more than double the speed on the old road. The new, twenty-two-million-dollar thoroughfare reduced the travel time between Kailua and Honolulu to approximately 15 minutes, as compared to the 45-minute trip on the former road during the day and up to 90-minute commute during morning or evening rush hours. When completed, the new highway was designed to carry 25,000 vehicles a day.

Following the opening of the new highway, several safety features made their first appearance in Hawaii on the Pali Highway. In December 1962, a drapery of chain link fencing, designed by State Highways Division engineer Herbert Tateishi, was hung above the Pali Highway on the cliff immediately below Wyllie Street to prevent falling boulders and debris from bouncing onto the highway. The fencing hung from a 110-foot-long, six-inch diameter pipe secured to the top of the cliff. Although used before on the mainland, this was the first time it was employed in Hawaii. Another Hawaii first transpired in December 1966, when Jersey Barriers were installed by the Royal Contracting Company along the horseshoe turn on the Pali Highway's windward side. Poured in place along the medial strip, the two and half foot high barriers had curved sides to deflect wayward cars back into traffic.

IMPACTS OF THE HIGHWAY

While the new highway had a direct and positive impact on the commute time between the windward side and downtown Honolulu, it also had many indirect impacts. A *Star-Bulletin* article from as early as 1954, foresaw the ramifications the proposed Pali Highway would have on the development of the windward side of Oahu, especially Kailua and Kaneohe. The article observed, "Modern roads spur suburban living because they convert commuting from drudgery into a relaxing interlude," and went on to foresee the highway bringing to Honolulu's doorsteps suburbs a mountain range away.[84] With the opening of the first two tunnels, the newspaper referred to the two tunnels as the "Gateway to Tomorrow".[85] It noted that, as "impressive and welcome as this project is, it's still only a chapter in the impressive story of Windward Oahu's development," and went on to predict, "IT'S ONLY THE BEGINNING!"[86]

Indeed, it was only the beginning. Knowing the two new highways were forthcoming, Kaneohe Ranch, which already had Aikahi Hillside under construction in 1957, began planning a 450 house subdivision known as Kalaheo Hillside, 500 houses in Kapunahala, and 2,000 dwellings in the 750 acre Luluku subdivision. Another 700 houses were slated to go up near the intersection of the new Waimanalo Road and recently completed Kailua Road, the first major development between Kailua town and the base of the Pali. In addition, Bishop Estate commenced planning a large subdivision on its lands in the Haiku area and the Hawaiian Home Lands Commission started to open up lands in Waimanalo for residential use. It was anticipated that by 1967 over 10,000 new homesites would be erected on Kaneohe Ranch lands, which was very conceivable considering that during the four years between 1953 and 1957, the company sold a house a day.

To accommodate the anticipated population growth, the Department of Public Instruction commenced construction of a new Kailua High School in 1957, and planned to convert the existing high school into an intermediate school. The Kaneohe Elementary School opened in 1956. The department also programmed for three new elementary schools in Kailua, and King Intermediate School and Haiku Elementary School in Kaneohe. Also, district parks were constructed in both Kailua and Kaneohe, as well as a number of small neighborhood playgrounds such as at Kaelepulu and Kalaheo. The Board of Public Parks and Recreation also opened the 225 acre Pali Golf Course in 1956, which was designed by Willard Wilkinson. Harold Castle donated half the land for the course, as he desired to preserve the verdant character of the windward side from the Pali Lookout and upon descending from the new highway.

Also, newer, better roadways were constructed to service the two trans-Koolau highways. The Kamehameha Highway between the Pali intersection and Kaneohe Bay Drive, a distance of 2.4 miles, was widened to four lanes, with work starting in 1957. Also a new three-mile road between Waimanalo and the Pali Highway intersection, now defined by Castle Hospital, was constructed, while the City & County handled construction of the Kahekili Highway.

Other developments that emerged with the Pali and Likelike nearing completion included the seventy-acre Hawaiian Memorial Park and the forty-bed Castle Memorial Hospital, operated by the Seventh Day Adventist Church. Also, the Windward City Shopping Center at the intersection of the Likelike and Kamehameha Highways joined the already-operating Kailua Shopping Center, which was completed in mid-1954. The latter underwent a

[84] "Breaking the Bottlenecks," *Honolulu Star-Bulletin* (Honolulu, HI), January 30, 1954.
[85] "$100 Million in Housing is Foreseen," *Honolulu Star-Bulletin* (Honolulu, HI), May 10, 1957.
[86] Ibid.

dramatic expansion in 1957, including a Times Supermarket. Foodland had opened in Kailua in its own building in 1953.

Thus, the highway not only made the commute from the windward side of Oahu to Honolulu more appealing to the existing motorists, but it also convinced others that the distance from town was not a detriment to living in the country.

VII. THE FEDERAL AID HIGHWAY SYSTEM AND INTERSTATE HIGHWAY SYSTEM ON OAHU: 1911 TO 1953

HISTORICAL BACKGROUND

Federal Aid in the construction of a system of State and National highways was made available to all the States in the continental United States in 1916. The Federal Aid Highway Act was developed in the 1930s due to building pressure for the construction of transcontinental superhighways. A feasibility study of a six route toll network in 1938 showed insufficient transcontinental traffic to support a network of toll superhighways. *A Master Plan for Free Highway Development* also recommended in this study a 43,000-kilometer non-toll interregional highway network. On April 14, 1941, a National Interregional Highway Committee was appointed by the president FDR to investigate the need for a limited system of national highways. In 1943, a report, *Interregional Highways*, recommended an interregional highway system of 63,000 km, designed to accommodate traffic 20 years from the date of construction.

Disagreements in the highway community resulted in an inability to agree on the major changes needed in the post-war era to address accumulated highway needs during the beginning of the Federal Aid Highway Act of 1944. The Public Roads Administration (PRA), as the BPR was now called, began to work with state and local officials and the American Association of State Highway Officials (AASHO) to develop interstate plans and design standards for the interstate system, which were approved in 1945 that address conditions such as traffic, populations density, topography, and other factors.

Even though the PRA announced the designation of the first 60,640 km of interstate highway in 1947, construction of the interstate system moved slowly. Many States did not wish to divert Federal Aid funds from local needs. Others complained that the standards were too high. By July 1950, the United States was again at war in Korea and the focus of the highway program shifted from the civilian to military needs. In 1953, the States had completed 10,327 km of system improvements at a cost of $955 million. Only 24 percent of interstate roadway was adequate for present traffic, which was still far from meeting the traffic expectations for 20 years in the future.

At the end of the Korean War, the Nation's highway problems again gained attention. With support from President Dwight D. Eisenhower, the financial funding problem for the interstate highway system was resolved among the federal, state and local governments by the passing of both the Federal Highway Act of 1956 and the Highway Revenue Act of 1956. The former called for uniform interstate design standards to accommodate traffic forecasted for 1975 (modified in later legislation to traffic forecasted in 20 years), and the latter provided increased tax and matching federal funds. BPR worked with AASHO to develop minimum standards that would ensure uniformity of design, full control of access, and elimination of highway and railroad-highway grade crossings. These acts resolved several more controversial issues: $1.1 billion was distributed to the various States for the first year of "the greatest public works program in the history of the world."[87] Bertram D. Tallmy was chosen as the head of BPR, with the newly authorized title "Federal Highway Administrator" to manage the program in 1957, so construction of the interstate system was under way. The next 40 years would be filled with unexpected engineering challenges, unanticipated controversies, and unforeseen funding difficulties. Nevertheless, the president's view would prove correct. The interstate system, and the Federal-State partnership that built it, changed the face of America.

[87] "US Prods Hawaii to Speed Road, Highway Work," *Honolulu Advertiser* (Honolulu, HI), November 14, 1949.

ROAD CONSTRUCTION

Road construction, as a means of communication around the Hawaiian Islands, can be traced back to the early kings and chiefs of the islands. It was said that there was a road around Maui which was about 138 miles long and from 3 to 5 feet wide. Most parts of this road were paved with hard beach stones passed from hand to hand by men. Stones were laid crosswise from the support, not in a solid surface but in an arrangement like the squares of a checker board. It is interesting to note that in 1890, under the monarchy, a group of prominent citizens went so far as to volunteer the advancement of amounts necessary to keep a particular highway project going, charging no interest, and trusting the legislature to vote an appropriation.

The catalyst for the great increase in road building in Hawaii after 1920 had its origin in 1924 when the provisions of the Federal Highways Act were extended to the Territory (now the State) of Hawaii by an act of congress in 1924. Since 1926, when the present Federal Aid program was launched in Hawaii, the THD had completed 518.91 miles of highways on the islands of Oahu, Hawaii, Maui, Molokai and Kauai and had maintained these sections. A Federal Aid Highway System upon which projects could be initiated to receive Federal Aid was laid out, consisting of a total length of allowable new construction of 213 miles, of which 118 miles were located on Oahu.

In 1931 and 1932, Congress made emergency appropriations, which resulted in allotments totaling one million dollars to the Territory. This money was to be used to relieve the unemployment situation with construction jobs and used in lieu of funds which states typically provided as their portion of the cost of Federal Aid projects. It created an $880,000 Hawaii Special Fund to take the Federal Aid System within the Territory in 1931. This system was selected by the Governor of Hawaii, and agreed upon by the Secretary of Agriculture, on November 18th 1931, and allowed for the construction of new roads totaling 532 miles in length.

Hawaii had accelerated the speed of other highway constructions since the 1940s with the increasing traffic problem and the national defense need. Highway construction in Hawaii experienced a slow start at the end of the World War II because of material and special engineers' shortages and high costs. President Truman pointed out, "By any reasonable standard, our highways are inadequate for today's demands. Future demands will inevitably be greater as business traffic continues to expand, as our population grows, and as we build roads to reach needed resources now relatively inaccessible."[88] The highway expansion and improvement program was proposed during the late 1940s for the reconstruction, rehabilitation and extension of highways, which would not only provide increased road safety and economic use for motor vehicles, but also ensure the adequacy of roads to serve in time of peace or war.

During the 1950s and 1960s there was a shortage of highways in Hawaii due to the increasing use of motor vehicles and the expanding tourism industry of the islands. Between 1950 and 1958 there was a 36 percent increase in motor-fuel consumption in the State of Hawaii. This average of 4 percent a year was almost the same as the continental increase. The total road mileage in the State of Hawaii had already reached 3,137 miles by January 1958. The island of Hawaii had the most highway mileage of any of the islands and it is also the largest. Most of the mileage of city streets was found on the island of Oahu and in the city of Honolulu. The annual travel on all roads and streets in Hawaii was estimated to be 1,707 million vehicle-miles during 1950-1958. This is based primarily on registration and motor-fuel consumption data. This would amount to an average daily traffic of about 1,530 vehicles on all roads and streets in Hawaii. This compared with similar volumes at the time recorded on all roads and streets of 1,570 vehicles in Connecticut, 1,200 in Delaware, 2,030 in Rhode Island, and an average of 523 for the entire United States.

[88] Ibid.

VIII. MILITARY CONTRIBUTION TO ROAD AND HIGHWAY CONSTRUCTION IN HAWAII: 1959 TO 1970s

HISTORICAL BACKGROUND

Defense activity played a minor role in the Hawaii during the first thirty-five years of Territorial status (1900-1935). Hawaii became a Territory of the United States in 1898, when the world was at peace. Only a "token defense force" was considered necessary in Hawaii at that time. World War I was centered in Europe and also had little effect on military population in Hawaii.

In 1931, a political shift in Japan from a relatively liberal to a militaristic government was followed by a rapid build-up of Japanese forces. Concerns about the intentions of Japan caused a gradual increase in military forces allocated to Hawaii. After Japan's attack on China in July 1937, American defense activity in the Pacific rose sharply, with Hawaii as a focal point. During the prewar defense program of 1939-1941, federal expenditures in Hawaii steadily rose. By 1941, the military establishment had become the largest employer of civilian workers in the Territory. Armed forces were concentrated in the island of Oahu with major installations at Pearl Harbor, Barber's Point, Schofield Barracks, and Kaneohe. Following the December 7, 1941 attack on Pearl Harbor, the military government regulated activity throughout Hawaii.

With the commencement of World War II, all construction, including highway construction, was restricted to only that which would materially aid National Defense as stated in General Administration Memo No. 148 from the Washington Office of the Public Roads Administration. The military authorities approved all Federal Aid highways constructed by the THD as strategic. In some cases they insisted that roads be built which were of doubtful value to the civilian population but of great value to the Army, such as the Kunia Road from Schofield to Waipahu.

During the War years (1941-1945), defense activities totally dominated the economic life of the islands and profoundly affected social and political life. Tourists and many unemployed residents were evacuated from the islands. Total employment rates rose sharply, with a large percentage of islanders entering the work force for patriotic reasons. War stimulated trade, construction, and income throughout Hawaii due to the extraordinary increase in defense construction and purchases and demands of servicemen on the islands. Military activity in the Territory remained at high levels until the end of 1946 because of Hawaii's role in demobilization and in the disposal of war surpluses.

During this period, many men who formerly worked for the road department changed their positions in working for the army on vital defense projects. Meanwhile, most federal road aid funds went to the War Department for use on roads of military value in Hawaii. All requests for road construction in Hawaii, except those initiated by the Navy, had to be approved by the Commanding General, Army Forces Middle Pacific (previously Pacific Ocean Areas, Central Pacific Area, and Hawaiian Department) before construction was approved and funds allocated for the work by the Federal Works Agency.

The period 1947-50 was one of repeated cutbacks. The defense expenditures in Hawaii declined from $224 million in 1946 to $148 million in 1950. The war that started in South Korea on June 25, 1950, had immediate repercussions in Hawaii. 1950 began with a depression and unemployment crisis, and ended with a rapid rise in income and employment which ushered in the boom years of 1951-1952. The Hawaii military establishments for the national defense system were increased due to the Korean War. A total of $1,785,500 was spent in the islands' military construction projects in 1950. In 1951 another $20 million was given to Territory of Hawaii Military. In the early 1950s, the Army decided that a cross-island road was imperative to the defense of Hawaii.

Even after the cessation of military activities in Korea, defense activity in Hawaii continued to rise because of rising tensions in the Pacific area. Delegate Farrington's weekly "Report To The People" from Washington declared that "recent events have shown that Hawaii is the proper place to build permanent military strength in the Pacific;" "The life of Hawaii needs to be closely integrated with that of States, in every way, politically as well as economically and culturally. This will all add to our military strength. And this is what the country needs today—and quickly."[89]

For defense in the Pacific, the military establishment maintained in Hawaii a vast system of facilities, service bases and command posts. Defense expenditures increased from $148 million in 1950 to $271 million in 1953. In 1954, Gen. Mark W. Clark urged to create a Pacific defense organization to help maintain those free countries in the Pacific independence against Communist encroachment. As part of President Eisenhower's military "new look" in Asia, Hawaii was headed for an even bigger role in the Pacific defense program. By 1955, defense continued to be the largest source of island income and the greatest employer of Hawaiian manpower. These defense activities had a direct impact on the road and highway construction activities of the islands.

The National System of Interstate and Defense Highways was designated by the Federal Aid Highway Act in 1944 to primarily serve national defense. The act originally included only the continental United States. States received Federal Aid for highway construction if the projects were regarded as vital to national defense. Hawaii was not eligible for this aid and the convention of the Western Association of State Highway officials refused to pass a resolution that Hawaii be included in the interstate highway system, even though the War Department designated all of Oahu's principal highways as "Strategic" in 1941.[90] The Pacific military command promised support to help pass a resolution. The Defense Department also thought that including Hawaii in the system would greatly influence public perception of the National Defense System.

In 1959, Congress authorized Hawaii's admission to Statehood and plans were underway to remove the 48-State limitation on the Interstate system. This system was extended to the State of Hawaii on July 12, 1960 with the passage of Hawaii Omnibus Bill, Public Law 86-624. The Act provided Hawaii with an initial apportionment of Federal Interstate Highway fund for the 1961-62 fiscal years in the amount of $12,375,000. It also provided that subsequent apportionments to Hawaii be based on estimated cost of completing the system in Hawaii as compared to the estimated cost of completing the system in all States.

Responding to urgent national defense needs in the 1960s, the Territory of Hawaii accumulated highway deficiencies of $50,000,000 which was ten times the annual construction budget. Highways were being developed at a faster rate than the THD could meet. Seeking additional federal aid was seen as a way to reduce time and money loss, and the destruction of lives and property as a result of inadequate roads and streets. John C. Myatt, the first deputy Territorial Highway Engineer said, "If Hawaii were admitted into the interstate system, $1,100,000 on annually would be available for 'strategic highway' construction on a 60 federal - 40 local matching basis, increasing the Territory's highway construction funds by $1,800,000 a year… It would also put us in line to share in President Eisenhower's proposed 50 billion dollar defense highway construction program, if Congress makes it into law."[91]

[89] "Effect of Korean War: Farrington Sees Build-up Here of Defenses for the Pacific," *Honolulu Star-Bulletin* (Honolulu, HI) August 4, 1950.
[90] D.F. Balch, *Comparative Report: Nuuanu Valley Tunnel Route vs. Kalihi Valley Tunnel Route*, April 5, 1943.
[91] "Military Backing May get Federal Aid for T. H. Roads," *Honolulu Advertiser* (Honolulu, HI), October 23, 1954.

Compared to the large, flexible construction industry on the mainland, the construction field in Hawaii is small and less varied. In addition, Hawaii is also isolated from the mainland and is subdivided by islands. For these reasons, the impact of defense and military establishment on the road construction in Hawaii over the past several decades has been more vital and direct than on any other activity in the Territory.

The Corps of Engineers, in the United States Army, under assignment by Congress, is charged with the public civil works program to control, regulate and improve river and harbor resources and to plan and construct flood control works. In addition to civil projects, the Corps is also engaged in extensive construction programs for the United States Army and Air Force. When local interests are unable to resolve a situation, local authorities can petition their representatives in Congress for assistance. If the representatives consider the petition favorably, they can direct the Corps of Engineers to investigate the feasibility and economics of correcting the situation.

Before the Corps of Engineers became involved in the development of the defense activities in the Hawaiian Islands, the Honolulu Engineer District had been in operation for approximately 45 years. While some minor improvement work and surveys were accomplished under the direction of Corps of Engineers as early as 1899 in connection with the improvement of Pearl Harbor, the District office was set up in Honolulu on 14 April 1905 under the direction of Lieutenant John R. Slattery.

District Engineers executed fortification and other military works under the direction of military commanders as prescribed in army regulations or other War Department instructions. On July 1, 1940, the hostilities with Japan became one of great activities for the Honolulu Engineer District in the initiation of and planning of vast and ever expanding preparations for an emergency. During this period, the construction activities of the Quartermaster Corps were transferred to the Corps of Engineers. In 1942, all engineer troops and military engineering came under the jurisdiction of the Department Engineer. On March 16, 1942, the Commanding General, Hawaiian Department, was granted "complete jurisdiction over, and responsibility for military construction activities in the Hawaiian Department, including administration of existing construction contracts..."[92]

The United States Army constructed approximately 240 miles of roads in the Territory of Hawaii during WWII as well as helped the road maintenance and repair during wartime. Due to the labor and material shortages, these roads had not been properly maintained by the city and county. In addition to the army's heavy wartime traffic (these highways and streets were mainly used for military vehicles and heavy trucks engaged in transportation for the army or navy), the military and naval authorities provided financial assistance to cover the cost of road maintenance and reconstruction work to put the highways of the islands in good condition. Today many of these roads are available for civilian use and several have been turned over to the Territory. These highways were built to afford easy access to military reservations because the Army thought that a cross-island road was imperative to the defense of Hawaii in early 1942.

[92] US Army Corp of Engineers, *Water Resources Development by the Corps of Engineers in the Hawaiian Islands* (Honolulu, 1959), 4.

INTERSTATE ROUTE H-1

The H-1 is the primary and most congested freeway along the south shore of the island of Oahu. It was authorized as part of the Statehood Act of 1960 and is one of three Interstate and Defense Highways in Hawaii to be funded by the US Department of Transportation's Federal Highway Administration. The Interstate-Defense Highway System for Oahu was approved in principle as part of the Statehood Act consisting of the H-1, H-2 and H-3 freeways.

The first section of H-1 in the Mauka Arterial was opened in 1953 near University Avenue. In 1959 at Statehood, part of the Lunalilo Freeway was opened between Punahou Street and King Street. After 1960, it extended both west and east along the south shore till the completion of H-1 in 1986. In 1967, H-1 first appeared on maps, cosigned as Hawaii State Route 72.

BRIDGES IN THE HIGHWAY SYSTEM

From a functional standpoint, bridges are part of a seamless national highway surface transportation system. The highway engineering community uses several terms to describe what are commonly called "bridges," such as overpass, separation, and ramp. The bridges to highway miles vary greatly within the various states and are influenced by topography and population. Their boom in the 1950s and 1960s are all due to traffic relief efforts and a "Cold War" defense initiative to move troops and material rapidly across the country in the national interstate highway system that started in the 1950s.

During the late 1960s and early 1970s, a series of disastrous vehicular bridge collapses occurred, causing loss of life throughout the United States. The nation began to focus attention on the decaying state of the civil infrastructure in general, and on the nation's bridges in particular. In 1970 Congress established a special Federal Aid program to provide up to three-fourths of the funds needed to help meet state bridge renewal needs. The initial funds from the Special Bridge Replacement Program became available in late 1972. The Surface Transportation Act of 1978 extended and expanded the Special Bridge Replacement Program to what is now known as the Highway Bridge Replacement and Rehabilitation Program. At the time, $4.2 billion was appropriated from 1979 through to 1982 for bridge replacement and rehabilitation.

H-1, when initially conceived, was known as the *mauka* arterial. A tentative route was laid out by Honolulu's planning engineer, Charles Welsh in 1940-41, which was included in the City and County's first master plan of December 1944. The arterial was to take the form of a divided highway, "with all grade-crossings eliminated" and no left turns allowed. Also pedestrians were not permitted on the highway, thus eliminating the need for pedestrian crossings, and there would be no utility poles other than the tall standards supporting mercury vapor street lamps.

As laid out by Jack Myatt of the Territorial DPW, the proposed seven mile highway was to run between Middle Street and Old Waialae Road, and the entire project was expected to take fifteen to twenty years to complete. Grade separation structures (under- or over-passes, i.e. bridges) eliminated intersections and thus allowed traffic to flow unimpeded by traffic lights.

In August 1952, the Territorial DPW awarded the contract for the first phase of the highway, between Old Waialae Road and Isenberg Street to J. N. Tanaka, and in November 1953 awarded the company a second contract for the section of road between Isenberg and Alexander streets. The *mauka* arterial was the most expensive construction project up to that time in Hawaii, with costs running $2 million a year (forty percent of the Territory's budget for road construction), with about one third of the costs expended on land acquisition.

The three Ewa bound lanes of the first one mile segment of the *mauka* arterial opened on November 9, 1953. The new highway segment immediately reduced the previous morning rush hour congestion around King Street and University Avenue. The newspapers explained, "A major feature of the new arterial is an overpass spanning University Avenue,"[93] and labeled the overpass "an 'air lift' answer to one of the city's worst traffic snarls."[94] The University Avenue part of the expressway also included the Islands' first on and off ramps allowing Manoa motorists to enter or exit the arterial. The utilization of a bridge to traverse University Avenue was very much a novelty for the people of Oahu, as at the time the Puowaina Bridge was the only bridge on the island to span another road. In addition to the University Avenue bridge, this section of the new highway also included the Palolo-Manoa bridge, which was completed in August 1953. In addition, in July 1956 a pedestrian bridge was opened at Isenberg Street to allow pedestrians safe passage over the arterial, one of the earliest structures in the islands erected for this purpose.

The Kaimuki bound lanes between Old Waialae Road and Alexander Street did not open until January 5, 1954, as they needed to await the completion of an overpass which carried Old Waialae Road over a two lane ramp taking traffic from the arterial to King Street. In April 1955 the half mile second segment of the highway, between Alexander and Keeaumoku, was opened to traffic, five months ahead of schedule. This segment included a bridge to allow Punahou Street to pass over the expressway. In addition, the bridge carrying McCully Street over the new freeway was completed in July 1956, and in September 1960 the Keeaumoku Street Bridge was completed, in anticipation of the freeway's eventual extension towards downtown.

At the dedication of this segment of the highway Honolulu Chamber of Commerce President Gilbert W. Root recalled that earlier the community debated whether the *mauka* arterial was needed, but now it was plain that it was, and the only question which remained was "How fast can we finish the job?"[95] Progress on the new highway was bolstered in 1954, when an additional $700,000 in federal highway funds was appropriated for Hawaii in 1954, thanks to President Eisenhower's desire to expand America's highway system. To match the new federal dollars and to have funds to pay back highway bonds Hawaii's gasoline tax was raised from four cents to five, commencing July 1, 1955. Also in July 1955, the Territorial DPW renamed the *mauka* arterial as the Lunalilo Freeway, in honor of the former monarch, following the suggestion of LeRoy C. Bush, the president of Honolulu Construction & Draying Company. The advent of statehood in 1959 led to the expansion of the Lunalilo Freeway into the H-1 Interstate Highway.

Also, by 1958 planning began on the Ewa terminus of the Lunalilo Freeway. Here, the firms of Belt Collins & Associates and Moffatt, Nichol & Taylor proposed a "three-level grade separation structure"; in other words, a double overpass with Middle Street as the upper most deck and an exit leading to Kamehameha Highway from the middle deck, both of which would bridge the Lunalilo Freeway as it continued straight ahead to merge with Moanalua Road. In addition a ramp coming from Kamehameha Highway would tunnel under King Street to join the eastbound lanes of the freeway. In the following year, 1959, construction got underway on the interchange between the Lunalilo Freeway and the Pali Highway. Designed by Law & Wilson, this would become the first three level grade separation structure to be completed in Hawaii. The Middle Street separation was completed in 1964.

The section between Kalihi and Houghtailing streets, which commenced construction in December 1958, was completed in September 1960. The segment between Nuuanu Stream and Pele Street got underway in June 1959 and was finished in May 1962. In November 1960, ground was broken on the half mile between Middle Street and Pinkham Street, which was finished in April 1964. In late 1963 James W. Glover Ltd. was awarded the construction

[93] "Mayor Asks Chamber Ban Pali Route," *Honolulu Advertiser* (Honolulu, HI), November 3, 1953.
[94] *Honolulu Advertiser* (Honolulu, HI), June 26, 1955: A10.
[95] *Honolulu Advertiser* (Honolulu, HI), April 1, 1955: 1.

chapter 3

k a u a i

I. ISLAND OF KAUAI

Map of Kauai

(Map taken from Google map)

Kauai History

Kauai: The fourth largest island, Kauai (called the Garden Island) occupies an area of 552 square miles. Geologically, Kauai is the oldest of the major Hawaiian Islands. It has one central shield volcano which has eroded over millions of years into spectacular land forms. Kauai has fertile valleys, deep fissures, many caves, pinnacles, and waterfalls. Waimea Canyon and the Napali coast, with its awesome cliffs, are products of the rain that fall on Kawaikini (5,243 feet) and Waialeale (5,148 feet). Kauai's heavy rainfall, many streams, and extensive areas of lush vegetation create an image of a green, tropical "paradise."

Kauai's bridges are primarily distributed around the circumference of the island, spanning the streams along the wet north and east coastlines, as well as the gulches and chasms of the drier south and west shores. Many early bridges remain in the Hanalei area, a late nineteenth century center of population on the north shore of the island. Other early bridges were built at the mouths of rivers (at Wailua, Waimea and Hanapepe), also traditional population centers and foci of trade and transportation of goods. Generally the earliest roads and bridges were constructed as spurs from ports and harbors into the interior valleys, rather than circum-island. As with the other principal islands, the development of sugar plantations in the early twentieth century resulted in the construction of the belt road in the 1920s-30s.

II. BRIDGE MATRIX: KAUAI

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007000500301190	Aakukui Stream Bridge	Aakukui Stream	Kaumualii Highway	1948	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000560301489	Aliomanu Stream Bridge	Aliomanu Stream	Kuhio Highway	1960	Concrete Slab	Concrete Solid Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000560301359	Anahola Stream Bridge	Anahola Stream	Kuhio Highway	1960	Concrete Girder	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500300700	Bridge No. 7E	Unnamed Stream	Kaumualii Highway	1933	Concrete Slab	Metal Thrie Beam	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
007000500300135	Drainage Canal No. 1	Drainage Channel	Kaumualii Highway	1957	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500300178	Drainage Canal No. 2	Drainage Channel	Kaumualii Highway	1957	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500300535	Drainage Canal No. 3	Drainage Channel	Kaumualii Highway	1957	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500300570	Drainage Canal No. 4	Drainage Channel	Kaumualii Highway	1957	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500001694	Eleele Pedestrian Overpass	Kaumualii Highway	Pedestrian	1939	Steel Trestle	Metal Chain Link	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of a steel girder pedestrian bridge built in 1930's on Kauai • Only pre-World War II pedestrian overpass • Earliest known pedestrian overpass to be constructed in Hawaii	3 -17
007005600500123	Hanalei River Bridge	Hanalei River	Kuhio Highway	1912	Steel Truss	Metal Horizontal	Yes	High Preservation Value	• Contributes to the Kauai Belt Road (North Shore section) District • See National Register of Places Nomination Form in appendices	3 - 20
007000560400123	Hanamaulu Stream (Kapaia) Bridge	Hanamaulu Stream	Kuhio Highway	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete girder bridge	3 - 23
007005830500004	Hanamaulu Stream (Maalo Road) Bridge	Hanamaulu Stream	Maalo Road	1927	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete girder bridge	3 - 26
007000500301631	Hanapepe River Bridge	Hanapepe River	Kaumualii Highway	1938	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Significant for economic development • Excellent 20th century example of bridge engineering and construction • Example of Federal Aid bridges constructed by the Territory in the 1930s • Representative of the work of a master: William R. Bartels	3 - 29
007000500303031	Hoinakaunalehua Stream Bridge	Hoinakaunalehua Stream	Kaumualii Highway	1950	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
007000560302497	Kalihiwai River Bridge	Kalihiwai River	Kuhio Highway	1963	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Longest concrete span built post-war (1945) on the island of Kauai in the historic study period prior to 1969	3 - 32
007000560300985	Kapaa Stream Bridge (Kealia Bridge)	Kapaa Stream	Kuhio Highway	1953	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007056000400161	Kapaa Temporary Bypass Road - Kainahola Stream Bridge	Kainahola Stream	Temporary Kapaa By-pass Road	1937	Concrete Slab	Metal Thrie Beam	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Associated with Lihue Plantation • Good example of a 1930's reinforced concrete bridge • Bridge abutments are a potentially eligible historic resource	3- 35
007000500001419	Kaumakani Pedestrian Overpass	Kaumualii Highway	Pedestrian	1948	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Only post-World War II pedestrian overpasses on Kauai • Associated with early developments in concrete bridge construction in Hawaii • Good example of 1940's reinforced concrete pedestrian bridge	3 -38

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007000560302286	Kilauea Stream Bridge	Kilauea Stream	Kuhio Highway	1970	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1921 bridge in 1970.	n/a
007000500302249	Lawai Stream Bridge	Lawai Stream	Kaumualii Highway	1934	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the replacement of the railing on the downstream side and bridge widening in 2002.	n/a
007005600500593	Lumahai Stream Bridge	Lumahai Stream	Kuhio Highway	1968	Concrete Girder	Concrete and Metal	Yes	Non-Contributing	• Bridge is non-contributing feature of Kauai Belt Road (North Shore section) due to the complete replacement of the original 1905 bridge that fell in 1967 • See National Register of Places Nomination Form in appendices	3 - 41
007000500301157	Mahaikona Bridge	Kekupa Stream	Kaumualii Highway	1948	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500301258	Mahinauli Stream Bridge	Mahinauli Stream	Kaumualii Highway	1948	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500002033	Makaweli Flume Overpass	Kaumualii Highway	Waterway	1946	Concrete Girder	Concrete Solid	No	High Preservation Value	• Associated with sugar plantation industry • Good example of reinforced concrete flume that was constructed in the 1940's • Only known flume on Kauai	3 - 44
007000500301668	McBryde Plantation Road	McBryde Plantation Road	Kaumualii Highway	1939	Concrete Slab	Metal Thrie Beam	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
007000560400859	Moikeha Canal Bridge	Moikeha Canal	Kuhio Highway	1948	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000560301844	Moloaa Stream Bridge	Moloaa Stream	Kuhio Highway	1965	Concrete Girder	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000510400023	Nawiliwili Stream Bridge	Nawiliwili Stream	Rice Street	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	3 - 47
007000500403271	Nawiliwili Stream Bridge (Lihue Mill)	Nawiliwili Stream	Kaumualii Highway	1936	Steel Stringer	Metal Picket	No	Not Eligible	This bridge has lost integrity due to extreme alteration in 2013. It is also known as Lihue Mill Bridge.	n/a
007000501101343	Olokele Plantation Highway Overpass	Kaumualii Highway	Plantation Road	1948	Concrete Tee Beam	Metal Chain Link	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500302465	Omao Stream Bridge	Omao Stream	Kaumualii Highway	1934	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with the development of Kauai's Belt Road system • Good example of a 1930's reinforced concrete bridge • Example of Federal Aid bridges constructed by the Territory in the 1930s	3 - 50
007005800600062	Opaekaa Stream Bridge	Opaekaa Stream	Kuamoo Road	1936	Concrete Tee Beam	Concrete Open Arched	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Best example of a 1930's reinforced concrete girder bridge	3 - 53
007000560301581	Papaa Stream Bridge	Papaa Stream	Kuhio Highway	1957	Concrete Tee Beam	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007005830500334	Railroad Overpass	Maalo Road	Plantation Road	1946	Steel Stringer	Metal Chain Link	No	High Preservation Value	• Associated with sugar plantation industry and economic development • Uncommon use of steel material in Hawaii's extreme marine environment • Associated with the railroad, and specific federal funding of the U.S. Works Program Grade Crossing Program	3 - 56
007000560400727	Uhelekawawa Canal Bridge	Uhelekawawa Canal	Kuhio Highway	1963	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000560302485	Un-named Channel Structure No. 4	Unnamed Channel	Kuhio Highway	1963	Concrete Slab	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007000500302388	Un-named Stream (2-Cell Box Culvert)	Unnamed Stream	Kaumualii Highway	1933	Concrete Box Culvert	Metal Thrie Beam	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
007000500301595	Un-named Stream Bridge (5-Cell Culvert)	Unnamed Stream	Kaumualii Highway	1967	Concrete Box Culvert	Concrete Solid	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
007005400500077	Wahiawa Kai Stream Bridge	Waiawa Stream	Halewili Road	1974	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1950 bridge in 1974.	n/a
007000500301972	Wahiawa Stream Bridge	Wahiawa Stream	Kaumualii Highway	1936	Concrete Rigid Frame	Concrete Open Greek Cross	No	High Preservation Value	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant for innovative engineering and aesthetic merit • First reinforced concrete rigid-frame bridge constructed in the islands • One of only five of this type built prior to WWII • One of the most sophisticated of the pre-WWII bridges from an engineering perspective • Representative of the work of a master: William R. Bartels	3 - 59
007000560302024	Waiakalua Stream Bridge	Waiakalua Stream	Kuhio Highway	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007000500302613	Waihohonu Stream Bridge	Waihohonu Stream	Kaumualii Highway	1934	Concrete Slab	Concrete Open Arched	No	Eligible	• Associated with the development of Kauai's Belt Road system • Good example of a 1930's reinforced concrete bridge • Example of Federal Aid bridges constructed by the Territory in the 1930s	3 - 62
007000560400804	Waikaea Canal Bridge	Waikakea Canal	Kuhio Highway	1948	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
007005600500427	Waikoko Stream Bridge	Waikoko Stream	Kuhio Highway	1913	Concrete Girder	Masonry Rock	Yes	High Preservation Value	• Contributes to the Kauai Belt Road (North Shore section) District • See National Register of Places Nomination Form in appendices	3 - 65
007000560400572	Wailua River Bridge	Wailua River	Kuhio Highway	1945	Concrete Tee Beam	Concrete and Metal	No	High Preservation Value	• Earliest concrete bridge built post-war (1945) and best example of program comments bridges on the island of Kauai in the historic study period prior to 1969	3 - 67
007000560400573	Wailua River Plantation Bridge	Wailua River	Kuhio Highway	2012	Steel Truss	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1920 bridge in 2012.	n/a
007000500301039	Waimea River Bridge	Waimea River	Kaumualii Highway	1940	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Associated with sugar plantation industry • Significant for economic development • Excellent 20th century example of bridge engineering and construction • Longest extant pre-WW II bridge on Kauai • Representative of the work of a master: William R. Bartels	3 - 71
007005600500670	Wainiha River Bridge No. 2	Wainiha River	Kuhio Highway	2004	Steel Truss	Metal Thrie Beam	Yes	Non-Contributing	• Bridge is non-contributing feature of Kauai Belt Road (North Shore section) due to the complete replacement of the original 1931 bridge in 2004 • See National Register of Places Nomination Form in appendices	3 - 74
007005600500673	Wainiha River Bridge No. 3	Wainiha River	Kuhio Highway	2007	Steel Truss	Metal Thrie Beam	Yes	Non-Contributing	• Bridge is non-contributing feature of Kauai Belt Road (North Shore section) due to the complete replacement of the original 1931 bridge in 2007 • See National Register of Places Nomination Form in appendices	3 - 77
007005600500644	Wainiha Stream Bridge No. 1	Wainiha Stream	Kuhio Highway	2010	Steel Truss	Metal Thrie Beam	Yes	Non-Contributing	• Bridge is non-contributing feature of Kauai Belt Road (North Shore section) due to the complete replacement of the original 1922 bridge in 2010 • See National Register of Places Nomination Form in appendices	3 - 80
007005600500343	Waioli Stream Bridge	Waioli Stream	Kuhio Highway	1912	Concrete Girder	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Kauai Belt Road (North Shore section) District • See National Register of Places Nomination Form in appendices	3 - 83

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007005600500396	Waipa Stream Bridge	Waipa Stream	Kuhio Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Kauai Belt Road (North Shore section) District • See National Register of Places Nomination Form in appendices	3 - 86
007000500302671	Weoweopilau Stream Bridge	Weoweopilau Stream	Kaumualii Highway	1937	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Associated with the development of Kauai's Belt Road system • Good example of a 1930's reinforced concrete bridge • Example of Federal Aid bridges constructed by the Territory in the 1930s	3 - 89

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007190071119004	Hanapepe Bridge	Hanapepe River	Hanapepe Road	1911	Concrete Girder	Concrete Solid with Cap	No	High Preservation Value	• Excellent example of early 20th century reinforced concrete deck girder • Prominent product of early territorial government's public works program • Significant contribution to development of Kauai's transportation system and history of Hanapepe town • Associated with early developments in concrete bridge construction in early reinforced concrete deck girder technology • Representative of work of a master: Kauai County Engineer Joseph H. Moragne • Part of belt road plan and connected previously isolated communities with a paved highway and series of concrete bridges	3 - 93
007380021138001	Hoomana Overpass	Cane Haul Road	Hoomana Road	1928	Concrete Rigid Frame	Concrete Solid Panel	No	High Preservation Value	• Built by Lihue Plantation in 1928 to accommodate new railroad line from the fields to the mill • Contributed to economic success of Lihue Plantation and the town by shortening the distance to the mill and by eliminating a grade crossing in plantation's skilled worker housing area • One of the few remaining bridges that was originally built by private enterprise • One of two bridges remaining in Kauai that was originally built as a railroad crossing • Has paneled rail design typical of period	3 - 96
007440181144002	Kainahola Bridge	Kainahola Stream	Kainahola Road	1950	Steel Stringer	No Parapet/Railing	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of 1950s concrete and steel stringer bridge that is atypical of its period	3 - 99
007460021146001	Kapahi Bridge	Kapaa Stream	Kawaihau Road	1937	Steel Stringer	Wood	No	Eligible	• Was an important transportation link for residents of Kapaa Homestead lands • Associated with early developments in steel bridge construction in Hawaii • Uncommon use of steel material in Hawaii's extreme marine environment • Good example of 1930s steel bridge that is typical of its period	3 - 102
007510011151001	Kiaki Bridge	Waipake Stream	Koolau Road	1913	Concrete Tee Beam	Concrete Open Decorative	No	High Preservation Value	• Significant for contributions to development of Kauai's transportation system, early history of Kilauea town, and early developments of concrete bridge construction in Hawaii • Unique three-part railing design demonstrates builder's creative adaptation of academic plan to site conditions • Excellent example of new reinforced concrete bridge construction technology in early 20th century in Kauai	3 - 105
007520201152001	Kilauea Bridge	Kilauea Stream	Kolo Road	2008	Concrete Girder	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1913 bridge in 2008.	n/a
007340011134001	Kipu Bridge	Huleia Stream	Kipu Road	1914	Concrete Tee Beam	Concrete Solid with Cap	No	High Preservation Value	• Early development in concrete bridge construction in Hawaii • One of the earliest concrete bridges • Good example of 1910's reinforced concrete bridge • Typical of its period in use of materials, method of construction, craftsmanship, and design	3 - 108
007120061112001	Kokee Bridge	Waipa Stream	Kokee Road	1920	Concrete Slab	Metal Thrie Beam	No	Eligible	• Good example of 1920's reinforced concrete bridge • Typical of its period in use of materials, method of construction, craftsmanship, and design	3- 111
007270100828001	Koloa Road Bridge	Waikomo Stream	Koloa Road	1928	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Funded under the Territorial Loan Fund program • Construction of the bridge was a part of belt road system and eased traffic for Koloa Town • At the time of construction, the bridge was fifty feet wide and was the widest on Kauai	3 - 114

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
007230411123003	Lawai Bridge	Lawai Stream	Lauoho Road	1919	Closed Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Only concrete closed spandrel arch concrete on Kauai • Arch bridges are an uncommon bridge type • One of approximately five remaining in Hawaii (design is identical to bridges on the island of Hawaii: Mamalahoa-Puuokalepa and Mamalahoa-Waiaama, and the island of Oahu: Waipahu Street-Waikele Stream arch) • Significant contributions to the development of Kauai's transportation system and the early history of Lawai • Associated with 20th century developments in early reinforced concrete arch bridge construction • 1929 alteration by work of a master: Kauai County Engineer Joseph H. Moragne • A part of a series of concrete arch bridges that ushered in new era in bridge development after 1904 – previously bridges were constructed of timber, stone, or metal	3 - 117
007120061112002	Mana Bridge No. 1	Mana Stream	Kokee Road	1930	Concrete Slab	Concrete Open Horizontal	No	High Preservation Value	• Associated with early developments in concrete bridge construction • Good example of 1930's reinforced concrete bridge with post and beam • Artistic value for craftsmanship and design • Apparent wooden form work from poured in place concrete	3 - 120
007350011135001	Nawiliwili Bridge	Nawiliwili Stream	Paena Loop	1920	Concrete Girder	Concrete Solid Panel with Cap	No	High Preservation Value	• One of two remaining reinforced concrete deck girder bridges on Kauai and is the longest span of its type on the island • Also known as a Duke's bridge • Is a prominent product of County of Kauai's public works program • Significant contributions to development of island's transportation system and history of Nawiliwili Harbor • Representative of work of a master: Kauai County Engineer Joseph H. Moragne	3 - 123
007430200743001	Olohena Bridge No. 1	Olohena Stream	Olohena Road	2005	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1941 bridge in 2005.	n/a
007270011127001	Omao Road Bridge	Omao Stream	Omao Road	2004	Concrete Girder	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the compelte replacement of the original 1941 bridge in 2004.	n/a
007420151142001	Opaekaa Bridge	Opaekaa Stream	Opaekaa Road	1900	Steel Truss	No Parapet/Railing	Yes	High Preservation Value	• Bridge was placed in the current location in 1919 • See National Register of Historic Places Nomination Form in appendices	3 - 126
007520171152002	Puukumu Bridge	Puukumu Stream	Kalihiwai Road	1913	Concrete Tee Beam	Concrete Solid with Cap	No	High Preservation Value	• Early development in concrete bridge construction in Hawaii • One of the earliest concrete bridges • Good example of 1910's concrete tee beam bridge • Typical of its period in use of materials, method of construction, craftsmanship, and design	3 - 129
007440111144001	Puuopae Bridge	Kalama Stream	Puuopae Road	1915	Steel Stringer	Metal Thrie Beam	Yes	High Preservation Value	• See National Register of Historic Places Nomination Form in appendices	3 - 132
007280500728003	Wailana Bridge No. 2	Wailana Stream	Maluhia Road	1936	Concrete Tee Beam	Concrete Solid with Cap	No	Eligible	• Early development in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete girder bridge • Typical of its period in use of materials, method of construction, craftsmanship, and design	3 - 135
007280500728001	Wailana Bridge No. 4	Wailana Stream	Maluhia Road	1910	Concrete Slab	Concrete Solid with Cap	No	High Preservation Value	• Early development in concrete bridge construction in Hawaii • Good example of 1910's reinforced concrete slab bridge • Typical of its period in use of materials, method of construction, craftsmanship, and design	3 - 138

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

III. HISTORIC BRIDGE DISTRICT: KAUAI BELT ROAD

Kauai Belt Road (North Shore Section) Map

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/ Railings Types	State/County
007005600500123	Hanalei River Bridge	Hanalei River	Kuhio Highway	1912	Steel Truss	Metal Horizontal	State
007005600500593	Lumahai River Bridge	Lumahai Stream	Kuhio Highway	1968	Concrete Girder	Concrete and Metal	State
007005600500427	Waikoko Stream Bridge	Waikoko Stream	Kuhio Highway	1913	Concrete Girder	Masonry Rock	State
007005600500670	Wainiha River Bridge No. 2	Wainiha River	Kuhio Highway	2004	Steel Truss	Metal Thrie Beam	State
007005600500673	Wainiha River Bridge No. 3	Wainiha River	Kuhio Highway	2007	Steel Truss	Metal Thrie Beam	State
007005600500644	Wainiha Stream Bridge No. 1	Wainiha Stream	Kuhio Highway	2010	Steel Truss	Metal Thrie Beam	State
007005600500343	Waioli Stream Bridge	Waioli Stream	Kuhio Highway	1912	Concrete Girder	Concrete Solid with Cap	State
007005600500396	Waipa Stream Bridge	Waipa Stream	Kuhio Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	State

Kauai Historic Bridge District

The Kauai Belt Road (North Shore Section) Historic District is registered on the National Register of Historic Places. See Appendices for the nomination form.

Below bridges and culverts in this district are not included in this report, because they are not on the National Bridge Inventory (NBI).

- Culvert #1 (Located near Mile Marker 2.0) – Not on the National Bridge Inventory (NBI)
- Culvert #2 (Located near Mile Marker 2.4) – Not on the National Bridge Inventory (NBI)
- Culvert #3 (Located near Mile Marker 2.6) – Not on the National Bridge Inventory (NBI)
- Haena Bridge #1 – Does not qualify as a bridge ; under 20 feet
- Haena Bridge #2 – Does not qualify as a bridge ; under 20 feet
- Limahulu Culvert – Not on the National Bridge Inventory (NBI)

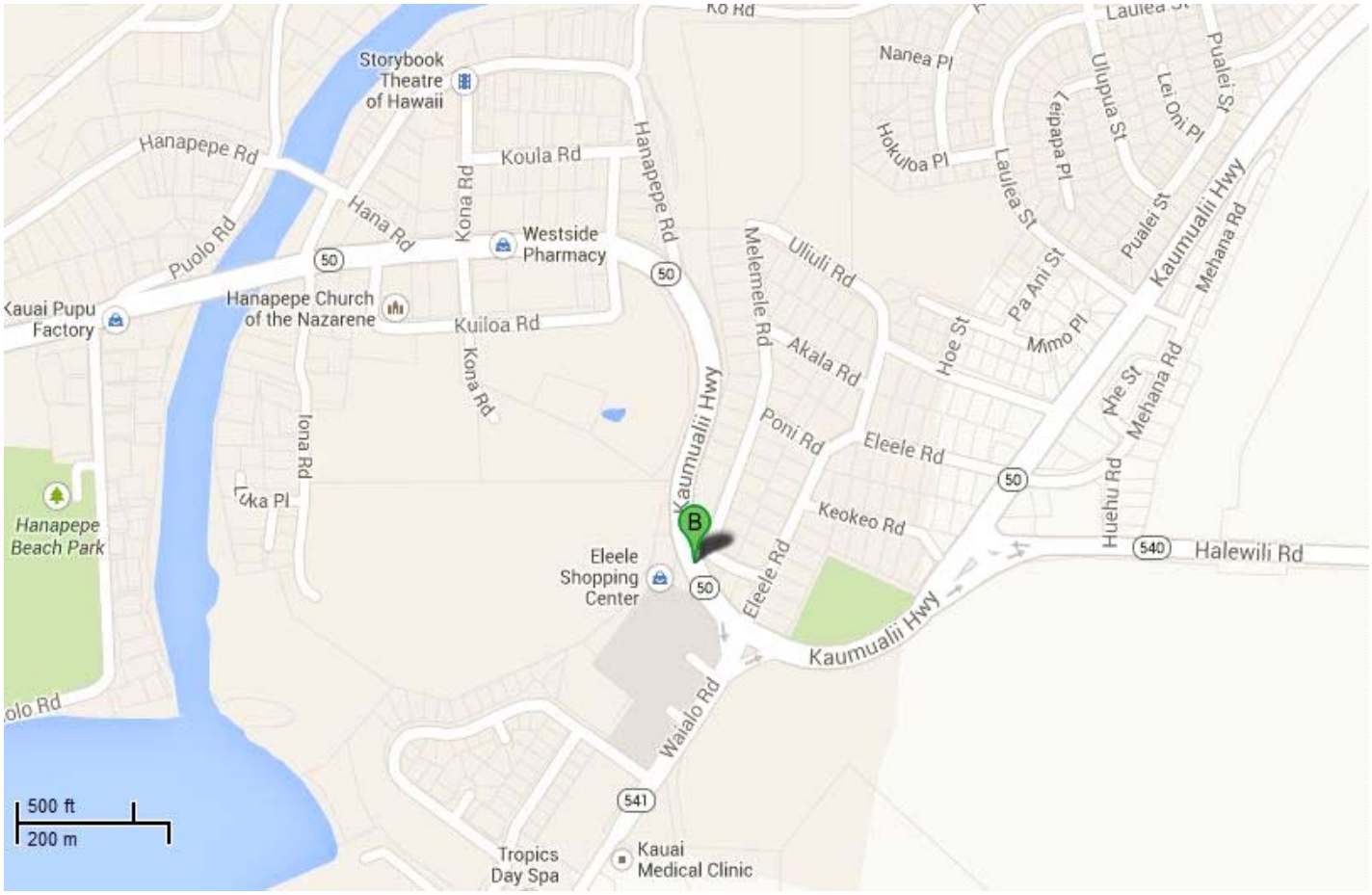
IV. INVENTORY FORMS: KAUAI STATE ELIGIBLE BRIDGES

Inventory Form
(State)

General Information

Bridge Number: 007000500001694 **Route No:** 50	
Popular Name: Eleele Pedestrian Overpass	
Feature Crossed: Kaumualii Highway	
Feature Carried: Pedestrian	
Milepost: 16.02 mi. **Island:** Kauai	
Longitude: 159d-35m-06.23s **Latitude:** 21d-54m-20.31s	
Location: 0.29 Miles Southeast of Puna Road	
Historic Name: Eleele Pedestrian Overpass	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Steel Trestle	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 44.0 ft.	**Total Length:** 69.9 ft.	**Deck Width:** 7.5 ft.
Superstructure: Steel Two-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck			
Parapets/Railings: Metal Chain Link			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Eleele Pedestrian Overpass is a steel girder pedestrian bridge that crosses over the two lane Kamualii Highway. The bridge is approximately 15 feet above the highway and approximately 70 feet long. It is supported by a pair of steel bents, each with four piers and cross bracing. It is supported by a pair of concrete bents, each with two piers. It has concrete abutments and steps at both ends and a 7.5 feet wide concrete deck. A pipe railing sheathed in chain link fencing traverses the length of the deck. The bridge retains its original setting that connects the Eleele Shopping Center and the residential area. The material remains intact and the workmanship of the bridge has not been obscured by additions or repairs. The bridge is highly visible from the highway.

Significance Statement:

This bridge is eligible under Criterion C for Engineering as a good example of the steel girder pedestrian bridge built ir 1930's on Kauai and for its distinctive structural type because very little steel is used for bridge construction in Hawaii. The use of steel was uncommon in Hawaii due to the extreme marine environment. It is a good example of a 1930's steel girder bridge atypical of its period in its use of materials and design. The bridge connects the shopping center and the residential area. The Eleele Pedestrian Overpass is the only pre-World War II pedestrian overpasses identified in this survey and it is the earliest known pedestrian overpass to be constructed on Kauai.

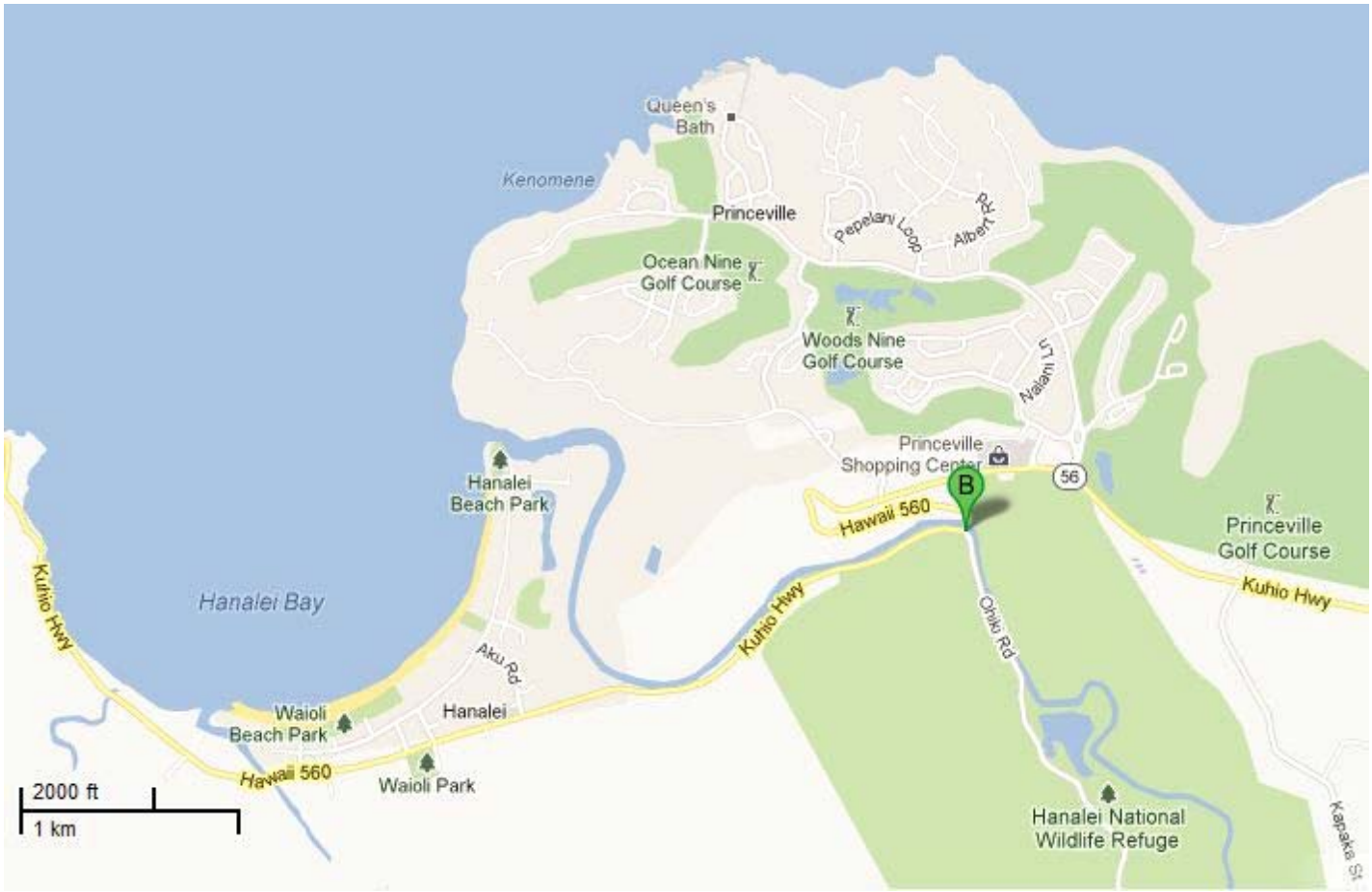
Inventory Form
(State)

General Information

Bridge Number: 007005600500123	**Route No:** 560
Popular Name: Hanalei River Bridge	
Feature Crossed: Hanalei River	
Feature Carried: Kuhio Highway	
Milepost: 1.23 mi.	**Island:** Kauai
Longitude: 159d-28m-33.87s	**Latitude:** 22d-12m-38.99s

Location: 0.81 Miles West of Honu Road
Historic Name: Hanalei River Bridge
Designer/Engineer: Joseph H. Moragne
Builder/Contractor: Honolulu Iron Works, Co. - Fabricator: Hamilton and Chamber, N. Y.

Location Map:



Construction Information

Bridge Type: Steel Truss	**Construction Date:** 1912	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1934, 1967, 1973, 2003	
Alteration Type(s):		
Alteration Description(s): Maintenance repairs (1934); new steel Warren pony trusses added (1967); strengthened members and connections (1973); bridge replaced with new Pratt trusses and repaired existing Warren pony trusses (2003)		

Bridge Information

Number of Spans: 1	**Max Span:** 106.0 ft.	**Total Length:** 112.9 ft.	**Deck Width:** 23.6 ft.
Superstructure: Steel Through Truss			
Substructure: Concrete Abutment Wall			
Floor/Decking: Timber Deck			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features: Commemorative plaque with name of builder, fabricator and date of construction			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Society History, Transportation, Commerce		

Narrative Description:

The bridge had a major alteration to remove, repair, and replace metal members of the bridge. The contractor of the project was Abhe & Svobonda, Inc. who completed the project in 2003.(1)

See linked documents for National Register of Historic Places Nomination Form.

(1) Information was provided by Fred Reyes at HDOT Kauai District.

Significance Statement:

This bridge contributes to the Kauai Belt Road (North Shore section) district. However it went through various major alterations in 1967, 1973, and most recently September 2003. For the latest alteration the consultation process began in 1998 and was completed in 2000. It included HAER documentation of the bridge which was prepared in September 1999.

See National Register of Historic Places Nomination Form.

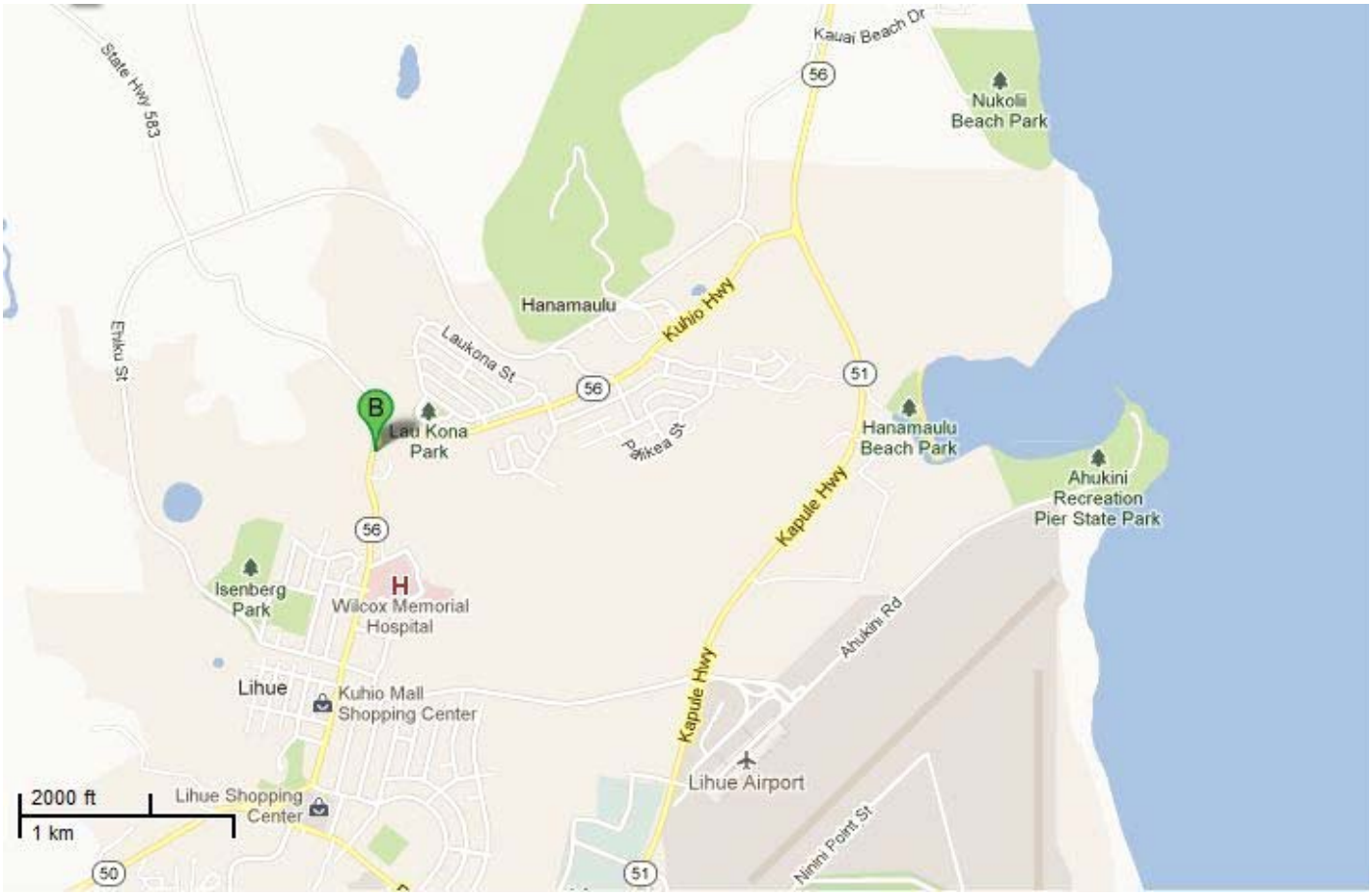
Inventory Form
(State)

General Information

Bridge Number: 007000560400123	**Route No:** 56
Popular Name: Hanamaulu Stream (Kapaia) Bridge	
Feature Crossed: Hanamaulu Stream	
Feature Carried: Kuhio Highway	
Milepost: 1.23 mi.	**Island:** Kauai
Longitude: 159d-21m-53.87s	**Latitude:** 21d-59m-31.03s

Location: 0.06 Miles Northeast of Maalo Road
Historic Name: Hanamaulu Stream (Kapaia) Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 51.8 ft.	**Total Length:** 157.2 ft.	**Deck Width:** 30.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hanamaulu Stream Bridge carries Kuhio Highway across the Hanamaulu Stream. This curved reinforced concrete girder bridge is in its original location, but in poor condition. The bridge has concrete parapet with flat caps and end posts. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not beed obscured. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete girder bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

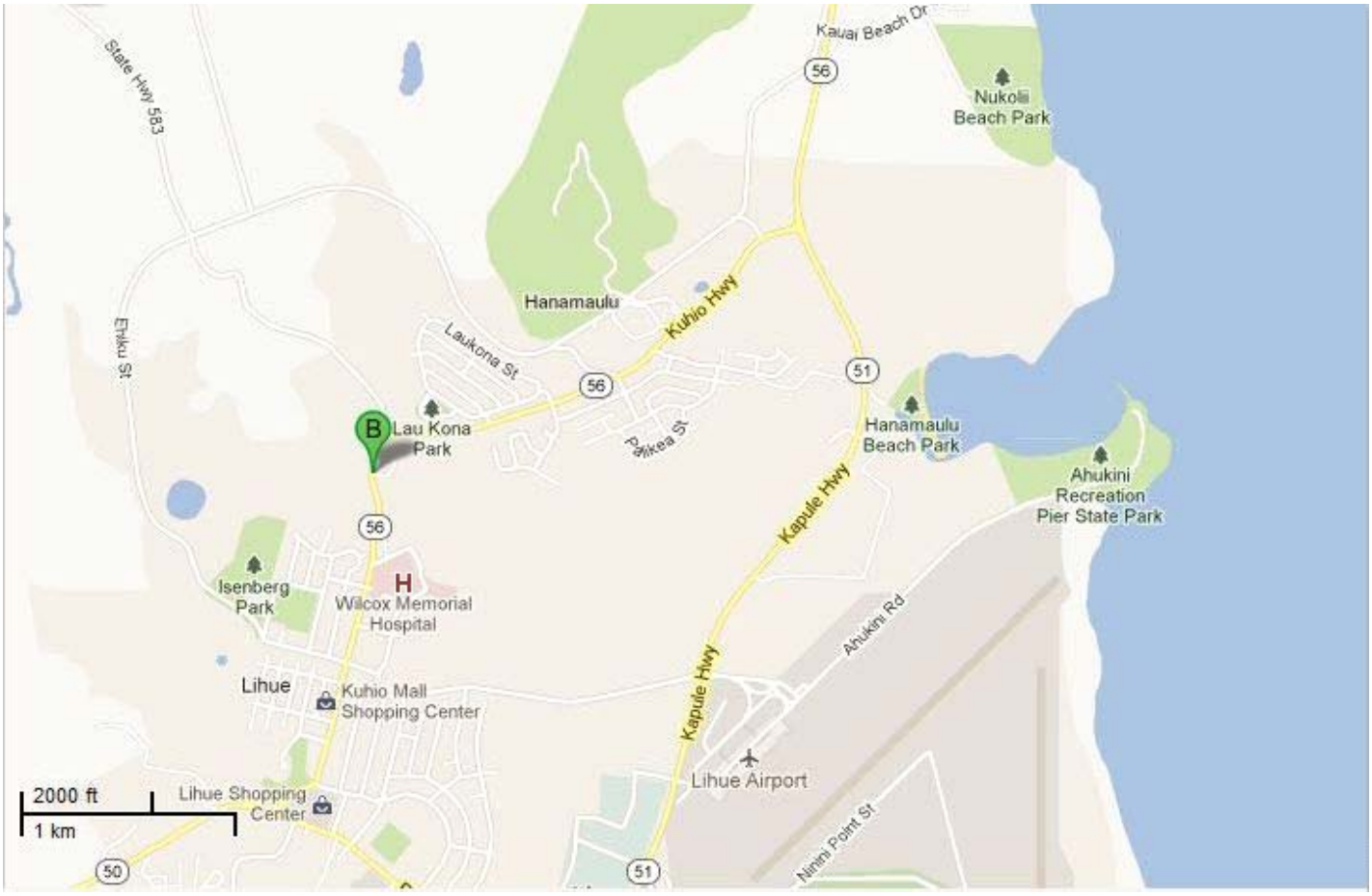
Inventory Form
(State)

General Information

Bridge Number: 007005830500004	**Route No:** 583
Popular Name: Hanamaulu Stream (Maalo Road) Bridge	
Feature Crossed: Hanamaulu Stream	
Feature Carried: Maalo Road	
Milepost: 0.04 mi.	**Island:** Kauai
Longitude: 159d-21m-57.36s	**Latitude:** 21d-59m-30.95s

Location: 0.04 Miles North of Kuhio Highway (Route 56)
Historic Name: Hanamaulu Stream (Maalo Road) Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 32.2 ft.	**Total Length:** 35.1 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hanamaulu Stream Bridge carries Maalo Road across the Hanamaulu Stream. This reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid parapets with flat caps. On one of the end caps had the date of construction engraved. The concrete deck is supported by concrete abutments. Some bottom section of the parapets were covered with the asphalt. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the period.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete girder bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

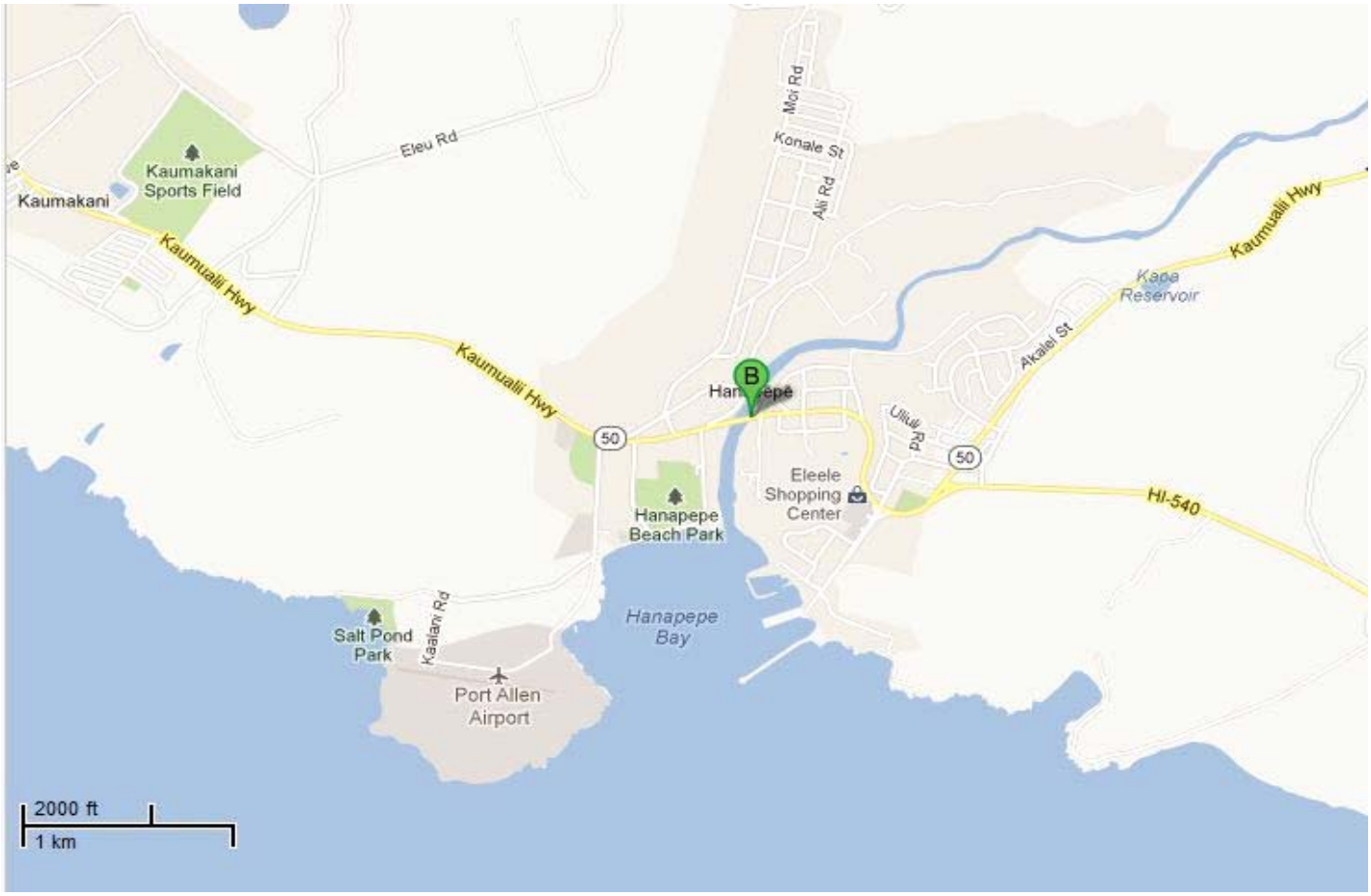
Inventory Form
(State)

General Information

Bridge Number: 007000500301631	**Route No:** 50
Popular Name: Hanapepe River Bridge	
Feature Crossed: Hanapepe River	
Feature Carried: Kaumualii Highway	
Milepost: 16.63 mi.	**Island:** Kauai
Longitude: 159d-35m-27.17s	**Latitude:** 21d-54m-31.87s

Location: 0.04 Miles West of Iona Road
Historic Name: Hanapepe River Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: James W. Glover

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1938	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1967	
Alteration Type(s):		
Alteration Description(s): Low solid reinforced concrete parapet added to east side of upstream end pier		

Bridge Information

Number of Spans: 3	**Max Span:** 113.8 ft.	**Total Length:** 276.9 ft.	**Deck Width:** 34.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; metal roadway lights cast into each intermediate rail piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Hanapepe Highway Bridge, a reinforced concrete tee-beam structure, was constructed in 1938 to carry Kaumualii highway over the Hanapepe River downstream from the original 1911 Hanapepe Bridge. Hanapepe is a small rural community located on the southwest shore of the island of Kauai which flourished until the Kauai Belt Road (Kaumualii Highway) and the Hanapepe Highway Bridge were constructed in the 1930s bypassing downtown Hanapepe.

The Hanapepe Highway Bridge has retained its historic location and setting. The original concrete tee beam design of the bridge remains intact. The original reinforced concrete material of the bridge is generally in good condition, although there are small areas of spalling and approximately one-third of the roadway lights imbedded in the rail are missing or damaged. The workmanship has not been obscured by additions or repairs and is particularly evident in the decorative concrete end piers. The historic associations of the bridge include the recurring theme of belt road realignment and the shift of traffic away from the old center of town. These may be inferred by travelers from the relationship between the 1938 highway bridge and the original 1911 Hanapepe Bridge which is visible upstream. The Hanapepe Highway Bridge retains its historic feeling primarily due to its relatively narrow width for a highway bridge and the decorative concrete rail design typical of 1930s Federal Aid bridges.

Significance Statement:

The Hanapepe Highway Bridge, a reinforced concrete tee beam structure, is significant for its contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. The bridge has also played a significant role in the history of Hanapepe town. The new alignment of the Belt Road and this new bridge had an adverse effect on Hanapepe town, as it drew traffic away from its existing commercial core. It is eligible under Criterion C as an excellent example of later developments in concrete bridge construction on Kauai and represents the "work of a master": William R. Bartels, Chief Highway Bridge Engineer for the Territorial Highway Department (THD).

The construction of the Hanapepe Highway Bridge was one of the late 1930s Federal Aid projects on Kauai, funded partially with regular Federal Aid money (sometimes called Post Road Funds), rather than Depression work program funds. Bridges were a special concern of the federal highway system, and the Territorial Highway Department began to straighten out the belt roads and replace narrow and hazardous bridges. New bridges constructed with Federal Aid dollars, such as the Hanapepe Highway Bridge, were generally larger and more decorative than county financed bridges. (1)

The bridge was designed by William R. Bartels of the THD and constructed by James W. Glover, Contractor. Robert M. Belt, THD District Engineer, supervised construction. (2) Bartels was responsible for the design of many major territorial bridge projects between 1932 and his retirement from the department in 1956. His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

William R. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. Bartels designed most territorial bridges from then until 1957. He was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time. There was also a marked shift in bridge structure to large deck girder and rigid frame bridges. Bartels ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard retirement age but he was kept on by special permission and out of necessity because his abilities were so great. Bridges designed by Bartels have often been hailed for their accomplishment of engineering as well as aesthetics.

(1) Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a): 73.

(2) Robert M. Belt, Rhymes of the Unborn Road, Belt, Collins & Associates, private edition (Honolulu, 1958).

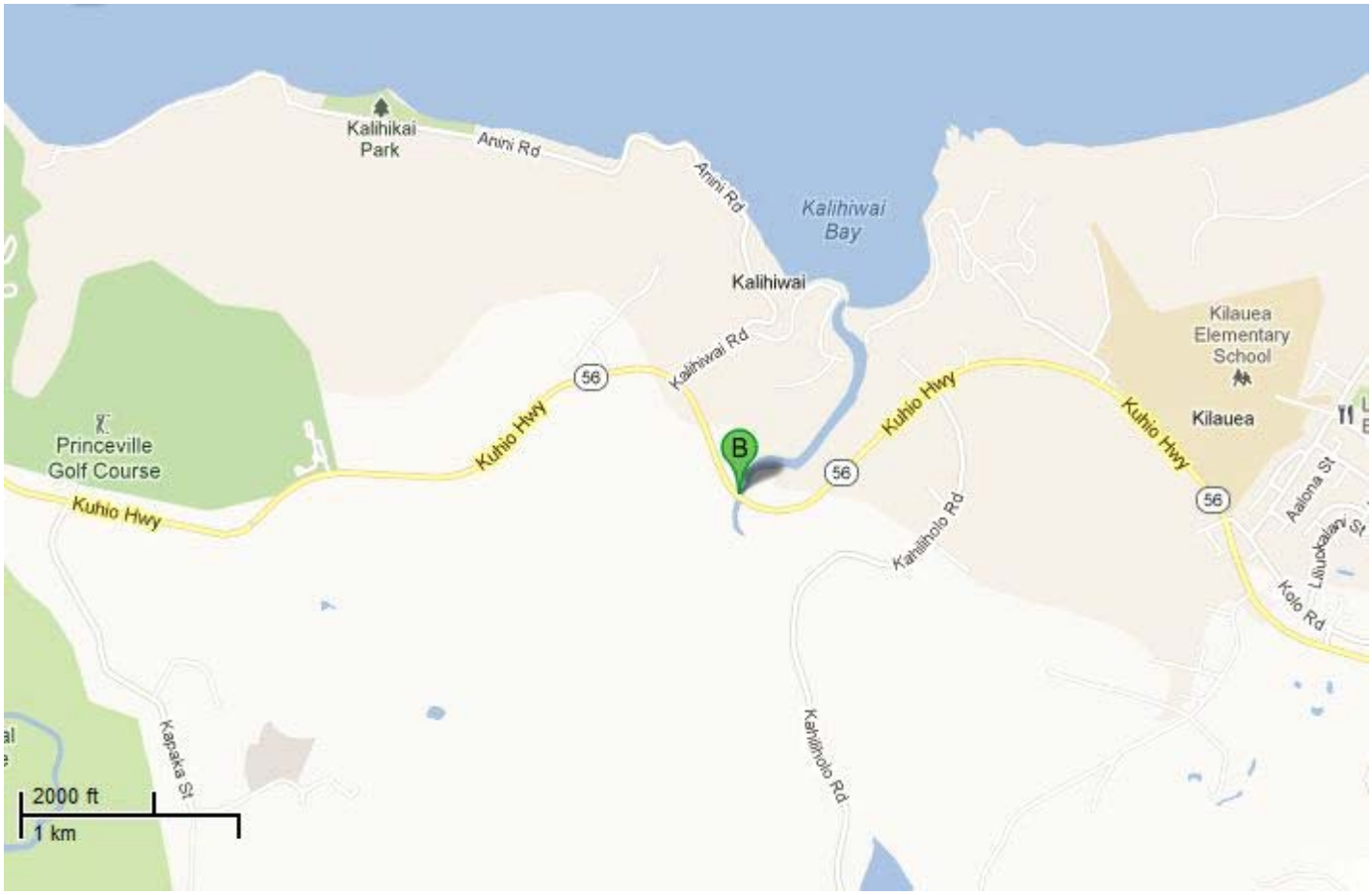
Inventory Form
(State)

General Information

Bridge Number: 007000560302497	**Route No:** 56
Popular Name: Kalihiwai River Bridge	
Feature Crossed: Kalihiwai River	
Feature Carried: Kuhio Highway	
Milepost: 24.97 mi.	**Island:** Kauai
Longitude: 159d-26m-02.27s	**Latitude:** 22d-12m-31.66s

Location: 1.14 Miles North of Kalihiwai Road
Historic Name: Kalihiwai River Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1963	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 8	**Max Span:** 119.1 ft.	**Total Length:** 797.9 ft.	**Deck Width:** 34.1 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kalihiwai River Bridge carries Kuhio Highway across the Kalihiwai River. This prestressed concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with a metal rail running horizontally above the concrete. The concrete deck is supported by concrete abutments. The solid parapet extends to the end posts and thrie beams are bolted to the approaches.

Significance Statement:

This bridge is eligible under Criterion C for being the longest concrete bridge with the longest concrete span built post-war (1945) on the island of Kauai in the historic study period prior to 1969.

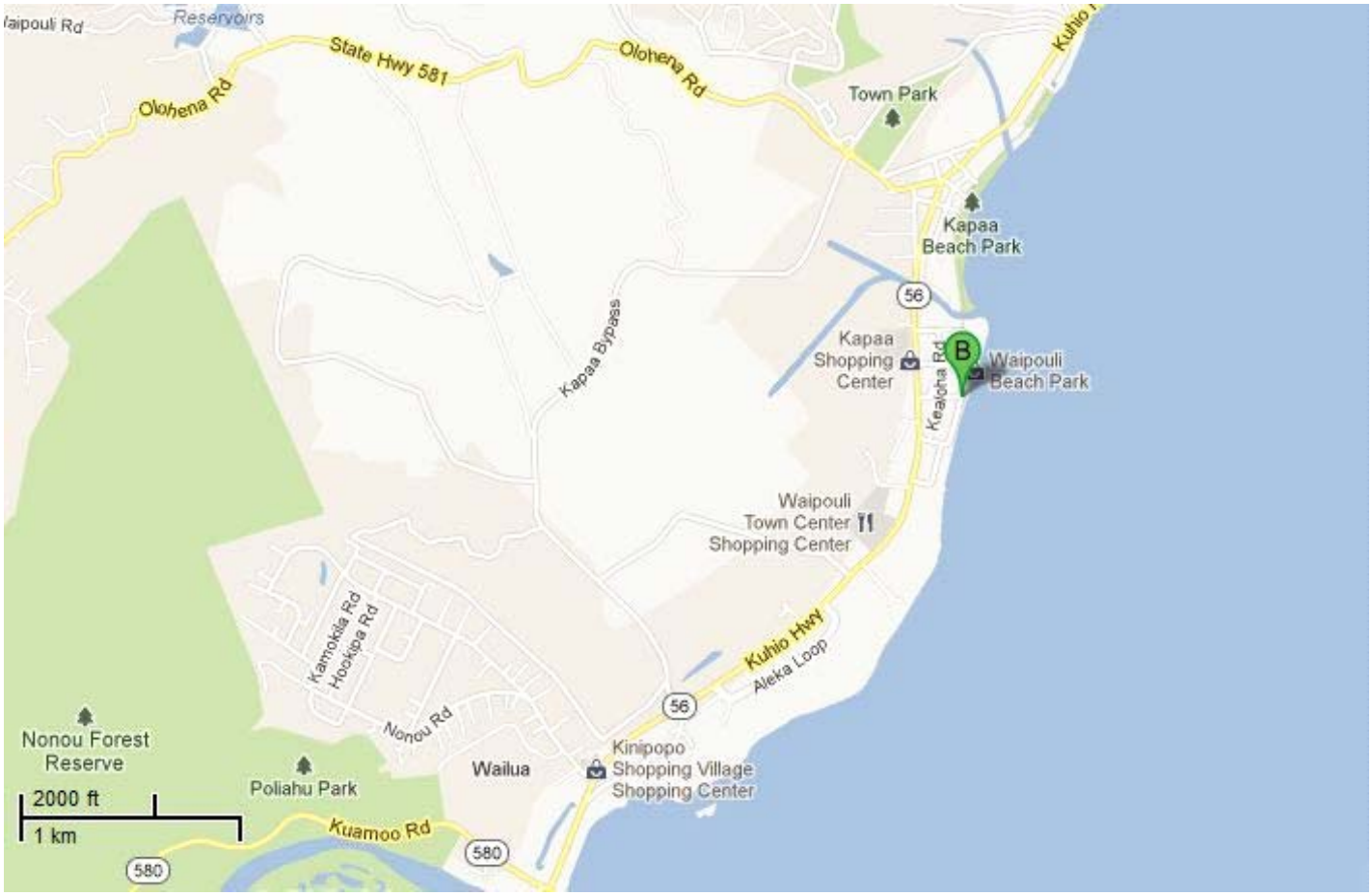
Inventory Form
(State)

General Information

Bridge Number: 007056000400161	**Route No:** 5600
Popular Name: Kapaa Temporary Bypass Road - Kainahola Stream Bridge	
Feature Crossed: Kainahola Stream	
Feature Carried: Temporary Kapaa By-pass Road	
Milepost: 1.47 mi.	**Island:** Kauai
Longitude: 159d-19m-49.43s	**Latitude:** 22d-04m-20.83s

Location: 0.71 Miles South of Olohena Road
Historic Name: Kapaa Temporary Bypass Road - Kainahola Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Commerce, Transportation, Engineering		

Narrative Description:

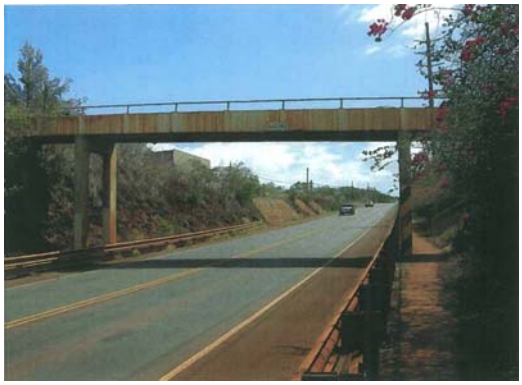
The Kainahola Stream Bridge carries Kapaa Bypass Road across Kainahola Stream. This reinforced concrete bridge is in its original location and is in good condition. The bridge has original solid parapets and the steel railing posts were bolted on the outer side of the parapets. The original concrete deck, which is covered by a thick layer of new asphalt concrete pavement, is supported by concrete rubble masonry abutments. The bridge's historic associations and feeling are primarily evident through its original parapets and abutments.

Significance Statement:

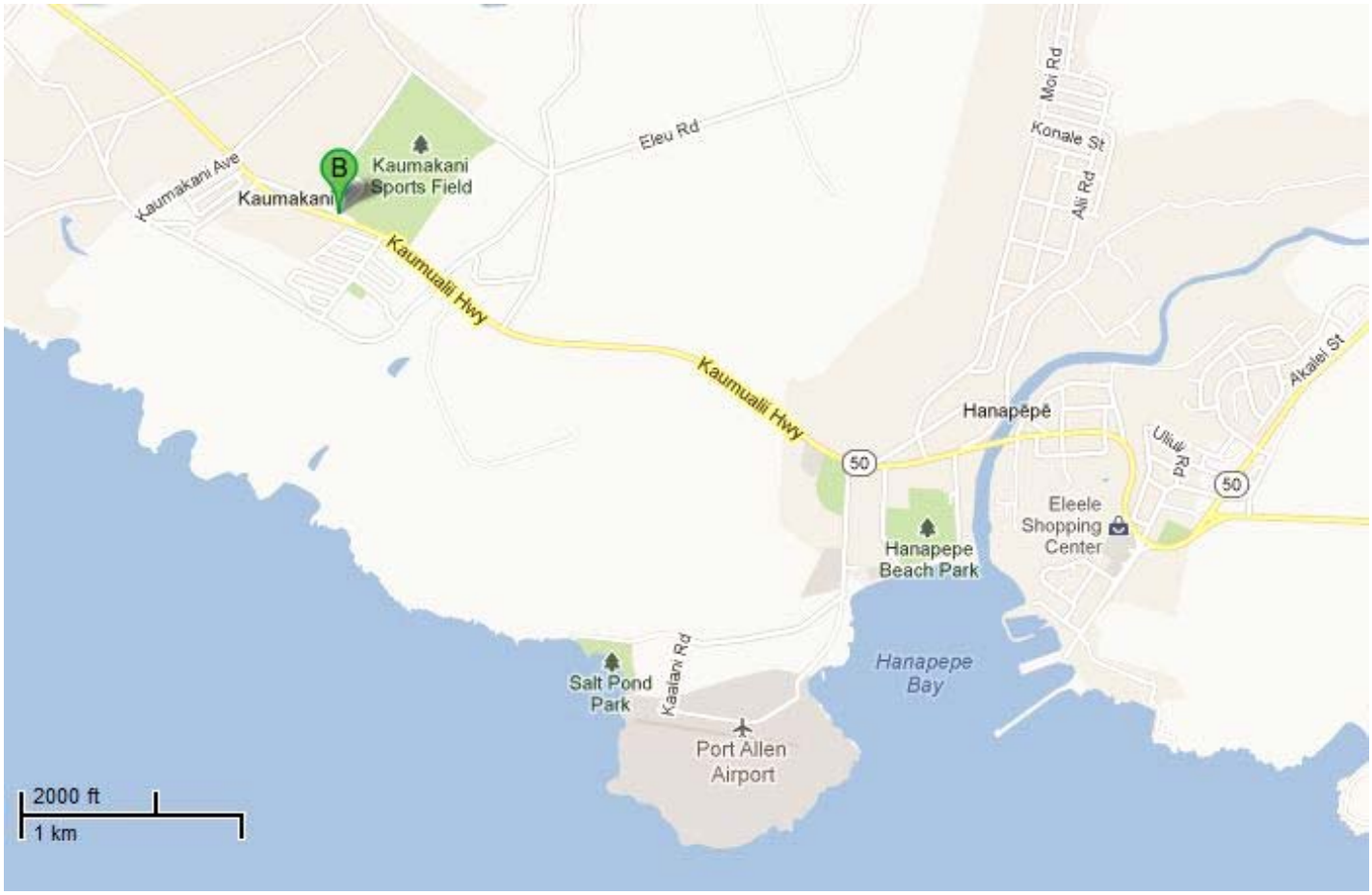
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. It is also eligible under Criterion A for its association with the Lihue plantation. The bridge abutments are a potentially eligible historic resource.

Inventory Form
(State)

General Information

Bridge Number: 007000500001419 **Route No:** 50	
Popular Name: Kaumakani Pedestrian Overpass	
Feature Crossed: Kaumualii Highway	
Feature Carried: Pedestrian	
Milepost: 18.77 mi. **Island:** Kauai	
Longitude: 159d-37m-15.65s **Latitude:** 21d-55m-06.07s	
Location: 0.22 Miles Southeast of Kaumakani School Road	
Historic Name: Kaumakani Pedestrian Overpass	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1948	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 40.0 ft.	**Total Length:** 84.0 ft.	**Deck Width:** 7.5 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaumakani Pedestrian Overpass is a reinforced concrete pedestrian bridge that crosses over the two lane Kamualii Highway. The bridge is 14 feet 8 inches above the highway and approximately 84 feet long. It is supported by a pair of concrete bents, each with two piers. It is supported by a pair of concrete bents, each with two piers. It has concrete abutments and steps at both ends and a 6 feet wide concrete deck. A concrete parapet, surmounted by a pipe railing traverses the length of the deck. The bridge retains its original setting that connects Kaumakani School and the residential area. The material remains intact and the workmanship of the bridge has not been obscured by additions or repairs. The bridge is highly visible from the highway.

Significance Statement:

The Kaumakani Pedestrian Overpass is the first post-World War II pedestrian overpass built on Kauai. The bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1940's reinforced concrete pedestrian bridge that is typical of its period in its use of materials, method of constriction, craftsmanship, and design.

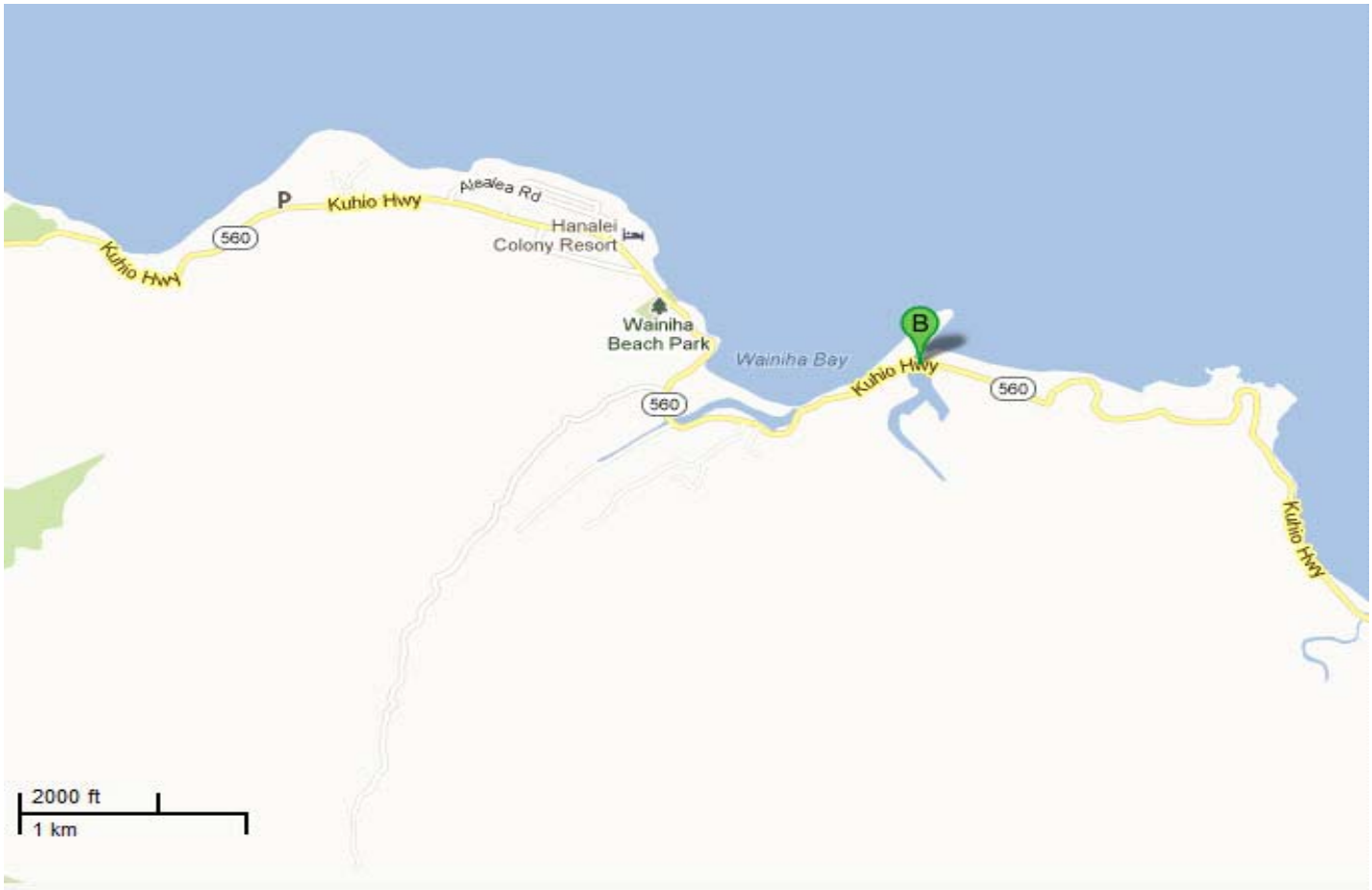
Inventory Form
(State)

General Information

Bridge Number: 007005600500593	**Route No:** 560
Popular Name: Lumahai Stream Bridge	
Feature Crossed: Lumahai Stream	
Feature Carried: Kuhio Highway	
Milepost: 5.93 mi.	**Island:** Kauai
Longitude: 159d-31m-59.76s	**Latitude:** 22d-12m-55.58s

Location: 0.90 Miles East of Wainiha Road
Historic Name: Lumahai River Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1968	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 9	**Max Span:** 60.0 ft.	**Total Length:** 538.1 ft.	**Deck Width:** 32.5 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a non-contributing feature of the Kauai Belt Road (North Shore section) district due to the complete replacement of the original 1905 bridge that fell in 1967. See National Register of Historic Places Nomination Form.

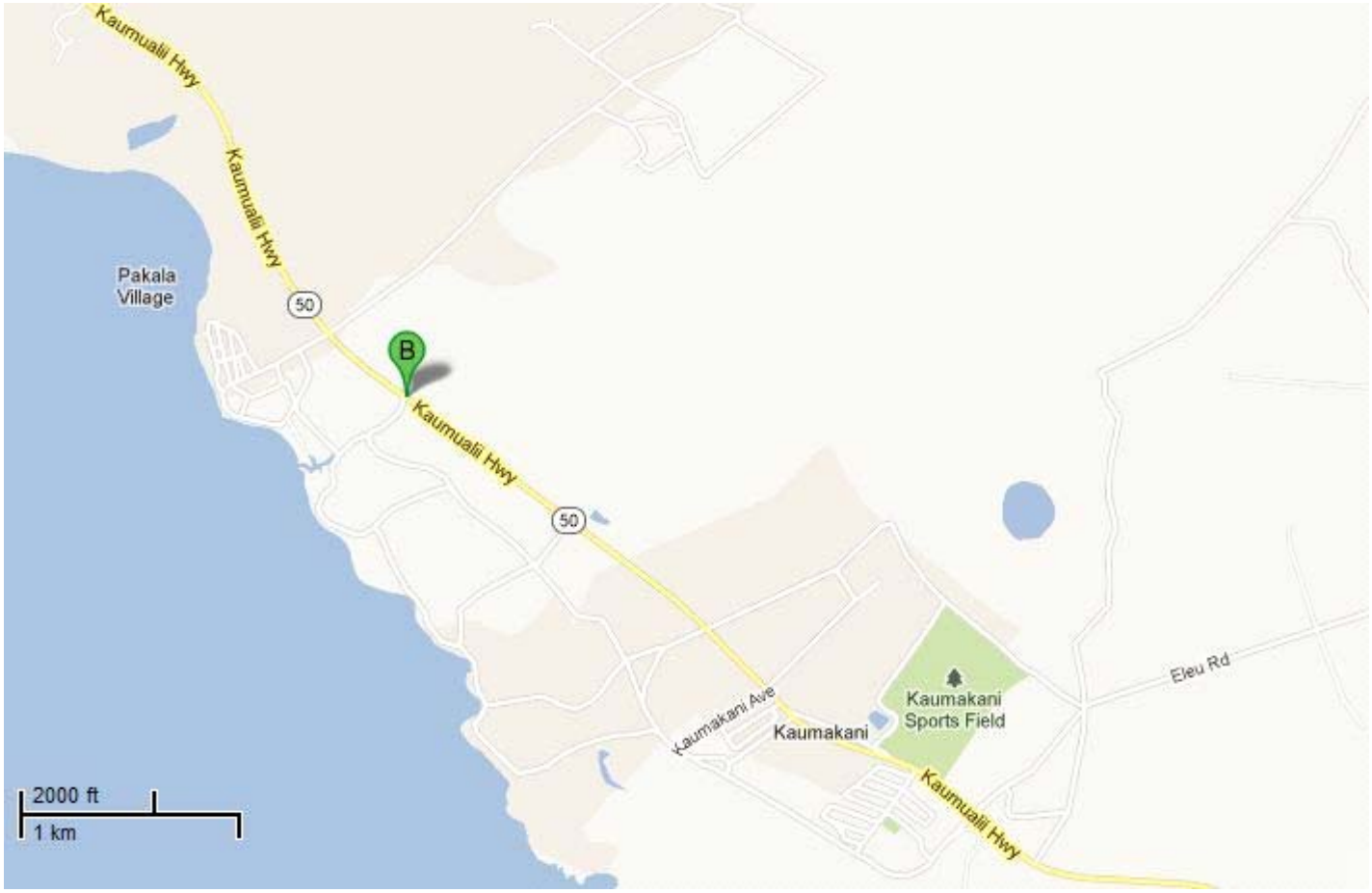
Inventory Form
(State)

General Information

Bridge Number: 007000500002033	**Route No:** 50
Popular Name: Makaweli Flume Overpass	
Feature Crossed: Kaumualii Highway	
Feature Carried: Waterway	
Milepost: 20.33 mi.	**Island:** Kauai
Longitude: 159d-38m-23.16s	**Latitude:** 21d-55m-54.58s

Location: 0.35 Miles Southeast of Makaweli Post Office
Historic Name: Makaweli Flume Overpass
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1946	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 49.9 ft.	**Total Length:** 145.0 ft.	**Deck Width:** 6.6 ft.
Superstructure:			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Flume	**Historic Function:** Flume	
Area of Significance: Commerce, Engineering		

Narrative Description:

The Makaweli Flume Crossing is a reinforced concrete flume which passes over the two lane Kamualii Highway. The flume is approximately 25 feet above the highway and approximately 145 feet long. It is supported by a pair of concrete bents, each with two piers. The 4 foot wide flume has side walls approximately 3 feet high, and retains its original setting. The material remains intact, and the workmanship has not been obscured by additions or repairs. The flume is highly visible from the Highway.

Significance Statement:

This bridge is eligible under Criterion A for its association with the primary economic endeavor of the islands – sugar production (c. 1850-1950). Sugar production changed the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor- primarily irrigation, cultivation and transportation of sugar cane – changed the face of the islands. Many of the bridges constructed along belt roads were intended to aid in the overland transport of raw cane to mills for processing, as well as to provide reasonable access for workers to sugar lands.(1) The bridge is also eligible under Criterion C as a good example of reinforced concrete flume that was constructed in the 1940's. This is the only known flume on Kauai.

(1) 1996 Spencer Mason Architects Report, P. V-8.

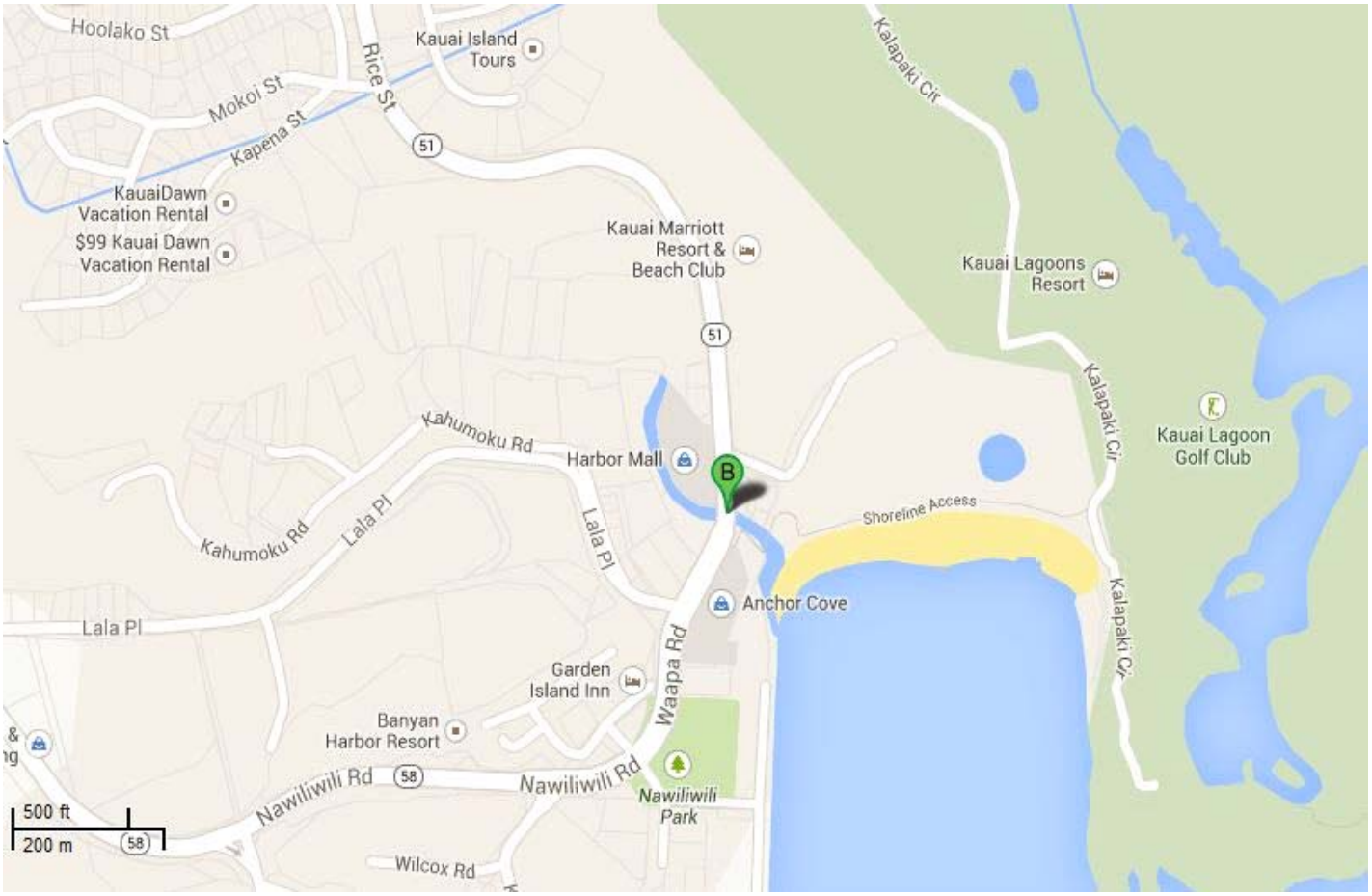
Inventory Form
(State)

General Information

Bridge Number: 007000510400023	**Route No:** 51
Popular Name: Nawiliwili Stream Bridge	
Feature Crossed: Nawiliwili Stream	
Feature Carried: Rice Street	
Milepost: 0.23 mi.	**Island:** Kauai
Longitude: 159d-21m-10.33s	**Latitude:** 21d-57m-38.79s

Location: 0.08 Miles North of Waapa Road
Historic Name: Nawiliwili Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 48.9 ft.	**Total Length:** 49.9 ft.	**Deck Width:** 25.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nawiliwili Stream Bridge carries Rice Street across the Nawiliwili Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and wide end posts. The solid parapet extends to the end posts and thrie beams are bolted to the approaches. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

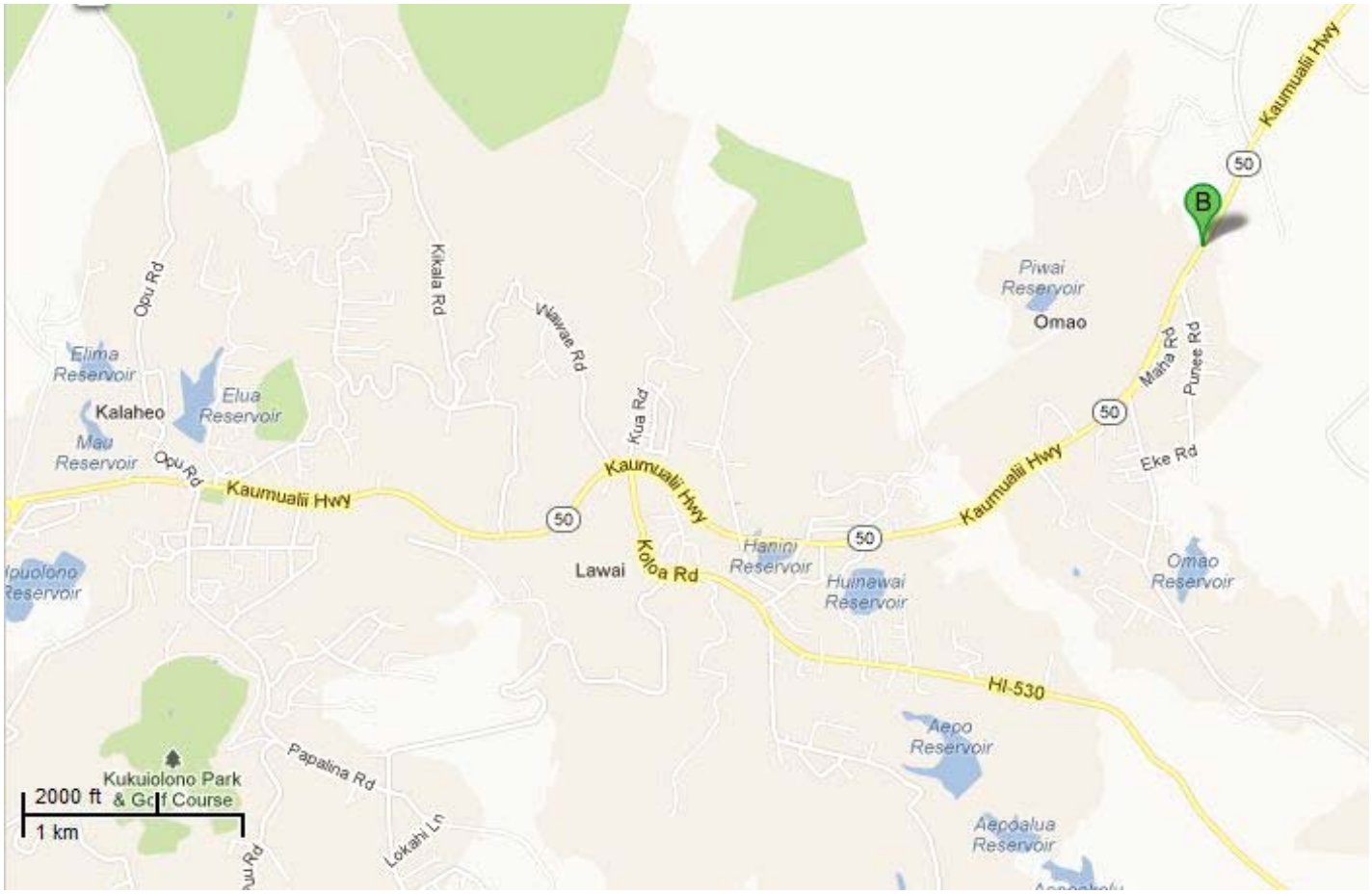
Inventory Form
(State)

General Information

Bridge Number: 007000500302465	**Route No:** 50
Popular Name: Omao Stream Bridge	
Feature Crossed: Omao Stream	
Feature Carried: Kaumualii Highway	
Milepost: 8.31 mi.	**Island:** Kauai
Longitude: 159d-28m-58.84s	**Latitude:** 21d-56m-07.87s

Location: 0.48 Miles Southeast of Omao Road
Historic Name: Omao Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 58.1 ft.	**Total Length:** 140.1 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Omao Stream Bridge carries Kaumualii Highway across the Omao Stream within the Koloa District. This reinforced concrete bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has open arched parapets with wide end posts. The concrete deck is supported by concrete piers and abutments. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured.

The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The Omao Stream Bridge has made contributions to the transportation and engineering in Kauai. The reinforced concrete bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. It is also eligible under Criterion C as a good example of a 1930's reinforced concrete bridge. The Omao Stream Bridge was constructed as part of the upgrading of the Kauai Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. Bridges were a special concern of the federal highway system, and the Territorial Highway Department began to straighten out the belt roads and replace narrow and hazardous bridges. New bridges constructed with Federal Aid dollars were generally larger and more decorative than county financed bridges.

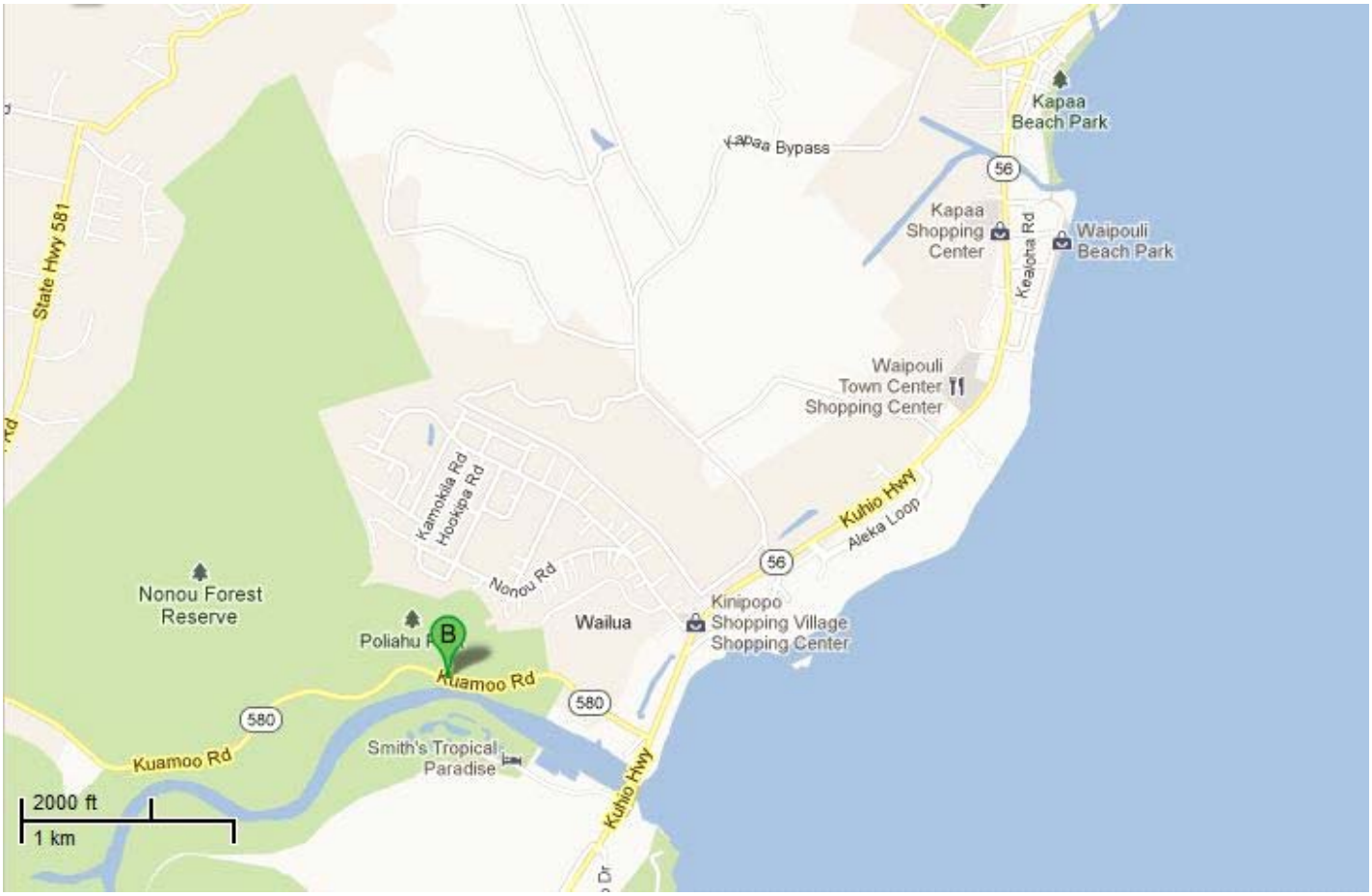
Inventory Form
(State)

General Information

Bridge Number: 007005800600062	**Route No:** 580
Popular Name: Opaekaa Stream Bridge	
Feature Crossed: Opaekaa Stream	
Feature Carried: Kuamoo Road	
Milepost: 0.62 mi.	**Island:** Kauai
Longitude: 159d-20m-40.40s	**Latitude:** 22d-02m-59.10s

Location: 0.62 Miles Northwest of Kuhio Highway (Route 56)
Historic Name: Opaekaa Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 49.9 ft.	**Total Length:** 53.1 ft.	**Deck Width:** 35.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Opaekaa Stream Bridge carries Kuamoo Road across the Opaekaa Stream. This reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open arched parapets in the middle and curved solid panel parapets at the end, with flat caps and wide end posts. The concrete deck is supported by concrete abutments. Thrie beams were bolted to the end parapets however, the workmanship of the bridge has not been obscured. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930's.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is one of the best examples of a 1930's reinforced concrete girder bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

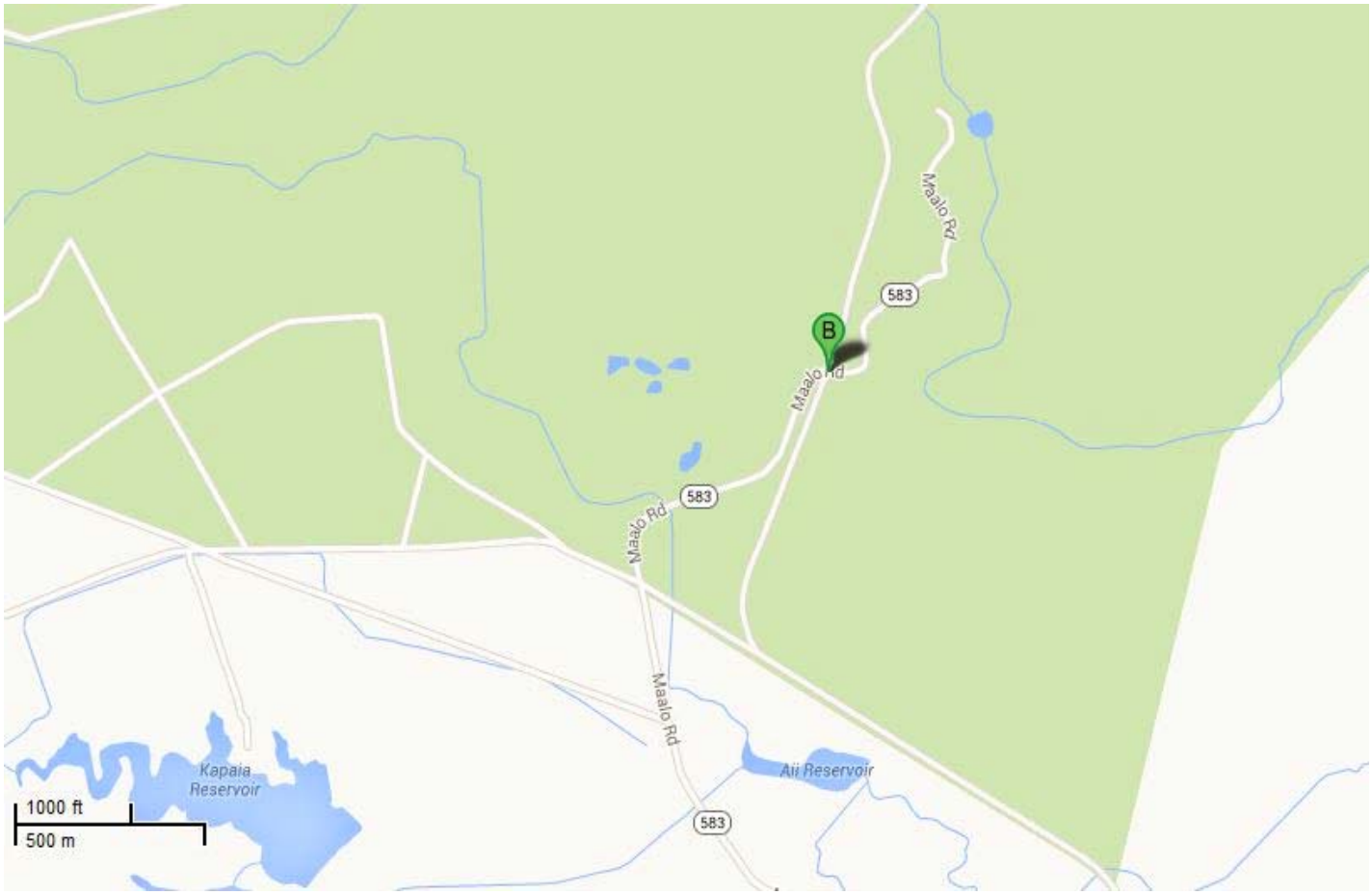
Inventory Form
(State)

General Information

Bridge Number: 007005830500334	**Route No:** 583
Popular Name: Railroad Overpass	
Feature Crossed: Maalo Road	
Feature Carried: Plantation Road	
Milepost: 3.34 mi.	**Island:** Kauai
Longitude: 159d-22m-55.96s	**Latitude:** 22d-01m-42.92s

Location: 3.34 Miles North of Kuhio Highway (Route 56)
Historic Name: Railroad Overpass
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1946	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 26.9 ft.	**Total Length:** 28.9 ft.	**Deck Width:** 22.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Chain Link			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Commerce, Transportation, Engineering		

Narrative Description:

The Lihue Plantation Road Railroad Overpass was constructed in 1946 as part of the plantation railroad system. The overpass remains in its original location although the plantation and railroad are now defunct. The plantation setting and rural/agricultural surroundings are still intact and there has been no visible design changes made to the overpass. Workmanship is evident in the concrete work, but there are no ornamental details on the structure. The overpass is easily interpreted from the Lihue Plantation Road.

Significance Statement:

This bridge is associated with the primary economic endeavor of the islands – sugar production (c. 1850-1950). Sugar production changed the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor- primarily irrigation, cultivation and transportation of sugar cane – changed the face of the islands forever. Many of the bridges constructed along belt roads were intended to aid in the overland transport of raw cane to mills for processing, as well as to provide reasonable access for workers to sugar lands.(1) Steel stringers were constructed in Hawaii primarily for industrial and railroad bridges. Ornamentation, if any, was usually limited to the pattern of the railings. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under criterion C for its distinctive structural type. Bridges of this type noted in earlier surveys are all associated with the railroad, and specific federal funding of the U.S. Works Program Grade Crossing Program.

(1) 1996 Spencer Mason Architects Report, P. V-8.

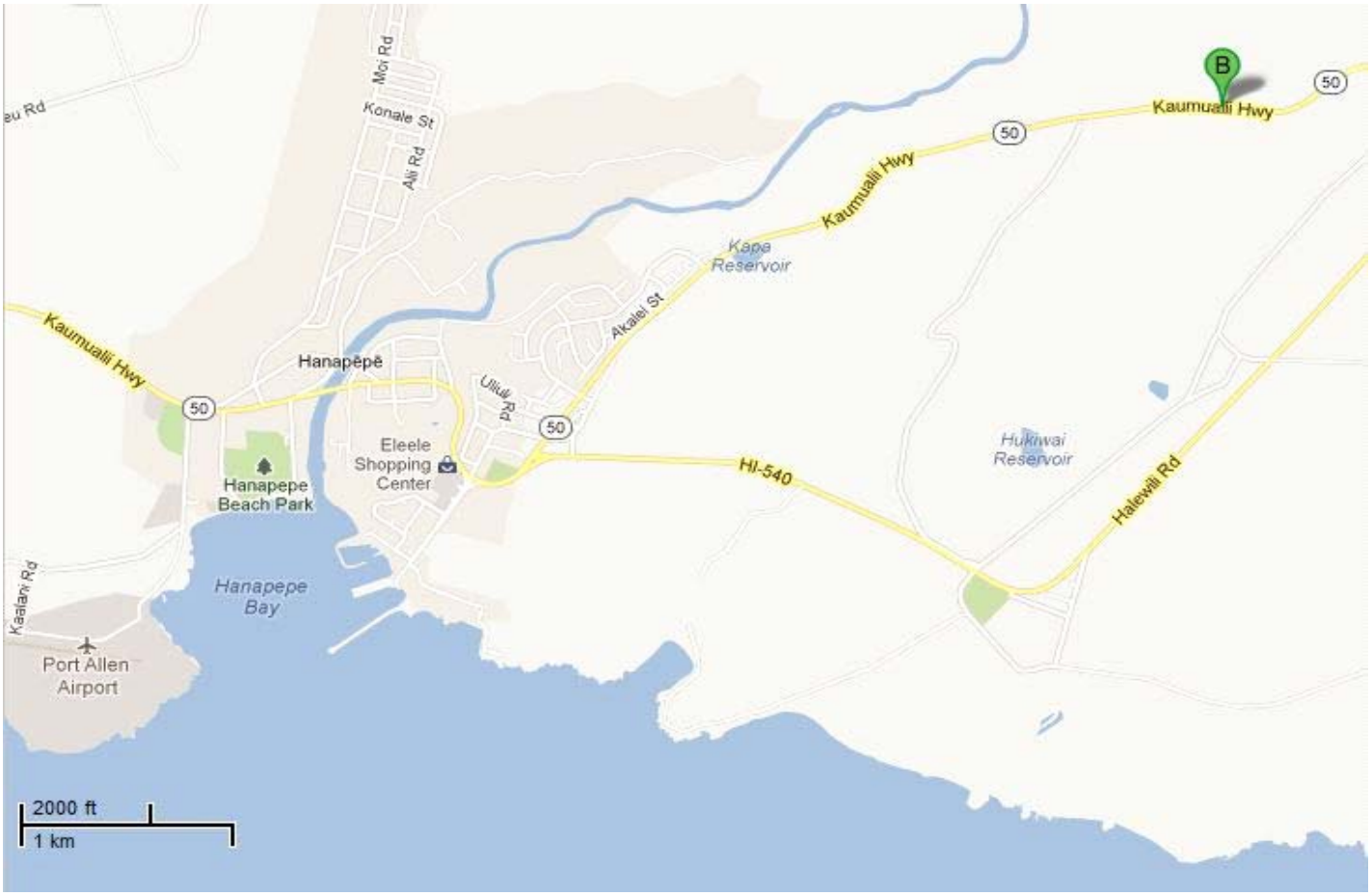
Inventory Form
(State)

General Information

Bridge Number: 007000500301972	**Route No:** 50
Popular Name: Wahiawa Stream Bridge	
Feature Crossed: Wahiawa Stream	
Feature Carried: Kaumualii Highway	
Milepost: 13.24 mi.	**Island:** Kauai
Longitude: 159d-32m-56.43s	**Latitude:** 21d-55m-18.02s

Location: 2.45 Miles Southeast of Mehana Road
Historic Name: Wahiawa Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: Kalihi Contracting Co., Ltd.

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): One of the end piers appears to have been reconstructed		

Bridge Information

Number of Spans: 3	**Max Span:** 120.1 ft.	**Total Length:** 180.1 ft.	**Deck Width:** 30.8 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Stepped conrete railing posts and support piers; incised bridge name and date of construction on end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Wahiawa Bridge carries Kaumualii Highway across the Wahiawa Stream within the Koloa District on the island of Kauai. This bridge was the first reinforced concrete rigid frame bridge constructed in the islands and one of only five reinforced concrete rigid frame bridges built prior to WW II (the others are the Kaahumanu Avenue-Naniloa Drive Overpass in Wailuku, Maui; Date Street Bridge on Oahu; and the Hionomoa and Moaula Bridges in Kau on the island of Hawaii). The bridge remains in its original location and its rural setting is unchanged. The original concrete material of the bridge is in generally good condition and has not been altered by major repairs. The bridge's technologically innovative rigid-frame design has not been altered. Overall, the bridge exhibits a high degree of workmanship, particularly the attention given to detailing the decorative stepped concrete end and intermediate piers. However, one railing end appears to have been reconstructed, and the workmanship does not match the original. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The Wahiawa Bridge has made significant contributions to the areas of engineering and transportation in Hawaii. The reinforced concrete rigid frame bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. It is eligible under Criterion C as an innovative example of bridge design utilizing new engineering technology, as well as for its aesthetic merit. Moreover, the Wahiawa Bridge is representative of the "work of a master": William R. Bartels, Chief Designer for the Territorial Highways Department.

The Wahiawa Bridge was constructed as part of the upgrading of the Kauai Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. Bridges were a special concern of the federal highway system, and the Territorial Highway Department began to straighten out the belt roads and replace narrow and hazardous bridges. New bridges constructed with Federal Aid dollars, such as the Wahiawa Bridge, were generally larger and more decorative than county financed bridges.(1)

This bridge is the first reinforced concrete rigid frame bridge constructed in the islands, and one of only five of this type built prior to WWII. The reinforced concrete rigid-frame bridge demonstrates the rapid advances in engineering technology in the early decades of the twentieth century and are the most sophisticated of the pre-WWII bridges from an engineering perspective. The abutments and deck of rigid frame bridges are constructed as one solid piece of concrete enabling the slab to double or triple the previous achievable span of twenty feet. The technology was not used in Hawaii until 1936, when William R. Bartels of the Territorial Highways Department developed the plans for the Wahiawa Bridge on Kauai and the Kaahumanu Avenue-Naniloa Drive Overpass in Wailuku, Maui. These were followed by the construction of two concrete rigid frame bridges on Hawaii Island and one on Oahu.

Bartels was responsible for the design of all major Territorial bridge projects between 1932 and his retirement from the department in 1956. His bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.(2) Robert M. Belt, the Resident Engineer for the Department on Kauai, supervised its construction and wrote a poem about the Wahiawa Bridge and its designer, which was published in Pacific Builder and Engineer magazine.

(1) Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a): 73.

(2) "Obituaries," Honolulu Advertiser (October 9, 1969): C3.

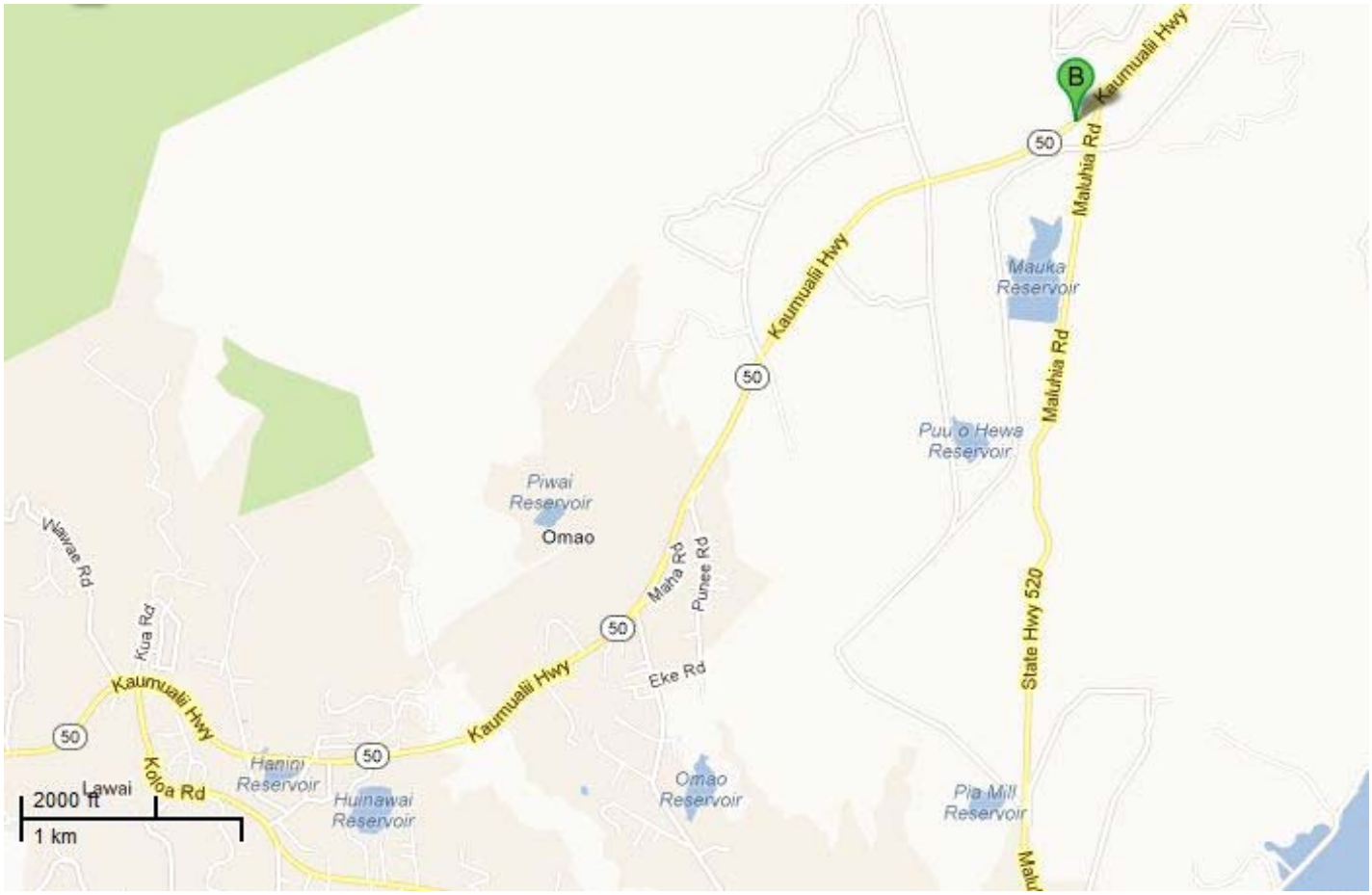
Inventory Form
(State)

General Information

Bridge Number: 007000500302613	**Route No:** 50
Popular Name: Waihohonu Stream Bridge	
Feature Crossed: Waihohonu Stream	
Feature Carried: Kaumualii Highway	
Milepost: 6.84 mi.	**Island:** Kauai
Longitude: 159d-28m-01.98s	**Latitude:** 21d-56m-58.14s

Location: 2.08 Miles Southeast of Omao Road
Historic Name: Waihohonu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 31.8 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Waihohonu Stream Bridge carries Kaumualii Highway across the Waihohonu Stream within the Koloa District. This reinforced concrete bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has open arched parapets with wide end posts. The concrete deck is supported by concrete abutments. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The Waihohonu Stream Bridge has made contributions to the transportation and engineering in Kauai. The reinforced concrete bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. It is also eligible under Criterion C as a good example of a 1930's reinforced concrete bridge.

The Waihohonu Stream Bridge was constructed as part of the upgrading of the Kauai Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. Bridges were a special concern of the federal highway system, and the Territorial Highway Department began to straighten out the belt roads and replace narrow and hazardous bridges. New bridges constructed with Federal Aid dollars were generally larger and more decorative than county financed bridges.

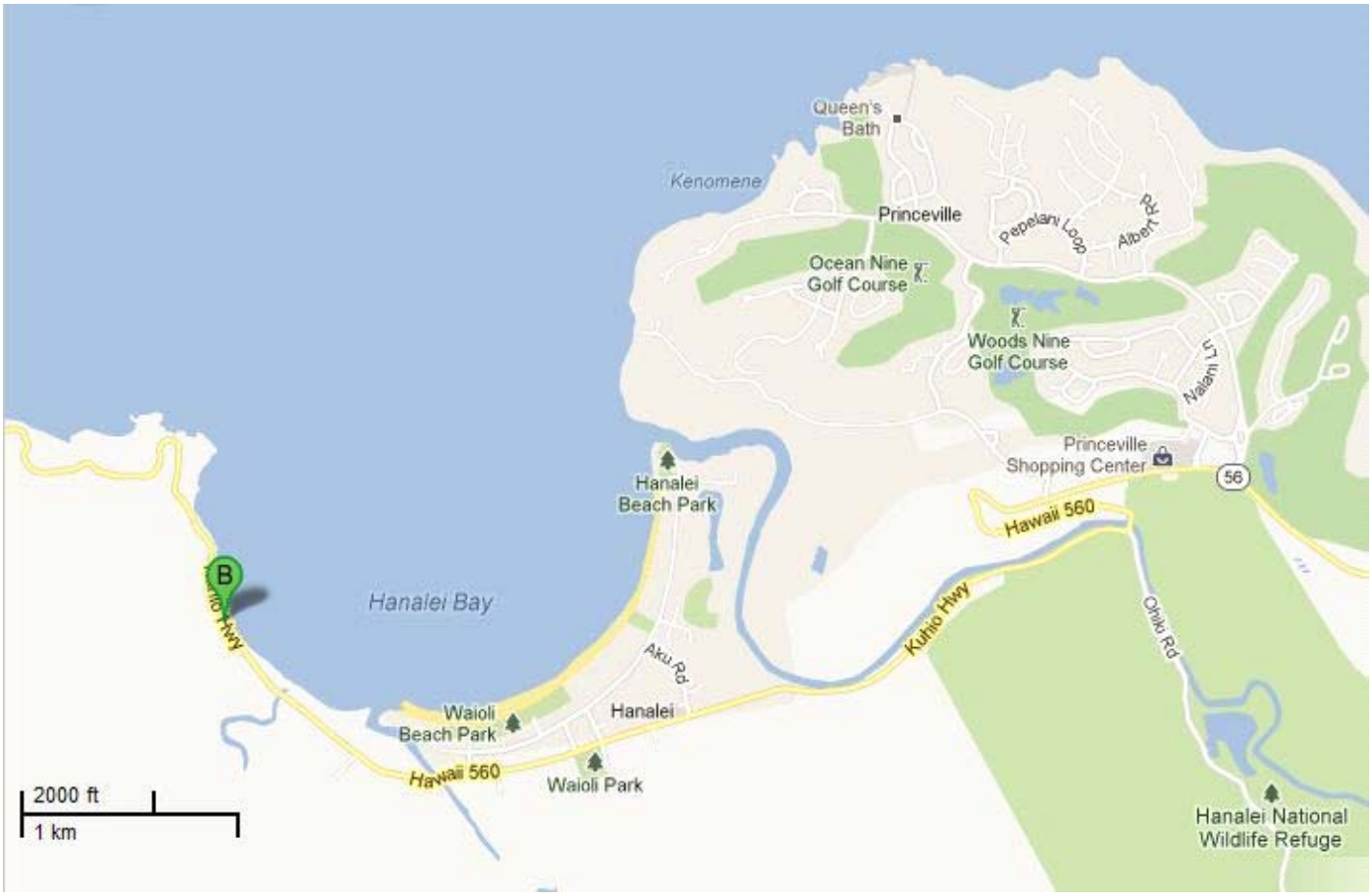
Inventory Form
(State)

General Information

Bridge Number: 007005600500427	**Route No:** 560
Popular Name: Waikoko Stream Bridge	
Feature Crossed: Waikoko Stream	
Feature Carried: Kuhio Highway	
Milepost: 4.27 mi.	**Island:** Kauai
Longitude: 159d-31m-00.59s	**Latitude:** 22d-12m-25.78s

Location: 0.80 Miles West of Kumu Road
Historic Name: Waikoko Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1913	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 43.0 ft.	**Total Length:** 44.9 ft.	**Deck Width:** 15.4 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Society History, Transportation, Commerce		

Narrative Description:

This bridge is a part of an ongoing 2013 design project.

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Kauai Belt Road (North Shore section) district. See National Register of Historic Places Nomination Form.

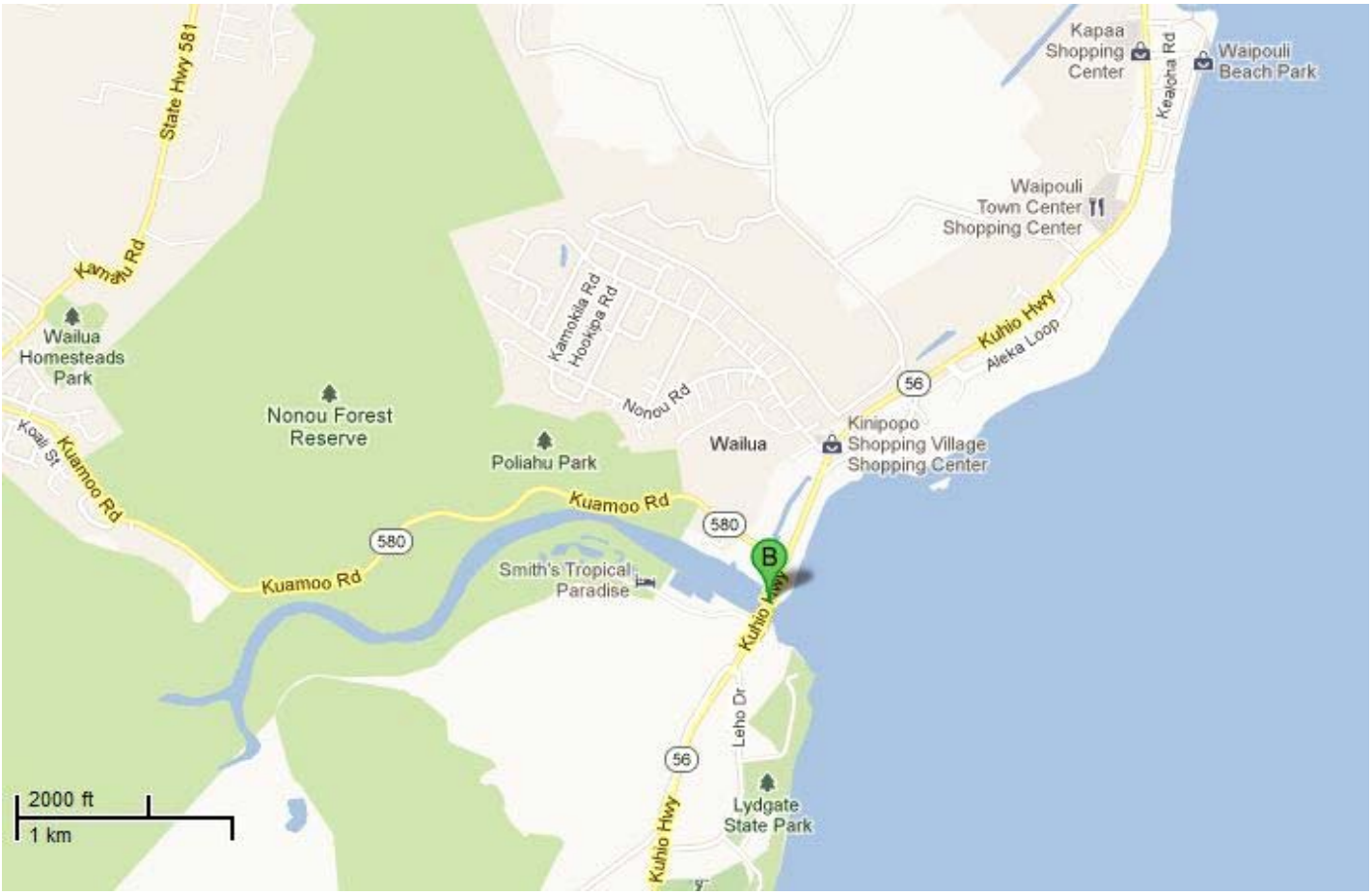
Inventory Form
(State)

General Information

Bridge Number: 007000560400572	**Route No:** 56
Popular Name: Wailua River Bridge	
Feature Crossed: Wailua River	
Feature Carried: Kuhio Highway	
Milepost: 5.72 mi.	**Island:** Kauai
Longitude: 159d-20m-11.77s	**Latitude:** 22d-02m-43.30s

Location: 0.16 Miles Northeast of Leho Drive
Historic Name: Wailua River Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1945	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 8	**Max Span:** 60.0 ft.	**Total Length:** 424.9 ft.	**Deck Width:** 37.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Wailua River Bridge carries Kuhio Highway across the Wailua River. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with rectangular voids and concrete end posts. Metal rails have been attached within the rectangular voids and above the concrete parapets. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not beed obscured. The bridge's historic associations and feeling are primarily evident through its parapets which were typical of post-war bridges.

Significance Statement:

The bridge is eligible under Criterion C for being the earliest and best example of a program comments concrete tee-beam bridge built post-war (1945) on the island of Kauai in the historic study period prior to 1969.

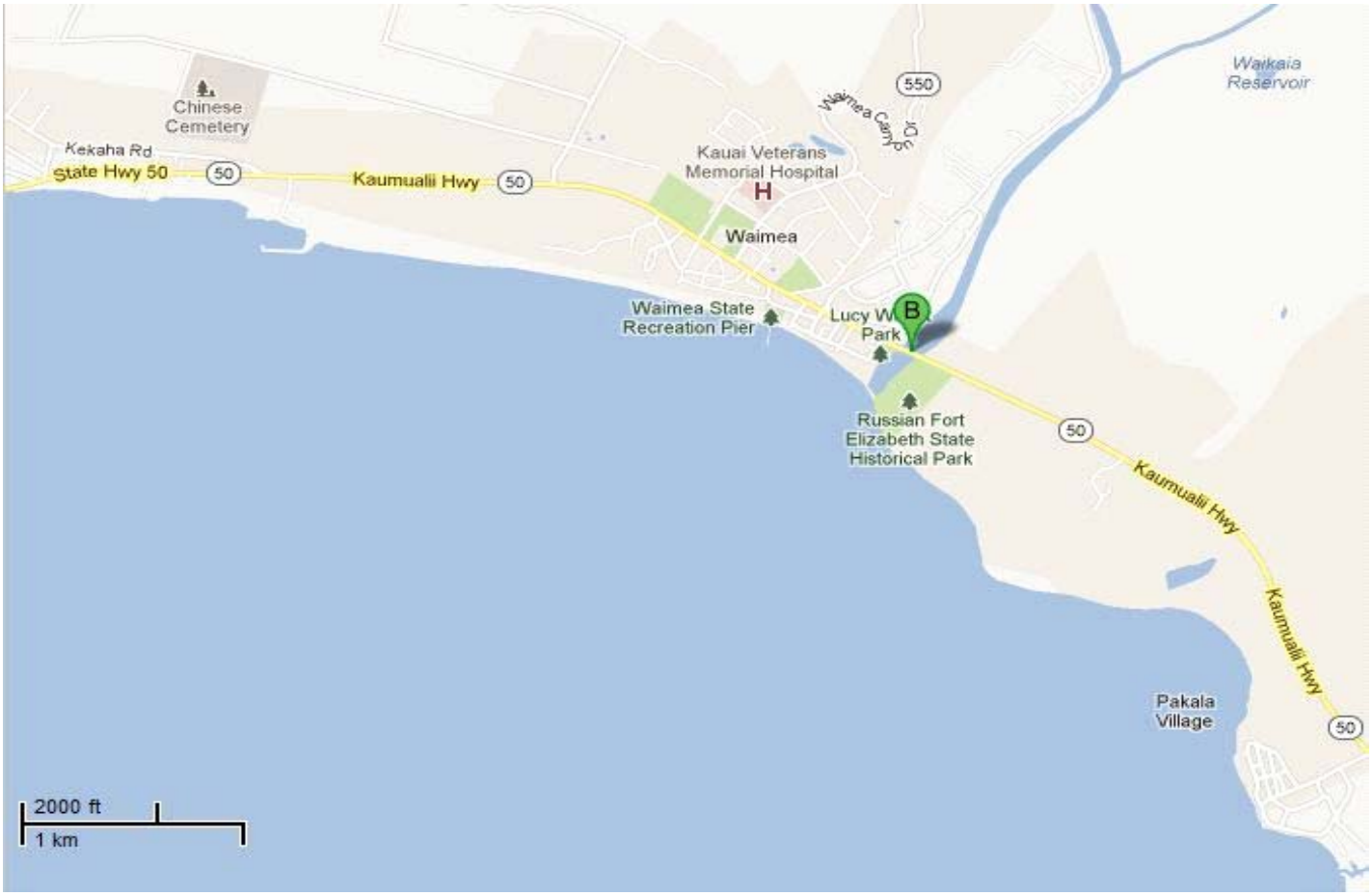
Inventory Form
(State)

General Information

Bridge Number: 007000500301039	**Route No:** 50
Popular Name: Waimea River Bridge	
Feature Crossed: Waimea River	
Feature Carried: Kaumualii Highway	
Milepost: 22.54 mi.	**Island:** Kauai
Longitude: 159d-39m-51.41s	**Latitude:** 21d-57m-11.80s

Location: 0.05 Miles East of Ala Wai Road
Historic Name: Waimea River Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: E. E. Black, Ltd.

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 105.0 ft.	**Total Length:** 365.2 ft.	**Deck Width:** 33.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Stepped railing posts and support piers; incised bridge name and date of construction on end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Waimea Bridge, a concrete tee beam structure, was constructed in 1940 to carry Kaumualii Highway across the Waimea River on the south coast of the island of Kauai. It is an excellent example of the late 1930s period bridges in Hawaii. The bridge retains its original location and setting except for the construction of flood protection walls on the west side of the river. The reinforced concrete tee beam materials and design have not been altered, although repairs were made to the bridge in 1967. The quality of the workmanship in the cast concrete decorative elements is quite good. At 365 feet in length, the Waimea Bridge was a long bridge for Kauai and the engineering of this bridge would be considered complex for its time. The artistic value of the bridge is high, due especially to the decorative design of the rail, the triangular cap design of the central piers, and the curved lines of the end posts. The curved lines of the concrete substructure, as well as decorative supporting piers, give the bridge a graceful appearance. The bridge retains its historic feeling, due to its decorative design and relatively narrow width. Its association with the first decade of Federal Aid bridges on Kauai could be interpreted by an informed observer. Interpretation is aided by the inscription of the bridge name and date of construction on the concrete end piers.

Significance Statement:

The Waimea Bridge has made significant contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. The bridge has also played a significant role in the history of Waimea town. It is eligible under Criterion C as an excellent example of later developments in concrete bridge construction on Kauai and represents the "work of a master": William R. Bartels, Chief Highway Bridge Engineer for the Territorial Highway Department.

The Waimea Bridge was constructed as part of the upgrading of the Kauai Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. The road and bridge contributed to the economic development of west Kauai by providing economical transportation to the harbor for the sugar cane plantations located in that region. This Federal Aid project was a significant event for Waimea town since the new alignment of the bridge and road altered the flow of traffic through the town. The bridge was designed in November 1938 according to plans in the State DOT Bridge Design Section. It was officially opened on April 16, 1940, when County Chairman William Ellis "cut the ribbon across the Waimea end of the bridge." (1) The Waimea Bridge demonstrates the rapid advances in engineering technology in the early decades of the twentieth century. At 365' the bridge is the longest extant pre-WW II bridge on Kauai. In the article about the opening of the bridge, the newspaper stated that "from an engineer's point of view . . . it has been one of the most satisfactory construction jobs on the island." (2) The newspaper described its engineering design:

The piers on the Makaweli side are of coffer dam construction, similar to the Golden Gate bridge. The abutments and piers on the Makaweli side end on solid rock. One of which is 30 feet below the surface. The two piers and abutments on the Waimea side rest on piles driven to bearings in the river bed. The bridge itself is a suspended span with fixed bearings at the abutment ends and concrete rocker bearings over the piers. (3)William Bartels was responsible for the design of many major Territorial bridge projects between 1932 and his retirement from the department in 1956. His bridges evidence a refined aesthetic sensibility which make them distinctive from the works of other engineers. The contractor was E.E. Black, Limited.

(1) "Ellis Opens New Bridge at Waimea," Honolulu Star Bulletin (16 April 1940): 8.

(2) Honolulu Star Bulletin (18 April 1940): 8.

(3) Honolulu Star Bulletin (18 April 1940): 8.

Inventory Form
(State)

General Information

Bridge Number: 007005600500670	**Route No:** 560
Popular Name: Wainiha River Bridge No. 2	
Feature Crossed: Wainiha River	
Feature Carried: Kuhio Highway	
Milepost: 6.70 mi.	**Island:** Kauai
Longitude: 159d-32m-35.69s	**Latitude:** 22d-12m-45.69s

Location: 0.13 Miles East of Wainiha Road
Historic Name: Wainiha River Bridge No. 2
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Steel Truss	**Construction Date:** 2004	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 100.1 ft.	**Total Length:** 100.1 ft.	**Deck Width:** 12.8 ft.
Superstructure: Steel Pony Truss			
Substructure: Concrete Abutment Wall			
Floor/Decking: Steel Deck			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

This 2004 bridge is a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a non-contributing feature of the Kauai Belt Road (North Shore section) district due to the complete replacement of the original 1931 bridge in 2004. It was replaced with a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

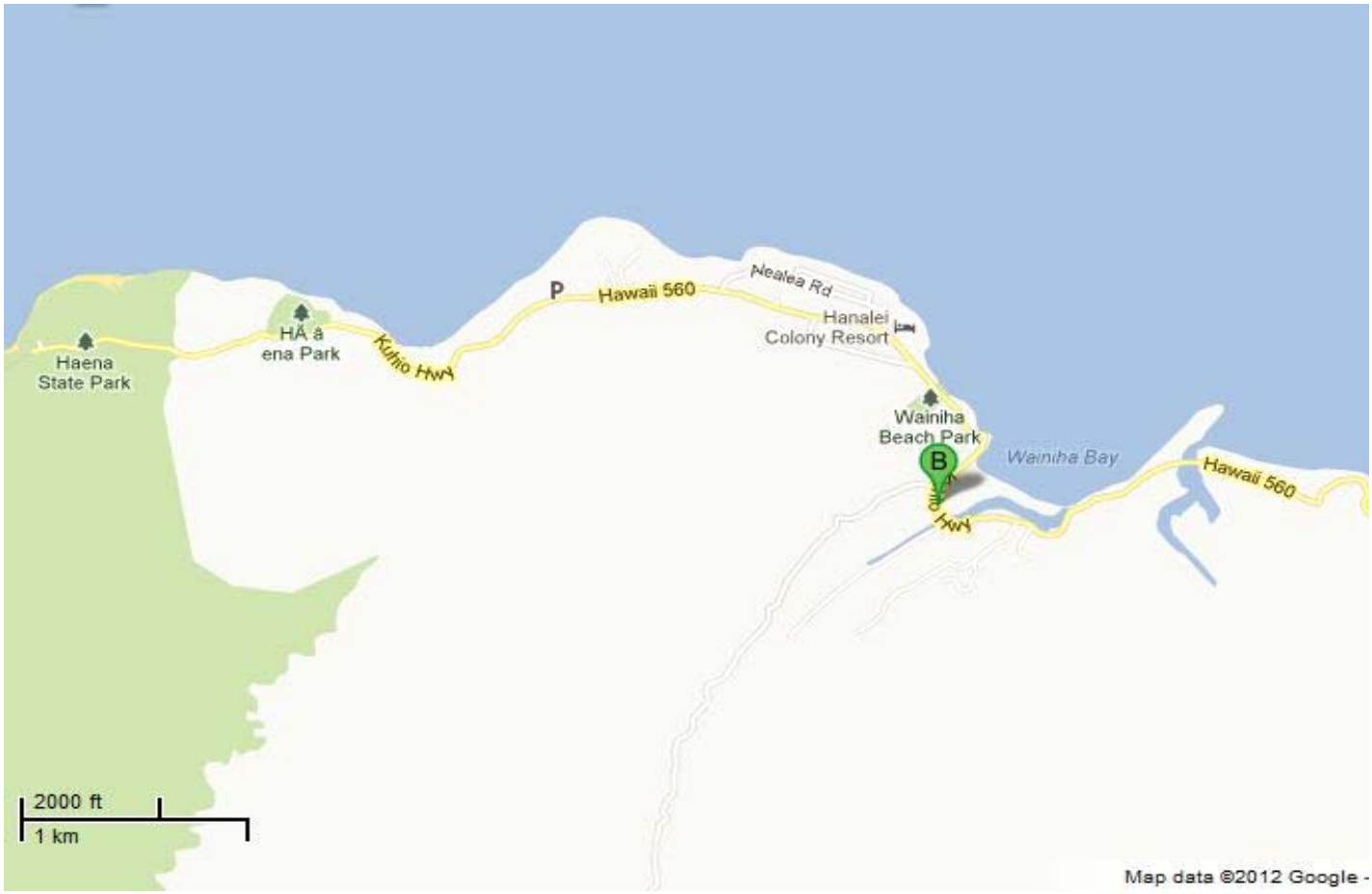
Inventory Form
(State)

General Information

Bridge Number: 007005600500673	**Route No:** 560
Popular Name: Wainiha River Bridge No. 3	
Feature Crossed: Wainiha River	
Feature Carried: Kuhio Highway	
Milepost: 6.73 mi.	**Island:** Kauai
Longitude: 159d-32m-37.25s	**Latitude:** 22d-12m-46.82s

Location: 0.10 Miles East of Wainiha Road
Historic Name: Wainiha River Bridge No. 3
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Truss	**Construction Date:** 2007	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 81.0 ft.	**Total Length:** 185.0 ft.	**Deck Width:** 15.7 ft.
Superstructure: Steel Pony Truss			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Steel Deck			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

This 2007 bridge is a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a non-contributing feature of the Kauai Belt Road (North Shore section) district due to the complete replacement of the original 1931 bridge in 2007. It was replaced with a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 007005600500644 **Route No:** 560	
Popular Name: Wainiha Stream Bridge No. 1	
Feature Crossed: Wainiha Stream	
Feature Carried: Kuhio Highway	
Milepost: 6.44 mi. **Island:** Kauai	
Longitude: 159d-32m-21.90s **Latitude:** 22d-12m-44.58s	
Location: 0.39 Miles East of Wainiha Road	
Historic Name: Wainiha Stream Bridge No. 1	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Steel Truss	**Construction Date:** 2010	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 15.7 ft.
Superstructure: Steel Pony Truss			
Substructure: Concrete Abutment Wall			
Floor/Decking: Steel Deck			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

This 2010 bridge is a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a non-contributing feature of the Kauai Belt Road (North Shore section) district due to the complete replacement of the original 1922 bridge in 2010. It was replaced with a temporary modular prefabricated steel truss bridge. See National Register of Historic Places Nomination Form.

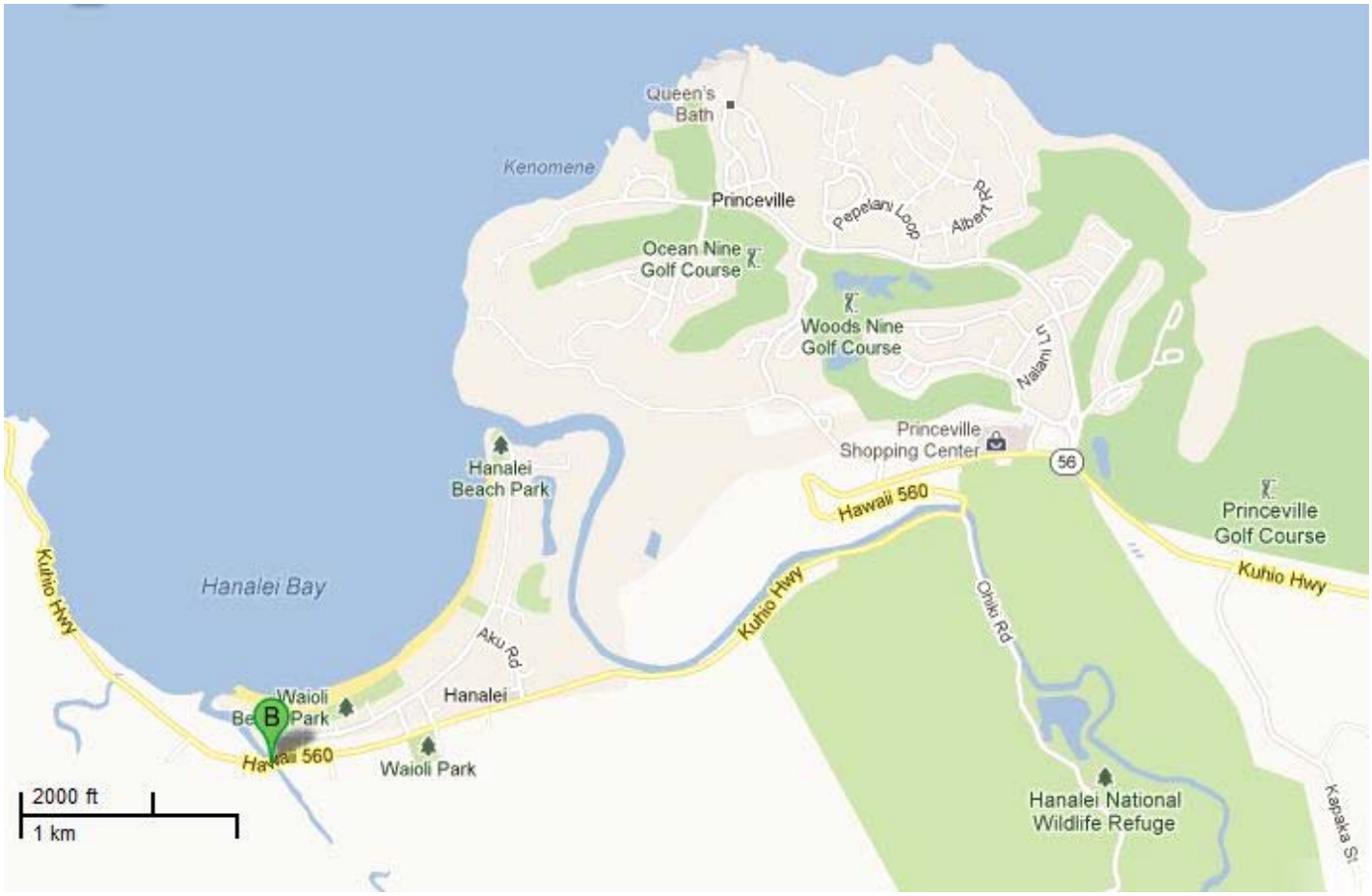
Inventory Form
(State)

General Information

Bridge Number: 007005600500343	**Route No:** 560
Popular Name: Waioli Stream Bridge	
Feature Crossed: Waioli Stream	
Feature Carried: Kuhio Highway	
Milepost: 3.45 mi.	**Island:** Kauai
Longitude: 159d-30m-25.50s	**Latitude:** 22d-12m-01.59s

Location: 0.13 Miles West of Anae Road
Historic Name: Waioli Stream Bridge
Designer/Engineer: Joseph H. Moragne
Builder/Contractor: George W. Mahukona

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 27.9 ft.	**Total Length:** 89.9 ft.	**Deck Width:** 15.4 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features: Date of construction (1912) incised on interior of south parapet			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Society History, Transportation, Commerce		

Narrative Description:

This bridge is a part of an ongoing 2013 design project.

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a contributing to the Kauai Belt Road (North Shore section) district. See National Register of Historic Places Nomination Form.

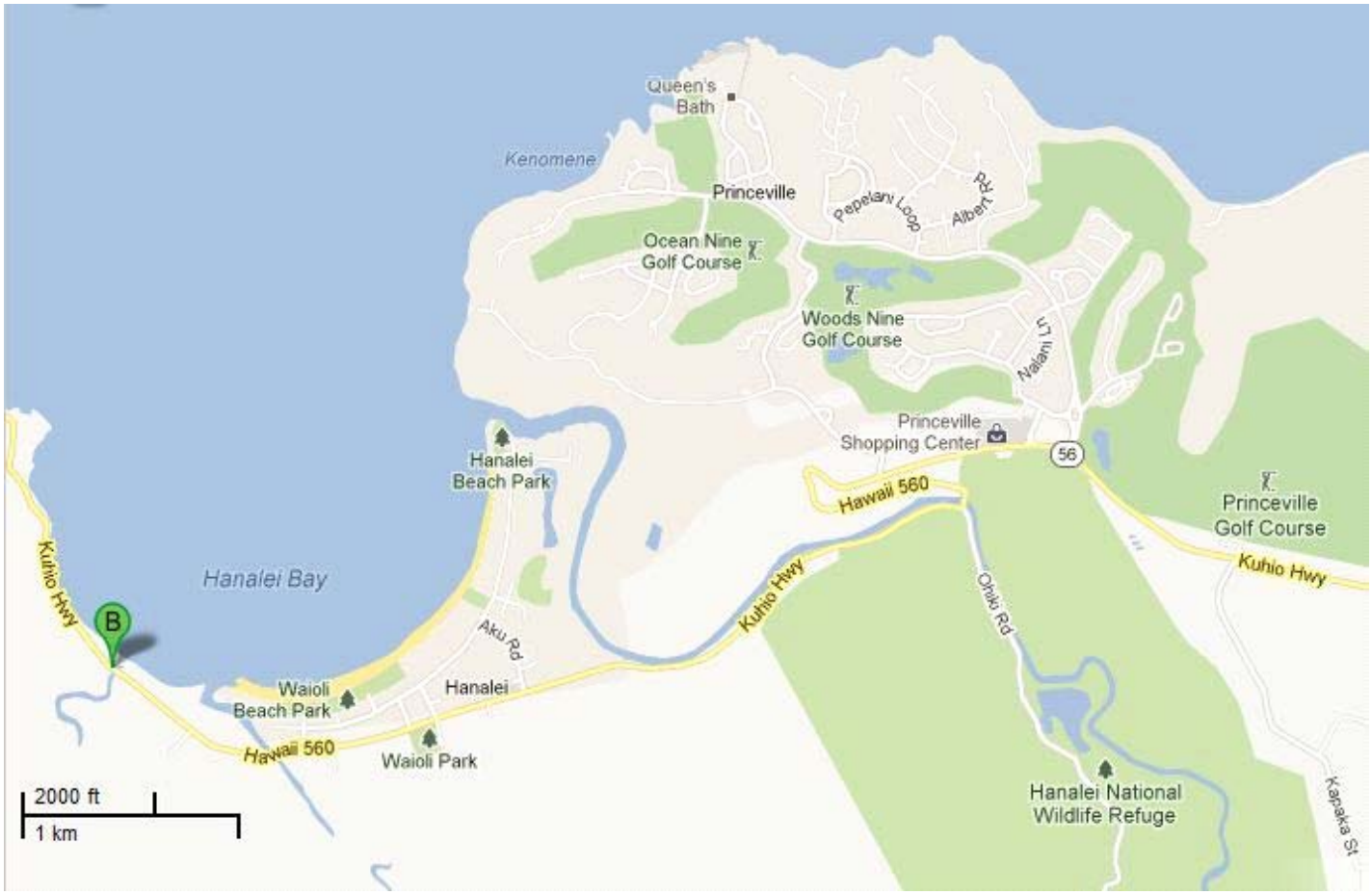
Inventory Form
(State)

General Information

Bridge Number: 007005600500396	**Route No:** 560
Popular Name: Waipa Stream Bridge	
Feature Crossed: Waipa Stream	
Feature Carried: Kuhio Highway	
Milepost: 3.96 mi.	**Island:** Kauai
Longitude: 159d-30m-50.55s	**Latitude:** 22d-12m-13.84s

Location: 0.49 Miles West of Kumu Road
Historic Name: Waipa Stream Bridge
Designer/Engineer: Joseph H. Moragne (1912) and R. L. Garlinghouse (1926)
Builder/Contractor: George R. Ewart, Jr. (1912)

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 9	**Max Span:** 16.1 ft.	**Total Length:** 138.1 ft.	**Deck Width:** 15.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features: Date of construction (1912) incised on interior of south parapet			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Society History, Transportation, Commerce		

Narrative Description:

This bridge is a part of an ongoing 2013 design project.

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a contributing to the Kauai Belt Road (North Shore section) district. See National Register of Historic Places Nomination Form.

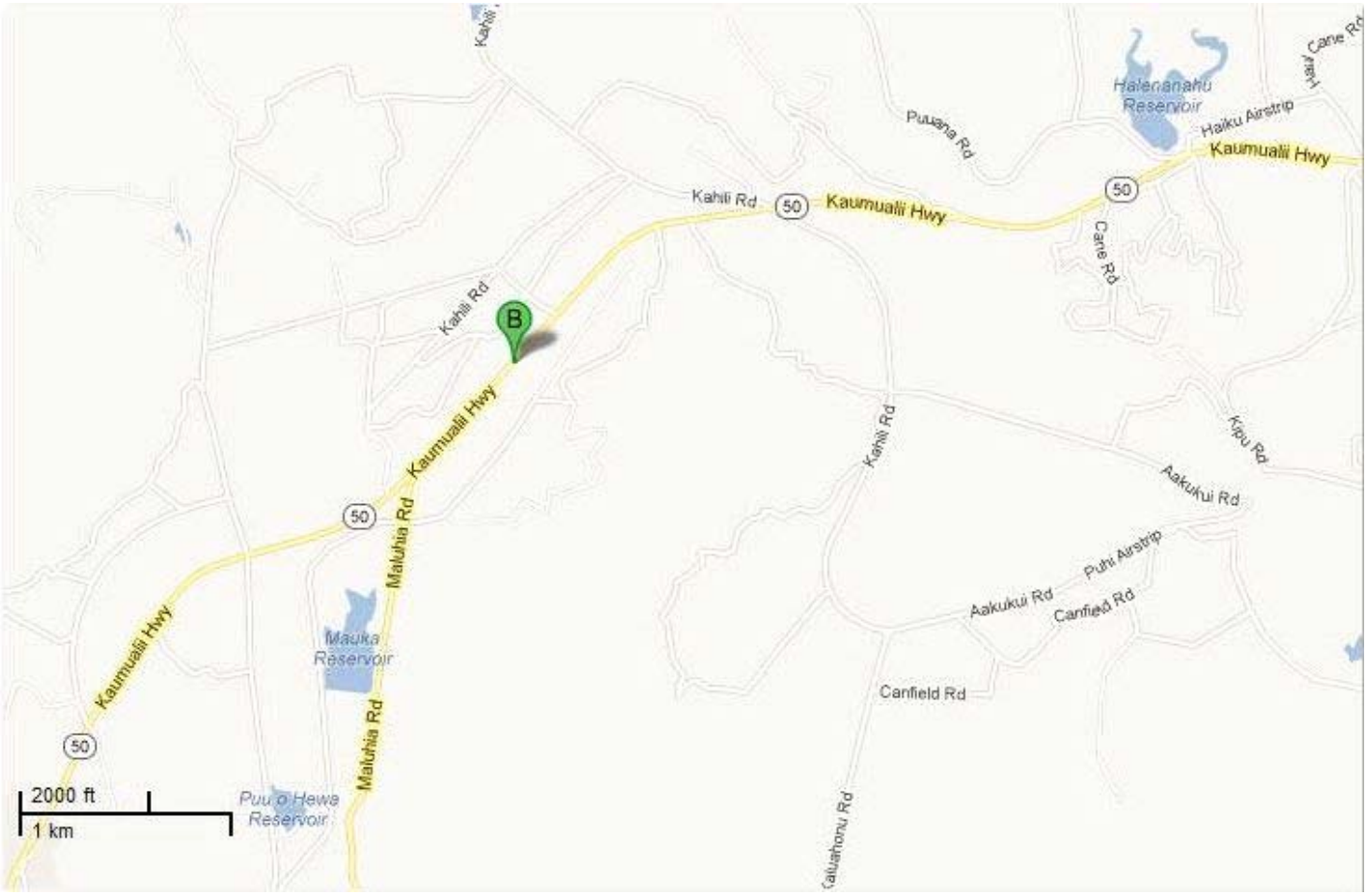
Inventory Form
(State)

General Information

Bridge Number: 007000500302671	**Route No:** 50
Popular Name: Weoweopilau Stream Bridge	
Feature Crossed: Weoweopilau Stream	
Feature Carried: Kaumualii Highway	
Milepost: 6.26 mi.	**Island:** Kauai
Longitude: 159d-27m-39.82s	**Latitude:** 21d-57m-20.07s

Location: 0.46 Miles Northeast of Maluhia Road
Historic Name: Weoweopilau Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 33.1 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Weoweopilau Stream Bridge carries Kaumualii Highway across the Weoweopilau Stream within the Koloa District. This reinforced concrete bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has open Greek cross parapets with wide end posts. The concrete deck is supported by concrete pier and abutments. Thrie beams were bolted to the end posts and bolts were pierced through the posts. However, the bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The Weoweopilau Stream Bridge has made contributions to the transportation and engineering in Kauai. The reinforced concrete bridge is eligible under Criterion A for its associations with the development of Kauai's Belt Road system. It is also eligible under Criterion C as a good example of a 1930's reinforced concrete bridge. The Weoweopilau Stream Bridge was constructed as part of the upgrading of the Kauai Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. Bridges were a special concern of the federal highway system, and the Territorial Highway Department began to straighten out the belt roads and replace narrow and hazardous bridges. New bridges constructed with Federal Aid dollars were generally larger and more decorative than county financed bridges.

V. INVENTORY FORMS:
KAUAI COUNTY ELIGIBLE BRIDGES

Inventory Form
(County/Private)

General Information

Bridge Number: 007190071119004

Popular Name: Hanapepe Bridge

Feature Crossed: Hanapepe River

Feature Carried: Hanapepe Road

Milepost: **County Private:** Kauai

Longitude: 159d-35m-24.30s **Latitude:** 21d-54m-36.37s

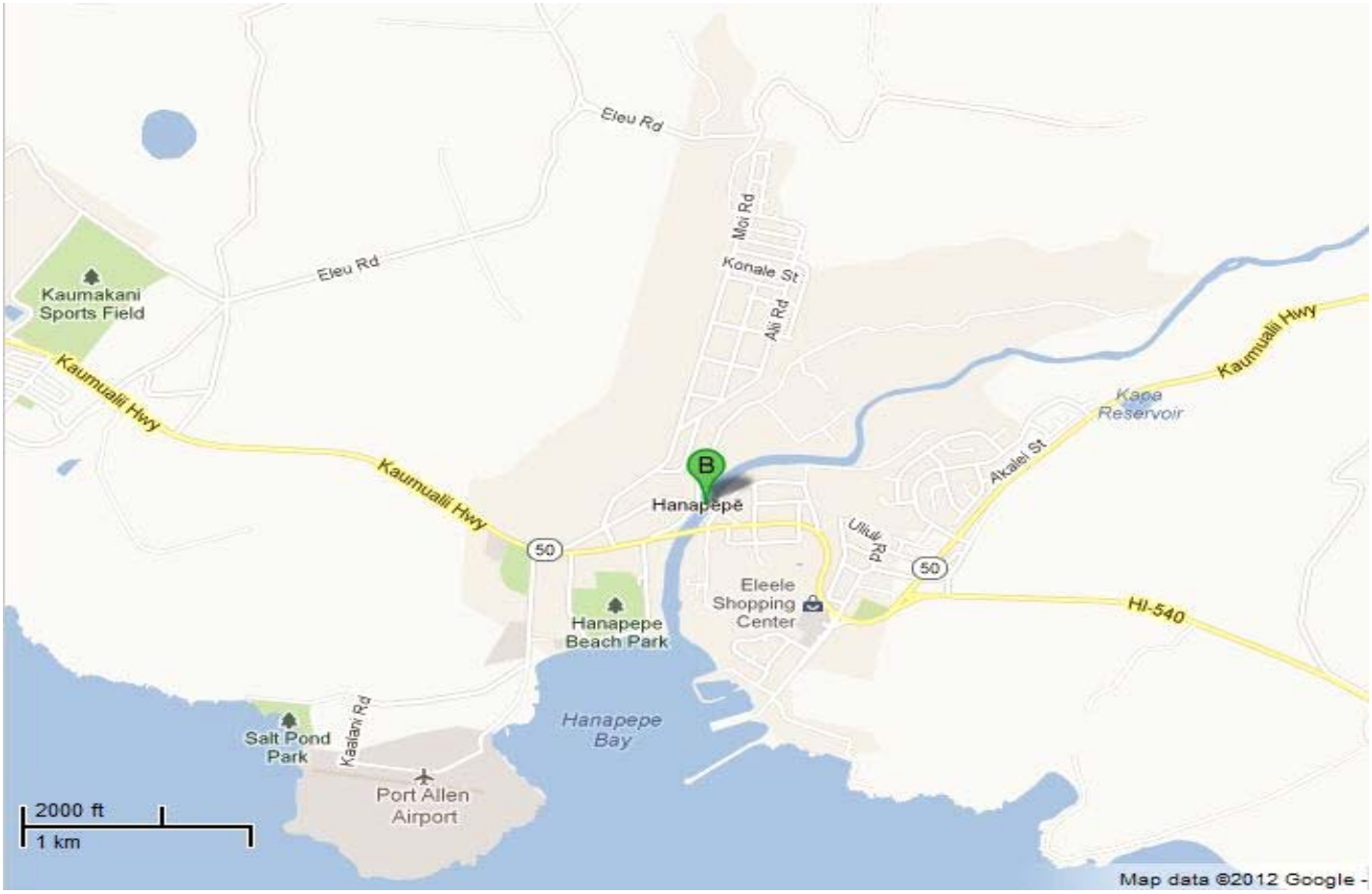
Location: TMK: 1-9-04 & 1-9-10

Historic Name: Hanapepe Bridge

Designer/Engineer: Joseph H. Moragne

Builder/Contractor: George R. Ewart, Jr. and T. Brandt

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1911	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1927	
Alteration Type(s):		
Alteration Description(s): Addition of cantilevered concrete walkway at south parapet wall		

Bridge Information

Number of Spans: 4	**Max Span:** 49.0 ft.	**Total Length:** 200.0 ft.	**Deck Width:** 23.9 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features: Pipe railing at sidewalk; date of brige (1911) incised on north parapet wall			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Hanapepe Bridge, a reinforced concrete deck girder structure, was constructed in 1911 to carry Hanapepe Road over the Hanapepe River. The Kauai Belt Road was constructed in the 1930s bypassing the town and the majority of traffic utilized the new Hanapepe Highway Bridge, thus Hanapepe Road became a secondary transportation artery.

The Hanapepe Bridge retains its integrity of location. The setting has undergone moderate change, with the erection of levees along the Hanapepe River. In 1927, a reinforced concrete sidewalk was added to the original structure. Since this change is more than fifty years old, it is considered part of the history of the design, and does not impact the historic integrity of the original bridge. The original reinforced concrete material of the bridge remains intact, however there has been some deterioration in the concrete parapet walls as a result of collisions. The workmanship of the original bridge is quite high and is not substantially obscured by additions or repairs. The historic quality of the bridge is obvious to travelers due to its early twentieth-century design and narrowness, as well as its physical relationship to the new bridge constructed downstream.

Significance Statement:

The Hanapepe Bridge is significant for its contributions to the fields of transportation and engineering in Hawaii. The bridge is an excellent example of an early twentieth-century reinforced concrete deck girder bridge. The Hanapepe Bridge is eligible under Criterion A as a prominent product of the early territorial government's public works program, and for its significant contributions to the development of Kauai's transportation system and the early history of Hanapepe town. The bridge is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. The bridge is also representative of the "work of a master": Joseph Moragne of the County of Kauai Engineer's Office.

The Hanapepe Bridge is one of the early examples of the progressive Territorial Highway System in Hawaii and is one of the first examples of the use of formal engineering expertise in bridge making by the new territorial government after the annexation of Hawaii by the United States. The 1911 Territorial Legislature had appropriated, in Act 166, $100,000 for Kauai's Belt Road and bridges. This bridge was the first erected on Kauai with these funds. (1) The bridge played a major role in the development of the county's belt road plan which connected previously isolated communities with a paved highway and a series of concrete bridges. The 1911 Hanapepe Bridge is the third bridge erected in that location, replacing an earlier metal truss. (2) The Hanapepe Bridge is an excellent example of bridge construction on Kauai in the early twentieth century, employing new reinforced concrete technology. The bridge is one of the oldest reinforced concrete deck girder bridges in the islands and the longest bridge of its type in the state pre-WWII. With a maximum span of forty-eight feet and a total length of two hundred feet, the bridge was significantly larger and more technically complex than other bridges constructed during this period. County Engineer, J. H. Moragne was instructed to draw up plans and specifications and call for bids for the bridge's reinforced concrete superstructure and piers. (3) The contract was awarded to George R. Ewart, Jr. and T. Brandt for the low bid of $11,950. The 1927 sidewalk addition was designed by the County Engineer of that time, R. L. Garlinghouse at a cost of $2,600.42. (4)

(1) "Loan Com. in Busy Meeting," Garden Isle (September 26, 1911): 1, 6.
(2) "Work Begins at Hanapepe Bridge," Garden Island (16 May 1911): 1.
(3) "Tenders, concrete Bridge," Garden Island (August 8, 1911): 1.
(4) Spencer Mason Architects, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, (Honolulu, 1989), 143.

Inventory Form
(County/Private)

General Information

Bridge Number: 007380021138001

Popular Name: Hoomana Overpass

Feature Crossed: Cane Haul Road

Feature Carried: Hoomana Road

Milepost: **County Private:** Kauai

Longitude: 159d-22m-25.11s **Latitude:** 21d-58m-33.13s

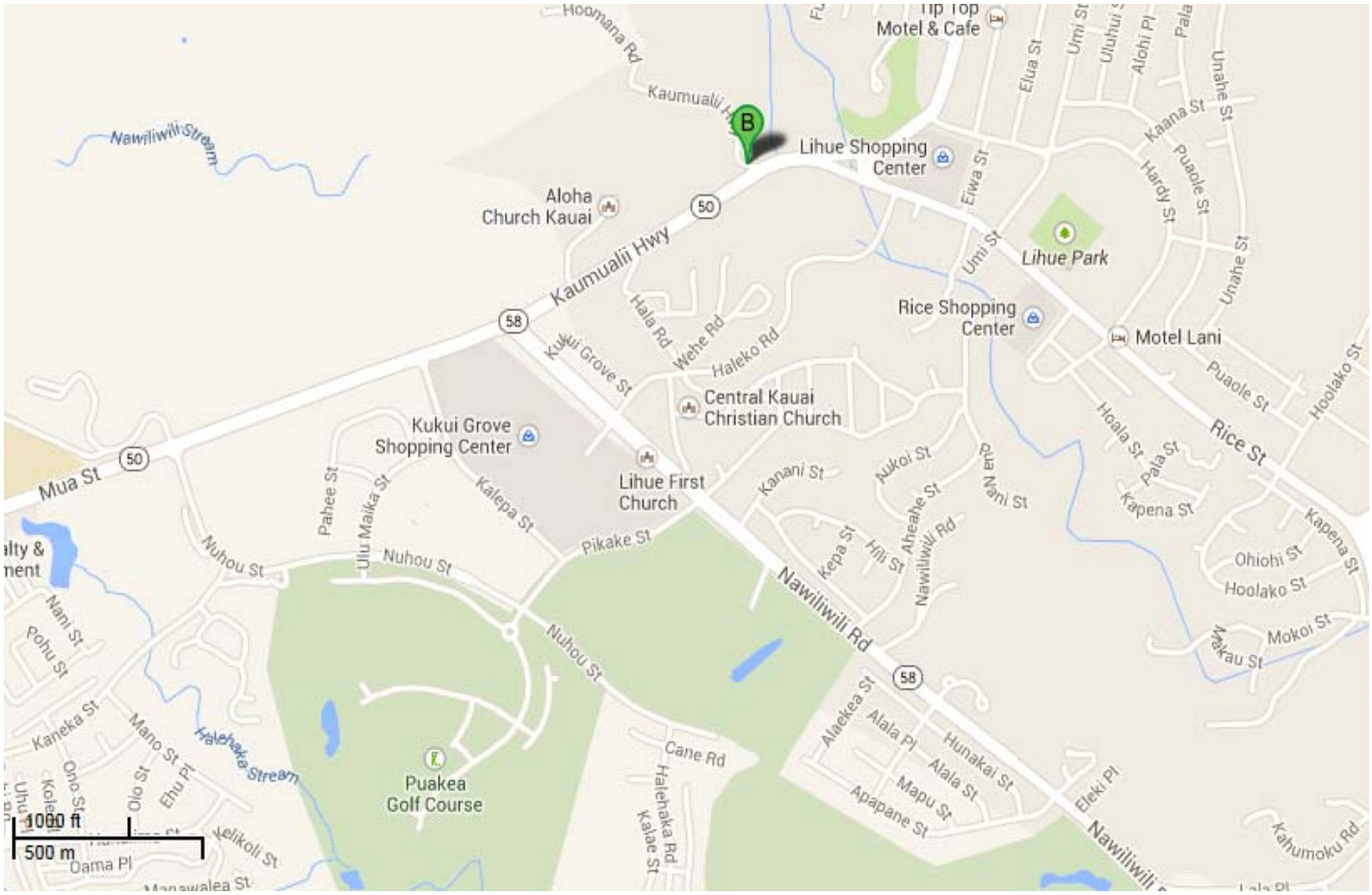
Location: TMK: 3-8-04 & 3-8-05

Historic Name: Hoomana Overpass

Designer/Engineer:

Builder/Contractor: Lihue Plantation, Kauai

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1928	**Replaced?** No
Altered? Yes **Alteration Date(s):** 2013		
Alteration Type(s):		
Alteration Description(s): Alteration to railings		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 20.8 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel			
Setting:			
Other Features: Date of bridge (1928) incised on outside of the top of railing on both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

Hoomana Overpass was built over the Lihue Plantation railroad alignment to the Lihue Sugar Mill in 1928.(1) This bridge is a common structural type, reinforced concrete flat slab. The year of construction is inscribed on each outer parapet. The bridge retains its original location and carrying Hoomana Road over the now defunct railroad alignment. In 2013 the new Lihue Mill Bridge will be build parallel to the Hoomana Overpass and the left side of the railings will be majorly impacted. It was associated with a mill access crossing and when it was built it crossed a part of the railroad line.

(1) Spencer Mason Architects, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1989), 74.

Significance Statement:

The Hoomana Overpass is significant for its contributions to the areas of engineering and transportation in Hawaii. The concrete slab overpass is eligible under Criterion A for its associations with Lihue Mill. The bridge is eligible under Criterion C as a representative example of a reinforced concrete flat slab bridge and a rare remaining example of a railroad overpass built by private enterprise.

The structure was built by Lihue Plantation in 1928 to accommodate the "new railroad line from their mauka (upslope) fields to the mill which eliminates the long haul via the hotel."(1) The Hoomana Overpass contributed to the economic success of the Lihue Plantation and hence, the town by shortening of the distance to the mill, and by eliminating a grade crossing in the heavily populated German town, the plantation's skilled-worker housing area.

Hoomana Overpass is one of the few remaining bridges in the state currently in public service that was originally built by private enterprise. It is one of two bridges remaining on Kauai (along with the adjacent Lihue Mill Bridge) that was originally built as a railroad crossing. The bridge's paneled rail design is typical of the period.

(1) "Reconstruction of Lihue Mill," Garden Island (Aug. 19, 1919): 1; "Lihue Plantation Completes New Rail Road Line to Mill," Garden Island (March 13, 1928): 1.

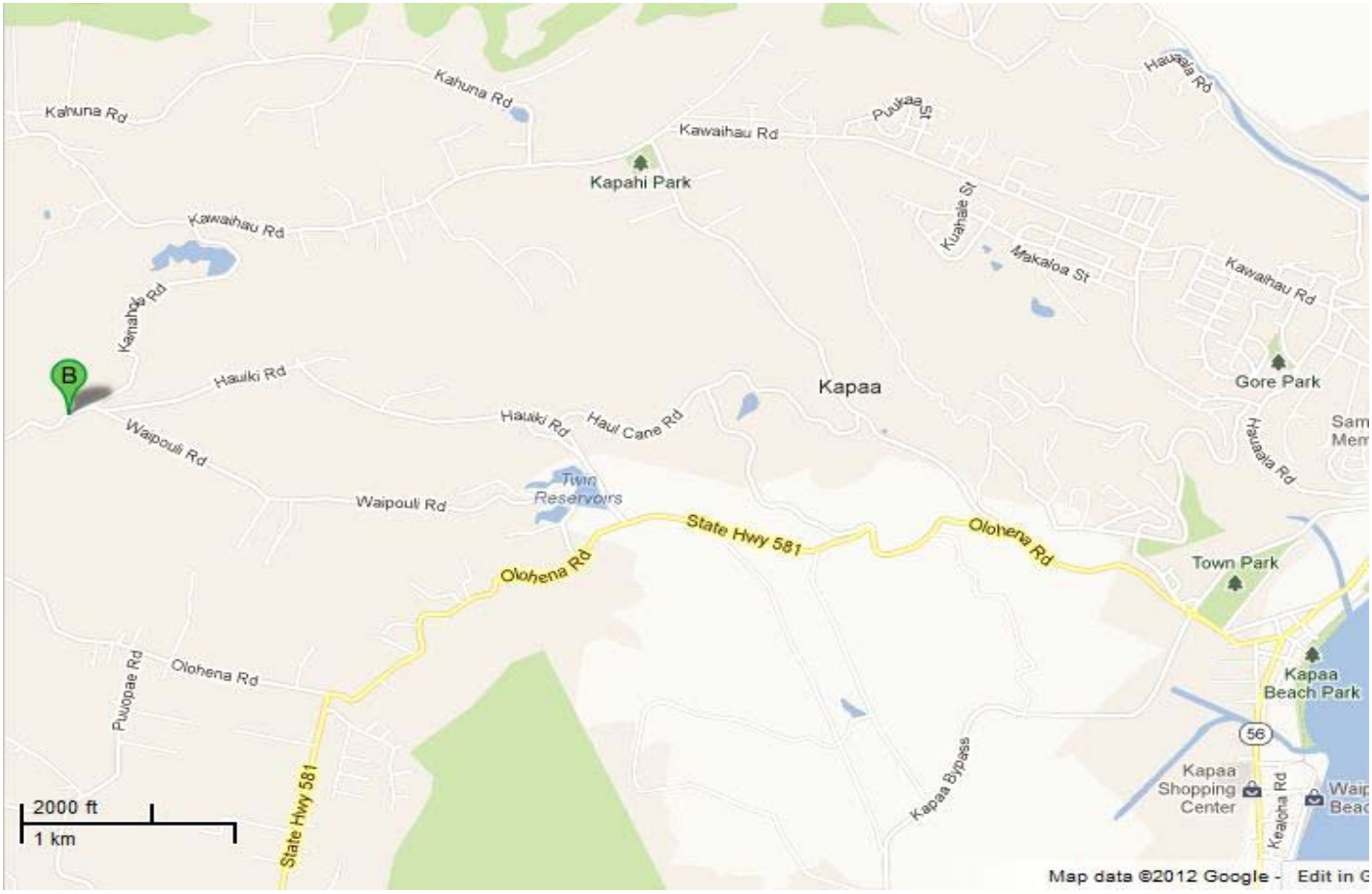
Inventory Form
(County/Private)

General Information

Bridge Number: 007440181144002	
Popular Name: Kainahola Bridge	
Feature Crossed: Kainahola Stream	
Feature Carried: Kainahola Road	
Milepost:	**County Private:** Kauai
Longitude: 159d-22m-15.32s	**Latitude:** 22d-05m-25.07s

Location: TMK: 4-4-04
Historic Name: Kainahola Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1950	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 31.0 ft.	**Total Length:** 38.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kainahola Stream Bridge No. 1 carries Kainahola Road across Kainahola Stream. This single-span steel stringer bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has no parapets but it has a concrete curb and at the ends of the approaching curbs are thrie beams. The reinforced concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. It is a good example of a 1950's steel stringer and reinforced concrete bridge atypical of its period in its use of materials and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 007460021146001

Popular Name: Kapahi Bridge

Feature Crossed: Kapaa Stream

Feature Carried: Kawaihau Road

Milepost: **County Private:** Kauai

Longitude: 159d-22m-32.62s **Latitude:** 22d-06m-03.71s

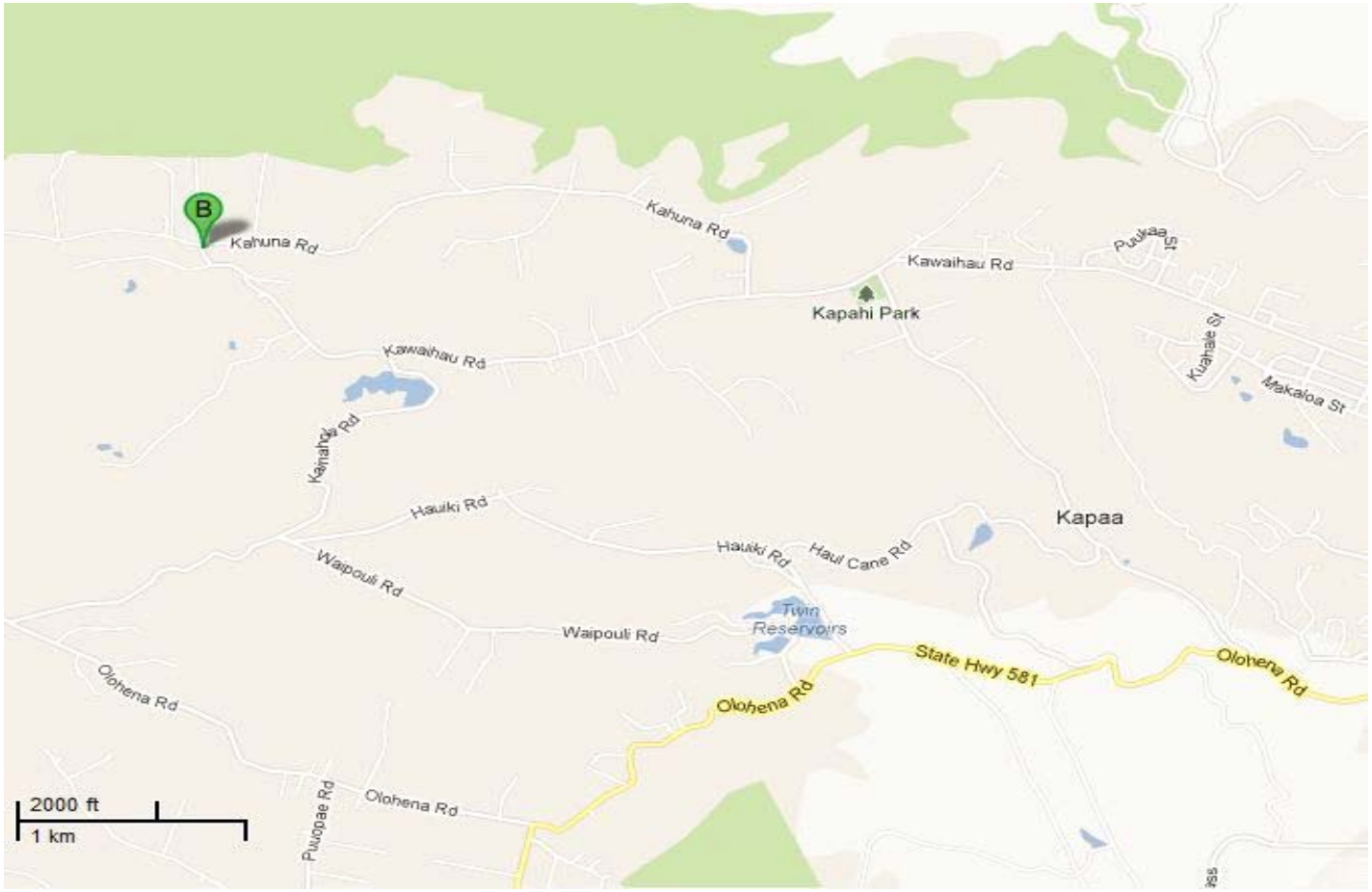
Location: TMK: 4-6-04

Historic Name: Kapahi Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1937	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1977, 2012	
Alteration Type(s):		
Alteration Description(s): Bridge deck was altered in 1977, railings were replaced in 2012		

Bridge Information

Number of Spans: 1	**Max Span:** 36.0 ft.	**Total Length:** 38.0 ft.	**Deck Width:** 16.3 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Planning and Development, Engineering		

Narrative Description:

The Kapahi Stream Bridge carries Kawaihau Road across the Kapaa Stream. This steel bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings. The timber deck is supported by concrete abutments. The Kapahi Bridge has undergone several design modifications over the years, including the addition of five steel girders in 1977 and the railings were replaced in 2012.

Significance Statement:

The present Kapahi Bridge appears to have its origins in 1937, when an earlier, 1907, bridge was widened. It performed an important transportation link for residents of Kapaa Homestead lands. The bridge represents a strong relationship with early to mid-twentieth century land use in the Kapaa Homesteads area. The bridge is also eligible under criterion C for its association with early developments in steel bridge construction in Hawaii. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. It is a good example of the 1930's steel bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

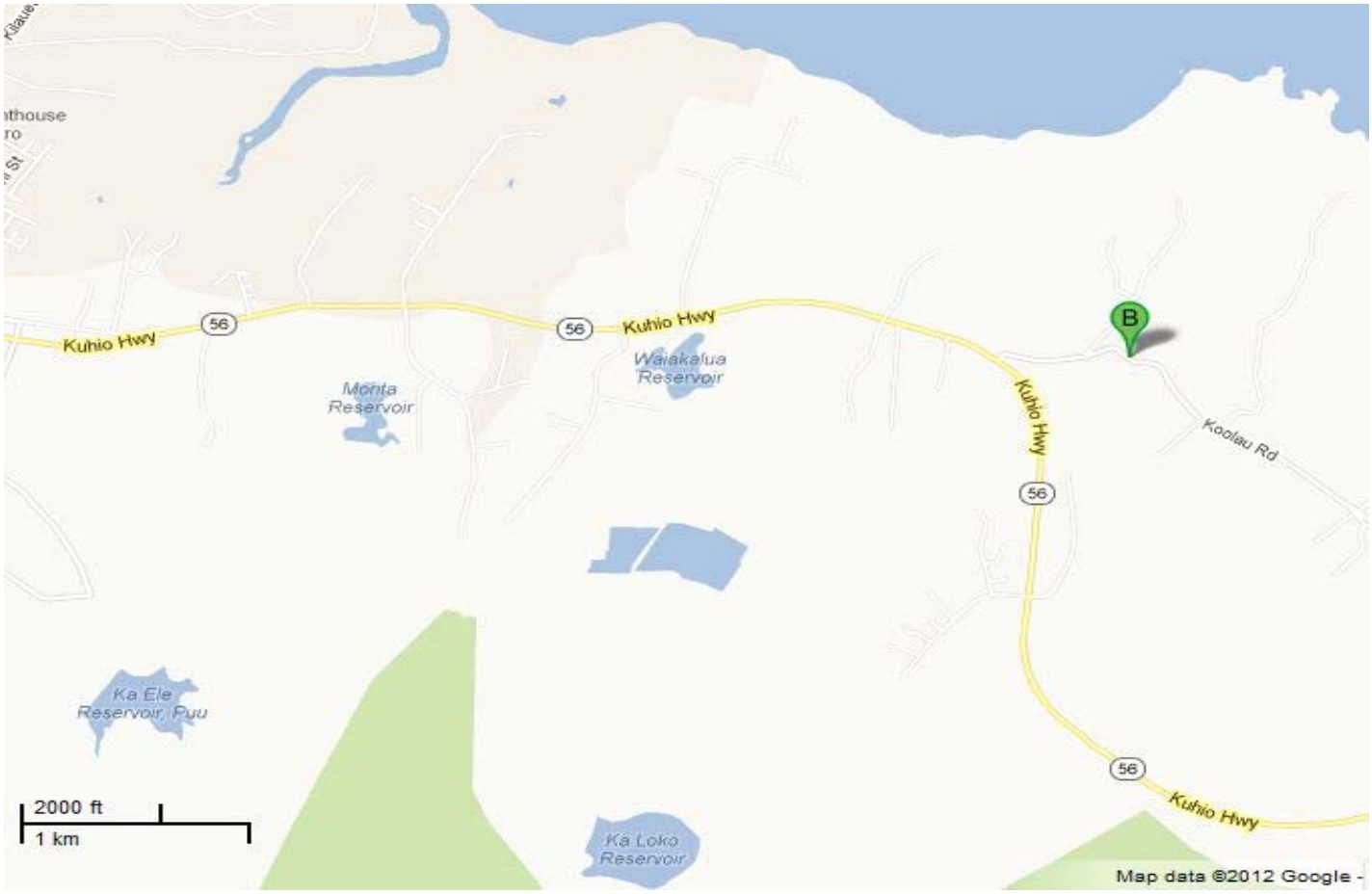
Inventory Form
(County/Private)

General Information

Bridge Number: 007510011151001	
Popular Name: Kiaki Bridge	
Feature Crossed: Waipake Stream	
Feature Carried: Koolau Road	
Milepost:	**County Private:** Kauai
Longitude: 159d-21m-23.24s	**Latitude:** 22d-12m-02.84s

Location: TMK: 5-1-03
Historic Name: Kiaki Bridge
Designer/Engineer: R. F. Middleton
Builder/Contractor: George Mahukona

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1913	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 38.0 ft.	**Total Length:** 78.0 ft.	**Deck Width:** 20.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features: Date of bridge (1921) incised on parapet wall			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Waipake Bridge, a reinforced concrete tee-beam structure, was constructed in 1921 to carry Koolau Road over the Waipake Stream. At the time of its construction, the Waipake Bridge was located on the original circum-island belt road. In the 1930s, Kuhio Highway was constructed to by-pass and straighten out the old belt road. The original bridge design, in three parts or sections, is very unusual, retains its integrity and has not been altered. The rural setting remains unchanged as there is no development nearby, however the original circum-island road was by-passed by a new highway in the 1930s. The original concrete material of the bridge has not been changed by major repairs but has been damaged by weathering and collisions. White paint has been applied to the concrete and has worn off unevenly. However, the high-quality workmanship of this bridge is still evident in the formwork and simple decorative elements. The feeling of historic quality is strong, due largely to its unusual three-part design. The association of this bridge with the first Belt Road and early County bridge building on Kauai is readily interpreted.

Significance Statement:

The Waipake Bridge is significant for its contributions to the fields of transportation and engineering in Hawaii. The Waipake Bridge is eligible under Criterion A as a prominent product of the early territorial government's public works program, and for its significant contributions to the development of Kauai's transportation system and the early history of Kilauea town. The bridge is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii.

The Waipake Bridge is a distinguishable entity because it is the only bridge on Kauai with such an unusual railing design. It is an unusual resource because it demonstrates the builder's creative adaptation of the academic plan to the site conditions. This bridge was built by the County, without involvement by the territorial government. The County Engineer, R. F. Middleton, designed the bridge.(1) G.W. Mahukona began work on the bridge on October 1, 1921, and it was opened to traffic by December 26, 1921, although it was not completed until February 1922.(2) Because it was built during the rainy season, the detour road became quite a bog and the Garden Island noted that "complaints have been piling up."(3) This was probably the reason the bridge was opened to traffic before work was complete.

The Waipake Bridge is an excellent example of bridge construction in the early twentieth century period on Kauai, employing new reinforced concrete technology. The bridge is one of the oldest reinforced concrete tee-beam bridges in the island of Kauai. The Waipake Bridge is of a common structural type on Kauai, reinforced concrete-tee beam. It is an excellent example of its period largely due to its unique three-part railing design. The engineering of the bridge was complex, due to its skewed plan. There is definite artistic value in the three-part railing design, with the central paneled portion and alternating blocks and voids in the outer sections of the railings. Reflecting the skew, or slant, in the overall plan, all of the elements are also rhombus-shaped in plan, including the paneled piers, hipped caps, and blocks. This skewing was apparently the builders' response to the angle the bridge makes with the road, since the plan drawing shows right-angled piers and posts.

(1) "Tenders for Concrete Bridge," Garden Island (August 2, 1921): 7.
(2) "Supervisors Hold Regular Monthly Meeting," Garden Island (October 18, 1921): 2; (January 17, 1922): 2; (Feb. 7, 1922): 5.
(3) "Autoists Complain About Detour," Garden Island (December 13, 1921): 8.

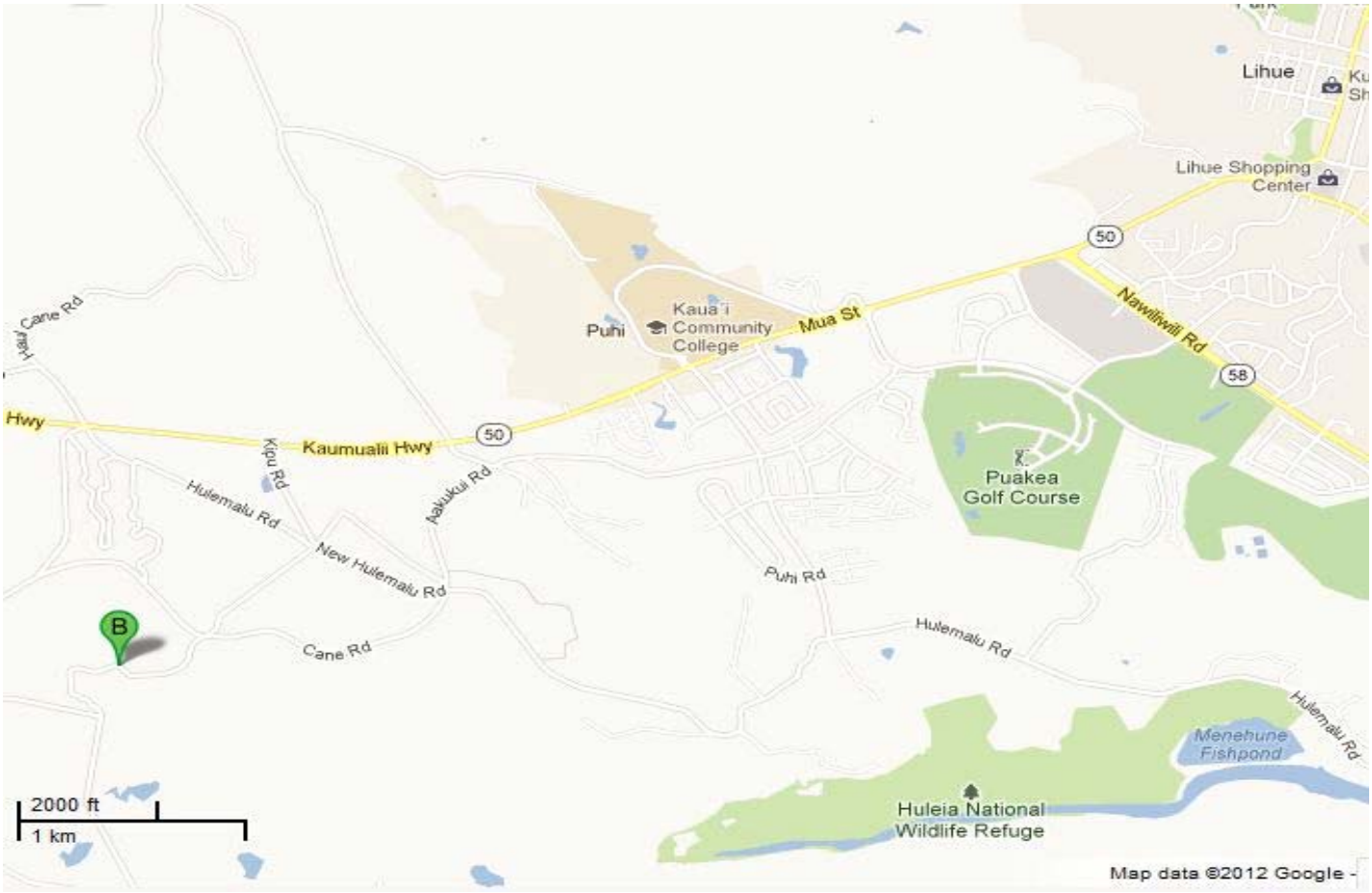
Inventory Form
(County/Private)

General Information

Bridge Number: 007340011134001	
Popular Name: Kipu Bridge	
Feature Crossed: Huleia Stream	
Feature Carried: Kipu Road	
Milepost:	**County Private:** Kauai
Longitude: 159d-25m-12.86s	**Latitude:** 21d-57m-08.95s

Location: TMK: 3-1-03
Historic Name: Kipu Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1914	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 37.0 ft.	**Total Length:** 148.0 ft.	**Deck Width:** 19.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Huleia Stream Bridge carries Kipu road across the Huleia Stream. This reinforced concrete bridge is in its original location, the material remains intact but in the poor condition. The bridge has concrete solid parapets with tapered caps. The workmanship of the bridge has not been obscured by additions or repairs. The simple design of the bridge and solid parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example and one of the oldest of the 1910's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 007120061112001	
Popular Name: Kokee Bridge	
Feature Crossed: Waipa Stream	
Feature Carried: Kokee Road	
Milepost:	**County Private:** Kauai
Longitude: 159d-42m-01.04s	**Latitude:** 22d-00m-21.85s

Location: TMK: 1-2-02:23
Historic Name: Kokee Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1920	**Replaced?** No
Altered? Yes **Alteration Date(s):** 2005		
Alteration Type(s):		
Alteration Description(s): Replaced railings		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 26.7 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kokee Bridge carries Kokee Road across the Waipa Stream. This concrete flat slab bridge is in its original location and is generally in fair condition. The bridge has original solid panel parapets with flat caps on the upstream side and thrie beams on downstream side. In 2005 the parapets were replaced. The concrete deck is supported by concrete abutments. The simple design of the bridge and original parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of an early 1920's reinforced concrete slab bridge that is typical of its period in its use of materials, method of constriction, craftsmanship, and design.

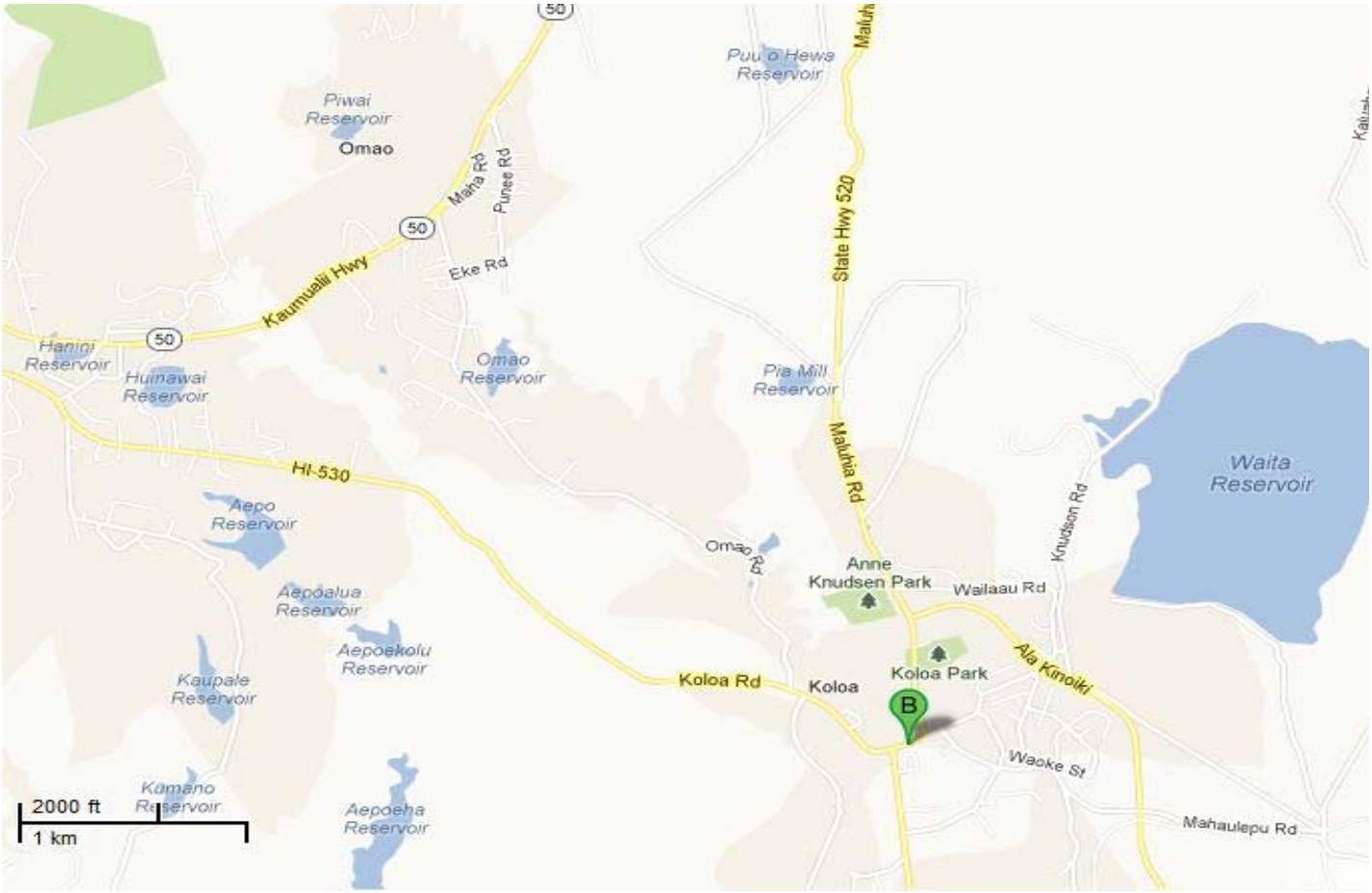
Inventory Form
(County/Private)

General Information

Bridge Number: 007270100828001	
Popular Name: Koloa Road Bridge	
Feature Crossed: Waikomo Stream	
Feature Carried: Koloa Road	
Milepost:	**County Private:** Kauai
Longitude: 159d-27m-56.50s	**Latitude:** 21d-54m-14.45s

Location: TMK: 2-8-07
Historic Name: Koloa Road Bridge
Designer/Engineer: R. L. Garlinghouse
Builder/Contractor: S. Honjiyo

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 19.0 ft.	**Total Length:** 43.0 ft.	**Deck Width:** 49.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Date of bridge (1928) incised on parapet ends			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Koloa Bridge, a reinforced concrete tee-beam structure, was constructed in 1928 to carry Koloa Road over the Waikomo Stream. It is wider than most bridges constructed around the same time. At the time of its construction, the Koloa Bridge was located on the original circum-island belt road. In the 1930s, Koloa Highway was constructed to by-pass and straighten out the old belt road. The Koloa Bridge is in its original location in historic Koloa town. At the time of the bridge's construction, the adjacent sugar mill was already a ruin. The town now depends on tourism, rather than sugar, for its economic support, but most of the buildings in the vicinity of the bridge have been retained and renovated. The bridge's original design retains its integrity and has not been altered. The setting remains unchanged, however the original circum-island road was by-passed by a new highway in the 1930s. The original concrete material of the bridge has not been changed by major repairs but has been damaged by weathering and collisions. Koloa Bridge is one of many concrete tee-beam type on Kauai. The engineering complexity could be considered standard for the period. However, the high-quality workmanship of this bridge is still evident in the formwork and simple decorative elements, such as the paneled parapet. There is a definite historic feeling, due largely to the bridge's location in historic Koloa Town. The association of this bridge with early county bridge building on the first belt road, as well as with the history of Koloa Town can easily be interpreted.

Significance Statement:

The Koloa Bridge is significant for its contributions to the fields of transportation and engineering in Hawaii. The Koloa Bridge is eligible under Criterion A as a prominent product of the territorial government and the County of Kauai's public works program, and for its significant contributions to the development of the island's transportation system and the early history of Koloa town. The bridge is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii.

The Koloa Bridge was funded under the Territorial Loan Fund program. On the plans drawn by R. L. Garlinghouse, the Kauai County Engineer, there is a notation, "Item 52, Act 271, S.L. 1927." This item in the Loan Fund Act of the 1927 Session Laws lists an appropriation of $75,000 for concrete bridges on Kauai. The County Engineer was instructed to draw up plans in June 1928, and these were approved by the Board of Supervisors in August 1928.(1) Since Territorial Loan funds were involved, the approval of the Territory's Superintendent of Public Works was also necessary, so the contract was not awarded until November 1928.(2) S. Honjiyo had the low bid of $7,692.95.(3) The construction of the bridge was very rapid; despite flooding during its progress, the concrete work was completed by the end of December 1928.(4) The Garden Island noted, "When finished it will be one of the outstanding concrete bridges on the island and it will greatly improve traffic conditions in a highly growing traffic center."(5) Thus, it appears that the construction of this bridge was a significant event for Koloa. At that time, this bridge was part of the belt road system.(6) The bridge it was replacing probably dated from 1919. (7) The plans for the existing bridge show the previous bridge in this location was only thirty-two feet wide, which apparently was too narrow. When the bridge was opened to traffic, the Garden Island stated that the fifty-foot [outside-to-outside measurement] bridge "is the widest on the island," with room for three cars to pass and a sidewalk on one side.(8)

(1) "Supervisors Hold Regular Meeting," Garden Isle (June 19, 1928): 3.
(2) Spencer Mason Architects, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1989), 118.
(3) "Honjiyo Awarded Contract for Koloa Mill Bridge," Garden Isle (November 13, 1928): 1.
(4) "Work Progresses on Koloa Bridge," Garden Isle (December 4, 1928): 1.
(5) "Concrete Work on Koloa Mill Bridge Complete," Garden Island (December 25, 1928): 1.
(6) Ethel Damon, Koamalu, 2 vols. (Honolulu: Star-Bulletin Press, 1931).
(7) "Meeting of Supervisors: A Record of Progress," Garden Isle (September 9, 1919): 1 & 4.
(8) "Koloa Bridge Open for Traffic Sunday," Garden Island (January 22, 1929): 1.

Inventory Form
(County/Private)

General Information

Bridge Number: 007230411123003

Popular Name: Lawai Bridge

Feature Crossed: Lawai Stream

Feature Carried: Lauoho Road

Milepost: **County Private:** Kauai

Longitude: 159d-30m-26.94s **Latitude:** 21d-55m-15.21s

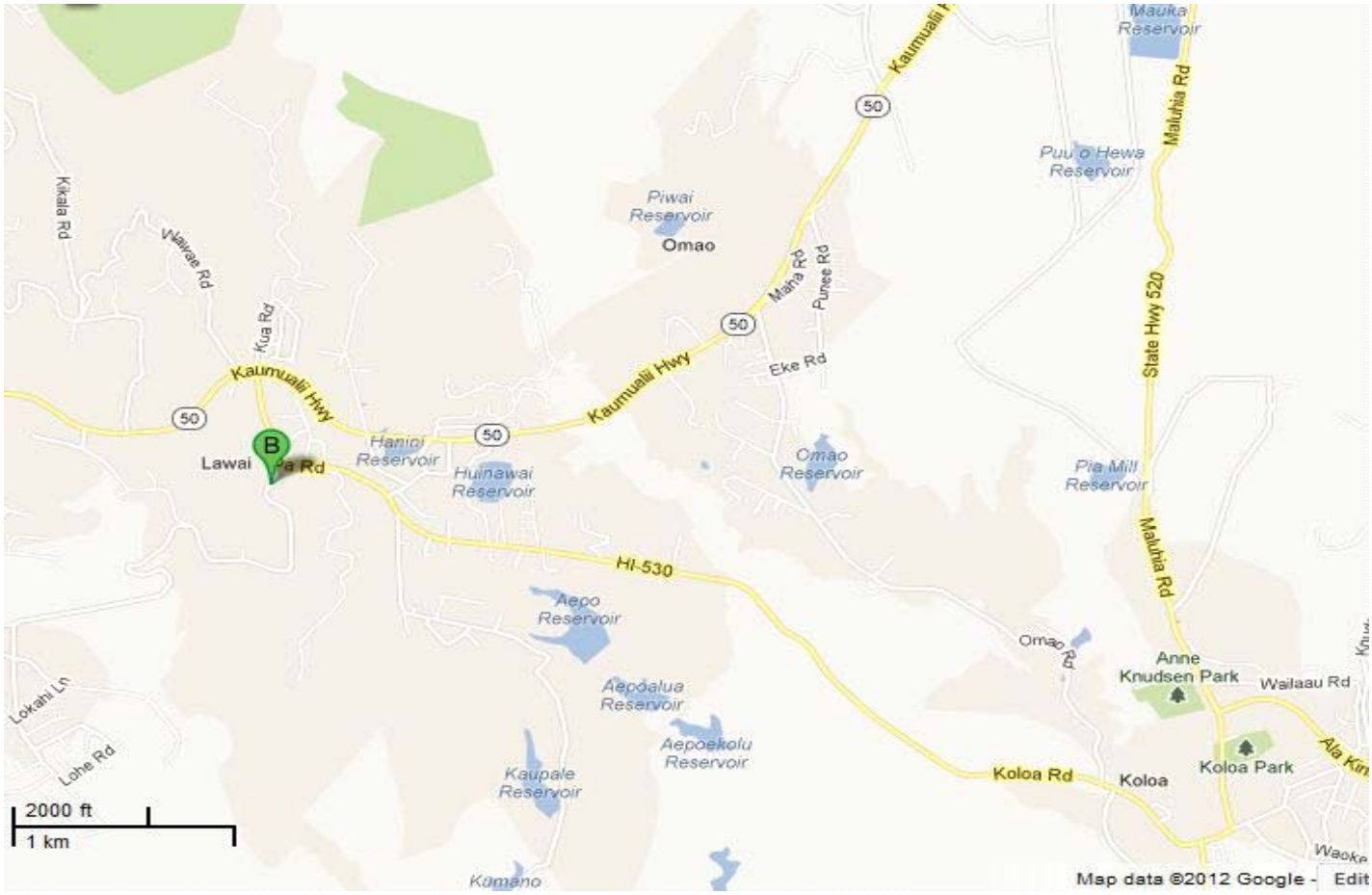
Location: TMK: 2-5-04

Historic Name: Lawai Bridge

Designer/Engineer: Joseph H. Moragne (1929)

Builder/Contractor: S. Honjiyo (1929)

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1919	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1929, 1964	
Alteration Type(s):		
Alteration Description(s): Widening and straightening of bridge with a 4-foot sidewalk (1929); replacement of damaged concrete parapet with metal piperail (1964)		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 63.0 ft.	**Deck Width:** 32.6 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Lawai Stream Bridge, a reinforced concrete solid-spandrel arch deck bridge, was constructed (circa 1907) to carry Lauoho Road over the Lawai Stream near the old pineapple cannery. In 1929, the bridge was widened by the addition of a four-foot wide concrete sidewalk and widened again in 1964. The date of construction for the original bridge has not been definitely established; however it is identical to bridges built on the islands of Hawaii and Oahu from standard plans issued by the territorial government in 1904-05. The cannery was built in 1907 and, most likely, the improved road and bridge date from that time. The bridge is the only remaining arch deck structure on Kauai. The Lawai Stream Bridge retains its integrity of location. The setting has not changed substantially since the construction of the cannery in 1907. The bridge has been seriously damaged by storms at least twice. County records indicate that the bridge was rebuilt in 1964 after approximately “one-third of the Lawai Stream Bridge was demolished by floodwaters.”(2) However, most of the damage appears to have been sustained by the approach and parapet rails; the concrete arch appears intact and unaltered. A metal pipe rail has replaced the damaged parapets. The workmanship of the original bridge is quite good and is not obscured by the later additions and repairs. The historic quality of the bridge is obvious to travelers due to its unusual construction type; its historic associations with the cannery are probable, and cannot be confirmed without further research.

(1) Spencer Mason Architects, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1989), 39.

Significance Statement:

The Lawai Stream Bridge is significant for its contributions to the fields of transportation and engineering in Hawaii. The Lawai Stream Bridge is eligible under Criterion A as a prominent product of the early territorial government's public works program, and for its significant contributions to the development of Kauai's transportation system and the early history of Lawai. The bridge is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii, and as a rare remaining example of a once-common bridge type. Arch bridges are also an uncommon bridge type. The bridge was among the first reinforced concrete arch bridges in the islands and it is the only arch bridge remaining on Kauai. The design was technically innovative and the construction of the bridge can be considered a milestone design. The 1929 alteration of the bridge is representative of the "work of a master": Joseph Moragne of the County of Kauai Engineer's Office.

The Lawai Stream Bridge is one of the early examples of the progressive Territorial Highway System in Hawaii and is one of the earliest examples of the use of formal engineering expertise in bridge making by the new territorial government after the annexation of Hawaii by the United States. The arch bridge is an excellent example of bridge construction in the early twentieth century period on Kauai, employing new reinforced concrete technology. The Lawai Stream Bridge was one of a series of concrete arch bridges that ushered in a new era in bridge development after 1904. Bridges heretofore had been constructed of timber, stone or metal, but the new Territorial Superintendent of Public Works, C. S. Holloway, strongly recommended concrete arches for small spans. His assistant, J.H. Howland, sent prints of several of this type of bridge to each island's Road Engineer to encourage the Road Boards to adopt this type of bridge.(1) The bridge is the only reinforced concrete arch deck bridge on the island and one of only approximately five of this type remaining in the state. The design of the Lawai arch is identical to bridges constructed on Hawaii island (including Mamalahoa-Puuokalepa and Mamalahoa-Waiaama Bridges), as well as the Waipahu Street-Waikele Stream arch on Oahu.(2)

(1) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii and A History of Road and Bridge Development on the Island of Hawaii, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1987b), 193.
(2) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii and A History of Road and Bridge Development on the Island of Hawaii, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1987b), 193.

Inventory Form
(County/Private)

General Information

Bridge Number: 007120061112002

Popular Name: Mana Bridge No. 1

Feature Crossed: Mana Stream

Feature Carried: Kokee Road

Milepost: **County Private:** Kauai

Longitude: 159d-42m-53.58s **Latitude:** 21d-58m-22.61s

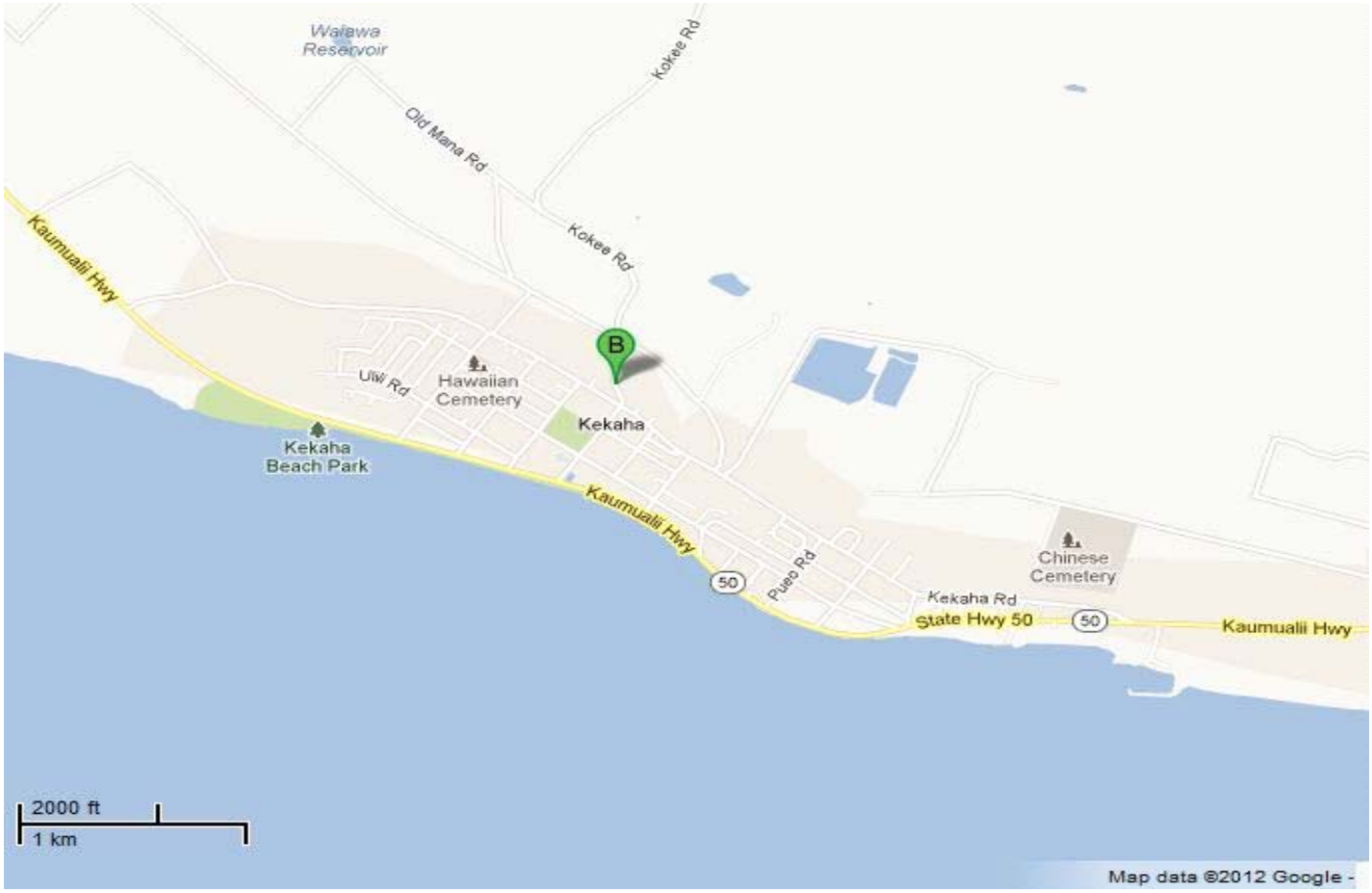
Location: TMK: 1-2-02

Historic Name: Mana Bridge No. 1

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 26.7 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Mana Bridge carries Kokee Road across the Mana Stream. This reinforced concrete flat slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has open horizontal parapets with flat caps. The concrete deck is supported by concrete rubble masonry abutments. The parapet has been painted white. The workmanship of the bridge has not been obscured by additions or repairs. The simple beam and post design of the parapet with the single horizontal opening retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials and method of constriction. The bridge has artistic value for craftsmanship and design. This is one of the only 1930s bridges to have a beam and post design. The wooden form work of this poured in place concrete bridge is apparent, unlike pre-cast concrete features on newer bridges.

Inventory Form
(County/Private)

General Information

Bridge Number: 007350011135001

Popular Name: Nawiliwili Bridge

Feature Crossed: Nawiliwili Stream

Feature Carried: Paena Loop

Milepost: **County Private:** Kauai

Longitude: 159d-21m-09.51s **Latitude:** 21d-57m-38.59s

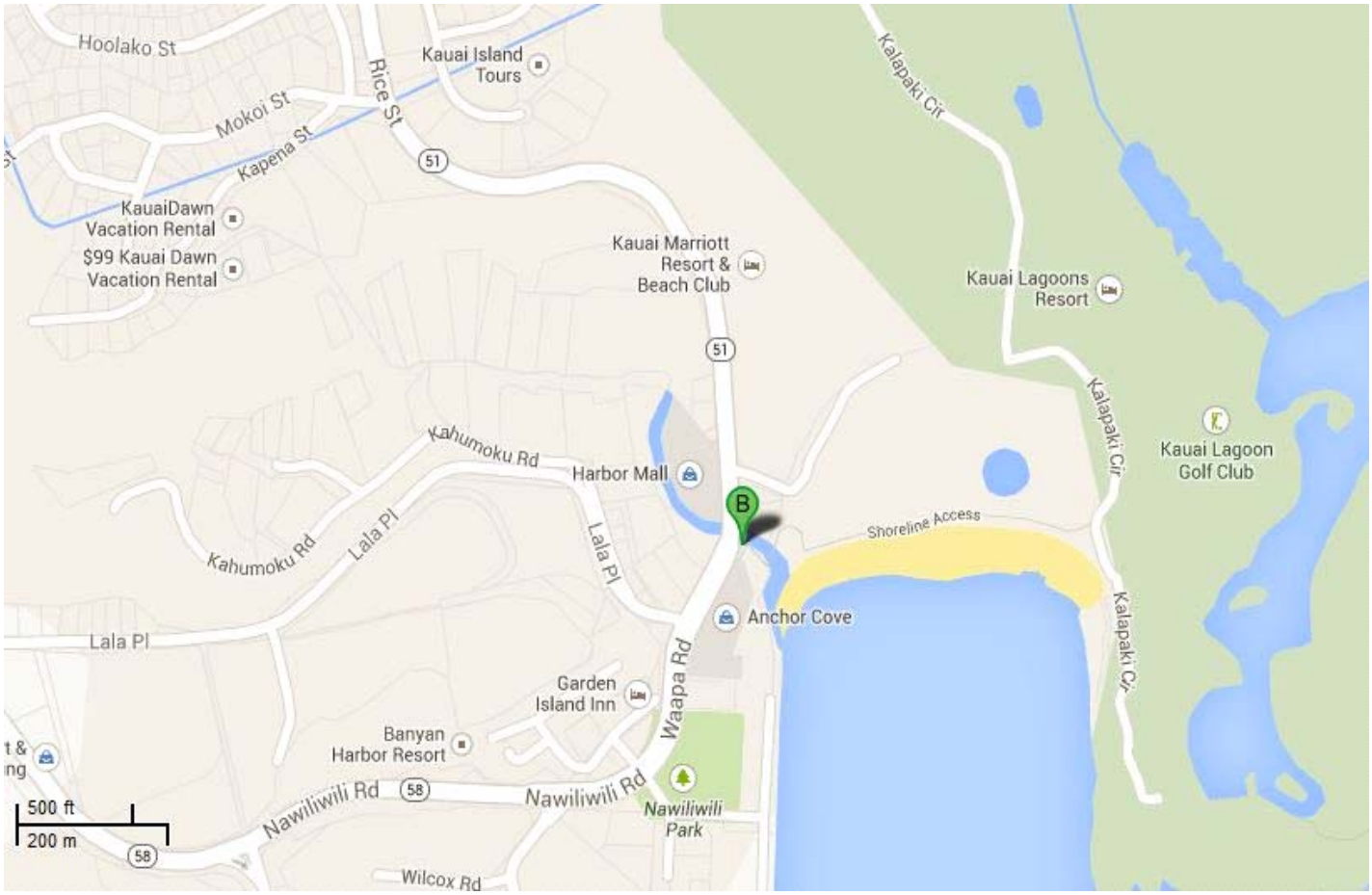
Location: TMK: 3-2-06:1

Historic Name: Nawiliwili Bridge

Designer/Engineer: Joseph H. Moragne

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 50.0 ft.	**Total Length:** 53.0 ft.	**Deck Width:** 29.0 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Date of bridge construction (1920) incised on mauka parapet			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Nawiliwili Stream Bridge, a reinforced concrete deck girder structure, was constructed in 1920 to carry the Old Government Road over the Nawiliwili Stream. At the time of its construction, the Nawiliwili Stream Bridge was located on the primary road to Nawiliwili Harbor. The bridge is also known as a “Duke’s Bridge”. The Nawiliwili Stream Bridge is in its original location near Nawiliwili Harbor. The setting has changed substantially, since the original county road was by-passed by a new roadway. Further, the shoreline area has become extensively developed for resort use in the last decade. The bridge’s original design retains its integrity and has not been altered. The original concrete material of the bridge has not been changed by major repairs but has been affected by spalling and other types of deterioration in small areas. The Nawiliwili Stream Bridge is one of two reinforced concrete deck girder bridges on Kauai (the other is the 1911 Hanapepe Bridge). The engineering complexity could be considered standard for the period. However, the workmanship of this bridge is still evident in the formwork and simple decorative elements, such as the paneled parapet. There is a definite historic feeling, due largely to the bridge’s unusual medial parapet. The association of this bridge with early county bridge building, as well as with the development of shipping in Lihue can be interpreted by an informed observer.

Significance Statement:

The Nawiliwili Stream Bridge is significant for its contributions to the fields of transportation and engineering in Hawaii. The Nawiliwili Stream Bridge is eligible under Criterion A as a prominent product of the County of Kauai's public works program, and for its significant contributions to the development of the island's transportation system and the history of Nawiliwili Harbor. The bridge is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. Moreover, the bridge is representative of the "work of a master": Joseph H. Moragne of the Kauai County Engineer's Office. It is also the longest concrete bridge with the longest concrete span built post-war (1945) on the island of Kauai in the historic study period prior to 1969.

The Nawiliwili Stream Bridge is a good example of county bridge construction in the early twentieth century period on Kauai. The bridge is one of two remaining reinforced concrete deck girder bridges on the island and has the longest span of its type pre-WWII. With a maximum span of fifty feet, the bridge was more technically complex than other bridges constructed during this period. The Nawiliwili Stream Bridge was funded entirely by the County of Kauai. (1) The plans were drawn by Joseph H. Moragne, the Kauai County Engineer; the builder is unknown.

(1) Spencer Mason Architects, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1989), 163.

Inventory Form
(County/Private)

General Information

Bridge Number: 007420151142001

Popular Name: Opaekaa Bridge

Feature Crossed: Opaekaa Stream

Feature Carried: Opaekaa Road

Milepost: **County Private:** Kauai

Longitude: 159d-22m-41.19s **Latitude:** 22d-03m-32.12s

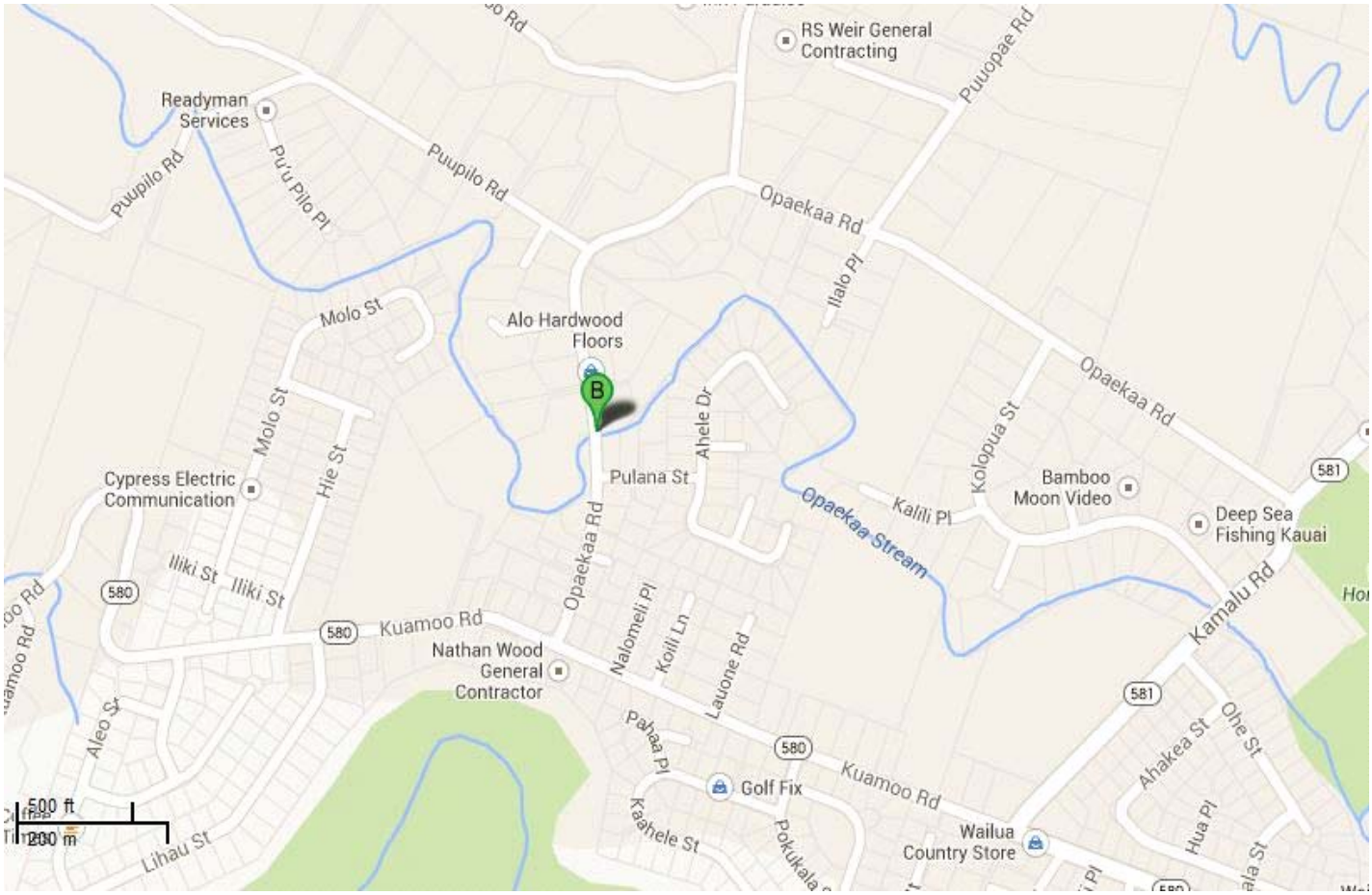
Location: TMK: 4-2-02

Historic Name: Opaekaa Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Truss	**Construction Date:** 1900	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 33.0 ft.	**Total Length:** 74.0 ft.	**Deck Width:** 14.9 ft.
Superstructure: Steel Pony Truss			
Substructure: Masonry Abutment and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Commerce, Engineering, Exploration/settlement, Industry, Transportation		

Narrative Description:

The bridge was placed in the current location in 1919.

See National Register of Historic Places Nomination Form

Significance Statement:

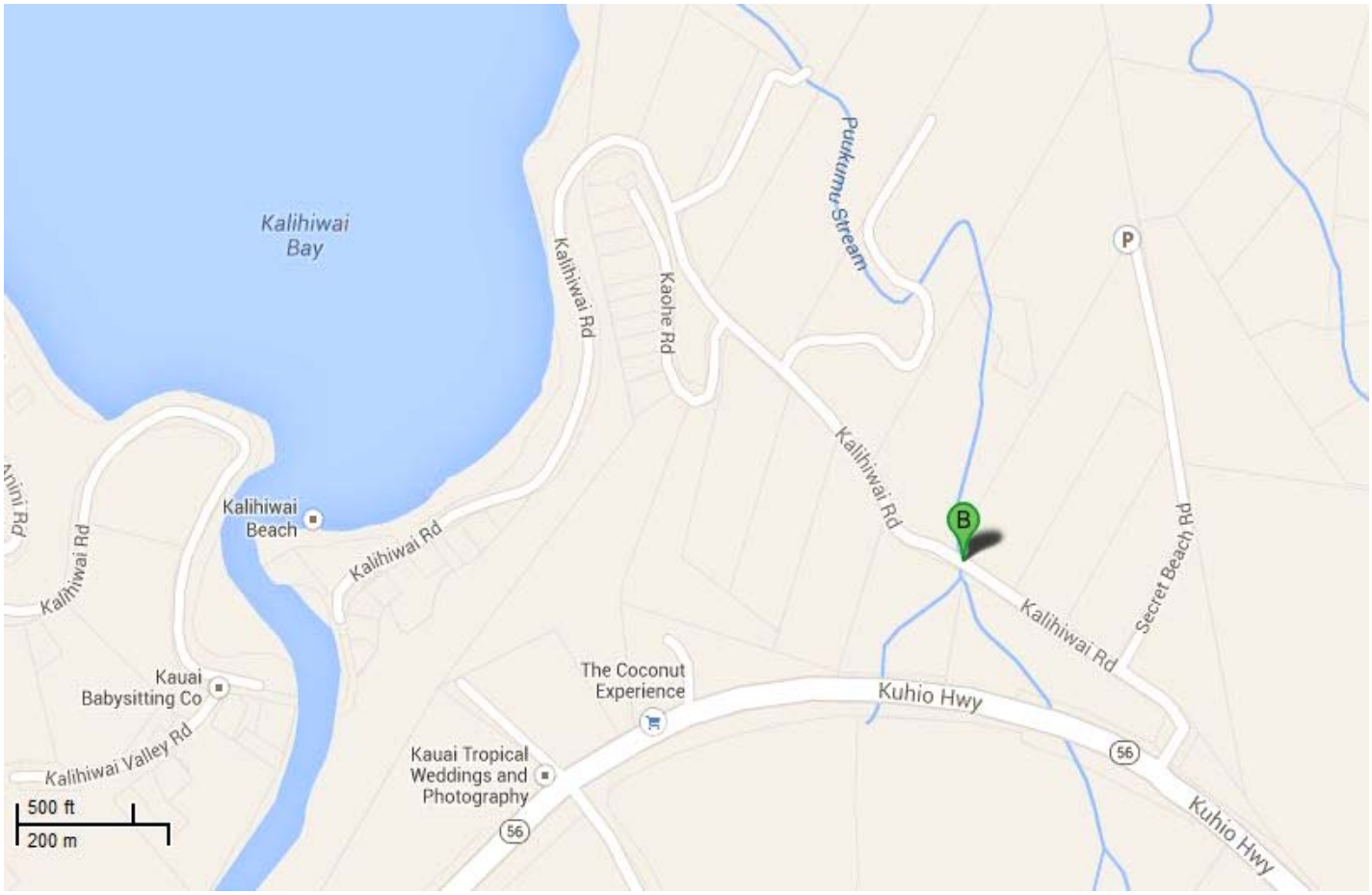
See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 007520171152002	
Popular Name: Puukumu Bridge	
Feature Crossed: Puukumu Stream	
Feature Carried: Kalihiwai Road	
Milepost: **County Private:** Kauai	
Longitude: 159d-25m-12.72s **Latitude:** 22d-12m-56.44s	
Location: TMK: 5-2-02	
Historic Name: Puukumu Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1913	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 19.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Puukumu Stream Bridge carries Kalihiwai Road across the Puukumu Stream. This reinforced concrete bridge is in its original location, but the setting has undergone little change. The bridge has concrete solid panel parapets with tapered caps. The concrete deck is supported by concrete rubble masonry abutments. The original reinforced concrete material of the bridge remains intact, however there has been some deterioration in the concrete parapet walls and cap as a result of collisions. The workmanship of the original bridge is quite high and is not substantially obscured by additions or repairs. The historic quality of the bridge is obvious to travelers due to its early twentieth-century design and narrowness.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of an early 1910's concrete tee beam bridge that is typical of its period in its use of materials, method of constriction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 007440111144001

Popular Name: Puuopae Bridge

Feature Crossed: Kalama Stream

Feature Carried: Puuopae Road

Milepost: **County Private:** Kauai

Longitude: 159d-22m-23.19s **Latitude:** 22d-04m-06.05s

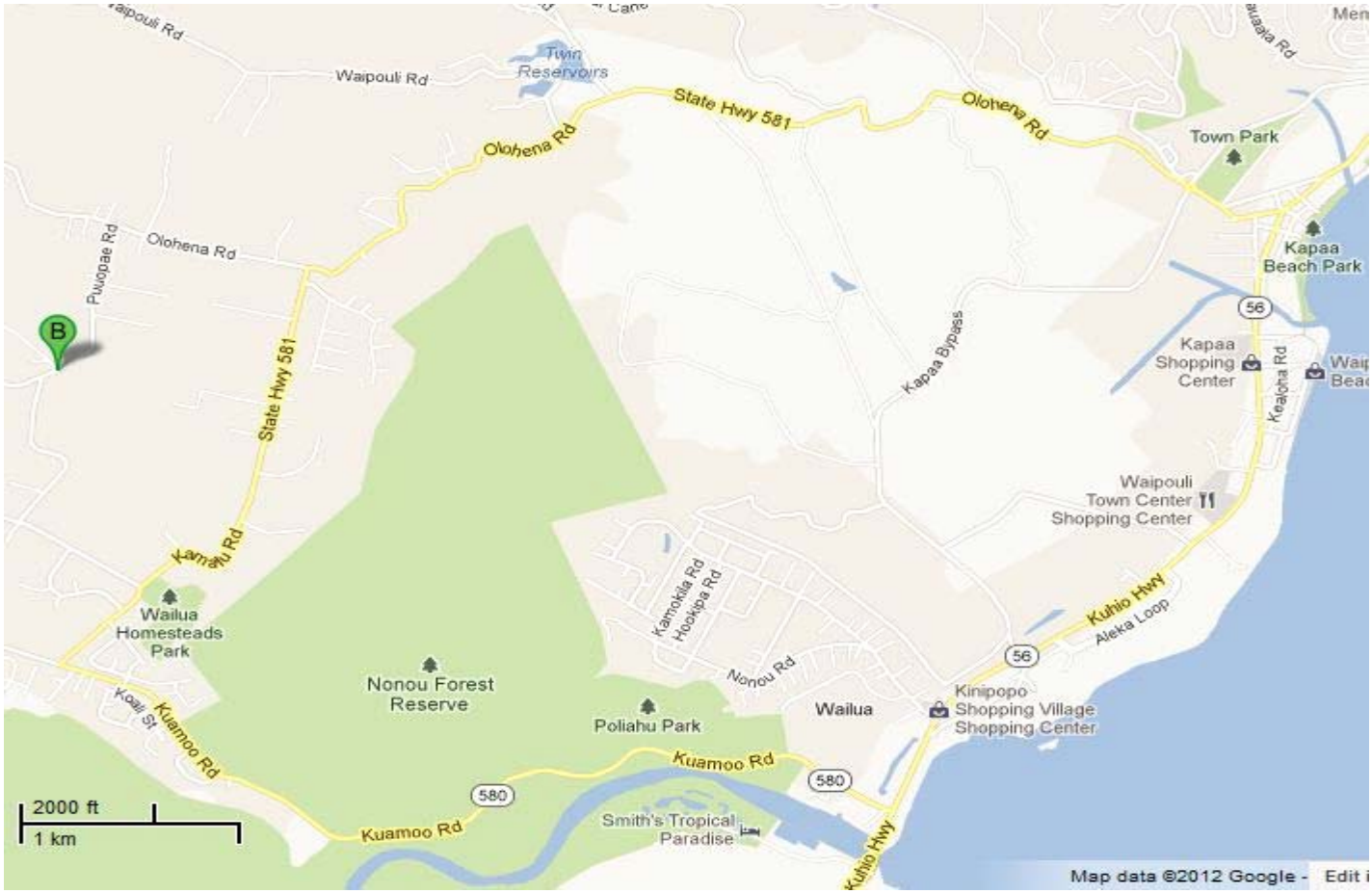
Location: TMK: 4-4-02

Historic Name: Puuopae Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1915	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1960, 2000	
Alteration Type(s):		
Alteration Description(s): Trusses removed and replaced with girders in 1960, Altered railings		

Bridge Information

Number of Spans: 1	**Max Span:** 44.0 ft.	**Total Length:** 48.0 ft.	**Deck Width:** 13.2 ft.
Superstructure: Steel Two-Girder			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Social History, Exploration/settlement, Community Planning and Development, Transportation, Commerce		

Narrative Description:

The Puuopae Bridge crossing Kalama Stream was a truss bridge when it was first built in 1915 however, it went through major structural changes starting in 1958 and finished in 1960 where the trusses were removed and replaced with two steel girders.

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 007280500728003	
Popular Name: Wailana Bridge No. 2	
Feature Crossed: Wailana Stream	
Feature Carried: Maluhia Road	
Milepost: 3.11 mi.	**County Private:** Kauai
Longitude: 159d-27m-56.44s	**Latitude:** 21d-54m-23.03s

Location: TMK: 2-8-04 & 2-8-06
Historic Name: Wailana Bridge No. 2
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): Pedestrian bridge added.		

Bridge Information

Number of Spans: 1	**Max Span:** 25.0 ft.	**Total Length:** 28.0 ft.	**Deck Width:** 25.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Wailana Stream Bridge #2 carries Maluhia road across the Wailana Stream. This reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid parapets with flat caps. A pedestrian walkway with a timber deck and chain link fence was added to the upstream side of the bridge. The construction date of the bridge, 1936 is engraved on the parapet but half of the text is embedded under the heavy asphalt layer.

Significance Statement:

The bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete girder bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 007280500728001	
Popular Name: Wailana Bridge No. 4	
Feature Crossed: Wailana Stream	
Feature Carried: Maluhia Road	
Milepost: 0.80 mi.	**County Private:** Kauai
Longitude: 159d-28m-03.98s	**Latitude:** 21d-56m-20.41s

Location: TMK: 2-7-02
Historic Name: Wailana Bridge No. 4
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1910	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 17.0 ft.	**Total Length:** 46.0 ft.	**Deck Width:** 31.4 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Wailana Stream carries Maluhia road across the Wailana Stream. This reinforced concrete bridge is in its location, is generally in good condition, and its materials remain intact. The bridge has concrete solid parapets with flat caps. The concrete deck is supported by the concrete abutment. The northeast corner of the parapet is damaged however, the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1910's reinforced concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

chapter 4

o a h u

I. ISLAND OF OAHU

Map of Oahu

(Map taken from Google map)

Oahu History

Oahu: With an area of 607.7 square miles, Oahu (also known as The Gathering Place) is the third largest island. It is formed of two mountain ranges, the Koolau on the east and the Waianae on the west. Lava flows from both have joined to create a central plain, the Leilehua Plateau, and a raised coral reef forms the south shore of the island and parts of the remaining coast. In both mountain ranges are amphitheater-headed valleys and spectacular cliffs. The island has no active volcanoes but many extinct craters, notably Diamond Head, Koko Head, and Punchbowl.

As the seat of state government and business, the island of Oahu led the islands in road and bridge construction due to its greater population and tax base. Post World War I, Oahu became an essential component of the strategic role the United States played in the Pacific. After the 1941 bombing of Pearl Harbor and Hawaii's subsequent entry into World War II, construction of highways and bridges deemed vital for National Defense was accelerated. Today, Oahu is primarily urban and contains some of Hawaii's most expensive and technologically complex road construction projects, including a major highway system around the island and three tunnels (Wilson, Likelike, and the H-3) through the central mountains. Although Oahu had the earliest and greatest number of bridges constructed in the islands, intensive development has led to the destruction and reconstruction of many early examples.

II. BRIDGE MATRIX: OAHU

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
003000830303803	Ahuimanu Stream (Hui Iwa)	Ahuimanu Stream	Kahekili Highway	1963	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000780400001	Aiea Interchange No. 2	Kamehameha Highway	Moanalua Freeway	1966	Steel Stringer	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000991202143	Aiea Interchange No. 4	Kamehameha Higway	Aiea Heights Access Road	1965	Steel Stringer	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000780000049	Aiea Interchange Pedestrian Overpass	Moanalua Freeway (Aiea Interchange Pedestrian Overpass)	Pedestrian	1966	Concrete Girder	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990402120	Aiea Stream	Aiea Stream	Kamehameha Highway	1938	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations in 1965. The bridge does not reflect the typical characteristics of a 1930s bridge and does not fall under Program Comments due to its construction date in 1938.	n/a
003000920400861	Ala Wai Canal	Ala Wai Canal	Ala Moana Boulevard	1939	Concrete Tee Beam	Metal Horizontal	No	Non-Contributing	• Associated with the Ala Wai Canal and development of Waikiki district • Located within the Waikiki special district • See National Register of Historic Places Nomination Form on Ala Wai Canal in appendices for related information	4 - 34
003000930300071	Awawanui Stream	Awawanui Stream	Old Farrington Highway	1927	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete tee beam bridge	4 - 37
003000631100418	Burmeister Overpass	Likelike Highway (Burmeister Overpass)	Private Road	1959	Concrete Girder	Concrete Open Horizontal	No	Eligible	• Built as a result of the Territory refusing to build the mauka entrance to Edward R. Burmeister Kalihi Valley land from the current Likelike Highway	4 - 40
003098001400116	Central Intermediate Pedestrian Overpass	Vineyard Boulevard	Pedestrian	1957	Concrete Tee Beam	Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. This pedestrian overpass was constructed to mitigate the extension of North Vineyard Boulevard to connect with the H-1 Freeway. The extension separated Central Intermediate School from its playground area.	n/a
003000830304369	Double 12 ft. x 10 ft. Concrete Box Culvert	Unnamed Stream	Kamehameha Highway	1933	Concrete Box Culvert	Metal Thrie Beam	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
003090001400038	Double Section Plate Pipe Culvert	Unknown Stream	Farrington Highway	1965	Metal Corrugated Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000720401801	Double-Cell Box Culvert	Unnamed Stream	Kalanianaole Highway	1958	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003009301101728	Farrington Highway-Waialua Plantation Road	Farrington Highway	Plantation Road	1940	Steel Stringer	Concrete Open Horizontal	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of a 1940's reinforced concrete and steel stringer bridge • Bridge is not publicly accessible	4 - 43
003071001400224	Former Halawa Ridge Road	Former Halawa Ridge Road	Halawa Heights Road	1952	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830303604	Haiamoa Stream-Double 10 ft. x 5 ft. Concrete Box Culvert	Haiamoa Stream	Kamehameha Highway	1922	Concrete Box Culvert	Concrete Solid	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
003000830303252	Hakipuu Stream	Hakipuu Stream	Kamehameha Highway	1922	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's concrete tee beam bridge	4 - 46
003000990402211	Halawa Stream (Eastbound)	Halawa Stream	Kamehameha Highway	1934	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations. In 2009 the bridge was rehabilitated and widened. The superstructure has been completely replaced however the original piers and pile foundations remain.	n/a

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Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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003000990402212	Halawa Stream (Westbound)	Halawa Stream	Kamehameha Highway	1945	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge	4 - 49
003000830302169	Hauula Stream	Hauula Stream	Kamehameha Highway	1932	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 52
003000830303972	Heeia Stream Culvert	Heeia Stream	Kahekili Highway	1963	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000830301357	Hoolapa Stream-Nanahu	Hoolapa Stream	Kamehameha Highway	1931	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's concrete tee beam bridge	4 - 55
003074001400274	Ihiihilauakea Stream	Ihiihilauakea Stream	Kalanianaole Highway	1931	Open Spandrel Arch	Metal Thrie Beam	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's open spandrel concrete arch bridge in Oahu	4 - 58
003000830302903	Kaaawa Stream	Kaaawa Stream	Kamehameha Highway	1927	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 61
003000830303575	Kaalaea Stream	Kaalaea Stream	Kamehameha Highway	1923	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 64
003000610300877	Kahanaiki Stream	Kahanaiki Stream	Kalanianaole Highway	1951	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000720700285	Kahawai Stream (East)	Kahawai Stream	Kalanianaole Highway	1926	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations in 1981. The bridge does not reflect the typical characteristics of a 1920s bridge and does not fall under Program Comments due to its construction date in 1926.	
003000830301785	Kahawainui Stream-Laiewai	Kahawainui Sream	Kamehameha Highway	1933	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 67
003009300500221	Kaiahi Stream (Makua) Double Concrete Box Culvert	Kaiahi Stream	Farrington Highway	1964	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000830302099	Kaipapau Stream	Kaipapau Stream	Kamehameha Highway	1932	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 70
003074000000432	Kalanianaole Highway-Lunalilo Home Road Pedestrian Overpass	Kalanianaole Highway	Pedestrian	1968	Concrete Tee Beam	Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990402053	Kalauao Springs (Eastbound)	Kalauao Springs	Kamehameha Highway	1936	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community	4 - 73
003000990402054	Kalauao Springs (Westbound)	Kalauao Springs	Kamehameha Highway	1945	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community	4 - 76
003000990402074	Kalauao Stream (Eastbound)	Kalauao Stream	Kamehameha Highway	1936	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community due to bridge widening in 1966	4 - 79
003000990402075	Kalauao Stream (Westbound)	Kalauao Stream	Kamehameha Highway	1945	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community	4 - 82
003000920400363	Kalihi Stream	Kalihi Stream	Nimitz Highway	1945	Concrete Girder	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003062071400019	Kalihi Stream (Eastbound)	Kalihi Stream	Kamehameha Highway	1926	Concrete Girder	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to significant alterations. This bridge and Kalihi Stream Bridge (003062071400018) were originally separate bridges but in 1983 both were widened and combined at the median. Consultation is recommended due to long term replacement plans regarding existing view planes.	n/a
003000630400167	Kalihi Stream (Inbound)	Kalihi Stream	Likelike Highway	1957	Concrete Tee Beam	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with Likelike Highway. The bridge was also widened in 1986.	n/a
003000630400166	Kalihi Stream (Outbound)	Kalihi Stream	Likelike Highway	1957	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003062071400018	Kalihi Stream (Westbound)	Kalihi Stream	Kamehameha Highway	1943	Concrete Girder	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to significant alterations. This bridge and Kalihi Stream Bridge (003062071400019) were originally separate bridges but in 1983 both were widened and combined at the median. Consultation is recommended due to long term replacement plans regarding existing view planes.	n/a
003000630400557	Kalihi Stream 3-Cell Concrete Box Culvert	Kalihi Stream	Likelike Highway	1954	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000630400087	Kalihi Street Overpass No. 1	H-1 (Kalihi Street Overpass No. 1)	Likelike Highway	1959	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003000630400081	Kalihi Street Overpass No. 2	H-1 (Kalihi Street Overpass No. 2)	Likelike Highway	1960	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000630400095	Kalihi Street Overpass No. 3	H-1 (Kalihi Street Overpass No. 3)	Likelike Highway - H-1 On Ramp	1959	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003000630000087	Kalihi Street Pedestrian Overpass	H-1 (Kalihi Street Pedestrian Overpass)	Pedestrian	1959	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003000830302282	Kaluanui Stream	Kaluanui Stream	Kamehameha Highway	1926	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 85
003000830304273	Kamooalii Stream	Kamooalii Stream	Kamehameha Highway	1968	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830404123	Kamooalii Stream - Triple 12 ft. x 13 ft.	Kamooalii Stream	Likelike Highway	1959	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000830004187	Kaneohe Elementary School Pedestrian Overpass	Kamehameha Highway (Kaneohe Elementary School Pedestrian Overpass)	Pedestrian	1968	Concrete Girder	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830404094	Kaneohe Stream-Double 10 ft. x 8 ft. Concrete Box Culvert	Kaneohe Stream	Likelike Highway	1959	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003090001400136	Kapakahi Stream (West)	Kapakahi Stream	Farrington Highway	1964	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003009300501414	Kapalaau Stream	Kapalaau Stream	Farrington Highway	1940	Concrete Slab	Concrete Open Vertical	No	Not Eligible	The bridge has lost integrity due to the replacement of the railings.	n/a
003000920400480	Kapalama Canal (Eastbound)	Kapalama Canal	Nimitz Highway	1949	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000920400481	Kapalama Canal (Westbound)	Kapalama Canal	Nimitz Highway	1949	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003000800300071	Kaukonahua Bridge-Karsten Thot	Wahaiwa Reservoir	Kamehameha Highway	1932	Steel Truss	Metal Horizontal	No	High Preservation Value	• Excellent example of a late-period steel through-deck Warren truss bridge that was constructed during the depression era • One of three metal truss bridges remaining in the state • Associated with public works efforts by the City and County of Honolulu during the Territorial period in Hawaii • Uncommon use of steel material in Hawaii's extreme marine environment • Contributed to the economic development of central Oahu by providing reliable vehicular access from Honolulu to the north shore of the island • Associated with Karsten Thot	4 - 88
003000990300787	Kaukonahua Stream	Kaukonahua Stream	Wilikina Drive	1944	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Associated with the post-war Federal Aid program during buildup of National Defense program; connected Schofield Barracks to Dillingham Air Field in Mokuleia • Was constructed to connect Schofield Barracks to the Dillingham Air Field in Mokuleia (via Farrington Hwy) • Surrounding rural environment has remained intact and the bridge continues to provide a vital connection between central Oahu and the North Shore	4 - 91
003009300501748	Kaukonahua Stream	Kaukonahua Stream	Farrington Highway	1940	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge	4 - 94
003000830300939	Kaunala Stream	Kaunala Stream	Kamehameha Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Not Eligible	The bridge has lost integrity due to the addition of the concrete walkway with horizontal railings on one side of the bridge in 1989 and a utility pipe on the other side.	n/a
003000930301128	Kaupuni Stream	Kaupuni Stream	Farrington Highway	1937	Concrete Tee Beam	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to significant alterations in 1965. The bridge does not reflect the typical characteristics of a 1930s bridge and does not fall under Program Comments due to its construction date in 1937.	n/a
003063001400065	Kawa Stream	Kawa Stream	Kaneohe Bay Drive	1939	Concrete Tee Beam	Masonry Rock	No	High Preservation Value	• Associated with early developments in concrete masonry bridge construction in Hawaii • Good example of a 1930's masonry structure bridge • High artistic value	4 - 97
003074001400256	Kawaiakaiea Stream	Kawaiakaiea Stream	Kalanianaole Highway	1931	Concrete Tee Beam	Metal Thrie Beam	No	Not Eligible	This bridge has lost integrity due to the replacement of the railings with thrie beams in 1998. The abutments are also undistinguishable.	n/a
003009300501254	Kawaihapai Stream	Kawaihapai Stream	Farrington Highway	1941	Concrete Slab	Metal Thrie Beam	No	Not Eligible	The bridge has lost integrity due to the lack of character defining features and removal of the original railings. Along one side of the bridge the original railing remains however, it is obscured by thrie beams.	n/a
003000830300456	Kawailoa Stream	Kawailoa Stream	Kamehameha Highway	1929	Concrete Tee Beam	Concrete Solid	No	Not Eligible	The bridge has lost integrity due to the replacement of the parapets and bridge widening in 1985.	n/a
003000610401061	Kawainui Stream (Inbound)	Kawainui Stream	Kailua Road	1940	Concrete Slab	Concrete Open Greek Cross	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge • Associated with the Kailua area development	4 - 100
003000610401060	Kawainui Stream (Outbound)	Kawainui Stream	Kailua Road	1940	Concrete Slab	Concrete Open Greek Cross	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge • Associated with the Kailua area development	4 - 103
003000830301140	Kawela Stream	Kawela Stream	Kamehameha Highway	1931	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 106
003000930300346	Keananoio Stream (Inbound)	Keananoio Stream	Farrington Highway	1967	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003000930300345	Keananoio Stream (Outbound)	Keananoio Stream	Farrington Highway	1967	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990301447	Kipapa Stream	Kipapa Stream	Kamehameha Highway	1933	Concrete Tee Beam	Concrete Open Arched	No	High Preservation Value	• Also known as Roosevelt Bridge • Contributes to the fields of engineering and transportation in Hawaii. • Excellent example of reinforced concrete tee beam construction with an open concrete rail typical of 1930s bridges • Associated with important public works project initiated by the territorial government and constructed with Federal work relief programs funds during the Depression era • Associated with William R. Bartels, chief designer for the Territorial Highway Department	4 - 109
003063000000155	Kokokahi Pedestrian Overpass	Kaneohe Bay Drive	Pedestrian	1952	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. It is suspected as the first pedestrian overpass on Oahu. It is associated with the Kokokahi YMCA as it connected the waterfront and its camping cabins with the outdoor amphitheater and the residential community.	n/a
003000830301970	Koloa Stream-Laiemaloo	Koloa Stream	Kamehameha Highway	1933	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 112
003000610000045	Kuakini Street Pedestrian Overpass	Pali Highway (Kuakini Street Pedestrian Overpass)	Pedestrian	1962	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003074001400545	Kuapa Pond-Maunalua	Kuapa Pond	Kalanianaole Highway	1936	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations. In 1994 the bridge was also widened and the railings were replaced.	n/a
003000830301255	Kuilima-Oio Stream	Kuilima-Oio Stream	Kamehameha Highway	1931	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 115
003000630000234	Kula Kolea Pedestrian Overpass	Likelike Highway (Kula Kolea Pedestrian	Pedestrian	1960	Concrete Girder	Metal Horizontal	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003000720401307	Kuliouou Stream Bridge	Kuliouou Stream	Kalanianaole Highway	1936	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations which included bridge widening in 1994.	n/a
003000830301851	Laieloa Stream	Laieloa Stream	Kamehameha Highway	1932	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 118
003000830300339	Lauhulu Stream	Lauhulu Stream	Kamehameha Highway	1937	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design	4 - 121
003000H11102129	Liliha Access Road Separation	H-1	Liliha Access Road	1965	Concrete Rigid Frame	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000H11102134	Liliha Street Separation	H-1	Liliha Street	1965	Concrete Rigid Frame	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830302151	Maakua Stream-Muliwai	Maakua Stream	Kamehameha Highway	1932	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 124
003000830302196	Maheiwi Stream	Maheiwi Stream	Kamehameha Highway	1926	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 127
003000930300970	Mailiilii Stream	Mailiilii Stream	Farrington Highway	1949	Concrete Slab	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to bridge widening in 1976.	n/a

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003000930300832	Maipalaoa Stream	Maipalaoa Stream	Farrington Highway	1967	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to replacement of the railings on one side of the bridge in 1970.	n/a
003009300501436	Makalena Stream	Makalena Stream	Farrington Highway	1940	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge	4 - 130
003000830302791	Makaua Stream	Makaua Stream	Kamehameha Highway	1927	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 133
003009300500242	Makua Stream-Triple Concrete Box Culvert	Makua Stream	Farrington Highway	1964	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003000H11202486	Manoa-Palolo Stream (Old Waialae Road)	Manoa Palolo Stream	Old Waialae Road	1953	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000610400912	Maunawili Stream	Maunawili Stream	Kalanianaole Highway	1951	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000H11201934	Middle Street (H-1) Tunnel	H-1 (Middle Street Tunnel)	Middle Street	1964	Concrete Rigid Frame	No Parapet/Railing	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway. It was designed by Belt-Collins as a part of an early triple grade separation design.	n/a
003000H11201937	Middle Street (Outbound)	H-1	Middle Street	1964	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway. It was designed by Belt-Collins as a part of an early triple grade separation design.	n/a
003000930300481	Nanakuli Stream Bridge	Nanakuli Stream	Farrington Highway	1970	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1947 bridge in 1970.	n/a
003000720401418	Niu Stream	Niu Stream	Kalanianaole Highway	1934	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to road widening and the replacement of the railings in 1964. The bridge does not reflect the typical characteristics of a 1930s bridge and do not fall under Program Comments due to its construction date in 1934.	n/a
003009300501823	North (Lower) Poamoho Stream	North Poamoho Stream	Kaukonahua Road	1934	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 136
003000830302624	North Kahana Stream	North Kahana Stream	Kamehameha Highway	2011	Concrete Slab	Concrete Open Decorative	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1927 bridge in 2011.	n/a
003000830302412	North Punaluu Stream	North Punaluu Stream	Kamehameha Highway	1926	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 139
003000920400587	Nuuanu Stream (Eastbound)	Nuuanu Stream	Nimitz Highway	1952	Concrete Tee Beam	Concrete and Metal Decorative	No	Not Eligible	The bridge has lost integrity due to the replacement of the railings in 2002.	n/a
003000920400588	Nuuanu Stream (Westbound)	Nuuanu Stream	Nimitz Highway	1932	Concrete Tee Beam	Concrete Solid with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 142
003098001400077	Nuuanu Stream Bridge	Nuuanu Stream	Vineyard Boulevard	1959	Concrete Slab	Concrete Open Horizontal	No	Eligible	• Widest concrete bridge built post-war (1945) on the island of Oahu in the historic study period prior to 1969 • A part of the channelization of Nuuanu Stream where all the walls of the channel were built with concrete masonry	4 - 145

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Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

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003000610400112	Nuuanu Stream Kapena Falls	Nuuanu Stream Kapena Falls	Pali Highway	1962	Concrete Rigid Frame	Concrete and Metal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 148
003090001400245	Oahu Sugar Co. Road	Oahu Sugar Company Road	Farrington Highway	1952	Concrete Slab	Concrete Solid	No	Not Eligible	The bridge has lost integrity due to the replacement of the railings in 2006.	n/a
003000830300043	Opaelua-Waialua Twin B	Opaelua Stream	Joseph P. Leong Highway	1928	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Good example of reinforced concrete deck girder construction • Associated with public works efforts by the Territorial government and as important civic structures associated with the development of Haleiwa • Located within the County-designated Haleiwa Special Design District and contribute significantly to the historic character of the town	4 - 151
003000H11100006	Palailai Interchange	H-1	Kalaeloa Boulevard	1966	Concrete Girder	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000930300083	Palailai Stream	Palailai Stream	Old Farrington Highway	1927	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 154
003000610300593	Pali Bridge No. 3 (Inbound)	Mountain (Pali Bridge No. 3)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 157
003000610300616	Pali Bridge No. 4 (Inbound)	Mountain (Pali Bridge No. 4)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 160
003000610300615	Pali Bridge No. 4B (Outbound)	Mountain (Pali Bridge No. 4B)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 163
003000610300621	Pali Bridge No. 5 (Inbound)	Mountain (Pali Bridge No. 5)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 166
003000610300623	Pali Bridge No. 5A (Outbound)	Mountain (Pali Bridge No. 5A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 169
003000610300629	Pali Bridge No. 6 (Inbound)	Mountain (Pali Bridge No. 6)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 172
003000610300632	Pali Bridge No. 7 (Inbound)	Mountain (Pali Bridge No. 7)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 175

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Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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003000610300631	Pali Bridge No. 7A (Outbound)	Mountain (Pali Bridge No. 7A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 178
003000610300640	Pali Bridge No. 8 (Inbound)	Mountain (Pali Bridge No. 8)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 181
003000610300638	Pali Bridge No. 8A (Outbound)	Mountain (Pali Bridge No. 8A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 184
003000610400015	Pali Highway Overpass (Inbound)	H-1	Pali Highway	1960	Concrete Rigid Frame	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000610400014	Pali Highway Overpass (Outbound)	H-1	Pali Highway	1960	Concrete Rigid Frame	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000610300591	Pali Partial Bridge No. 1 (Inbound)	Mountain (Pali Partial Bridge No. 1)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 187
003000610300592	Pali Partial Bridge No. 2 (Inbound)	Mountain (Pali Partial Bridge No. 2)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 190
003000610300613	Pali Partial Bridge No. 4A (Outbound)	Mountain (Pali Bridge No. 4A)	Pali Highway	1961	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 193
003000610300619	Pali Partial Bridge No. 4C (Outbound)	Mountain (Pali Bridge No. 4C)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 196
003000610300569	Pali Tunnel No. 1 (Inbound)	Mountain (Pali Tunnel No. 1)	Pali Highway	1957	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 199
003000610300568	Pali Tunnel No. 1A (Outbound)	Mountain (Pali Tunnel No. 1A)	Pali Highway	1959	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 202

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003000610300596	Pali Tunnel No. 2 (Inbound)	Mountain (Pali Tunnel No. 2)	Pali Highway	1957	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 205
003000610300595	Pali Tunnel No. 2A (Outbound)	Mountain (Pali Tunnel No. 2A)	Pali Highway	1961	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 208
003000610400019	Pali-Lunalilo Overpass	H-1	Pali Highway - H-1 On Ramp	1960	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830302186	Papau Stream-Waipuhi	Papau Stream	Kamehameha Highway	1932	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 211
003000610400090	Partial Bridge No. 8	Unnamed Gulch	Pali Highway	1962	Concrete Tee Beam	Concrete and Metal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 214
003000830300869	Paumalu Stream	Paumalu Stream	Kamehameha Highway	1930	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 217
003000610400064	Pauoa Road Overpass	Pauoa Road	Pali Highway	1961	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Contributes to Pali Highway Historic Bridge District • See Pali Highway historic context Chapter 2.6 • Significant engineering of tunnels and bridges • Connected Windward side and downtown Honolulu • Associated with Windward side community development	4 - 220
003000610400044	Pauoa Stream Culvert	Pauoa Stream	Pali Highway	1925	Concrete Box Culvert	Concrete and Metal	No	Not Eligible**	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design. However the bridge concrete rubble masonry abutments and adjacent portion of concrete rubble masonry wall channelization project are potentially eligible historic resources.	n/a
003000990401871	Pearl City Stream (Eastbound)	Pearl City Stream	Kamehameha Highway	1936	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to significant alterations in 1962. The bridge does not reflect the typical characteristics of a 1930s bridge and does not fall under Program Comments due to its construction date in 1936.	n/a
003000990401872	Pearl City Stream (Westbound)	Pearl City Stream	Kamehameha Highway	1945	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990300626	Poamoho Stream	Upper Poamoho Stream	Kamehameha Highway	1936	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 223
003009300501315	Polipoli Stream	Polipoli Stream	Farrington Highway	1940	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the replacement of a railing on one side of the bridge in the 1976.	n/a
003009300500272	Punapohaku Stream-Double Concrete Box Culvert	Punapohaku Stream	Farrington Highway	1964	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003090001400114	Railroad Crossing (Highway Overpass)	Railroad Crossing	Farrington Highway	1939	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Associated with plantation industry; last major accommodation built by the FHWA for the railroad before it went out of business • Good example of a 1930's reinforced concrete bridge	4 - 226

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003000640400150	Sand Island Bascule Bridge	Harbor (Bascule Bridge)	Sand Island Parkway	1962	Steel Stringer	Concrete Solid	No	High Preservation Value	• Longest steel bridge with the longest steel span built post-war (1945) on the island of Oahu in the historic study period prior to 1969 • Uncommon use of steel material in Hawaii's extreme marine environment • Good example of a 1960's steel stringer and reinforced concrete bridge	4 - 229
003000920400592	Slip Cover No. 1-Honolulu Harbor	Honolulu Harbor	Nimitz Highway	1952	Concrete Slab	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000920400603	Slip Cover No. 2-Honolulu Harbor	Honolulu Harbor	Nimitz Highway	1952	Concrete Slab	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000920400609	Slip Cover No. 3-Honolulu Harbor	Honolulu Harbor	Nimitz Highway	1952	Concrete Slab	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000920400617	Slip Cover No. 4-Honolulu Harbor	Honolulu Harbor	Nimitz Highway	1952	Concrete Tee Beam	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000920400580	Slip Cover-Honolulu Harbor	Honolulu Harbor	Nimitz Highway	1952	Concrete Tee Beam	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830302637	South Kahana Stream	South Kahana Stream	Kamehameha Highway	1927	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 232
003000830302442	South Punaluu Stream	South Punaluu Stream	Kamehameha Highway	2011	Concrete Tee Beam	Concrete Open Decorative	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1926 bridge in 2011.	n/a
003000930400640	Ulehawa Stream	Ulehawa Stream	Farrington Highway	1963	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000720000030	Ulupii Pedestrian Overpass	Kalanianaole Highway (Ulupii Pedestrian Overpass)	Pedestrian	1967	Concrete Girder	Concrete Solid Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000830303396	Unnamed Stream (North Waiahole)	Unnamed Stream (North Waiahole)	Kamehameha Highway	1928	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 235
003000930301279	Unnamed Stream-Makaha No. 2A	Unnamed Stream	Farrington Highway	1937	Concrete Box Culvert	Metal Horizontal	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
003000930301404	Unnamed Stream-Makaha No. 3	Unnamed Stream	Farrington Highway	1937	Timber Stringer	Wood	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete tee beam bridge • The bridge is scheduled for replacement; MOA complete as of Summer 2013	4 - 238
003000930301412	Unnamed Stream-Makaha No. 3A	Unnamed Stream	Farrington Highway	1937	Timber Stringer	Wood	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete tee beam bridge • The bridge is scheduled for replacement; MOA complete as of Summer 2013	4 - 241
003000990300562	Upper Poamoho Stream-Brodie Camp 2 Bridge	Upper Poamoho Stream	Kamehameha Highway	1937	Concrete Slab	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the replacement of the railings in 1965.	n/a
003098001400160	Vineyard Blvd.-Lunalilo No. 2 On Ramp (Ramp B1)	Vineyard Boulevard	Vineyard Boulevard - H-1 On Ramp	1968	Concrete Girder	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830303459	Waiahole Stream (County)	Waiahole Stream	Kamehameha Highway	1922	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 244
003000H11202503	Waialae Road Separation	H-1	Old Waialae Road	1967	Concrete Girder	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a

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003000H11202476	Waialae Road Separation (Old Waialae Road)	H-1	Old Waialae Road	1953	Concrete Tee Beam	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. The bridge is also associated with the development of H-1 Freeway.	n/a
003000830301059	Waialee Stream	Waialee Stream	Kamehameha Highway	1931	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 247
003009300501794	Waialua Plantation Road	Farrington Highway	Plantation Road	1941	Concrete Slab	Metal Thrie Beam	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Associated with plantation industry in Hawaii • Good example of a 1940's reinforced concrete slab bridge	4 - 250
003000830300041	Waialua Twin A (Helemano)	Helemano Stream	Joseph P. Leong Highway	1928	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Good example of reinforced concrete deck girder construction • Associated with public works efforts by the Territorial government and as important civic structures associated with the development of Haleiwa • Located within the County-designated Haleiwa Special Design District and contribute significantly to the historic character of the town	4 - 253
003000990401689	Waiawa Interchange No. 4A	H-1	Kamehameha Highway	1968	Concrete Girder	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401688	Waiawa Interchange No. 4B	H-1	Kamehameha Highway	1968	Concrete Girder	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401815	Waiawa Separation (Highway Underpass)	Kamehameha Highway	Kamehameha Highway	1953	Concrete Tee Beam	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401745	Waiawa Stream (Eastbound)	Waiawa Stream	Kamehameha Highway	1949	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401804	Waiawa Stream (Eastbound)	Waiawa Stream	Farrington Highway	1952	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401746	Waiawa Stream (Westbound)	Waiawa Stream	Kamehameha Highway	1953	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401802	Waiawa Stream (Westbound)	Waiawa Stream	Farrington Highway	1933	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 256
003000990301164	Waikakalaua Stream (Inbound)	Waikakalaua Stream	Kamehameha Highway	1936	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 259
003000990301165	Waikakalaua Stream (Outbound)	Waikakalaua Stream	Kamehameha Highway	1950	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830303377	Waikane Stream	Waikane Stream	Kamehameha Highway	1928	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's reinforced concrete bridge	4 - 262
003090001400108	Waikele Canal (Inbound)	Waikele Canal	Farrington Highway	1939	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Associated with plantation industry; last major reaccommodation built by the FHWA for the railroad before it went out of business • Good example of a 1930's reinforced concrete bridge	4 - 265
003090001400113	Waikele Canal (Outbound)	Waikele Canal	Farrington Highway	1963	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000720401504	Wailupe Stream (Inbound)	Wailupe Stream	Kalanianaole Highway	1930	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the replacement of one parapet and bridge widening in 1991.	n/a
003000720401505	Wailupe Stream (Outbound)	Wailupe Stream	Kalanianaole Highway	1955	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to bridge widening and the replacement of one of the railings in 1991.	n/a
003000990401986	Waimalu Stream (Eastbound)	Waimalu Stream	Kamehameha Highway	1936	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community	4 - 268

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003000990401987	Waimalu Stream (Westbound)	Waimalu Stream	Kamehameha Highway	1945	Concrete Girder	Concrete Open Greek Cross	No	Eligible	• Associated with post-war developments of the community	4 - 271
003000720700329	Waimanalo Stream	Waimanalo Stream	Kalanianaole Highway	1924	Concrete Tee Beam	Concrete and Metal	No	Not eligible	The bridge has lost integrity due to the replacement of the original railings with post-war solid concrete and metal rail parapets.	n/a
003000830302242	Waimanana Stream	Waimanana Stream	Kamehameha Highway	1926	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1920's concrete slab bridge	4 - 274
003000830300573	Waimea Stream	Waimea Stream	Kamehameha Highway	1930	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Contributed to the fields of engineering and transportation in Hawaii • Associated with public works efforts by the Territorial government and as an important link in the island's belt road system • Good representative example of tee beam bridge construction in the late 1920s • Contributes significantly to the historic character of the area	4 - 277
003090001400174	Waipahu Canal	Waipahu Canal	Farrington Highway	1964	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401679	Waipahu Overpass (Inbound)	Cane Haul Road	Kamehameha Highway	1953	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000990401678	Waipahu Overpass (Outbound)	Cane Haul Road	Kamehameha Highway	1953	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003000830302112	Waipilopilo Stream	Waipilopilo Stream	Kamehameha Highway	1932	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	4 - 280
003074001400083	Wawamalu Stream	Wawamalu Stream	Kalanianaole Highway	1947	Concrete Girder	Concrete and Metal	No	Eligible	• Intact example of 1940's concrete tee beam bridge • Representative of the work of a master: William R. Bartels • Original Wawamalu Bridge with concrete parapets and cross voids built in 1931 runs alongside this 1947 Wawamalu Bridge	4 - 283
003000630400576	Wilson Tunnel (Inbound)	Mountain (Wilson Tunnel - Inbound)	Likelike Highway	1958	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Associated with transportation and communication between the Windward and Leeward sides of the island • A major engineering feat • Associated with Johnny Wilson, a former mayor • The tunnel relieved traffic on the old Pali Road	4 - 286
003000630400575	Wilson Tunnel (Outbound)	Mountain (Wilson Tunnel - Outbound)	Likelike Highway	1959	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• Associated with transportation and communication between the Windward and Leeward sides of the island • A major engineering feat • Associated with Johnny Wilson, a former mayor • The tunnel relieved traffic on the old Pali Road	4 - 289
003000611100124	Wyllie Street Overpass	Pali Highway (Wyllie Street Overpass)	Wyllie Street	1961	Concrete Rigid Frame	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003364001200001	10th Avenue Double Box Culvert-Waiomao Stream	Waiomao Stream	10th Avenue	1962	Concrete Box Culvert	Metal Horizontal	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Unique example of a box culvert built in the 1960s	4-293
003382001200001	10th Avenue Place Bridge-Waiomao Stream	Waiomao Stream	10th Avenue Place	1930	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-296
003401001100001	Ahaolelo Road Bridge No. 1-Kahaluu WPP A-1 Channel	Kahaluu WPP A-1 Channel	Ahaolelo Road	1965	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003370001200001	Ahe Street Bridge-Pukele Stream	Pukele Stream	Ahe Street	1950	Concrete Slab	Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003430001100001	Ahiki Street 4-Cell Box Culvert No. 1-Drainage Ditch	Drainage Ditch	Ahiki Street	1955	Concrete Box Culvert	No Parapet/Railing	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003431001100001	Ahiki Street 4-Cell Box Culvert No. 2-Drainage Ditch	Drainage Ditch	Ahiki Street	1955	Concrete Box Culvert	No Parapet/Railing	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003495001200001	Ahilama Road Box Culvert-Waihee Stream	Waihee Stream	Ahilama Road	1965	Concrete Box Culvert	Concrete Solid Decorative	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003460001200001	Ahuimanu Place Box Culvert-Drainage Ditch	Drainage Ditch	Ahuimanu Place	1965	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003455001100001	Akumu Street 4-Cell Box Culvert-Saint John Vianney Ditch	Saint John Vianney Ditch	Akumu Street	1961	Concrete Box Culvert	Concrete Solid Decorative	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003122001200001	Ala Aolani Arch Culvert-Moanalua Stream	Moanalua Stream	Ala Aolani Street	1962	Concrete Arch Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003126001200001	Ala Aolani Street Bridge No. 1-Moanalua Stream	Moanalua Stream	Ala Aolani Street	1965	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003127001200001	Ala Aolani Street Bridge No. 2-Moanalua Stream	Moanalua Stream	Ala Aolani Street	1965	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003128001200001	Ala Aolani Street Bridge No. 3-Moanalua Stream	Moanalua Stream	Ala Aolani Street	1963	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003131001200001	Ala Aoloa Loop Bridge-Moanalua Stream	Moanalua Stream	Ala Aoloa Loop	1965	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003371001200001	Aliikoa Street Bridge-Kapakahi Stream	Kapakahi Stream	Aliikoa Street	1954	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003300001200001	Ani Street Bridge-Wailupe Stream	Wailupe Stream	Ani Street	1954	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003406001100001	Auloa Road Bridge No. 1-Kahanaiki Stream	Kahanaiki Stream	Auloa Road	1921	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-299

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003407001100001	Auloa Road Bridge No. 2-Maunawili Stream	Maunawili Stream	Auloa Road	1921	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-302
003801001100001	Auyong Homestead Road Bridge-Ulehawa Channel U-3	Ulehawa Channel U-3	Auyong Homestead Road	1964	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083041400055	Date Street Bridge-Manoa Palolo Drainage Canal	Manoa-Palolo Stream	Date Street	1937	Concrete Slab	Concrete Solid Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-305
003083051400001	Diamond Head Road Bridge Upper-Gully	Gully (Diamond Head)	Diamond Head Road	1930	Open Spandrel Arch	Concrete Open Arched	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's open spandrel arch bridge	4-308
003062071400140	Dillingham Boulevard Bridge-Kapalama Canal	Kapalama Canal	Dillingham Boulevard	1930	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-311
003083061400076	Dole Street Bridge-Manoa Stream	Manoa Stream	Dole Street	1953	Concrete Slab	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003309001200001	East Hind Drive Bridge-Wailupe Stream	Wailupe Stream	East Hind Drive	1949	Concrete Tee Beam	Concrete and Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003208001200001	East Manoa Road Bridge No. 1-Manoa Stream	Manoa Stream	East Manoa Road	1938	Concrete Tee Beam	Concrete Open Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-314
003083071400092	East Manoa Road Bridge No. 2-Manoa Stream	Manoa Stream	East Manoa Road	1950	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003923001100001	Farrington Highway Bridge No. 1-Kaloi Gulch	Kaloi Gulch	Farrington Highway	1941	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to thrie beams that have been bolted in front of the solid concrete parapet such that the concrete is not visible. The bridge does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
003924001100001	Farrington Highway Bridge No. 2-Hunehune Stream	Hunehune Stream	Farrington Highway	1941	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to thrie beams that have been bolted in front of the solid concrete parapet such that the concrete is not visible. The bridge does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
003902001100001	Farrington Highway Bridge No. 3-Palehua Stream	Palehua Stream	Farrington Highway	1922	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-317
003922001100001	Farrington Highway Bridge-Honouliuli Stream	Honouliuli Stream	Farrington Highway	1939	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-320
003209001100001	Fern Street Bridge-Makiki Stream	Makiki Stream	Fern Street	1931	Concrete Slab	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-323
003062081400252	Fort Street Mall Underpass-South King Street	Fort Street Mall	South King Street	1968	Concrete Slab	Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. Originally this structure was designed as a pedestrian underpass. It was later filled in with a City and County office and no longer reads as an underpass.	n/a

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003076001400581	Fort Weaver Road Bridge-Honouliuli Stream	Honouliuli Stream	Fort Weaver Road	1927	Closed Spandrel Arch	Concrete Solid Panel with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's closed spandrel arch bridge	4-326
003982001100001	Halawa Correctional Facility Access Road	Stream	Halawa Correctional Facility Access Road	1959	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003306001200001	Halemaumau Place Triple Cell Box Culvert-Niu Stream	Niu Stream	Halemaumau Place	1960	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003514001100001	Hauula Homestead Road Bridge-Maakua Stream	Maakua Stream	Hauula Homestead Road	1930	Concrete Slab	Concrete Solid	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-329
003304001200001	Hawaii Kai Drive Bridge-Kuapa Pond	Kuapa Pond	Hawaii Kai Drive	1967	Concrete Slab	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003303001200001	Hawaii Kai Drive Double Box Culvert-Hahaione Channel	Hahaione Channel	Hawaii Kai Drive	1962	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003346001200001	Hawaii Kai Drive-Kamiloiki Stream	Kamiloiki Stream	Hawaii Kai Drive	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003345001200001	Hiikala Place Bridge-Waialae Nui Stream	Waialae Nui Stream	Hiikala Place	1962	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003968001100001	Honowai Street Bridge-Waipahu Stream	Waipahu Stream	Honowai Street	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003408001100001	Kaawakea Road 4-Cell Box Culvert-Kawainui Stream	Kawainui Stream	Kaawakea Road	1961	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003311001200001	Kahala Avenue Bridge No. 1-Muliwai Ditch	Muliwai Ditch	Kahala Avenue	1947	Concrete Rigid Frame	Concrete Solid Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1940's and 1950's concrete rigid frame bridge	4-332
003312001200001	Kahala Avenue Bridge No. 2-Kapakahi Stream	Kapakahi Stream	Kahala Avenue	1927	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to its rehabilitation in 1952 where metal rails were added to the existing solid concrete parapet. The bridge does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
003211001200001	Kahaloa Drive Extension Bridge-Manoa Stream	Manoa Stream	Kahaloa Drive	1954	Concrete Rigid Frame	Concrete Solid with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1950's concrete rigid frame bridge	4-335
003804001100001	Kahau Place Bridge-Ulehawa Channel U-3	Ulehawa Channel U-3	Kahau Place	1964	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003083181400074	Kalakaua Avenue Bridge-Ala Wai Canal	Ala Wai Canal	Kalakaua Avenue	1929	Closed Spandrel Arch	Concrete Solid Decorative	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Excellent example of reinforced concrete solid-spandrel arch bridge in the Art Deco style • Associated with public works efforts by Territory of Hawaii and the development of Waikiki • Contributed to economic development of Honolulu and Waikiki by providing reliable vehicular access • Only multiple-span marine reinforced concrete arch of its kind in the state • Built in 1929 by Ralph E. Woolley, a prolific builder in Honolulu • See National Register of Historic Places Nomination Form in appendices	4-338
003083211400072	Kalihi Street Bridge No. 1-Kamanaiki Stream	Kamanaiki Stream	Kalihi Street	1938	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-341
003148001200001	Kalihi Street Bridge No. 3-Kalihi Stream	Kalihi Stream	Kalihi Street	1942	Steel Stringer	Wood	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of steel stringer bridge that is not associated with railroads	4-344
003314001200001	Kalua Road Bridge-Palolo Stream	Palolo Stream	Kalua Road	1953	Concrete Slab	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
00300C291100137	Kamehameha Highway Bridge-Anahulu Stream	Anahulu Stream	Kamehameha Highway	1921	Rainbow Arch	Concrete Solid Panel with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Excellent example of 1920's reinforced concrete "rainbow"/marsh arch construction • One of two remaining examples of this bridge type in the state • Associated with public works efforts by the City and County of Honolulu during early Territorial period and with the development of Haleiwa • Representative of work of a master: designer Guy Rothwell • Serves as gateway to historic Haleiwa district and Town	4-347
003008360800242	Kamehameha Highway Bridge-Heeia Stream	Heeia Stream	Kamehameha Highway	1921	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Excellent example of 1920's era reinforced concrete solid-spandrel arch bridge in the Art Deco style • Associated with public works efforts by City and County of Honolulu in Territorial period • Contributions to economic development of Windward Oahu by providing reliable vehicular access to previously isolated communities	4-350
003083601400059	Kamehameha Highway Bridge-Kaneohe Stream	Kaneohe Stream	Kamehameha Highway	1953	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083601400098	Kamehameha Highway Bridge-Keaahala Stream	Keaahala Stream	Kamehameha Highway	1918	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1910's reinforced concrete bridge	4-353
00300C301100152	Kamehameha Highway Double Box Culvert-Lokoea Stream	Lokoea Stream	Kamehameha Highway	1989	Concrete Box Culvert	Concrete and Metal	No	Not Eligible	This culvert has lost integrity due to the complete replacement of the original 1923 culvert in 1989. Reinforced metal and concrete rails were used. The culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
003083220000049	Kamehameha IV Road Footbridge-Kamehameha IV Road	Kamehameha IV Road	Pedestrian Overpass	1961	Concrete Tee Beam	Metal Decorative	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003062021400052	Kapiolani Boulevard Bridge No. 1-Makiki Stream	Makiki Stream	Kapiolani Boulevard	1931	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's concrete tee beam bridge	4-356

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003062021400168	Kapiolani Boulevard Bridge-Manoa-Palolo Channel	Manoa-Palolo Stream	Kapiolani Boulevard	1950	Concrete Tee Beam	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003253001200001	Kapulei Street Triple Box Culvert-Pauoa Stream	Pauoa Stream	Kapulei Street	1951	Concrete Box Culvert	Concrete Solid	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003411001100001	Kawailoa Road Bridge-Kaelepulu Stream	Kaelepulu Stream	Kawailoa Road	1925	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Not Eligible	This bridge has lost integrity due to extensive reconstruction. It was extended in 1960 and includes metal railings. In 1971 a foot bridge with decorative metal railings was added behind an original solid panel concrete parapet. The bridge does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
003825001100001	Kawiwi Stream Bridge-Channel K-3	Kaupuni Channel K-3	Unnamed Road	1968	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003425001100001	Keolu Drive Bridge No. 1-Kaelepulu Stream	Kaelepulu Stream	Keolu Drive	1961	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003427001100001	Keolu Drive Bridge No. 2-Hele Drainage Channel	Hele Drainage Channel	Keolu Drive	1957	Concrete Slab	Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003928001100001	Kihale Street Bridge-Kalauao Stream	Kalauao Stream	Kihale Street	1956	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003083261400006	Kikowaena Street Bridge-Moanalua Stream	Moanalua Stream	Kikowaena Street	1961	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003260001200001	Kimo Drive Bridge-Nuuanu Stream	Nuuanu Stream	Kimo Drive	1925	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge • Associated with historic Nuuanu residential development	4-359
003343001200001	Kiwila Street Bridge-Palolo Stream	Palolo Stream	Kiwila Street	1961	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003918001100001	Komo Mai Drive Bridge-Waimano Stream	Waimano Stream	Komo Mai Drive	1961	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003351001200001	Kuliouou Road Bridge-Kuliouou Stream	Kuliouou Stream	Kuliouou Road	1968	Steel Stringer	Wood	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of post-war 1960's steel stringer bridge	4-362
003429001100001	Kumuhau Street Bridge-Waimanalo Stream	Waimanalo Stream	Kumuhau Street	1963	Steel Stringer	Metal Horizontal	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of post-war 1960's steel stringer bridge • Metal rails made of structural steel tubes and wide flange posts	4-365
003378001200001	Lai Road Bridge No. 1-Pukele Stream	Pukele Stream	Lai Road	1935	Concrete Slab	Metal Thrie Beam	No	Not Eligible	This bridge does not have distinctive engineering or architectural features that depart from standard bridge design. The bridge is on a private road and not publicly accessible but maintained by the City.	n/a
003379001200001	Lai Road Bridge No. 2-Pukele Stream	Pukele Stream	Lai Road	1935	Concrete Slab	Metal Thrie Beam	No	Not Eligible	This bridge does not have distinctive engineering or architectural features that depart from standard bridge design. The bridge is on a private road and not publicly accessible but maintained by the City.	n/a

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** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
003380001200001	Lai Road Bridge No. 3-Pukele Stream	Pukele Stream	Lai Road	1935	Concrete Slab	Metal Thrie Beam	No	Not Eligible	This bridge does not have distinctive engineering or architectural features that depart from standard bridge design. The bridge is on a private road and not publicly accessible but maintained by the City.	n/a
003261001200001	Laimi Road Bridge-Nuuanu Stream	Nuuanu Stream	Laimi Road	1920	Concrete Girder	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge • Associated with historic Nuuanu residential development	4-368
003949001100001	Leokane Street Triple Box Culvert-Waipahu Stream	Waipahu Stream	Leokane Street	1965	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003950001100001	Leonui Street Triple Box Culvert-Waipahu Stream	Waipahu Stream	Leonui Street	1965	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003262001200001	Liholiho Street Box Culvert-Makiki Stream	Makiki Stream	Liholiho Street	1977	Concrete Box Culvert	Concrete and Metal Decorative	No	Not Eligible	This culvert has lost integrity due to the complete reconstruction of the original 1937 culvert in 1977. It is also scheduled for rehabilitation in fall of 2013. The concrete rubble masonry channel is a potentially eligible historic resource.	n/a
003083371400092	Lowrey Avenue Bridge-Manoa Stream	Manoa Stream	Lowrey Avenue	1953	Concrete Tee Beam	Concrete Open Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. This bridge replaced an earlier wood bridge and was part of the Manoa Stream Flood Control Project.	n/a
003484001100001	Luluku Road Triple Box Culvert-Kaneohe Stream	Kaneohe Stream	Luluku Road	1962	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003083381400047	Lusitana Street Bridge-Pauoa Stream	Pauoa Stream	Lusitana Street	1932	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-371
003806001100001	Maaloa Street Bridge-Ulehawa Channel U-3	Ulehawa Channel U-3	Maaloa Street	1964	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003402001100001	Makakalo Street 4-Cell Box Culvert-Drainage Ditch	Drainage Ditch	Makakalo Street	1955	Concrete Box Culvert	No Parapet/Railing	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003226001200001	Makiki Street Bridge-Makiki Stream	Makiki Stream	Makiki Street	1912	Closed Spandrel Arch	Metal Horizontal	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developements in concrete bridge construction in Hawaii • Good example of 1910's closed spandrel arch bridge	4-374
003340001200001	Malia Street Bridge No. 1-Waialae Nui Stream	Waialae Nui Stream	Malia Street	1961	Concrete Slab	Concrete Solid Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1960's reinforced concrete bridge	4-377
003807001100001	Maliona Street Box Culvert-Channel M-4	Maili Channel M-4	Maliona Street	1967	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003444001100001	Maunawili Road Bridge No. 2-Kamakalepo Stream	Kamakalepo Stream	Maunawili Road	1966	Concrete Slab	Metal Thrie Beam	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003437001100001	Maunawili Road Bridge No. 3-Maunawili Stream	Maunawili Stream	Maunawili Road	2009	Concrete Slab	Concrete and Metal	No	Not Eligible**	This bridge has lost integrity due to the complete replacement of the original 1937 bridge in 2009. The concrete rubble masonry abutments are a potentially eligible historic resource.	n/a

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
003083401400011	Mccully Street Bridge-Ala Wai Canal	Ala Wai Canal	McCully Street	1959	Concrete Slab	Metal Horizontal	Yes	High Preservation Value	• Contributed to economic development of Honolulu and Waikiki by providing reliable vehicular access • Part of 1954 Bennett-Maier plan (Charles B. Bennett and Eugene Maier) for redevelopment to relieve and control traffic in Waikiki • See National Register of Historic Places Nomination Form in appendices	4-380
003485001100001	Melekula Road Bridge-Kahaluu Stream	Kahaluu Stream	Melekula Road	1956	Concrete Tee Beam	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003072001400258	Moanalua Road Box Culvert-Kalauao Stream	Kalauao Stream	Moanalua Road	1992	Concrete Box Culvert	Concrete and Metal	No	Not Eligible	This culvert has lost integrity due to the complete replacement of the original 1935 culvert in 1992. Reinforced metal and concrete rails were also used. The culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
003072001400318	Moanalua Road Bridge-Aiea Stream	Aiea Stream	Moanalua Road	1951	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003072001400235	Moanalua Road Bridge-Kaonohi Stream	Kaonohi Stream	Moanalua Road	1966	Closed Spandrel Arch	Metal Horizontal	No	High Preservation Value	• Good example of 1960's closed arch bridge • Arch bridges are an uncommon bridge type • Only arch bridge built post-war (1945) in the state of Hawaii in the historic study period prior to 1969	4-383
003072001400159	Moanalua Road Bridge-Waimalu Stream	Waimalu Stream	Moanalua Road	1965	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003808001100001	Mohihi Street Bridge-Ulehawa Channel U-3	Ulehawa Channel U-3	Mohihi Street	1964	Concrete Slab	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003154001200001	Naio Street Bridge-Nuhelewai Stream	Nuhelewai Stream	Naio Street	1927	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-386
003083451400011	Nalanieha Street Bridge-Kalihi Stream	Kalihi Stream	Nalanieha Street	1955	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083461400067	Nehoa Street Bridge-Makiki Stream	Makiki Stream	Nehoa Street	1920	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-389
003062091400213	North Beretania Street Bridge-Nuuanu Stream	Nuuanu Stream	North Beretania Street	1967	Concrete Slab	Metal Horizontal	No	Not Eligible**	This bridge is near the Chinatown Special Design District however, the bridge does not have distinctive engineering or architectural features that depart from standard bridge design. The concrete rubble masonry channel is a potentially eligible historic resource.	n/a
003083981400003	North Hotel Street Bridge-Nuuanu Stream	Nuuanu Stream	North Hotel Street	1936	Concrete Slab	Concrete and Metal Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-392
003083761400197	North Kalaheo Avenue Bridge-Kawainui Canal	Kawainui Canal	North Kalaheo Avenue	1952	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. This bridge was a part of the Kawainui Swamp Flood Control Project.	n/a
003062081400218	North King Street Bridge No. 1-Nuuanu Stream	Nuuanu Stream	North King Street	1922	Concrete Tee Beam	Concrete Solid	No	High Preservation Value	• Excellent example of 1920's era reinforced concrete tee beam construction with solid decorative parapets • Associated with public works efforts by the City and County of Honolulu during Territorial period • Located alongside the Chinatown Historic District which was nominated to the National Register in January 17, 1973	4-395

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003062081400134	North King Street Bridge No. 2-Kapalama Canal	Kapalama Canal	North King Street	1938	Concrete Tee Beam	Concrete and Metal Decorative	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-398
003062081400037	North King Street Bridge-Kalihi Stream	Kalihi Stream	North King Street	1933	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-401
003083321400031	North Kuakini Street Bridge No. 1-Nuuanu Stream	Nuuanu Stream	North Kuakini Street	1934	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-404
003083321400019	North Kuakini Street Bridge No. 2-Waiolani Stream	Waiolani Stream	North Kuakini Street	1934	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-407
003123001200001	North Kukui Street Bridge-Nuuanu Stream	Nuuanu Stream	North Kukui Street	1966	Concrete Slab	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083631400093	North School Street Bridge-Kalihi Stream	Kalihi Stream	North School Street	1927	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge	4-410
003083631400271	North School Street Bridge-Nuuanu Stream	Nuuanu Stream	North School Street	1932	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-413
003083471400113	Nuuanu Avenue Arch Bridge-Nuuanu Stream	Nuuanu Stream	Nuuanu Avenue	1904	Masonry Arch	Masonry Rock with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Excellent example of 1900's masonry arch construction and is one of nine of type left in Hawaii • Notable for use of vernacular building materials from the islands: local basalt rock/"lava rock" • Associated with early public works efforts by Territory of Hawaii, and for contributions to commercial and residential development of urban Honolulu • Representative of work of a master: Louis M. Whitehouse, a prolific contractor from that era	4-416
003265001200001	Nuuanu Pali Drive Bridge-Nuuanu Stream	Nuuanu Stream	Nuuanu Pali Drive	1930	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge • Associated with historic Nuuanu residential development	4-419
003083761400001	Oneawa Street Bridge-Kawainui Stream	Kawainui Stream	Oneawa Street	1967	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments. This bridge was constructed in conjunction with the Kawainui Swamp Flood Control Project.	n/a
003809001100001	Paakea Road Bridge-Channel M-1	Mailiilii Channel M-1	Paakea Road	1966	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003601001100001	Paalaa Road Box Culvert-Unnamed Stream	Unnamed Stream	Paalaa Road	1968	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003326001200001	Paalea Street Bridge Palolo Stream	Palolo Stream	Paalea Street	1952	Concrete Slab	Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003953001100001	Paiwa Street Triple Box Culvert-Wailani Stream	Wailani Stream	Paiwa Street	1963	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003083531400155	Palolo Avenue Bridge No. 1-Palolo Stream	Palolo Stream	Palolo Avenue	1949	Concrete Tee Beam	Concrete and Metal Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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003083531400001	Palolo Avenue Bridge No. 2-Pukele Stream	Pukele Stream	Palolo Avenue	1928	Concrete Tee Beam	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to bridge widening in the 1960s. The original bridge railings appear to have been replaced with post-war concrete and metal railings. The bridge does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
003232001200001	Pawaina Street Bridge-Manoa Stream	Manoa Stream	Pawaina Street	1961	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003267001200001	Pelekane Drive Bridge-Nuuanu Stream	Nuuanu Stream	Pelekane Drive	1930	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's reinforced concrete bridge • Associated with historic Nuuanu residential development	4-422
003331001200001	Pepeekeo Street Double Box Culvert-Hahaione Channel	Hahaione Channel	Pepeekeo Street	1962	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003234001200001	Phillip Street-Makiki Stream	Makiki Stream	Phillip Street	1938	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge does not have distinctive engineering or architectural features that depart from standard bridge design. In 1995 the bridge was widened. The concrete rubble masonry channel is a potentially eligible historic resource.	n/a
003810001100001	Plantation Road Bridge-Channel K-2	Kaupuni Channel K-2	Plantation Road	1968	Concrete Tee Beam	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003257001200001	Puiwa Road Triple Box Culvert-Nuuanu Stream	Nuuanu Stream	Puiwa Road	1964	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments. This culvert is located in the historic Nuuanu residential development.	n/a
003236001200001	Puowaina Drive Bridge-Auwaiolimu Street	Auwaiolimu Street	Puowaina Drive	1936	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Excellent example of 1930's continuous reinforced concrete T-beam construction with typical open concrete rail • Associated with important public works projects initiated by the county government • Contributed to the economic development of urban Honolulu by providing reliable vehicular access • Associated with engineer W.F. Way from City and County of Honolulu, Department of Public Works and builder James Glover Ltd., a contracting company • At the time of construction it was the only bridge on Oahu to cross a road	4-425
003814001100001	Saint John's Road Bridge-Channel M-4	Maili Channel M-4	Saint John's Road	1967	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083061400136	Saint Louis Drive Bridge-Palolo Stream	Palolo Stream	Saint Louis Drive	1929	Open Spandrel Arch	Concrete Open Horizontal	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developements in concrete bridge construction in Hawaii • Good example of 1920's and 1930's open spandrel arch	4-428
003067001400301	Salt Lake Boulevard Bridge-Halawa Stream	Halawa Stream	Salt Lake Boulevard	1968	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003933001100001	Ulune Street Double Box Culvert-Aiea Stream	Aiea Stream	Ulune Street	1954	Concrete Box Culvert	Masonry Rock	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003237001200001	Waaloa Way Bridge No. 1-Manoa Stream	Manoa Stream	Waaloa Way	1996	Steel Stringer	Metal Thrie Beam	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1967 bridge in 1996. The bridge is not publicly accessible and is utilized as a Board of Water Supply maintenance bridge.	n/a

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003268001200001	Waaloa Way Bridge No. 2-Manoa Stream	Manoa Stream	Waaloa Way	1965	Steel Stringer	Wood	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of distinct structural type of 1960's steel girder bridge • Bridge is maintained by the Board of Water Supply	4-431
003244001200001	Waaloa Way Bridge No. 3-Waiakeakua Stream	Waiakeakua Stream	Waaloa Way	1967	Steel Stringer	Wood	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Good example of distinct structural type of 1960's steel girder bridge • Bridge is maintained by the Board of Water Supply	4-434
003245001200001	Waaloa Way Bridge No. 4-Waiakeakua Stream	Waiakeakua Stream	Waaloa Way	1963	Timber Stringer	Wood	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of post-war 1960's timber stringer bridge • Bridge is maintained by the Board of Water Supply	4-437
003605001100001	Waialua Beach Road Bridge-Kiikii Stream	Kiikii Stream	Waialua Beach Road	1950	Concrete Tee Beam	Concrete Open Horizontal	No	Eligible	• Associated with Howard Hisayuki Kurio who worked for Territorial Department of Public Works for 17 years since 1932	4-440
003955001100001	Waihau Street Double Box Culvert-Waipio Lined No.1	Waipio Lined No. 1	Waihau Street	1957	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003443001100001	Wailele Road Bridge Keaahala Stream	Keaahala Stream	Wailele Road	1967	Concrete Rigid Frame	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003349001200001	Wainiha Street Bridge-Kamiloiki Stream	Kamiloiki Stream	Wainiha Street	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003967001100001	Wainihi Street Double Box Culvert-Waipio Lined No.1	Waipio Lined No. 1	Wainihi Street	1957	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003083661400104	Waipahu Street Arch Bridge-Waikele Stream	Waikele Stream	Waipahu Street	1905	Closed Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Associated with early developements in concrete bridge construction in Hawaii • Good example of 1900's closed spandrel arch bridge	4-443
003083661400002	Waipahu Street Bridge No. 3-Waipahu Stream	Waipahu Stream	Waipahu Street	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003083660000003	Waipahu Street Footbridge-Waipahu Street	Waipahu Street	Pedestrian Overpass	1963	Concrete Tee Beam	Metal Picket	No	Program Comments	This is a typical post-war pedestrian bridge and falls under Program Comments.	n/a
003971001100001	Waipio Point Access Road Bridge No. 2-Wailani Stream	Wailani Stream	Waipio Point Access Road	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
003903001100001	Waipio Point Access Road Bridge No.1-Railroad Right of Way	Railroad Right of Way	Waipio Point Access Road	1946	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1940's reinforced concrete bridge	4-446
003956001100001	Waipuka Place Double Culvert-Waipio Lined No.1	Waipio Lined No. 1	Waipuka Place	1957	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
003083681400001	Wyllie Street Bridge-Waolani Stream	Waolani Stream	Wyllie Street	1931	Concrete Tee Beam	Concrete Open Arched	No	Eligible	• Associated with early developements in concrete bridge construction in Hawaii • Good example of 1930's reinforced concrete bridge	4-449

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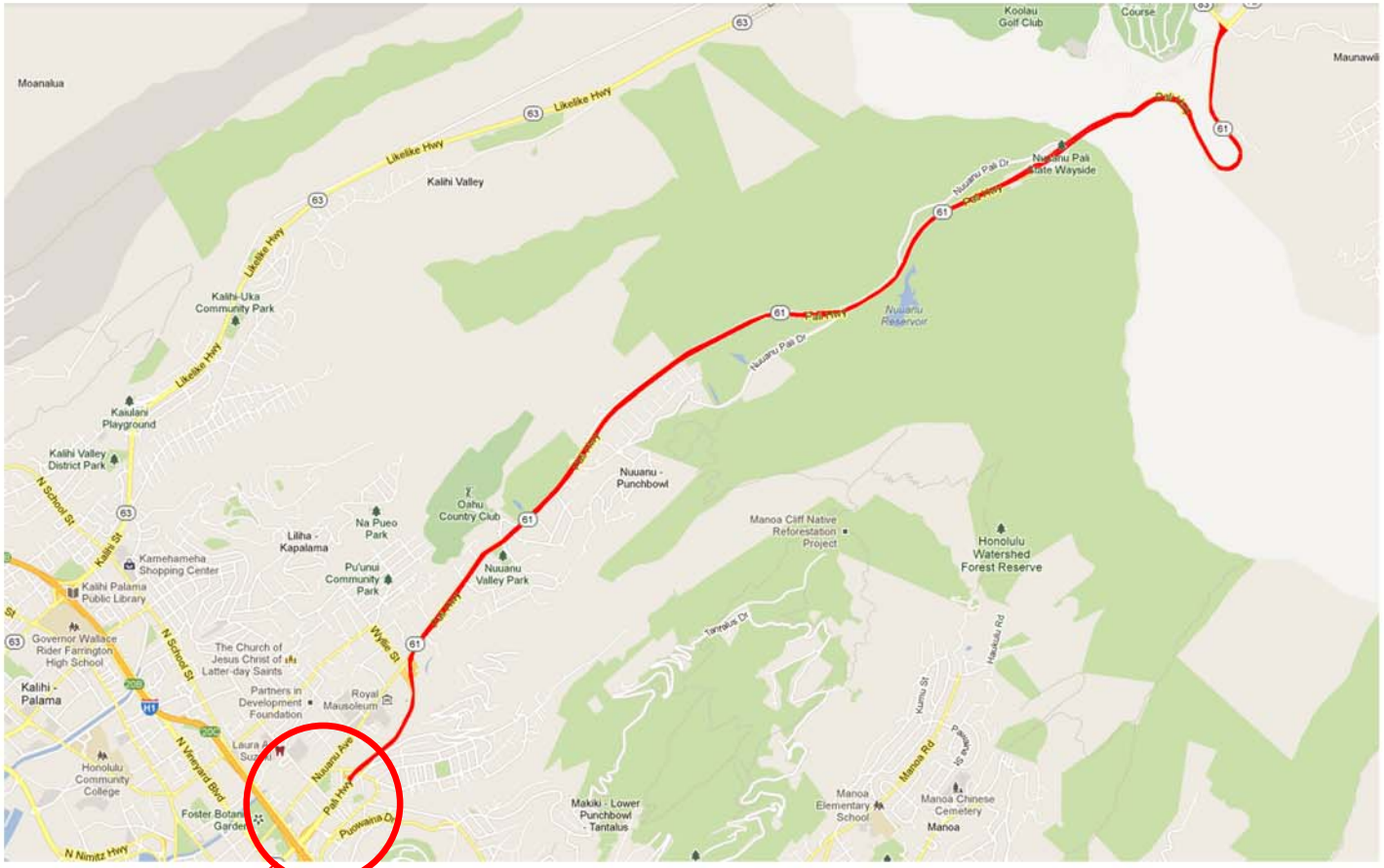
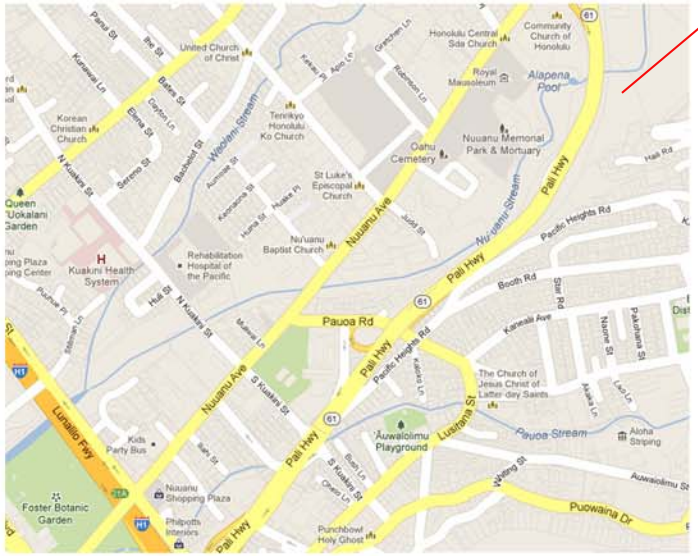
III. HISTORIC BRIDGE DISTRICT: PALI HIGHWAY





Pali Highway District Starts from the intersection of Pacific Heights Road and Pali Highway to the intersection of Kamehameha Highway and Pali Highway

Oahu Historic Bridge District

Oahu has one historic district which is Pali Highway Historic District. It is not on the National Register of Historic Places. See Chapter 2 section VI for the historic context.

Pali Highway District

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
003000610400112	Nuuanu Stream Kapena Falls	Nuuanu Stream Kapena Falls	Pali Highway	1962	Concrete Rigid Frame	Concrete and Metal	State
003000610300593	Pali Bridge No. 3 (Inbound)	Mountain (Pali Bridge No. 3)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	State
003000610300616	Pali Bridge No. 4 (Inbound)	Mountain (Pali Bridge No. 4)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	State
003000610300615	Pali Bridge No. 4B (Outbound)	Mountain (Pali Bridge No. 4B)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	State
003000610300621	Pali Bridge No. 5 (Inbound)	Mountain (Pali Bridge No. 5)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	State
003000610300623	Pali Bridge No. 5A (Outbound)	Mountain (Pali Bridge No. 5A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	State
003000610300629	Pali Bridge No. 6 (Inbound)	Mountain (Pali Bridge No. 6)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	State
003000610300632	Pali Bridge No. 7 (Inbound)	Mountain (Pali Bridge No. 7)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	State
003000610300631	Pali Bridge No. 7A (Outbound)	Mountain (Pali Bridge No. 7A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	State
003000610300640	Pali Bridge No. 8 (Inbound)	Mountain (Pali Bridge No. 8)	Pali Highway	1956	Concrete Girder	Concrete Open Horizontal	State
003000610300638	Pali Bridge No. 8A (Outbound)	Mountain (Pali Bridge No. 8A)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	State
003000610300592	Pali Partial Bridge No. 2 (Inbound)	Mountain (Pali Partial Bridge No. 2)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	State
003000610300613	Pali Partial Bridge No. 4A (Outbound)	Mountain (Pali Bridge No. 4A)	Pali Highway	1961	Concrete Tee Beam	Concrete Open Horizontal	State
003000610300619	Pali Partial Bridge No. 4C (Outbound)	Mountain (Pali Bridge No. 4C)	Pali Highway	1961	Concrete Girder	Concrete Open Horizontal	State
003000610300591	Pali Partial Bridge No. 1 (Inbound)	Mountain (Pali Partial Bridge No. 1)	Pali Highway	1956	Concrete Tee Beam	Concrete Open Horizontal	State
003000610300569	Pali Tunnel No. 1 (Inbound)	Mountain (Pali Tunnel No. 1)	Pali Highway	1957	Concrete Arch Culvert	No Parapet/Railing	State

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
003000610300568	Pali Tunnel No. 1A (Outbound)	Mountain (Pali Tunnel No. 1A)	Pali Highway	1959	Concrete Arch Culvert	No Parapet/Railing	State
003000610300596	Pali Tunnel No. 2 (Inbound)	Mountain (Pali Tunnel No. 2)	Pali Highway	1957	Concrete Arch Culvert	No Parapet/Railing	State
003000610400014	Pali Highway Overpass (Outbound)	H-1	Pali Highway	1960	Concrete Rigid Frame	Concrete and Metal	State
003000610400015	Pali Highway Overpass (Inbound)	H-1	Pali Highway	1960	Concrete Rigid Frame	Concrete and Metal	State
003000610400044	Pauoa Stream Culvert	Pauoa Stream	Pali Highway	1925	Concrete Box Culvert	Concrete and Metal	State
003000610300595	Pali Tunnel No. 2A (Outbound)	Mountain (Pali Tunnel No. 2A)	Pali Highway	1961	Concrete Arch Culvert	No Parapet/Railing	State
003000610400090	Partial Bridge No. 8	Unnamed Gulch	Pali Highway	1962	Concrete Tee Beam	Concrete and Metal	State
003000610400064	Pauoa Road Overpass	Pauoa Road	Pali Highway	1961	Concrete Girder	Concrete and Metal	State

IV. INVENTORY FORMS: OAHU STATE ELIGIBLE BRIDGES

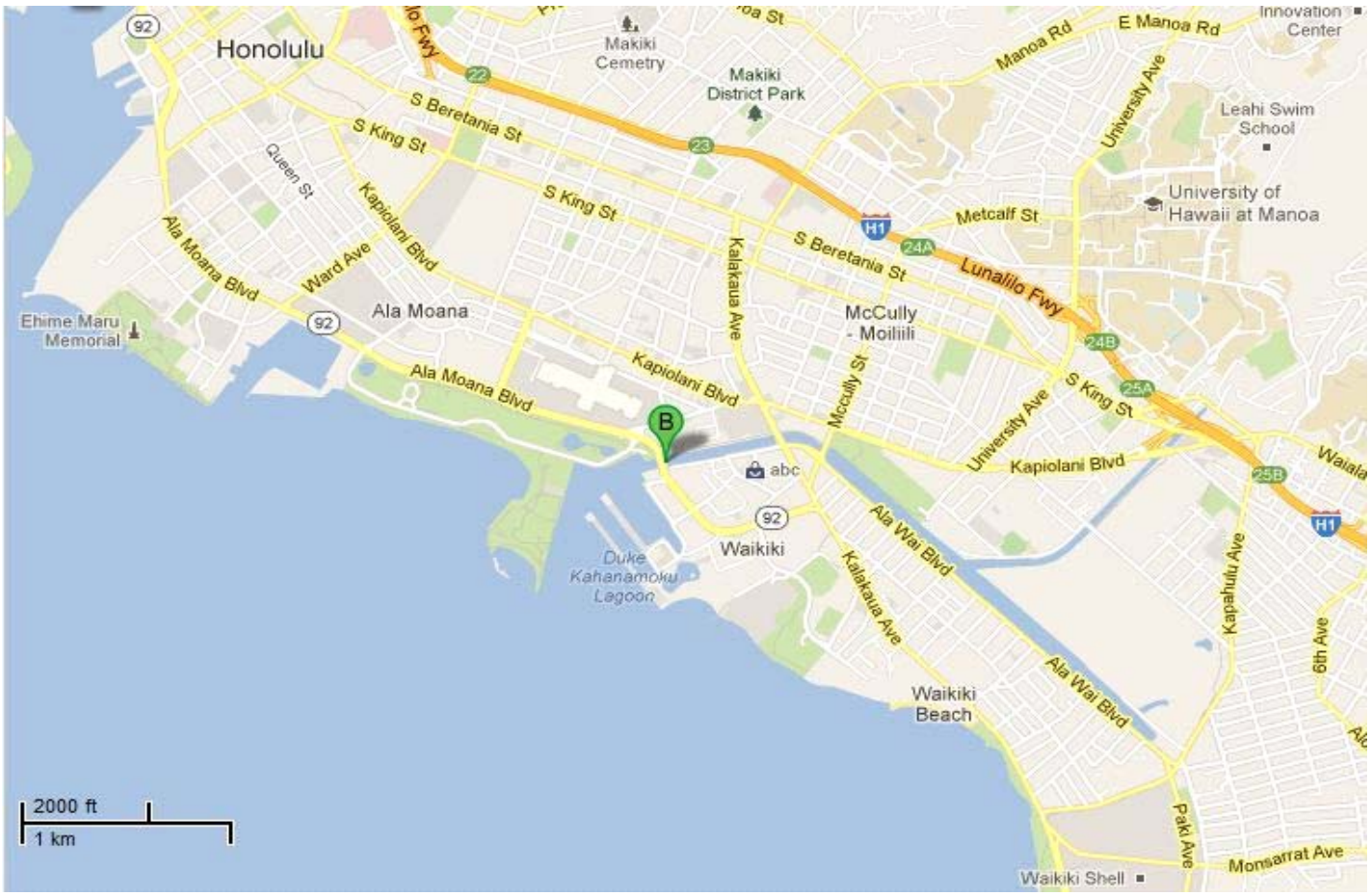
Inventory Form
(State)

General Information

Bridge Number: 003000920400861	**Route No:** 92
Popular Name: Ala Wai Canal	
Feature Crossed: Ala Wai Canal	
Feature Carried: Ala Moana Boulevard	
Milepost: 8.61 mi.	**Island:** Oahu
Longitude: 157d-50m-24.99s	**Latitude:** 21d-17m-16.04s

Location: 0.21 Miles West of Hobron Lane
Historic Name: Ala Wai Canal
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 67.9 ft.	**Total Length:** 166.0 ft.	**Deck Width:** 100.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

The Ala Wai Canal Bridge carries Ala Moana Boulevard across the Ala Wai Canal and is located in the Waikiki Special District. This reinforced concrete bridge is in its original location and is generally in good condition. The bridge has metal open horizontal railings with solid concrete end posts. The open railings create a visual relationship with the ocean and Ala Wai Canal. The concrete deck is supported by concrete abutments. Stairs that connect the bridge to the Ala Wai Canal, Ala Wai Boulevard, and the boat harbor are located near the end posts.

Significance Statement:

The bridge is a noncontributing bridge to the Ala Wai Canal. The bridge is located at the beginning of the canal and connects Waikiki and Ala Moana area. It is heavily used by the tourists who visit the Ala Moana Park, Ala Moana Shopping Center and other nearby tourist area from the Waikiki district. It is also located within the Waikiki Special district. The bridge is identified as one of the locations to have ocean views and maintains a visual relationship with the ocean. (1)

See National Register of Historic Places Nomination Form for the Ala Wai Canal.

(1) Department of Planning and Permitting City and County of Honolulu, Land Use Ordinance (April, 2003): 9-51.

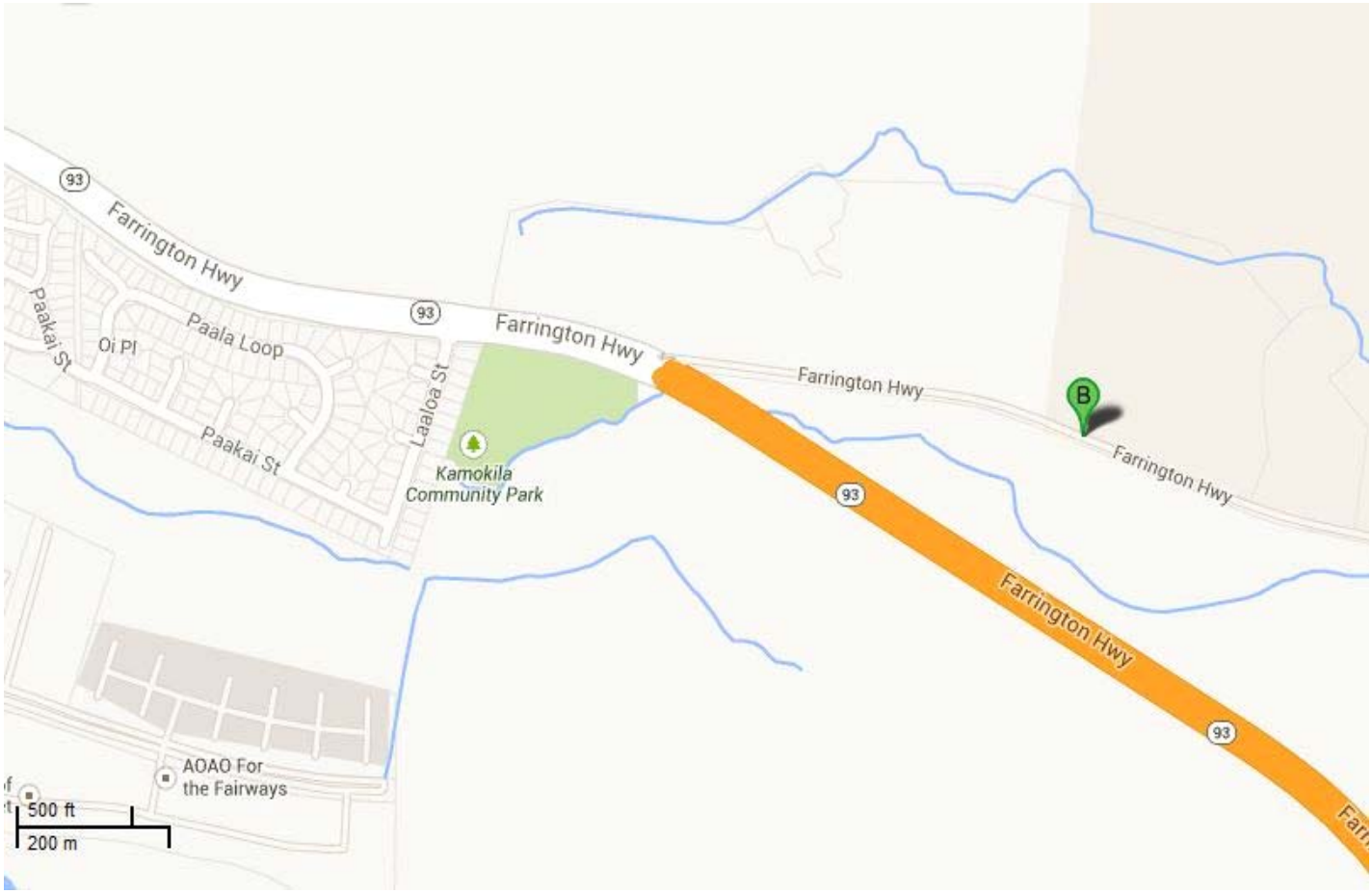
Inventory Form
(State)

General Information

Bridge Number: 003000930300071	**Route No:** 93
Popular Name: Awawanui Stream	
Feature Crossed: Awawanui Stream	
Feature Carried: Old Farrington Highway	
Milepost: 0.71 mi.	**Island:** Oahu
Longitude: 158d-05m-55.93s	**Latitude:** 21d-20m-25.44s

Location: 0.83 Miles West of Kalaeloa Boulevard
Historic Name: Awawanui Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.9 ft.	**Total Length:** 30.8 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Awawanui Stream Bridge carries Old Farrington Highway across the Awawanui Stream and is not publicly accessible. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open arched parapets with tapered caps and wide end posts. The bridge name was also engraved on the parapet. The reinforced concrete tee beam deck is supported by the concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

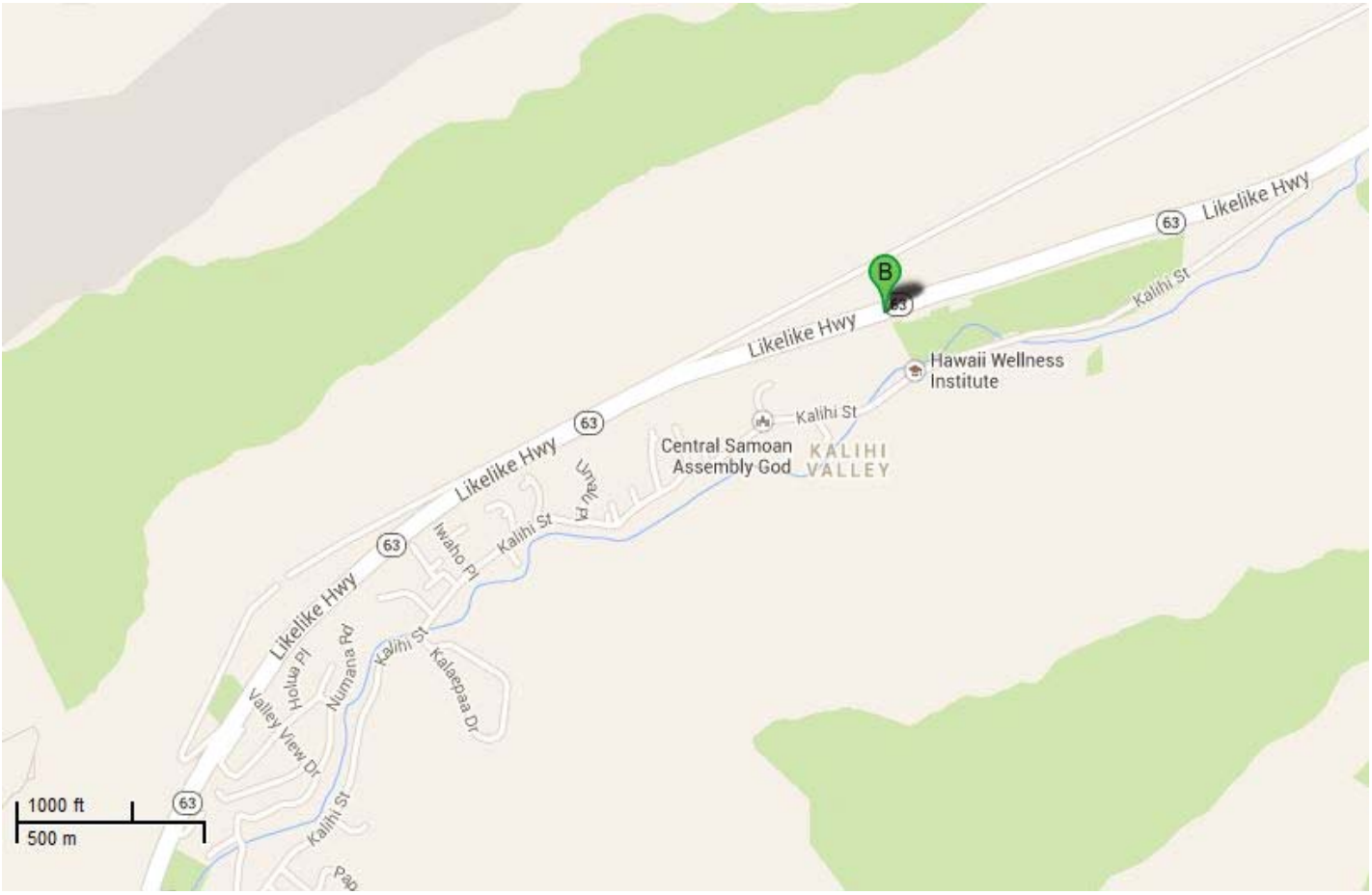
Inventory Form
(State)

General Information

Bridge Number: 003000631100418	**Route No:** 63
Popular Name: Burmeister Overpass	
Feature Crossed: Likelike Highway (Burmeister Overpass)	
Feature Carried: Private Road	
Milepost: 4.18 mi.	**Island:** Oahu
Longitude: 157d-50m-28.29s	**Latitude:** 21d-22m-01.11s

Location: 1.25 Miles Northeast of Valley View Drive
Historic Name: Burmeister Overpass
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 49.9 ft.	**Total Length:** 179.1 ft.	**Deck Width:** 16.4 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Other, Bridge History		

Narrative Description:

The Burmeister Overpass carries private road across the Likelike Highway. This reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open horizontal parapets, concrete deck, and concrete piers.

Significance Statement:

This overpass was built as a result of the Territory refusing to build the mauka entrance to Edward R. Burmeister's Kalihi Valley land from the proposed Kalihi Tunnel access road (current Likelike Highway). The 1958 newspaper article leads one to believe that Governor Quinn was planning to build the mauka entrance to Burmeister's land with the assumption that the City would build a matching makai entrance on his property. The article goes on to say that the City claimed the makai entrance was never a part of their plan. Without this second entrance, Federal Aid requirements would not be met, thus resulting in the loss of Federal Aid funds. (1)

(1) "City's Disappearing Road Proves Grade-A Mystery," Honolulu Advertiser, March 12, 1958, page A-4, C1-2.

Inventory Form
(State)

General Information

Bridge Number: 003009301101728	**Route No:** 930
Popular Name: Farrington Highway-Waialua Plantation Road	
Feature Crossed: Farrington Highway	
Feature Carried: Plantation Road	
Milepost: 5.95 mi.	**Island:** Oahu
Longitude: 158d-07m-23.81s	**Latitude:** 21d-33m-59.24s

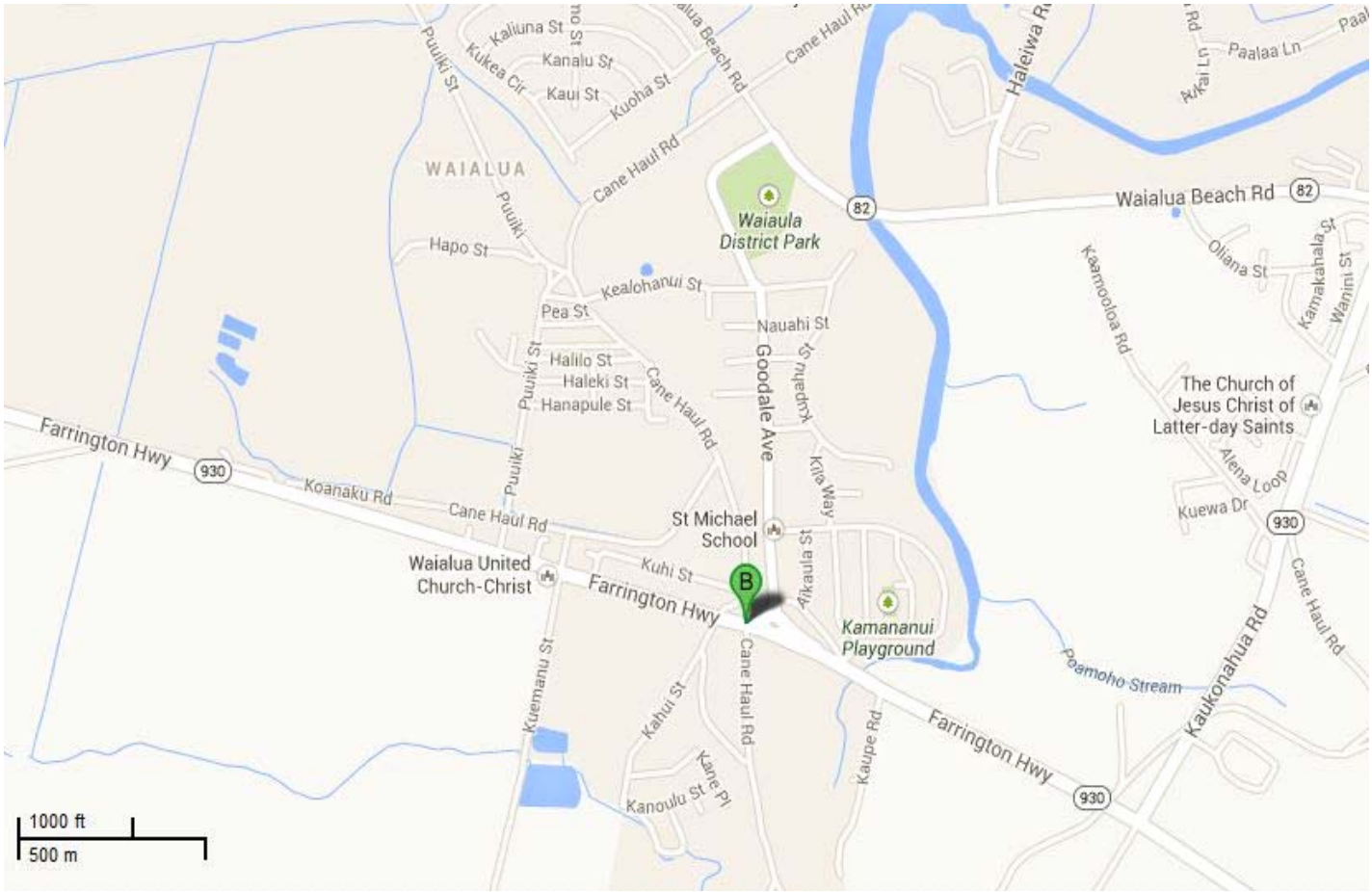
Location: 0.26 Miles East of Kuhi Street

Historic Name: Farrington Highway-Waialua Plantation Road

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 62.0 ft.	**Total Length:** 62.0 ft.	**Deck Width:** 33.1 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Farrington Highway-Waialua Plantation Road Bridge carries Waialua Plantation Road across the Farrington Highway. This reinforced concrete and steel stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open horizontal parapets, concrete deck with steel girders, and concrete abutments. Chain links and jersey barriers were placed in front of the open parapets. The workmanship of the bridge has not been obscured and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete and steel bridge construction in Hawaii. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is also eligible under Criterion C for its distinctive structural type. The bridge is one of the few steel stringer bridges left on Oahu. It is a good example of a 1940's reinforced concrete and steel stringer bridge atypical of its period in its use of materials and design.

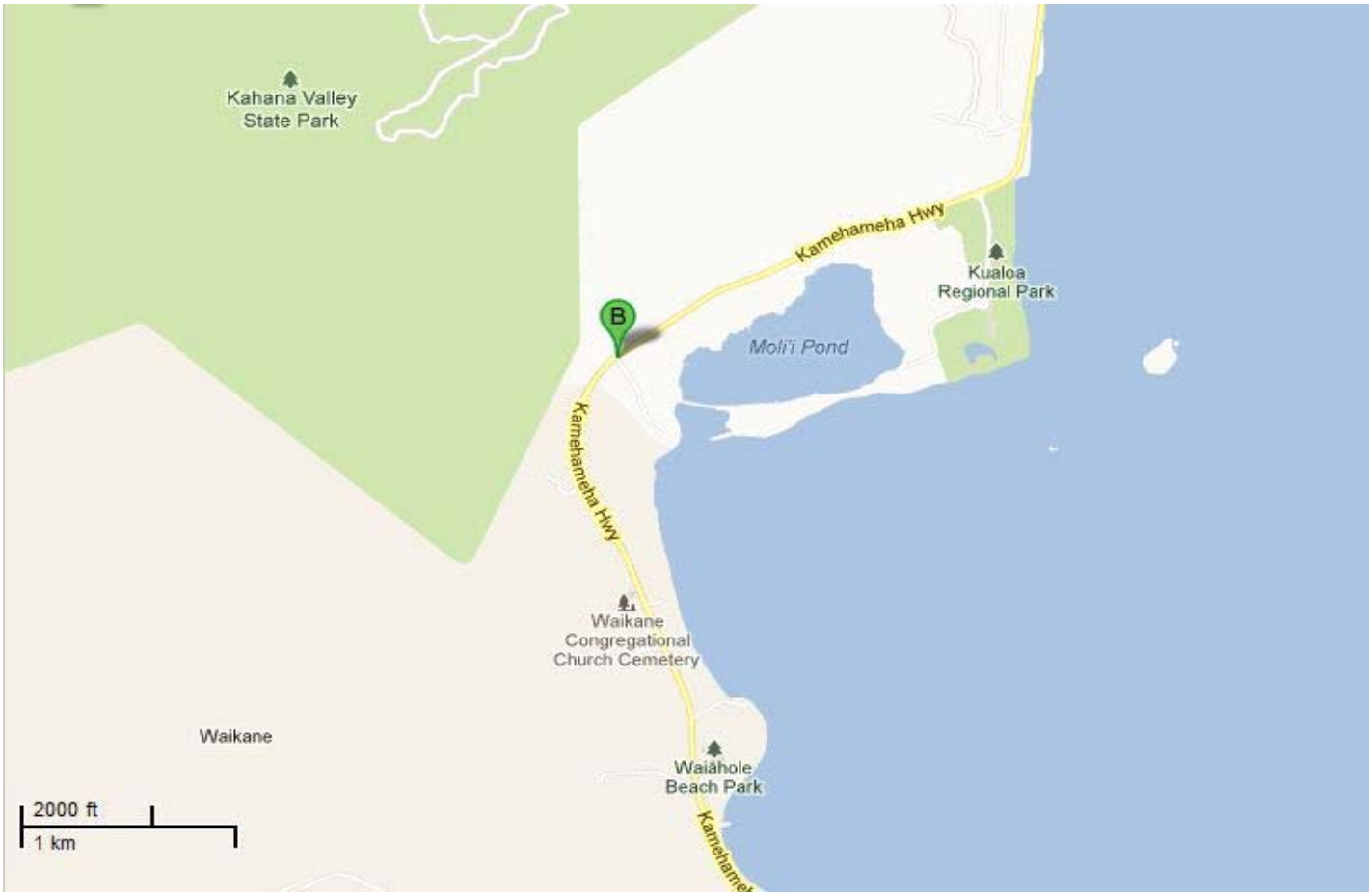
Inventory Form
(State)

General Information

Bridge Number: 003000830303252	**Route No:** 83
Popular Name: Hakipuu Stream	
Feature Crossed: Hakipuu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 32.52 mi.	**Island:** Oahu
Longitude: 157d-51m-18.60s	**Latitude:** 21d-30m-30.28s

Location: 0.10 Miles South of Johnson Road
Historic Name: Hakipuu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1922	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.9 ft.	**Total Length:** 32.2 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hakipuu Stream Bridge carries Kamehameha Highway across the Hakipuu Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and wide end posts which looks to be an addition to the original parapet. The concrete deck is supported by concrete abutments. The parapet cap and end posts have been painted white. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

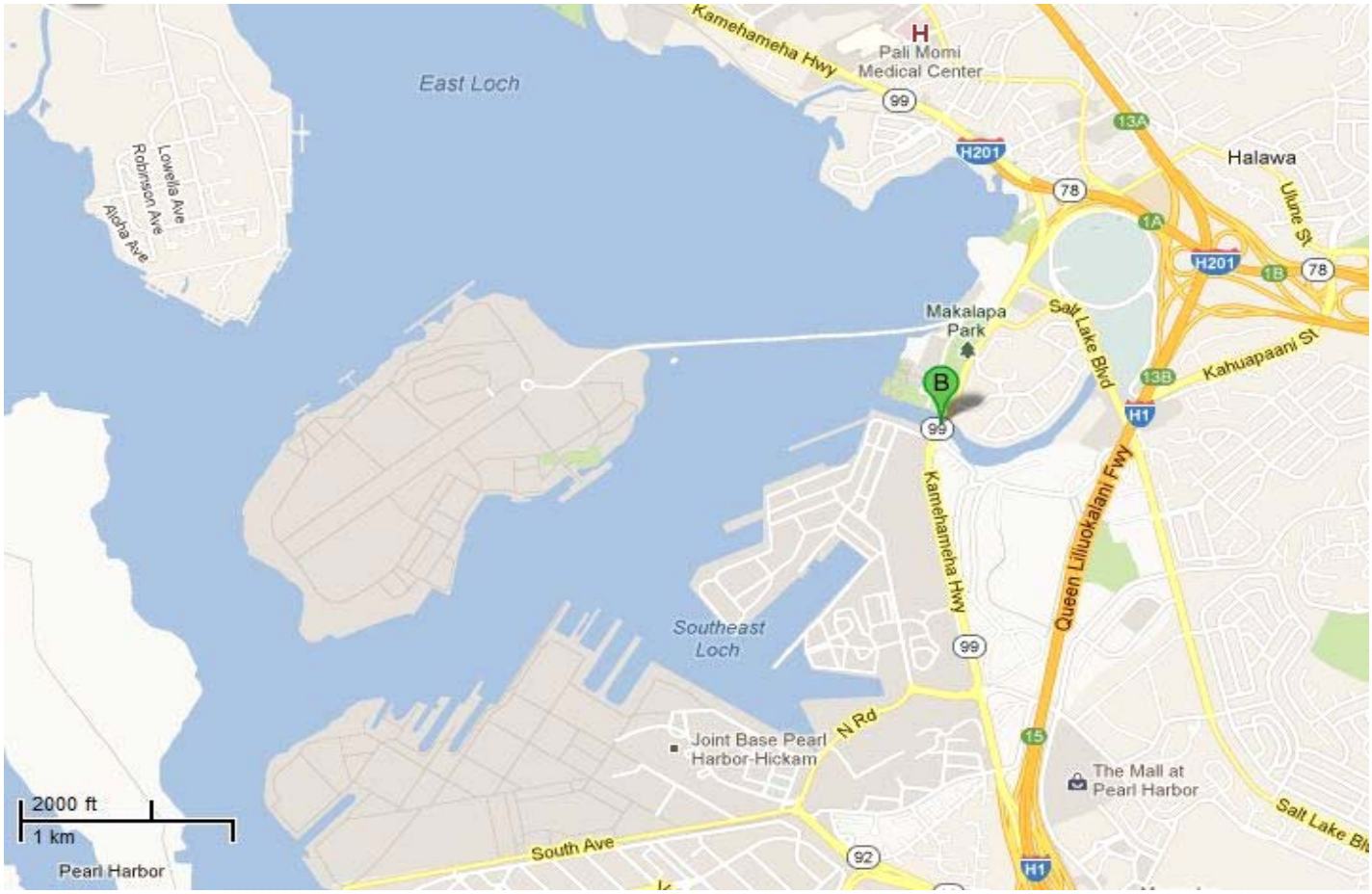
Inventory Form
(State)

General Information

Bridge Number: 003000990402212	**Route No:** 99
Popular Name: Halawa Stream (Westbound)	
Feature Crossed: Halawa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 22.10 mi.	**Island:** Oahu
Longitude: 157d-56m-13.63s	**Latitude:** 21d-21s-54.36s

Location: 0.06 Miles South of Kalaloa Street
Historic Name: Halawa Stream (Westbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1945	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 40.0 ft.	**Total Length:** 240.2 ft.	**Deck Width:** 35.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Halawa Stream (Westbound) Bridge carries Kamehameha Highway across the Halawa Stream. This concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and wide solid stepped profile end posts. Two of the end posts have the bridge name and year of construction engraved. The concrete deck is supported by concrete piers and abutments. Only the stepped caps and end posts have been painted white. Unlike most of the other similar type of the bridges, thrie beams were not bolted to the solid panel parapets therefore the workmanship of the bridge has not been obscured.

Significance Statement:

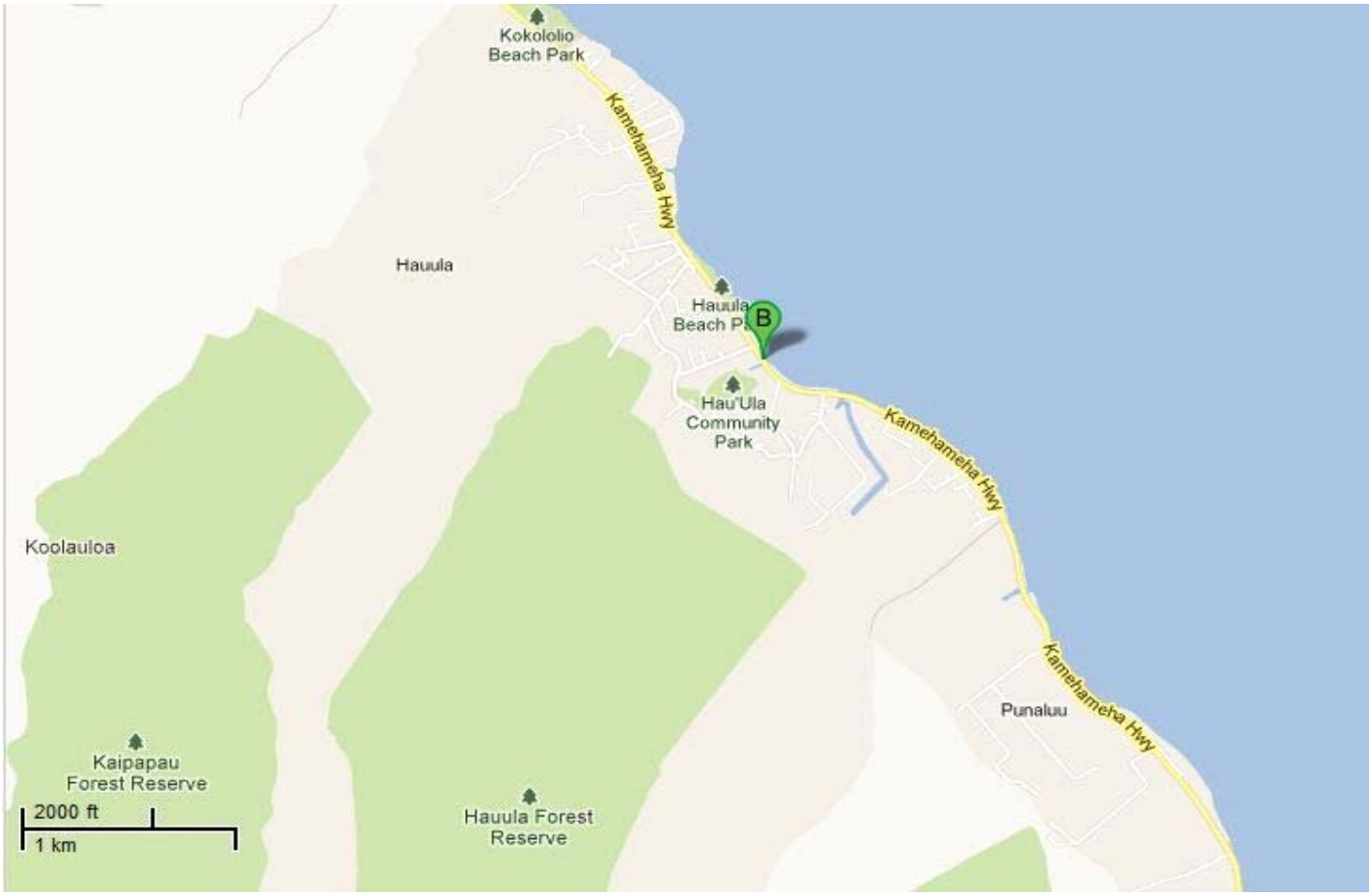
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000830302169	**Route No:** 83
Popular Name: Hauula Stream	
Feature Crossed: Hauula Stream	
Feature Carried: Kamehameha Highway	
Milepost: 21.69 mi.	**Island:** Oahu
Longitude: 157d-54m-31.88s	**Latitude:** 21d-36m-30.13s
Location: 0.06 Miles Southeast of Kukuna Road	
Historic Name: Hauula Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added.		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.9 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hauula Stream Bridge carries Kamehameha Highway across the Hauula Stream. This concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete solid parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge and thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

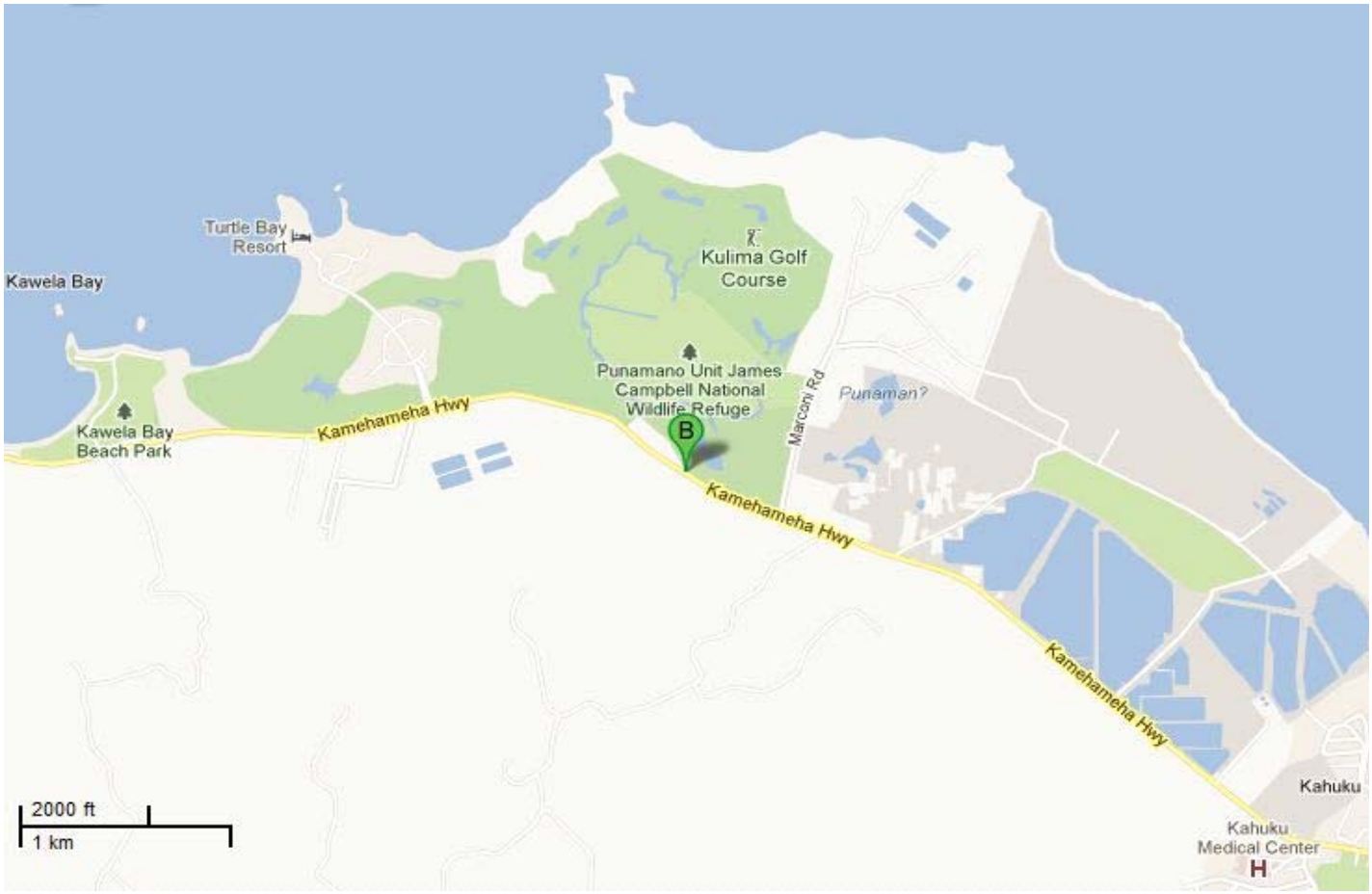
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000830301357 **Route No:** 83	
Popular Name: Hoolapa Stream-Nanahu	
Feature Crossed: Hoolapa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 13.57 mi. **Island:** Oahu	
Longitude: 157d-58m-40.51s **Latitude:** 21d-41m-35.38s	
Location: 1.04 Miles East of Kuilima Drive (Turtle Bay Hilton)	
Historic Name: Hoolapa Stream-Nanahu	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.9 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hoolapa Stream Bridge carries Kamehameha Highway across the Hoolapa Stream. This concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name and the year of construction engraved. The single span concrete deck is supported by concrete abutments. The parapet cap and end posts have been painted white. Thrie beams were bolted to the end posts and covering the engraving. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

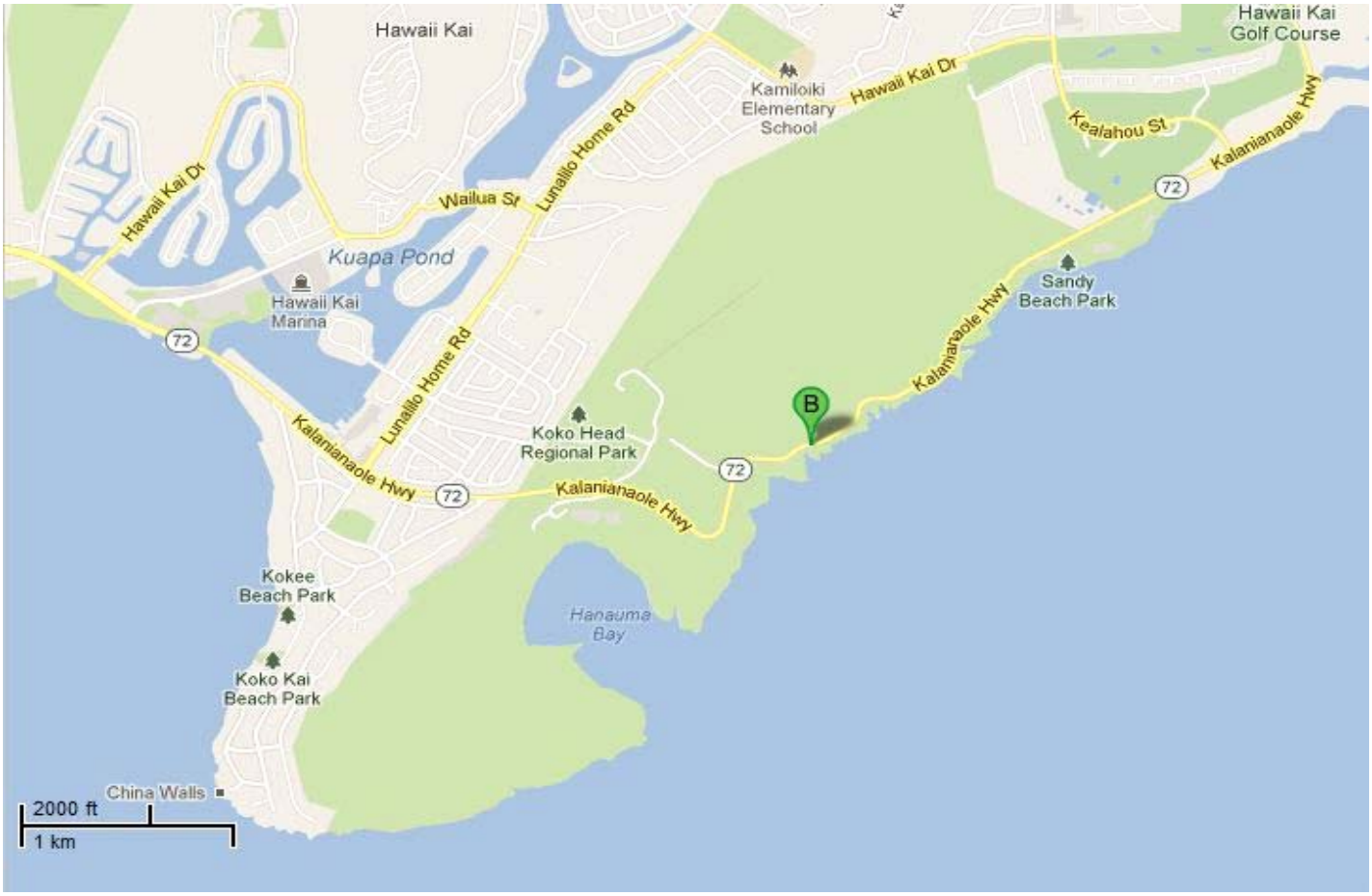
Inventory Form
(State)

General Information

Bridge Number: 003074001400274	**Route No:** 72
Popular Name: Ihiihilauakea Stream	
Feature Crossed: Ihiihilauakea Stream	
Feature Carried: Kalanianaole Highway	
Milepost: 11.66 mi.	**Island:** Oahu
Longitude: 157d-41m-02.53s	**Latitude:** 21d-16m-38.39s

Location: 0.59 Miles Southwest of Blow Hole Lookout
Historic Name: Ihiihilauakea Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 2013	**Replaced?** Yes
Altered? Yes	**Alteration Date(s):** 2013	
Alteration Type(s):		
Alteration Description(s): The structure was repaired and encapsulated with externally bonded fiber reinforced polymer (FRP).		

Bridge Information

Number of Spans: 1	**Max Span:** 65.0 ft.	**Total Length:** 69.9 ft.	**Deck Width:** 29.9 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Ihiihilauakea Stream Bridge carries Kalanianaole Highway across the Ihiihilauakea Stream. This open spandrel concrete arch is in its original location, is generally in good condition, and its materials remain intact. The bridge has thrie beam railings, the concrete deck is supported by masonry abutments and the workmanship of the structural arch has not been obscured. In 2013 the structure was repaired and encapsulated with externally bonded fiber reinforced polymer (FRP) for structural integrity.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's open spandrel concrete bridge in Oahu that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(State)

General Information

Bridge Number: 003000830302903	**Route No:** 83
Popular Name: Kaaawa Stream	
Feature Crossed: Kaaawa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 29.03 mi.	**Island:** Oahu
Longitude: 157d-50m-44.32s	**Latitude:** 21d-32m-40.17s

Location: 0.10 Miles Southeast of Pohuehue Road
Historic Name: Kaaawa Stream
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1927	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964.		

Bridge Information

Number of Spans: 7	**Max Span:** 18.0 ft.	**Total Length:** 126.0 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaaawa Stream Bridge carries Kamehameha Highway across the Kaaawa Stream. This concrete slab bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name and the year of construction were engraved. The reinforced concrete slab deck is supported by the concrete abutments. Only the parapet caps and end posts have been painted white. A wood pedestrian walkway with metal horizontal railing was added to one side of the bridge in 1964. The new concrete solid panel parapets were extended to the end posts to secure the thrie beams approaches; therefore the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

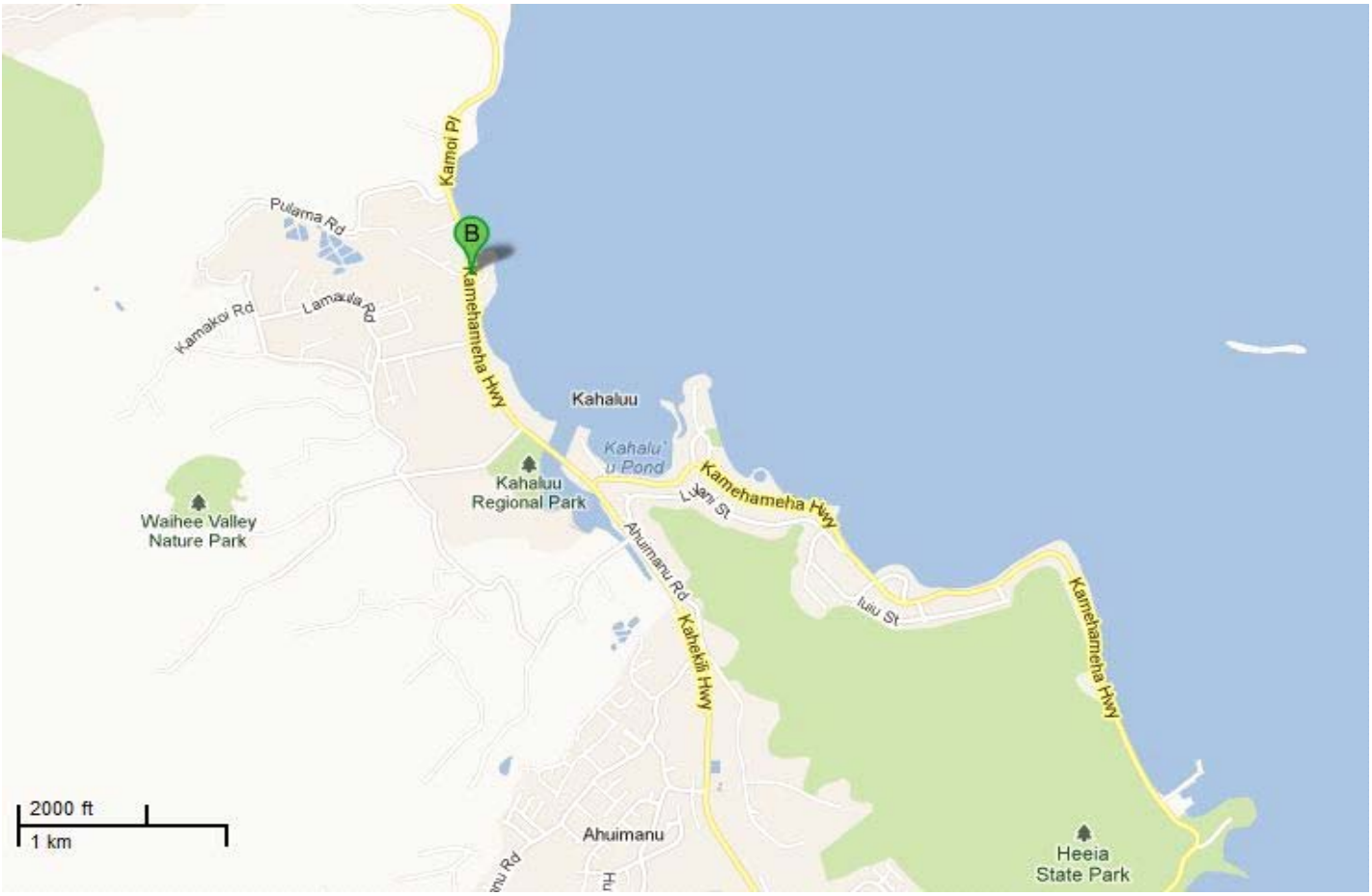
Inventory Form
(State)

General Information

Bridge Number: 003000830303575	**Route No:** 83
Popular Name: Kaalaea Stream	
Feature Crossed: Kaalaea Stream	
Feature Carried: Kamehameha Highway	
Milepost: 35.75 mi.	**Island:** Oahu
Longitude: 157d-50m-36.92s	**Latitude:** 21d-27m-59.34s

Location: 0.01 Miles South of Kaalaea Road
Historic Name: Kaalaea Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1923	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1974, 1992	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1974. Wood pedestrian bridge replaced in 1992.		

Bridge Information

Number of Spans: 2	**Max Span:** 19.0 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaalaea Stream Bridge carries Kamehameha Highway across the Kaakaea Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name engraved. The reinforced concrete deck is supported by the concrete abutments. Wood pedestrian walkways with wood horizontal railings were added both sides of the bridge in 1974 and were replaced in 1992. Thrie beams were bolted to the end posts but the workmanship of the parapet has not been obscured. The simple design of the parapet retains its historic feeling.

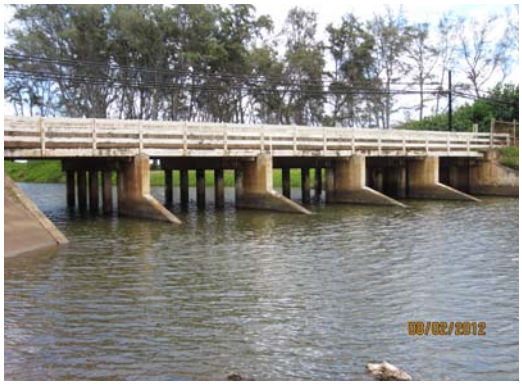
Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

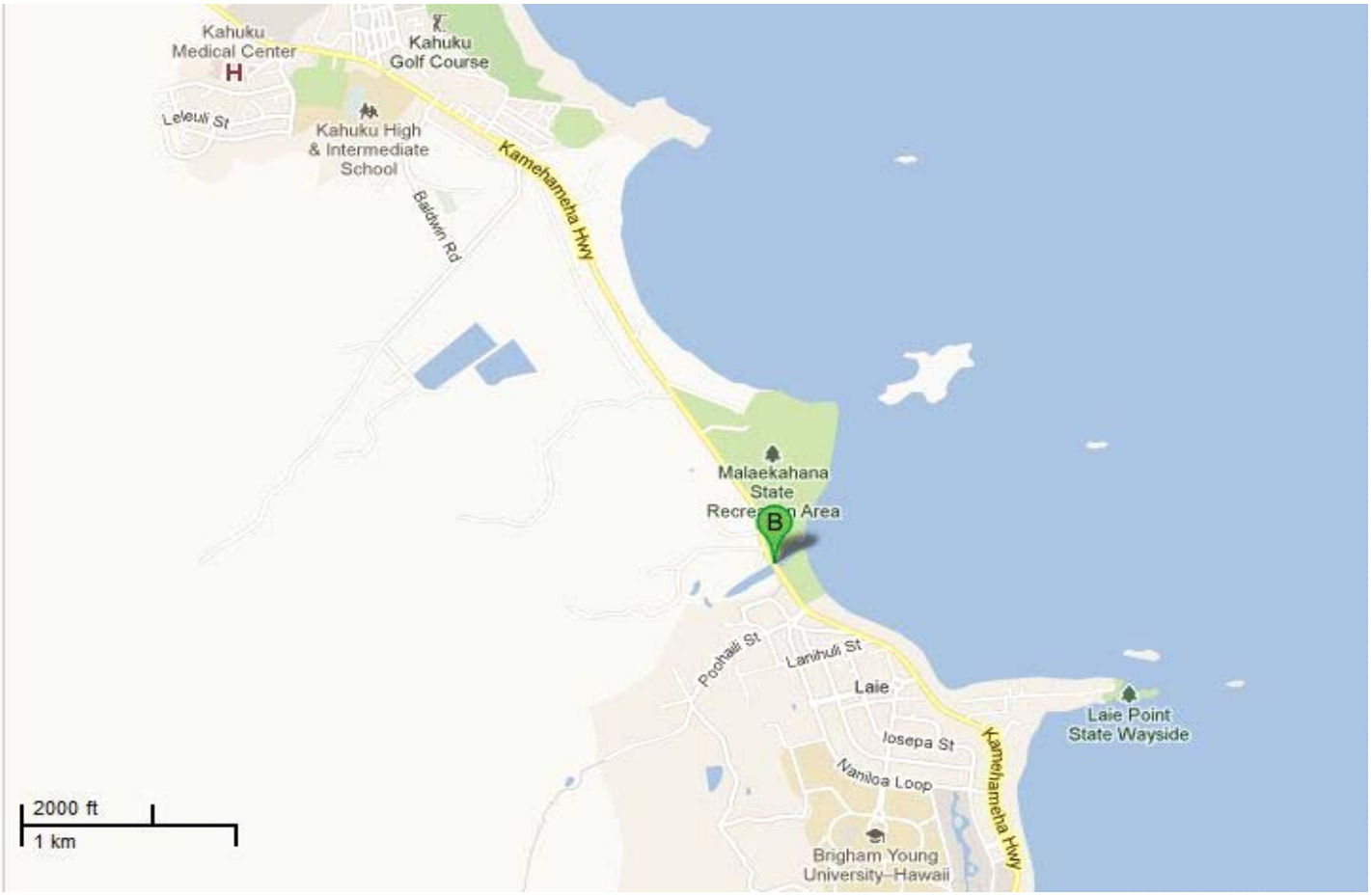
General Information

Bridge Number: 003000830301785	**Route No:** 83
Popular Name: Kahawainui Stream-Laiewai	
Feature Crossed: Kahawainui Sream	
Feature Carried: Kamehameha Highway	
Milepost: 17.85 mi.	**Island:** Oahu
Longitude: 157d-55m-47.68s	**Latitude:** 21d-39m-14.39s



Location: 0.17 Miles Northwest of Naniloa Loop
Historic Name: Kahawainui Stream-Laiewai
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1933	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1991	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1991.		

Bridge Information

Number of Spans: 5	**Max Span:** 18.0 ft.	**Total Length:** 90.9 ft.	**Deck Width:** 27.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kahawainui Stream-Laiewai Bridge carries Kamehameha Highway across the Kahawainui Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1991. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

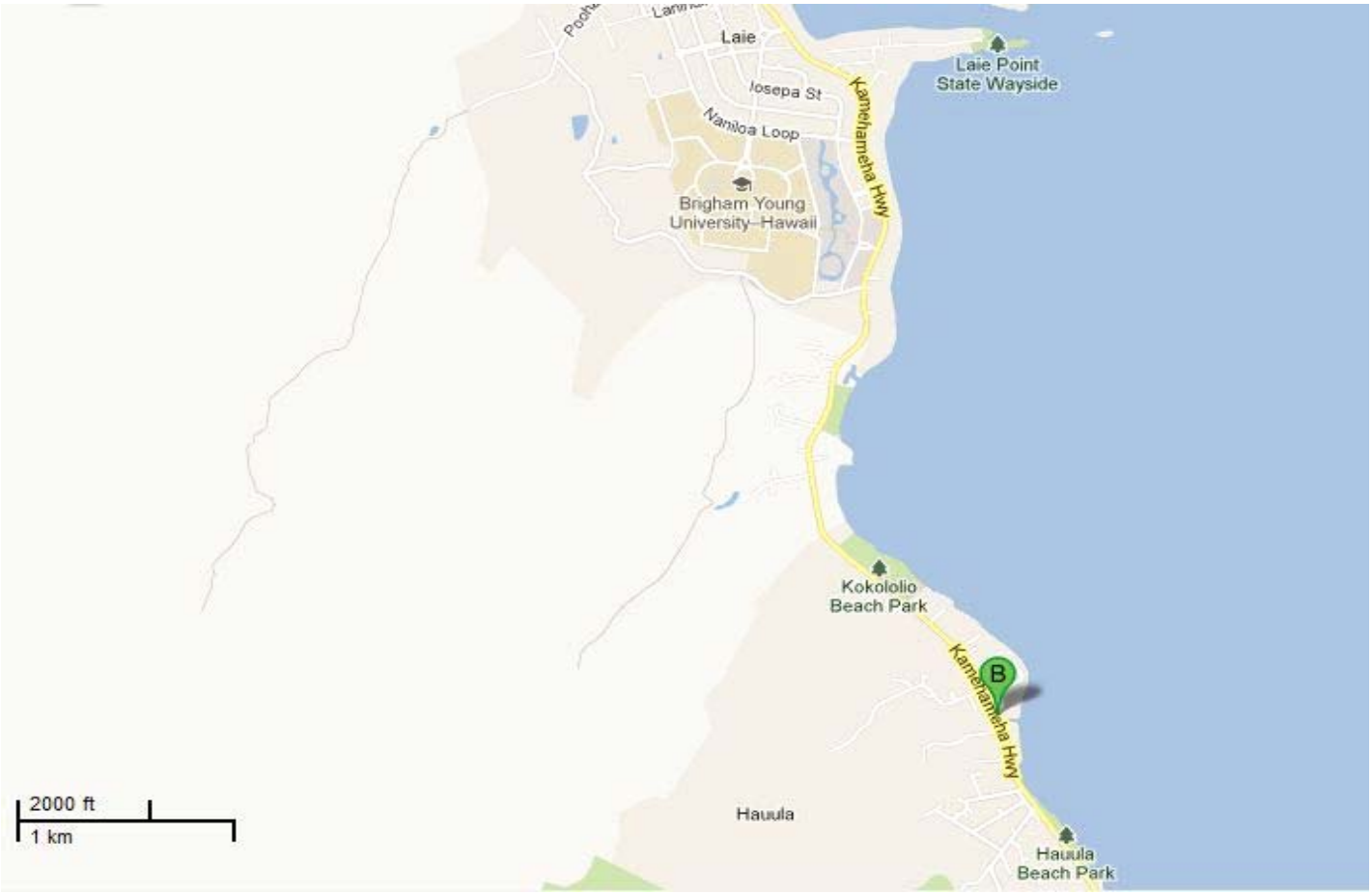
Inventory Form
(State)

General Information

Bridge Number: 003000830302099	**Route No:** 83
Popular Name: Kaipapau Stream	
Feature Crossed: Kaipapau Stream	
Feature Carried: Kamehameha Highway	
Milepost: 20.99 mi.	**Island:** Oahu
Longitude: 157d-54m-49.88s	**Latitude:** 21d-37m-01.72s

Location: 0.01 Miles Southeast of Pipilani Place
Historic Name: Kaipapau Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964.		

Bridge Information

Number of Spans: 2	**Max Span:** 40.0 ft.	**Total Length:** 82.0 ft.	**Deck Width:** 28.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaipaupau Stream Bridge carries Kamehameha Highway across the Kaipaupau Stream. This long concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete open arch parapets with tapered caps and curved wide end posts. The concrete deck is supported by concrete abutments. The parapet caps and end posts have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1964. Thrie beams were bolted to the end posts but the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

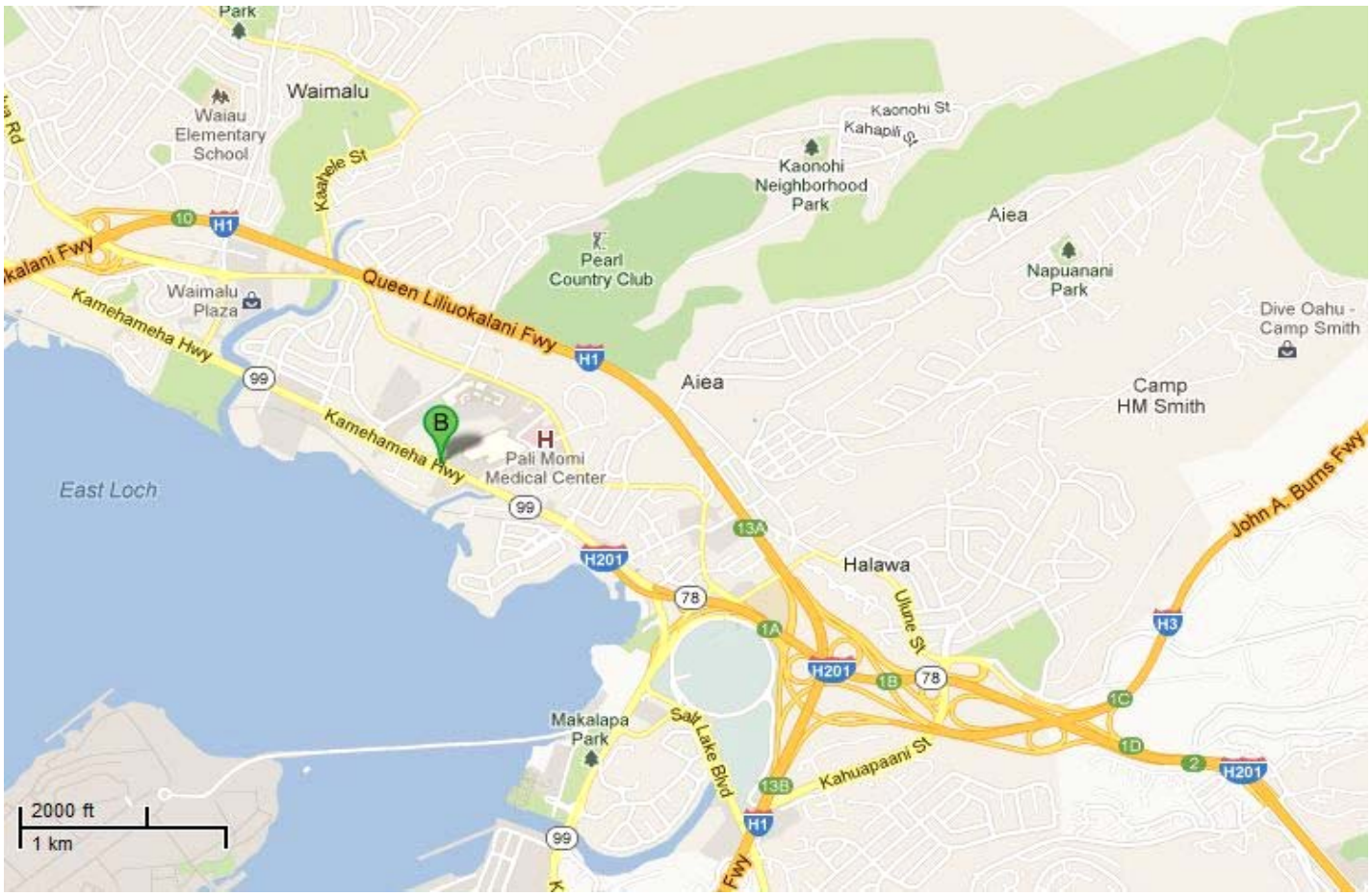
Inventory Form
(State)

General Information

Bridge Number: 003000990402053 **Route No:** 99	
Popular Name: Kalauao Springs (Eastbound)	
Feature Crossed: Kalauao Springs	
Feature Carried: Kamehameha Highway	
Milepost: 20.51 mi. **Island:** Oahu	
Longitude: 157d-56m-35.61s **Latitude:** 21d-22m-55.13s	

Location: 0.11 Miles East of Lipoa Place
Historic Name: Kalauao Springs (Eastbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1936	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1966		
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 1	**Max Span:** 43.0 ft.	**Total Length:** 44.9 ft.	**Deck Width:** 47.9 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Kalauao Spring (Eastbound) Bridge carries Kamehameha Highway across Kalauao Stream. This concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide end posts on one side. The original construction year “1936” is engraved on one of the end posts. The other side of the parapet is replaced to the concrete and metal parapet due to the bridge widening in 1966. Bridge name and the widening year of “1966” are engraved on the end solid parapet but thrie beam was bolted over the engravings.

Significance Statement:

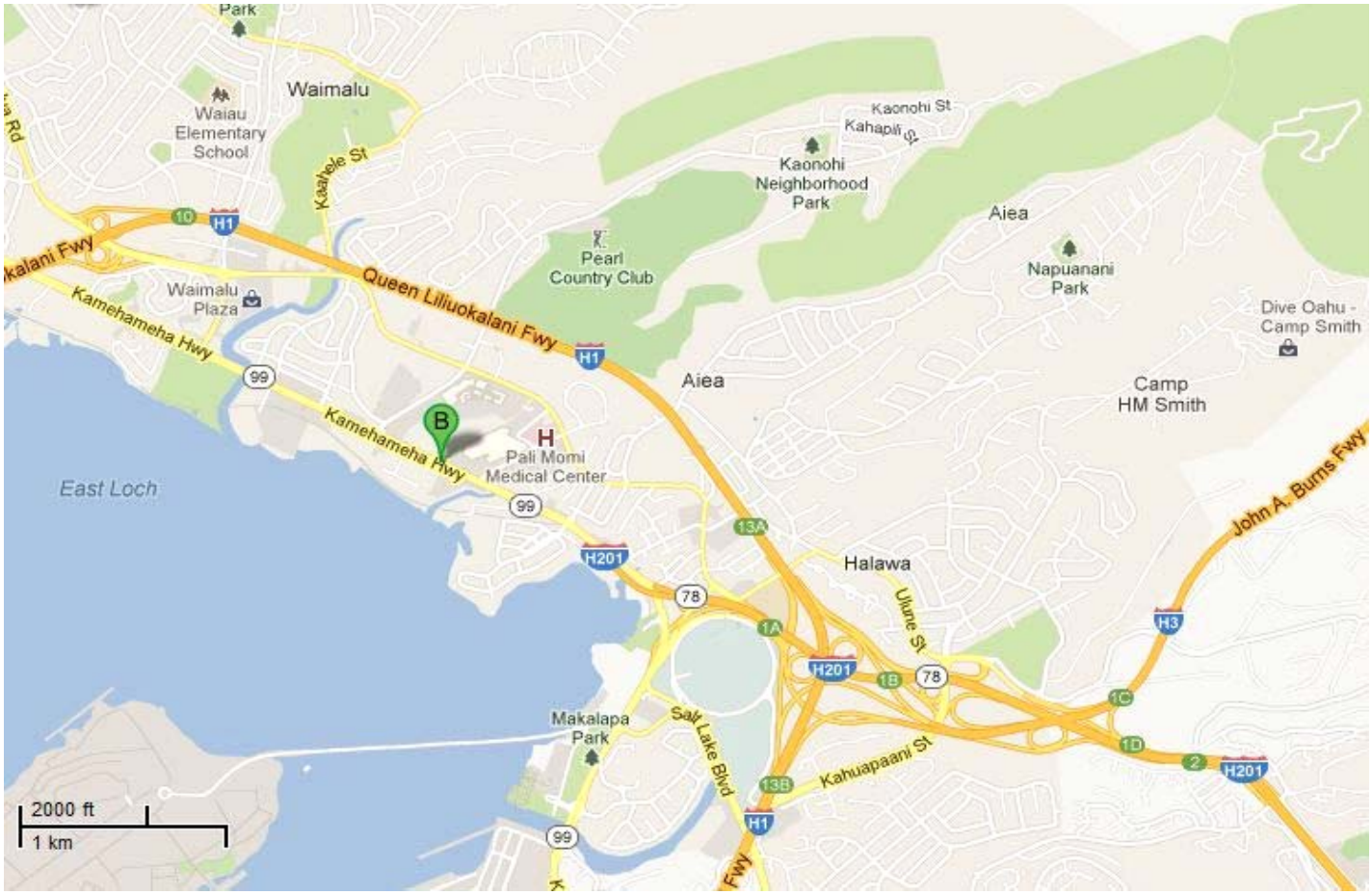
This bridge is eligible under Criterion A for its association with post-war developments of the community.

Inventory Form
(State)

General Information

Bridge Number: 003000990402054 **Route No:** 99	
Popular Name: Kalauao Springs (Westbound)	
Feature Crossed: Kalauao Springs	
Feature Carried: Kamehameha Highway	
Milepost: 20.52 mi. **Island:** Oahu	
Longitude: 157d-56m-35.34s **Latitude:** 21d-22m-55.58s	
Location: 0.11 Miles East of Lipoa Place	
Historic Name: Kalauao Springs (Westbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1945	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1966		
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 2	**Max Span:** 26.9 ft.	**Total Length:** 54.1 ft.	**Deck Width:** 46.3 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Kalauao Spring (Westbound) Bridge carries Kamehameha Highway across Kalauao Stream. This concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide end posts on one side. The other side of the parapet is replaced to the concrete and metal parapet due to the bridge widening in 1966. Bridge name and the widening year of “1966” are engraved on the end solid parapet.

Significance Statement:

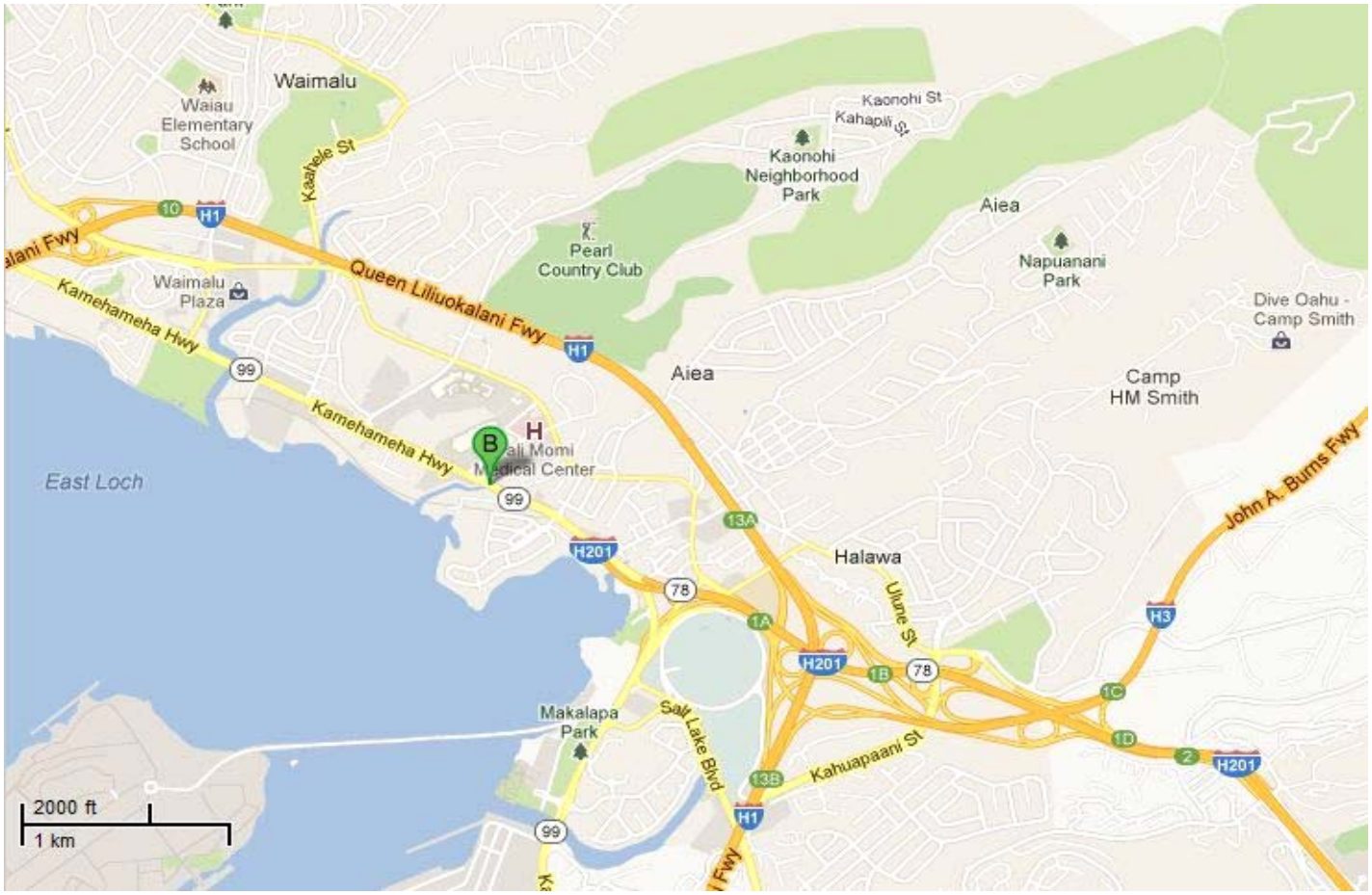
This bridge is eligible under Criterion A for its association with post-war developments of the community.

Inventory Form
(State)

General Information

Bridge Number: 003000990402074 **Route No:** 99	
Popular Name: Kalauao Stream (Eastbound)	
Feature Crossed: Kalauao Stream	
Feature Carried: Kamehameha Highway	
Milepost: 20.72 mi. **Island:** Oahu	
Longitude: 157d-56m-25.43s **Latitude:** 21d-22m-50.50s	
Location: 0.10 Miles West of Kihale Street	
Historic Name: Kalauao Stream (Eastbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1936	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1966		
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 1	**Max Span:** 50.0 ft.	**Total Length:** 57.4 ft.	**Deck Width:** 48.1 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Kalauao Stream (Eastbound) Bridge carries Kamehameha Highway across Kalauao Stream. This concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide end posts on one side. The original construction year “1936” is engraved on one of the end posts. The other side of the parapet is replaced to the concrete and metal parapet due to the bridge widening in 1966. Bridge name and the widening year “1966” is engraved on the end solid parapet. The thrie beam approaches were bolted at the end parapets.

Significance Statement:

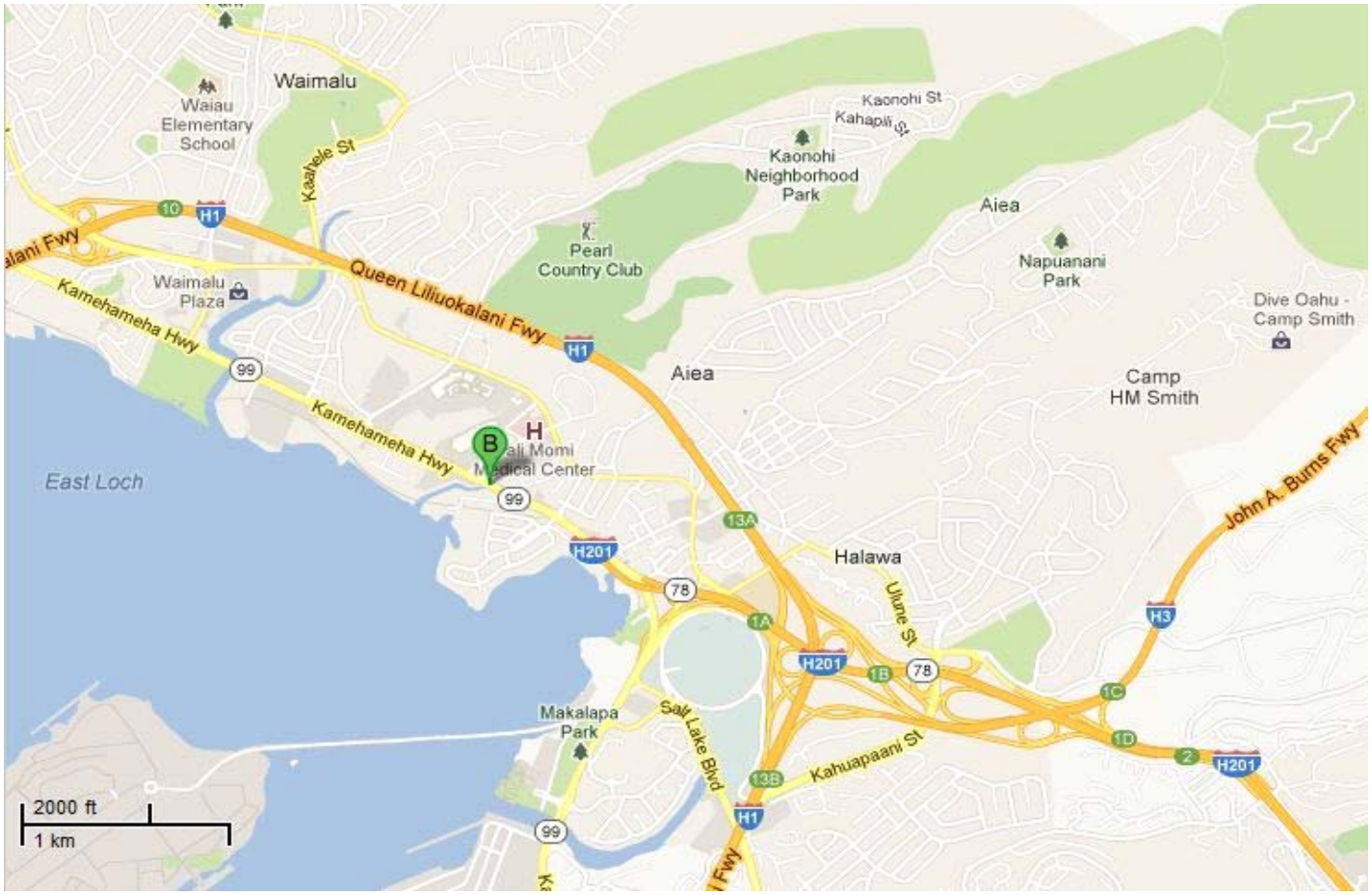
This bridge is eligible under Criterion A for its association with post-war developments of the community due to bridge widening in 1966.

Inventory Form
(State)

General Information

Bridge Number: 003000990402075 **Route No:** 99	
Popular Name: Kalauao Stream (Westbound)	
Feature Crossed: Kalauao Stream	
Feature Carried: Kamehameha Highway	
Milepost: 20.73 mi. **Island:** Oahu	
Longitude: 157d-56m-24.55s **Latitude:** 21d-22m-50.71s	
Location: 0.10 Miles West of Kihale Street	
Historic Name: Kalauao Stream (Westbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1945	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1966	
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 2	**Max Span:** 47.9 ft.	**Total Length:** 107.9 ft.	**Deck Width:** 46.3 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Kalauao Stream (Westbound) Bridge carries Kamehameha Highway across Kalauao Stream. This concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide end posts on one side. The thrie beam approaches were bolted to the end posts. The other side of the parapet is replaced to the concrete and metal parapet due to the bridge widening in 1966. Bridge name and the widening year “1966” is engraved on the end solid parapet.

Significance Statement:

This bridge is eligible under Criterion A for its association with post-war developments of the community.

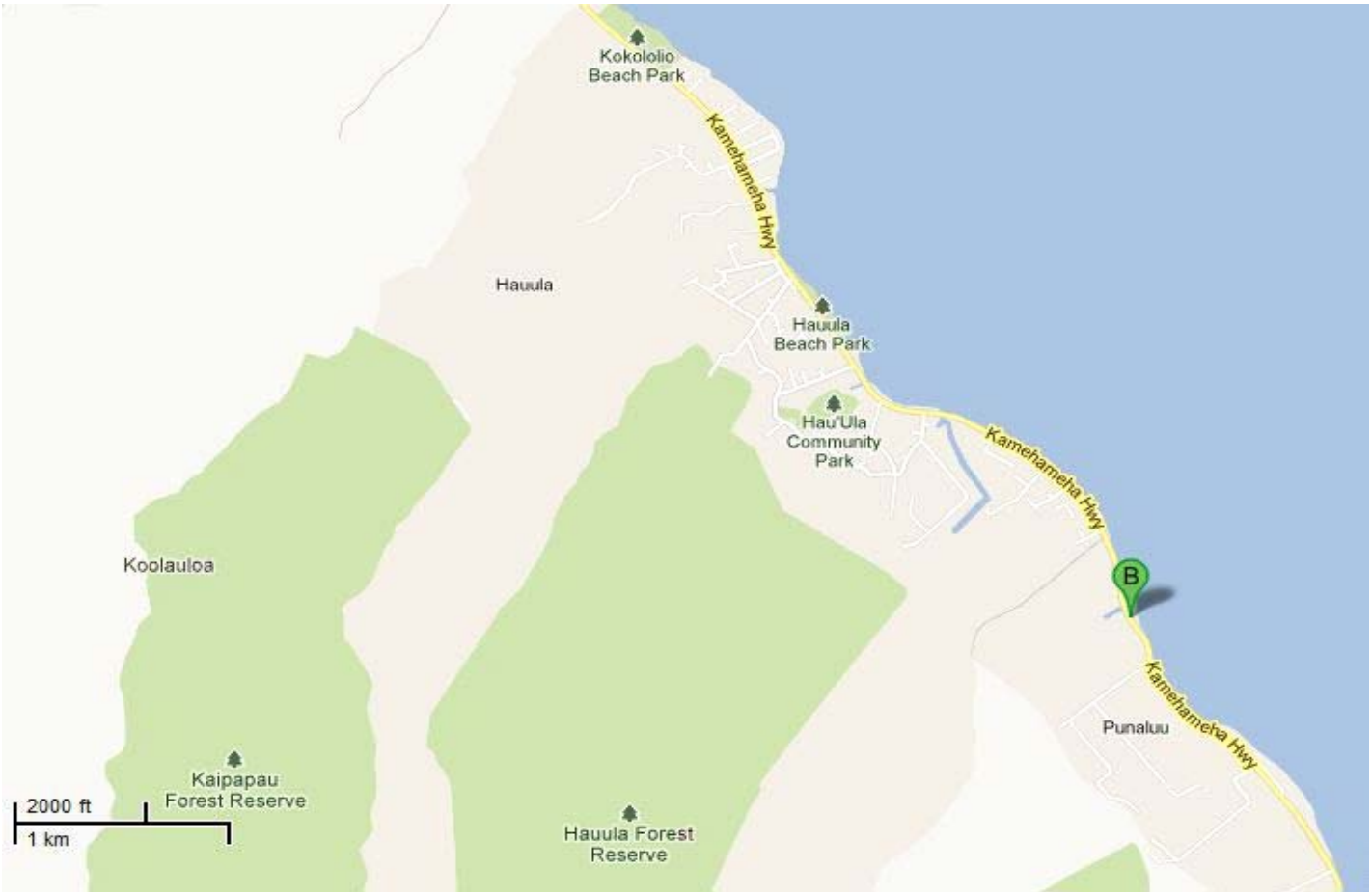
Inventory Form
(State)

General Information

Bridge Number: 003000830302282	**Route No:** 83
Popular Name: Kaluanui Stream	
Feature Crossed: Kaluanui Stream	
Feature Carried: Kamehameha Highway	
Milepost: 22.82 mi.	**Island:** Oahu
Longitude: 157d-53m-49.30s	**Latitude:** 21d-35m-52.74s

Location: 0.25 Miles Southeast of Sacred Falls Road
Historic Name: Kaluanui Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 7	**Max Span:** 18.0 ft.	**Total Length:** 126.0 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaluanui Stream Bridge carries Kamehameha Highway across the Kaluanui Stream. This reinforced concrete tee beam is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and end posts. The reinforced concrete deck with gunnite sprayed at the bottom is supported by the concrete abutments. Only the parapet caps have been painted white. The large utility pipe was added on the upstream side of the parapet. Thrie beams were bolted to the end posts but the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000800300071 **Route No:** 80

Popular Name: Kaukonahua Bridge-Karsten Thot

Feature Crossed: Wahiawa Reservoir

Feature Carried: Kamehameha Highway

Milepost: 0.67 mi. **Island:** Oahu

Longitude: 158d-01m-46.08s **Latitude:** 21d-30m-03.16s

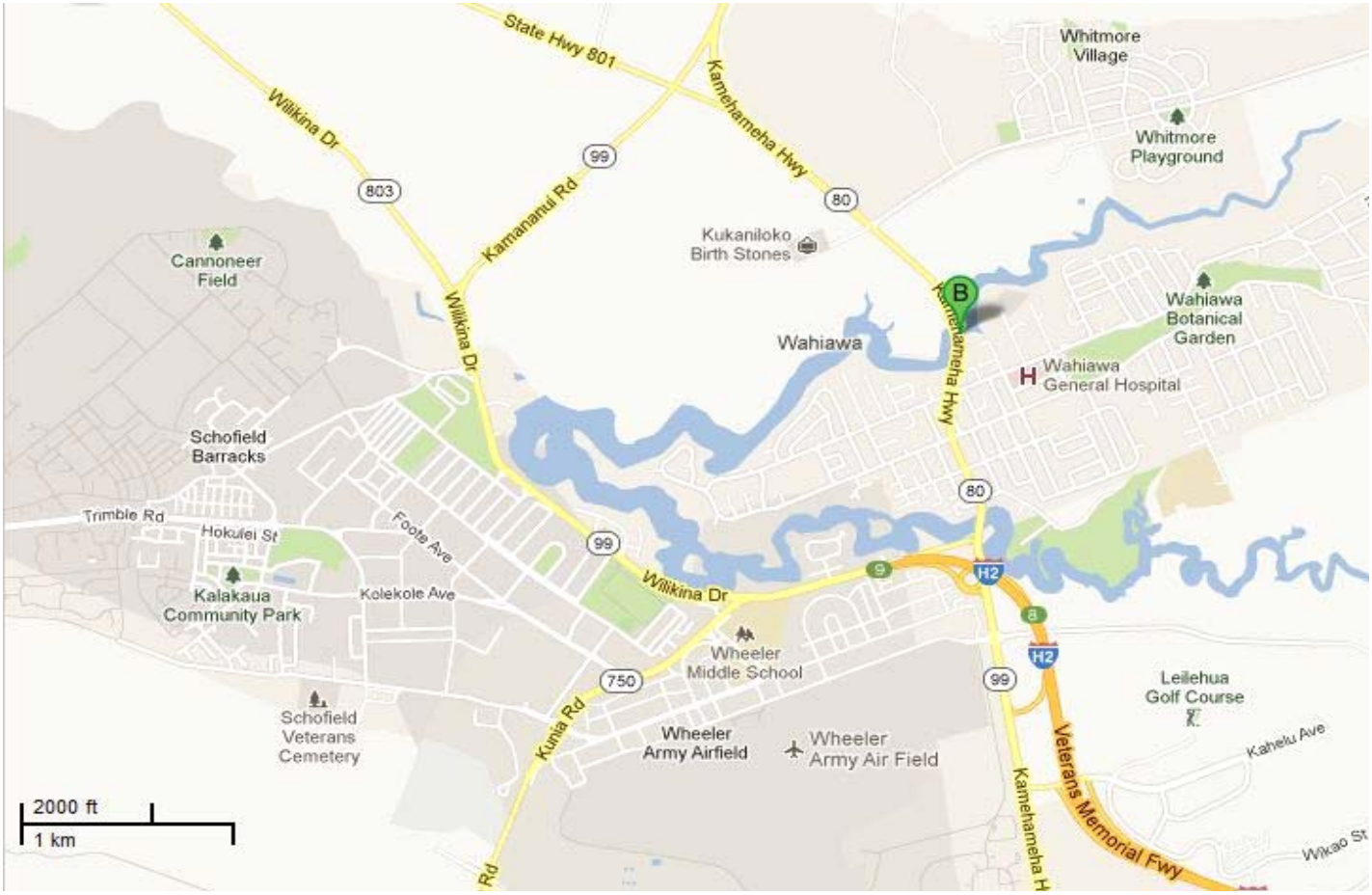
Location: 0.18 Miles North of Kilani Avenue

Historic Name: Kaukonahua Bridge-Karsten Thot

Designer/Engineer: G. K. Dawson

Builder/Contractor: J. L. Young Engineering

Location Map:



Construction Information

Bridge Type: Steel Truss	**Construction Date:** 1932	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 210.0 ft.	**Total Length:** 213.9 ft.	**Deck Width:** 40.0 ft.
Superstructure: Steel Through Truss			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features: Walkways on both sides; commemorative plaques			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation,Social, Engineering		

Narrative Description:

The Karsten Thot Bridge, located outside the rural community of Wahiawa on the central Oahu plain, carries Kamehameha Highway across the North Fork of Kaukonahua Stream. The structure is a steel through-deck Warren truss; one of only three metal trusses in the islands and the only bridge of its type on Oahu.

The Karsten Thot Bridge remains in its original location. The bridge's setting has retained its rural character, however, Kamehameha Highway - once the primary circum-island road - was bypassed by the construction of the H-2 Interstate in the 1960s. The bridge's original Warren truss design and riveted steel materials remain intact, with no major alterations. In January 1996, the bridge was cleaned and repainted and some of the steel cross braces were repaired. The bridge's historic associations, as an important civic structure associated with Mr. Karsten Thot and the development of Wahiawa, is readily apparent due to the commemorative plaques located on the bridge. The bridge retains its historic feeling due to its rural location, narrow width, and now uncommon construction type.

Significance Statement:

The Karsten Thot Bridge is significant for its contributions to the areas of engineering and transportation in Hawaii. The 1932 bridge is an excellent example of a late-period steel through-deck Warren truss. The Karsten Thot Bridge is eligible under Criterion A for its associations with public works efforts by the City and County of Honolulu during the Territorial period in Hawaii, and for its contributions to the economic development of central Oahu by providing reliable vehicular access from Honolulu to the north shore of the island. It is eligible under Criterion B for its association with Karsten Thot, a prominent Wahiawa citizen, for whom the bridge was renamed. The bridge is also eligible under Criterion C as a rare remaining example of this once common bridge type. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. The bridge is one of three metal truss bridges remaining in the state; others include the 1898 Opaekaa Stream Bridge and the 1912 Hanalei Bridge (replaced "in-kind" in 2003), both located on Kauai.

The bridge was an important transportation link for the central Oahu region, and contributed to the growth of Wahiawa. Kamehameha Highway was the major artery between Honolulu and the rural communities on the north shore until the H-2 Interstate was built in the 1960s. The Karsten Thot Bridge was constructed at a major crossing, the North Fork of the Kaukonahua Stream, north of Wahiawa, a sugar plantation town in central Oahu. The bridge is named after Karsten Thot, a supervisor for the Hawaiian Pineapple Company, who was very active in community affairs. Mr. Thot was born in Schleswig-Holstein, Germany on 12 February 1889 and moved to Hawaii in 1904. Upon his death in 1932, the Honolulu Board of Supervisors voted to name the new bridge after him. In 1974, a memorial plaque was finally placed on the bridge by the family.

The Karsten Thot Bridge is the only steel truss erected in Hawaii during the Depression-era. The construction was authorized by the City and County of Honolulu, despite the Territorial Highway Department's policy against the use of metal bridges due to salt water corrosion problems. The Kaukonahua Stream required a relatively long span (210 feet), consequently steel must have been selected over concrete for cost considerations. The bridge was built by the John L. Young Construction and Engineering Company. The company merged with another construction company and upon completion of the bridge called itself the Hawaiian-American Construction Co. The designer was, G. K. Dawson, an engineer with the City and County of Honolulu.

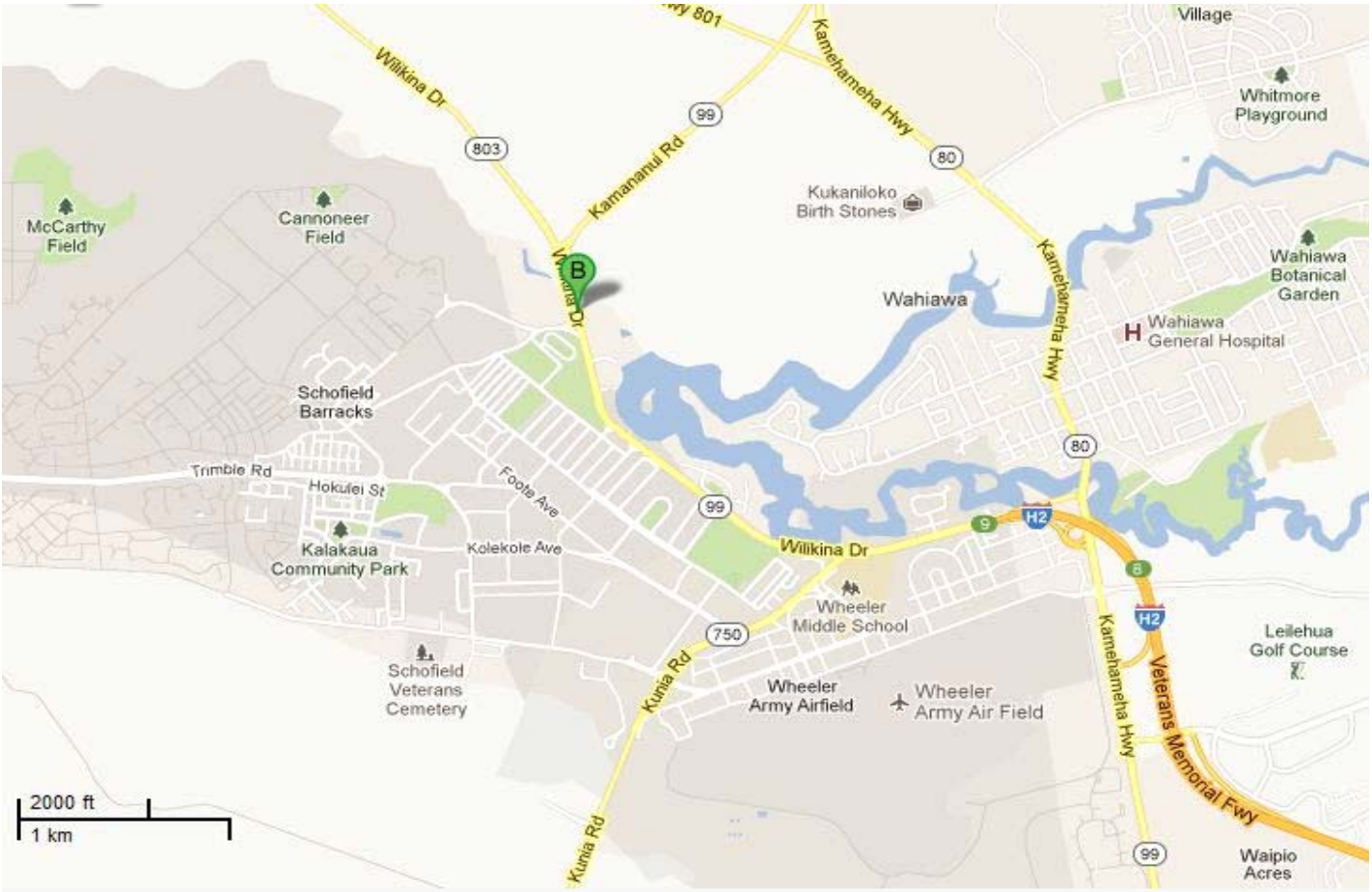
Inventory Form
(State)

General Information

Bridge Number: 003000990300787	**Route No:** 99
Popular Name: Kaukonahua Stream	
Feature Crossed: Kaukonahua Stream	
Feature Carried: Wilikina Drive	
Milepost: 7.87 mi.	**Island:** Oahu
Longitude: 158d-03m-06.83s	**Latitude:** 21d-30m-01.36s

Location: 0.06 Miles North of McNair Gate
Historic Name: Kaukonahua Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1944	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 89.9 ft.	**Total Length:** 233.9 ft.	**Deck Width:** 34.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Walkway each side			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Kaukonahua Stream Bridge was built in 1944, to carry Wilikina Drive over the South Fork of Kaukonahua Stream in Wahiawa just past historic Kemoo Farm. The bridge is in its original location near the McNair Gate of Schofield Barracks. The area has retained its original rural setting in a wooded section on the outskirts of Wahiawa Town, adjacent to agricultural land. The bridge's continuous concrete tee-beam construction and reinforced concrete trestles remain intact. The tee beam engineering eliminated the need for expansion joints on the deck. Despite minor damage, and the addition of removable flared guardrails at the end piers, the bridge's original workmanship remains evident. The guard railings are composed of reinforced concrete "Greek-cross" balustrade that was typical of the era. Interpretation of the bridge is aided by the name and date inscribed on the interior of the end piers.

Significance Statement:

Because ample equipment held by the U.S. Army and Navy were available in the Territory of Hawaii for several years after World War II, every effort was made to obtain needed materials and equipment for local public works projects. The projects were carefully planned not only to tie in with private employment, but to provide employment to the extent necessary to pick up the slack in unemployment that may exist at any particular time. Each county was tasked with proposing specific public works projects for their county including need for project, sketches, estimated cost and estimated man hours required to complete each project. The proposals were submitted to the Department of Postwar Planning to be compiled into a statewide report and priority list.

The Kaukonahua Stream Bridge is a typical example of a project that benefited from the Postwar Planning Division of the Department of Public Works. As a Federal Aid Project during the buildup of the National Defense program, the first Kaukonahua timber trestle bridge was constructed in 1940 to connect Schofield Barracks to the Dillingham Air Field in Mokuleia (via Farrington Hwy). In 1944, as part of the Post War Planning the obsolete timber bridge was upgraded to the existing concrete tee structure.

The surrounding rural environment has remained intact and the bridge continues to provide a vital connection between central Oahu and the North Shore.

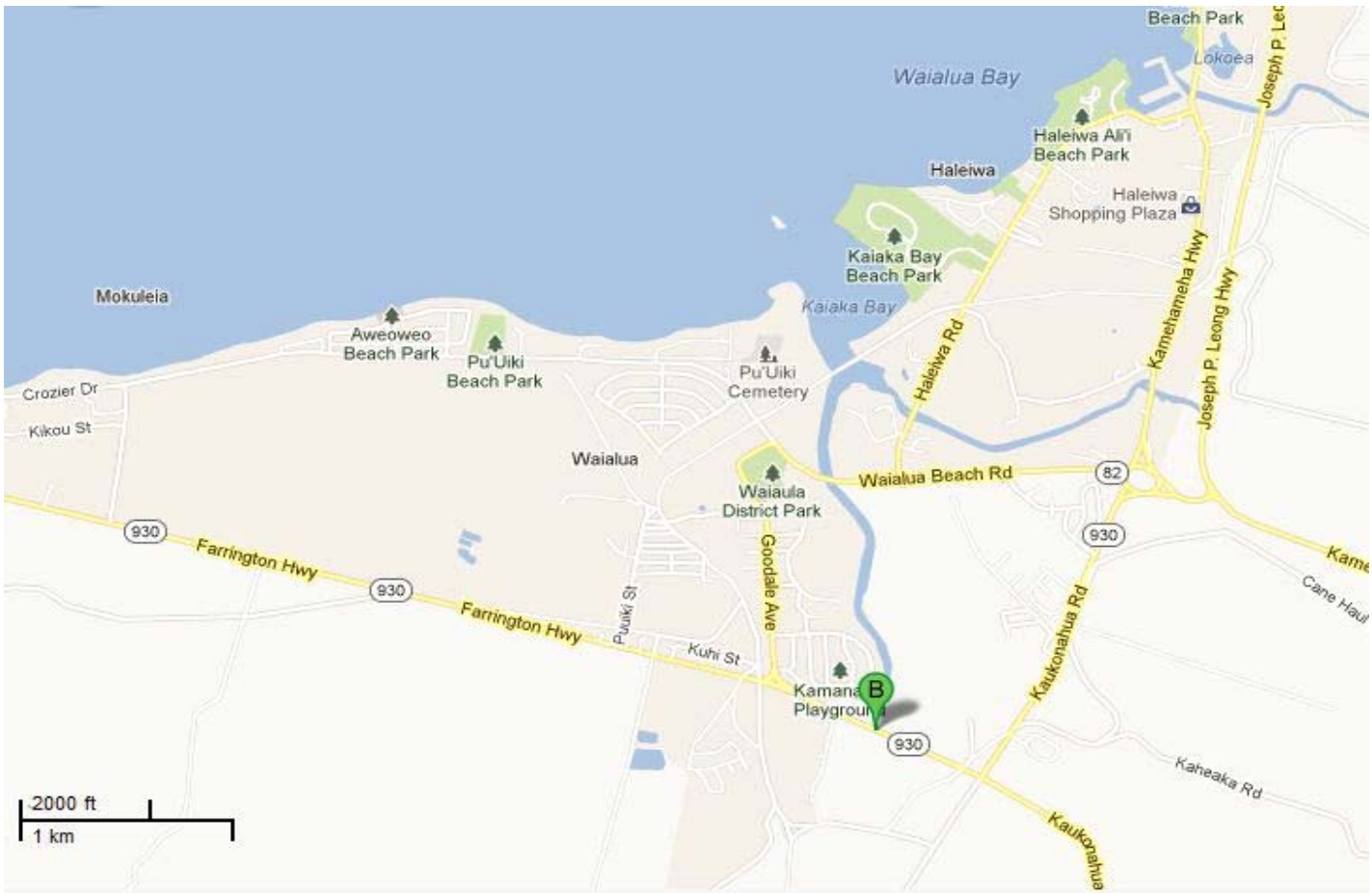
Inventory Form
(State)

General Information

Bridge Number: 003009300501748	**Route No:** 930
Popular Name: Kaukonahua Stream	
Feature Crossed: Kaukonahua Stream	
Feature Carried: Farrington Highway	
Milepost: 6.15 mi.	**Island:** Oahu
Longitude: 158d-07m-13.08s	**Latitude:** 21d-33m-54.98s

Location: 0.02 Miles East of Naluahi Street
Historic Name: Kaukonahua Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



003009300501748 Kaukonahua Stream

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 54.1 ft.	**Total Length:** 148.0 ft.	**Deck Width:** 37.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaukonahua Stream Bridge carries Farrington Highway across the Kaukonahua Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and wide solid stepped profile end posts. Solid concrete parapets and thrie beam additions extend from all of the bridge's end posts as part of Farrington Highway. One of the bridge's end posts has the bridge name engraved upon it. The concrete deck is supported by concrete piers and abutments. Only the stepped caps and end posts have been painted white. The workmanship of the bridge has not been obscured.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003063001400065 **Route No:** 65

Popular Name: Kawa Stream

Feature Crossed: Kawa Stream

Feature Carried: Kaneohe Bay Drive

Milepost: 0.65 mi. **Island:** Oahu

Longitude: 157d-47m-25.50s **Latitude:** 21d-24m-20.92s

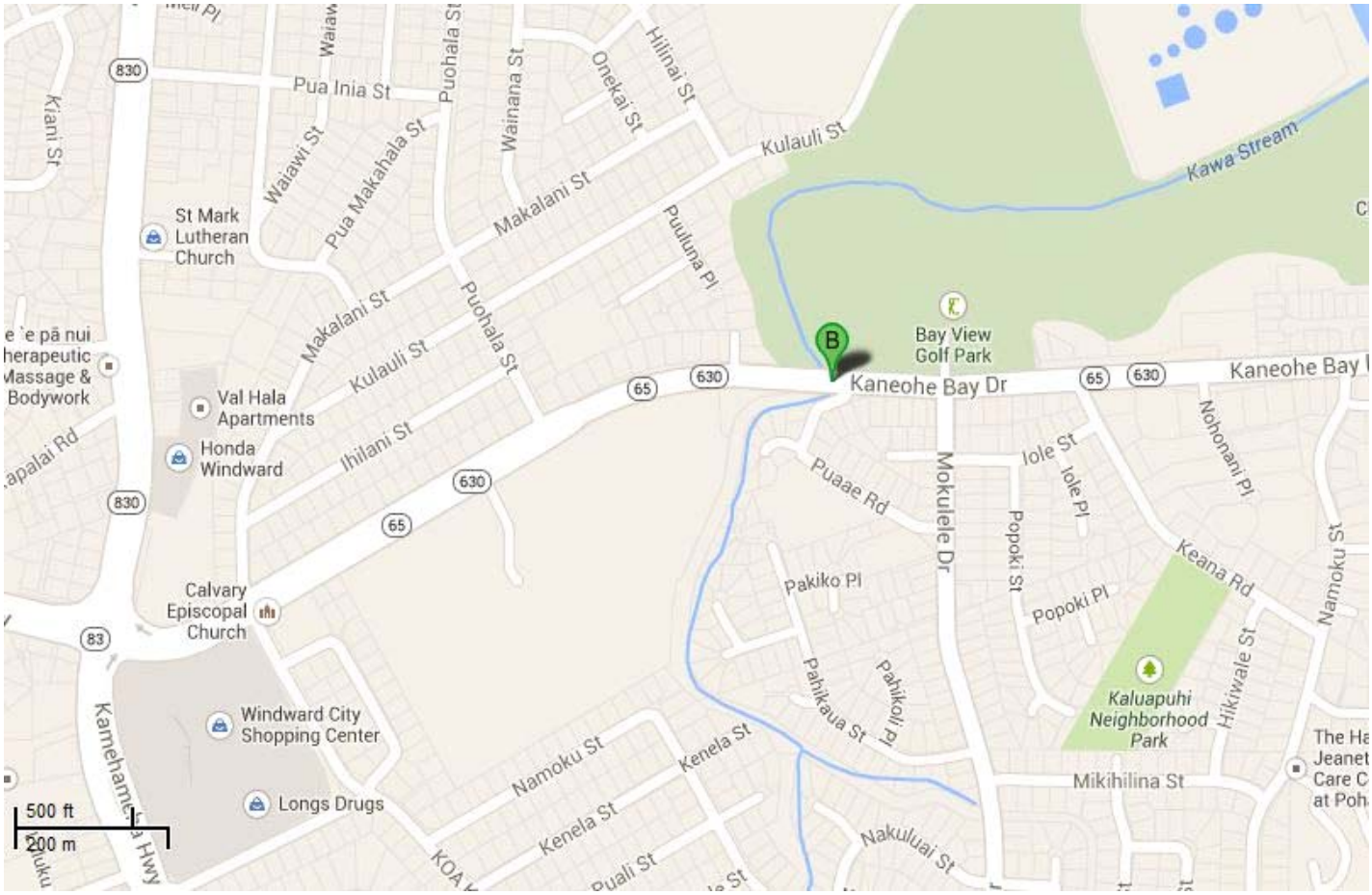
Location: 0.01 Miles West of Puaae Road

Historic Name: Kawa Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 50.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kawa Stream Bridge carries Kaneohe Bay Drive across the Kawa Stream. This concrete masonry bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has masonry parapets, concrete deck is supported by masonry abutments. The parapet cap and end posts have been painted white. Thrie beams were placed in front of the masonry parapets. The workmanship of the bridge has not been obscured and the simple design of the parapet retains its historic feeling.

Significance Statement:

The bridge is eligible under Criterion C for its association with early developments in concrete masonry bridge construction in Hawaii. It is a good example of a 1930's masonry structure bridge that is typical of its period in its use of materials, method of construction, and craftsmanship. The design of the bridge has a high artistic value.

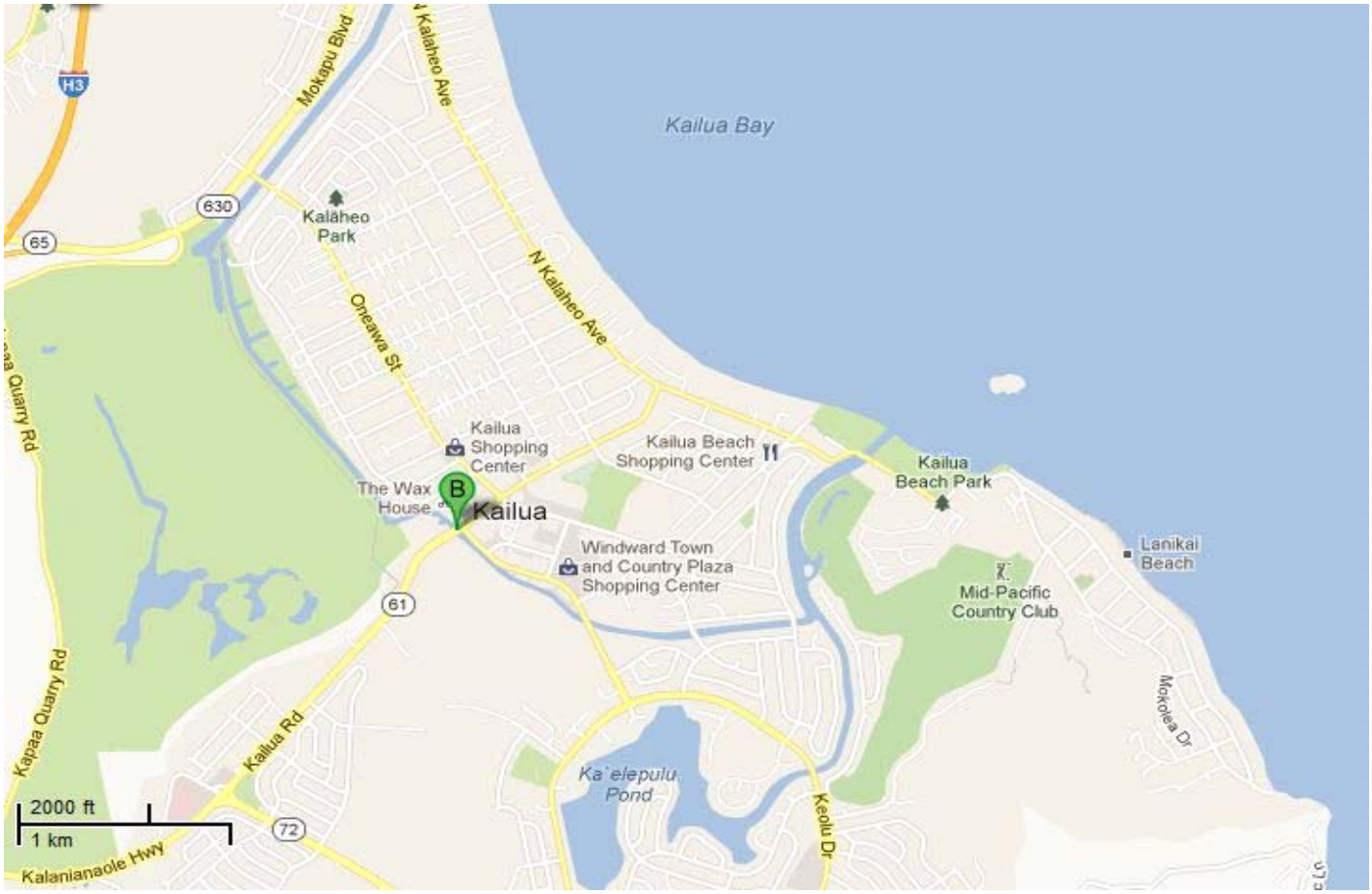
Inventory Form
(State)

General Information

Bridge Number: 003000610401061	**Route No:** 61
Popular Name: Kawainui Stream (Inbound)	
Feature Crossed: Kawainui Stream	
Feature Carried: Kailua Road	
Milepost: 10.61 mi.	**Island:** Oahu
Longitude: 157d-44m-43.80s	**Latitude:** 21d-23m-35.11s

Location: 0.70 Miles East of Ulumanu Drive
Historic Name: Kawainui Stream (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 18.0 ft.	**Total Length:** 57.1 ft.	**Deck Width:** 30.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Community Planning and Development		

Narrative Description:

The Kawainui Stream (Inbound) Bridge carries Kailua Road across the Kawainui Stream. This reinforced concrete bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid stepped profile end posts. The concrete deck is supported by concrete piers and masonry abutments. A solid concrete parapet addition extends from one of the bridge's end posts as part of Kailua Road. Unlike many other bridges that have gone through alterations, thrie beams are not attached to the post ends therefore the workmanship of the bridge has not been obscured.

Significance Statement:

The bridge is eligible under Criterion A for its association of the development of Kailua community. It is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000610401060 **Route No:** 61

Popular Name: Kawainui Stream (Outbound)

Feature Crossed: Kawainui Stream

Feature Carried: Kailua Road

Milepost: 10.60 mi. **Island:** Oahu

Longitude: 157d-44m-43.46s **Latitude:** 21d-23m-34.75s

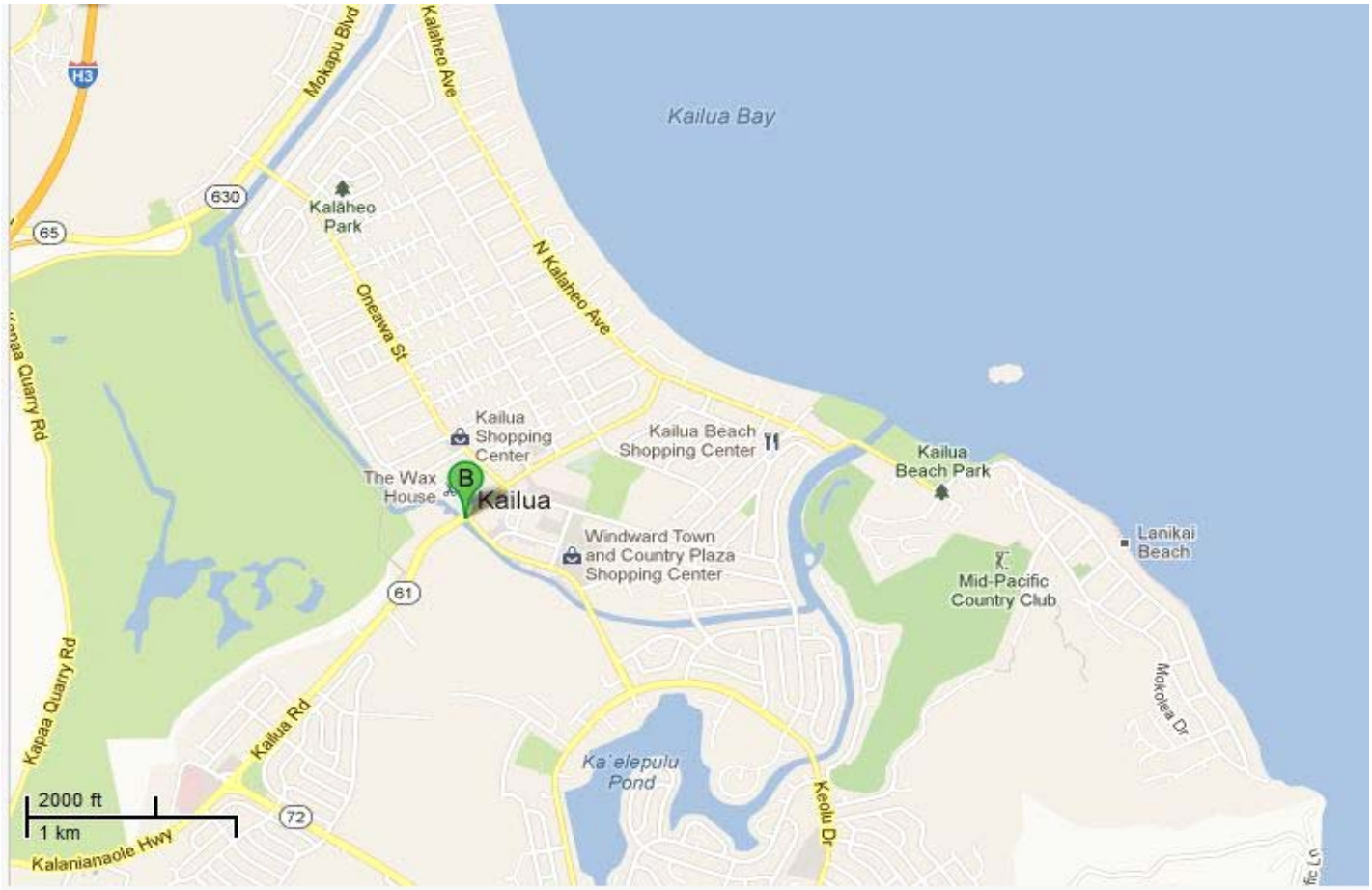
Location: 0.70 Miles East of Ulumanu Drive

Historic Name: Kawainui Stream (Outbound)

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 17.1 ft.	**Total Length:** 54.1 ft.	**Deck Width:** 30.8 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Community Planning and Development		

Narrative Description:

The Kawainui Stream (Outbound) Bridge carries Kailua Road across the Kawainui Stream. This reinforced concrete bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid stepped profile end posts. The concrete deck is supported by concrete piers and masonry abutments. A solid concrete parapet addition extends from one of the bridge's end posts as part of Kailua Road. Unlike many other bridges that have gone through alterations, thrie beams are not attached to the post ends therefore the workmanship of the bridge has not been obscured.

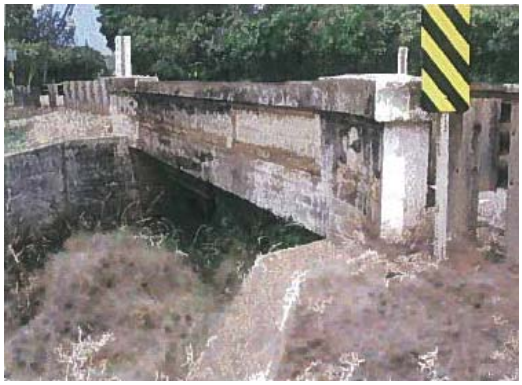
Significance Statement:

The bridge is eligible under Criterion A for its association of the development of Kailua community. It is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

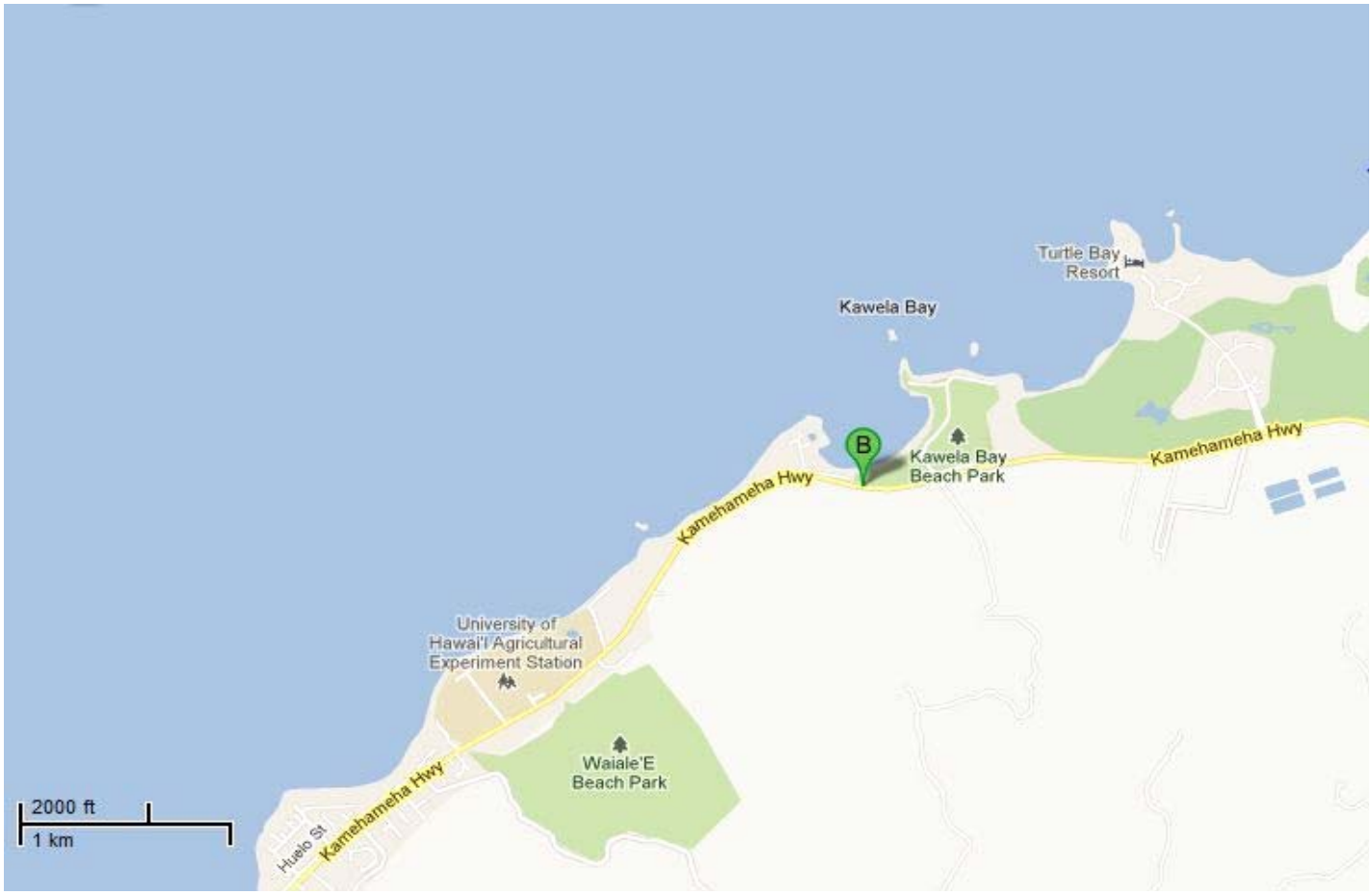
General Information

Bridge Number: 003000830301140	**Route No:** 83
Popular Name: Kawela Stream	
Feature Crossed: Kawela Stream	
Feature Carried: Kamehameha Highway	
Milepost: 11.40 mi.	**Island:** Oahu
Longitude: 158d-00m-34.86s	**Latitude:** 21d-41m-41.92s



Location: 0.13 Miles West of Kawela Camp Road
Historic Name: Kawela Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 24.7 ft.	**Deck Width:** 27.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kawela Stream Bridge carries Kamehameha Highway across the Kawela Stream. This concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name and the year of construction engraved. The single span concrete deck is supported by concrete abutments. The parapet cap and end posts have been painted white. Thrie beams were bolted to the end posts and covering the engraving. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

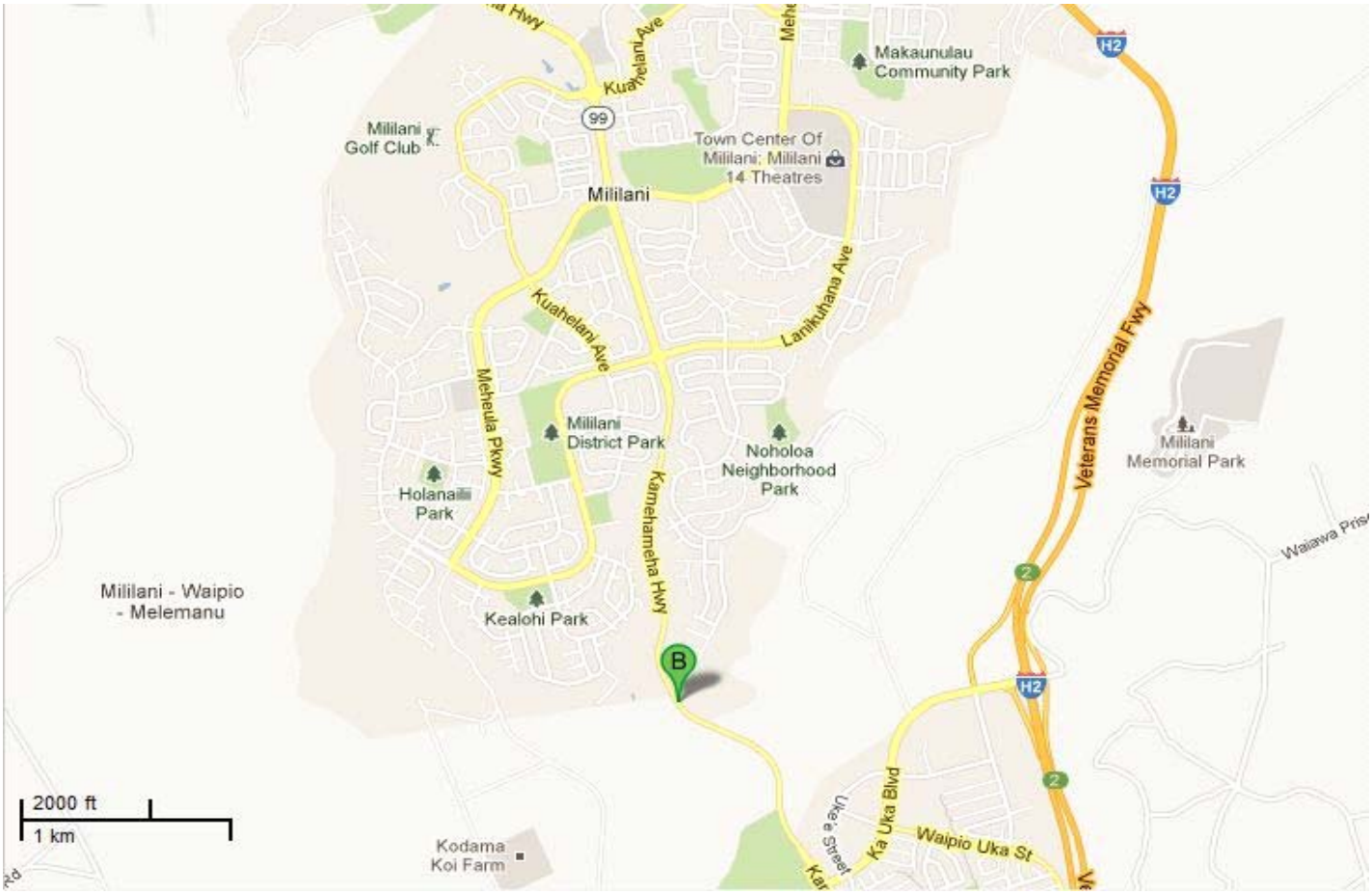
Inventory Form
(State)

General Information

Bridge Number: 003000990301447	**Route No:** 99
Popular Name: Kipapa Stream	
Feature Crossed: Kipapa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 14.46 mi.	**Island:** Oahu
Longitude: 158d-00m-41.20s	**Latitude:** 21d-25m-37.25s

Location: 0.03 Miles South of Ka Uka Boulevard
Historic Name: Kipapa Stream
Designer/Engineer: William R. Bartels
Builder/Contractor: Hawaiian Contracting Co.

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 16	**Max Span:** 42.0 ft.	**Total Length:** 483.9 ft.	**Deck Width:** 33.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; high stepped end piers.			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Kipapa Bridge carries Kamehameha Highway across Kipapa Gulch in central Oahu. The bridge is a reinforced concrete continuous tee beam structure built on reinforced concrete trestles. Although commonly known as the Kipapa Bridge, the 1933 structure was originally named the Franklin Delano Roosevelt (or F.D.R.) Bridge.

The Kipapa Bridge is in its original location and has retained its original rural setting over Kipapa Gulch despite extensive residential development in the area since the 1970s. The bridge's original continuous tee beam design and reinforced concrete material remain intact. The bridge's original workmanship remains evident despite collision damage at the end piers. The engineering of the bridge can be considered complex for its time due to the continuous tee beam design of the structure, which eliminates the need for expansion joints in the deck, and because of its height. The bridge's historic associations as a 1930s Federal Aid bridge is apparent only to informed observers. Interpretation is aided by the inscription of the bridge name and date of construction on the end piers. The bridge retains its historic feeling primarily due to its relatively narrow width and rail type which is typical of bridges of this period in Hawaii.

Significance Statement:

The Kipapa Gulch Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The 1933 bridge is an excellent example of reinforced concrete tee beam construction with an open concrete rail typical of 1930s bridges. The Kipapa Gulch Bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with Federal work relief programs funds during the Depression era. Moreover, the bridge contributed to the economic development of central Oahu by providing reliable vehicular access to the area. It is eligible under Criterion C as a representative example of a 1930s-era Federal Aid bridge utilizing an advanced engineering technology: continuous reinforced concrete tee beam construction. Further, the bridge is representative of the work of a master: William R. Bartels, chief designer for the Territorial Highway Department.

The Kipapa Bridge was constructed in 1933 during the general upgrading of Kamehameha Highway, the belt road around Oahu which serviced the sugar lands on the North Shore. The structure is an important transportation link for the central Oahu community. Its construction spanned the wide Kipapa Gulch and spared travelers from the previous long, circuitous route through the ravine. The bridge was associated with many prominent military and civilian men of Honolulu during its construction and was named after our thirty-first president, Franklin Delano Roosevelt.

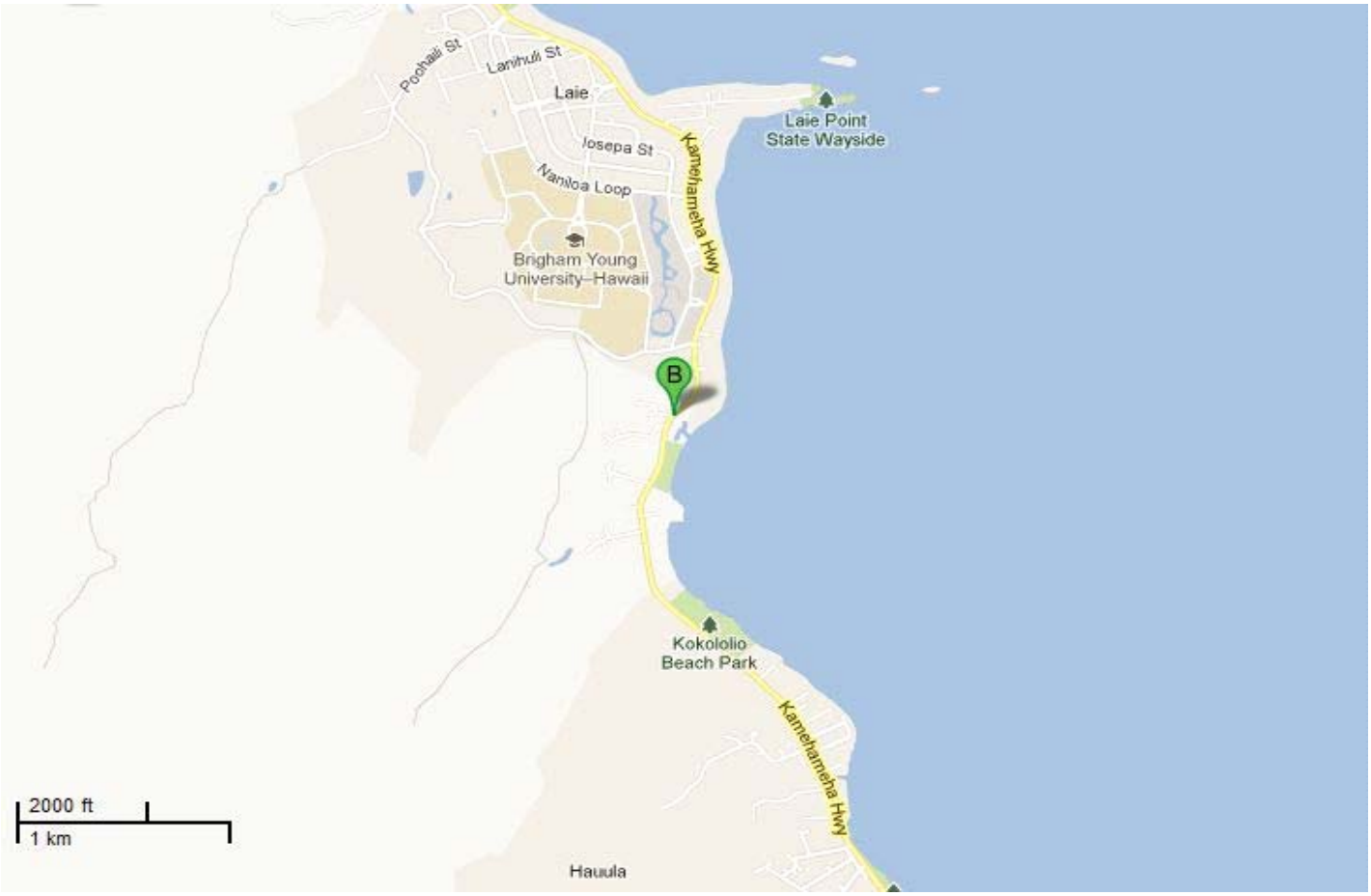
The bridge is a striking example of the Federal Aid bridges constructed by the Territory in the 1930s. The design and height of the bridge are representative of the rapid advances made in engineering technology in the early decades of the twentieth century. Engineer W. R. Bartels was responsible for the design of all major territorial bridge projects from 1932 until his retirement from the department in 1956. His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the work of other engineers. The builder was W. F. Dillingham, a prolific Honolulu builder and owner of the Hawaiian Contracting Co.

Inventory Form
(State)

General Information

Bridge Number: 003000830301970 **Route No:** 83	
Popular Name: Koloa Stream-Laiemaloo	
Feature Crossed: Koloa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 19.70 mi. **Island:** Oahu	
Longitude: 157d-55m-16.59s **Latitude:** 21d-37m-57.85s	
Location: 0.46 Miles South of Polynesian Cultural Center	
Historic Name: Koloa Stream-Laiemaloo	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1933	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1986	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1986.		

Bridge Information

Number of Spans: 5	**Max Span:** 18.0 ft.	**Total Length:** 89.9 ft.	**Deck Width:** 27.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Koloa Stream-Laiemaloo Bridge carries Kamehameha Highway across the Koloa Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1986. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

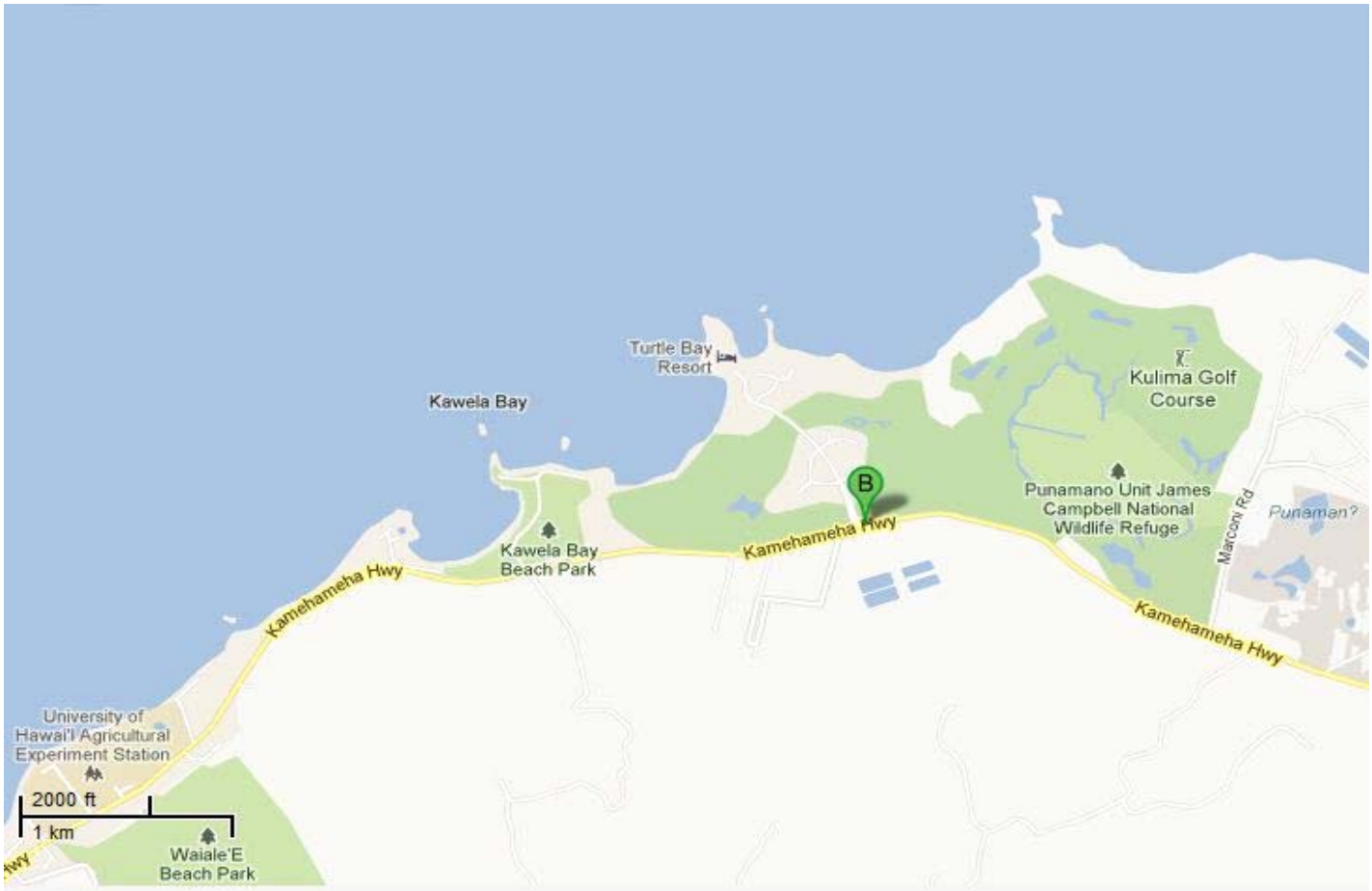
Inventory Form
(State)

General Information

Bridge Number: 003000830301255	**Route No:** 83
Popular Name: Kuilima-Oio Stream	
Feature Crossed: Kuilima-Oio Stream	
Feature Carried: Kamehameha Highway	
Milepost: 12.55 mi.	**Island:** Oahu
Longitude: 157d-59m-31.84s	**Latitude:** 21d-41m-51.35s

Location: 0.04 Miles East of Kuilima Drive (Turtle Bay Hilton)
Historic Name: Kuilima-Oio Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 24.9 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kuilima-Oio Stream Bridge carries Kamehameha Highway across the Kuilima-Oio Stream. This concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and curved end posts with the bridge name and the year of construction engraved. The single span concrete deck is supported by concrete abutments. The parapet cap and end posts have been painted white. Thrie beams were bolted to the end posts and covering the engraving. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design

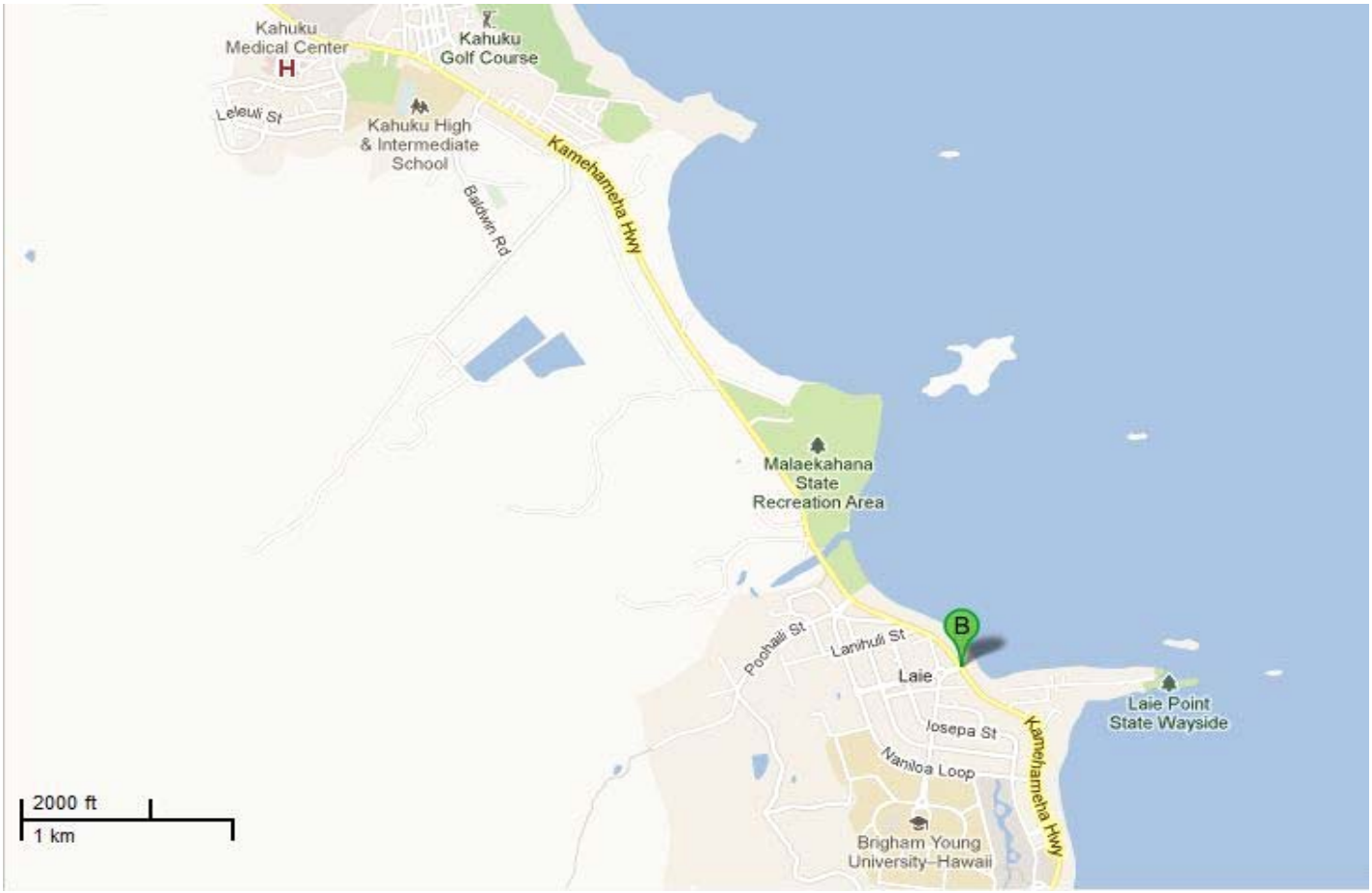
Inventory Form
(State)

General Information

Bridge Number: 003000830301851	**Route No:** 83
Popular Name: Laieloa Stream	
Feature Crossed: Laieloa Stream	
Feature Carried: Kamehameha Highway	
Milepost: 18.51 mi.	**Island:** Oahu
Longitude: 157d-55m-21.80s	**Latitude:** 21d-38m-52.39s

Location: 0.09 Miles Southeast of Halelaa Boulevard
Historic Name: Laieloa Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964.		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.9 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Laieloa Stream Bridge carries Kamehameha Highway across the Laieloa Stream. This concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and curved wide end posts with the bridge name and the year of construction engraved. The single span concrete deck is supported by concrete abutments. The parapet cap and end posts panels have been painted white. A wood pedestrian walkway with wood horizontal railings was added to upstream side of the bridge in 1964. Thrie beams were bolted to the one end of the posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

The bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

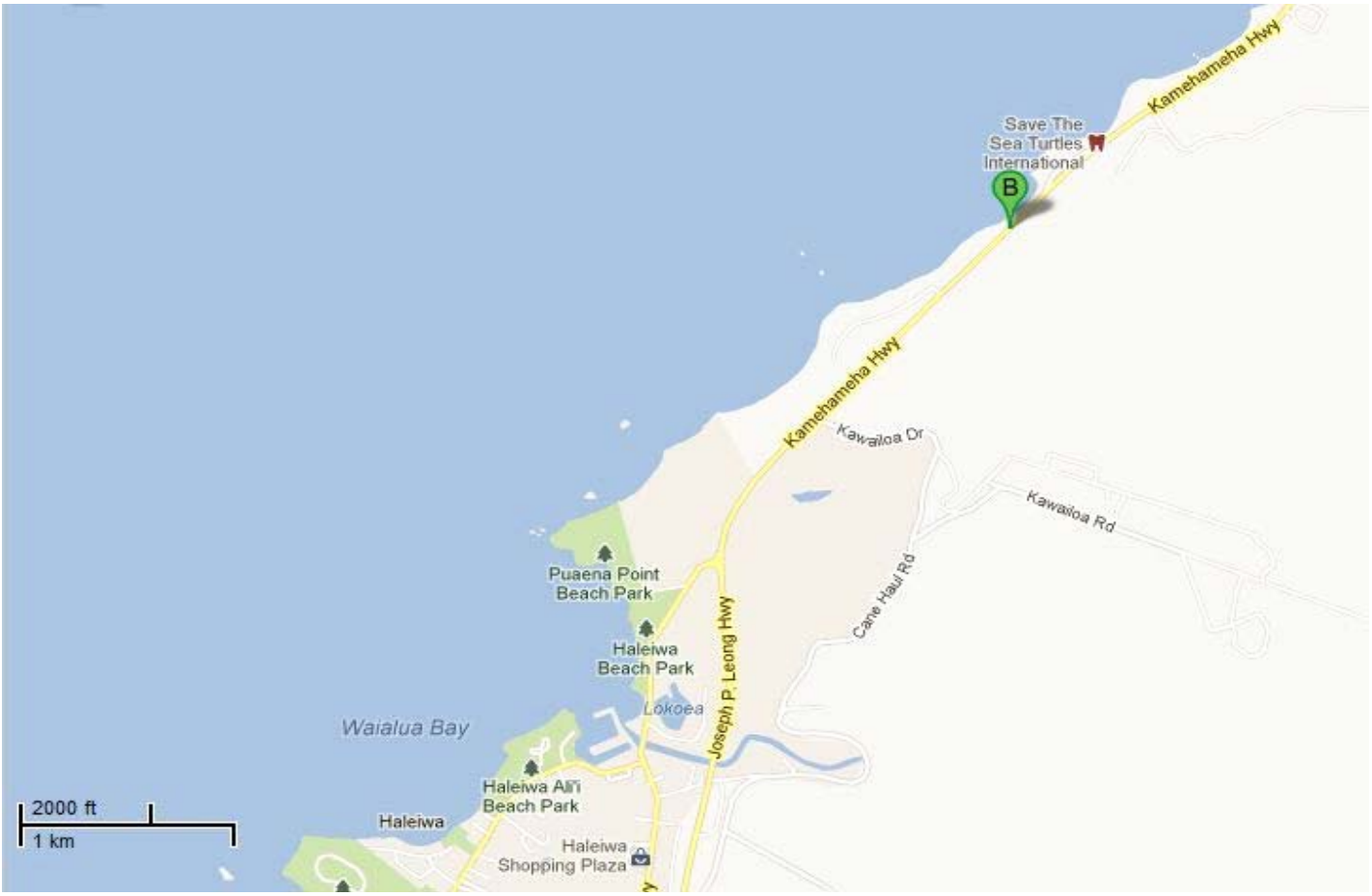
Inventory Form
(State)

General Information

Bridge Number: 003000830300339	**Route No:** 83
Popular Name: Lauhulu Stream	
Feature Crossed: Lauhulu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 3.39 mi.	**Island:** Oahu
Longitude: 158d-05m-12.28s	**Latitude:** 21d-37m-01.66s

Location: 0.15 Miles South of Pohaku Loa Way
Historic Name: Lauhulu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 33.1 ft.	**Total Length:** 69.9 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Lauhulu Stream Bridge carries Kamehameha Highway across the Lauhulu Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid end posts. End posts consist of stepped profile and one of the posts has the bridge name engraved. The concrete deck is supported by concrete piers and masonry abutments. Thrie beams were bolted to the end posts and small triangular concrete blocks were attached to the posts to create a flat surface. The thrie beam is covering the bridge name engraving. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000830302151	**Route No:** 83
Popular Name: Maakua Stream-Muliwai	
Feature Crossed: Maakua Stream	
Feature Carried: Kamehameha Highway	
Milepost: 21.51 mi.	**Island:** Oahu
Longitude: 157d-54m-37.03s	**Latitude:** 21d-36m-37.93s

Location: 0.21 Miles Southeast of Hauula Homestead Road
Historic Name: Maakua Stream-Muliwai
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1997	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1997.		

Bridge Information

Number of Spans: 6	**Max Span:** 19.0 ft.	**Total Length:** 109.9 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Maakua Stream-Muliwai Bridge carries Kamehameha Highway across the Maakua Stream. This long concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1997. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

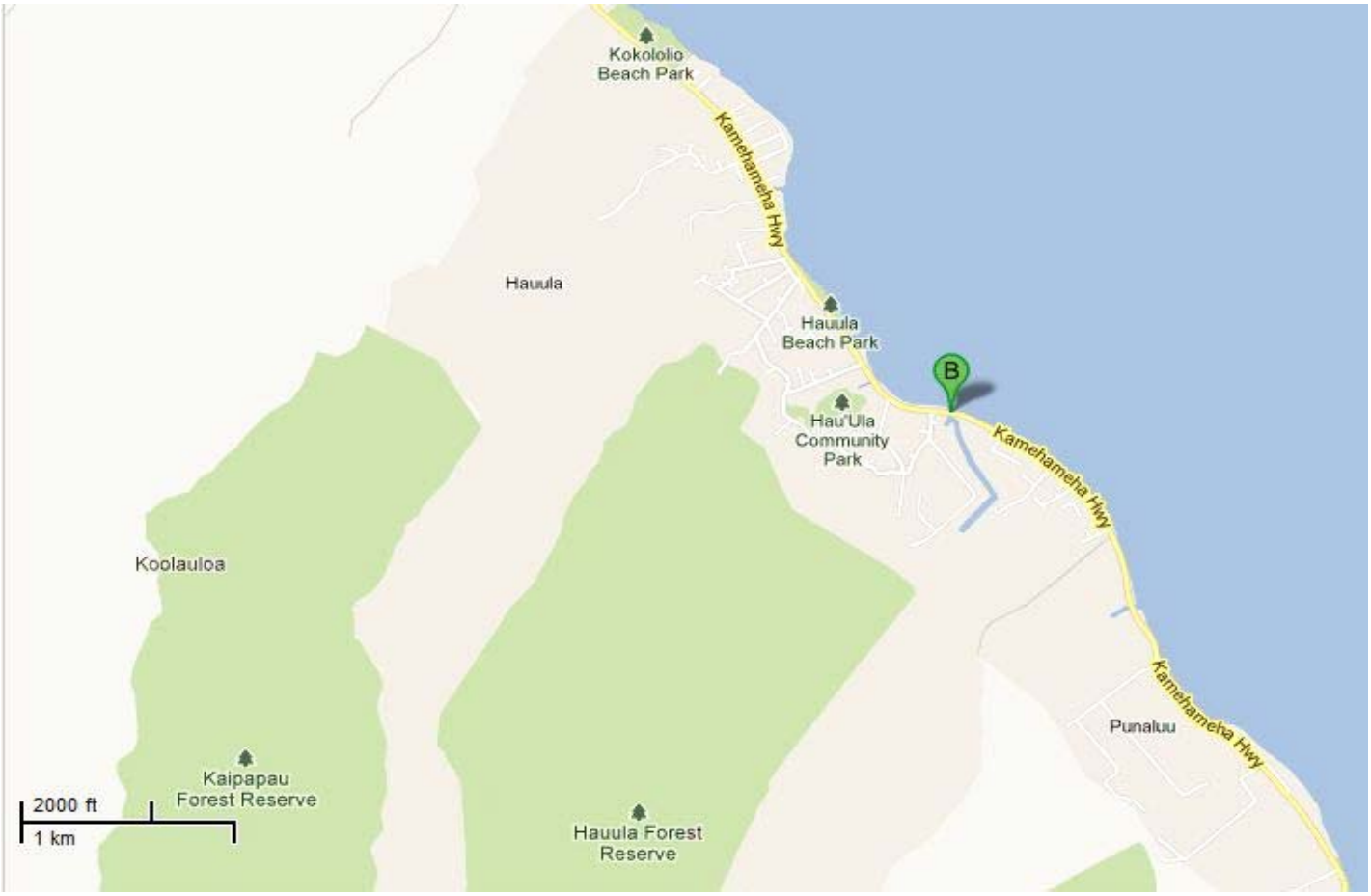
Inventory Form
(State)

General Information

Bridge Number: 003000830302196	**Route No:** 83
Popular Name: Maheiwi Stream	
Feature Crossed: Maheiwi Stream	
Feature Carried: Kamehameha Highway	
Milepost: 21.96 mi.	**Island:** Oahu
Longitude: 157d-54m-19.01s	**Latitude:** 21d-36m-24.78s

Location: 0.06 Miles Southeast of Hauula Homestead Road
Historic Name: Maheiwi Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1926	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964, 1997	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964. Wood pedestrian bridge replaced in 1997.		

Bridge Information

Number of Spans: 3	**Max Span:** 18.0 ft.	**Total Length:** 54.1 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Maheiwi Stream Bridge carries Kamehameha Highway across the Maheiwi Stream. This reinforced concrete is in its original location but is in poor condition. The bridge has concrete solid panel parapets with flat caps and end posts. The reinforced concrete slab deck is supported by the concrete abutments. A wood pedestrian walkway with wood horizontal railings was added to upstream side of the bridge in 1964 and was replaced in 1997. Thrie beams were bolted to the end of the posts however, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

003000830302196 Maheiwi Stream

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

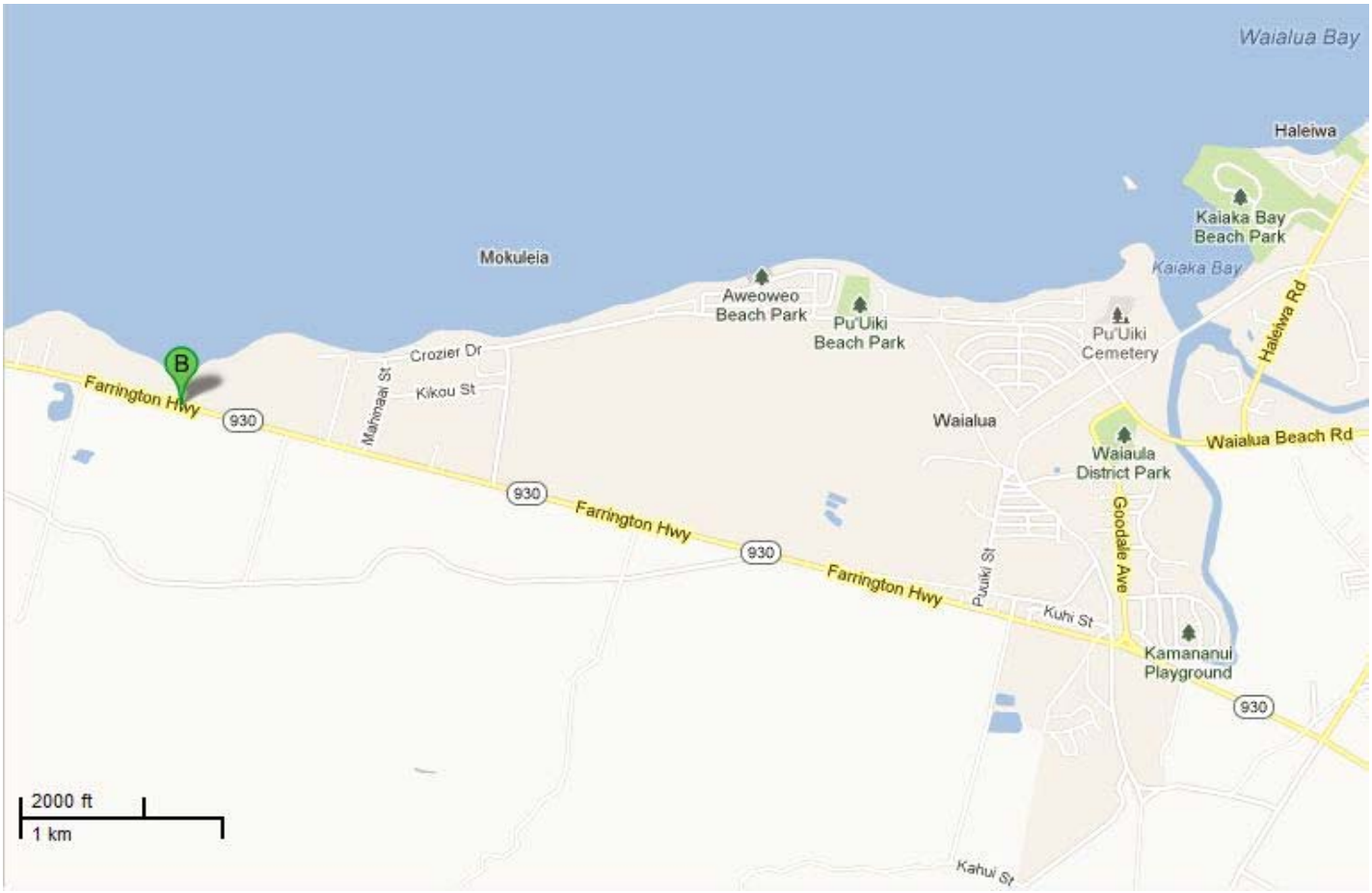
Inventory Form
(State)

General Information

Bridge Number: 003009300501436	**Route No:** 930
Popular Name: Makalena Stream	
Feature Crossed: Makalena Stream	
Feature Carried: Farrington Highway	
Milepost: 3.03 mi.	**Island:** Oahu
Longitude: 158d-10m-01.07s	**Latitude:** 21d-34m-37.65s

Location: 0.73 Miles East of Hoomana Place
Historic Name: Makalena Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 24.0 ft.	**Total Length:** 49.9 ft.	**Deck Width:** 31.8 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makalena Stream Bridge carries Farrington Highway across Makalena Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid end posts. End posts consist of a stepped profile. The concrete deck is supported by concrete piers and masonry abutments and thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

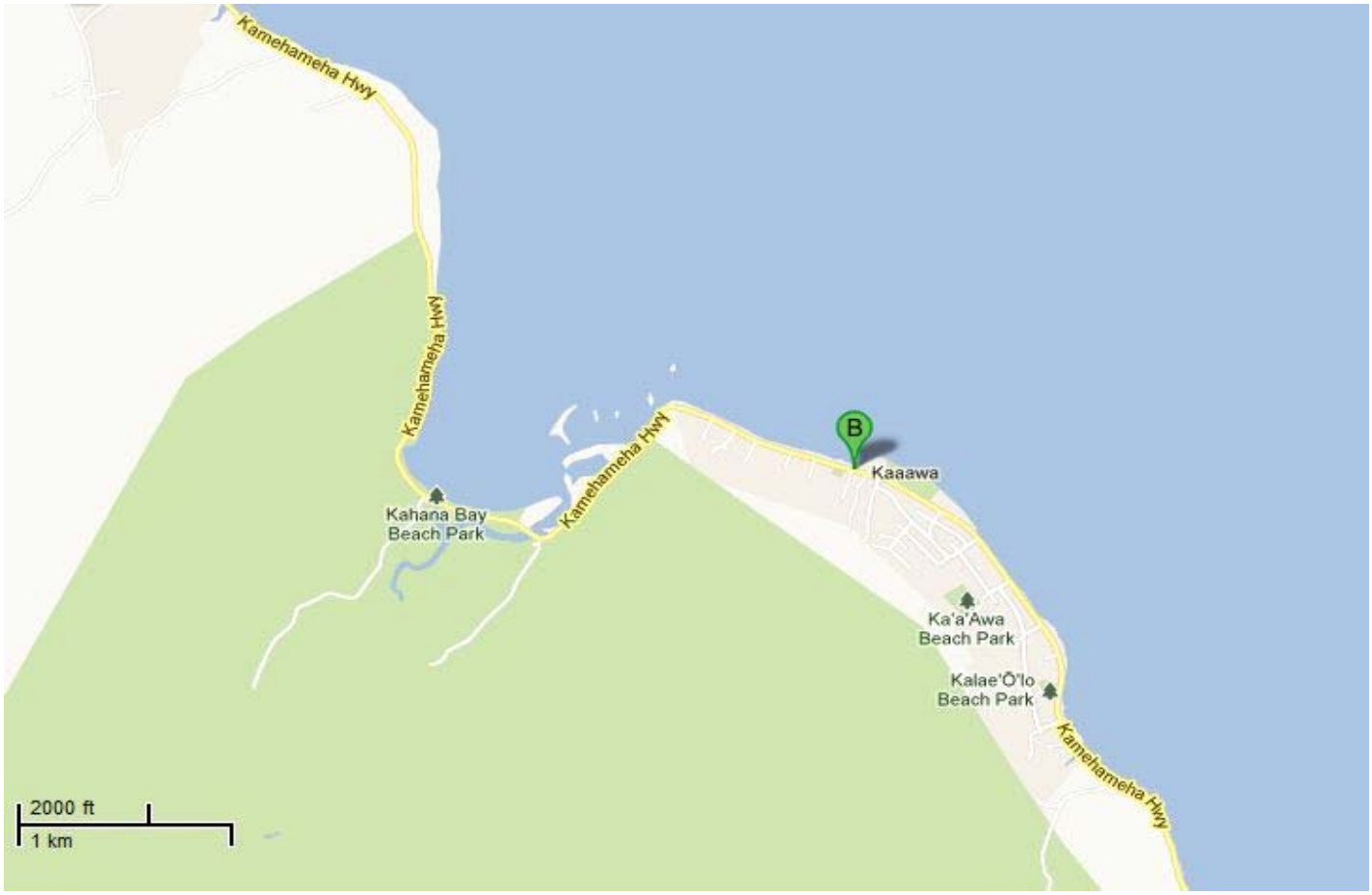
Inventory Form
(State)

General Information

Bridge Number: 003000830302791	**Route No:** 83
Popular Name: Makaua Stream	
Feature Crossed: Makaua Stream	
Feature Carried: Kamehameha Highway	
Milepost: 27.91 mi.	**Island:** Oahu
Longitude: 157d-51m-17.99s	**Latitude:** 21d-33m-25.35s

Location: 0.23 Miles West of Hiaka Road
Historic Name: Makaua Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964.		

Bridge Information

Number of Spans: 1	**Max Span:** 42.0 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 26.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makaua Stream Bridge carries Kamehameha Highway across the Makaua Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name and year of construction were engraved. The reinforced concrete tee beam deck is supported by the concrete abutments. A wood pedestrian walkway with metal horizontal railing was added to the upstream side of the bridge in 1964. The parapet cap and end posts have been painted white. The new concrete solid panel parapet were extended to the end posts to secure the thrie beams, therefore the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003009300501823 **Route No:** 930	
Popular Name: North (Lower) Poamoho Stream	
Feature Crossed: North Poamoho Stream	
Feature Carried: Kaukonahua Road	
Milepost: 6.90 mi. **Island:** Oahu	
Longitude: 158d-06m-40.18s **Latitude:** 21d-33m-53.43s	
Location: 0.05 Miles South of Hukilau Loop	
Historic Name: North (Lower) Poamoho Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 62.0 ft.	**Total Length:** 164.0 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The North Poamoho Stream Bridge carries Kaukonahua Road across the Poamoho Stream. This concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with flat caps and wide solid panel end posts. The concrete deck is supported by concrete piers and abutments. Thrie beams were bolted to the end posts however, the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000830302412	**Route No:** 83
Popular Name: North Punaluu Stream	
Feature Crossed: North Punaluu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 24.12 mi.	**Island:** Oahu
Longitude: 157d-53m-12.96s	**Latitude:** 21d-34m-57.10s

Location: 1.53 Miles Southeast of Sacred Falls Road
Historic Name: North Punaluu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 37.1 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The North Punaluu Stream Bridge carries Kamehameha Highway across the Punaluu Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and wide end posts with the bridge name engraved. The reinforced concrete slab deck is supported by the concrete abutments. Only the parapet and end posts caps have been painted white. The large utility pipe was added on the upstream side of the parapet. Thrie beams were bolted to the end posts and covering the engraving but the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

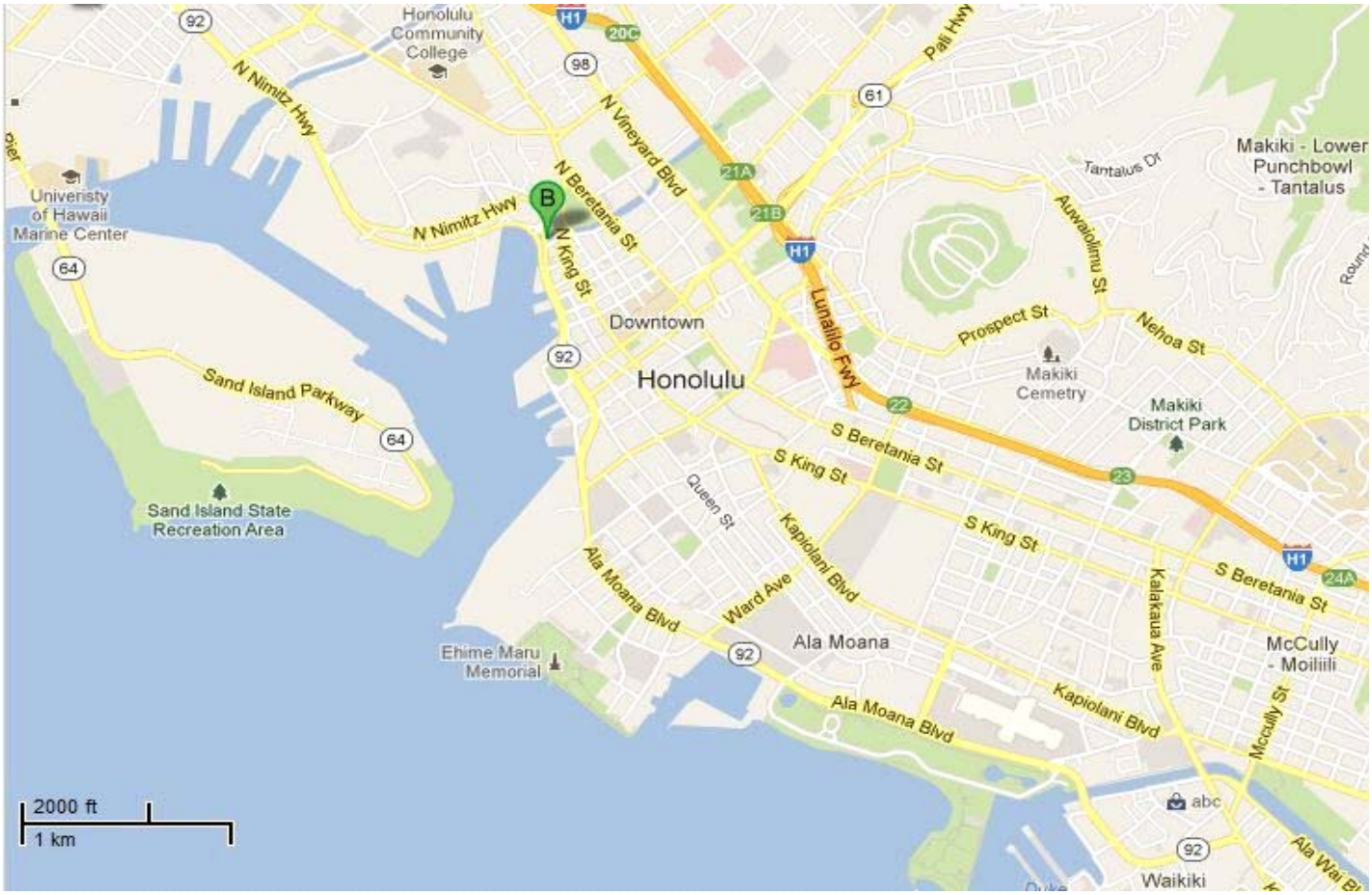
Inventory Form
(State)

General Information

Bridge Number: 003000920400588 **Route No:** 92	
Popular Name: Nuuanu Stream (Westbound)	
Feature Crossed: Nuuanu Stream	
Feature Carried: Nimitz Highway	
Milepost: 5.88 mi. **Island:** Oahu	
Longitude: 157d-51m-54.40s **Latitude:** 21d-18m-48.25s	

Location: 0.06 Miles East of Awa Street
Historic Name: Nuuanu Stream (Westbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 32.2 ft.	**Total Length:** 151.9 ft.	**Deck Width:** 69.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Stream (Westbound) Bridge carries Nimitz Highway across the Nuuanu Stream. The bridge is located near the Chinatown district. This concrete tee beam bridge is in its original location and in fair condition, and its materials remain intact. The bridge has concrete solid parapets with molding decoration at the bottom and top and wide end posts. One of the end posts has bridge name and year of construction engraved. The concrete deck is supported by concrete abutments. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

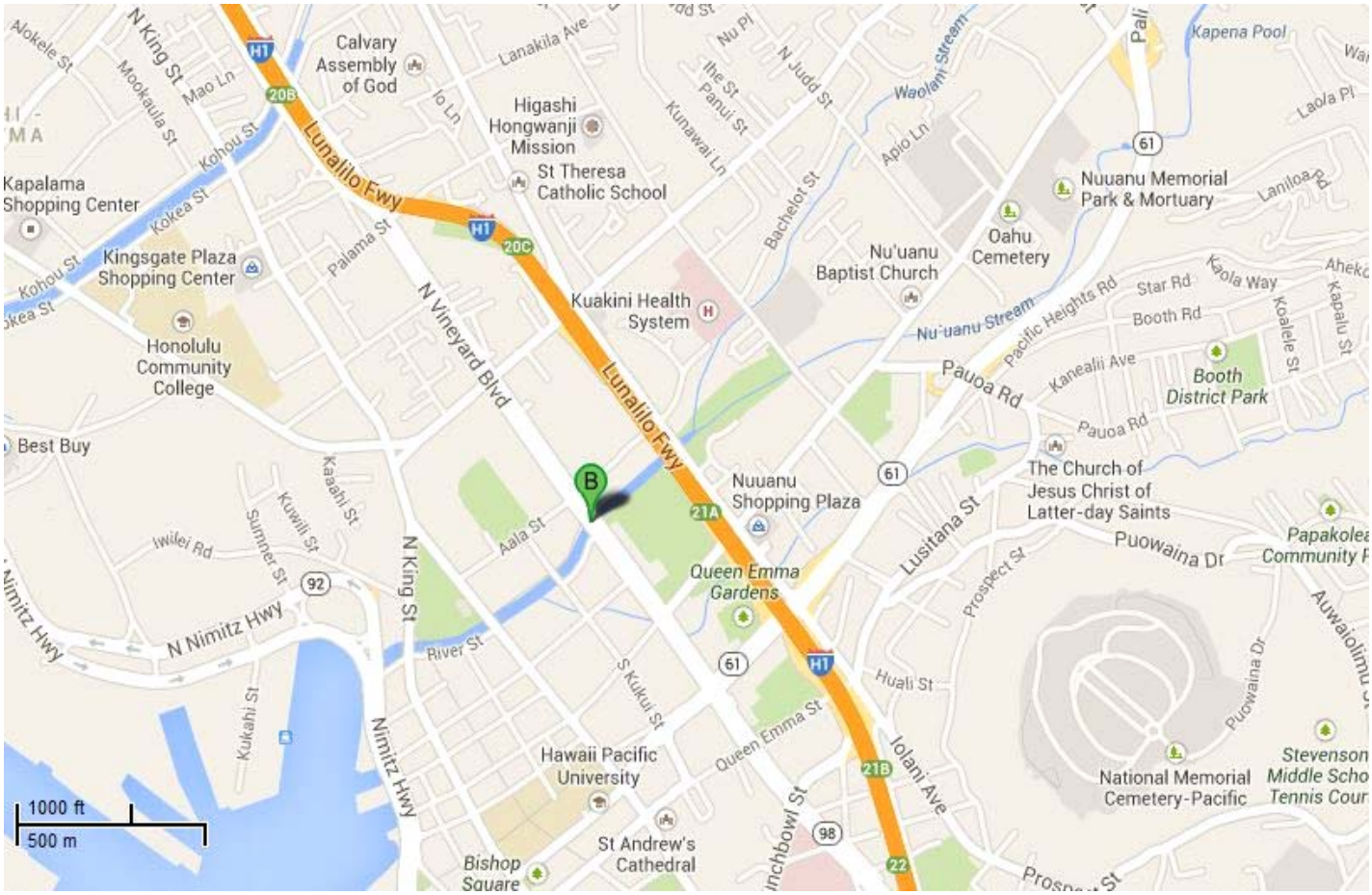
Inventory Form
(State)

General Information

Bridge Number: 003098001400077	**Route No:** 98
Popular Name: Nuuanu Stream Bridge	
Feature Crossed: Nuuanu Stream	
Feature Carried: North Vineyard Boulevard	
Milepost: 0.77 mi.	**Island:** Oahu
Longitude: 157d-51m-34.56s	**Latitude:** 21d-19m-00.11s

Location: 0.03 Miles East of Aala Street
Historic Name: Nuuanu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 36.1 ft.	**Total Length:** 95.1 ft.	**Deck Width:** 120.1 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Stream Bridge carries N Vineyard Boulevard across Nuuanu Stream. This three span concrete slab bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has concrete horizontal parapets with rectangular voids. The reinforced concrete deck is supported by reinforced concrete abutments. Nuuanu Stream channel has concrete masonry walls which the bridge's abutments connect to.

Significance Statement:

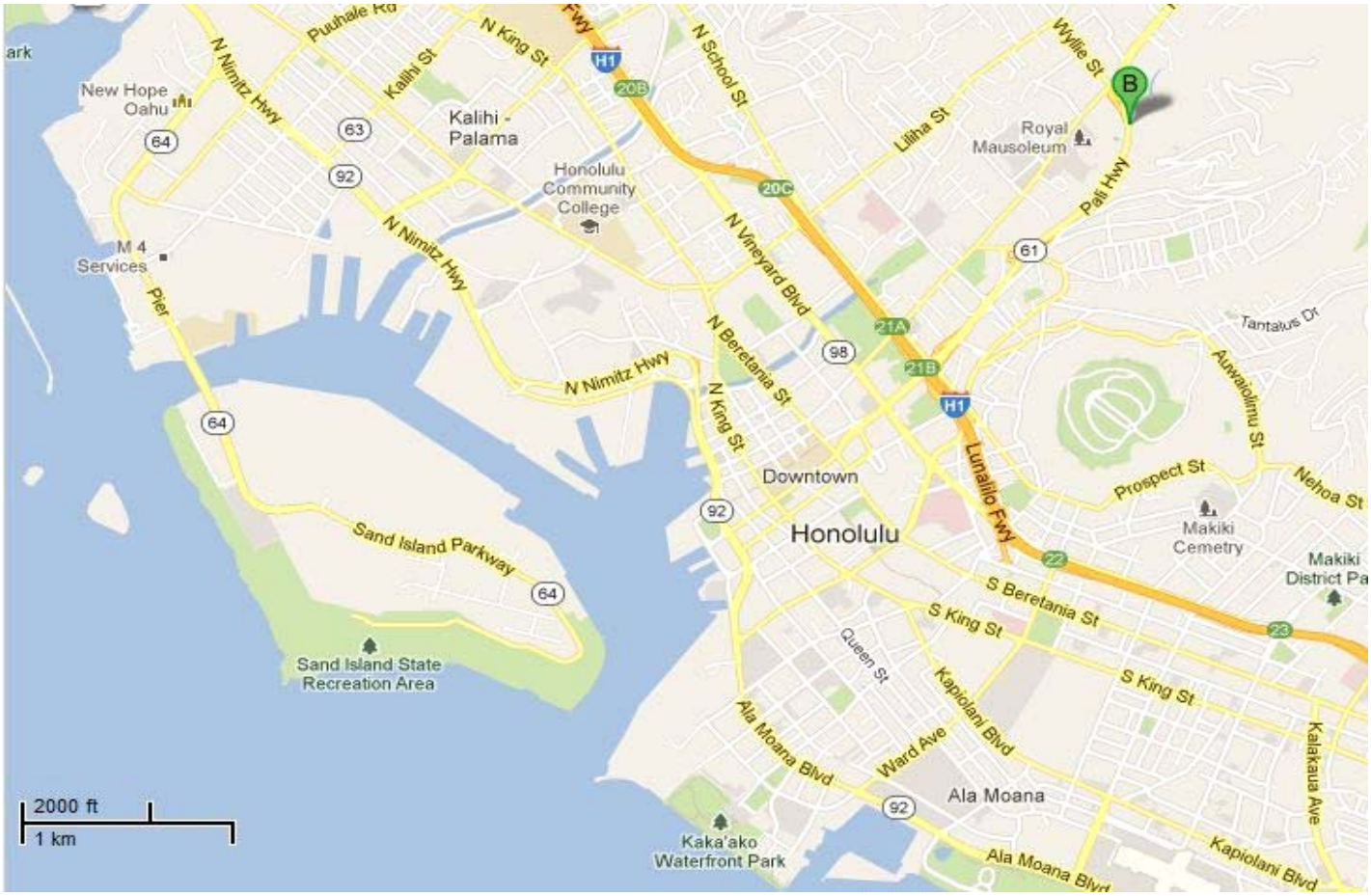
This bridge is eligible under Criterion C for being the widest concrete bridge built post-war (1945) on the island of Oahu in the historic study period prior to 1969. This bridge was also a part of the channelization of Nuuanu Stream where all the walls of the channel were built with concrete masonry.

Inventory Form
(State)

General Information

Bridge Number: 003000610400112 **Route No:** 61	
Popular Name: Nuuanu Stream Kapena Falls	
Feature Crossed: Nuuanu Stream Kapena Falls	
Feature Carried: Pali Highway	
Milepost: 1.12 mi. **Island:** Oahu	
Longitude: 157d-50m-43.09s **Latitude:** 21d-19m-31.63s	
Location: 0.48 Miles Northeast of Pauoa Road	
Historic Name: Nuuanu Stream Kapena Falls	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1962	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 84.0 ft.	**Total Length:** 94.2 ft.	**Deck Width:** 72.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Integral Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

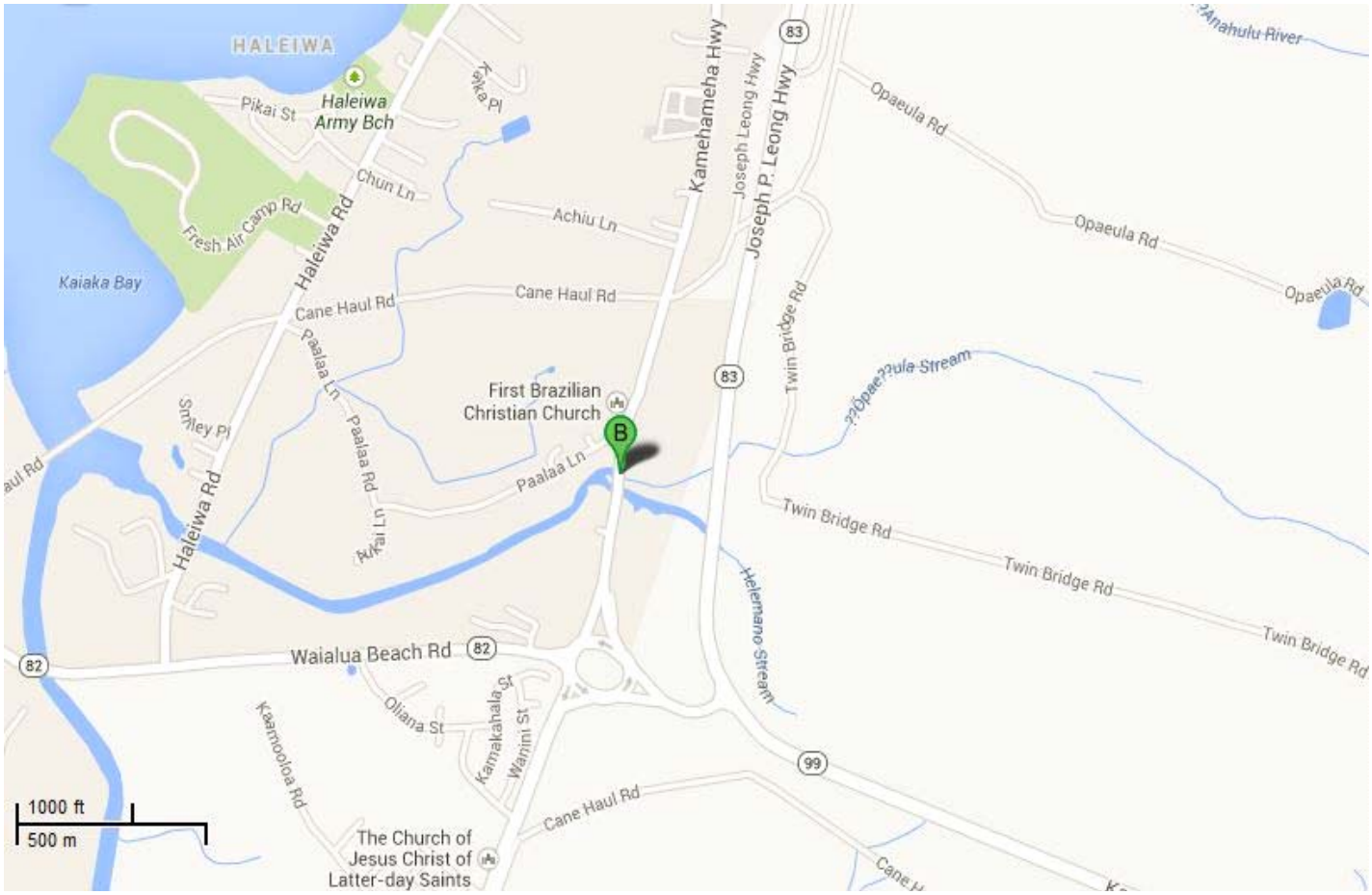
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000830300043 **Route No:** 83	
Popular Name: Opaelua-Waialua Twin B	
Feature Crossed: Opaelua Stream	
Feature Carried: Kamehameha Highway	
Milepost: 0.43 mi. **Island:** Oahu	
Longitude: 158d-06m-18.64s **Latitude:** 21d-34m-48.66s	
Location: 0.39 Miles North of Waialua Beach Road	
Historic Name: Opaelua-Waialua Twin B	
Designer/Engineer: U. S. Department of Agriculture, Bureau of Public Roads, San Francisco, CA	
Builder/Contractor: John McCandless	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 29.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; sidewalks on both sides of roadway			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Waialua Twin Bridges were built in 1928 to carry Kamehameha Highway across the adjacent Helemano and Opaeula Streams. The bridges are located in the former plantation town of Haleiwa on the north shore of Oahu. The Waialua Twin Bridges are identical reinforced concrete deck girder structures.

The Waialua Twin Bridges remain in their original location. The bridges' setting has changed slightly due to commercial and residential development within the Haleiwa community, thus placing increased development pressure on the structures. A by-pass highway to accommodate additional traffic was completed by the State Department of Transportation in 1994. The bridges' original deck girder design and reinforced concrete materials remain intact. The workmanship of the bridges is good and has not been obscured by additions or repairs. The bridges' masonry (lava rock) abutments appear to be wider than the present bridge and probably date from an earlier wood truss bridge identified in an historic photograph as "Twin Bridges at Waialua." (1) The bridges' historic associations as important civic structures associated with the development of Haleiwa can be discerned by informed observers. The bridges retain their historic feeling due to their narrow width and solid, paneled reinforced concrete rail typical of 1920s bridges.

(1) Historic photograph: "Twin Bridges at Waialua, Aug. 26, '04," Hawaii State Archives (Honolulu), Album 43, 104.

Significance Statement:

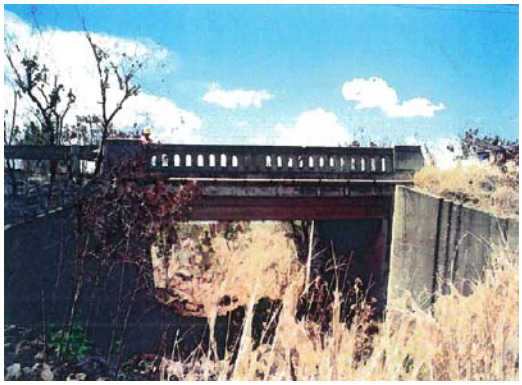
The Waialua Twin Bridges are significant for their contributions to the fields of engineering and transportation in Hawaii. The bridges are a good example of reinforced concrete deck girder construction. The bridges are eligible under Criterion A for their associations with public works efforts by the Territorial government and as important civic structures associated with the development of Haleiwa. They are eligible under Criterion C as good representative examples of deck girder bridge construction in the late 1920s.

The bridges are located within the County-designated Haleiwa Special Design District and contribute significantly to the historic character of the town. The bridges were inadvertently involved in an important preservation battle for the nearby Anahulu Bridge, a rare remaining example of a “rainbow” or Marsh arch (through deck) bridge. The State Department of Transportation planned to replace the structure, however, concerned citizens rallied to preserve the picturesque bridge. The alternative plan preserved the historic bridge by by-passing it with a new highway and moderr four-lane bridge upstream. The Waialua Twin Bridges were also by-passed, thus relieving them from modern traffic pressures.

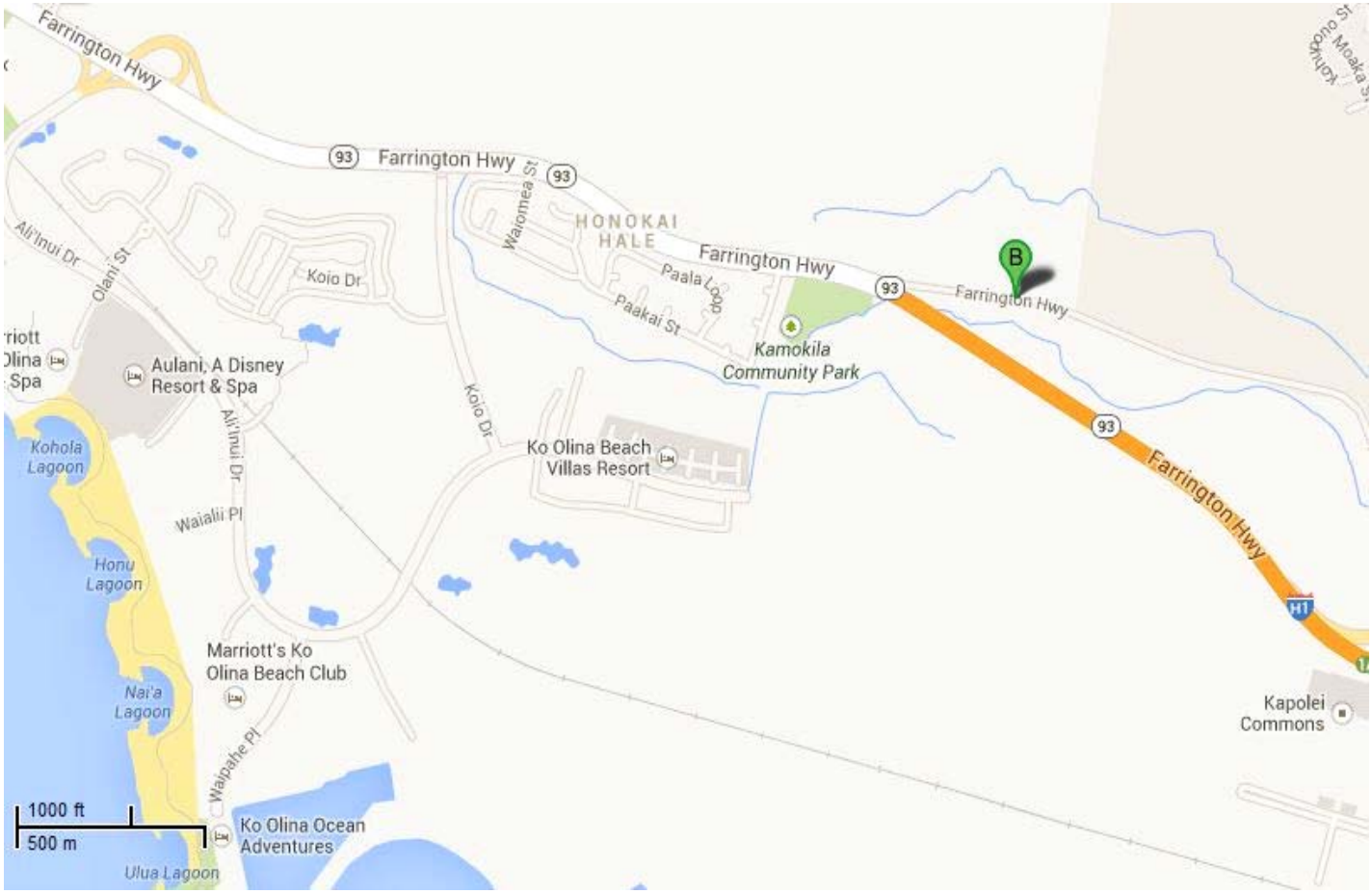
The bridges’ sixty foot clear spans make them good examples of late-period reinforced concrete deck girder technology. Their solid, paneled parapets are characteristic of the period. The plans were prepared by the U.S. Department of Agriculture’s Bureau of Public Roads in San Francisco, California. The bridges were constructed by local builder, John McCandless.

Inventory Form
(State)

General Information

Bridge Number: 003000930300083 **Route No:** 93	
Popular Name: Palailai Stream	
Feature Crossed: Palailai Stream	
Feature Carried: Old Farrington Highway	
Milepost: 0.83 mi. **Island:** Oahu	
Longitude: 158d-06m-03.19s **Latitude:** 21d-20m-27.28s	
Location: 0.95 Miles West of Kalaeloa Boulevard	
Historic Name: Palailai Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 23.0 ft.	**Total Length:** 25.9 ft.	**Deck Width:** 25.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Palailai Stream Bridge carries Old Farrington Highway across the Palailai Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete open arched parapets with tapered caps and wide end posts. The bridge name was also engraved on the parapet. The reinforced concrete tee beam deck is supported by the concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction craftsmanship, and design.

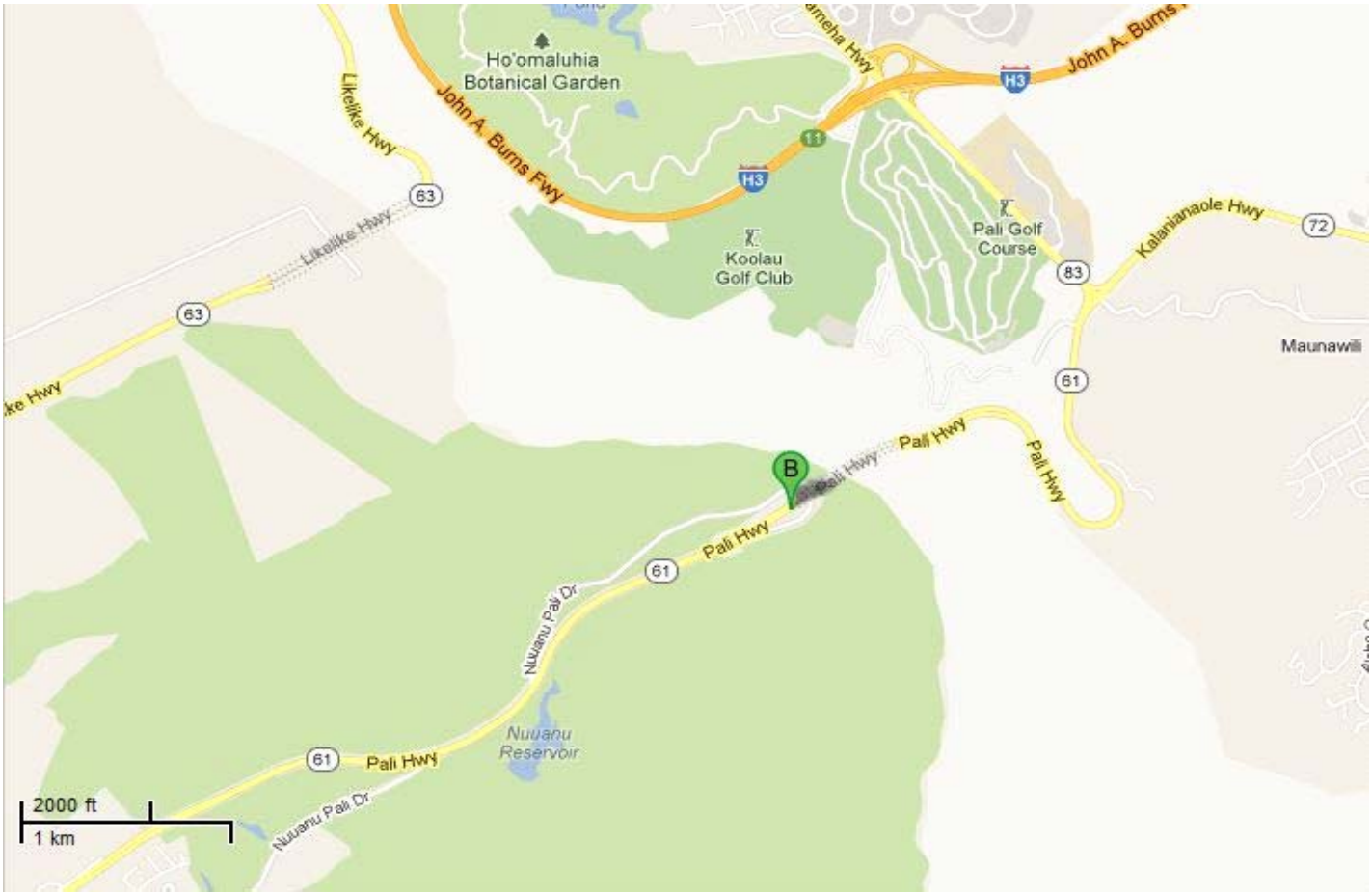
Inventory Form
(State)

General Information

Bridge Number: 003000610300593	**Route No:** 61
Popular Name: Pali Bridge No. 3 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 3)	
Feature Carried: Pali Highway	
Milepost: 5.93 mi.	**Island:** Oahu
Longitude: 157d-47m-30.03s	**Latitude:** 21d-22m-03.61s

Location: 0.34 Miles Northeast of Pali Lookout Road
Historic Name: Pali Bridge No. 3 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 57.1 ft.	**Total Length:** 107.9 ft.	**Deck Width:** 31.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

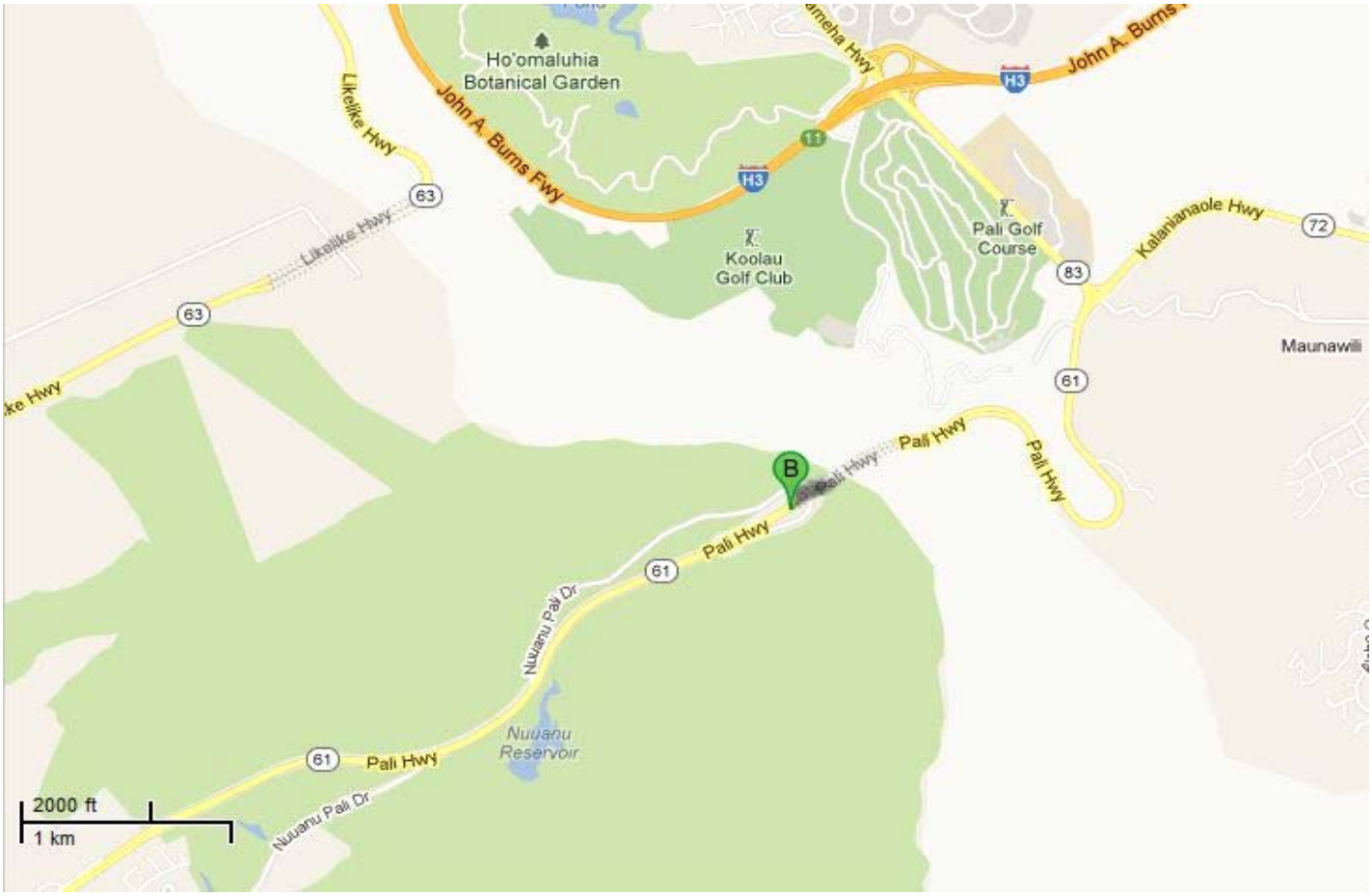
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300616 **Route No:** 61	
Popular Name: Pali Bridge No. 4 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 4)	
Feature Carried: Pali Highway	
Milepost: 6.16 mi. **Island:** Oahu	
Longitude: 157d-47m-17.58s **Latitude:** 21d-22m-07.57s	
Location: 0.57 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Bridge No. 4 (Inbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 105.0 ft.	**Total Length:** 379.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

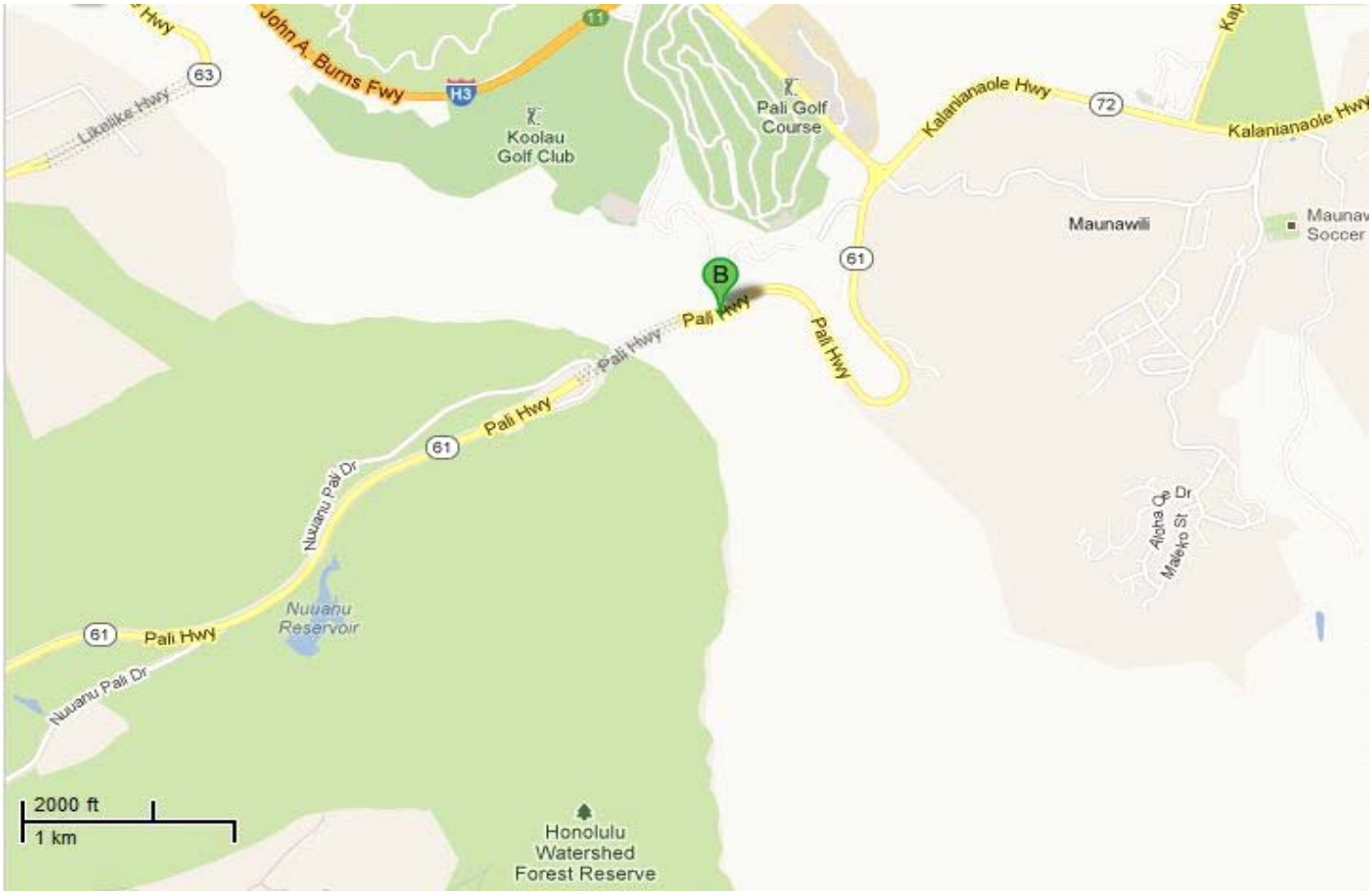
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300615 **Route No:** 61	
Popular Name: Pali Bridge No. 4B (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 4B)	
Feature Carried: Pali Highway	
Milepost: 6.15 mi. **Island:** Oahu	
Longitude: 157d-47m-17.44s **Latitude:** 21d-22m-06.92s	
Location: 0.56 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Bridge No. 4B (Outbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 60.0 ft.	**Total Length:** 125.0 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300621	**Route No:** 61
Popular Name: Pali Bridge No. 5 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 5)	
Feature Carried: Pali Highway	
Milepost: 6.21 mi.	**Island:** Oahu
Longitude: 157d-47m-13.77s	**Latitude:** 21d-22m-10.32s

Location: 0.62 Miles Northeast of Pali Lookout Road
Historic Name: Pali Bridge No. 5 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 83.0 ft.	**Total Length:** 299.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300623 **Route No:** 61	
Popular Name: Pali Bridge No. 5A (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 5A)	
Feature Carried: Pali Highway	
Milepost: 6.23 mi. **Island:** Oahu	
Longitude: 157d-47m-13.55s **Latitude:** 21d-22m-09.63s	
Location: 0.64 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Bridge No. 5A (Outbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 100.1 ft.	**Total Length:** 206.0 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

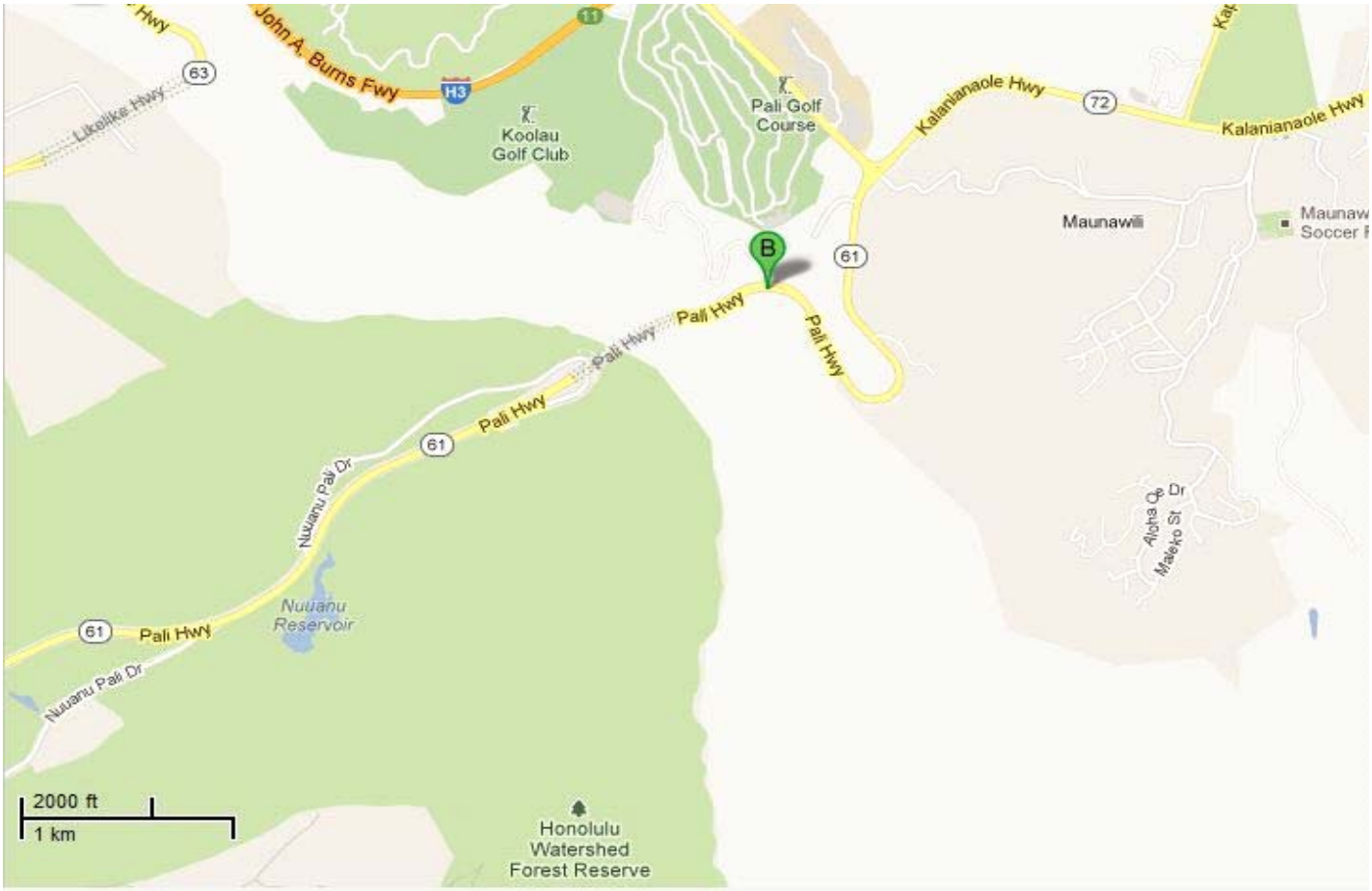
Inventory Form
(State)

General Information

Bridge Number: 003000610300629	**Route No:** 61
Popular Name: Pali Bridge No. 6 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 6)	
Feature Carried: Pali Highway	
Milepost: 6.29 mi.	**Island:** Oahu
Longitude: 157d-47m-11.24s	**Latitude:** 21d-22m-11.23s

Location: 0.70 Miles Northeast of Pali Lookout Road
Historic Name: Pali Bridge No. 6 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 45.9 ft.	**Total Length:** 193.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

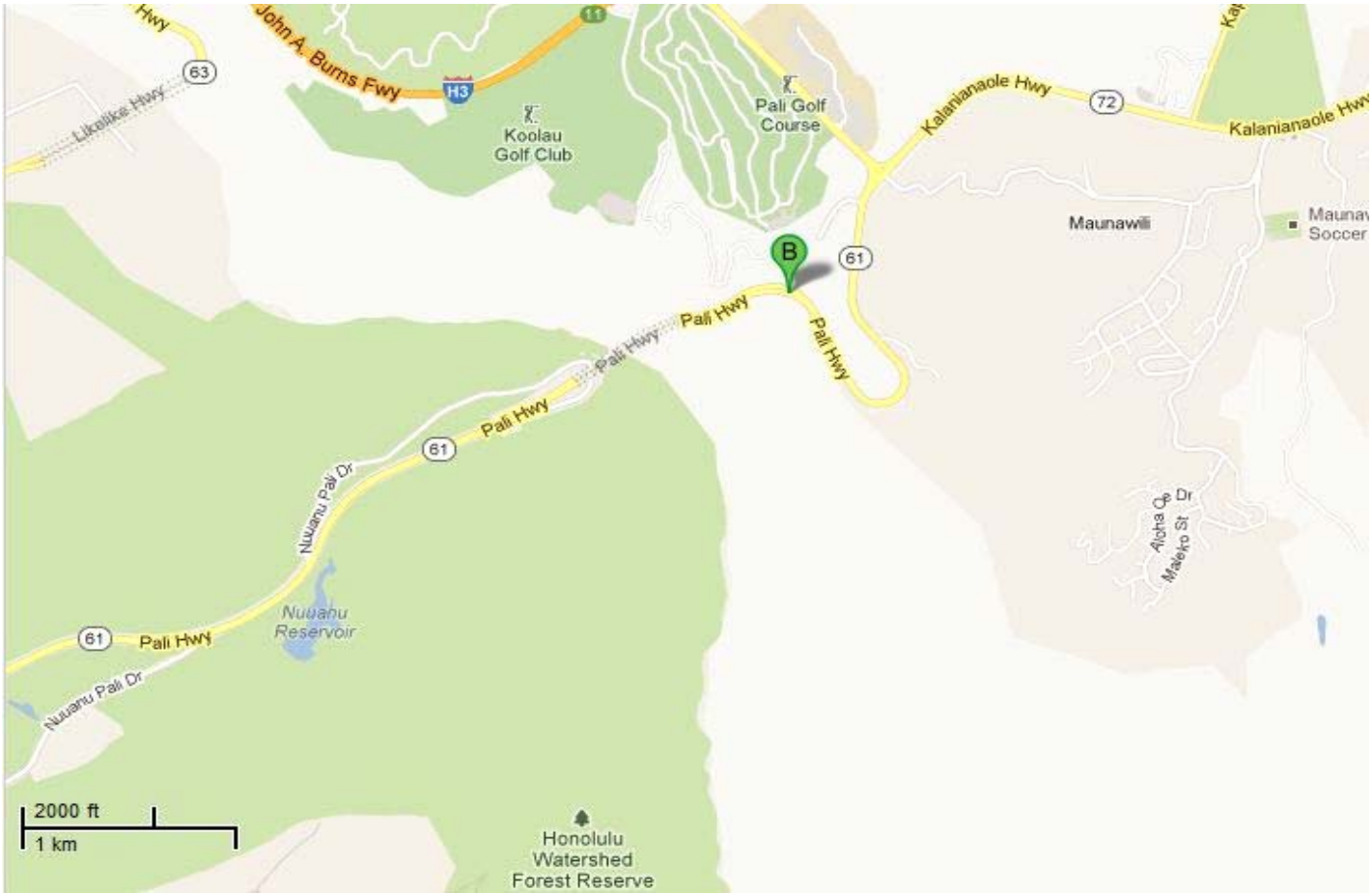
Inventory Form
(State)

General Information

Bridge Number: 003000610300632	**Route No:** 61
Popular Name: Pali Bridge No. 7 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 7)	
Feature Carried: Pali Highway	
Milepost: 6.32 mi.	**Island:** Oahu
Longitude: 157d-47m-08.67s	**Latitude:** 21d-22m-11.62s

Location: 0.73 Miles Northeast of Pali Lookout Road
Historic Name: Pali Bridge No. 7 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 78.1 ft.	**Total Length:** 282.2 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

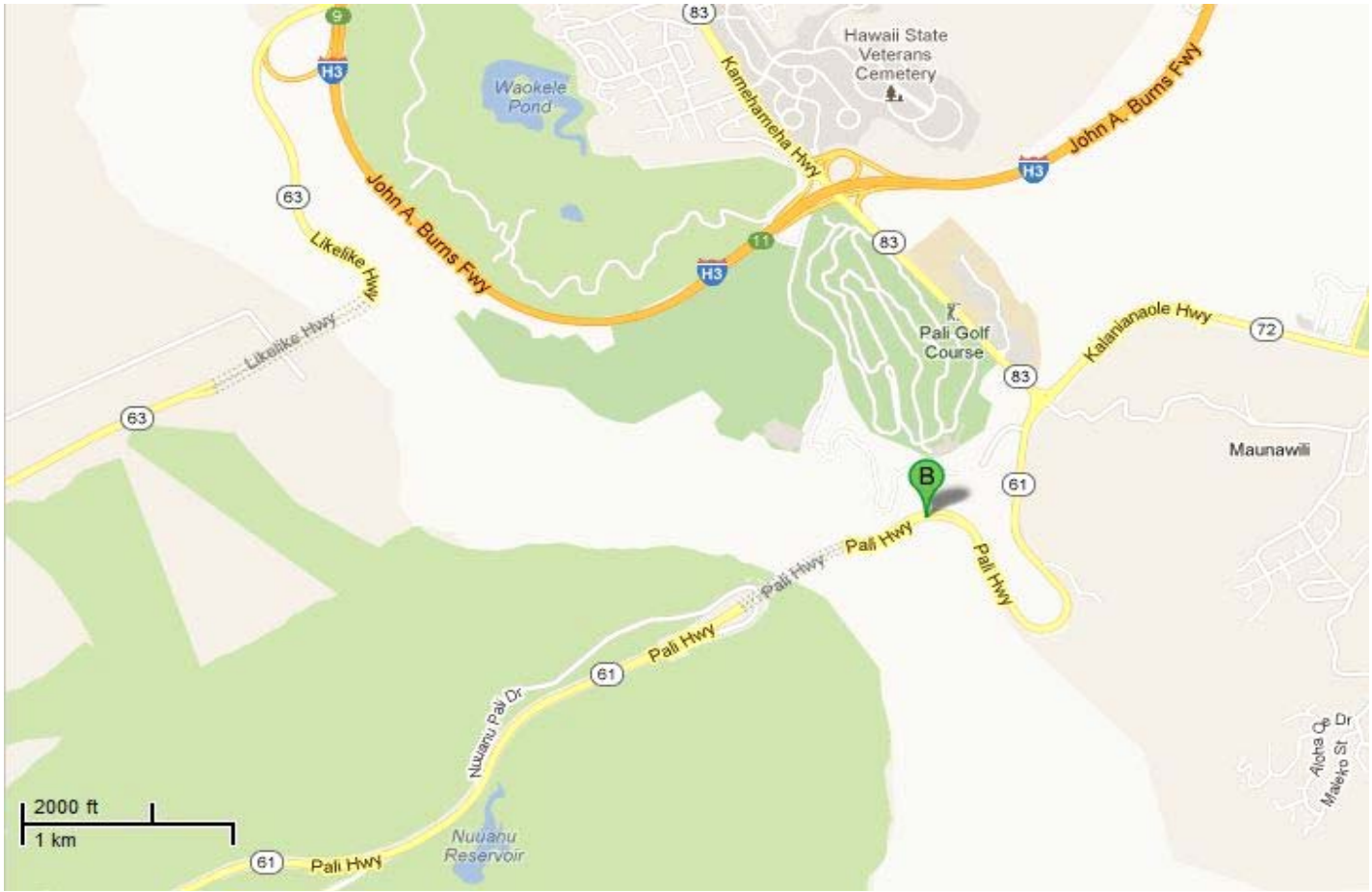
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300631 **Route No:** 61	
Popular Name: Pali Bridge No. 7A (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 7A)	
Feature Carried: Pali Highway	
Milepost: 6.31 mi. **Island:** Oahu	
Longitude: 157d-47m-08.99s **Latitude:** 21d-22m-10.78s	
Location: 0.72 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Bridge No. 7A (Outbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 60.0 ft.	**Total Length:** 128.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

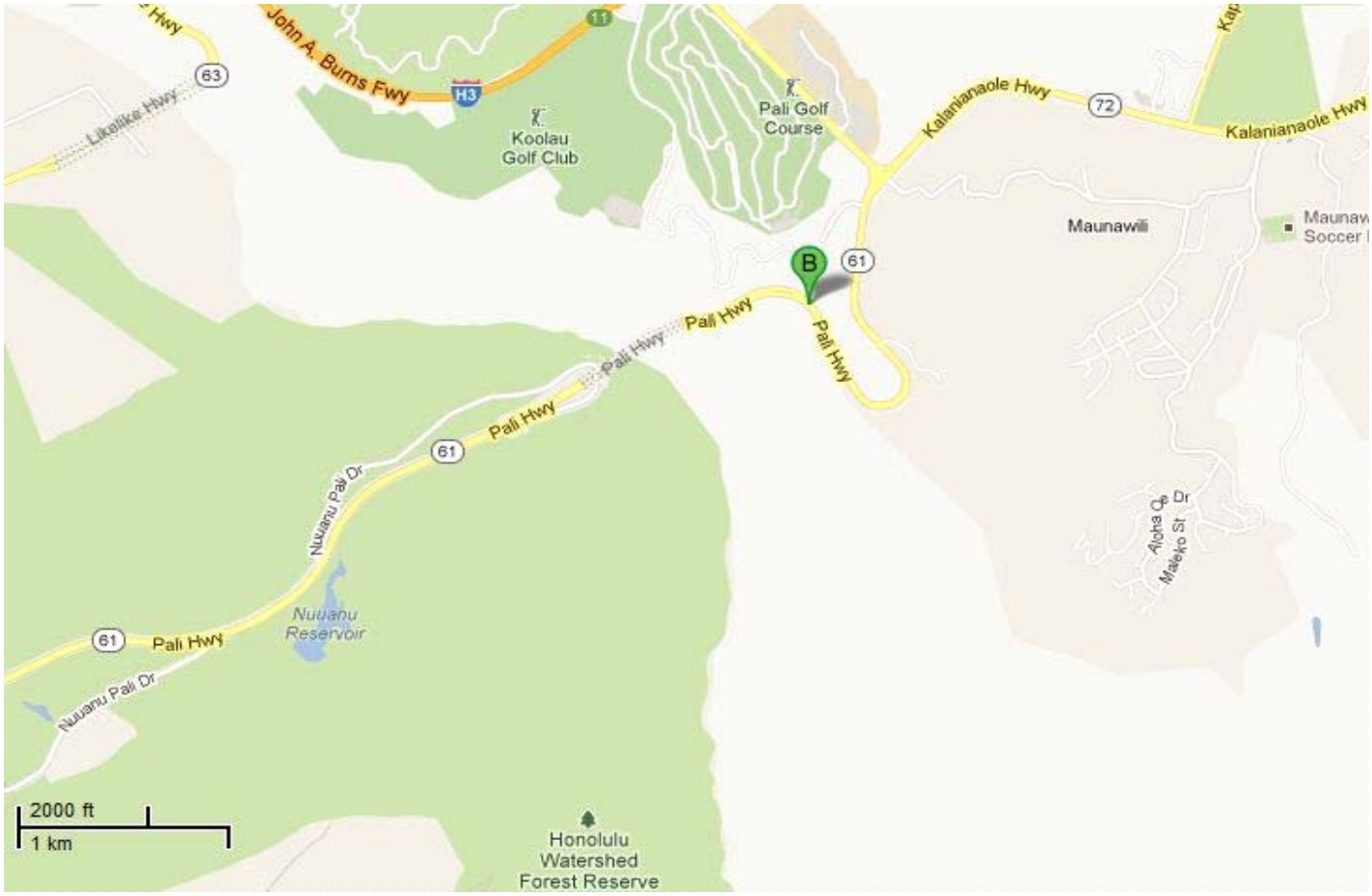
Inventory Form
(State)

General Information

Bridge Number: 003000610300640	**Route No:** 61
Popular Name: Pali Bridge No. 8 (Inbound)	
Feature Crossed: Mountain (Pali Bridge No. 8)	
Feature Carried: Pali Highway	
Milepost: 6.40 mi.	**Island:** Oahu
Longitude: 157d-47m-04.64s	**Latitude:** 21d-22m-10.39s

Location: 0.81 Miles Northeast of Pali Lookout Road
Historic Name: Pali Bridge No. 8 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 94.2 ft.	**Total Length:** 345.1 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300638	**Route No:** 61
Popular Name: Pali Bridge No. 8A (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 8A)	
Feature Carried: Pali Highway	
Milepost: 6.35 mi.	**Island:** Oahu
Longitude: 157d-47m-04.85s	**Latitude:** 21d-22m-09.82s
Location: 0.79 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Bridge No. 8A (Outbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 84.0 ft.	**Total Length:** 175.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

003000610300638 Pali Bridge No. 8A (Outbound)

Significance Statement:

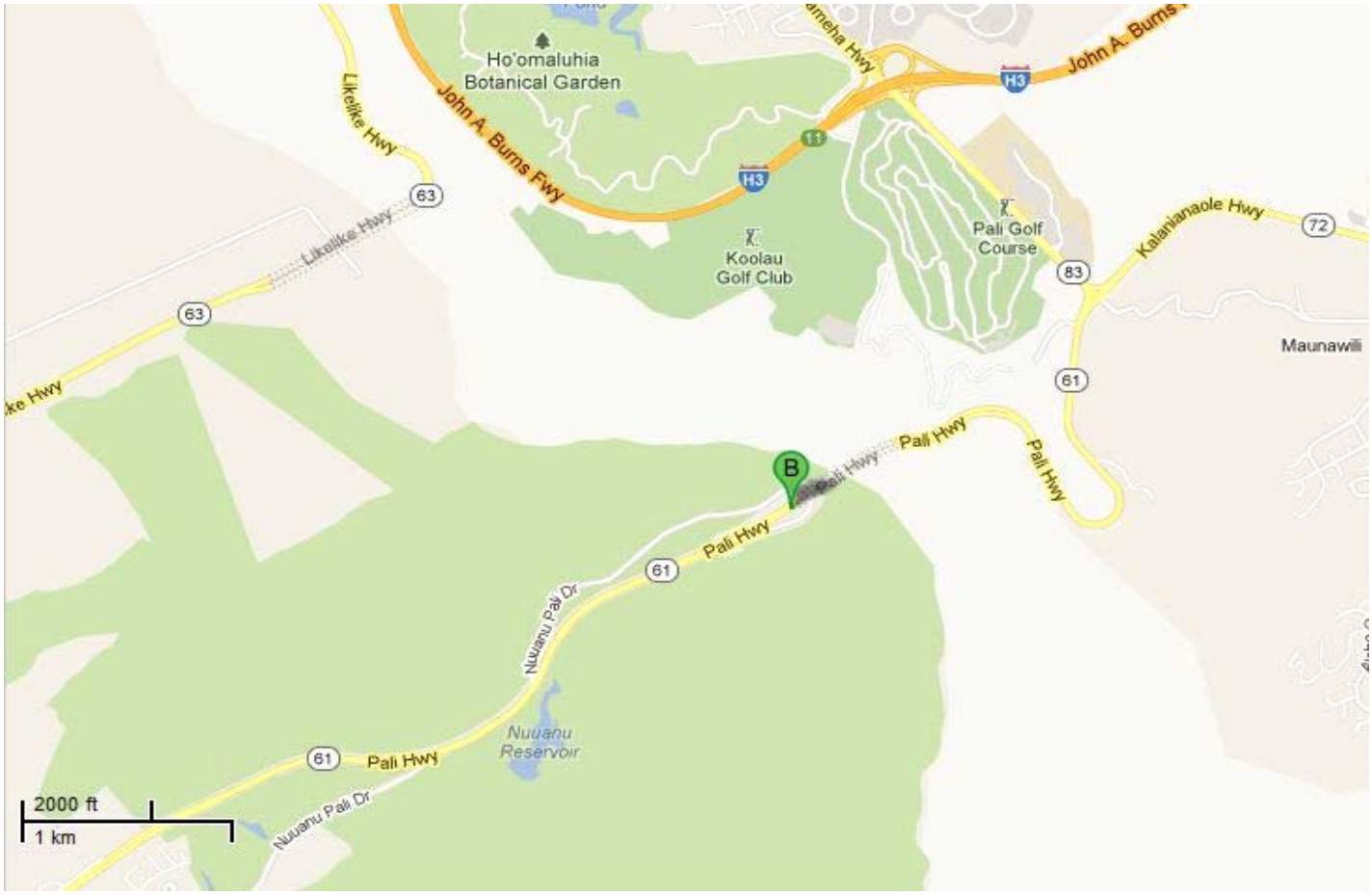
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300591 **Route No:** 61	
Popular Name: Pali Partial Bridge No. 1 (Inbound)	
Feature Crossed: Mountain (Pali Partial Bridge No. 1)	
Feature Carried: Pali Highway	
Milepost: 5.91 mi. **Island:** Oahu	
Longitude: 157d-47m-31.48s **Latitude:** 21d-22m-02.75s	
Location: 0.32 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Partial Bridge No. 1 (Inbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 38.1 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

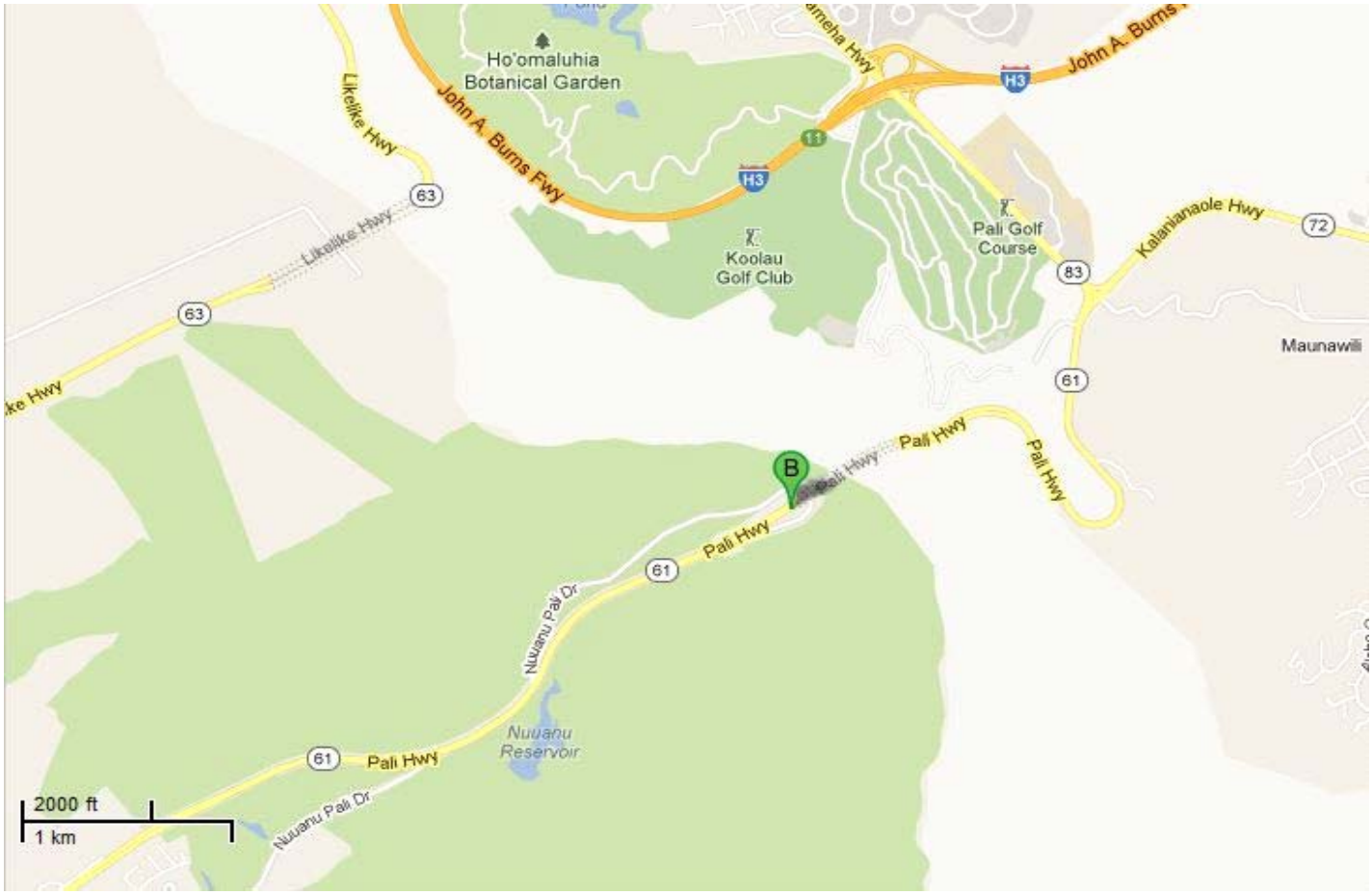
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300592 **Route No:** 61	
Popular Name: Pali Partial Bridge No. 2 (Inbound)	
Feature Crossed: Mountain (Pali Partial Bridge No. 2)	
Feature Carried: Pali Highway	
Milepost: 5.92 mi. **Island:** Oahu	
Longitude: 157d-47m-30.90s **Latitude:** 21d-22m-03.18s	
Location: 0.33 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Partial Bridge No. 2 (Inbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 59.1 ft.	**Total Length:** 62.0 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

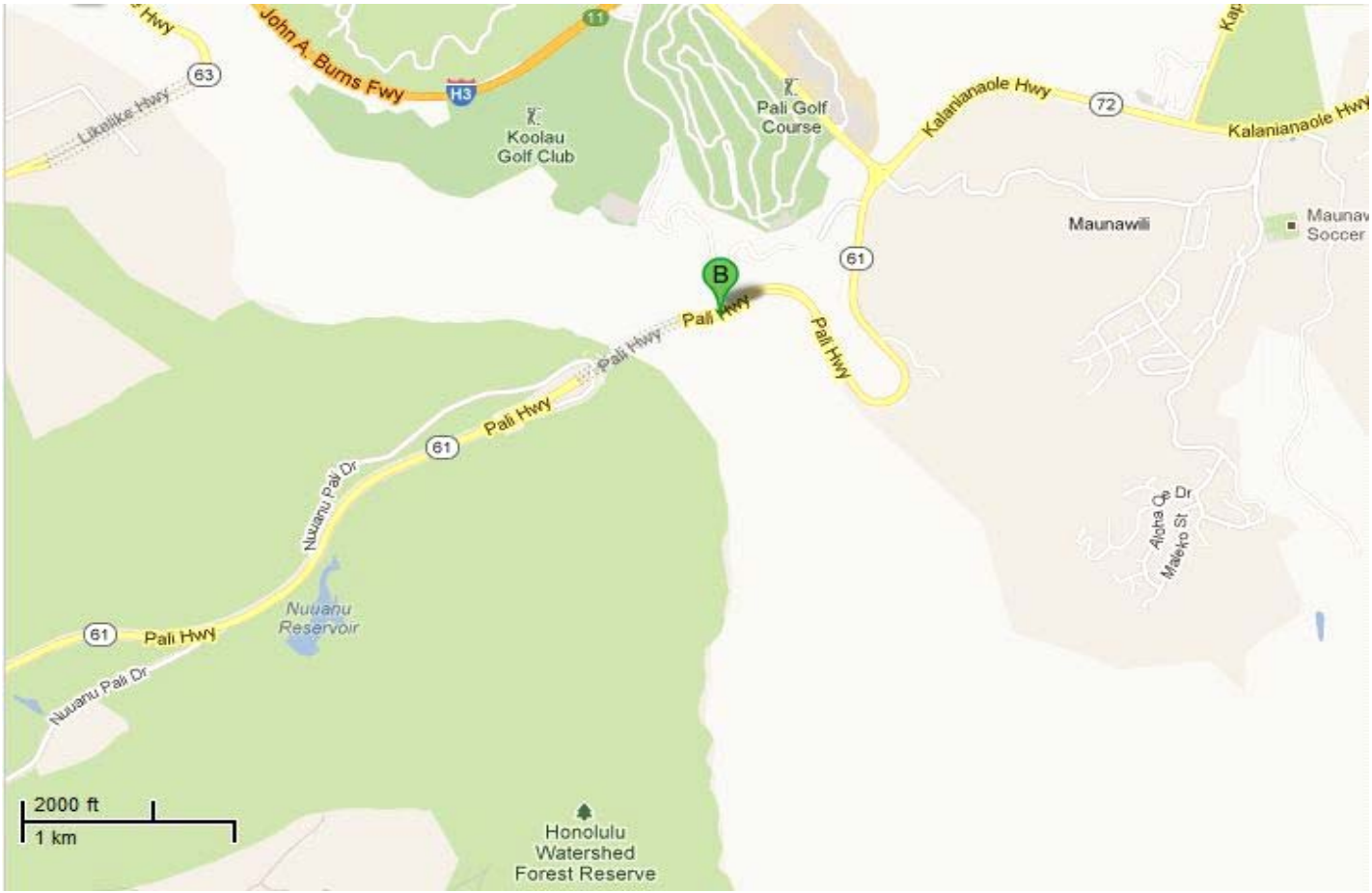
Inventory Form
(State)

General Information

Bridge Number: 003000610300613	**Route No:** 61
Popular Name: Pali Partial Bridge No. 4A (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 4A)	
Feature Carried: Pali Highway	
Milepost: 6.13 mi.	**Island:** Oahu
Longitude: 157d-47m-18.23s	**Latitude:** 21d-22m-06.64s

Location: 0.54 Miles Northeast of Pali Lookout Road
Historic Name: Pali Partial Bridge No. 4A (Outbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 27.9 ft.	**Total Length:** 113.8 ft.	**Deck Width:** 31.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Single Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

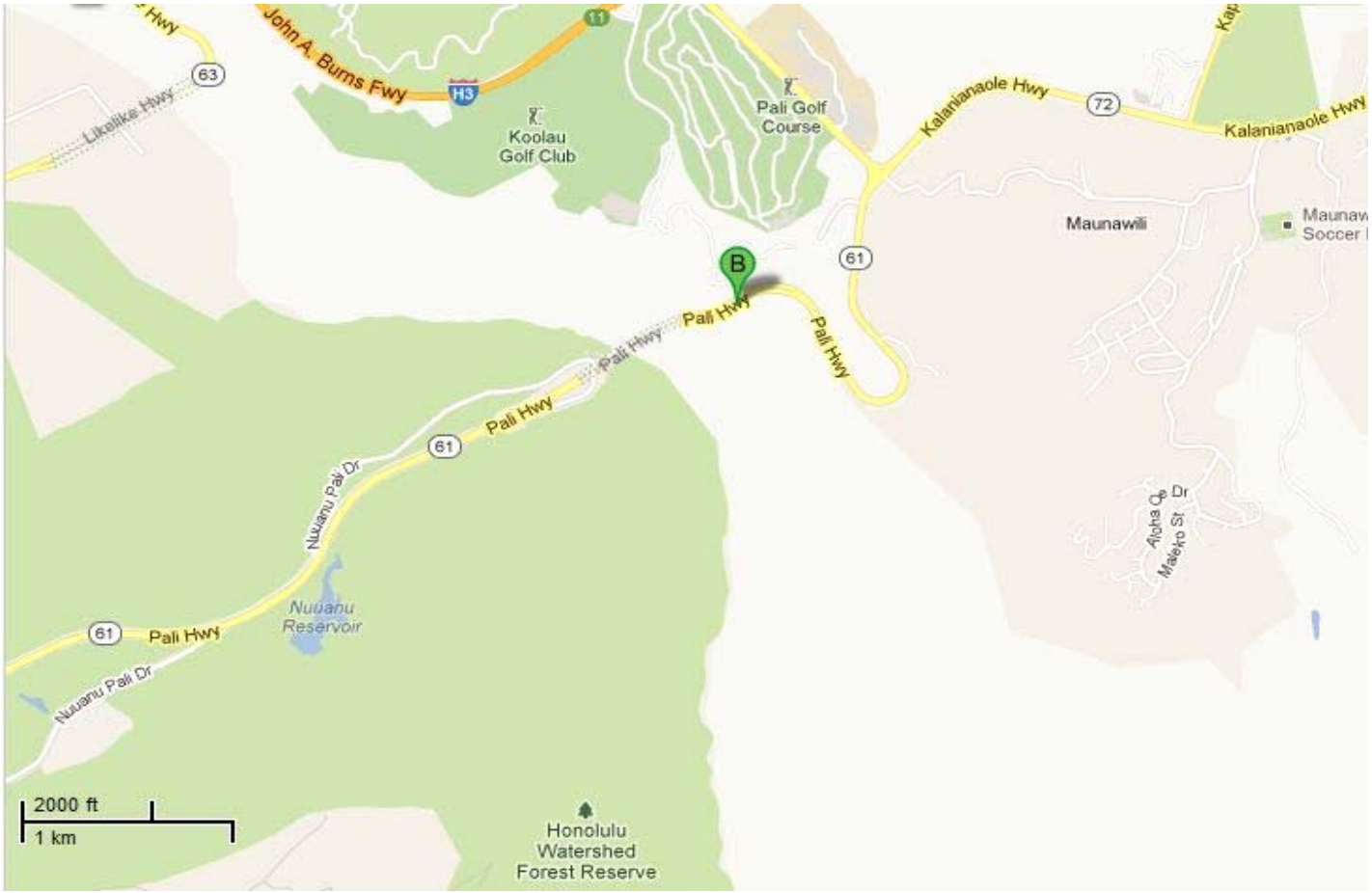
Inventory Form
(State)

General Information

Bridge Number: 003000610300619 **Route No:** 61	
Popular Name: Pali Partial Bridge No. 4C (Outbound)	
Feature Crossed: Mountain (Pali Bridge No. 4C)	
Feature Carried: Pali Highway	
Milepost: 6.19 mi. **Island:** Oahu	
Longitude: 157d-47m-16.63s **Latitude:** 21d-22m-07.53s	

Location: 0.60 Miles Northeast of Pali Lookout Road
Historic Name: Pali Partial Bridge No. 4C (Outbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 26.9 ft.	**Total Length:** 74.1 ft.	**Deck Width:** 32.5 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

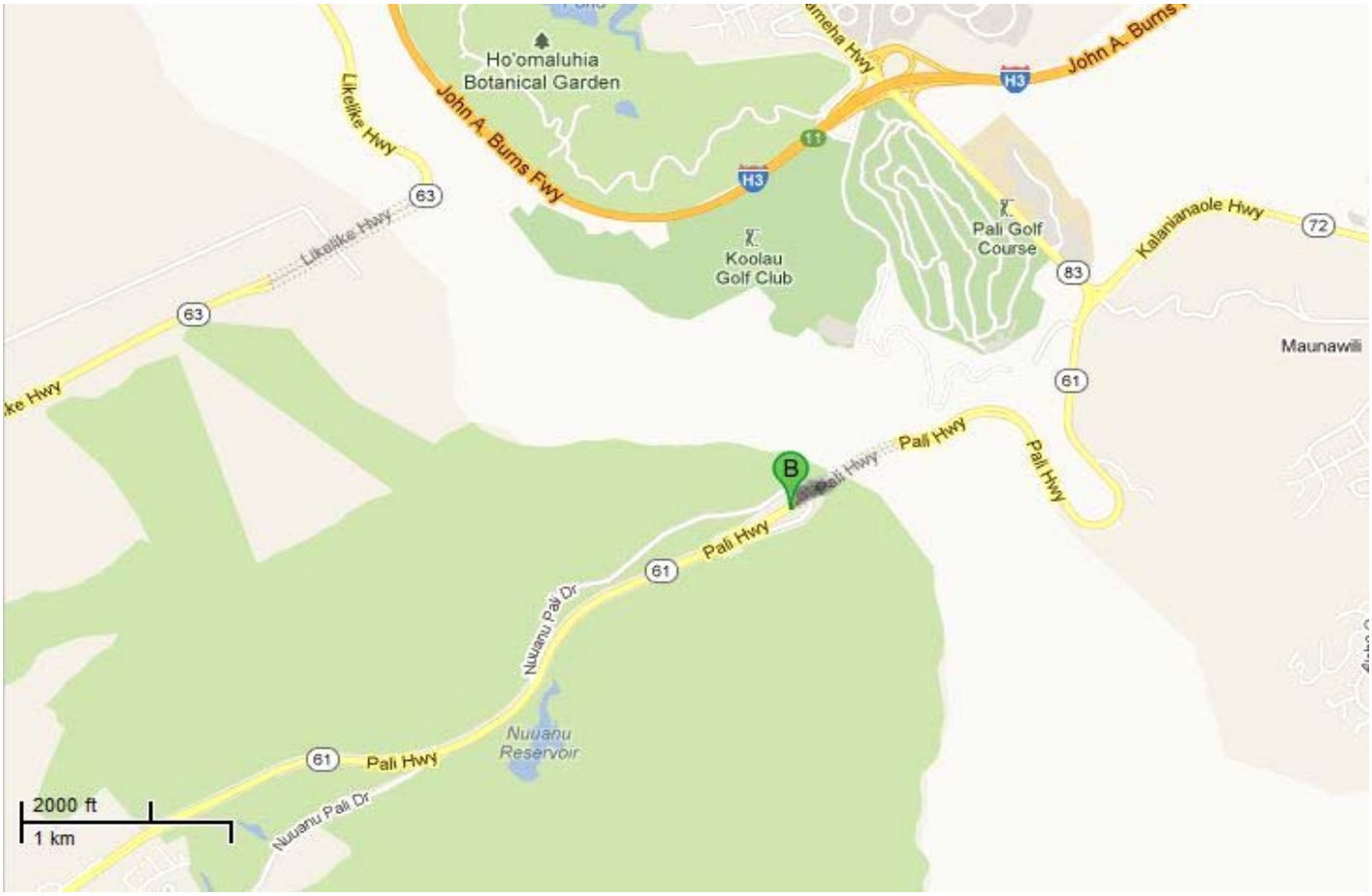
Inventory Form
(State)

General Information

Bridge Number: 003000610300569	**Route No:** 61
Popular Name: Pali Tunnel No. 1 (Inbound)	
Feature Crossed: Mountain (Pali Tunnel No. 1)	
Feature Carried: Pali Highway	
Milepost: 5.69 mi.	**Island:** Oahu
Longitude: 157d-47m-32.01s	**Latitude:** 21d-22m-02.22s

Location: 0.10 Miles Northeast of Pali Lookout Road
Historic Name: Pali Tunnel No. 1 (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1957	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 1000.0 ft.	**Deck Width:** 31.5 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

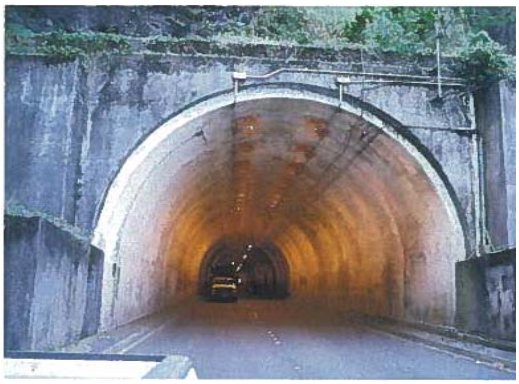
Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

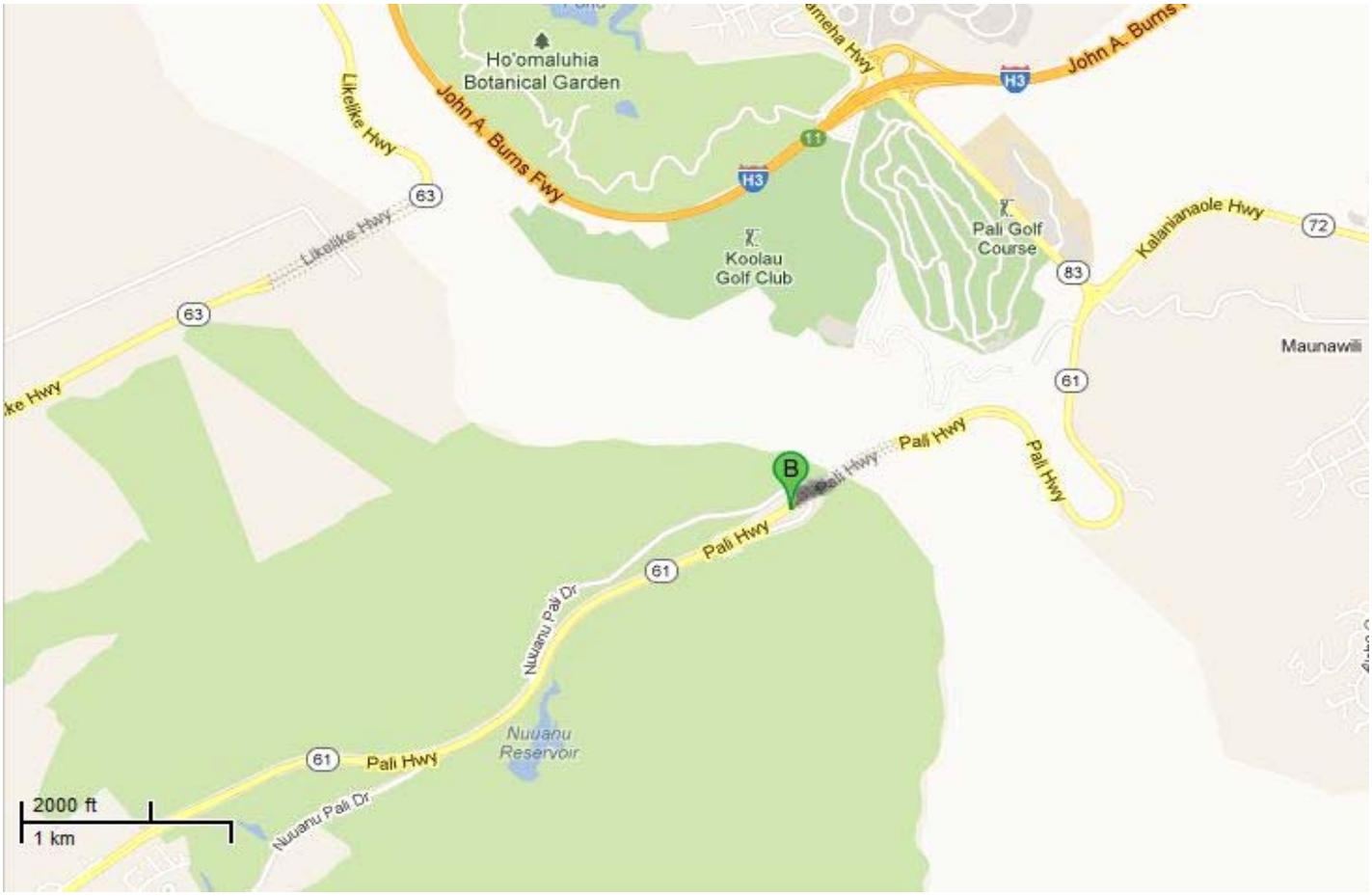
General Information

Bridge Number: 003000610300568	**Route No:** 61
Popular Name: Pali Tunnel No. 1A (Outbound)	
Feature Crossed: Mountain (Pali Tunnel No. 1A)	
Feature Carried: Pali Highway	
Milepost: 5.68 mi.	**Island:** Oahu
Longitude: 157d-47m-40.70s	**Latitude:** 21d-21m-55.58s



Location: 0.10 Miles Northeast of Pali Lookout Road
Historic Name: Pali Tunnel No. 1A (Outbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 1080.1 ft.	**Deck Width:** 31.5 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

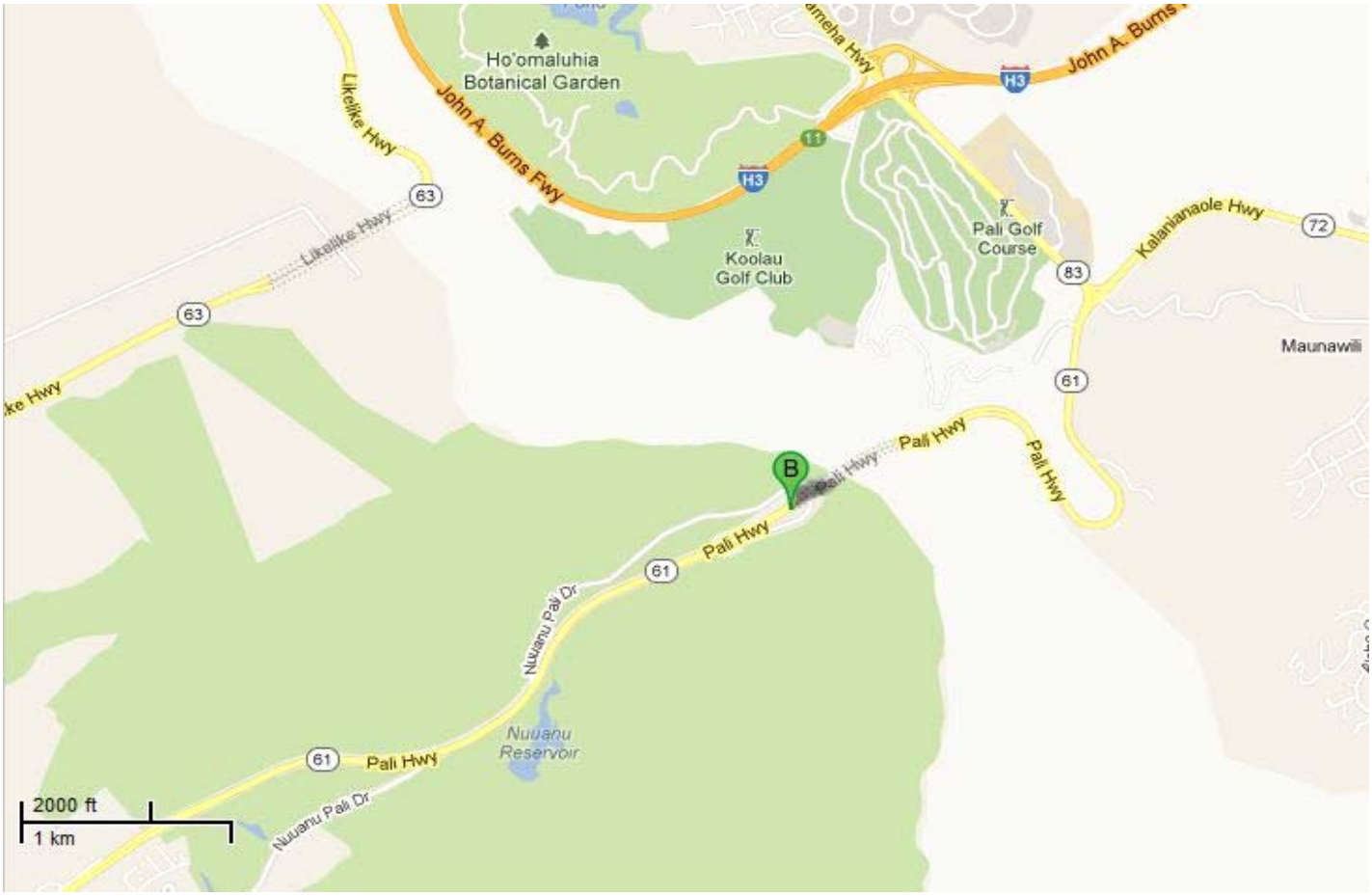
See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000610300596 **Route No:** 61	
Popular Name: Pali Tunnel No. 2 (Inbound)	
Feature Crossed: Mountain (Pali Tunnel No. 2)	
Feature Carried: Pali Highway	
Milepost: 5.96 mi. **Island:** Oahu	
Longitude: 157d-47m-24.05s **Latitude:** 21d-22m-06.23s	
Location: 0.36 Miles Northeast of Pali Lookout Road	
Historic Name: Pali Tunnel No. 2 (Inbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1957	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 500.0 ft.	**Deck Width:** 31.5 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

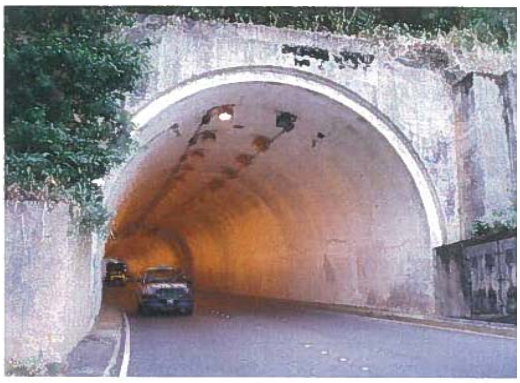
Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

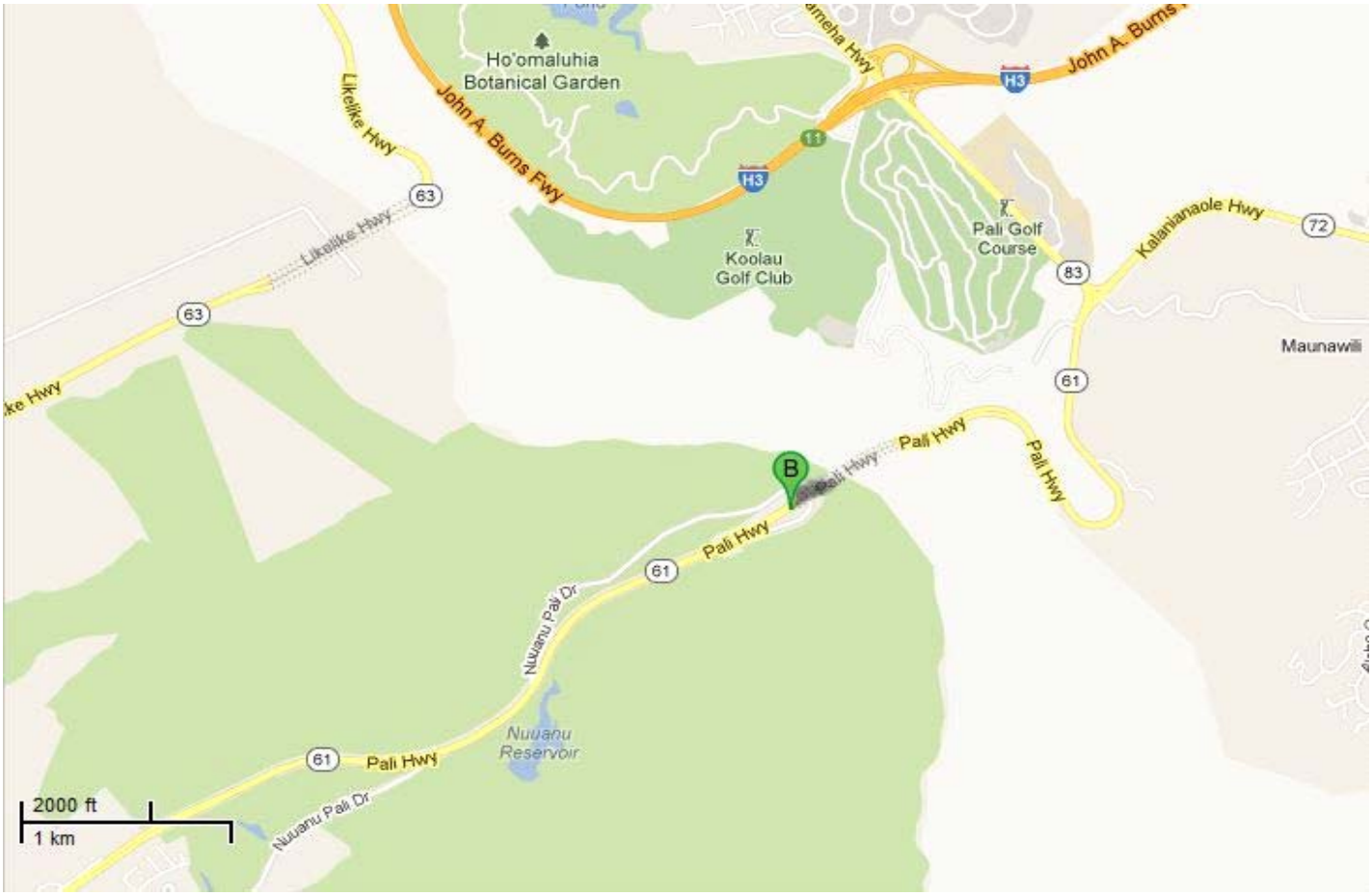
General Information

Bridge Number: 003000610300595	**Route No:** 61
Popular Name: Pali Tunnel No. 2A (Outbound)	
Feature Crossed: Mountain (Pali Tunnel No. 2A)	
Feature Carried: Pali Highway	
Milepost: 5.95 mi.	**Island:** Oahu
Longitude: 157d-47m-28.64s	**Latitude:** 21d-22m-03.54s



Location: 0.36 Miles Northeast of Pali Lookout Road
Historic Name: Pali Tunnel No. 2A (Outbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 497.0 ft.	**Deck Width:** 31.5 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000830302186	**Route No:** 83
Popular Name: Papau Stream-Waipuhi	
Feature Crossed: Papau Stream	
Feature Carried: Kamehameha Highway	
Milepost: 21.86 mi.	**Island:** Oahu
Longitude: 157d-54m-24.76s	**Latitude:** 21d-36m-25.30s

Location: 0.23 Miles Southeast of Kukuna Road
Historic Name: Papau Stream-Waipuhi
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1997	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1997.		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Papau Stream-Waipuhi Stream Bridge carries Kamehameha Highway across the Papau Stream. This concrete tee beam bridge is in its original location and in fair condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and curved end posts. The concrete deck is supported by concrete abutments. The parapet and end posts caps have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1997. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

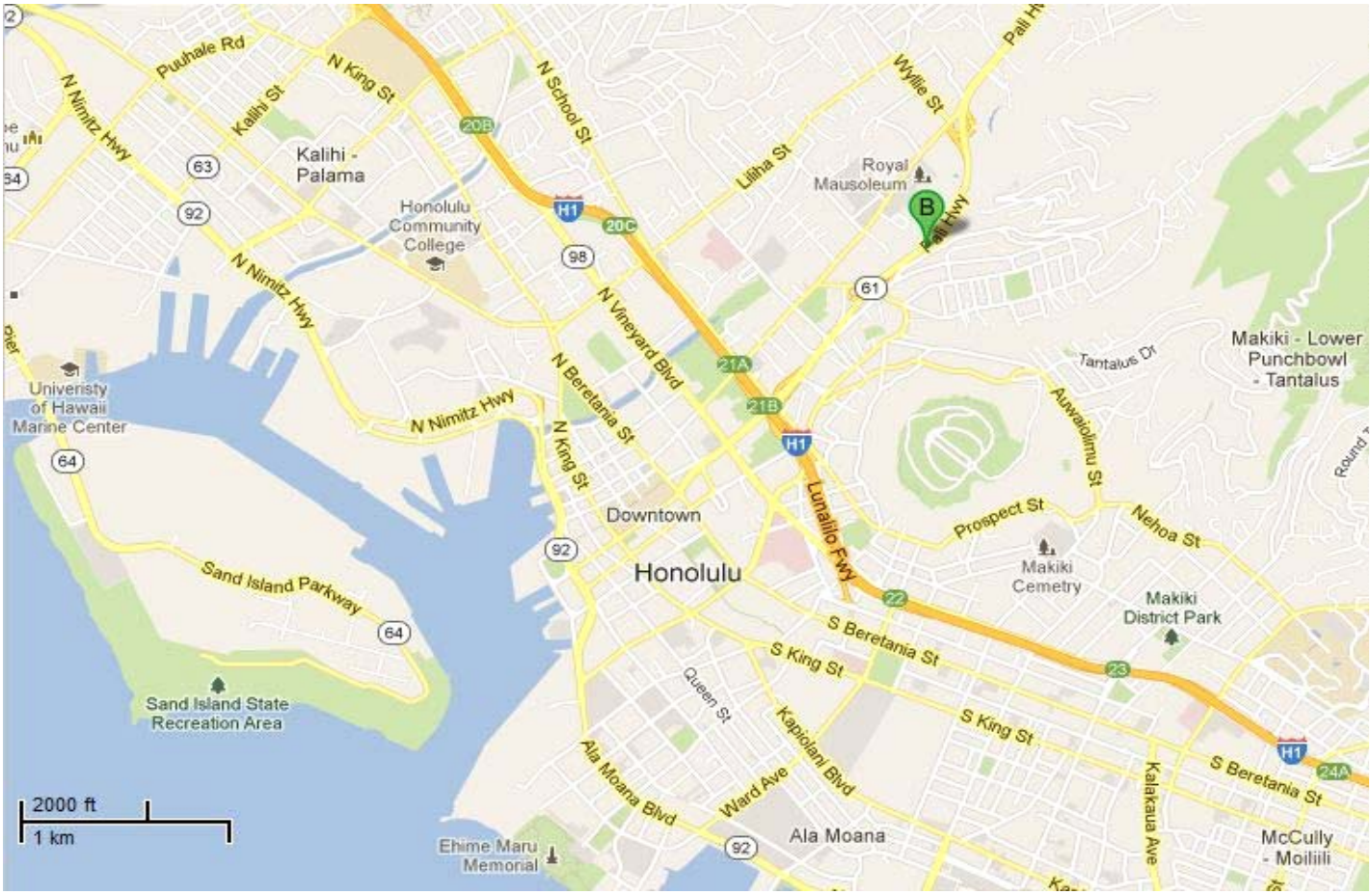
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000610400090 **Route No:** 61	
Popular Name: Partial Bridge No. 8	
Feature Crossed: Unnamed Gulch	
Feature Carried: Pali Highway	
Milepost: 0.90 mi. **Island:** Oahu	
Longitude: 157d-50m-48.40s **Latitude:** 21d-19m-21.01s	
Location: 0.26 Miles Northeast of Pauoa Road	
Historic Name: Partial Bridge No. 8	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1962	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 37.1 ft.	**Total Length:** 76.1 ft.	**Deck Width:** 35.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Single Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

Inventory Form
(State)

General Information

Bridge Number: 003000830300869	**Route No:** 83
Popular Name: Paumalu Stream	
Feature Crossed: Paumalu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 8.69 mi.	**Island:** Oahu
Longitude: 158d-02m-29.72s	**Latitude:** 21d-40m-21.53s

Location: 0.03 Miles Southwest of Paumalu Place
Historic Name: Paumalu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1984	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1984.		

Bridge Information

Number of Spans: 5	**Max Span:** 18.0 ft.	**Total Length:** 89.9 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Paumalu Stream Bridge carries Kamehameha Highway across the Paumalu Stream. This concrete slab bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and wide end posts with the bridge name engraved. The concrete deck is supported by the concrete piers and concrete abutments. Only the parapet caps have been painted white. A wood walkway with horizontal metal railing was added to one side of the bridge and utility pipes were attached to the both side of the piers in 1984. Thrie beams were bolted to the end posts which obscures the engraved bridge name. The simple design of the parapet retains its historic feeling.

Significance Statement:

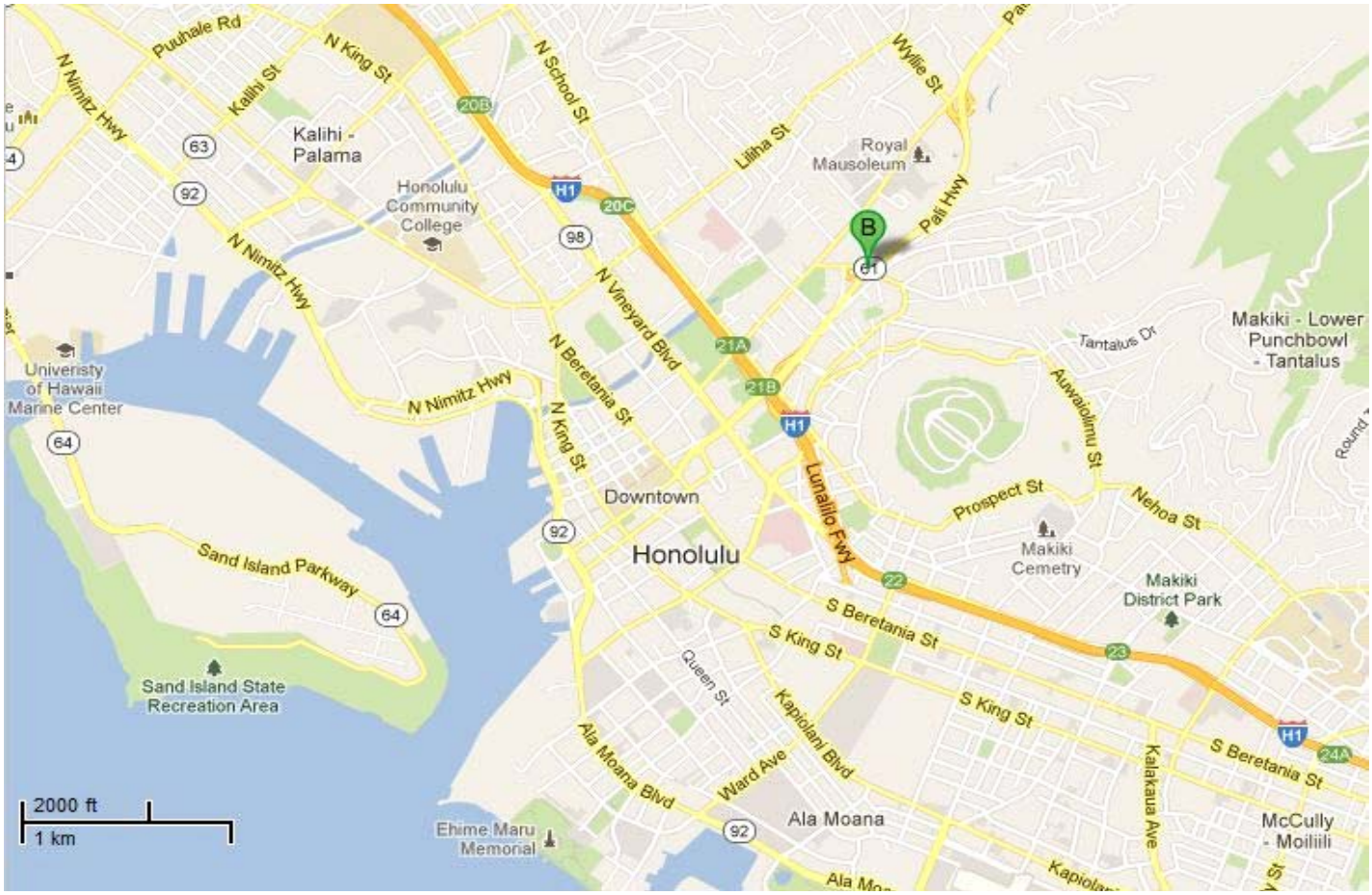
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000610400064 **Route No:** 61	
Popular Name: Pauoa Road Overpass	
Feature Crossed: Pauoa Road	
Feature Carried: Pali Highway	
Milepost: 0.61 mi. **Island:** Oahu	
Longitude: 157d-50m-59.64s **Latitude:** 21d-19m-12.13s	
Location: 0.46 Miles Northeast of School Street	
Historic Name: Pauoa Road Overpass	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 63.0 ft.	**Total Length:** 68.9 ft.	**Deck Width:** 82.3 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Pali Historic District description.

Significance Statement:

See Pali Historic District description.

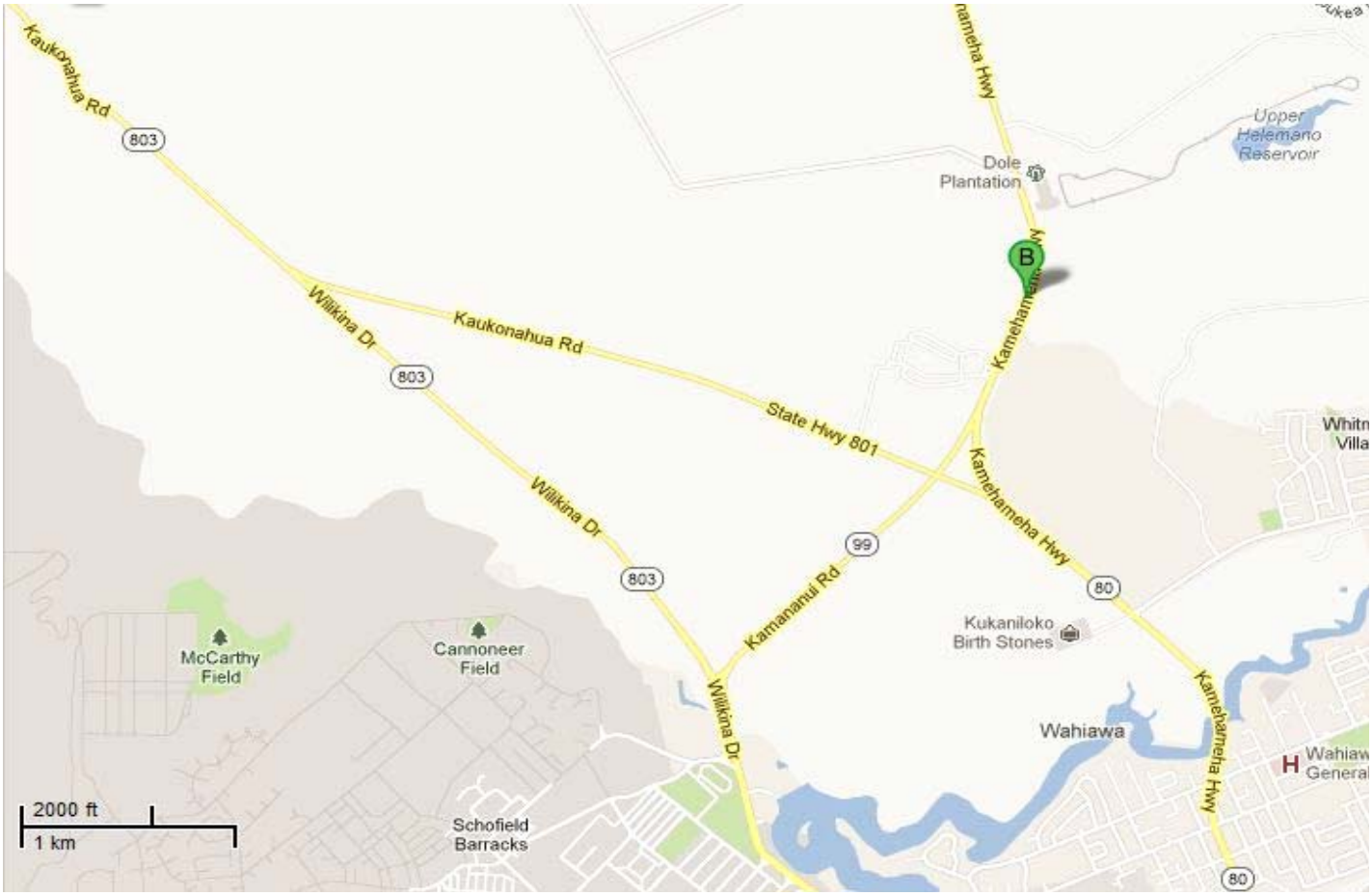
Inventory Form
(State)

General Information

Bridge Number: 003000990300626	**Route No:** 99
Popular Name: Poamoho Stream	
Feature Crossed: Upper Poamoho Stream	
Feature Carried: Kamehameha Highway	
Milepost: 6.26 mi.	**Island:** Oahu
Longitude: 158d-02m-20.59s	**Latitude:** 21d-31m-06.11s

Location: 0.18 Miles North of Nui Avenue
Historic Name: Poamoho Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 116.1 ft.	**Total Length:** 404.9 ft.	**Deck Width:** 31.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Poamoho Stream Bridge carries Kamehameha Highway across the Poamoho Stream. This concrete tee beam bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with flat caps and curved wide solid end posts. End posts consist of stepped profile and two of the posts have the bridge name and the year of construction engraved. The concrete deck is supported by concrete piers and abutments. Thrie beams were bolted to the end posts however, the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

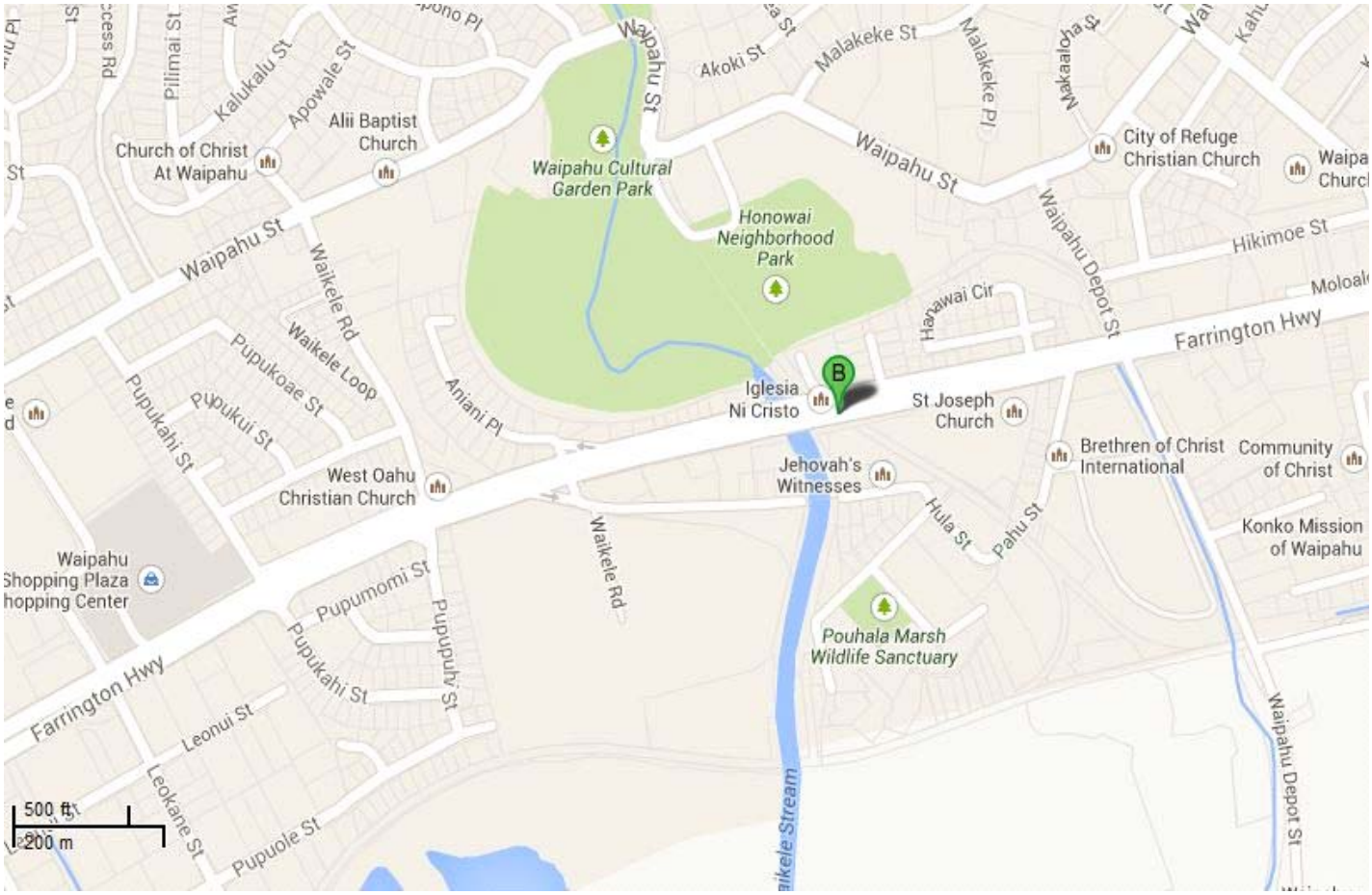
Inventory Form
(State)

General Information

Bridge Number: 003090001400114	**Route No:** 7101
Popular Name: Railroad Crossing (Highway Overpass)	
Feature Crossed: Railroad Crossing	
Feature Carried: Farrington Highway	
Milepost: 1.17 mi.	**Island:** Oahu
Longitude: 158d-00m-36.22s	**Latitude:** 21d-22m-58.28s

Location: 0.28 Miles East of Waikele Road
Historic Name: Railroad Crossing (Highway Overpass)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 42.0 ft.	**Total Length:** 48.9 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Agriculture, Engineering		

Narrative Description:

The Railroad Crossing (Highway Overpass) Bridge carries Farrington Highway across a Railroad right of way. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide end posts. The concrete deck is supported by concrete abutments. The posts consist of a stepped profile and one of the posts has the bridge name engraved upon it. The concrete deck is supported by concrete piers and masonry abutments. Thrie beams were bolted to the end posts and small triangular concrete blocks were attached to the posts to create a flat surface. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion A for its association with plantation industry that the rail road was running under the bridge. It is also eligible for Criterion C as a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. It was the last major accommodation built by the FHWA for the railroad before it went out of business.

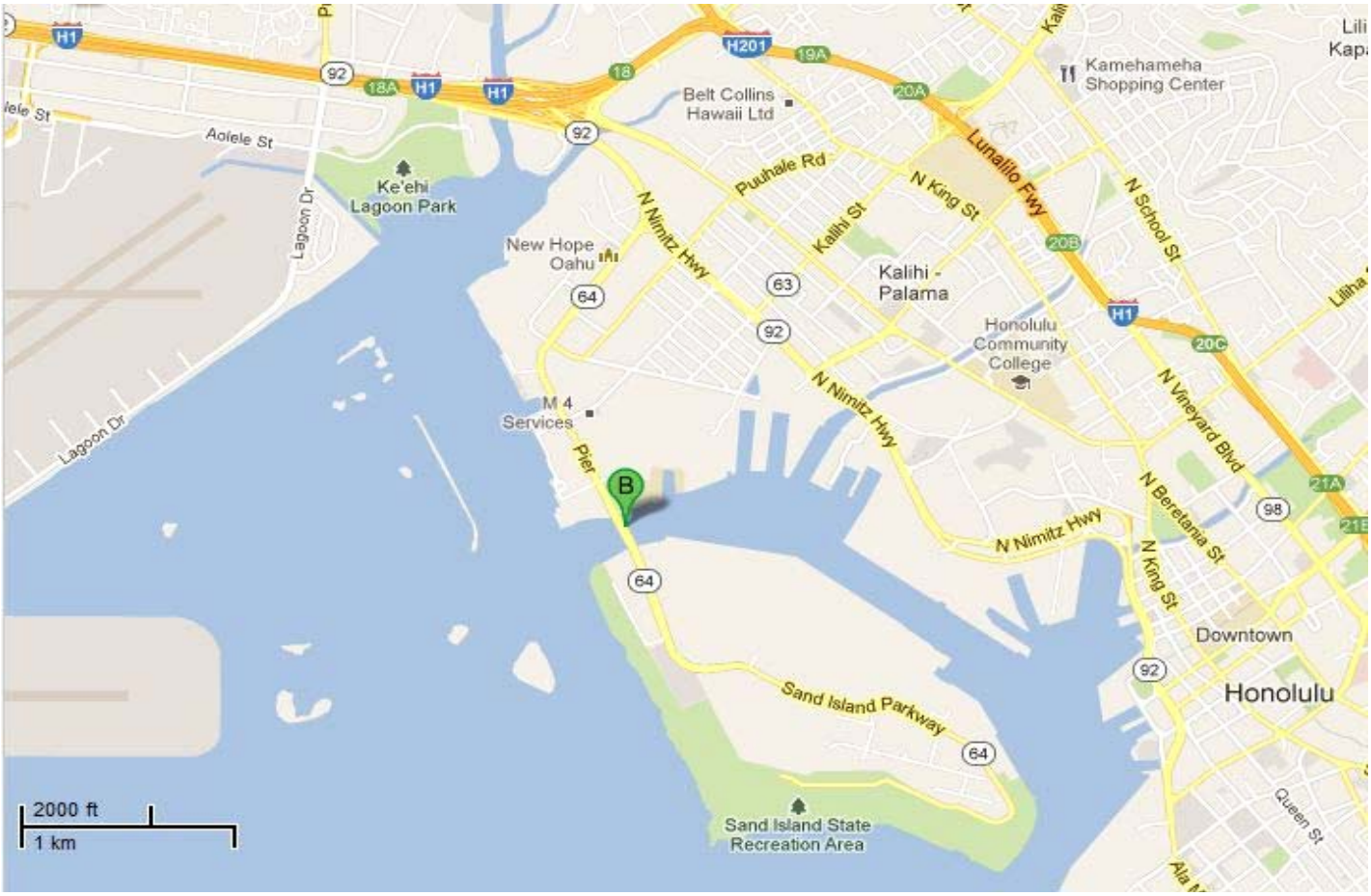
Inventory Form
(State)

General Information

Bridge Number: 003000640400150	**Route No:** 64
Popular Name: Sand Island Bascule Bridge	
Feature Crossed: Harbor (Bascule Bridge)	
Feature Carried: Sand Island Parkway	
Milepost: 1.41 mi.	**Island:** Oahu
Longitude: 157d-53m-16.50s	**Latitude:** 21d-18m-51.80s

Location: 0.22 Miles South of Keehi Boat Harbor Access Road
Historic Name: Sand Island Bascule Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1962	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 299.9 ft.	**Total Length:** 692.9 ft.	**Deck Width:** 35.4 ft.
Superstructure: Steel Two-Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Steel Deck			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Sand Island Bascule Bridge 1962 carries Sand Island Access Road over a waterway. This 5 span steel stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets with horizontal metal rails. Thrie beams are bolted to the approaches of the parapets.

Significance Statement:

This bridge is eligible under Criterion C for being the longest steel bridge with the longest steel span built post-war (1945) on the island of Oahu in the historic study period prior to 1969. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type as well. It is a good example of a 1960's steel stringer and reinforced concrete bridge atypical of its period in its use of materials and design.

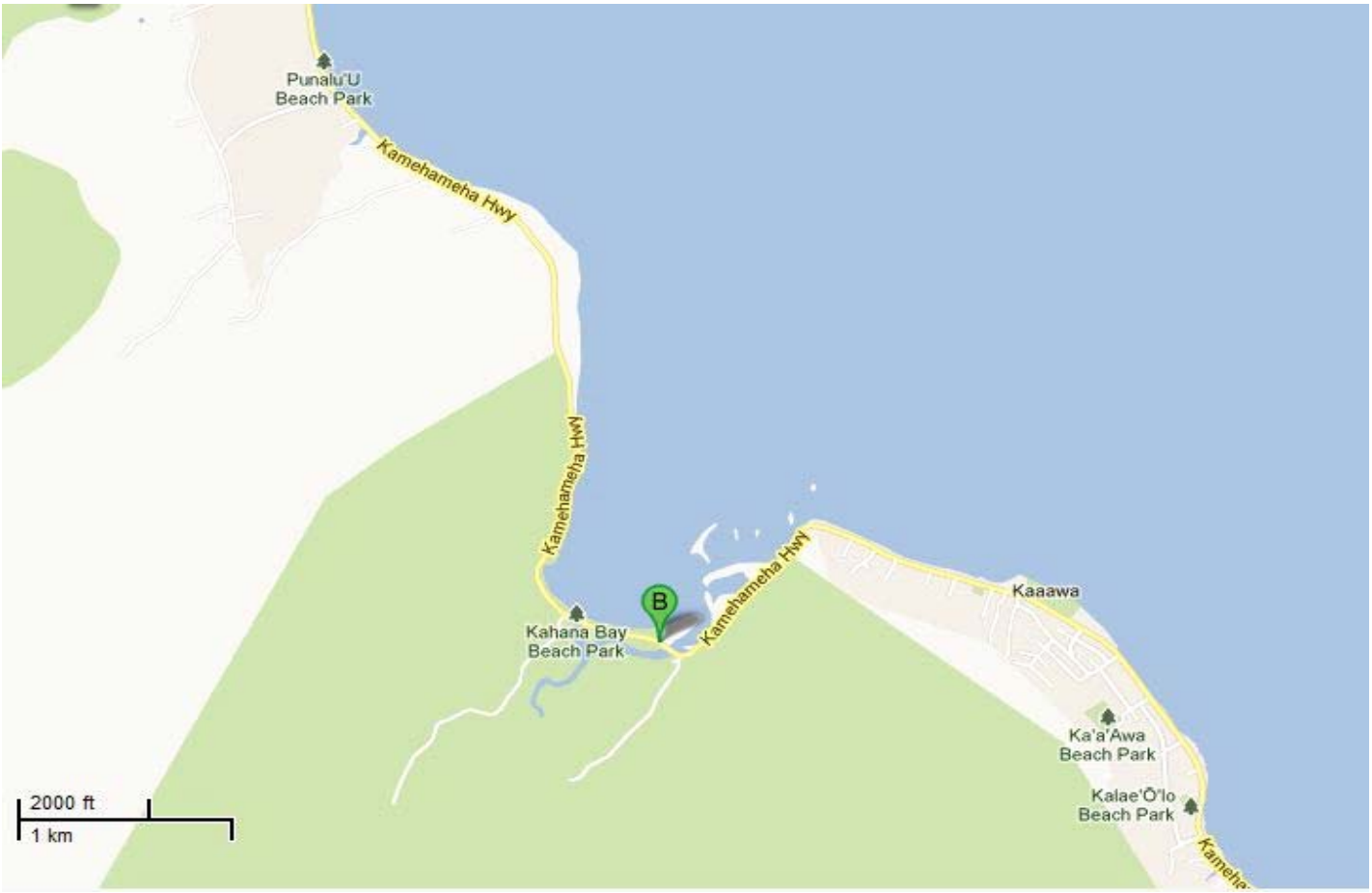
Inventory Form
(State)

General Information

Bridge Number: 003000830302637	**Route No:** 83
Popular Name: South Kahana Stream	
Feature Crossed: South Kahana Stream	
Feature Carried: Kamehameha Highway	
Milepost: 26.65 mi.	**Island:** Oahu
Longitude: 157d-52m-14.63s	**Latitude:** 21d-33m-15.98s

Location: 3.78 Miles Southeast of Sacred Falls Road
Historic Name: South Kahana Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1927	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1972	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1972.		

Bridge Information

Number of Spans: 5	**Max Span:** 18.0 ft.	**Total Length:** 89.9 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The South Kahana Stream Bridge carries Kamehameha Highway across the Kahana Stream. This concrete slab bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete solid panel parapets with flat caps and end posts with the bridge name engraved. The reinforced concrete slab deck is supported by the concrete abutments. A wood pedestrian walkway with wood horizontal railing was added to the upstream side of the bridge in 1972. The new concrete parapet were extended to the end posts to secure the thrie beams, therefore the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

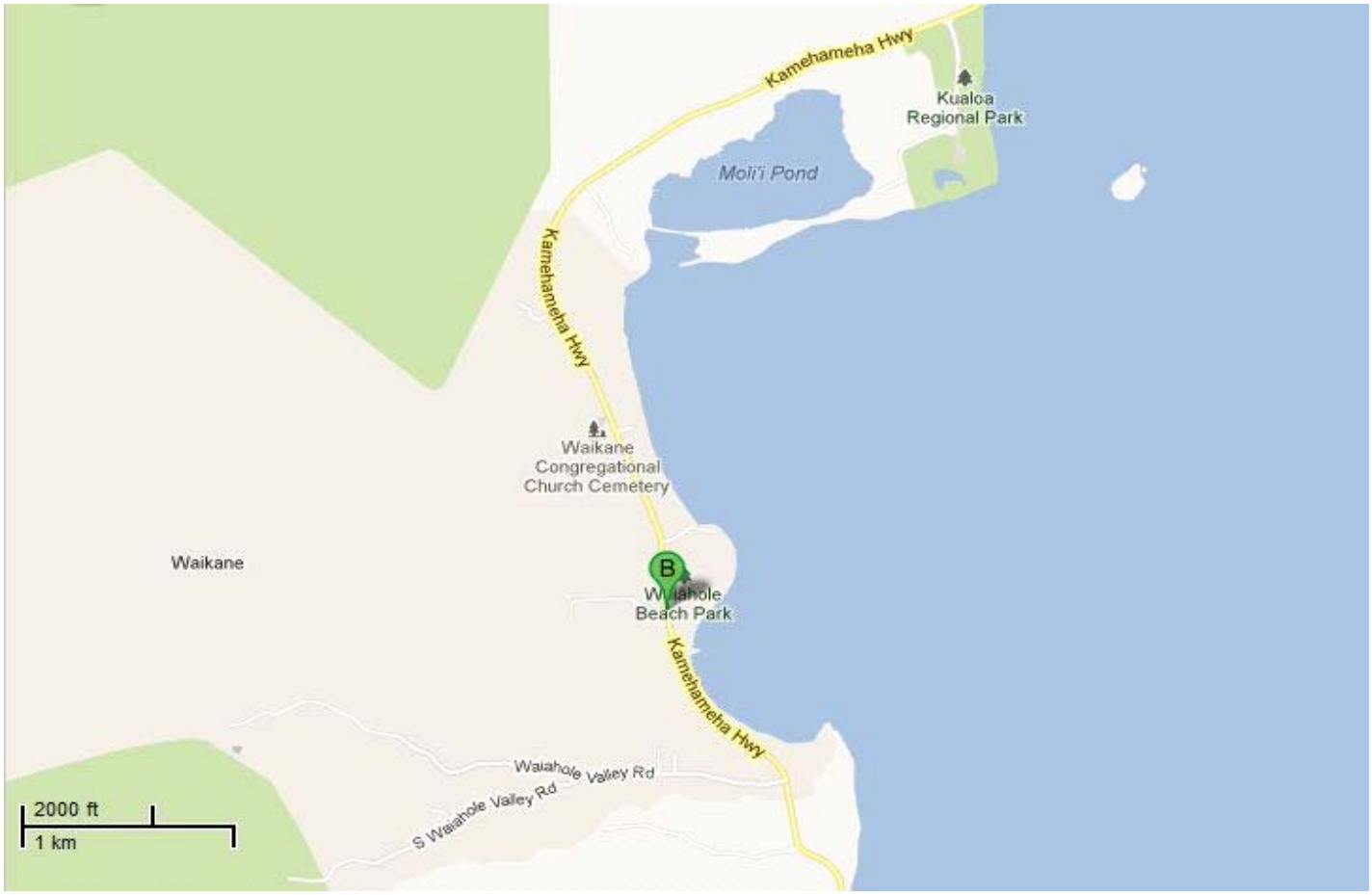
Inventory Form
(State)

General Information

Bridge Number: 003000830303396	**Route No:** 83
Popular Name: Unnamed Stream (North Waiahole)	
Feature Crossed: Unnamed Stream (North Waiahole)	
Feature Carried: Kamehameha Highway	
Milepost: 33.96 mi.	**Island:** Oahu
Longitude: 157d-51m-00.75s	**Latitude:** 21d-29m-19.68s

Location: 0.59 Miles North of Waiahole Valley Road
Historic Name: Unnamed Stream (North Waiahole)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1928	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1972	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1972.		

Bridge Information

Number of Spans: 3	**Max Span:** 18.0 ft.	**Total Length:** 54.1 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The North Waiahole Stream Bridge carries Kamehameha Highway across the Waiahole Stream. This concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and end posts. The reinforced concrete deck is supported by concrete abutments. A wood pedestrian walkway with metal horizontal railing was added to one side of the bridge in 1972. The new concrete solid panel parapets were extended to the end posts to bolt the thrie beam approaches however, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000930301404 **Route No:** 93

Popular Name: Unnamed Stream-Makaha No. 3

Feature Crossed: Unnamed Stream

Feature Carried: Farrington Highway

Milepost: 14.04 mi. **Island:** Oahu

Longitude: 158d-13m-09.60s **Latitude:** 21d-28m-34.16s

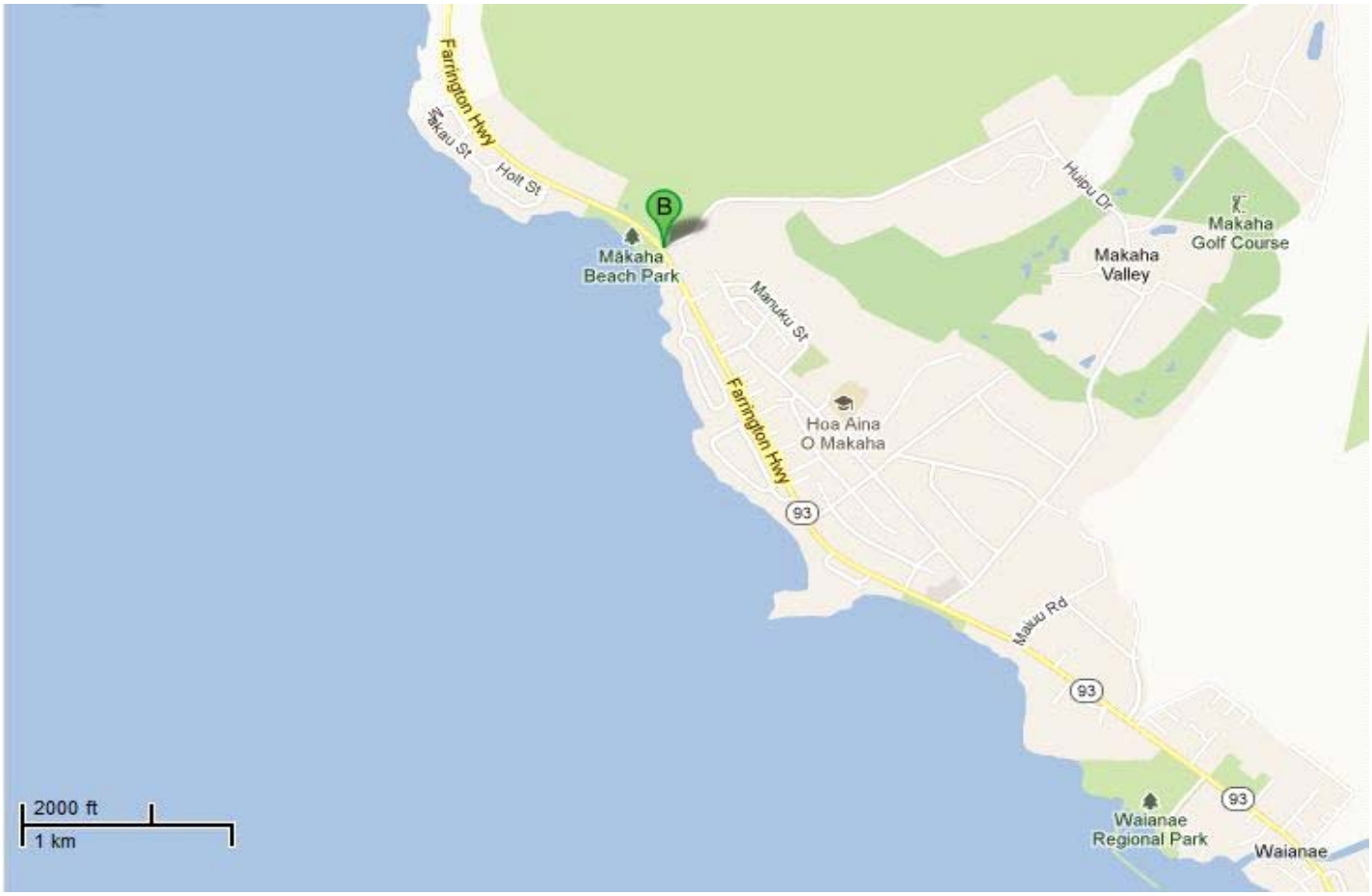
Location: 0.12 Miles West of Upena Street

Historic Name: Unnamed Stream-Makaha No. 3

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 19.0 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 29.2 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Timber Deck with AC Overlay			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Unmamed Stream (Makaha No. 3) Bridge carries Farrington Highway across the Unnamed Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railing, reinforced concrete tee beam deck, concrete piers and masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the parapet retains its historic feeling.

The bridge is scheduled for replacement; MOA complete as of Summer 2013.

Significance Statement:

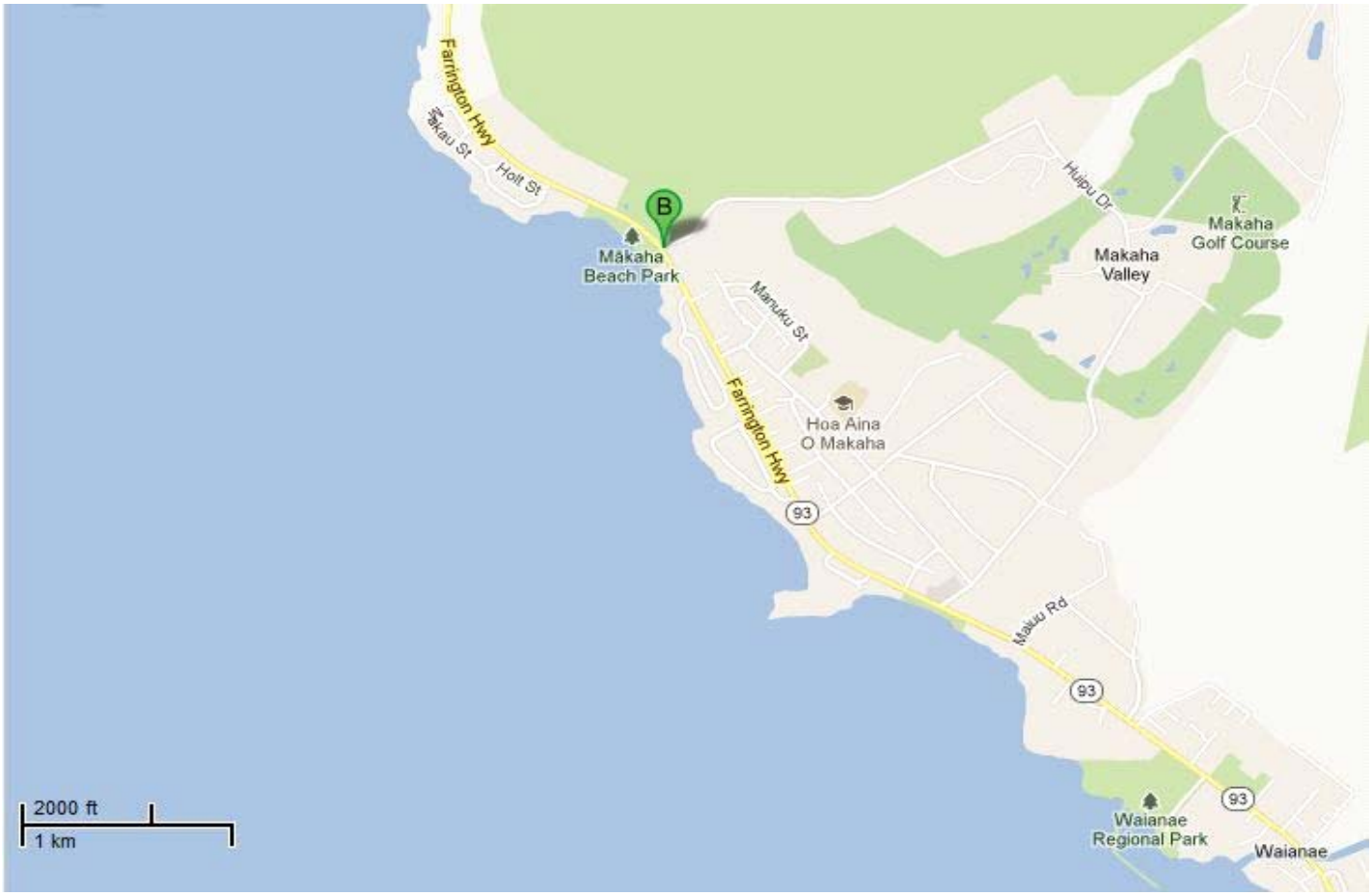
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000930301412 **Route No:** 93	
Popular Name: Unnamed Stream-Makaha No. 3A	
Feature Crossed: Unnamed Stream	
Feature Carried: Farrington Highway	
Milepost: 14.12 mi. **Island:** Oahu	
Longitude: 158d-13m-12.05s **Latitude:** 21d-28m-37.41s	
Location: 0.20 Miles West of Upena Street	
Historic Name: Unnamed Stream-Makaha No. 3A	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 19.0 ft.	**Total Length:** 78.1 ft.	**Deck Width:** 29.2 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Timber Deck with AC Overlay			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Unnamed Stream (Makaha No. 3A) Bridge carries Farrington Highway across the Unnamed Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railing, reinforced concrete tee beam deck, concrete piers and masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the parapet retains its historic feeling.

The bridge is scheduled for replacement; MOA complete as of Summer 2013.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

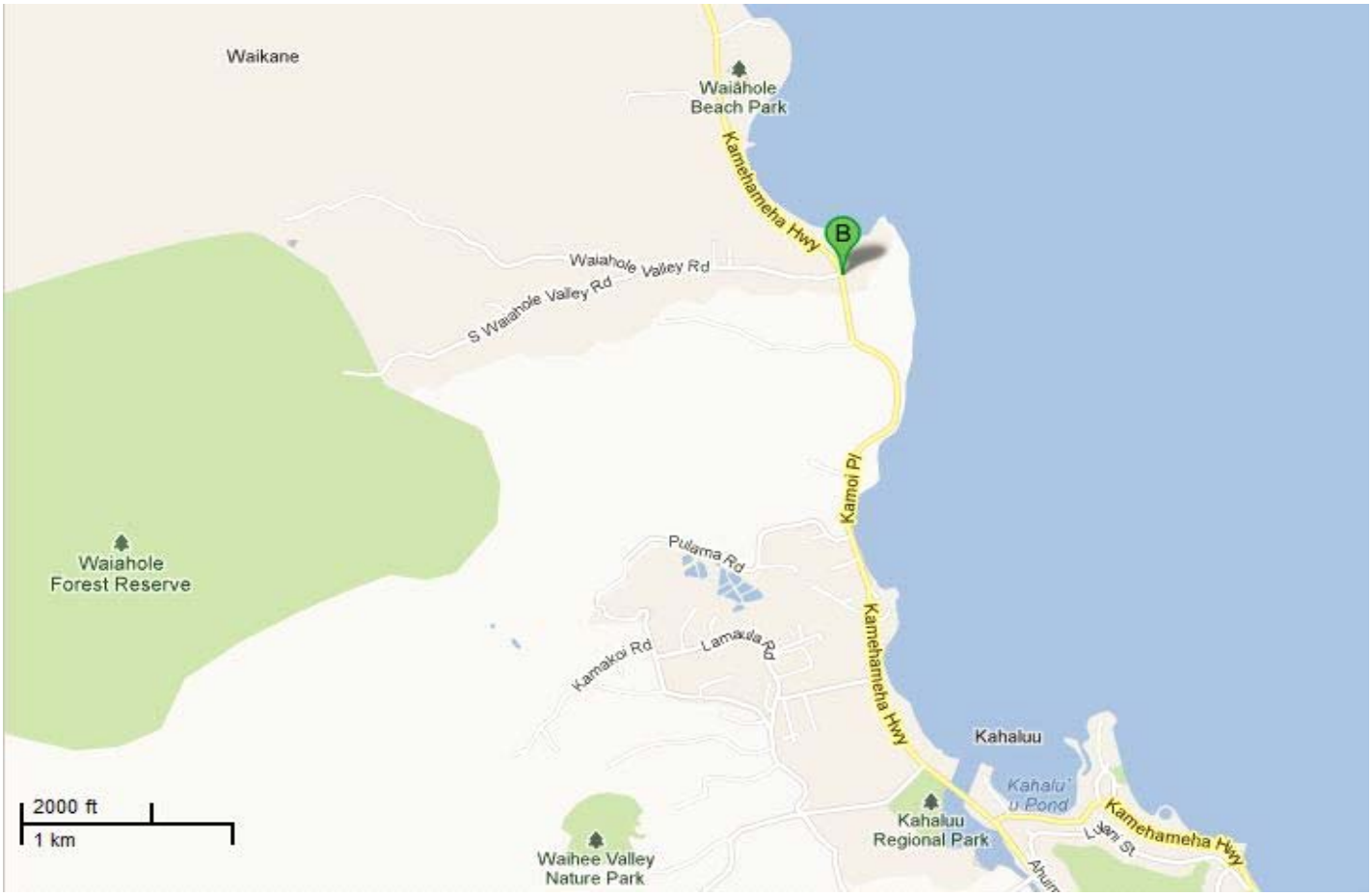
Inventory Form
(State)

General Information

Bridge Number: 003000830303459	**Route No:** 83
Popular Name: Waiahole Stream (County)	
Feature Crossed: Waiahole Stream	
Feature Carried: Kamehameha Highway	
Milepost: 34.59 mi.	**Island:** Oahu
Longitude: 157d-50m-41.63s	**Latitude:** 21d-28m-53.54s

Location: 0.04 Miles South of Waiahole Valley Road
Historic Name: Waiahole Stream (County)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1922	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1968	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1968.		

Bridge Information

Number of Spans: 2	**Max Span:** 32.2 ft.	**Total Length:** 65.9 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waiahole Stream (County) Bridge carries Kamehameha Highway across the Waiahole Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete solid panel parapets with flat casp and wide end posts. The two span reinforced concrete deck is supported by concrete abutments. A wood pedestrian walkway with wood horizontal railing was added to one side of the bridge in 1968. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

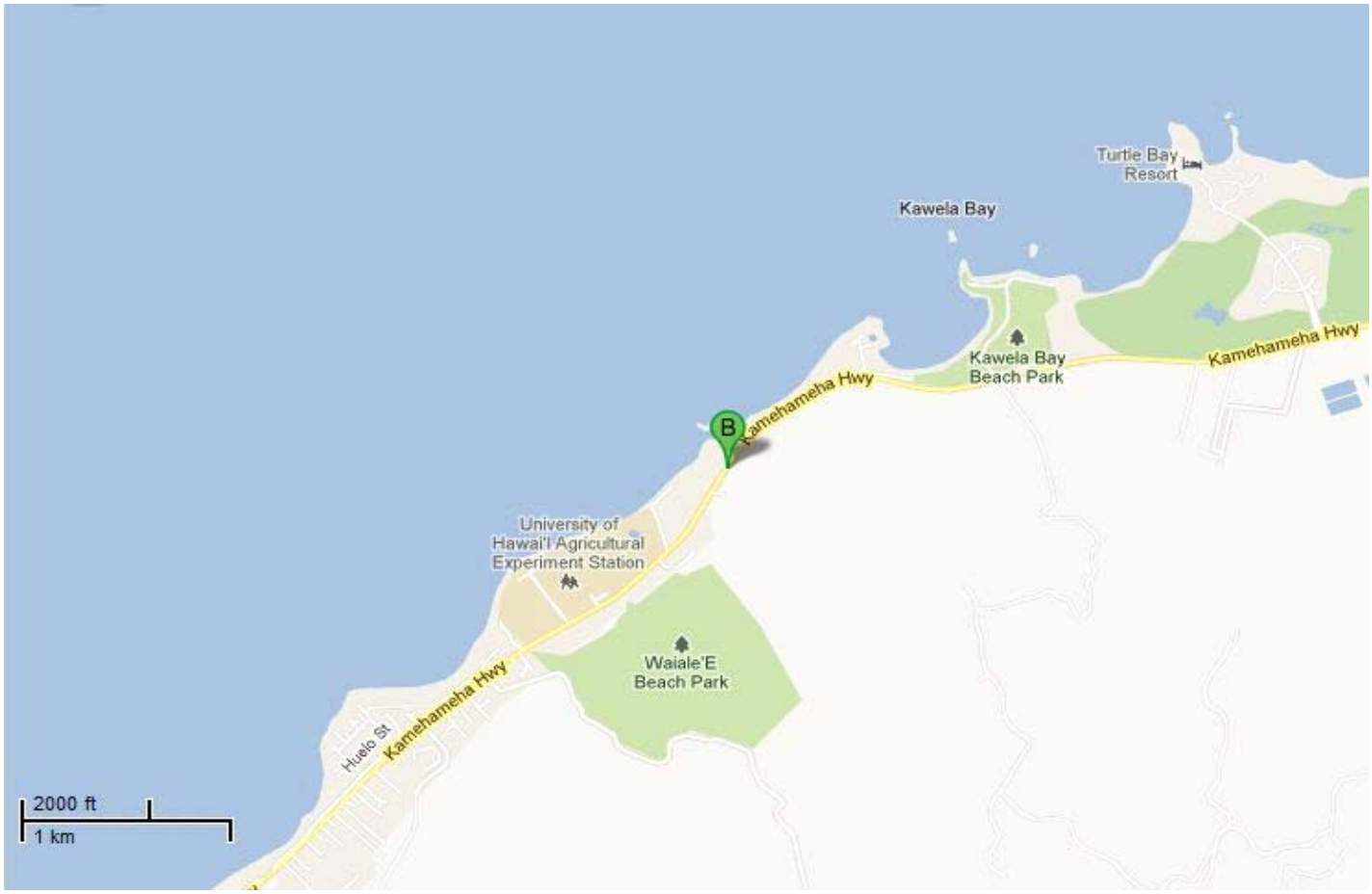
Inventory Form
(State)

General Information

Bridge Number: 003000830301059	**Route No:** 83
Popular Name: Waialee Stream	
Feature Crossed: Waialee Stream	
Feature Carried: Kamehameha Highway	
Milepost: 10.59 mi.	**Island:** Oahu
Longitude: 158d-01m-13.20s	**Latitude:** 21d-41m-28.48s

Location: 1.07 Miles Northeast of Kaunala Street
Historic Name: Waialee Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 32.2 ft.	**Total Length:** 35.6 ft.	**Deck Width:** 28.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waialee Stream Bridge carries Kamehameha Highway across the Waialee Stream. This concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open arch parapets with tapered caps and wide end posts with the name of the bridge and the year of construction engraved. The single span concrete deck is supported by concrete abutments. The parapet caps and end posts have been painted white. The new concrete parapets were extended to the end posts to secure the thrie beams, therefore the original workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

003000830301059 Waialee Stream

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

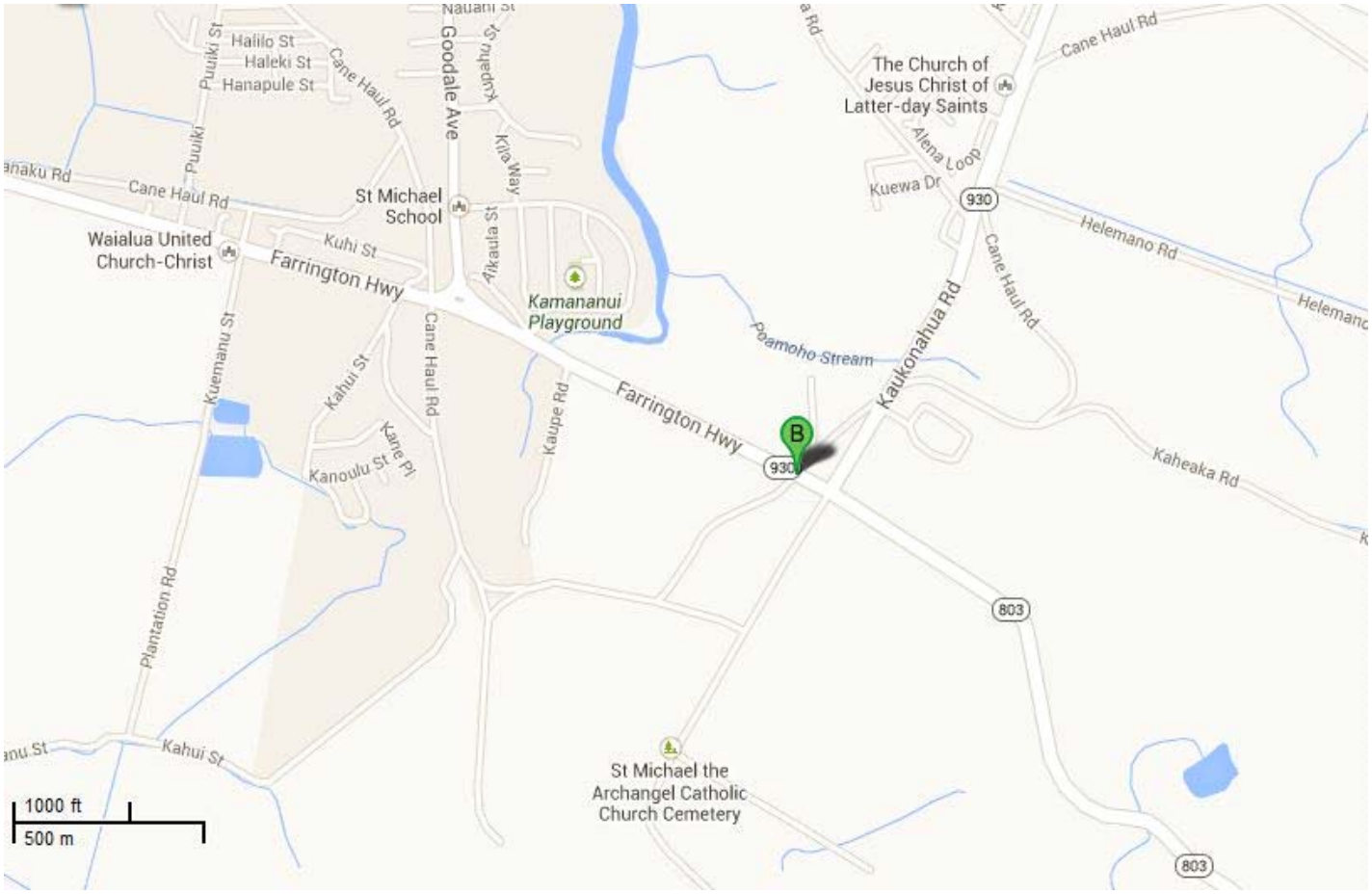
Inventory Form
(State)

General Information

Bridge Number: 003009300501794	**Route No:** 930
Popular Name: Waialua Plantation Road	
Feature Crossed: Farrington Highway	
Feature Carried: Plantation Road	
Milepost: 6.61 mi.	**Island:** Oahu
Longitude: 158d-06m-50.06s	**Latitude:** 21d-33m-44.65s

Location: 0.41 Miles East of Kaupe Road
Historic Name: Waialua Plantation Road
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1941	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 38.1 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Agriculture		

Narrative Description:

The Waialua Plantation Road Bridge carries Waialua Plantation Road across Farrington Highway. This reinforced concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets with thrie beams attached on the road side obscuring workmanship of the parapets. The concrete deck is supported by concrete abutments.

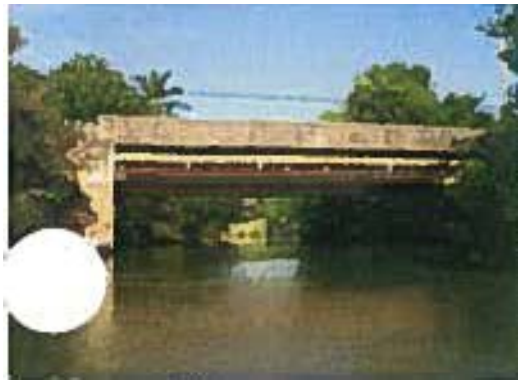
Significance Statement:

This bridge is eligible under Criterion A for its association with plantation industry in Hawaii. It is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

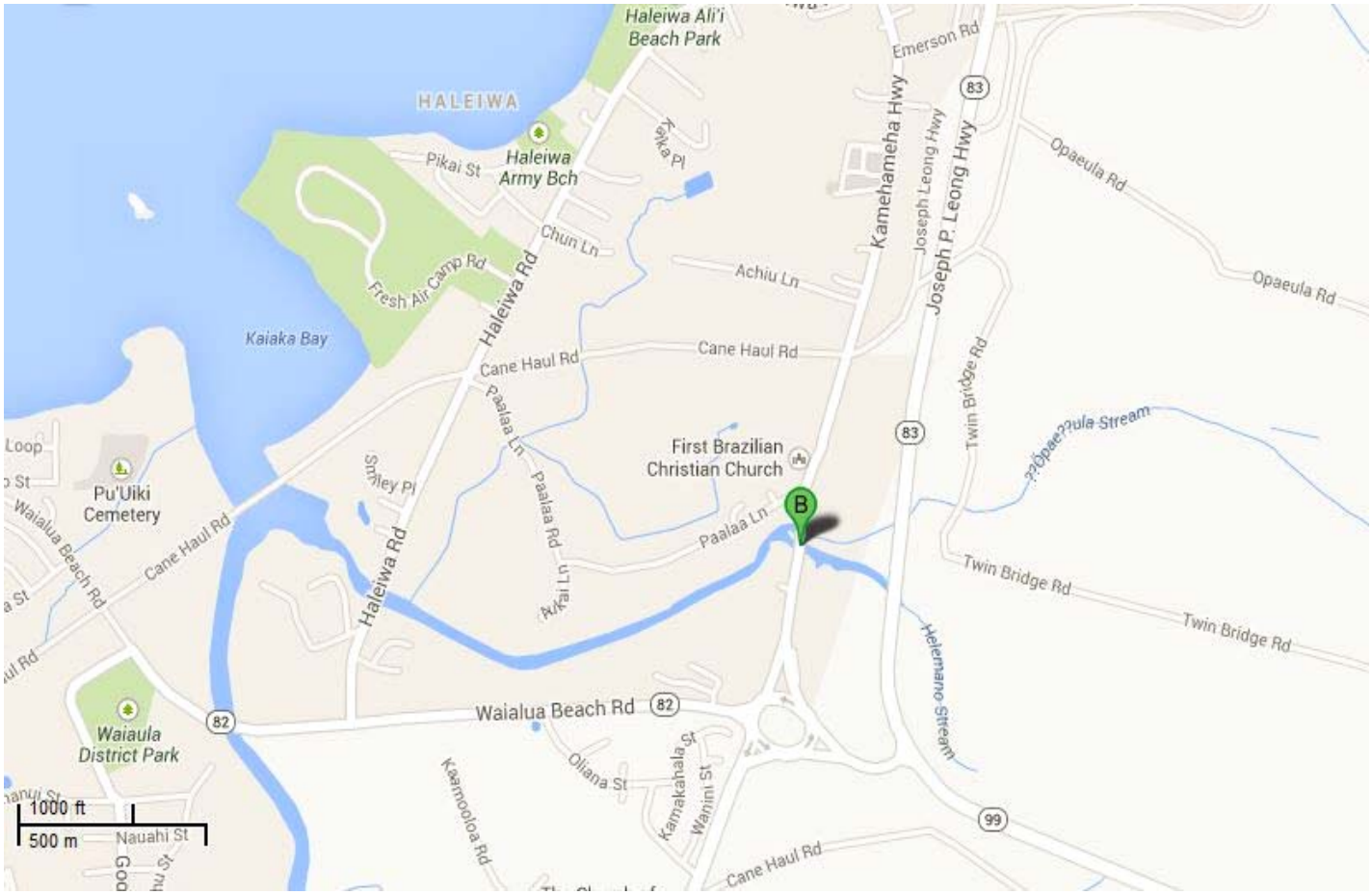
General Information

Bridge Number: 003000830300041	**Route No:** 83
Popular Name: Waialua Twin A (Helemano)	
Feature Crossed: Helemano Stream	
Feature Carried: Kamehameha Highway	
Milepost: 0.41 mi.	**Island:** Oahu
Longitude: 158d-06m-18.86s	**Latitude:** 21d-34m-47.41s



Location: 0.37 Miles North of Waialua Beach Road
Historic Name: Waialua Twin A (Helemano)
Designer/Engineer: U. S. Department of Agriculture, Bureau of Public Roads, San Francisco, CA
Builder/Contractor: John McCandless

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 30.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; sidewalks on both sides of roadway			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Waialua Twin Bridges were built in 1928 to carry Kamehameha Highway across the adjacent Helemano and Opaeula Streams. The bridges are located in the former plantation town of Haleiwa on the north shore of Oahu. The Waialua Twin Bridges are identical reinforced concrete deck girder structures.

The Waialua Twin Bridges remain in their original location. The bridges' setting has changed slightly due to commercial and residential development within the Haleiwa community, thus placing increased development pressure on the structures. A by-pass highway to accommodate additional traffic was completed by the State Department of Transportation in 1994. The bridges' original deck girder design and reinforced concrete materials remain intact. The workmanship of the bridges is good and has not been obscured by additions or repairs. The bridges' masonry (lava rock) abutments appear to be wider than the present bridge and probably date from an earlier wood truss bridge identified in an historic photograph as "Twin Bridges at Waialua." (1) The bridges' historic associations as important civic structures associated with the development of Haleiwa can be discerned by informed observers. The bridges retain their historic feeling due to their narrow width and solid, paneled reinforced concrete rail typical of 1920s bridges.

(1) Historic photograph: "Twin Bridges at Waialua, Aug. 26, '04," Hawaii State Archives (Honolulu), Album 43, 104.

Significance Statement:

The Waialua Twin Bridges are significant for their contributions to the fields of engineering and transportation in Hawaii. The bridges are a good example of reinforced concrete deck girder construction. The bridges are eligible under Criterion A for their associations with public works efforts by the Territorial government and as important civic structures associated with the development of Haleiwa. They are eligible under Criterion C as good representative examples of deck girder bridge construction in the late 1920s.

The bridges are located within the County-designated Haleiwa Special Design District and contribute significantly to the historic character of the town. The bridges were inadvertently involved in an important preservation battle for the nearby Anahulu Bridge, a rare remaining example of a “rainbow” or Marsh arch (through deck) bridge. The State Department of Transportation planned to replace the structure, however, concerned citizens rallied to preserve the picturesque bridge. The alternative plan preserved the historic bridge by by-passing it with a new highway and moderr four-lane bridge upstream. The Waialua Twin Bridges were also by-passed, thus relieving them from modern traffic pressures.

The bridges’ sixty foot clear spans make them good examples of late-period reinforced concrete deck girder technology. Their solid, paneled parapets are characteristic of the period. The plans were prepared by the U.S. Department of Agriculture’s Bureau of Public Roads in San Francisco, California. The bridges were constructed by local builder, John McCandless.

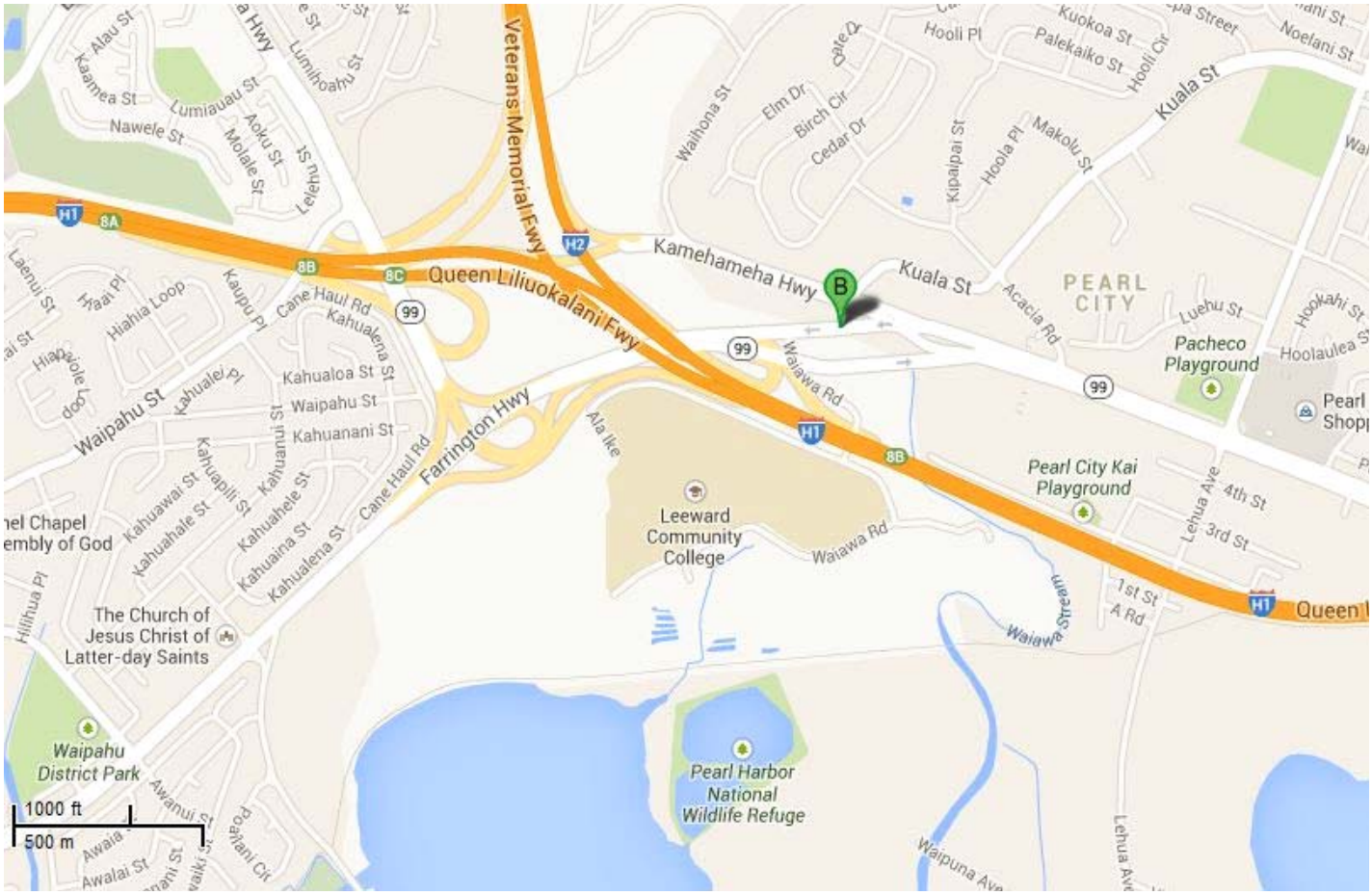
Inventory Form
(State)

General Information

Bridge Number: 003000990401802 **Route No:** 99	
Popular Name: Waiawa Stream (Westbound)	
Feature Crossed: Waiawa Stream	
Feature Carried: Farrington Highway	
Milepost: 18.02 mi. **Island:** Oahu	
Longitude: 157d-58m-48.35s **Latitude:** 21d-23m-47.06s	

Location: 0.12 Miles East of Leeward Community College Access Road
Historic Name: Waiawa Stream (Westbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 55.1 ft.	**Total Length:** 332.0 ft.	**Deck Width:** 33.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waiawa Stream (West Bound) Bridge carries Faarington Highway across the Waiawa Stream. This concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open arch parapets with tapered caps and curved wide end posts. Two end posts have the bridge name and the year of construction engraving. The concrete deck is supported by concrete abutments. The parapet caps and end posts have been painted white. Thrie beams were bolted to the end section of the bridge and some utility pipes were attached to the bottom of the bridge. The simple design of the parapet retains its historic feeling.

Significance Statement:

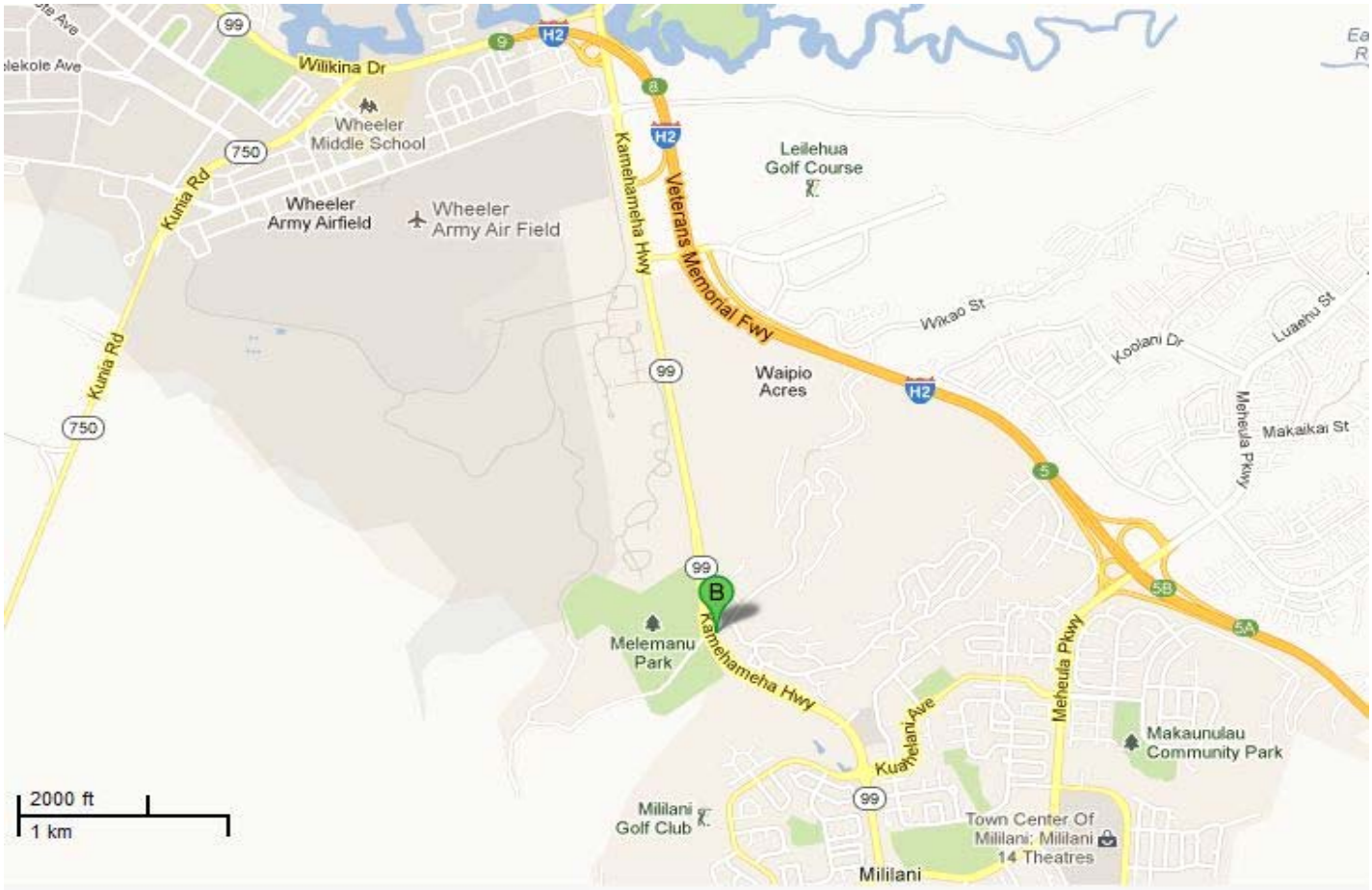
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000990301164 **Route No:** 99	
Popular Name: Waikakalaua Stream (Inbound)	
Feature Crossed: Waikakalaua Stream	
Feature Carried: Kamehameha Highway	
Milepost: 11.63 mi. **Island:** Oahu	
Longitude: 158d-01m-26.15s **Latitude:** 21d-27m-49.56s	
Location: 0.67 Miles South of Lehua Road	
Historic Name: Waikakalaua Stream (Inbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2007	
Alteration Type(s):		
Alteration Description(s): Thrie beams added to the bridge in 2007.		

Bridge Information

Number of Spans: 3	**Max Span:** 89.9 ft.	**Total Length:** 225.1 ft.	**Deck Width:** 38.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikakalaua Stream (Inbound) Bridge carries Kamehameha Highway across the Waikakalaua Stream. This concrete tee beam bridge is in its original location and in fair condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with flat caps and curved wide solid end posts. End posts consist of stepped profile. The concrete deck is supported by concrete piers and abutments. A pedestrian walkway with thrie beams was built along the inner side of the bridge in 2007.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

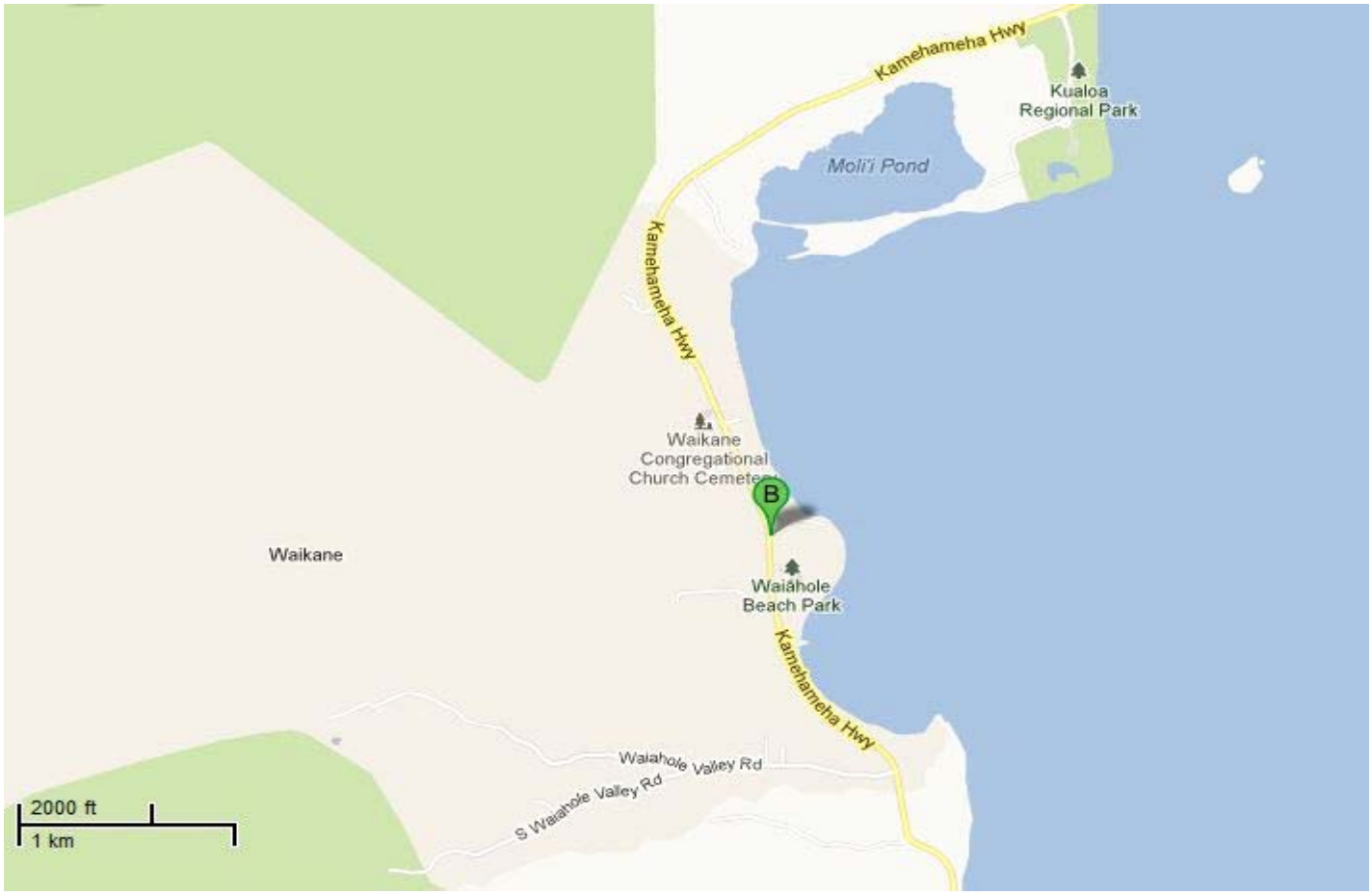
Inventory Form
(State)

General Information

Bridge Number: 003000830303377	**Route No:** 83
Popular Name: Waikane Stream	
Feature Crossed: Waikane Stream	
Feature Carried: Kamehameha Highway	
Milepost: 33.77 mi.	**Island:** Oahu
Longitude: 157d-51m-02.38s	**Latitude:** 21d-29m-30.01s

Location: 1.35 Miles South of Johnson Road
Historic Name: Waikane Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 42.0 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikane Stream Bridge carries Kamehameha Highway across the Waikane Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its material remain intact. The bridge has concrete solid panel parapets with flat cap and end posts with the bridge name engraved. The single span reinforced concrete tee beam deck is supported by the concrete abutments. Wood pedestrian walkway with metal horizontal railing was added to one side of the bridge. The new concrete solid panel parapet with panel is extended to the end posts to secure the thrie beams approaches, therefore the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

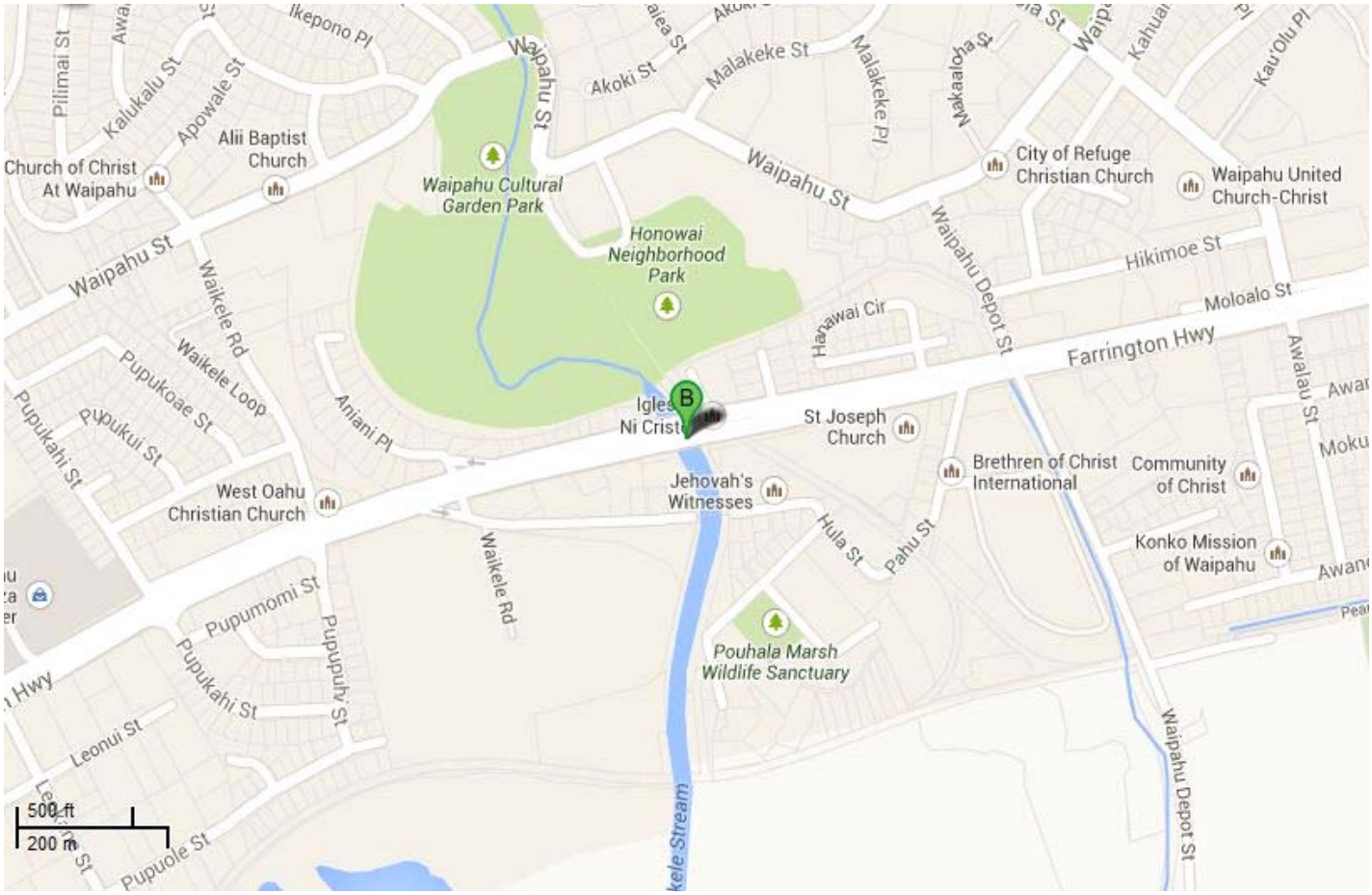
Inventory Form
(State)

General Information

Bridge Number: 003090001400108	**Route No:** 7101
Popular Name: Waikele Canal (Inbound)	
Feature Crossed: Waikele Canal	
Feature Carried: Farrington Highway	
Milepost: 1.12 mi.	**Island:** Oahu
Longitude: 158d-00m-38.21s	**Latitude:** 21d-22m-57.94s

Location: 0.22 Miles East of Waikele Road
Historic Name: Waikele Canal (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 49.9 ft.	**Total Length:** 129.9 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Social History, Transportation, Commerce, Engineering		

Narrative Description:

The Waikele Canal (Inbound) Bridge carries Farrington Highway across the Waikele Stream. This tall concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid end posts. The concrete deck is supported by concrete piers and concrete abutments. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

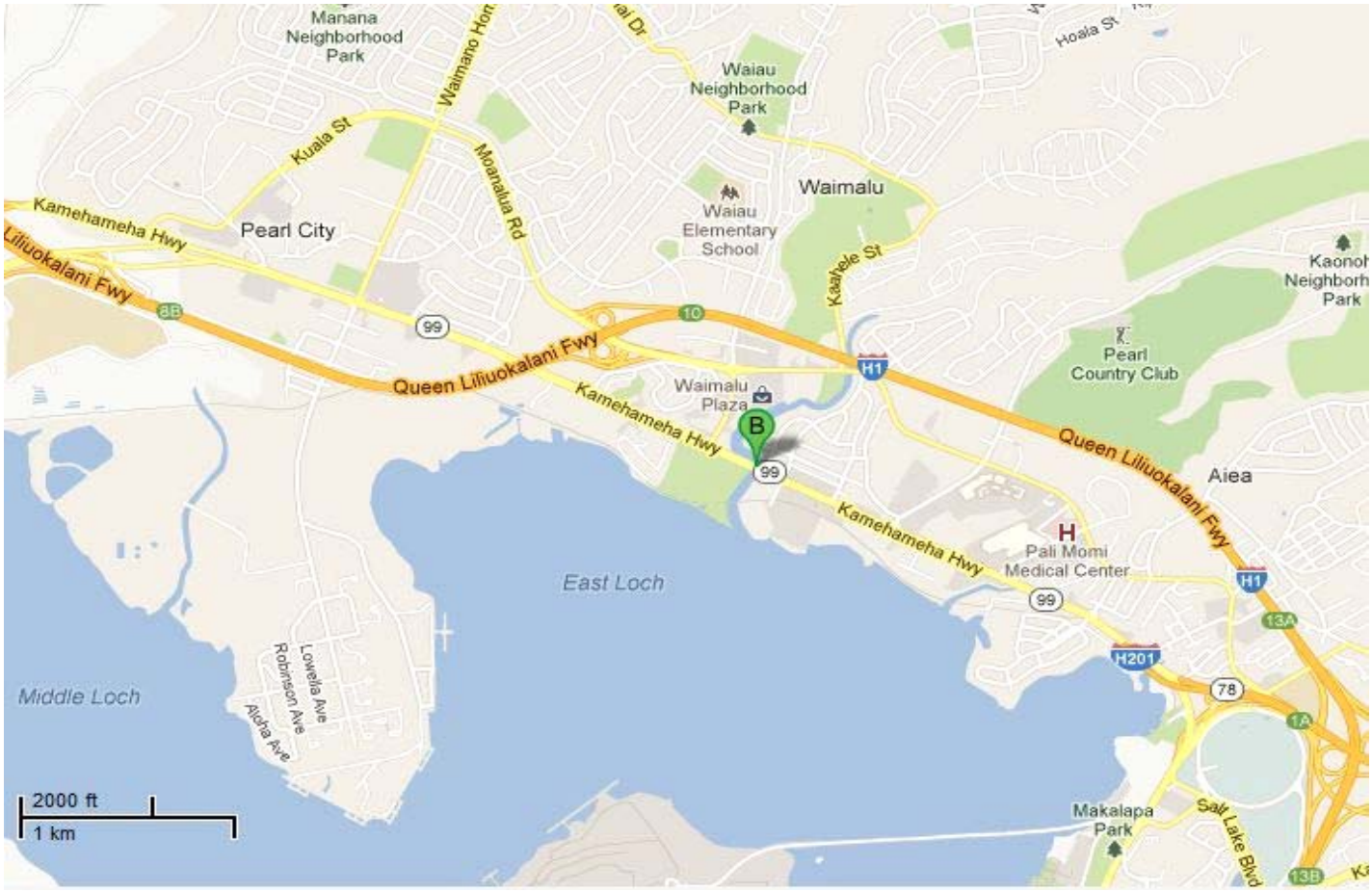
This bridge is eligible under Criterion A for its association with the plantation industry. It is the last major reaccommodation bridge built by the FHWA for the railroad before it went out of business. It is also eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. The bridge is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000990401986 **Route No:** 99	
Popular Name: Waimalu Stream (Eastbound)	
Feature Crossed: Waimalu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 19.86 mi. **Island:** Oahu	
Longitude: 157d-57m-08.44s **Latitude:** 21d-23m-10.03s	
Location: 0.13 Miles East of Kaahumanu Street	
Historic Name: Waimalu Stream (Eastbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1966	
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 3	**Max Span:** 47.9 ft.	**Total Length:** 145.0 ft.	**Deck Width:** 48.2 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Waimalu Stream (East Bound) Bridge carries Kamehameha Highway across Waimalu Stream. This concrete girder bridge, in its original location, is in generally good condition, and its materials remain intact. The bridge has a concrete open Greek cross parapet with stepped caps and curved wide end posts on one side. The other side of the parapet has been replaced with a concrete and metal parapet due to bridge widening in 1966.

Significance Statement:

This bridge is eligible under Criterion A for its association with post-war developments of the community.

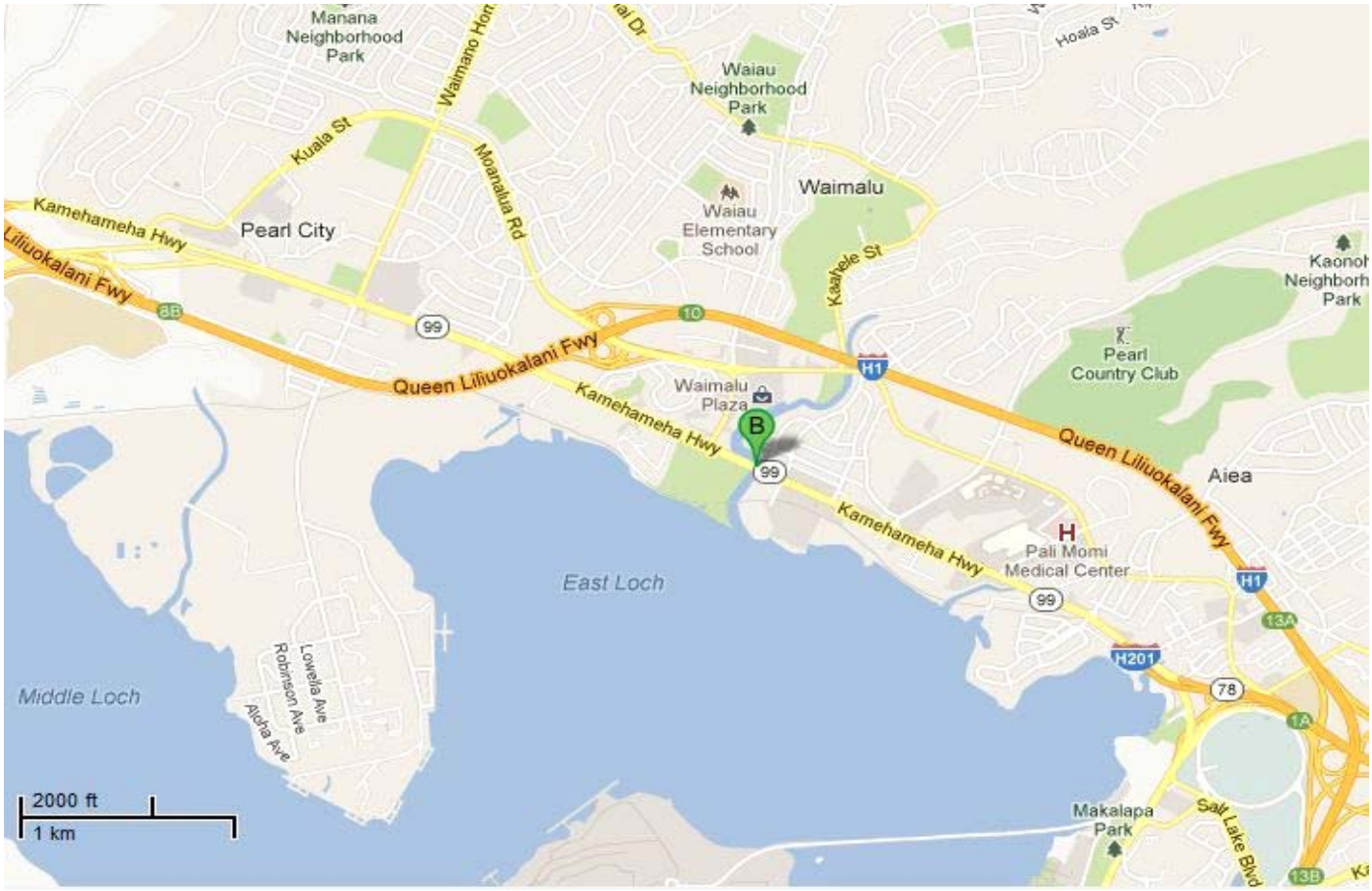
Inventory Form
(State)

General Information

Bridge Number: 003000990401987	**Route No:** 99
Popular Name: Waimalu Stream (Westbound)	
Feature Crossed: Waimalu Stream	
Feature Carried: Kamehameha Highway	
Milepost: 19.87 mi.	**Island:** Oahu
Longitude: 157d-57m-08.19s	**Latitude:** 21d-23m-10.56s

Location: 0.13 Miles East of Kaahumanu Street
Historic Name: Waimalu Stream (Westbound)
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1945	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1966	
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 3	**Max Span:** 47.9 ft.	**Total Length:** 143.0 ft.	**Deck Width:** 46.3 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Community Development		

Narrative Description:

The Waimalu Stream (West Bound) Bridge carries Kamehameha Highway across Waimalu Stream. This concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has a concrete open Greek cross parapet with stepped caps and curved wide end posts on one side with thrie beams bolted to the end posts. The other parapet was replaced with concrete and metal due to bridge widening in 1966.

Significance Statement:

This bridge is eligible under Criterion A for its association with post-war developments of the community.

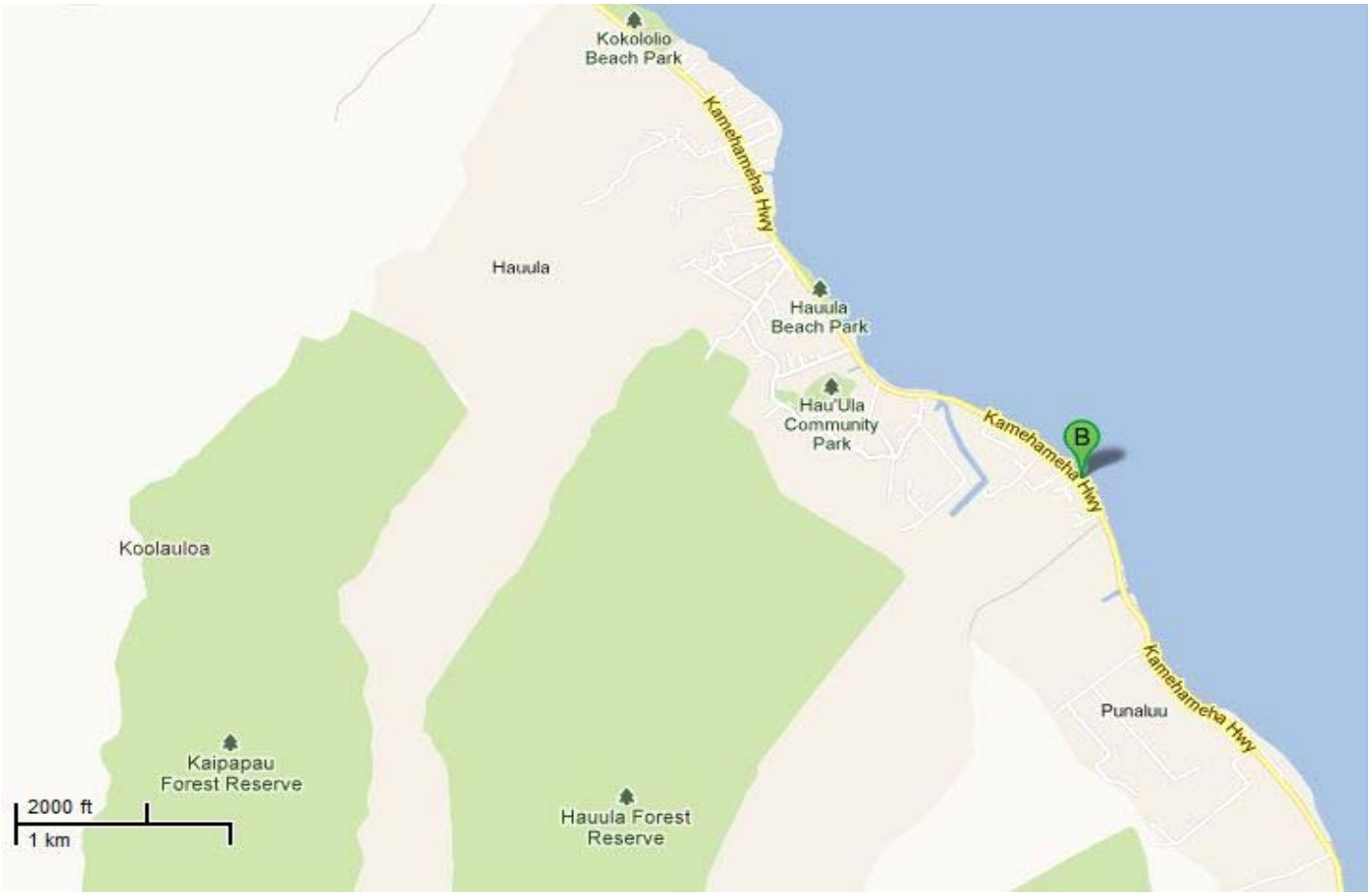
Inventory Form
(State)

General Information

Bridge Number: 003000830302242	**Route No:** 83
Popular Name: Waimanana Stream	
Feature Crossed: Waimanana Stream	
Feature Carried: Kamehameha Highway	
Milepost: 22.42 mi.	**Island:** Oahu
Longitude: 157d-53m-56.94s	**Latitude:** 21d-36m-11.83s

Location: 0.02 Miles Southeast of Pokiwai Place
Historic Name: Waimanana Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1926	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1990	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1990.		

Bridge Information

Number of Spans: 4	**Max Span:** 18.0 ft.	**Total Length:** 71.9 ft.	**Deck Width:** 26.2 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waimanana Stream Bridge carries Kamehameha Highway across the Waimanana Stream. This concrete slab bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps and end posts. The reinforced concrete slab deck is supported by concrete abutments. Only the flat parapet caps have been painted white. A wood pedestrian walkway with wood horizontal railing was added to the upstream side of the bridge in 1990. Thrie beams were bolted to the end posts but the simple design of the parapet retains its historic feeling.

003000830302242 Waimanana Stream

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 003000830300573	**Route No:** 83
Popular Name: Waimea Stream	
Feature Crossed: Waimea Stream	
Feature Carried: Kamehameha Highway	
Milepost: 5.73 mi.	**Island:** Oahu
Longitude: 158d-03m-38.72s	**Latitude:** 21d-38m-21.35s
Location: 0.04 Miles Northeast of Waimea Beach Park Road	
Historic Name: Waimea Stream	
Designer/Engineer: U. S. Department of Agriculture, Bureau of Public Roads, San Francisco, CA	
Builder/Contractor: John L. Young (National Construction Company)	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 51.8 ft.	**Total Length:** 268.0 ft.	**Deck Width:** 27.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Waimea Bridge was built in 1930 to carry Kamehameha Highway across the mouth of the Waimea River on the north shore of Oahu. The bridge is a reinforced concrete tee beam structure. It was constructed as part of a larger contract including one large bridge (Waimea), three smaller bridges, two culverts and five miles of roadway.

The Waimea Bridge remains in its original location. The bridge's rural setting has not changed significantly, however the circum-island rail line no longer runs adjacent to the bridge (only the foundations of the wood trestle structure remain). Remnants of the masonry (lava rock) abutments of an earlier multi-span metal truss are evident upstream. The bridge's original tee beam design and reinforced concrete materials remain intact. The workmanship of the bridge is good and has not been obscured by additions or repairs. The bridge's historic associations, as an important transportation link in the island's belt road system, can be discerned by informed observers. The bridge retains its historic feeling due to its narrow width and solid, paneled reinforced concrete rail typical of 1920s bridges.

Significance Statement:

The Waimea Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with public works efforts by the Territorial government and as an important link in the island's belt road system. It is eligible under Criterion C as a good representative example of tee beam bridge construction in the late 1920s.

The Waimea Bridge was constructed in the general upgrading of the belt road around Oahu to service the sugar lands on the North Shore. It was part of a larger contract that included including the Waimea bridge, three smaller bridges (perhaps the Paumalu, Kaunala and Kawailoa bridges), two culverts and five miles of roadway. The bridges and roadway contributed to the economic development of the region by providing reliable vehicular access, and an alternative to rail, between the north shore and Honolulu.

The bridge is located over the Waimea River which drains into Waimea Bay and is adjacent to the entrance of the Waimea Falls Park, a Hawaiian historical interpretive center on Oahu's north shore. The bridge contributes significantly to the historic character of the area.

The bridge's fifty-two foot clear span makes it a good example of reinforced concrete tee beam technology. The solid, paneled parapets are characteristic of the period. The plans were prepared by the U.S. Department of Agriculture's Bureau of Public Roads in San Francisco, California. The contract for the bridge was awarded to John L. Young, owner of the National Construction Company, who filed for bankruptcy during its construction. The Territory of Hawaii hired a construction superintendent to complete the bridge.

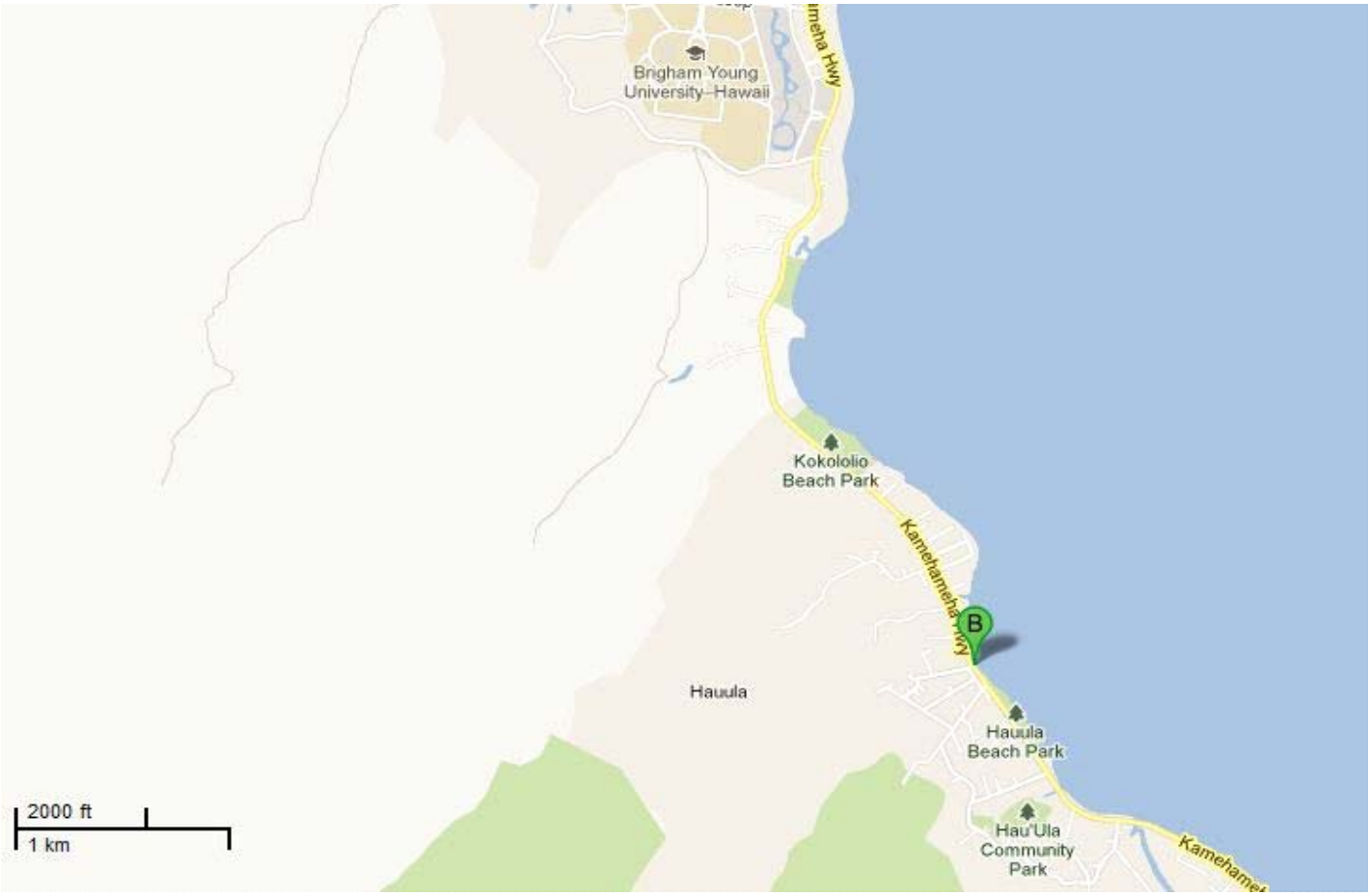
Inventory Form
(State)

General Information

Bridge Number: 003000830302112	**Route No:** 83
Popular Name: Waipilopilo Stream	
Feature Crossed: Waipilopilo Stream	
Feature Carried: Kamehameha Highway	
Milepost: 21.12 mi.	**Island:** Oahu
Longitude: 157d-54m-47.51s	**Latitude:** 21d-36m-53.74s

Location: 0.03 Miles Southeast of Imua Place
Historic Name: Waipilopilo Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1964	
Alteration Type(s):		
Alteration Description(s): Wood pedestrian bridge added in 1964.		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 24.9 ft.	**Deck Width:** 27.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waipilopilo Stream Bridge carries Kamehameha Highway across the Waipilopilo Stream. This concrete tee beam bridge is in its original location and in fair condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps and curved wide end posts. The single span concrete deck is supported by concrete abutments. The parapet cap and end posts panels have been painted white. A wood pedestrian walkway with wood horizontal railings was added to one side of the bridge in 1964. Thrie beams were bolted to the end posts. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

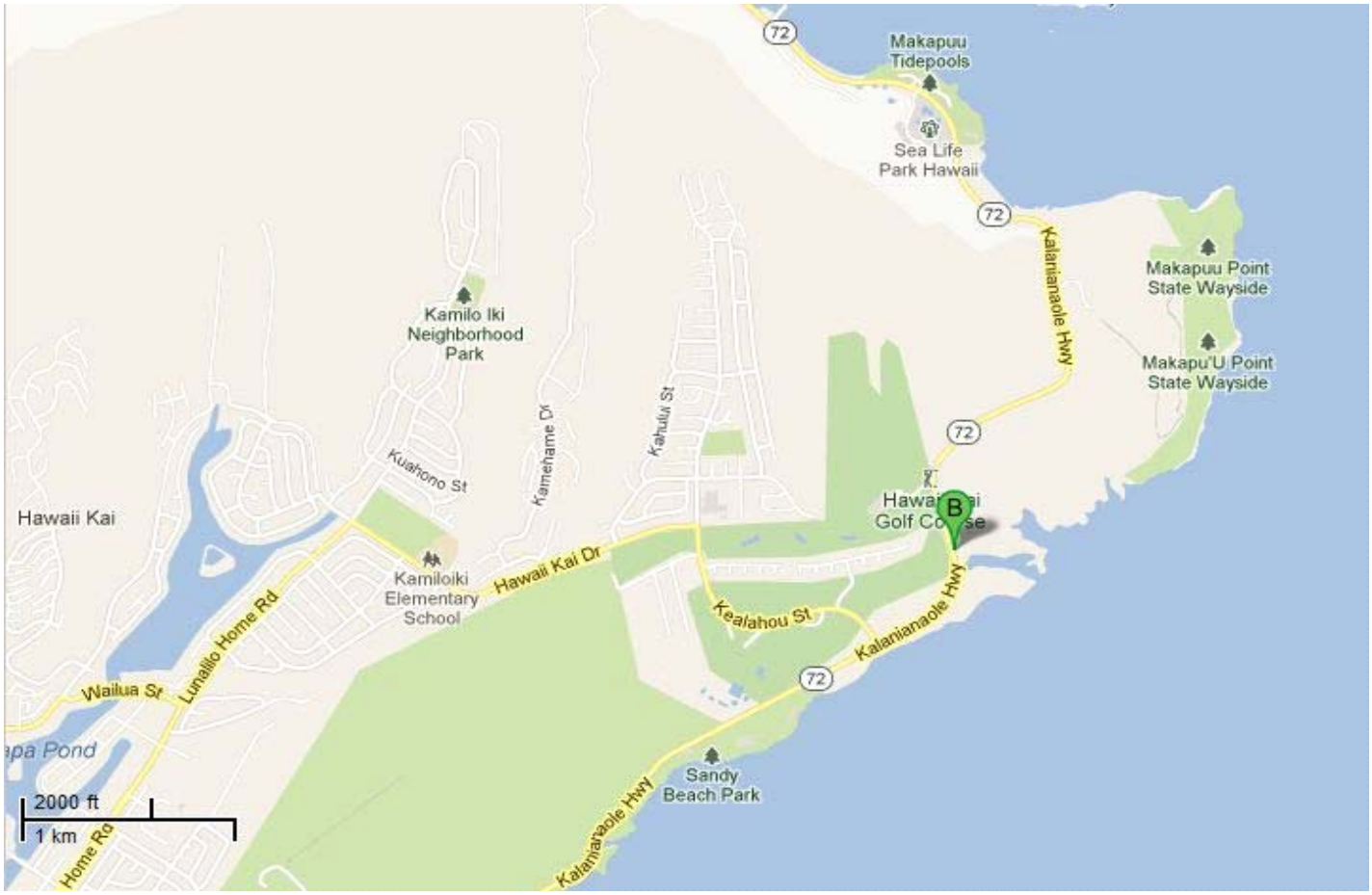
Inventory Form
(State)

General Information

Bridge Number: 003074001400083	**Route No:** 72
Popular Name: Wawamalu Stream	
Feature Crossed: Wawamalu Stream	
Feature Carried: Kalanianaole Highway	
Milepost: 9.75 mi.	**Island:** Oahu
Longitude: 157d-39m-41.96s	**Latitude:** 21d-17m-37.36s

Location: 0.96 Miles South of Makapuu Lighthouse Road
Historic Name: Wawamalu Stream
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1947	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 69.9 ft.	**Deck Width:** 44.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features: Name and date incised			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Wawamalu Stream Bridge was constructed in 1947 to carry a re-aligned Kalanianaole Highway over Wawamalu Canal on the East Shore of Oahu. It is a single-span continuous concrete tee beam structure that runs parallel to the original Wawamalu Bridge built in 1931. The guard railings are composed of three horizontal steel rails with vertical steel posts. The bridge remains in its original, undeveloped setting near the Hawaii Kai Golf Course on the East Oahu coastline. The workmanship of the bridge is good, and has not been obscured by additions or repairs. The original concrete tee beam design and materials remain intact. The bridge's historic association as the work of a master is not easily discernible, but the date of construction is incised on the end pier. This bridge has little historic feeling, because it runs parallel to the older, unused, bridge which is obviously historic.

Significance Statement:

The Wawamalu Stream Bridge is eligible under criterion C- because it was the work of a master. It is the work of a person of significance - William R. Bartels, Chief Engineer for the Territorial Highways Department, who was responsible for all major territorial bridge projects from 1932- 1956. Bartels was considered a “cracker-jack” engineer who enjoyed the challenge of difficult assignments and his work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges show refined aesthetic sensibility which makes them distinctive from work of other engineers. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. He designed most Territorial bridges from then until 1957. Bartels was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time and there was a marked shift to large deck girder and rigid frame bridges. (1) (2) He ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard retirement age but he was kept on by special permission and out of necessity because his abilities were so great. Bridges designed by Bartels have often been hailed for their accomplishment of engineering as well as aesthetics.

The Wawamalu Stream Bridge is a typical example of the work by Bartels and is similar to the other stream bridges of the era.

(1) 1996 Report by Spencer Mason Architects, V-6.

(2) 1996 Report by Spencer Mason Architects, V-13.

(3) www.hookele.com/crc/bridge1.html

Inventory Form
(State)

General Information

Bridge Number: 003000630400576 **Route No:** 63	
Popular Name: Wilson Tunnel (Inbound)	
Feature Crossed: Mountain (Wilson Tunnel - Inbound)	
Feature Carried: Likelike Highway	
Milepost: 5.76 mi. **Island:** Oahu	
Longitude: 157d-48m-43.24s **Latitude:** 21d-22m-46.91s	

Location: 2.82 Miles Northeast of Valley View Drive
Historic Name: Wilson Tunnel (Inbound)
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1958	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.9 ft.	**Total Length:** 2774.9 ft.	**Deck Width:** 27.9 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: Concrete Deck			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Persons, Engineering		

Narrative Description:

The Wilson Tunnel (Inbound) carries Likelike Highway through the Koolau Mountain Range. This 42 module tunnel is in its original location, is generally in good condition, and its materials remain intact. The tunnel has tile on the interior walls.

Significance Statement:

The Wilson Tunnel is eligible under Criterion C for its association with providing convenient transportation and communication between the Windward and Leeward sides of the island through the Koolau Mountain Range, and for being a major engineering feat. It was officially named “John H. Wilson Tunnel” in 1953 after Johnny Wilson, the 1964 mayor of Honolulu who was an advocate for the tunnel to be located on the Kalihi Valley route. The Wilson Tunnel is also eligible under Criterion A for its association with Johnny Wilson. The project for the Wilson Tunnel began in 1952. Tunnel construction halted in 1954 to 1955 after a cave-in that caused the death of five people. The project continued in 1956 and was completed by 1957. The completion of the John H. Wilson Tunnel (and the Pali Tunnel) relieved traffic on the old Pali Road.

Inventory Form
(State)

General Information

Bridge Number: 003000630400575 **Route No:** 63	
Popular Name: Wilson Tunnel (Outbound)	
Feature Crossed: Mountain (Wilson Tunnel - Outbound)	
Feature Carried: Likelike Highway	
Milepost: 5.75 mi. **Island:** Oahu	
Longitude: 157d-49m-07.03s **Latitude:** 21d-22m-31.91s	
Location: 2.82 Miles Northeast of Valley View Drive	
Historic Name: Wilson Tunnel (Outbound)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 2813.0 ft.	**Deck Width:** 27.9 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: Concrete Deck			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Tunnel	**Historic Function:** Tunnel	
Area of Significance: Persons, Engineering		

Narrative Description:

The Wilson Tunnel (Outbound) carries Likelike Highway through the Koolau Mountain Range. This 42 module tunnel is in its original location, is generally in good condition, and its materials remain intact. The tunnel has tile on the interior walls.

Significance Statement:

The Wilson Tunnel is eligible under Criterion C for its association with providing convenient transportation and communication between the Windward and Leeward sides of the island through the Koolau Mountain Range, and for being a major engineering feat. It was officially named “John H. Wilson Tunnel” in 1953 after Johnny Wilson, the 1964 mayor of Honolulu who was an advocate for the tunnel to be located on the Kalihi Valley route. The Wilson Tunnel is also eligible under Criterion A for its association with Johnny Wilson. The project for the Wilson Tunnel began in 1952. Tunnel construction halted in 1954 to 1955 after a cave-in that caused the death of five people. The project continued in 1956 and was completed by 1957. The completion of the John H. Wilson Tunnel (and the Pali Tunnel) relieved traffic on the old Pali Road.

V. INVENTORY FORMS:
OAHU COUNTY ELIGIBLE BRIDGES

Inventory Form
(County/Private)

General Information

Bridge Number: 003364001200001

Popular Name: 10th Avenue Double Box Culvert-Waiomao Stream

Feature Crossed: Waiomao Stream

Feature Carried: 10th Avenue

Milepost: **County Private:** Honolulu

Longitude: 157d-47m-24.61s **Latitude:** 21d-18m-04.64s

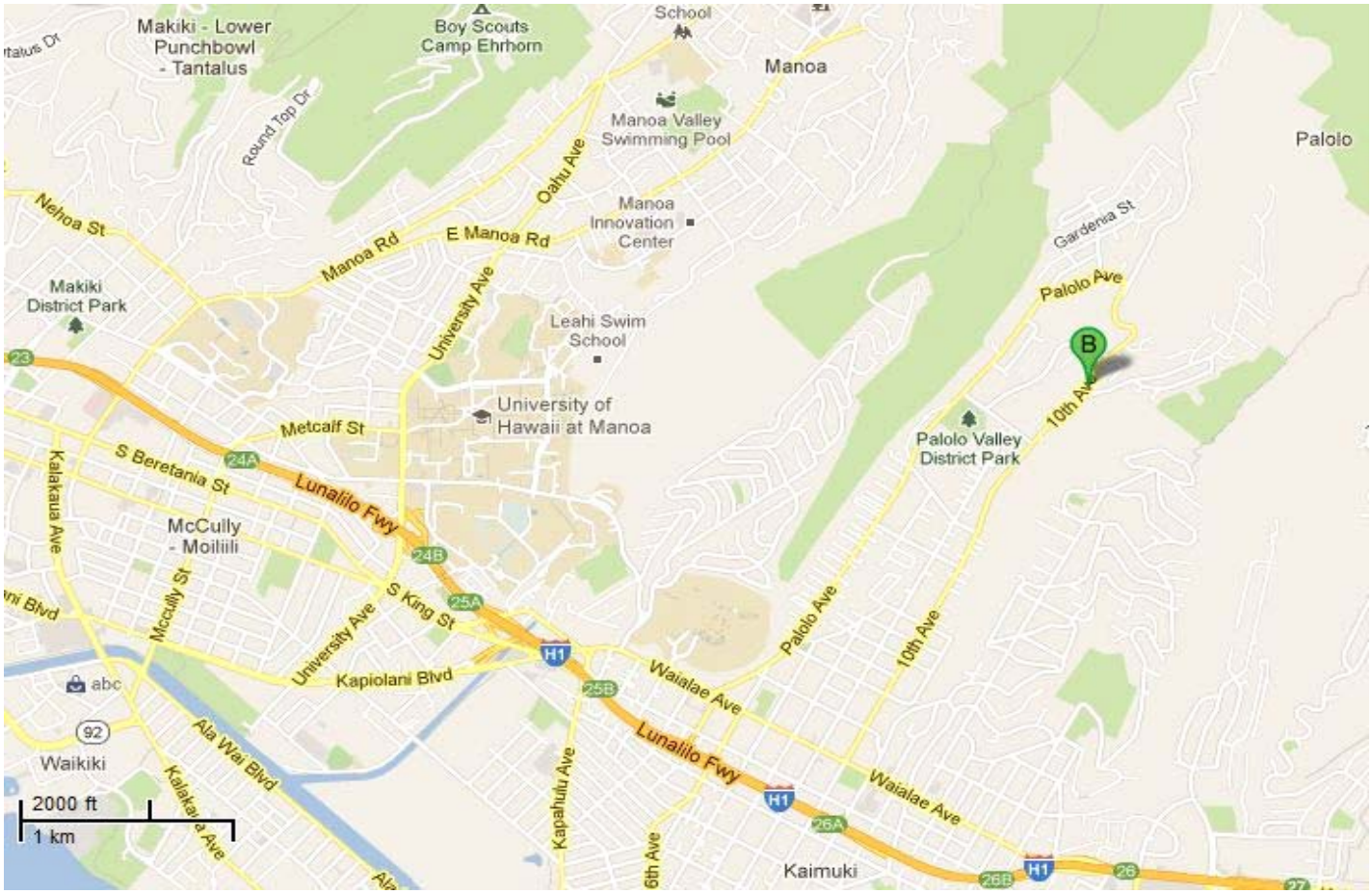
Location: TMK: 3-4-03

Historic Name: 10th Avenue Double Box Culvert-Waiomao Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Box Culvert	**Construction Date:** 1962	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 10.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 48.3 ft.
Superstructure:			
Substructure: Concrete Box Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The 10th Avenue/Waioamo Stream Culvert carries 10th Avenue across Waiomao Stream. This double 10’ x 10’ box culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has metal round pipe railings with chain link fencing. The deck is earth fill on reinforced concrete box culvert. Concrete abutments support the box culvert above a channeled stream with concrete rock masonry walls. Concrete rock masonry detailing is shown on the side of the bridge. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a unique example of a box culvert in the 1960s in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003382001200001

Popular Name: 10th Avenue Place Bridge-Waiomao Stream

Feature Crossed: Waiomao Stream

Feature Carried: 10th Avenue Place

Milepost: **County Private:** Honolulu

Longitude: 157d-47m-19.31s **Latitude:** 21d-18m-07.87s

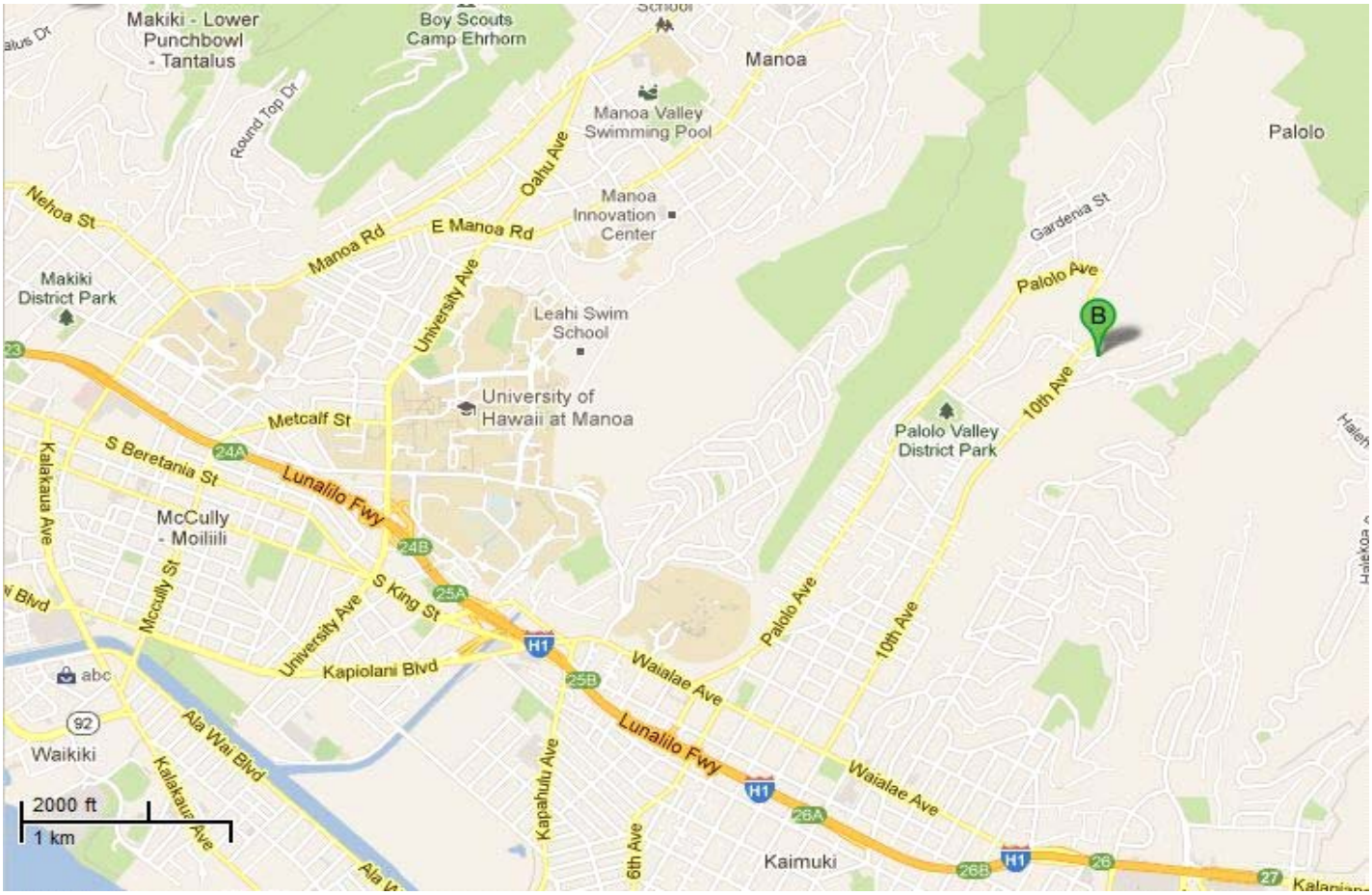
Location: TMK: 3-4-03

Historic Name: 10th Avenue Place Bridge-Waiomao Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 27.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The 10th Avenue Place Bridge carries 10th Avenue across Waiomao Stream. This single-span reinforced concrete bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has concrete parapets with arched voids and caps. Paneled concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by rock masonry abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003406001100001

Popular Name: Auloa Road Bridge No. 1-Kahanaiki Stream

Feature Crossed: Kahanaiki Stream

Feature Carried: Auloa Road

Milepost: 0.80 mi. **County Private:** Honolulu

Longitude: 157d-46m-02.41s **Latitude:** 21d-22m-25.42s

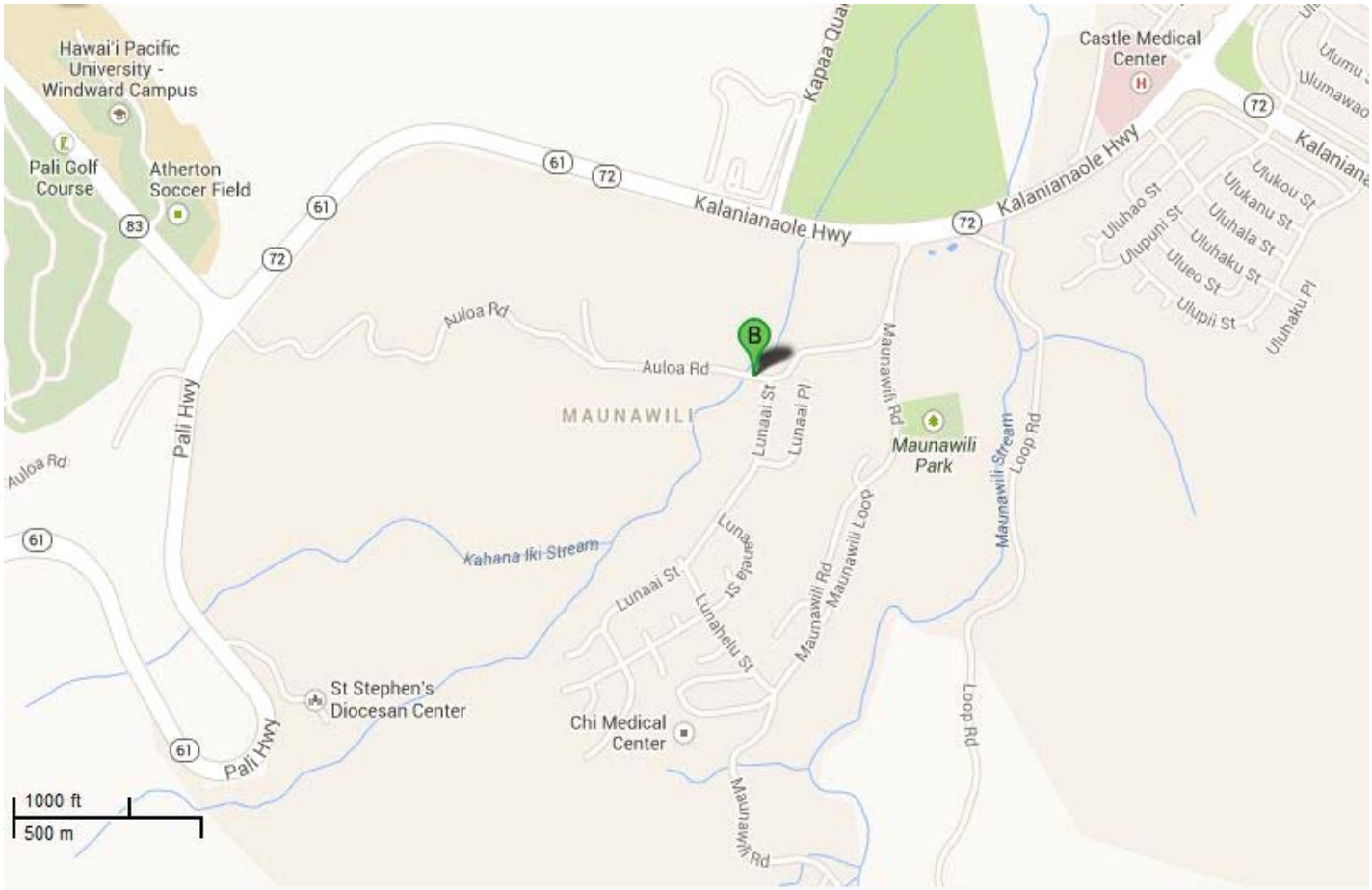
Location: TMK: 4-2-07

Historic Name: Auloa Road Bridge No. 1-Kahanaiki Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1921	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 26.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Auloa Road/Kahanaiki Stream Bridge carries Auloa Road across Kahanaiki Stream. This single-span reinforced concrete bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has solid panel concrete parapets with intermittent posts and caps. Concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by reinforced concrete abutments. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design.

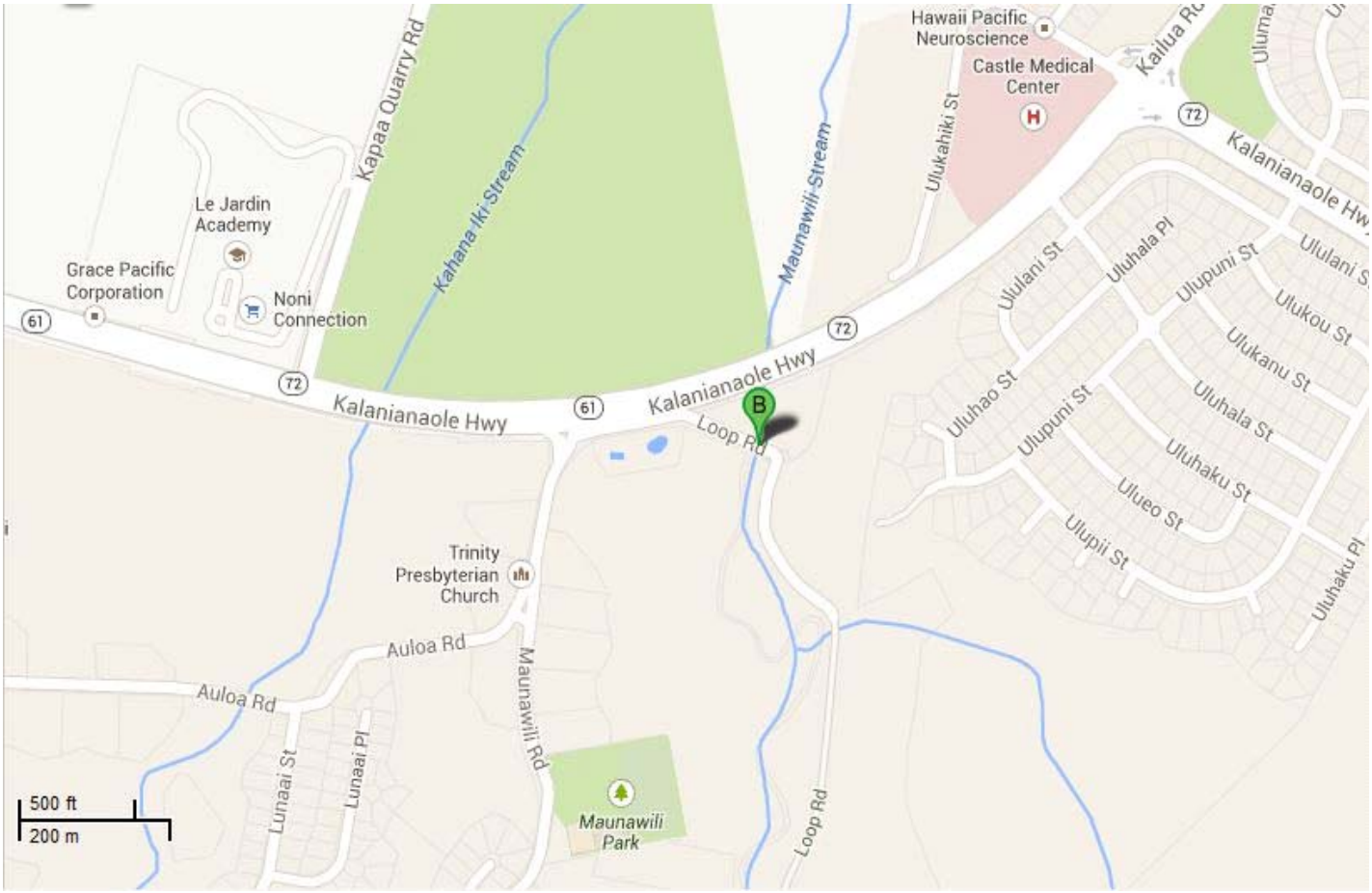
Inventory Form
(County/Private)

General Information

Bridge Number: 003407001100001	
Popular Name: Auloa Road Bridge No. 2-Maunawili Stream	
Feature Crossed: Maunawili Stream	
Feature Carried: Auloa Road	
Milepost:	**County Private:** Honolulu
Longitude: 157d-45m-39.49s	**Latitude:** 21d-22m-35.96s

Location: TMK: 4-2-07
Historic Name: Auloa Road Bridge No. 2-Maunawili Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1921	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 18.0 ft.	**Total Length:** 108.0 ft.	**Deck Width:** 26.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Auloa Road/Maunawili Stream Bridge carries Auloa Road across Maunawili Stream. This single-span reinforced concrete bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has solid panel concrete parapets with caps and slight intermittent posts. Small concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by reinforced concrete abutments. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083041400055

Popular Name: Date Street Bridge-Manoa Palolo Drainage Canal

Feature Crossed: Manoa-Palolo Stream

Feature Carried: Date Street

Milepost: 0.55 mi. **County Private:** Honolulu

Longitude: 157d-49m-13.80s **Latitude:** 21d-17m-05.29s

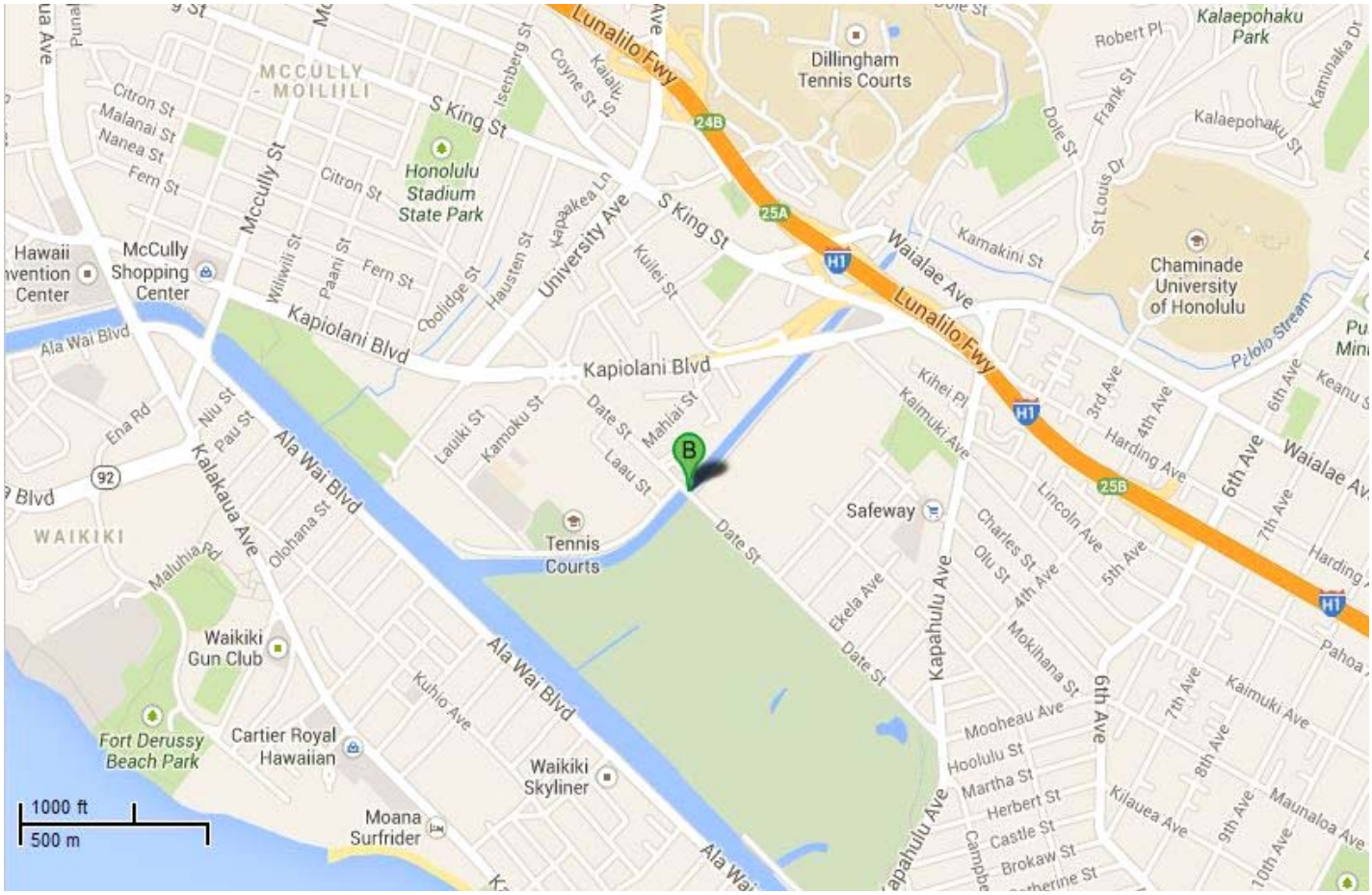
Location: East of Laau Street

Historic Name: Date Street Bridge-Manoa Palolo Drainage Canal

Designer/Engineer: Clarence T. Loo

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 56.1 ft.	**Total Length:** 113.8 ft.	**Deck Width:** 57.1 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Decorative			
Setting:			
Other Features: Walkways along two sides; "WPA" and date of construction incised on parapets			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Manoa Palolo Stream Bridge carries Date Street across the Manoa-Palolo Drainage Canal. This 3-span reinforced concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. Solid concrete parapets with horizontal caps, intermittent posts at the piers, and decorative Art Moderne end posts are unique features of the bridge. The concrete deck is supported by concrete piers and concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

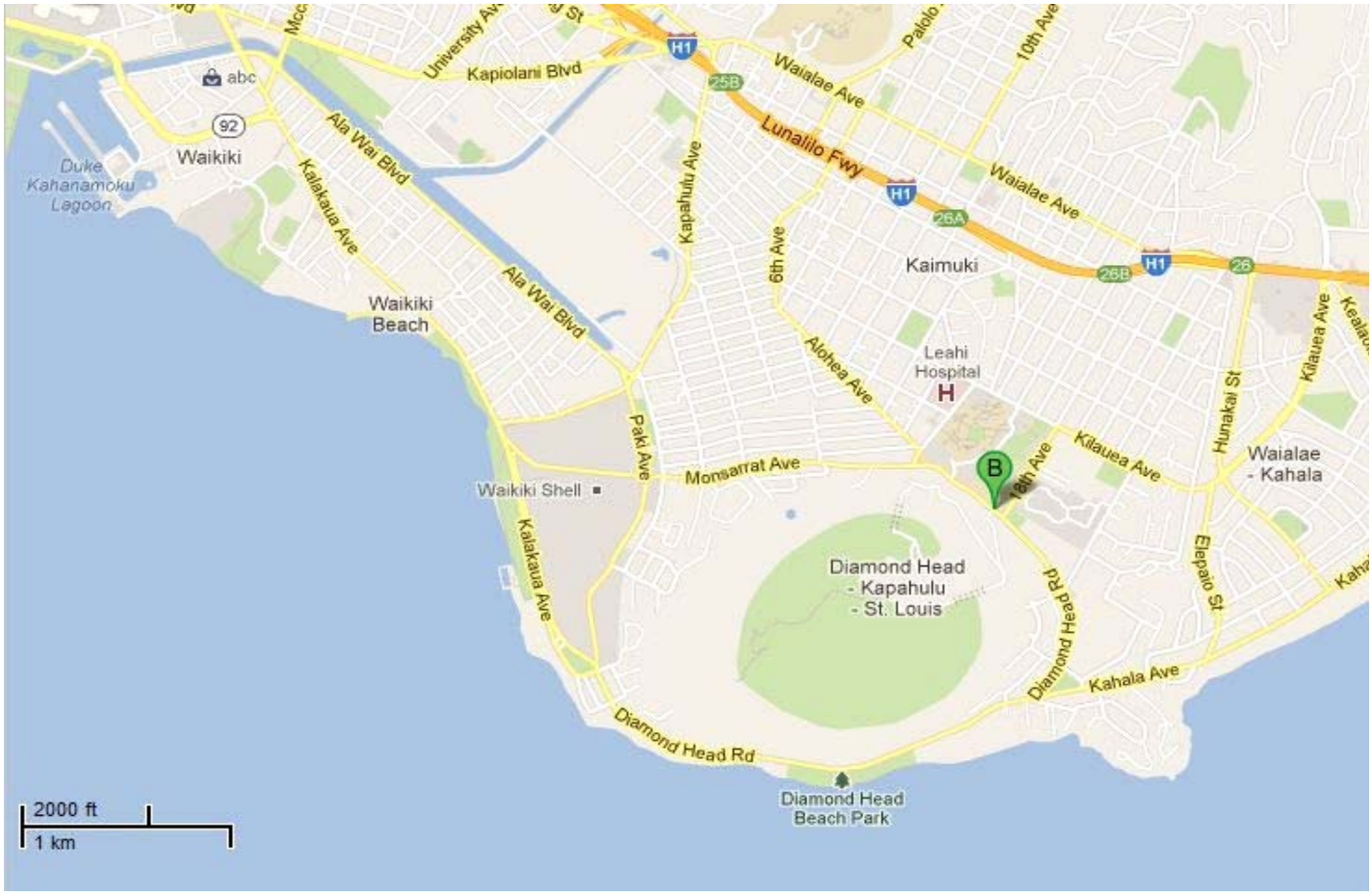
Inventory Form
(County/Private)

General Information

Bridge Number: 003083051400001	
Popular Name: Diamond Head Road Bridge Upper-Gully	
Feature Crossed: Gully (Diamond Head)	
Feature Carried: Diamond Head Road	
Milepost:	**County Private:** Honolulu
Longitude: 157d-48m-16.65s	**Latitude:** 21d-15m-22.75s

Location: 0.38 Miles West of Poka Street
Historic Name: Diamond Head Road Bridge Upper-Gully
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2013	
Alteration Type(s):		
Alteration Description(s): Structural repair, raised the railing height to meet code		

Bridge Information

Number of Spans: 1	**Max Span:** 49.9 ft.	**Total Length:** 65.9 ft.	**Deck Width:** 14.6 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Diamond Head Road Bridge carries Diamond Head Road across a gully. This single-span, round arch girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has one concrete parapet with arch voids and a horizontal cap. Concrete end posts with caps flank the approaches of the parapets. The concrete deck is supported by reinforced concrete abutments which rest on soil and rock. The workmanship of the bridge has not been obscured by additions or repairs. The simple design of the parapets retains the bridge's historic feeling. The parapets have been repaired/altered in 2013.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's open spandrel arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

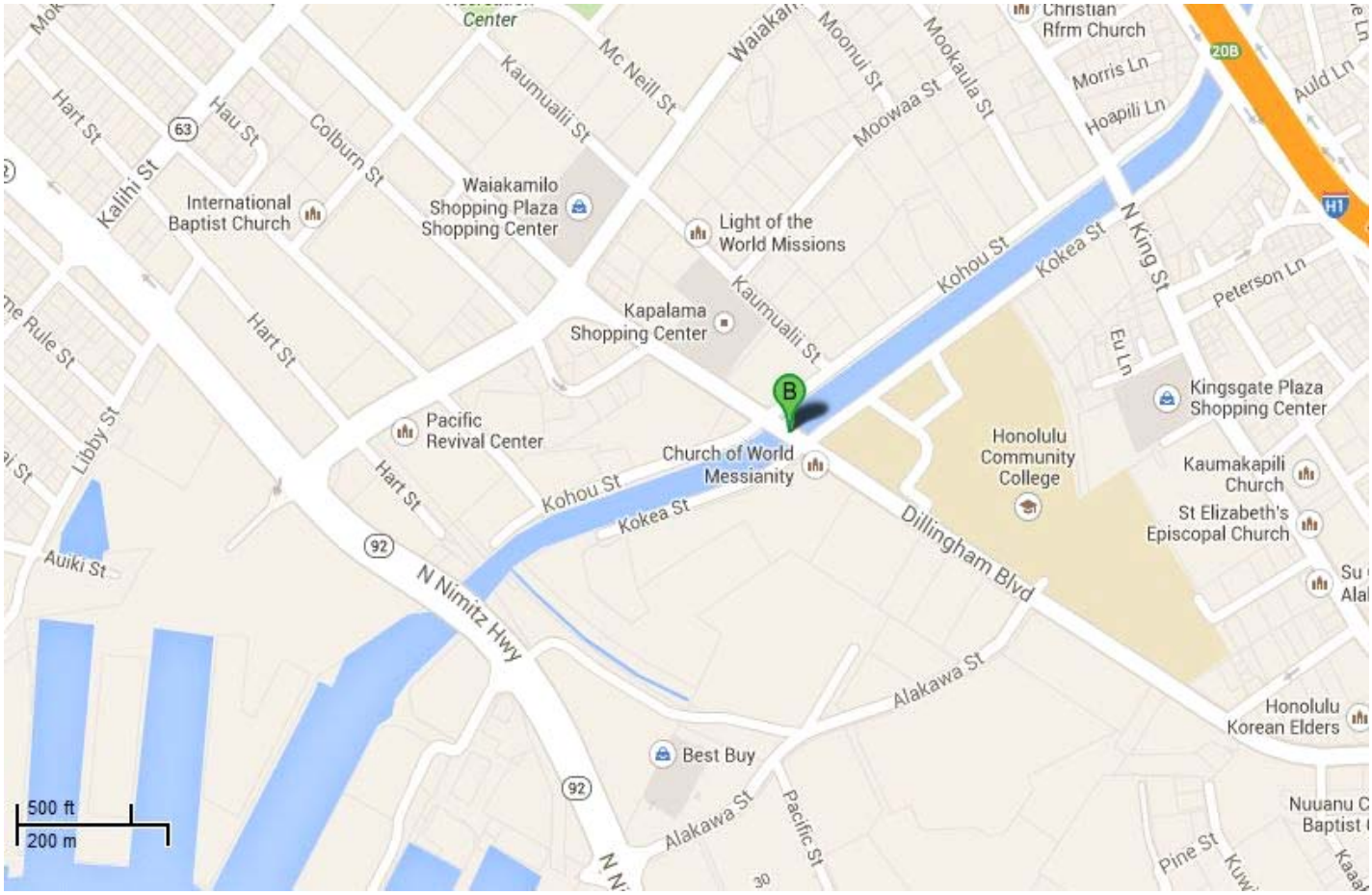
Inventory Form
(County/Private)

General Information

Bridge Number: 003062071400140	
Popular Name: Dillingham Boulevard Bridge-Kapalama Canal	
Feature Crossed: Kapalama Canal	
Feature Carried: Dillingham Boulevard	
Milepost:	**County Private:** Honolulu
Longitude: 157d-52m-23.22s	**Latitude:** 21d-19m-19.42s

Location: Between Kohou Street and Kokea Street
Historic Name: Dillingham Boulevard Bridge-Kapalama Canal
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 23.0 ft.	**Total Length:** 109.9 ft.	**Deck Width:** 78.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kapalama Canal Bridge carries Dillingham Boulevard across the Kapalama Canal. This 5-span reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has parapets with arched voids, intermittent posts, and end posts with caps. The concrete deck is supported by concrete piers and concrete masonry abutments. The workmanship of the bridge has not been obscured by additions or repairs. The bridge has retained its historic feeling due to the design of the railings which are typical of 1930s bridges.

Significance Statement:

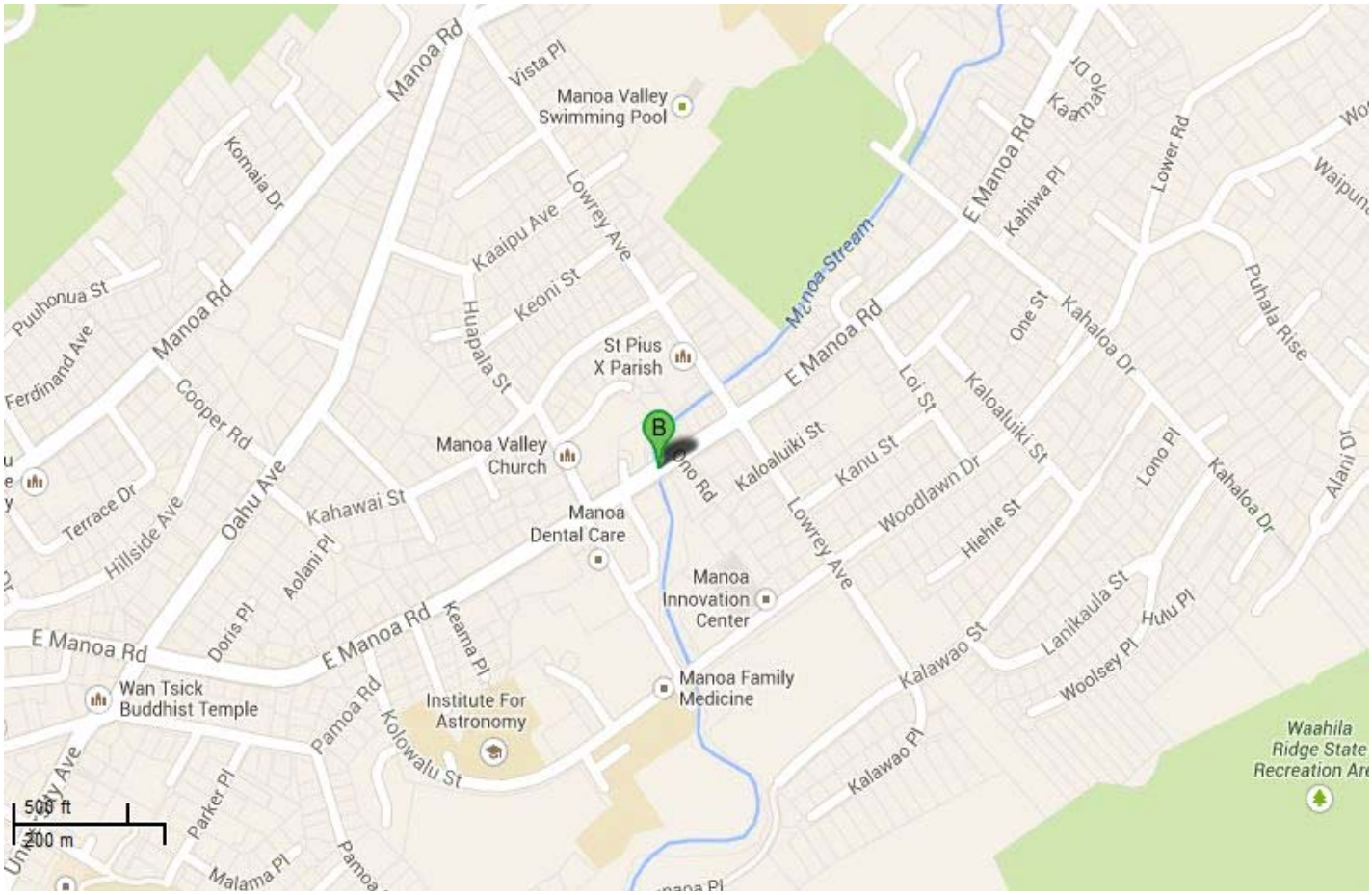
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003208001200001	
Popular Name: East Manoa Road Bridge No. 1-Manoa Stream	
Feature Crossed: Manoa Stream	
Feature Carried: East Manoa Road	
Milepost:	**County Private:** Honolulu
Longitude: 157d-48m-34.37s	**Latitude:** 21d-18m-36.75s
Location: TMK: 2-9-06	
Historic Name: East Manoa Road Bridge No. 1-Manoa Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1938	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 30.0 ft.	**Total Length:** 33.0 ft.	**Deck Width:** 46.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The East Manoa Road Bridge carries East Manoa Road across Manoa PK Ditch. This single-span reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets and decorative concrete end posts. The concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003902001100001

Popular Name: Farrington Highway Bridge No. 3-Palehua Stream

Feature Crossed: Palehua Stream

Feature Carried: Farrington Highway

Milepost: **County Private:** Honolulu

Longitude: 158d-03m-47.40s **Latitude:** 21d-21m-07.33s

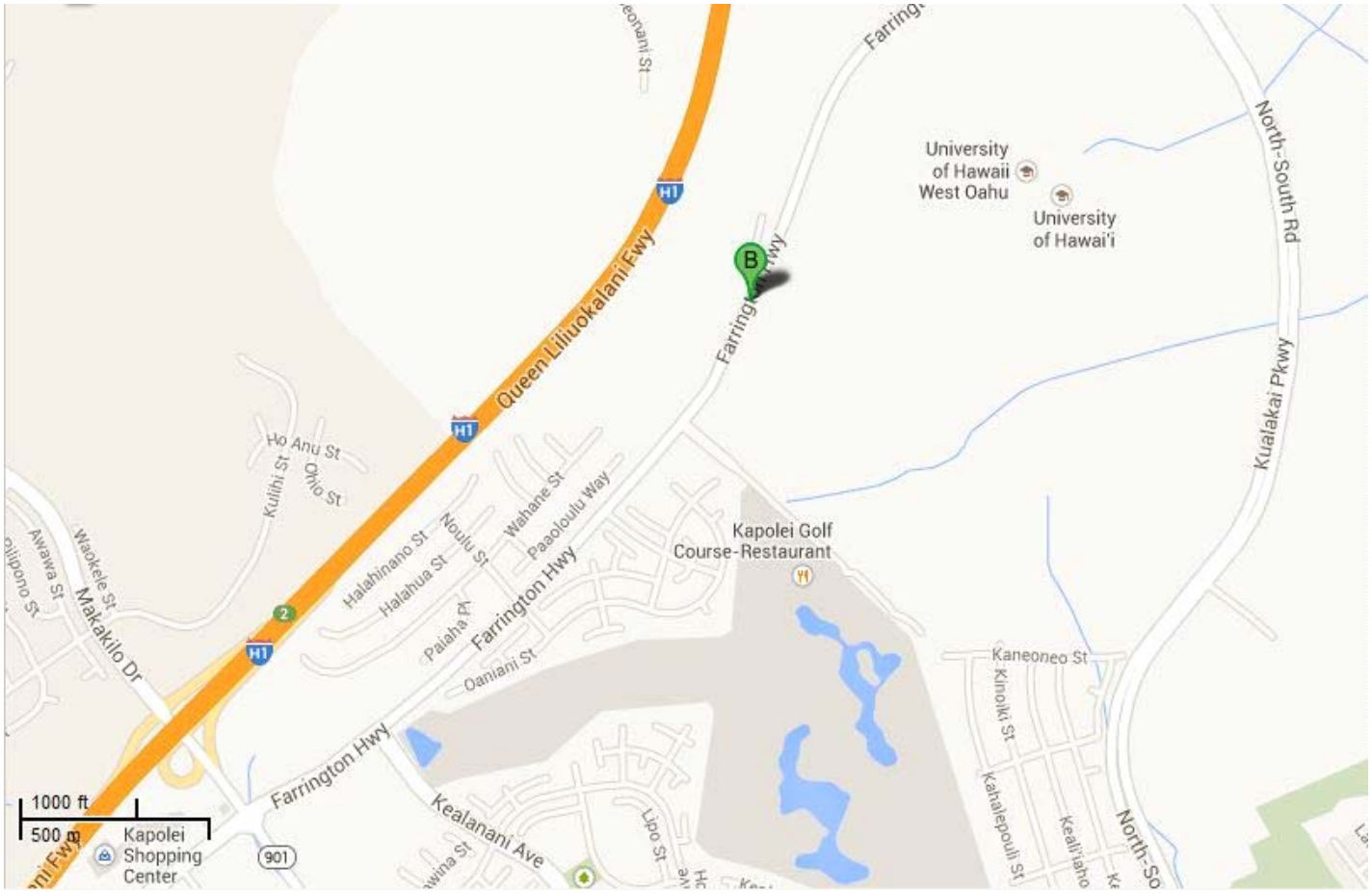
Location: TMK: 9-1-16

Historic Name: Farrington Highway Bridge No. 3-Palehua Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1922	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 27.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Farrington Highway Bridge No. 3 carries Farrington Highway across Palehua Stream. This single-span reinforced cast-in-place concrete bridge is in its original location, is in poor condition, and its materials remain intact. The bridge has solid panel reinforced concrete parapets with caps and small end posts with caps. Thrie beams flank the approaches of the parapets but are not attached to the parapet itself. The concrete deck is supported by reinforced concrete abutments and spread footings. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's concrete slab bridge that is typical of its materials, method of construction, craftsmanship, and design.

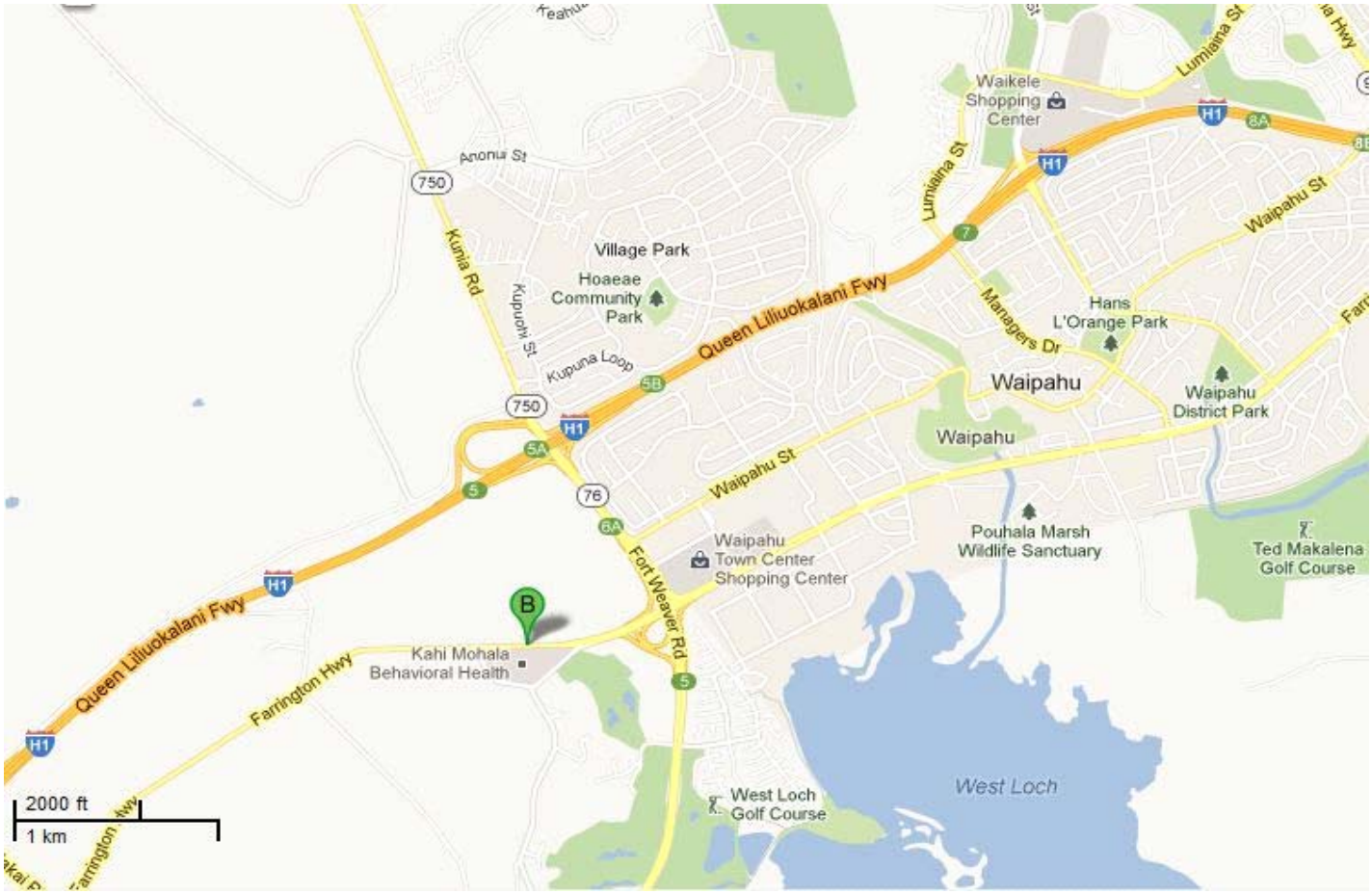
Inventory Form
(County/Private)

General Information

Bridge Number: 003922001100001	
Popular Name: Farrington Highway Bridge-Honouliuli Stream	
Feature Crossed: Honouliuli Stream	
Feature Carried: Farrington Highway	
Milepost:	**County Private:** Honolulu
Longitude: 158d-02m-00.83s	**Latitude:** 21d-22m-27.82s

Location: TMK: 9-1-17
Historic Name: Farrington Highway Bridge-Honouliuli Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1939	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 54.0 ft.	**Deck Width:** 32.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Farrington Highway Bridge carries Farrington Highway across the Honouliuli Stream. This single-span reinforced cast-in-place concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with cross shaped voids and caps. Wide end posts flank the ends of the parapets. The concrete deck is supported by concrete abutments, two piers, and spread footings. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's concrete tee beam bridge that is typical of its materials, method of construction, craftsmanship, and design.

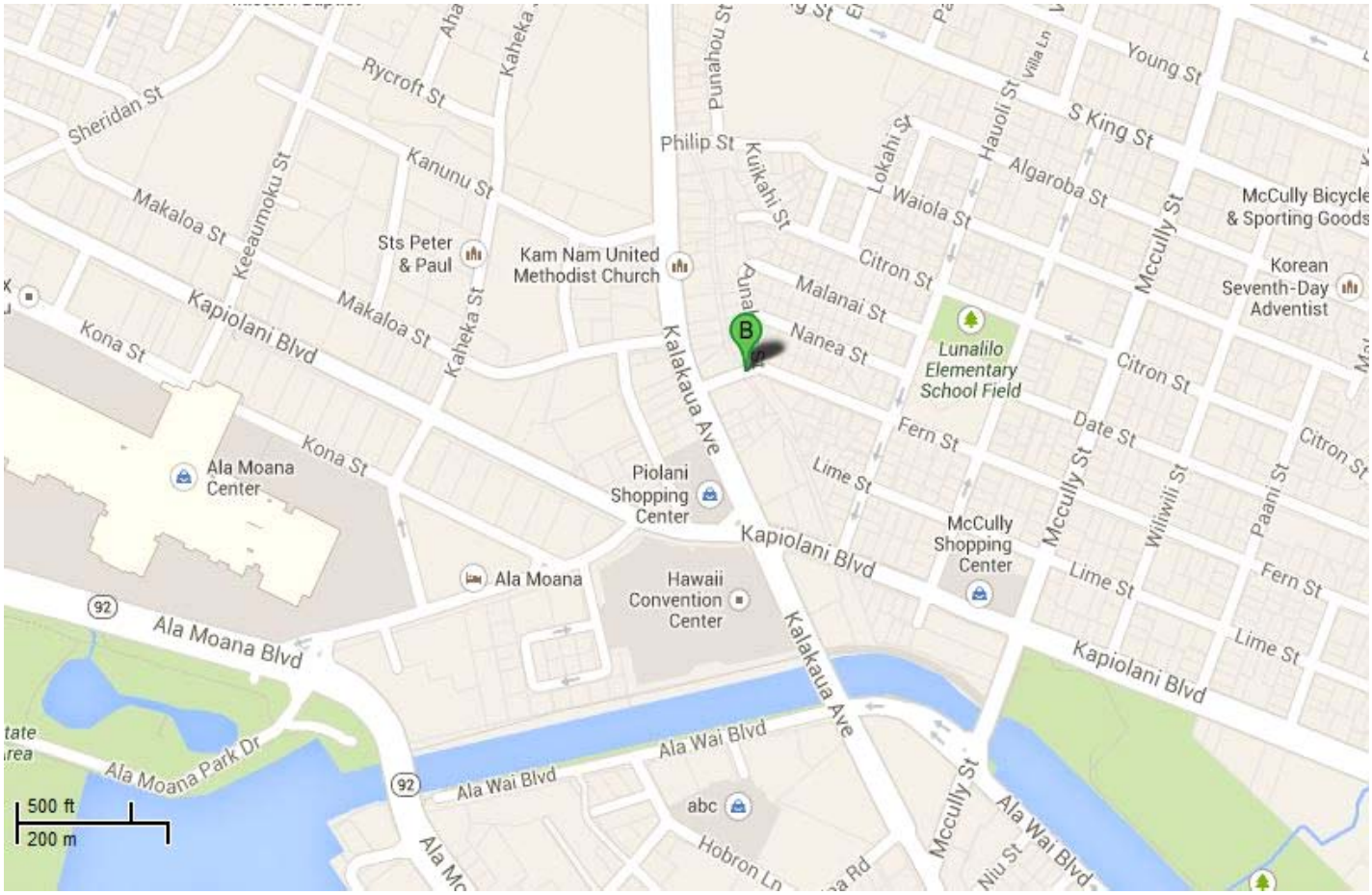
Inventory Form
(County/Private)

General Information

Bridge Number: 003209001100001	
Popular Name: Fern Street Bridge-Makiki Stream	
Feature Crossed: Makiki Stream	
Feature Carried: Fern Street	
Milepost:	**County Private:** Honolulu
Longitude: 157d-50m-09.07s	**Latitude:** 21d-17m-32.74s

Location: TMK: 2-3-23
Historic Name: Fern Street Bridge-Makiki Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1931	**Replaced?** No
Altered? Yes **Alteration Date(s):** 2013		
Alteration Type(s):		
Alteration Description(s): Structural repair, raised the railing height to meet code		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 55.3 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Fern Street Bridge carries Fern Street across Makiki Stream. This single-span reinforced concrete slab bridge with fascia girders is in its original location, is generally in good condition, and its materials remain intact. The bridge has a concrete parapet with arch voids and a horizontal cap. Paneled concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs. In 2013 rehabilitation of the bridge included spall repair and an increase to the parapet height to meet code.

Significance Statement:

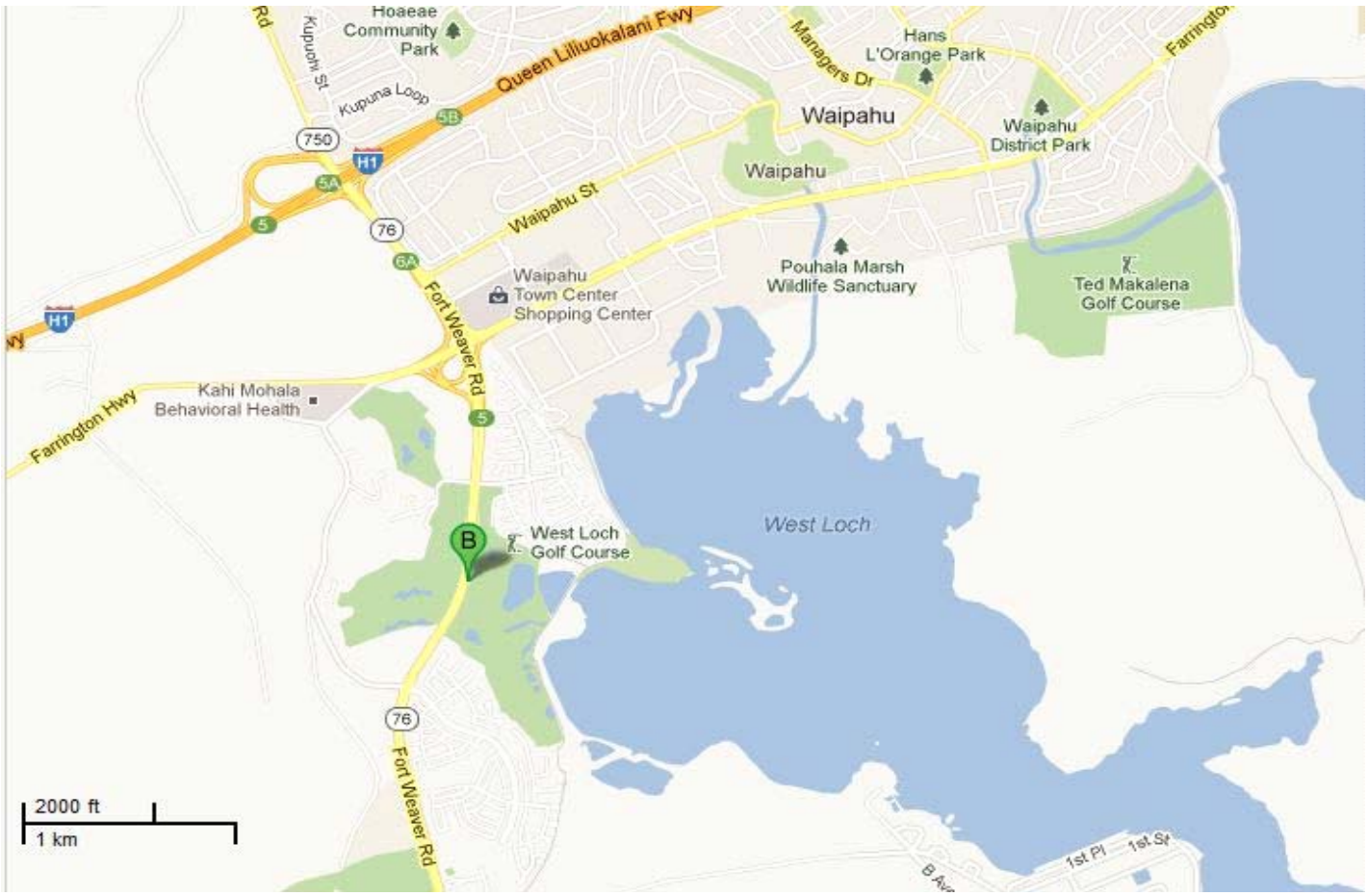
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003076001400581	
Popular Name: Fort Weaver Road Bridge-Honouliuli Stream	
Feature Crossed: Honouliuli Stream	
Feature Carried: Fort Weaver Road	
Milepost: 5.81 mi. **County Private:** Honolulu	
Longitude: 158d-01m-58.30s **Latitude:** 21d-22m-21.06s	
Location: TMK: 9-1-17	
Historic Name: Fort Weaver Road Bridge-Honouliuli Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 32.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 32.9 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Honouliuli Stream Bridge carries Fort Weaver Road across the Honouliuli Stream. This single span closed arch bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid panel concrete parapets with concrete panel end posts. The concrete deck is supported by concrete abutments. Thrie beams were bolted to the end posts however, the workmanship of the bridge has not been obscured. The simple design of the parapets retains the bridge's historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's closed spandrel arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(County/Private)

General Information

Bridge Number: 003514001100001

Popular Name: Hauula Homestead Road Bridge-Maakua Stream

Feature Crossed: Maakua Stream

Feature Carried: Hauula Homestead Road

Milepost: **County Private:** Honolulu

Longitude: 157d-54m-49.54s **Latitude:** 21d-36m-33.47s

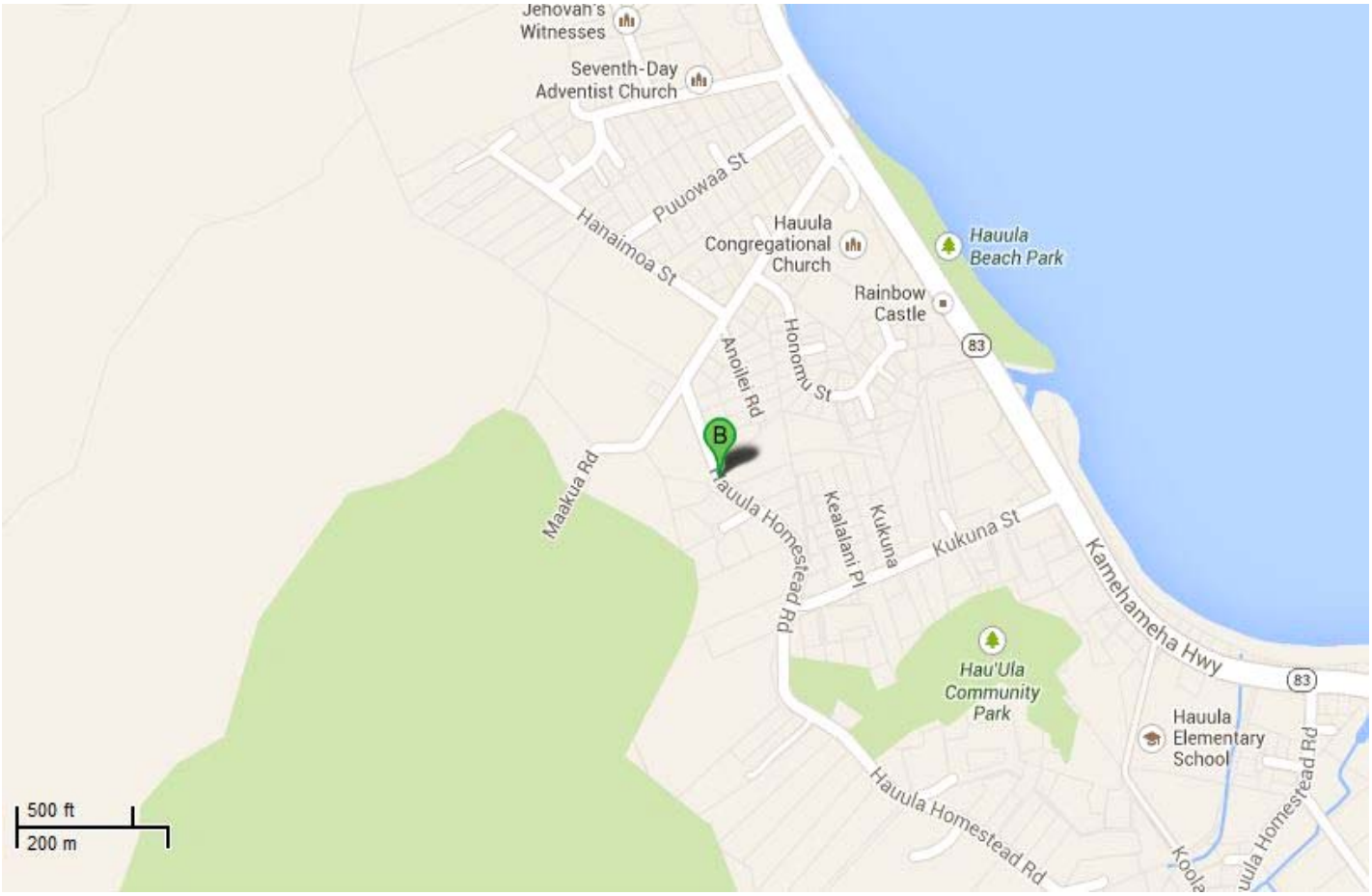
Location: TMK: 5-4-13

Historic Name: Hauula Homestead Road Bridge-Maakua Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:**	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 11.0 ft.	**Total Length:** 36.0 ft.	**Deck Width:** 33.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hauula Homestead Road Stream Bridge carries Hauula Homestead Road across Maakua Stream. This two-span reinforced concrete bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has solid panel concrete parapets and metal guardrails flank the approaches of the parapets but are not attached to the parapets. The concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's concrete slab bridge that is typical of its materials, method of construction, craftsmanship, and design.

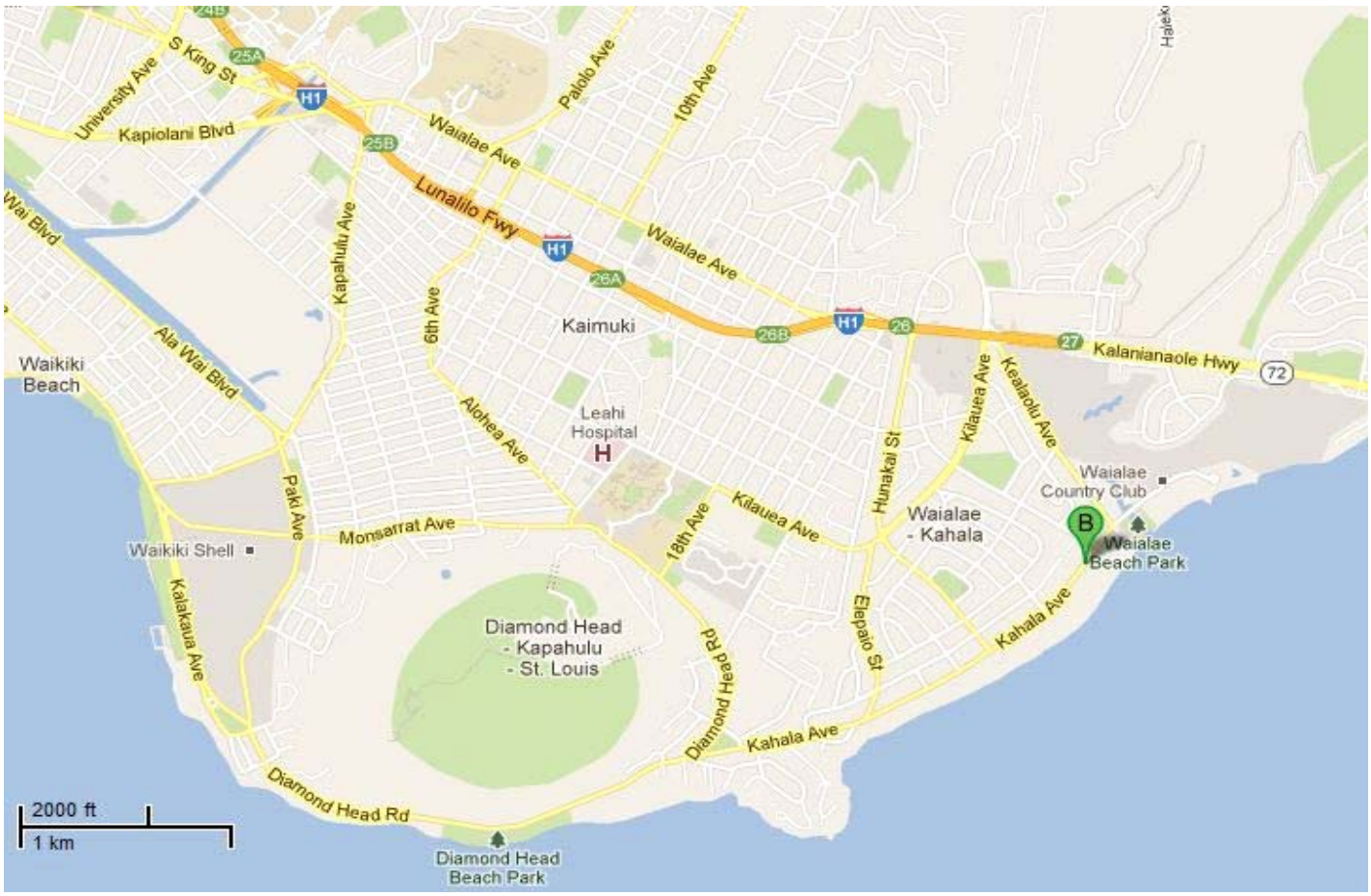
Inventory Form
(County/Private)

General Information

Bridge Number: 003311001200001	
Popular Name: Kahala Avenue Bridge No. 1-Muliwai Ditch	
Feature Crossed: Muliwai Ditch	
Feature Carried: Kahala Avenue	
Milepost:	**County Private:** Honolulu
Longitude: 157d-46m-48.27s	**Latitude:** 21d-16m-04.09s

Location: TMK: 3-5-07
Historic Name: Kahala Avenue Bridge No. 1-Muliwai Ditch
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1947	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 26.0 ft.	**Total Length:** 29.0 ft.	**Deck Width:** 60.0 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Integral Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kahala Avenue Bridge carries Kahala Avenue across Muliwai Ditch. This single-span reinforced concrete frame bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid parapets with decorative Art Moderne ends which are a unique feature. The deck is supported by concrete abutments. The workmanship of the bridge parapet has been obscured by vine vegetation on one side of the bridge.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1940's and 1950's reinforced concrete frame bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

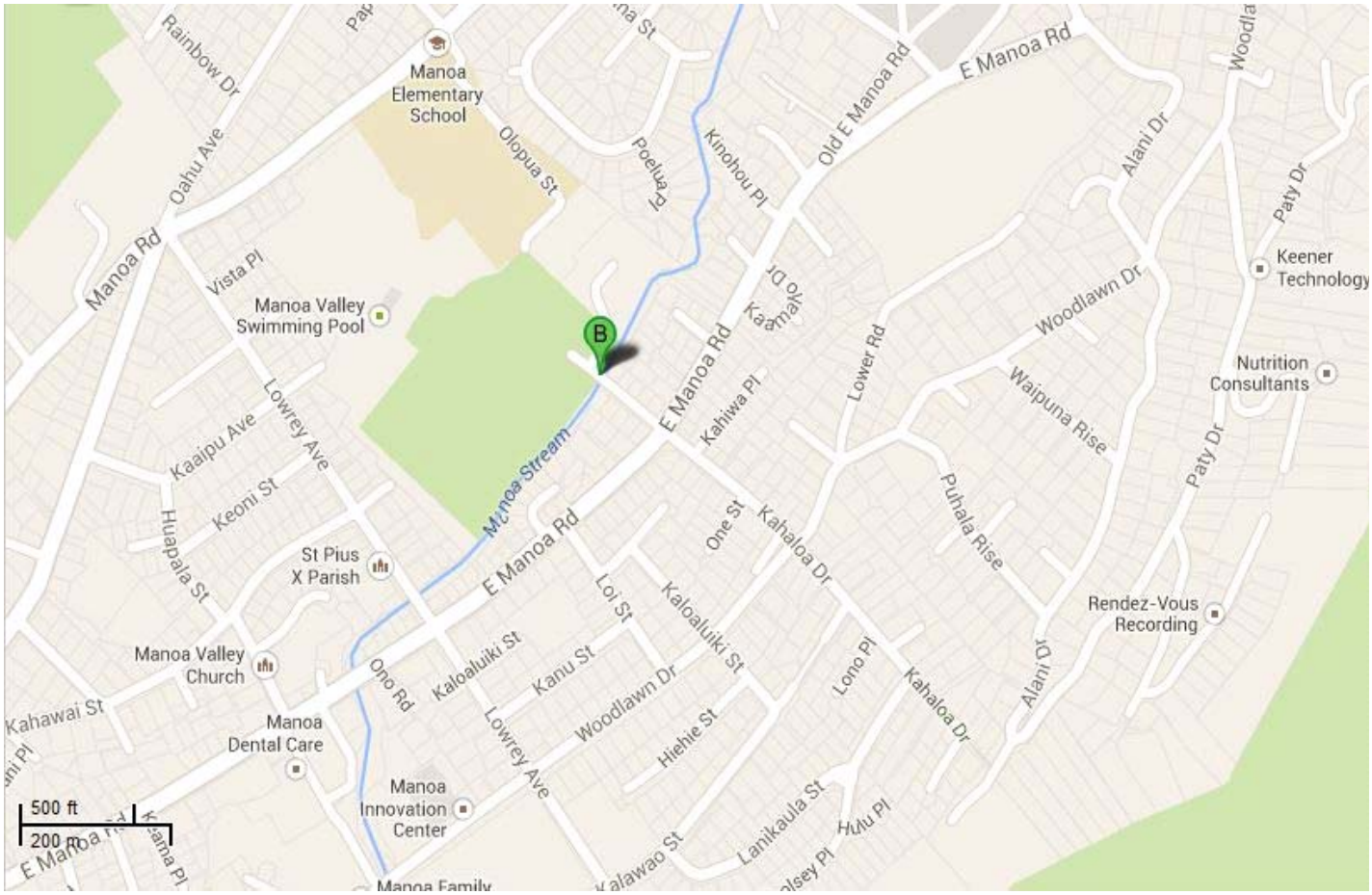
Inventory Form
(County/Private)

General Information

Bridge Number: 003211001200001	
Popular Name: Kahaloa Drive Extension Bridge-Manoa Stream	
Feature Crossed: Manoa Stream	
Feature Carried: Kahaloa Drive	
Milepost:	**County Private:** Honolulu
Longitude: 157d-48m-23.18s	**Latitude:** 21d-18m-49.30s

Location: TMK: 2-9-36 & 2-9-37
Historic Name: Kahaloa Drive Extension Bridge-Manoa Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1954	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 45.0 ft.	**Deck Width:** 40.0 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Integral Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kahaloa Drive Bridge carries Kahaloa Drive across Manoa Stream. This single-span reinforced concrete frame bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets with caps and small concrete end posts. The concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

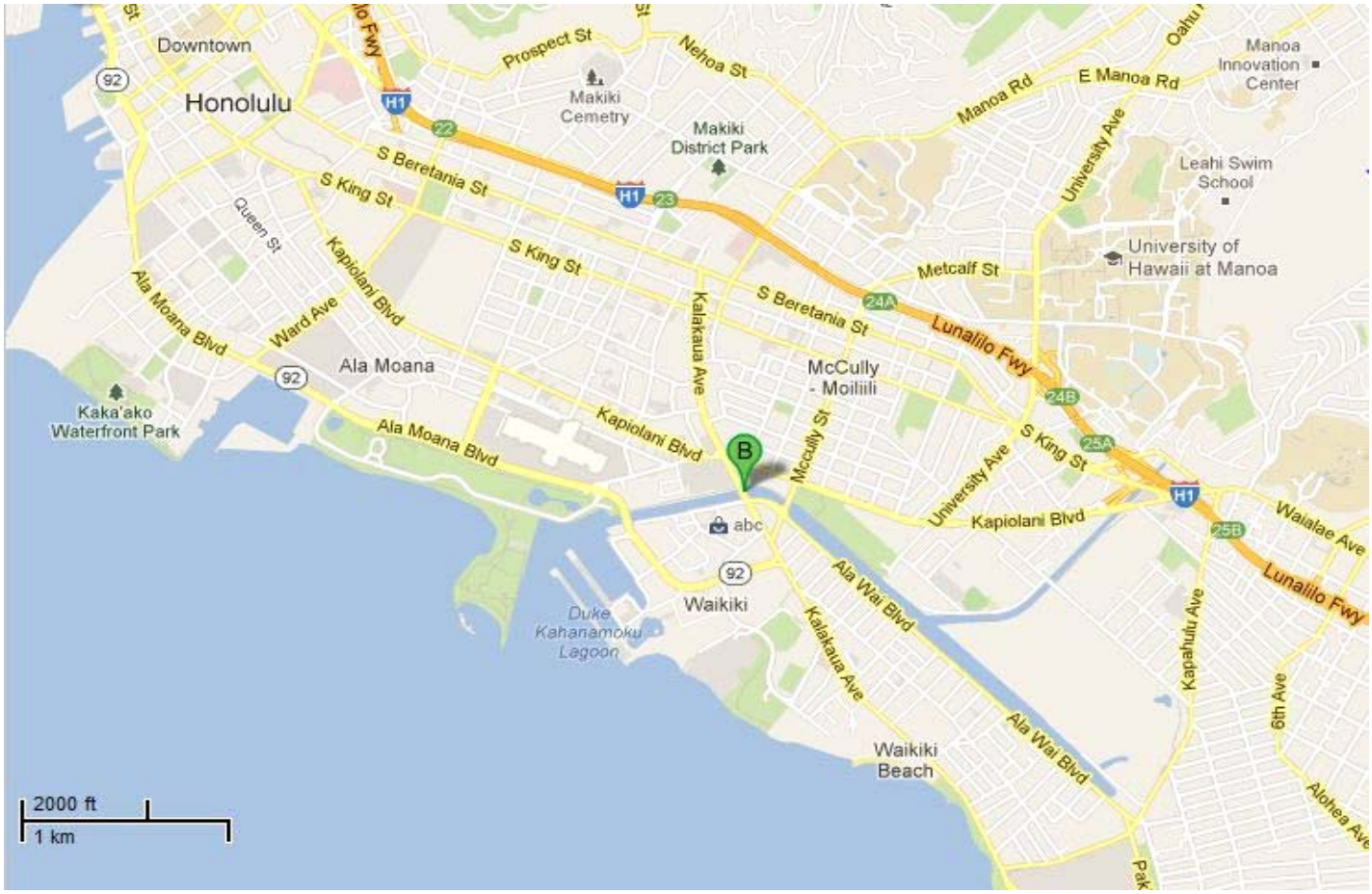
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1950's reinforced concrete frame bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083181400074	
Popular Name: Kalakaua Avenue Bridge-Ala Wai Canal	
Feature Crossed: Ala Wai Canal	
Feature Carried: Kalakaua Avenue	
Milepost: 0.74 mi.	**County Private:** Honolulu
Longitude: 157d-50m-05.26s	**Latitude:** 21d-17m-19.82s
Location: North of Ala Wai Boulevard	
Historic Name: Kalakaua Avenue Bridge-Ala Wai Canal	
Designer/Engineer: James O. Yapp	
Builder/Contractor: R. E. Woolley	

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1929	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Before 1990	
Alteration Type(s):		
Alteration Description(s): Original lamp posts removed		

Bridge Information

Number of Spans: 3	**Max Span:** 49.9 ft.	**Total Length:** 141.1 ft.	**Deck Width:** 75.8 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Decorative			
Setting:			
Other Features: Walkways on two sides; incised name and date of construction on parapets			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Kalakaua Avenue Bridge is located on the major vehicular access to Waikiki. It spans the Ala Wai Canal, a drainage channel which made the construction of Waikiki Beach resort area possible. The bridge is representative of late period reinforced concrete solid-spandrel arch construction. The neo-classical influenced Art Deco styling and graceful concrete arches of the Kalakaua Avenue Bridge make it one of the most decorative bridges in the state.

The Kalakaua Avenue Bridge remains in its original location over the Ala Wai Canal. The bridge's setting has urbanized as a result of the extensive development of Waikiki area in the 1960s-80s. The original Art Deco-style arch design and reinforced concrete materials remain intact, with the exception of the removal of the glass globe street lamps on the end piers. The quality of workmanship is high with no evidence of significant additions or repairs however, the original lamp posts were removed sometime before 1990. The bridge's historic association, as an important civic structure associated with the development of Waikiki, is readily apparent to traffic traveling along Kalakaua Avenue and the Ala Wai Canal. Interpretation is aided by the inscription of the bridge name and date of construction on the end piers. The bridge retains its historic feeling due to its decorative design and now uncommon construction type.

Significance Statement:

The Kalakaua Avenue Bridge is significant for its contributions to the areas of engineering and transportation in Hawaii. The 1929 bridge is an excellent example of reinforced concrete solid-spandrel arch construction in the then popular Art Deco style. The Kalakaua Avenue Bridge is eligible under Criterion A for its associations with public works efforts by the Territory of Hawaii, and as an important civic structure associated with the development of Waikiki, the internationally renowned beach resort on the Island of Oahu. Moreover, the bridge contributed to the economic development of Honolulu and Waikiki by providing reliable vehicular access to the recently established resort area. It is eligible under Criterion C as a rare remaining example of this once common bridge type, as well as for its aesthetic merit. The Kalakaua Avenue Bridge and Ala Wai Canal were determined eligible for the National Register of Historic Places in October 1985. This bridge is an arch bridge which is an uncommon bridge type.

The Waikiki Reclamation Project began in concept as early as 1904, when Lucius E. Pinkham, head of the Board of Health, saw the odiferous duck-ponds and swamps of coastal Waikiki as a health hazard. Once he was appointed Governor of the Territory he pursued the Waikiki Reclamation Project with zeal. However actual work on the Ala Wai Canal did not begin until 1922, when Hawaiian Dredging Company, owned by Walter F. Dillingham, was given the contract to dredge a canal 150 feet wide, twenty-five feet deep and about two miles in length. The original concept included a canal from Kapiolani Park to the Pacific Ocean in the vicinity of Kuhio Beach but this section was never completed.(1) The construction of the canal and the bridge led to the development of the Waikiki resort area and an era of expanded tourism in the islands.

The Kalakaua Avenue Bridge was constructed along the major transportation artery to Waikiki. This was the first permanent bridge in this location after the dredging of the Canal in 1921-24. It is the only multiple-span marine reinforced concrete arch of its kind in the state.(2) The bridge's elaborate neo-classically influenced Art Deco styling makes it one of the most decorative bridges in the island. The Kalakaua Avenue Bridge was built in 1929 by Ralph E. Woolley, who was a prolific builder in Honolulu. Woolley built the Mormon Temple at Laie, Oahu, which was "declared by competent critics to be one of the most beautiful edifices in the world."(3)

See National Register of Historic Places Nomination Form for the Ala Wai Canal Nomination.

(1) Thomas Thrum, "The Waikiki Reclamation Project," Hawaiian Annual (Honolulu, 1923).
(2) Bethany Thomas, Historic Bridge Inventory: Island of Oahu, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1983), IV-13.
(3) George Nellist, ed., The Story of Hawaii and its Buildings, with which is Incorporated Vol. III, Men of Hawaii (Honolulu: Honolulu Star Bulletin Ltd., 1925), 903-904.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083211400072

Popular Name: Kalihi Street Bridge No. 1-Kamanaiki Stream

Feature Crossed: Kamanaiki Stream

Feature Carried: Kalihi Street

Milepost: 0.72 mi. **County Private:** Honolulu

Longitude: 157d-51m-39.96s **Latitude:** 21d-20m-48.89s

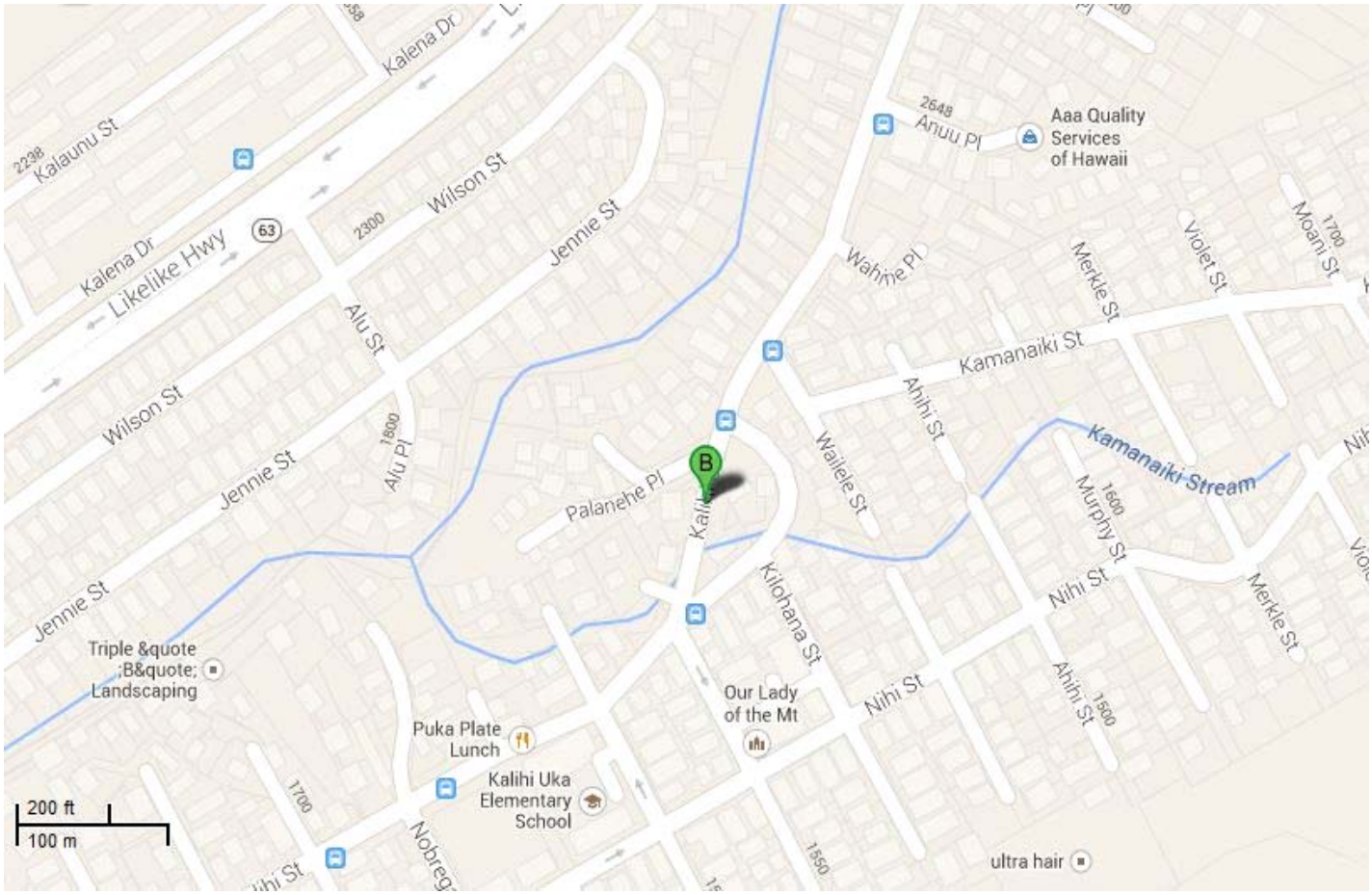
Location: TMK: 1-3-37

Historic Name: Kalihi Street Bridge No. 1-Kamanaiki Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1938	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 29.0 ft.	**Deck Width:** 49.2 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kamanaiki Bridge carries Kalihi Street across Kamanaiki Stream. This single-span concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets with caps. The end posts are rounded and without caps however, thrie beam approaches have been placed in front of both ends of the parapets. The concrete deck is supported by lava rock masonry abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003148001200001

Popular Name: Kalihi Street Bridge No. 3-Kalihi Stream

Feature Crossed: Kalihi Stream

Feature Carried: Kalihi Street

Milepost: **County Private:** Honolulu

Longitude: 157d-50m-30.94s **Latitude:** 21d-21m-52.76s

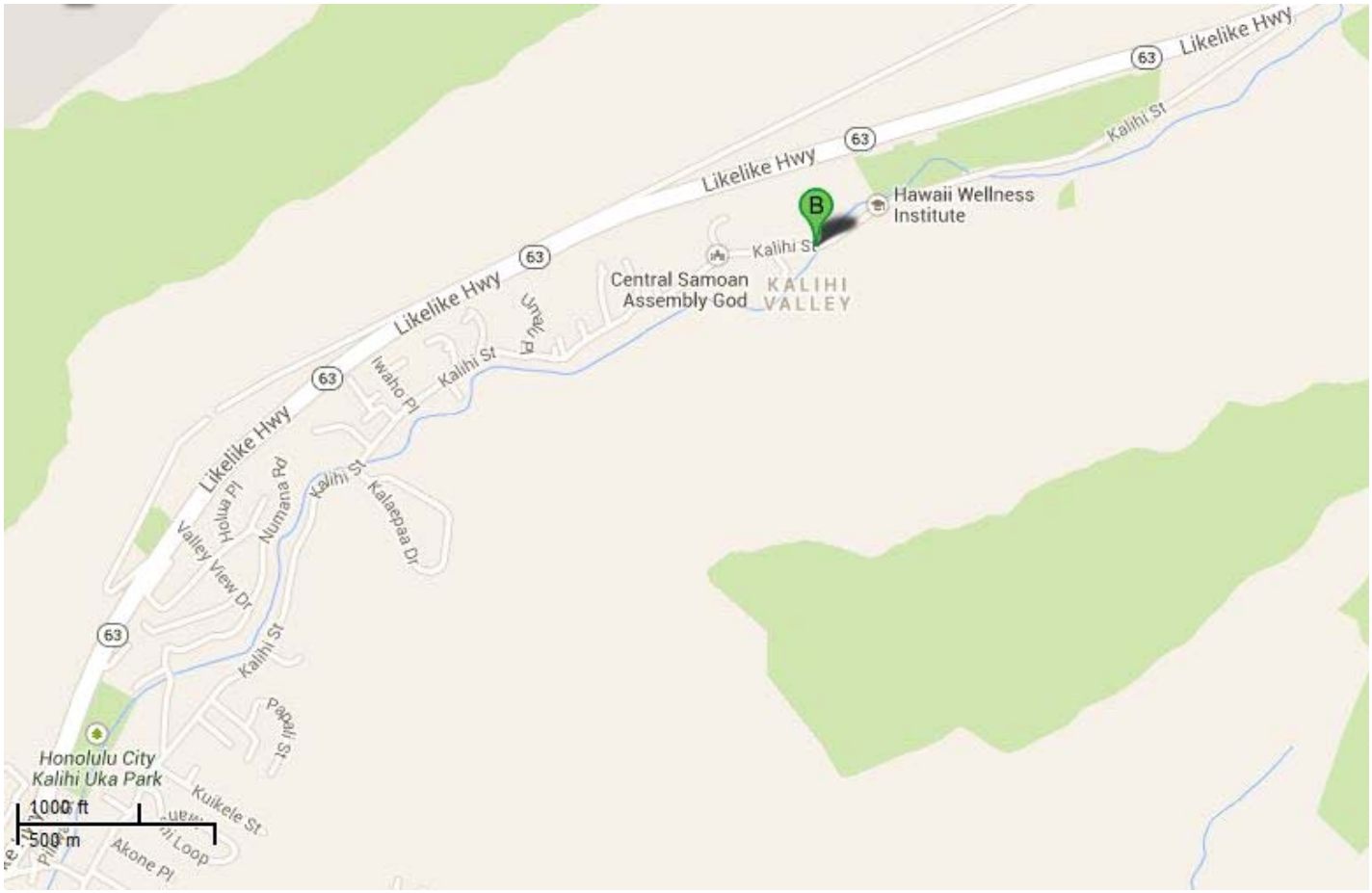
Location: TMK: 1-4-20

Historic Name: Kalihi Street Bridge No. 3-Kalihi Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1942	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2009, 2012	
Alteration Type(s):		
Alteration Description(s): Replaced Wood Decking		

Bridge Information

Number of Spans: 3	**Max Span:** 23.0 ft.	**Total Length:** 64.0 ft.	**Deck Width:** 17.7 ft.
Superstructure: Steel Multi-girder			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Construction		

Narrative Description:

The Kalihi Stream Bridge #3 is a steel stinger/multi-beam structure, constructed in 1942, to carry Kalihi Street over Kalihi Stream near the Kalihi Orphanage (now St. Anthony's Retreat). The Hawaiian Electric Company mainly uses the bridge and there are only six residential properties beyond the bridge. The bridge is in its original location in the back of Kalihi Valley. The rural setting is fully intact and surrounded by the lush vegetation of the rainy valley. The engineering of the bridge is neither complex nor typical for the era, but the workmanship of the bridge is good, and not obscured by repairs or additions. The superstructure consists of 4x12 steel stringers laid on the diagonal. The guard railings are painted wood and the decking is 4x12 timber. The timber decking was replaced in 2009 and 2012, but both replacements were consistent with the original design and materials. The rustic setting along with the painted wood railing, unfinished wood decking and narrow breadth contribute greatly to the overall historic feeling of the bridge

Significance Statement:

The Kalihi Stream Bridge #3 is eligible under criterion C – due to its distinct structural type for the area. Steel stringers were constructed in Hawaii primarily for industrial and railroad bridges. Ornamentation, if any, was usually limited to the pattern of the railings. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under criterion C for its distinctive structural type. The Kalihi Stream Bridge may be the only extant bridge of this type. Other bridges of this type noted in earlier surveys are all associated with the railroad, and specific Federal funding of the U.S. Works Program Grade Crossing Program.

Inventory Form
(County/Private)

General Information

Bridge Number: 00300C291100137

Popular Name: Kamehameha Highway Bridge-Anahulu Stream

Feature Crossed: Anahulu Stream

Feature Carried: Kamehameha Highway

Milepost: 1.37 mi. **County Private:** Honolulu

Longitude: 158d-06m-12.17s **Latitude:** 21d-35m-36.85s

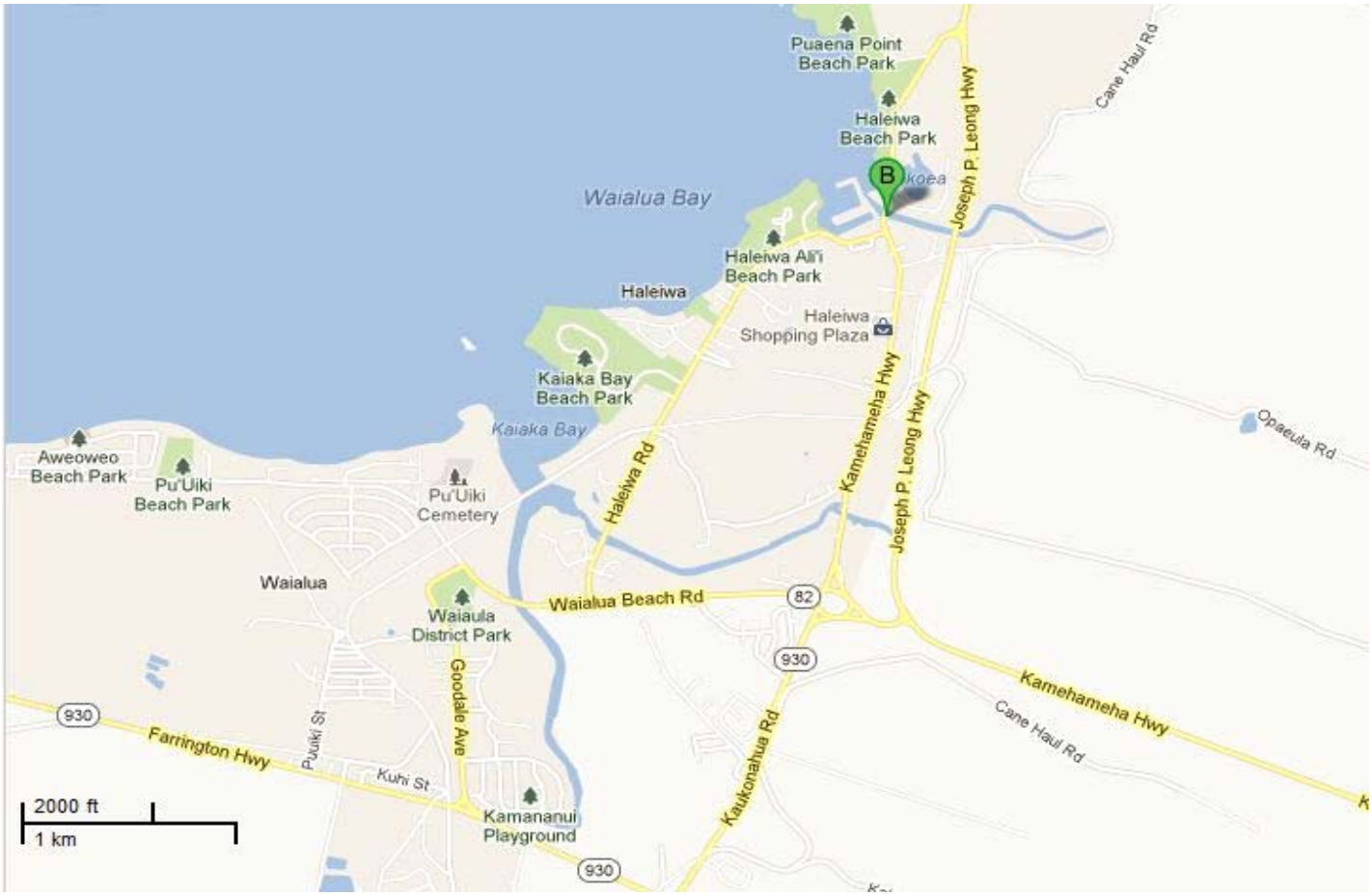
Location: TMK: 6-2-03:012

Historic Name: Kamehameha Highway Bridge-Anahulu Stream

Designer/Engineer: Guy Rothwell and Fred Ohrt

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Rainbow Arch	**Construction Date:** 1921	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Before 1989	
Alteration Type(s):		
Alteration Description(s): Lamp standards at four end piers and at center span of arch removed		

Bridge Information

Number of Spans: 2	**Max Span:** 80.0 ft.	**Total Length:** 161.0 ft.	**Deck Width:** 31.8 ft.
Superstructure: Concrete Through Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; two 3.5 feet "outrigger" sidewalks suspended from both sides of roadway			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Construction		

Narrative Description:

The Anahulu Stream Bridge was built in 1921 to carry the Kamehameha Highway across the Anahulu Stream. The bridge is located in the former town of Haleiwa on the north shore of Oahu. The Anahulu Stream Bridge is a double “rainbow” or Marsh through-deck arch bridge constructed of reinforced concrete.

The Anahulu Stream Bridge has been listed on the National Historic Register since 1985 and remains in its original location. The bridge’s setting has changed slightly due to commercial and residential development within the Haleiwa community, thus placing increased pressure on the structure. The lamp standards were removed sometime before 1989 and a by-pass highway to accommodate additional traffic was completed by the state Department of Transportation in 1994. The bridge's original double-rainbow arch design and reinforced concrete materials remain intact, with the exception of the removal of the street lamps on the end piers. The bridge is obviously the work of skilled workmen and the quality of workmanship is extremely high, particularly the bush-hammered finish of the paneled parapets. The bridge's historic association as an important civic structure associated with the development of Haleiwa can be readily discerned by pedestrian and automobile traffic along Kamehameha Avenue. The bridge retains its historic feeling due to its prominent location, narrow width, high-profile design and now uncommon construction type.

Significance Statement:

The Anahulu Stream Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The bridge is an excellent example of reinforced concrete “rainbow” or Marsh arch construction. The Anahulu Stream Bridge is eligible under Criterion A for its associations with public works efforts by the City and County of Honolulu during the early Territorial period and as an important civic structure associated with the development of Haleiwa. It is eligible under Criterion C as a rare remaining example of this bridge type. Moreover, it is representative of the work of a master: Guy Rothwell, the designer of the Palama Settlement and the Harris Memorial Church.

The Anahulu “Haleiwa” Bridge has been identified as the most well-known man-made feature in Haleiwa Town.(1) The bridge serves as the “gateway” to historic Haleiwa and is located within the County-designated Haleiwa Special Design District. The bridge survived an important preservation battle between the community and the local governmental transportation agency. In the 1960s, the Anahulu Bridge was determined to be too narrow for two-way traffic and the Waialua Community Association urged the City Council to replace it with a new structure.(2) However by 1970, concerned citizens rallied to preserve the picturesque bridge, yet recognize the present-day transportation needs of the north shore community. The alternative plan preserved the historic bridge by creating a bypass with a new highway and modern four-lane bridge upstream.

This bridge is one of two remaining “Rainbow” or Marsh arch bridges in the state; the other being the Keawe Street-Wailuku River Bridge near downtown Hilo. Arch bridges are also an uncommon bridge type.

(1) Honolulu (City and County), Department of Land Utilization, Haleiwa, Historic, Cultural, and Scenic District No. 6 (Honolulu: Printing by city and County Printing Services, Office of Information and Complaint, 1983), 11.
(2) “Anahulu Bridge,” Honolulu Advertiser, April 12, 1968; “Anahulu Bridge,” Star Bulletin, January 3, 1970.

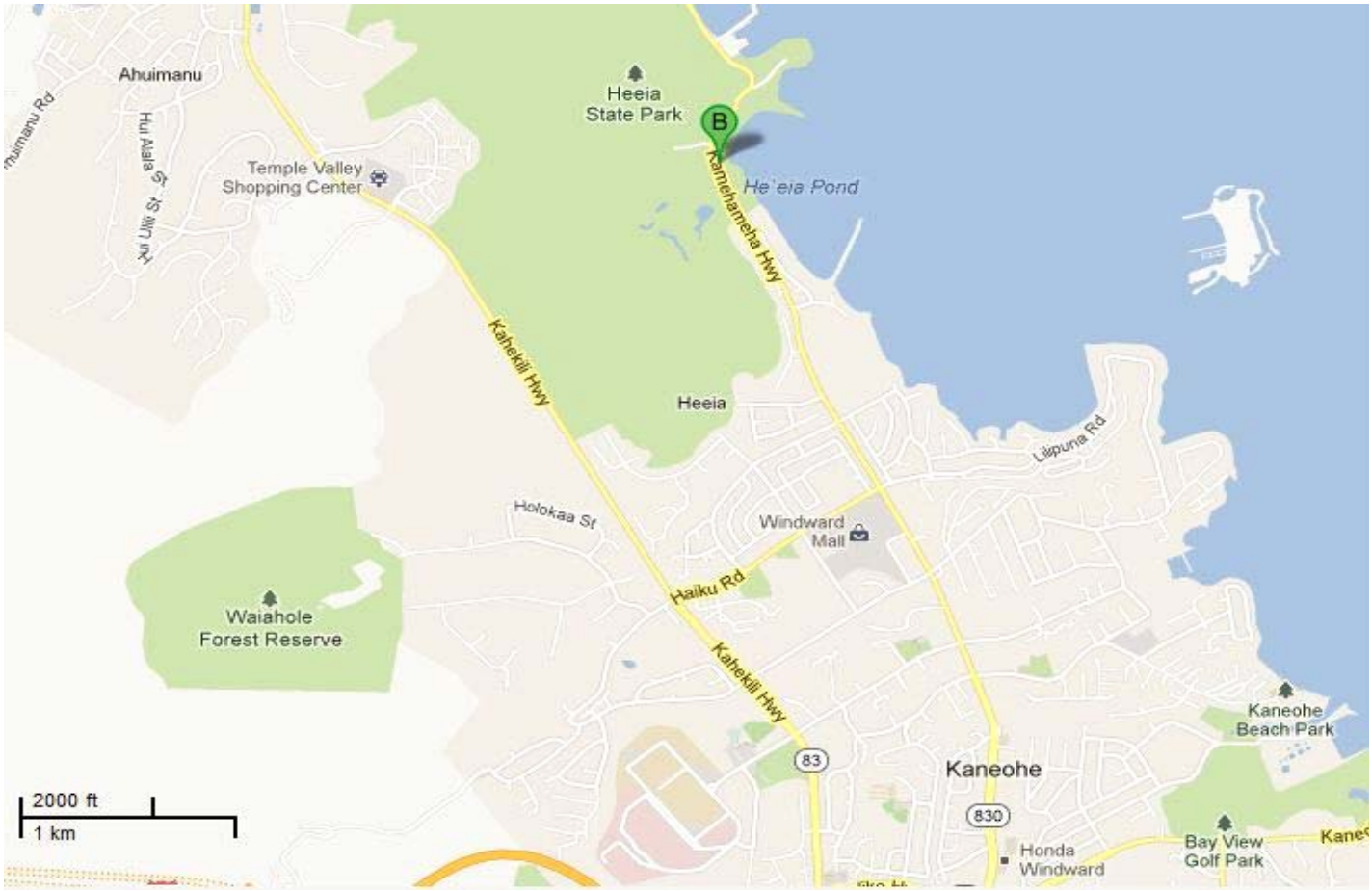
Inventory Form
(County/Private)

General Information

Bridge Number: 003008360800242	
Popular Name: Kamehameha Highway Bridge-Heeia Stream	
Feature Crossed: Heeia Stream	
Feature Carried: Kamehameha Highway	
Milepost: 2.42 mi.	**County Private:** Honolulu
Longitude: 157d-48m-41.20s	**Latitude:** 21d-26m-11.68s

Location: 0.39 Miles South of Heeia State Park
Historic Name: Kamehameha Highway Bridge-Heeia Stream
Designer/Engineer: H. A. R. Austin
Builder/Contractor: E. J. Lord

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1921	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1948 and 1989	
Alteration Type(s):		
Alteration Description(s): Wood framed walkway added to outside of one parapet (1948); reconstructed with corrugated steel decking and concrete (1989)		

Bridge Information

Number of Spans: 52	**Max Span:** 17.1 ft.	**Total Length:** 892.1 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Design, Construction		

Narrative Description:

The Heeia Viaduct carries Kamehameha Highway over Heeia Stream which drains into Heeia Fishpond, a native Hawaiian site listed on the National Register of Historic Places. The bridge is a multi-span reinforced concrete tee-beam bridge with fifty-two spans.

The Heeia Viaduct remains in its original location. The bridge's setting over Heeia Stream has retained its rural character, although intensive vegetation growth has obscured the once highly visible bridge. Nonetheless, the bridge's original design and materials remain intact. A wood-framed footbridge was added to the outside of one parapet in 1948; this footbridge has since been reconstructed in 1989 with corrugated steel decking and concrete. The 1922 bridge was technologically innovative for its time, since tee beam construction was relatively uncommon in the islands until the mid-1930s. The original bridge was the work of skilled builders, who constructed its fifty-two concrete spans over the salt water fishpond. The quality of the workmanship remains evident despite alterations to the footbridge and the addition of metal guardrails at the end piers. The bridge's historic associations, as a representative example of an early concrete tee beam bridge and an essential element in Oahu's belt road system, are apparent to an informed observer. The bridge's historic feeling is primarily evident due to its narrow width and solid paneled parapets, typical of 1920s era bridges.

Significance Statement:

The Heeia Viaduct is significant in the areas of engineering and transportation in Hawaii. The 1922 bridge is an excellent example of reinforced concrete tee beam construction with solid paneled parapets typical of 1920s bridges. The Heeia Viaduct is eligible under Criterion A for its associations with public works efforts by the City and County of Honolulu during the territorial period and for its contributions to the economic development of Windward (east) Oahu by providing reliable vehicular access to the area. It is eligible under Criterion C as representative example of a 1920s era bridge utilizing a relatively new engineering technology, continuous reinforced concrete tee beam construction.

The Heeia Viaduct was constructed as part of the upgrading of Oahu's belt road. Begun in 1917, this segment of the belt road connected previously isolated communities with a new paved highway. The bridge is important transportation link for Windward communities. Its construction saved travelers from the long inland journey around the Heeia fishpond, a significant natural and cultural feature of the Windward side of the island.

The Heeia Viaduct is the longest concrete tee-beam bridge on Oahu and one of the first large reinforced concrete tee-beam bridges built in the state.(1) The bridge utilizes technology typical of later concrete bridges and demonstrates the rapid advances in engineering technology in the early decades of the twentieth century. The Heeia Viaduct was built in 1922 by E. J. Lord, a Honolulu contractor. Lord was responsible for "more than one-half of the public work in the Territory," including the Waimanalo road and the belt road, contracts amounting to $1,500,000.(2) H.A.R. Austin, whose name appears on the plans for the bridge, was the chief engineer for the City and County of Honolulu, Department of Public Works.

(1) Bethany Thompson, Historic Bridge Inventory: Island of Oahu, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 1983), VII-25.
(2) George Nellist, ed., The Story of Hawaii and its Builders, with which is Incorporated Vol. III, Men of Hawaii (Honolulu: Star Bulletin, 1925), 603.

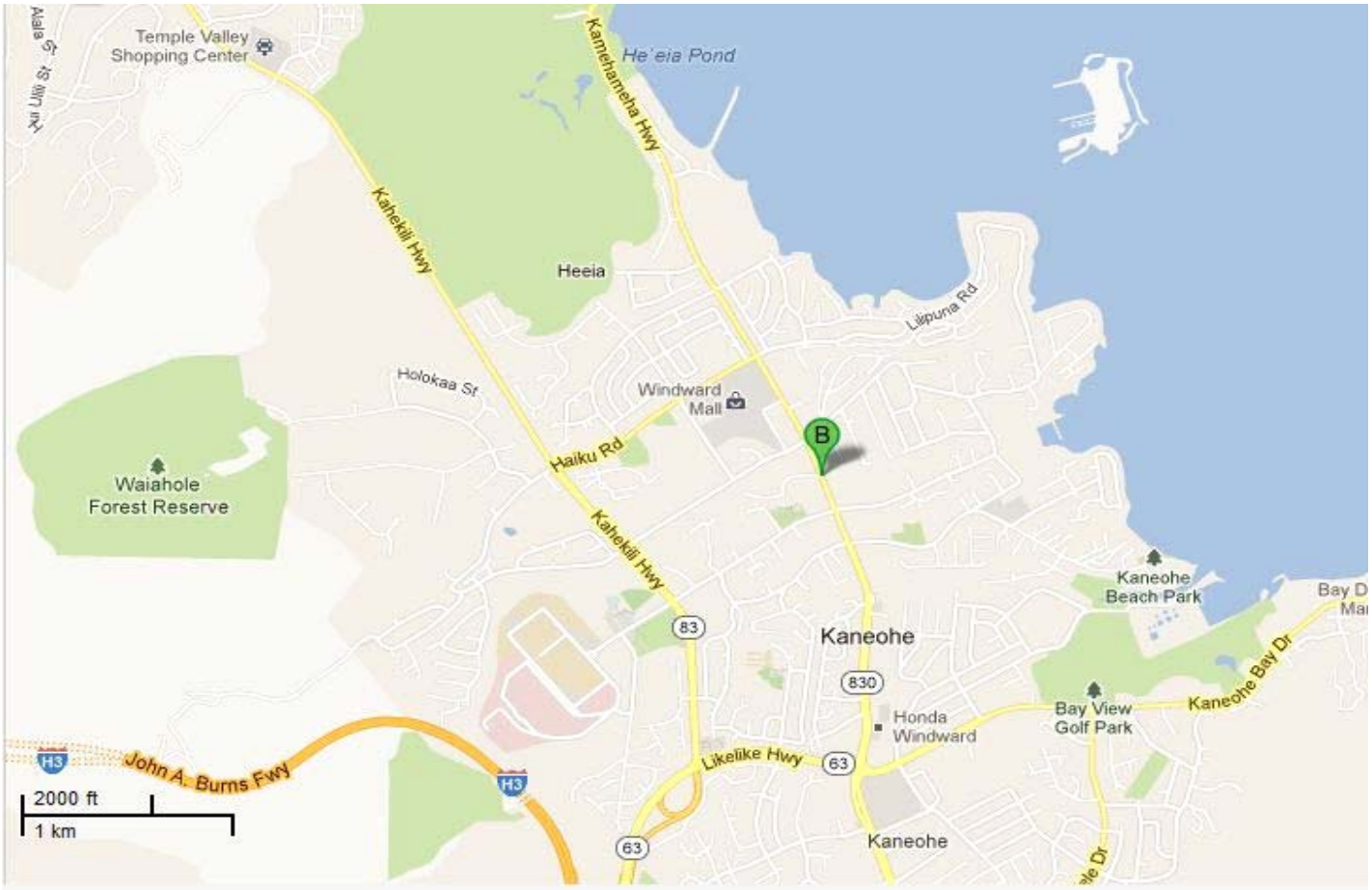
Inventory Form
(County/Private)

General Information

Bridge Number: 003083601400098	
Popular Name: Kamehameha Highway Bridge-Keaahala Stream	
Feature Crossed: Keaahala Stream	
Feature Carried: Kamehameha Highway	
Milepost: 0.98 mi.	**County Private:** Honolulu
Longitude: 157d-48m-05.14s	**Latitude:** 21d-25m-00.78s

Location: TMK: 4-5-19
Historic Name: Kamehameha Highway Bridge-Keaahala Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1918	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 70.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

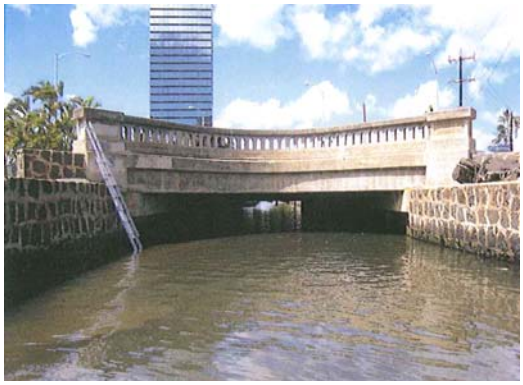
The Keaahala Stream Bridge carries Kamehameha Highway across Keaahala Stream. This single-span reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid panel concrete parapets with horizontal caps. The concrete deck is supported by concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

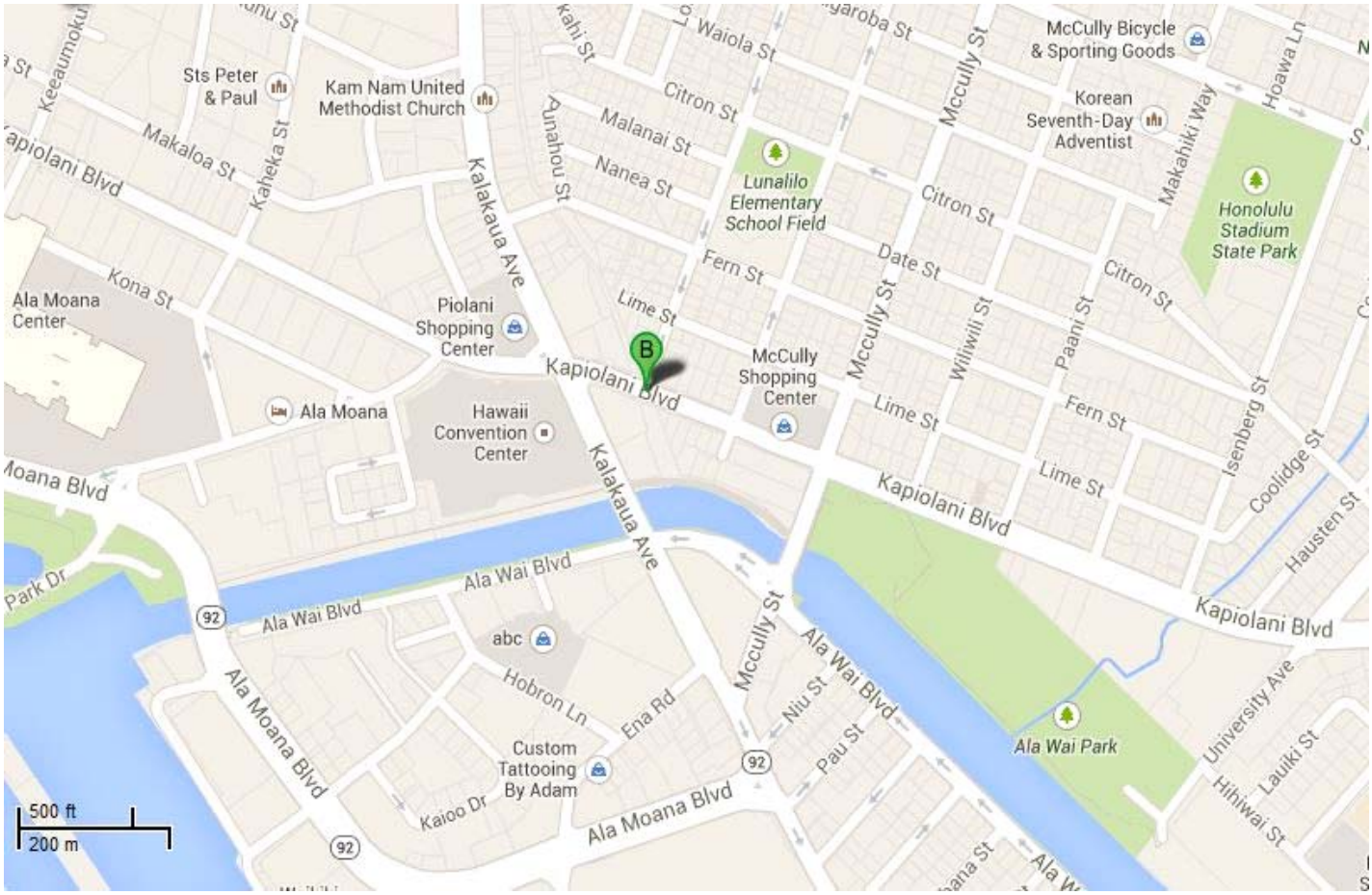
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of an early 1910's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003062021400052	
Popular Name: Kapiolani Boulevard Bridge No. 1-Makiki Stream	
Feature Crossed: Makiki Stream	
Feature Carried: Kapiolani Boulevard	
Milepost: **County Private:** Honolulu	
Longitude: 157d-50m-04.62s **Latitude:** 21d-17m-25.04s	
Location: 320 Feet East of Kalakaua Avenue	
Historic Name: Kapiolani Boulevard Bridge No. 1-Makiki Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 100.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makiki Ditch Bridge carries Kapiolani Boulevard across Makiki Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has open concrete parapets with arched voids and wide end posts with flat caps. The structure of the bridge is diagonal along Kapiolani Boulevard and is curved along one parapet. The workmanship of the bridge has not been obscured by additions or repairs. The bridge has retained its historic feeling due to the design of the railings which are typical of 1930s bridges.

Significance Statement:

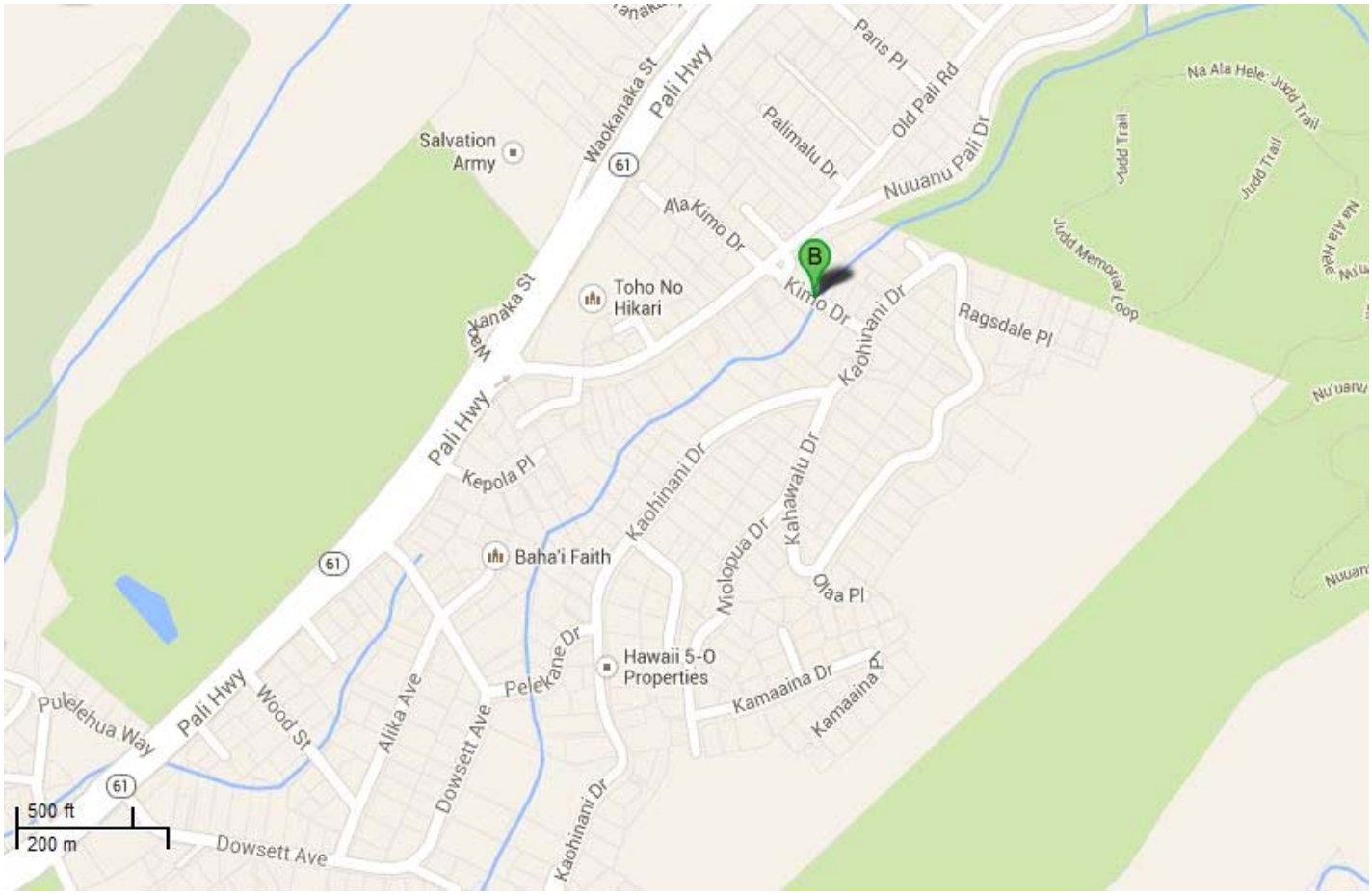
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003260001200001	
Popular Name: Kimo Drive Bridge-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: Kimo Drive	
Milepost:	**County Private:** Honolulu
Longitude: 157d-49m-42.76s	**Latitude:** 21d-20m-35.82s
Location: TMK: 2-2-50	
Historic Name: Kimo Drive Bridge-Nuuanu Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1925	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 44.0 ft.	**Total Length:** 125.0 ft.	**Deck Width:** 40.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kimo Drive Bridge carries Kimo Drive across Nuuanu Stream. This three-span reinforced concrete multi-girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arched voids and caps. Paneled concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design. It is also associated with historic Nuuanu residential development.

Inventory Form
(County/Private)

General Information

Bridge Number: 003351001200001

Popular Name: Kuliouou Road Bridge-Kuliouou Stream

Feature Crossed: Kuliouou Stream

Feature Carried: Kuliouou Road

Milepost: **County Private:** Honolulu

Longitude: 157d-43m-26.05s **Latitude:** 21d-17m-40.99s

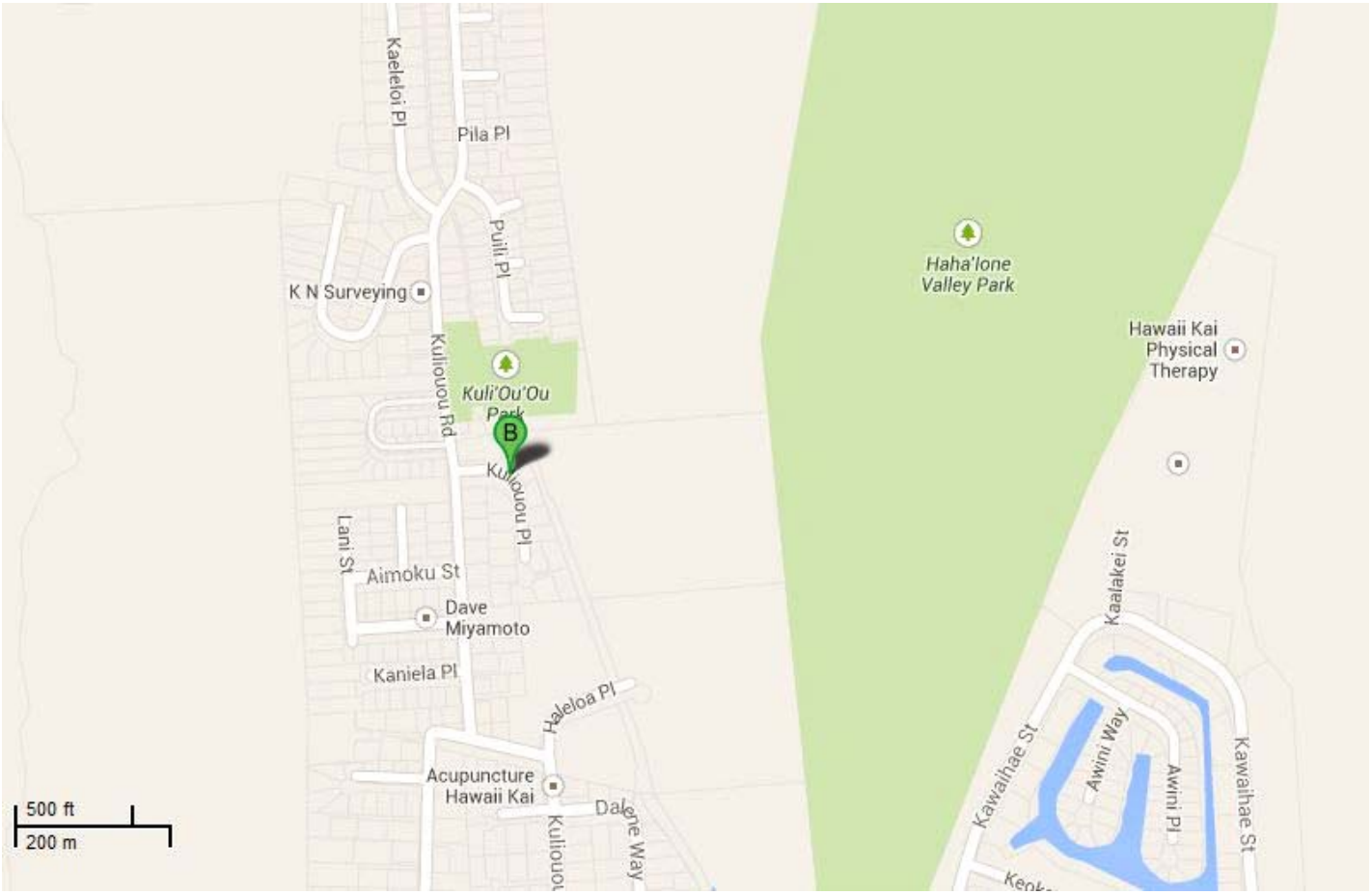
Location: TMK: 3-8-06

Historic Name: Kuliouou Road Bridge-Kuliouou Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1968	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 42.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 12.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kuliouou Road Bridge carries Kuliouou Road across Kuliouou Stream. This double-span steel stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has metal and wood rails and a 4x12 wood timber deck. The bridge deck is supported by concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs. Currently it is a city-owned bridge but it is undergoing process of conveyance to private property ownership in 2013.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. It is a good example of a 1960's steel stringer bridge atypical of its period in its use of materials and design.

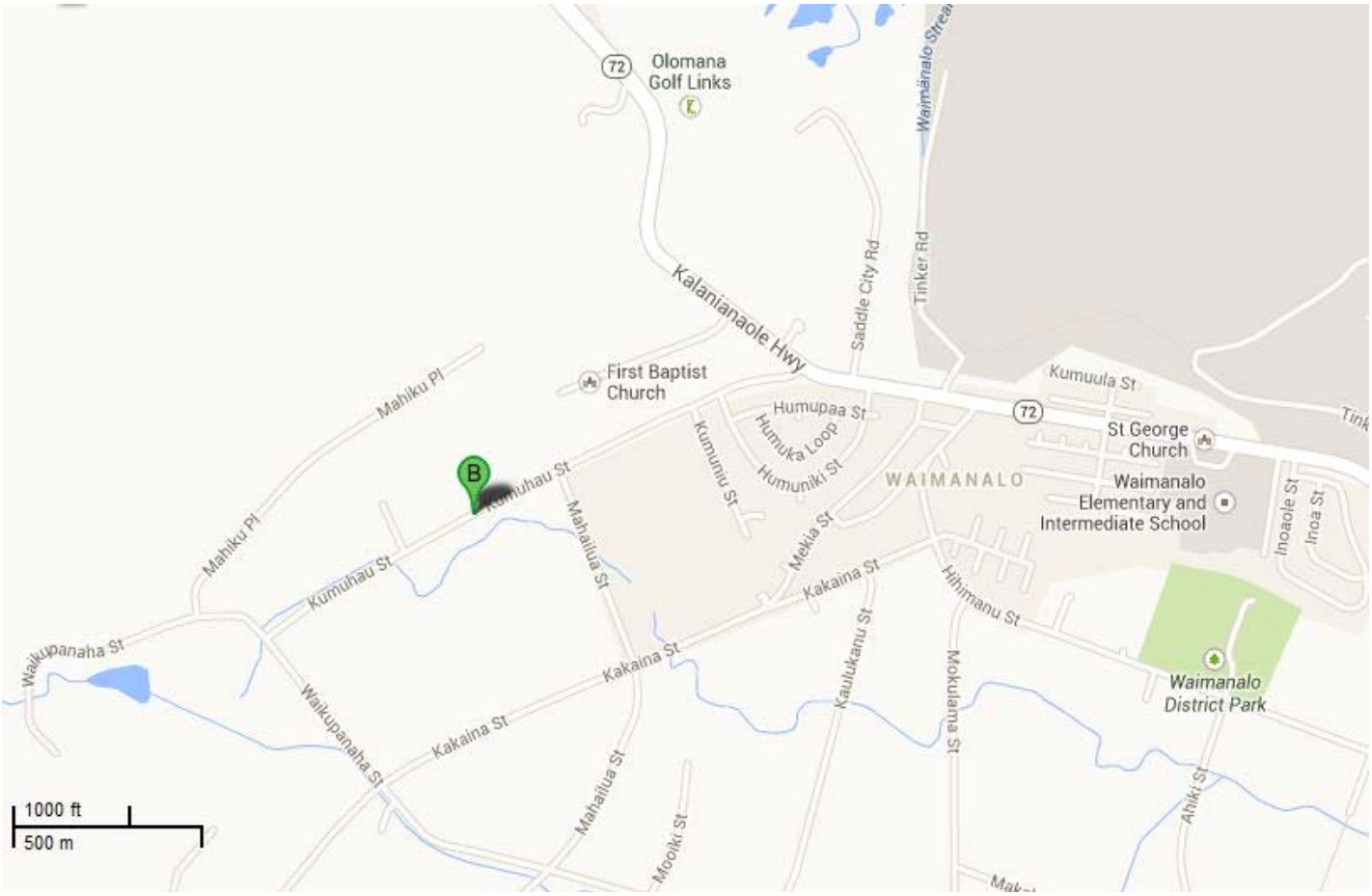
Inventory Form
(County/Private)

General Information

Bridge Number: 003429001100001	
Popular Name: Kumuhau Street Bridge-Waimanalo Stream	
Feature Crossed: Waimanalo Stream	
Feature Carried: Kumuhau Street	
Milepost:	**County Private:** Honolulu
Longitude: 157d-44m-04.55s	**Latitude:** 21d-20m-45.39s

Location: TMK: 4-1-18
Historic Name: Kumuhau Street Bridge-Waimanalo Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1963	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 30.0 ft.	**Total Length:** 31.0 ft.	**Deck Width:** 15.9 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Metal Corrugated Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Construction		

Narrative Description:

The Kumuhau Street Bridge carries Kumuhau Street across Waimanalo Stream. This single-span steel bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has metal railings made of structural steel tubes and wide flange posts. A metal deck and an asphalt overlay are supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. It is a good example of a 1960's steel stringer bridge atypical of its period in its use of materials and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003261001200001

Popular Name: Laimi Road Bridge-Nuuanu Stream

Feature Crossed: Nuuanu Stream

Feature Carried: Laimi Road

Milepost: **County Private:** Honolulu

Longitude: 157d-50m-20.24s **Latitude:** 21d-19m-58.95s

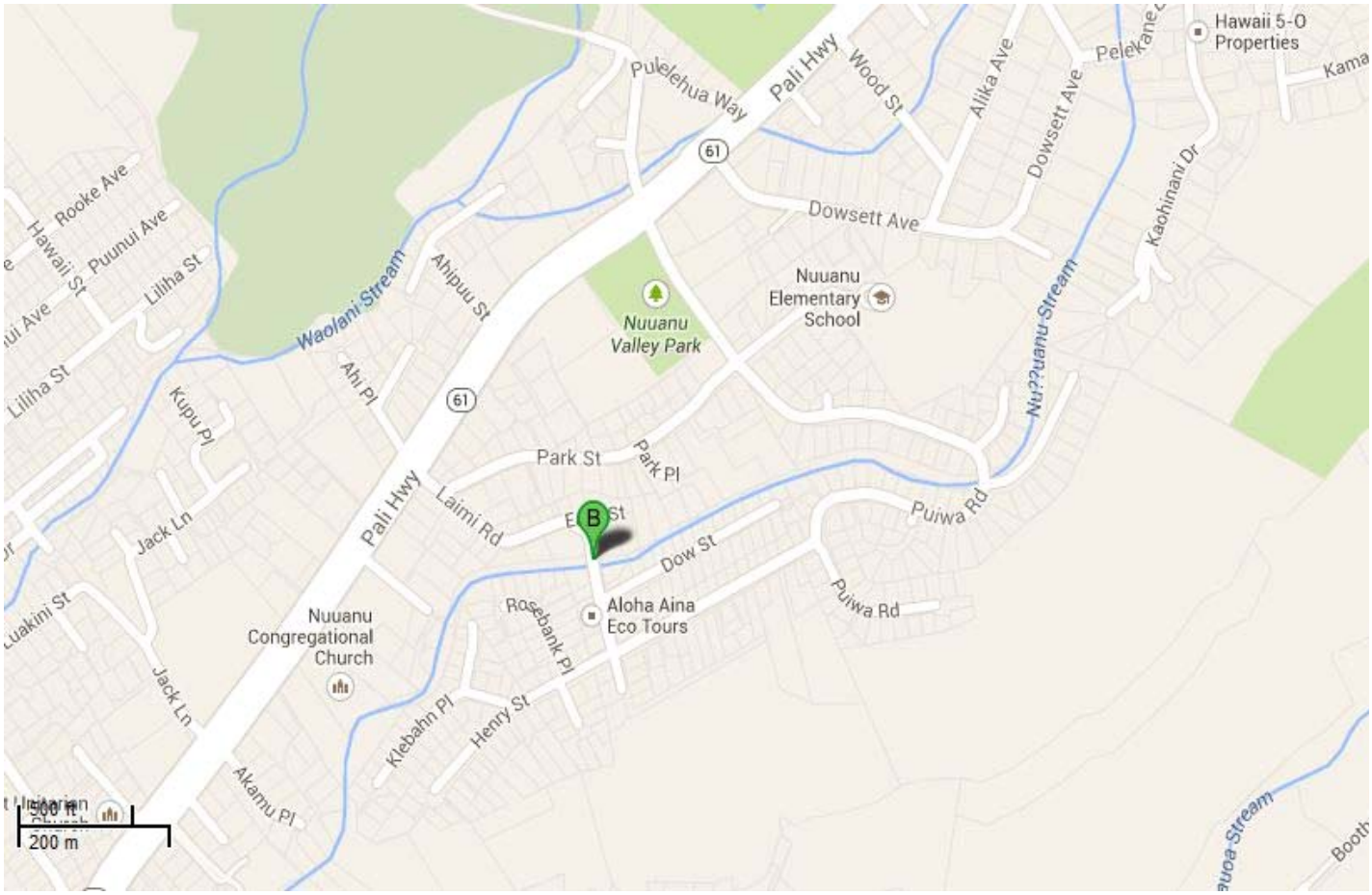
Location: TMK: 2-2-35

Historic Name: Laimi Road Bridge-Nuuanu Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1920	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1976		
Alteration Type(s):		
Alteration Description(s): Pedestrian footbridge added		

Bridge Information

Number of Spans: 1	**Max Span:** 50.0 ft.	**Total Length:** 53.0 ft.	**Deck Width:** 22.0 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Laimi Road Bridge carries Laimi Road across Nuuanu Stream. This single-span reinforced concrete two-girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete panel parapets with caps and panel detail concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs however, a pre-stressed tee-beam pedestrian footbridge was added in 1976 to one side of the bridge.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design. It is also associated with historic Nuuanu residential development.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083381400047

Popular Name: Lusitana Street Bridge-Pauoa Stream

Feature Crossed: Pauoa Stream

Feature Carried: Lusitana Street

Milepost: 0.47 mi. **County Private:** Honolulu

Longitude: 157d-50m-53.64s **Latitude:** 21d-19m-06.19s

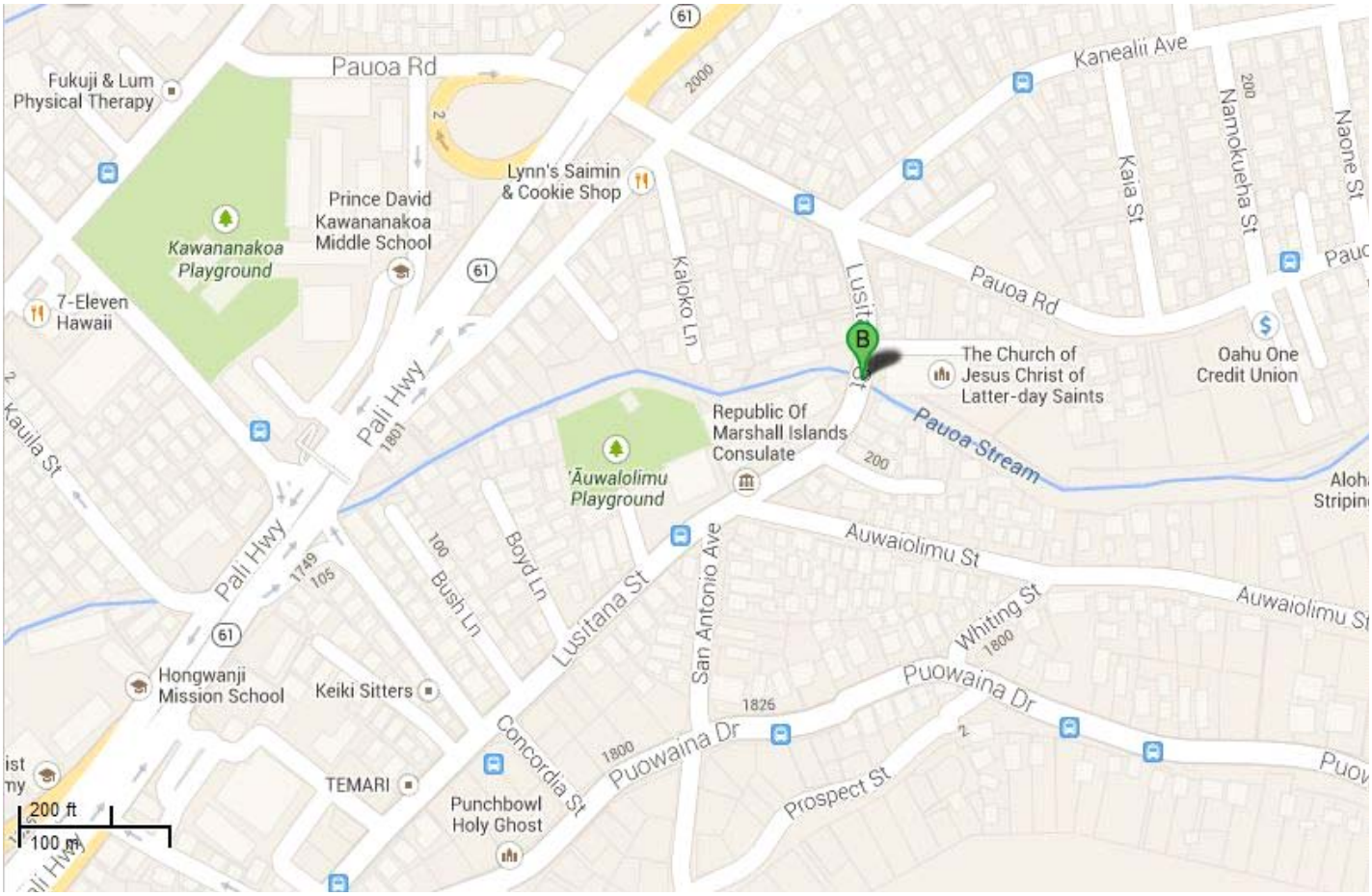
Location: 350 Feet North of Auwaiolimu Street

Historic Name: Lusitana Street Bridge-Pauoa Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2013	
Alteration Type(s):		
Alteration Description(s): Concrete repair of spalls and cracks		

Bridge Information

Number of Spans: 1	**Max Span:** 34.1 ft.	**Total Length:** 38.1 ft.	**Deck Width:** 15.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Pauoa Stream Bridge carries Lusitania Street across Pauoa Stream. This single-span reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arch voids and horizontal caps. Concrete end posts with caps flank the approaches of the parapets. The concrete deck is supported by concrete and masonry abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

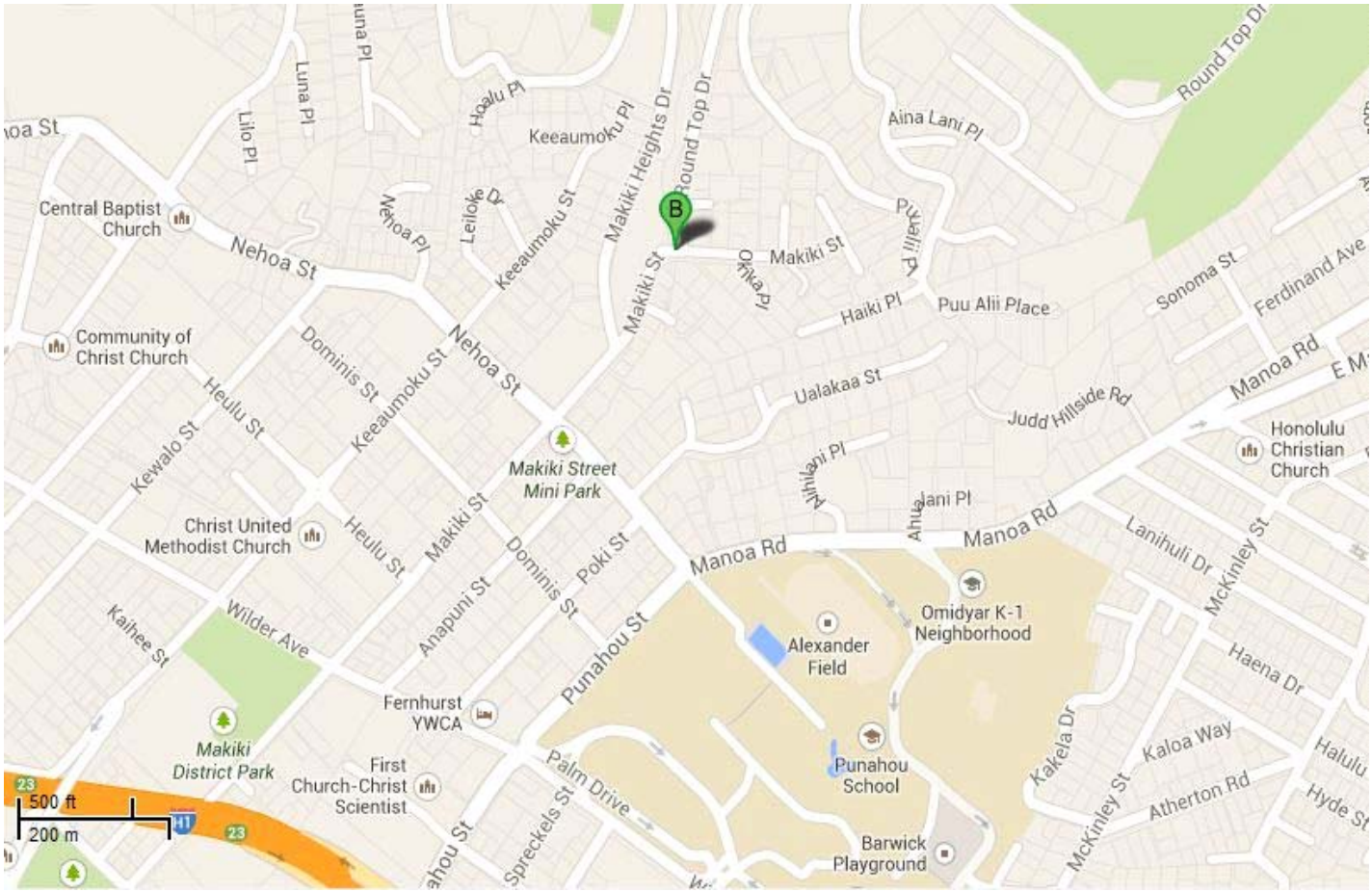
Inventory Form
(County/Private)

General Information

Bridge Number: 003226001200001	
Popular Name: Makiki Street Bridge-Makiki Stream	
Feature Crossed: Makiki Stream	
Feature Carried: Makiki Street	
Milepost:	**County Private:** Honolulu
Longitude: 157d-49m-49.64s	**Latitude:** 21d-18m-31.19s

Location: TMK: 2-4-23
Historic Name: Makiki Street Bridge-Makiki Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1912	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1953		
Alteration Type(s):		
Alteration Description(s): Bridge widened		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 44.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makiki Street Bridge carries Makiki Street across Makiki Stream. This widened arched bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge was widened in 1953 using reinforced concrete girders with a concrete deck on both sides of the elevation. It has round metal pipe rails and a chain-link fence. Although the 1953 work on the bridge widened it, the workmanship of the bridge has not been obscured by the additions or repairs, and the work did does not detract from the original design.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete arch bridge construction in Hawaii. It is a good example of a 1910's concrete arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(County/Private)

General Information

Bridge Number: 003340001200001

Popular Name: Malia Street Bridge No. 1-Waialae Nui Stream

Feature Crossed: Waialae Nui Stream

Feature Carried: Malia Street

Milepost: **County Private:** Honolulu

Longitude: 157d-46m-59.91s **Latitude:** 21d-16m-49.68s

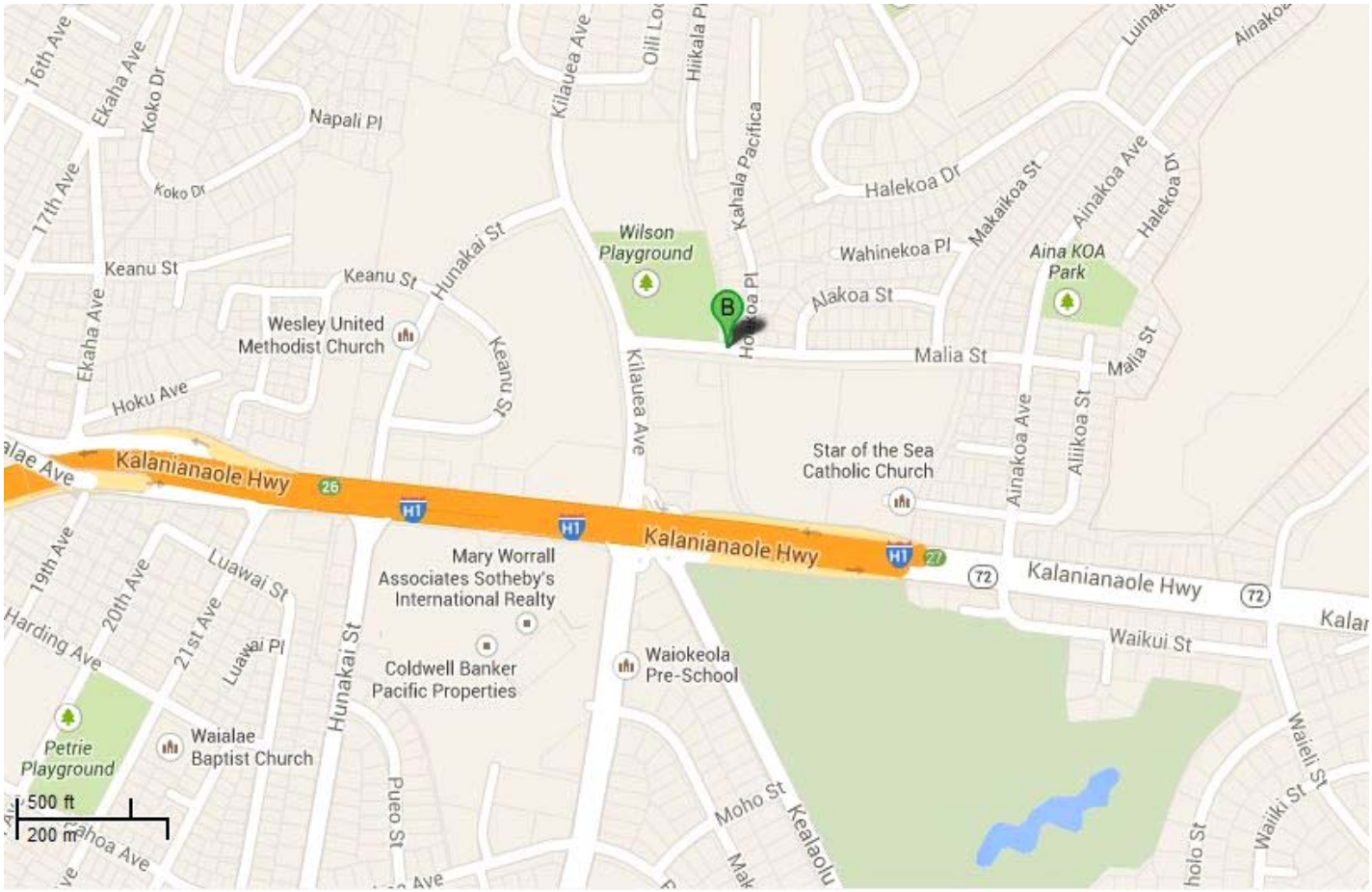
Location: TMK: 3-5-17

Historic Name: Malia Street Bridge No. 1-Waialae Nui Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1961	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 54.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Malia Street Bridge carries Malia Street across Waialae Nui Stream. This single-span reinforced concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid parapets with horizontal detailing and decorative curved ends which are a unique feature but the parapets have been modified. The deck is supported by concrete abutments over a channeled ditch. The workmanship of the bridge parapet has been obscured by vine vegetation on one side of the bridge.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1960's reinforced concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

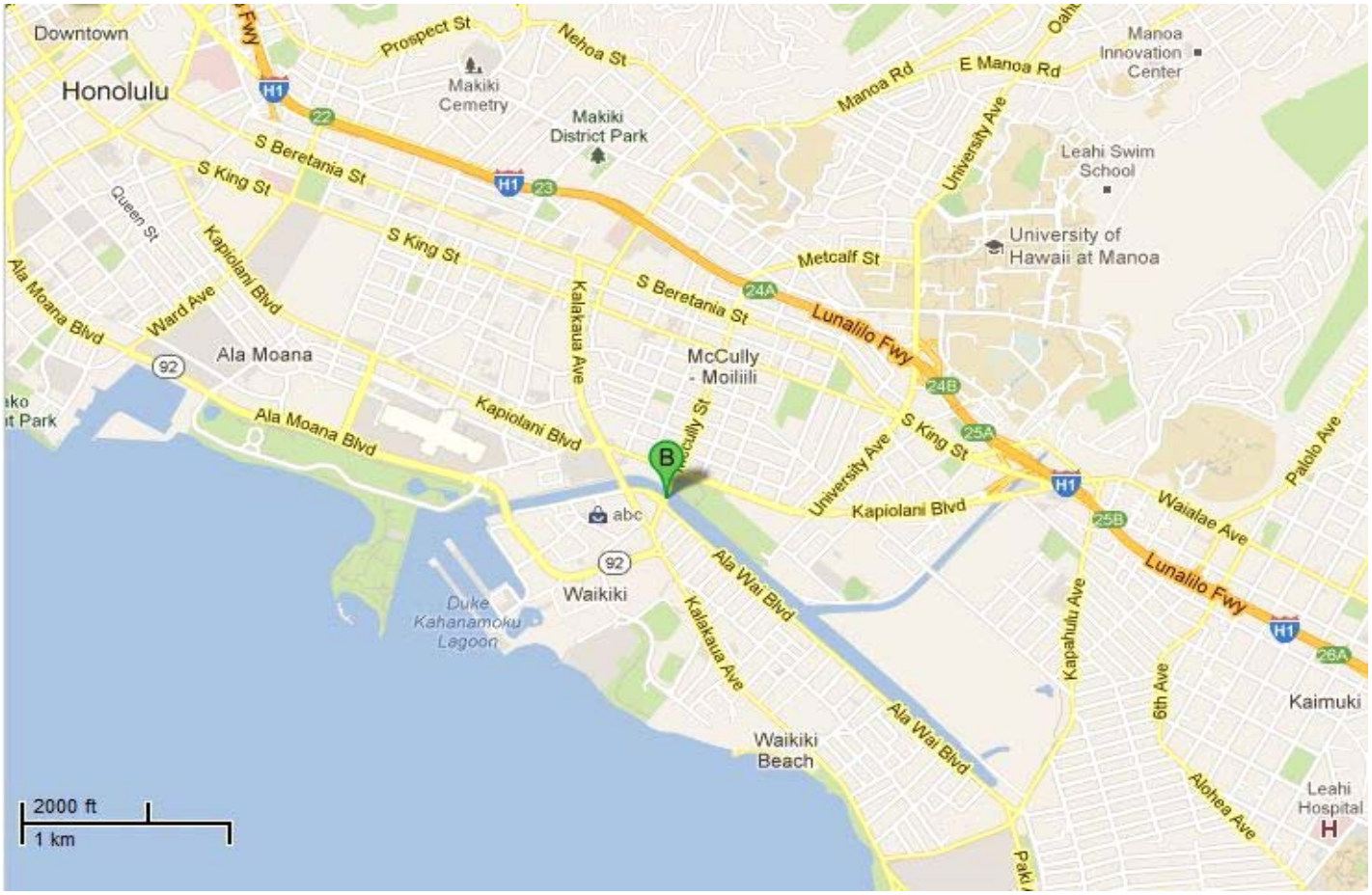
Inventory Form
(County/Private)

General Information

Bridge Number: 003083401400011	
Popular Name: Mccully Street Bridge-Ala Wai Canal	
Feature Crossed: Ala Wai Canal	
Feature Carried: McCully Street	
Milepost: 0.11 mi.	**County Private:** Honolulu
Longitude: 157d-49m-57.96s	**Latitude:** 21d-17m-17.86s

Location: North of Ala Wai Boulevard
Historic Name: Mccully Street Bridge-Ala Wai Canal
Designer/Engineer: W.R. Bartels, M. Katak and R. Shima
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1959	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2004	
Alteration Type(s):		
Alteration Description(s): Replaced missing part, patch and repair		

Bridge Information

Number of Spans: 7	**Max Span:** 34.1 ft.	**Total Length:** 166.0 ft.	**Deck Width:** 86.6 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features: Walkways both sides, built on existing piles and piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Community Development		

Narrative Description:

The Ala Wai Canal Bridge was constructed in 1959 to cope with heavy traffic over McCully Street and was rehabilitated in 2004. The bridge is located on McCully Street between Kapiolani Boulevard and Ala Wai Boulevard as a seven span reinforced concrete slab bridge. It is built on existing piers of the old McCully St. Bridge which was no longer meeting the increasing motor vehicles' needs. The south end of the bridge is flared to accommodate merging traffic and the ends spans are not supported by abutments. The decking is a reinforced flat concrete slab. This bridge is still in relatively good condition, except for some missing parts of the parapet, spalls and cracks on concrete support brackets, and exposed/corroded reinforcing bars. The parapets and the MOA are scheduled to be modified and completed during the summer of 2013. Each pier consists of pre-stressed concrete piles with a reinforced concrete pile cap. The materials and workmanship have not been obscured by additions or alterations. The engineering complexity can be considered standard for the era. However, the urbanized surroundings and width of the bridge distract moderately from the historic feeling of this structure.

Significance Statement:

William R. Bartels, Chief Engineer for the Territorial Highway Department, was responsible for many major territorial bridge projects from 1932-1956. His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility, which makes them distinctive from work of other engineers.

William R. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. Bartels designed most territorial bridges from then until 1957. He was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time and there was a marked shift to large deck girder and rigid frame bridges. Bartels ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard retirement age but he was kept on by special permission and out of necessity because his abilities were so great. Bridges designed by Bartels have often been hailed for their accomplishment of engineering as well as aesthetics.

The Bennett-Maier Plan for Waikiki Re-development
This new McCully St. Bridge is a part of the Bennett-Maier plan in 1954 for Waikiki redevelopment to relieve and control the increasing traffic problem in the Waikiki area. The plan proposed this bridge as a way to improve traffic movement into Waikiki from all sections of the island, as well as correct the serious traffic conditions on Kalakaua at the Ala Moana and Ala Wai Boulevard intersections. Studied by Charles B. Bennett, a planning consultant from Los Angeles, and Eugene Maier, a traffic consultant from Houston,(1) the development plan for Waikiki in 1954 suggested the construction of a new bridge at McCully Street, with six traffic lanes over the Ala Wai.(2) The construction of the bridge alleviated the most dangerous intersection, in terms of traffic accidents, in the City & County of Honolulu.

Eugene Maier
Eugene Maier was the director of public works and engineering in Houston and was awarded by the American Public Work Association of National Public Works Week as one of the Top Ten Public Works Leaders for the year 1961.(3)

The Ala Wai Canal
The Ala Wai Canal is a picturesque waterway at the western entrance to Waikiki. Constructed in 1922, the canal drains marshlands and diverts storm water runoff away from Waikiki and into the Pacific Ocean. The canal is about 2 miles long, 75 yards wide at the mouth and 100 yards wide in the upper reaches. The drainage area or watershed comprises about 16.3 square miles.(4) The Ala Wai Canal is a man-made estuary that separates the tourist destination of Waikiki from the rest of the island. The watershed encompasses a variety of land uses including urban areas, residential neighborhoods, preservation lands, agriculture, and three stream systems.(5)

Prior to the completion of the canal, the southeastern coast of Oahu was a swampland of fish and duck ponds. Today, the Ala Wai Canal marks the entrance to one of the most famous tourist and beach areas in the world - Waikiki.

The Canal has been designated as both a State Historic Site in 1992, and a National Historic Site in 1985. It is important as a visual feature of Waikiki, in a state which generates about 70 percent of its income from the tourist industry. The canal is important as a place for practice by many kayak and outrigger canoe clubs.(6)

(1) Charles B. Bennett and Eugene Maier, Studies and Recommendations for the Development of Waikiki, 1954, 1.
(2) Charles B. Bennett and Eugene Maier, Studies and Recommendations for the Development of Waikiki, 1954, 1.
(3) APWA. Top Ten Public Works Leaders of the Year: 1960 to Present, www.apwa.net/About/Awards.asp?Display=top10list (accessed March 9, 2005).
(4) Eugene P. Dashiell, Ala Wai Canal Watershed Water Quality Improvement Project, Honolulu, Mayors' Asia Pacific Environmental Summit, www.csis.org/e4e/Mayor32Dshiell.html (accessed September 3, 2003).
(5) Ala Wai Canal, Inventory of Current EPA Efforts to Protect Ecosystem, www.epa.gov/ecoplaces/part2/region9/site1.html (accessed September 3, 2003).
(6) Eugene P. Dashiell, Ala Wai Canal Watershed Water Quality Improvement Project, Honolulu, Mayors' Asia Pacific Environmental Summit, www.csis.org/e4e/Mayor32Dshiell.html (accessed September 3, 2003).

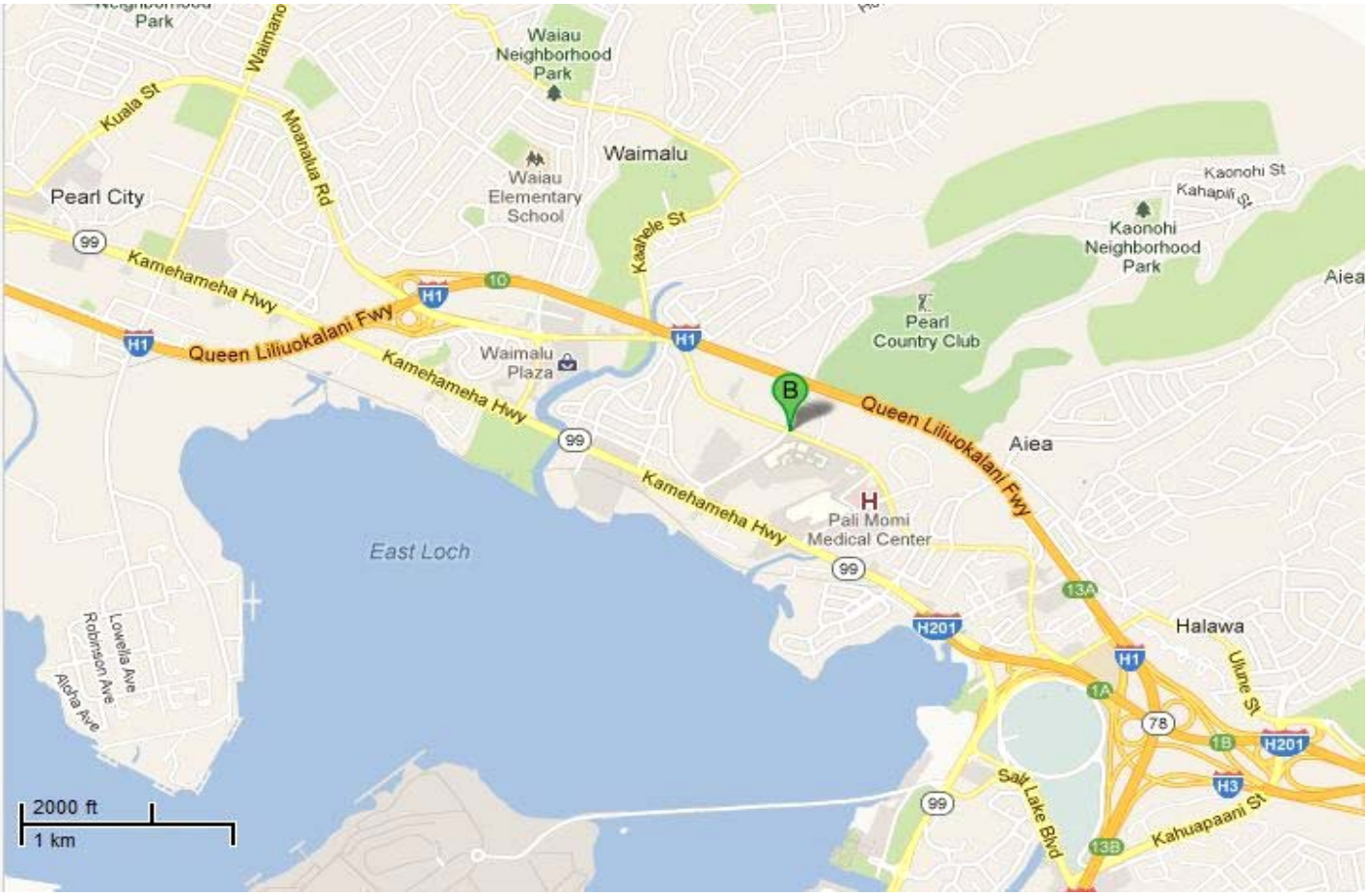
Inventory Form
(County/Private)

General Information

Bridge Number: 003072001400235	
Popular Name: Moanalua Road Bridge-Kaonohi Stream	
Feature Crossed: Kaonohi Stream	
Feature Carried: Moanalua Road	
Milepost: 2.35 mi.	**County Private:** Honolulu
Longitude: 157d-56m-19.62s	**Latitude:** 21d-23m-06.37s

Location: 0.23 Miles East of Kaonohi Street
Historic Name: Moanalua Road Bridge-Kaonohi Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 46.9 ft.	**Total Length:** 88.9 ft.	**Deck Width:** 80.1 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

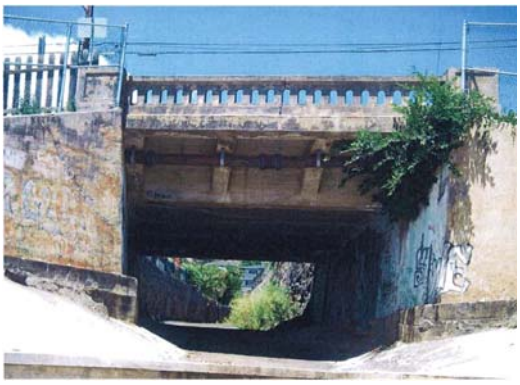
The Kaonohi Stream Bridge carries Moanalua Road across the Kaonohi Stream. This single span closed arch bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has metal horizontal railings with horizontally detailed concrete end posts. The concrete deck is a reinforced concrete slab with asphalt overlay and is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs however, portions of the bridge has graffiti.

Significance Statement:

This bridge is eligible under Criterion C for being a good example of a 1960's closed arch bridge that is atypical of its period in methods of construction, craftsmanship, and design. This bridge is the only arch bridge built post-war (1945) in the state of Hawaii in the historic study period prior to 1969. Arch bridges are an uncommon bridge type.

Inventory Form
(County/Private)

General Information



Bridge Number: 003154001200001

Popular Name: Naio Street Bridge-Nuhelewai Stream

Feature Crossed: Nuhelewai Stream

Feature Carried: Naio Street

Milepost: **County Private:** Honolulu

Longitude: 157d-51m-37.73s **Latitude:** 21d-20m-02.72s

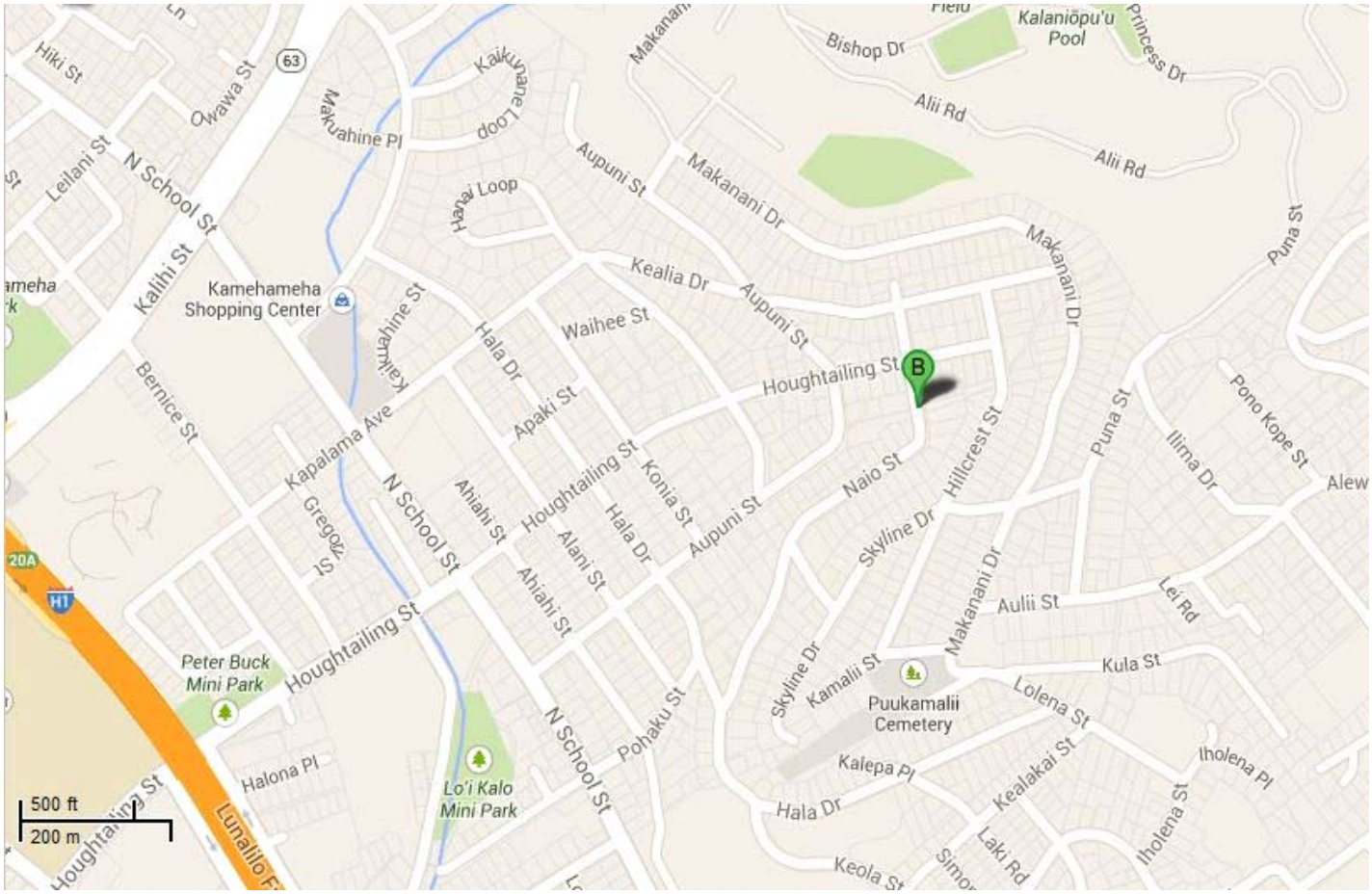
Location: TMK: 1-6-17

Historic Name: Naio Street Bridge-Nuhelewai Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 19.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 40.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Naio Avenue Bridge carries Naio Street across Nuhelewai Stream. This single-span reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arch voids and horizontal caps. Concrete panel detailed end posts with caps flank the approaches of the parapets. The concrete deck is supported by reinforced concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1920's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

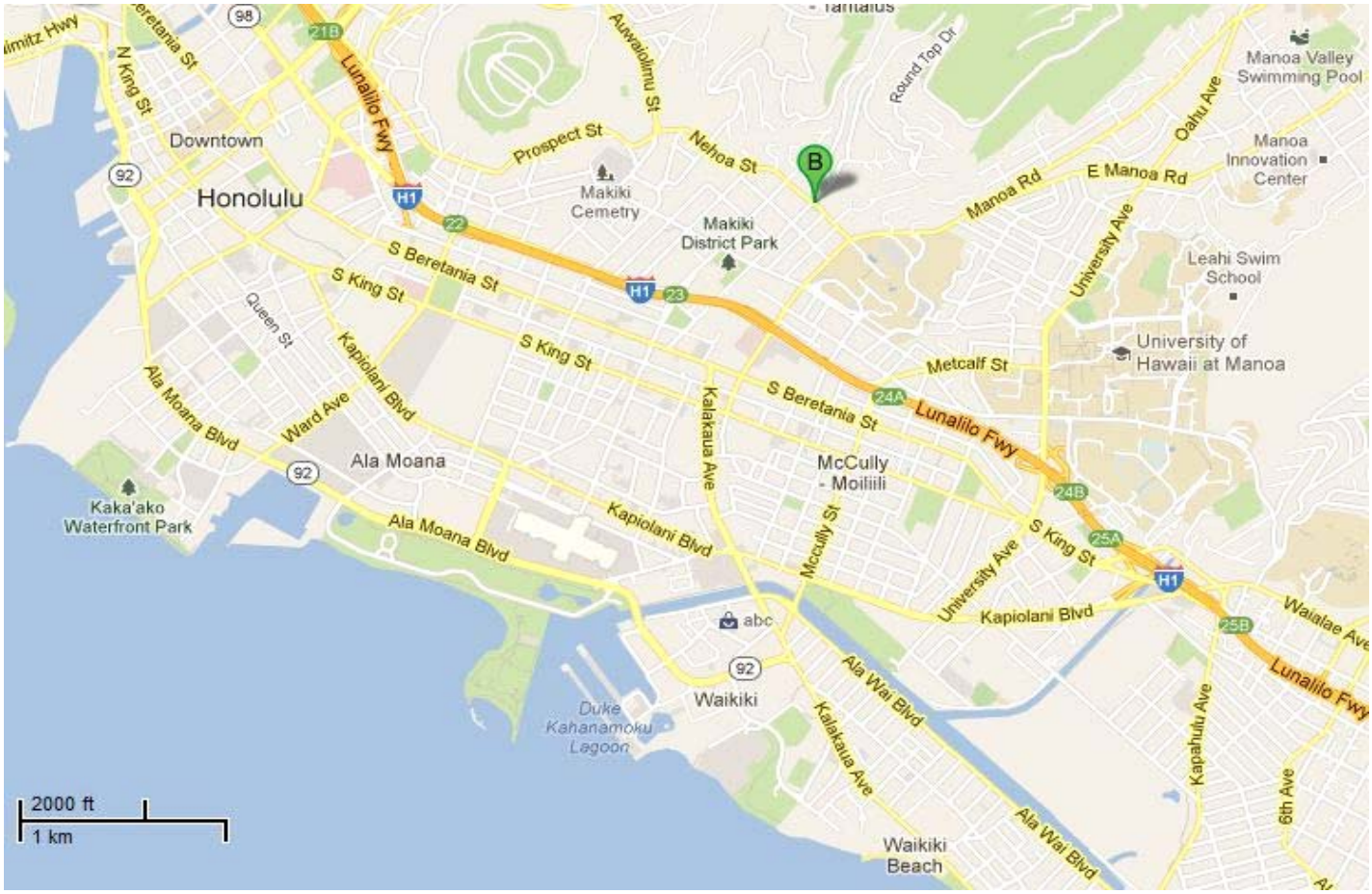
Inventory Form
(County/Private)

General Information

Bridge Number: 003083461400067	
Popular Name: Nehoa Street Bridge-Makiki Stream	
Feature Crossed: Makiki Stream	
Feature Carried: Nehoa Street	
Milepost:	**County Private:** Honolulu
Longitude: 157d-49m-54.02s	**Latitude:** 21d-18m-23.38s

Location: 100 Feet East of Makiki Street
Historic Name: Nehoa Street Bridge-Makiki Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 48.6 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makiki Stream Bridge carries Nehoa Street across Makiki Stream. This single-span concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete parapets with horizontal caps and panel detailed end posts with horizontal caps. The concrete deck is supported by concrete and masonry abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

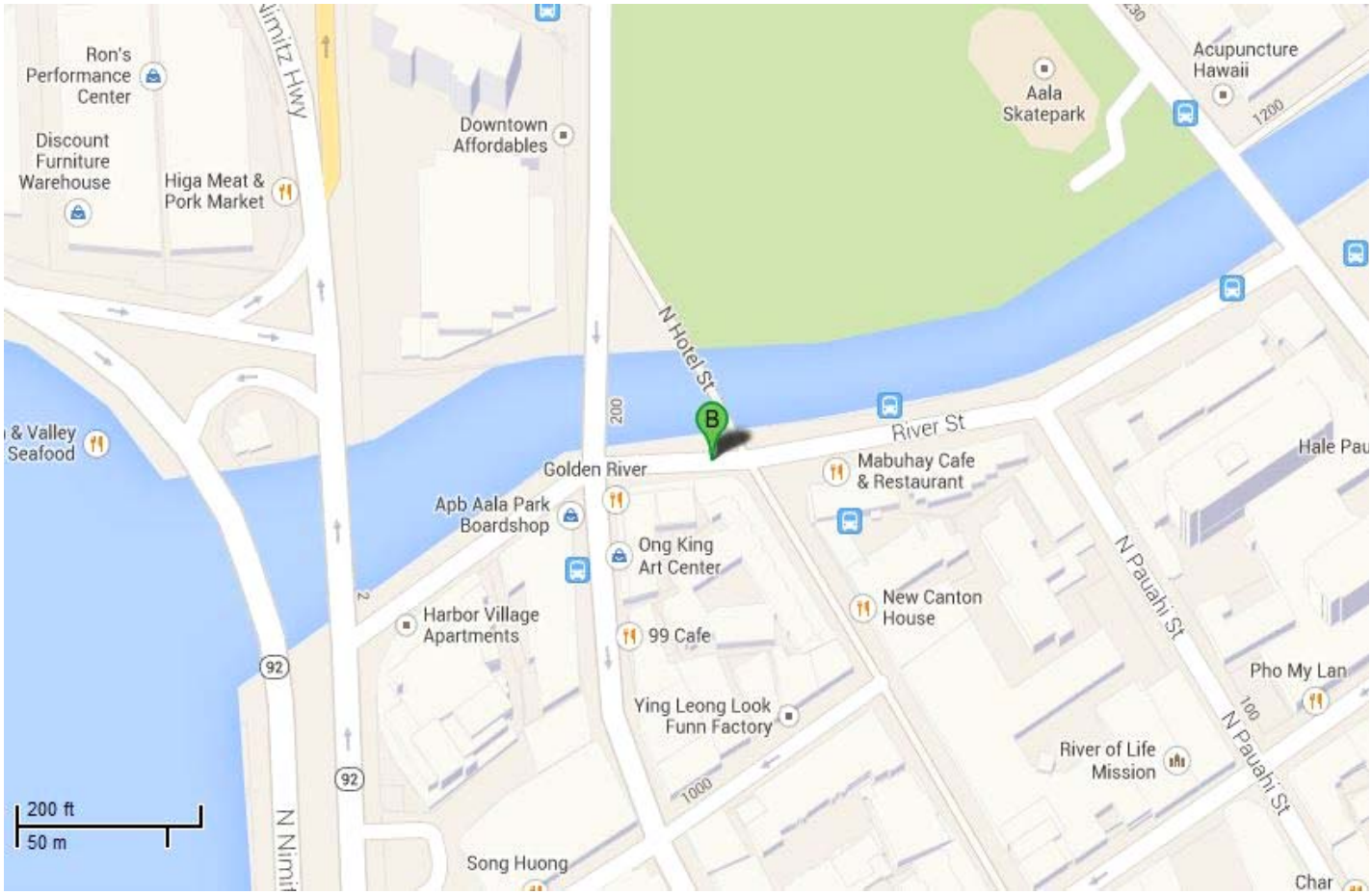
Inventory Form
(County/Private)

General Information

Bridge Number: 003083981400003	
Popular Name: North Hotel Street Bridge-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: North Hotel Street	
Milepost: 0.03 mi.	**County Private:** Honolulu
Longitude: 157d-51m-49.98s	**Latitude:** 21d-18m-49.82s

Location: TMK: 1-7-27
Historic Name: North Hotel Street Bridge-Nuuanu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1936	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 41.0 ft.	**Total Length:** 101.0 ft.	**Deck Width:** 46.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete and Metal Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Stream Bridge carries North Hotel Street across Nuuanu Stream. This single-span reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete capped parapets with arched voids and decorative end posts. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

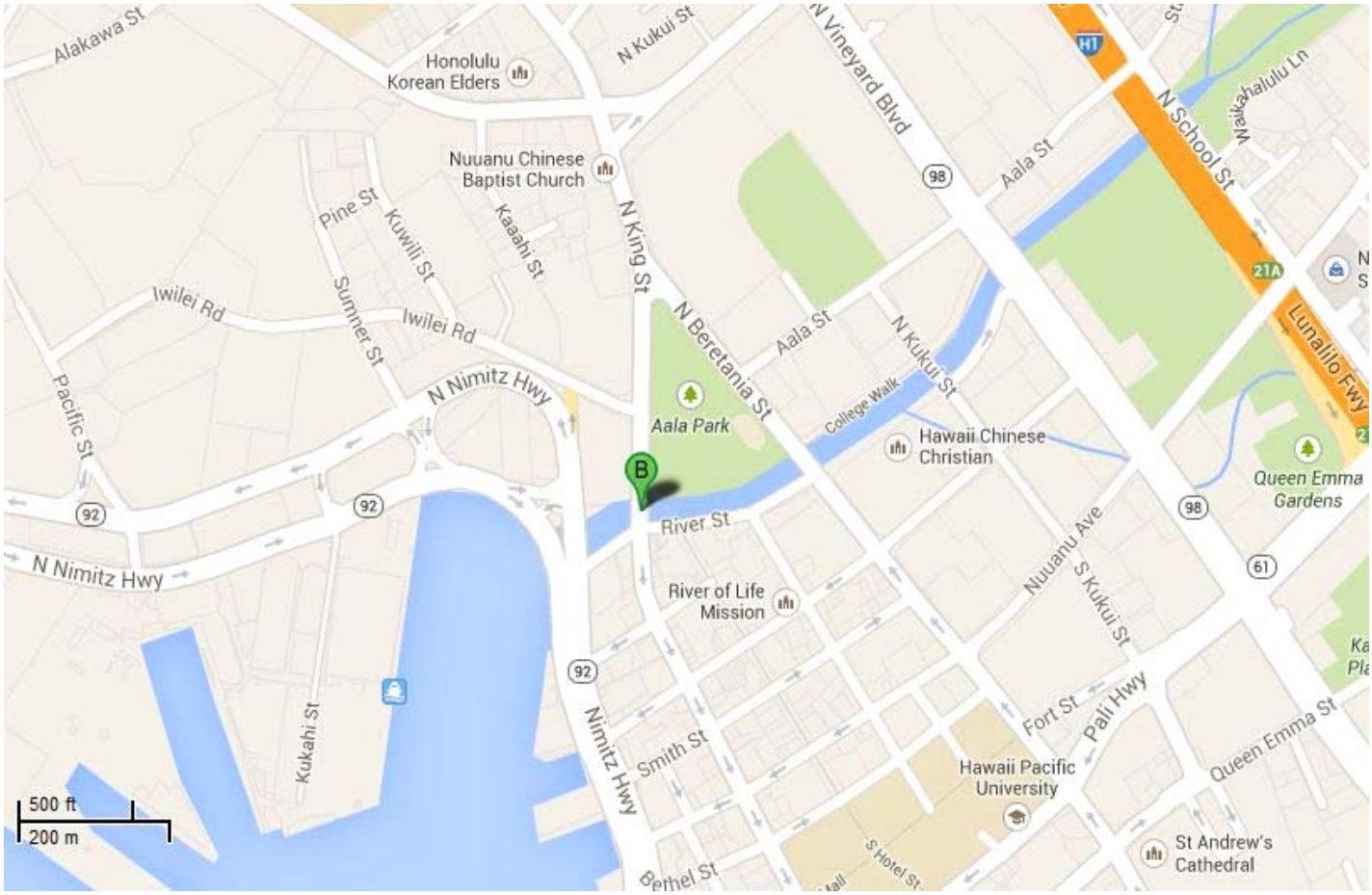
Inventory Form
(County/Private)

General Information

Bridge Number: 003062081400218	
Popular Name: North King Street Bridge No. 1-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: North King Street	
Milepost: 2.18 mi.	**County Private:** Honolulu
Longitude: 157d-51m-51.25s	**Latitude:** 21d-18m-49.65s

Location: East of River Street
Historic Name: North King Street Bridge No. 1-Nuuanu Stream
Designer/Engineer: H. A. R. Austin / Fred Ohrt
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1922	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): Replaced original light fixtures		

Bridge Information

Number of Spans: 4	**Max Span:** 24.9 ft.	**Total Length:** 91.9 ft.	**Deck Width:** 80.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features: Reinforced concrete lamp standards			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The North King Street-Nuuanu River Bridge, also known as the North King Street Bridge No. 1, carries King Street over the Nuuanu River which drains into Honolulu Harbor. The bridge is a three-span reinforced concrete continuous tee beam bridge.

The North King Street Bridge remains in its original location over the Nuuanu River. The bridge's setting alongside the Chinatown Historic District has retained its historic character. The bridge's original tee beam design and reinforced concrete materials remain intact. The bridge was technologically innovative for its time, since tee beam construction was relatively uncommon in the islands until the mid-1930s. The original bridge was the work of skilled builders, who constructed its three concrete spans over the river. The quality of the workmanship remains evident despite minor spalling concrete and the replacement of the original light fixtures from the cast concrete lamp standards. The bridge's historic associations, as a representative example of an early concrete tee beam bridge and an essential element in Honolulu's urban road system, as well as a potentially contributing resource within the Chinatown Historic District, are readily apparent to visitors. The bridge is easily viewed from River Street which runs parallel to the Nuuanu River. The bridge's historic feeling is primarily evident due to its decorative stepped parapets and the slight rise of the deck as it spans the river.

Significance Statement:

The North King Street-Nuuanu River Bridge is significant in the areas of engineering and transportation in Hawaii. The bridge is an excellent example of reinforced concrete tee beam construction with solid decorative parapets. The bridge is eligible under Criterion A for its associations with public works efforts by the City and County of Honolulu during the Territorial period, and as an important civic structure associated with the development of urban Honolulu and Chinatown. It is eligible under Criterion C as excellent example of a 1920s-era bridge utilizing a relatively new engineering technology, continuous reinforced concrete tee-beam construction, as well as for its aesthetic merit. The bridge is located alongside the Chinatown Historic District which was nominated to the National Register on January 17, 1973 (State Site Number 80-14-9986).

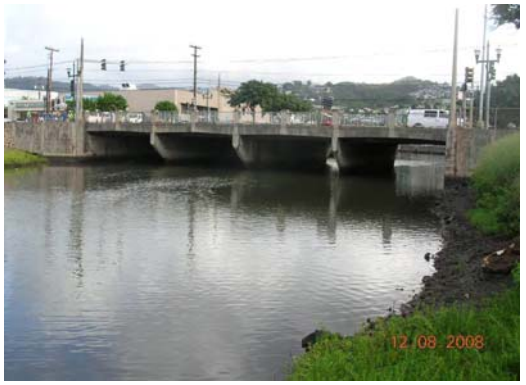
The North King Street-Nuuanu River Bridge was constructed as part of the upgrading of Honolulu's road system. The bridge is a significant contributing historic resource alongside the Chinatown Historic District. The bridge contributed to the economic development of Chinatown by providing reliable vehicular access at an important river crossing.

The North King Street- Nuuanu River Bridge is one of the first large reinforced concrete tee-beam bridges built in the state.(1) The bridge utilizes technology typical of later concrete bridges and demonstrates the rapid advances in engineering technology in the early decades of the twentieth century. H.A.R. Austin, whose name appears on the plans for the bridge, was the chief engineer for the City and County of Honolulu, Department of Public Works.

(1) Bethany Thompson, Historic Bridge Inventory: Island of Oahu, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1983), VII-25.

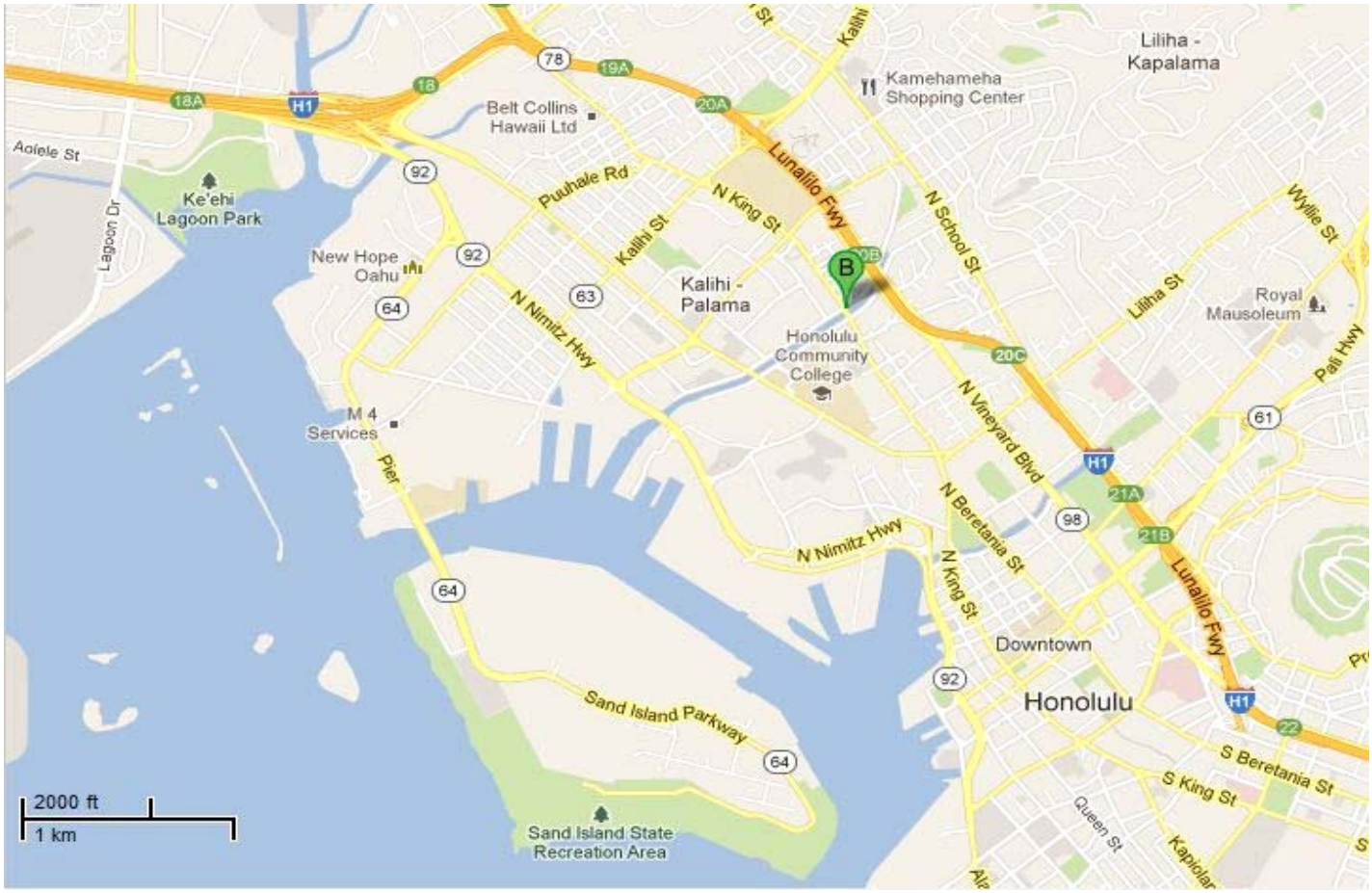
Inventory Form
(County/Private)

General Information

Bridge Number: 003062081400134	
Popular Name: North King Street Bridge No. 2-Kapalama Canal	
Feature Crossed: Kapalama Canal	
Feature Carried: North King Street	
Milepost: 1.34 mi. **County Private:** Honolulu	
Longitude: 157d-52m-07.93s **Latitude:** 21d-19m-29.66s	

Location: TMK: 1-6-02
Historic Name: North King Street Bridge No. 2-Kapalama Canal
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1938	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 23.0 ft.	**Total Length:** 101.0 ft.	**Deck Width:** 86.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kapalama Canal Bridge carries North King Street across the Kapalama Canal. This four-span reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has decorative metal railings with concrete intermittent posts and concrete end posts. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs however, portions of the metal railings show signs of corrosion.

Significance Statement:

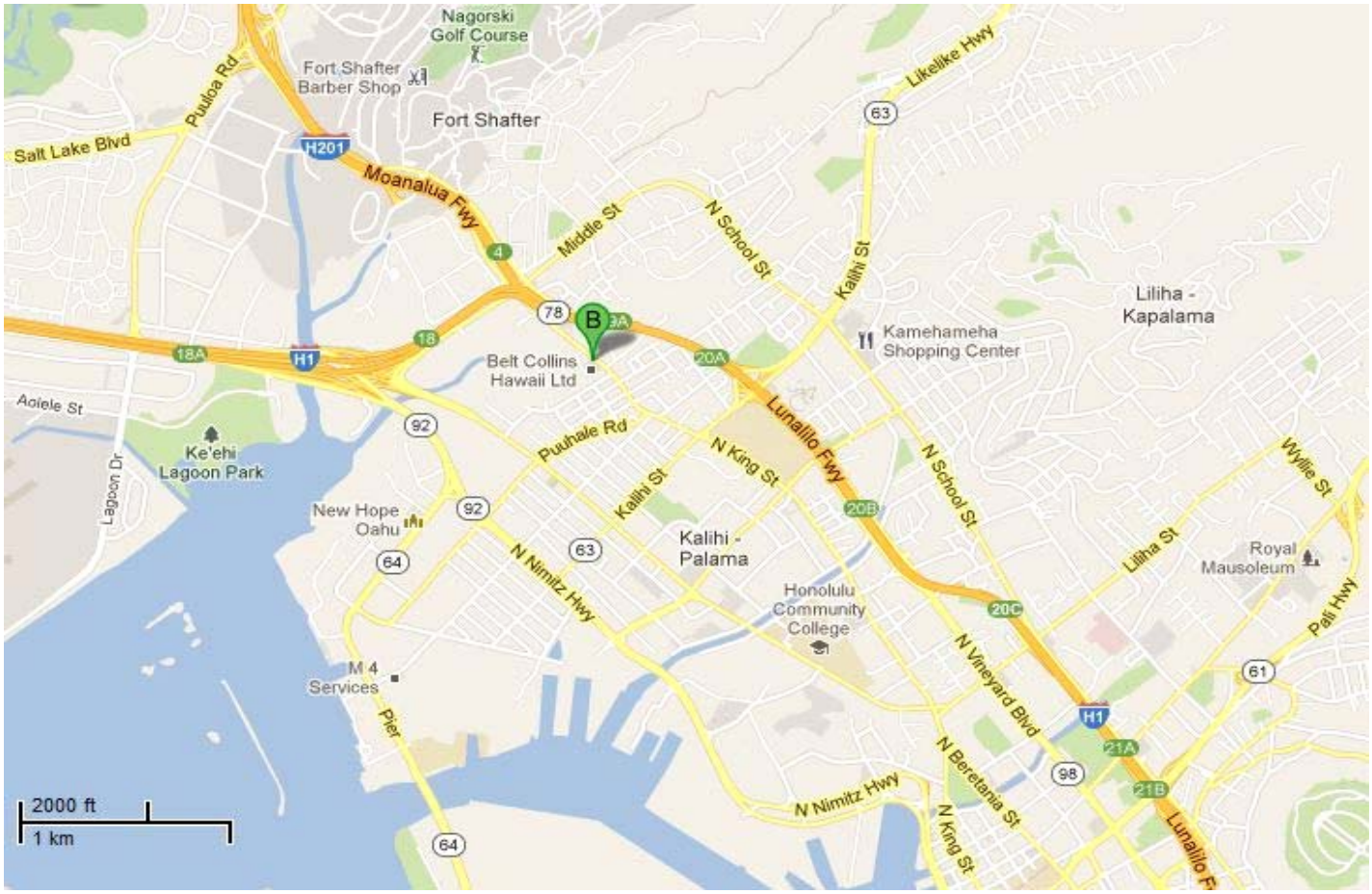
This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003062081400037	
Popular Name: North King Street Bridge-Kalihi Stream	
Feature Crossed: Kalihi Stream	
Feature Carried: North King Street	
Milepost: 0.37 mi. **County Private:** Honolulu	
Longitude: 157d-52m-46.86s **Latitude:** 21d-20m-02.61s	
Location: 300 Feet West of Gulick Avenue	
Historic Name: North King Street Bridge-Kalihi Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 62.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 86.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

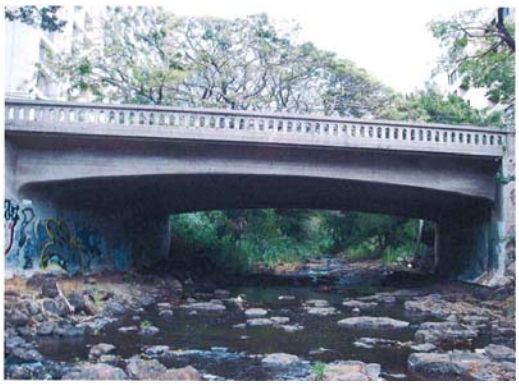
The Kalihi Stream Bridge carries North King Street across the Kalihi Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has parapets with arched voids and end posts with caps. The concrete deck is supported by concrete masonry abutments. The workmanship of the bridge has not been obscured by additions or repairs. The bridge has retained its historic feeling due to the design of the railings which are typical of 1930s bridges.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information



Bridge Number: 003083321400031

Popular Name: North Kuakini Street Bridge No. 1-Nuuanu Stream

Feature Crossed: Nuuanu Stream

Feature Carried: North Kuakini Street

Milepost: **County Private:** Honolulu

Longitude: 157d-51m-15.55s **Latitude:** 21d-19m-12.33s

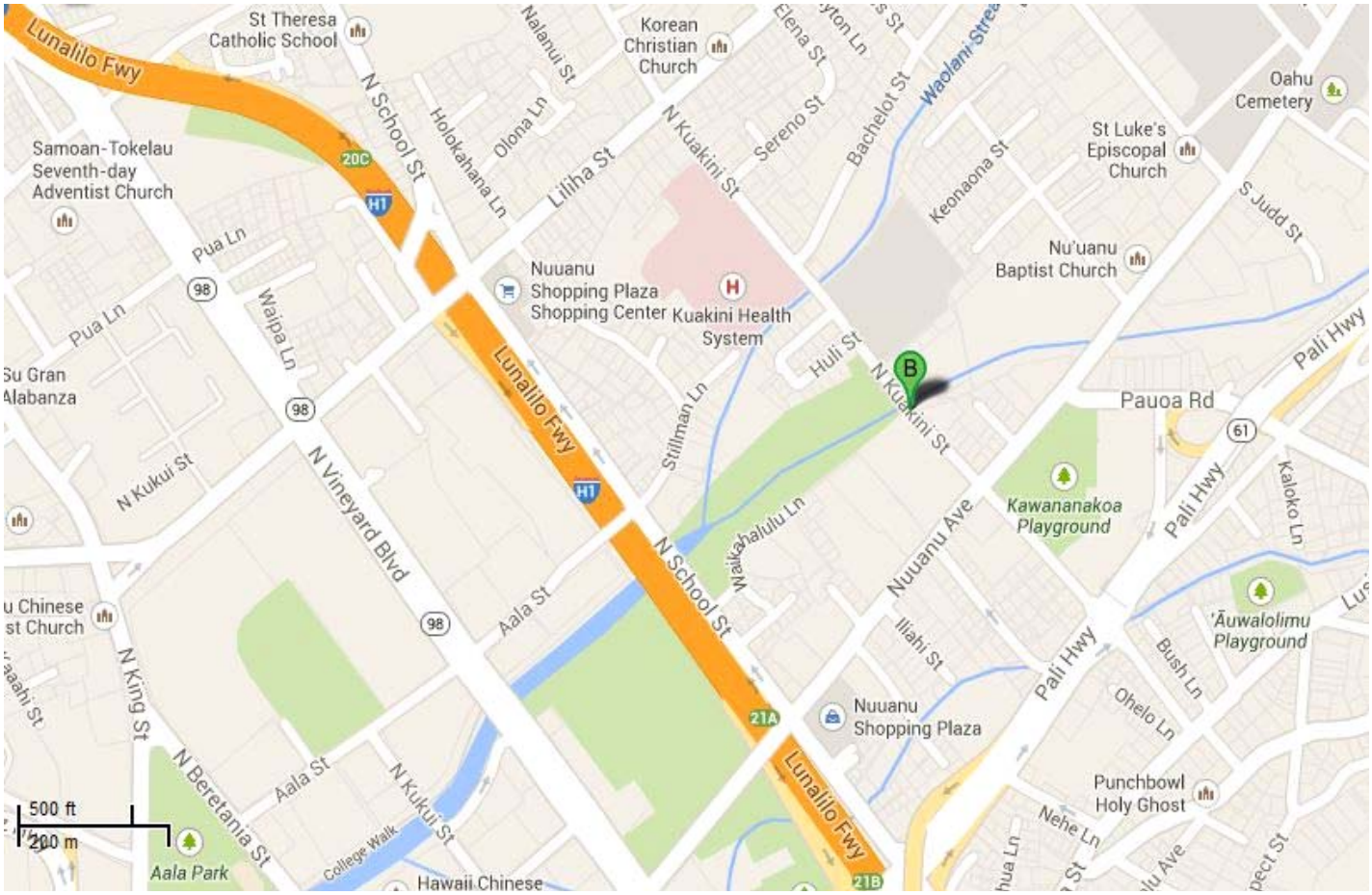
Location: 450 Feet Northwest of Nuuanua Avenue

Historic Name: North Kuakini Street Bridge No. 1-Nuuanu Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 55.1 ft.	**Total Length:** 64.0 ft.	**Deck Width:** 52.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Stream Bridge carries North Kuakini Street across Nuuanu Stream. This single-span arch girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arch voids and horizontal caps. Concrete end posts with caps flank the approaches of the parapets. The concrete deck is supported by reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083321400019

Popular Name: North Kuakini Street Bridge No. 2-Waiolani Stream

Feature Crossed: Waiolani Stream

Feature Carried: North Kuakini Street

Milepost: **County Private:** Honolulu

Longitude: 157d-51m-19.82s **Latitude:** 21d-19m-17.33s

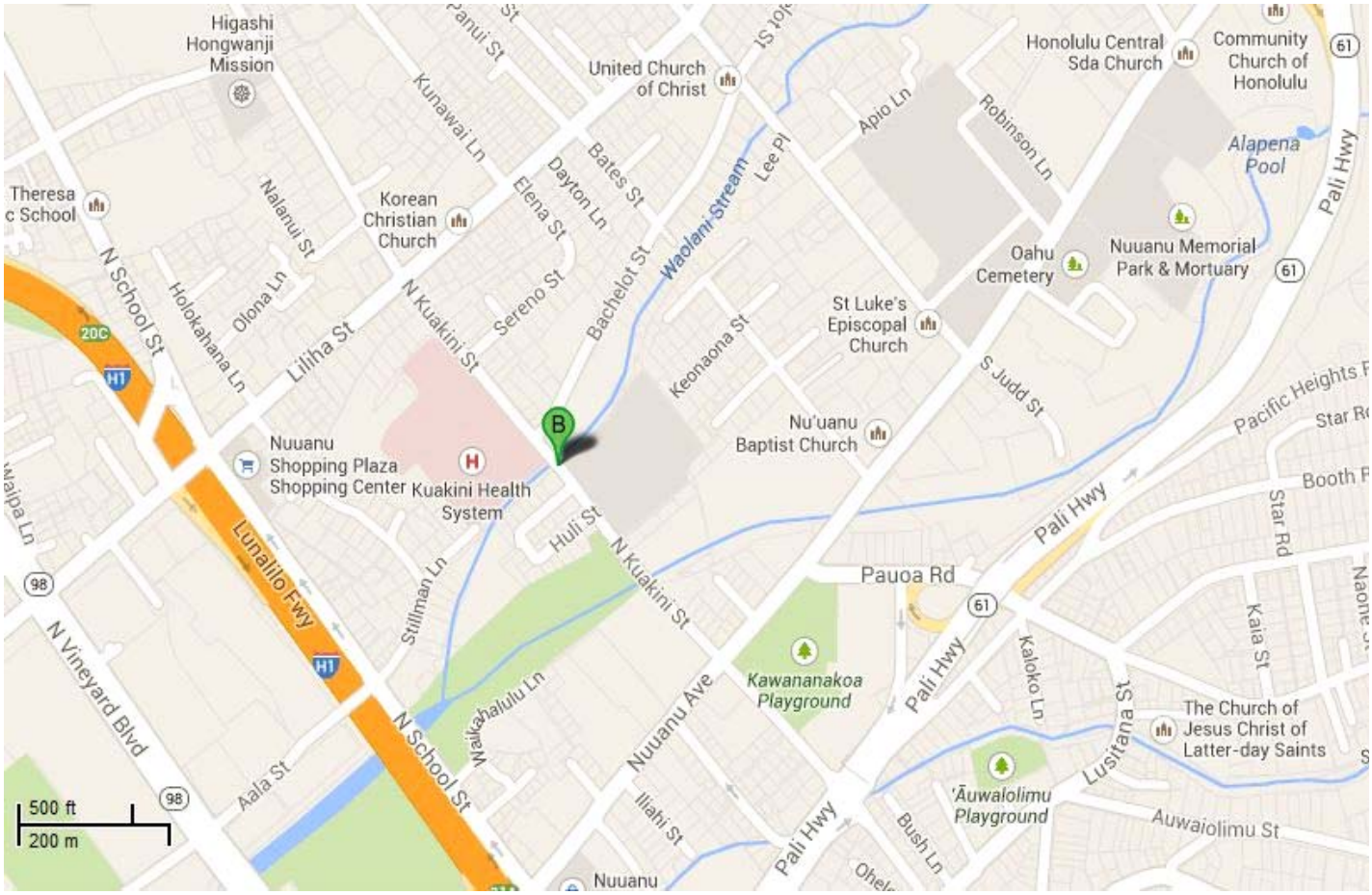
Location: 100 Feet Northwest of Huna Street

Historic Name: North Kuakini Street Bridge No. 2-Waiolani Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 37.1 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 52.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

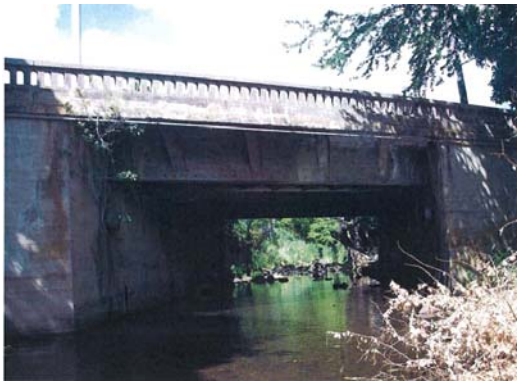
The Waiolani Stream Bridge carries North Kuakini Street across Waolani Stream. This single-span reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arch voids and horizontal caps, and concrete end posts with caps. The workmanship of the bridge has not been obscured by additions or repairs. The simple design of the parapets retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information



Bridge Number: 003083631400093

Popular Name: North School Street Bridge-Kalihi Stream

Feature Crossed: Kalihi Stream

Feature Carried: North School Street

Milepost: **County Private:** Honolulu

Longitude: 157d-52m-23.31s **Latitude:** 21d-20m-21.55s

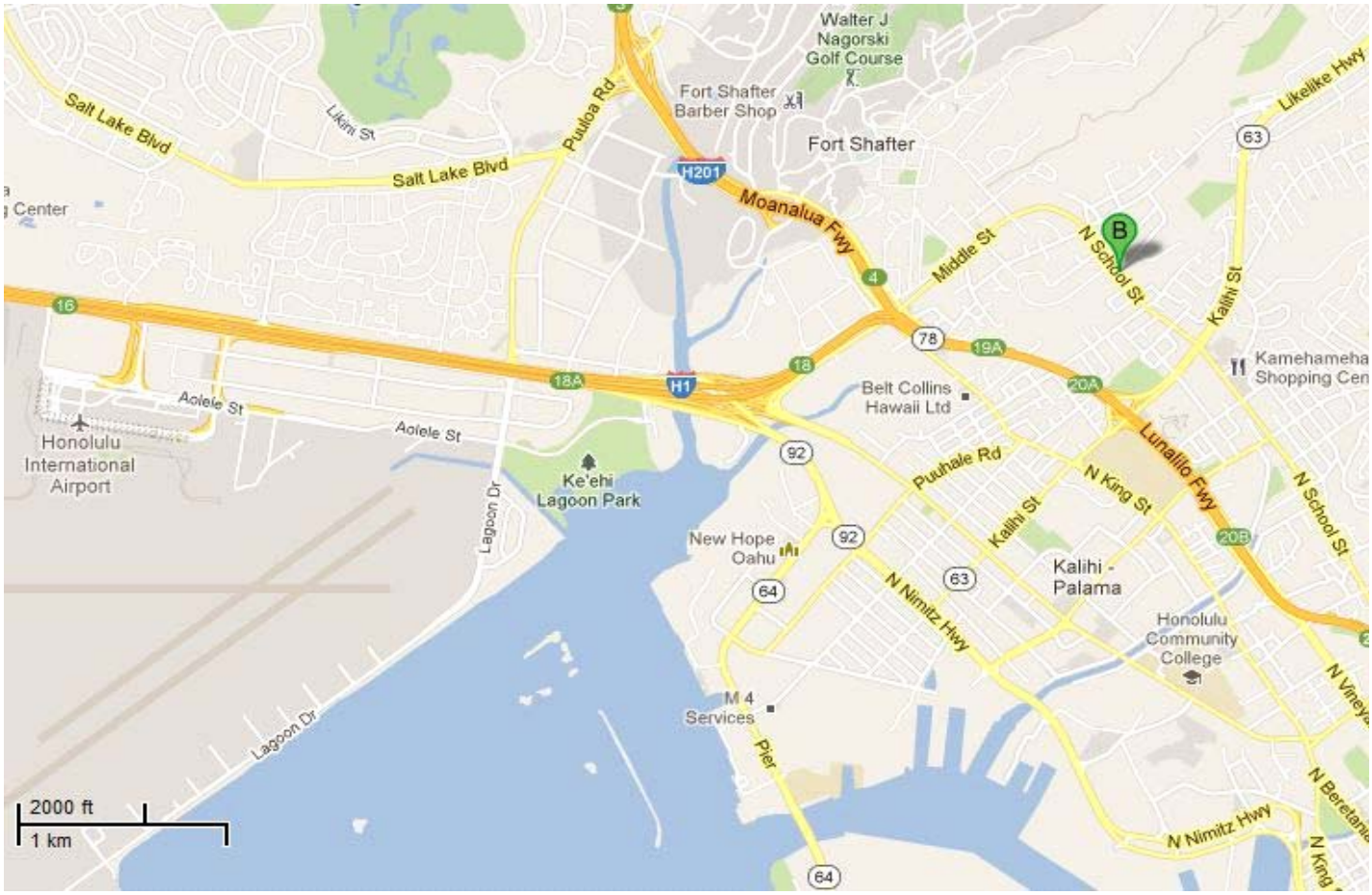
Location: 600 Feet Northwest of Gulick Avenue

Historic Name: North School Street Bridge-Kalihi Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1927	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 38.1 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 60.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kalihi Stream Bridge carries North School Street across Kalihi Stream. This single-span reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with arched voids and horizontal caps, and panel detailed end posts with horizontal caps. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

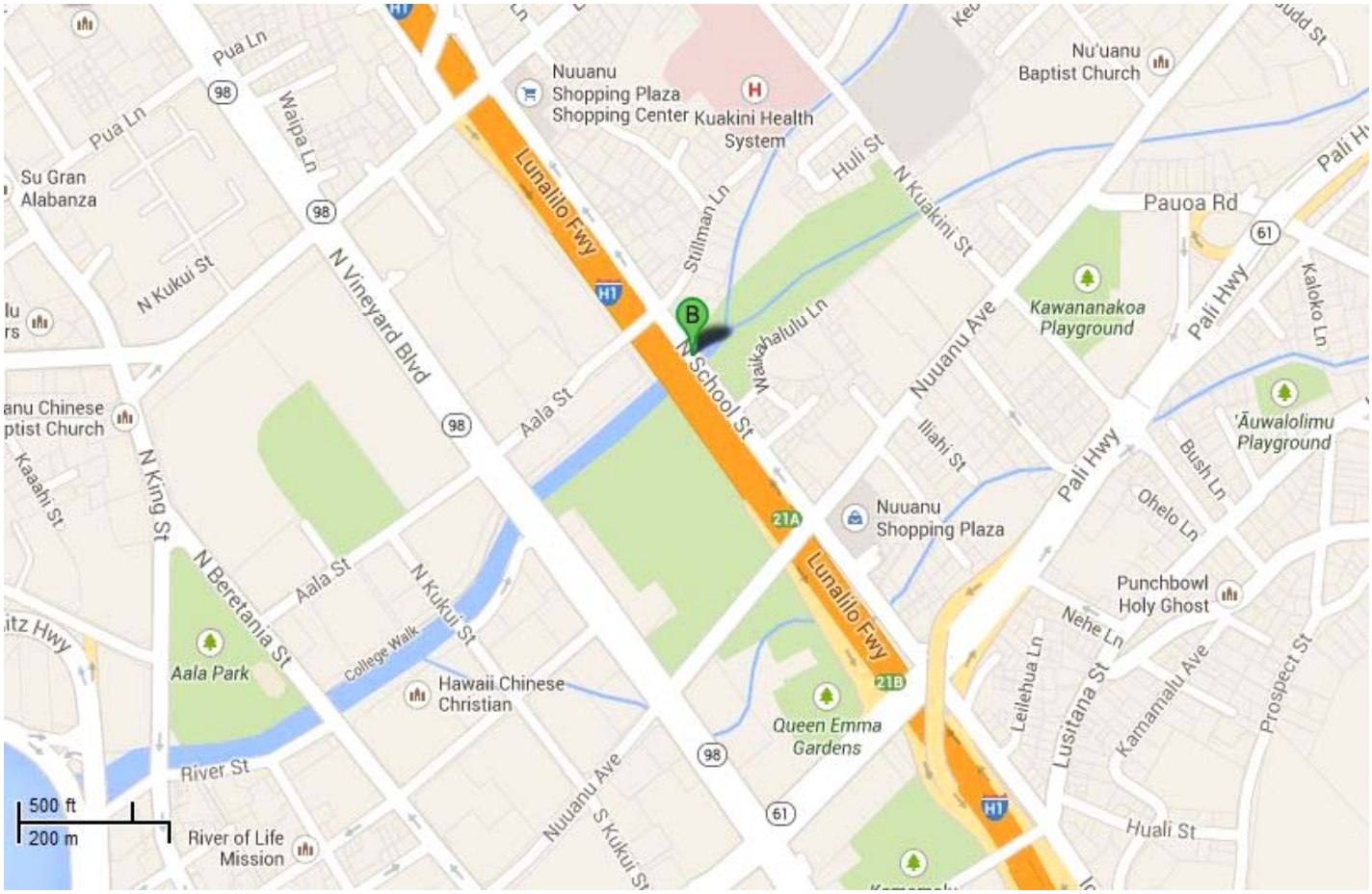
Inventory Form
(County/Private)

General Information

Bridge Number: 003083631400271	
Popular Name: North School Street Bridge-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: North School Street	
Milepost:	**County Private:** Honolulu
Longitude: 157d-51m-26.63s	**Latitude:** 21d-19m-06.39s

Location: 250 Feet South of Stillman Lane
Historic Name: North School Street Bridge-Nuuanu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1932	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 48.9 ft.	**Total Length:** 128.9 ft.	**Deck Width:** 60.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Stream Bridge carries North School Street across Nuuanu Stream. This three-span reinforced concrete T-girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete capped parapets with arched voids, intermittent posts, and end posts. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

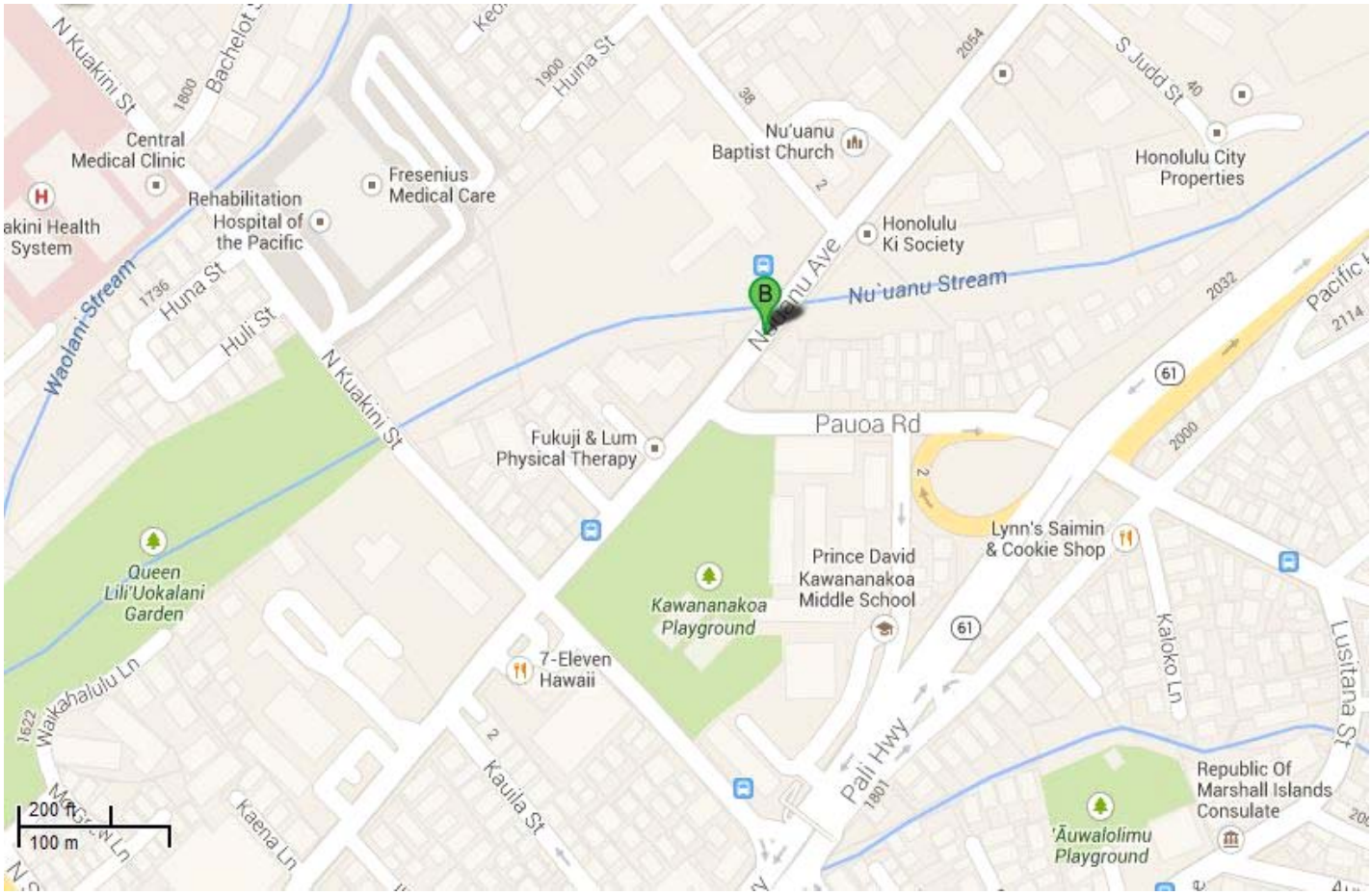
Inventory Form
(County/Private)

General Information

Bridge Number: 003083471400113	
Popular Name: Nuuanu Avenue Arch Bridge-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: Nuuanu Avenue	
Milepost:	**County Private:** Honolulu
Longitude: 157d-51m-07.08s	**Latitude:** 21d-19m-14.51s

Location: 200 Feet North of Pauoa Road
Historic Name: Nuuanu Avenue Arch Bridge-Nuuanu Stream
Designer/Engineer:
Builder/Contractor: L. M. Whitehouse

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1904	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1937		
Alteration Type(s):		
Alteration Description(s): Inverts reconstructed		

Bridge Information

Number of Spans: 1	**Max Span:** 32.2 ft.	**Total Length:** 32.2 ft.	**Deck Width:** 62.0 ft.
Superstructure: Masonry Closed Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock with Cap			
Setting:			
Other Features: Sidewalks along two sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Nuuanu Avenue Bridge carries Nuuanu Avenue over the Nuuanu Stream. The bridge, located in one of Honolulu's oldest residential neighborhoods, is a rare remaining example of a masonry arch built from local basalt, known as "lava rock". The Nuuanu Avenue Bridge's original residential setting has been altered by the intensive development of nearby Honolulu in the 1960s-80s. Commercial development and high-rise construction have replaced the older single family homes that once flourished in this area. The bridge's original design, a single-span masonry arch with a concrete-finished vault, remains intact. The bridge's parapets are continuous along this section of Nuuanu Avenue, due to the skew of the stream in relation to the roadway, and are difficult to discern from the roadway due to their low height. The original basalt has not received any major repairs, although one of the cap blocks was replaced in-kind. The inverts were reconstructed in concrete in 1937. The quality of workmanship on the bridge, particularly the massive basalt blocks with dressed margins, is extremely high. The bridge's association with the residential development of urban Honolulu is apparent to the informed observer. The bridge's historic feeling is evident due to the large size and skillful detailing of the basalt ("lava rock") blocks, a once common vernacular building material. In 2013, the bridge will undergo rehabilitation to increase the railing height via cap alteration to meet code.

Significance Statement:

The Nuuanu Avenue Bridge is significant in the areas of engineering and transportation in Hawaii. The bridge is an excellent example of masonry arch construction in Hawaii. Arch bridges are also an uncommon bridge type. The Nuuanu Avenue Bridge is eligible under Criterion A for its associations with early public works efforts by the Territory of Hawaii and for its contributions to the development of urban Honolulu. It is eligible under Criterion C as a rare remaining example of a once common bridge type constructed with vernacular materials (cut basalt or “lava rock”). Moreover, it is representative of the work of a master: Louis M. Whitehouse, the prolific contractor who built many other roads and bridges in this era.

At the time of its initial construction in 1904, the bridge served as a vital transportation link to downtown Honolulu, aiding in the commercial and residential development of Honolulu. Nuuanu was one of the earliest residential developments on the outskirts of urban Honolulu. After annexation by the United States in 1898, the Territory of Hawaii made road building in urban areas a high priority. The road to Nuuanu would have been among the first to be paved.

The Nuuanu Avenue Bridge is an excellent example of a masonry arch bridge, displaying the skill and artistry of Hawaii's stone masons. It is one of nine remaining masonry-arch bridges in the state and one of the last masonry arch bridges built in Hawaii. The bridge is notable for its use of vernacular building materials. The local basalts which compose the lava-rock used in the bridge’s construction are unique to Hawaii and the islands of the Pacific;(1) thus these masonry arch bridges may be the only examples of this type in the United States.

The county estimates the construction date of this bridge to be 1937, however a photograph of the bridge, dated “June 1904”, was found in the Hawaii State Archives. The 1902 SPW annual report makes a reference to funding for the “Nuuanu Avenue Bridge” and the establishment of a basalt quarry in Nuuanu. The builder was previously identified as “D. W. Whitehouse”,(2) however, it was most likely built by Louis M. Whitehouse. A search through the city directories for the years 1902 through 1934 reveal only a “Whitehouse, L. M.”(3) Further, Whitehouse’s obituary states that “in 1903, he . . . built Nuuanu dam and reservoir” and may have been responsible for this bridge as well.(4)

(1) Dr. Jane Tribble, personal conversation, School of Ocean and Earth Sciences, University of Hawaii, Honolulu, HI, June 30, 1994.
(2) Bethany Thompson, Historic Bridge Inventory: Island of Oahu, prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu: 1983), IV-23.
(3) Husted’s Directory of Honolulu and the Territory of Hawaii, (Honolulu: 1902), 545; Polk-Husted City Directory (Honolulu, 1931/1932), 505; Polk-Husted City Directory (Honolulu: 1933/1934), 497.
(4) “Whitehouse, Head of Land Office Dies,” Honolulu Star Bulletin (November 25, 1942).

Inventory Form
(County/Private)

General Information

Bridge Number: 003265001200001

Popular Name: Nuuanu Pali Drive Bridge-Nuuanu Stream

Feature Crossed: Nuuanu Stream

Feature Carried: Nuuanu Pali Drive

Milepost: **County Private:** Honolulu

Longitude: 157d-49m-14.80s **Latitude:** 21d-20m-49.47s

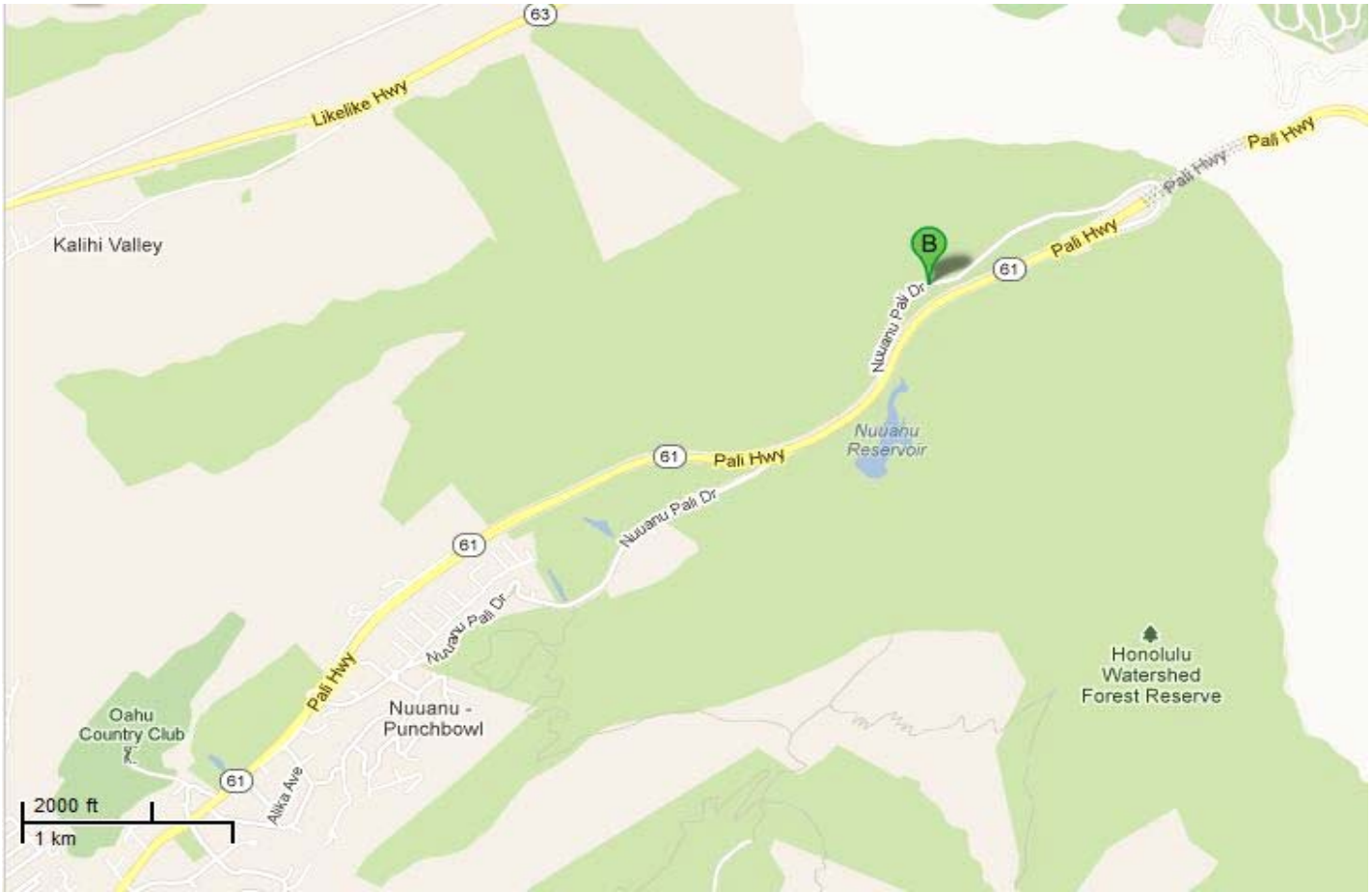
Location: TMK: 2-2-54

Historic Name: Nuuanu Pali Drive Bridge-Nuuanu Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 26.0 ft.	**Deck Width:** 32.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Nuuanu Pali Drive Bridge carries Nuuanu Pali Drive across Nuuanu Stream. This single-span reinforced concrete girder bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has concrete parapets with arched voids and caps. Panel detail concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design. It is also associated with historic Nuuanu residential development.

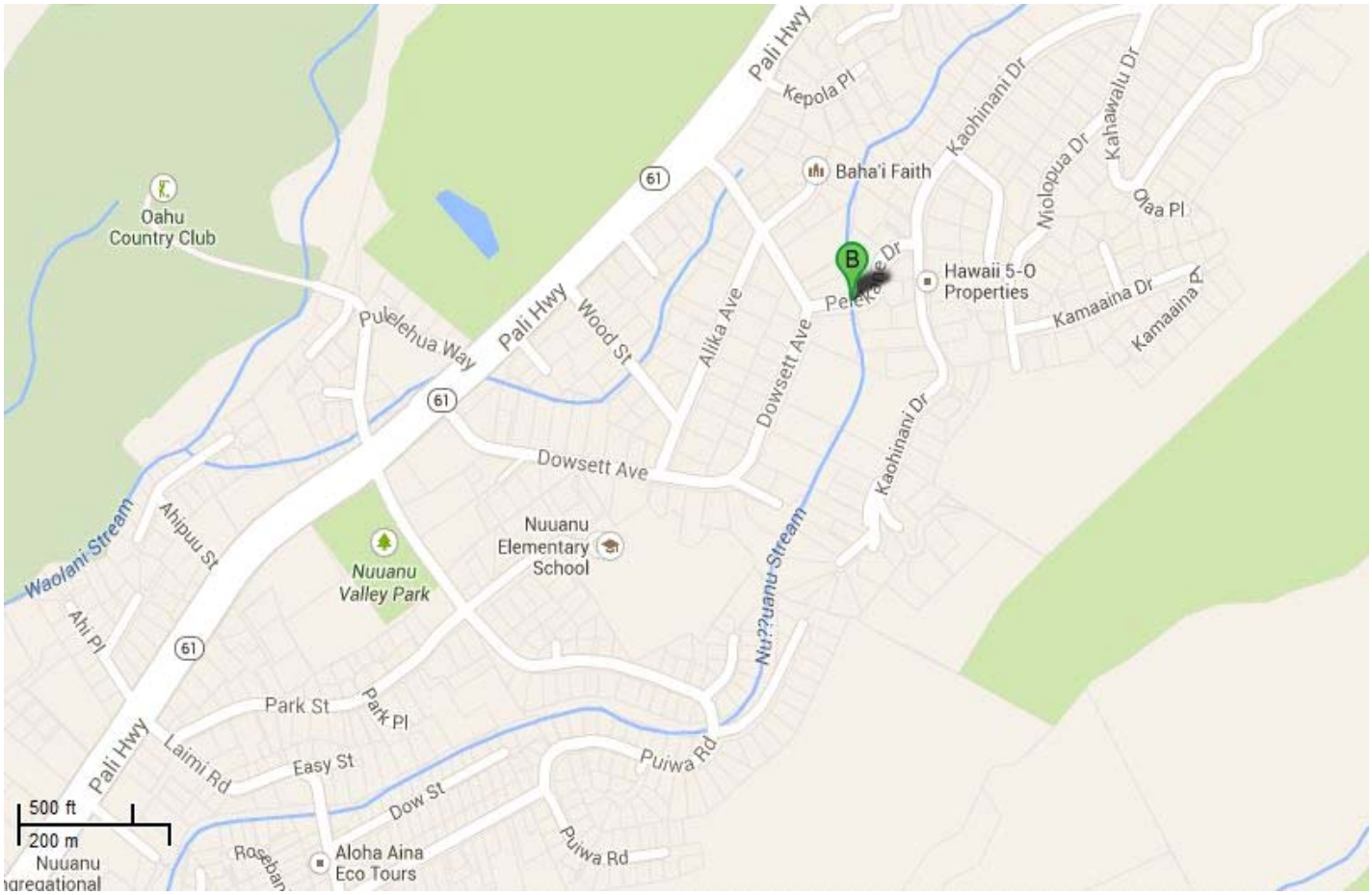
Inventory Form
(County/Private)

General Information

Bridge Number: 003267001200001	
Popular Name: Pelekane Drive Bridge-Nuuanu Stream	
Feature Crossed: Nuuanu Stream	
Feature Carried: Pelekane Drive	
Milepost:	**County Private:** Honolulu
Longitude: 157d-49m-55.87s	**Latitude:** 21d-20m-19.71s

Location: TMK: 2-2-46
Historic Name: Pelekane Drive Bridge-Nuuanu Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 38.0 ft.	**Total Length:** 43.0 ft.	**Deck Width:** 40.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Pelekane Drive Bridge carries Pelekane Drive across Nuuanu Stream. This single-span reinforced concrete multi-girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete panel parapets with caps and panel detail concrete end posts with caps flank the approaches of the parapet. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1930's reinforced concrete bridge that is typical of its materials, method of construction, craftsmanship, and design. It is also associated with historic Nuuanu residential development.

Inventory Form
(County/Private)

General Information

Bridge Number: 003236001200001

Popular Name: Puowaina Drive Bridge-Auwaiolimu Street

Feature Crossed: Auwaiolimu Street

Feature Carried: Puowaina Drive

Milepost: **County Private:** Honolulu

Longitude: 157d-50m-30.80s **Latitude:** 21d-18m-57.86s

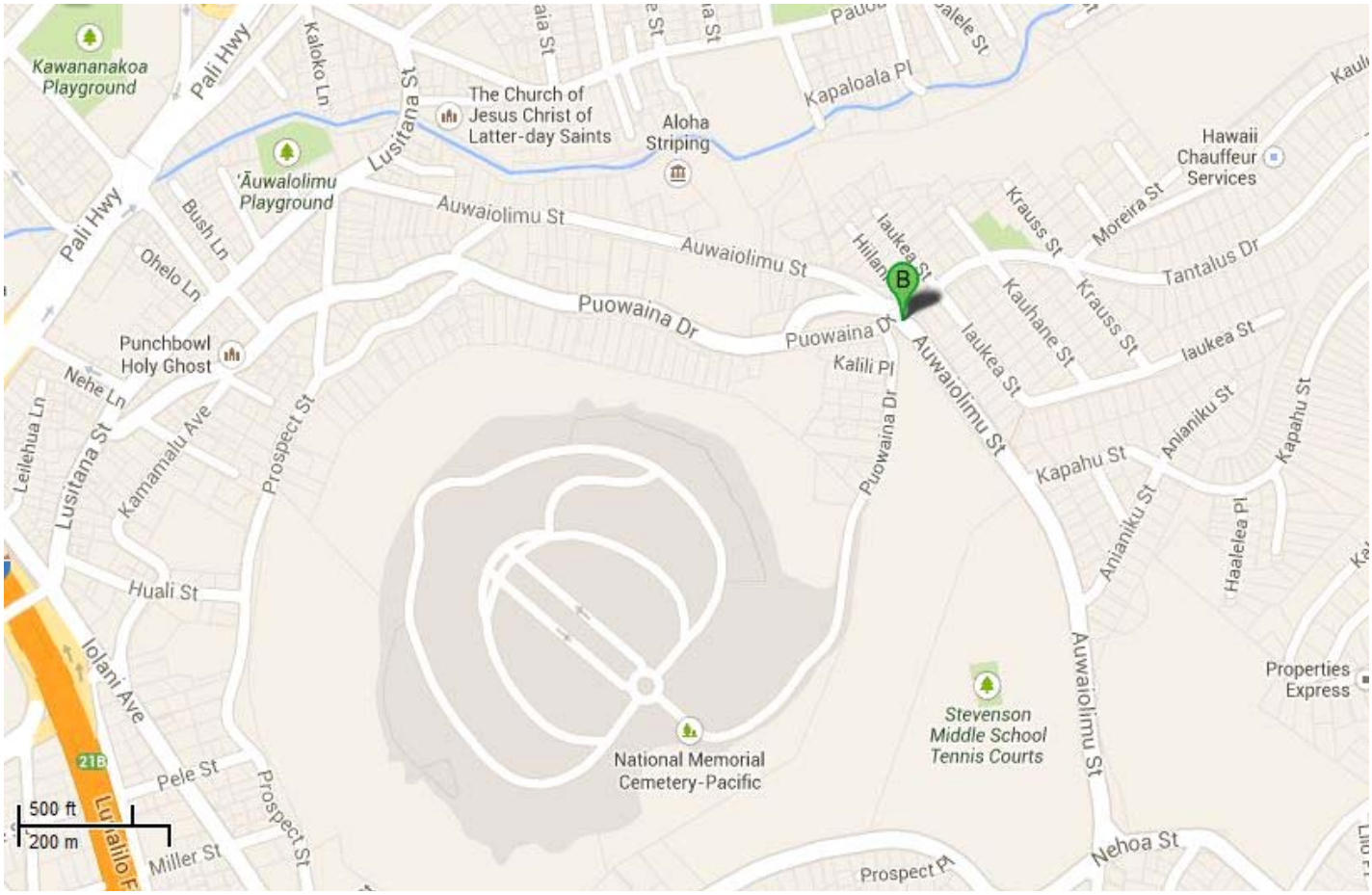
Location: TMK: 2-2-15

Historic Name: Puowaina Drive Bridge-Auwaiolimu Street

Designer/Engineer: W. F. Way

Builder/Contractor: James Glover Ltd.

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2013	
Alteration Type(s):		
Alteration Description(s): Raised the railing height to meet code		

Bridge Information

Number of Spans: 3	**Max Span:** 61.0 ft.	**Total Length:** 122.0 ft.	**Deck Width:** 44.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; high stepped end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Puowaina Bridge carries Puowaina Drive across Auwaiolimu Street in urban Honolulu. The bridge is a reinforced concrete continuous tee beam structure built on reinforced concrete trestles. The Puowaina Bridge remains in its original location adjacent to Punchbowl Crater. The Pauoa area, in which the bridge is located, has retained its residential character despite extensive development in urban Honolulu since the 1960s. The bridge's original continuous tee beam design and reinforced concrete material remain intact. The fine workmanship of the bridge is apparent with no evidence of additions or major repairs. The engineering of the bridge was complex for its time due to the continuous tee beam design of the structure, which eliminates the need for expansion joints in the deck, and because of its exceptional height. The bridge's historic associations as a 1930s-era county bridge are apparent only to informed observers. However, interpretation is aided by the inscription of the bridge name and date of construction on the end piers. The bridge retains its historic feeling primarily due to its relatively narrow width which is typical of bridges of this period in Hawaii. The parapet was modified/raised to meet current safety codes, but are re-constructed in a similar historic style.

Significance Statement:

The Puowaina Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The 1936 bridge is an excellent example of reinforced concrete tee beam construction with an open concrete rail typical of 1930s bridges. The Puowaina Bridge is eligible under Criterion A for its associations with important public works projects initiated by the county government. The bridge contributed to the economic development of urban Honolulu by providing reliable vehicular access to the area. It is eligible under Criterion C as a representative example of a 1930s-era bridge utilizing an advanced engineering technology: continuous reinforced concrete tee-beam constructior

The Puowaina Bridge was constructed in 1936 during the general upgrading of Honolulu's roadways utilizing Federal Depression-relief (Work Progress Administration) funds. The bridge is located in Pauoa, a residential area near the volcanic Punchbowl Crater in downtown Honolulu. The structure is an important transportation link for the community; its construction spanned Auwaiolimu Street, identified on the construction drawings as the "Pensacola Street Extension".

The bridge is the most ambitious and striking example of the bridges constructed by the county in the 1930s. The design and height of the bridge are representative of the rapid advances made in engineering technology in the early decades of the twentieth century. The engineer W.F. Way was with the City and County of Honolulu, Department of Public Works. The builder is James Glover Ltd., the Hawaii Island contracting company that built many of the roads and bridges on that island, as well as the Punchbowl National Memorial Cemetery, the Ala Wai Yacht Harbor and sections of the H-1 Freeway.(1) James Glover was a well-known entrepreneur who owned Kahuku Ranch near South Point on Hawaii Island.

At the time of its construction it was the only bridge on Oahu to cross a road.

(1) "Jas. W. Glover Celebrates 60th Anniversary," Building Industry (September 1995), 69-71.

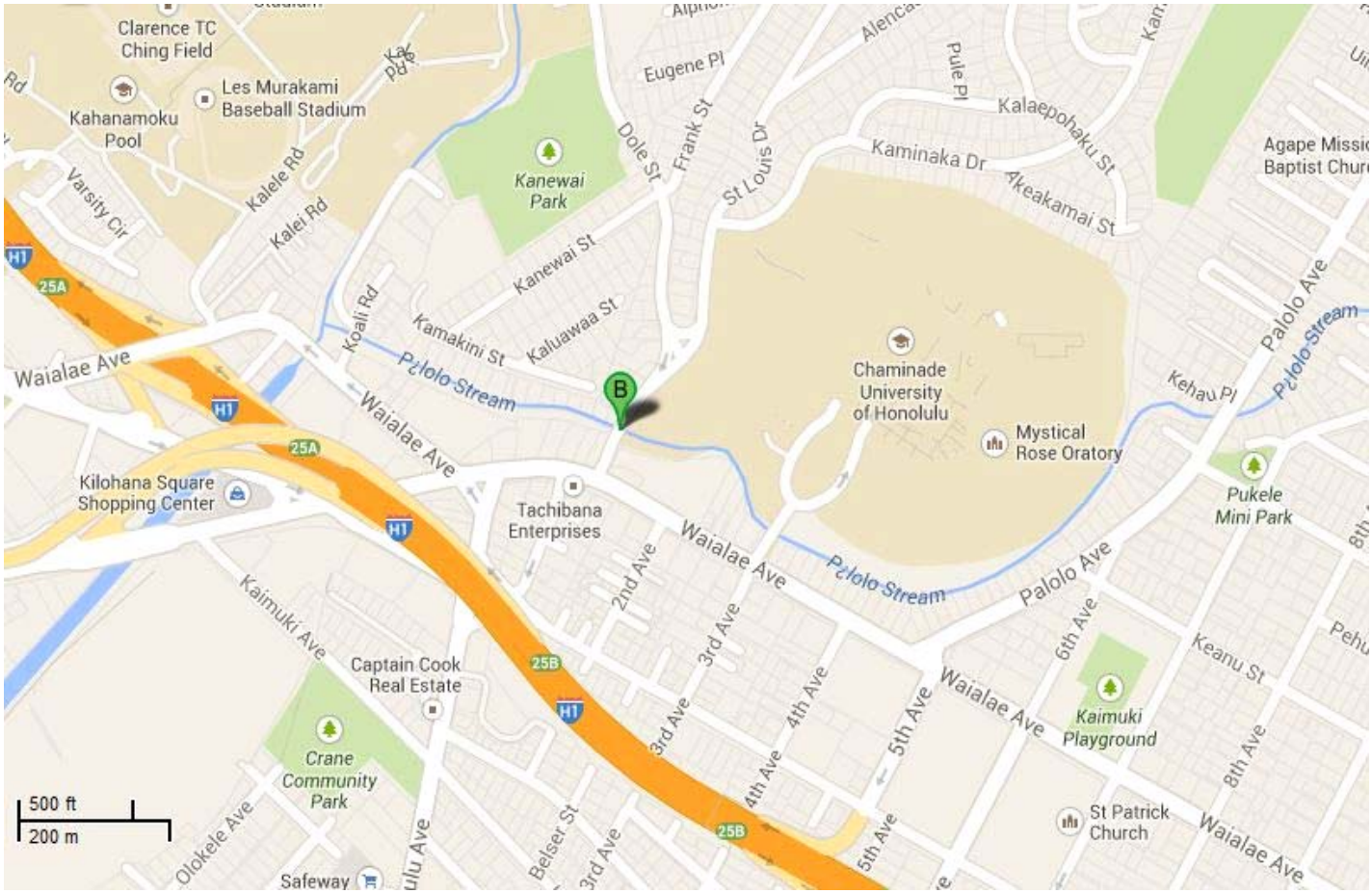
Inventory Form
(County/Private)

General Information

Bridge Number: 003083061400136	
Popular Name: Saint Louis Drive Bridge-Palolo Stream	
Feature Crossed: Palolo Stream	
Feature Carried: Saint Louis Drive	
Milepost:	**County Private:** Honolulu
Longitude: 157d-48m-39.64s	**Latitude:** 21d-17m-22.32s

Location: 200 Feet North of Waialae Avenue
Historic Name: Saint Louis Drive Bridge-Palolo Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1929	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2013, 2014	
Alteration Type(s):		
Alteration Description(s): Metal horizontal railings will be added in between the existing concrete horizontal railings		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 122.0 ft.	**Deck Width:** 60.0 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Palolo Stream Bridge carries Saint Louis Drive across Palolo Stream. This single-span arch girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has reinforced concrete parapets each with two rows of rectangular horizontal voids and concrete caps. Wide horizontal end posts with horizontal detailing flank the ends of the parapets. The concrete deck is supported by reinforced concrete abutments over a channeled stream. The workmanship of the bridge has not been obscured by additions or repairs however, in 1958 the bridge was widened and the parapets were added to in 2013. Metal horizontal rails will be added in between the existing concrete horizontal parapets.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1920's and 1930's reinforced concrete arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(County/Private)

General Information

Bridge Number: 003268001200001

Popular Name: Waaloa Way Bridge No.2-Manoa Stream

Feature Crossed: Manoa Stream

Feature Carried: Waaloa Way

Milepost: **County Private:** Honolulu

Longitude: 157d-47m-58.00s **Latitude:** 21d-19m-42.00s

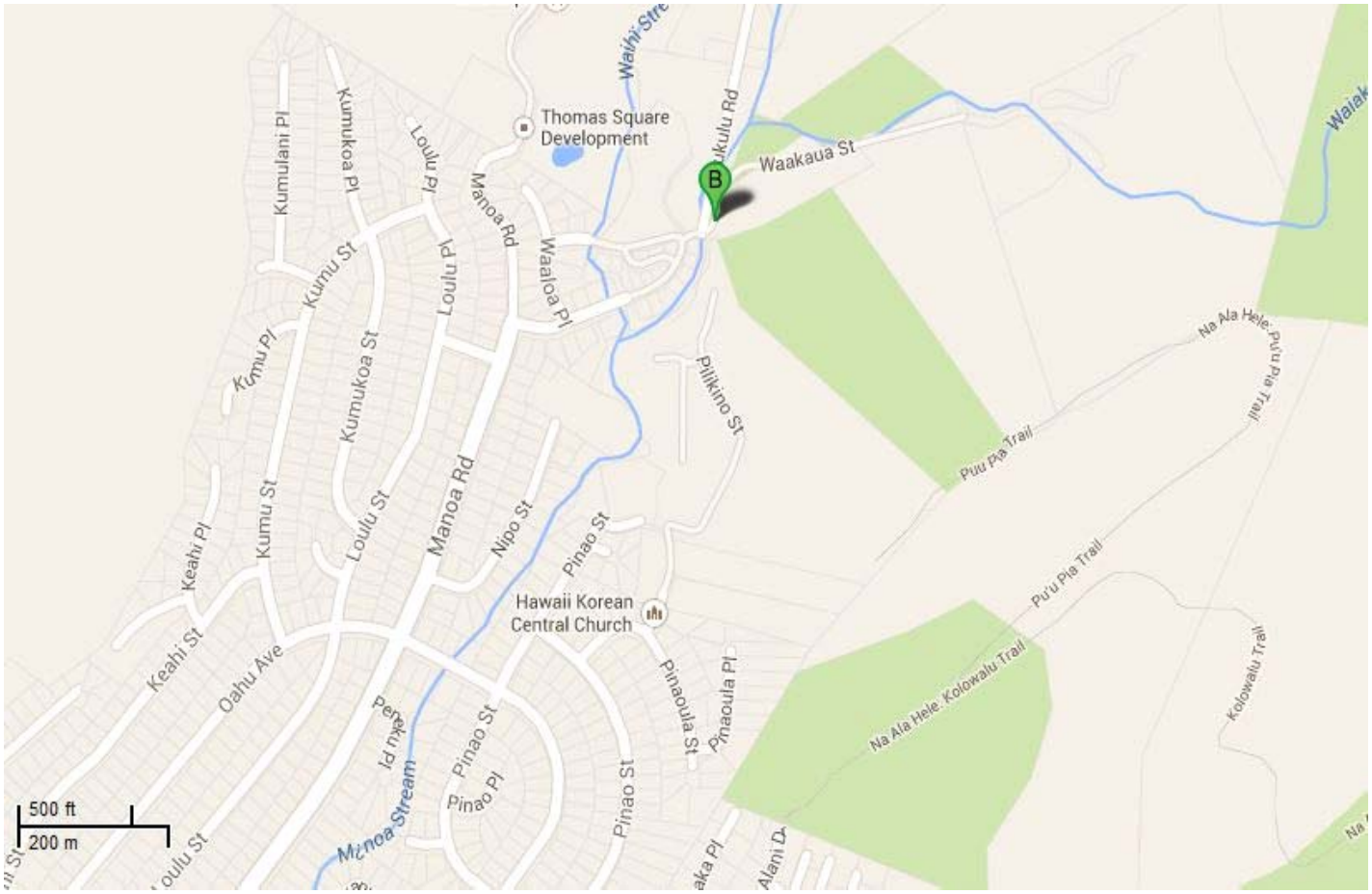
Location: TMK: 2-9-54

Historic Name: Waaloa Way Bridge No.2-Manoa Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1965	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.0 ft.	**Total Length:** 28.0 ft.	**Deck Width:** 14.1 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Construction		

Narrative Description:

The Waaloa Bridge No. 2 carries Waaloa Way across Waiakeakua Stream. This single-span steel stringer bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has painted 2-2x6 timber rails attached to W6x posts which are attached to exterior steel beams below. The deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs. The bridge is not publicly accessible and is utilized as a Board of Water Supply maintenance bridge.

Significance Statement:

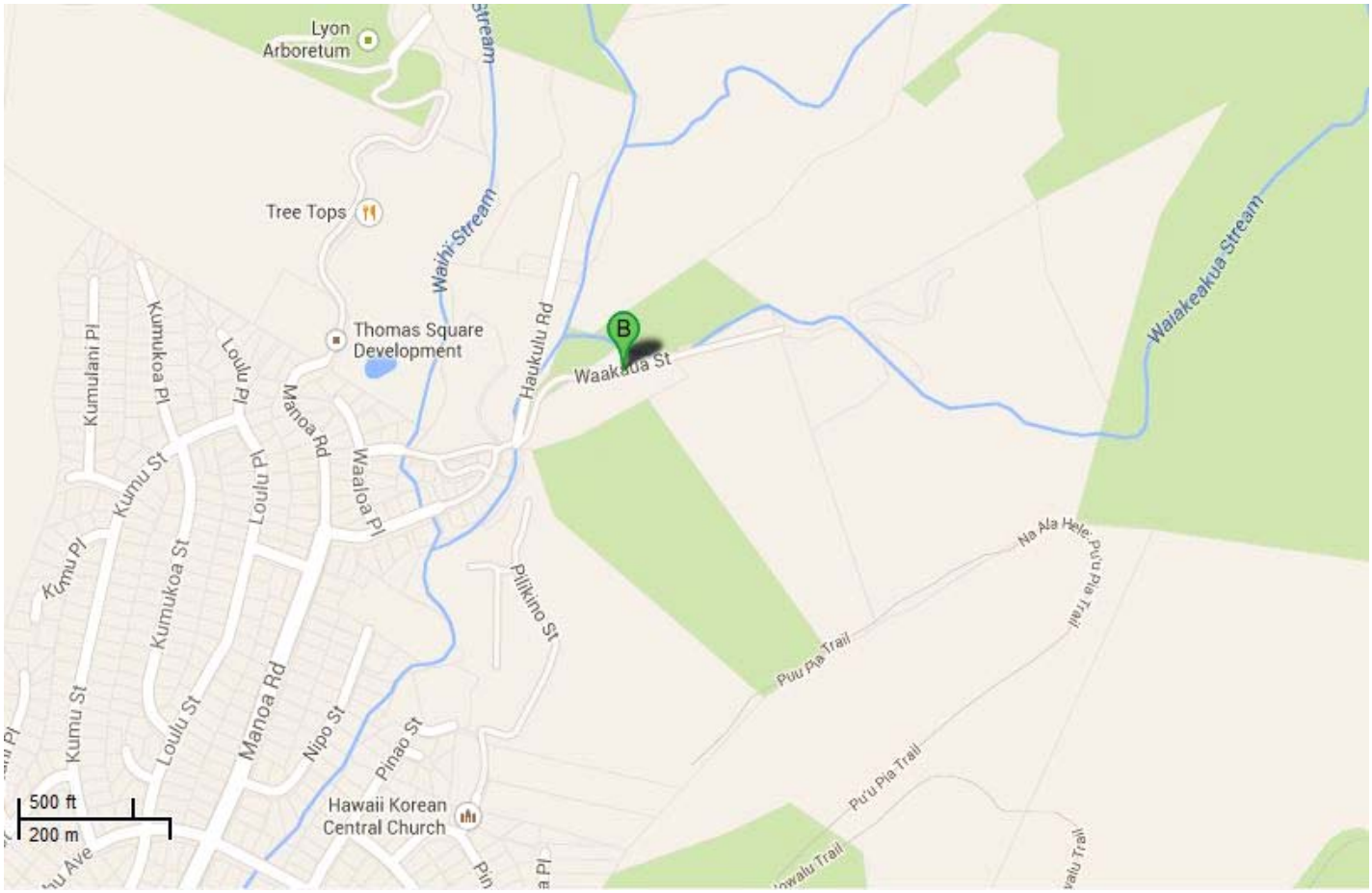
The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under criterion C for its distinctive structural type. It is a good example of a 1960's steel girder bridge atypical of its period in its use of materials and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003244001200001	
Popular Name: Waaloa Way Bridge No. 3-Waiakeakua Stream	
Feature Crossed: Waiakeakua Stream	
Feature Carried: Waaloa Way	
Milepost:	**County Private:** Honolulu
Longitude: 157d-47m-54.00s	**Latitude:** 21d-19m-45.00s
Location: TMK: 2-9-54	
Historic Name: Waaloa Way Bridge No. 3-Waiakeakua Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1967	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 21.0 ft.	**Deck Width:** 13.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Construction		

Narrative Description:

The Waaloa Bridge No. 3 carries Waaloa Way across Waiakeakua Stream. This single-span steel stringer bridge is in its original location, is in fair condition, and its materials remain intact. The bridge has wood rails and a 4x12 wood timber deck. The deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs. The bridge is not publicly accessible and is utilized as a Board of Water Supply maintenance bridge.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under criterion C for its distinctive structural type. It is a good example of a 1960's steel girder bridge atypical of its period in its use of materials and design.

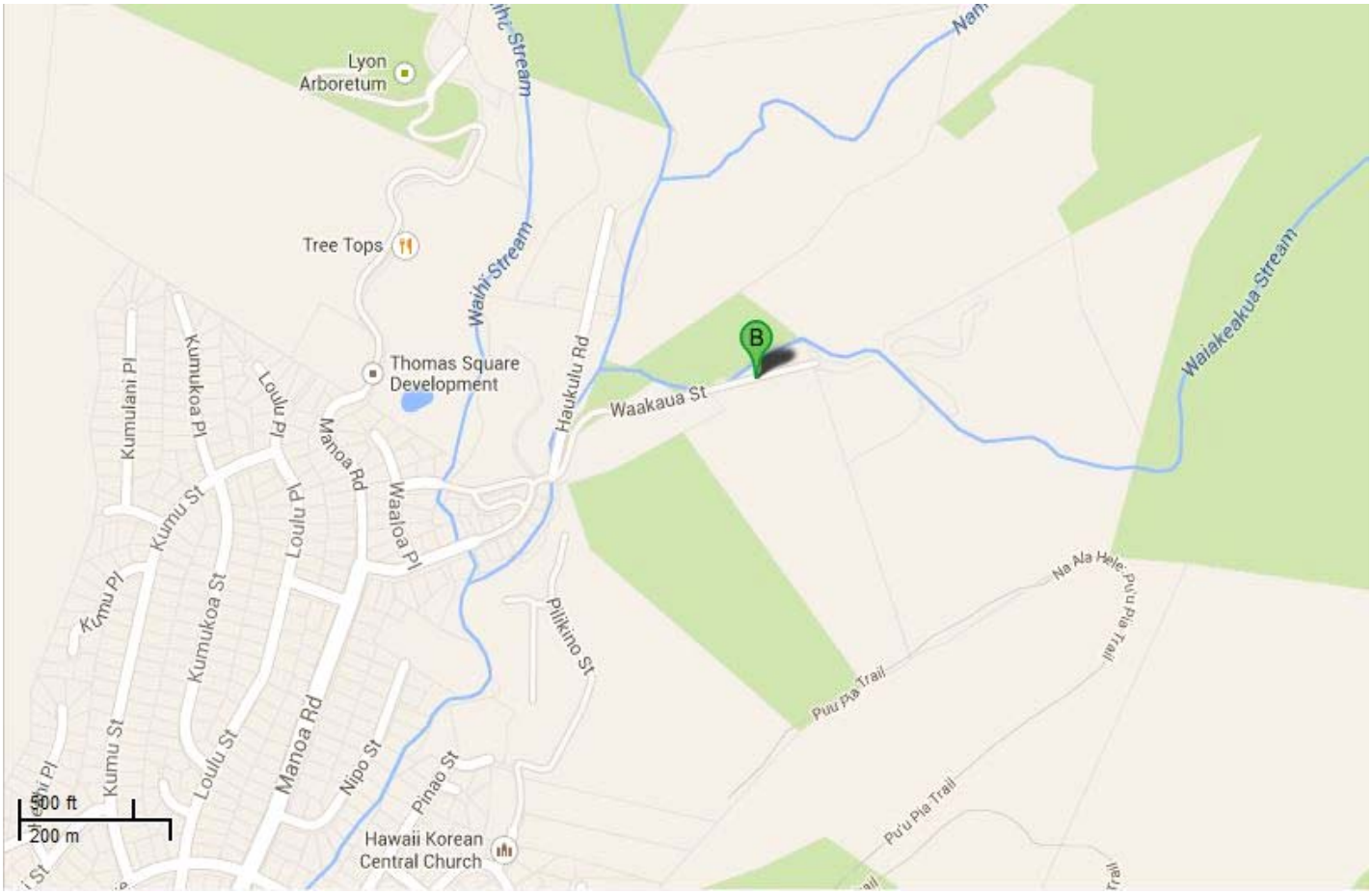
Inventory Form
(County/Private)

General Information

Bridge Number: 003245001200001	
Popular Name: Waaloa Way Bridge No. 4-Waiakeakua Stream	
Feature Crossed: Waiakeakua Stream	
Feature Carried: Waaloa Way	
Milepost:	**County Private:** Honolulu
Longitude: 157d-47m-49.00s	**Latitude:** 21d-19m-45.00s

Location: TMK: 2-9-54
Historic Name: Waaloa Way Bridge No. 4-Waiakeakua Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1963	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 15.0 ft.	**Total Length:** 31.0 ft.	**Deck Width:** 13.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Double Column Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waaloa Way Bridge No. 4 carries Waaloa Way across Waiakeakua Stream. This double-span wood bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has wood rails and a 4x12 wood timber deck. The bridge deck is supported by boulder concrete rock masonry abutments. The workmanship of the bridge has not been obscured by additions or repairs. The bridge is not publicly accessible and is utilized as a Board of Water Supply maintenance bridge.

Significance Statement:

The bridge is eligible under Criterion C for its association with post-war wood bridge construction in Hawaii. It is a good example of a wood bridge in the 1960s in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003605001100001

Popular Name: Waialua Beach Road Bridge-Kiikii Stream

Feature Crossed: Kiikii Stream

Feature Carried: Waialua Beach Road

Milepost: **County Private:** Honolulu

Longitude: 158d-07m-12.22s **Latitude:** 21d-34m-32.62s

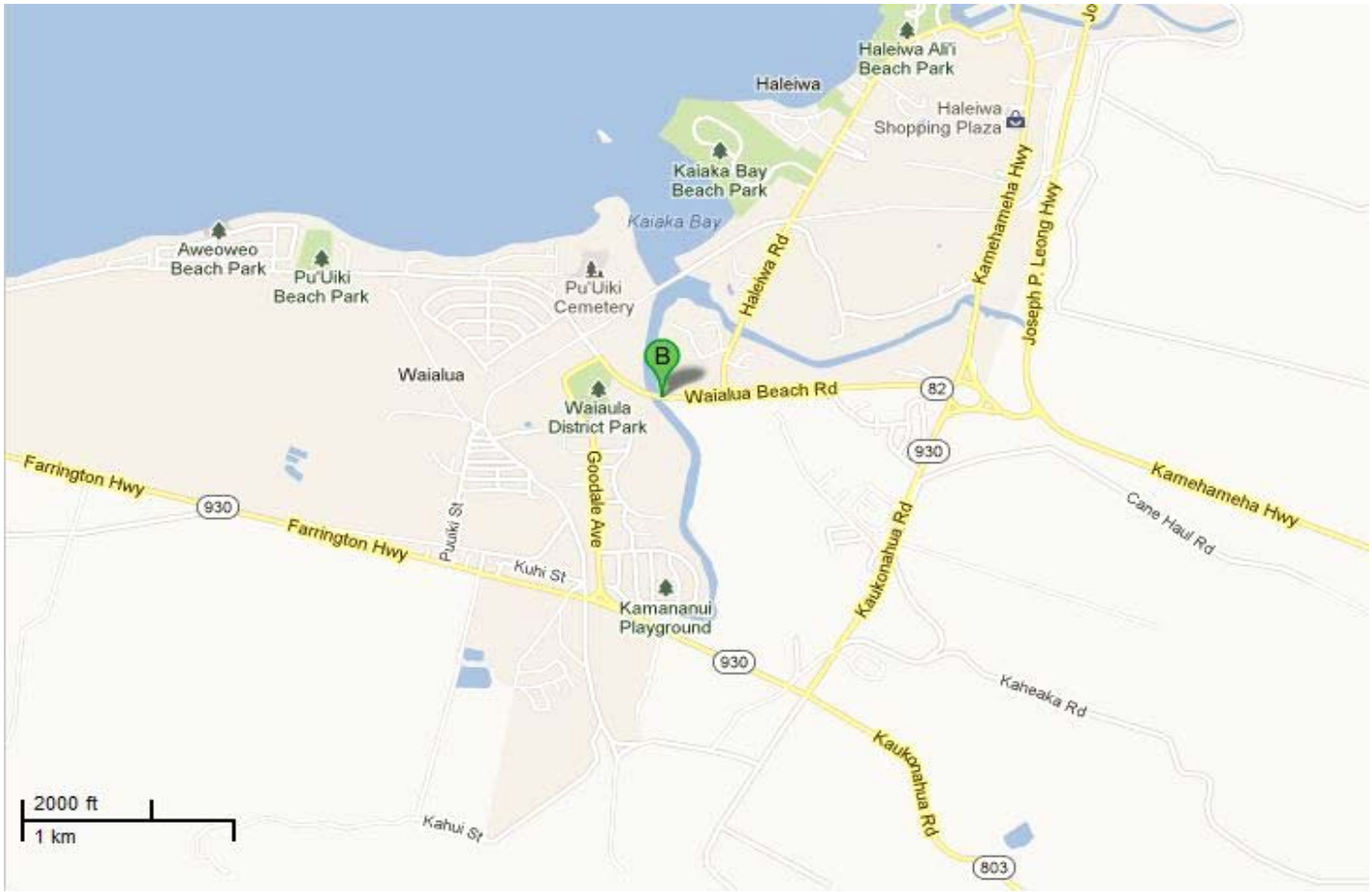
Location: TMK: 6-7-01

Historic Name: Waialua Beach Road Bridge-Kiikii Stream

Designer/Engineer:

Builder/Contractor: E. E. Black, Ltd.

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1950	**Replaced?** No
Altered? Yes **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s): Replaced timber deck		

Bridge Information

Number of Spans: 4	**Max Span:** 35.0 ft.	**Total Length:** 141.0 ft.	**Deck Width:** 38.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Pile Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Sidewalk one side; stepped end piers			

Historic Association

Eligibility Status: Eligible	**Criteria:** B	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Significance with a Person		

Narrative Description:

The Kiikii Stream Bridge was built in 1950 and carries Waialua Beach Road over Kiikii stream in Waialua near the Waialua Elementary School. The bridge is part of the Haleiwa cut-off from Weed Junction to Waialua, created in 1952. It has four spans and is concrete tee beam construction. The Kiikii Stream Bridge is in its original location and has retained its original rural setting in the rural agricultural area of Waialua. The bridge's continuous tee beam construction remains intact and no apparent alterations have been made to the structure. Despite minor damage and the addition of removable flared guardrails to the end piers, the bridge's original workmanship remains evident. The guard railings are composed of a reinforced concrete balustrade of two horizontal rails with intermittent pairs of vertical supports common to the post-war era. The incised name and date on the end piers aid interpretation of the bridge. There is a bronze dedication plaque on one of the endposts. The bridge was dedicated in August 1952 to Howard Misayuki Kurio, a section engineer with the Territorial Department of Public works. Kurio was fatally injured on the jobsite during the construction of the bridge.

Significance Statement:

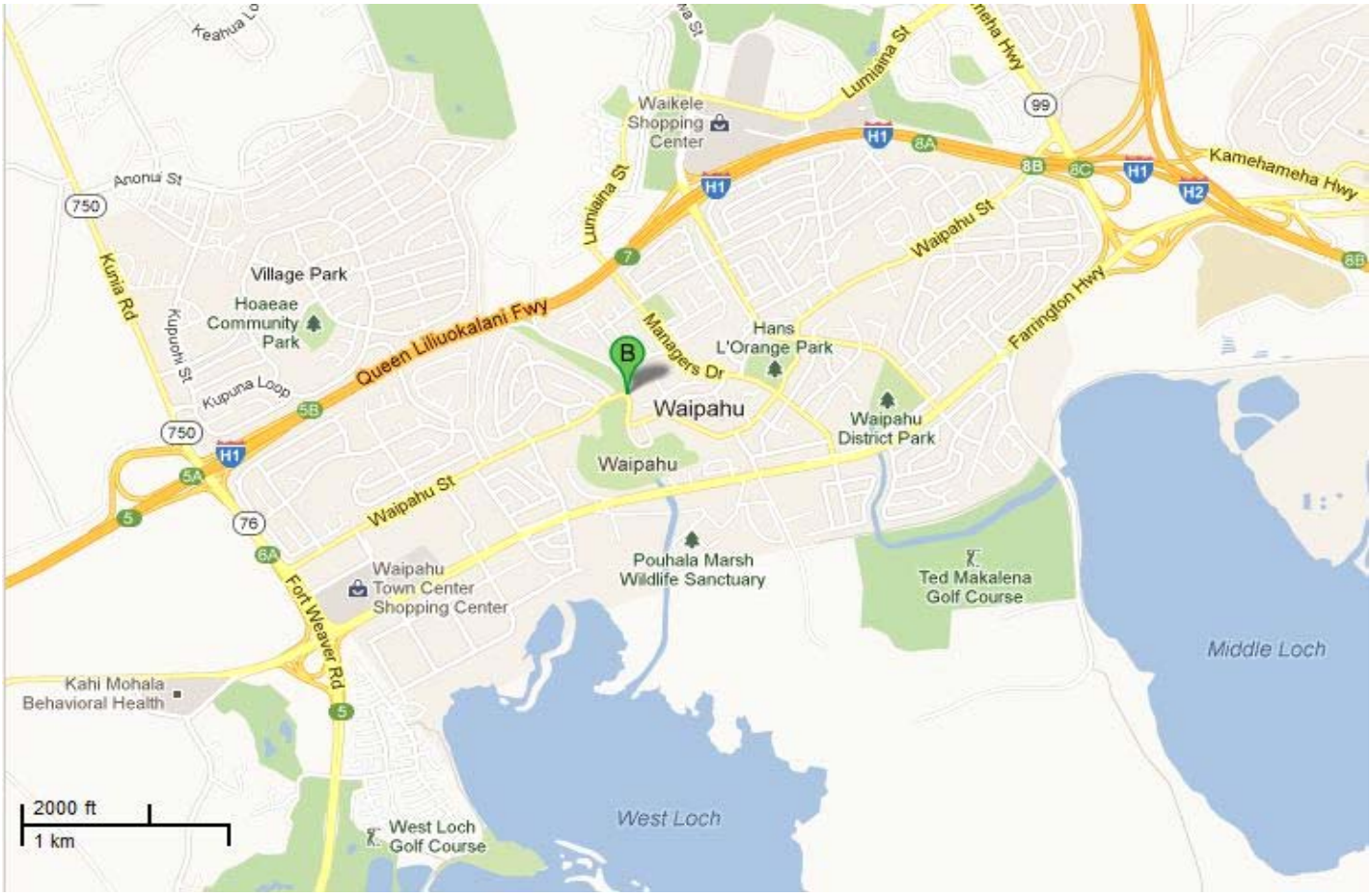
The Kiikii Stream Bridge is eligible under criterion B – due to its close association with a significant person. Howard Hisayuki Kurio was a respected member of the Wahiawa community. He had a seventeen year career with the Territorial Department of Public Works where he began in 1932 as a rodman. At the time of his death, he was a section engineer. Prior to joining the Department of Public Works, Howard Kurio was the Postmaster at Wahiawa.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083661400104	
Popular Name: Waipahu Street Arch Bridge-Waikele Stream	
Feature Crossed: Waikele Stream	
Feature Carried: Waipahu Street	
Milepost: **County Private:** Honolulu	
Longitude: 158d-00m-46.08s **Latitude:** 21d-23m-14.19s	
Location: 200 Feet East of Awamoi Street	
Historic Name: Waipahu Street Arch Bridge-Waikele Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1905	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1982	
Alteration Type(s):		
Alteration Description(s): Pedestrian walkway added in 1982.		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 54.1 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikele Stream Bridge carries Waipahu Street across Waikele Stream. This single-span closed arch bridge is in its original location and its materials remain intact. The bridge has solid concrete parapets with horizontal caps and has been painted various colors including white and brown. The concrete deck is supported by concrete abutments. A pedestrian walkway with a chain-link fence has been added on one side behind the parapet and metal in 1982. Thrie Beams have been bolted to all approaches of the parapets. The workmanship of the bridge has not been obscured by additions or repairs however, the chain-link fence has detracted from the historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of an early 1900's closed spandrel arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(County/Private)

General Information

Bridge Number: 003903001100001

Popular Name: Waipio Pt. Access Rd. Bridge No.1-Railroad ROW

Feature Crossed: Railroad Right of Way

Feature Carried: Waipio Point Access Road

Milepost: **County Private:** Honolulu

Longitude: 157d-59m-36.04s **Latitude:** 21d-23m-04.90s

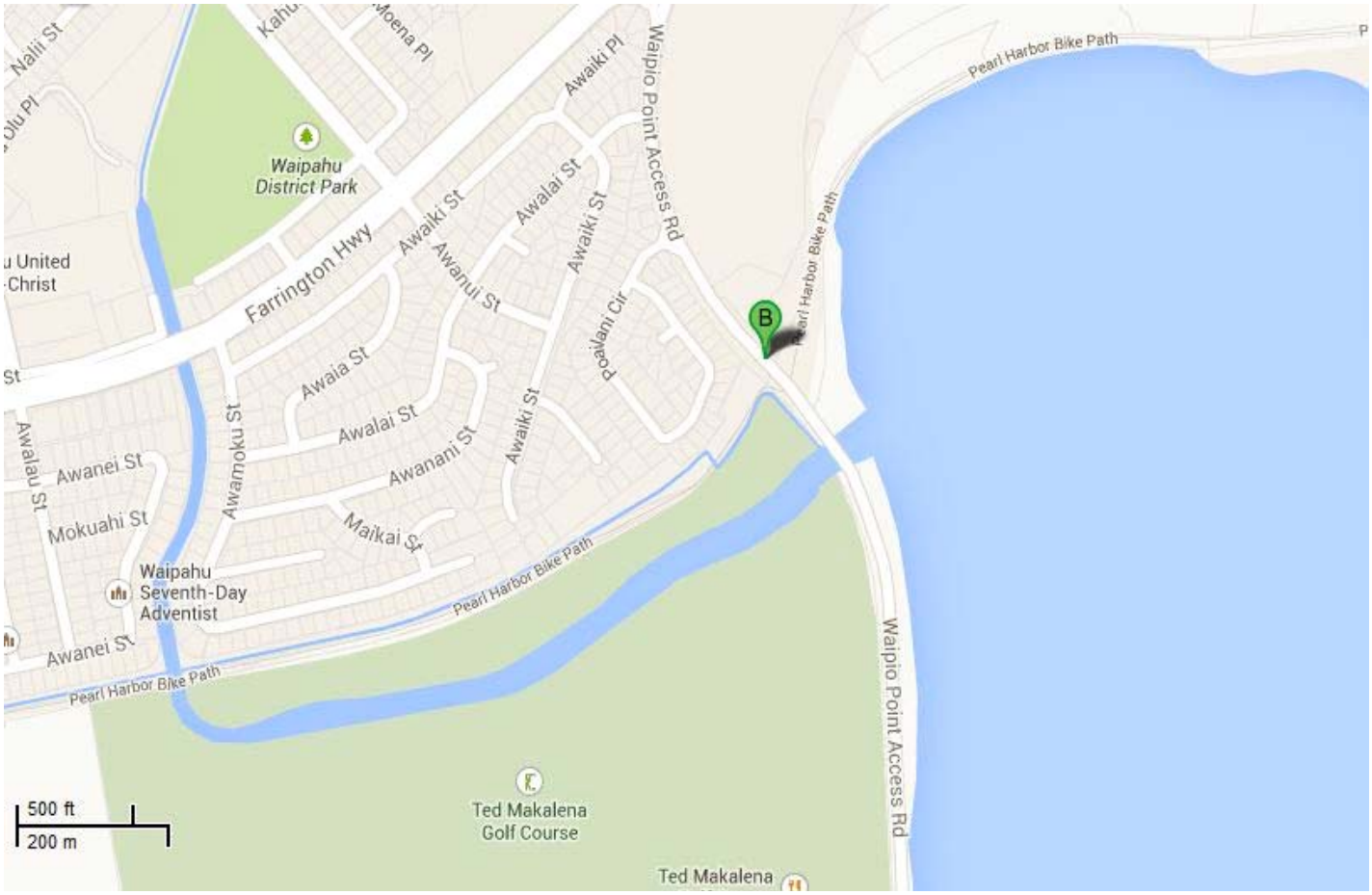
Location: TMK: 9-4-50

Historic Name: Waipio Point Access Road Bridge No.1-Railroad Right of Way

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1946	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 50.0 ft.	**Total Length:** 84.0 ft.	**Deck Width:** 33.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Wapio Pt. Access Road Bridge No. 1 carries Waipio Pt. Access Road across a railroad right of way. This two-span reinforced cast-in-place concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete parapets with cross shaped voids and caps. Wide end posts flank the ends of the parapets. The concrete deck is supported by concrete abutments, two piers, and spread footings. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. This is a unique example of a 1940's concrete tee beam bridge in its materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 003083681400001

Popular Name: Wyllie Street Bridge-Waolani Stream

Feature Crossed: Waolani Stream

Feature Carried: Wyllie Street

Milepost: 0.01 mi. **County Private:** Honolulu

Longitude: 157d-50m-54.09s **Latitude:** 21d-19m-49.47s

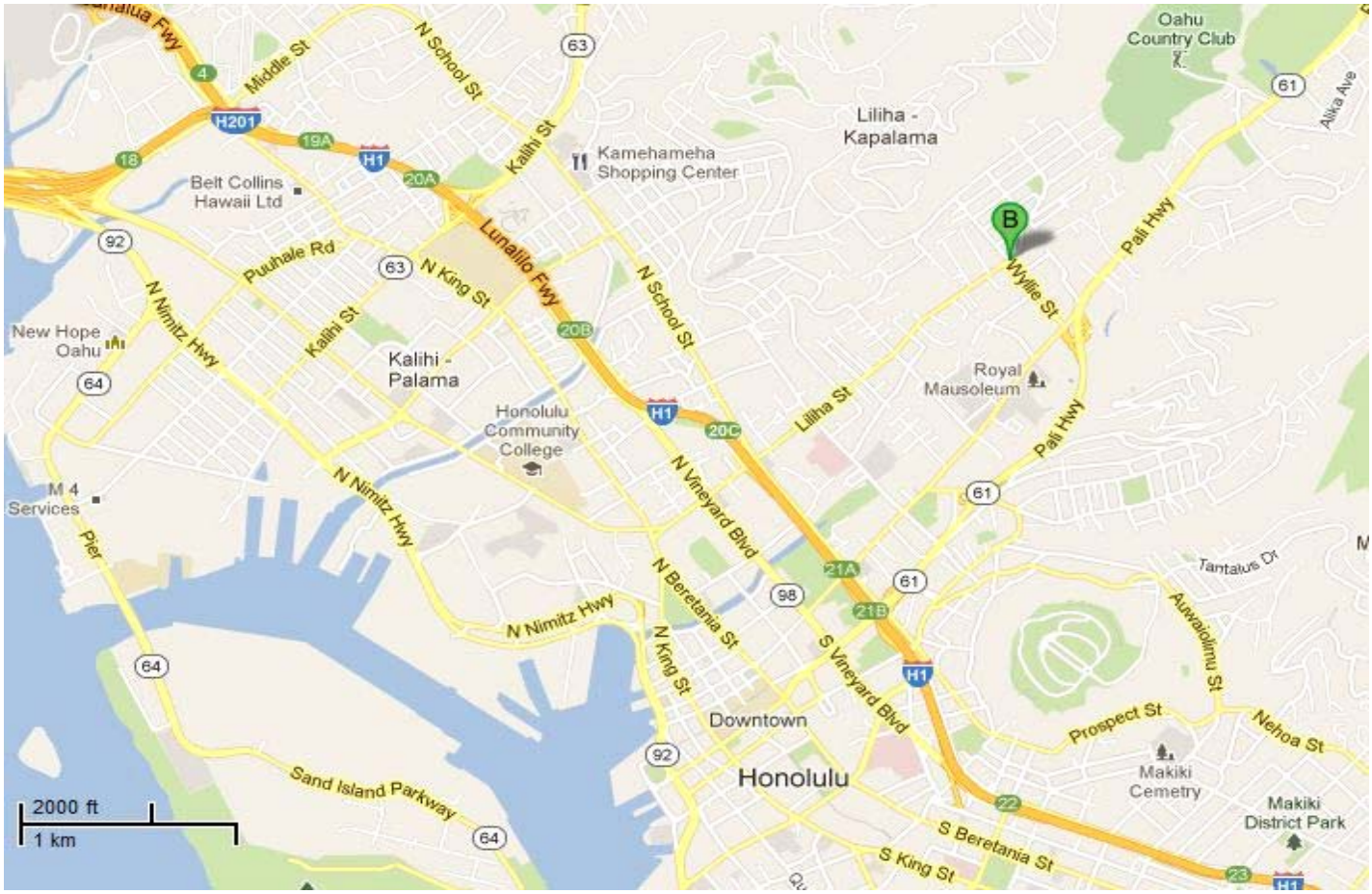
Location: TMK: 1-8-05

Historic Name: Wyllie Street Bridge-Waolani Stream

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1931	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.0 ft.	**Total Length:** 33.0 ft.	**Deck Width:** 56.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waolani Stream Bridge carries Wyllie Street across Waolani Stream. This single-span reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid concrete capped parapets with arched voids and decorative end posts. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

chapter 5

m a u i

I. ISLANDS OF MAUI AND MOLOKAI

Map of Maui, Molokai
(Map taken from Google map)

Maui and Molokai History

Maui: The second largest island, Maui (also called The Valley Island) is 728.8 square miles in land area. It is composed of two shield volcanoes, which constitute east and west Maui. Lava flows from the two volcanoes have formed a connecting isthmus which is the location of the contiguous cities of Wailuku and Kahului, the center of population and the seat of government, as well as some of the most fertile and productive agricultural land in the state. The highest peak, Haleakala (10,025 feet), is the largest extinct volcanic crater in the world.

The County of Maui is comprised of the islands of Maui, Molokai, Kahoolawe and Lanai. However, Kahoolawe and Lanai do not have any bridges which have been categorized as "historic".[1] The majority of Maui's historic bridges are located in wet, windward (northeastern) Maui; these represent the county's efforts to forge a road through the "wilderness of the ditch country" to the rural community of Hana. The "ditch" was East Maui Irrigation Company's extraordinary late-nineteenth century engineering effort which brought water from the East Maui mountains to the dry central plain. For the most part, road construction paralleled the course of the irrigation ditch. More than eighty bridges were constructed along the east end of Maui between 1908 and 1940, assuring overland access to the previously isolated Hana district from the rest of the island.

Molokai: The last surviving piece of the old rural Hawaii, Molokai (also called The Friendly Island) is the fifth largest island with only 38 miles from end to end and just 10 miles wide, comprising 260 square miles in total. It was born from three volcanic eruptions that occurred 1.5 million years ago and was mainly formed in two parts: One side is a flat, austere, arid desert; the other is a lush, green, steepled tropical Eden. The last eruption produced the island's "thumb"—a peninsula jutting out of the steep cliffs of the north shore. Those 3,250-foot high sea cliffs, the highest in the world, stand along Mount Kamakou (4961 feet), stretching 14 majestic miles along Molokai's north shore.

As noted above, Molokai does not have any bridges constructed prior to 1959, which have been categorized as "historic." Most highways and roads were newly constructed after the 1930's, with the earliest roads mainly designed for horse-drawn wagons.

[1] Hawaii Heritage Center, *Historic Bridge Inventory: Islands of Maui and Moloka'i*, prepared for the State of Hawaii, Department of Transportation, Highway Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu: 1990), 5.

II. BRIDGE MATRIX: MAUI AND MOLOKAI

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009003770500058	Alae Bridge-Naalae Gulch	Naalae Gulch	Kekaulike Avenue	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Significant for economic development • 20th century example of bridge engineering and construction • Striking example of Federal Aid bridges constructed by the Territory in the 1930s • One of the longer and taller bridges in Maui County, with two twin-arch reinforced concrete piers • May represent work of a master: (drawings are unsigned but attributed to) William R. Bartels	5 - 25
009000300303899	Anakaluahine Stream Bridge	Anakaluahine Stream	Kahekili Highway	1924	Concrete Tee Beam	Metal Thrie Beam	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Fair example of 1920's reinforced concrete bridge	5 - 28
009003600502419	East Hanawi Stream Bridge	East Hanawi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 31
009003600502131	East Wailuaiki Stream Bridge	East Wailuaiki Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 34
009000370301511	Haakakai Stream Bridge	Haakakai Stream	Kula Highway	1964	Metal Corrugated Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
009003600501145	Haipuaena Stream Bridge	Haipuaena Stream	Hana Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 37
009003600502402	Hanawi Stream Bridge	Hanawi Stream	Hana Highway	1926	Closed Spandrel Arch	Concrete Open Vertical	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 40
009003770500255	Hapapa Bridge	Hapapa Gulch	Kekaulike Avenue	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Good example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 43
009003600502795	Heleleikeoha Stream Bridge	Heleleikeoha Stream	Hana Highway	1917	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 46
009003600500509	Hoalua Stream Bridge	Hoalua Stream	Hana Highway	1929	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 49
009000300303640	Honokohau Stream Bridge	Honokohau Stream	Honoapiilani Highway	1966	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009000300300346	Honolua Stream Bridge	Honolua Stream	Honoapiilani Highway	1924	Concrete Tee Beam	Concrete Solid	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Intact example of 1920's reinforced concrete bridge	5 - 52
009003600502958	Honomaele Stream Bridge	Honomaele Stream	Hana Highway	1924	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 55
009003600501372	Honomanu Stream Bridge	Honomanu Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 58
009004500901040	Honouliwai Stream-3-Cell Culvert	Honouliwai Stream	Kamehameha V Highway	1965	Metal Corrugated Culvert	No Parapet/Railing	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
009034001400162	Iao Bridge	Iao Stream	Waiehu Beach Road	1953	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009000321200060	Kaahumanu Avenue Underpass-Naniloa Drive Overpass	Kaahumanu Avenue	Naniloa Drive	1936	Concrete Tee Beam	Concrete Open Greek Cross	Yes	High Preservation Value	• One of the earliest rigid-frame bridges built in Hawaii, and one of only two grade-separation structures on Maui • 20th century example of bridge engineering and construction • Representative of work of a master: William R. Bartels	5 - 61
009003600500858	Kaaiea Stream Bridge	Kaaiea Stream	Hana Highway	1928	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 64
009003600502598	Kahalaowaka Stream Bridge	Unnamed Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 67
009003600502664	Kahawaihapapa Stream Bridge	Kahawaihapapa Stream	Hana Highway	1922	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 70
009003600500588	Kailua Stream Bridge	Kailua Stream	Hana Highway	1929	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 73
009000370300900	Kaipoioi Stream Bridge	Kaipoioi Stream	Kula Highway	1933	Concrete Tee Beam	Concrete and Metal	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridge constructed by the Territory in the 1930s	5 - 76
009003600500045	Kakipi-Halehaku Gulch Culvert	Halehaku Gulch	Hana Highway	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
009000370301383	Kalialinui B Stream Bridge	Kalialinui Stream	KULA HWY	1964	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Longest concrete bridge with the longest concrete span built post-war (1945) on the island of Maui in the historic study period prior to 1969	5 - 79
009000360300228	Kalialinui Stream Bridge	Kalialinui Stream	Hana Highway	1944	Concrete Girder	Concrete and Metal Picket	No	Not Eligible	This bridge has lost integrity due to the bridge being extended in 1990.	n/a

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Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009004500500200	Kamiloloa Bridge	Unnamed Stream	Kamehameha V Highway	1940	Concrete Slab	Concrete Solid	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Good example of 1940's reinforced concrete flat slab bridge • One of the few historic bridges located on Molokai	5 - 82
009003770500053	Kanoulu Bridge	Kanoulu Stream	Kekaulike Avenue	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 85
009003600502339	Kapaula Stream Bridge	Kapaula Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 88
009004600501611	Kaunakakai 16-Cell Culvert	Kaunakakai Stream	Maunaloa Highway	1953	Concrete Pipe Culvert	Metal Thrie Beam	No	Eligible	• Only sixteen cell culvert in the state • Unique culvert because most culverts in state are two to five cells	5 - 91
009000360301364	Kaupakalua Stream Bridge	Kaupakalua Stream	Hana Highway	2003	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1941 bridge in 2003.	n/a
009003600503347	Kawaipapa Stream Bridge	Kawaipapa Stream	Hana Highway	1947	Concrete Tee Beam	Concrete Open Horizontal	Yes	High Preservation Value	• Bridge was not listed as a part of the Hana Highway Historic Bridge District nomination form; however, it is within the boundaries of and is a contributing feature to the historic district • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 94
009004500500511	Kawela Bridge	Kawela Stream	Kamehameha V Highway	2013	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1940 bridge in 2013.	n/a
009003600502681	Keaaiki Stream Bridge	Keaaiki Stream	Hana Highway	1921	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 97
009000370301125	Keahuaiwi B Bridge	Keahuaiwi Stream	Kula Highway	1964	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009372001100001	Kealia Pond Outlet No. 72	Kealia Pond	North Kihei Road	1911	Concrete Box Culvert	Metal Thrie Beam	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
009003600501317	Kolea (Punalau Stream) Bridge	Punalau Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 100
009003600502189	Kopiliula Stream Bridge	Kopiliula Stream	Hana Highway	1926	Concrete Girder	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 103
009003600502523	Kuhiwa Stream Bridge	Kuhiwa Stream	Hana Highway	1926	Closed Spandrel Arch	Concrete Open Vertical	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 106

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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009003600502546	Kupukoi Stream Bridge	Kupukoi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 109
009003600502779	Lanikele Stream Bridge	Lanikele Stream	Hana Highway	1917	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 112
009000300301907	Launiupoko Stream Bridge	Launiupoko Stream	Honoapiilani Highway	1938	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to significant road widening in 1990.	n/a
009004500500394	Makakupaia Bridge	Unnamed Stream	Kamehameha V Highway	1940	Concrete Slab	Concrete Solid	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1940's reinforced concrete flat slab bridge • Bridge is undergoing consultation process in 2013 for replacement in 2015	5 - 115
009003600500824	Makanali Stream Bridge	Makanali Stream	Hana Highway	1928	Concrete Slab	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 118
009003600502502	Makapipi Stream Bridge	Makapipi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 121
009000360301008	Maliko Stream Bridge	Maliko Stream	Hana Highway	1961	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009004500900536	Mapulehu Bridge	Mapulehu Stream	Kamehameha V Highway	1950	Concrete Slab	Metal Thrie Beam	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009003600502835	Mokulehua Stream Bridge	Mokulehua Stream	Hana Highway	1908	Concrete Slab	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 124
009003600500624	Nailiilihaele Bridge	Nailiilihaele Stream	Hana Highway	1930	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 127
009003600501540	Nuaailua Bridge	Nuaailua Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 130

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009003600502922	Oilowai Stream Bridge	Oilowai Stream	Hana Highway	1914	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 133
009000300301971	Olowalu B Stream Bridge	Olowalu Stream	Honoapiilani Highway	1938	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to significant road widening in 1990.	n/a
009000300302100	Olowalu Stream Bridge	Olowalu Stream	Honoapiilani Highway	1938	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to significant road widening in 1990.	n/a
009000300302596	Olowalu Tunnel	Mountain Range	Honoapiilani Highway	1950	Concrete Arch Culvert	No Parapet/Railing	No	High Preservation Value	• First highway tunnel constructed in Hawaii • Only tunnel on the island of Maui • Representative of work of a master: William R. Bartels	5 - 136
009003600500797	Oopuola Bridge	Oopuola Stream	Hana Highway	1925	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 139
009003600502301	Paakea Stream-Unnamed Bridge No.3	Paakea Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 142
009003600501679	Palauhulu Stream Bridge	Palauhulu Stream	Hana Highway	1916	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 145
009000300304184	Papanahoa Bridge	Papanahoa Stream	Kahekili Highway	1924	Concrete Slab	Metal Thrie Beam	No	Eligible	• Unique three faceted abutments support the bridge over the stream • Bridge abutments a potentially eligible historic resource	5 - 148
009003600501662	Piinaau Stream Bridge	Piinaau Stream	Hana Highway	1916	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 151
009003780500770	Pohakuokala Bridge	Pohakuokala Gulch	Haleakala Highway	1934	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the replacement of the original railings with new railings and bridge widening in 1970. The widened bridge has unique features that may be considered eligible in the future (approximately 2020).	n/a
009003770500349	Pohakuokala Bridge-Pulehu Gulch	Pulehu Gulch	Kekaulike Avenue	1934	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 154
009003600502231	Puakaa Stream Bridge	Puakaa Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 157
009003770500217	Pulehu Bridge-Keahuaiwi Gulch (Kekaulike Avenue)	Keahuaiwi Gulch	Kekaulike Avenue	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 160

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Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009003600501098	Puohokamoa Bridge	Puohokamoa Stream	Hana Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 163
009003600502652	Pupape Stream Bridge	Pupape Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 166
009000300302351	Ukumehame Stream Bridge	Ukumehame Stream	Honoapiilani Highway	1950	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009003600502801	Ulaino Stream Bridge	Ulaino Stream	Hana Highway	1914	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 169
009003600502298	Unnamed Bridge No.1 (Waiohuolua Bridge)	Unnamed Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 172
009003600502300	Unnamed Bridge No.2	Unnamed Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 175
009004600501402	Unnamed Stream-Kalamaula No. 1	Unnamed Stream	Maunaloa Highway	1954	Concrete Slab	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009004600501425	Unnamed Stream-Kalamaula No. 2	Unnamed Stream	Maunaloa Highway	1954	Concrete Slab	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009004600501473	Unnamed Stream-Kalamaula No. 3	Unnamed Stream	Maunaloa Highway	1954	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009004600501489	Unnamed Stream-Kalamaula No. 4	Unnamed Stream	Maunaloa Highway	1954	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
009003770500540	Waiale Bridge	Waiale Gulch	Kekaulike Avenue	1934	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Striking example of Federal Aid bridges constructed by the Territory in the 1930s • One of the longer and taller bridges in Maui County, with two twin-arch reinforced concrete piers • Representative of work of a master: William R. Bartels	5 - 178
009003780500850	Waiale Gulch Bridge	Waiale Gulch	Haleakala Highway	1934	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the replacement of the original railings with new railings and bridge widening in 1970. The widened bridge has unique features that may be considered eligible in the future (approximately 2020).	n/a

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Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009000320400050	Waiale Road Overpass	Waiale Drive	Kaahumanu Avenue	1936	Steel Stringer	Metal Picket	Yes	High Preservation Value	• Associated with sugar plantation industry • Contributed to economic development of Maui by providing transportation • Unique example of a steel stringer bridge in Hawaii • Rare example of vernacular materials (lava rock abutments) on a Federal Aid bridge • Only bridge on Maui associated with the U.S. Works Program Grade Crossing funding • Representative of work of a master: William R. Bartels	5 - 181
009003400500004	Waiehu Twin 12 ft. Culvert	Waiehu Stream	Kahekili Highway	1967	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Uses concrete rock masonry which is unique feature in design and construction of culverts	5 - 184
009004500900778	Kawaikapu Bridge	Kawaikapu Stream	Kamehameha V Highway	2007	Concrete Girder	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1950 bridge in 2007.	n/a
009003600500990	Waikamoi Stream Bridge	Waikamoi Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	1 - 187
009003600501942	Waikani Stream Bridge	Waikani Stream	Hana Highway	1926	Open Spandrel Arch	Concrete Open Vertical	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Hana Highway Historic Bridge District • Constructed by prominent native Hawaiian contractor Moses Akiona and skilled builders • Only example of a continuous concrete arch deck bridge on Maui • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 190
009000300303404	Waikapu Stream Bridge	Waikapu Stream	Honoapiilani Highway	1937	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Good example of Federal Aid bridges constructed by the Territory in the 1930s • Representative of work of a master: William R. Bartels	5 - 193
009003600502250	Waiohue Stream Bridge	Waiohue Stream	Hana Highway	1937	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 196
009000370300802	Waiohuli A Stream Bridge	Waiohuli Stream	Kula Highway	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 199
009000370300759	Waiohuli B Stream Bridge	Waiohuli Stream	Kula Highway	1933	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Significant for economic development • 20th century example of bridge engineering and construction • Intact example of Federal Aid bridges constructed by the Territory in the 1930s	5 - 202
009003600501811	Waiokamilo Stream Bridge	Waiokamilo Stream	Hana Highway	1921	Concrete Tee Beam	Concrete Open Greek Cross	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 205

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Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009003600502702	Waioni Stream Bridge	Waioni Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 208
009003600502086	West Wailuaiki Stream Bridge	West Wailuaiki Stream	Hana Highway	1937	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 211
009003600502697	West Waioni Stream Bridge	West Waioni Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Open Vertical	Yes	High Preservation Value	• Contributes to the Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 214

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Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
009003600904579	Alaalaua No. 27	Alaalaua Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 218
009003600903873	Alelele No. 13	Alelele Stream	Hana Highway	1983	Concrete Girder	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1937 bridge in 1983.	n/a
009003600904304	Hahalawe No. 19	Hahalawe Stream	Hana Highway	1910	Masonry Arch	Concrete Solid	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices • One of nine remaining masonry arch bridges in the state • Has cut basalt rock abutments and arch ring	5 - 221
009030801100001	Honokowai No. 91	Honokowai Stream	Lower Honoapiilani Road	1988	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1967 bridge in 1988.	n/a
009003201100001	Iao Stream Bridge No. 59	Iao Stream	Iao Valley Road	1955	Steel Stringer	Metal Horizontal	No	High Preservation Value	• Longest metal bridge built post-war (1945) on Maui island in the historic study period prior to 1969 • Uncommon use of steel material in Hawaii's extreme marine environment • Good example of 1940s steel stringer bridge that is typical of its period	5 - 224
009311301200001	Iron Bridge No. 113	Iao Stream	North Market Street	1949	Steel Stringer	Metal Horizontal	No	High Preservation Value	• Longest metal bridge built post-war (1945) on Maui island in the historic study period prior to 1969 • Uncommon use of steel material in Hawaii's extreme marine environment • Good example of 1940s steel stringer bridge that is typical of its period	5 - 227
009030801100003	Kahana Nui No. 93	Kahana Nui Stream	Lower Honoapiilani Road	1964	Concrete Tee Beam	Concrete Solid with Cap	No	Eligible	• Exceptional 1960's concrete bridge because of uncommon use of solid parapet with masonry rubble concrete abutments during this period • Bridge is undergoing consultation process in 2013 for scheduled replacement in 2014	5 - 230
009003600904864	Kahawaiokapia No. 30	Kapia Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Solid	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 233
009003600904984	Kaholopo No. 31	Haneoo Stream	Hana Highway	1917	Concrete Slab	Metal Thrie Beam	Yes	Non-Contributing	• Bridge is a non-contributing feature in the Hana Highway Historic Bridge District due for replacement in 2013 • See National Register of Places Nomination Form in appendices	5 - 236
009000310903847	Kalepa No. 12	Kalepa Stream	Piilani Highway	1993	Concrete Slab	Metal Thrie Beam	No	Not Eligible**	This bridge has lost integrity due to the complete replacement of the original 1937 bridge in 1993. The rock abutments are a potentially eligible historic resource.	n/a
009332001100001	Kalialinui No. 2	Kalialinui Gulch	Lower Kula Road	1911	Concrete Slab	Concrete Open Horizontal	No	High Preservation Value	• Good example of a 1910's reinforced concrete bridge with lava rock abutments, piers, and wing walls	5 - 239
009358001100001	Kaohu No. 58	Spreckelsville Ditch	Kaohu Street	1911	Concrete Slab	Concrete Open Vertical	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of 1910's reinforced concrete bridge	5 - 242
009335001100001	Kaupakalua No. 35	Kaupakalua Stream	Peahi Road	1911	Timber Stringer	Metal Thrie Beam	No	Eligible	• Intact example of a 1910's timber bridge with rock abutments and concrete and timber piers	5 - 245

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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009003600904058	Koukouai No. 16	Koukouai Stream	Hana Highway	1911	Open Spandrel Arch	Concrete Solid with Cap	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to Hana Highway Historic Bridge District • Constructed by prominent native Hawaiian contractor Moses Akiona and skilled builders • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 248
009000310900001	Kulanihakoa No. 76	Kulanihakoa Ditch	South Kihei Road	1911	Concrete Box Culvert	No Parapet/Railing	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
009003600903922	Lelekea No. 81	Lelekea Stream	Hana Highway	1947	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Super structure has arched corrugated metal pipe for main support with partial reinforced concrete and concrete rubble masonry footings • Unique example of culvert that has been reclassified into a bridge	5 - 251
009003600904329	Mahalawa No. 20	Kakiweka Stream	Hana Highway	1910	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 254
009003400900277	Makamakaole No. 63	Makamakaole Stream	Kahekili Highway	1980	Concrete Slab	Metal Thrie Beam	No	Not Eligible**	This bridge has lost integrity due to the complete replacement of the original 1927 bridge in 1980. The rock abutments are a potentially eligible historic resource.	n/a
009003650700299	Maliko No. 48	Maliko Gulch	Makawao Avenue	1945	Closed Spandrel Arch	Concrete Open Vertical	No	High Preservation Value	• Only county bridge built during WWII • Rare to find arched bridge from this period • Arch bridges are an uncommon bridge type • Features a parapet with closely set rectangular balusters	5 - 257
009000310903514	Manawainui No. 80	Manawainui Stream	Piilani Highway	1947	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Earliest concrete bridge built post-war (1945) on Maui island in the historic study period prior to 1969	5 - 260
009003600904358	Paehala No. 21	Wailele Stream	Hana Highway	1910	Masonry Arch	Concrete Solid with Cap	Yes	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • One of nine remaining masonry arch bridges in the state • Has cut basalt rock abutments and arch ring • See National Register of Places Nomination Form in appendices	5 - 263
009003600904494	Paihi No. 25	Paihi Stream	Hana Highway	2005	Concrete Girder	Concrete Solid	Yes	Non-Contributing	• Bridge is a non-contributing feature in the Hana Highway Historic Bridge District due to the complete replacement of the original 1911 bridge in 2005 • See National Register of Places Nomination Form in appendices	5 - 266
009003600904636	Papahawahawa No. 28	Papahawahawa Stream	Hana Highway	2011	Concrete Tee Beam	Concrete Solid with Cap	Yes	Non-Contributing	• Bridge is a non-contributing feature in the Hana Highway Historic Bridge District due to the complete replacement of the original 1915 bridge in 2011 • See National Register of Places Nomination Form in appendices	5 - 269
009339001100001	Pauwela No. 39	Pauwela Gulch	Haiku Road	1911	Concrete Tee Beam	Concrete Open Vertical	No	High Preservation Value	• Associated with early developments in concrete bridge construction in Hawaii • Good example of early 1900's reinforced concrete T-beam bridge	5 - 272
009003600904386	Puuhaoa No. 22	Unnamed Stream	Hana Highway	1910	Concrete Tee Beam	Concrete Open Decorative	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 275

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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009003650700070	Sam Kalama No. 50	Kailua Gulch	Makawao Avenue	1930	Concrete Tee Beam	Concrete and Metal	No	Not Eligible**	This bridge has lost integrity due to widening of the bridge in 1980. The rock abutments are a potentially eligible historic resource.	n/a
009003600904464	South Wailua No. 23	Honolewa Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 278
009003600904542	Waikakoi No. 26	Waikakoi Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid with Cap	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • See National Register of Places Nomination Form in appendices	5 - 281
009003400900584	Wailena No. 65	Wailena Gulch	Kahekili Highway	1987	Concrete Slab	Metal Thrie Beam	No	Not Eligible**	This bridge has lost integrity due to the complete replacement of the 1927 bridge in 1987. The original rock abutments from 1927 are a potentially eligible historic resource.	n/a
009003600904475	Wailua No. 24	Wailua Stream	Hana Highway	1947	Concrete Tee Beam	Concrete Open Horizontal	Yes	High Preservation Value	• Contributes to Hana Highway Historic Bridge District • Part of best remaining intact example of a belt road system in the state • 20th century example of bridge engineering and construction • Significant for commerce and social history • Post-War Public Works Project • See National Register of Places Nomination Form in appendices	5 - 264
009003600904803	Waiohonu No. 29	Waiohonu Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Open Vertical	Yes	Non-Contributing	• Bridge is a non-contributing feature in the Hana Highway Historic Bridge District due for replacement in 2013 • See National Register of Places Nomination Form in appendices	5 - 267

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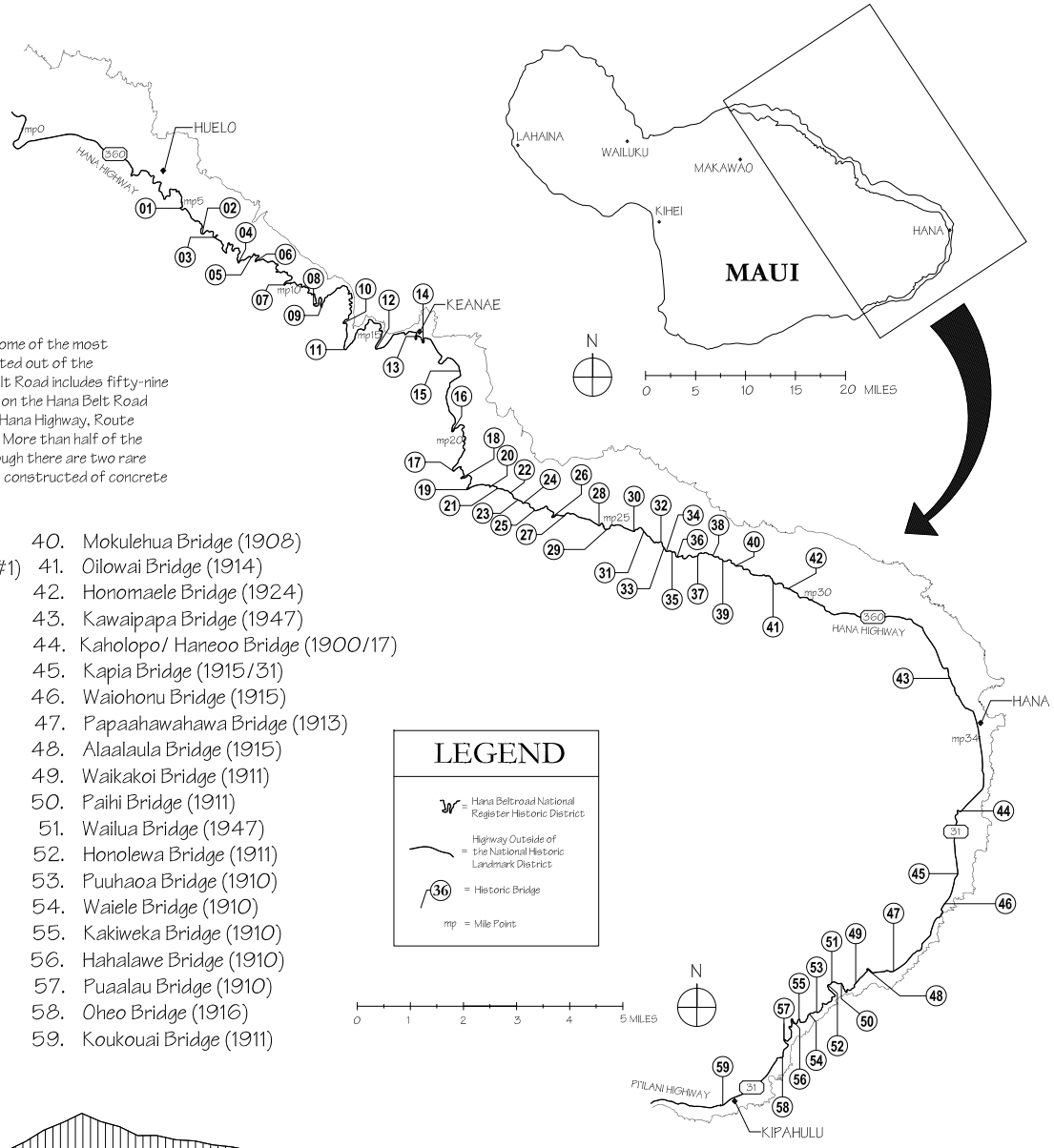
III. HISTORIC BRIDGE DISTRICT: HANA HIGHWAY

HISTORIC BRIDGES
OF THE HANA BELT ROAD

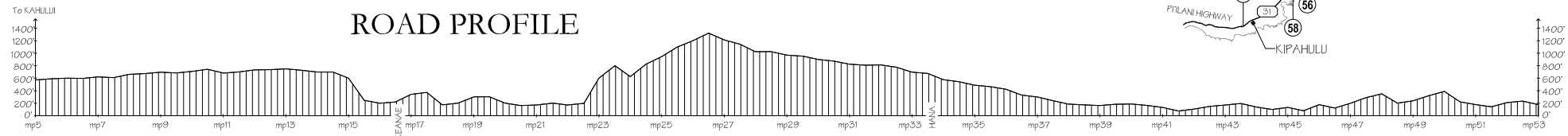
The island of Maui is comprised of two shield volcanoes joined by an isthmus, which constitutes east and west Maui. East Maui, where the Hana Belt Road is located, is the immense Haleakala, a dormant volcano more than 10,000 feet in elevation. Lava flows from earlier times had poured into the ocean, which created the jagged coastline along which the road is aligned. Centuries of stream erosion from the wet, trade-wind climate on Haleakala's windward (northeastern) slope cut a rugged terrain of great sea-cliffs and v-shaped valleys. The wet climate has allowed dense forests to grow over the rough terrain making the Hana District in East Maui one of Hawaii's most isolated and inaccessible areas.

Chiseled into the precipitous cliffs and winding around more than 600 curves, the Hana Belt Road offers some of the most spectacular scenery in the Hawaiian islands and is a marvel of early road engineering. Miles of road were blasted out of the mountainsides and many bridges were required to carry the road across streams and gulches. The Hana Belt Road includes fifty-nine bridges and numerous culverts constructed between 1908 and 1947. Sixteen of these bridges are located on the Hana Belt Road south of Hana (Pi'ilani Highway, Route 31) and forty-three on the Hana Belt Road between Hana and Huelo (Hana Highway, Route 360). The narrowest bridges are approximately 12'-6" wide and the widest bridge is approximately 20'-6". More than half of the bridges are single span. The majority of bridges were constructed of reinforced cast-in-place concrete, though there are two rare surviving examples of masonry arch construction. Many of the bridges have wingwalls, abutments and piers constructed of concrete rubble masonry with basalt (lava rock).



01. Hoalua Bridge (1929)
02. Kailua Bridge (1929)
03. Nailiilihaele Bridge (1930)
04. Oopuola Bridge (1925)
05. Makanali Bridge (1928)
06. Kaaiea Bridge (1928)
07. Waikamoi Bridge (1911)
08. Puohokamoa Bridge (1912)
09. Haipuaena Bridge (1912)
10. Punala Bridge (1911)
11. Honomanu Bridge (1911)
12. Nuaailua Bridge (1911/40)
13. Piinaau Bridge (1916)
14. Palauhulu Bridge (1916)
15. Waiokamilo Bridge (1921/37)
16. Waikani Bridge (1926)
17. West Wailuaiki Bridge (1926)
18. East Wailuaiki Bridge (1926)
19. Kopiliula Bridge (1926)
20. Puakoa Bridge (1926)
21. Waiohue Bridge (1926/37)
22. Waiohuolua Bridge (Unnamed Bridge #1) (1920/70)
23. Unnamed Bridge #2 (1920)
24. Paakea Bridge (1920)
25. Kapaula Bridge (1926)
26. Hanawi Bridge (1926)
27. East Hanawi Bridge (1926)
28. Makapipi Bridge (1926)
29. Kuhiwa Bridge (1926)
30. Kupukoi Bridge (1926)
31. Kahalaowaka Bridge (1926)
32. Pupape-Manawikeae Bridge (1926)
33. Kahaiwaihapapa Bridge (1922)
34. Keaaiki Bridge (1921)
35. West Waioni Bridge (1920)
36. Waioni Bridge (1920)
37. Lanikele Bridge (1917)
38. Heleleikeoha Bridge (1917)
39. Ulaino Bridge (1914)
40. Mokulehua Bridge (1908)
41. Oilowai Bridge (1914)
42. Honomaele Bridge (1924)
43. Kawaipapa Bridge (1947)
44. Kaholopo/ Haneoo Bridge (1900/17)
45. Kapia Bridge (1915/31)
46. Waiohonu Bridge (1915)
47. Papaahawahawa Bridge (1913)
48. Alaalaula Bridge (1915)
49. Waikakoi Bridge (1911)
50. Paihi Bridge (1911)
51. Wailua Bridge (1947)
52. Honolewa Bridge (1911)
53. Puuhaoa Bridge (1910)
54. Waiele Bridge (1910)
55. Kakiweka Bridge (1910)
56. Hahalawe Bridge (1910)
57. Puaalau Bridge (1910)
58. Oheo Bridge (1916)
59. Koukouai Bridge (1911)

ROAD PROFILE



Vertical Exaggeration Times Ten

ORIGINAL DOCUMENT COURTESY OF HAER HI-75 HAS BEEN MODIFIED FOR SPELLING CONSISTENCY PER HAWAII STATE DEPARTMENT OF TRANSPORTATION DATA.

DELINEATED BY: DANIEL SCHAIBLE, 2005

HANA HIGHWAY RECORDING PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

HANA VICINITY

HANA BELT ROAD (HANA HIGHWAY)
BETWEEN HAIKU AND KIPAHULU/STATE HIGHWAY 360/COUNTY HIGHWAY31
MAUI

HAWAII

SHEET 2 OF 13

HISTORIC AMERICAN ENGINEERING RECORD HI-75

5-18

Maui and Molokai Historic Bridge District

The Hana Belt Road Historic District is registered on the National Register of Historic Places. See Chapter 2 section III for the historic context.

Hana Highway Distict Bridges

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
009003600904579	Alaalaua No. 27	Alaalaua Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Solid with Cap	County
009003600502419	East Hanawi Stream Bridge	East Hanawi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600502131	East Wailuaiki Stream Bridge	East Wailuaiki Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600904304	Hahalawe No. 19	Hahalawe Stream	Hana Highway	1910	Masonry Arch	Concrete Solid	County
009003600501145	Haipuaena Stream Bridge	Haipuaena Stream	Hana Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	State
009003600502402	Hanawi Stream Bridge	Hanawi Stream	Hana Highway	1926	Closed Spandrel Arch	Concrete Open Vertical	State
009003600502795	Heleleikeoha Stream Bridge	Heleleikeoha Stream	Hana Highway	1917	Concrete Tee Beam	Concrete Open Vertical	State
009003600500509	Hoalua Stream Bridge	Hoalua Stream	Hana Highway	1929	Concrete Tee Beam	Concrete Open Vertical	State
009003600502958	Honomaele Stream Bridge	Honomaele Stream	Hana Highway	1924	Concrete Tee Beam	Concrete Open Vertical	State
009003600501372	Honomanu Stream Bridge	Honomanu Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	State
009003600500858	Kaaiea Stream Bridge	Kaaiea Stream	Hana Highway	1928	Concrete Tee Beam	Concrete Open Vertical	State
009003600502598	Kahalaowaka Stream Bridge	Unnamed Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600502664	Kahawaihapapa Stream Bridge	Kahawaihapapa Stream	Hana Highway	1922	Concrete Tee Beam	Concrete Open Vertical	State
009003600904864	Kahawaiokapia No. 30	Kapia Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Solid	County
009003600904984	Kaholopo No. 31	Haneoo Stream	Hana Highway	1917	Concrete Slab	Metal Thrie Beam	County
009003600500588	Kailua Stream Bridge	Kailua Stream	Hana Highway	1929	Concrete Tee Beam	Concrete Open Vertical	State

Hana Highway Distict Bridges

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
009003600502339	Kapaula Stream Bridge	Kapaula Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600503347	Kawaipapa Stream Bridge	Kawaipapa Stream	Hana Highway	1947	Concrete Tee Beam	Concrete Open Horizontal	State
009003600502681	Keaaiki Stream Bridge	Keaaiki Stream	Hana Highway	1921	Concrete Tee Beam	Concrete Open Vertical	State
009003600501317	Kolea (Punala Stream) Bridge	Punalau Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	State
009003600502189	Kopiliula Stream Bridge	Kopiliula Stream	Hana Highway	1926	Concrete Girder	Concrete Solid	State
009003600904058	Koukouai No. 16	Koukouai Stream	Hana Highway	1911	Open Spandrel Arch	Concrete Solid with Cap	County
009003600502523	Kuhiwa Stream Bridge	Kuhiwa Stream	Hana Highway	1926	Closed Spandrel Arch	Concrete Open Vertical	State
009003600502546	Kupukoi Stream Bridge	Kupukoi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600502779	Lanikele Stream Bridge	Lanikele Stream	Hana Highway	1917	Concrete Tee Beam	Concrete Open Vertical	State
009003600904329	Mahalawa No. 20	Kakiweka Stream	Hana Highway	1910	Concrete Tee Beam	Concrete Solid with Cap	County
009003600500824	Makanali Stream Bridge	Makanali Stream	Hana Highway	1928	Concrete Slab	Concrete Open Vertical	State
009003600502502	Makapipi Stream Bridge	Makapipi Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600502835	Mokulehua Stream Bridge	Mokulehua Stream	Hana Highway	1908	Concrete Slab	Concrete Solid	State
009003600500624	Nailiilihaele Bridge	Nailiilihaele Stream	Hana Highway	1930	Concrete Tee Beam	Concrete Open Vertical	State
009003600501540	Nuaailua Bridge	Nuaailua Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Open Vertical	State
009003600502922	Oilowai Stream Bridge	Oilowai Stream	Hana Highway	1914	Concrete Tee Beam	Concrete Open Vertical	State

Hana Highway Distict Bridges

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
009003600500797	Oopuola Bridge	Oopuola Stream	Hana Highway	1925	Concrete Tee Beam	Concrete Open Vertical	State
009003600502301	Paakea Stream-Unnamed Bridge No.3	Paakea Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid	State
009003600904358	Paehala No. 21	Wailele Stream	Hana Highway	1910	Masonry Arch	Concrete Solid with Cap	County
009003600904494	Paihi No. 25	Paihi Stream	Hana Highway	2005	Concrete Girder	Concrete Solid	County
009003600501679	Palauhulu Stream Bridge	Palauhulu Stream	Hana Highway	1916	Concrete Tee Beam	Concrete Open Vertical	State
009003600904636	Papahawahawa No. 28	Papahawahawa Stream	Hana Highway	2011	Concrete Tee Beam	Concrete Solid with Cap	County
009003600501662	Piinaau Stream Bridge	Piinaau Stream	Hana Highway	1916	Concrete Tee Beam	Concrete Open Vertical	State
009003600502231	Puakaa Stream Bridge	Puakaa Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600501098	Puohokamoa Bridge	Puohokamoa Stream	Hana Highway	1912	Concrete Tee Beam	Concrete Solid with Cap	State
009003600502652	Pupape Stream Bridge	Pupape Stream	Hana Highway	1926	Concrete Tee Beam	Concrete Open Vertical	State
009003600904386	Puuhaoa No. 22	Unnamed Stream	Hana Highway	1910	Concrete Tee Beam	Concrete Open Decorative	County
009003600904464	South Wailua No. 23	Honolewa Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid with Cap	County
009003600502801	Ulaino Stream Bridge	Ulaino Stream	Hana Highway	1914	Concrete Tee Beam	Concrete Open Vertical	State
009003600502300	Unnamed Bridge No.2	Unnamed Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid with Cap	State
009003600904542	Waikakoi No. 26	Waikakoi Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid with Cap	County

Hana Highway Distict Bridges

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
009003600500990	Waikamoi Stream Bridge	Waikamoi Stream	Hana Highway	1911	Concrete Tee Beam	Concrete Solid	State
009003600501942	Waikani Stream Bridge	Waikani Stream	Hana Highway	1926	Open Spandrel Arch	Concrete Open Vertical	State
009003600904475	Wailua No. 24	Wailua Stream	Hana Highway	1947	Concrete Tee Beam	Concrete Open Horizontal	County
009003600904803	Waiohonu No. 29	Waiohonu Stream	Hana Highway	1915	Concrete Tee Beam	Concrete Open Vertical	County
009003600502250	Waiohue Stream Bridge	Waiohue Stream	Hana Highway	1937	Concrete Tee Beam	Concrete Solid with Cap	State
009003600502298	Waiohuolua Bridge (Unnamed Bridge No.1)	Unnamed Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Solid with Cap	State
009003600501811	Waiokamilo Stream Bridge	Waiokamilo Stream	Hana Highway	1921	Concrete Tee Beam	Concrete Open Greek Cross	State
009003600502702	Waioni Stream Bridge	Waioni Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Open Vertical	State
009003600502086	West Wailuaiki Stream Bridge	West Wailuaiki Stream	Hana Highway	1937	Concrete Tee Beam	Concrete Open Vertical	State
009003600502697	West Waioni Stream Bridge	West Waioni Stream	Hana Highway	1920	Concrete Tee Beam	Concrete Open Vertical	State

IV. INVENTORY FORMS:
MAUI STATE ELIGIBLE BRIDGES

Inventory Form
(State)

General Information

Bridge Number: 009003770500058 **Route No:** 377	
Popular Name: Alae Bridge-Naalae Gulch	
Feature Crossed: Naalae Gulch	
Feature Carried: Kekaulike Avenue	
Milepost: 8.57 mi. **Island:** Maui	
Longitude: 156d-19m-33.87s **Latitude:** 20d-44m-32.11s	
Location: 0.21 Miles North of Waipoli Road	
Historic Name: Alae Bridge-Naalae Gulch	
Designer/Engineer:	
Builder/Contractor: Hawaiian Contracting Co.	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 49.9 ft.	**Total Length:** 149.9 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Alae (Naalae Gulch) Bridge carries Kekaulike Avenue (State Highway 377) over Naalae Gulch, south of the Kula Botanical Gardens. Alae Gulch Bridge, a reinforced concrete tee beam structure, is the most impressive of the six bridges built in Kula by the Hawaiian Contracting Company under contract to the Territorial Highways Department in 1933-34.

The Alae Bridge remains in its original location and has retained its rural setting on the upper Kula Road. The bridge's original concrete tee-beam design is unaltered, however modern steel guardrails have been attached to the end piers thus obscuring the paneled surface detail. The original reinforced concrete material of the bridge remains intact, with the exception of minor concrete spalling on the parapets. The workmanship is typical of bridges of this period. The bridge is easily visible from the Kula Botanical Gardens. The bridge's historic associations with Federal Aid highway improvements and advances in concrete technology are apparent to informed observers. The bridge retains its historic feeling due to its rural location, sharp approach and narrow width.

Significance Statement:

The Alae Gulch Bridge is significant for its contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A as a representative of an important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century. Further, the bridge may also represent the “work of a master”: William R. Bartels of the Territorial Highways Department.

The Alae Gulch Bridge is one of four built in 1933 on the Kekaulike Avenue, followed by two more bridges built on that same highway in 1934. The bridge is a striking example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the deep Naalae Gulch along the Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

The Alae Gulch Bridge with its three spans is one of the longer and taller bridges in Maui County. Its substructure is distinguished by the two twin-arch reinforced concrete piers.(1) Although the drawings for the Alae Gulch Bridge (dated September 1932) are unsigned. Bartels was responsible for the design of many major Territorial bridge projects between 1932 and his retirement from the department in 1956.(2) His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

(1) Hawaii Heritage Center, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii, Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1990), 97.

(2) Patricia Alvarez, “A History of Road and Bridge Development on the Island of Hawaii” in Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

Inventory Form
(State)

General Information

Bridge Number: 009000300303899	**Route No:** 30
Popular Name: Anakaluahine Stream Bridge	
Feature Crossed: Anakaluahine Stream	
Feature Carried: Kahekili Highway	
Milepost: 38.46 mi.	**Island:** Maui
Longitude: 156d-35m-23.65s	**Latitude:** 21d-01m-12.24s

Location: 13.00 Miles North of Camp Maluhia Road
Historic Name: Anakaluahine Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** Yes
Altered? Yes	**Alteration Date(s):** 1976	
Alteration Type(s):		
Alteration Description(s): Significant alteration to superstructure in 1976		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 17.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Anakaluahine Stream Bridge carries Kahekili Highway across Anakaluahine Stream. This concrete tee beam bridge remains intact and is in fair condition. Metal thrie beam railings have replaced the original parapets. The concrete rock masonry abutments are original. In 1976 the bridge had undergone significant alterations that could've included the replacement of the superstructure.

Significance Statement:

This bridge is eligible under Criterion C for its associations with early developments in concrete bridge construction in Hawaii. It is a fair example of a 1920s concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. The rock abutments are a potentially eligible historic resource.

Inventory Form
(State)

General Information

Bridge Number: 009003600502419 **Route No:** 360	
Popular Name: East Hanawi Stream Bridge	
Feature Crossed: East Hanawi Stream	
Feature Carried: Hana Highway	
Milepost: 24.16 mi. **Island:** Maui	
Longitude: 156d-06m-26.36s **Latitude:** 20d-48m-36.36s	
Location: 0.86 Miles West of Lowere Nahiku Road	
Historic Name: East Hanawi Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: high Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

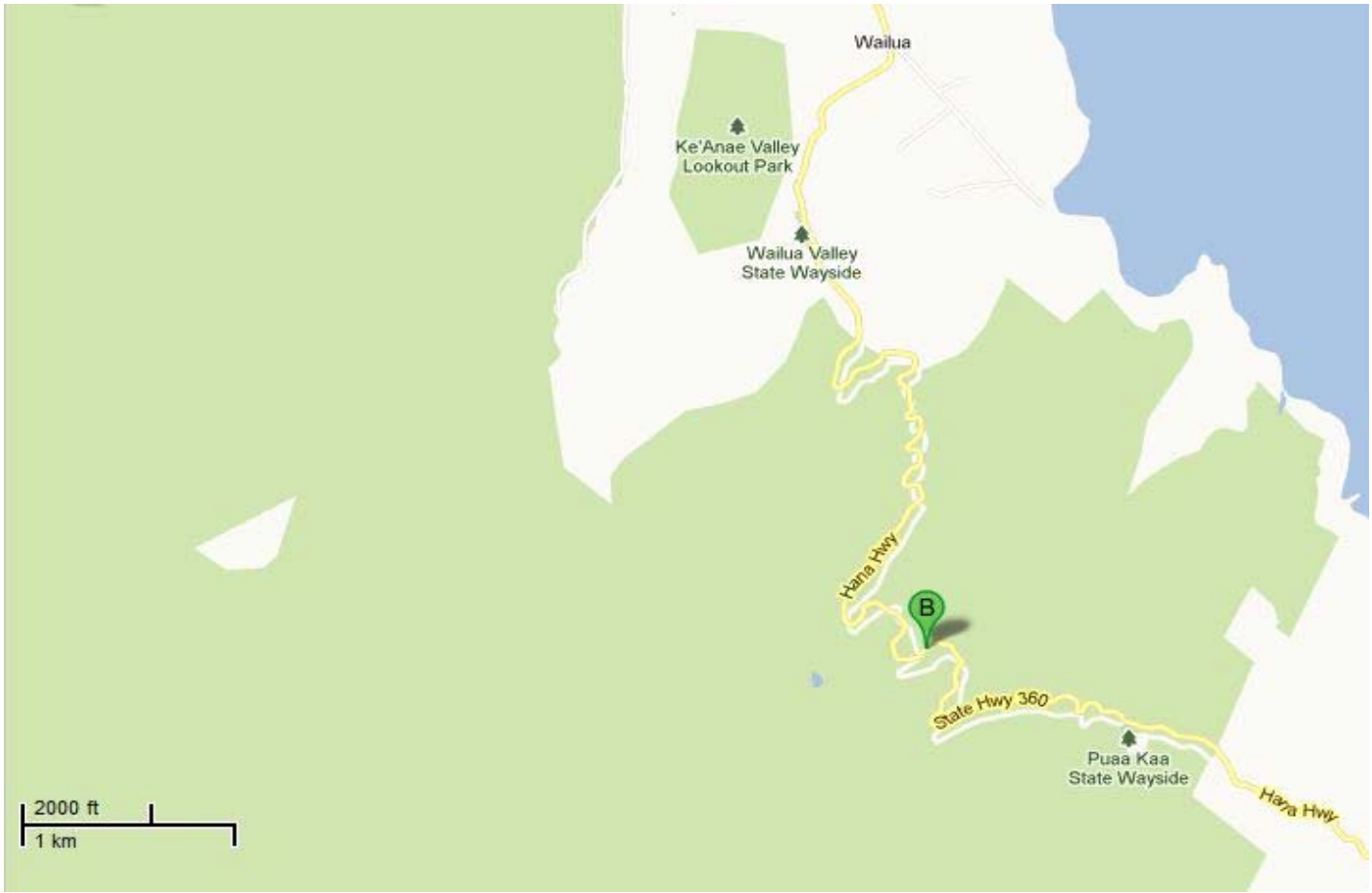
Inventory Form
(State)

General Information

Bridge Number: 009003600502131	**Route No:** 360
Popular Name: East Wailuaiki Stream Bridge	
Feature Crossed: East Wailuaiki Stream	
Feature Carried: Hana Highway	
Milepost: 21.27 mi.	**Island:** Maui
Longitude: 156d-08m-08.84s	**Latitude:** 20d-49m-12.87s

Location: 2.24 Miles East of Wailua Valley Lookout
Historic Name: East Wailuaiki Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 30.8 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 20.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600501145 **Route No:** 360	
Popular Name: Haipuaena Stream Bridge	
Feature Crossed: Haipuaena Stream	
Feature Carried: Hana Highway	
Milepost: 11.44 mi. **Island:** Maui	
Longitude: 156d-10m-34.52s **Latitude:** 20d-51m-59.37s	
Location: 0.69 Miles West of Kaumahina State Wayside Park Road	
Historic Name: Haipuaena Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 16.1 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 14.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

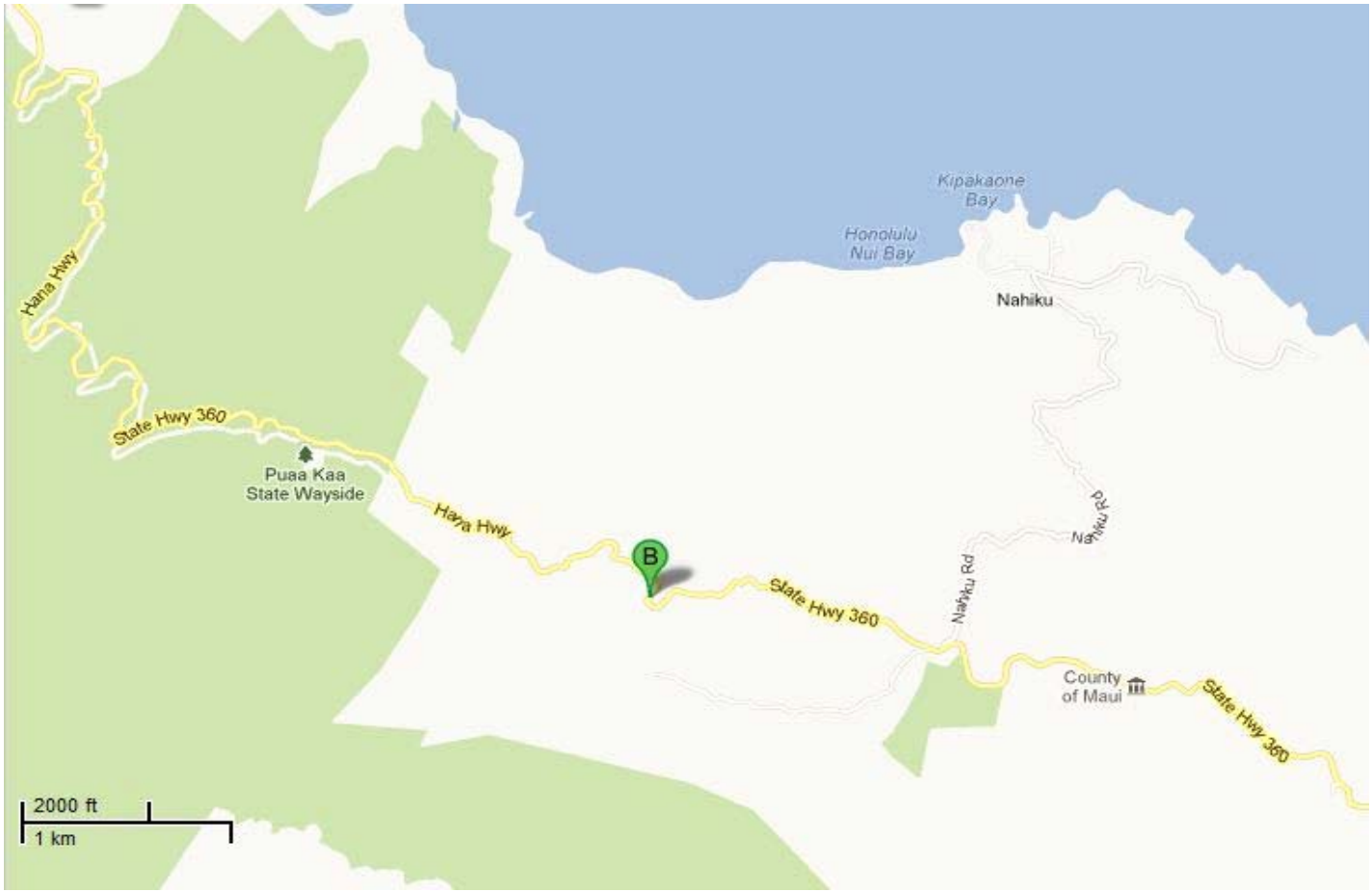
Inventory Form
(State)

General Information

Bridge Number: 009003600502402	**Route No:** 360
Popular Name: Hanawi Stream Bridge	
Feature Crossed: Hanawi Stream	
Feature Carried: Hana Highway	
Milepost: 23.99 mi.	**Island:** Maui
Longitude: 156d-06m-34.20s	**Latitude:** 20d-48m-34.96s

Location: 1.03 Miles West of Lower Nahiku Road
Historic Name: Hanawi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 36.1 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 23.6 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

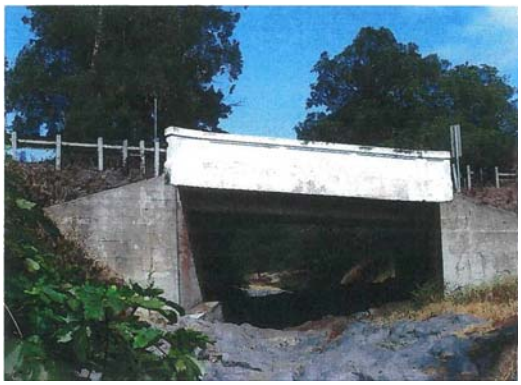
Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. Arch bridges are also an uncommon bridge type. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003770500255	**Route No:** 377
Popular Name: Hapapa Bridge	
Feature Crossed: Hapapa Gulch	
Feature Carried: Kekaulike Avenue	
Milepost: 6.62 mi.	**Island:** Maui
Longitude: 156d-18m-25.93s	**Latitude:** 20d-45m-37.18s



Location: 0.05 Miles North of Kamehameiki Road
Historic Name: Hapapa Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 23.0 ft.	**Total Length:** 24.9 ft.	**Deck Width:** 24.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Hapapa Gulch Bridge carries Kekaulike Avenue across the Hapapa Gulch Stream within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by thrie beam guardrails on both sides of the bridge. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.

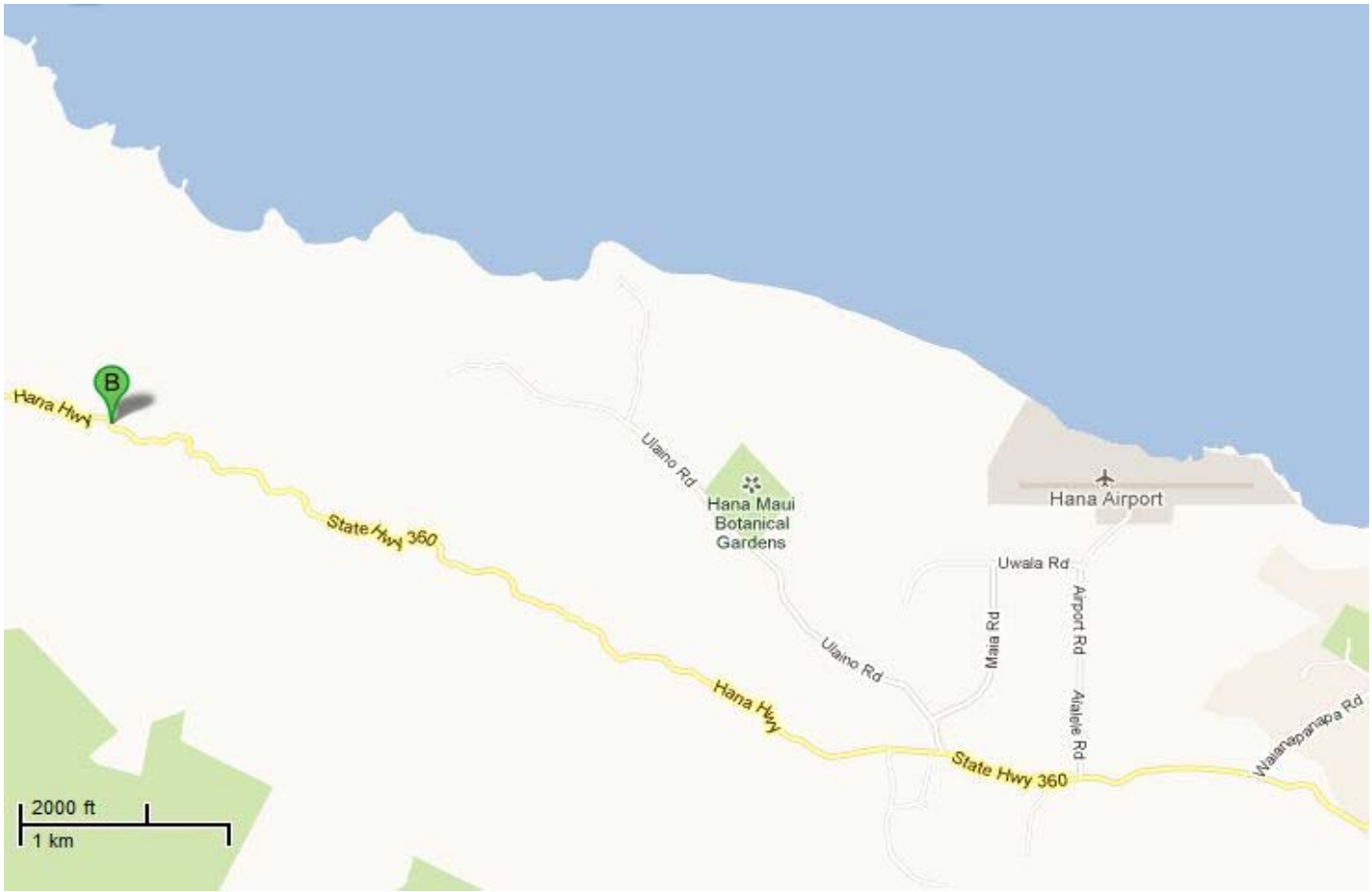
The Hapapa Gulch Bridge is one of four built in 1933 on the Kekaulike Avenue, followed by two more bridges built on that same highway in 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Hapapa Gulch along Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

Inventory Form
(State)

General Information

Bridge Number: 009003600502795 **Route No:** 360	
Popular Name: Heleleikeoha Stream Bridge	
Feature Crossed: Heleleikeoha Stream	
Feature Carried: Hana Highway	
Milepost: 27.92 mi. **Island:** Maui	
Longitude: 156d-03m-41.56s **Latitude:** 20d-47m-53.62s	
Location: 2.90 Miles East of Lower Nahiku Road	
Historic Name: Heleleikeoha Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1917	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 23.0 ft.	**Total Length:** 27.9 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

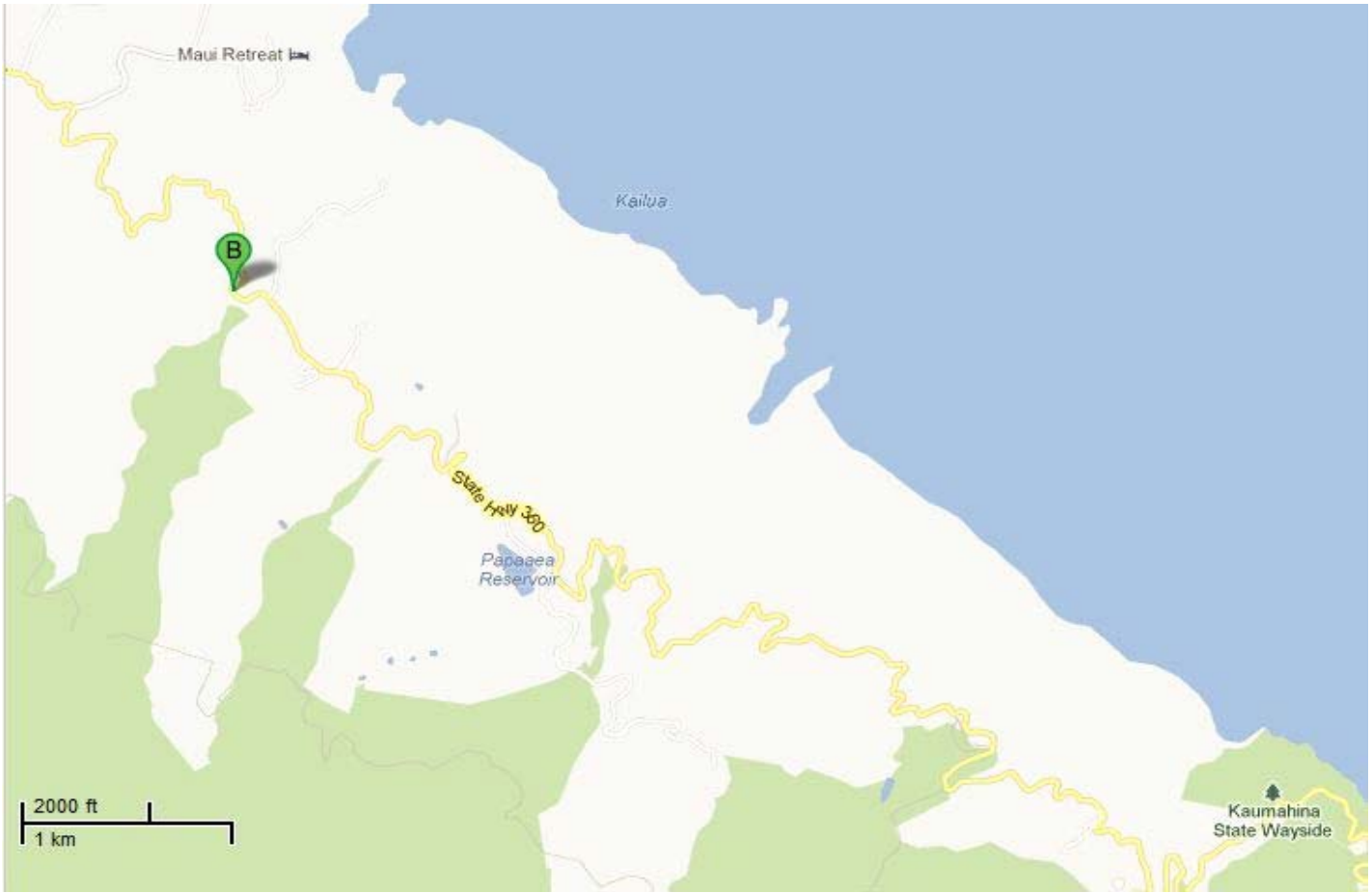
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600500509	**Route No:** 360
Popular Name: Hoalua Stream Bridge	
Feature Crossed: Hoalua Stream	
Feature Carried: Hana Highway	
Milepost: 5.09 mi.	**Island:** Maui
Longitude: 156d-13m-11.05s	**Latitude:** 20d-53m-41.76s
Location: 5.09 Miles East of Kaupakalua Road	
Historic Name: Hoalua Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 47.9 ft.	**Total Length:** 48.9 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009000300300346	**Route No:** 30
Popular Name: Honolua Stream Bridge	
Feature Crossed: Honolua Stream	
Feature Carried: Honoapiilani Highway	
Milepost: 32.41 mi.	**Island:** Maui
Longitude: 156d-38m-01.19s	**Latitude:** 21d-00m-48.98s

Location: 0.57 Miles North of Honolua Place
Historic Name: Honolua Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1974	
Alteration Type(s):		
Alteration Description(s): Bridge spall repairs done in 1974		

Bridge Information

Number of Spans: 1	**Max Span:** 23.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Honolua Stream Bridge carries Honoapiilani Highway across Honolua Stream. This concrete tee beam bridge remains intact and is in fair condition. Attached to the approaches of the solid concrete parapets are thrie beams from the highway. The concrete rock masonry abutments are original. In 1974 the bridge was rehabilitated with spall repairs.

Significance Statement:

This bridge is eligible under Criterion C for its associations with early developments in concrete bridge construction in Hawaii. It is an intact example of a 1920s concrete tee-beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. The rock abutments are a potentially eligible historic resource.

Inventory Form
(State)

General Information

Bridge Number: 009003600502958	**Route No:** 360
Popular Name: Honomaele Stream Bridge	
Feature Crossed: Honomaele Stream	
Feature Carried: Hana Highway	
Milepost: 29.54 mi.	**Island:** Maui
Longitude: 156d-02m-30.56s	**Latitude:** 20d-47m-24.46s

Location: 1.83 Miles West of Alalele Place (Road to Hana Airport)
Historic Name: Honomaele Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 20.0 ft.	**Total Length:** 38.1 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

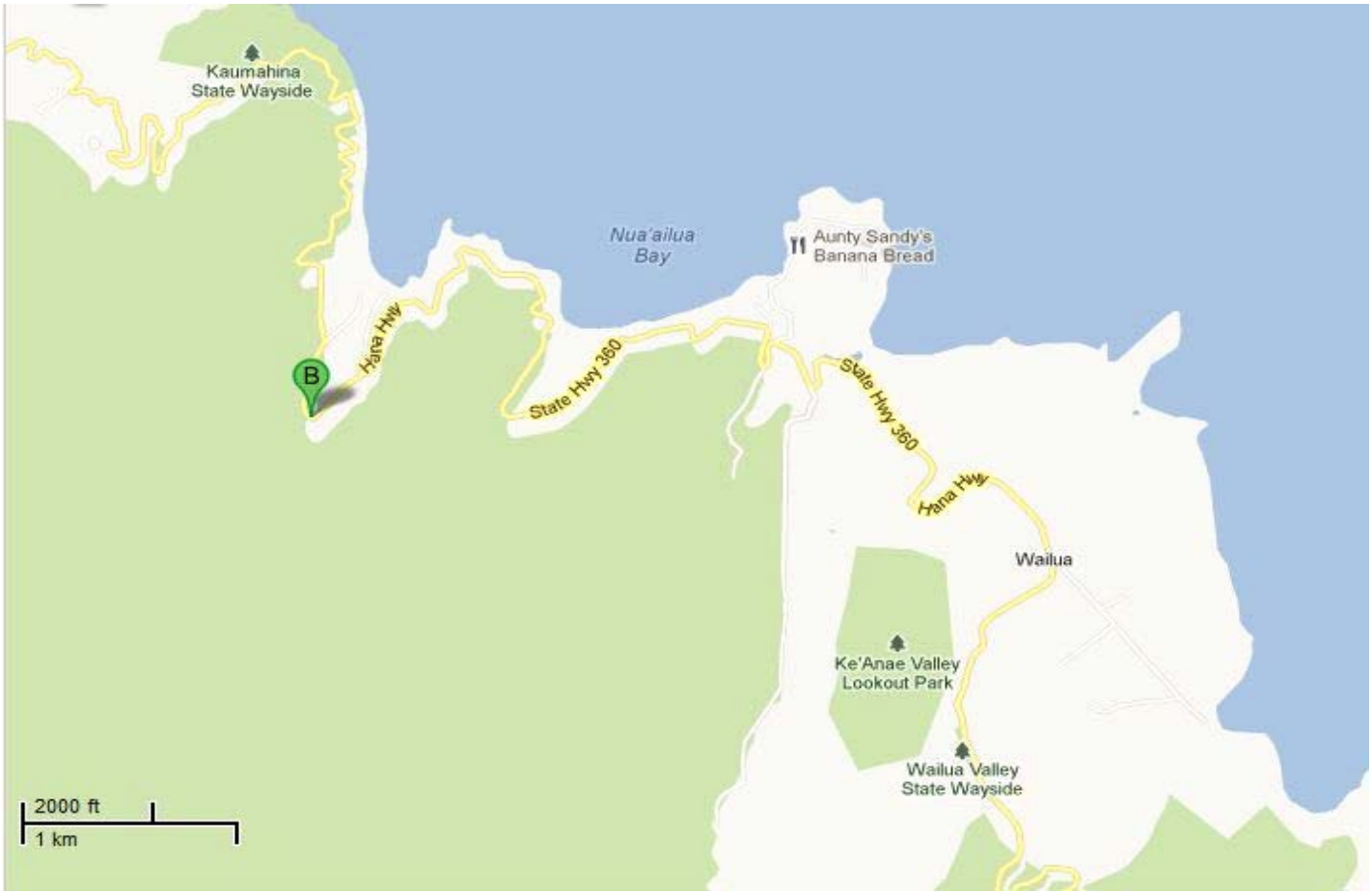
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600501372 **Route No:** 360	
Popular Name: Honomanu Stream Bridge	
Feature Crossed: Honomanu Stream	
Feature Carried: Hana Highway	
Milepost: 13.71 mi. **Island:** Maui	
Longitude: 156d-10m-10.61s **Latitude:** 20d-51m-19.24s	
Location: 1.58 Miles East of Kaumahina State Wayside Park Road	
Historic Name: Honomanu Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 23.0 ft.	**Total Length:** 47.9 ft.	**Deck Width:** 14.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

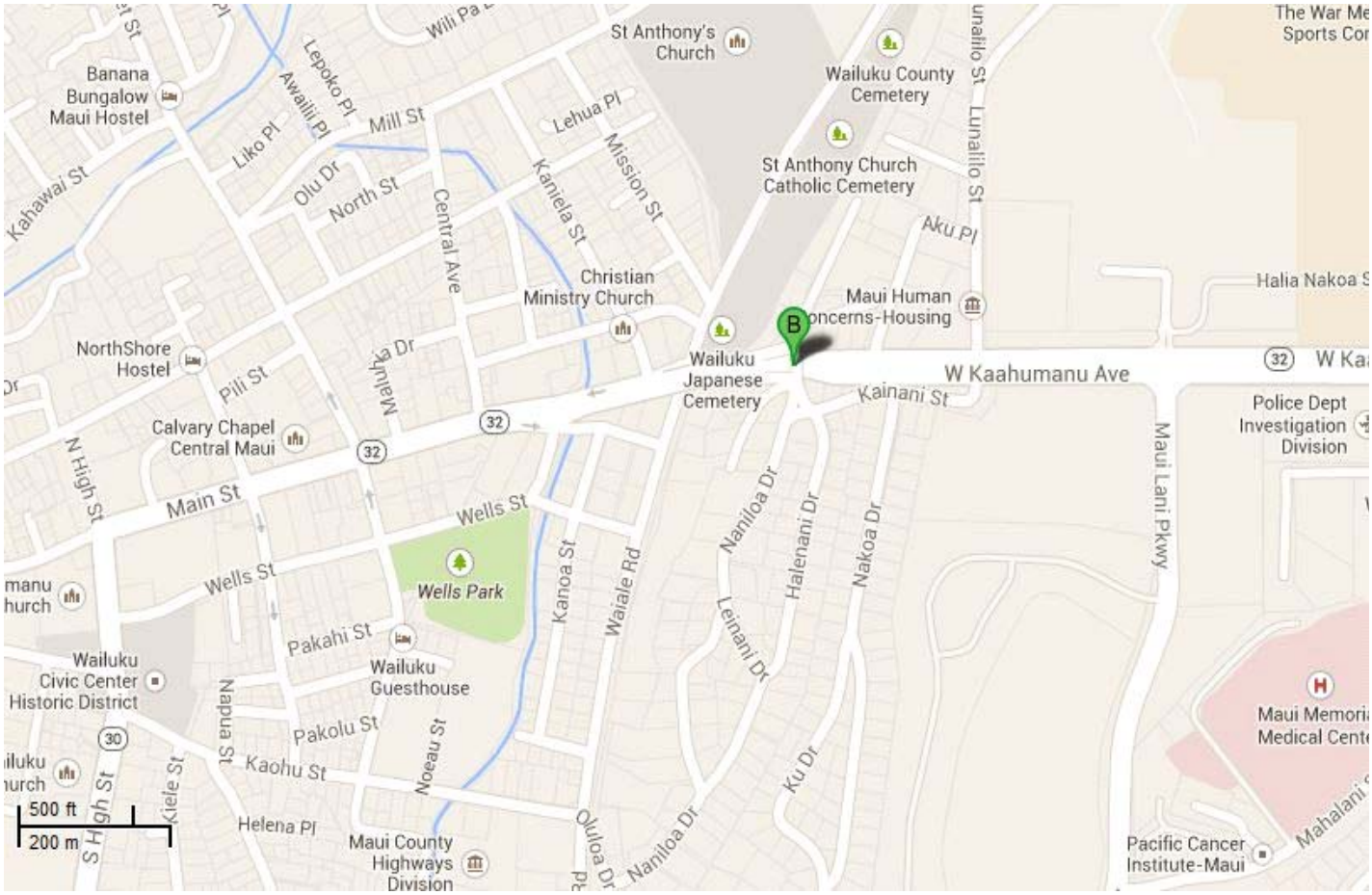
Inventory Form
(State)

General Information

Bridge Number: 009000321200060	**Route No:** 32
Popular Name: Kaahumanu Avenue Underpass-Naniloa Drive Overpass	
Feature Crossed: Kaahumanu Avenue	
Feature Carried: Naniloa Drive	
Milepost: 0.60 mi.	**Island:** Maui
Longitude: 156d-29m-45.66s	**Latitude:** 20d-53m-19.87s

Location: 0.06 Miles West of Aku Place
Historic Name: Kaahumanu Avenue Underpass-Naniloa Drive Overpass
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 50.9 ft.	**Total Length:** 63.0 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; 2'-6" wide sidewalks on each side of roadway			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600500858	**Route No:** 360
Popular Name: Kaaiea Stream Bridge	
Feature Crossed: Kaaiea Stream	
Feature Carried: Hana Highway	
Milepost: 8.57 mi.	**Island:** Maui
Longitude: 156d-11m-43.33s	**Latitude:** 20d-52m-42.10s

Location: 3.56 Miles West of Kaumahina State Wayside Park Road
Historic Name: Kaaiea Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 17.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502598 **Route No:** 360	
Popular Name: Kahalaowaka Stream Bridge	
Feature Crossed: Unnamed Stream	
Feature Carried: Hana Highway	
Milepost: 25.95 mi. **Island:** Maui	
Longitude: 156d-05m-04.08s **Latitude:** 20d-48m-20.10s	
Location: 0.93 Miles East of Lower Nahiku Road	
Historic Name: Kahalaowaka Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

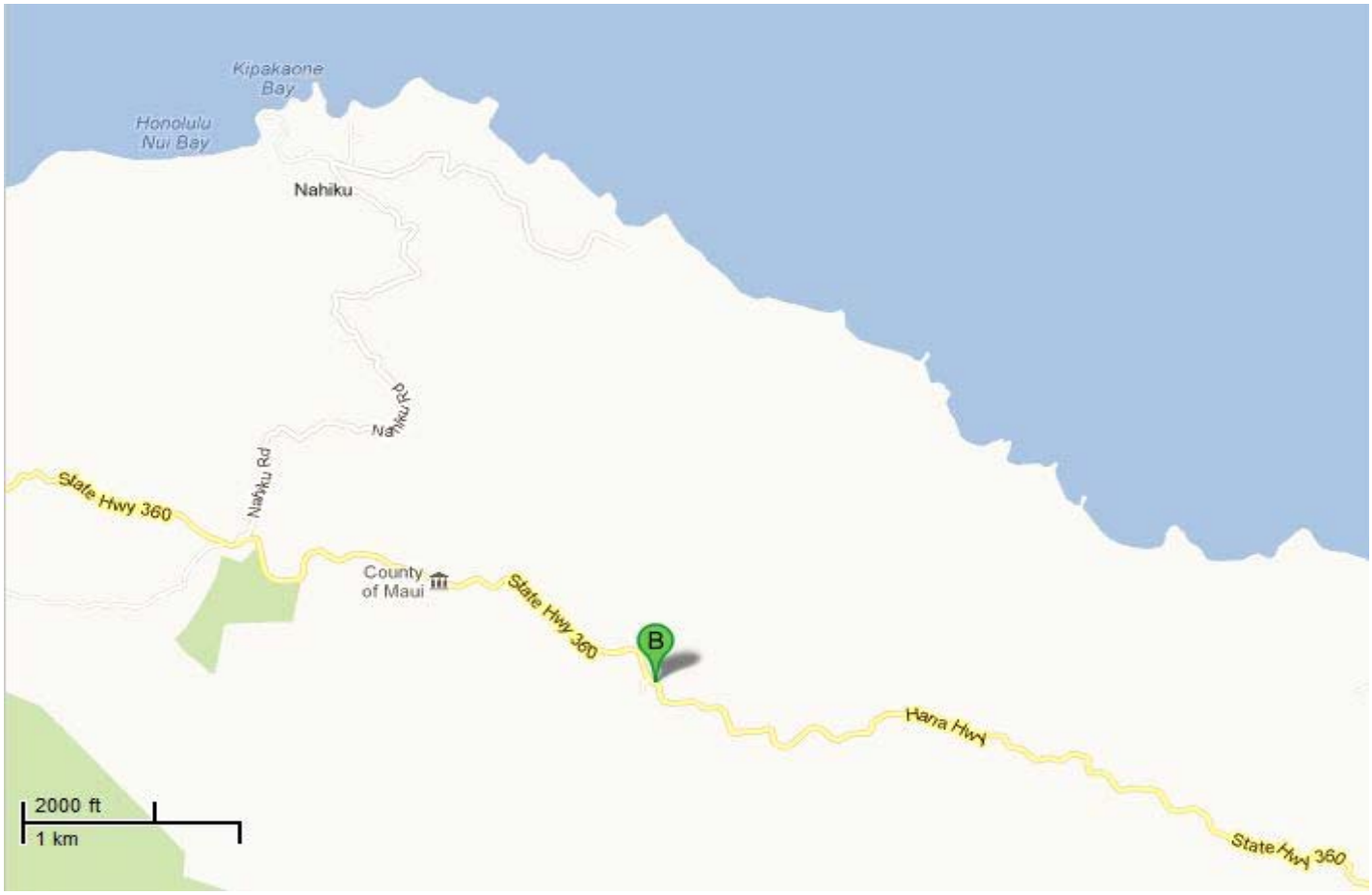
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502664 **Route No:** 360	
Popular Name: Kahawaihapapa Stream Bridge	
Feature Crossed: Kahawaihapapa Stream	
Feature Carried: Hana Highway	
Milepost: 26.60 mi. **Island:** Maui	
Longitude: 156d-04m-38.92s **Latitude:** 20d-48m-04.08s	
Location: 1.59 Miles East of Lower Nahiku Road	
Historic Name: Kahawaihapapa Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1922	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 17.1 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 17.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

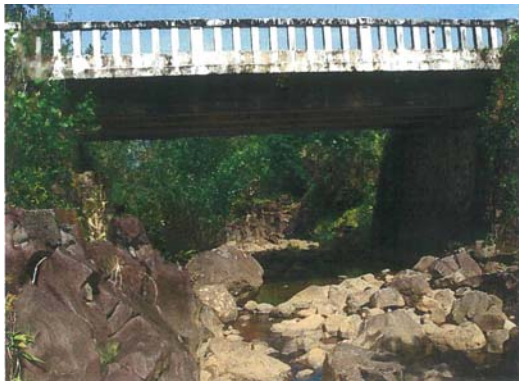
See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

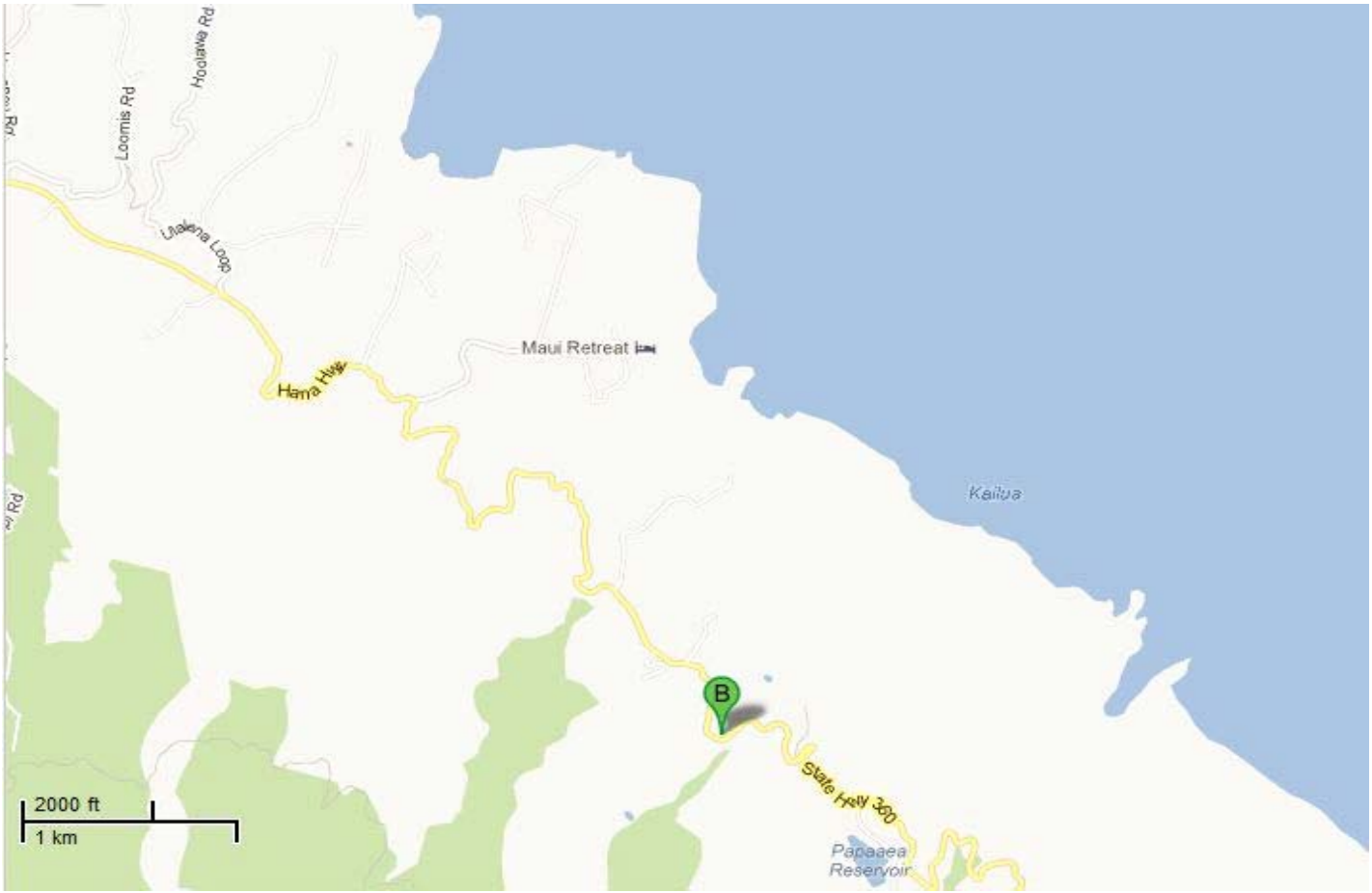
Inventory Form
(State)

General Information



Bridge Number: 009003600500588	**Route No:** 360
Popular Name: Kailua Stream Bridge	
Feature Crossed: Kailua Stream	
Feature Carried: Hana Highway	
Milepost: 5.86 mi.	**Island:** Maui
Longitude: 156d-12m-48.51s	**Latitude:** 20d-53m-16.26s
Location: 6.26 Miles West of Kaumahina State Wayside Park Road	
Historic Name: Kailua Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 39.0 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 21.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009000370300900	**Route No:** 37
Popular Name: Kaipoioi Stream Bridge	
Feature Crossed: Kaipoioi Stream	
Feature Carried: Kula Highway	
Milepost: 14.33 mi.	**Island:** Maui
Longitude: 156d-19m-59.56s	**Latitude:** 20d-44m-11.33s
Location: 0.05 Miles South of Kekaulike Avenue (Route 377)	
Historic Name: Kaipoioi Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 24.9 ft.	**Total Length:** 75.1 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Kaipoioi Stream Bridge carries Kula Highway across the Kaipoioi Stream within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by thrie beam guardrails on both sides of the bridge. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.

The Kaipoioi Stream Bridge is a part of the 6 bridges built in Kula on Kekaulike Avenue and Kula Highway between 1933 and 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Kaipoioi Stream along the Kula Highway, a major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

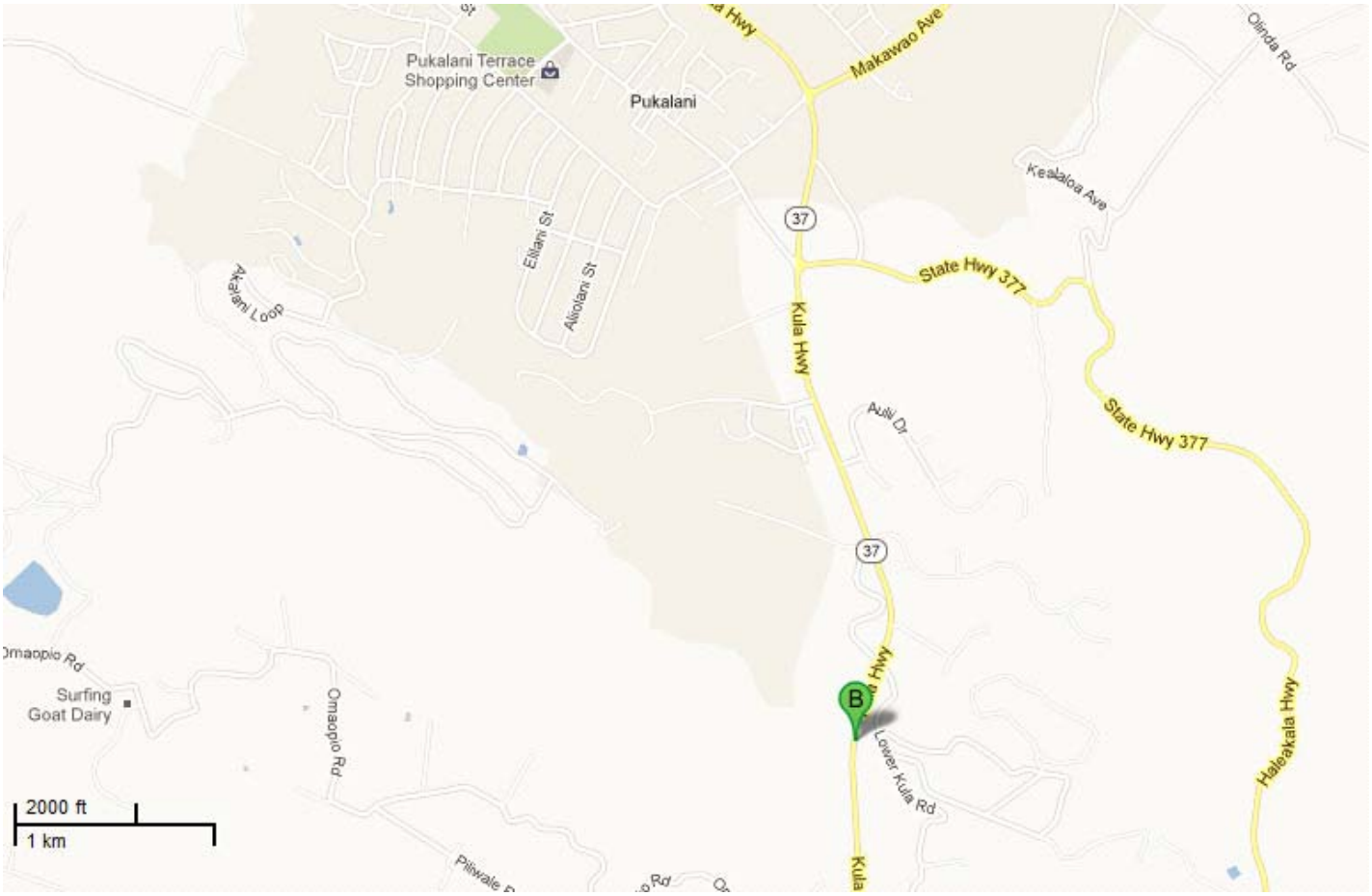
Inventory Form
(State)

General Information

Bridge Number: 009000370301383	**Route No:** 37
Popular Name: Kalialinui B Stream Bridge	
Feature Crossed: Kalialinui Stream	
Feature Carried: Kula Highway	
Milepost: 9.40 mi.	**Island:** Maui
Longitude: 156d-19m-39.38s	**Latitude:** 20d-48m-22.10s

Location: 0.57 Miles North of Omaopio Road
Historic Name: Kalialinui B Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1964	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 80.1 ft.	**Total Length:** 324.1 ft.	**Deck Width:** 36.1 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kalianui B Bridge carries Kula Highway across the Kalialinui Gulch.This prestressed and reinforced concrete bridge remains intact and is generally in good condition. The bridge has solid concrete parapets with a metal rail running horizontally above the concrete. The concrete deck is supported by concrete abutments. Thrie beams have been placed in front of the solid concrete and metal parapets and obscure the original parapet.

Significance Statement:

This bridge is eligible under Criterion C for being the longest concrete bridge with the longest concrete span built post-war (1945) on the island of Maui in the historic study period prior to 1969.

Inventory Form
(State)

General Information

Bridge Number: 009004500500200	**Route No:** 450
Popular Name: Kamiloloa Bridge	
Feature Crossed: Unnamed Stream	
Feature Carried: Kamehameha V Highway	
Milepost: 1.99 mi.	**Island:** Molokai
Longitude: 156d-59m-39.62s	**Latitude:** 21d-04m-43.11s
Location: 0.36 Miles East of Kahinani Place	
Historic Name: Kamiloloa Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.9 ft.	**Deck Width:** 27.9 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

Located on the island of Molokai, the Kamiloloa Bridge is a simple reinforced concrete, flat slab bridge with lava rock abutments. The form work is evident in its parapets.

The Kamiloloa Bridge carries Kamehameha V Highway Street across Kamiloloa Stream. Located on the island of Molokai, the Makakupaia Bridge is a single-span reinforced concrete, flat slab bridge in its original location, is generally in good condition, and its materials remain intact. The form work is evident on its solid concrete parapets and the bridge has CRM abutments. Metal thrie beams are integrated to the approaches of the parapets however, workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1940's reinforced concrete flat slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. This is one of the few historic bridges on the island of Molokai.

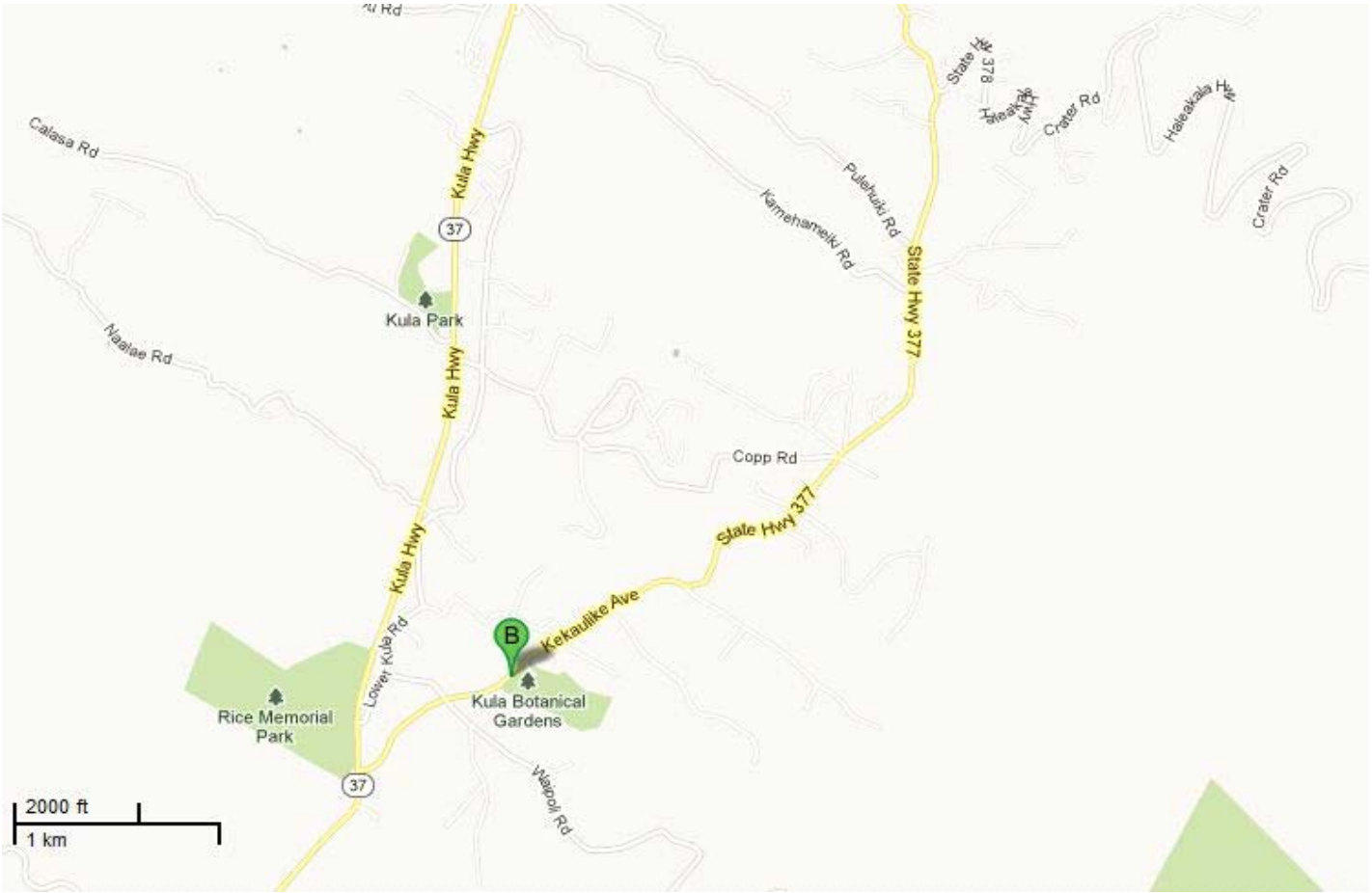
Inventory Form
(State)

General Information

Bridge Number: 009003770500053	**Route No:** 377
Popular Name: Kanoulu Bridge	
Feature Crossed: Kanoulu Stream	
Feature Carried: Kekaulike Avenue	
Milepost: 8.63 mi.	**Island:** Maui
Longitude: 156d-19m-36.05s	**Latitude:** 20d-44m-30.03s

Location: 0.16 Miles North of Waipoli Road
Historic Name: Kanoulu Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 27.9 ft.	**Total Length:** 29.9 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Kanoulu Stream Bridge carries Kekaulike Avenue across the Kanoulu Stream within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by thrie beam guardrails on both sides of the bridge. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.The Kanoulu Stream Bridge is one of four built in 1933 on the Kekaulike Avenue, followed by two more bridges built on that same highway in 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Kanoulu Stream along the Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

Inventory Form
(State)

General Information

Bridge Number: 009003600502339	**Route No:** 360
Popular Name: Kapaula Stream Bridge	
Feature Crossed: Kapaula Stream	
Feature Carried: Hana Highway	
Milepost: 23.37 mi.	**Island:** Maui
Longitude: 156d-06m-52.93s	**Latitude:** 20d-48m-41.44s

Location: 1.64 Miles West of Lower Nahiku Road
Historic Name: Kapaula Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 21.0 ft.	**Total Length:** 48.9 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

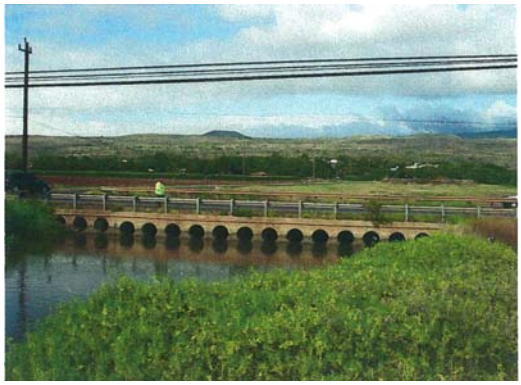
Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

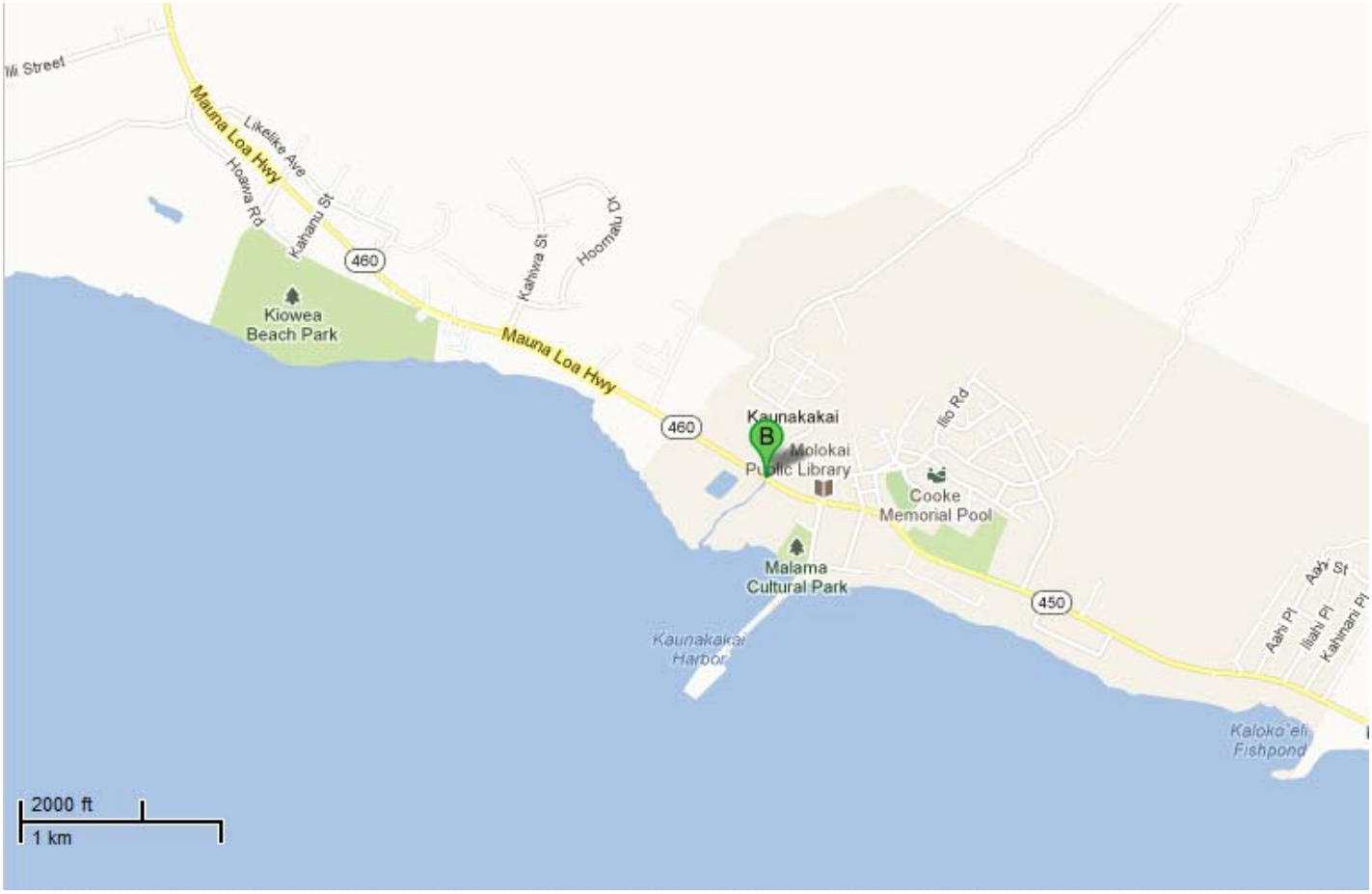
General Information

Bridge Number: 009004600501611	**Route No:** 460
Popular Name: Kaunakakai 16-Cell Culvert	
Feature Crossed: Kaunakakai Stream	
Feature Carried: Maunaloa Highway	
Milepost: 0.43 mi.	**Island:** Molokai
Longitude: 157d-01m-30.83s	**Latitude:** 21d-05m-25.76s



Location: 0.01 Miles East of Manila Place
Historic Name: Kaunakakai 16-Cell Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Pipe Culvert	**Construction Date:** 1953	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 16	**Max Span:** 3.0 ft.	**Total Length:** 73.2 ft.	**Deck Width:** 42.0 ft.
Superstructure:			
Substructure: Concrete Pipe Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Kaunakakai 16-Cell Culvert carries Maunaloa Highway across Kaunakakai Stream on the island of Molokai. This reinforced concrete pipe culvert with thrie beam guardrails remains intact and is generally in good condition.

Significance Statement:

This is the only sixteen cell culvert in the state. It was built post-war and is unique in design and construction as most culverts around the state will generally have two to five cells.

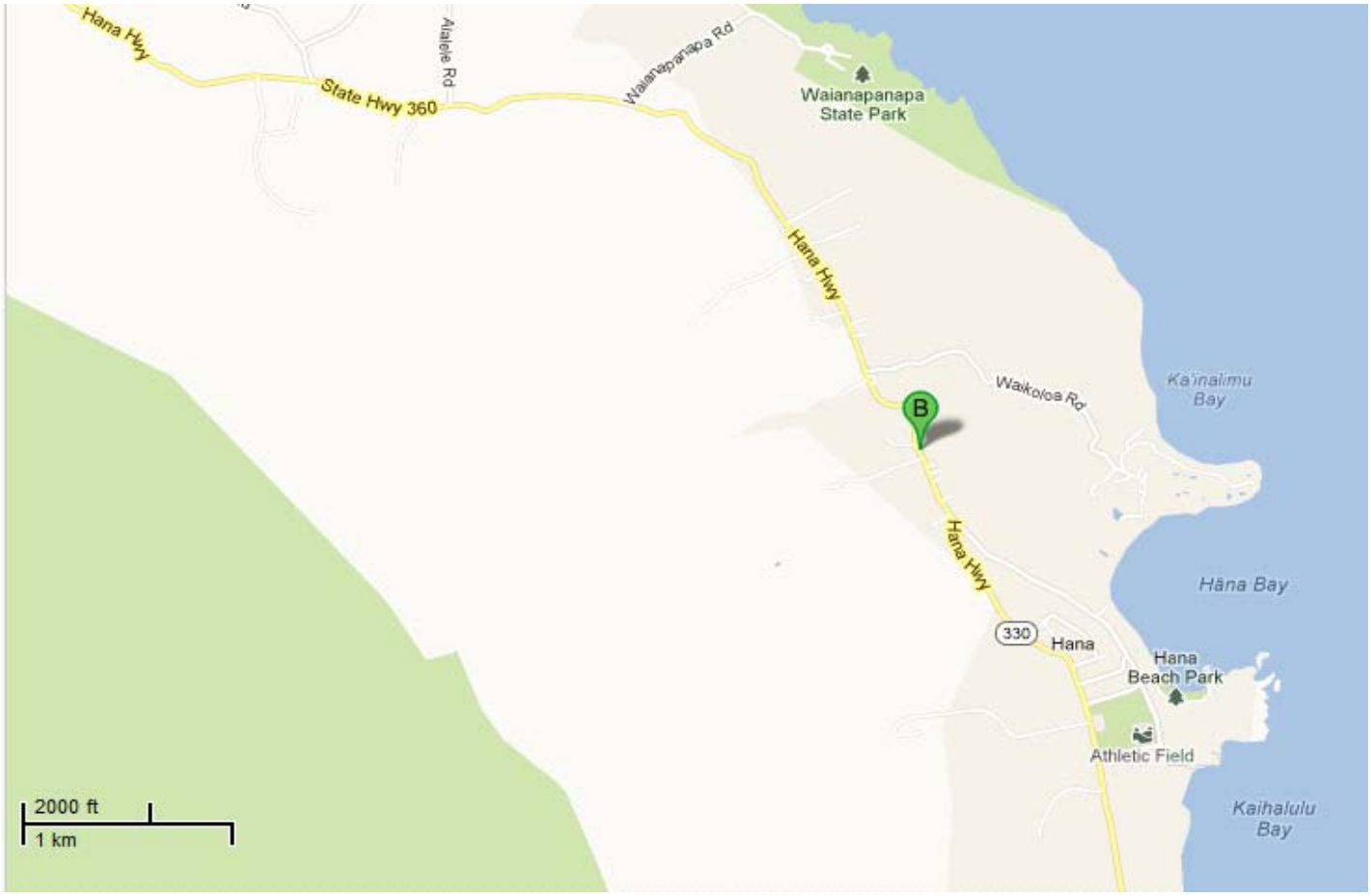
Inventory Form
(State)

General Information

Bridge Number: 009003600503347 **Route No:** 360	
Popular Name: Kawaipapa Stream Bridge	
Feature Crossed: Kawaipapa Stream	
Feature Carried: Hana Highway	
Milepost: 33.44 mi. **Island:** Maui	
Longitude: 155d-59m-43.14s **Latitude:** 20d-45m-58.32s	

Location: 2.06 Miles East of Alalele Place (Road to Hana Airport)
Historic Name: Kawaipapa Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1947	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 33.1 ft.	**Total Length:** 79.1 ft.	**Deck Width:** 31.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form. This bridge was omitted from listing on the Hana Highway Historic Bridge District nomination form; however, it is a contributing feature to the historic district.

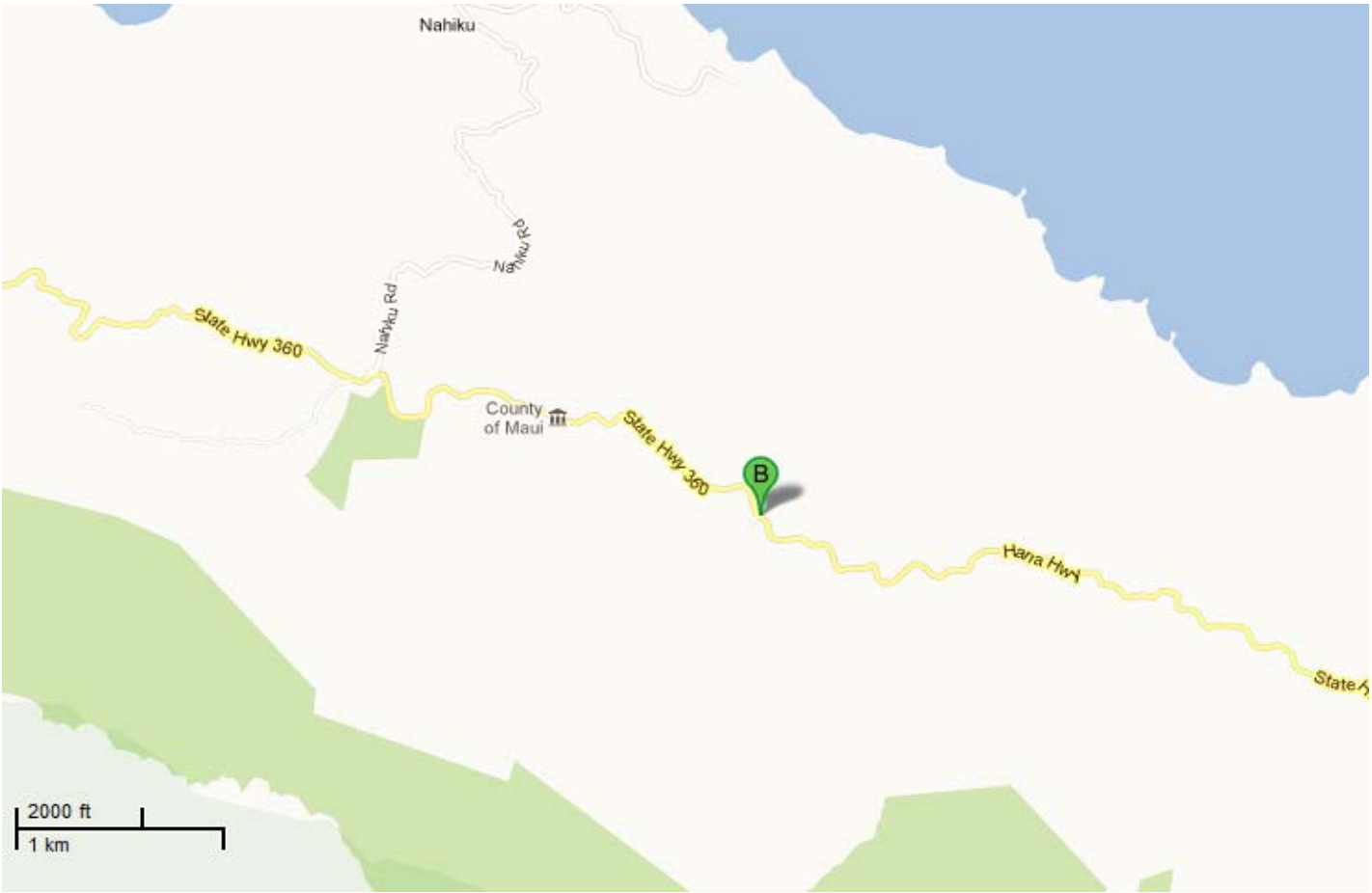
Inventory Form
(State)

General Information

Bridge Number: 009003600502681	**Route No:** 360
Popular Name: Keaaiki Stream Bridge	
Feature Crossed: Keaaiki Stream	
Feature Carried: Hana Highway	
Milepost: 26.77 mi.	**Island:** Maui
Longitude: 156d-04m-31.96s	**Latitude:** 20d-48m-00.88s

Location: 1.76 Miles East of Lower Nahiku Road
Historic Name: Keaaiki Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1921	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

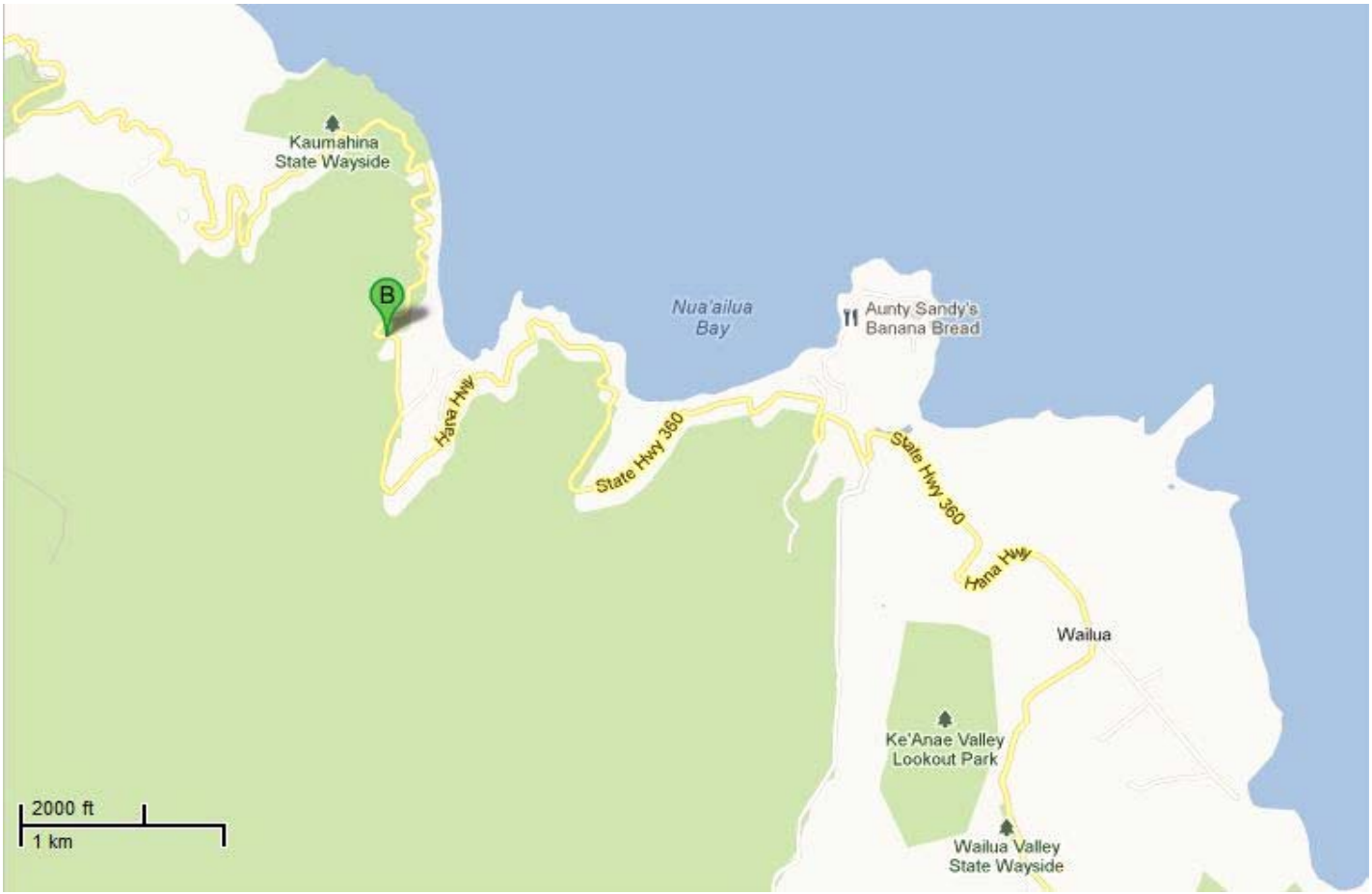
Inventory Form
(State)

General Information

Bridge Number: 009003600501317 **Route No:** 360	
Popular Name: Kolea (Punalau Stream) Bridge	
Feature Crossed: Punalau Stream	
Feature Carried: Hana Highway	
Milepost: 13.16 mi. **Island:** Maui	
Longitude: 156d-10m-11.67s **Latitude:** 20d-51m-44.29s	

Location: 1.03 Miles East of Kaumahina State Wayside Park Road
Historic Name: Kolea (Punalau Stream) Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.9 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 14.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

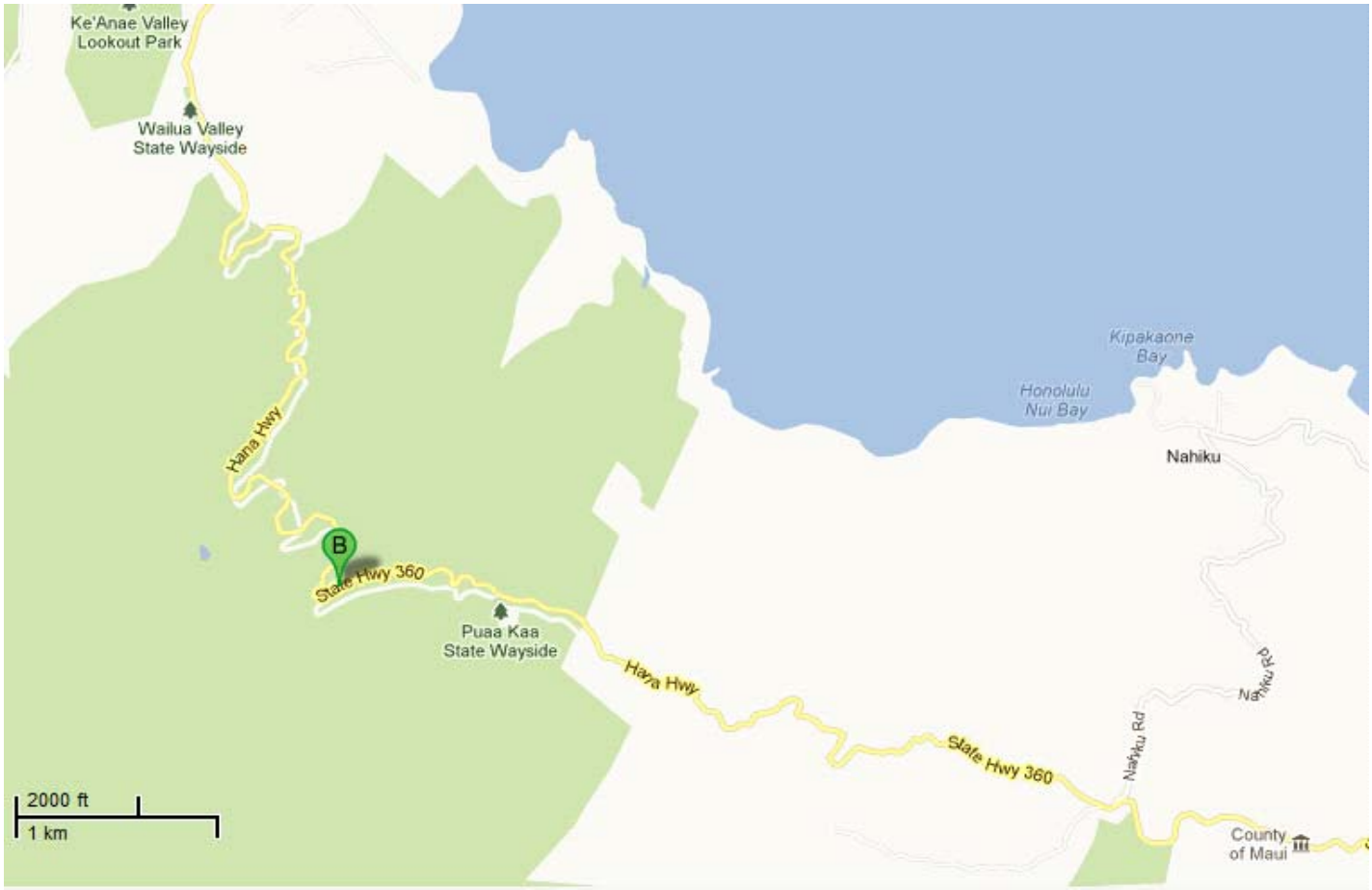
Inventory Form
(State)

General Information

Bridge Number: 009003600502189	**Route No:** 360
Popular Name: Kopiliula Stream Bridge	
Feature Crossed: Kopiliula Stream	
Feature Carried: Hana Highway	
Milepost: 21.78 mi.	**Island:** Maui
Longitude: 156d-08m-02.51s	**Latitude:** 20d-49m-01.90s

Location: 2.80 Miles East of Wailua Valley Lookout
Historic Name: Kopiliula Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 33.1 ft.	**Total Length:** 77.1 ft.	**Deck Width:** 17.7 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

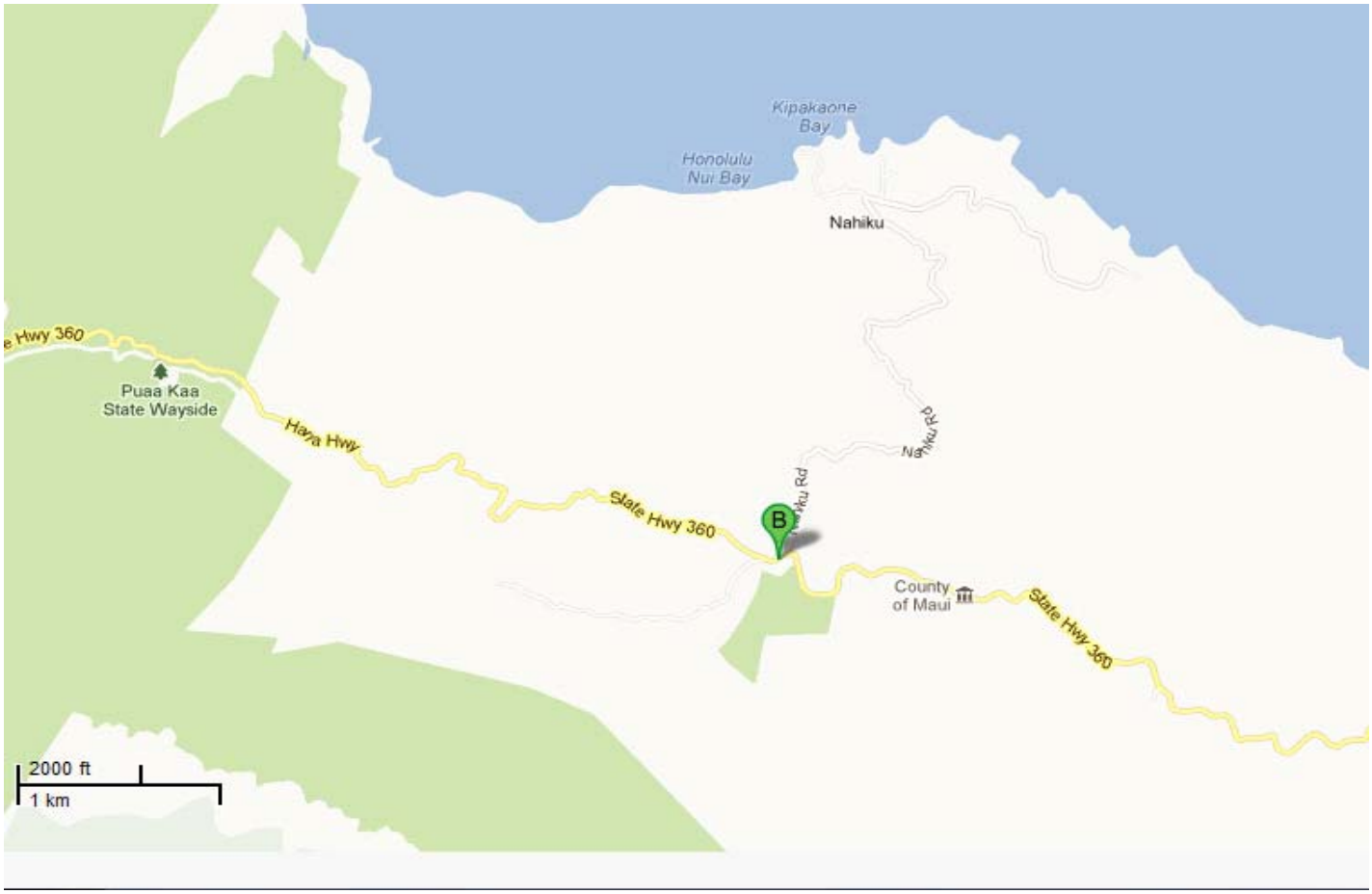
Inventory Form
(State)

General Information

Bridge Number: 009003600502523	**Route No:** 360
Popular Name: Kuhiwa Stream Bridge	
Feature Crossed: Kuhiwa Stream	
Feature Carried: Hana Highway	
Milepost: 25.20 mi.	**Island:** Maui
Longitude: 156d-05m-39.76s	**Latitude:** 20d-48m-21.52s

Location: 0.18 Miles East of Lower Nahiku Road
Historic Name: Kuhiwa Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 36.1 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 18.4 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. Arch bridges are also an uncommon bridge type. See National Register of Historic Places Nomination Form.

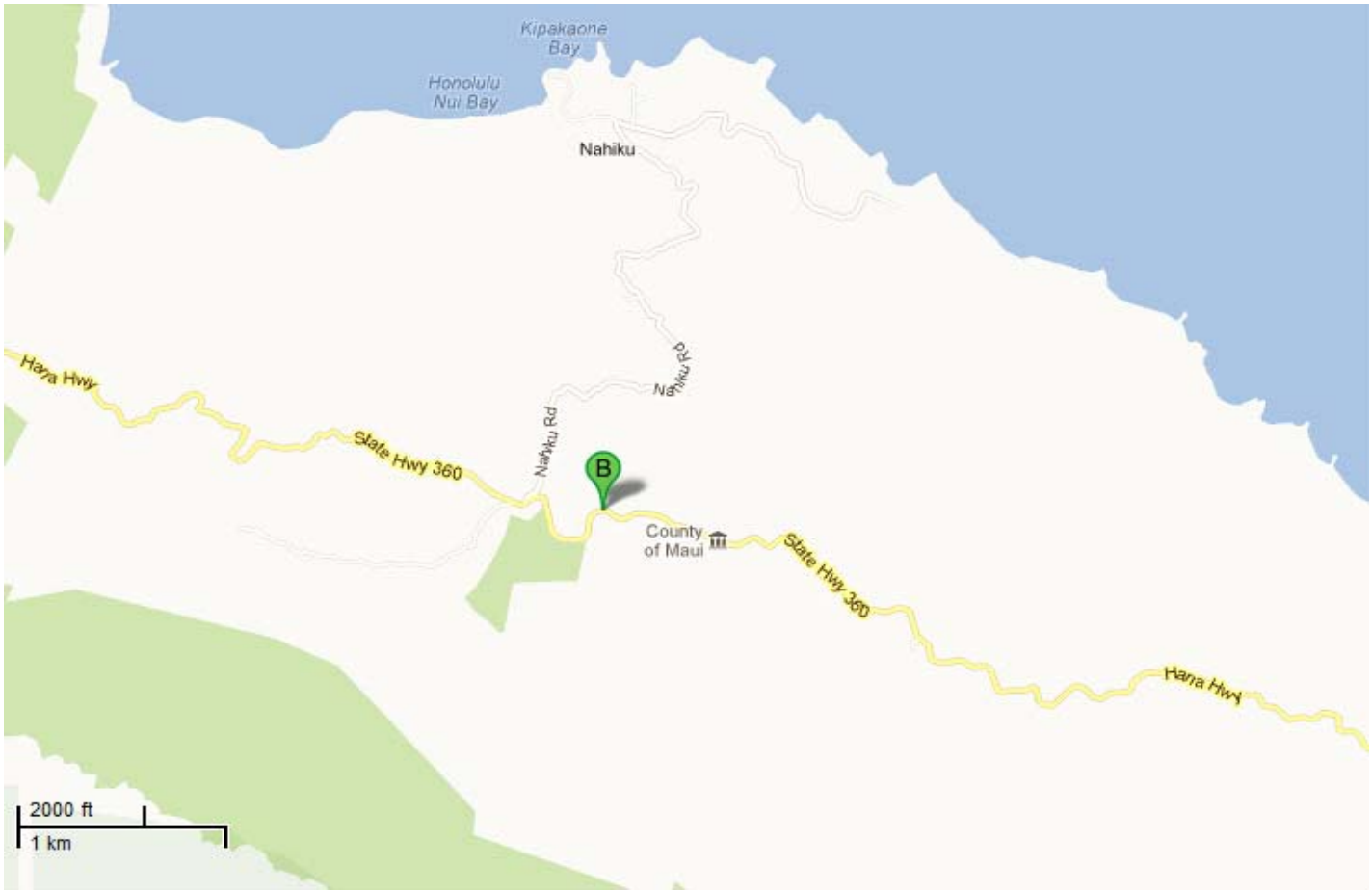
Inventory Form
(State)

General Information

Bridge Number: 009003600502546	**Route No:** 360
Popular Name: Kupukoi Stream Bridge	
Feature Crossed: Kupukoi Stream	
Feature Carried: Hana Highway	
Milepost: 25.42 mi.	**Island:** Maui
Longitude: 156d-05m-31.06s	**Latitude:** 20d-48m-25.47s

Location: 0.41 Miles East of Lower Nahiku Road
Historic Name: Kupukoi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

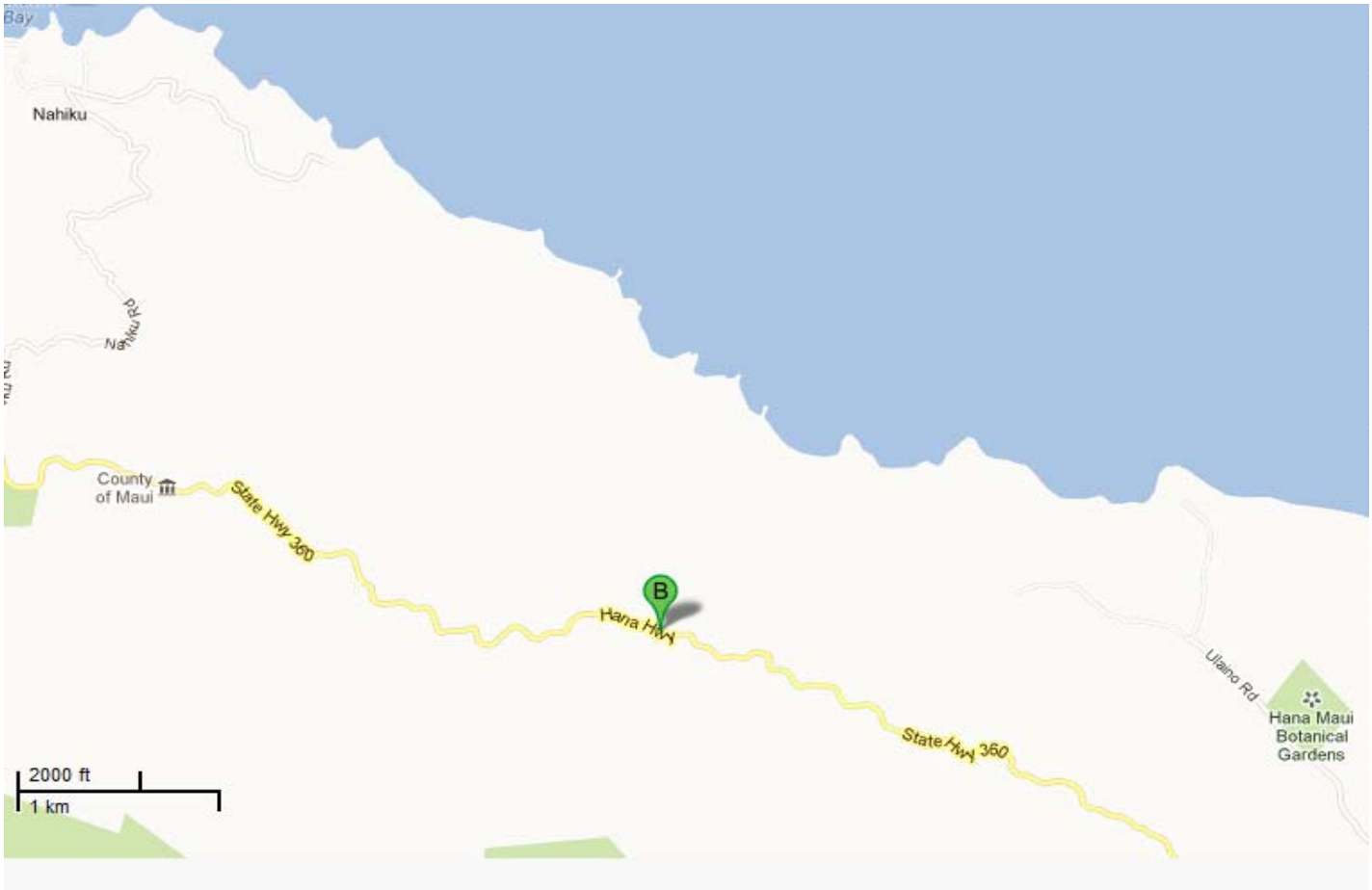
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502779 **Route No:** 360	
Popular Name: Lanikele Stream Bridge	
Feature Crossed: Lanikele Stream	
Feature Carried: Hana Highway	
Milepost: 27.76 mi. **Island:** Maui	
Longitude: 156d-03m-48.63s **Latitude:** 20d-47m-56.27s	
Location: 2.74 Miles East of Lower Nahiku Road	
Historic Name: Lanikele Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1917	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 22.0 ft.	**Total Length:** 50.9 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

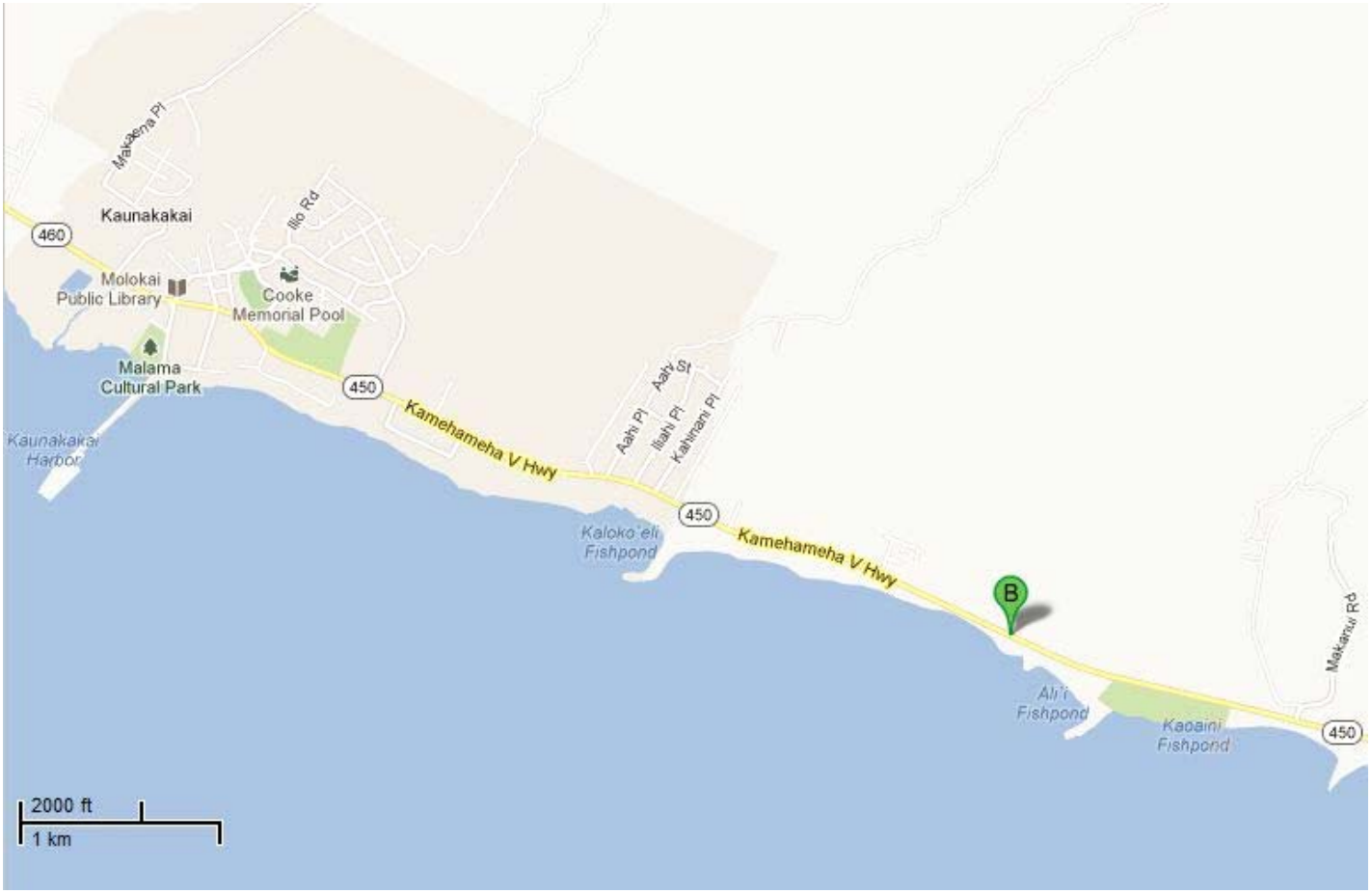
Inventory Form
(State)

General Information

Bridge Number: 009004500500394	**Route No:** 450
Popular Name: Makakupaia Bridge	
Feature Crossed: Unnamed Stream	
Feature Carried: Kamehameha V Highway	
Milepost: 3.94 mi.	**Island:** Molokai
Longitude: 156d-57m-57.02s	**Latitude:** 21d-04m-11.48s

Location: 0.36 Miles West of Hooulu Place
Historic Name: Makakupaia Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 27.9 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Makakupaia Bridge carries Kamehameha V Highway Street across Makakupaia Stream. Located on the island of Molokai, the Makakupaia Bridge is a single-span reinforced concrete, flat slab bridge in its original location, is generally in good condition, and its materials remain intact. The form work is evident on its solid concrete parapets and the bridge has CRM abutments. Metal thrie beams are integrated to the approaches of the parapets however, workmanship of the bridge has not been obscured by additions or repairs. The bridge is scheduled for replacement in 2015.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1940's reinforced concrete flat slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. However this bridge is scheduled for reconstruction in 2015.

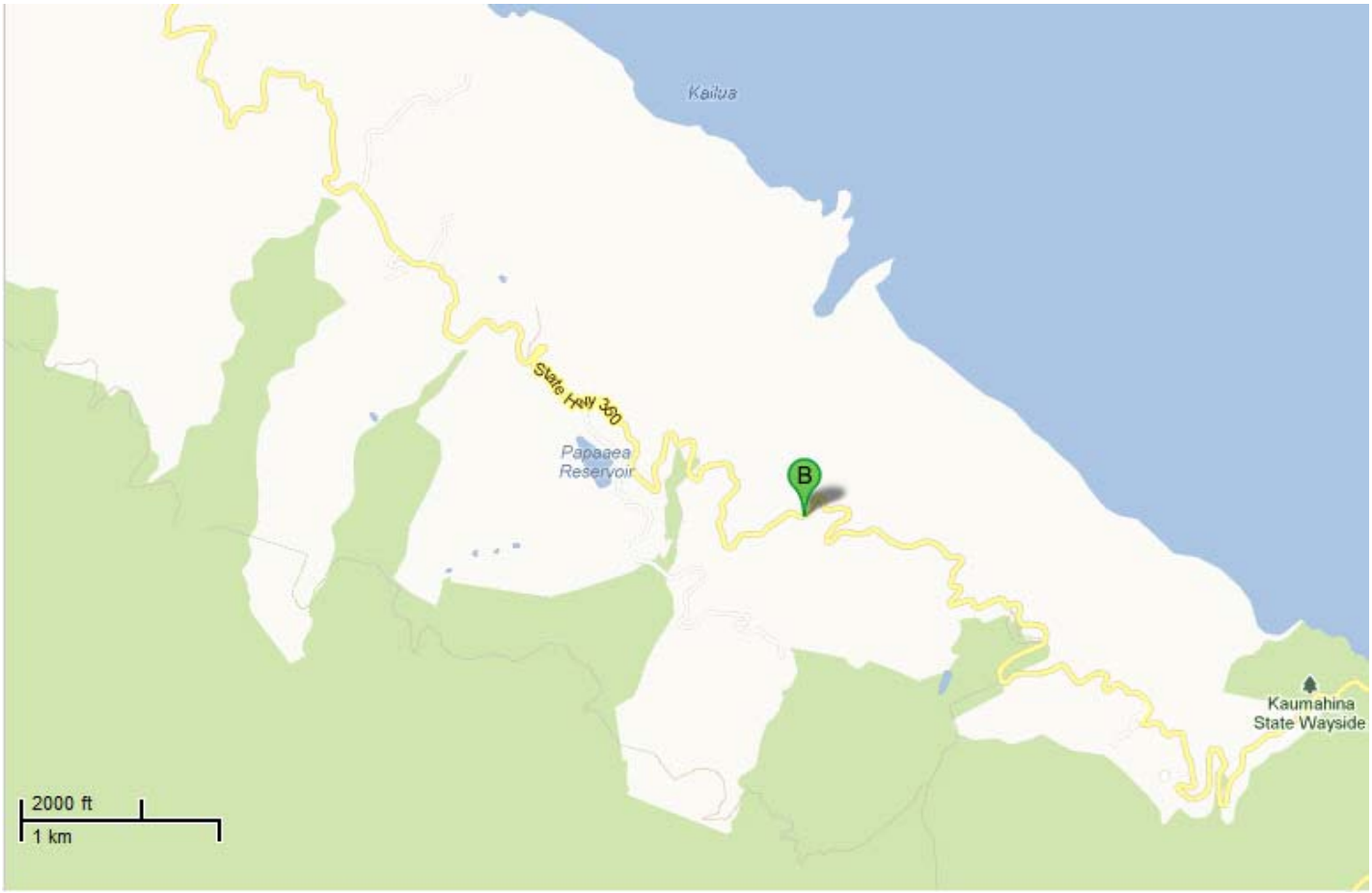
Inventory Form
(State)

General Information

Bridge Number: 009003600500824	**Route No:** 360
Popular Name: Makanali Stream Bridge	
Feature Crossed: Makanali Stream	
Feature Carried: Hana Highway	
Milepost: 8.24 mi.	**Island:** Maui
Longitude: 156d-11m-47.19s	**Latitude:** 20d-52m-46.42s

Location: 3.90 Miles West of Kaumahina State Wayside Park Road
Historic Name: Makanali Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 13.1 ft.	**Total Length:** 18.0 ft.	**Deck Width:** 17.7 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502502	**Route No:** 360
Popular Name: Makapipi Stream Bridge	
Feature Crossed: Makapipi Stream	
Feature Carried: Hana Highway	
Milepost: 24.98 mi.	**Island:** Maui
Longitude: 156d-05m-46.45s	**Latitude:** 20d-48m-27.06s

Location: 0.03 Miles West of Lower Nahiku Road
Historic Name: Makapipi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 22.0 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

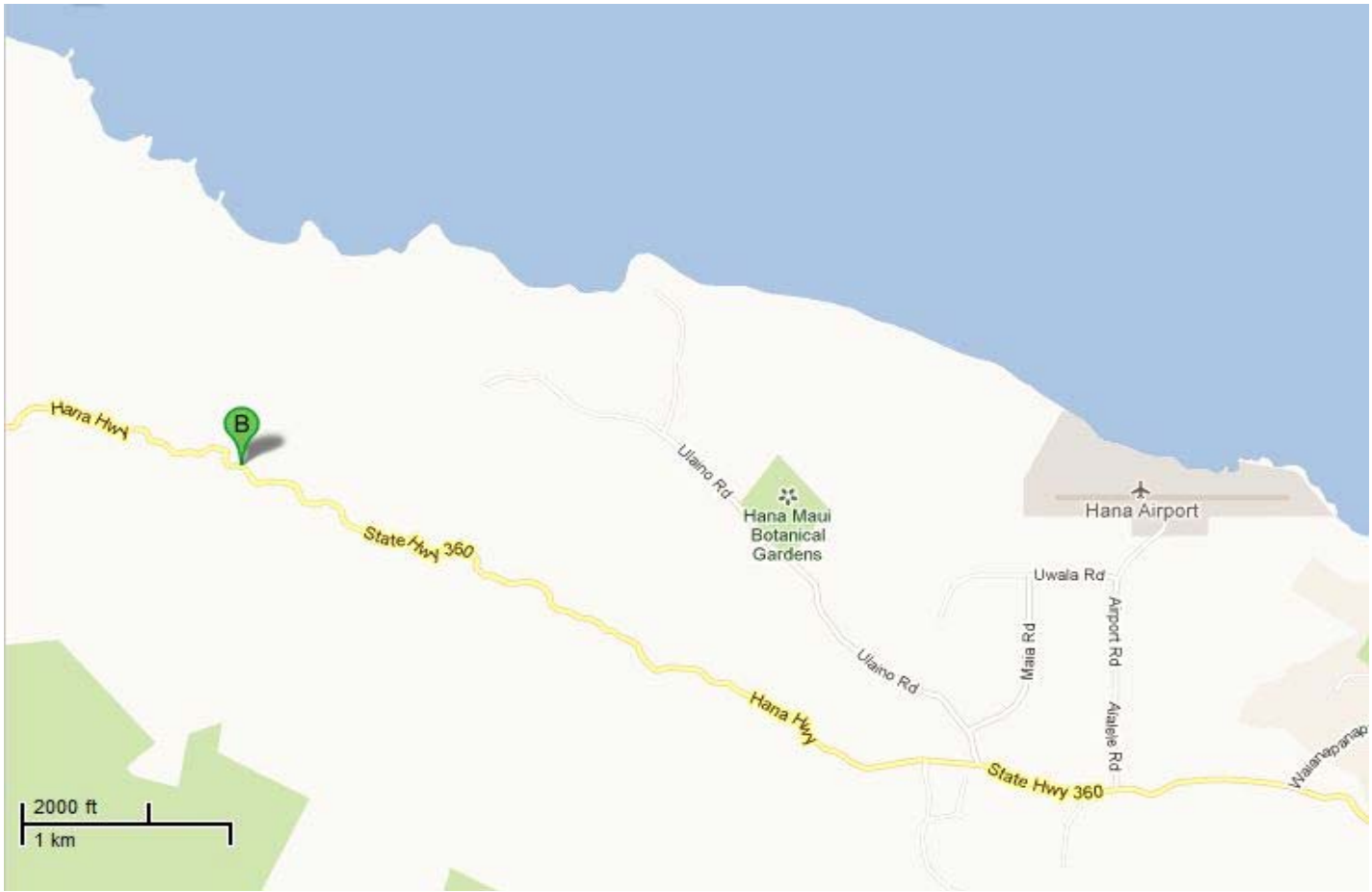
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502835 **Route No:** 360	
Popular Name: Mokulehua Stream Bridge	
Feature Crossed: Mokulehua Stream	
Feature Carried: Hana Highway	
Milepost: 28.31 mi. **Island:** Maui	
Longitude: 156d-03m-24.50s **Latitude:** 20d-47m-46.70s	
Location: 3.06 Miles West of Alalele Place (Road to Hana Airport)	
Historic Name: Mokulehua Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1908	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 14.1 ft.	**Total Length:** 47.9 ft.	**Deck Width:** 15.1 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

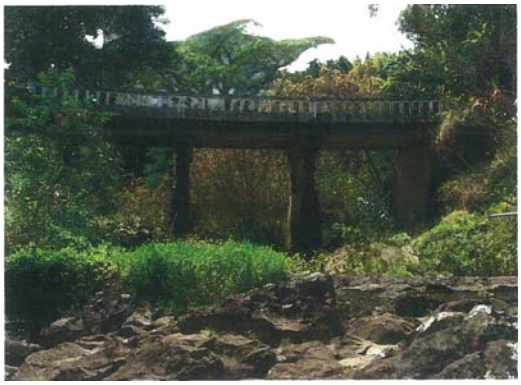
Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

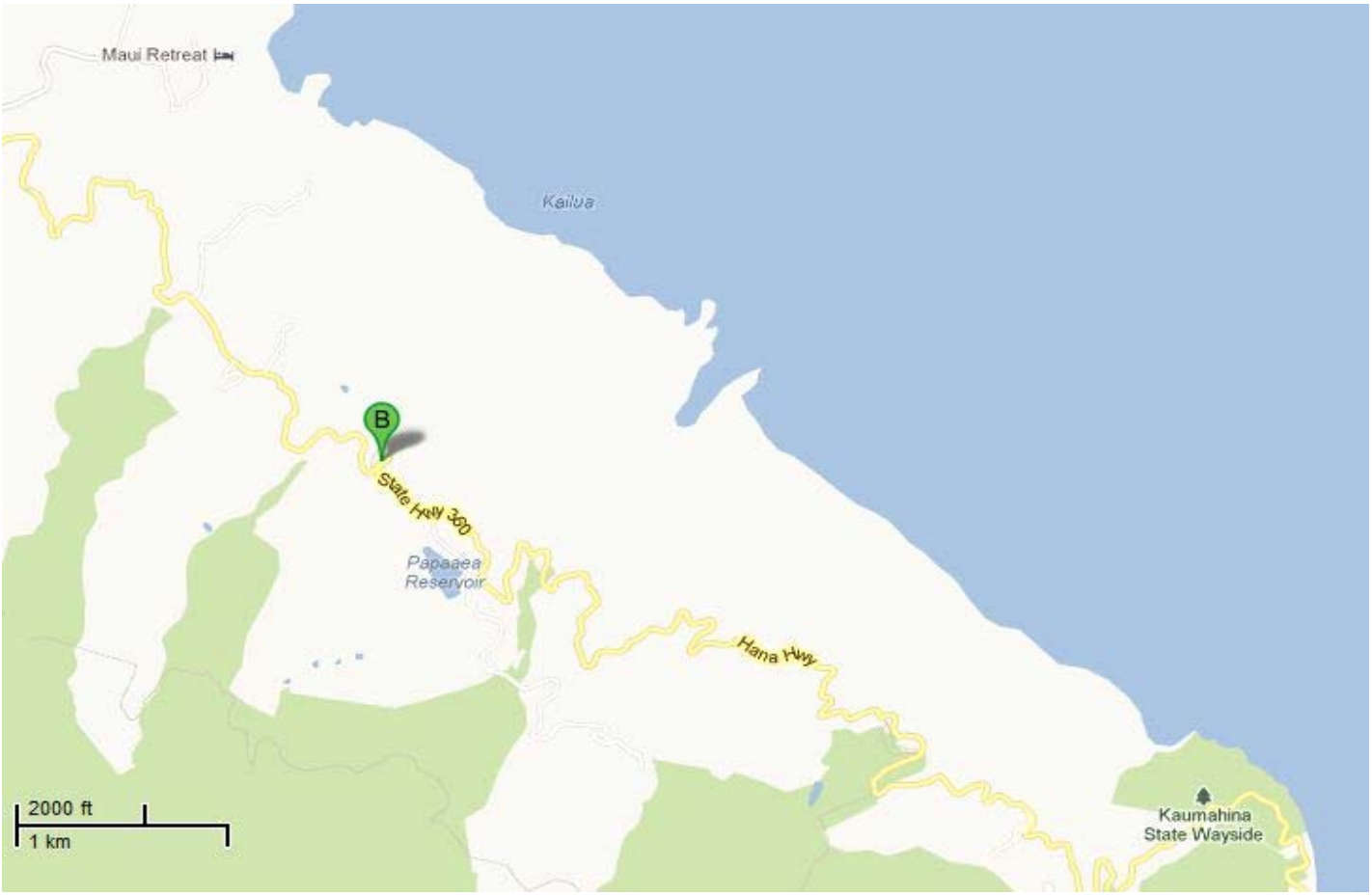
General Information

Bridge Number: 009003600500624	**Route No:** 360
Popular Name: Nailiilihaele Bridge	
Feature Crossed: Nailiilihaele Stream	
Feature Carried: Hana Highway	
Milepost: 6.22 mi.	**Island:** Maui
Longitude: 156d-12m-36.70s	**Latitude:** 20d-53m-12.63s



Location: 5.90 Miles West of Kaumahina State Wayside Park Road
Historic Name: Nailiilihaele Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 21.0 ft.	**Total Length:** 64.0 ft.	**Deck Width:** 23.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

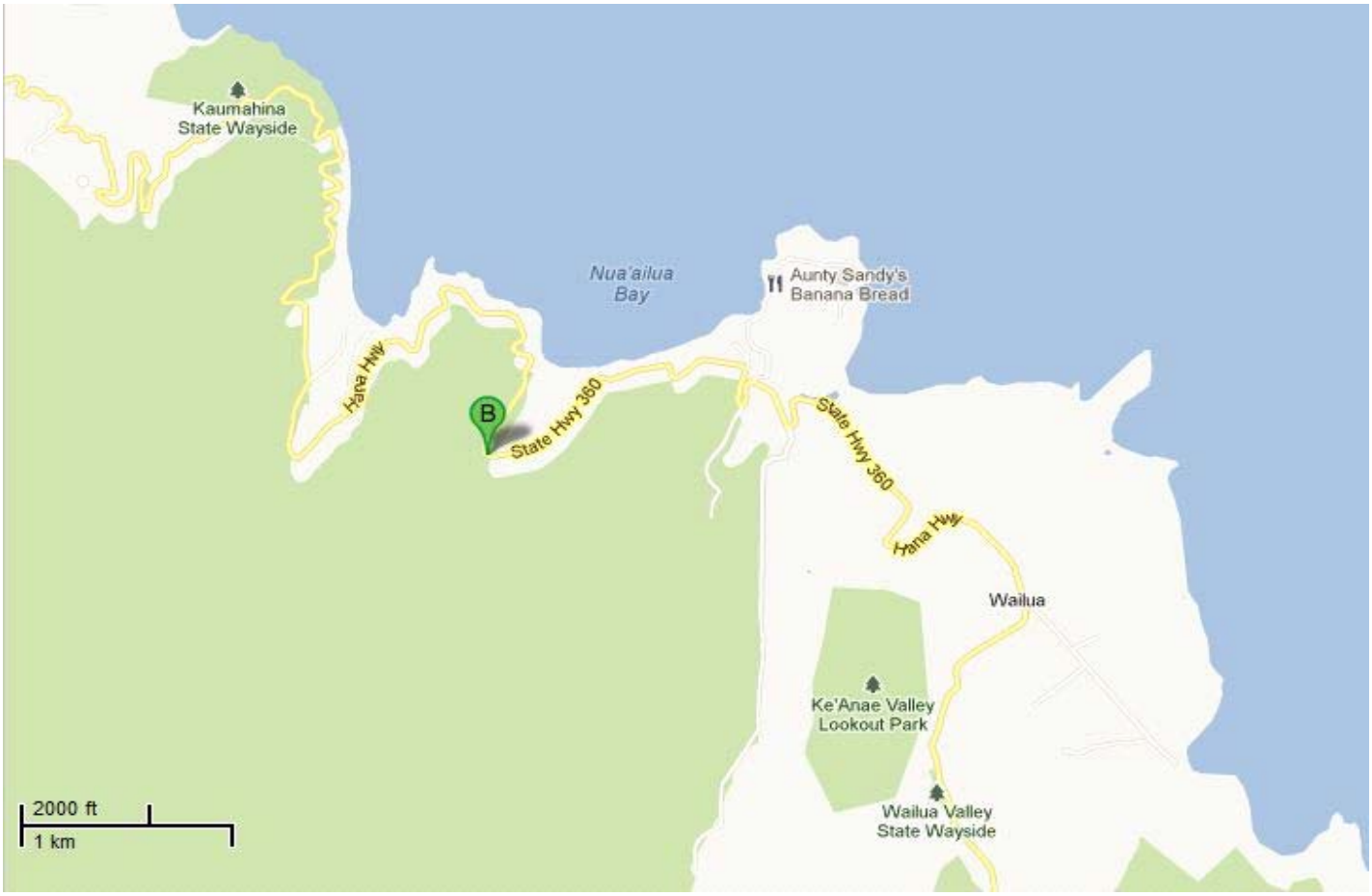
Inventory Form
(State)

General Information

Bridge Number: 009003600501540	**Route No:** 360
Popular Name: Nuaailua Bridge	
Feature Crossed: Nuaailua Stream	
Feature Carried: Hana Highway	
Milepost: 15.38 mi.	**Island:** Maui
Longitude: 156d-09m-38.24s	**Latitude:** 20d-51m-18.94s

Location: 1.16 Miles West of Keanae Homestead Road
Historic Name: Nuaailua Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.9 ft.	**Total Length:** 35.1 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

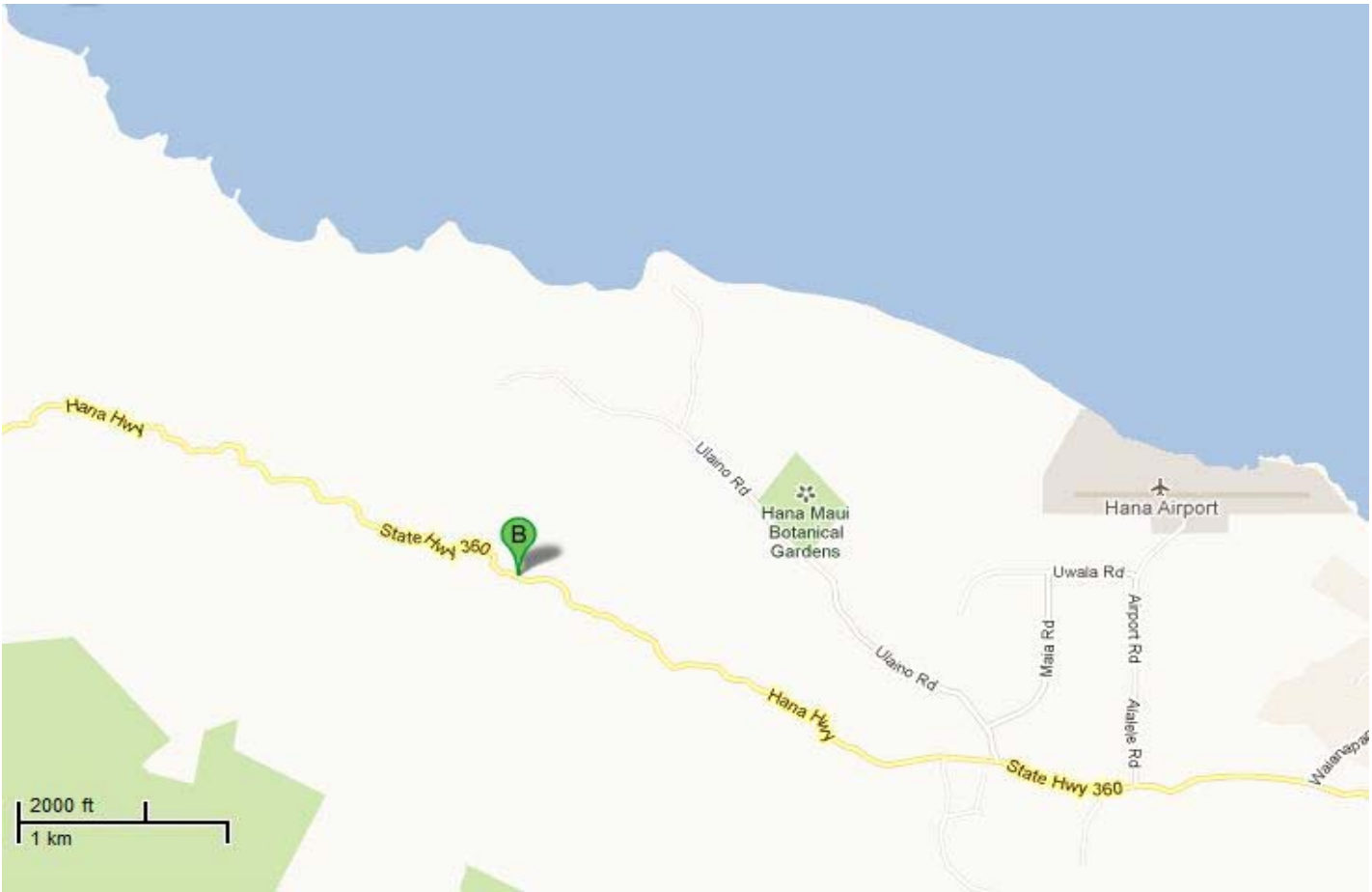
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502922 **Route No:** 360	
Popular Name: Oilowai Stream Bridge	
Feature Crossed: Oilowai Stream	
Feature Carried: Hana Highway	
Milepost: 29.18 mi. **Island:** Maui	
Longitude: 156d-02m-45.82s **Latitude:** 20d-47m-31.33s	
Location: 2.19 Miles West of Alalele Place (Road to Hana Airport)	
Historic Name: Oilowai Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1914	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

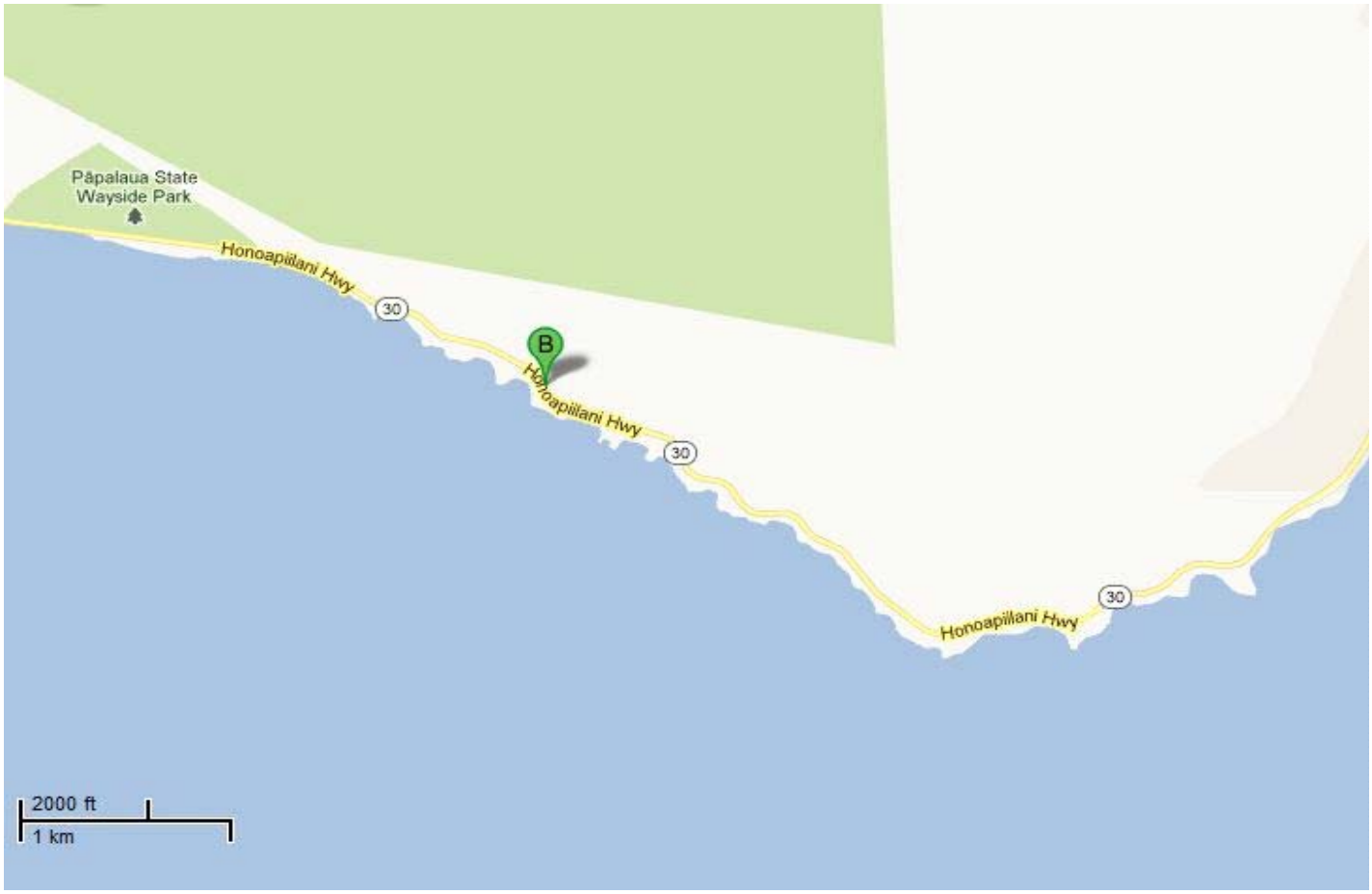
Inventory Form
(State)

General Information

Bridge Number: 009000300302596	**Route No:** 30
Popular Name: Olowalu Tunnel	
Feature Crossed: Mountain Range	
Feature Carried: Honoapiilani Highway	
Milepost: 10.34 mi.	**Island:** Maui
Longitude: 156d-33m-24.30s	**Latitude:** 20d-47m-17.98s

Location: 3.51 Miles Southwest of Road to Maalaea Boat Harbor
Historic Name: Olowalu Tunnel
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Arch Culvert	**Construction Date:** 1950	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): Concrete post and guardrails		

Bridge Information

Number of Spans: 1	**Max Span:** 25.9 ft.	**Total Length:** 317.9 ft.	**Deck Width:** 32.2 ft.
Superstructure:			
Substructure: Concrete Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features: Walkways both sides; date incised			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Work of a Master		

Narrative Description:

The Olowalu Tunnel was constructed in 1950 so that the Honoapiilani Highway could pass through the rocky foothills which extend to the coast. The tunnel remains in its original location as an integral part of the well-traveled coastal highway. Despite an increase in tourist traffic, the surrounding area has changed very little since the tunnel was built. The Art Deco detailing and the construction date incised at each entry portal are evidence of skilled workmanship and aid in historical interpretation of the bridge. A current construction project inside the tunnel is adding concrete parapets between the small shoulder and the exposed rock interior. This safety addition does not detract substantially from the design of the tunnel. The setting along the rural south coastline has remained unchanged and adds to the historic feeling to the structure.

Significance Statement:

The TUNNEL: There is only one tunnel on Maui and it is where the 'Menehunes' (our little mischievous imps) live during the day (They only come on at night). Please honk your horn a couple of times when driving through our tunnel so you will not accidentally hit them.(1)

The tunnel is the work of a person of significance - William R. Bartels, Chief Engineer for the Territorial Highways Department, who was responsible for many major territorial bridge projects from 1932-1956. Bartels was considered a "cracker-jack" engineer who enjoyed the challenge of difficult assignments and his work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges show refined aesthetic sensibility which makes them distinctive from work of other engineers. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. He designed most territorial bridges from then until 1957. Bartels was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time and there was a marked shift to large deck girder and rigid frame bridges.(2)(3) He ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard retirement age but he was kept on by special permission and out of necessity because his abilities were so great. Bridges designed by Bartels have often been hailed for their accomplishment of engineering as well as aesthetics.(4)

The tunnel remains the only tunnel on the island of Maui, and was the first highway tunnel constructed in Hawaii, pre-dating both the Wilson Tunnel and the Pali Highway tunnels on Oahu.

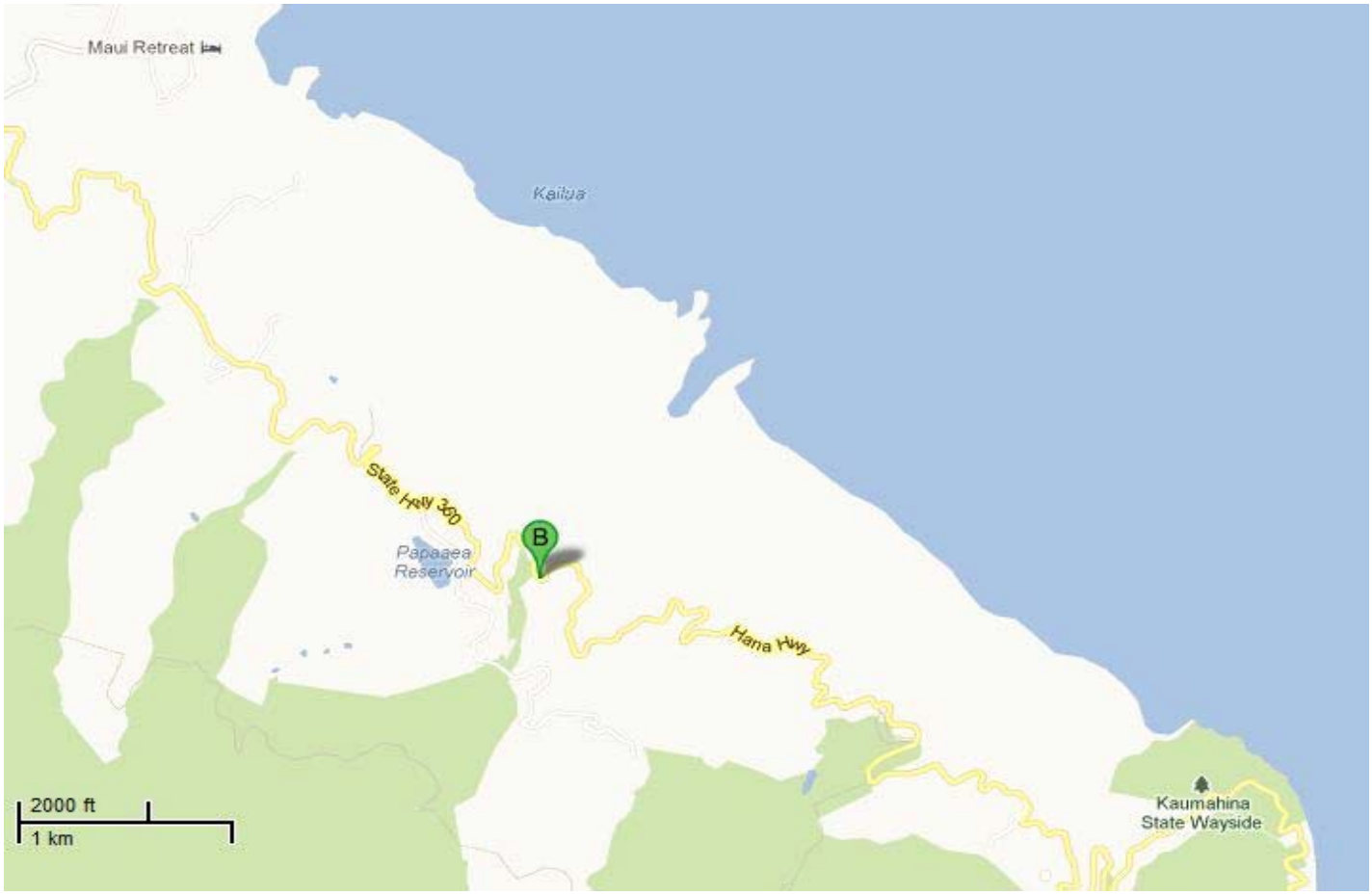
(1) http://mauigateway.com/~rw/driving.html, retrieved Dec 2, 2005.
(2) Spencer Mason Architects, "Historic Highway Bridges of Hawaii, 1894-1941," prepared for the State of Hawaii Department of Transportation (Honolulu, 1996), V-6.
(3) Spencer Mason Architects, "Historic Highway Bridges of Hawaii, 1894-1941," prepared for the State of Hawaii Department of Transportation (Honolulu, 1996).
(4) http://www.hookele.com/crc/bridge1.html

Inventory Form
(State)

General Information

Bridge Number: 009003600500797	**Route No:** 360
Popular Name: Oopuola Bridge	
Feature Crossed: Oopuola Stream	
Feature Carried: Hana Highway	
Milepost: 7.94 mi.	**Island:** Maui
Longitude: 156d-12m-00.93s	**Latitude:** 20d-52m-40.67s
Location: 4.17 Miles West of Kaumahina State Wayside Park Road	
Historic Name: Oopuola Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1925	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.9 ft.	**Total Length:** 29.9 ft.	**Deck Width:** 21.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

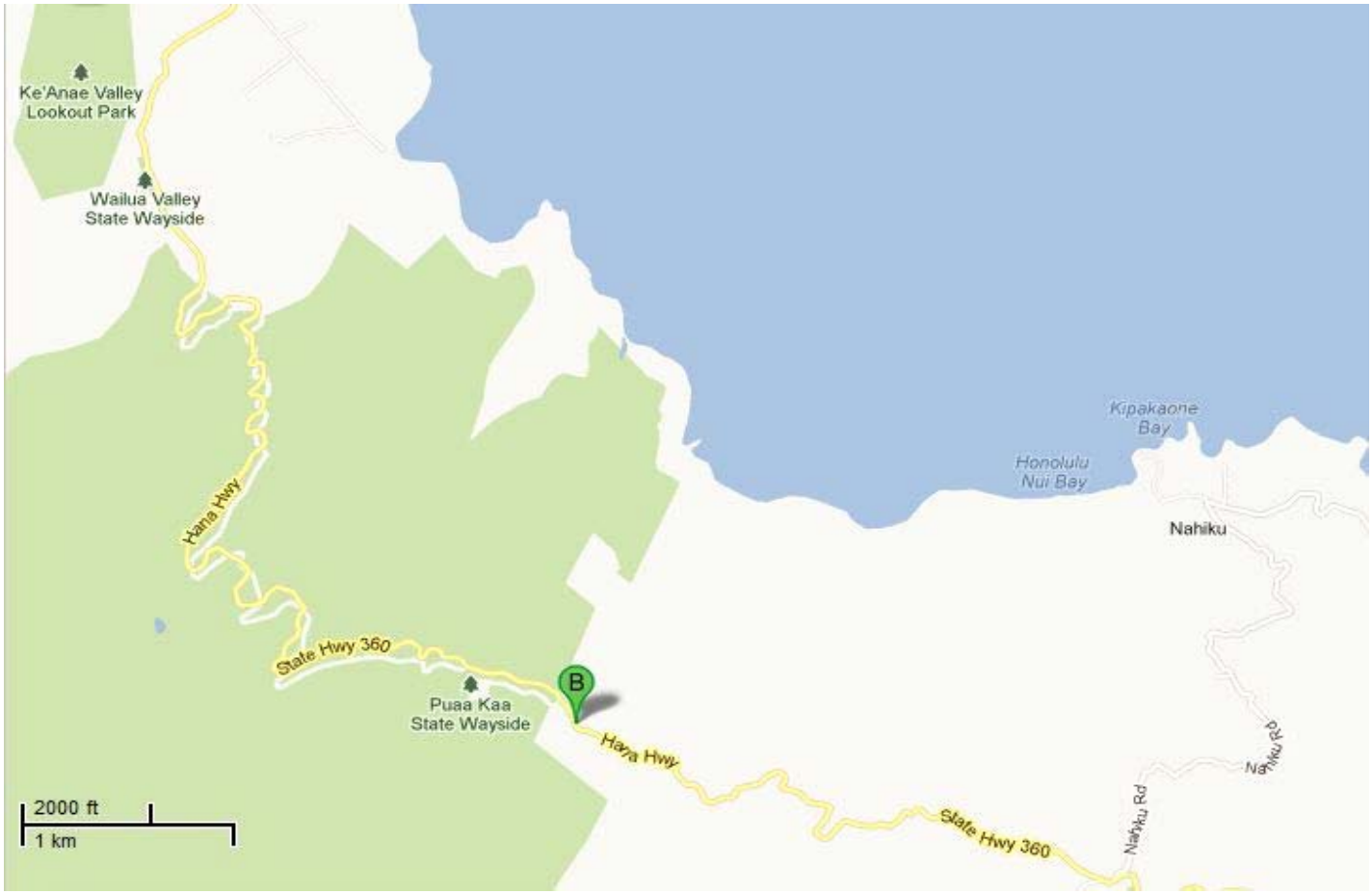
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502301 **Route No:** 360	
Popular Name: Paakea Stream-Unnamed Bridge No.3	
Feature Crossed: Paakea Stream	
Feature Carried: Hana Highway	
Milepost: 22.97 mi. **Island:** Maui	
Longitude: 156d-07m-09.52s **Latitude:** 20d-48m-50.80s	
Location: 2.00 Miles West of Lower Nahiku Road	
Historic Name: Paakea Stream-Unnamed Bridge No.3	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 15.1 ft.	**Total Length:** 19.0 ft.	**Deck Width:** 14.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600501679 **Route No:** 360	
Popular Name: Palauhulu Stream Bridge	
Feature Crossed: Palauhulu Stream	
Feature Carried: Hana Highway	
Milepost: 16.77 mi. **Island:** Maui	
Longitude: 156d-08m-47.71s **Latitude:** 20d-51m-23.87s	
Location: 0.21 Miles East of Keanae Homestead Road	
Historic Name: Palauhulu Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1916	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.9 ft.	**Total Length:** 30.8 ft.	**Deck Width:** 21.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009000300304184	**Route No:** 30
Popular Name: Papanahoa Bridge	
Feature Crossed: Papanahoa Stream	
Feature Carried: Kahekili Highway	
Milepost: 41.32 mi.	**Island:** Maui
Longitude: 156d-34m-04.33s	**Latitude:** 21d-00m-33.52s

Location: 10.03 Miles North of Camp Maluhia Road
Historic Name: Papanahoa Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1924	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1980	
Alteration Type(s):		
Alteration Description(s): Bridge railing and possibly slab		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 19.7 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Papanahoa Stream Bridge carries Kahekili Highway across Papanahoa Stream. This concrete slab bridge remains intact and is in poor condition. The concrete rock masonry abutments are original. In 1980 the bridge railings were replaced with metal thrie beam railings.

Significance Statement:

This bridge is eligible under Criterion C for its rock abutments which are a potentially eligible historic resource. The unique three faceted abutments support the bridge over the stream.

Inventory Form
(State)

General Information

Bridge Number: 009003600501662	**Route No:** 360
Popular Name: Piinaau Stream Bridge	
Feature Crossed: Piinaau Stream	
Feature Carried: Hana Highway	
Milepost: 16.60 mi.	**Island:** Maui
Longitude: 156d-08m-52.50s	**Latitude:** 20d-51m-29.99s

Location: 0.04 Miles East of Keanae Homestead Road
Historic Name: Piinaau Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1916	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 26.9 ft.	**Total Length:** 27.9 ft.	**Deck Width:** 20.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003770500349 **Route No:** 377

Popular Name: Pohakuokala Bridge-Pulehu Gulch

Feature Crossed: Pulehu Gulch

Feature Carried: Kekaulike Avenue

Milepost: 5.66 mi. **Island:** Maui

Longitude: 156d-18m-28.17s **Latitude:** 20d-46m-23.91s

Location: 0.08 Miles South of Kulalani Drive

Historic Name: Pohakuokala Bridge-Pulehu Gulch

Designer/Engineer:

Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 36.1 ft.	**Total Length:** 109.9 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Pulehu Gulch Bridge carries Kekaulike Avenue across the Pulehu Gulch within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by additions of modern steel guardrails attached to the end piers thus obscuring the paneled surface detail. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

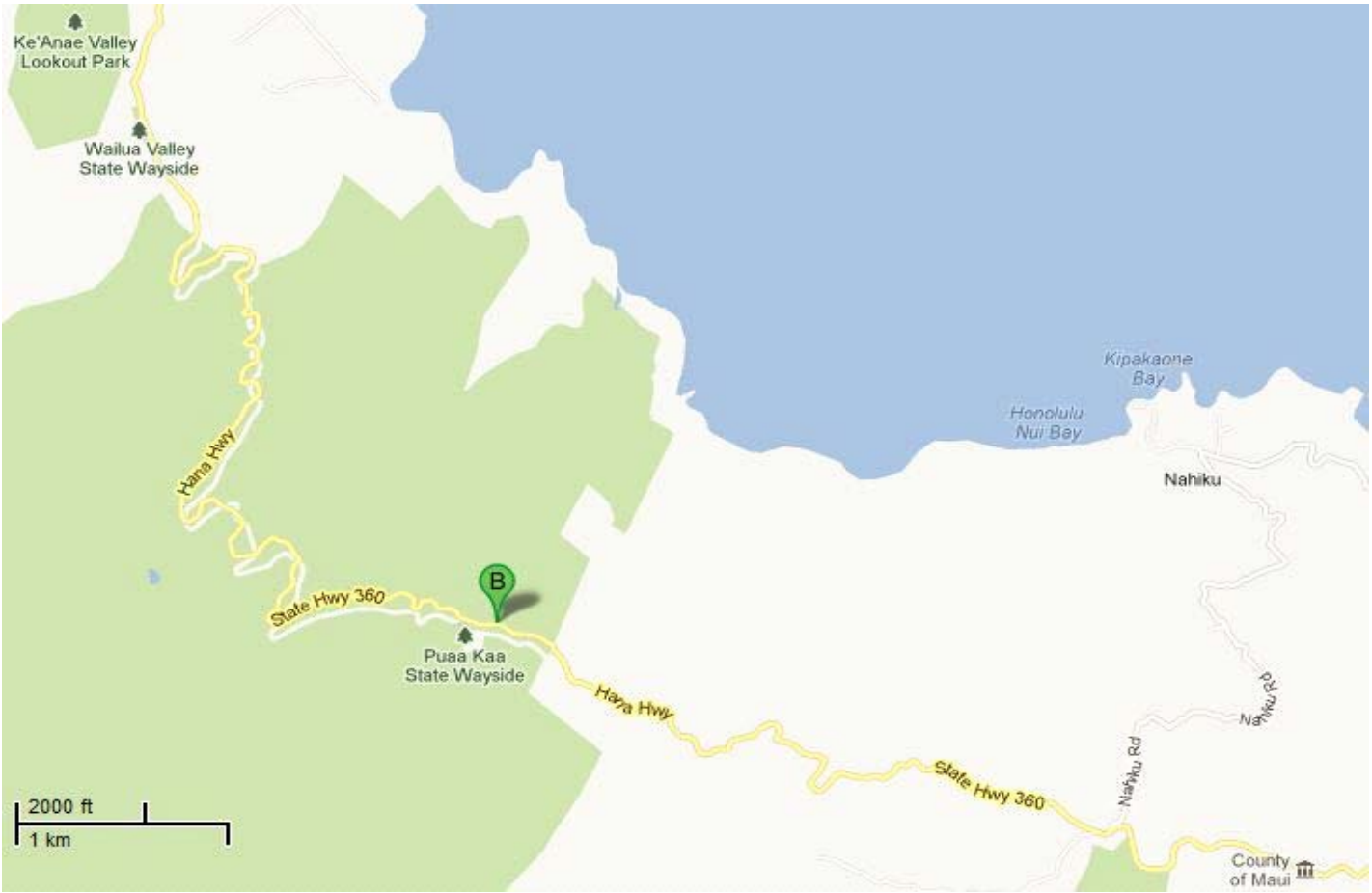
The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.The Pulehu Gulch Bridge is one of two built in 1934 on the Kekaulike Avenue; it was preceded by four bridges constructed the year before under the same contract. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Pulehu Gulch along Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

Inventory Form
(State)

General Information

Bridge Number: 009003600502231 **Route No:** 360	
Popular Name: Puakaa Stream Bridge	
Feature Crossed: Puakaa Stream	
Feature Carried: Hana Highway	
Milepost: 22.28 mi. **Island:** Maui	
Longitude: 156d-07m-39.23s **Latitude:** 20d-49m-04.08s	
Location: 2.74 Miles West of Lower Nahiku Road	
Historic Name: Puaakaa (Waiohue) Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 19.0 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 24.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

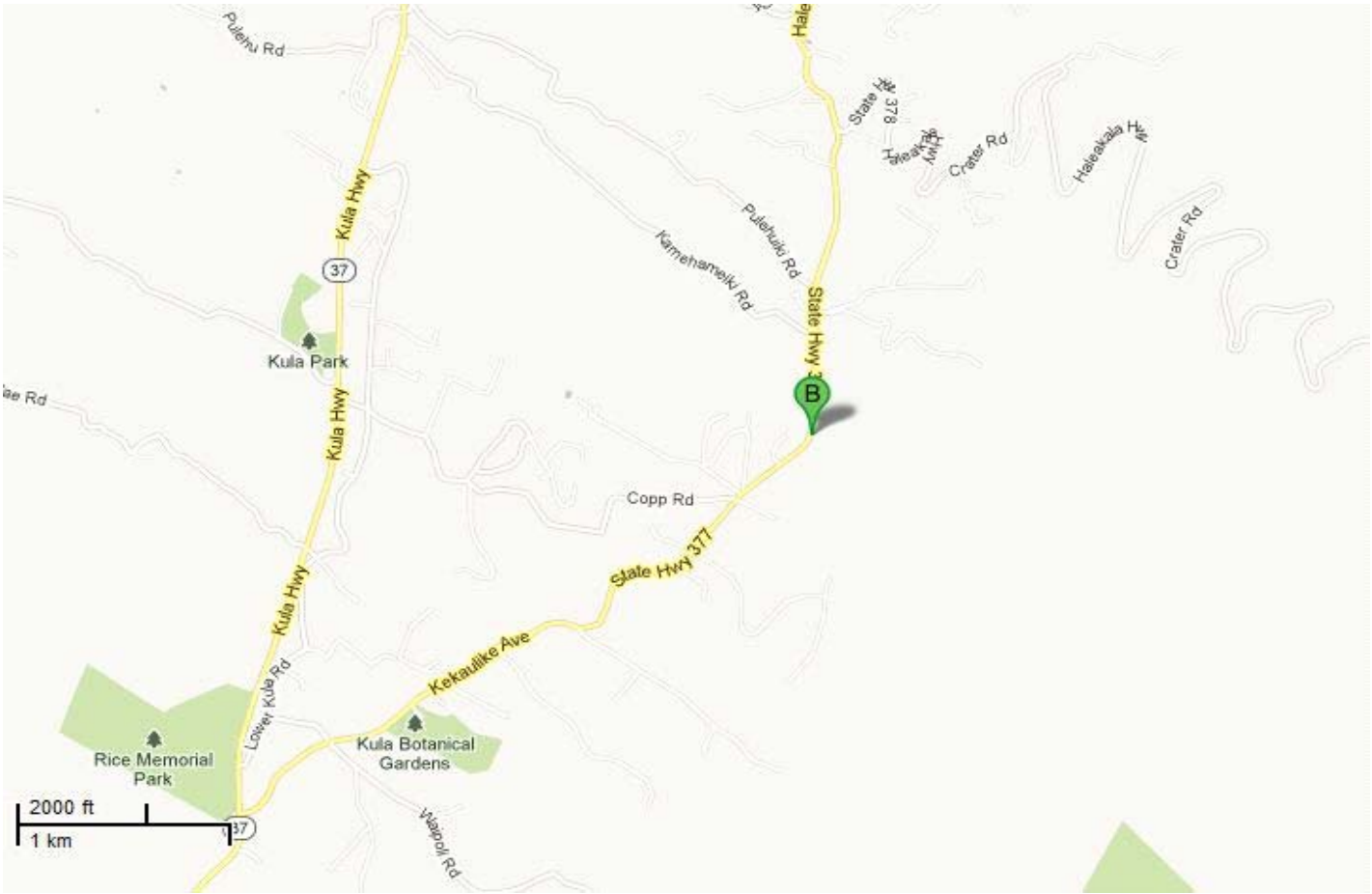
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003770500217	**Route No:** 377
Popular Name: Pulehu Bridge-Keahuaiwi Gulch (Kekaulike Avenue)	
Feature Crossed: Keahuaiwi Gulch	
Feature Carried: Kekaulike Avenue	
Milepost: 6.99 mi.	**Island:** Maui
Longitude: 156d-18m-26.87s	**Latitude:** 20d-45m-17.80s
Location: 0.26 Miles North of Ihe Place	
Historic Name: Pulehu Bridge-Keahuaiwi Gulch (Kekaulike Avenue)	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 33.1 ft.	**Total Length:** 36.1 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Keahuaiwi Gulch Bridge carries Kekaulike Avenue across the Keahuaiwi Gulch within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by thrie beam guardrails on both sides of the bridge. The bridge's historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.

The Keahuaiwi Gulch Stream Bridge is one of four built in 1933 on the Kekaulike Avenue, followed by two more bridges built on that same highway in 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Keahuaiwi Gulch along Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

Inventory Form
(State)

General Information

Bridge Number: 009003600501098	**Route No:** 360
Popular Name: Puohokamoa Bridge	
Feature Crossed: Puohokamoa Stream	
Feature Carried: Hana Highway	
Milepost: 10.97 mi.	**Island:** Maui
Longitude: 156d-10m-42.27s	**Latitude:** 20d-52m-01.90s

Location: 1.16 Miles West of Kaumahina State Wayside Park Road
Historic Name: Puohokamoa Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 24.9 ft.	**Total Length:** 56.1 ft.	**Deck Width:** 17.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

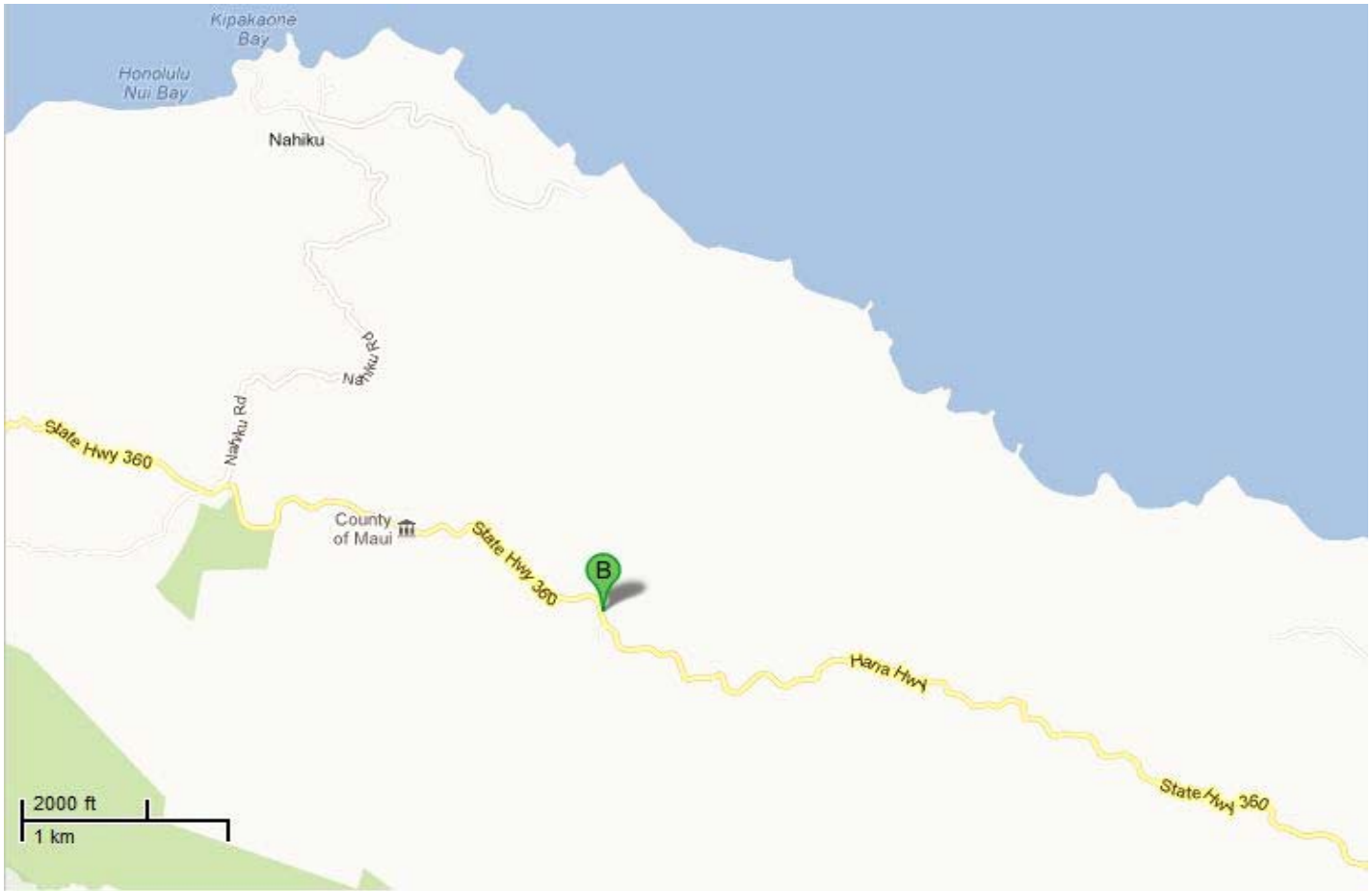
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502652	**Route No:** 360
Popular Name: Pupape Stream Bridge	
Feature Crossed: Pupape Stream	
Feature Carried: Hana Highway	
Milepost: 26.48 mi.	**Island:** Maui
Longitude: 156d-04m-42.06s	**Latitude:** 20d-48m-09.54s
Location: 1.47 Miles East of Lower Nahiku Road	
Historic Name: Pupape Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502801	**Route No:** 360
Popular Name: Ulaino Stream Bridge	
Feature Crossed: Ulaino Stream	
Feature Carried: Hana Highway	
Milepost: 27.98 mi.	**Island:** Maui
Longitude: 156d-03m-38.36s	**Latitude:** 20d-47m-52.04s
Location: 2.96 Miles East of Lower Nahiku Road	
Historic Name: Ulaino Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1914	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

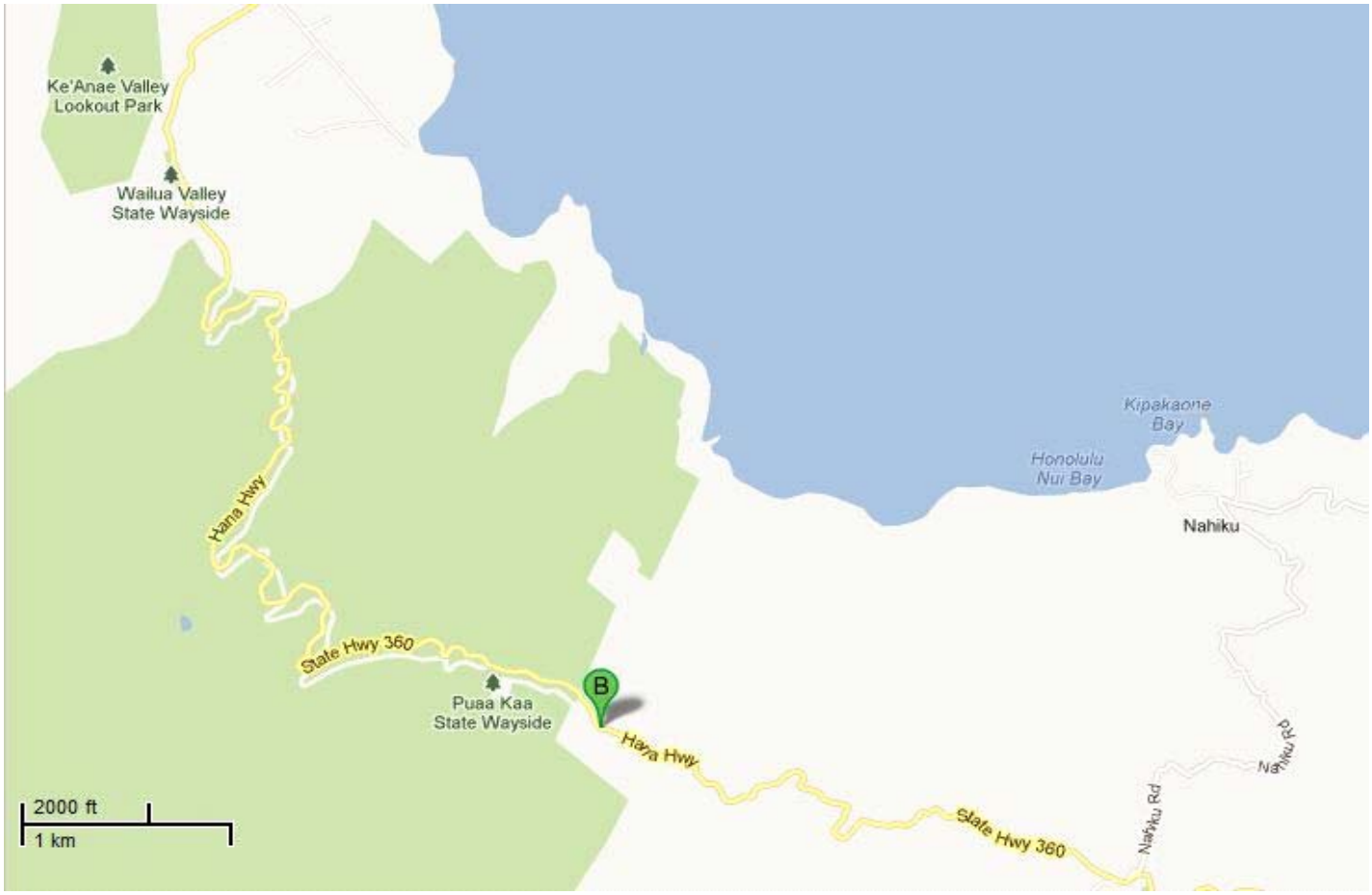
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502298	**Route No:** 360
Popular Name: Unnamed Bridge No.1	
Feature Crossed: Unnamed Stream	
Feature Carried: Hana Highway	
Milepost: 22.90 mi.	**Island:** Maui
Longitude: 156d-07m-11.09s	**Latitude:** 20d-48m-51.58s
Location: 2.08 Miles West of Lower Nahiku Road	
Historic Name: Waiohuolua Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 19.0 ft.	**Deck Width:** 13.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502300	**Route No:** 360
Popular Name: Unnamed Bridge No.2	
Feature Crossed: Unnamed Stream	
Feature Carried: Hana Highway	
Milepost: 22.96 mi.	**Island:** Maui
Longitude: 156d-07m-09.72s	**Latitude:** 20d-48m-50.96s
Location: 2.05 Miles West of Lower Nahiku Road	
Historic Name: Unnamed Bridge No.2	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 16.1 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 14.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

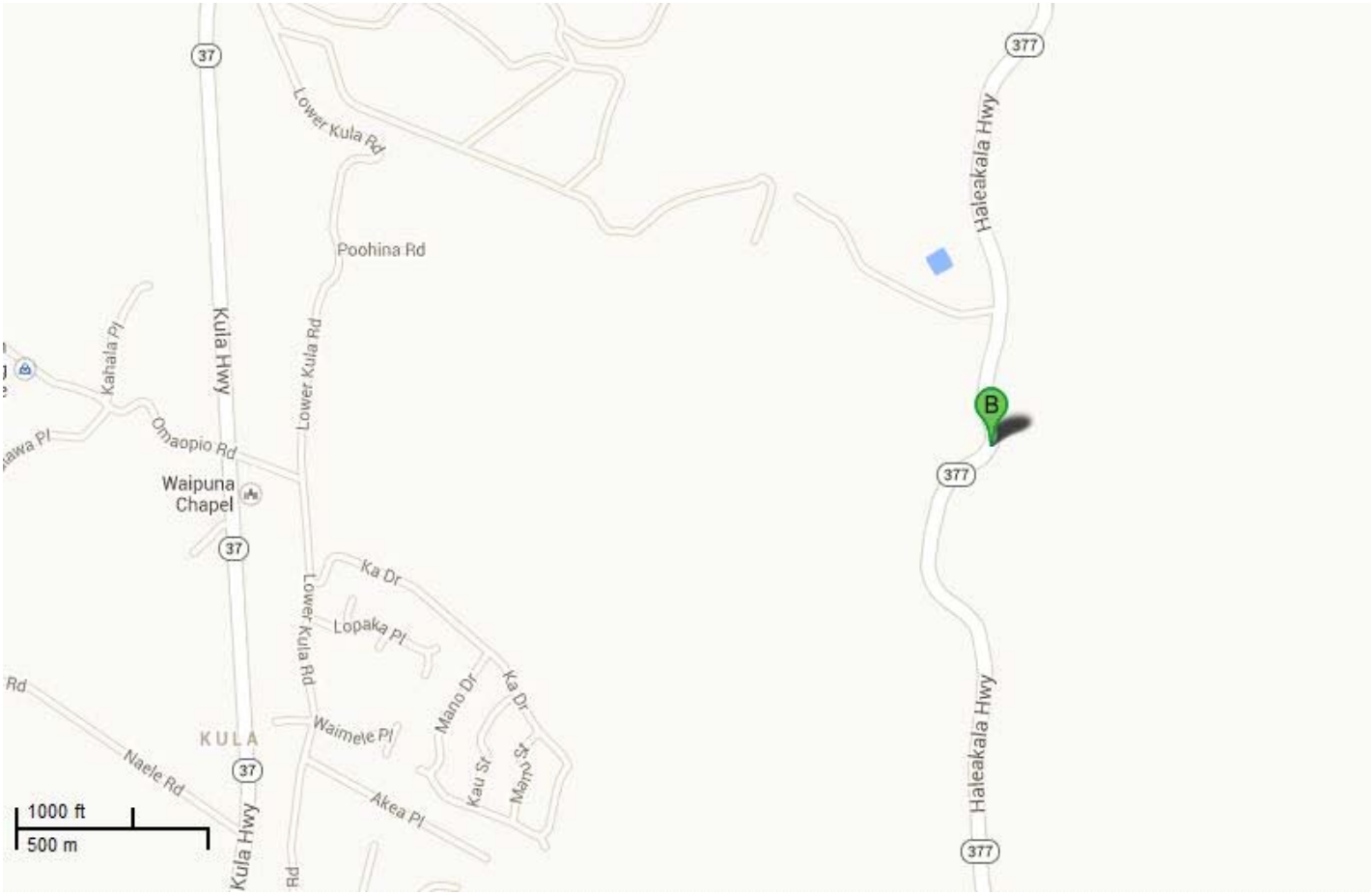
Inventory Form
(State)

General Information

Bridge Number: 009003770500540	**Route No:** 377
Popular Name: Waiale Bridge	
Feature Crossed: Waiale Gulch	
Feature Carried: Haleakala Highway	
Milepost: 3.74 mi.	**Island:** Maui
Longitude: 156d-18m-28.55s	**Latitude:** 20d-47m-51.64s

Location: 1.44 Miles North of Lower Kimo Drive
Historic Name: Waiale Bridge
Designer/Engineer:
Builder/Contractor: Hawaiian Contracting Co.

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 49.9 ft.	**Total Length:** 149.9 ft.	**Deck Width:** 27.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features: Bridge name and date of construction incised on end piers			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Waiale Gulch Bridge carries Kekaulike Avenue (State Highway 377) over Waiale Gulch. Waiale Gulch Bridge, a curved reinforced concrete tee beam structure, is one of the most impressive of the six bridges built in Kula by the Hawaiian Contracting Company under contract to the Territorial Highways Department in 1933-34.

The Waiale Gulch Bridge remains in its original location and has retained its rural setting on the upper Kula Road. The bridge's original concrete tee beam design is unaltered. However, modern steel guardrails have been attached to the end piers thus obscuring the paneled surface detail. The original reinforced concrete material of the bridge remains intact, with the exception of minor concrete spalling on the parapets. The workmanship is typical of bridges of this period. The bridge's historic associations with Federal Aid highway improvements and advances in concrete technology are apparent to informed observers. The bridge retains its historic feeling due to its rural location, sharp approach and narrow width.

Significance Statement:

The Waiale Gulch Bridge is significant for its contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A as a representative of an important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century. Further, the bridge may also represent the “work of a master”: William R. Bartels of the Territorial Highways Department.

The Waiale Gulch Bridge is one of two built in 1934 on Kekaulike Avenue; it was preceded by four bridges constructed the year before under the same contract. The bridge is a striking example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the deep Waiale Gulch along Kekaulike Avenue, the major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, small vegetable and flower farming.

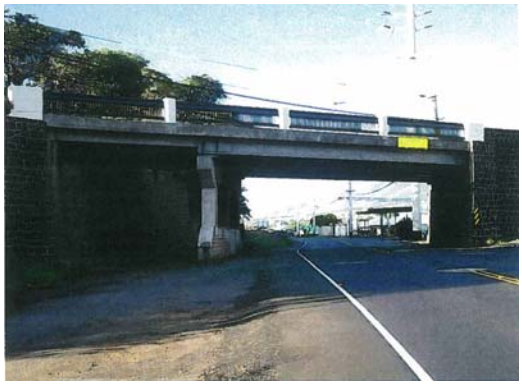
The Waiale Gulch Bridge has a length of 150 feet, with a maximum span length of approximately 50 feet, making it one of the longer and taller bridges in Maui County. Its substructure is distinguished by the two twin-arch reinforced concrete piers.(1) It is likely that William R. Bartels designed this bridge, as well as the Alae Gulch Bridge and the others in the contract. Bartels was responsible for the design of all major Territorial bridge projects between 1932 and his retirement from the department in 1956.(2) His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

(1) Hawaii Heritage Center, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii, Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1990), 107.
(2) Patricia Alvarez, “A History of Road and Bridge Development on the Island of Hawaii” in Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

Inventory Form
(State)

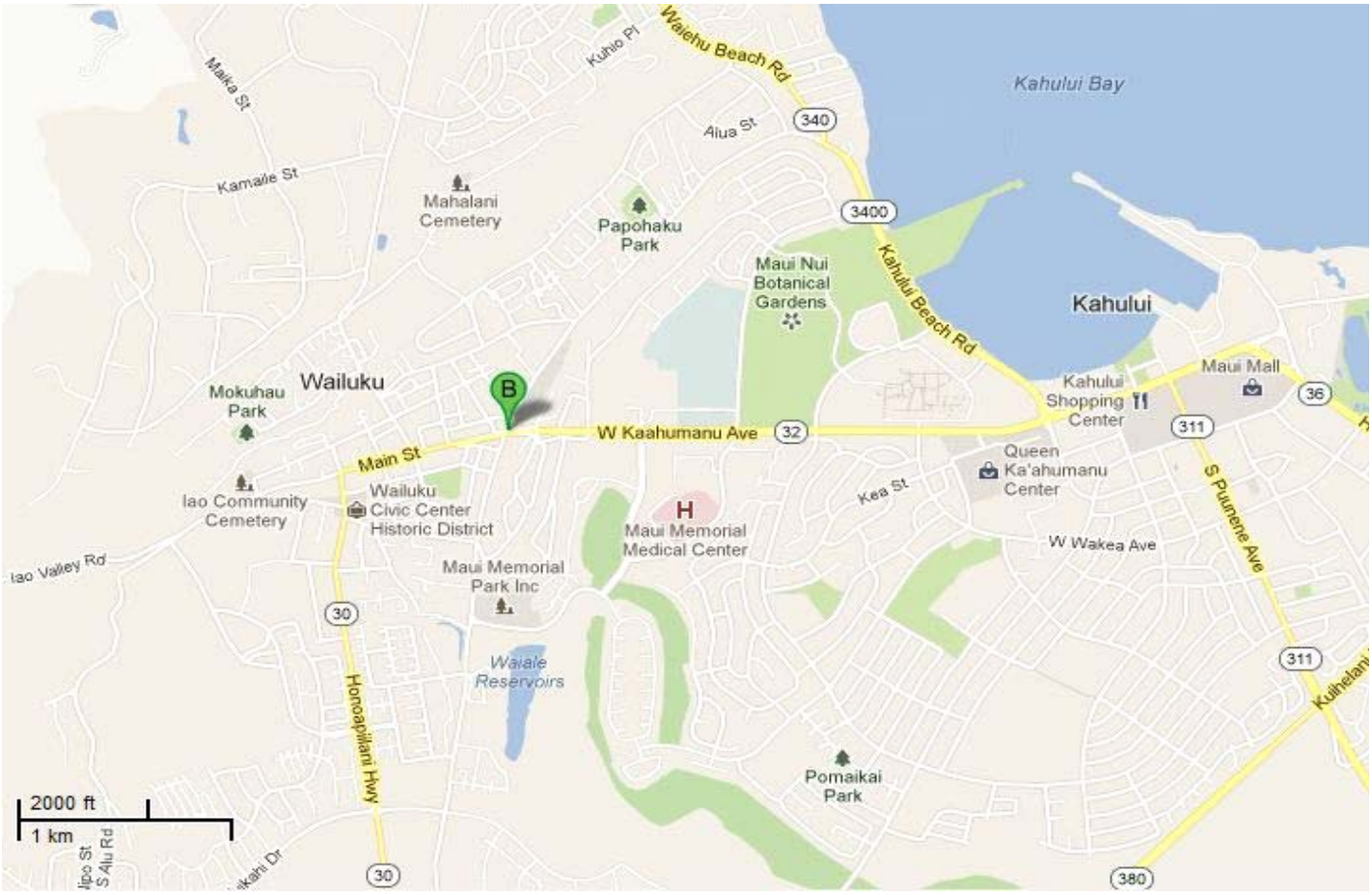
General Information

Bridge Number: 009000320400050	**Route No:** 32
Popular Name: Waiale Road Overpass	
Feature Crossed: Waiale Drive	
Feature Carried: Kaahumanu Avenue	
Milepost: 0.50 mi.	**Island:** Maui
Longitude: 156d-29m-50.61s	**Latitude:** 20d-53m-19.30s



Location: 0.10 Miles East of Kinipopo Street
Historic Name: Waiale Road Overpass
Designer/Engineer: William R. Bartels
Builder/Contractor: Hawaiian Contracting Co.

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2010	
Alteration Type(s):		
Alteration Description(s): Bridge parapets replaced in kind in 2010		

Bridge Information

Number of Spans: 2	**Max Span:** 50.9 ft.	**Total Length:** 79.1 ft.	**Deck Width:** 49.5 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Picket			
Setting:			
Other Features: Bridge name and date incised on end piers; sidewalks on both sides of roadway; masonry and concrete pedestrian stair to road below			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

See National Register of Historic Places Nomination Form.

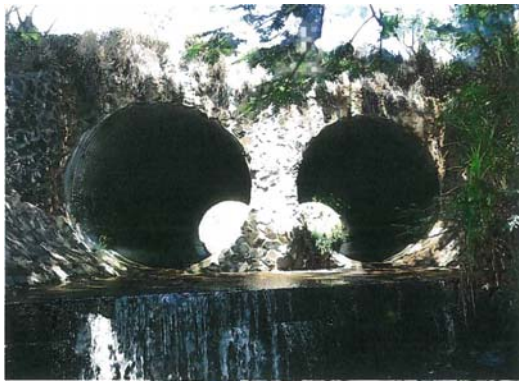
Significance Statement:

See National Register of Historic Places Nomination Form.

Inventory Form
(State)

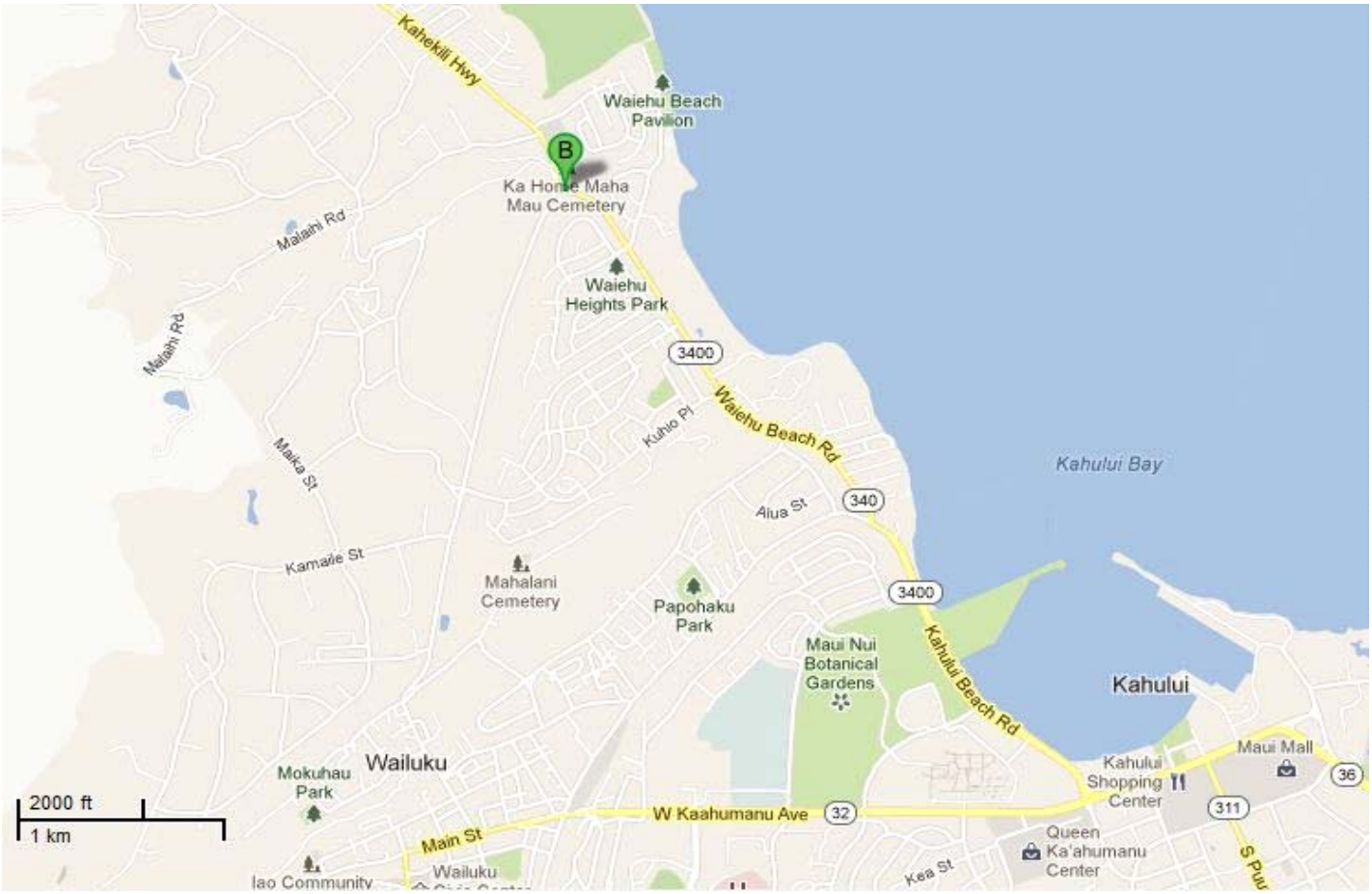
General Information

Bridge Number: 009003400500004	**Route No:** 340
Popular Name: Waiehu Twin 12 ft. Culvert	
Feature Crossed: Waiehu Stream	
Feature Carried: Kahekili Highway	
Milepost: 0.02 mi.	**Island:** Maui
Longitude: 156d-29m-51.89s	**Latitude:** 20d-55m-04.55s



Location: 0.02 Miles North of Waiehu Beach Road (Route 3400)
Historic Name: Waiehu Twin 12 ft. Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1967	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 12.1 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 44.9 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Waiehu Twin 12 ft. Culvert carries Kahekili Highway across the Waiehu Stream. This two cell concrete culvert remains intact and is generally in good condition. The culvert has thrie beam parapets, and concrete rock masonry elevations and wingwalls. The twin cells are made of circular corrugated metal.

Significance Statement:

This culvert is eligible due to the concrete rock masonry elevations and wingwalls which is a unique feature in the design and construction of culverts.

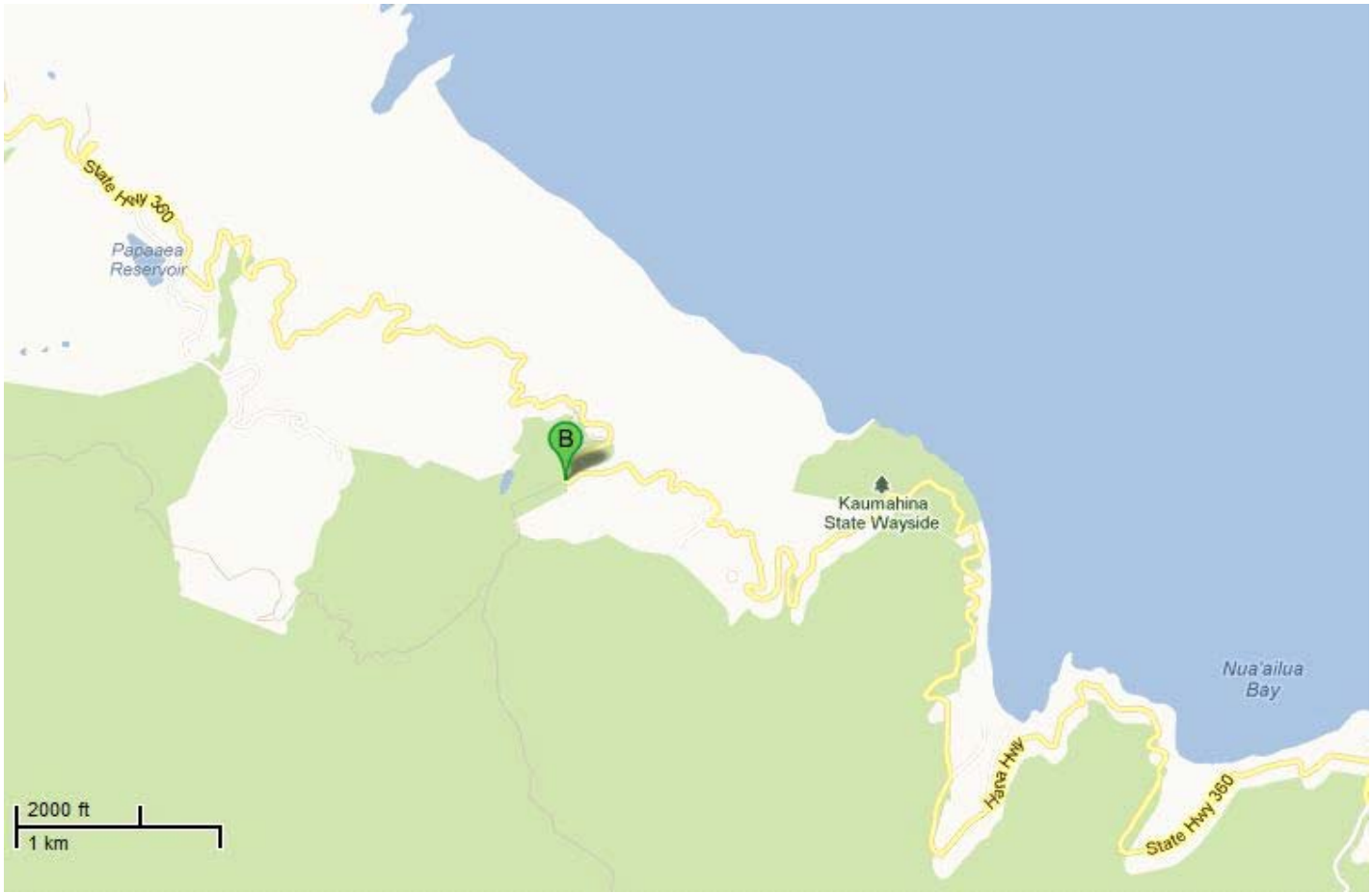
Inventory Form
(State)

General Information

Bridge Number: 009003600500990	**Route No:** 360
Popular Name: Waikamoi Stream Bridge	
Feature Crossed: Waikamoi Stream	
Feature Carried: Hana Highway	
Milepost: 9.88 mi.	**Island:** Maui
Longitude: 156d-11m-13.24s	**Latitude:** 20d-52m-19.93s

Location: 2.24 Miles West of Kaumahina State Wayside Park Road
Historic Name: Waikamoi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 19.0 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 14.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600501942	**Route No:** 360
Popular Name: Waikani Stream Bridge	
Feature Crossed: Waikani Stream	
Feature Carried: Hana Highway	
Milepost: 19.39 mi.	**Island:** Maui
Longitude: 156d-08m-18.93s	**Latitude:** 20d-49m-58.01s

Location: 0.33 Miles East of Wailua Valley Lookout
Historic Name: Waikani Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1926	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 83.0 ft.	**Total Length:** 107.9 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

The Koukouai Gulch and Waikani Stream Bridges are open-spandrel arch deck bridges along Hana Highway. The Waikani Stream Bridge in the Keanae district is a reinforced concrete open-spandrel arch bridge. It was placed on "reserve" status for the Hawaii Register of Historic Places in 1974, although it was never formally listed.(1) The bridge is highly visible from the highway and is one of the most dramatic and aesthetically distinguished bridges in the state. The Waikani Bridge is the only example of a continuous concrete arch deck bridge on Maui.(2) In addition, the Waikani Stream Bridge was constructed by the prominent native Hawaiian contractor Moses Akiona. Akiona was born in the Keanae district of Maui and later established the Moses Akiona Contracting Company in Honolulu.

This open-spandrel arch bridge remains in its original location and retain its rural settings. The bridge's original design and materials remain intact, with the exception of minor concrete repairs to the parapets. Progressive repaving has obstructed from view the lower portion of the railing from the roadway. The bridge is obviously the work of skilled builders, such as Moses Akiona. The bridge's historic associations with the rapid advances in engineering technology in the early decades of the twentieth century and as a representative example of public works efforts by the County of Maui, is readily apparent to travelers on the Hana Highway. The bridge retains its historic feeling due to its location, sharp approach, and narrow width.

This bridge contributes to the Hana Highway Historic Bridge District. Arch bridges are also an uncommon bridge type. See National Register of Historic Places Nomination Form.

(1) J.C. Wright, Hawaii Register of Historic Places, Short Form: Waikani Bridge, Wailuanui, Hana (State of Hawaii, Department of Land and Natural Resources, Division of State Parks, March 1974).

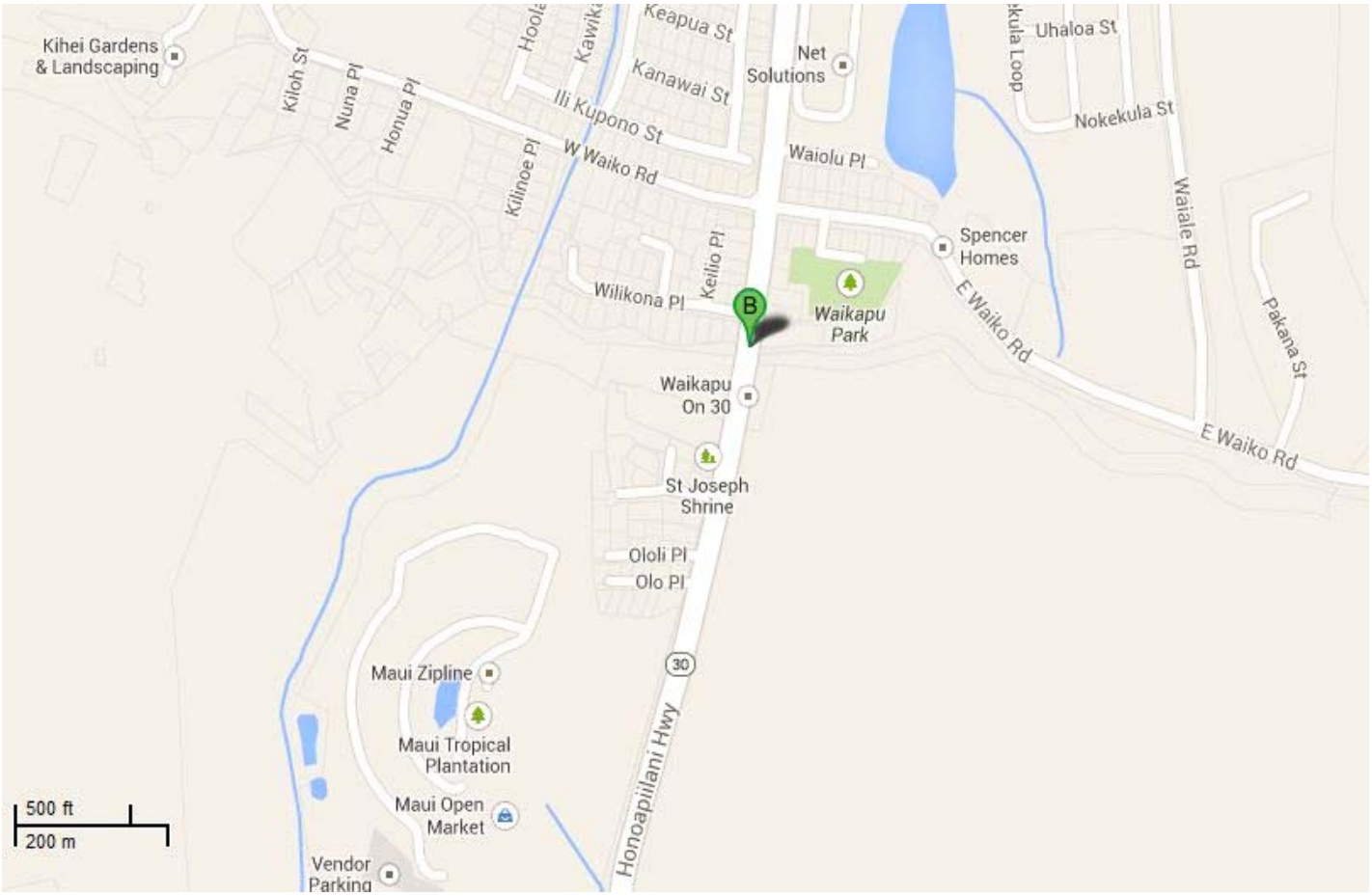
Inventory Form
(State)

General Information

Bridge Number: 009000300303404	**Route No:** 30
Popular Name: Waikapu Stream Bridge	
Feature Crossed: Waikapu Stream	
Feature Carried: Honoapiilani Highway	
Milepost: 2.32 mi.	**Island:** Maui
Longitude: 156d-30m-13.67s	**Latitude:** 20d-51m-11.97s

Location: 0.08 Miles South of Waiko Road
Historic Name: Waikapu Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: Clarke Transportation Company

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 36.1 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Bridge name and date of construction incised on end piers; sidewalk on both sides of roadway			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Stream Bridge carries Honoapiilani Highway (FAP 30) over the Waikapu Stream, south of Waikapu village. The Waikapu Bridge, a reinforced concrete flat slab structure, is one of two bridges built along this roadway by the Clarke Transportation Company under contract to the Territorial Highways Department in 1937.

The Waikapu Stream Bridge remains in its original location and has retained its residential setting on the outskirts of Waikapu Town. The bridge's original concrete flat slab design and original reinforced concrete material remains intact, with the exception of minor concrete spalling on the parapets. The workmanship is typical of bridges of this period and has not been obscured by additions or repairs. The bridge is easily visible from Waikapu's main street. The bridge's historic associations with Federal Aid highway improvements and advances in concrete technology are apparent to informed observers. The bridge retains its historic feeling due to the rail type typical of 1930s Federal Aid bridges.

Significance Statement:

The Waikapu Stream Bridge is significant for its contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A as a representative of an important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between the sugar lands of west Maui and Wailuku. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century. Further, the bridge also represents the “work of a master”: William R. Bartels of the Territorial Highways Department.

The Waikapu Stream Bridge is a good example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for primary roads.(1) The bridge is one of two built in 1937 along the Honoapiilani Highway, the major transportation route between Wailuku and Maalaea-Lahaina region (the other is the Pohakea Stream Bridge, which was replaced in 2002). Generally, this entire region was sparsely populated but the roadway and bridges were necessary to accommodate the transportation of sugar.

William R. Bartels was Chief Engineer for the Territorial Highways Department between 1932 and his retirement from the department in 1956.(2) His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

(1) Hawaii Heritage Center, Historic Bridge Inventory: Island of Kauai, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1990), 171.
(2) Patricia Alvarez, “A History of Road and Bridge Development on the Island of Hawaii” in Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

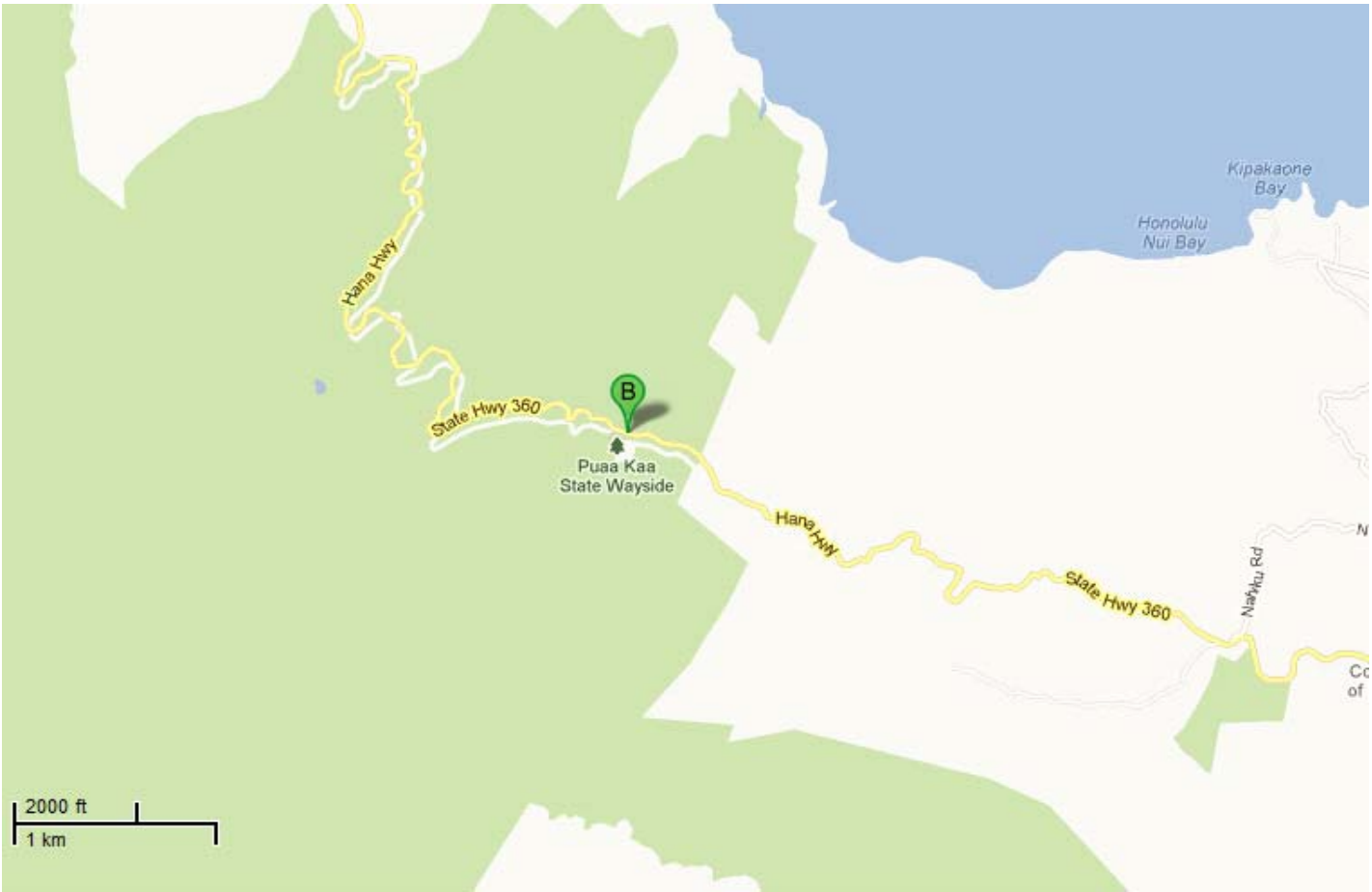
Inventory Form
(State)

General Information

Bridge Number: 009003600502250	**Route No:** 360
Popular Name: Waiohue Stream Bridge	
Feature Crossed: Waiohue Stream	
Feature Carried: Hana Highway	
Milepost: 22.47 mi.	**Island:** Maui
Longitude: 156d-07m-31.80s	**Latitude:** 20d-49m-02.80s

Location: 2.54 Miles West of Lower Nahiku Road
Historic Name: Waiohue Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 16.1 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 14.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

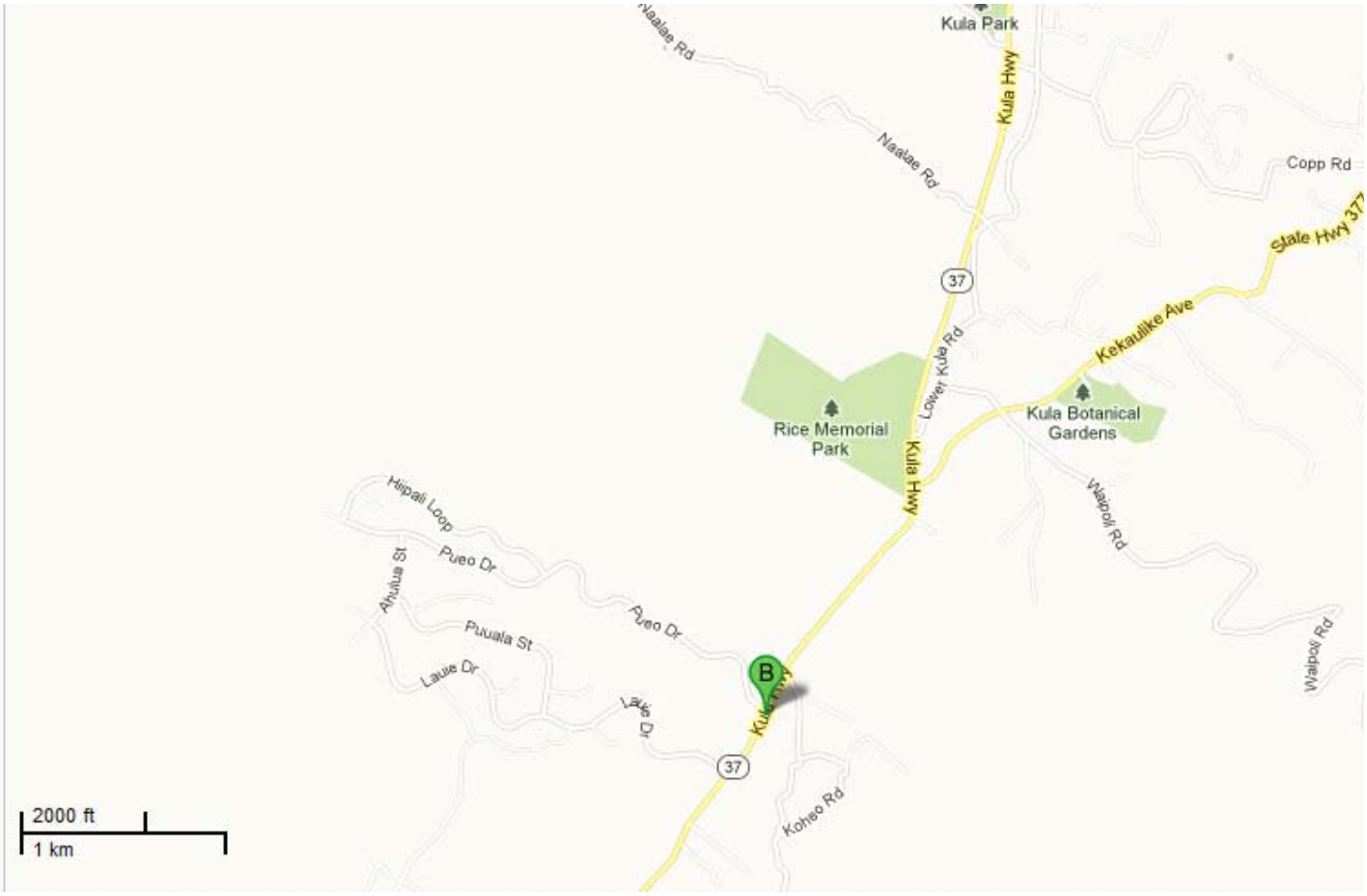
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009000370300802 **Route No:** 37	
Popular Name: Waiohuli A Stream Bridge	
Feature Crossed: Waiohuli Stream	
Feature Carried: Kula Highway	
Milepost: 15.28 mi. **Island:** Maui	
Longitude: 156d-20m-29.08s **Latitude:** 20d-43m-31.09s	
Location: 0.31 Miles South of Polipoli Road	
Historic Name: Waiohuli A Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2008	
Alteration Type(s): Railings		
Alteration Description(s): Bridge railings were replaced in 2008.		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Waiohuli “A” Stream Bridge carries Kula Highway across the Waiohuli Stream within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. As a part of the Kula Highway Flood Damage Repairs in 2008, the bridge railings were replaced. The bridge’s historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.

The Waiohuli “A” Stream Bridge is a part of the 6 bridges built in Kula on Kekaulike Avenue and Kula Highway between 1933 and 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Waiohuli Stream along the Kula Highway, a major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

Inventory Form
(State)

General Information

Bridge Number: 009000370300759 **Route No:** 37

Popular Name: Waiohuli B Stream Bridge

Feature Crossed: Waiohuli Stream

Feature Carried: Kula Highway

Milepost: 15.71 mi. **Island:** Maui

Longitude: 156d-20m-43.08s **Latitude:** 20d-43m-12.67s

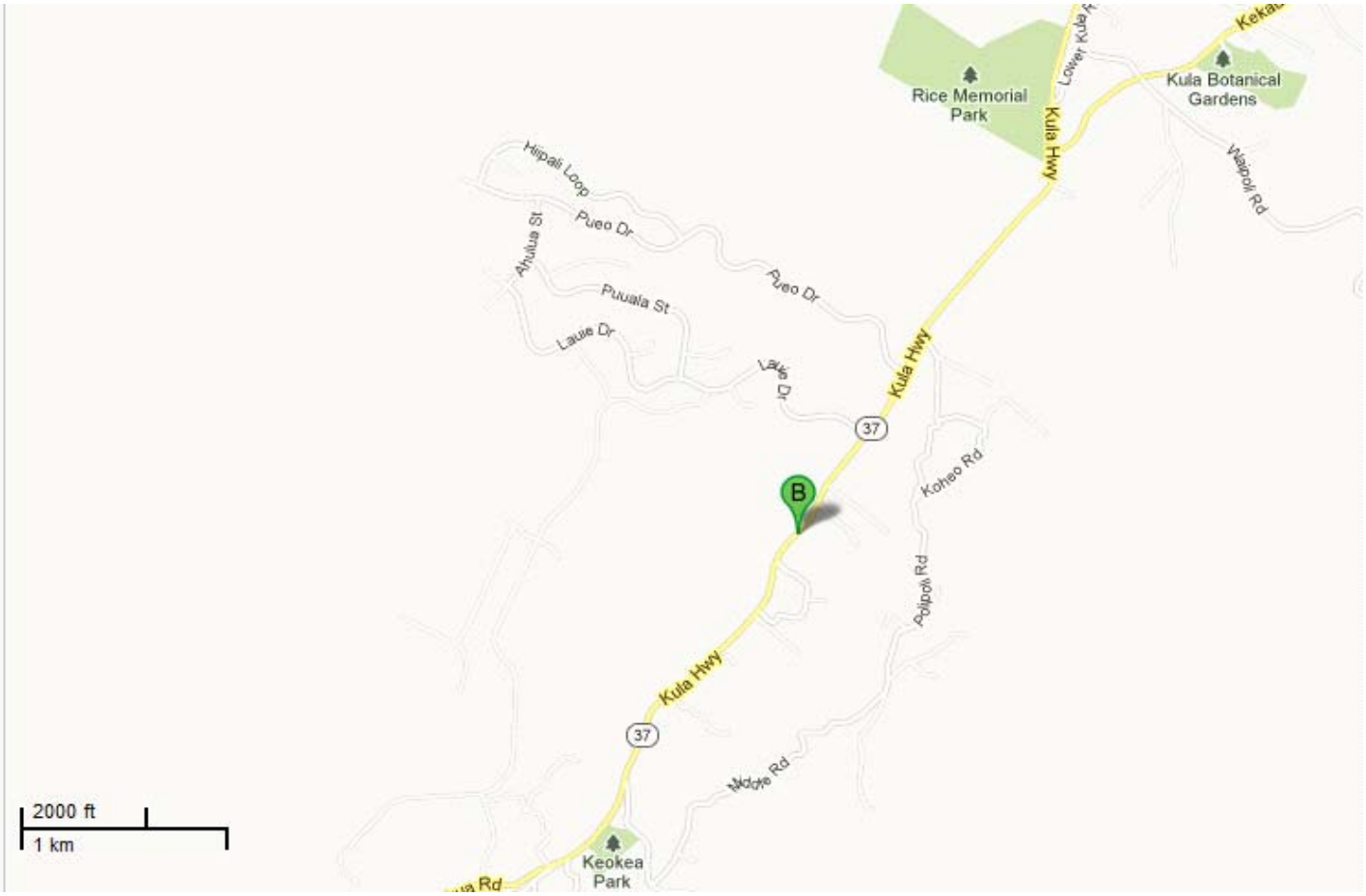
Location: 0.11 Miles South of Malamahale Place

Historic Name: Waiohuli B Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 24.9 ft.	**Deck Width:** 24.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Waiohuli “B” Stream Bridge carries Kula Highway across the Waiohuli Stream within the Makawao District on the island of Maui. This reinforced concrete bridge remains intact and is generally in good condition. The workmanship of the parapet has been obscured by thrie beam guardrails on both sides of the bridge. The bridge’s historic associations and feeling are primarily evident through its geometric styling which was typical of the 1930s.

Significance Statement:

The bridge and roadway contributed to the economic development of the region by providing reliable vehicular access between Kula farms and the markets in Wailuku and Makawao. The bridge is eligible under Criterion C for its associations with the rapid advances in engineering technology in the early decades of the twentieth century.

The Waiohuli “B” Stream Bridge is a part of the 6 bridges built in Kula on Kekaulike Avenue and Kula Highway between 1933 and 1934. The bridge is an example of the Federal Aid bridges constructed by the Territory in the 1930s with funds designated for secondary roads. The bridge was constructed over the Waiohuli Stream along the Kula Highway, a major transportation route in the Kula area. This entire region is sparsely populated but the roadway and bridges were much needed to accommodate the major economic activities, such as ranching, and small vegetable and flower farming.

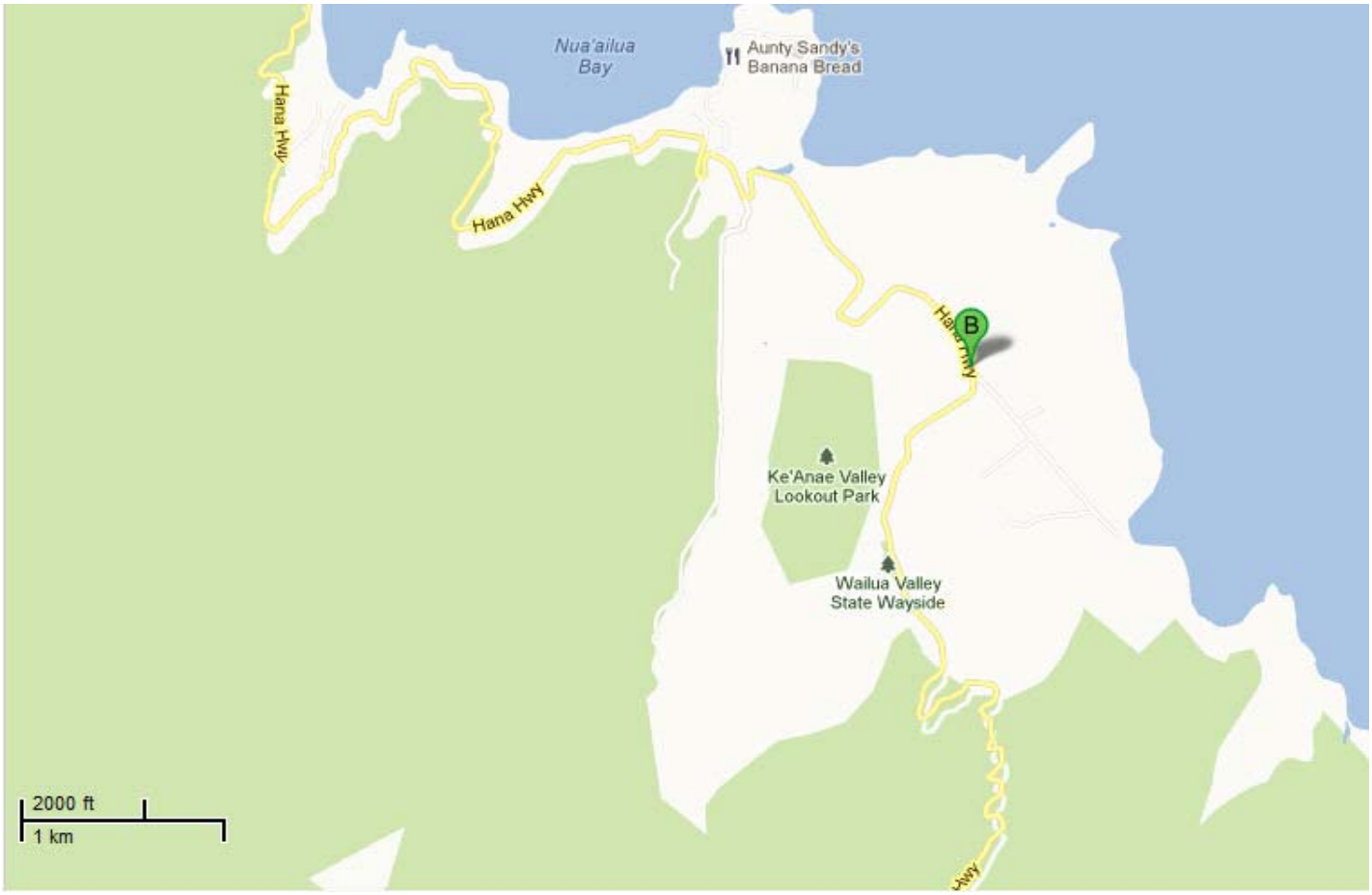
Inventory Form
(State)

General Information

Bridge Number: 009003600501811	**Route No:** 360
Popular Name: Waiokamilo Stream Bridge	
Feature Crossed: Waiokamilo Stream	
Feature Carried: Hana Highway	
Milepost: 18.07 mi.	**Island:** Maui
Longitude: 156d-08m-10.47s	**Latitude:** 20d-50m-56.26s

Location: 0.02 Miles West of Wailua Homestead Road
Historic Name: Waiokamilo Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1921	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 36.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

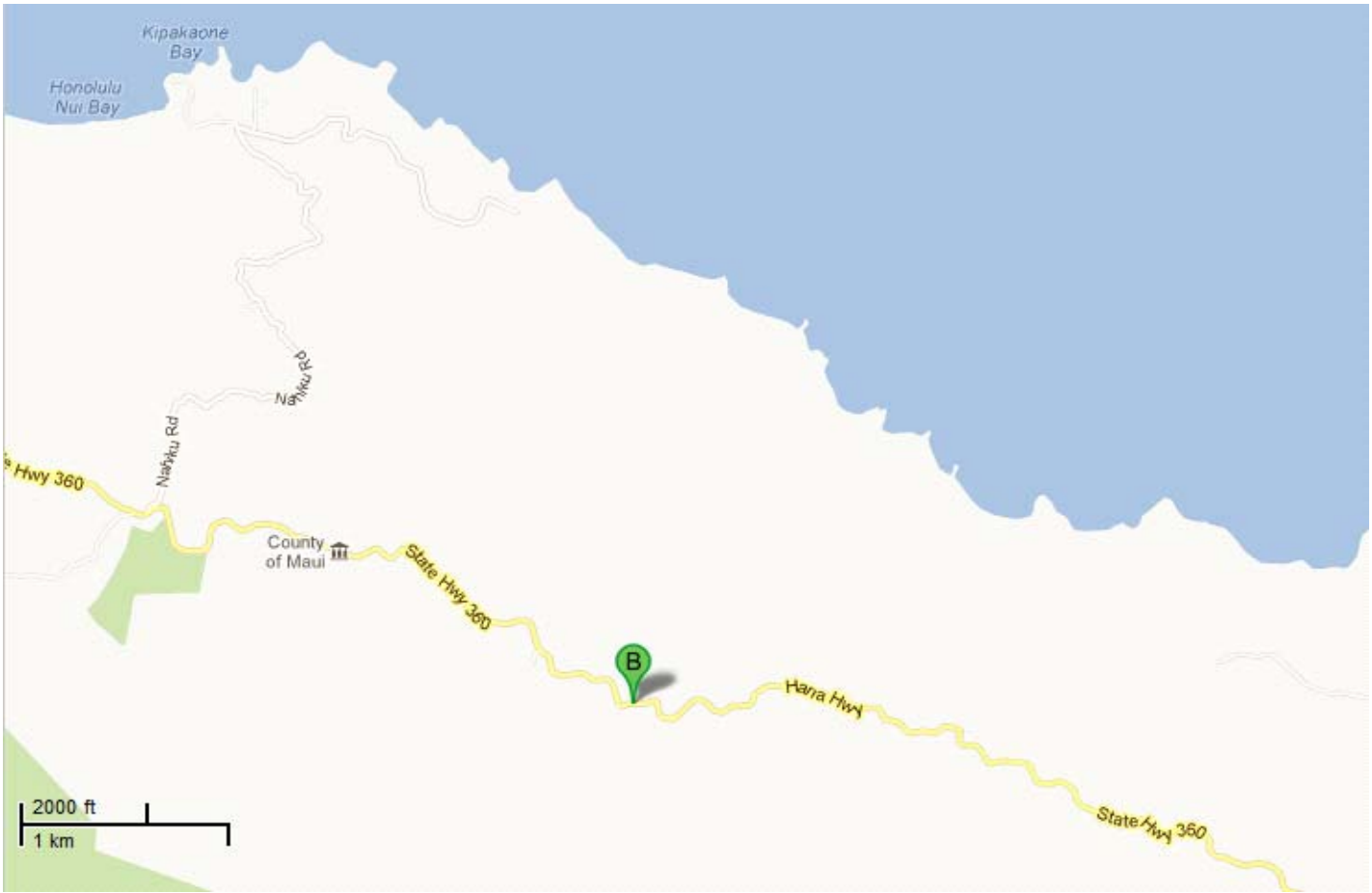
Inventory Form
(State)

General Information

Bridge Number: 009003600502702	**Route No:** 360
Popular Name: Waioni Stream Bridge	
Feature Crossed: Waioni Stream	
Feature Carried: Hana Highway	
Milepost: 26.98 mi.	**Island:** Maui
Longitude: 156d-04m-24.51s	**Latitude:** 20d-47m-55.85s

Location: 1.97 Miles East of Lower Nahiku Road
Historic Name: Waioni Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

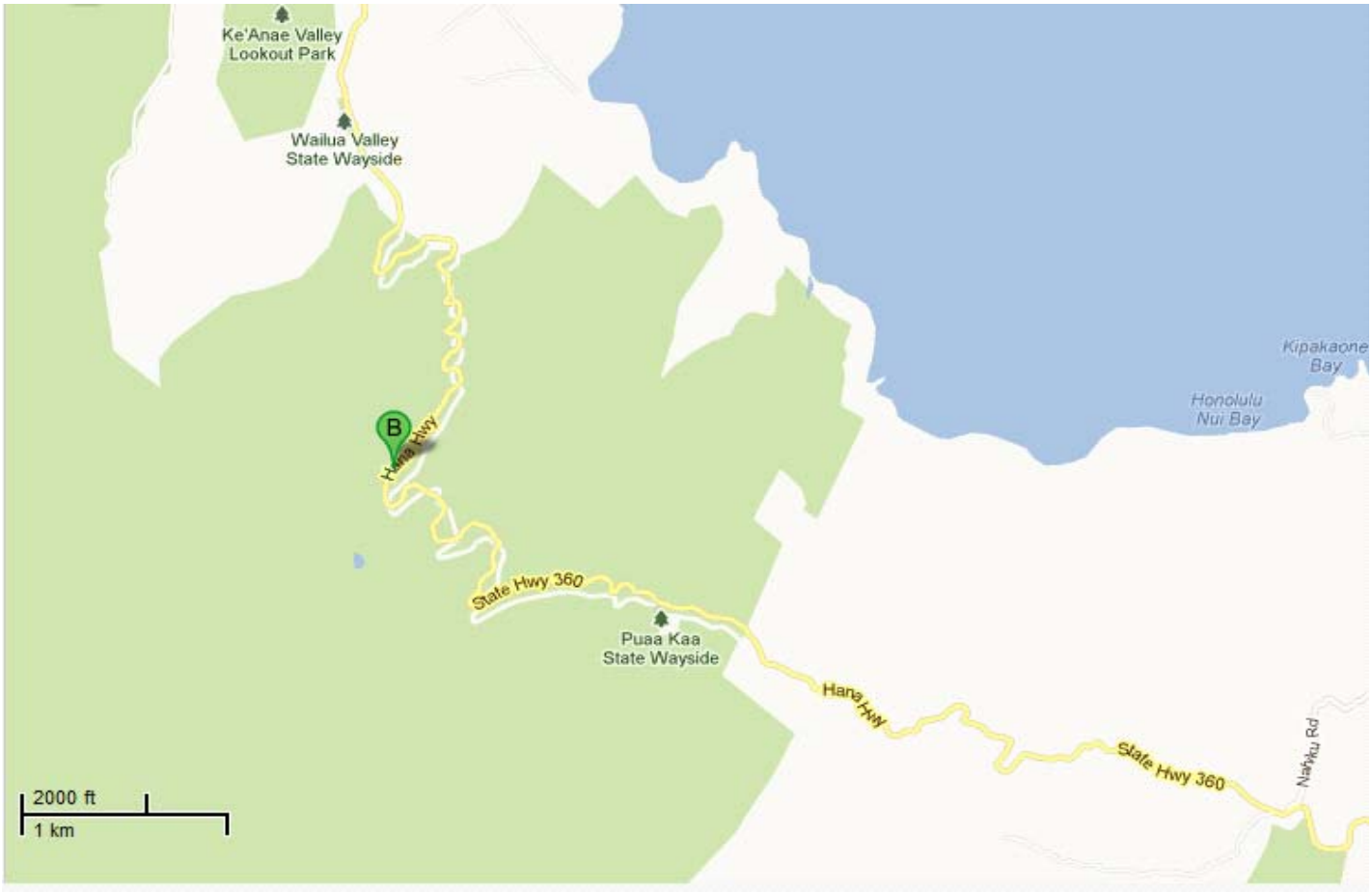
This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502086 **Route No:** 360	
Popular Name: West Wailuaiki Stream Bridge	
Feature Crossed: West Wailuaiki Stream	
Feature Carried: Hana Highway	
Milepost: 20.83 mi. **Island:** Maui	
Longitude: 156d-08m-17.05s **Latitude:** 20d-49m-18.91s	
Location: 1.77 Miles East of Wailua Valley Lookout	
Historic Name: West Wailuaiki Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 28.9 ft.	**Total Length:** 70.9 ft.	**Deck Width:** 22.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(State)

General Information

Bridge Number: 009003600502697 **Route No:** 360	
Popular Name: West Waioni Stream Bridge	
Feature Crossed: West Waioni Stream	
Feature Carried: Hana Highway	
Milepost: 26.94 mi. **Island:** Maui	
Longitude: 156d-04m-26.58s **Latitude:** 20d-47m-55.65s	
Location: 1.92 Miles East of Lower Nahiku Road	
Historic Name: West Waioni Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 28.9 ft.	**Deck Width:** 18.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

V. INVENTORY FORMS:
MAUI COUNTY ELIGIBLE BRIDGES

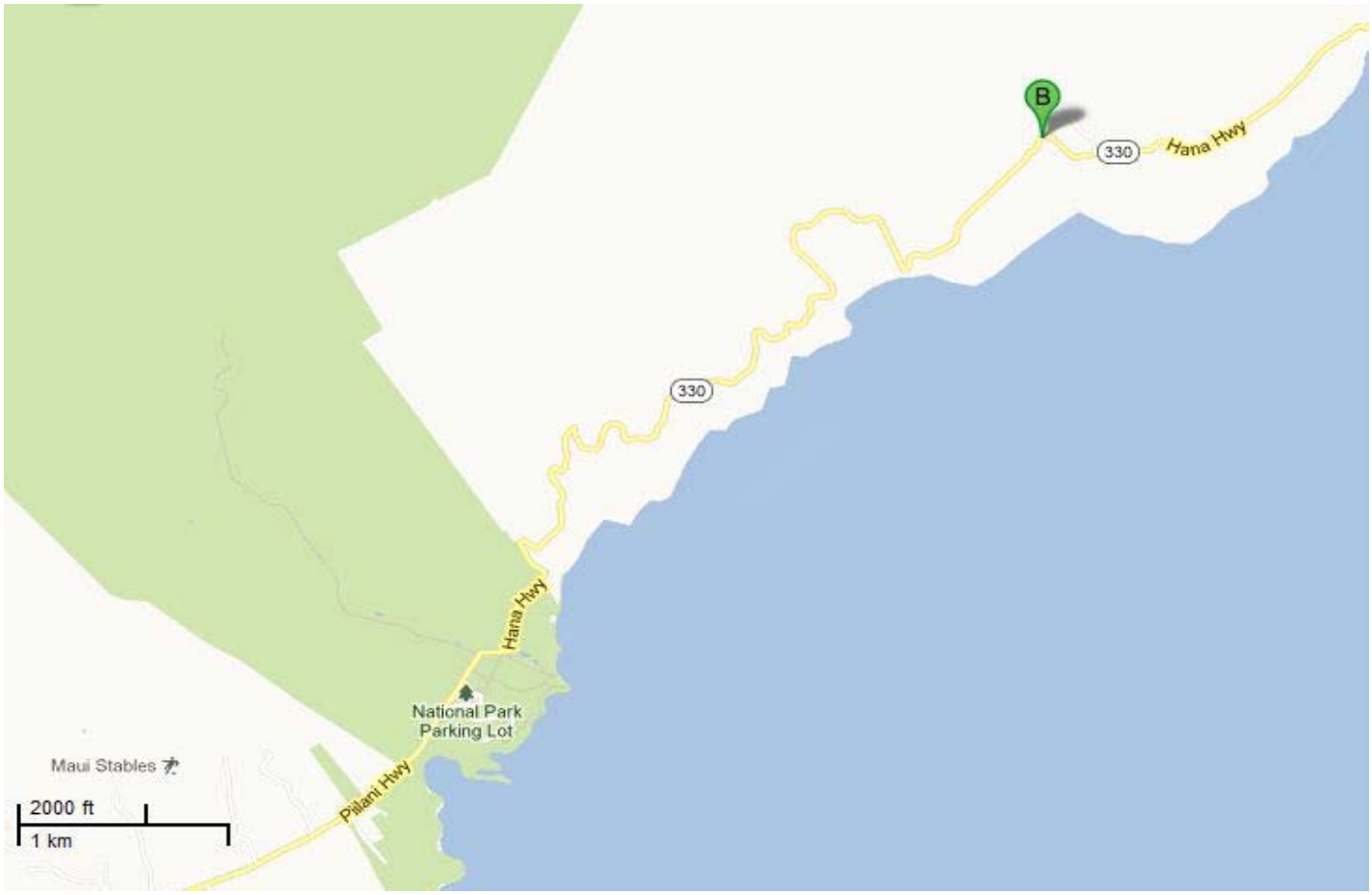
Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904579	
Popular Name: Alaalaua No. 27	
Feature Crossed: Alaalaua Stream	
Feature Carried: Hana Highway	
Milepost: 45.78 mi.	**County Private:** Maui
Longitude: 156d-01m-08.23s	**Latitude:** 20d-41m-14.47s

Location: 3.14 Miles South of Haneoo Road (Road to Hamoa)
Historic Name: Alaalaua No. 27
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1915	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 30.0 ft.	**Total Length:** 54.0 ft.	**Deck Width:** 14.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904304

Popular Name: Hahalawe No. 19

Feature Crossed: Hahalawe Stream

Feature Carried: Hana Highway

Milepost: 43.04 mi. **County Private:** Maui

Longitude: 156d-02m-25.44s **Latitude:** 20d-40m-26.43s

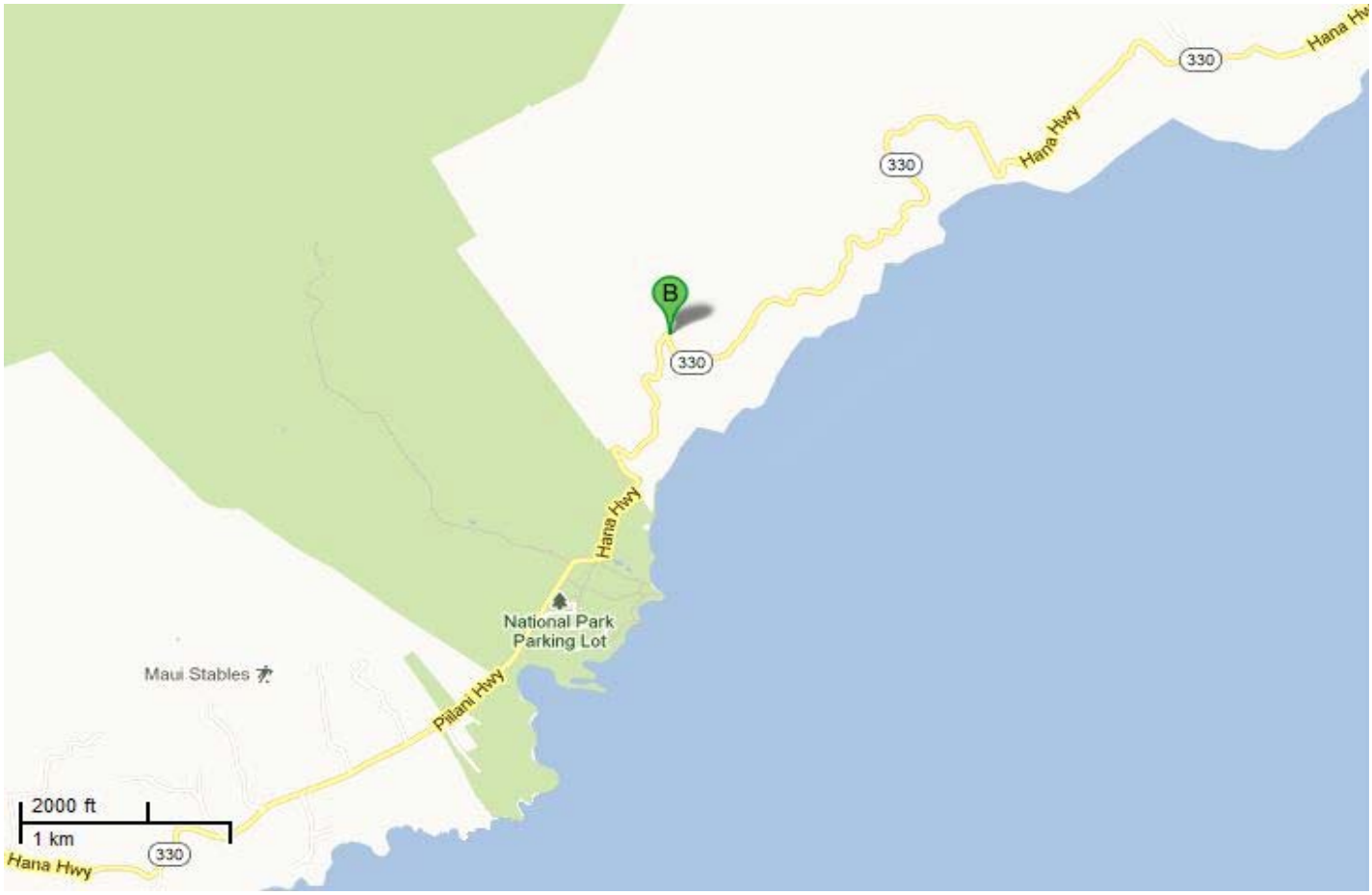
Location: 5.89 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Hahalawe No. 19

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1910	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 16.0 ft.
Superstructure:			
Substructure: Masonry Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

Hahalawe Stream Bridge and Waiele (Paehala Stream Bridge) are two of the nine remaining masonry arch bridges in the state and are located along the Hana Highway north of Haleakala National Park. These bridges, constructed by the county in 1910, are small, single-span circular masonry arch deck bridges with solid spandrels. Both bridges utilize cut basalt blocks for the abutments and arch ring; solid reinforced concrete was utilized for the parapets and rail caps. The dates “A.D. 1910” are inscribed on the outer parapet of each bridge. The masonry arches are typical of earlier structures constructed by the Kingdom or Republic of Hawaii (prior to 1898) and appear to date from an earlier period than the parapets. Arch bridges are also an uncommon bridge type.

The masonry arch bridges on the Hana Highway remain in their original locations and have retained their rural settings. The bridges retain their original design features and materials, although the concrete parapets appear to date from later period than the masonry arch. Generally, early masonry arch bridges were constructed by prisoners or day labor. Later masonry arch bridges were constructed by skilled masons. It is unknown who constructed Hana’s masonry arch bridges. The bridges’ historic associations with public works improvements of the early Territorial period and as rare survivors of this once common bridge type are apparent to the informed observer. The bridges retain their historic feeling due to their finely-detailed, and now uncommon materials.

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

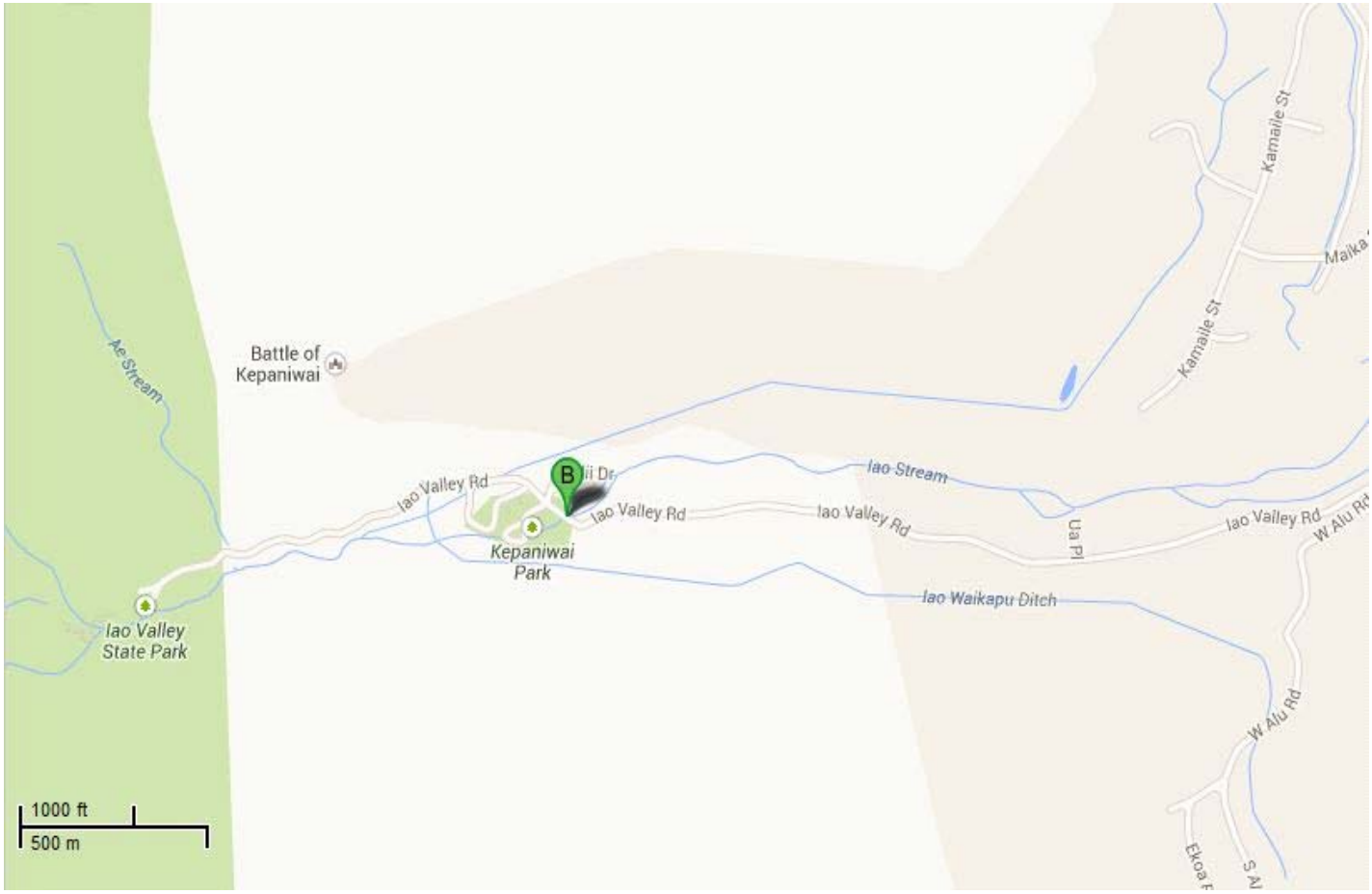
Inventory Form
(County/Private)

General Information

Bridge Number: 009003201100001	
Popular Name: Iao Stream Bridge No. 59	
Feature Crossed: Iao Stream	
Feature Carried: Iao Valley Road	
Milepost:	**County Private:** Maui
Longitude: 156d-32m-01.60s	**Latitude:** 20d-52m-58.50s

Location: Before Heritage Gardens Kepaniwai Park
Historic Name: Iao Stream Bridge No. 59
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1955	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 40.0 ft.	**Total Length:** 122.0 ft.	**Deck Width:** 27.8 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Iao Stream Bridge #59 carries Iao Valley Road over the Iao Stream. This three span steel stringer bridge is in its original location, is generally in good condition, and its materials remain intact. It has horizontal metal railings with concrete end posts and a concrete curb. The reinforced concrete deck is supported by reinforced concrete abutments and piers. This bridge can be interpreted by the name and construction date incised on the concrete end posts.

Significance Statement:

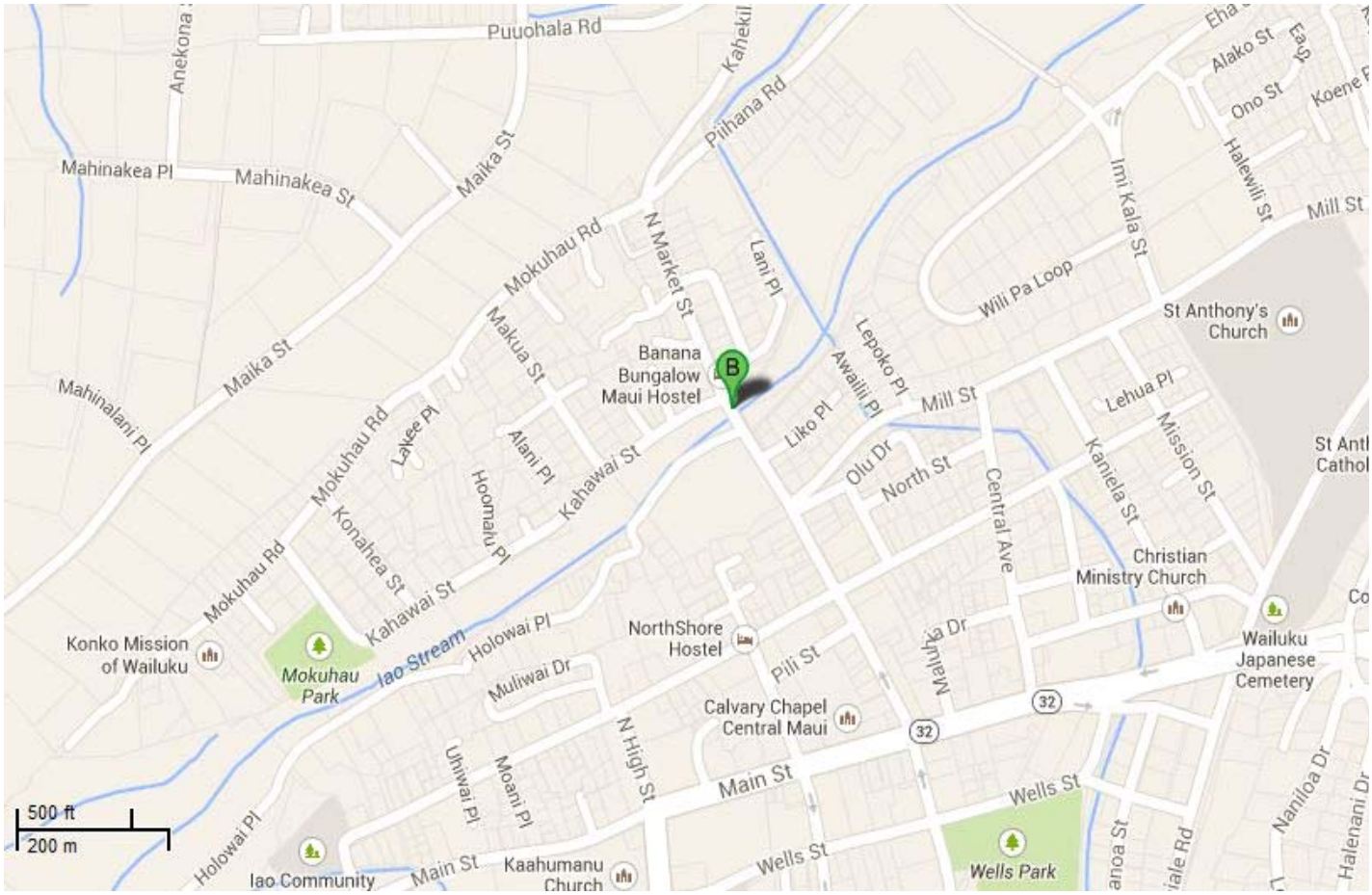
This bridge is eligible under Criterion C for being the longest metal bridge built post-war (1945) on the island of Maui in the historic study period prior to 1969. The use of steel was uncommon in Hawaii due to the extreme marine environment. It is a good example of a 1940's steel stringer bridge atypical of its period in its use of materials and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 009311301200001	
Popular Name: Iron Bridge No. 113	
Feature Crossed: Iao Stream	
Feature Carried: North Market Street	
Milepost:	**County Private:** Maui
Longitude: 156d-30m-13.90s	**Latitude:** 20d-53m-29.57s
Location: Intersection with Kahawai Street	
Historic Name: Iron Bridge No. 113	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1949	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 57.0 ft.	**Total Length:** 62.0 ft.	**Deck Width:** 37.9 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Iron Bridge #113 carries North Market Street across Iao Stream. This one span steel stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has horizontal metal railings with concrete end caps. Attached to the approaches of the bridge are rubble masonry parapets that are a part of North Market Street. The concrete deck is supported by reinforced concrete abutments.

Significance Statement:

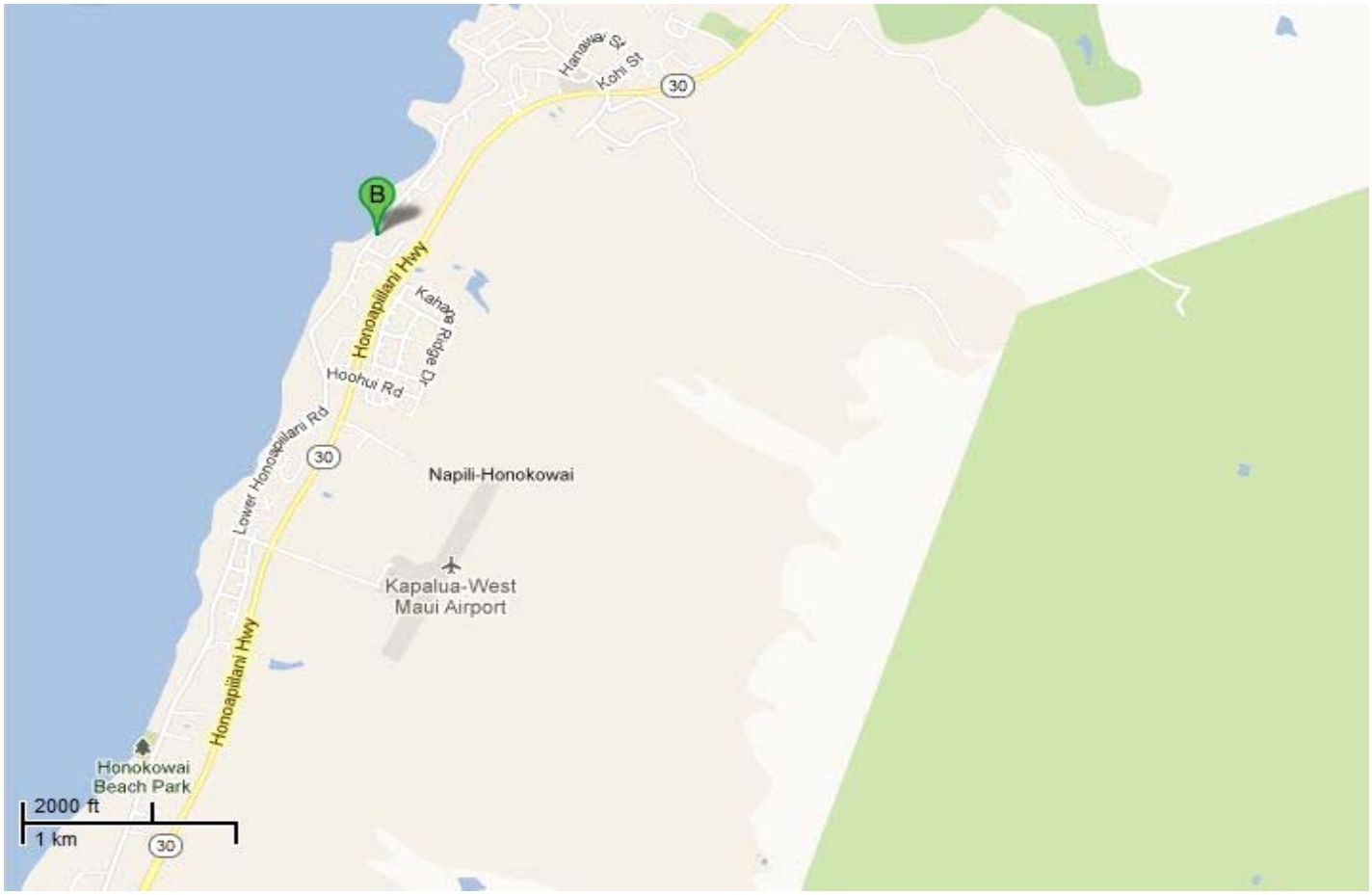
This bridge is eligible under Criterion C for being the longest metal span built post-war (1945) on the island of Maui in the historic study period prior to 1969. The use of steel was uncommon in Hawaii due to the extreme marine environment. It is a good example of a 1940's steel stringer bridge atypical of its period in its use of materials and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 009030801100003	
Popular Name: Kahana Nui No. 93	
Feature Crossed: Kahana Nui Stream	
Feature Carried: Lower Honoapiilani Road	
Milepost:	**County Private:** Maui
Longitude: 156d-40m-36.39s	**Latitude:** 20d-58m-37.98s
Location: 0.40 Miles North of Hoohui Road	
Historic Name: Kahana Nui No. 93	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1964	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 26.0 ft.	**Total Length:** 29.0 ft.	**Deck Width:** 28.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kahana Nui Stream Bridge carries Lower Honoapilani Road across Kahana-nui Stream. This reinforced concrete girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps. The concrete deck is supported by masonry rubble concrete abutments. The workmanship of the bridge has not been obscured by the addition or repair and the simple design of the parapet retains its historic feeling. This bridge is undergoing the consultation process in 2013 for scheduled replacement in 2014.

Significance Statement:

This bridge is eligible under Criterion C as an exceptional type of 1960's concrete bridge construction in Hawaii. It is uncommon to use a solid parapet design with masonry rubble concrete abutments for bridges constructed in this period. This bridge is scheduled to be replaced in 2014.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904864

Popular Name: Kahawaiokapia No. 30

Feature Crossed: Kapia Stream

Feature Carried: Hana Highway

Milepost: 48.64 mi. **County Private:** Maui

Longitude: 155d-59m-34.61s **Latitude:** 20d-42m-47.08s

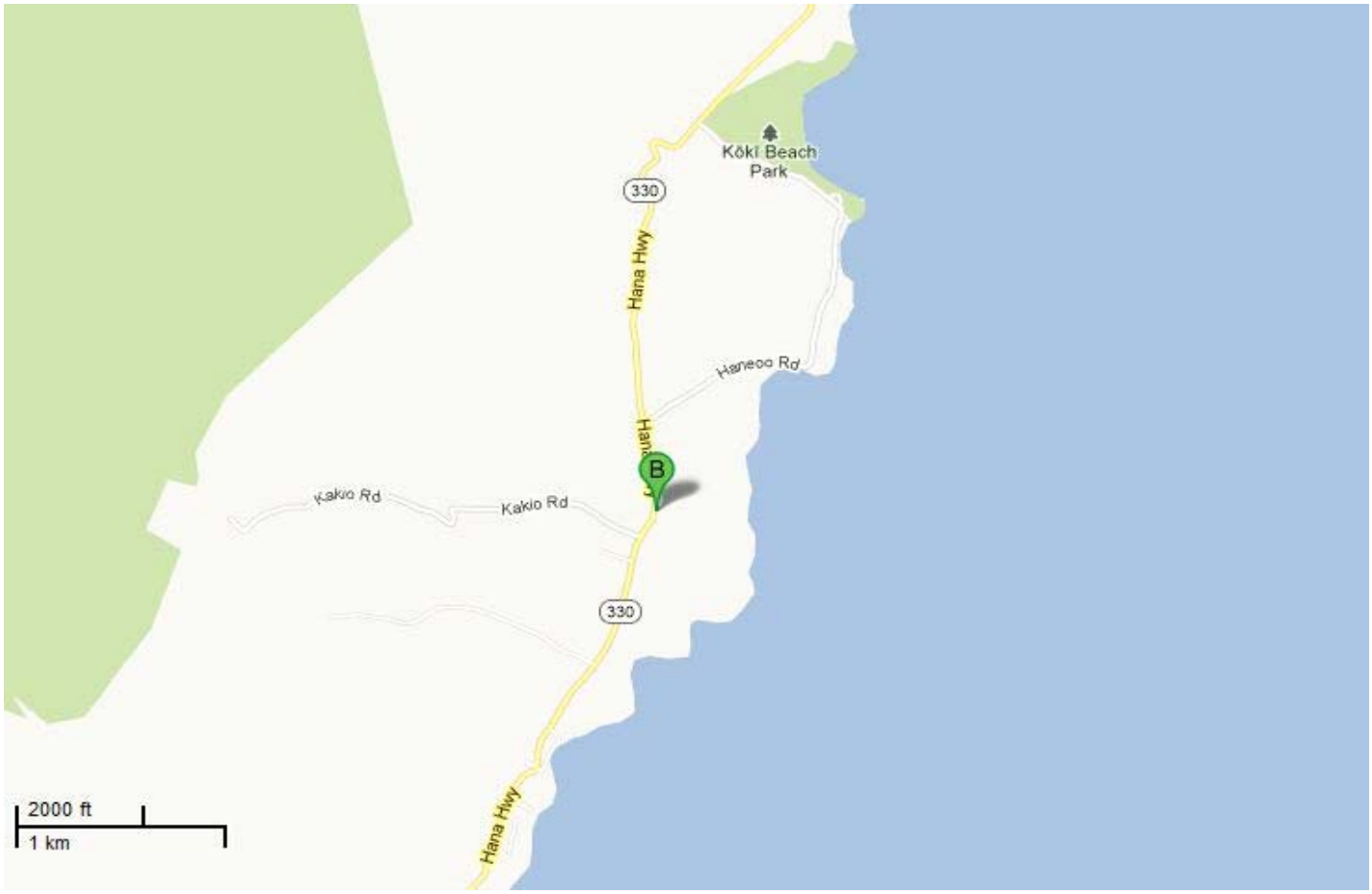
Location: 0.29 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Kahawaiokapia No. 30

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1915	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 17.0 ft.	**Total Length:** 59.0 ft.	**Deck Width:** 15.8 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904984

Popular Name: Kaholopo No. 31

Feature Crossed: Haneoo Stream

Feature Carried: Hana Highway

Milepost: 49.84 mi. **County Private:** Maui

Longitude: 155d-59m-34.44s **Latitude:** 20d-43m-48.42s

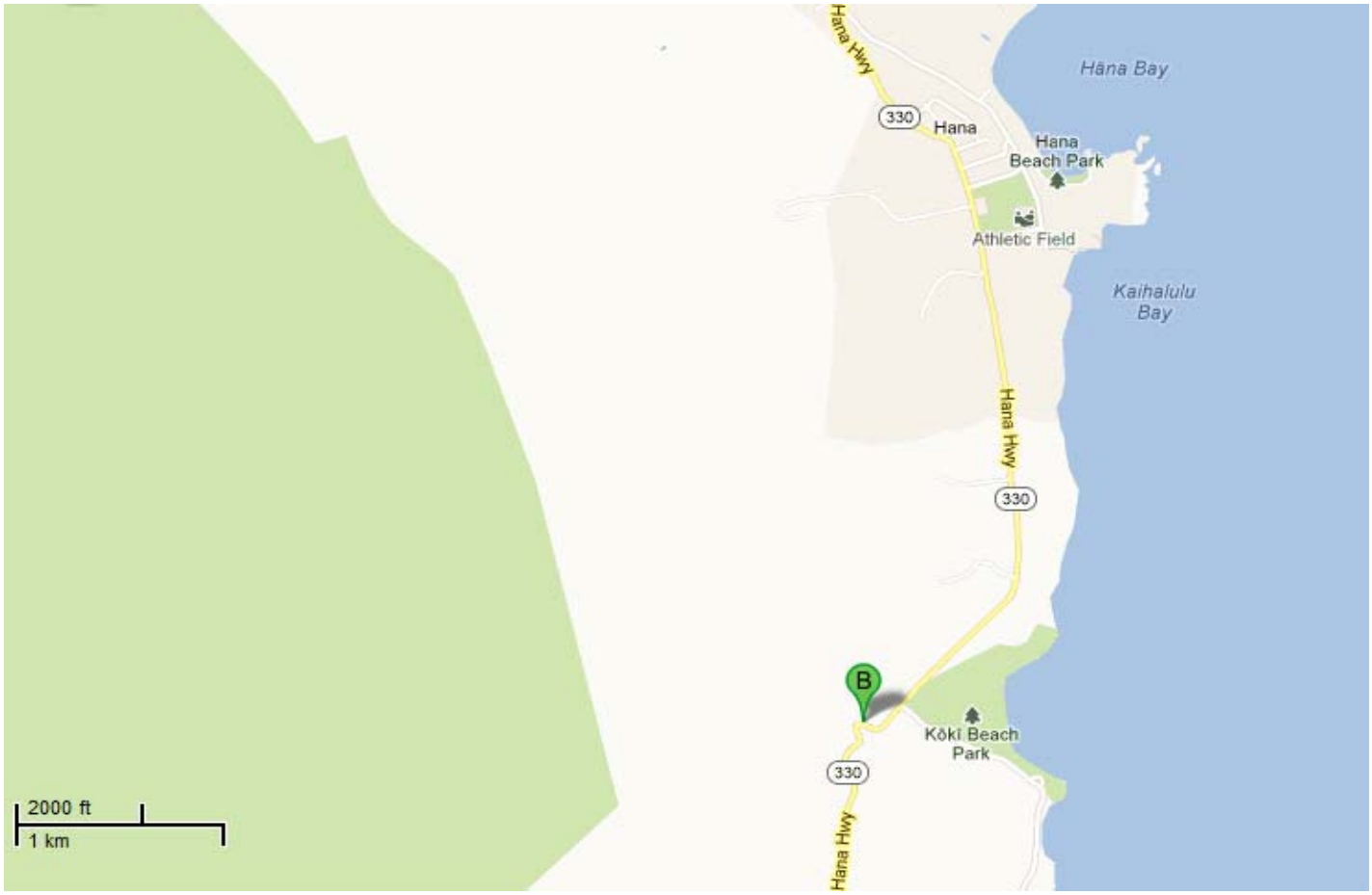
Location: 0.91 Miles North of Haneoo Road (Road to Hamoa)

Historic Name: Kaholopo No. 31

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1917	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 10.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge is a non-contributing feature in the Hana Highway Historic Bridge. See National Register of Historic Places Nomination Form. This bridge is scheduled for replacement in 2013.

Inventory Form
(County/Private)

General Information

Bridge Number: 009332001100001

Popular Name: Kalialinui No. 2

Feature Crossed: Kalialinui Gulch

Feature Carried: Lower Kula Road

Milepost: **County Private:** Maui

Longitude: 156d-19m-23.43s **Latitude:** 20d-48m-15.32s

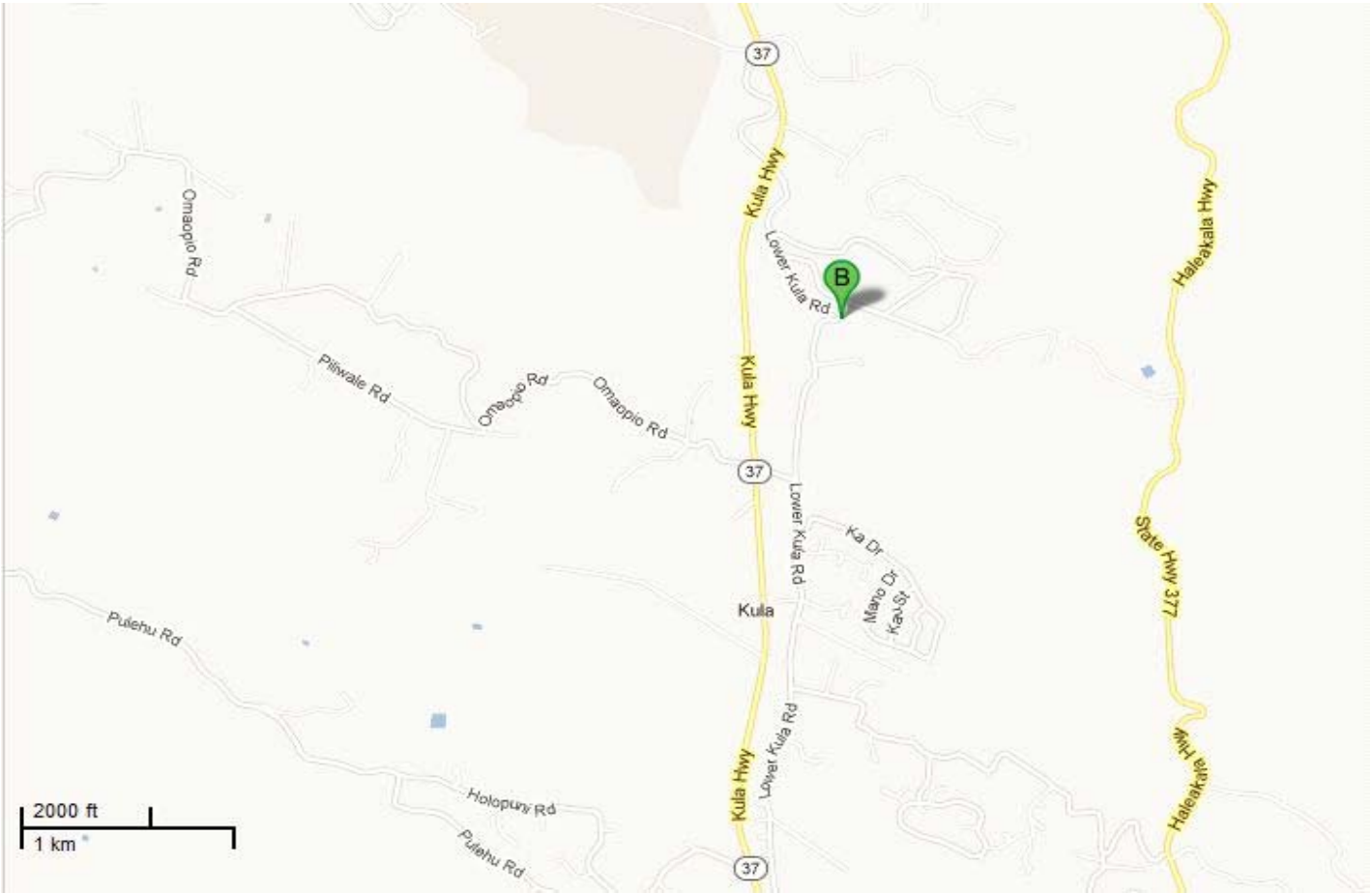
Location: 0.57 Miles North of Omaopio Road

Historic Name: Kalialinui No. 2

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 11.0 ft.	**Total Length:** 38.0 ft.	**Deck Width:** 21.0 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kalialinui #2 Bridge carries Lower Kula Road across Kalialinui Stream. This reinforced concrete bridge is in its original location, is in satisfactory condition, and its materials remain intact. The bridge has concrete open vertical parapets with flat caps and end posts. The concrete deck is supported by concrete rubble masonry piers and abutments. The concrete solid parapet was extended to the original parapets on the inner curve side and a thrie beam was added to the outer side of the curve.

Significance Statement:

This bridge is eligible under Criterion C for Engineering as a good example of a reinforced concrete bridge with lava rock abutments, piers and wing walls, built in the 1910s. It is an excellent example of its period in its use of materials, method of construction, craftsmanship, design and artistry.

Inventory Form
(County/Private)

General Information

Bridge Number: 009358001100001

Popular Name: Kaohu No. 58

Feature Crossed: Spreckelsville Ditch

Feature Carried: Kaohu Street

Milepost: **County Private:** Maui

Longitude: 156d-30m-01.12s **Latitude:** 20d-53m-02.23s

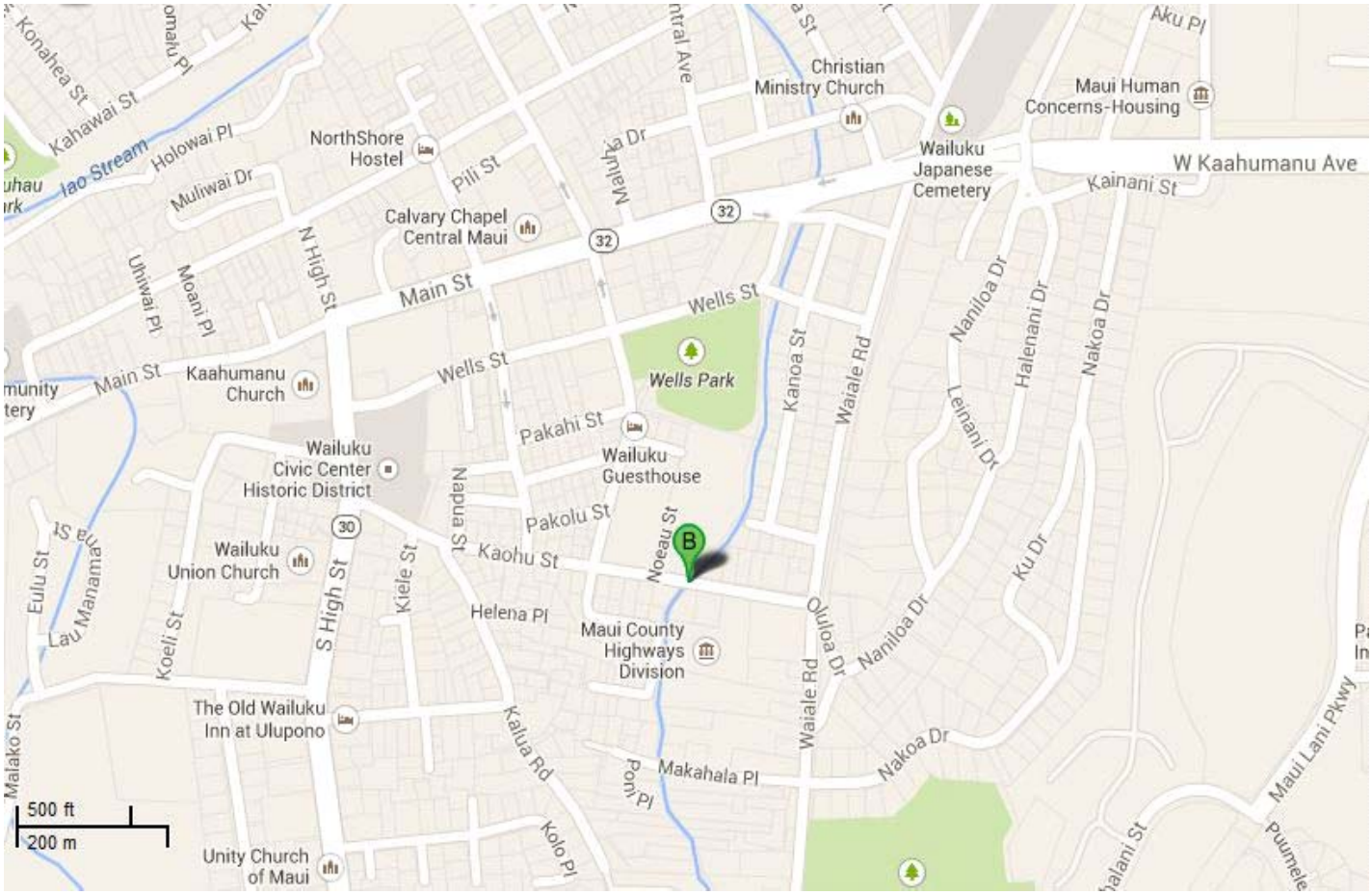
Location: 0.10 Miles West of Waiale Road

Historic Name: Kaohu No. 58

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 34.0 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaohu #58 bridge carries Kaohu Street across the Spreckelsville ditch. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open vertical parapets with flat caps and end posts. The concrete deck is supported by concrete rubble masonry abutments. The concrete walkway was added to the upstream side and the bottom of the parapets were covered by the asphalt. However, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of the 1910's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

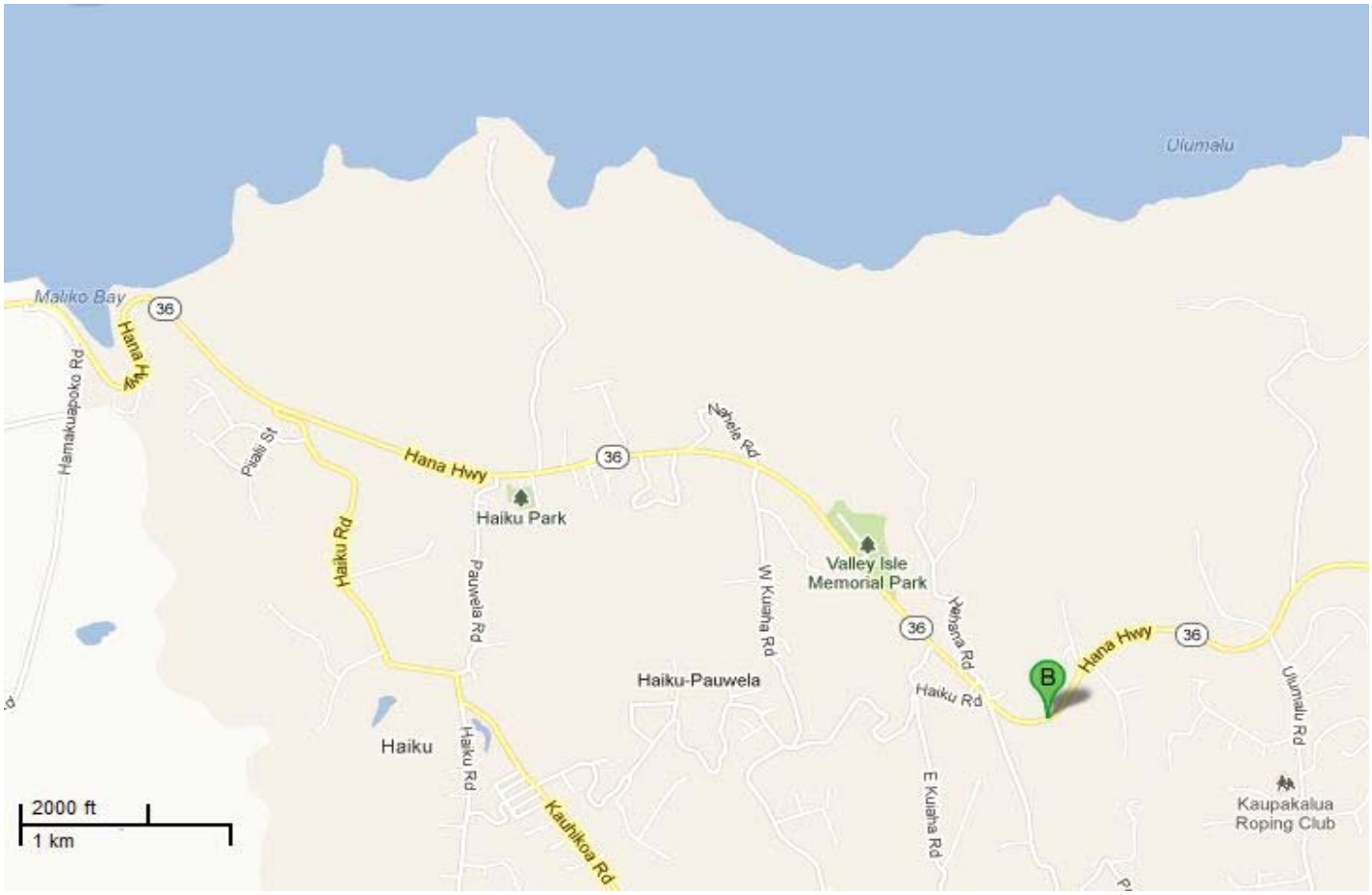
Inventory Form
(County/Private)

General Information

Bridge Number: 009335001100001	
Popular Name: Kaupakalua No. 35	
Feature Crossed: Kaupakalua Stream	
Feature Carried: Peahi Road	
Milepost:	**County Private:** Maui
Longitude: 156d-17m-45.35s	**Latitude:** 20d-54m-36.79s

Location: 0.70 Miles South of Haiku Road
Historic Name: Kaupakalua No. 35
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1911	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2004-2005	
Alteration Type(s):		
Alteration Description(s): The bridge was rehabilitated in 2004-2005.		

Bridge Information

Number of Spans: 2	**Max Span:** 16.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 19.5 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** n/a	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

The Kaupakalua Stream Bridge carries Peahi Road across Kaupakalua Stream. This timber stringer bridge is in its original location and is in satisfactory condition however, it is not fully intact. The original railings have been replaced with thrie beam railings. The timber deck is supported by concrete and timber piers and original rock wall abutments. From 2004 to 2005 the bridge was rehabilitated.

Significance Statement:

This bridge is eligible under Criterion C for Engineering as an example of a timber stringer bridge with rock abutments and concrete and timber piers built in the 1910s. It is an example of its period in its use of materials, method of construction, craftsmanship, design and artistry.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904058

Popular Name: Koukouai No. 16

Feature Crossed: Koukouai Stream

Feature Carried: Hana Highway

Milepost: 39.54 mi. **County Private:** Maui

Longitude: 156d-03m-37.08s **Latitude:** 20d-39m-03.78s

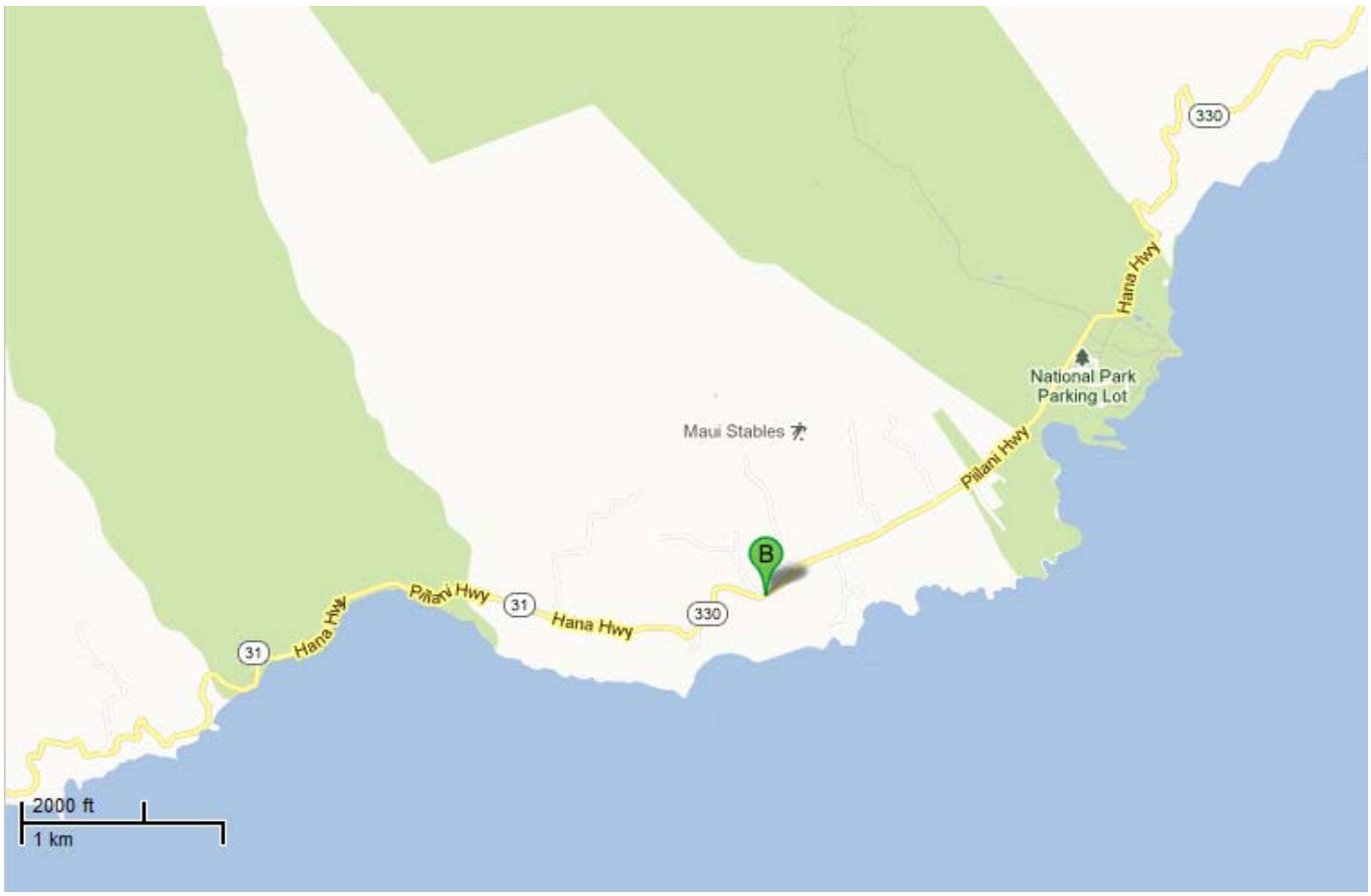
Location: 8.35 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Koukouai No. 16

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 32.0 ft.	**Total Length:** 58.0 ft.	**Deck Width:** 16.6 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

The Koukouai Gulch and Waikani Stream Bridges are open-spandrel arch deck bridges along Hana Highway. The Koukouai Gulch Bridge, a single semi-circular open-spandrel arch spanning thirty-two feet with a shallow rise, is located in the Kipahulu district. The spandrel wall utilizes arched spandrel columns of varying heights. Concrete arch bridges, with filled spandrels up to thirty-five or fifty feet, have been built in Hawaii since 1904. The Koukouai Bridge was constructed in 1911, the same year as the Mamalahoa-Honolii Bridge, an open spandrel bridge located north of Hilo on the island of Hawaii. These bridges are technologically sophisticated for their time and mark the evolution of concrete technology toward lighter, yet larger structures.

The Koukouai Gulch Bridge was the first open-spandrel arch bridge on the island. It is an excellent example of bridge construction in the early twentieth-century period in Hawaii. The design was technically innovative and the construction of the bridge was considered to be a major engineering feat. The road bridge played a major role in the development of the county's belt road plan which connected Hana with the rest of Maui by a paved highway and a series of bridges. The bridge is one of five built in 1910-1911 along the Hana Highway.

This open-spandrel arch bridge remains in its original location and retain its rural settings. The bridge's original design and materials remain intact, with the exception of minor concrete repairs to the parapets. Progressive repaving has obstructed from view the lower portion of the railing from the roadway. The bridge is obviously the work of skilled builders, such as Moses Akiona. Akiona was a prominent native Hawaiian contractor who was born in the Keanae district of Maui and later established the Moses Akiona Contracting Company in Honolulu. The bridge's historic associations with the rapid advances in engineering technology in the early decades of the twentieth century and as a representative example of public works efforts by the County of Maui, is readily apparent to travelers on the Hana Highway. The bridge retains its historic feeling due to its location, sharp approach, and narrow width.

This bridge contributes to the Hana Highway Historic Bridge District. This bridge contributes to the Hana Highway Historic Bridge District. Arch bridges are also an uncommon bridge type. See National Register of Historic Places Nomination Form. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600903922

Popular Name: Lelekea No. 81

Feature Crossed: Lelekea Stream

Feature Carried: Hana Highway

Milepost: 39.22 mi. **County Private:** Maui

Longitude: 156d-04m-51.24s **Latitude:** 20d-39m-02.67s

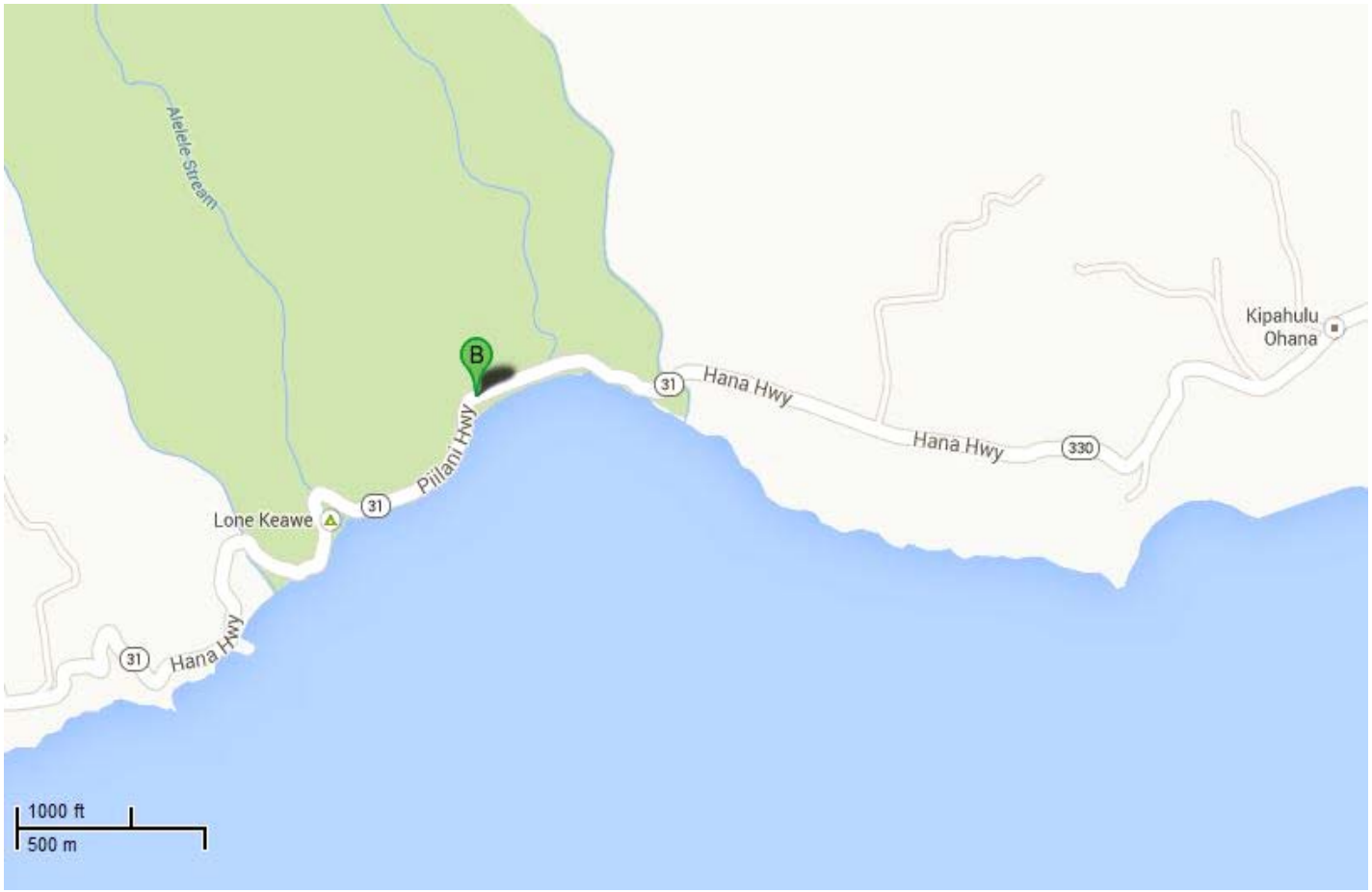
Location: 9.92 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Lelekea No. 81

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1947	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1968	
Alteration Type(s):		
Alteration Description(s): The bridge was rehabilitated in 1968.		

Bridge Information

Number of Spans: 3	**Max Span:** 12.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 19.0 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Lelekea Stream Structure #81 Bridge carries Hana Highway across the Lelekea Stream. This arched corrugated metal pipe design structure with reinforced concrete and concrete rubble masonry footings was reclassified from a culvert to a bridge. It is in its original location but in poor condition. The bridge has thrie beam railings, three round arched corrugated metal pipe cells, and concrete rubble masonry piers and dividing walls. The concrete deck is supported by concrete rubble masonry abutments. The structure was rehabilitated in 1968 from the rust and scaling due to the close proximity (100 feet) to the ocean.

Significance Statement:

This bridge is eligible under Criterion C for its unique structure. The super structure has an arched corrugated metal pipe for main support with partial reinforced concrete and concrete rubble masonry footings. It is a unique example of a culvert that has been reclassified into a bridge.

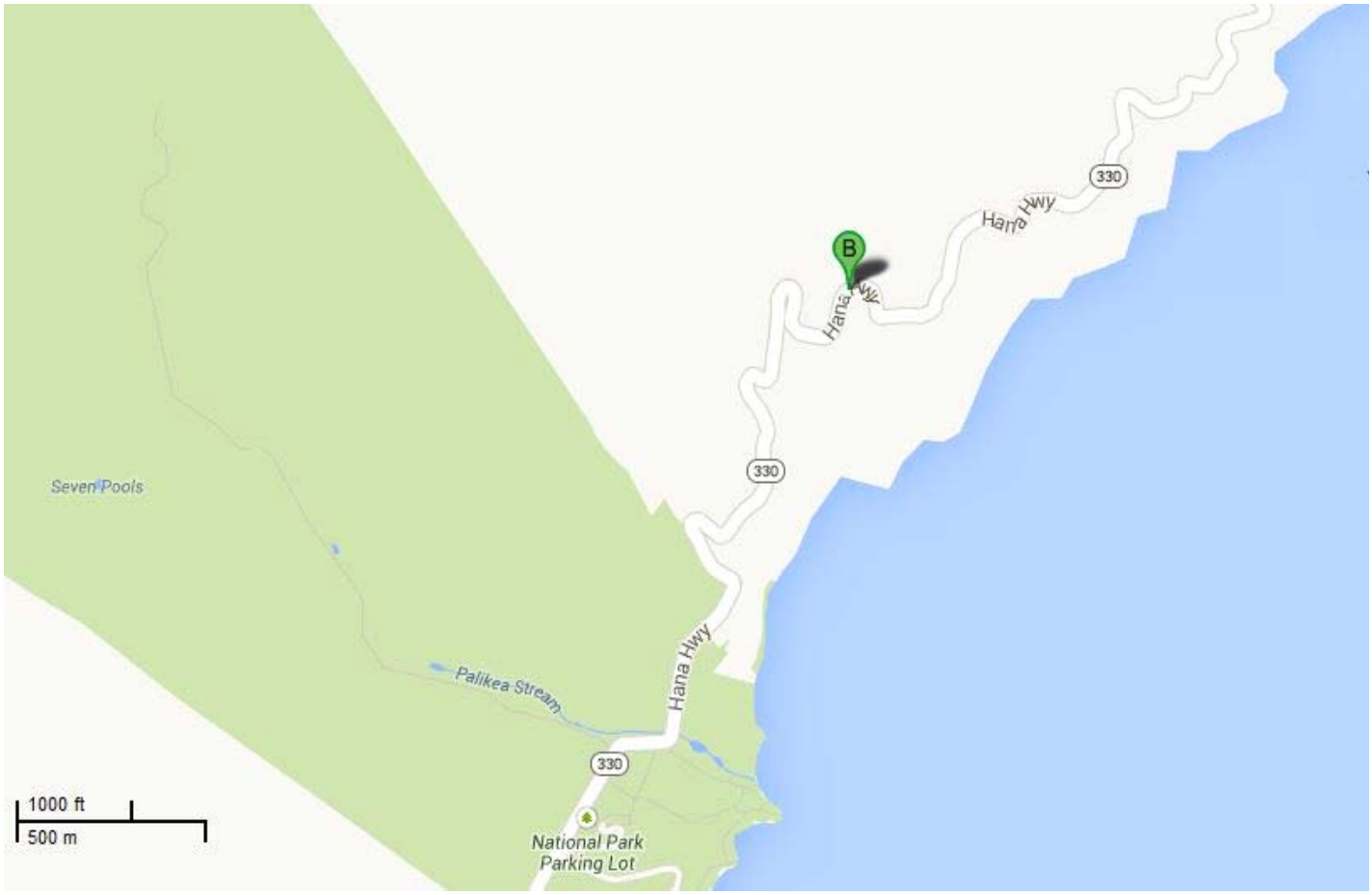
Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904329	
Popular Name: Mahalawa No. 20	
Feature Crossed: Kakiweka Stream	
Feature Carried: Hana Highway	
Milepost: 43.29 mi.	**County Private:** Maui
Longitude: 156d-02m-20.04s	**Latitude:** 20d-40m-26.90s

Location: 5.64 Miles South of Haneoo Road (Road to Hamoa)
Historic Name: Mahalawa No. 20
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1910	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.0 ft.	**Total Length:** 31.0 ft.	**Deck Width:** 15.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003650700299

Popular Name: Maliko No. 48

Feature Crossed: Maliko Gulch

Feature Carried: Makawao Avenue

Milepost: 2.96 mi. **County Private:** Maui

Longitude: 156d-18m-22.09s **Latitude:** 20d-51m-49.65s

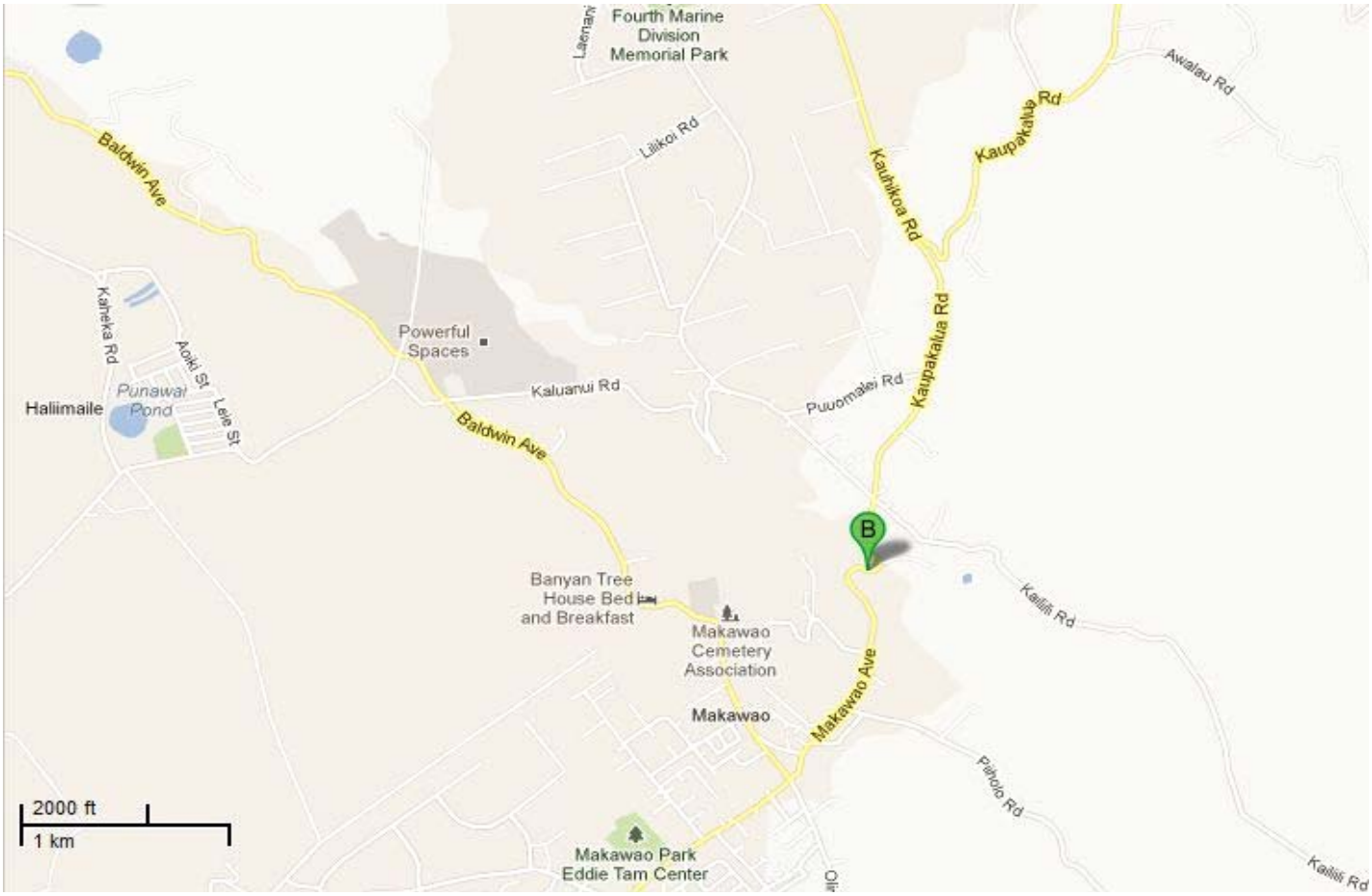
Location: 0.21 Miles South of Kokomo Road

Historic Name: Maliko No. 48

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1945	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 36.0 ft.	**Total Length:** 38.0 ft.	**Deck Width:** 32.2 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Maliko Gulch Bridge #48 carries Makawao Ave. across the Maliko Gulch. This reinforced concrete closed spandrel arch bridge is in its original location, is generally in fair condition, and its materials remain intact. The bridge has concrete open vertical parapets with flat caps and end posts. The concrete deck is supported by concrete abutments. The concrete solid parapets were extended to the end posts to bolt the thrie beams however, the workmanship of the bridge has not been obscured. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for Engineering as a good example of a reinforced concrete closed spandrel arch bridge. Arch bridges are also an uncommon bridge type. It was built during World War II and features a parapet with closely set rectangular balusters. It is the only county bridge which was built during this period; most bridges were built before or after the war. The bridges built around this time have a flat slab deck and do not have significant features so it is rare to find an arched bridge from this period, especially with features such as the railing with rectangular balusters.

Inventory Form
(County/Private)

General Information

Bridge Number: 009000310903514

Popular Name: Manawainui No. 80

Feature Crossed: Manawainui Stream

Feature Carried: Piilani Highway

Milepost: 35.14 mi. **County Private:** Maui

Longitude: 156d-07m-02.90s **Latitude:** 20d-38m-20.77s

Location: 13.79 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Manawainui No. 80

Designer/Engineer:

Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1947	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 40.0 ft.	**Total Length:** 111.0 ft.	**Deck Width:** 19.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Manawainui Bridge #80 carries Piilani Highway over Manawainui Stream. This three span concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. It has horizontal parapets with rectangular voids, intermittent posts, and end posts. The reinforced concrete deck is supported by reinforced concrete abutments and piers.

Significance Statement:

This bridge is eligible under Criterion C for its unique structure. The super structure has an arched corrugated metal pipe for main support with partial reinforced concrete and concrete rubble masonry footings. It is a unique example of a culvert that has been reclassified into a bridge.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904358

Popular Name: Paehala No. 21

Feature Crossed: Waiele Stream

Feature Carried: Hana Highway

Milepost: 43.58 mi. **County Private:** Maui

Longitude: 156d-02m-09.85s **Latitude:** 20d-40m-31.08s

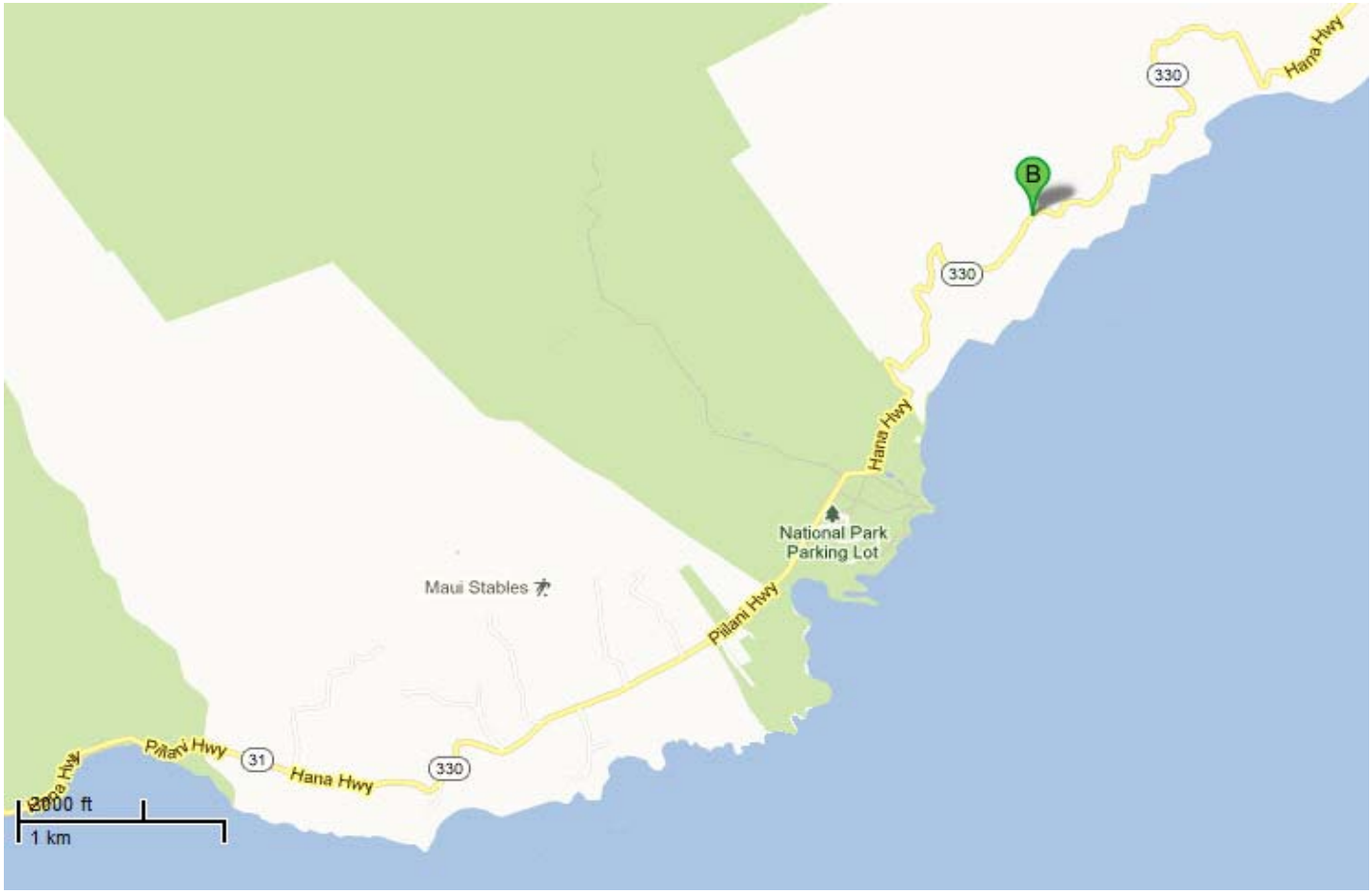
Location: 5.35 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Paehala No. 21

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1910	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 13.7 ft.
Superstructure:			
Substructure: Masonry Arch Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

Hahalawe Stream Bridge and Waiele (Paehala Stream Bridge) are two of the nine remaining masonry arch bridges in the state and are located along the Hana ighway north of Haleakala National Park. These bridges, constructed by the county in 1910, are small, single-span circular masonry arch deck bridges with solid spandrels. Both bridges utilize cut basalt blocks for the abutments and arch ring; solid reinforced concrete was utilized for the parapets and rail caps. The dates “A.D. 1910” are inscribed on the outer parapet of each bridge. The masonry arches are typical of earlier structures constructed by the Kingdom or Republic of Hawaii (prior to 1898) and appear to date from an earlier period than the parapets. Arch bridges are also an uncommon bridge type.

The masonry arch bridges on the Hana Highway remain in their original locations and have retained their rural settings. The bridges retain their original design features and materials, although the concrete parapets appear to date from later period than the masonry arch. Generally, early masonry arch bridges were constructed by prisoners or day labor. Later masonry arch bridges were constructed by skilled masons. It is unknown who constructed Hana’s masonry arch bridges. The bridges’ historic associations with public works improvements of the early Territorial period and as rare survivors of this once common bridge type are apparent to the informed observer. The bridges retain their historic feeling due to their finely-detailed, and now uncommon materials.

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

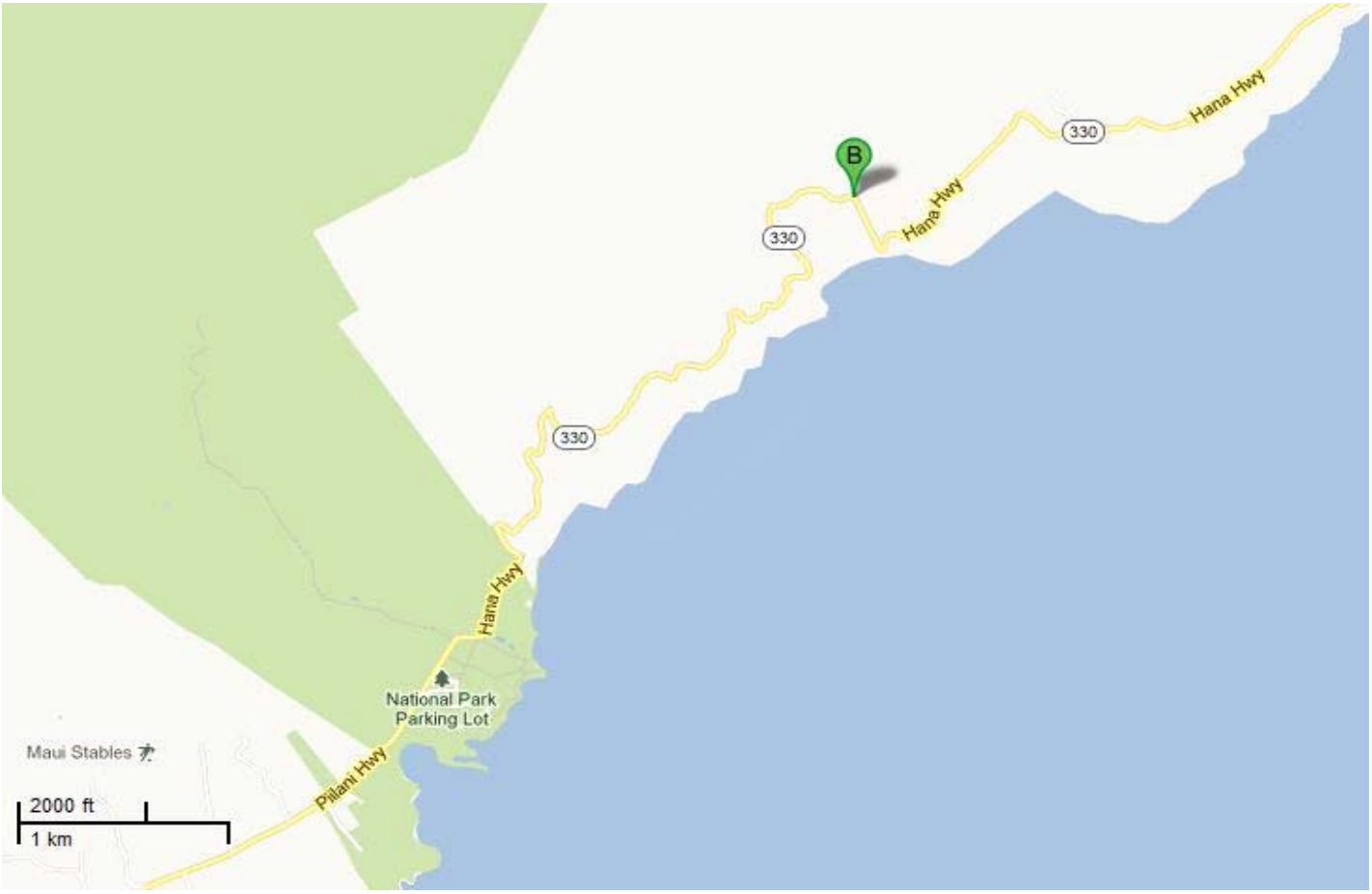
Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904494	
Popular Name: Paihi No. 25	
Feature Crossed: Paihi Stream	
Feature Carried: Hana Highway	
Milepost: 44.95 mi.	**County Private:** Maui
Longitude: 156d-01m-34.84s	**Latitude:** 20d-41m-00.86s

Location: 3.99 Miles South of Haneoo Road (Road to Hamoa)
Historic Name: Paihi No. 25
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 2005	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 36.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 17.8 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See National Register of Historic Places Nomination Form. This bridge has been completely replaced in 2005.

Significance Statement:

This bridge is a non-contributing feature in the Hana Highway Historic Bridge District due to the complete replacement of the original 1911 bridge in 2005. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904636	
Popular Name: Papahawahawa No. 28	
Feature Crossed: Papahawahawa Stream	
Feature Carried: Hana Highway	
Milepost: 46.36 mi.	**County Private:** Maui
Longitude: 156d-00m-39.73s	**Latitude:** 20d-41m-13.50s

Location: 2.57 Miles South of Haneoo Road (Road to Hamoa)
Historic Name: Papahawahawa No. 28
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 2011	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 22.0 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See National Register of Historic Places Nomination Form. This bridge has been completely replaced in 2011.

Significance Statement:

This bridge is a non-contributing feature in the Hana Highway Historic Bridge District due to the complete replacement of the original 1915 bridge in 2011. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009339001100001

Popular Name: Pauwela No. 39

Feature Crossed: Pauwela Gulch

Feature Carried: Haiku Road

Milepost: **County Private:** Maui

Longitude: 156d-18m-42.75s **Latitude:** 20d-54m-58.73s

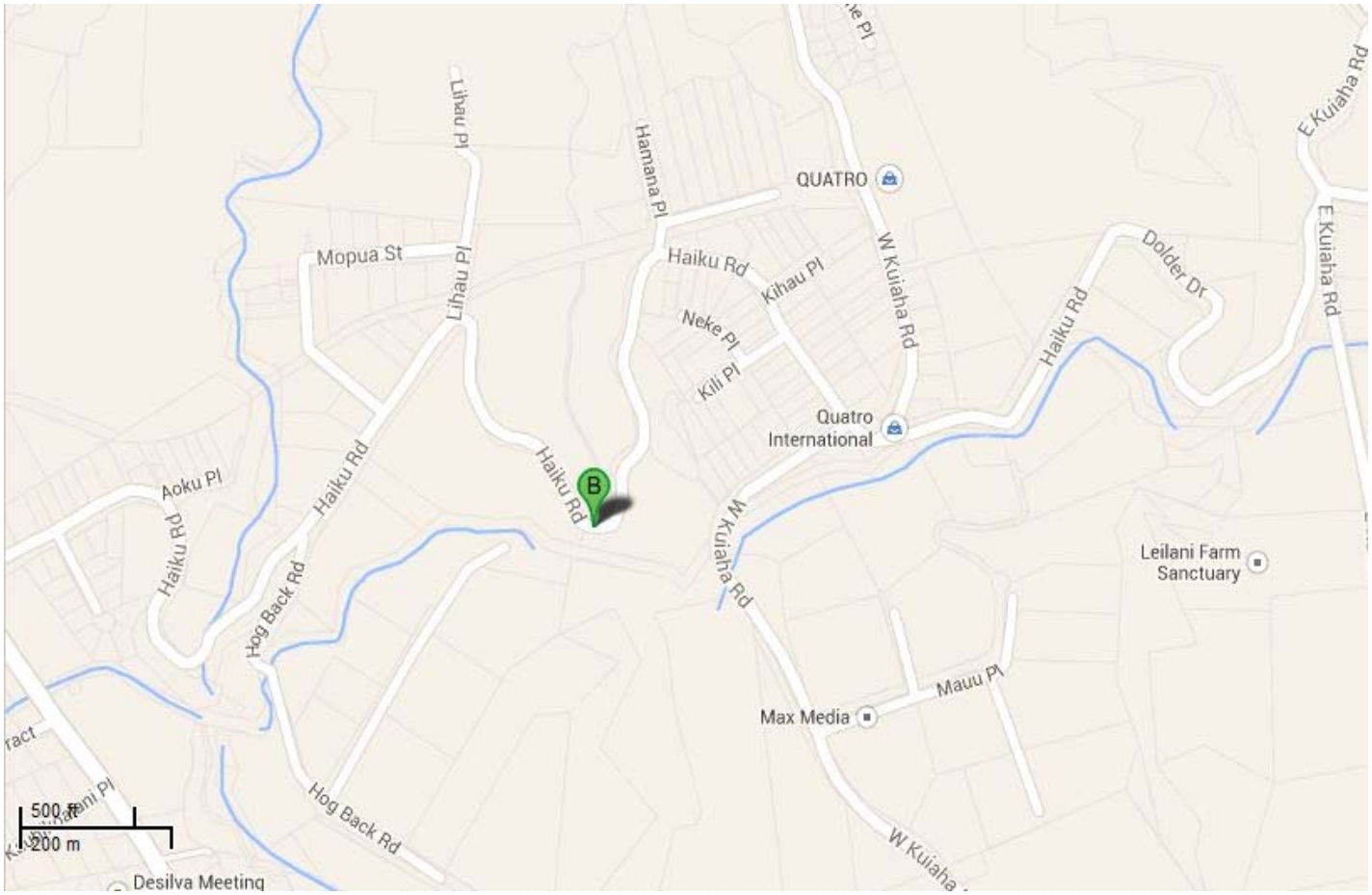
Location: 0.80 Miles East of Kauhikoa Road

Historic Name: Pauwela No. 39

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 26.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Pauwela Stream Bridge carries Haiku Road across Pauwela Stream. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open vertical parapets with flat caps. The concrete deck is supported by concrete rubble masonry abutments. The bottom of the parapets were covered by a heavy layer of asphalt and a thrie beam covers one side of the parapet. The other side of the parapet is visible and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of an early 1900's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904386

Popular Name: Puuhaoa No. 22

Feature Crossed: Unnamed Stream

Feature Carried: Hana Highway

Milepost: 43.86 mi. **County Private:** Maui

Longitude: 156d-01m-57.96s **Latitude:** 20d-40m-34.75s

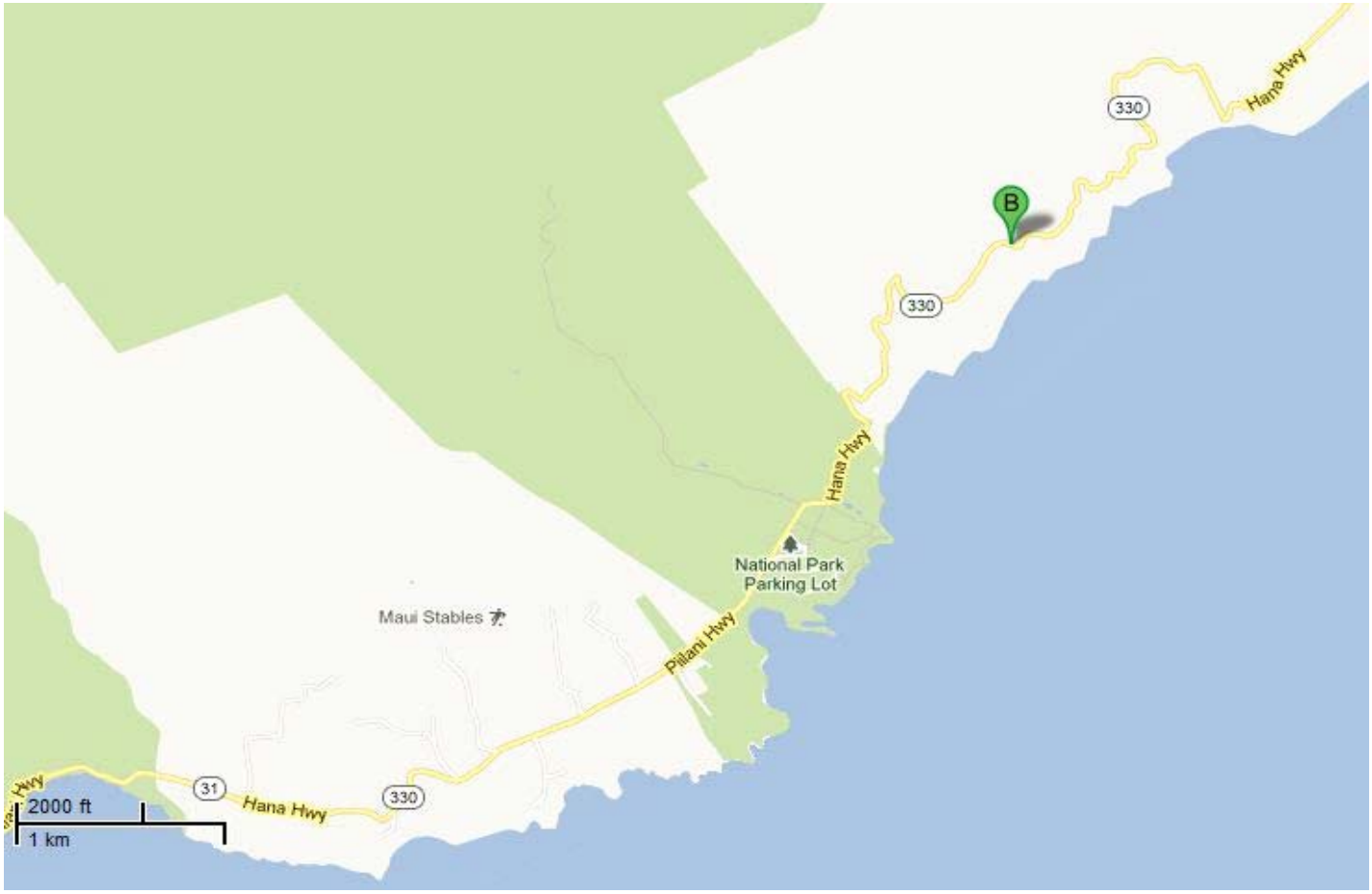
Location: 5.07 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Puuhaoa No. 22

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1910	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 16.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904464

Popular Name: South Wailua No. 23

Feature Crossed: Honolewa Stream

Feature Carried: Hana Highway

Milepost: 44.63 mi. **County Private:** Maui

Longitude: 156d-01m-48.94s **Latitude:** 20d-40m-59.31s

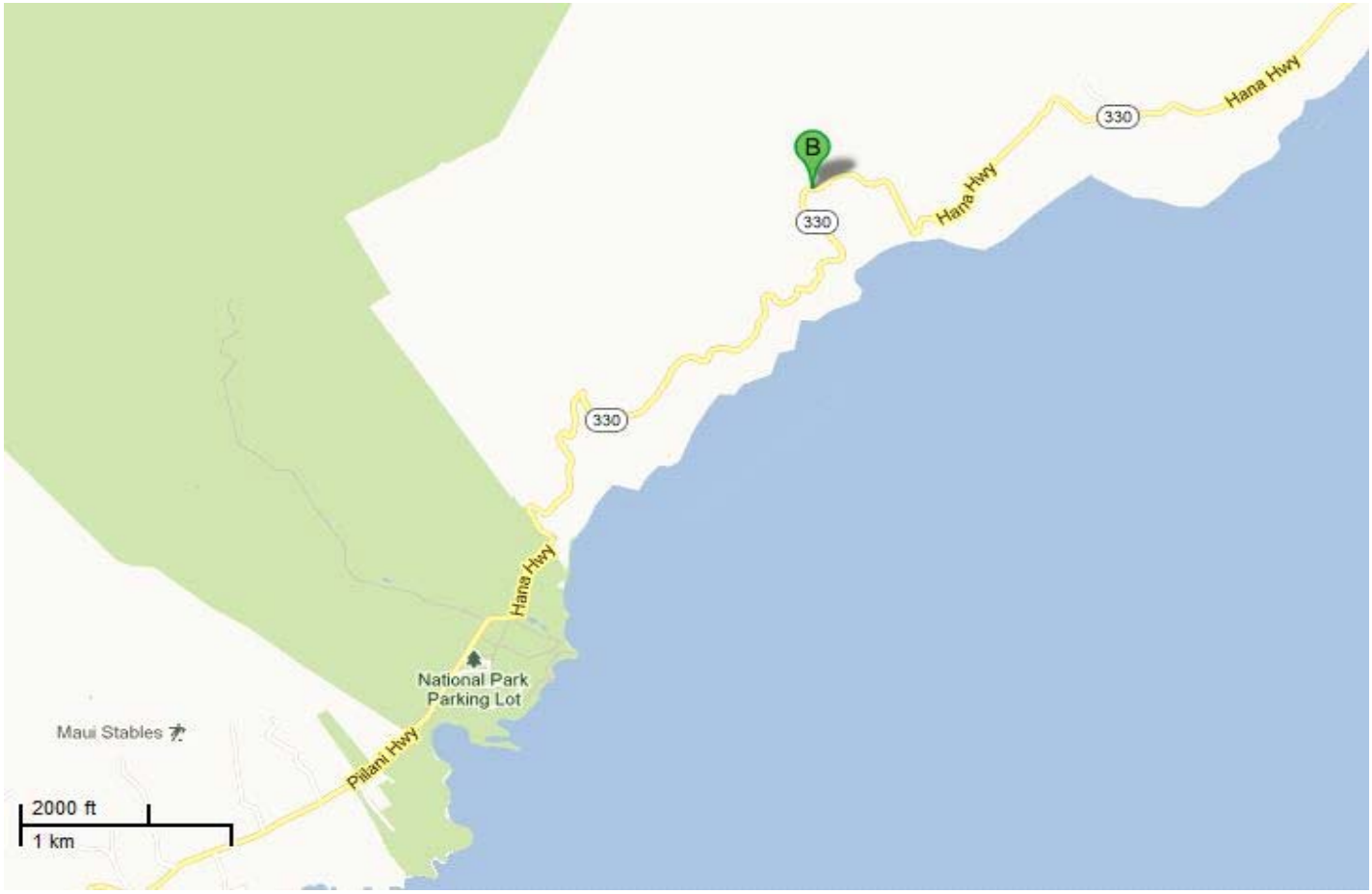
Location: 4.29 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: South Wailua No. 23

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 26.0 ft.	**Total Length:** 57.0 ft.	**Deck Width:** 16.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904542

Popular Name: Waikakoi No. 26

Feature Crossed: Waikakoi Stream

Feature Carried: Hana Highway

Milepost: 45.45 mi. **County Private:** Maui

Longitude: 156d-01m-20.97s **Latitude:** 20d-41m-00.97s

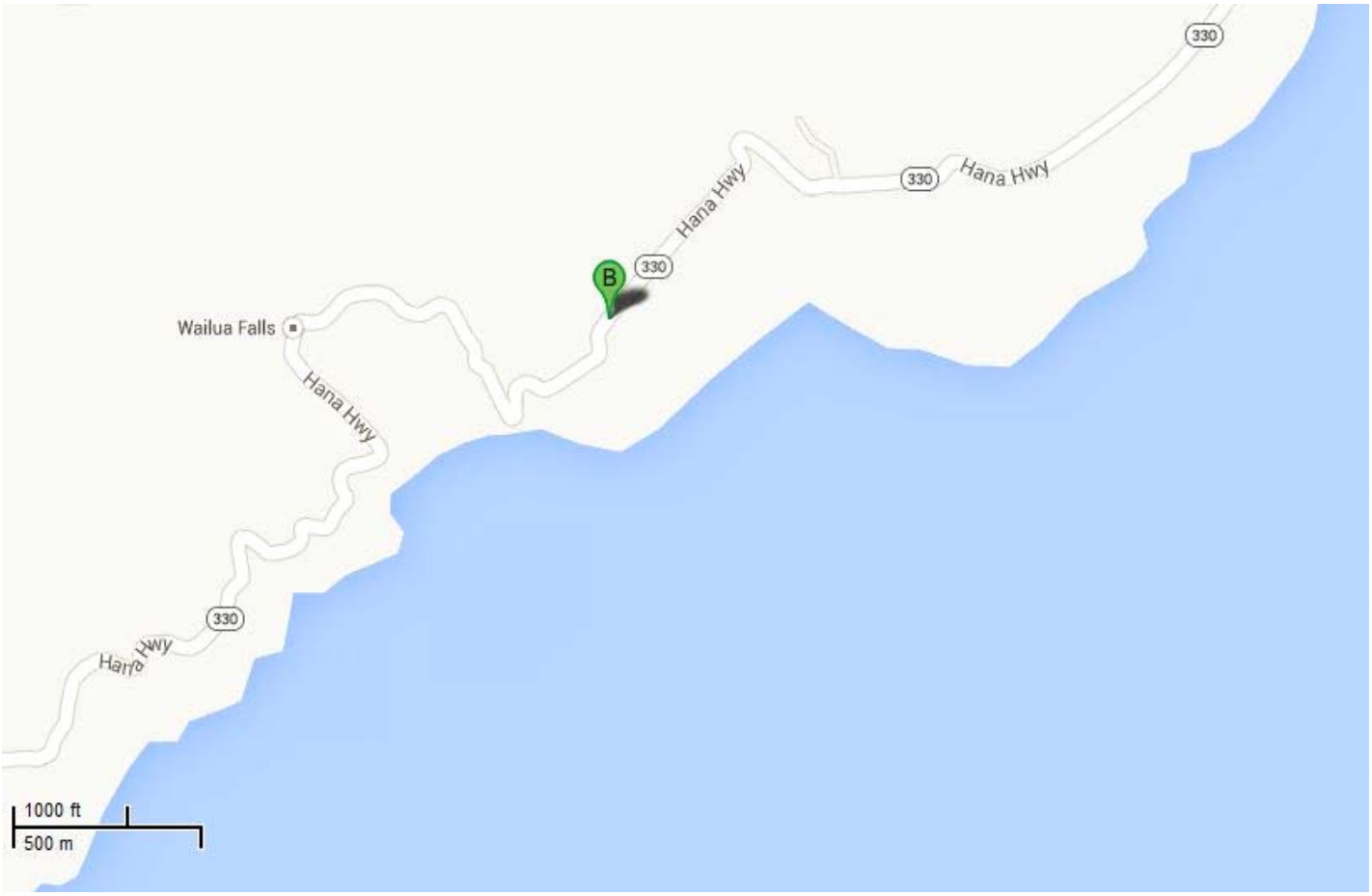
Location: 3.51 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Waikakoi No. 26

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 14.0 ft.	**Total Length:** 33.0 ft.	**Deck Width:** 16.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904475

Popular Name: Wailua No. 24

Feature Crossed: Wailua Stream

Feature Carried: Hana Highway

Milepost: 44.74 mi. **County Private:** Maui

Longitude: 156d-01m-44.69s **Latitude:** 20d-41m-02.38s

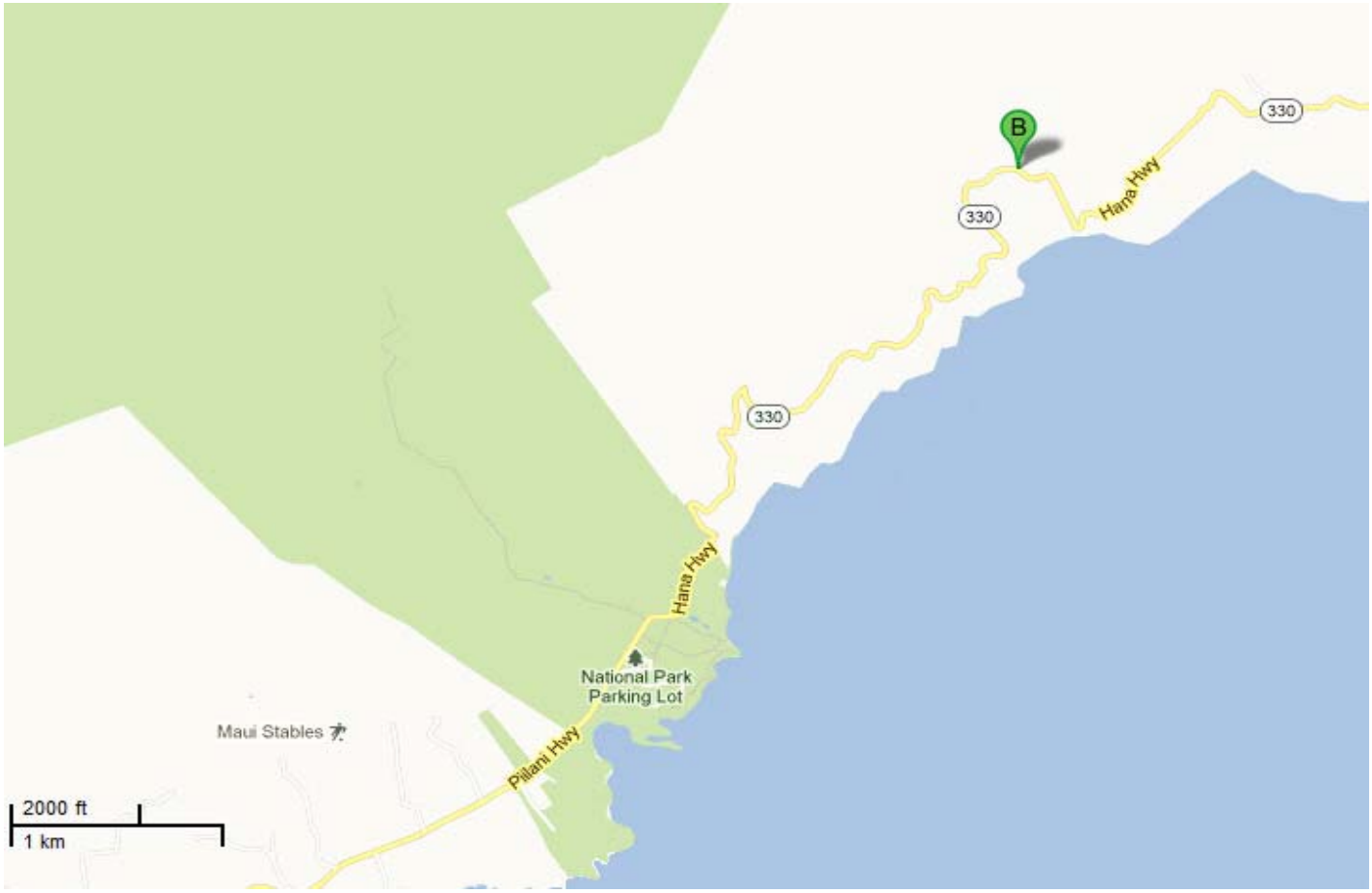
Location: 4.18 Miles South of Haneoo Road (Road to Hamoa)

Historic Name: Wailua No. 24

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1947	**Replaced?** No
Altered? Yes **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s): Metal guardrails		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 66.0 ft.	**Deck Width:** 19.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Name and date incised			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Social History, Transportation, Commerce		

Narrative Description:

The Wailua Stream Bridge #24 was built in 1947 to replace a temporary wooden structure which carried the Hana Highway over the Wailua stream near Hana on Maui. The bridge remains in its original location and the setting is unchanged and extremely rural. The workmanship of the bridge is good but is slightly obscured by repairs with the later of addition of metal guardrails and concrete posts. The original concrete tee beam design and material remain intact. The decking is asphalt over concrete. This bridge feels extremely historic due to its remote location, surrounding vegetation, scale and design of the bridge. This bridge can be interpreted by the name and construction date incised on the end cap.

See National Register of Historic Places Nomination Form.

Significance Statement:

This bridge was a Post-War Public Works Project undertaken by the Postwar Planning Division of the Department of Public Works. Because ample materials and equipment, held by the Army and navy were available in the Territory of Hawaii for several years, every effort was made to obtain the required materials and equipment for local public works projects. The public works projects were carefully planned not only to tie in with private employment but to provide employment when necessary.(1)

Each county was tasked with proposing public works projects including reasons for project, sketches, estimated cost and estimated man hours required. These were submitted to the Department of Postwar Planning to be compiled into a statewide report and priority list.(2)

The 1947 Wailua Bridge was proposed as an important project during the Postwar Planning era in order to replace the temporary wooden structure which was erected after the initial concrete bridge was washed away.

This bridge contributes to the Hana Highway Historic Bridge District. See National Register of Historic Places Nomination Form.

(1) Postwar Planning Construction Projects, 1944.

(2) Postwar Planning Construction Projects, 1944.

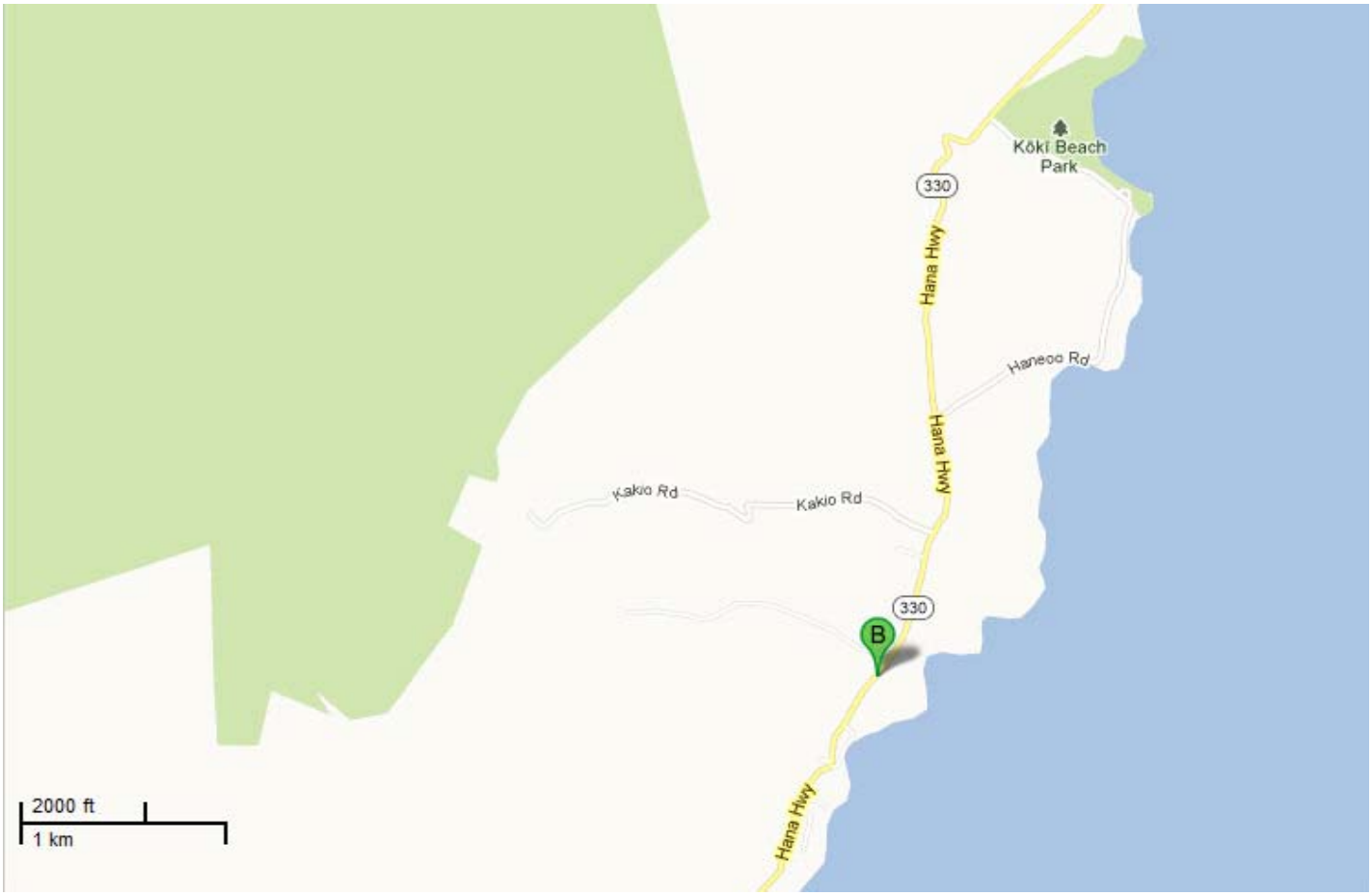
Inventory Form
(County/Private)

General Information

Bridge Number: 009003600904803	
Popular Name: Waiohonu No. 29	
Feature Crossed: Waiohonu Stream	
Feature Carried: Hana Highway	
Milepost: 48.03 mi.	**County Private:** Maui
Longitude: 155d-59m-47.01s	**Latitude:** 20d-42m-19.20s

Location: 0.90 Miles South of Haneoo Road (Road to Hamoa)
Historic Name: Waiohonu No. 29
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1915	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 20.0 ft.	**Total Length:** 97.0 ft.	**Deck Width:** 16.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See National Register of Historic Places Nomination Form. This bridge has been scheduled for replacement in 2013.

Significance Statement:

The bridge is a non-contributing feature in the Hana Highway Historic Bridge District due for replacement in 2013. See National Register of Historic Places Nomination Form.

chapter 6

h a w a i i

I. ISLAND OF HAWAII

Map of Hawaii

(Map taken from Google map)

Hawaii History

Hawaii Island: The biggest island, Hawaii (also called The Big Island), has a land area of 4,038 square miles and comprises two-thirds of the land area of the state. It is composed of five mountain masses; the highest peaks are Mauna Loa and Mauna Kea at 13,680 feet and 13,796 feet, respectively. Kilauea Crater on Mauna Loa is the world's most active volcano. Sheer sea-cliffs, as well as deep valleys and gulches, grace the rugged, meandering coastline of the island.

Hawaii Island contains by far the greatest concentration of historic bridges, perhaps due to its rural nature and consequent lack of development, and an abundance of land for alternate transportation routes without the destruction of older bridges and roads. Most of the Big Island's bridges are located along the Hamakua Coast, north of Hilo, due to its abundant rainfall and innumerable streams and gulches. In the 42.5 mile stretch from Hilo to Honokaa on FAP (Federal Aid Primary Route) 19, there are fifty-one bridges, more than one bridge per mile. Remnants of the Mamalahoa Highway, the former belt road which runs parallel to the new highway, serve as a sort of "bridge museum" with examples of almost every remaining bridge type in the islands, including some of the oldest and rarest bridges found in the islands. A number of early masonry (lava-rock) arch bridges dating from 1894-1903 are located along the Mamalahoa Highway and are the oldest remaining bridges in the state. A second major area of bridges is in the Kau District, south of the Volcano National Park, albeit with considerably fewer than on the Hamakua Coast. In Kau, eleven bridges are lined up in a row along the FAP 11 within twelve miles of each other. In addition, numerous small county bridges were constructed over streams along the early twentieth-century homestead roads.

II. BRIDGE MATRIX: HAWAII

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
001002700500304	2-Cell Metal Pipe Culvert	Unnamed Stream (Twin Metal Culvert)	Akoni Pule Highway	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Unique masonry culvert in Hawaii • Good example of a masonry culvert, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 32
001002700500915	2-Cell Metal Pipe Culvert	Unnamed Stream (Double Metal Culvert)	Akoni Pule Highway	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Unique lava rock culvert • Good example of a lava rock culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 35
001002400500733	2-Cell Pipe Culvert-Ahualoa Stream	Ahualoa Stream	Honokaa-Waipio Road	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001000110310346	2-Metal Pipe Culvert	Double Pipe Culvert (Volcano)	Hawaii Belt Road (Volcano Road)	1966	Metal Corrugated Culvert	No Parapet/Railing	No	Eligible	• Unique lava rock culvert • Good example of a culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 38
001000110310424	2-Metal Pipe Culvert	Double Pipe Culvert (Volcano)	Hawaii Belt Road (Volcano Road)	1966	Metal Corrugated Culvert	No Parapet/Railing	No	Eligible	• Unique lava rock culvert • Good example of a culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 41
001002500500937	3-Cell Concrete Box Culvert-Kawaihae Uka	Kawaihae Stream (Triple Box)	Kohala Mountain Road	1953	Concrete Box Culvert	Concrete Solid	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001002700500655	3-Cell Metal Pipe Culvert	Unnamed Stream (Triple Metal Culvert)	Akoni Pule Highway	1966	Metal Corrugated Culvert	No Parapet/Railing	No	Eligible	• Unique lava rock culvert • Good example of a lava rock culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 44
001002400500487	3-Cell Pipe Culvert-Honokaia Stream	Honokaia Stream	Honokaa-Waipio Road	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Unique lava rock culvert • Good example of a culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 47
001002400500691	3-Cell Pipe Culvert-Kainapahoa Stream	Kainapahoa Stream	Honokaa-Waipio Road	1966	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Unique lava rock culvert • Good example of a culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 50
001001900503111	3-Cell Pipe Culvert-Kamakoa Bridge No. 2	Kamakoa Stream No. 2	Mamalahoa Highway	1930	Metal Corrugated Culvert	Metal Thrie Beam	No	Eligible	• Distinctive lava rock head walls and wing walls • Good example of a culvert that uses vernacular material	6 - 53
001000110307485	3-Concrete Box Culvert	Panaewa Stream	Hawaii Belt Road (Mamalahoa Highway)	1945	Concrete Box Culvert	Concrete Solid	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
001000110307506	3-Concrete Box Culvert	Panaewa Stream	Hawaii Belt Road (Mamalahoa Highway)	1945	Concrete Box Culvert	Concrete Solid	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
001000110310410	3-Metal Pipe Culvert	Triple Pipe Culvert (Volcano)	Hawaii Belt Road (Volcano Road)	1966	Metal Corrugated Culvert	No Parapet/Railing	No	Eligible	• Unique lava rock culvert • Good example of a culvert that uses local material, and is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 56
001000110307307	4-Concrete Box Culvert (Piikea)	Piikea Stream	Hawaii Belt Road (Mamalahoa Highway)	1938	Concrete Box Culvert	Concrete Open Horizontal	No	Not Eligible	This culvert does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under “Not Eligible” or “Program Comments” and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
001002700502318	Aamakoa Stream Bridge	Aamakoa Gulch	Akoni Pule Highway	1918	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Although the structure was seismically retrofitted in 2009, original parapets remain intact	6 - 59
001000190307917	Ahole Stream Bridge	Ahole Stream	Hawaii Belt Road	1934	Concrete Rigid Frame	Concrete Open Greek Cross	No	Eligible	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant element of the Territorial Belt Road Plan and contributed to the economic development of the region • Good example of federally-funded tee-beam bridge constructed in the 1930s • 20th century example of advanced bridge engineering and construction • Representative of the work of a master: William R. Bartels • One of the first major concrete tee-beam highway bridges constructed during the upgrading of the Hawaii Belt Road in the 1930s, with an emphasis on aesthetics	6 - 62
001000110311539	Cane Haul Road Underpass	Canehaul Road Underpass	Hawaii Belt Road (Volcano Road)	1956	Concrete Slab	Concrete Solid	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190008461	Chin Chuck Pedestrian Overpass	Hawaii Belt Road (Chin Chuck Pedestrian Overpass)	Pedestrian	1961	Concrete Tee Beam	Metal Chain Link	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000191108426	Hakalau Plantation Road Overpass	Hawaii Belt Road (Hakalau Plantation Road Overpass)	Plantation Road	1953	Steel Stringer	Concrete Open Horizontal	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Associated with the railroad and Hilo-Hamakua Heritate Coastline • Associated with development of the Hawaii Belt Road, particularly as part of the mid-century "Seismic Wave Damage Rehabilitation Project" • Representative of the work of a master: William R. Bartels • See Hawaii Belt Road historic context Chapter 2.5	6- 65
001000190308410	Hakalau Stream Bridge	Hakalau Stream	Hawaii Belt Road	1953	Steel Trestle	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • Longest steel bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969 • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5 • See National Register of Historic Places Nomination Form in appendices	6 - 68
001000190309124	Hanawi Stream Bridge	Hanawi Stream	Hawaii Belt Road	1968	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • See Hawaii Belt Road historic context Chapter 2.5 • Longest concrete bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969	6 - 71
001000110306489	Hilea Stream Bridge	Hilea Stream	Hawaii Belt Road (Mamalahoa Highway)	1940	Timber Stringer	Wood	No	Eligible	• Associated with developments in wood bridge construction in Hawaii • Good example of a 1940's wood bridge	6 - 74
001000190009643	Hilo Plantation Flume Overpass	Hilo Plantation Flume (Highway Underpass)	Waterway	1949	Concrete Girder	Concrete Solid	No	Eligible	• Associated with the sugar plantation industry • Earliest concrete flume bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969	6 - 77
001000191109626	Hilo Plantation Road Overpass	Hawaii Belt Road (Hilo Plantation Road Overpass)	Plantation Road	1949	Concrete Tee Beam	Concrete Open Horizontal	No	Eligible	• Associated with the sugar plantation industry • Bridge maintained by State although not in use and ownership is unknown	6 - 80

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
001000110306996	Hionomoa Stream Bridge	Hionomoa Stream	Hawaii Belt Road (Mamalahoa Highway)	1938	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant element of the Territorial Belt Road Plan • Associated with sugar plantation industry and economic development • Significant for innovative engineering developments and aesthetic merit • One of the first reinforced-concrete rigid-frame bridges constructed in the islands • One of only five of this type built prior to WW II • One of the most sophisticated of the pre-WWII bridges from an engineering perspective • Representative of the work of a master: William R. Bartels	6 - 83
001002700500114	Honokoa Stream Bridge	Honokoa Stream	Akoni Pule Highway	1965	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190309493	Honolii Stream Bridge	Honolii Stream	Hawaii Belt Road	1936	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant element of the Territorial Belt Road Plan and contributed to the economic development of the region • Excellent example of federally-funded tee-beam bridge construction in the 1930s • 20th century example of advanced bridge engineering and construction • Significant for complex technological engineering developments exhibited in its design • One of the last major concrete tee-beam highway bridges constructed along the Hawaii Belt Road prior to WWII • Representative of the work of a master: James O. Yapp	6 - 86
001000110306199	Honuapo Bridge	Railroad (Honuapo)	Hawaii Belt Road (Mamalahoa Highway)	1940	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Associated with developments in concrete bridge construction in Hawaii • Good example of a 1940's concrete bridge	6 - 89
001000190306695	Kaala Stream Bridge	Kaala Stream	Hawaii Belt Road	1935	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	6 - 92
001000190307644	Kaaluu Stream Bridge	Kaalau Stream	Hawaii Belt Road	1933	Concrete Tee Beam	Concrete Open Horizontal	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	6 - 95
001000190305755	Kahaupu Stream Culvert	Kahaupu Stream	Hawaii Belt Road	1953	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001002400500949	Kahaupu Stream Culvert	Kahaupu Stream	Honokaa-Waipio Road	1953	Concrete Box Culvert	Metal Thrie Beam	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001000190305863	Kahawailiilii Stream Bridge	Kahawailiilii Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete and Metal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 98
001000190306865	Kaholo Stream Bridge	Kaholo Stream	Hawaii Belt Road	1935	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	6 - 101
001000190309220	Kaieie Stream Bridge	Kaieie Stream	Hawaii Belt Road	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190307555	Kaiwilahilahi Stream Bridge	Kaiwilahilahi Stream	Hawaii Belt Road	1956	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190309172	Kalaoa Stream Bridge	Kalaoa Stream	Hawaii Belt Road	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

*High Preservation Value: Has unique or exemplary characteristics of a bridge type and exhibits high degrees of historic integrity.
Eligible: Not unique or the best example of a type, but may become a rare example of a bridge type in the future; reflects characteristics of its bridge type.
Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
001000190306021	Kalopa Stream Bridge	Kalopa Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • Longest concrete span built post-war (1945) on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 104
001001900503405	Kamakoa Bridge No. 1	Kamakoa Stream No. 1	Mamalahoa Highway	1930	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Very modest concrete slab bridge with solid parapets • Typical of its period in its design, materials, methods of construction, and craftsmanship	6 - 107
001000110306913	Kanenelu Stream Bridge	Kanenelu Stream	Hawaii Belt Road (Mamalahoa Highway)	1938	Concrete Slab	Concrete Open Greek Cross	No	Eligible	• Associated with developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	6 - 110
001000190307673	Kapehu Stream Bridge	Kapehu Stream	Hawaii Belt Road	1933	Concrete Tee Beam	Concrete Open Horizontal	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1930's reinforced concrete bridge	6 - 113
001000190309317	Kapue Stream Bridge	Kapue Stream	Hawaii Belt Road	1950	Steel Trestle	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5	6 - 116
001000190306944	Kaula Stream Bridge	Kaula Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 119
001000190306165	Kaumoali Stream Bridge	Kaumoali Stream	Hawaii Belt Road	1959	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000270300326	Kawaihae Stream Bridge	Kawaihae Stream	Kawaihae Road	1960	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001002400500410	Kawaikalia Stream Bridge	Kawaikalia Stream	Honokaa-Waipio Road	1967	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190306458	Kawaili Stream Bridge	Kawaili Stream	Hawaii Belt Road	2011	Concrete Slab	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1938 bridge in 2011.	n/a
001000190309043	Kawainui Stream Bridge	Kawainui Stream	Hawaii Belt Road	1948	Steel Stringer	Concrete Open Greek Cross	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Contributes to Post-War Hawaii Belt Road • See Hawaii Belt Road historic context Chapter 2.5 • Earliest steel bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969 • One of six bridges listed under 2000 MOA	6 - 122
001000190306756	Kealakaha Stream Bridge	Kealakaha Stream	Hawaii Belt Road	1935	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant element of the Territorial Belt Road Plan and contributed to the economic development of the region • Excellent example of federally-funded tee-beam bridge constructed in the 1930s • 20th century example of advanced bridge engineering and construction • Significant for complex technological engineering developments exhibited in its design • One of the last major concrete tee-beam highway bridges constructed along the Hawaii Belt Road prior to WWII • Representative of the work of a master: William R. Bartels	6 - 125

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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001001900502561	Keamuku Stream Bridge	Keamuku Stream	Mamalahoa Highway	1940	Concrete Slab	Concrete Solid	No	Not Eligible	This bridge has lost integrity due to alterations and resemblance to box culverts. It does not have distinctive engineering or architectural features that depart from standard culvert design.	n/a
001002500500844	Keawewai Stream (Honokoa Bridge)	Keawewai Stream (Honokoa)	Kohala Mountain Road	1961	Concrete Slab	Concrete Solid Decorative	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190306656	Kekualele Stream Bridge	Kekualele Stream	Hawaii Belt Road	1935	Concrete Rigid Frame	Concrete and Metal	No	Not Eligible	This bridge has lost integrity due to alterations. In 2004, the bridge railings were completely replaced. It does not have distinctive engineering or architectural features that depart from standard bridge design.	n/a
001000190307519	Kihalani Stream Bridge	Kihalani Stream	Hawaii Belt Road	1956	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 128
001000190307387	Kilau Stream Bridge	Kilau Stream	Hawaii Belt Road	1953	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 131
001000190308549	Kolekole Stream Bridge	Kolekole Stream	Hawaii Belt Road	1950	Steel Truss	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • See National Register of Historic Places Nomination Form in appendices • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5	6 - 134
001000190306590	Kukaiau Stream Bridge	Kukaiau Stream	Hawaii Belt Road	1951	Steel Stringer	Concrete and Metal	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 137
001000190306876	Kupapaulua Stream Bridge	Kupapaulua Stream	Hawaii Belt Road	1935	Open Spandrel Arch	Concrete and Metal	No	Not Eligible	This bridge has of lost integrity due to significant alterations. In 2004, the bridge was rehabilitated and widened. The existing arch structure was built-up with concrete to increase load capacity and the bridge railings were replaced with solid concrete rails with aesthetic indentations.	n/a
001000190307474	Kuwaikahi Stream Bridge	Kuwaikahi Stream	Hawaii Belt Road	1957	Steel Stringer	Concrete Open Horizontal	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 140
001000270300281	Makahuna Stream Bridge	Makahuna Stream	Kawaihae Road	1960	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000270300275	Makeahua Stream Bridge	Makeahua Stream	Kawaihae Road	1934	Concrete Tee Beam	Concrete and Metal Decorative	No	Not Eligible	The bridge has lost integrity due to modifications. The thrie beams are placed in front of the original parapets and metal railings were added on top of it.	n/a
001000190307981	Manoloa Stream Bridge	Manoloa Stream	Hawaii Belt Road	1951	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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001000190307457	Manowaiopae Stream Bridge	Manowaiopae Stream	Hawaii Belt Road	1957	Concrete Girder	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190307799	Maulua Stream Bridge	Maulua Stream	Hawaii Belt Road	1953	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190307585	Moanalulu Stream Bridge	Moanalulu Stream	Hawaii Belt Road	1956	Concrete Tee Beam	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 143
001000110306986	Moaula Stream Bridge	Moaula Stream	Hawaii Belt Road (Mamalahoa Highway)	1938	Concrete Tee Beam	Concrete Open Greek Cross	No	High Preservation Value	• Example of Federal Aid bridges constructed by the Territory in the 1930s • Significant element of the Territorial Belt Road Plan • Associated with sugar plantation industry and economic development • Significant for innovative engineering developments and aesthetic merit • One of the first reinforced-concrete rigid-frame bridges constructed in the islands • One of only five of this type built prior to WW II • One of the most sophisticated of the pre-WWII bridges from an engineering perspective • Representative of the work of a master: William R. Bartels	6 - 146
001000190306612	Mohuna Stream Bridge	Mohuna Stream	Hawaii Belt Road	1951	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001950001100003	Naalehu Box Culvert	Flood Control Channel	Hawaii Belt Road (Mamalahoa Highway)	1966	Concrete Box Culvert	Metal Horizontal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001000190308146	Nanue Stream Bridge	Nanue Stream	Hawaii Belt Road	1952	Steel Trestle	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • See National Register of Historic Places Nomination Form in appendices • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5	6 - 149
001000190305585	Nienie Stream Bridge	Nienie Stram	Hawaii Belt Road	1963	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001002400500771	Nienie Stream Bridge	Nienie Stream	Honokaa-Waipio Road	1967	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000110306600	Ninole Stream Bridge	Ninole Stream	Hawaii Belt Road (Mamalahoa Highway)	1940	Timber Stringer	Wood	No	High Preservation Value	• Associated with developments in timber bridge construction in Hawaii • Good example of a 1940's timber bridge • Bridge abutments a potentially eligible historic resource	6 - 152
001000190308012	Ninole Stream Bridge	Ninole Stream	Hawaii Belt Road	1951	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001002700502390	Niulii Stream Bridge	Niulii Stream	Akoni Pule Highway	1918	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1910's reinforced concrete bridge	6 - 155
001000191106953	Ookala Plantation Road Overpass	Hawaii Belt Road (Ookala Plantation Road Overpass)	Plantation Road	1959	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190308189	Opea Stream Bridge	Opea Stream	Hawaii Belt Road	1952	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a

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Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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001000190006359	Paauilo Pedestrian Overpass	Hawaii Belt Road (Paauilo Pedestrian Overpass)	Pedestrian	1962	Concrete Tee Beam	Metal Chain Link	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001002200500040	Paheehee Mauka Bridge	Paheehee Gulch (Akaka Falls)	Akaka Falls Road	1927	Concrete Slab	Metal Thrie Beam	No	Not Eligible**	This bridge has lost integrity due to alterations and seismic retrofitting. Thrie beams were placed in front of the original parapets and metal pipe railings were added on top of the original. This bridge has a 10 inch water line on the inlet side. Seismic retrofit was completed in 2003. The bridge abutments are a potentially eligible historic resource.	n/a
001000190308619	Paheehee Stream Bridge	Paheehee Stream	Hawaii Belt Road	1950	Steel Trestle	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • See National Register of Historic Places Nomination Form in appendices • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5	6 - 158
001000190309368	Pahoehoe Stream Bridge	Pahoehoe Stream	Hawaii Belt Road	1912	Closed Spandrel Arch	Metal Thrie Beam	No	Eligible	• Arch bridges are an uncommon bridge type • Good example of 1910's closed spandrel arch typical of its period in its use of materials, method of construction, craftsmanship, and design	6- 161
001000110411925	Panaewa Stream Bridge	Panaewa Stream	Hawaii Belt Road (Kanoelehua Avenue)	1950	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190007529	Papaaloa Pedestrian Overpass	Hawaii Belt Road (Papaaloa Pedestrian Overpass)	Pedestrian	1964	Concrete Tee Beam	Metal Chain Link	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000191108812	Pepeekeo Plantation Road	Hawaii Belt Road (Pepeekeo Plantation Road Overpass)	Plantation Road	1950	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190307887	Pohakupuka Stream Bridge	Pohakupuka Stream	Hawaii Belt Road	1953	Concrete Rigid Frame	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 164
001000190409666	Pukihae Stream Bridge	Pukihae Stream	Hawaii Belt Road	1949	Concrete Tee Beam	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001001300502441	Puna Sugar Truck Underpass	Puna Plantation Truck Underpass (Highway Overpass)	Keaau-Pahoa Road	1968	Concrete Slab	Metal Thrie Beam	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000110306805	Punaluu Stream Bridge	Punaluu Stream	Hawaii Belt Road (Mamalahoa Highway)	1940	Concrete Tee Beam	Concrete Open Greek Cross	No	Eligible	• Associated with developments in concrete bridge construction in Hawaii • Good example of a 1940's reinforced concrete bridge	6 - 167

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001000190308346	Umauma Stream Bridge	Umauma Stream	Hawaii Belt Road	1952	Steel Stringer	Concrete Open Horizontal	Yes	High Preservation Value	• One of six registered steel trestle bridges on the Hamakua coast • Uncommon use of steel material in Hawaii's extreme marine environment • Engineering significance of the trestle structure of the early twentieth century • Associated with the sugar plantation industry • Associated with the Hilo Railroad Company • Associated with three founders of the Hilo railroad company • See National Register of Historic Places Nomination Form in appendices • Associated with Post-War Hawaii Belt Road District • See Hawaii Belt Road historic context Chapter 2.5	6 - 170
001000190308983	Waiaama Stream Bridge	Waiaama Stream	Hawaii Belt Road	1968	Concrete Girder	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001002500500053	Waiaka Stream Bridge	Waiaka Stream	Kohala Mountain Road	1932	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Good example of a 1930's reinforced concrete bridge	6 - 173
001002700502386	Waikane Stream Bridge	Waikane Stream	Akoni Pule Highway	1918	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1910's reinforced concrete bridge	6 - 176
001000190308092	Waikaumalo Stream Bridge	Waikaumalo Stream	Hawaii Belt Road	1952	Steel Stringer	Concrete Open Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190308038	Waikolu Stream Bridge	Waikolu Stream	Hawaii Belt Road	1934	Concrete Rigid Frame	Concrete Open Greek Cross	No	Eligible	• Associated with early developments in concrete and steel bridge construction in Hawaii • Uncommon use of steel material in Hawaii's extreme marine environment • Good example of a 1930's reinforced concrete and steel bridge	6 - 179
001000190409828	Wailoa River Bridge	Wailoa Stream	Kamehameha Avenue	1993	Concrete Girder	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1938 bridge in 1993.	n/a
001000190409696	Wailuku River Bridge	Wailuku Stream	Hawaii Belt Road	1950	Steel Stringer	Metal Horizontal	No	High Preservation Value	• Uncommon use of steel material in Hawaii's extreme marine environment • Associated with the railroad, and specific federal funding of the U.S. Works Program Grade Crossing Program • Associated with development of the Hawaii Belt Road, particularly as part of the mid-century "Seismic Wave Damage Rehabilitation Project" • Representative of the work of a master: William R. Bartels • Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 182
001001300502182	Waipahoehoe Stream Bridge	Waipahoehoe Stream	Keaau-Pahoa Road	1968	Concrete Slab	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001000190306280	Waipunahina Stream Bridge	Waipunahina Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	No	High Preservation Value	• Contributes to Post-War Hawaii Belt Road • One of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969 • See Hawaii Belt Road historic context Chapter 2.5	6 - 185
001002700502266	Walaohia Stream Bridge	Walaohia Gulch	Akoni Pule Highway	1919	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of a 1910's reinforced concrete bridge	6 - 188

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001019201400400	4 Mile Creek Bridge	4-Mile Creek	Kilauea Avenue	1916	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Fair example of a 1910's reinforced concrete tee beam bridge	6- 192
001002010900998	51 Mile Bridge	Unnamed Stream	Saddle Road	1942	Concrete Slab	Concrete Solid	No	Eligible	• Good example of a 1940's reinforced concrete slab bridge • Rock abutments are a potentially eligible historic resource	6 - 195
001002010901164	53 Mile Bridge	Unnamed Stream	Saddle Road	1942	Concrete Slab	Concrete Solid	No	Eligible	• Good example of a 1940's reinforced concrete slab bridge	6 - 198
001460001100009	Ahualoa Gulch No. 1 Bridge	Ahualoa No. 1 Gulch	Kahana Drive	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 201
001460001100007	Ahualoa Gulch No. 2 Bridge	Ahualoa No. 2 Gulch	Kumupele Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 204
001460001100002	Ahualoa No. 2 Gulch Bridge	Ahualoa No. 2 Gulch	Mamalahoa Highway	1923	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 207
001440001100002	Between Kaapahu and Waikaalulu Gulch Bridge	Kaapahu and Waikaalulu Gulch	Paauilo Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 210
001440001100003	Between Kaapahu and Waikaalulu Gulch Bridge	Kaapahu and Waikaalulu Gulch	Paauilo Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 213
001440001100004	Between Waikaalulu and Kaapahu Gulch Bridge	Kaapahu and Waikaalulu Gulch	Paauilo Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 216
001210001100001	Coconut Island Bridge	Pacific Ocean	Pedestrian Walkway	1967	Concrete Tee Beam	Metal Picket	No	Eligible	• Typical post war bridge type with a unique bridge function • Good example of a modest interisland pedestrian bridge that connects the small offshore Coconut Island to the main island of Hawaii	6 - 219
001220001100004	Elm Street Bridge	4-Mile Creek	Elm Street	1963	Concrete Box Culvert	Metal Horizontal	No	Program Comments**	This is a typical post-war culvert and falls under Program Comments. The rock abutments are a potentially eligible historic resource.	n/a
001290001100003	Hakalau Stream Bridge	Hakalau Stream	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Open Decorative	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 222
001270001100005	Hanawi Stream Bridge	Hanawi Stream	Old Mamalahoa Highway	1922	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 225
001470001100001	Honokaia Gulch East Branch Bridge	Honokaia Gulch	Mamalahoa Highway	1924	Concrete Tee Beam	No Parapet/Railing	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 228
001470001100002	Honokaia Gulch West Branch Bridge	Honokaia Gulch	Mamalahoa Highway	1924	Concrete Tee Beam	Metal Horizontal	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 231
001260001100006	Honolii Stream Bridge	Honolii Stream	Old Mamalahoa Highway	1911	Open Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 234
001280001100002	Honomu Stream Bridge	Honomu Stream	Old Mamalahoa Highway	2002	Concrete Girder	Concrete Solid Panel with Cap	No	Non-Contributing	• Bridge is a non-contributing feature in the Mamalahoa Historic District due to complete replacement of the original 1935 bridge in 2002 • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 237
001460001100005	Inoino Gulch Bridge	Inoino Gulch	Mamalahoa Highway	1924	Concrete Girder	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 240

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Not Eligible: Has lost historic integrity through significant alteration or does not reflect characteristics from its time period.
Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapet/Railing Type	Listed on National/Hawaii Register	Eligibility Status*	Character Defining Feature (Significance)	Page No.
001290001100001	Kaahakini Stream Bridge	Kaahakini Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 243
001440001100001	Kaapahu Gulch Bridge	Kaapahu Gulch	Paauilo Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 246
001270001100006	Kahalii Stream Bridge	Kahalii Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 249
001440001100010	Kahawailiilii Gulch Bridge	Kahawailiilii Gulch	Old Mamalahoa Highway	1919	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 252
001750001100004	Kahului Bridge	Relief	Alii Drive	1937	Concrete Slab	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1930's reinforced concrete bridge • Rock abutments are a potentially eligible historic resource	6 - 255
001270001100003	Kaieie Stream Bridge	Kaieie Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 258
001260001100005	Kaiwiki Bridge No. 1	Kaiwiki Stream	Old Mamalahoa Highway	1920	Concrete Tee Beam	Metal Horizontal	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 261
001260001100007	Kaiwiki Homestead Road Bridge	Unnamed Stream	Kaiwiki Homestead Road	1930	Timber Stringer	Wood	No	Eligible	• Good example of the timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design	6 - 264
001350001100001	Kaiwilahilahi Stream Bridge	Kaiwilahilahi Stream	Old Mamalahoa Highway	1923	Open Spandrel Arch	Concrete Open Vertical	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 267
001260001100002	Kalalau Stream Bridge	Kalalau Stream	Old Mamalahoa Highway	1920	Masonry Arch	Masonry Rock with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 270
001270001100004	Kalaoa Stream Bridge	Kalaoa Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 273
001430001100009	Kalopa Aliipali Gulch Bridge	Aliipali Gulch	Kalopa Pohakea Road	2003	Concrete Tee Beam	Concrete and Metal Picket	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1939 bridge in 2003.	n/a
001440001100007	Kalopa Gulch Bridge	Kalopa Gulch	Kaapahu Road	1919	Concrete Tee Beam	Concrete Solid Panel with Cap	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1910's cast in place concrete bridge	6 - 276
001440001100009	Kalopa Gulch Bridge	Kalopa Gulch	Kalopa Road	1930	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 279
001430001100008	Kalopa Kaumoali Gulch Bridge	Kaumoali Gulch	Kalopa Pohakea Road	2003	Concrete Tee Beam	Concrete and Metal Picket	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1930 bridge in 2003.	n/a
001250001100004	Kaluiiki Bridge	Kaluiiki Stream	Akolea Road	1940	Timber Stringer	Metal Thrie Beam	No	Not Eligible	This bridge has lost integrity due to replacement of the railings with thrie beams in 2005. The deck was also replaced in-kind.	n/a
001270001100001	Kapue Stream Bridge	Kapue Stream	Old Mamalahoa Highway	1935	Closed Spandrel Arch	Concrete Solid	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 282
001410001100001	Kaula Gulch Bridge	Kaula Gulch	Old Mamalahoa Highway	1928	Steel Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 285

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Program Comments: Common post-war bridges built after 1945 covered by Advisory Council program comments.
Non-Contributing: The bridge/culvert is non-contributing to the historic district.

** This bridge falls under "Not Eligible" or "Program Comments" and has potentially historic resources adjacent to the structure that requires additional consideration.

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001430001100002	Kaumoali Gulch Bridge	Kaumoali Gulch	Old Mamalahoa Highway	1932	Masonry Arch	Concrete Open Horizontal	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 288
001240001100002	Kawailani Street Bridge	Waiakea Stream	Kawailani Street	2005	Concrete Slab	Concrete and Metal	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1930 bridge in 2005.	n/a
001270001100007	Kawainui Stream Bridge	Kawainui Stream	Old Mamalahoa Highway	1900	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 291
001460001100004	Keaakaukau Gulch Bridge	Keaakaukau Gulch	Mamalahoa Highway	1925	Concrete Slab	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 294
001460001100008	Keaakaukau Stream Bridge	Keaakaukau Gulch	Kahana Drive	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 297
001230001100001	Keawe-Wailuku Bridge	Wailuku River	Keawe Street	1938	Rainbow Arch	Concrete Open Decorative	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Significant in the areas of engineering and transportation in Hawaii • Associated with public works efforts by the County of Hawaii, and as an important civic structure associated with the development of Hilo • One of two remaining "rainbow" or Marsh arch bridges in the state • Representative of the work of a master: William Hoy Chun • The only bridge on Hawaii Island that received Public Works Administration moneys from the U.S. government during the Great Depression	6 - 300
001360001100002	Kilau Stream Bridge	Kilau Stream	Manowaiopae Homestead Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 304
001019201400370	Kilauea Avenue Bridge	Palai Stream	Kilauea Avenue	1968	Concrete Box Culvert	Concrete and Metal	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001019301400110	Kinoole Street Bridge-Waiakea Stream	Waiakea Stream	Kinoole Street	1964	Concrete Box Culvert	Metal Chain Link	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001280001100004	Kolekole Stream Bridge	Kolekole Stream	Old Mamalahoa Highway	1929	Closed Spandrel Arch	Concrete Open Arched	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 307
001019401400180	Komohana Street Bridge	Waiakea Stream	Komohana Street	1966	Concrete Slab	Concrete and Metal	No	Not Eligible	The bridge has lost integrity resulting from the extension of both sides of the bridge in 2005.	n/a
001450001100001	Kukuiaonanipahu Gulch Bridge	Kukuiaonanipahu Gulch	Ohia Street	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 310
001240001100003	Kupulau Bridge	Waiakea Stream	Kupulau Street	1967	Concrete Slab	Metal Thrie Beam	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001240001100001	Lanikaula Street Bridge	Waiakea Stream	Lanikaula Street	1968	Concrete Tee Beam	Concrete and Metal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001640001100001	Lanimaumau Stream Culvert	Lanimaumau Stream	Kamamalu Street	1955	Concrete Box Culvert	Metal Chain Link	No	Program Comments	This is a typical post-war culvert and falls under Program Comments.	n/a
001420001100001	Lauhala Gulch Bridge	Lauhala Gulch	Old Mamalahoa Highway	1930	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 313
001360001100001	Laupahoehoe Gulch Bridge	Laupahoehoe Gulch	Old Mamalahoa Highway	1930	Masonry Arch	Masonry Rock	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 316
001420001100002	Mahuna Gulch Bridge	Mahuna Gulch	Old Mamalahoa Highway	1930	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 319

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Non-Contributing: The bridge/culvert is non-contributing to the historic district.

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001260001100003	Maili Stream Bridge	Maili Stream	Kaiwiki Road	1900	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1910's timber bridge	6 - 322
001260001100004	Maili Stream Bridge	Maili Stream	Old Mamalahoa Highway	1916	Concrete Tee Beam	Concrete Solid	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 325
001430001100006	Manienie Gulch Bridge	Manienie Gulch	Pohakea Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Good example of the 1930's reinforced concrete bridge	6 - 328
001430001100007	Manienie Gulch Bridge	Manienie Gulch	Manienie Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 331
001320001100001	Nanue Stream Bridge	Nanue Stream	Old Mamalahoa Highway	1930	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 334
001460001100001	Nienie Gulch Bridge	Nienie Gulch	Mamalahoa Highway	1923	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 337
001180001100003	North Peck Road Bridge	Relief	North Peck Road	1940	Timber Stringer	Wood	No	Eligible	• Significant for construction type built in Hawaii in this period • Unique single span timber bridge type during a period consisting primarily of concrete bridge construction • Good example of the 1940's timber bridge	6 - 340
001290001100002	Old Railroad Crossing Bridge	Railroad Crossing	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Solid Panel with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • Rock abutments are a potentially eligible historic resource	6 - 343
001270001100010	Onomea Camp Road Bridge	Railroad Crossing	Onomea Camp Road	2002	Concrete Box Culvert	Masonry Rock	No	Not Eligible**	This culvert has lost integrity due to the complete replacement of the original 1930 culvert in 2002. The rock abutments are a potentially eligible historic resource.	n/a
001310001100002	Opea Stream Bridge	Opea Stream	Old Mamalahoa Highway	1912	Concrete Tee Beam	Metal Horizontal	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 346
001180001100004	Oshiro Road Bridge	Relief	Oshiro Road	2003	Concrete Tee Beam	Concrete and Metal Picket	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1940 bridge in 2003.	n/a
001280001100003	Paheehee Stream Bridge	Paheehee Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 349
001220001100002	Pauahi Bridge	Waiolama Canal	Pauahi Street	1949	Steel Stringer	Metal Picket	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001430001100005	Pohakuhaku Gulch Bridge	Pohakuhaku Gulch	Paauilo Pohakea Road	1936	Concrete Tee Beam	Concrete Open Vertical	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1930's reinforced concrete bridge	6 - 352
001260001100001	Pukihae Stream Bridge	Pukihae Stream	Old Mamalahoa Highway	1904	Masonry Arch	Masonry Rock with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • One of the oldest masonry bridges remaining in Hawaii • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 355
001270001100002	Puuokalepa Bridge No. 1	Puuokalepa Stream	Old Mamalahoa Highway	1904	Closed Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 358
001230001100003	Reeds Island Bridge	Wailuku River	Kaiulani Street	2013	Timber Stringer	Wood	No	Not Eligible	This bridge has lost integrity due to the complete replacement of the original 1940 bridge in 2013.	n/a

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001470001100003	Relief Elevation 2760 Bridge	Relief	Mamalahoa Highway	1924	Concrete Tee Beam	Metal Horizontal	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 361
001460001100010	Relief Stream Bridge	Relief	Kahana Drive	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of the 1930's timber bridge	6 - 364
001310001100001	Umauma Stream Bridge	Umauma Stream	Old Mamalahoa Highway	1920	Concrete Tee Beam	Concrete Solid Panel with Cap	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 367
001270001100008	Waiaama Stream Bridge	Waiaama Stream	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 370
001001800700484	Waiaha Bridge	Intermittent Stream	Mamalahoa Highway	1920	Concrete Slab	Metal Horizontal	No	Not Eligible	This bridge has lost integrity due to railing replacement in 2008. The original qualities have not been retained and there is insufficient distinction to mitigate the loss of integrity to its railing. In 2006 the bridge was damaged in an earthquake and the wing walls were replaced in 2007. More research is needed in the future.	n/a
001960001100001	Waiakaloa Gulch Bridge	Waiakaloa Gulch	Wood Valley Homestead Road	1935	Concrete Slab	No Parapet/Railing	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1930's reinforced concrete bridge	6 - 373
001960001100002	Waiakaloa Gulch Bridge	Waiakaloa Gulch	Wood Valley Homestead Road	1935	Concrete Slab	No Parapet/Railing	No	Eligible	• Associated with early developments in concrete bridge construction in Hawaii • Good example of the 1930's reinforced concrete bridge	6 - 376
001027201400020	Waianuenue Bridge	Ainako Stream	Waianuenue Avenue	1924	Closed Spandrel Arch	Concrete Open Decorative	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Significant for its contributions to the fields of engineering and transportation in Hawaii • Excellent example of reinforced-concrete solid-spandrel arch construction in the Italianate style • Associated with public works efforts by the County of Hawaii, and as an important civic structure associated with the development of Hilo • Rare remaining example of this once common bridge type, as well as for its aesthetic merit • Representative of early 20th century neoclassical architectural style and exhibits influence of the City Beautiful Movement • Representative of design by En Leong Wung • Earliest of the decorative arch bridges built by the county in the 1920s and 1930s	6 - 379
001440001100005	Waikaalulu Gulch Bridge	Waikaalulu Gulch	Paauilo Mauka Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of a 1930's timber bridge	6 - 382
001440001100006	Waikaalulu Gulch Bridge	Waikaalulu Gulch	Kaapahu Road	1930	Timber Stringer	Wood	No	Eligible	• Associated with early developments in timber bridge construction in Hawaii • Good example of a 1930's timber bridge	6 - 385
001440001100008	Waikaalulu Gulch Bridge	Waikaalulu Gulch	Kalopa Road	1930	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4 • One of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini	6 - 388
001320001100002	Waikaumalo Stream Bridge	Waikaumalo Stream	Old Mamalahoa Highway	1920	Timber Stringer	Wood	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 391
001320001100003	Waikaumalo Stream Bridge	Waikaumalo Stream	Unnamed Road off Piha Kahuku Homestead Road	1930	Timber Stringer	Wood	No	Eligible	• Good example of a 1930's timber bridge	6 - 394

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001019201400100	Wailoa Bridge	Wailoa Stream	Kilauea Avenue	1964	Concrete Slab	Metal Horizontal	No	Program Comments	This is a typical post-war bridge and falls under Program Comments.	n/a
001230001100002	Wailuku Bridge No.1	Wailuku River	Wainaku Street	1919	Concrete Tee Beam	Concrete Open Decorative	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 397
001280001100001	Waimaauau Stream Bridge	Waimaauau Stream	Old Mamalahoa Highway	1930	Concrete Slab	Concrete Solid Panel	No	High Preservation Value	• Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 400
001020001400450	Waipahoehoe Stream Bridge	Waipahoehoe Stream	Kaumana Drive	1924	Closed Spandrel Arch	Concrete Solid with Cap	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Rare example of a 1920's reinforced concrete round arch bridge	6 - 403
001430001100001	Waipunahina Gulch Bridge	Waipunahina Gulch	Old Mamalahoa Highway	1928	Open Spandrel Arch	Concrete Open Decorative	No	High Preservation Value	• Arch bridges are an uncommon bridge type • Contributes to the Mamalahoa Historic District • See Old Mamalahoa historic context Chapter 2.4	6 - 406
001620001100001	Waiulaula Gulch Bridge	Waiulaula Gulch	Old Puako Road	1951	Steel Stringer	Wood	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Associated with the railroad • Good example of a 1950s steel stringer bridge	6 - 409
001620001100002	Waiulaula Gulch Bridge	Waiulaula Gulch	Old Puako Road	1951	Steel Stringer	Wood	No	Eligible	• Uncommon use of steel material in Hawaii's extreme marine environment • Associated with the railroad • Good example of a 1950s steel stringer bridge	6 - 412
001480001100002	Waiulili Stream Bridge	Waiulili Stream	Old Honokaa-Waipio Road	1979	Concrete Slab	Metal Thrie Beam	No	Not Eligible	The bridge has lost integrity due to the complete replacement of the original 1920 bridge in 1979.	n/a

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III. HISTORIC BRIDGE DISTRICT: HAWAII BELT ROAD


Old Mamalahoa Highway Bridges
HONOKAA
HILO
HAWAII
Waikaumalo Stream Bridge
(001320001100002)
1920
Waikaumalo Park
Opea Stream Bridge
(001310001100002)
1912
Nanue Stream Bridge
(001320001100001)
1930
Mamalahoa Hwy
Umauma Stream Bridge
(001310001100001)
1920
Lepahoa Rd
Hakalau Stream Bridge
(001290001100003)
1930
19
Old Railroad Crossing Bridge
(001290001100002)
1930
Kolekole Beach Park
Kaahakini Stream Bridge
(001290001100001)
1929
Kolekole Stream Bridge
(001280001100004)
1929
Honomu
Paheehee Stream Bridge
(001280001100003)
1929
Hawaii Belt Rd
220
22
Laupahu Rd
Old Mamalahoa Hwy
Beach Rd
Waimaauau Stream Bridge
(001280001100001)
1930
19
Pepeekeo
Waiaama Stream Bridge
(001270001100008)
1930
Kawainui Stream Bridge
(001270001100007)
1900
Kahalii Stream Bridge
(001270001100006)
1929
Hanawi Stream Bridge
(001270001100005)
1922
Kalaoa Stream Bridge
(001270001100004)
1929
Papaikou
Kaieie Stream Bridge
(001270001100003)
1929
Puuokalepa Bridge No. 1
(001270001100002)
1904
19
Kapue Stream Bridge
(001270001100001)
1935
Mamalahoa Hwy
Honolii Stream Bridge
(001260001100006)
1911
Puia Rd
Maili Stream Bridge
(001260001100004)
1916
Kaiwiki Bridge No. 1
(001260001100005)
1920
Kalalau Stream Bridge
(001260001100002)
1920
Waianuenue St
Hilo Bay
Pukihae Stream Bridge
(001260001100001)
1904
Puhi Bay
Kūhiō Bay
Hilo
Liliuokalani Gardens
Wailuku Bridge No.1
(001230001100002)
1919

Old Mamalahoa Highway Bridges

Honokaia Gulch West Branch Bridge
(001470001100002)
1924

Keaakaukau Gulch Bridge
(001460001100004)
1925

Nienie Gulch Bridge
(001460001100001)
1923

Kahawailiilii Gulch Bridge
(001440001100010)
1919

Kaumoali Gulch Bridge
(001430001100002)
1932

Mahuna Gulch Bridge
(001420001100002)
1930

Kaula Gulch Bridge
(001410001100001)
1928

Ahualoa No. 2 Gulch Bridge
(001460001100002)
1923

Inoino Gulch Bridge
(001460001100005)
1924

Honokaia Gulch East Branch Bridge
(001470001100001)
1924

Relief Elevation 2760 Bridge
(001470001100003)
1924

Waikaalulu Gulch Bridge
(001440001100008)
1930

Kalopa Gulch Bridge
(001440001100009)
1930

Waipunahina Gulch Bridge
(001430001100001)
1928

Lauhala Gulch Bridge
(001420001100001)
1930

Laupahoehoe Gulch Bridge
(001360001100001)
1930

Kaiwilahilahi Stream Bridge
(001350001100001)
1923

6 - 22

Honokaa
Hamakua Forest Reserve
Hauola Forest Reserve
Manowaialee Forest Reserve
Laupāhoehoe Point County Park
Pu'u Mali Restoration Area
Mana Rd
Mamalahoa Hwy
Hawaii Belt Rd
Kalopa Rd
Lower Cane Haul Rd
Upper Haul Cane Rd
Honokaa-Waipio Rd
Louisville Dr
Camp Rd
Kia Manu
Paauhau St
Pohakea Rd
Ho'okena Rd
Homestead Rd
Ookala Rd
Papaaloa Rd
Aloa Rd
Pumou Rd
240
19

Hawaii Historic Bridge District

Old Mamalahoa Highway

Hawaii has one historic district which is Old Mamalahoa Highway Historic District. It is not on the National Register of Historic Places. See Chapter 2 section IV for the historic context.

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
001460001100002	Ahualoa No. 2 Gulch Bridge	Ahualoa No. 2 Gulch	Mamalahoa Highway	1923	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001290001100003	Hakalau Stream Bridge	Hakalau Stream	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Open Decorative	County
001270001100005	Hanawi Stream Bridge	Hanawi Stream	Old Mamalahoa Highway	1922	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001470001100001	Honokaia Gulch East Branch Bridge	Honokaia Gulch	Mamalahoa Highway	1924	Concrete Tee Beam	No Parapet/Railing	County
001470001100002	Honokaia Gulch West Branch Bridge	Honokaia Gulch	Mamalahoa Highway	1924	Concrete Tee Beam	Metal Horizontal	County
001260001100006	Honolii Stream Bridge	Honolii Stream	Old Mamalahoa Highway	1911	Open Spandrel Arch	Concrete Solid with Cap	County
001280001100002	Honomu Stream Bridge	Honomu Stream	Old Mamalahoa Highway	2002	Concrete Girder	Concrete Solid Panel with Cap	County
001460001100005	Inoino Gulch Bridge	Inoino Gulch	Mamalahoa Highway	1924	Concrete Girder	Concrete Solid Panel with Cap	County
001290001100001	Kaahakini Stream Bridge	Kaahakini Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001270001100006	Kahalii Stream Bridge	Kahalii Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001440001100010	Kahawailiilii Gulch Bridge	Kahawailiilii Gulch	Old Mamalahoa Highway	1919	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001270001100003	Kaieie Stream Bridge	Kaieie Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001260001100005	Kaiwiki Bridge No. 1	Kaiwiki Stream	Old Mamalahoa Highway	1920	Concrete Tee Beam	Metal Horizontal	County
001350001100001	Kaiwilahilahi Stream Bridge	Kaiwilahilahi Stream	Old Mamalahoa Highway	1923	Open Spandrel Arch	Concrete Open Vertical	County
001260001100002	Kalalau Stream Bridge	Kalalau Stream	Old Mamalahoa Highway	1920	Masonry Arch	Masonry Rock with Cap	County
001270001100004	Kalaoa Stream Bridge	Kalaoa Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001440001100009	Kalopa Gulch Bridge	Kalopa Gulch	Kalopa Road	1930	Timber Stringer	Wood	County

Old Mamalahoa Hwy District

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
001270001100001	Kapue Stream Bridge	Kapue Stream	Old Mamalahoa Highway	1935	Closed Spandrel Arch	Concrete Solid	County
001410001100001	Kaula Gulch Bridge	Kaula Gulch	Old Mamalahoa Highway	1928	Steel Stringer	Wood	County
001430001100002	Kaumoali Gulch Bridge	Kaumoali Gulch	Old Mamalahoa Highway	1932	Masonry Arch	Concrete Open Horizontal	County
001270001100007	Kawainui Stream Bridge	Kawainui Stream	Old Mamalahoa Highway	1900	Timber Stringer	Wood	County
001460001100004	Keaakaukau Gulch Bridge	Keaakaukau Gulch	Mamalahoa Highway	1925	Concrete Slab	Concrete Solid Panel with Cap	County
001280001100004	Kolekole Stream Bridge	Kolekole Stream	Old Mamalahoa Highway	1929	Closed Spandrel Arch	Concrete Open Arched	County
001420001100001	Lauhala Gulch Bridge	Lauhala Gulch	Old Mamalahoa Highway	1930	Timber Stringer	Wood	County
001360001100001	Laupahoehoe Gulch Bridge	Laupahoehoe Gulch	Old Mamalahoa Highway	1930	Masonry Arch	Masonry Rock	County
001420001100002	Mahuna Gulch Bridge	Mahuna Gulch	Old Mamalahoa Highway	1930	Timber Stringer	Wood	County
001260001100004	Maili Stream Bridge	Maili Stream	Old Mamalahoa Highway	1916	Concrete Tee Beam	Concrete Solid	County
001320001100001	Nanue Stream Bridge	Nenue Stream	Old Mamalahoa Highway	1930	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001460001100001	Nienie Gulch Bridge	Nienie Gulch	Mamalahoa Highway	1923	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001290001100002	Old Railroad Crossing Bridge	Railroad Crossing	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Solid Panel with Cap	County
001310001100002	Opea Stream Bridge	Opea Stream	Old Mamalahoa Highway	1912	Concrete Tee Beam	Metal Horizontal	County
001280001100003	Paheehee Stream Bridge	Paheehee Stream	Old Mamalahoa Highway	1929	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001260001100001	Pukihae Stream Bridge	Pukihae Stream	Old Mamalahoa Highway	1904	Masonry Arch	Masonry Rock with Cap	County
001270001100002	Puuokalepa Bridge No. 1	Puuokalepa Stream	Old Mamalahoa Highway	1904	Closed Spandrel Arch	Concrete Solid with Cap	County

Old Mamalahoa Hwy District

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
001470001100003	Relief Elevation 2760 Bridge	Relief	Mamalahoa Highway	1924	Concrete Tee Beam	Metal Horizontal	County
001310001100001	Umauma Stream Bridge	Umauma Stream	Old Mamalahoa Highway	1920	Concrete Tee Beam	Concrete Solid Panel with Cap	County
001270001100008	Waiaama Stream Bridge	Waiaama Stream	Old Mamalahoa Highway	1930	Closed Spandrel Arch	Concrete Solid with Cap	County
001440001100008	Waikaalulu Gulch Bridge	Waikaalulu Gulch	Kalopa Road	1930	Timber Stringer	Wood	County
001320001100002	Waikaumalo Stream Bridge	Waikaumalo Stream	Old Mamalahoa Highway	1920	Timber Stringer	Wood	County
001230001100002	Wailuku Bridge No.1	Wailuku River	Wainaku Street	1919	Concrete Tee Beam	Concrete Open Decorative	County
001280001100001	Waimaauau Stream Bridge	Waimaauau Stream	Old Mamalahoa Highway	1930	Concrete Slab	Concrete Solid Panel	County
001430001100001	Waipunahina Gulch Bridge	Waipunahina Gulch	Old Mamalahoa Highway	1928	Open Spandrel Arch	Concrete Open Decorative	County

IV. HISTORIC BRIDGE DISTRICT: POST-WAR HAWAII BELT ROAD


Hawaii Belt Road Bridges
Honokaa
Mamalahoa Hwy
Kahawaiiilii Stream Bridge
(001000190305863) 1959
Kalopa Stream Bridge
(001000190306021) 1959
19
Waipunahina Stream Bridge
(001000190306280) 1959
Mamalahoa Hwy
Kaula Stream Bridge
(001000190306944) 1959
Kukaiau Stream Bridge
(001000190306590) 1951
Hawaii Belt R
Laupāhoehoe
Point
County Park
Kuwaikahi Stream Bridge
(001000190307474) 1957
Moanalulu Stream Bridge
(001000190307585) 1956
Kilau Stream Bridge
(001000190307387) 1953
Kihalani Stream Bridge
(001000190307519) 1956
Pohakupuka Stream Bridge
(001000190307887) 1953
19
World Botanical
Gardens &
Waterfall
Kolekole
Beach Park
Mamalaha Hwy
Kawainui Stream Bridge
(001000190309043) 1948
Hanawi Stream Bridge
(001000190309124) 1968
Papaikou
19
Mauna Kea
Hakalau Forest
National
Wildlife Refuge
Mauna Kea
State Park
200
Hilo Bay
Wailuku River Bridge
(001000190409696)
1950
Hilo
Liliuokalani
Gardens

Post–War Hawaii Belt Road Bridges

There are 19 significant post-war bridges along the Hawaii Belt Road. Some bridges are already registered on the National Register of the Historic Places. The Hawaii Belt Road is not considered a historic district, but is significant as a group of post-war bridges along the Belt Road. See Chapter 2 section V for the historic context.

Post-War Hawaii Belt Road Bridges

Bridge Number	Bridge Name	Feature Crossed	Feature Carried	Construction Date	Bridge Type	Parapets/Railing Type	State/County
001000190309124	Hanawi Stream Bridge	Hanawi Stream	Hawaii Belt Road	1968	Concrete Girder	Concrete and Metal	State
001000190305863	Kahawailiilii Stream Bridge	Kahawailiilii Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete and Metal	State
001000190306021	Kalopa Stream Bridge	Kalopa Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	State
001000190306944	Kaula Stream Bridge	Kaula Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	State
001000190309043	Kawainui Stream Bridge	Kawainui Stream	Hawaii Belt Road	1948	Steel Stringer	Concrete Open Greek Cross	State
001000190307519	Kihalani Stream Bridge	Kihalani Stream	Hawaii Belt Road	1956	Concrete Girder	Concrete Open Horizontal	State
001000190307387	Kilau Stream Bridge	Kilau Stream	Hawaii Belt Road	1953	Concrete Tee Beam	Concrete Open Horizontal	State
001000190306590	Kukaiau Stream Bridge	Kukaiau Stream	Hawaii Belt Road	1951	Steel Stringer	Concrete and Metal	State
001000190307474	Kuwaikahi Stream Bridge	Kuwaikahi Stream	Hawaii Belt Road	1957	Steel Stringer	Concrete Open Horizontal	State
001000190307585	Moanalulu Stream Bridge	Moanalulu Stream	Hawaii Belt Road	1956	Concrete Tee Beam	Concrete Open Horizontal	State
001000190307887	Pohakupuka Stream Bridge	Pohakupuka Stream	Hawaii Belt Road	1953	Concrete Rigid Frame	Concrete Open Horizontal	State
001000190409696	Wailuku River Bridge	Wailuku Stream	Hawaii Belt Road	1950	Steel Stringer	Metal Horizontal	State
001000190306280	Waipunahina Stream Bridge	Waipunahina Stream	Hawaii Belt Road	1959	Concrete Girder	Concrete Open Horizontal	State

V. INVENTORY FORMS: HAWAII STATE ELIGIBLE BRIDGES

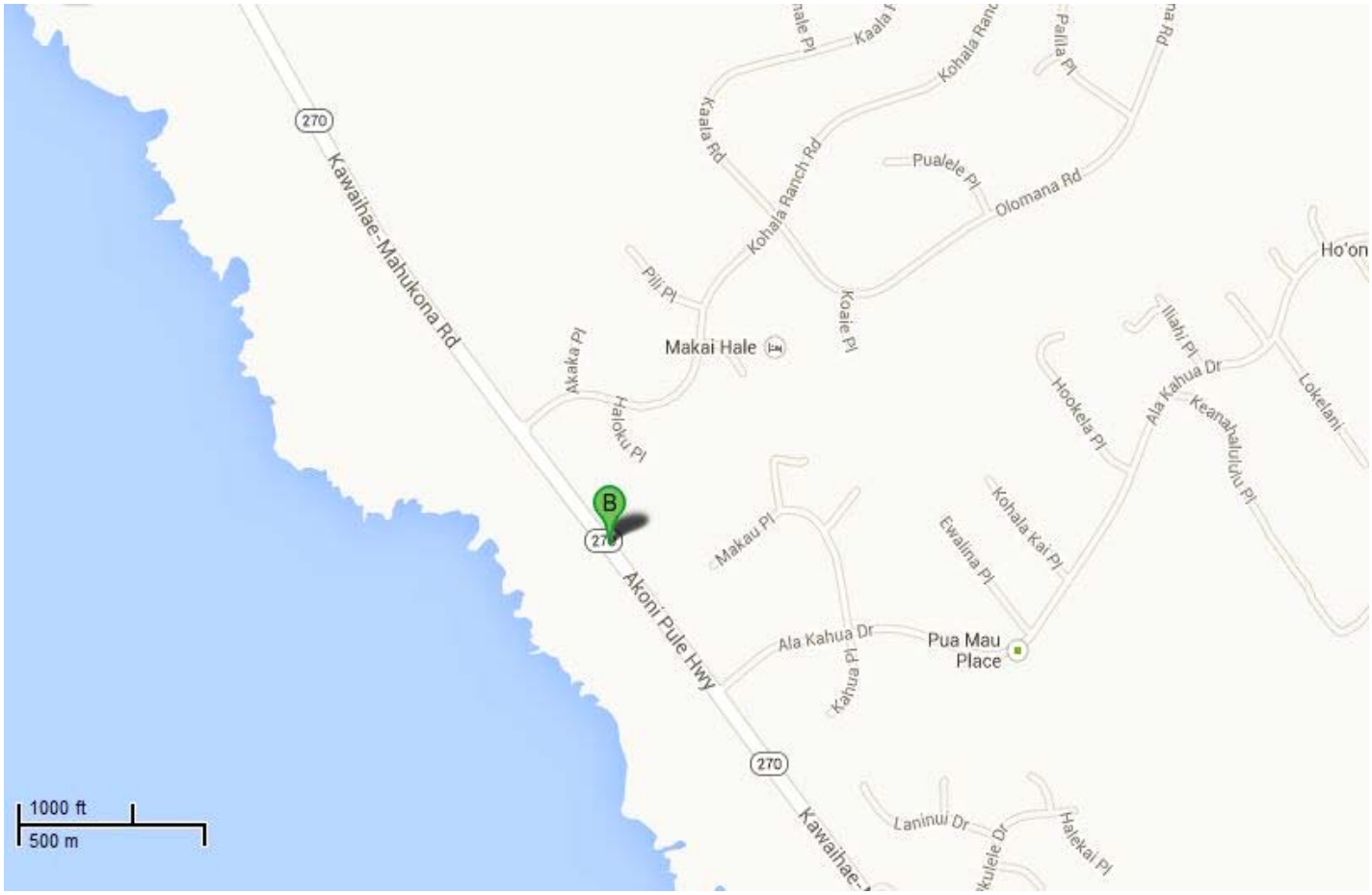
Inventory Form
(State)

General Information

Bridge Number: 001002700500304	**Route No:** 270
Popular Name: 2-cell Metal Pipe Culvert	
Feature Crossed: Unnamed Stream (Twin Metal Culvert)	
Feature Carried: Akoni Pule Highway	
Milepost: 6.45 mi.	**Island:** Hawaii
Longitude: 155d-51m-21.89s	**Latitude:** 20d-04m-26.28s

Location: 2.09 Miles North of Maluokalani Street
Historic Name: 2-cell Metal Pipe Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 9.8 ft.	**Total Length:** 23.0 ft.	**Deck Width:** 102.7 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Double pipe culvert carries Kawaihae-Mahukona across the stream. This masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has two metal pipes though the culvert. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001002700500304 2-cell Metal Pipe Culvert

Significance Statement:

This bridge is eligible under Criterion C for unique masonry culvert in Hawaii. It is a good example of a masonry culvert, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

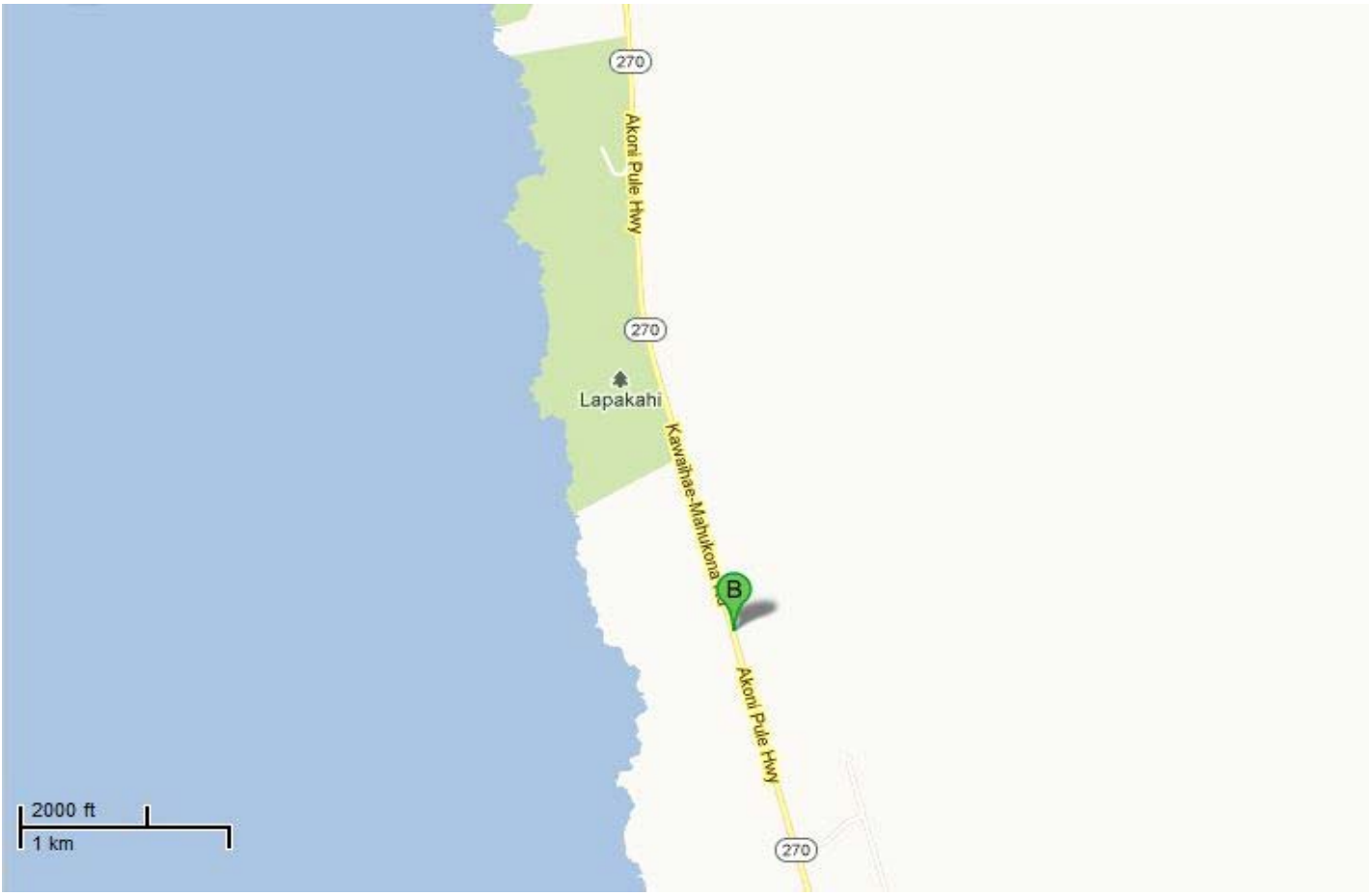
Inventory Form
(State)

General Information

Bridge Number: 001002700500915	**Route No:** 270
Popular Name: 2-cell Metal Pipe Culvert	
Feature Crossed: Unnamed Stream (Double Metal Culvert)	
Feature Carried: Akoni Pule Highway	
Milepost: 12.55 mi.	**Island:** Hawaii
Longitude: 155d-53m-30.15s	**Latitude:** 20d-09m-18.61s

Location: 8.17 Miles North of Maluokalani Street
Historic Name: 2-cell Metal Pipe Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 13.1 ft.	**Total Length:** 28.9 ft.	**Deck Width:** 64.0 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The twin corrugated metal pipe culvert carries Kawaihae Mahukona Road across the stream. This steel and masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has two metal pipes though the culvert. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001002700500915 2-cell Metal Pipe Culvert

Significance Statement:

This bridge is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

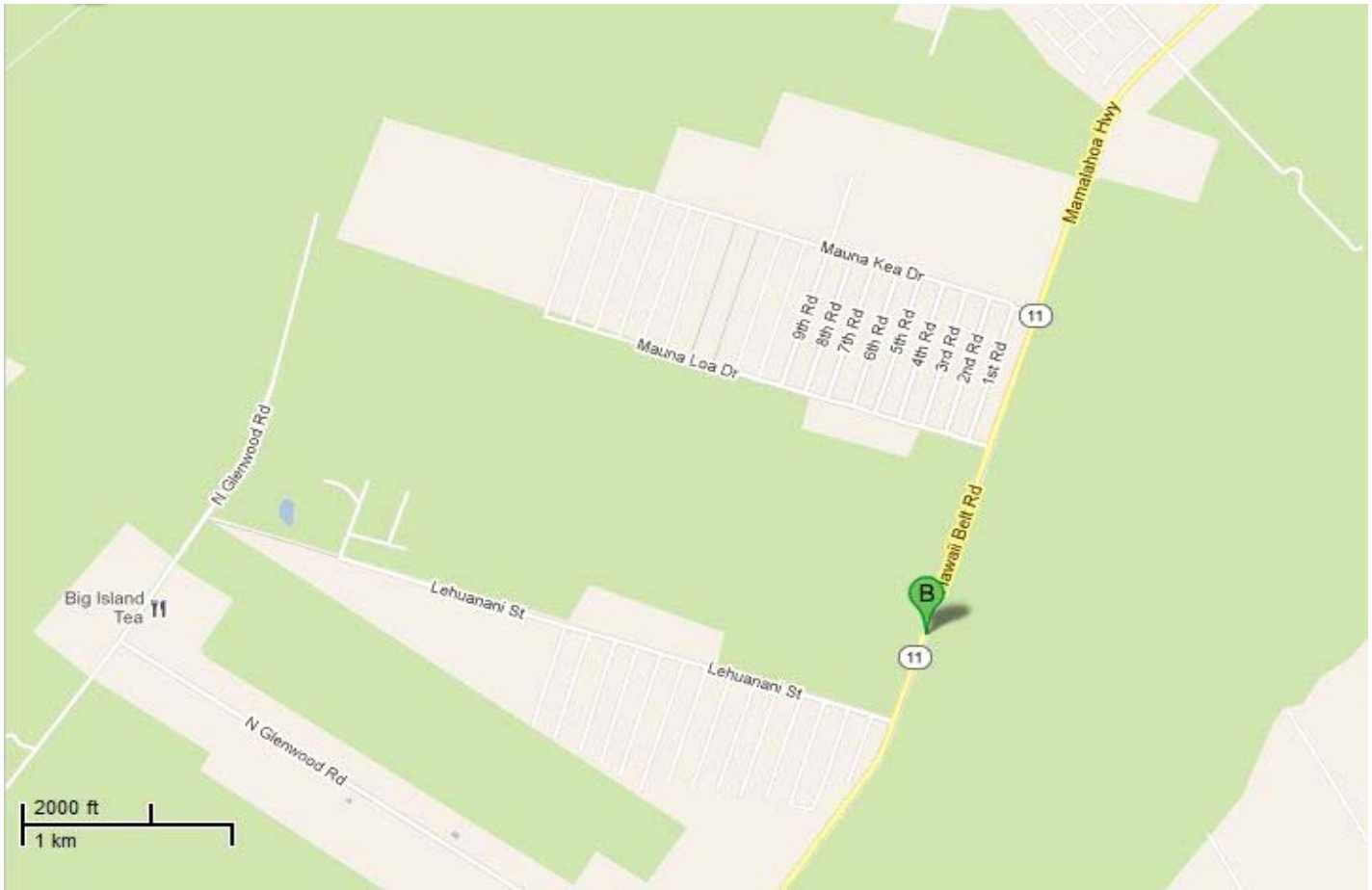
Inventory Form
(State)

General Information

Bridge Number: 001000110310346	**Route No:** 11
Popular Name: 2-Metal Pipe Culvert	
Feature Crossed: Double Pipe Culvert (Volcano)	
Feature Carried: Hawaii Belt Road (Volcano Road)	
Milepost: 19.24 mi.	**Island:** Hawaii
Longitude: 155d-08m-51.23s	**Latitude:** 19d-29m-37.01s

Location: 3.39 Miles South of North Peck Road
Historic Name: 2-Metal Pipe Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 16.1 ft.	**Total Length:** 43.0 ft.	**Deck Width:** 71.9 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Double pipe culvert carries Hawaii Belt Road across the stream. This masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has two metal pipes though the culvert. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001000110310346 2-Metal Pipe Culvert

Significance Statement:

This culvert is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

001000110310346 2-Metal Pipe Culvert

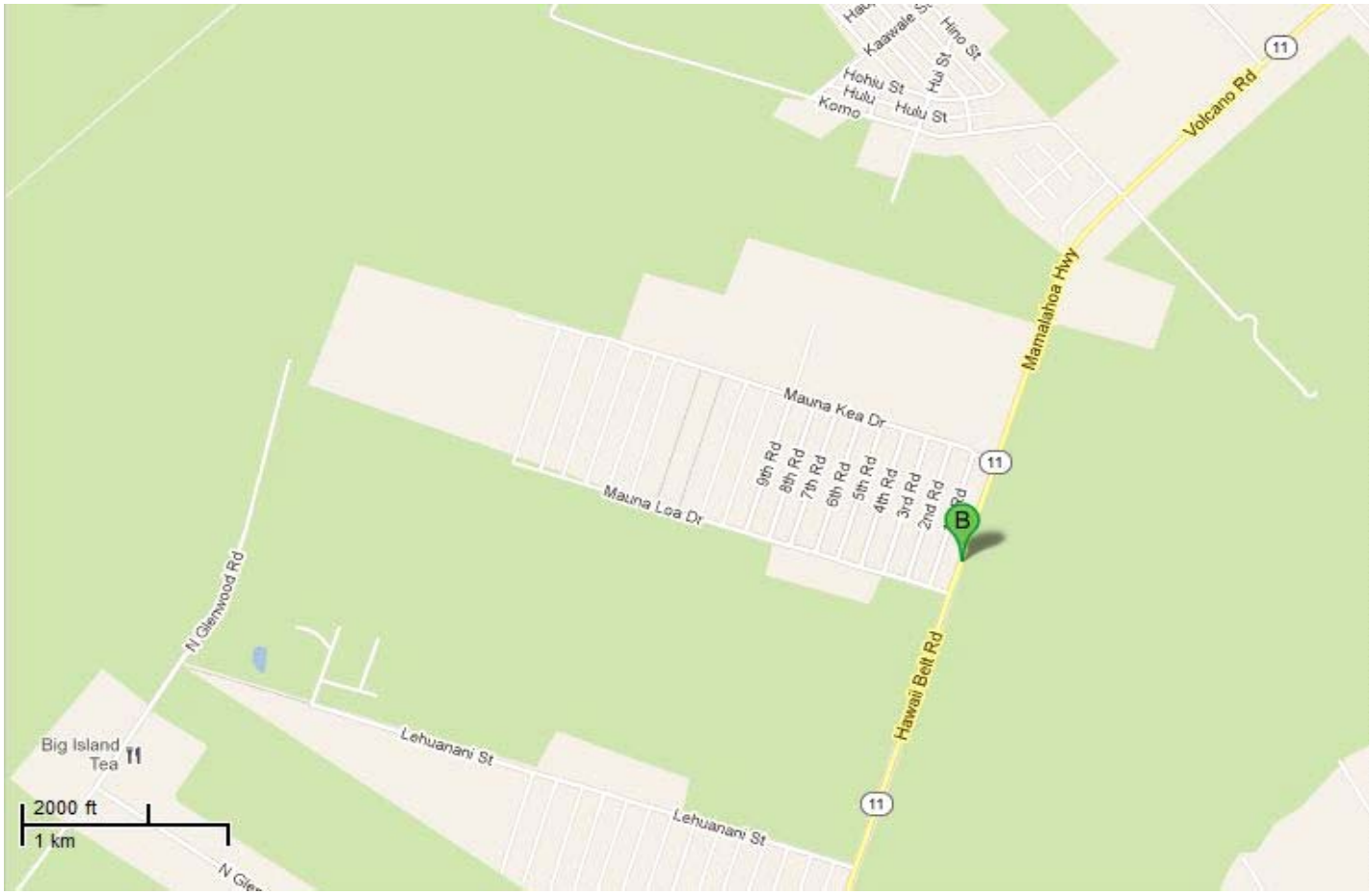
Inventory Form
(State)

General Information

Bridge Number: 001000110310424	**Route No:** 11
Popular Name: 2-Metal Pipe Culvert	
Feature Crossed: Double Pipe Culvert (Volcano)	
Feature Carried: Hawaii Belt Road (Volcano Road)	
Milepost: 18.37 mi.	**Island:** Hawaii
Longitude: 155d-08m-31.93s	**Latitude:** 19d-30m-16.71s

Location: 2.52 Miles South of North Peck Road
Historic Name: 2-Metal Pipe Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 17.1 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 69.9 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Double pipe culvert carries Hawaii Belt Road across the stream. This masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has two metal pipes though the culvert. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001000110310424 2-Metal Pipe Culvert

Significance Statement:

This culvert is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

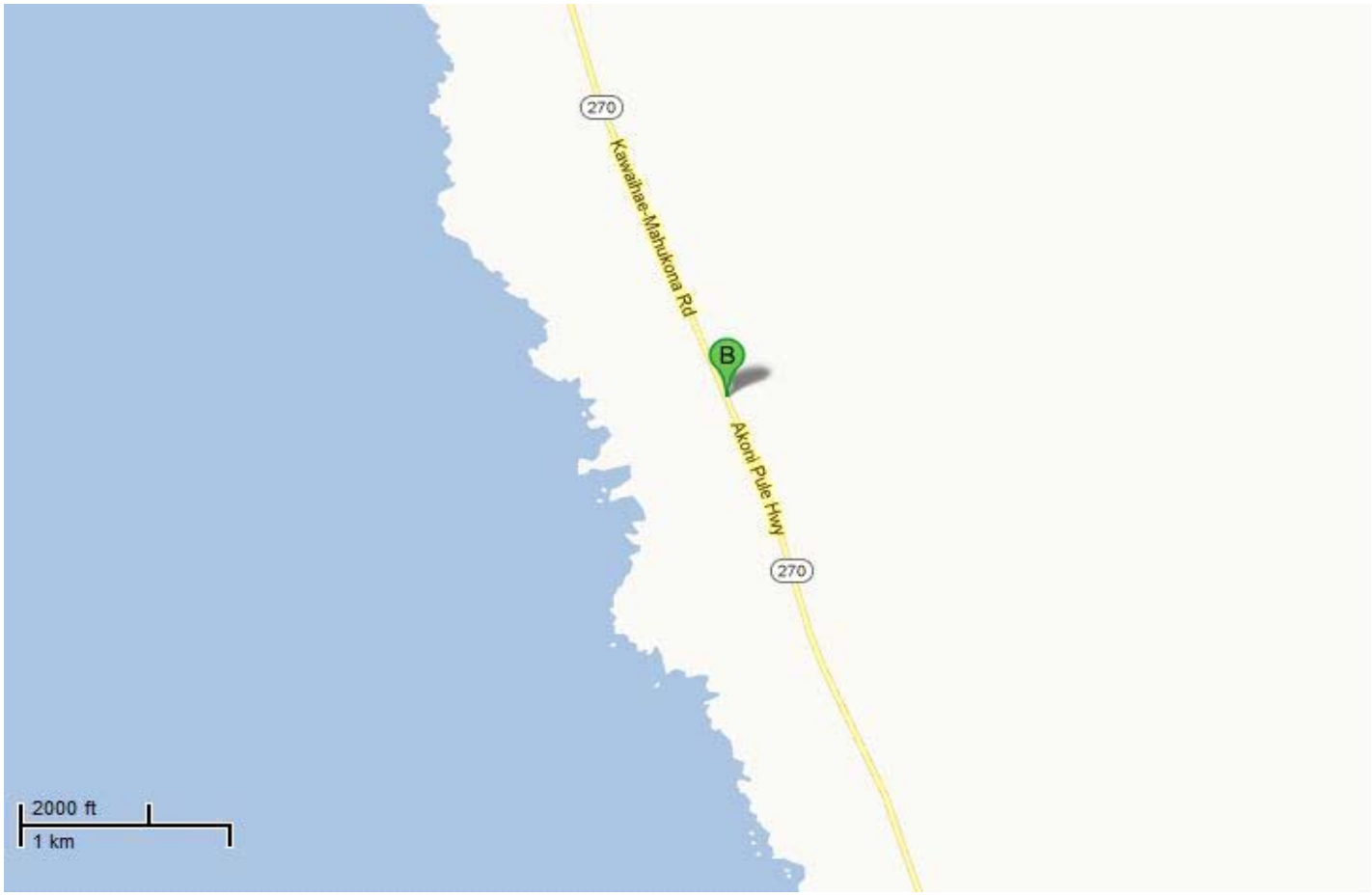
Inventory Form
(State)

General Information

Bridge Number: 001002700500655	**Route No:** 270
Popular Name: 3-cell Metal Pipe Culvert	
Feature Crossed: Unnamed Stream (Triple Metal Culvert)	
Feature Carried: Akoni Pule Highway	
Milepost: 9.94 mi.	**Island:** Hawaii
Longitude: 155d-52m-47.12s	**Latitude:** 20d-07m-08.93s

Location: 5.60 Miles North of Maluokalani Street
Historic Name: 3-cell Metal Pipe Culvert
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? Yes **Alteration Date(s):** 2000		
Alteration Type(s):		
Alteration Description(s): Culvert was cleaned and painted. Riprap apron was constructed.		

Bridge Information

Number of Spans: 3	**Max Span:** 8.9 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 56.4 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The triple pipe arch culvert carries Kawaihae Mahukona Road across the stream. This steel and masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has three metal pipes and a lava rock head wall and wing walls. Repair work has been done by a bridge crew in 2000. The simple design of the culvert retains its historic feeling.

001002700500655 3-cell Metal Pipe Culvert

Significance Statement:

This bridge is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

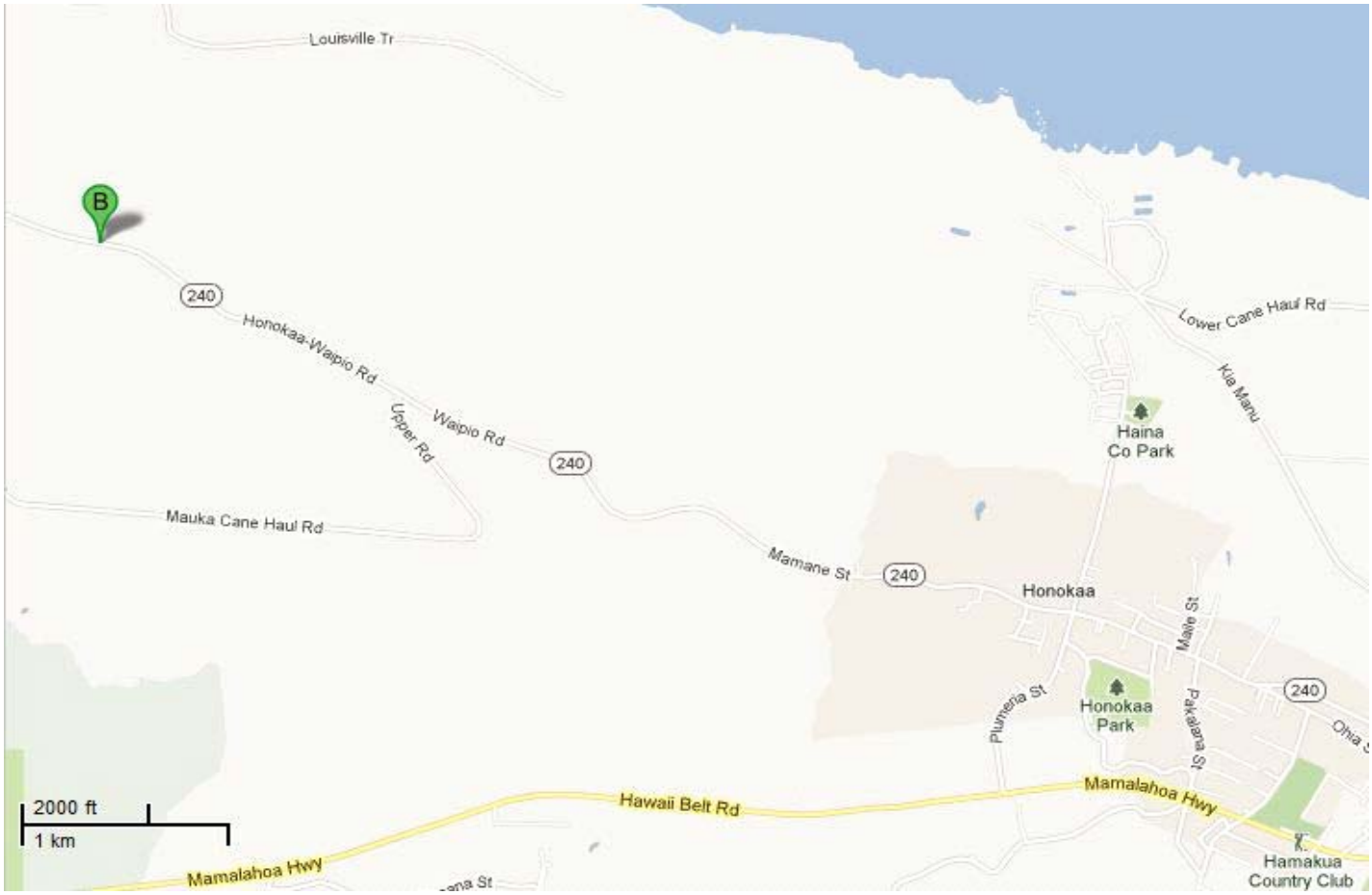
Inventory Form
(State)

General Information

Bridge Number: 001002400500487 **Route No:** 240	
Popular Name: 3-Cell Pipe Culvert-Honokaia Stream	
Feature Crossed: Honokaia Stream	
Feature Carried: Honokaa-Waipio Road	
Milepost: 4.81 mi. **Island:** Hawaii	
Longitude: 155d-30m-54.74s **Latitude:** 20d-05m-48.18s	

Location: 4.87 Miles East of Waipio Valley Lookout
Historic Name: 3-Cell Pipe Culvert-Honokaia Stream
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 15.1 ft.	**Total Length:** 50.9 ft.	**Deck Width:** 39.4 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The three cell corrugated metal pipe culvert carries Hawaii Belt Road across the Honokaia stream. This masonry culvert is in its original location, in generally in good condition, and its materials remain intact. The culvert has three metal pipes and features lava rock head walls. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001002400500487 3-Cell Pipe Culvert-Honokaia Stream

Significance Statement:

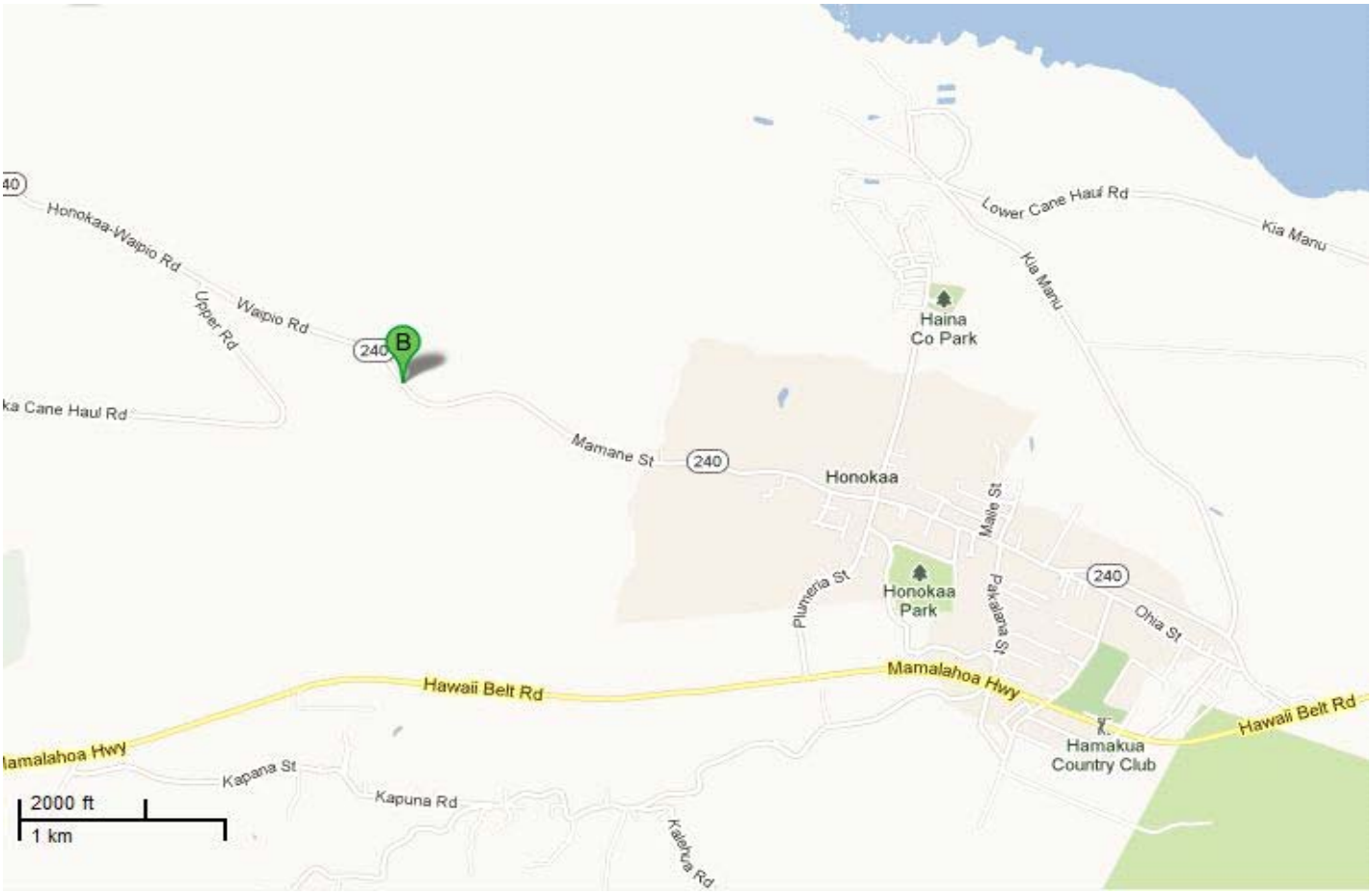
This bridge is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 001002400500691	**Route No:** 240
Popular Name: 3-Cell Pipe Culvert-Kainapahoa Stream	
Feature Crossed: Kainapahoa Stream	
Feature Carried: Honokaa-Waipio Road	
Milepost: 2.99 mi.	**Island:** Hawaii
Longitude: 155d-29m-28.15s	**Latitude:** 20d-05m-03.89s
Location: 1.14 Miles West of Kahili Street	
Historic Name: 3-Cell Pipe Culvert-Kainapahoa Stream	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 14.1 ft.	**Total Length:** 50.9 ft.	**Deck Width:** 39.4 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Kainapahoa Stream triple cell, corrugated metal pipe culvert carries Hawaii Belt Road across the Kainapahoa Stream. This steel and masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has three metal pipes which had been lined with concrete. The culvert contains an angled rock masonry head wall design depicting adaptation within the locale. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

Significance Statement:

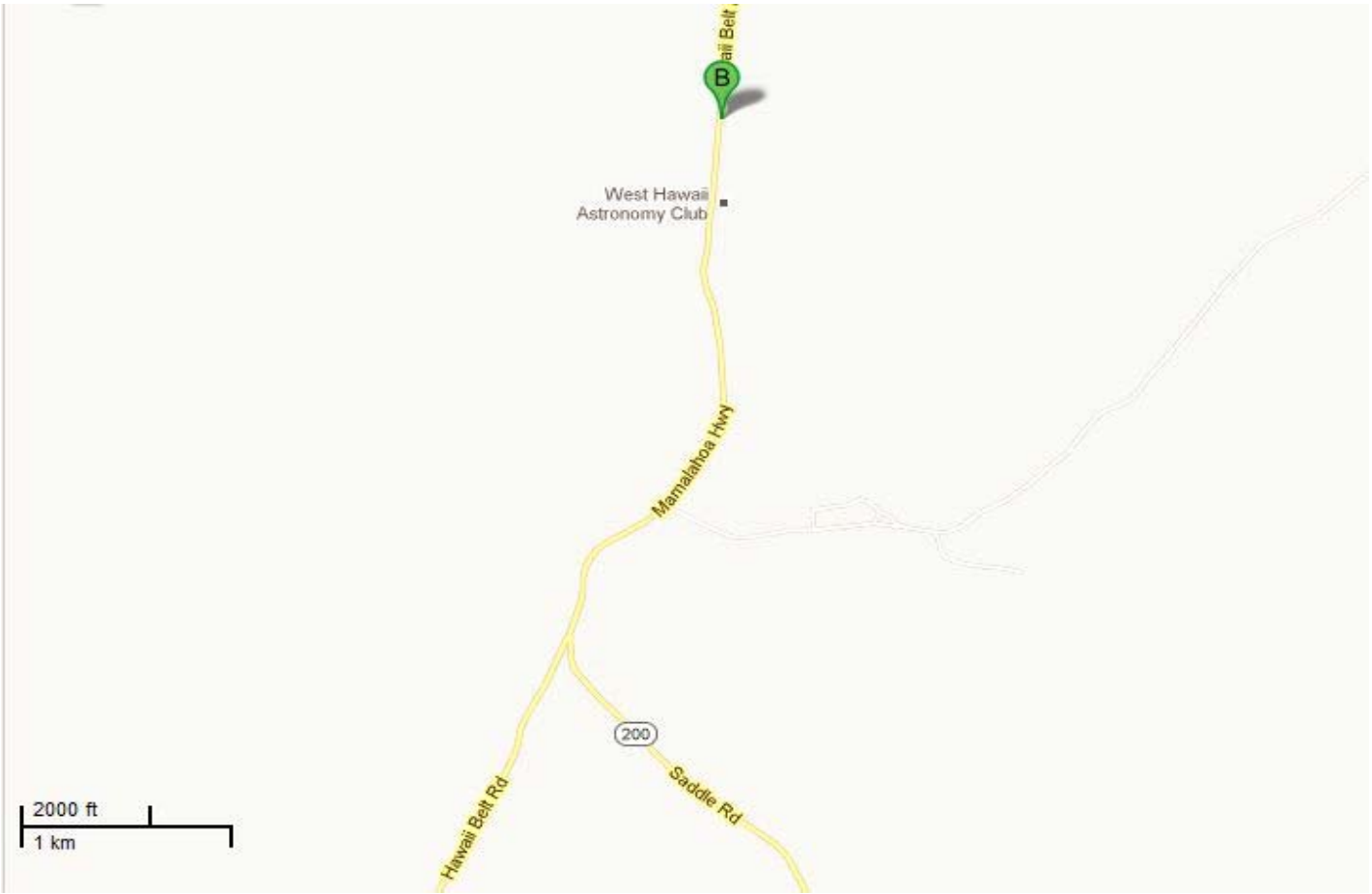
This bridge is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 001001900503111	**Route No:** 190
Popular Name: 3-Cell Pipe Culvert-Kamakoa Bridge No. 2	
Feature Crossed: Kamakoa Stream No. 2	
Feature Carried: Mamalahoa Highway	
Milepost: 7.58 mi.	**Island:** Hawaii
Longitude: 155d-41m-48.07s	**Latitude:** 19d-55m-06.50s
Location: 1.35 Miles South of Saddle Road (Route 200)	
Historic Name: 3-Cell Pipe Culvert-Kamakoa Bridge No. 2	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 11.2 ft.	**Total Length:** 36.1 ft.	**Deck Width:** 65.0 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Kamakoa #2 three cell corrugated metal pipe culvert carries Hawaii Belt Road across the Kamakoa Stream. This steel and masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has three metal pipes and lava rock head walls and wing walls. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for distinctive lava rock head walls and wing walls. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 001000110310410 **Route No:** 11

Popular Name: 3-Metal Pipe Culvert

Feature Crossed: Triple Pipe Culvert (Volcano)

Feature Carried: Hawaii Belt Road (Volcano Road)

Milepost: 18.46 mi. **Island:** Hawaii

Longitude: 155d-08m-33.53s **Latitude:** 19d-30m-12.15s

Location: 2.61 Miles South of North Peck Road

Historic Name: 3-Metal Pipe Culvert

Designer/Engineer:

Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Metal Corrugated Culvert	**Construction Date:** 1966	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 15.1 ft.	**Total Length:** 59.1 ft.	**Deck Width:** 71.9 ft.
Superstructure:			
Substructure: Metal Corrugated Culvert			
Floor/Decking: AC Pavement			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Culvert	**Historic Function:** Culvert	
Area of Significance: Engineering		

Narrative Description:

The Triple pipe culvert carries Hawaii Belt Road across the stream. This masonry culvert is in its original location, is generally in good condition, and its materials remain intact. The culvert has two metal pipes though the culvert. The workmanship of the bridge has not been obscured by addition or repair. The simple design of the culvert retains its historic feeling.

001000110310410 3-Metal Pipe Culvert

Significance Statement:

This culvert is eligible under Criterion C for unique lava rock culvert in Hawaii. It is a good example of a culvert that uses local material, is typical of its period in its use of materials, method of construction, craftsmanship, and design.

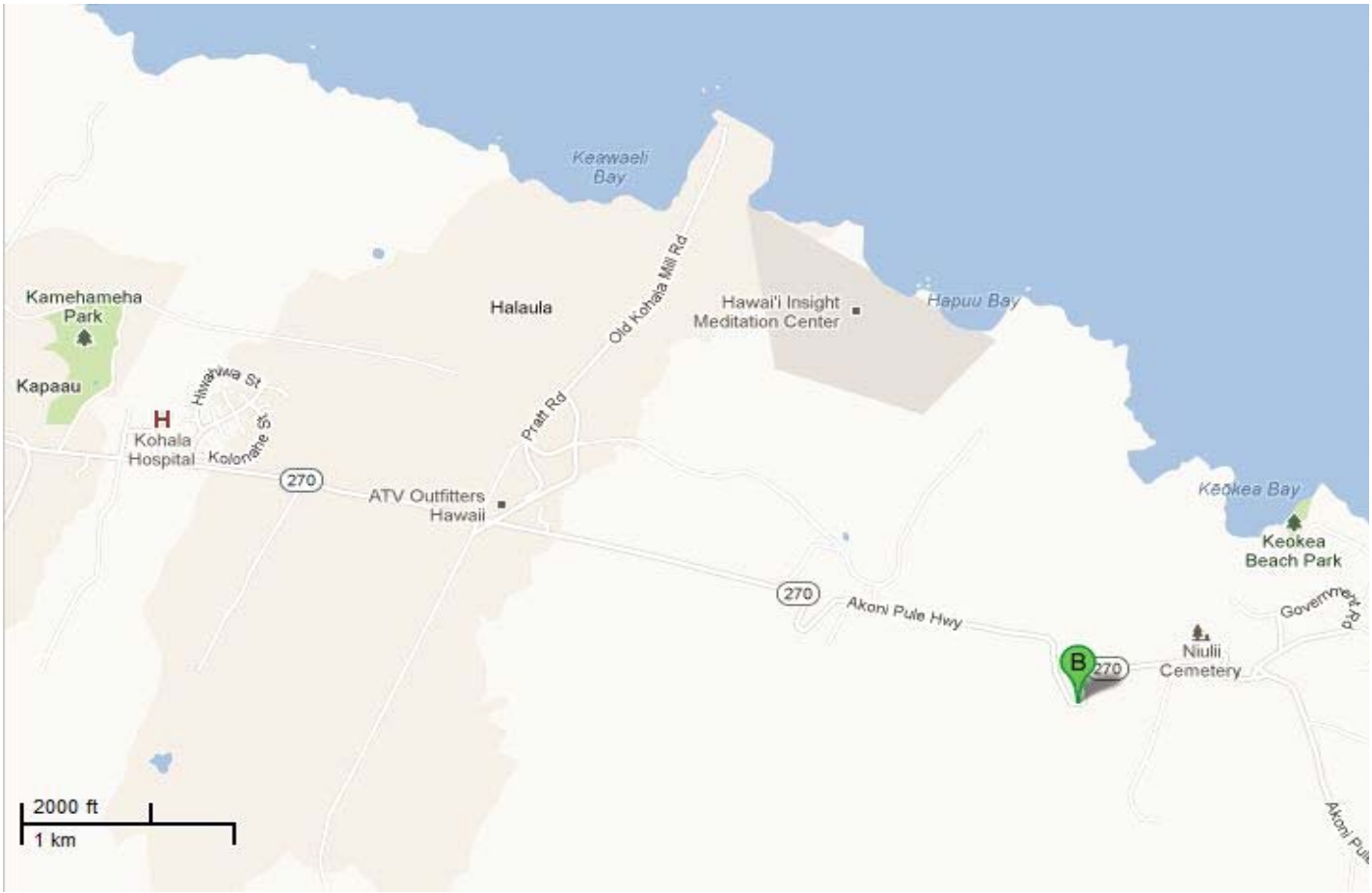
Inventory Form
(State)

General Information

Bridge Number: 001002700502318	**Route No:** 270
Popular Name: Aamakoa Stream Bridge	
Feature Crossed: Aamakoa Gulch	
Feature Carried: Akoni Pule Highway	
Milepost: 26.58 mi.	**Island:** Hawaii
Longitude: 155d-45m-19.34s	**Latitude:** 20d-13m-08.95s

Location: 0.76 Miles East of Akana Place
Historic Name: Aamakoa Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1918	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2009	
Alteration Type(s): Seismic Retrofit		
Alteration Description(s): Bridge abutments and pier seismic retrofitted.		

Bridge Information

Number of Spans: 2	**Max Span:** 39.0 ft.	**Total Length:** 80.1 ft.	**Deck Width:** 20.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Aamakoa Gulch Bridge carries Hawi Niulii Road across the Asmakoa Gulch. This concrete bridge is in its original location and is generally in good condition. The bridge has concrete solid panel parapets with flat caps. One of the end parapets has the bridge name engraved. The masonry wall approach is attached to the curved solid parapet end. The concrete deck is supported by concrete piers and abutments which look to be new. The simple design of the parapet retains its historic feeling. The bridge was seismically retrofitted in 2009.

Significance Statement:

The bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. Although the structure looks to be replaced, the original parapets remain intact.

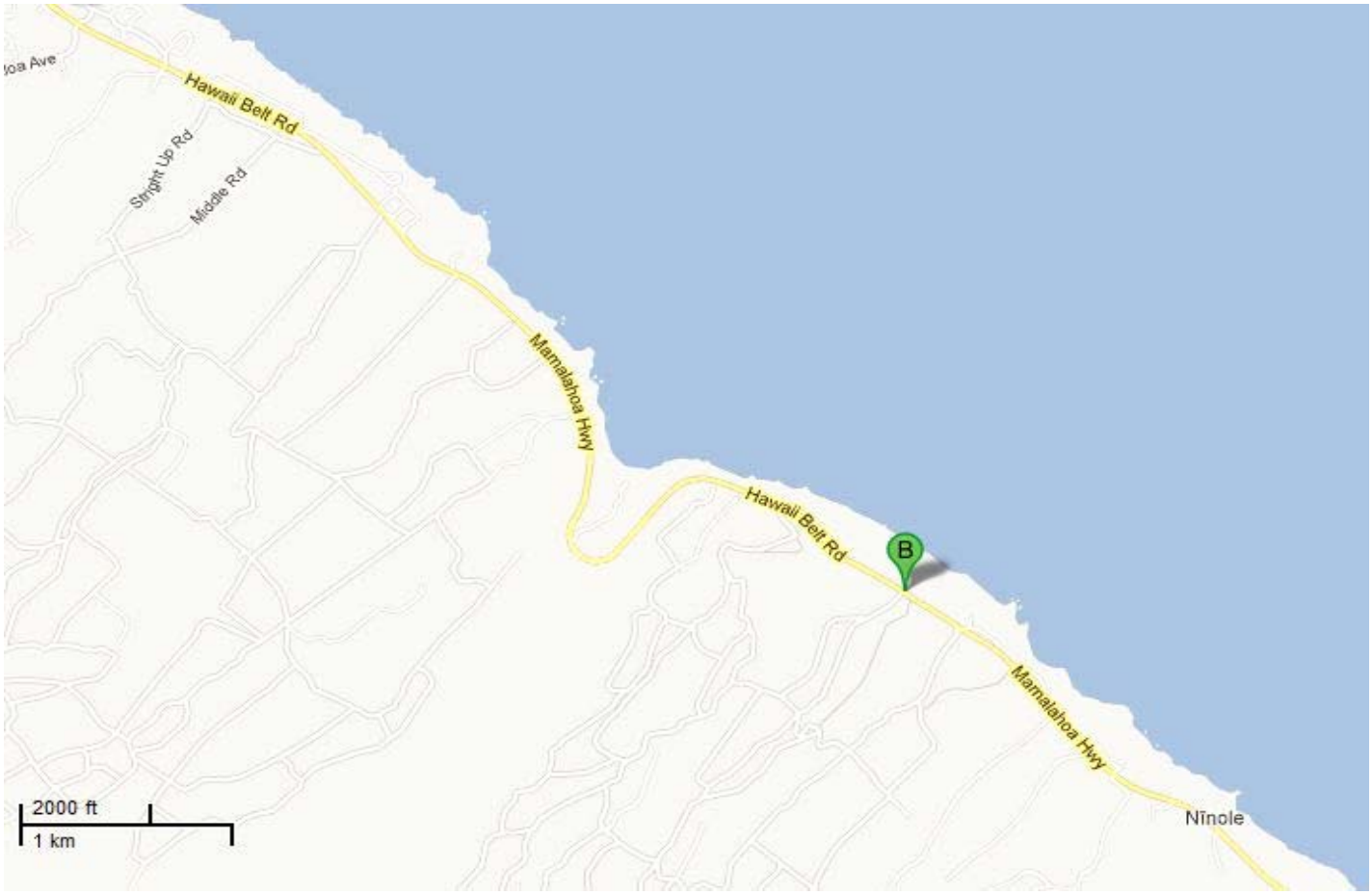
Inventory Form
(State)

General Information

Bridge Number: 001000190307917	**Route No:** 19
Popular Name: Ahole Stream Bridge	
Feature Crossed: Ahole Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 20.36 mi.	**Island:** Hawaii
Longitude: 155d-10m-58.07s	**Latitude:** 19d-56m-57.13s

Location: 3.95 Miles West of Kauniho Road
Historic Name: Ahole Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: Henry Freitas

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1934	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 65.0 ft.	**Total Length:** 137.1 ft.	**Deck Width:** 29.5 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Integral Abutment and Concrete Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction; brackets at rail and arched pier columns			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Ahole Bridge carries the Hawaii Belt Road (FAP 19) across the Ahole Stream on the island of Hawaii. The structure is a two-span reinforced-concrete tee beam bridge.The Ahole Bridge retains its original location and setting at the mouth of Ahole Stream. The bridge's original continuous tee beam design and reinforced-concrete materials remain intact. The workmanship of the bridge has not been obscured by additions or repairs. The bridge is the work of Hawaii Island contractor, Henry Freitas. The continuous tee beam bridge was structurally innovative at the time of its construction. The bridge is readily visible from the adjacent Pohakupuka Church. The bridge's historic associations with Territorial efforts to upgrade the belt road and advances in concrete technology are apparent to informed observers.

Significance Statement:

The Ahole Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge was a significant element of the Territorial Belt Road Plan and contributed to the economic development of the region. The Ahole Bridge is eligible under Criterion C as a good example of federally-funded tee beam bridge constructed in the 1930s. Further, the bridge is representative of the "work of a master": William R. Bartels of the Territorial Highways Department.

Between 1932 and 1958, the Territory of Hawaii began to construct a modern highway, called the Hawaii Belt Road (FAP 19), around the island. The new road and a series of large, steel-reinforced concrete bridges straightened out, bisected, and often bypassed, the circuitous old government road. These bridges spanned gulches high above sea level and enabled the belt road to run a straighter course. The new road is an extraordinary engineering feat; it contains fifty-six bridges in forty-two miles, took twenty-two years to build, cost $54 million, and reduced the driving time between Hilo and Honokaa from over two hours to forty minutes.

The Ahole Bridge is an excellent example of the substantial yet attractive bridges built with Federal Aid funds. The Ahole Bridge was one of the first major concrete tee beam highway bridges constructed during the upgrading of the Hawaii Belt Road in the 1930s. These Federal Aid bridges did not scrimp on ornament, and every attempt was made to add beauty to utility. Ahole's girders were haunched to give the impression of an arch, and brackets were added under the railings at each pier column. Adjacent to the bridge is the historic Pohakupuka Congregational Church, built in the early-twentieth century to serve the Christian congregation on the nearby sugar plantations.
The contractor on the Ahole Bridge was Henry Freitas, who built St. Louis College in Honolulu. Freitas and his son George, founder of the Pacific Construction Company, built many other Federal Aid bridges of this era.

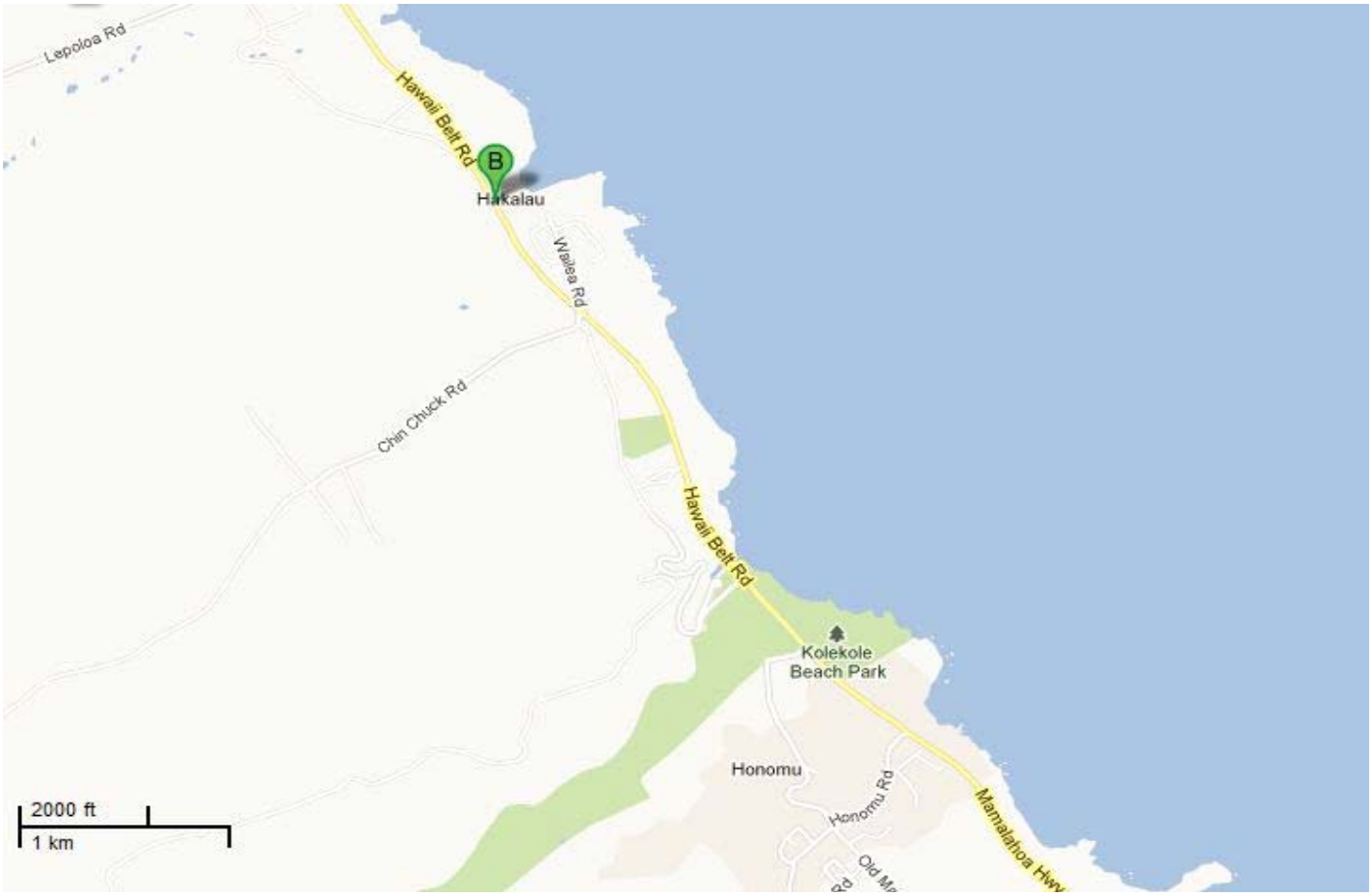
(1) Russell Apple, Ala Kahakai: A phrase in the Hawaiian language meaning Trail by the Sea…a walk through one Hundred and Fifty Years of History on the Island of Hawaii (Hawaii National Park, Hawaii: Macappleville Press, 1994), 57.
(2) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 230.
(3) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 248.

Inventory Form
(State)

General Information

Bridge Number: 001000191108426 **Route No:** 19	
Popular Name: Hakalau Plantation Road Overpass	
Feature Crossed: Hawaii Belt Road (Hakalau Plantation Road Overpass)	
Feature Carried: Plantation Road	
Milepost: 15.29 mi. **Island:** Hawaii	
Longitude: 155d-07m-45.10s **Latitude:** 19d-53m-53.46s	
Location: 1.14 Miles East of Kauniho Road	
Historic Name: Hakalau Plantation Road Overpass	
Designer/Engineer: William R. Bartels	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1953	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 79.1 ft.	**Total Length:** 83.0 ft.	**Deck Width:** 16.4 ft.
Superstructure: Steel Two-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Agriculture, Engineering		

Narrative Description:

The Hawaii Belt Road-Hakalau Plantation Road Bridge is a concrete tee-beam/steel stringer structure, constructed in 1953, to cross over the Hawaii Belt Road in South Hilo district. This bridge is part of the “Seismic Wave Damage Rehabilitation Project”. The steel girders of this bridge were salvaged from the 80’ span of Maulua Gulch Railroad Bridge, where they were used as lateral cross-bracing members. The bridge remains in its original location and the rural/coastal setting has not changed. Workmanship can be seen in the concrete formwork. The original design and materials are mostly intact. The guard railings are composed of a reinforced concrete balustrade penetrated with horizontal rectilinear voids with a concrete rail cap, common in the post-war era. Like all of the bridges along this stretch of the Hawaii Belt Road, this bridge has a degree of historic character.

Significance Statement:

This bridge is eligible for its association to the sugar plantation industry in Hawaii and the Hawaii Belt Road. It is also representative of the work of a master: William R. Bartels.

See Hawaii Belt Road historic context Chapter 2.5.

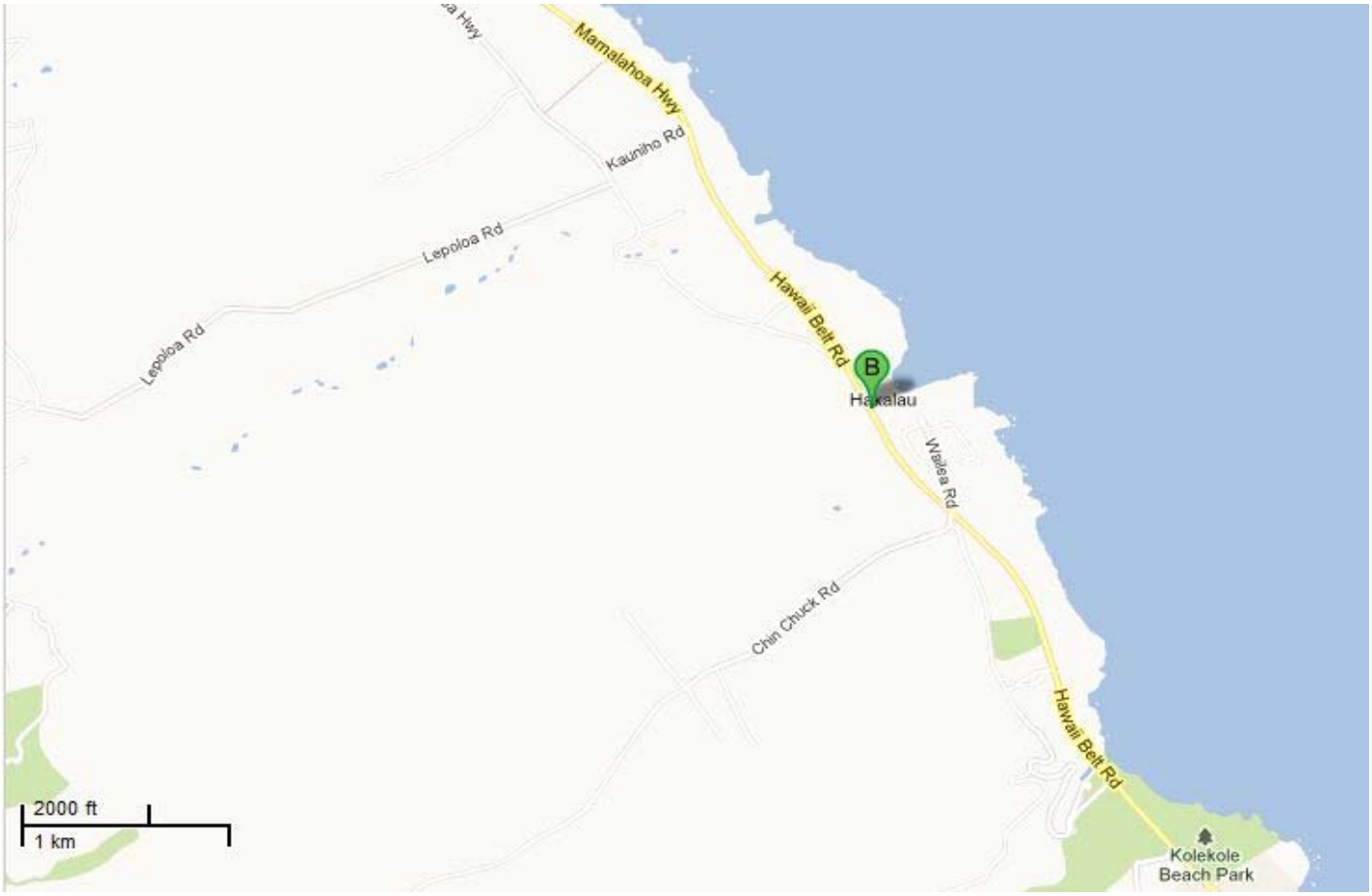
Inventory Form
(State)

General Information

Bridge Number: 001000190308410	**Route No:** 19
Popular Name: Hakalau Stream Bridge	
Feature Crossed: Hakalau Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 15.30 mi.	**Island:** Hawaii
Longitude: 155d-07m-47.40s	**Latitude:** 19d-53m-57.42s

Location: 1.12 Miles East of Kauniho Road
Historic Name: Hakalau Stream Bridge
Designer/Engineer: John Mason Young (1911) / William R. Bartels (1953)
Builder/Contractor: W. W. Beers (1911) - Fabricator: Hamilton and Chambers, N.Y. (1911) / Independent Iron Works, Ca. (1953)

Location Map:



Construction Information

Bridge Type: Steel Trestle	**Construction Date:** 1953	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1953	
Alteration Type(s):		
Alteration Description(s): The highway bridge is a reconstructed railroad trestle		

Bridge Information

Number of Spans: 14	**Max Span:** 71.9 ft.	**Total Length:** 774.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction (added 1953)			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. This bridge is eligible under Criterion C for being the longest steel bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969.

See National Register of Historic Places Nomination Form and see Post-War Hawaii Belt Road significance statement.

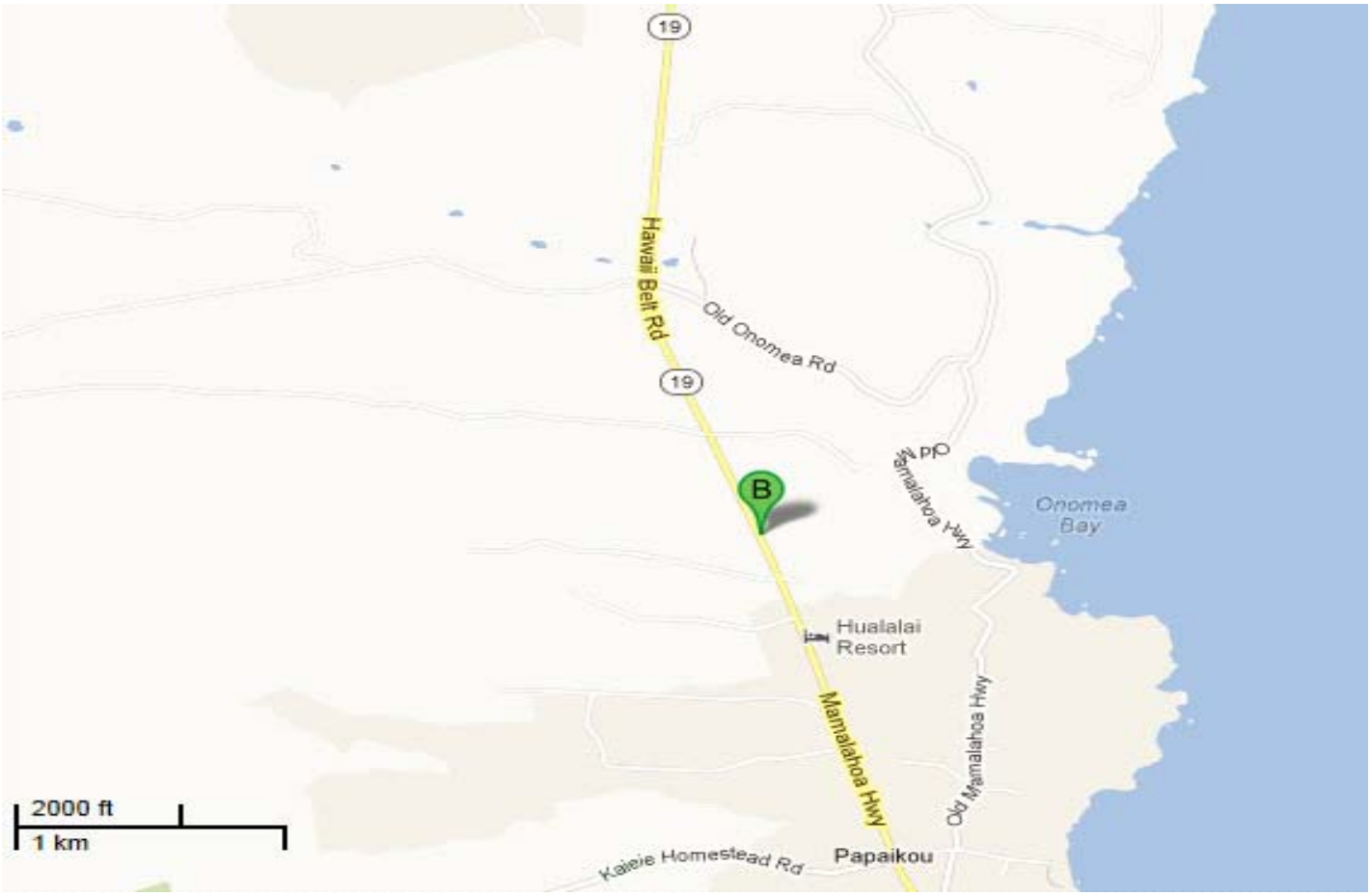
Inventory Form
(State)

General Information

Bridge Number: 001000190309124	**Route No:** 19
Popular Name: Hanawi Stream Bridge	
Feature Crossed: Hanawi Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 8.21 mi.	**Island:** Hawaii
Longitude: 155d-06m-03.51s	**Latitude:** 19d-48m-26.25s

Location: 1.23 Miles West of Kaieie Road
Historic Name: Hanawi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1968	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 82.0 ft.	**Total Length:** 423.9 ft.	**Deck Width:** 34.4 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Hanawi Stream Bridge is a concrete girder bridge, constructed in 1968 to carry the Hawaii Belt Road over Hanaw Stream from Honokaa to Hilo in Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. The original design and materials are mostly intact however, thrie beams are attached to the ends of the parapets. The parapets are solid concrete with horizontal metal rails which are a common parapet type of post-war bridges. The rural setting contributes to the historic character of the bridge.

Significance Statement:

This bridge is eligible under Criterion C for being the longest concrete bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

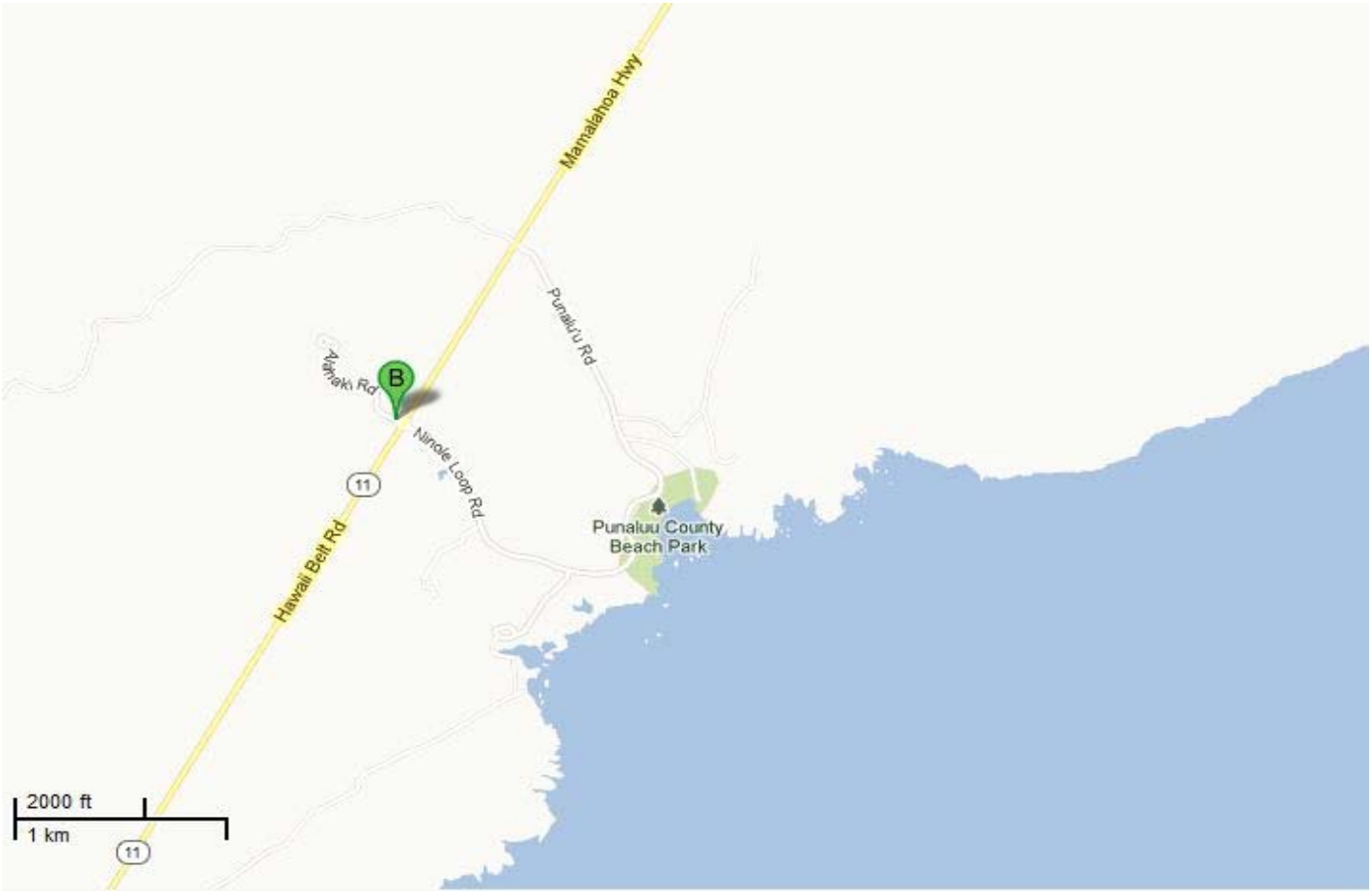
Inventory Form
(State)

General Information

Bridge Number: 001000110306489	**Route No:** 11
Popular Name: Hilea Stream Bridge	
Feature Crossed: Hilea Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 57.72 mi.	**Island:** Hawaii
Longitude: 155d-31m-33.33s	**Latitude:** 19d-07m-28.86s

Location: 2.84 Miles North of Honuapo Wharf Road
Historic Name: Hilea Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 19.0 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 26.9 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck with AC Overlay			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Hilea Stream Bridge carries the Hawaii Belt Road across the Hilea Stream. This wood bridge is in its original location, is generally in good condition, and its materials remain mostly intact. The bridge has a white wooden parapet on both sides and a wooden deck. Concrete rock masonry abutments support the timber bridge. The workmanship of the bridge has not been obscured by additions or repairs. The MOA between DOT and the Central Federal Lands considering the bridge for replacement in 2013 was completed.

Significance Statement:

This bridge is eligible under Criterion C for its association with wood bridge construction in Hawaii. It is a good example of a wood bridge in the 1940s in its use of materials, method of construction, craftsmanship, and design.

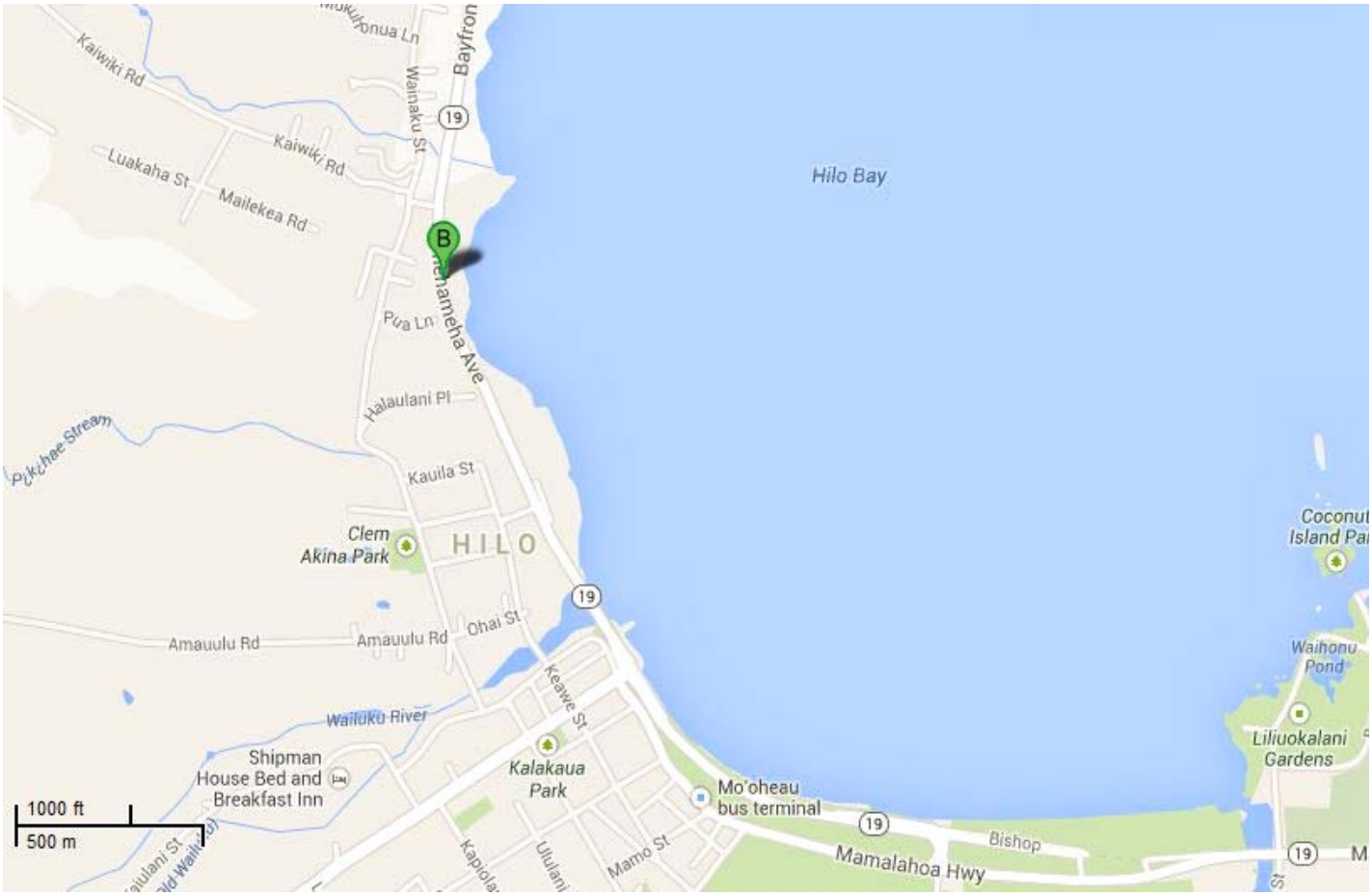
Inventory Form
(State)

General Information

Bridge Number: 001000190009643	**Route No:** 19
Popular Name: Hilo Plantation Flume Overpass	
Feature Crossed: Hawaii Belt Road	
Feature Carried: Hilo Plantation Flume	
Milepost: 3.10 mi.	**Island:** Hawaii
Longitude: 155d-05m-28.73s	**Latitude:** 19d-44m-08.92s

Location: 0.35 Miles West of Pukihae Street
Historic Name: Hilo Plantation Flume Overpass
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1949	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 74.1 ft.	**Total Length:** 182.1 ft.	**Deck Width:** 15.1 ft.
Superstructure: Concrete Through Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Flume	**Historic Function:** Flume	
Area of Significance: Agriculture, Engineering		

Narrative Description:

The Hilo Flume Overpass Hawaii Belt Road. This reinforced concrete flume is in its original location but in poor condition. The concrete box flume is supported by concrete pier and abutments. The workmanship of the flume has not been obscured by addition or repair and the simple design of the flume retains its historic feeling. The state of Hawaii maintains the bridge however it is not in use and the ownership is unknown.

Significance Statement:

The design of the flume does not have much character defining features but its associated with the plantation industry. The flume looks to be used to transport merely water. This region is Hawaii's wet district, starting at Upolu Point, the northern tip of the island, and running through Hamakua and into the Hilo District, which supported many large sugar plantations.

The flume is eligible under Criterion C for being the earliest concrete flume bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969.

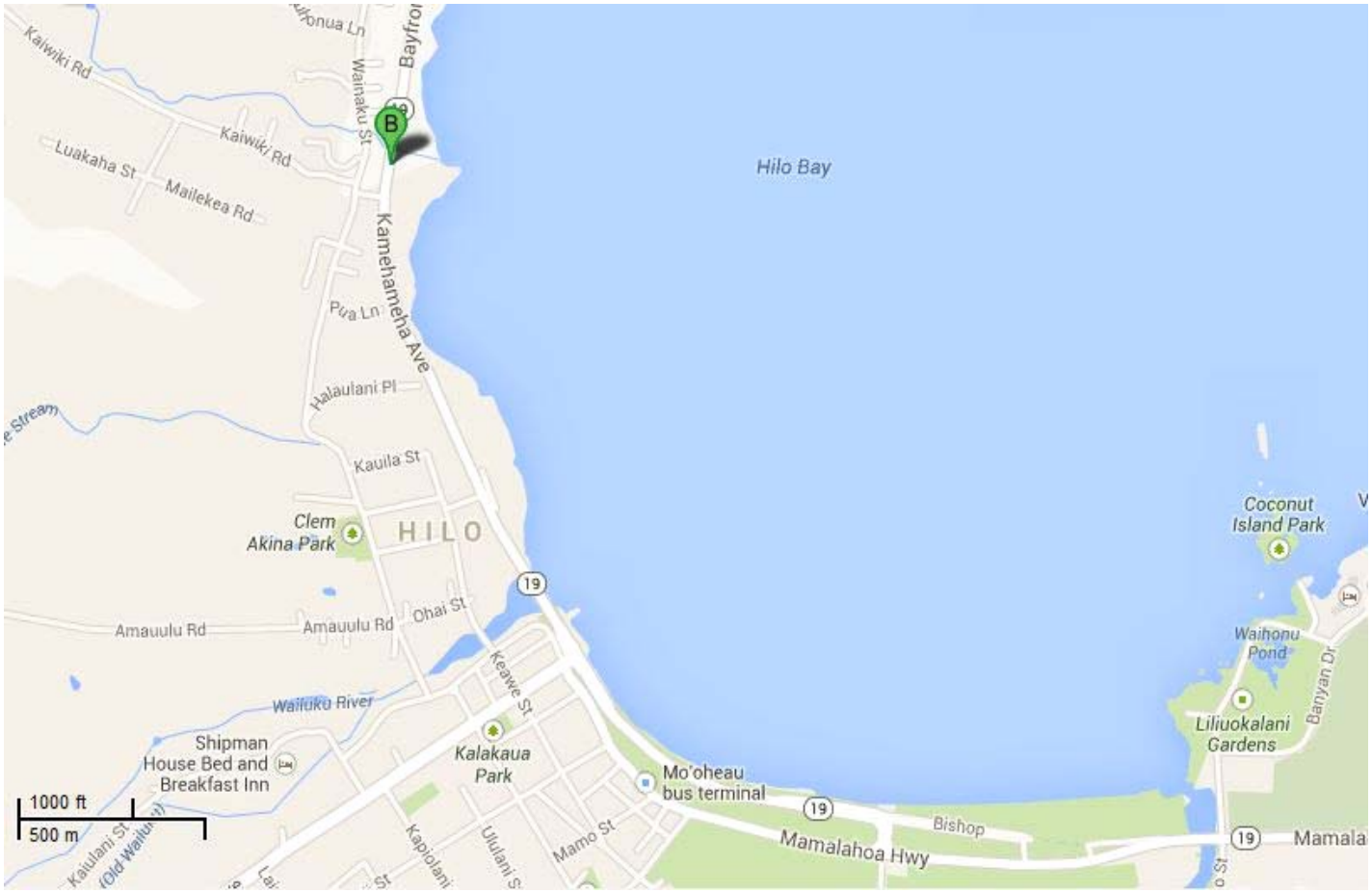
Inventory Form
(State)

General Information

Bridge Number: 001000191109626	**Route No:** 19
Popular Name: Hilo Plantation Road Overpass	
Feature Crossed: Hawaii Belt Road (Hilo Plantation Road Overpass)	
Feature Carried: Plantation Road	
Milepost: 3.28 mi.	**Island:** Hawaii
Longitude: 155d-05m-28.67s	**Latitude:** 19d-44m-17.73s

Location: 0.05 Miles West of Hau Street
Historic Name: Hilo Plantation Road Overpass
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1949	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 45.9 ft.	**Total Length:** 126.0 ft.	**Deck Width:** 37.1 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** A	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Agriculture		

Narrative Description:

The Hilo Plantation Road Overpass carries Hawaii Belt Road across Plantation Road. This reinforced concrete bridge is in its original location but in poor condition. The bridge has concrete open horizontal parapets, concrete deck, and concrete piers and abutments. The workmanship of the bridge has not been obscured by addition or repair. The state of Hawaii maintains the bridge however it is not in use and the ownership is unknown.

Significance Statement:

The design of the bridge does not have much character defining features but its associated with the plantation industry. This region is Hawaii's wet district, starting at Upolu Point, the northern tip of the island, and running through Hamakua and into the Hilo District, which supported many large sugar plantations. From Niulii in North Kohala, the coast is a series of canyons with rivers pouring out of the Kohala Mountains or off of Mauna Kea. Travel was problematic closer to the coast. However, the towns were situated along the coast so one could stay on higher trails if the main purpose was to get from Waimea to Hilo or stop at one of the sheep stations in the uplands.

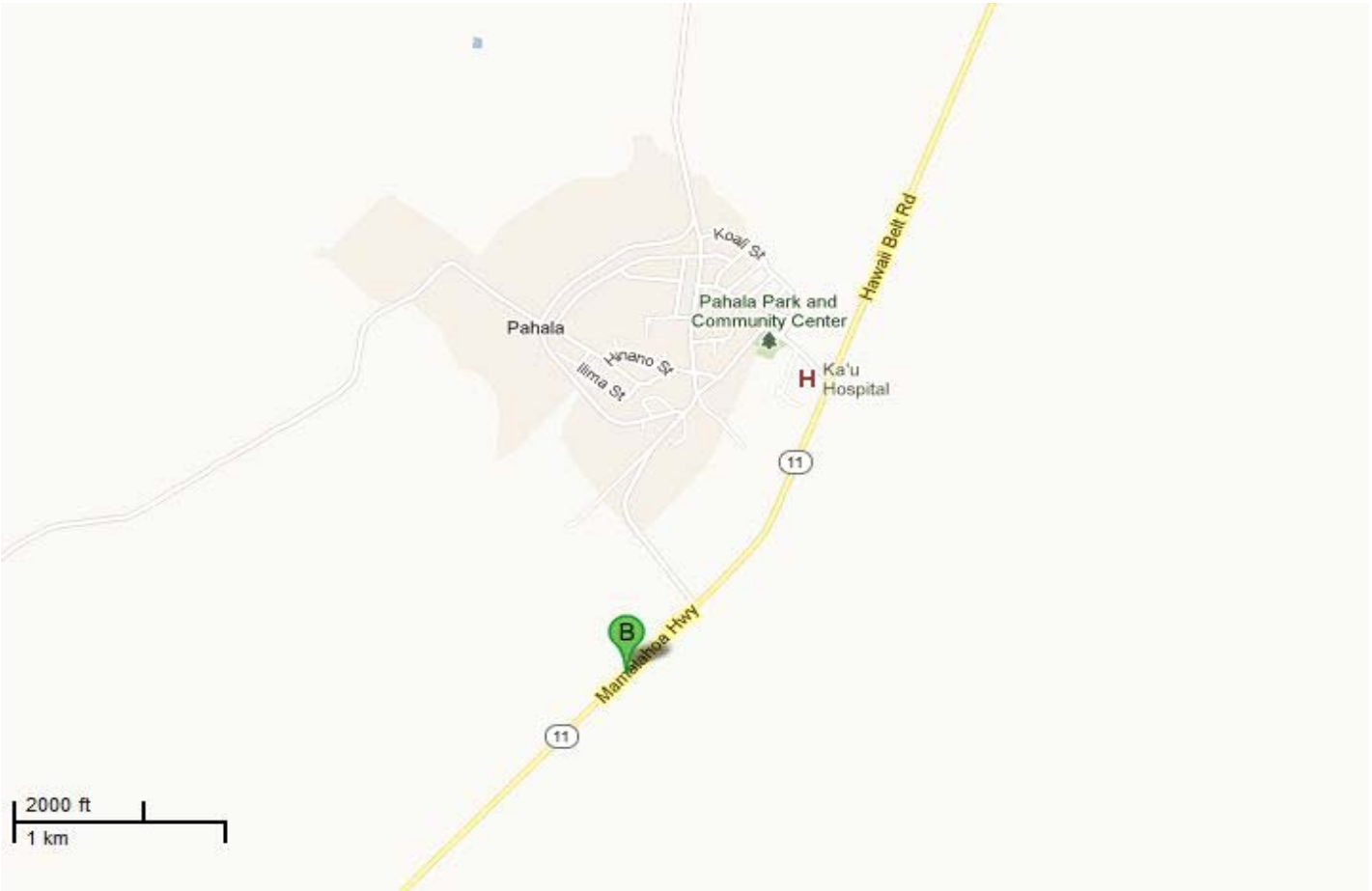
Inventory Form
(State)

General Information

Bridge Number: 001000110306996	**Route No:** 11
Popular Name: Hionomoa Stream Bridge	
Feature Crossed: Hionomoa Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 52.61 mi.	**Island:** Hawaii
Longitude: 155d-28m-54.87s	**Latitude:** 19d-11m-04.57s

Location: 0.43 Miles South of Maile Street
Historic Name: Hionomoa Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: George Freitas

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1938	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2003	
Alteration Type(s):		
Alteration Description(s): Metal thrie beam railing added in front of existing concrete bridge railing		

Bridge Information

Number of Spans: 1	**Max Span:** 69.9 ft.	**Total Length:** 82.0 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Incised bridge name and date of constructionon end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering and transportation		

Narrative Description:

The Hionomoa Bridge carries the Hawaii Belt Road (FAP 11) across the Hionomoa Stream within the Kau District of the island of Hawaii. The bridge is one of five reinforced-concrete rigid frame structures built in the pre-World War II period in Hawaii.

The bridge is in its original location and its rural setting has remained unchanged. The original concrete material of the bridge is in generally good condition and has not been altered by major repairs. Overall, the bridge exhibits a high degree of workmanship, particularly the attention given to the rail and the masonry (lava-rock) abutments. The rigid-frame bridge was technologically innovative for its time. The bridge's historic associations, as a product of the Territorial Highways Department effort to upgrade the belt road in the 1930s, is apparent to informed observers. The bridge’s historic feeling is primarily evident through its rail style which was typical of the 1930s.

Significance Statement:

The Hionomoa Bridge has made significant contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge was a significant facet of the Territorial Belt Road Plan and contributed to the economic development of Kau by providing economical transportation to the harbor for the sugar plantations located in that district. The reinforced-concrete rigid-frame bridge is eligible under Criterion C as an innovative example of bridge design utilizing new engineering technology, as well as for its aesthetic merit. The Hionomoa Bridge is representative of the "work of a master": William R. Bartels of the Territorial Highways Department (THD).

Between 1932 and 1958, the Territory of Hawaii began to construct a modern highway, called the Hawaii Belt Road (FAP 11). The bridge is one of seven (Hionomoa, Kaalaala, Kanenelu, Keaiwa, Moaula, Paauau and Piikea) bridges constructed along the highway in 1937 to serve the sugar plantations near Pahala in the Kau district.

This bridge is one of the first reinforced-concrete rigid-frame bridges constructed in the islands, and one of only five of this type built prior to WW II. The reinforced-concrete rigid-frame bridge demonstrates the rapid advances in engineering technology in the early decades of the twentieth century and are the most sophisticated of the pre-WWII bridges from an engineering perspective. The abutments and deck of rigid-frame bridges are constructed as one solid piece of concrete enabling the slab to double or triple the previous achievable span of twenty feet. This technology was not used in Hawaii until 1936, when William R. Bartels of the Territorial Highways Department developed the plans for the Wahiawa Bridge on Kauai and the Kaahumanu Avenue-Naniloa Drive Overpass in Wailuku, Maui. These were followed by two concrete rigid-frame bridges on Hawaii Island (including the Moaula Bridges) and one on Oahu.

Bartels work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers. Contractor George Freitas constructed both the Kealakaha and the Honolii Highway Bridges on the Hawaisi Belt Road, which were also designed by the THD.

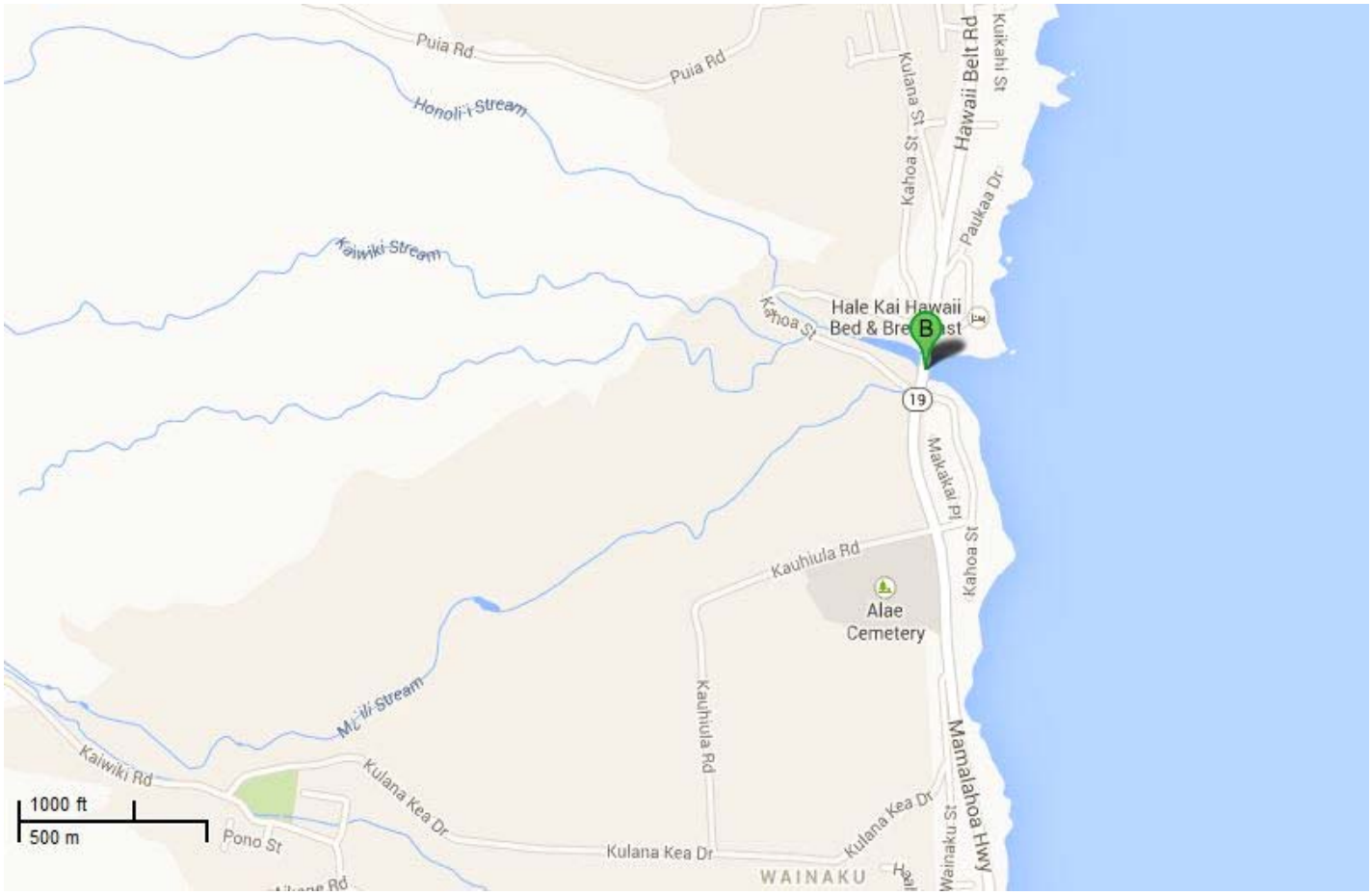
Inventory Form
(State)

General Information

Bridge Number: 001000190309493	**Route No:** 19
Popular Name: Honolii Stream Bridge	
Feature Crossed: Honolii Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 4.50 mi.	**Island:** Hawaii
Longitude: 155d-05m-31.90s	**Latitude:** 19d-45m-23.28s

Location: 0.11 Miles East of Paukaa Drive
Historic Name: Honolii Stream Bridge
Designer/Engineer: James O. Yapp
Builder/Contractor: George Freitas

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2002, 2009	
Alteration Type(s): Seismic Retrofit		
Alteration Description(s): Bridge piers and pier cap beams retrofitted with built-up concrete to increase size and strength. Concrete columns altered from T-shaped sections to square sections with chamfered corners.		

Bridge Information

Number of Spans: 8	**Max Span:** 98.1 ft.	**Total Length:** 544.0 ft.	**Deck Width:** 31.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction; brackets at rail and arched pier columns			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering and transportation		

Narrative Description:

The Honolii Bridge carries the Hawaii Belt Road (FAP 19) across the Honolii Stream north of Hilo on the island of Hawaii. The structure is a multi-span reinforced-concrete tee beam bridge. The Honolii Bridge retains its original setting at the mouth of Honolii Stream, downstream of the Mamalahoa-Honolii Bridge and the Mamalahoa-Maili Bridge (both constructed on the old Mamalahoa Highway in 1911). The bridge's original continuous tee beam design and reinforced-concrete materials remain intact. The bridge pier's columns were originally T-shaped but were seismically retrofitted in 2002 and 2009 and are now rectangular. The bridge is the work of skilled builders, who constructed the massive concrete bridge. The large continuous tee beam bridge was structurally innovative at the time of its construction. The bridge is highly visible from the old Mamalahoa Highway, which runs under the bridge. The bridge's historic associations with territorial efforts to upgrade the belt road and advances in concrete technology are readily apparent to all observers due to the juxtaposition of the 1936 bridge with the two adjacent older bridges on the old Mamalahoa Highway.

Significance Statement:

The Honolii Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge was a significant element of the Territorial Belt Road Plan and contributed to the economic development of the region. The Honolii Bridge is eligible under Criterion C as an excellent example of federally-funded tee beam bridge construction in the 1930s and is indicative of the advances in bridge technology in the early twentieth-century. Further, the bridge is representative of the “work of a master”: James O. Yapp of the Territorial Highways Department (THD).

Between 1932 and 1958, the Territory of Hawaii began to construct a modern highway, called the Hawaii Belt Road (FAP 19), around the island of Hawaii. The new road and a series of large, steel-reinforced concrete bridges straightened out, bisected, and often bypassed, the circuitous old government road. The new road is an extraordinary engineering feat; it contains fifty-six bridges in forty-two miles, took twenty-two years to build, cost $54 million, and reduced the driving time between Hilo and Honokaa from over two hours to forty minutes. (1)

The Honolii Bridge is an excellent example of the substantial, yet attractive, bridges built with Federal Aid funds. These bridges spanned gulches high above sea level and enabled the belt road to run a straighter course. Several bridges had previously been erected over the stream at its mouth, but a major restructuring of the road, which the Hilo Tribune called the "magnum opus of the County of Hawaii," brought it away from the beach and back into the valley in 1911. (2) The Honolii Bridge bypassed the long road into and out of the valley, which had previously necessitated three separate bridges. The caissons of the former railroad bridge, taken down in the late 1940s, are evident in the water near the pier footings of the concrete bridge.

The bridge’s continuous concrete tee-beam design was technically ambitious, particularly due to its extraordinary height and long spans; the construction of the bridge was considered to be a major engineering feat. It was one of the last major concrete tee beam highway bridges constructed along the Hawaii Belt Road prior to WWII. The Honolii Bridge was designed by James O. Yapp, the Hawaii District Engineer for the THD. He served in this capacity from 1930 to 1947 and also designed the Kapehu and Kaaluu Bridges. The contractor was George Freitas, founder of Pacific Construction Company, who built several other Federal Aid bridges. (3)

(1) Russell Apple, Ala Kahakai: A phrase in the Hawaiian language meaning Trail by the Sea…a walk through one Hundred and Fifty Years of History on the Island of Hawaii (Hawaii National Park, Hawaii: Macappleville Press, 1994), 57.
(2) Hilo Tribune (April 11, 1911), 2.
(3) Pacific Business News (September 8, 1986), 2.

Inventory Form
(State)

General Information

Bridge Number: 001000110306199 **Route No:** 11

Popular Name: Honuapo Bridge

Feature Crossed: Railroad (Honuapo)

Feature Carried: Hawaii Belt Road (Mamalahoa Highway)

Milepost: 60.60 mi. **Island:** Hawaii

Longitude: 155d-32m-58.76s **Latitude:** 19d-05m-20.88s

Location: 0.06 Miles South of Honuapo Wharf Road

Historic Name: Honuapo Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 20.0 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 44.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Railroad (Honuapo) Bridge carries the Hawaii Belt Road across a railroad crossing. This concrete bridge is in its original location, is generally in good condition, and its materials remain mostly intact with some patches on the railing starting to crack and a few transverse hairline cracks at the soffit. This bridge contains an aesthetically pleasing Greek cross rail that has been kept intact over the years. Reinforced concrete open arched balustrade with “Greek-cross” voids and concrete rail caps is a significant characteristic of this bridge.

Significance Statement:

This bridge is eligible under Criterion C for its association with the development of concrete bridge construction in Hawaii. It is a good example of a 1940's concrete bridge that is typical of its period in its use of materials, method of constructions, craftsmanship, and design.

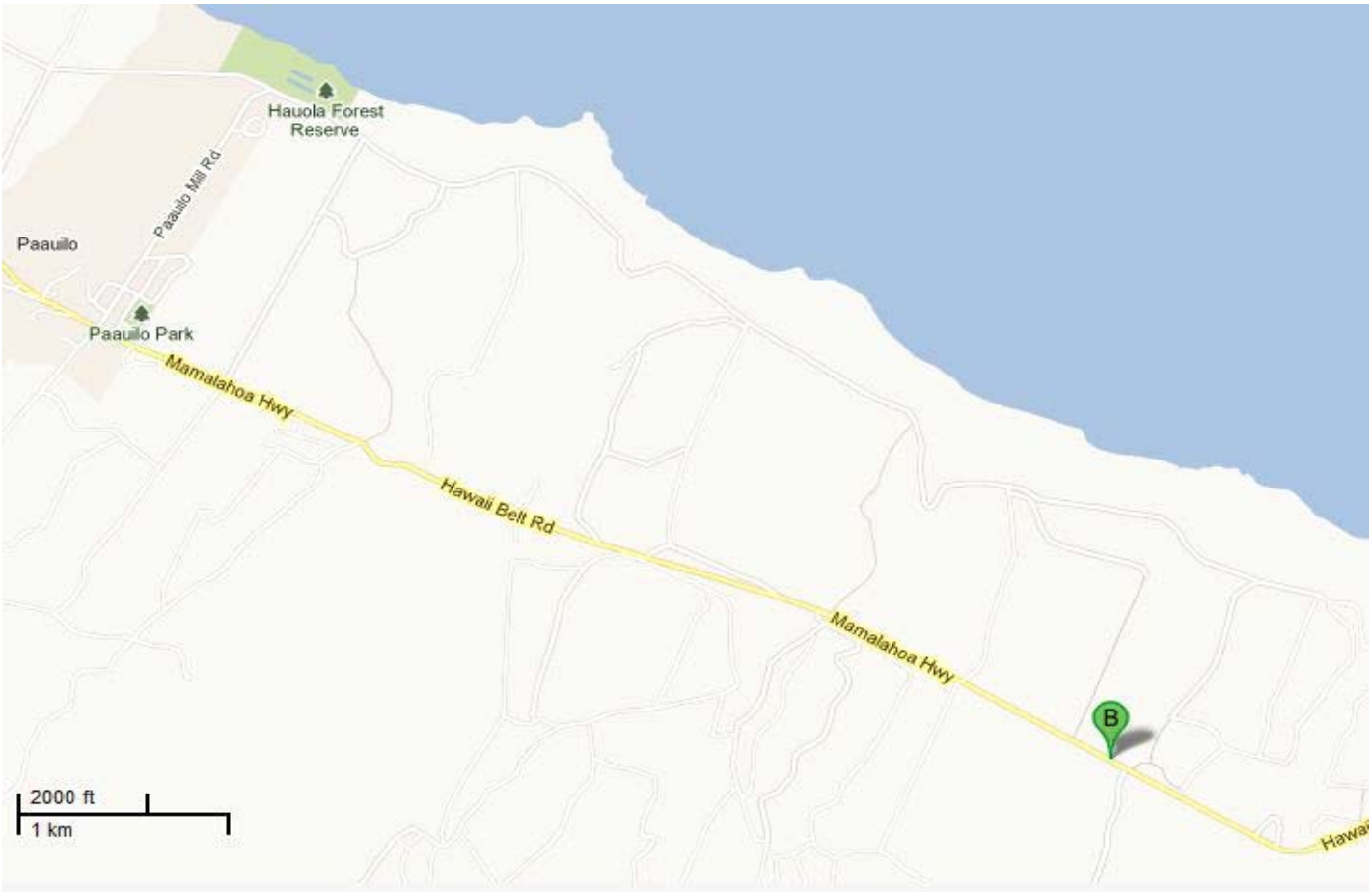
Inventory Form
(State)

General Information

Bridge Number: 001000190306695	**Route No:** 19
Popular Name: Kaala Stream Bridge	
Feature Crossed: Kaala Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 32.60 mi.	**Island:** Hawaii
Longitude: 155d-19m-19.77s	**Latitude:** 20d-01m-08.46s

Location: 3.93 Miles East of Paauilo Plantation Road
Historic Name: Kaala Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1935	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2001	
Alteration Type(s): Seismic Retrofit		
Alteration Description(s): Bridge abutments seismic retrofitted.		

Bridge Information

Number of Spans: 3	**Max Span:** 86.0 ft.	**Total Length:** 214.9 ft.	**Deck Width:** 29.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaaka Stream Bridge carries Hawaii Belt Road across the Kaala Stream. This reinforced concrete bridge is in its original location but in poor condition. The bridge has concrete open Greek cross parapets with stepped caps and curved wide solid end posts. End posts consist of stepped profile and one of the posts has the bridge name engraved. The concrete deck is supported by concrete piers and masonry abutments. Thrie beams were bolted to the end posts and small triangular concrete blocks were attached to the posts to create a flat surface. The simple design of the parapet retains its historic feeling. In 2001 the abutments were seismically retrofitted.

Significance Statement:

This bridge is eligible under Criterion C for its association with the development of concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 001000190307644	**Route No:** 19
Popular Name: Kaaluu Stream Bridge	
Feature Crossed: Kaalau Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 23.10 mi.	**Island:** Hawaii
Longitude: 155d-12m-29.50s	**Latitude:** 19d-58m-07.83s

Location: 6.11 Miles East of Ookala Access Road
Historic Name: Kaaluu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): Abutments and piers seismic retrofitted.		

Bridge Information

Number of Spans: 3	**Max Span:** 39.0 ft.	**Total Length:** 132.9 ft.	**Deck Width:** 28.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaaluu Stream Bridge carries Hawaii Belt Road across the Kaaluu Stream. This concrete bridge features two double arch piers. It is in its original location, is generally in good condition, and its materials remain intact. It is aesthetically similar to its neighbor, Kapehu Stream Bridge. The original concrete pier wall on both sides contains double arches that house a recessed alcove within. The original concrete diaphragm is cast between the girders at both pier walls, which are still in good condition. The original railings are concrete open arched and have been kept in their original state with deterioration over the years due to regular use. This bridge has an existing 8 inch waterline with surface rusting on the side of the bridge. Seismic retrofitting was done previously on this bridge by a private contractor.

Significance Statement:

This bridge is eligible under Criterion C for it association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

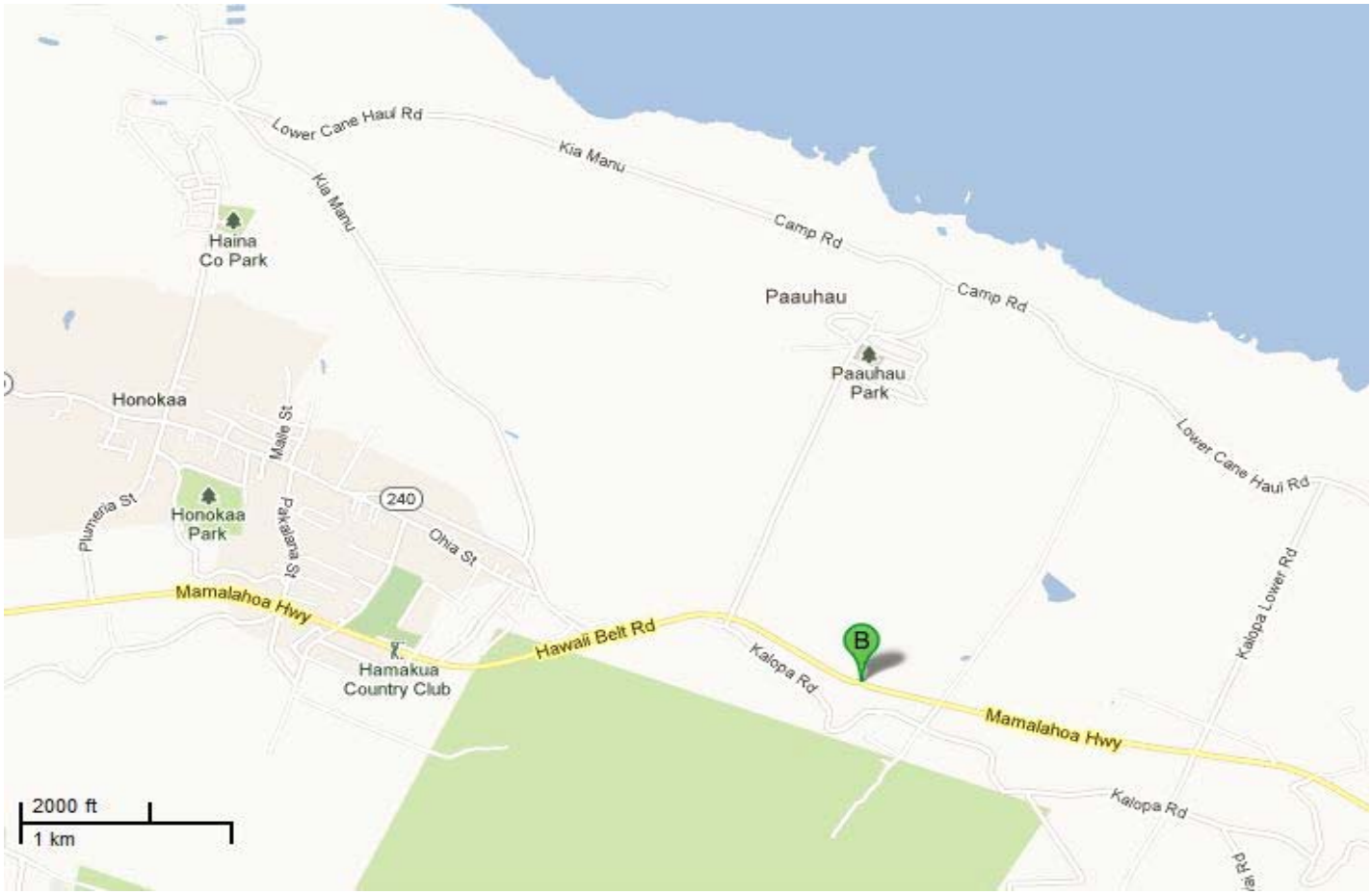
Inventory Form
(State)

General Information

Bridge Number: 001000190305863	**Route No:** 19
Popular Name: Kahawailiilii Stream Bridge	
Feature Crossed: Kahawailiilii Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 40.92 mi.	**Island:** Hawaii
Longitude: 155d-26m-17.01s	**Latitude:** 20d-04m-02.35s

Location: 0.83 Miles East of Mamane Street
Historic Name: Kahawailiilii Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1959	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1999	
Alteration Type(s):		
Alteration Description(s): End posts upgraded		

Bridge Information

Number of Spans: 3	**Max Span:** 107.0 ft.	**Total Length:** 216.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kahawailiilii Stream Bridge is a continuous concrete box beam/multiple girder bridge, constructed in 1959 to carry the Hawaii Belt Road over Kahawailiilii Gulch from Honokaa to Hilo in Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. An old horse trail remains along-side the bridge. The original design and materials are mostly intact although the end posts of the bridge were upgraded in 1999. The parapets are concrete open horizontal which is a common type of the post-war bridge. The elliptical ornaments on the end posts add to the bridge's artistic value and workmanship. The rural setting contributes to the historic character of the bridge. Interpretation is eased by the date of construction incised on the end piers.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

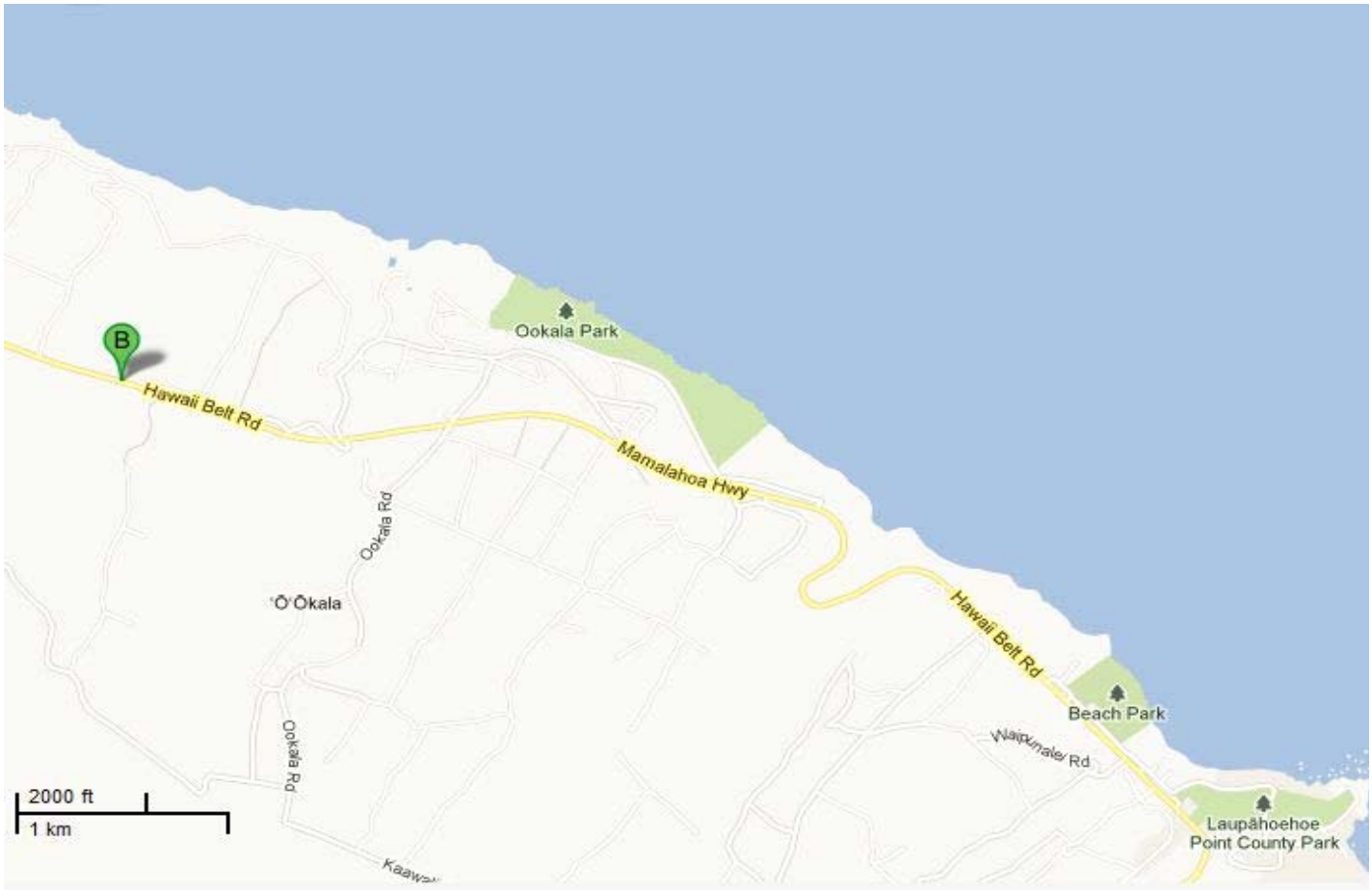
Inventory Form
(State)

General Information

Bridge Number: 001000190306865	**Route No:** 19
Popular Name: Kaholo Stream Bridge	
Feature Crossed: Kaholo Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 30.89 mi.	**Island:** Hawaii
Longitude: 155d-17m-54.46s	**Latitude:** 20d-00m-47.64s

Location: 1.68 Miles West of Ookala Access Road
Historic Name: Kaholo Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1935	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 89.9 ft.	**Total Length:** 225.1 ft.	**Deck Width:** 29.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaholo Stream Bridge carries Hawaii Belt Road across the Kaholo Stream. This concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has open Greek cross parapets with stepped caps and curved wide end posts. One of the end posts have the the bridge name engraved. The concrete deck is supported by concrete abutments. Thrie beams approaches were bolted to the end posts but the workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with the development of concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(State)

General Information

Bridge Number: 001000190306021 **Route No:** 19

Popular Name: Kalopa Stream Bridge

Feature Crossed: Kalopa Stream

Feature Carried: Hawaii Belt Road

Milepost: 39.33 mi. **Island:** Hawaii

Longitude: 155d-24m-53.13s **Latitude:** 20d-03m-41.30s

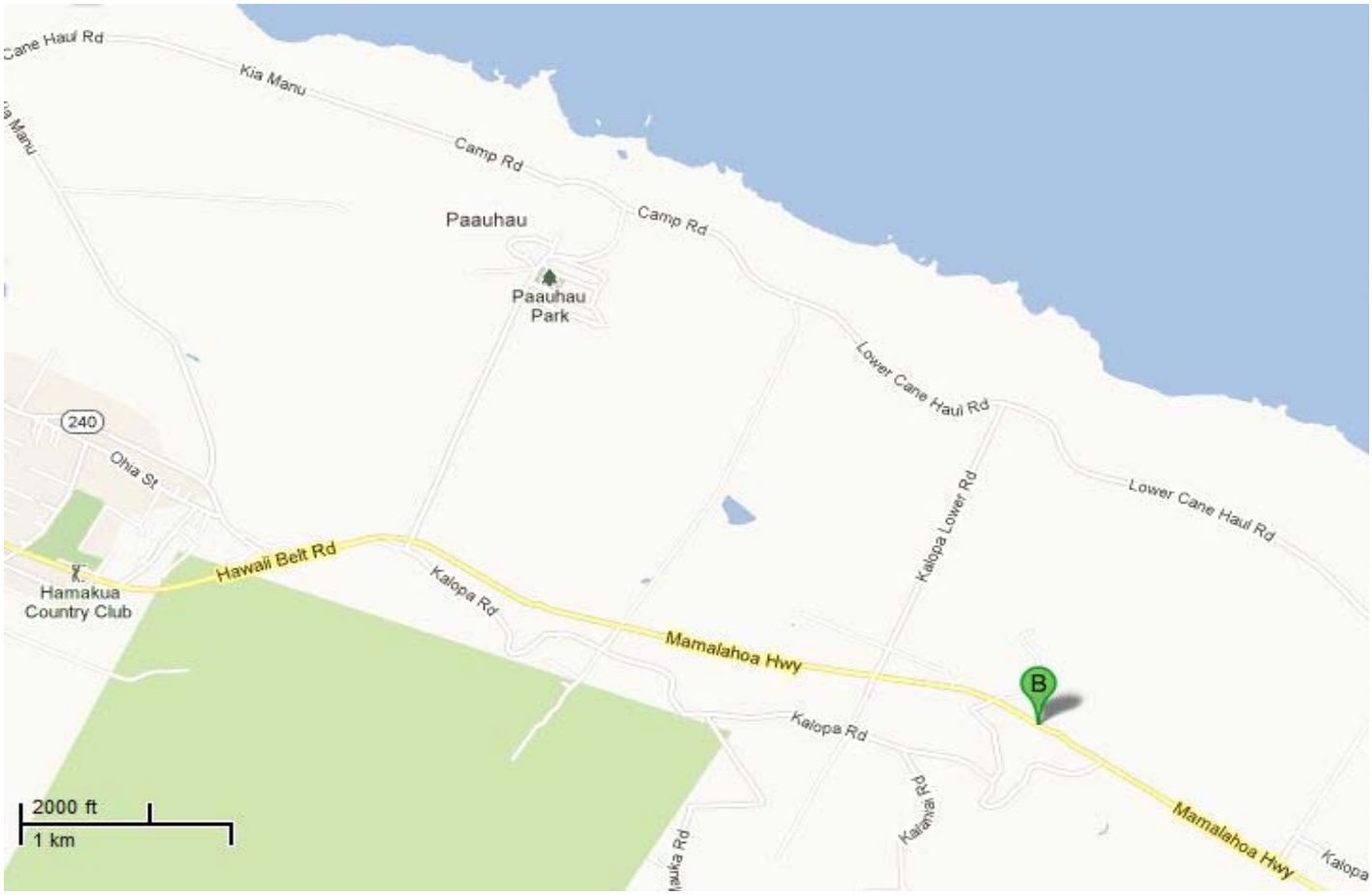
Location: 2.41 Miles East of Mamane Street

Historic Name: Kalopa Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 125.0 ft.	**Total Length:** 331.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kalopa Stream Bridge is a continuous concrete bridge, constructed in 1959 to carry the Hawaii Belt Road over Kalopa Stream from Honokaa to Hilo in Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. The balustrade is a typical rectilinear post-war style, composed of a reinforced concrete balustrade penetrated with horizontal rectilinear voids with a concrete rail cap, common in the post-war era. The elliptical ornaments on the end posts add to the bridge's artistic value and workmanship. The rural setting contributes to the historic character of the bridge.

Significance Statement:

This bridge is eligible under Criterion C for having the longest concrete span built post-war (1945) on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

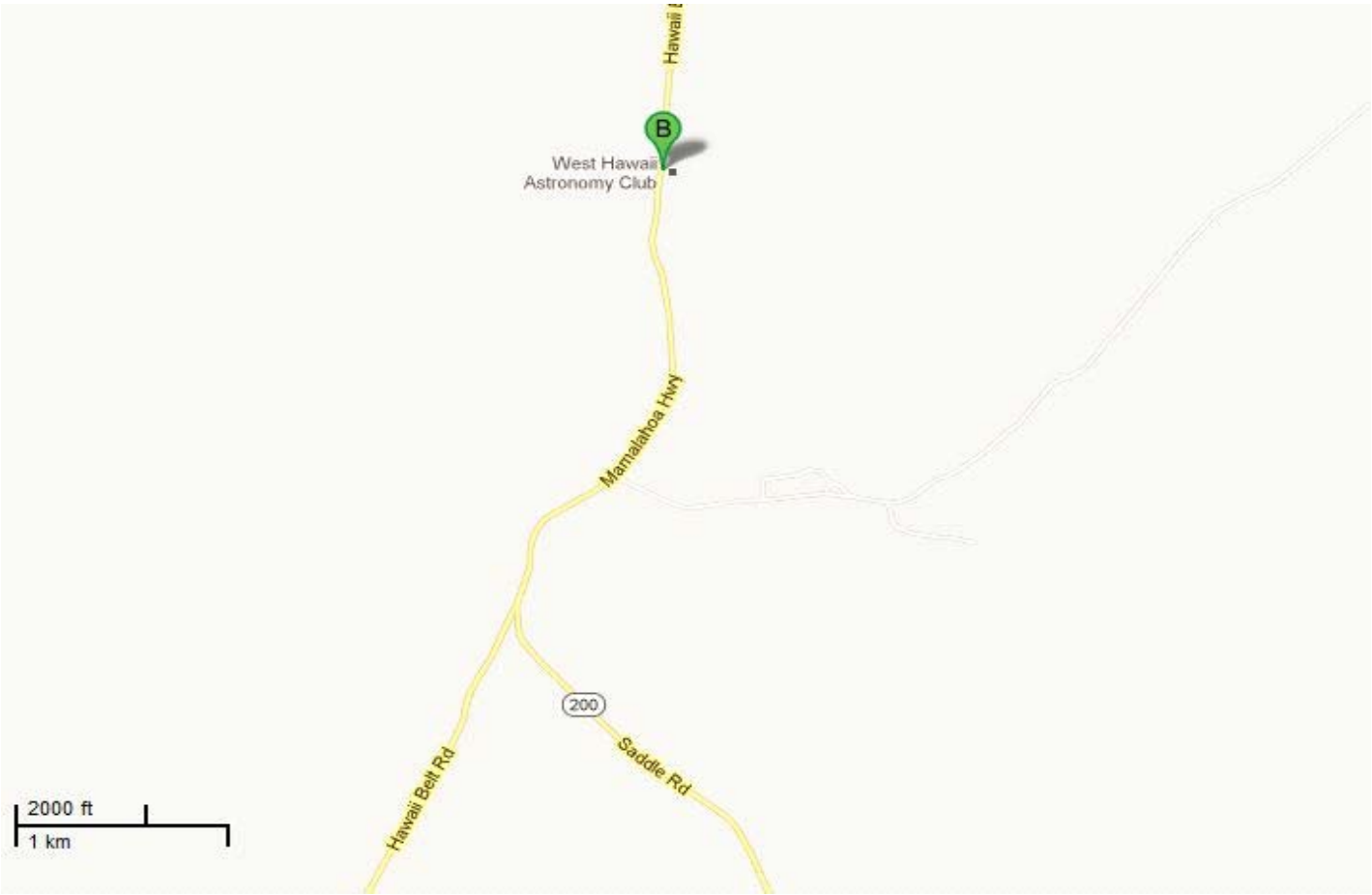
Inventory Form
(State)

General Information

Bridge Number: 001001900503405	**Route No:** 190
Popular Name: Kamakoa Bridge No. 1	
Feature Crossed: Kamakoa Stream No. 1	
Feature Carried: Mamalahoa Highway	
Milepost: 4.66 mi.	**Island:** Hawaii
Longitude: 155d-40m-51.65s	**Latitude:** 19d-57m-21.63s

Location: 1.59 Miles North of Saddle Road (Route 200)
Historic Name: Kamakoa Bridge No. 1
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 21.0 ft.	**Deck Width:** 26.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kamakoa Stream #1 bridge carries Hawaii Belt Road across the Kamakoa Stream. This concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid panel parapets with flat caps. Thrie beams have been added at end of the parapets but the simple design of the bridge retains its historic feeling.

Significance Statement:

A very modest concrete slab bridge with solid parapets, the Kamakoa Stream is typical of its period in its design, materials, methods of construction, and craftsmanship.

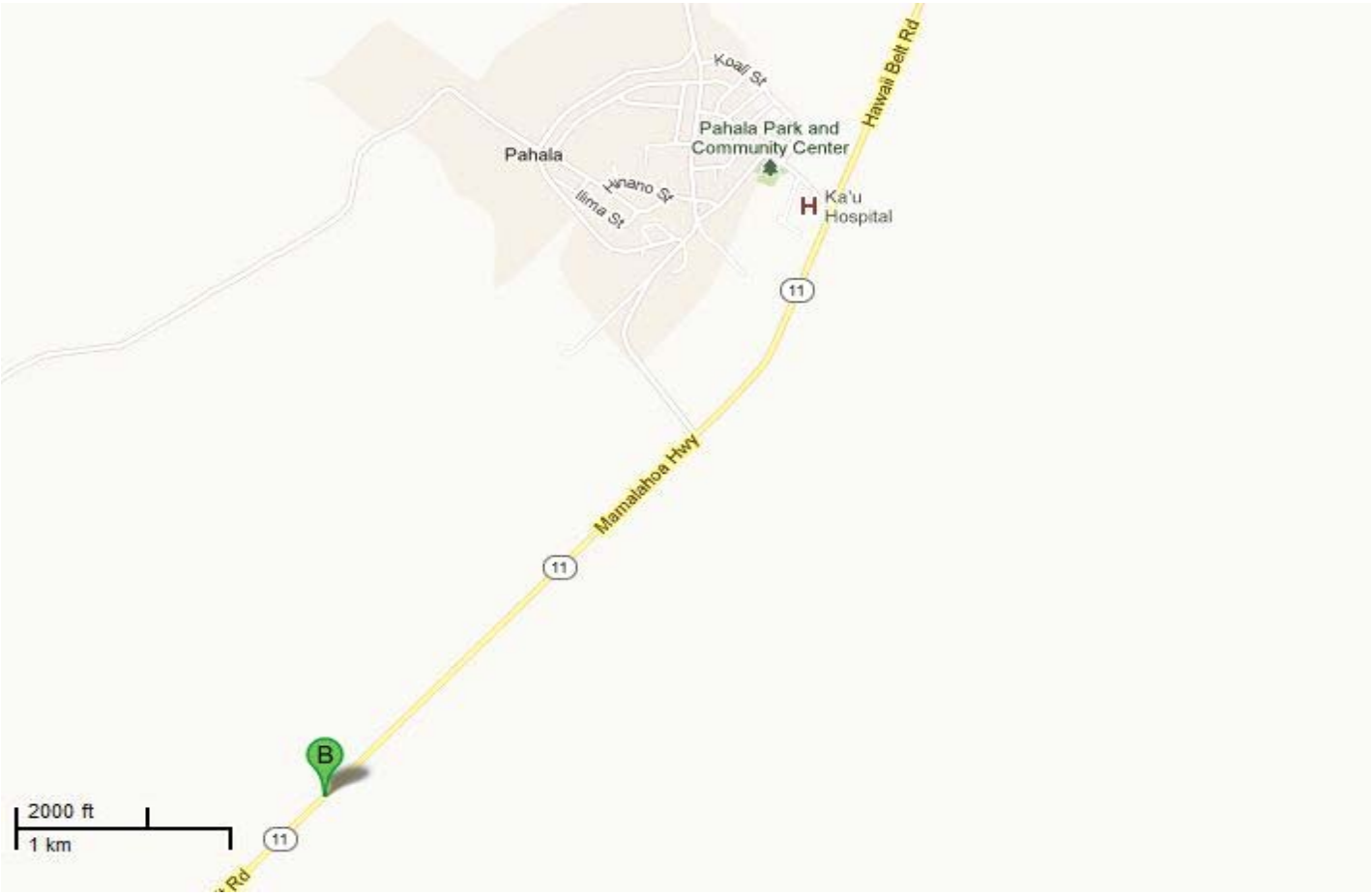
Inventory Form
(State)

General Information

Bridge Number: 001000110306913	**Route No:** 11
Popular Name: Kanenelu Stream Bridge	
Feature Crossed: Kanenelu Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 53.46 mi.	**Island:** Hawaii
Longitude: 155d-29m-26.10s	**Latitude:** 19d-10m-33.34s

Location: 1.26 Miles South of Maile Street
Historic Name: Kanenelu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1938	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 20.0 ft.	**Total Length:** 43.0 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kanenelu Stream Bridge carries Hawaii Belt Road across the Kanenelu Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has open Greek cross parapets with stepped caps and curved wide end posts. Two of the end posts have the construction date and the bridge name engraved. The concrete deck is supported by concrete abutments. The parapets have been painted white only on the surface facing the road. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with the development of concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

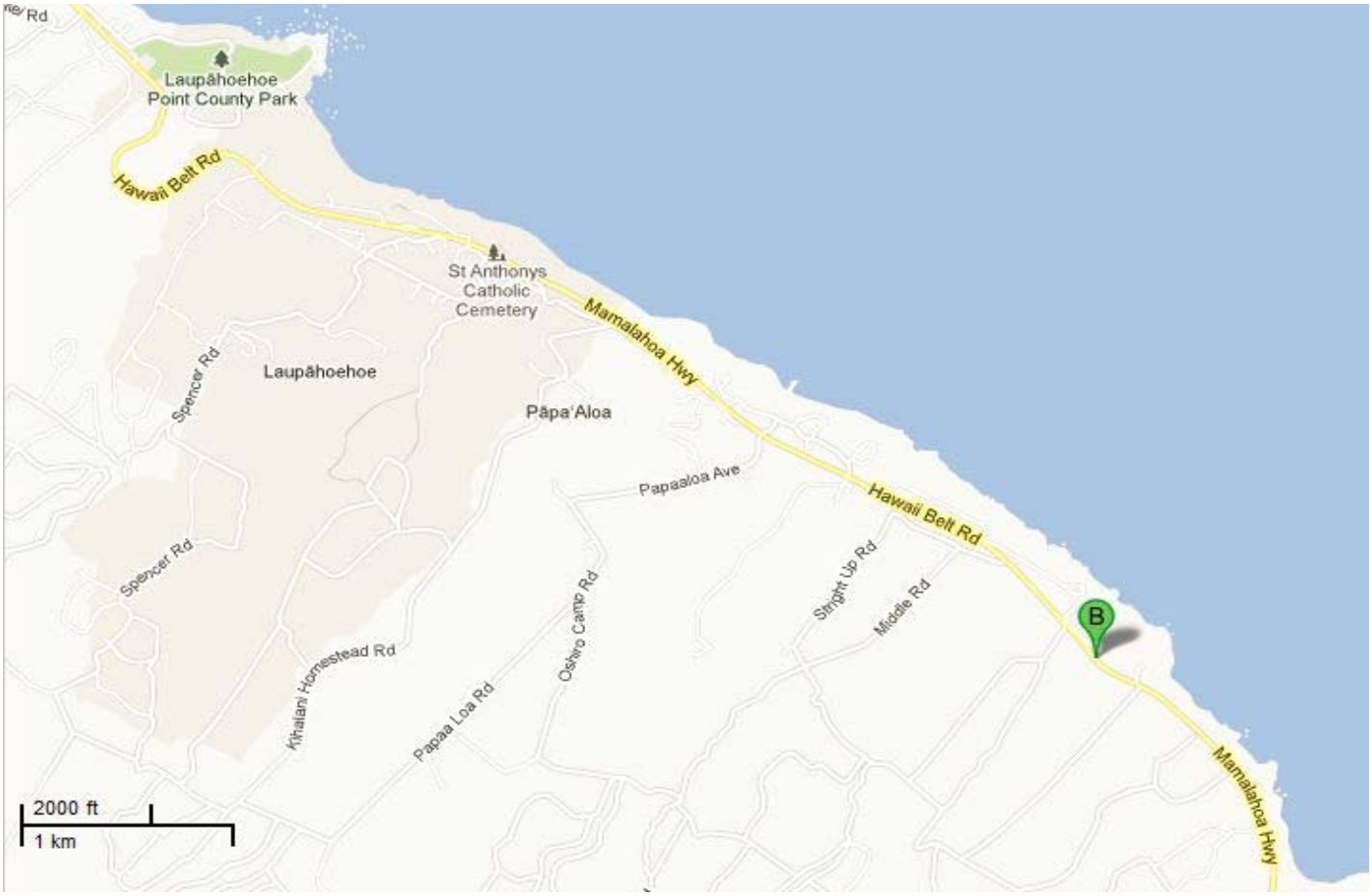
Inventory Form
(State)

General Information

Bridge Number: 001000190307673	**Route No:** 19
Popular Name: Kapehu Stream Bridge	
Feature Crossed: Kapehu Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 22.79 mi.	**Island:** Hawaii
Longitude: 155d-12m-18.48s	**Latitude:** 19d-57m-55.24s

Location: 6.43 Miles East of Ookala Access Road
Historic Name: Kapehu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1933	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 39.0 ft.	**Total Length:** 130.9 ft.	**Deck Width:** 28.9 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kapehu Stream Bridge carries Hawaii Belt Road across the Kapehu Stream. This concrete bridge is in its original location, is generally in good condition, and its materials remain intact. It is aesthetically similar to its neighbor, Kaaluu Stream Bridge. The original concrete pier wall on both sides contains double arches that house a recessed alcove within. The original concrete diaphragm is cast between the girders at both pier walls, which are still in good condition. Seismic retrofitting was done previously on this bridge by a private contractor.

Significance Statement:

This bridge is eligible under Criterion C for it association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

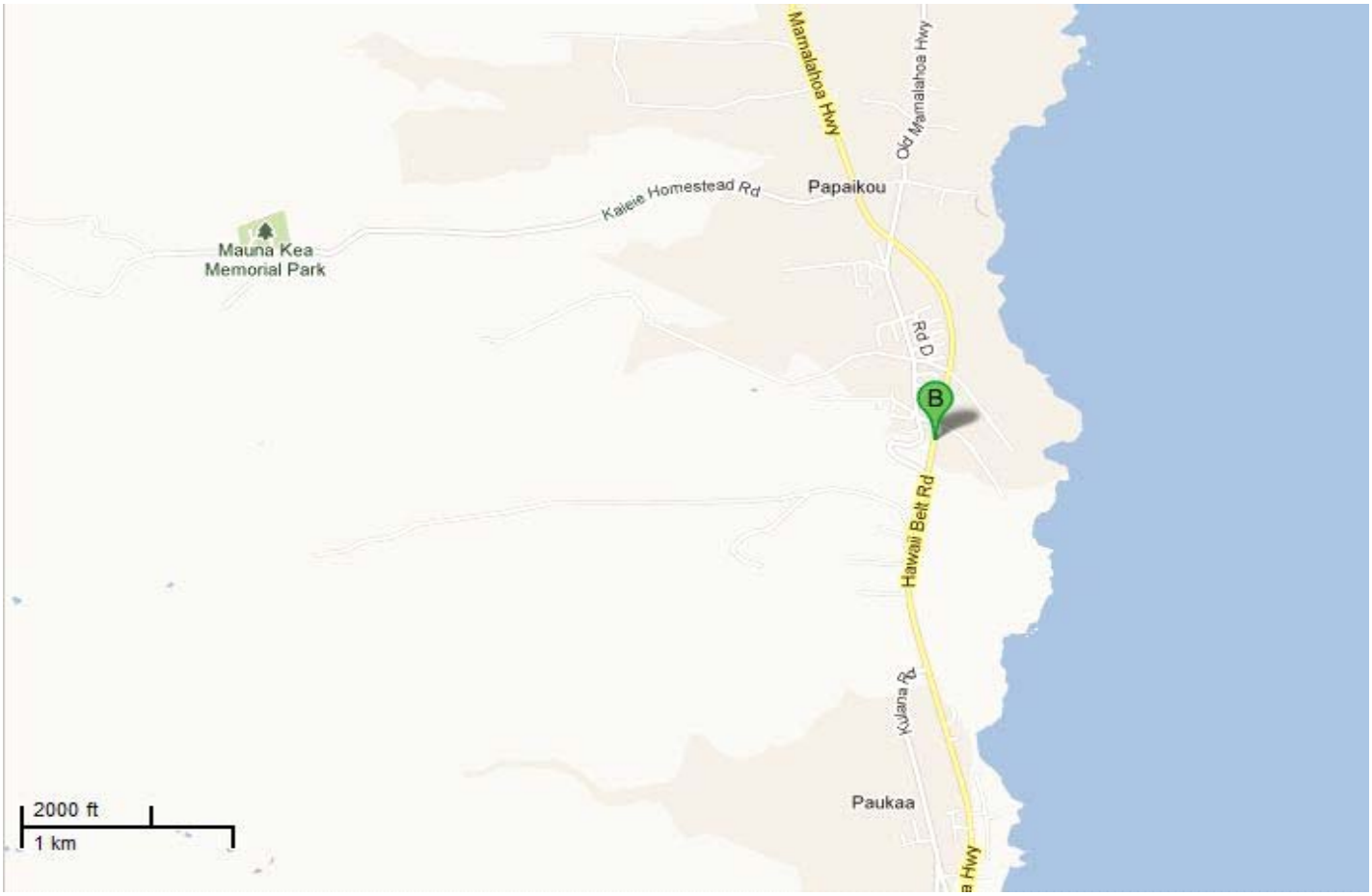
Inventory Form
(State)

General Information

Bridge Number: 001000190309317	**Route No:** 19
Popular Name: Kapue Stream Bridge	
Feature Crossed: Kapue Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 6.28 mi.	**Island:** Hawaii
Longitude: 155d-05m-34.06s	**Latitude:** 19d-46m-53.35s

Location: 0.70 Miles East of Kaieie Road
Historic Name: Kapue Stream Bridge
Designer/Engineer: John Mason Young (1911) / William R. Bartels (1950)
Builder/Contractor: W. W. Beers (1911) - Fabricator: Hamilton and Chambers, N.Y. (1911) / Independent Iron Works, Ca. (1953)

Location Map:



Construction Information

Bridge Type: Steel Trestle	**Construction Date:** 1950	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1950	
Alteration Type(s):		
Alteration Description(s): The highway bridge is a reconstructed railroad trestle		

Bridge Information

Number of Spans: 8	**Max Span:** 65.9 ft.	**Total Length:** 415.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction (added 1950)			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form and see Hawaii Belt Road significance statement.

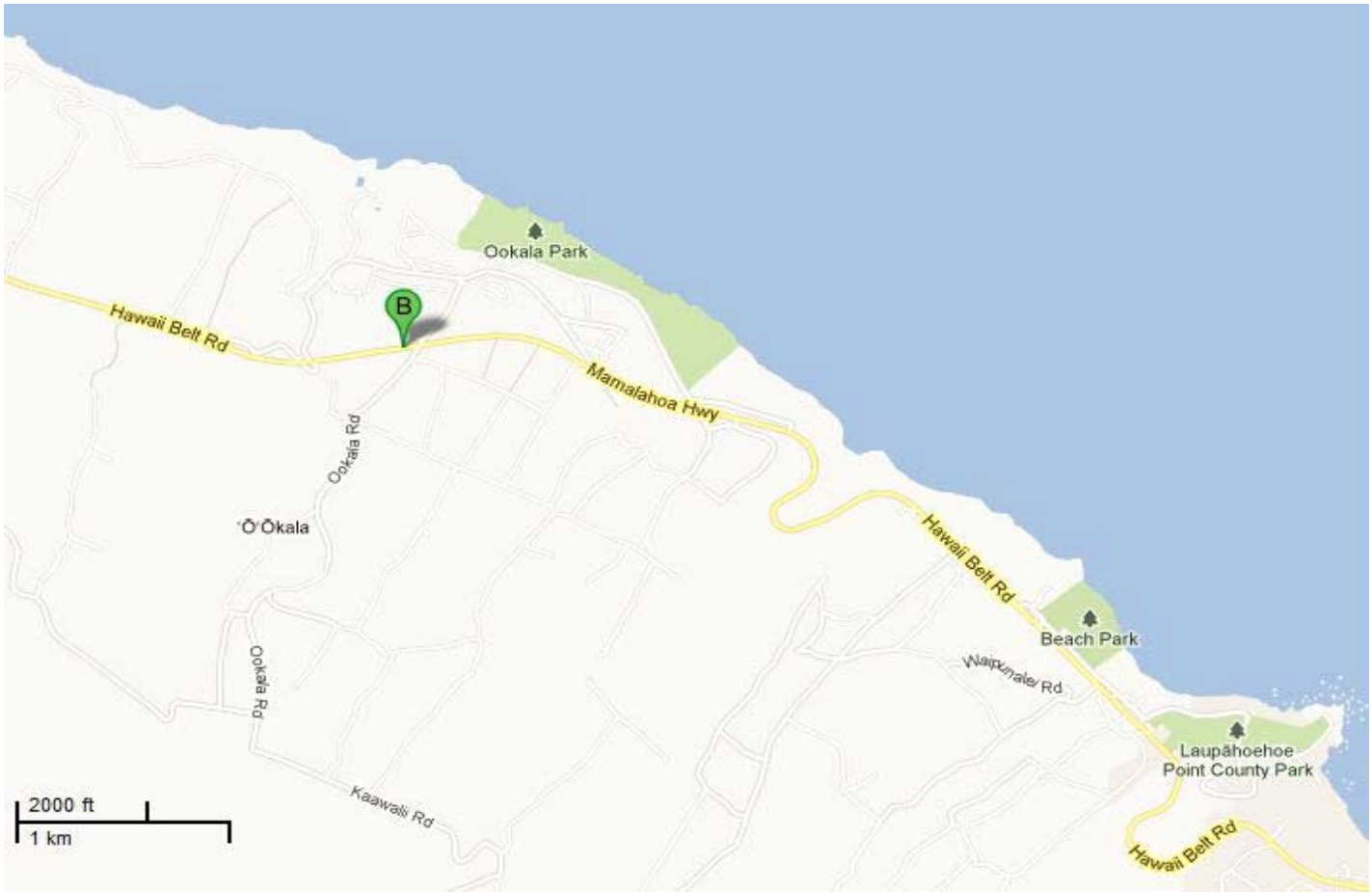
Inventory Form
(State)

General Information

Bridge Number: 001000190306944	**Route No:** 19
Popular Name: Kaula Stream Bridge	
Feature Crossed: Kaula Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 30.07 mi.	**Island:** Hawaii
Longitude: 155d-17m-11.19s	**Latitude:** 20d-00m-35.52s

Location: 0.89 Miles West of Ookala Access Road
Historic Name: Kaula Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1959	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 124.0 ft.	**Total Length:** 356.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kaula Stream Bridge is a continuous concrete multiple box beam/girder structure, constructed in 1959, to carry the Hawaii Belt Road over Kaula Gulch from Honokaa to Hilo in the Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location with the Kaula Gulch roadway still underneath. There is a concrete retaining wall at the left footing pier and dry rubble protective walls at both piers. The original design and materials are mostly intact. The parapets are concrete open horizontal which is a common parapet type of post-war bridges. The elliptical ornaments at the end posts add to the bridge's artistic value. The workmanship is evident in the rocker column above the top of the pier. The rural/coastal setting has not changed and, along with the existing roadway, contributes to the historic character of the bridge. Interpretation is aided by the name and date of construction incised on the end piers.

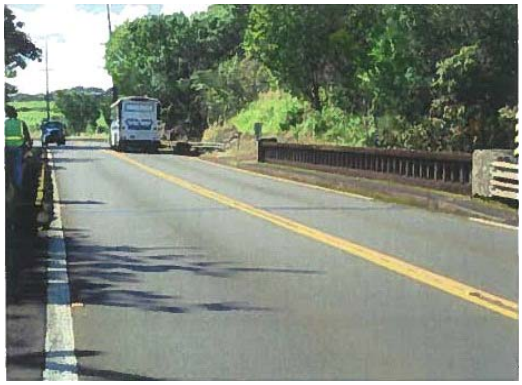
Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

Inventory Form
(State)

General Information



Bridge Number: 001000190309043 **Route No:** 19

Popular Name: Kawainui Stream Bridge

Feature Crossed: Kawainui Stream

Feature Carried: Hawaii Belt Road

Milepost: 9.09 mi. **Island:** Hawaii

Longitude: 155d-06m-17.80s **Latitude:** 19d-49m-08.18s

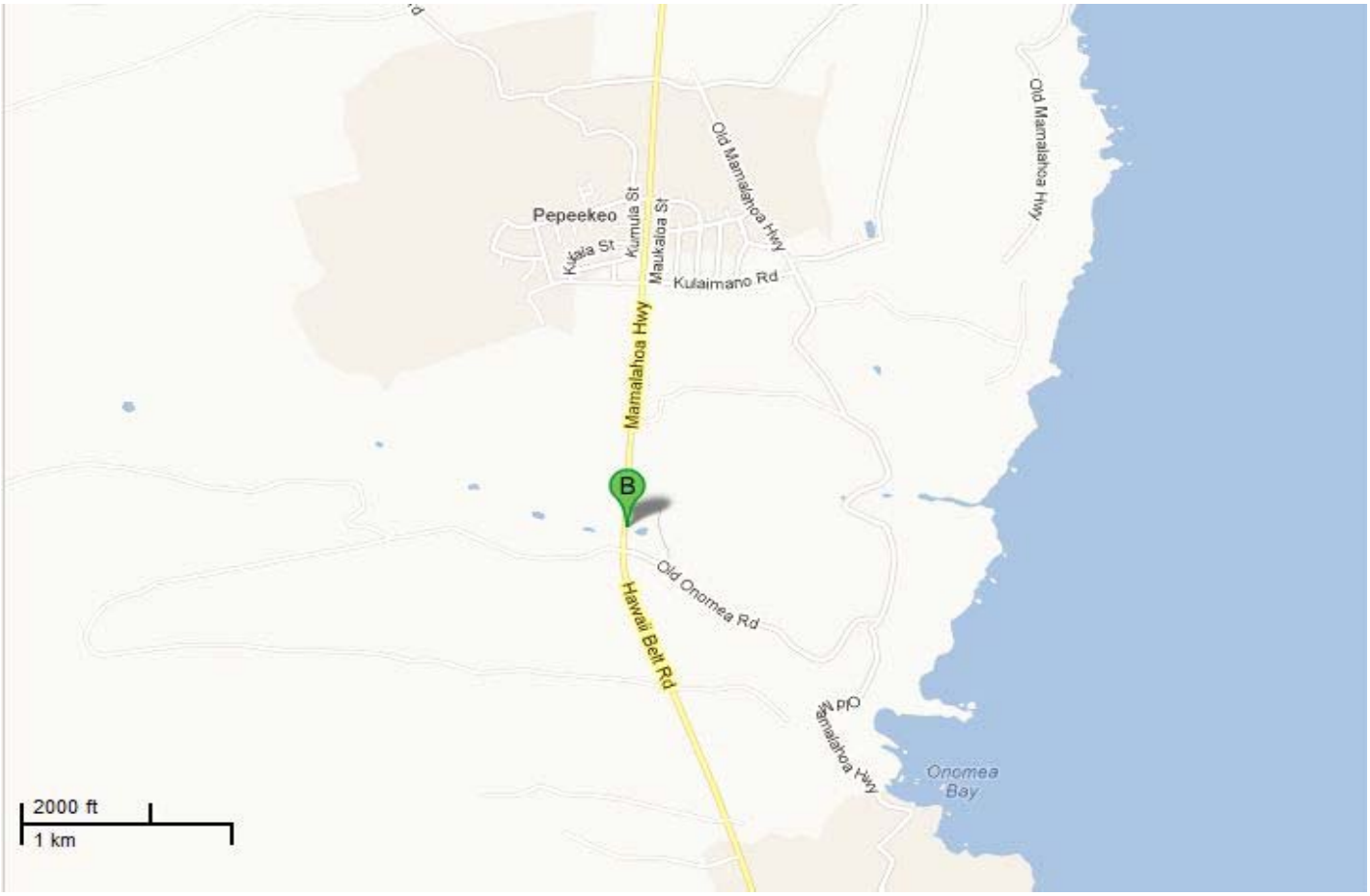
Location: 0.80 Miles East of Kulaimano Road

Historic Name: Kawainui Stream Bridge

Designer/Engineer: William R. Bartels

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1948	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:**	**Total Length:** 70.9 ft.	**Deck Width:** 32.5 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Walkways each side			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kawainui Stream Bridge was constructed in 1948 to carry the upgraded Hawaii Belt Road over the Kawainui Stream. The bridge remains in its original location. The rural setting remains unchanged. The ornate design and materials of this structure are intact. There are sidewalks on both sides of the bridge that are flanked with concrete “Greek cross” style parapets which terminate in curved, stepped end piers. Significant skill and craftsmanship are evident on this structure. The unique style of parapet seen in earlier eras makes the bridge one of only two that remain from this post-war period (the Kaukonahua Bridge on Oahu is the other). The abandoned concrete supports nearby of a previous bridge can also be observed. The bridge’s design, materials and workmanship are good and have not been obscured by additions or repairs. The setting, late use of the style, and material contribute to the historic character of the bridge.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. This bridge is also eligible under Criterion C for being the earliest steel bridge built post-war (1945) on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

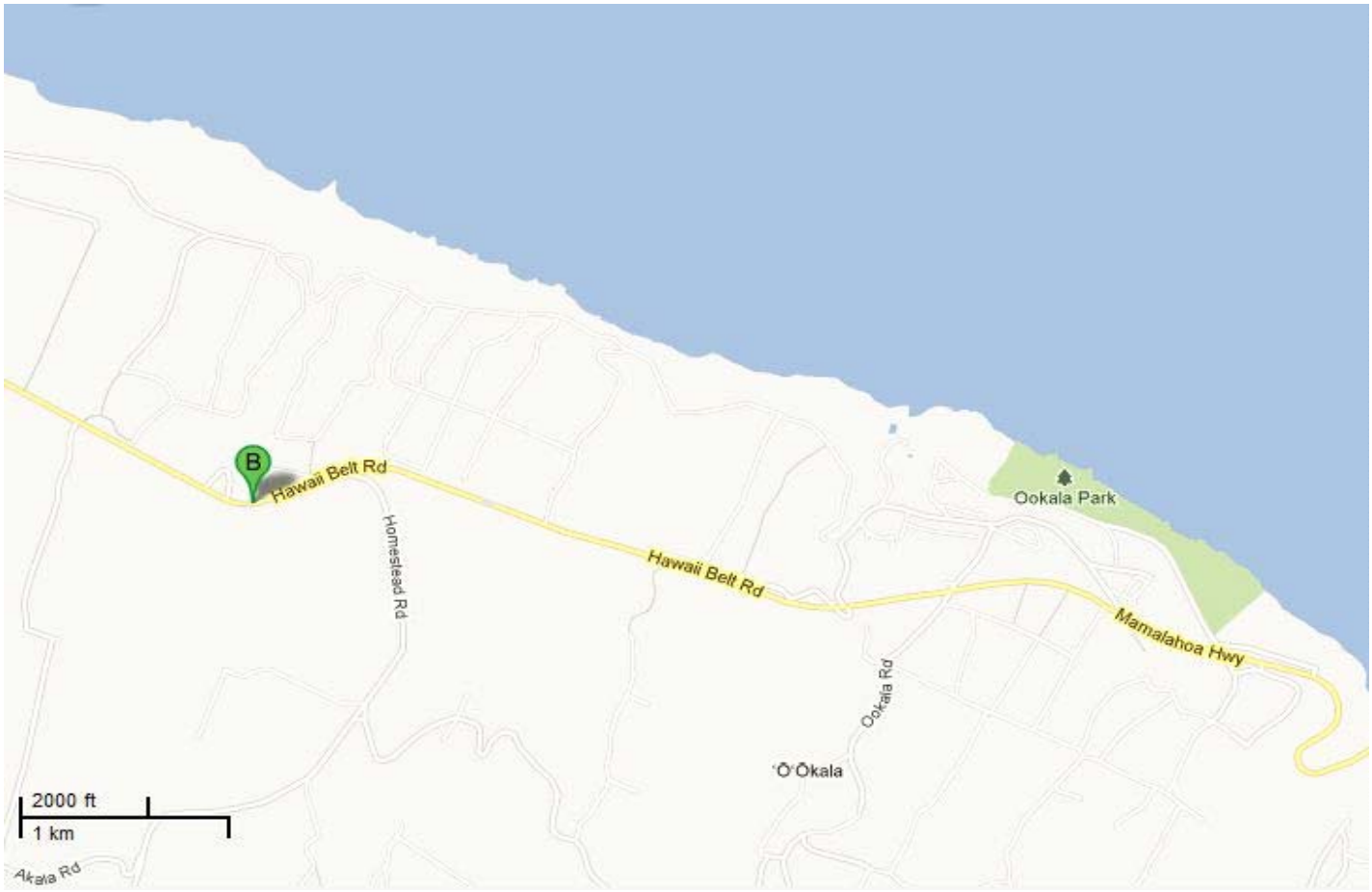
Inventory Form
(State)

General Information

Bridge Number: 001000190306756	**Route No:** 19
Popular Name: Kealakaha Stream Bridge	
Feature Crossed: Kealakaha Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 31.94 mi.	**Island:** Hawaii
Longitude: 155d-18m-48.89s	**Latitude:** 20d-00m-52.79s

Location: 4.54 Miles East of Paauilo Plantation Road
Historic Name: Kealakaha Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: George Freitas

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1935	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 98.1 ft.	**Total Length:** 486.9 ft.	**Deck Width:** 29.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction; brackets at rail and arched pier columns			

Historic Association

Eligibility Status: Eligible	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

A new bridge was built recently parallel to this old bridge with the same name. This information pertains to the older historic bridge rather than the newly built structure. The old historic bridge is currently closed and gated with no access to vehicles or pedestrians and there have been talks about demolishing the bridge in the future.

The Kealakaha Bridge carries the Hawaii Belt Road (FAP 19) across the Kealakaha Stream on the Hamakua coast of the island of Hawaii. The structure is a curved multi-span reinforced-concrete tee-beam bridge. The Kealakaha Bridge is in its original location and the rural setting has remained unchanged. The bridge's original continuous tee beam design and reinforced-concrete materials remain intact. The workmanship of the bridges has not been obscured by additions or repairs. The bridge is the work of local contractor George Freitas, who constructed the massive concrete bridge. The bridge was structurally innovative at the time of its construction since the calculations for a curved structure, such as this one, were done in long hand. (1) Due to its length and curvature, the bridge is easily visible from roadway. The bridge has retained its historic feeling, primarily due to its relatively narrow width and the appearance of the railings which are typical of 1930s Federal Aid bridges. The bridge's historic associations with territorial efforts to upgrade the belt road and advances in concrete technology are readily apparent to informed observers.

(1) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 229.

Significance Statement:

The Kealakaha Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge was a significant element of the Territorial Belt Road Plan and contributed to the economic development of the region. The Kealakaha Bridge is eligible under Criterion C as an excellent example of federally-funded tee-beam bridge construction in the 1930s and is indicative of the advances in bridge technology in the early twentieth-century. Further, the bridge is representative of the "work of a master": William R. Bartels of the Territorial Highways Department.

Between 1932 and 1958, the Territory of Hawaii began to construct a modern highway, called the Hawaii Belt Road (FAP 19), around the island. The new road and bridges straightened out, bisected, and often bypassed, the circuitous old government road. The new road is an extraordinary engineering feat; it contains fifty-six bridges in forty-two miles, took twenty-two years to build, cost $54 million, and reduced the driving time between Hilo and Honokaa from over two hours to forty minutes. (1)

The Kealakaha Bridge is an excellent example of the substantial yet attractive bridges built with Federal Aid funds. These bridges spanned gulches high above sea level and enabled the belt road to run a straighter course. Federal Aid bridges did not scrimp on ornament, and every attempt was made to add beauty to utility. (2) The bridge was one of the last major concrete tee beam highway bridges constructed along the Hawaii Belt Road prior to WW II. The bridge's continuous concrete tee beam design was technically ambitious, particularly due to its extraordinary height and long spans; the construction of the bridge was considered to be a major engineering feat. Bartels was responsible for the design of all major territorial bridge projects between 1932 and his retirement from the department in 1956. The contractor on the Kealakaha Bridge was George Freitas, founder of Pacific Construction Company, who built the Honolulu Advertiser Building and several other Federal Aid bridges.

In 1995, the State Department of Transportation (DOT) determined that the bridge did not meet current federal highway standards due to its narrow width and curvature of the roadway. In consultation with the SHPO, the DOT developed roadway improvement plans to preserve the bridge in-place for pedestrian use.

(1) Russell Apple, Ala Kahakai: A phrase in the Hawaiian language meaning Trail by the Sea…a walk through one Hundred and Fifty Years of History on the Island of Hawaii (Hawaii National Park, Hawaii: Macappleville Press, 1994), 57.
(2) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 230.

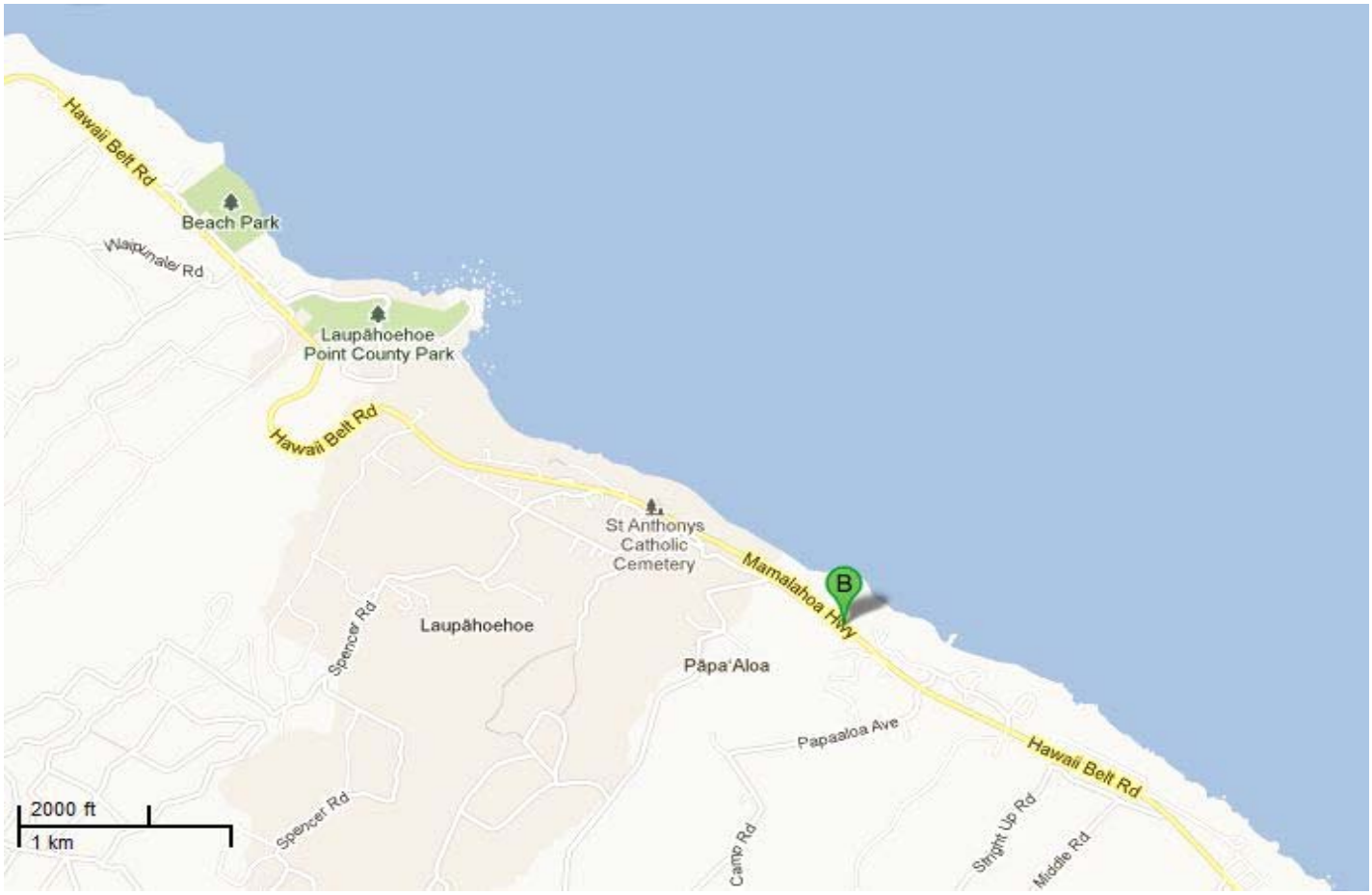
Inventory Form
(State)

General Information

Bridge Number: 001000190307519	**Route No:** 19
Popular Name: Kihalani Stream Bridge	
Feature Crossed: Kihalani Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 24.31 mi.	**Island:** Hawaii
Longitude: 155d-13m-25.26s	**Latitude:** 19d-58m-42.72s

Location: 4.86 Miles East of Ookala Access Road
Historic Name: Kihalani Stream Bridge
Designer/Engineer: William R. Bartels and R. Kawamura
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 125.0 ft.	**Total Length:** 331.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kihalani Stream Bridge is a continuous concrete box beam/multiple girder structure, constructed in 1956, to carry Hawaii Belt Road over Kihalani Gulch from Honokaa to Hilo in the Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. The original design and materials are mostly intact. The parapets are concrete open horizontal which is a common parapet type of post-war bridges. The elliptical ornaments at the end posts add to the bridge's artistic value. The rural setting contributes to the historic character of the bridge. Interpretation is aided by the name and date of construction incised on the end piers.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

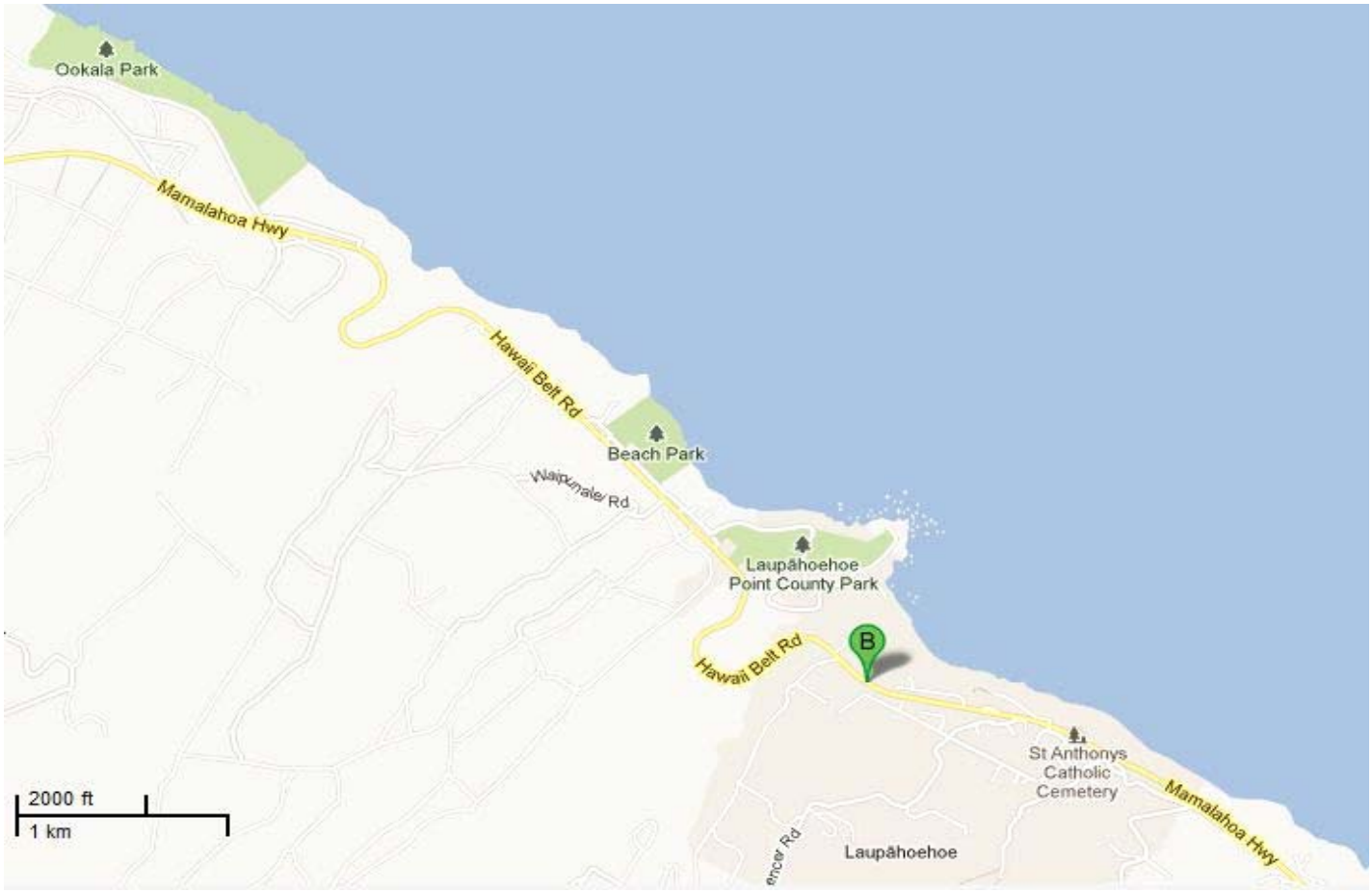
Inventory Form
(State)

General Information

Bridge Number: 001000190307387	**Route No:** 19
Popular Name: Kilau Stream Bridge	
Feature Crossed: Kilau Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 25.65 mi.	**Island:** Hawaii
Longitude: 155d-14m-29.88s	**Latitude:** 19d-59m-11.03s

Location: 3.54 Miles East of Ookala Access Road3.54MI W/OOKALA ACC RD
Historic Name: Kilau Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1953	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 84.0 ft.	**Total Length:** 225.1 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kilau Stream Bridge is a continuous concrete and tee beam structure, constructed in 1953, to carry Hawaii Belt Road over Kilau Stream from Honokaa to Hilo in the Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. Ditches are found at the ends of the bridge. The original design and materials are mostly intact. The parapets are concrete open horizontal which is a common parapet type of post-war bridges. The rural setting and the concrete rubble masonry wall contribute to the historic character of the bridge. Interpretation is aided by the name and date of construction incised on the end piers.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

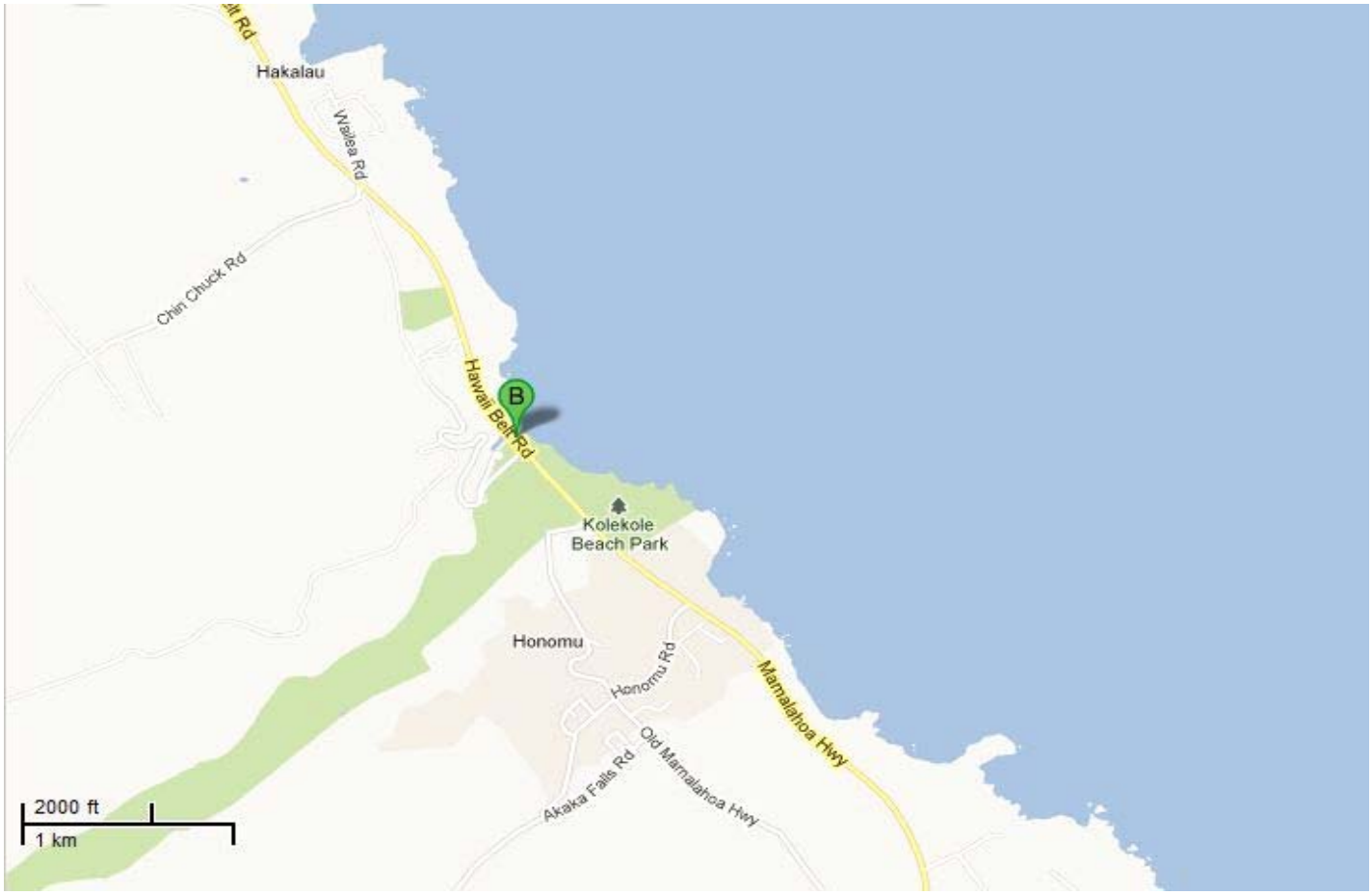
Inventory Form
(State)

General Information

Bridge Number: 001000190308549	**Route No:** 19
Popular Name: Kolekole Stream Bridge	
Feature Crossed: Kolekole Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 13.97 mi.	**Island:** Hawaii
Longitude: 155d-07m-08.50s	**Latitude:** 19d-52m-57.75s

Location: 0.10 Miles West of Road to Kolekole Beach Park
Historic Name: Kolekole Stream Bridge
Designer/Engineer: Bureau of Public Roads
Builder/Contractor: James W. Glover, Ltd.

Location Map:



Construction Information

Bridge Type: Steel Truss	**Construction Date:** 1950	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 130.9 ft.	**Total Length:** 497.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Deck Truss			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways each side			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form and see Hawaii Belt Road significance statement.

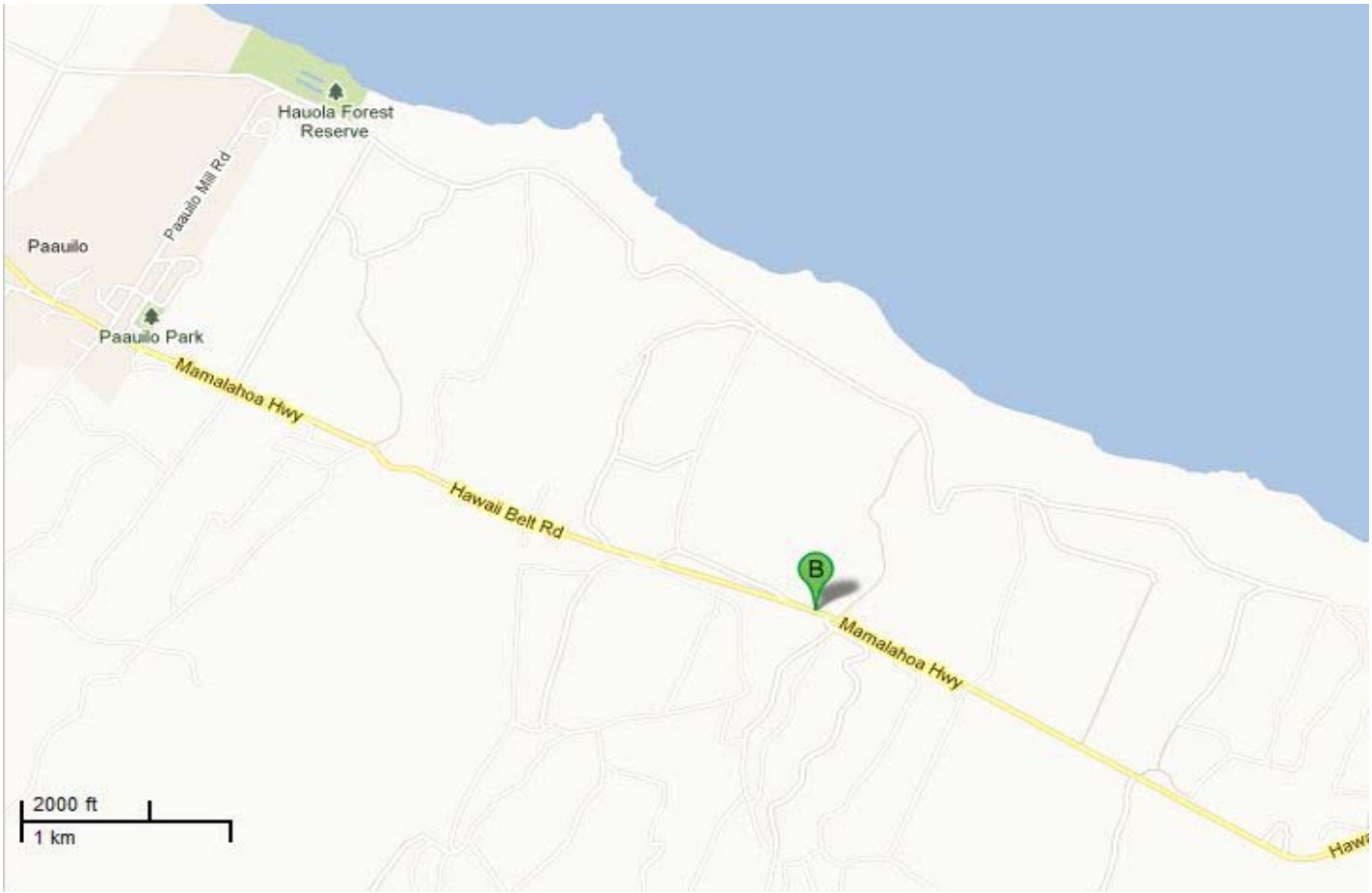
Inventory Form
(State)

General Information

Bridge Number: 001000190306590	**Route No:** 19
Popular Name: Kukaiau Stream Bridge	
Feature Crossed: Kukaiau Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 33.62 mi.	**Island:** Hawaii
Longitude: 155d-20m-10.15s	**Latitude:** 20d-01m-34.71s

Location: 2.88 Miles East of Paauilo Plantation Road
Historic Name: Kukaiau Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1951	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2001	
Alteration Type(s): Seismic Retrofit		
Alteration Description(s): Piers #1, #2, #4 and #5 seismic retrofitted.		

Bridge Information

Number of Spans: 7	**Max Span:** 77.1 ft.	**Total Length:** 380.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete and Metal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kukaiau Stream Bridge was constructed in 1951 to carry the Hawaii Belt Road over the stream in the Hamakua region of the Big Island of Hawaii. The bridge remains in its original location and the rural/coastal setting has not changed. The parapets are concrete and metal which is a typical post-war style. The original design and materials are mostly intact, and workmanship is visible in the concrete work. Metal guardrails have been added that detract slightly from the overall historic impression of the structure. The bridge was seismically retrofitted in 2001.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. This bridge is of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

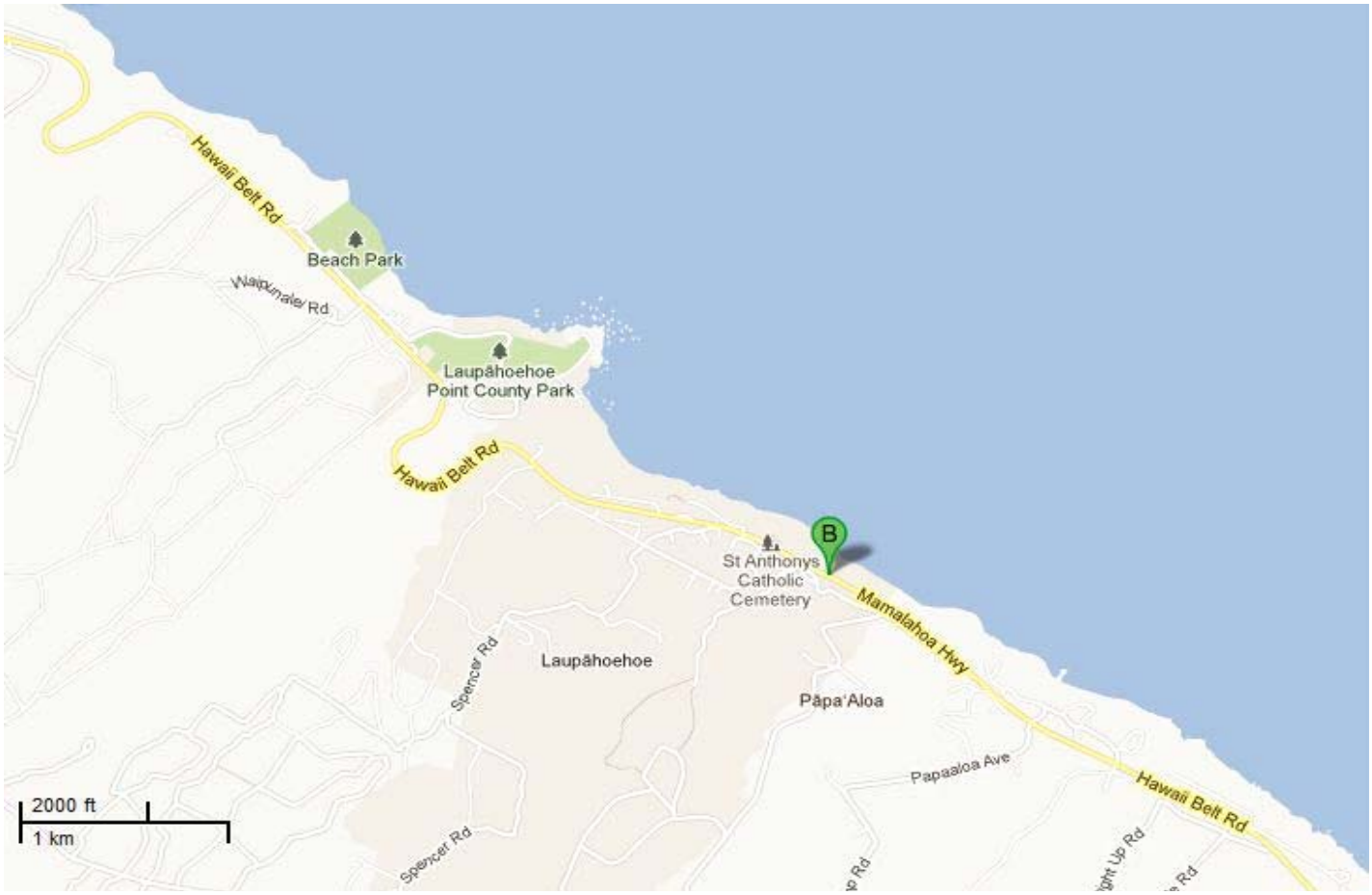
Inventory Form
(State)

General Information

Bridge Number: 001000190307474	**Route No:** 19
Popular Name: Kuwaikahi Stream Bridge	
Feature Crossed: Kuwaikahi Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 24.78 mi.	**Island:** Hawaii
Longitude: 155d-13m-45.11s	**Latitude:** 19d-58m-56.16s

Location: 4.41 Miles East of Ookala Access Road4.41MI E/OOKALA ACC RD
Historic Name: Kuwaikahi Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1957	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 82.0 ft.	**Total Length:** 193.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Kuwaikahi Stream Bridge is a steel and stringer multi-beam girder structure, which was constructed in 1957 to carry the Hawaii Belt Road over Kuwaikahi Gulch from Honokaa to Hilo in the Hilo-Hamakua Heritage Coastline that was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. The original design and materials are mostly intact. The workmanship and engineering complexity is evident in the frame of the steel plate girder. The balustrade is a typical rectilinear post-war style, composed of a reinforced concrete balustrade penetrated with horizontal rectilinear voids with a concrete rail cap, common in the post-war era. The elliptical ornaments at the end posts add to the bridge's artistic value. The rural setting and the design contribute to the historic character of the bridge. Interpretation is aided by the name and date of construction incised on the end piers.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. This bridge is of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

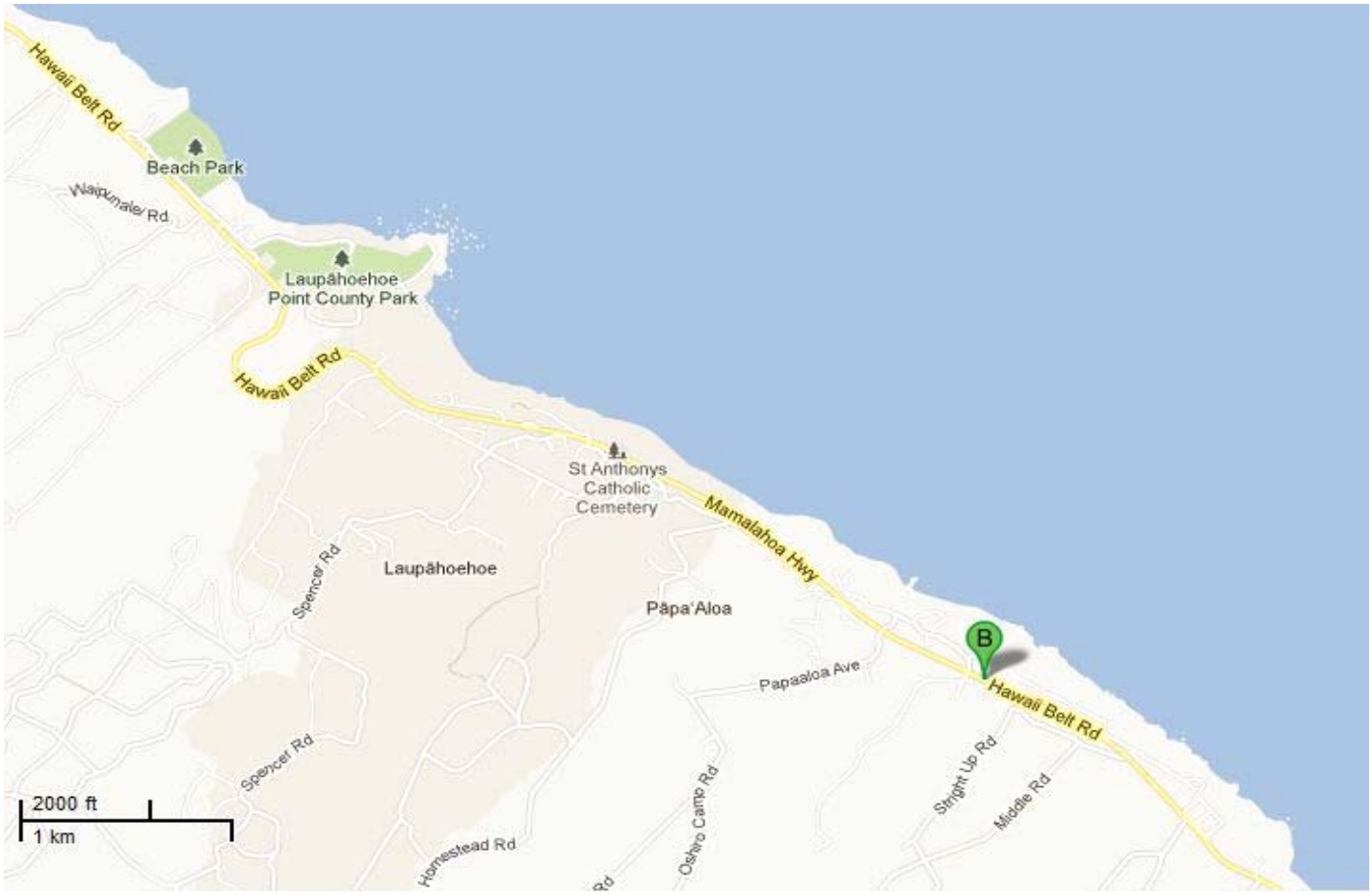
Inventory Form
(State)

General Information

Bridge Number: 001000190307585	**Route No:** 19
Popular Name: Moanalulu Stream Bridge	
Feature Crossed: Moanalulu Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 23.66 mi.	**Island:** Hawaii
Longitude: 155d-12m-55.69s	**Latitude:** 19d-58m-23.67s

Location: 5.52 Miles East of Ookala Access Road
Historic Name: Moanalulu Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1956	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 94.2 ft.	**Total Length:** 246.1 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Moanalulu Stream Bridge is a continuous concrete and tee beam structure, constructed in 1956, as part of a "Seismic Wave Damage Rehabilitation Project". This bridge carries the Hawaii Belt Road over Moanalulu Stream from Honokaa to Hilo and remains in its original location, where the rural/coastal setting has not changed. The original design and materials are mostly intact. The parapets are concrete open horizontal which was a common in the post-war era with metal railings addition on the top. The elliptical ornaments at the end posts add to the bridge's artistic value. The rural setting contributes to the historic character of the bridge. Interpretation is aided by the name and date of construction incised on the end piers.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

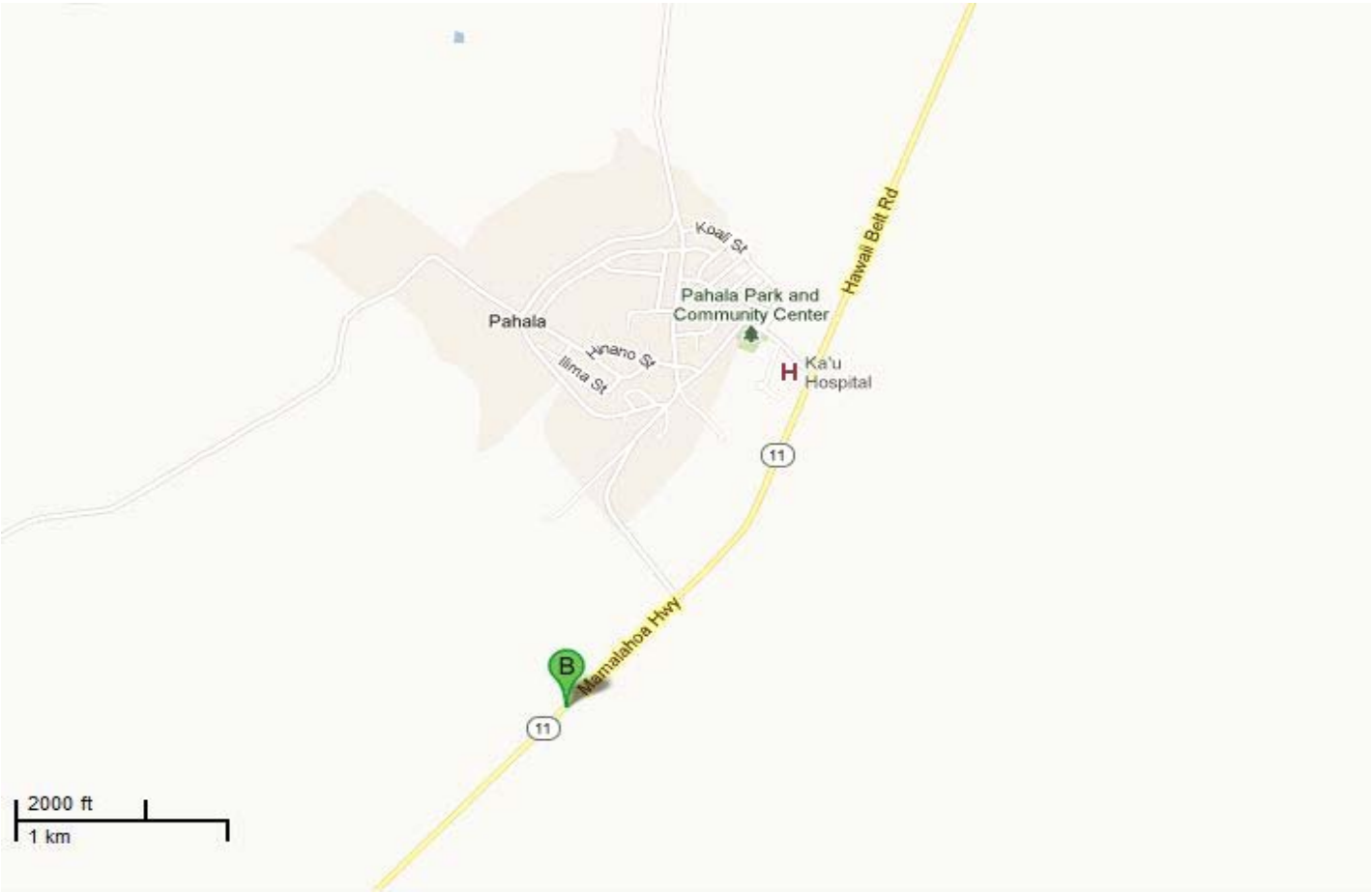
Inventory Form
(State)

General Information

Bridge Number: 001000110306986	**Route No:** 11
Popular Name: Moaula Stream Bridge	
Feature Crossed: Moaula Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 52.72 mi.	**Island:** Hawaii
Longitude: 155d-28m-58.58s	**Latitude:** 19d-11m-00.87s

Location: 0.52 Miles South of Maile Street
Historic Name: Moaula Stream Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor: George Freitas

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1938	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 69.9 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features: Incised bridge name and date of construction on end piers			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering and transportation		

Narrative Description:

The Moaula Bridge carries the Hawaii Belt Road (FAP 11) across the Moaula Stream within the Kau District of the island of Hawaii. The bridge is one of five reinforced-concrete rigid frame structures built in the pre-World War II period in Hawaii.

The bridge is in its original location and its rural setting has remained unchanged. The original concrete material of the bridge is in generally good condition and has not been altered by major repairs or additions. Overall, the bridge exhibits a high degree of workmanship, particularly the attention given to the rail. The rigid-frame bridge was technologically innovative for its time. The bridge is the work of Hawaii Island contractor George Freitas. The bridge's historic associations, as a product of the Territorial Highways Department effort to upgrade the belt road in the 1930s, is apparent to informed observers. The bridge’s historic feeling is primarily evident through its rail style which was typical of the 1930s.

Significance Statement:

The Moaula Bridge has made significant contributions to the areas of engineering and transportation in Hawaii. The bridge is eligible under Criterion A for its associations with important public works project initiated by the territorial government and constructed with federal work relief programs funds during the Depression era. The bridge was a significant component of the Territorial Belt Road Plan and contributed to the economic development of Kau by providing economical transportation to the harbor for the sugar plantations located in that district. The reinforced-concrete rigid-frame bridge is eligible under Criterion C as an innovative example of bridge design utilizing new engineering technology, as well as for its aesthetic merit. The Moaula Bridge is representative of the "work of a master": William R. Bartels of the Territorial Highways Department.

Between 1932 and 1958, the Territory of Hawaii began to construct a modern highway, called the Hawaii Belt Road (FAP 19). The bridge is one of seven (Hionomoa, Kaalaala, Kanenelu, Keaiwa, Moaula, Paauau and Piikea) bridges constructed along the highway in 1937 to serve the sugar plantations near Pahala in the Kau district.

This bridge is one of the first reinforced-concrete rigid-frame bridges constructed in the islands, and one of only five of this type built prior to WW II. The reinforced-concrete rigid-frame bridge demonstrates the rapid advances in engineering technology in the early decades of the twentieth century and are the most sophisticated of the pre-WWII bridges from an engineering perspective. The abutments and deck of rigid-frame bridges are constructed as one solid piece of concrete enabling the slab to double or triple the previous achievable span of twenty feet. This technology was not used in Hawaii until 1936, when William R. Bartels of the Territorial Highways Department developed the plans for the Wahiawa Bridge on Kauai and the Kaahumanu Avenue-Naniloa Drive Overpass in Wailuku, Maui. (1) These were followed by the construction of two concrete rigid-frame bridges on Hawaii Island and one on Oahu. (2)

Bartels was responsible for the design of virtually all major territorial bridge projects between 1932 and his retirement from the department in 1956. His bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers. Contractor George Freitas constructed both the Kealakaha and the Honolii Bridges on the Hawaii Belt Road, which were also designed by the Territorial Highways Department.

(1) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1987b), 341.
(2) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1987b), 341.

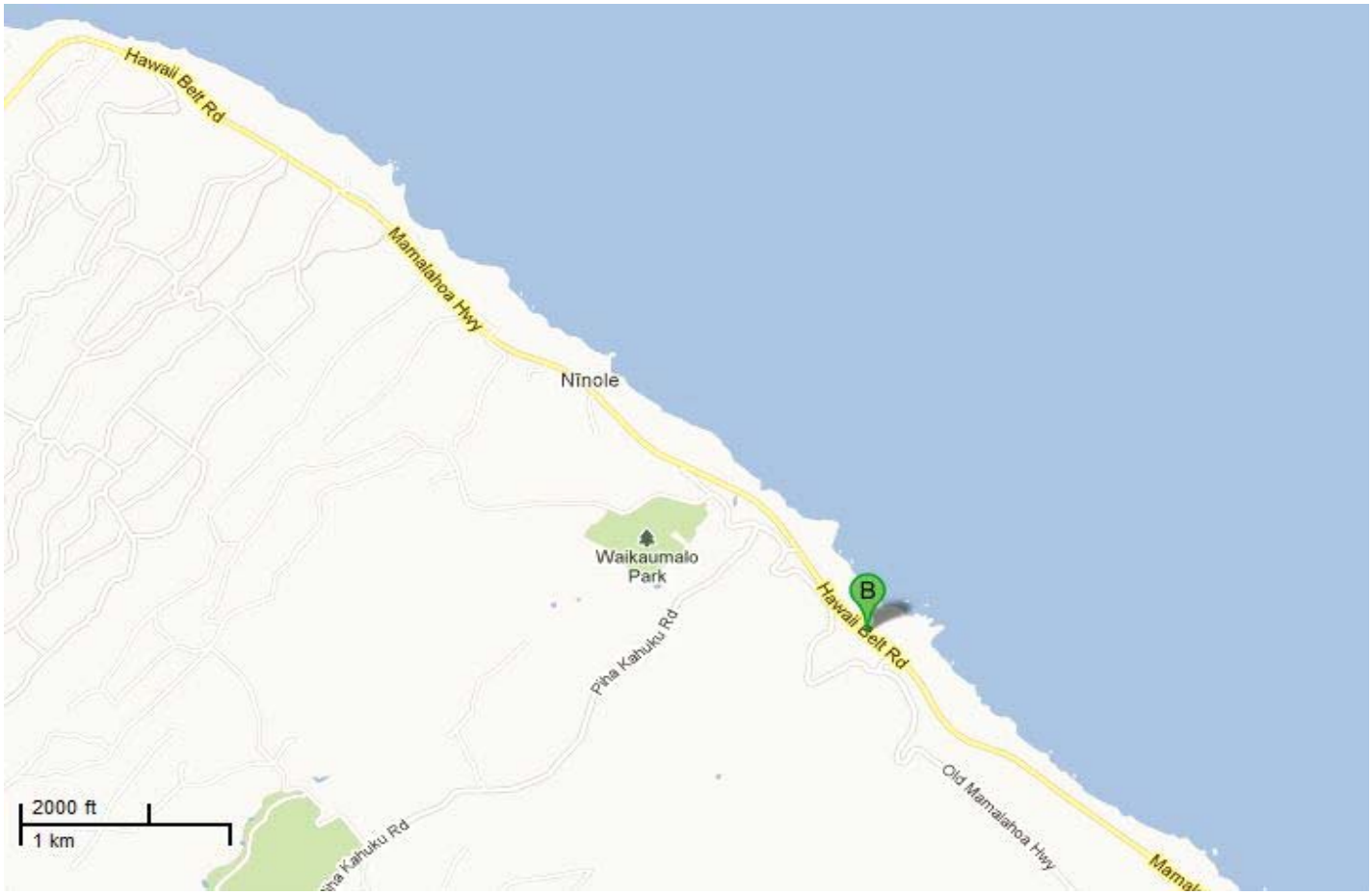
Inventory Form
(State)

General Information

Bridge Number: 001000190308146	**Route No:** 19
Popular Name: Nanue Stream Bridge	
Feature Crossed: Nanue Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 17.99 mi.	**Island:** Hawaii
Longitude: 155d-09m-22.55s	**Latitude:** 19d-55m-38.30s

Location: 1.56 Miles West of Kauniho Road
Historic Name: Nanue Stream Bridge
Designer/Engineer: John Mason Young (1911) / William R. Bartels (1952)
Builder/Contractor: W. W. Beers (1911) - Fabricator: Hamilton and Chambers, N.Y. (1911) / Independent Iron Works, Ca. (1952)

Location Map:



Construction Information

Bridge Type: Steel Trestle	**Construction Date:** 1952	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1952	
Alteration Type(s):		
Alteration Description(s): The highway bridge is a reconstructed railroad trestle		

Bridge Information

Number of Spans: 10	**Max Span:** 71.9 ft.	**Total Length:** 530.8 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction (added 1952)			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form and see Hawaii Belt Road significance statement.

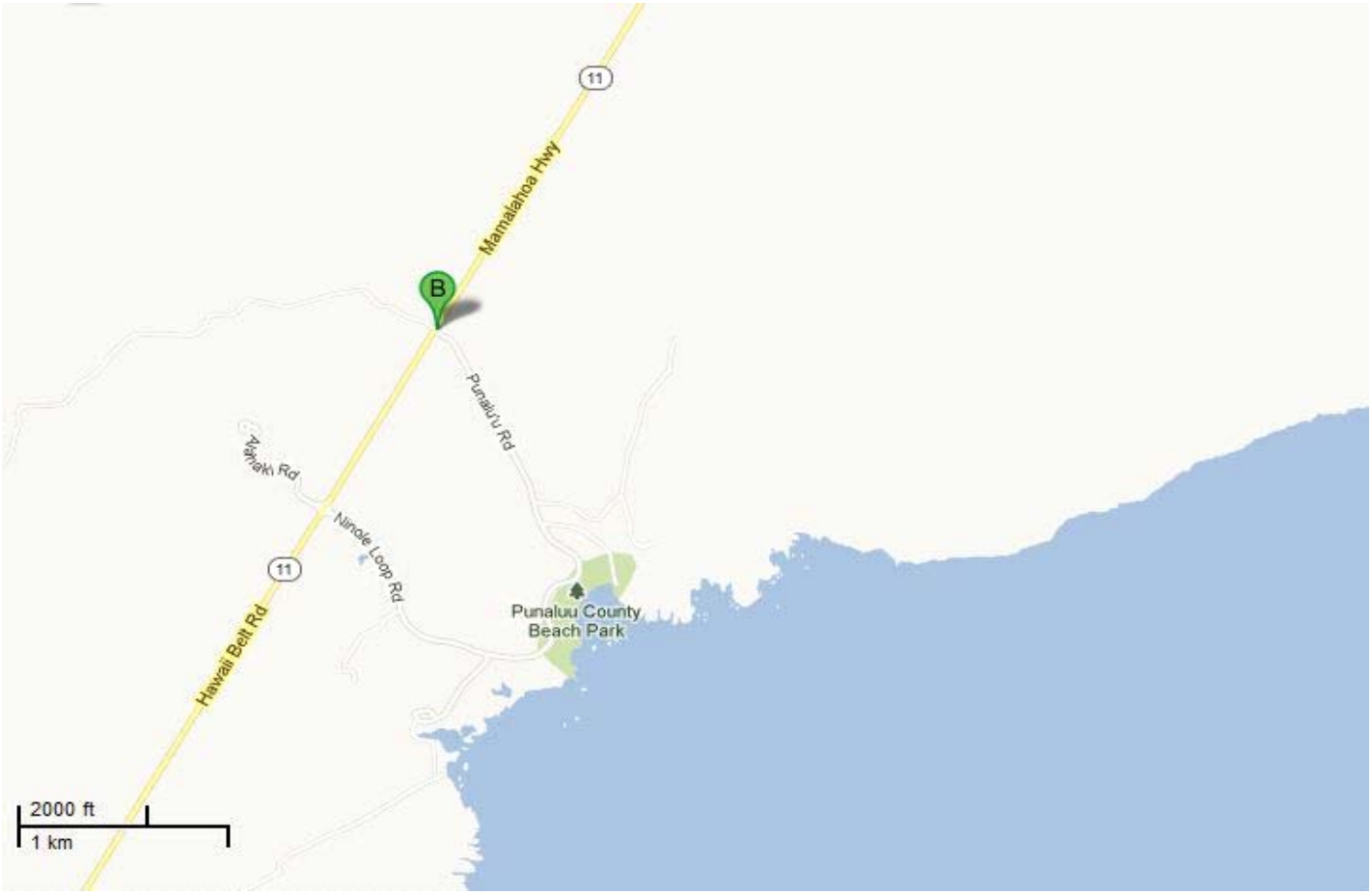
Inventory Form
(State)

General Information

Bridge Number: 001000110306600	**Route No:** 11
Popular Name: Ninole Stream Bridge	
Feature Crossed: Ninole Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 56.58 mi.	**Island:** Hawaii
Longitude: 155d-31m-02.45s	**Latitude:** 19d-08m-18.97s

Location: 0.76 Miles South of Road to Punaluu Black Sand Beach
Historic Name: Ninole Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 19.0 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 26.9 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Ninole Stream Bridge carries Hawaii Belt Road across the Ninole Stream. This timber bridge has an asphalt deck and is in its original location. It is generally in good condition. The bridge has timber railings and concrete footings. The asphalt deck is supported by timber columns with concrete rubble masonry footings and concrete rubble masonry abutments. The simple design of the bridge retains its historic feeling. The MOA between DOT and the Central Federal Lands considering the bridge for replacement in 2013 was completed.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1940's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. It is also one of the last district owned timber bridges.

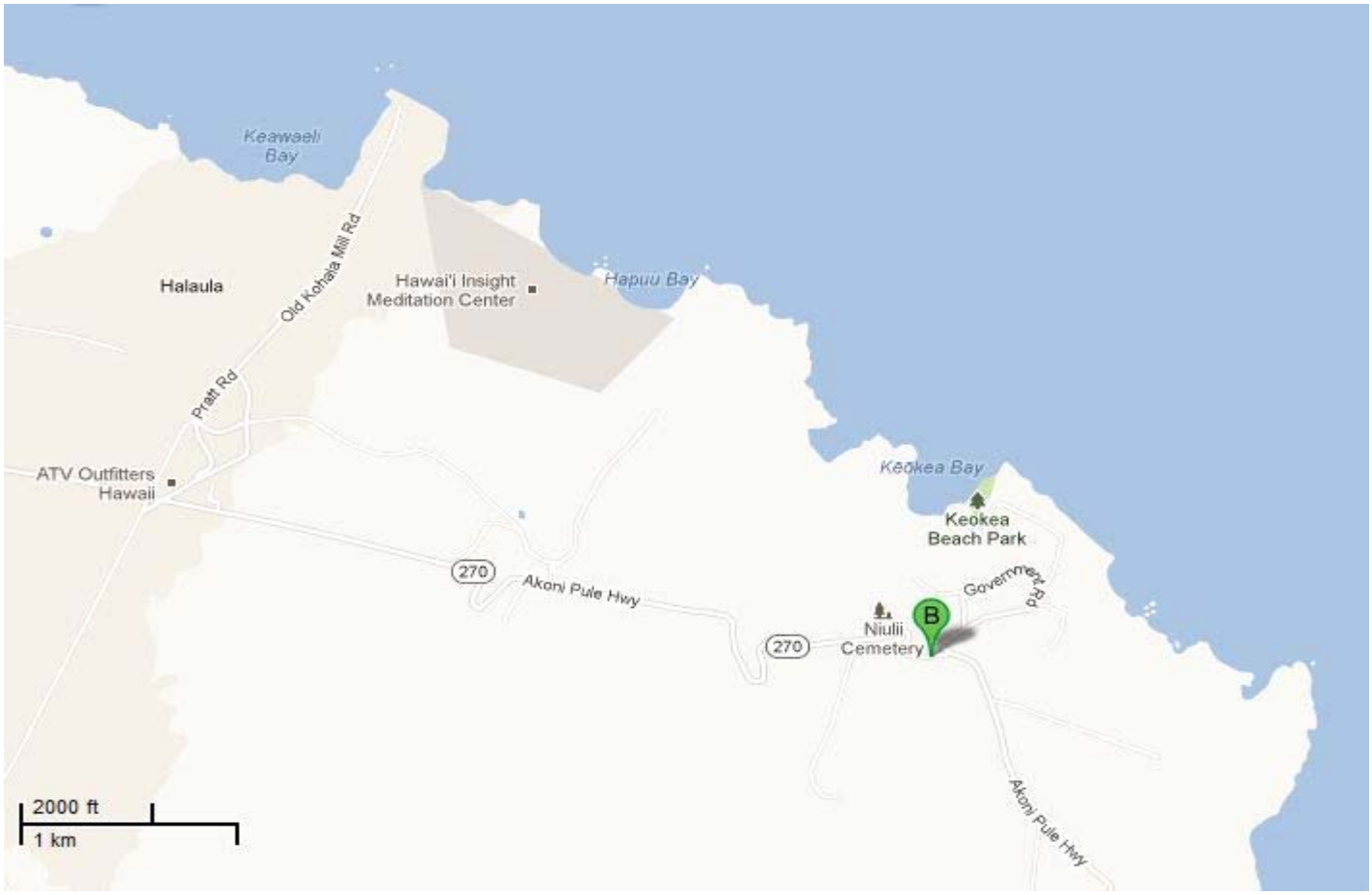
Inventory Form
(State)

General Information

Bridge Number: 001002700502390	**Route No:** 270
Popular Name: Niulii Stream Bridge	
Feature Crossed: Niulii Stream	
Feature Carried: Akoni Pule Highway	
Milepost: 27.29 mi.	**Island:** Hawaii
Longitude: 155d-44m-51.48s	**Latitude:** 20d-13m-13.08s

Location: 1.46 Miles East of Akana Place
Historic Name: Niulii Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1918	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 29.9 ft.	**Total Length:** 33.1 ft.	**Deck Width:** 25.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Niulii Stream Bridge carries Hawi-Niulii Road across the Niulii Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets. The end posts have the construction date and the bridge name engraved. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling. This bridge has a wood (timber) pedestrian side walk laid on top of metal I-beams on one side. The sidewalk has been repaired and repainted.

Significance Statement:

This bridge is eligible under Criterion C for it association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1910's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

Inventory Form
(State)

General Information

Bridge Number: 001000190308619	**Route No:** 19
Popular Name: Paheehee Stream Bridge	
Feature Crossed: Paheehee Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 13.31 mi.	**Island:** Hawaii
Longitude: 155d-06m-42.57s	**Latitude:** 19d-52m-31.96s

Location: 0.09 Miles West of Honomu Road to Akaka Falls (Route 220)
Historic Name: Paheehee Stream Bridge
Designer/Engineer: John Mason Young
Builder/Contractor: W. W. Beers

Location Map:

Construction Information

Bridge Type: Steel Trestle	**Construction Date:** 1950	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1950	
Alteration Type(s):		
Alteration Description(s): The highway bridge is a reconstructed railroad trestle		

Bridge Information

Number of Spans: 5	**Max Span:** 65.9 ft.	**Total Length:** 254.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction (added 1950)			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form and see Hawaii Belt Road significance statement.

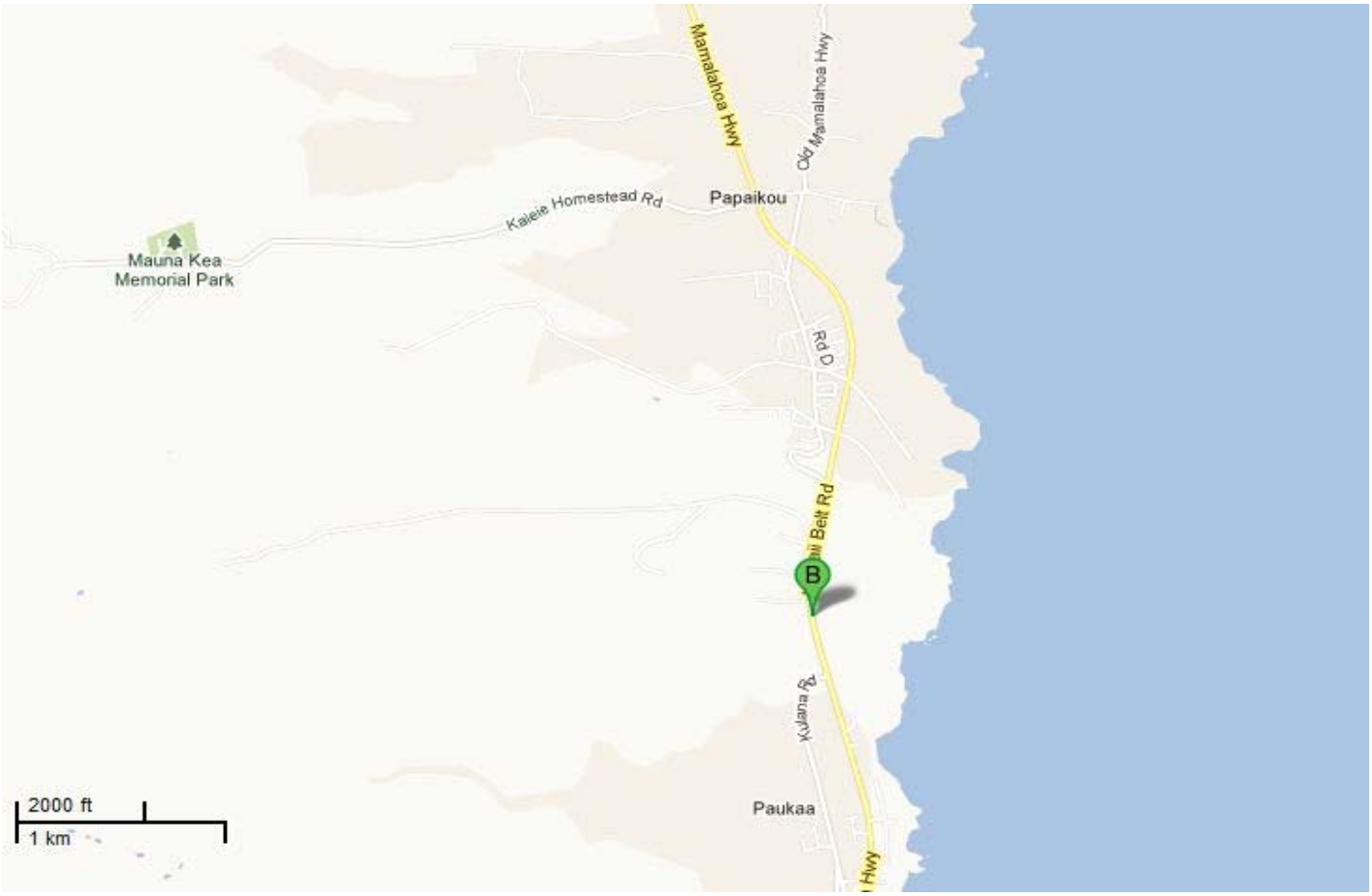
Inventory Form
(State)

General Information

Bridge Number: 001000190309368	**Route No:** 19
Popular Name: Pahoehoe Stream Bridge	
Feature Crossed: Pahoehoe Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 5.84 mi.	**Island:** Hawaii
Longitude: 155d-05m-37.56s	**Latitude:** 19d-46m-29.15s

Location: 0.62 Miles West of Kuikahi Road
Historic Name: Pahoehoe Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 45.9 ft.	**Total Length:** 48.9 ft.	**Deck Width:** 44.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Metal Thrie Beam			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Pahoehoe Stream Bridge carries Hawaii Belt Road across the Pahoehoe Stream. This closed spandrel arch is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete abutments however the original railings were replaced with thrie beams. In 2013 the bridge was scheduled to be replaced.

Significance Statement:

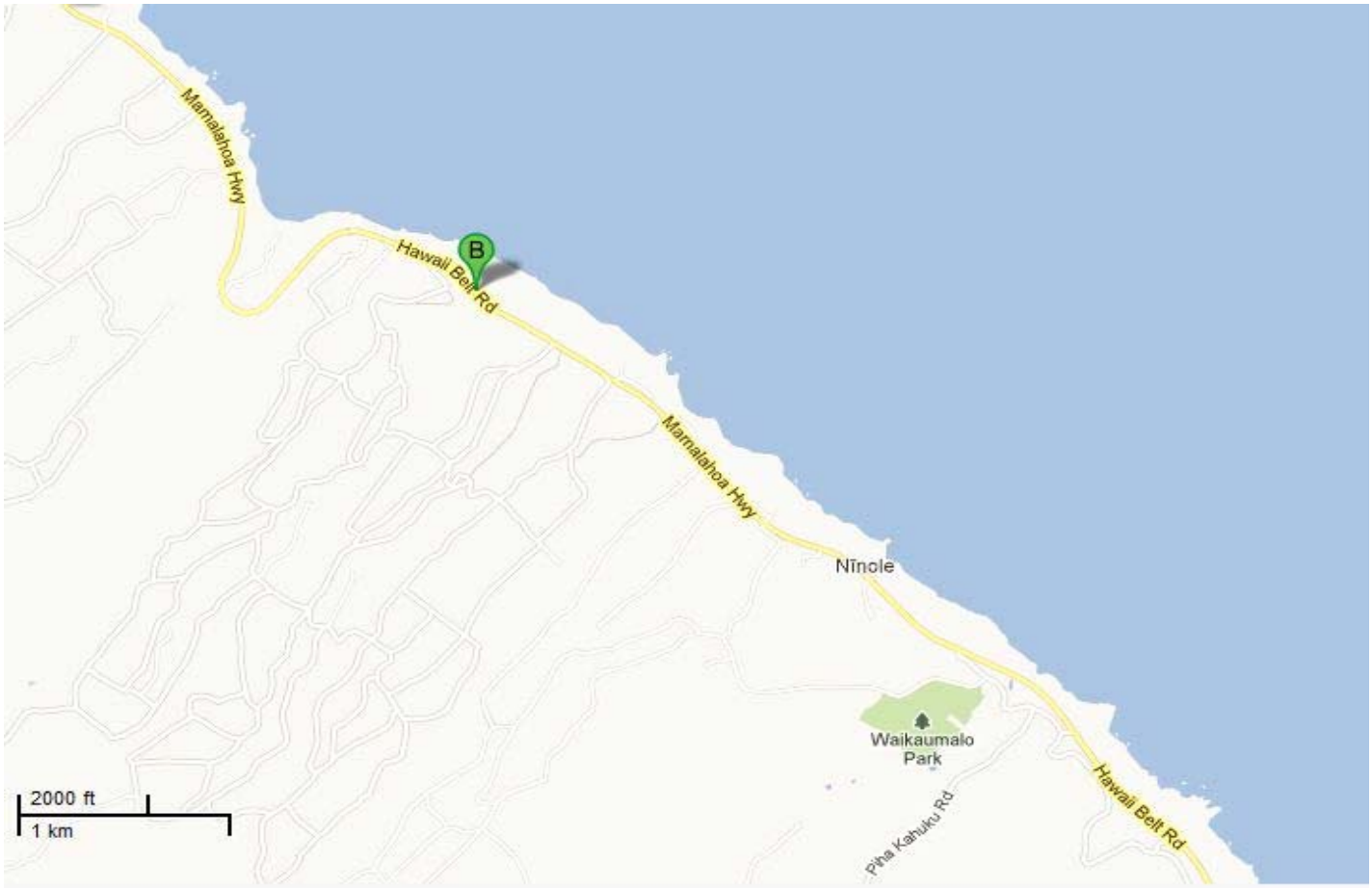
This bridge is eligible for being a good example of an early closed spandrel arch bridge. Although the original railings do not remain, the early original arched structure is unusual in Hawaii. It is a good example of a 1910's closed spandrel arch that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(State)

General Information

Bridge Number: 001000190307887	**Route No:** 19
Popular Name: Pohakupuka Stream Bridge	
Feature Crossed: Pohakupuka Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 20.67 mi.	**Island:** Hawaii
Longitude: 155d-11m-11.89s	**Latitude:** 19d-57m-06.11s
Location: 4.25 Miles West of Kauniho Road	
Historic Name: Pohakupuka Stream Bridge	
Designer/Engineer: William R. Bartels	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1953	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 60.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 37.1 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Integral Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Pohakupuka Stream Bridge is a continuous concrete frame bridge, constructed in 1953, to carry Hawaii Belt Road over a concrete channel taking Holiilii stream from Honokaa to Hilo along the Hamakua Coast of the island of Hawaii. This bridge is part of the “Seismic Wave Damage Rehabilitation Project”. This bridge remains in its original location and the abandoned Maulua railroad Tunnel and an old road still in existence is found nearby. The integrity of whole structure remains intact. Workmanship can be seen in the concrete formwork. The parapets are concrete open horizontal that were common in the post-war era but the thrie beams are bolted over the original parapets and invisible from the road side. The incised name and date on the end post aid interpretation of the bridge.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

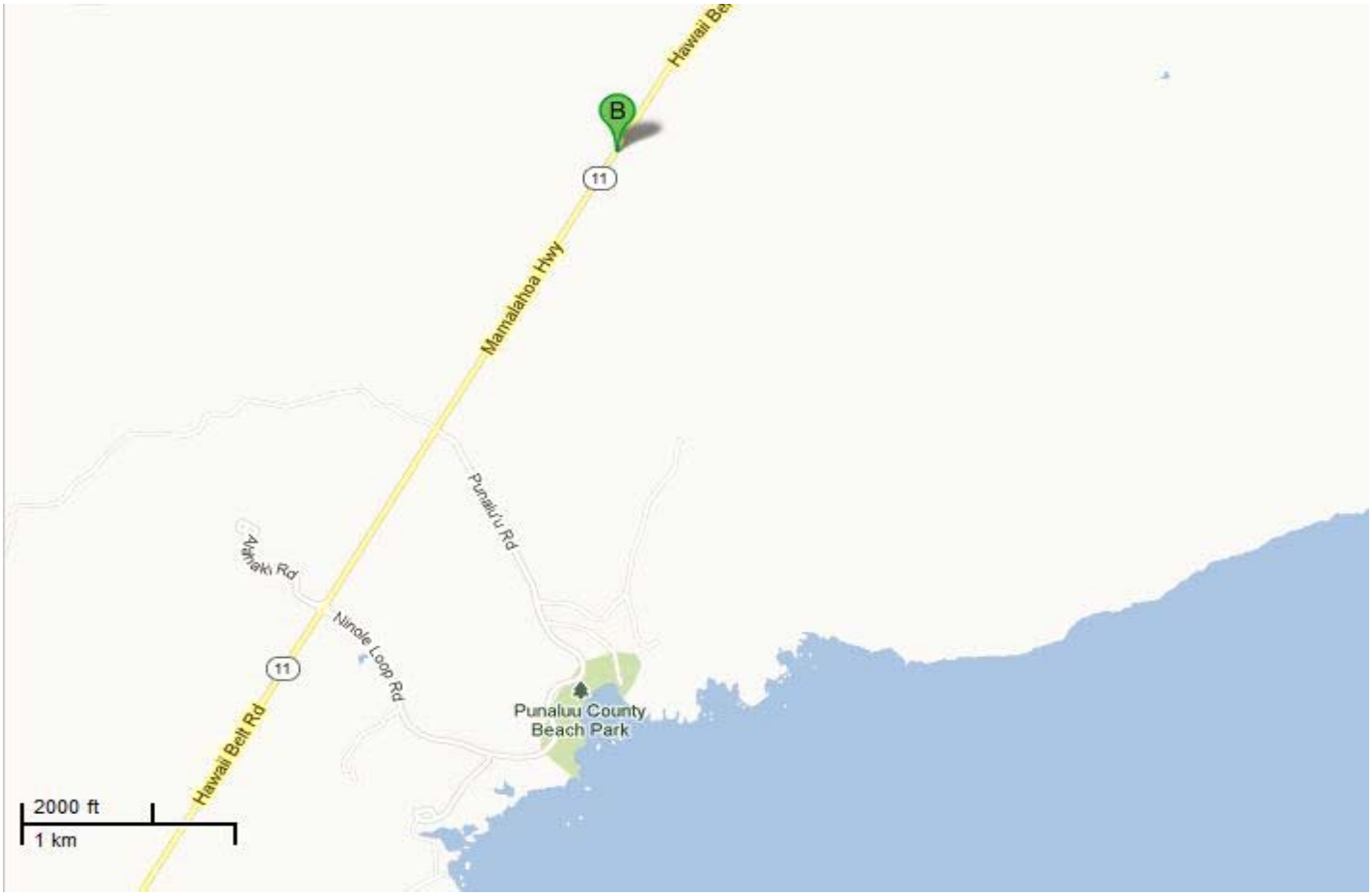
See Post-War Hawaii Belt Road significance statement.

Inventory Form
(State)

General Information

Bridge Number: 001000110306805	**Route No:** 11
Popular Name: Punaluu Stream Bridge	
Feature Crossed: Punaluu Stream	
Feature Carried: Hawaii Belt Road (Mamalahoa Highway)	
Milepost: 54.53 mi.	**Island:** Hawaii
Longitude: 155d-30m-05.35s	**Latitude:** 19d-09m-51.81s
Location: 1.29 Miles North of Road to Punaluu Black Sand Beach	
Historic Name: Punaluu Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.9 ft.	**Total Length:** 30.8 ft.	**Deck Width:** 27.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Punaluu Stream Bridge carries Hawaii Belt Road across the Punaluu Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has open Greek cross parapets with stepped caps and curved wide end posts. Two of the end posts have the construction date and the bridge name engraved. The concrete deck is supported by concrete abutments. The parapets have been painted white only on the surface facing the road. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with the development of concrete bridge construction in Hawaii. It is a good example of a 1940's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

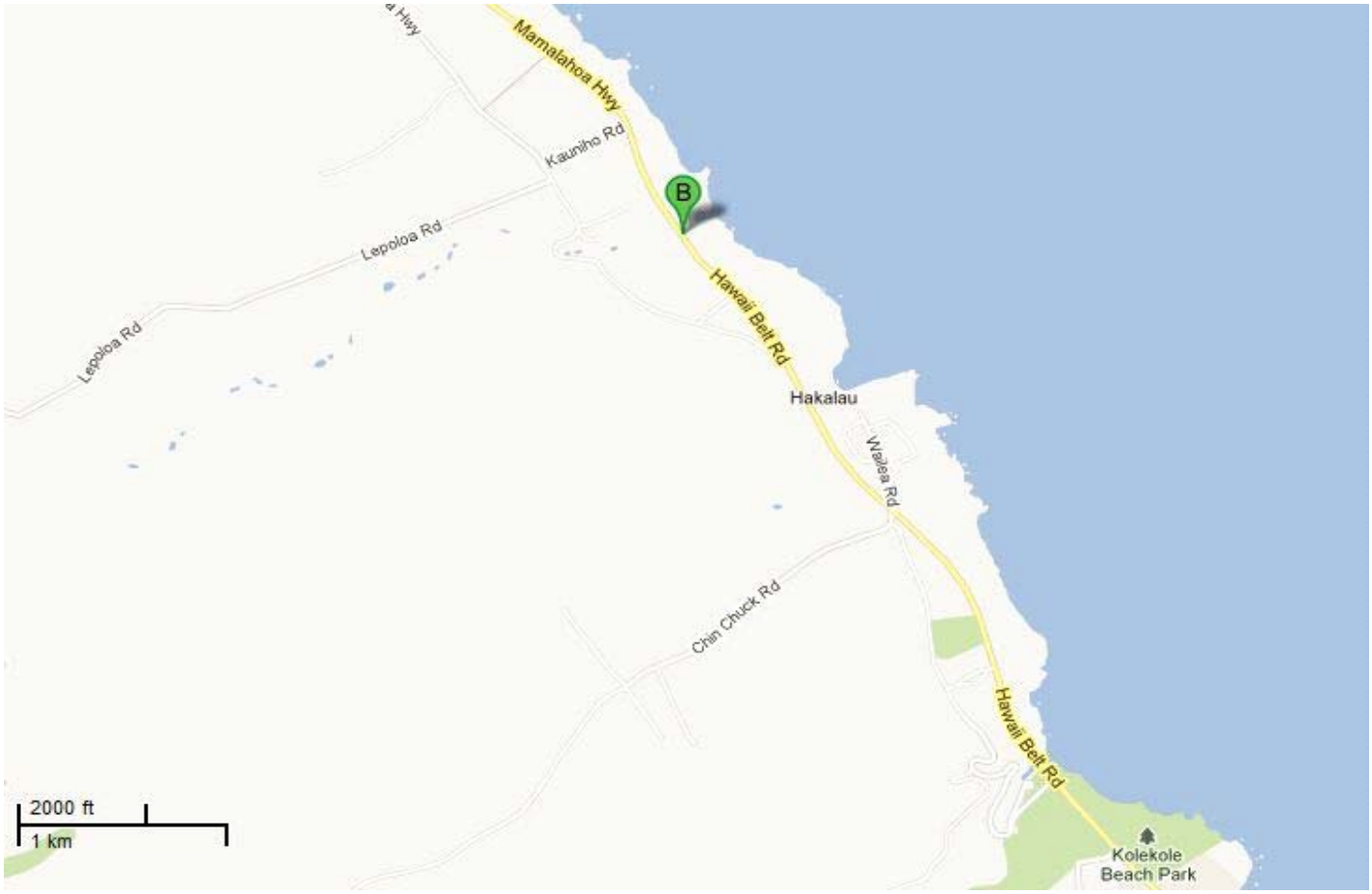
Inventory Form
(State)

General Information

Bridge Number: 001000190308346	**Route No:** 19
Popular Name: Umauma Stream Bridge	
Feature Crossed: Umauma Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 16.02 mi.	**Island:** Hawaii
Longitude: 155d-08m-08.77s	**Latitude:** 19d-54m-26.10s

Location: 0.34 Miles East of Kauniho Road
Historic Name: Umauma Stream Bridge
Designer/Engineer: John Mason Young (1911) / William R. Bartels (1953)
Builder/Contractor: W. W. Beers (1911) - Fabricator: Hamilton and Chambers, N. Y. (1911) / Independent Iron Works, Ca. (1953)

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1952	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1952, 2013	
Alteration Type(s):		
Alteration Description(s): The highway bridge is a reconstructed railroad trestle, added concrete pillars inside of trestles in 2013		

Bridge Information

Number of Spans: 6	**Max Span:** 65.9 ft.	**Total Length:** 280.8 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Steel Trestle			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Concrete end piers with incised bridge name and date of construction (added 1952)			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** Yes
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

In 2013 concrete pillars were placed inside of the trestles.

See National Register of Historic Places Nomination Form.

Significance Statement:

See National Register of Historic Places Nomination Form and see Hawaii Belt Road significance statement.

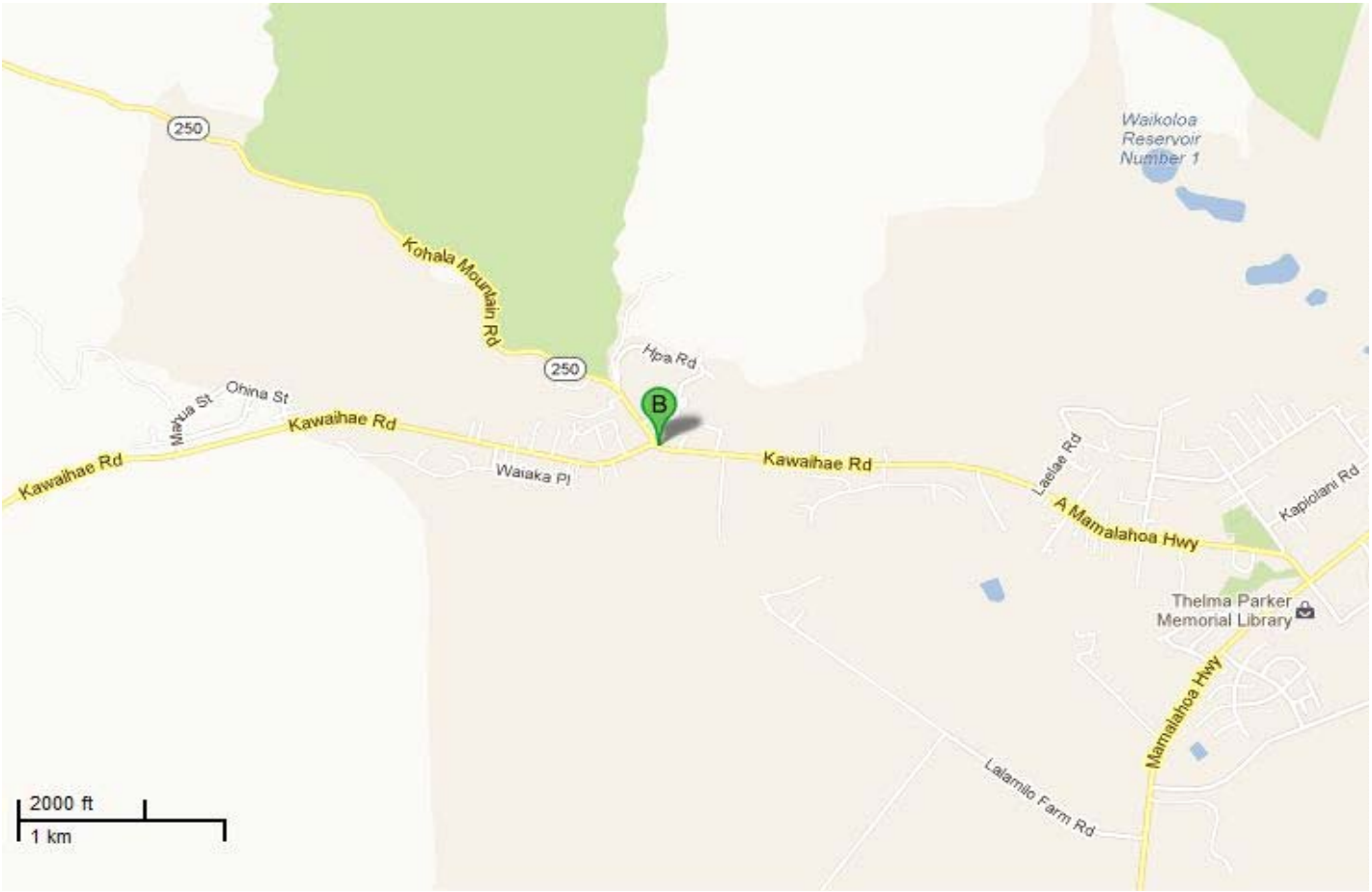
Inventory Form
(State)

General Information

Bridge Number: 001002500500053	**Route No:** 19
Popular Name: Waiaka Stream Bridge	
Feature Crossed: Waiaka Stream	
Feature Carried: Kawaihae Road	
Milepost: 0.53 mi.	**Island:** Hawaii
Longitude: 155d-41m-56.06s	**Latitude:** 20d-01m-35.97s

Location: 0.08 Miles East of Lindsey Road
Historic Name: Waiaka Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1932	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 15.1 ft.	**Total Length:** 38.1 ft.	**Deck Width:** 26.9 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waiaka Stream Bridge carries Hawaii Belt Road across the Waiaka Stream. This reinforced concrete and masonry bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete, solid panel parapets. This bridge's name which is engraved on the parapet is obscured by thrie beams. It contains arch piers and the middle support is a double arch. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling. The MOA between DOT and the Central Federal Lands considering the bridge for replacement in 2013 was completed. Per the MOA, the bridge is scheduled for replacement and road re-alignment.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

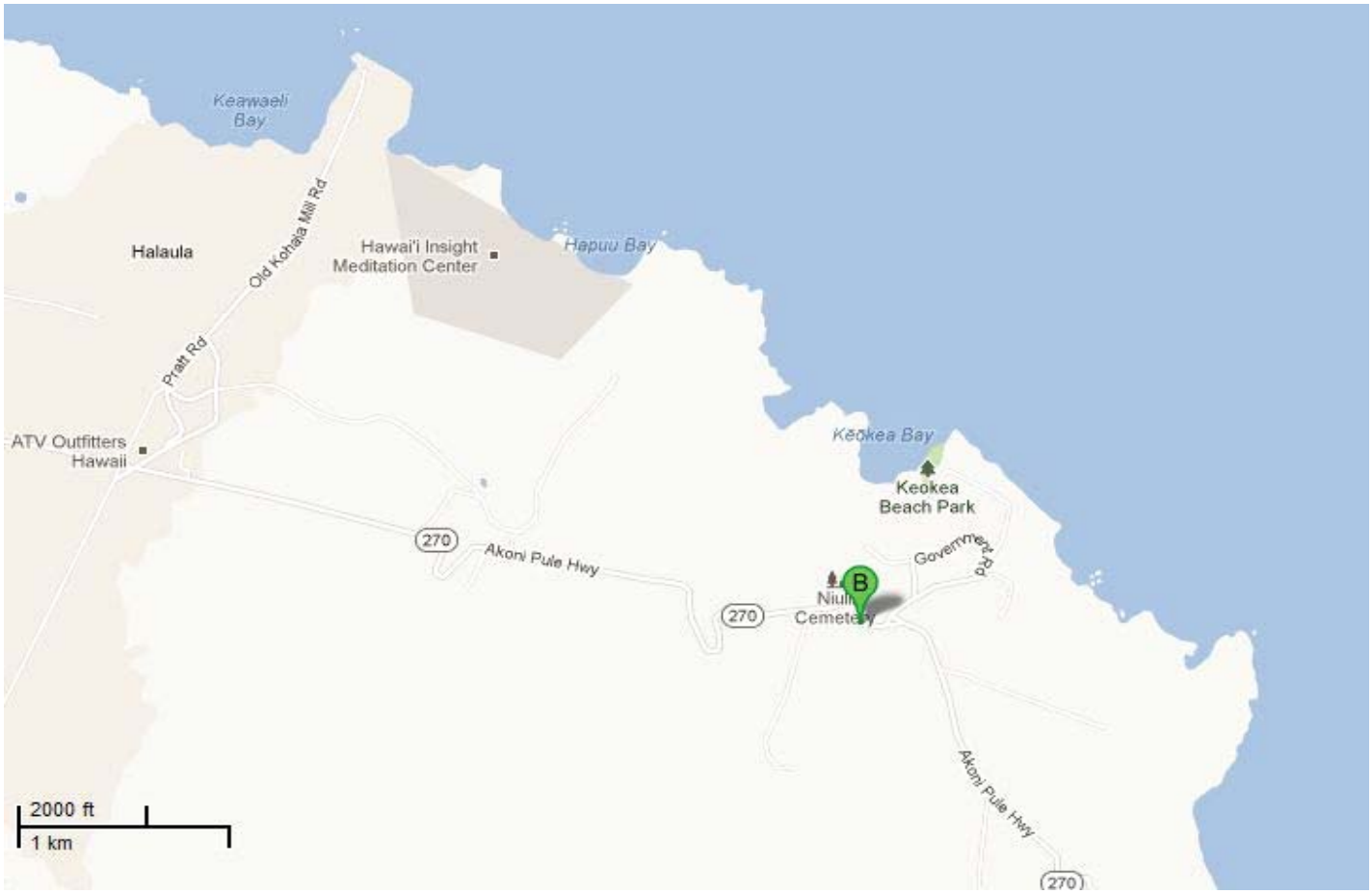
Inventory Form
(State)

General Information

Bridge Number: 001002700502386	**Route No:** 270
Popular Name: Waikane Stream Bridge	
Feature Crossed: Waikane Stream	
Feature Carried: Akoni Pule Highway	
Milepost: 27.24 mi.	**Island:** Hawaii
Longitude: 155d-44m-53.87s	**Latitude:** 20d-13m-13.03s

Location: 1.43 Miles East of Akana Place
Historic Name: Waikane Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1918	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 25.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikane Stream Bridge carries Hawi-Niulii Road across the Waikane Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets. The end posts have the construction date and the bridge name engraved. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling. This bridge has a wood (timber) pedestrian side walk on one side. The sidewalk has been repaired and repainted.

Significance Statement:

This bridge is eligible under Criterion C for it association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1910's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

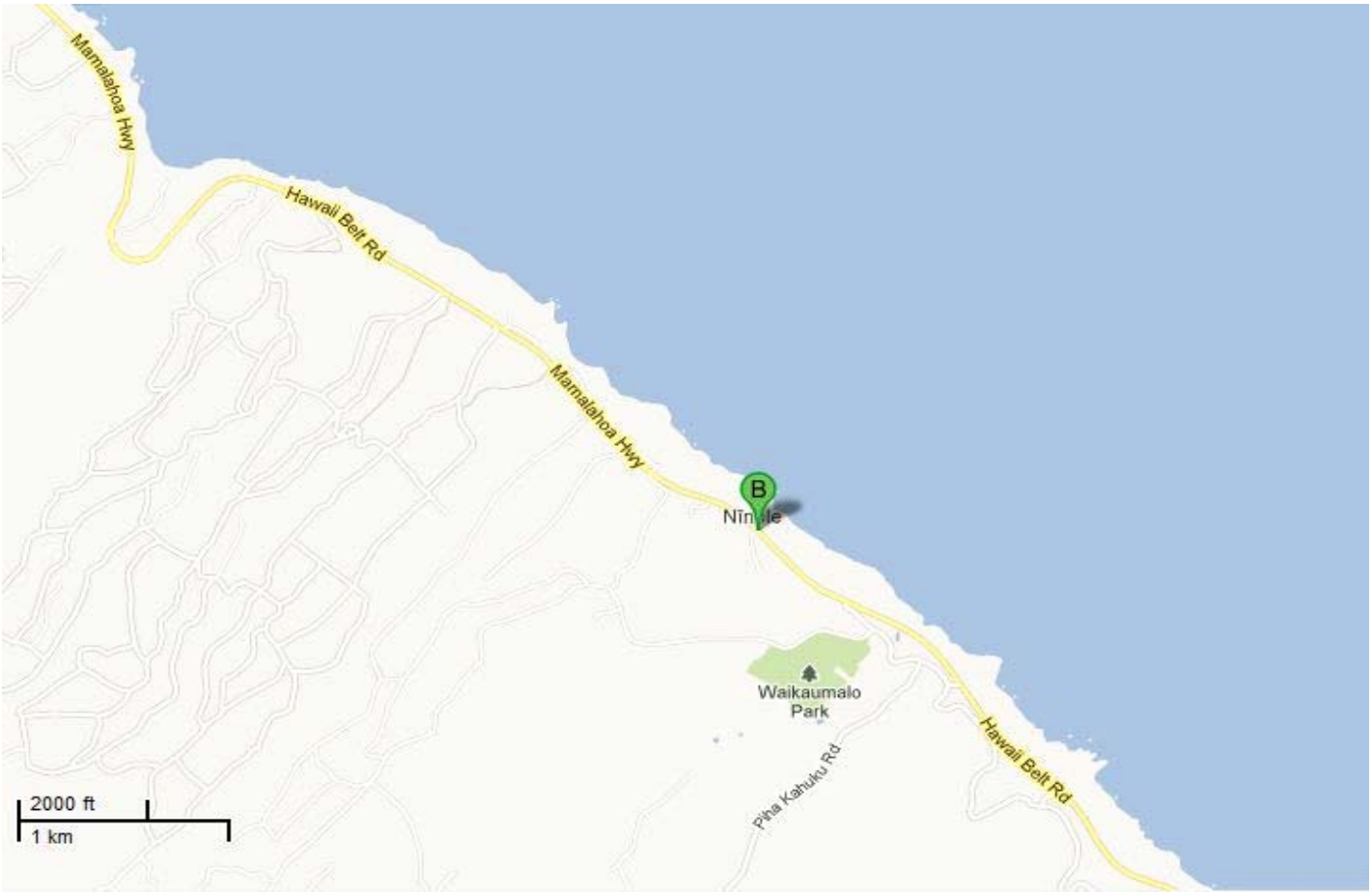
Inventory Form
(State)

General Information

Bridge Number: 001000190308038	**Route No:** 19
Popular Name: Waikolu Stream Bridge	
Feature Crossed: Waikolu Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 19.16 mi.	**Island:** Hawaii
Longitude: 155d-10m-07.32s	**Latitude:** 19d-56m-17.91s

Location: 2.74 Miles West of Kauniho Road
Historic Name: Waikolu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Rigid Frame	**Construction Date:** 1934	**Replaced?** No
Altered? No **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 28.9 ft.	**Total Length:** 34.1 ft.	**Deck Width:** 29.5 ft.
Superstructure: Concrete Rigid Frame			
Substructure: Concrete Integral Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Greek Cross			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikolu Stream Bridge carries Hawaii Belt Road across the Waikolu Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. Reinforced concrete open arched balustrades with “Greek-cross” voids and concrete rail caps are significant characteristics of this bridge. The end posts have the construction date and the bridge name engraved. There has been an addition of a pedestrian bridge on the side of the bridge. An 8 inch cast iron water line is located on the mauka side of the bridge. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete and steel bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete and steel bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

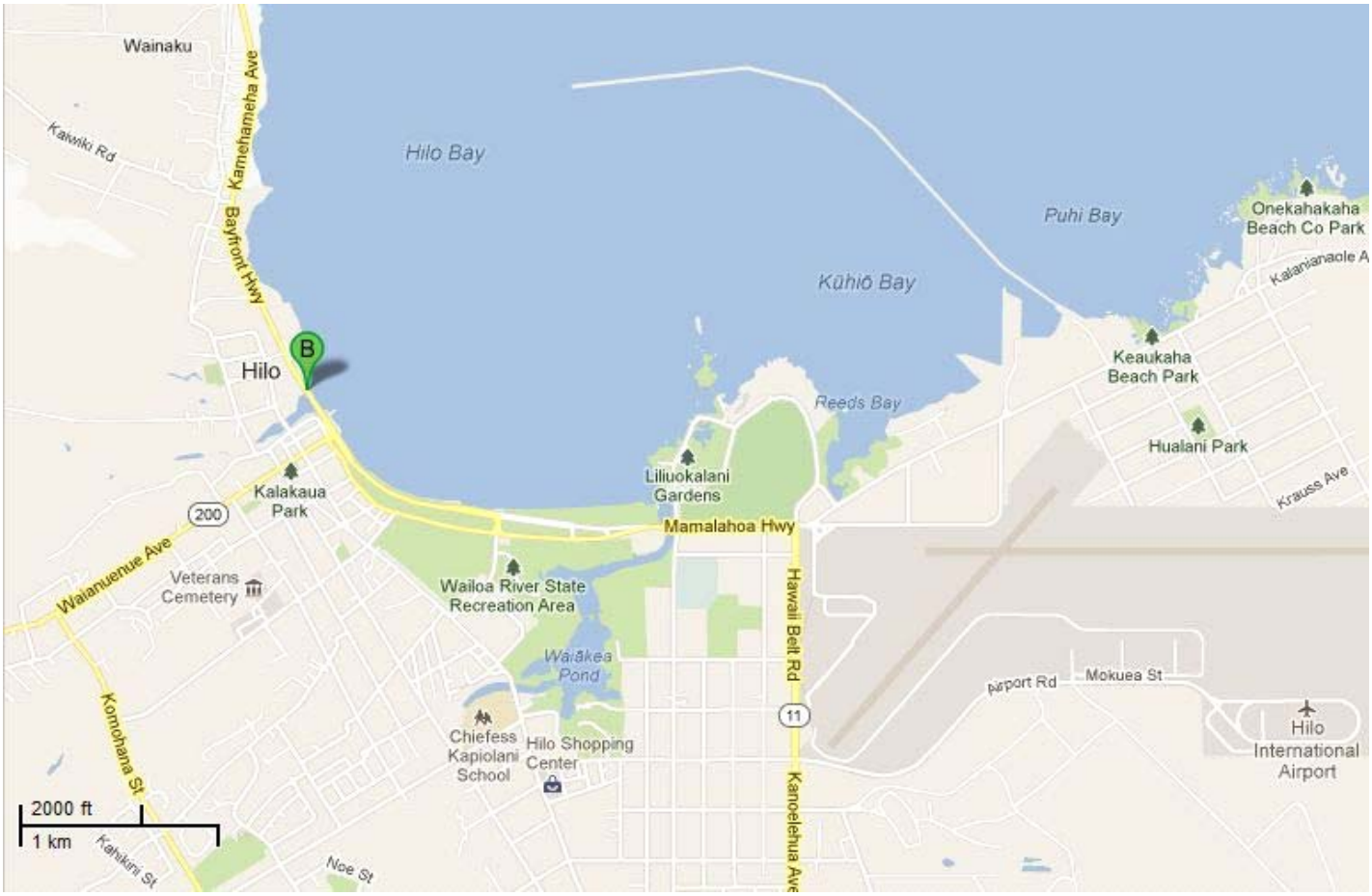
Inventory Form
(State)

General Information

Bridge Number: 001000190409696	**Route No:** 19
Popular Name: Wailuku River Bridge	
Feature Crossed: Wailuku Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 2.49 mi.	**Island:** Hawaii
Longitude: 155d-05m-14.93s	**Latitude:** 19d-43m-41.75s

Location: 0.16 Miles West of Wainuenue Avenue
Historic Name: Wailuku River Bridge
Designer/Engineer: William R. Bartels
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1950	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 133.9 ft.	**Total Length:** 421.9 ft.	**Deck Width:** 38.4 ft.
Superstructure: Steel Multi-Girder			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Steel Deck			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features: Concrete piers and wooden walkways			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Wailuku Stream Bridge was constructed in 1950 to carry the Hawaii Belt Road over the Wailuku Stream on the edge of downtown Hilo. The bridge was constructed on existing railroad pier columns.

It remains in its original location and the historic Hilo setting has undergone few changes. The design of the bridge has remained intact. Many of the materials, including the wooden walkway and steel grid have been replaced in kind. The name and date of the bridge are incised on the concrete end piers, and aid in interpretation. The addition at concrete parapets to the original piers detracts from the bridge's historic feelings. The steel railings have been repaired and repainted, are unique in pattern, and contribute to the historic ambiance of the structure, along with the bridge's proximity to downtown Hilo.

Significance Statement:

The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type. This bridge is of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

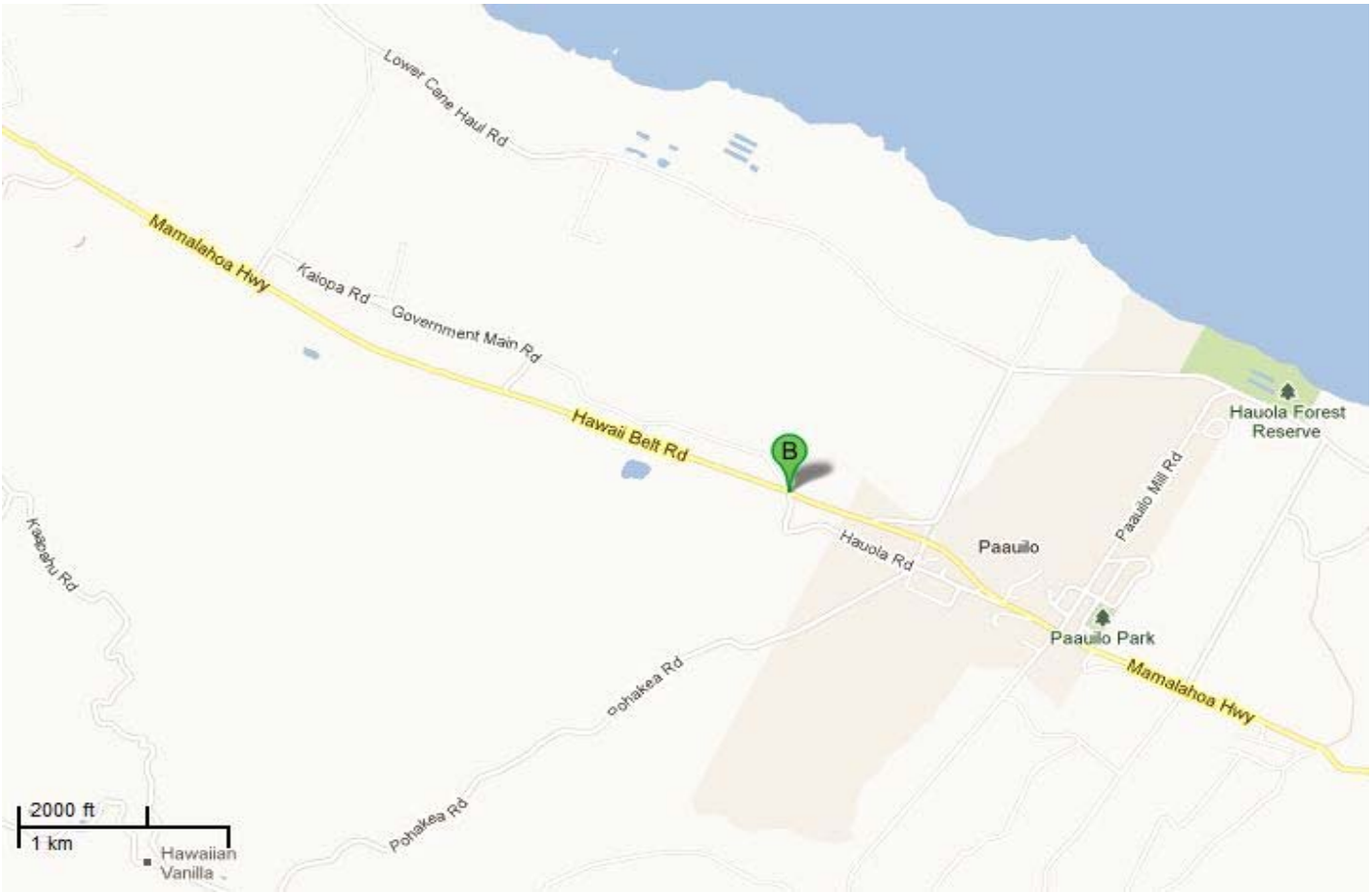
Inventory Form
(State)

General Information

Bridge Number: 001000190306280	**Route No:** 19
Popular Name: Waipunahina Stream Bridge	
Feature Crossed: Waipunahina Stream	
Feature Carried: Hawaii Belt Road	
Milepost: 36.75 mi.	**Island:** Hawaii
Longitude: 155d-22m-45.63s	**Latitude:** 20d-02m-42.55s

Location: 5.00 Miles East of Mamane Street
Historic Name: Waipunahina Stream Bridge
Designer/Engineer: William R. Bartels and J. Okamoto
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1959	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 1999	
Alteration Type(s):		
Alteration Description(s): End posts upgraded		

Bridge Information

Number of Spans: 2	**Max Span:** 91.9 ft.	**Total Length:** 190.0 ft.	**Deck Width:** 38.4 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall and Concrete T-Shaped Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features: Walkways both sides			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, B, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Commerce, Engineering		

Narrative Description:

The Waipunahina Stream Bridge is a continuous concrete box beam/multiple girder structure, constructed in 1959, to carry Hawaii Belt Road over Waipunahina Gulch. The Hilo-Hamakua corridor was once vital to the sugar industry. The bridge remains in its original location and the rural/coastal setting has not changed. Parts of the plantation railroad are still kept at the both sides of the Hawaii Belt Road and the Hamakua Mill is located not far away from the bridge. There are ditches at the ends of the bridge. Some boulders can also be found along the stream side. The original design and materials are mostly intact although the end posts of the bridge were upgraded in 1999. The parapets are concrete open horizontal which is a common type of the post-war bridge. The elliptical ornaments at the end posts add to the bridge's artistic value and workmanship. The rural setting contributes to the historic character of the bridge. Interpretation is eased by the date and name of construction incised on the end piers.

Significance Statement:

This bridge is one of the best examples of a program comment bridge built post-war (1945) along the Hawaii Belt Road on the island of Hawaii in the historic study period prior to 1969.

See Post-War Hawaii Belt Road significance statement.

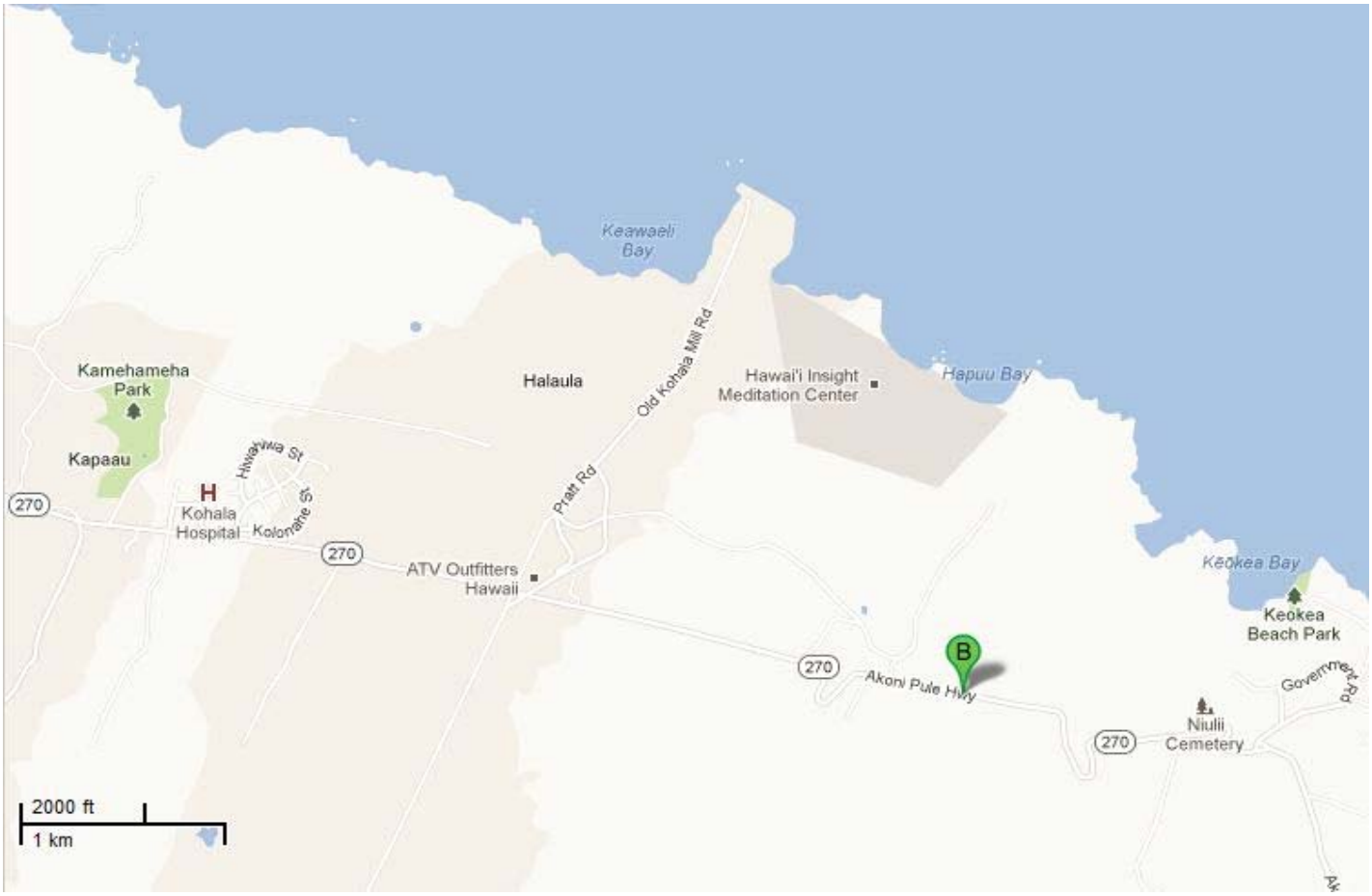
Inventory Form
(State)

General Information

Bridge Number: 001002700502266	**Route No:** 270
Popular Name: Walaohia Stream Bridge	
Feature Crossed: Walaohia Gulch	
Feature Carried: Akoni Pule Highway	
Milepost: 26.04 mi.	**Island:** Hawaii
Longitude: 155d-45m-39.85s	**Latitude:** 20d-13m-22.79s

Location: 0.22 Miles East of Akana Place
Historic Name: Walaohia Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1919	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 40.0 ft.	**Total Length:** 160.1 ft.	**Deck Width:** 20.3 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Walaohia Gulch/Stream Bridge carries Hawi-Niulii Road across the Walaohia Stream. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete, solid panel parapets. The end posts have the construction date and the bridge name engraved. The workmanship of the bridge has not been obscured by addition or repair and retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for it association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1910's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship and design.

VI. INVENTORY FORMS: HAWAII COUNTY ELIGIBLE BRIDGES

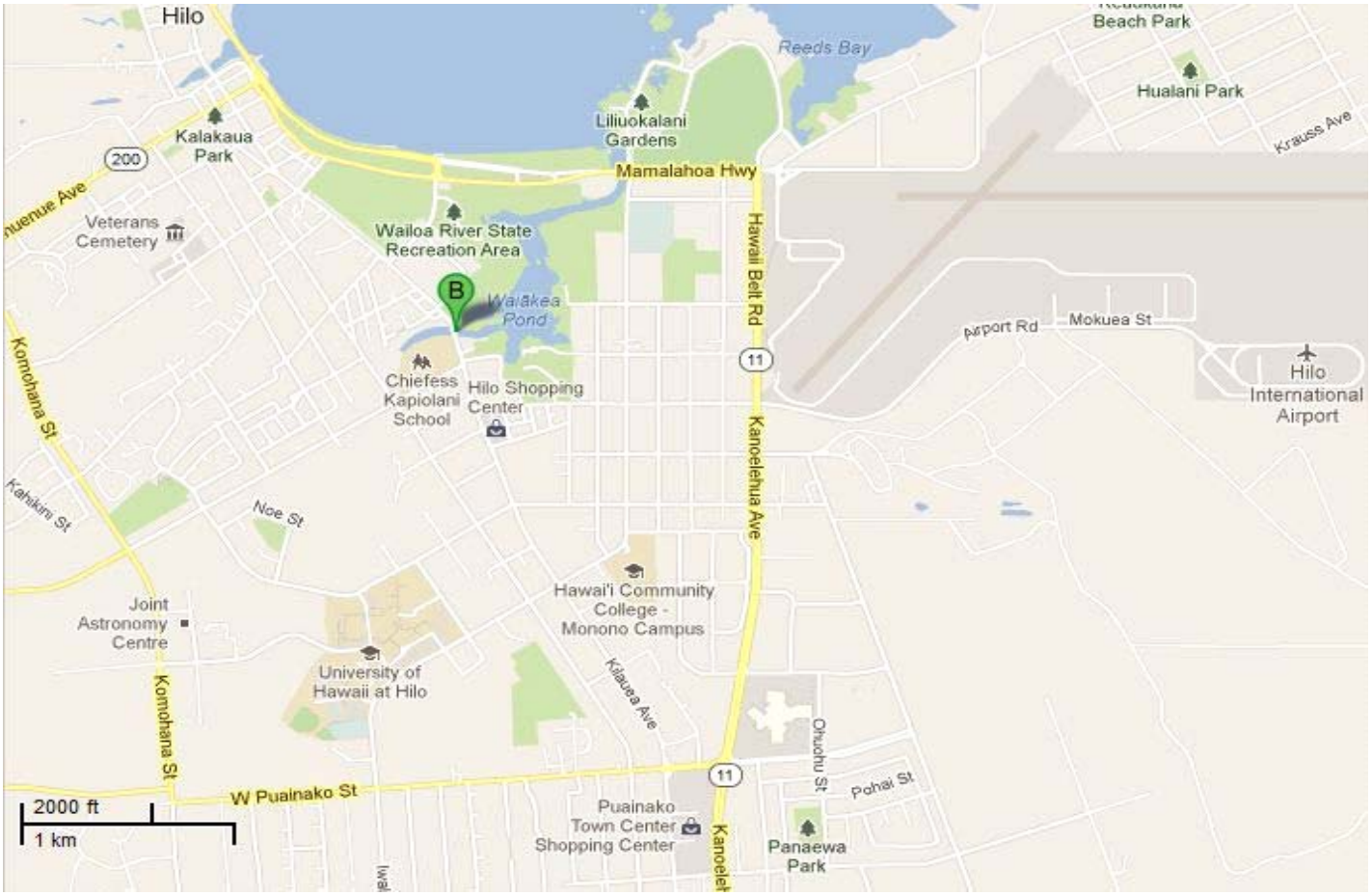
Inventory Form
(County/Private)

General Information

Bridge Number: 001019201400400	
Popular Name: 4 Mile Creek Bridge	
Feature Crossed: 4-Mile Creek	
Feature Carried: Kilauea Avenue	
Milepost: 4.00 mi.	**County Private:** Hawaii
Longitude: 155d-03m-59.69s	**Latitude:** 19d-40m-26.23s

Location: TMK: 2-4-45:02
Historic Name: 4 Mile Creek Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1916	**Replaced?** No
Altered? Yes **Alteration Date(s):** 1964		
Alteration Type(s):		
Alteration Description(s): Deck altered with tee beams		

Bridge Information

Number of Spans: 2	**Max Span:** 23.0 ft.	**Total Length:** 49.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The 4 Mile Creek Bridge carries Kilauea Avenue across 4 Mile Creek. This concrete tee beam slab bridge is in its original location, is generally in fair condition, and its materials remain intact. The bridge has solid concrete panel parapets with caps, reinforced concrete pier wall, and reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1910's reinforced concrete tee beam bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001002010900998	
Popular Name: 51 Mile Bridge	
Feature Crossed: Unnamed Stream	
Feature Carried: Saddle Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-40m-29.92s	**Latitude:** 19d-54m-19.10s

Location: TMK: 6-7-001
Historic Name: 51 Mile Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1942	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 17.0 ft.	**Total Length:** 21.0 ft.	**Deck Width:** 26.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The 51 Mile Bridge carries Saddle Road across a watercourse. This single-span reinforced concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid parapets, timber shoring at its mid-span, and reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1940's reinforced concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. The rock abutments are a potentially eligible historic resource.

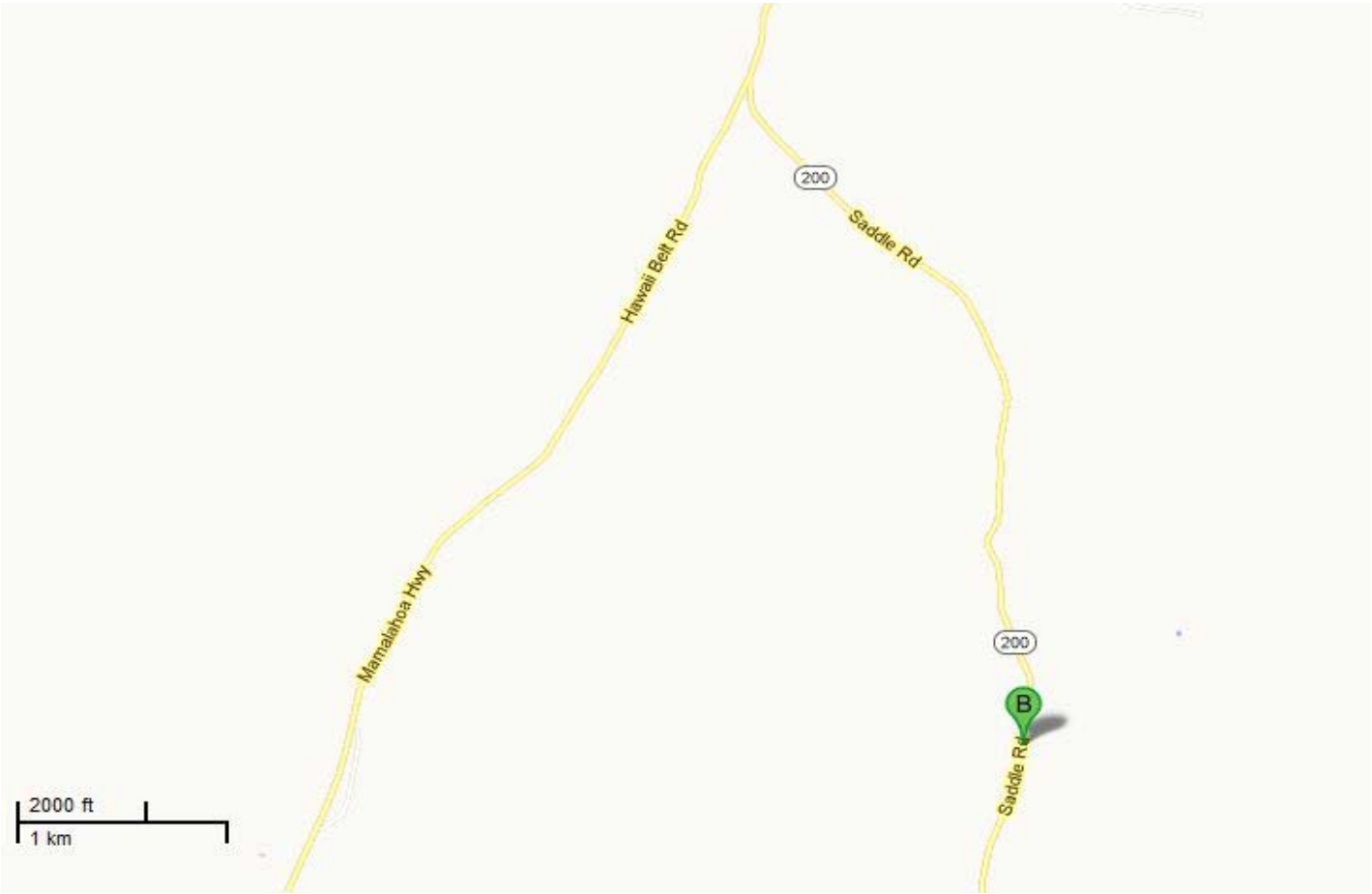
Inventory Form
(County/Private)

General Information

Bridge Number: 001002010901164	
Popular Name: 53 Mile Bridge	
Feature Crossed: Unnamed Stream	
Feature Carried: Saddle Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-40m-47.62s	**Latitude:** 19d-55m-39.06s

Location: TMK: 6-7-01
Historic Name: 53 Mile Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1942	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 28.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The 53 Mile Bridge carries Saddle Road across a watercourse. This two-span reinforced concrete slab bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has solid parapets, reinforced concrete pier wall, and reinforced concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1940's reinforced concrete slab bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100009

Popular Name: Ahualoa Gulch No. 1 Bridge

Feature Crossed: Ahualoa No. 1 Gulch

Feature Carried: Kahana Drive

Milepost: **County Private:** Hawaii

Longitude: 155d-30m-04.65s **Latitude:** 20d-03m-00.72s

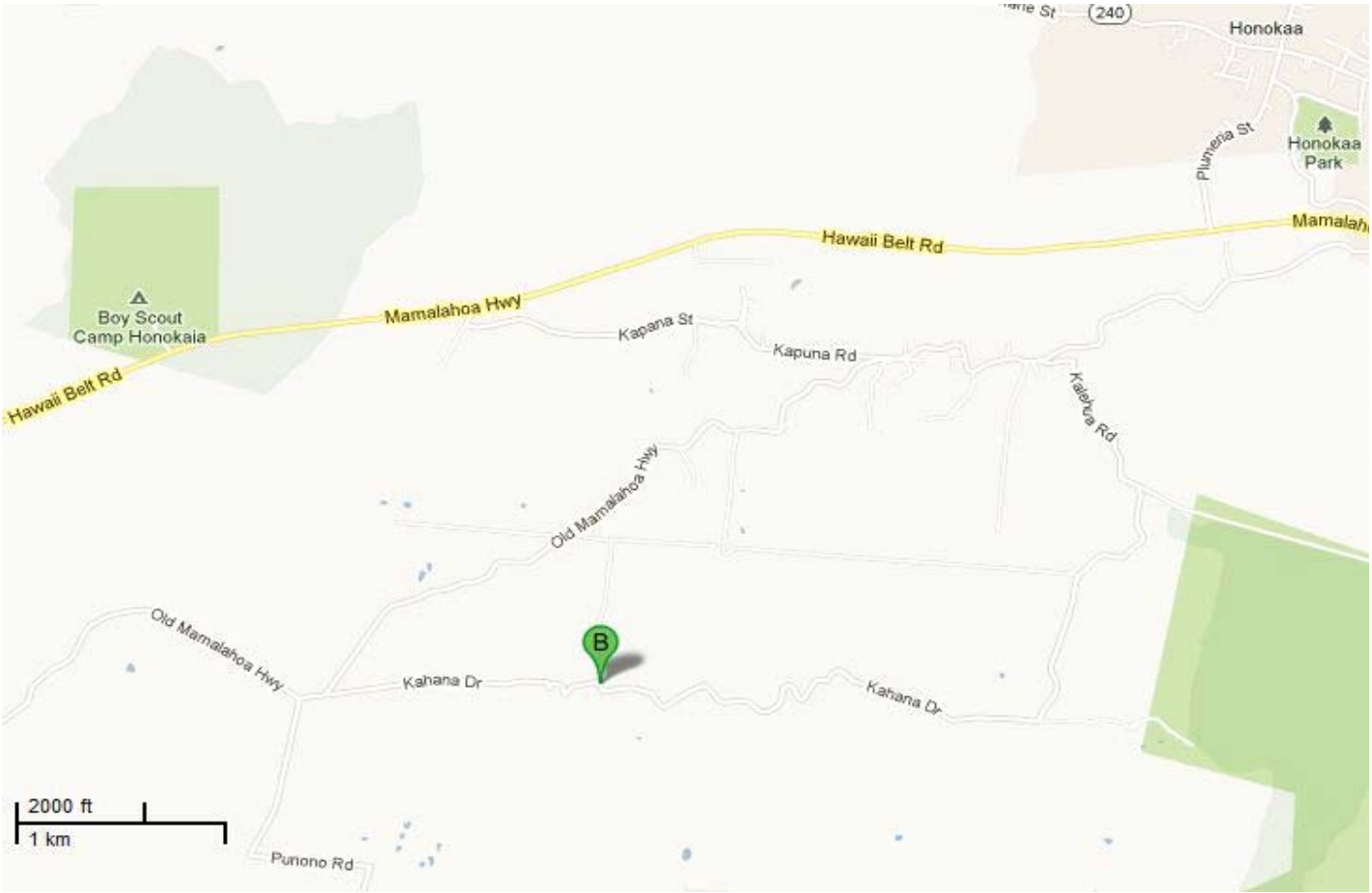
Location: TMK: 4-6-09:006

Historic Name: Ahualoa Gulch No. 1 Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 15.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Ahualoa Gulch #1 Bridge carries Kahana Drive across Ahualoa Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

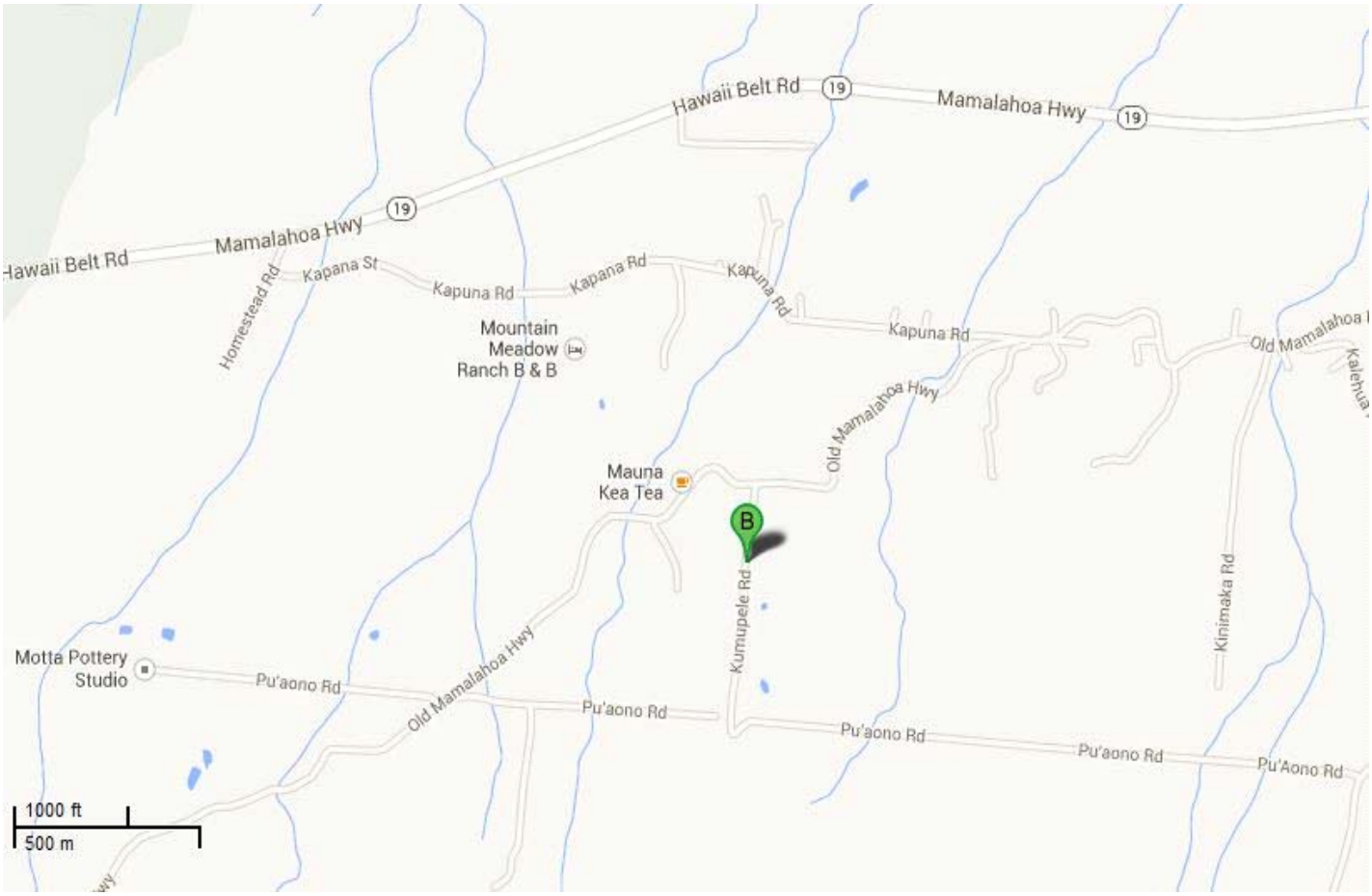
Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100007	
Popular Name: Ahualoa Gulch No. 2 Bridge	
Feature Crossed: Ahualoa No. 2 Gulch	
Feature Carried: Kumupele Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-29m-40.73s	**Latitude:** 20d-03m-36.49s

Location: TMK: 4-6-07:024
Historic Name: Ahualoa Gulch No. 2 Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 21.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Ahualoa #2 Gulch Bridge carries Kumupele Homestead Road across Ahualoa #2 Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

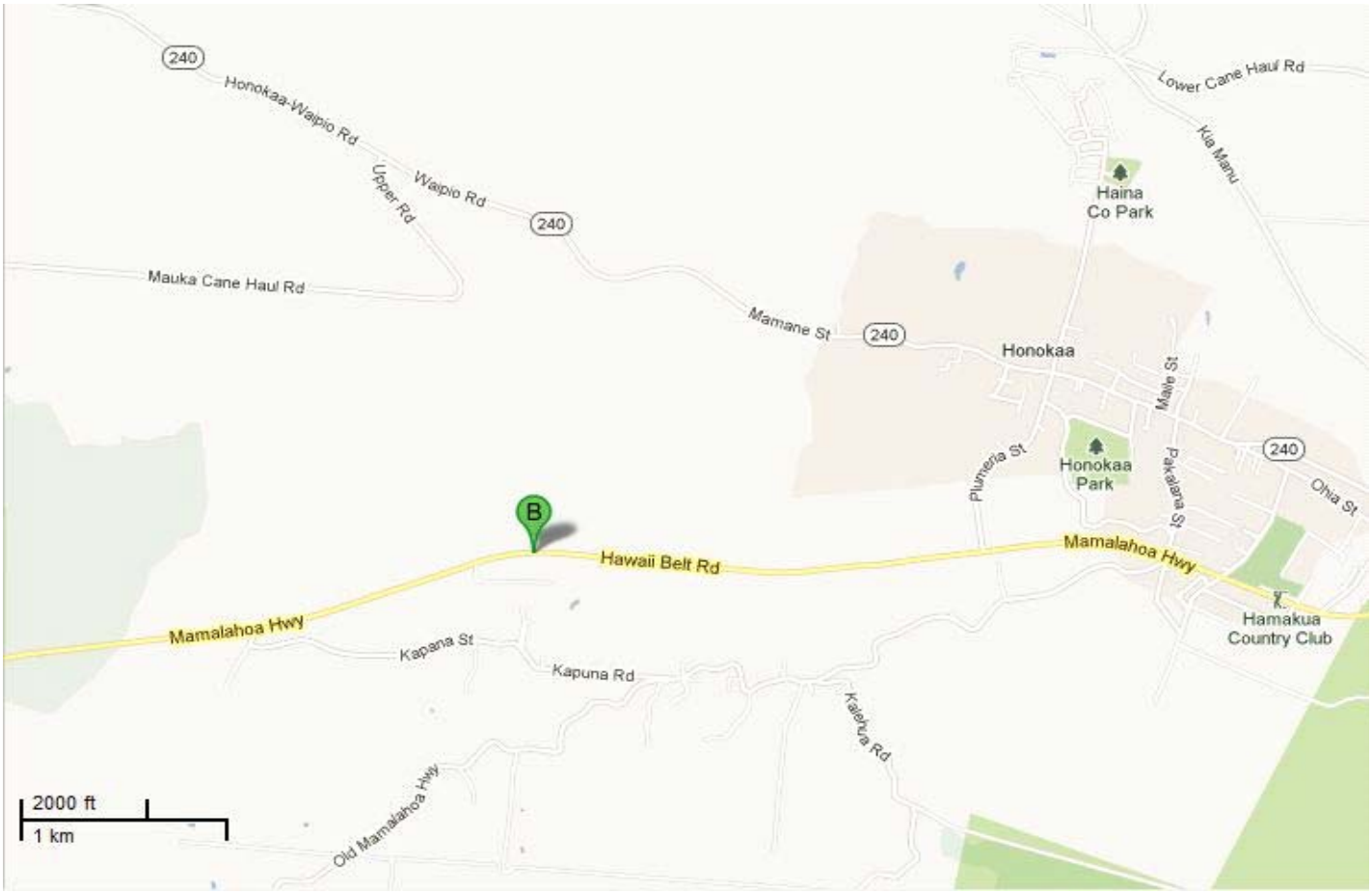
Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100002	
Popular Name: Ahualoa No. 2 Gulch Bridge	
Feature Crossed: Ahualoa No. 2 Gulch	
Feature Carried: Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-29m-35.03s	**Latitude:** 20d-03m-42.99s

Location: TMK: 4-6-007:025
Historic Name: Ahualoa No. 2 Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1923	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100002

Popular Name: Between Kaapahu and Waikaalulu Gulch Bridge

Feature Crossed: Kaapahu and Waikaalulu Gulch

Feature Carried: Paauilo Mauka Road

Milepost: **County Private:** Hawaii

Longitude: 155d-25m-23.92s **Latitude:** 20d-01m-51.29s

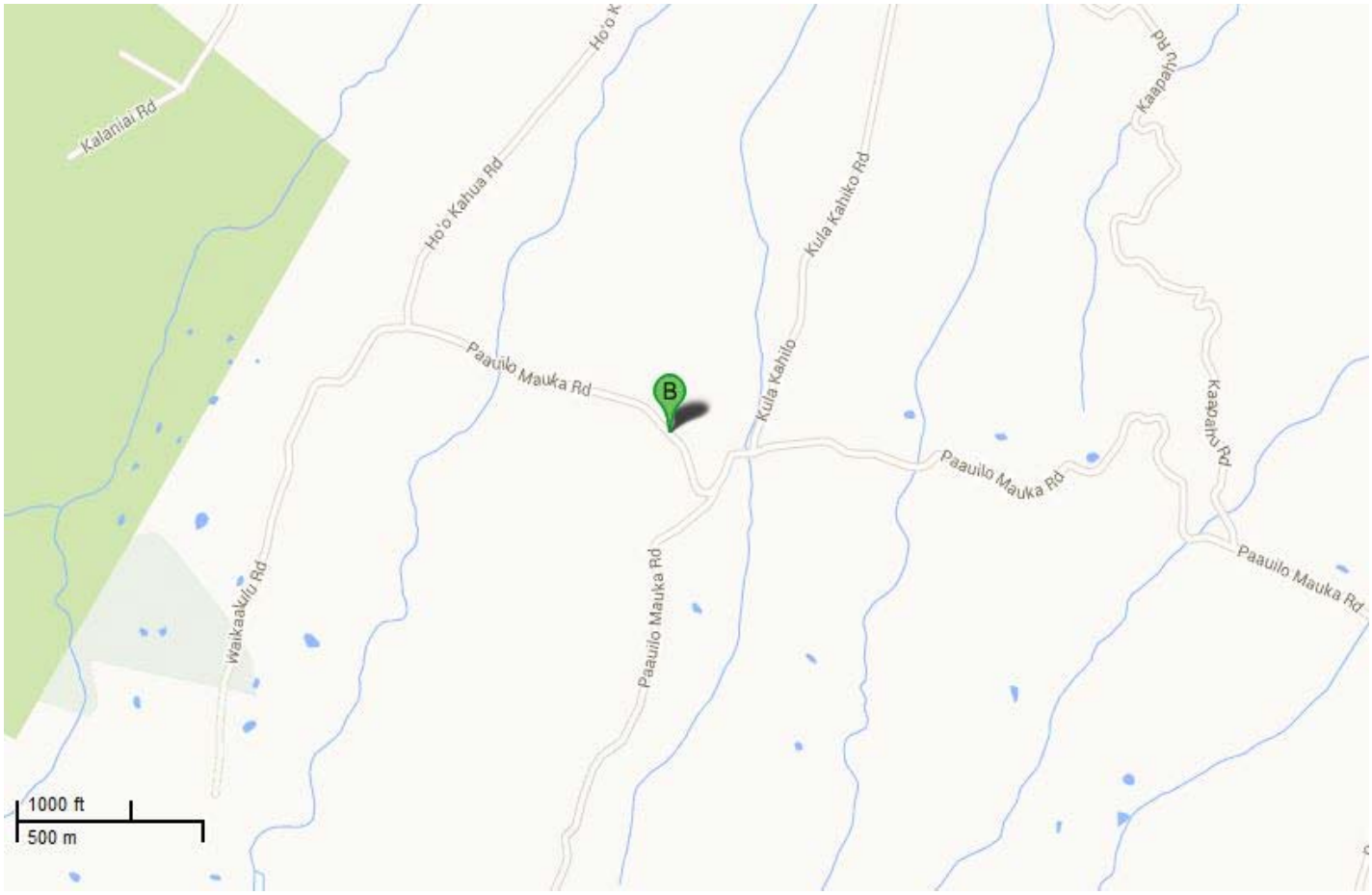
Location: TMK: 4-4-11:12

Historic Name: Between Kaapahu and Waikaalulu Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 14.6 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

Between Kaapahu and Waikaalulu Gulch Bridge carries Paauilo Mauka Road across Kaapahu and Waikaalulu Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100003

Popular Name: Between Kaapahu and Waikaalulu Gulch Bridge

Feature Crossed: Kaapahu and Waikaalulu Gulch

Feature Carried: Paauilo Mauka Road

Milepost: **County Private:** Hawaii

Longitude: 155d-25m-25.69s **Latitude:** 20d-01m-53.10s

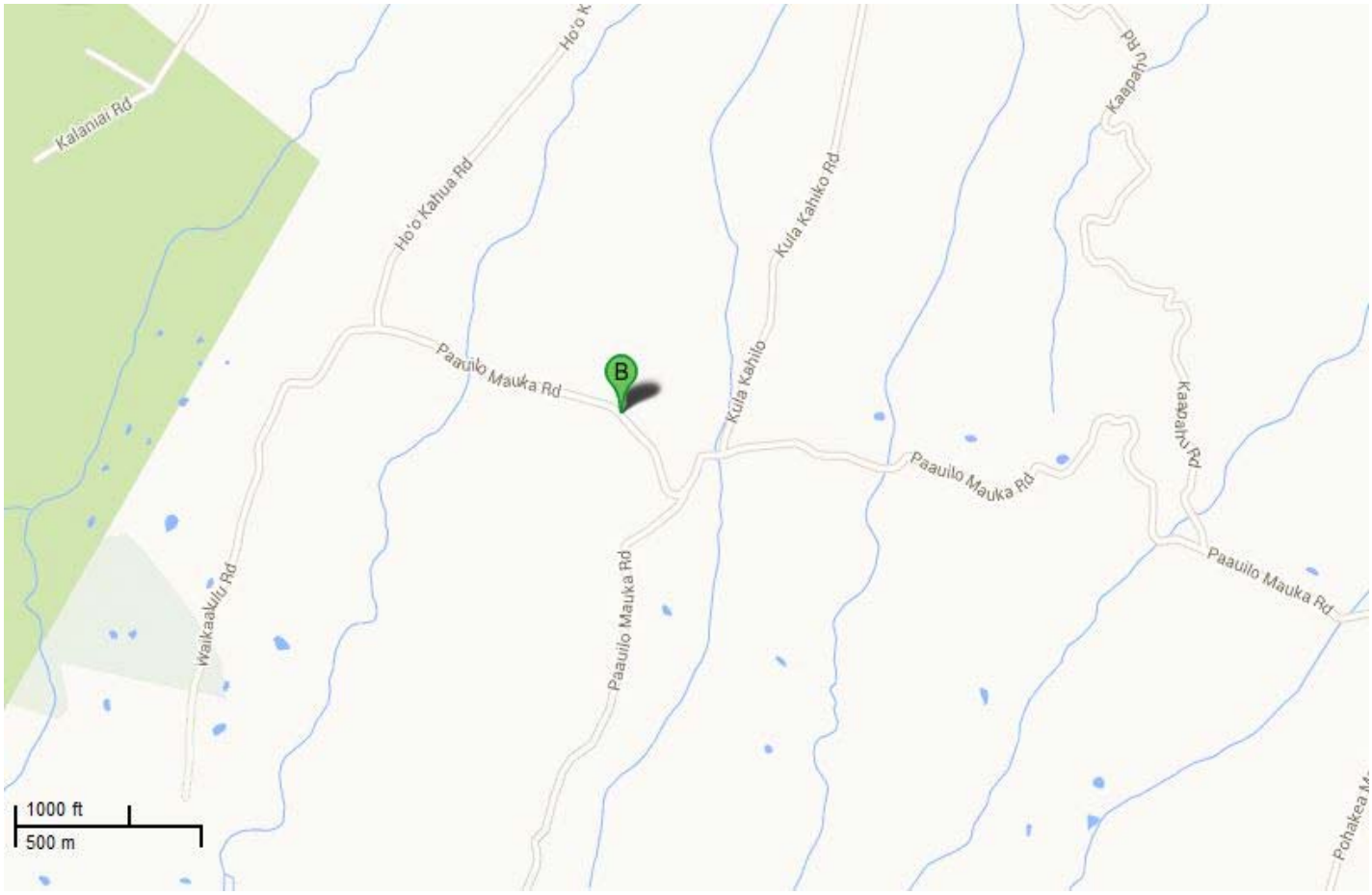
Location: TMK: 4-4-11:12

Historic Name: Between Kaapahu and Waikaalulu Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 10.0 ft.	**Total Length:** 13.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaapahu and Waikaalulu Gulch Bridge carries Paauilo Mauka Road across Kaapahu and Waikaalulu Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100004

Popular Name: Between Waikaalulu and Kaapahu Gulch Bridge

Feature Crossed: Kaapahu and Waikaalulu Gulch

Feature Carried: Paauilo Mauka Road

Milepost: **County Private:** Hawaii

Longitude: 155d-25m-36.10s **Latitude:** 20d-01m-55.78s

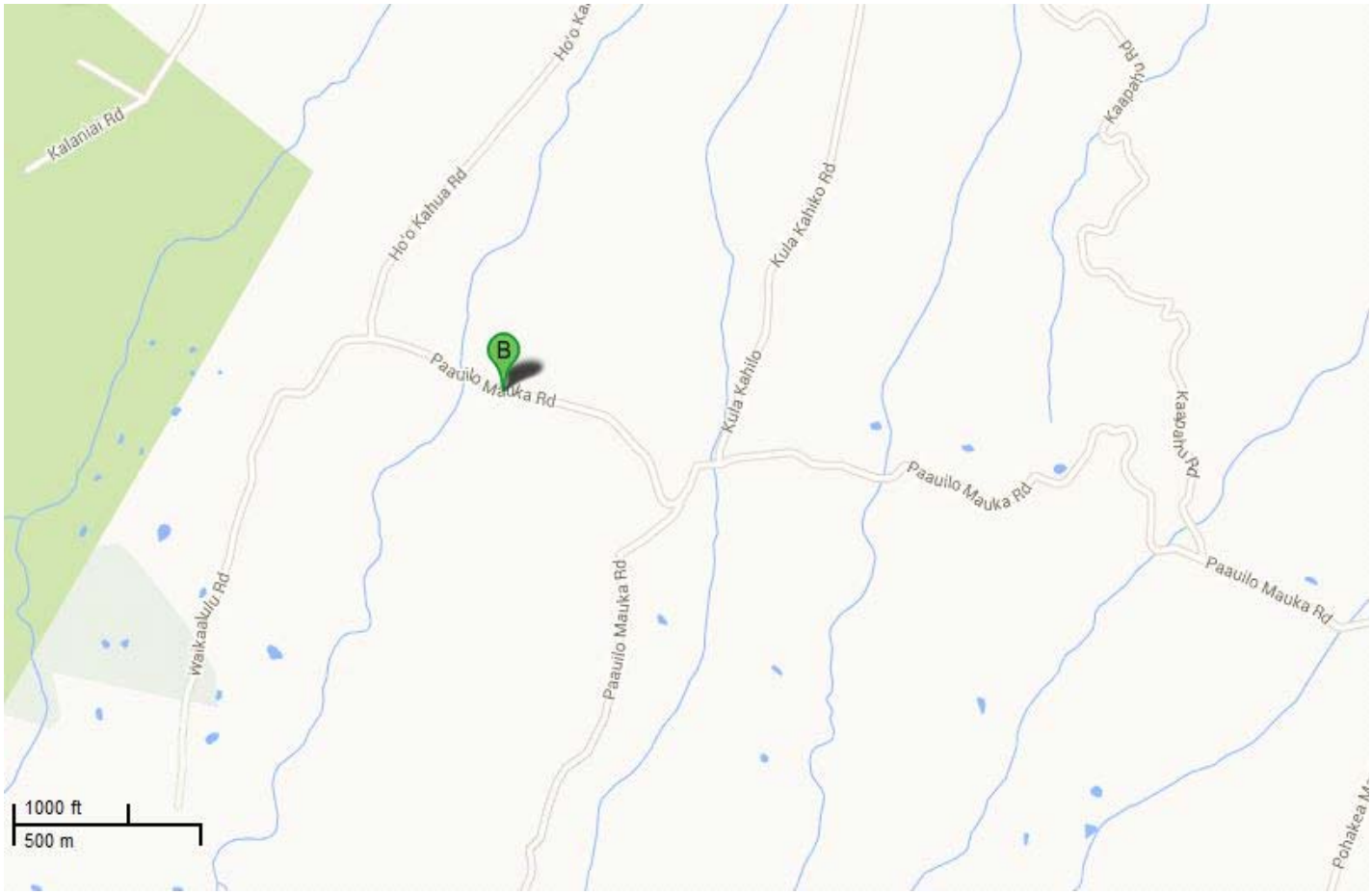
Location: TMK: 4-4-11:12

Historic Name: Between Waikaalulu and Kaapahu Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 12.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikaaluku and Kaapahu Gulch Bridge carries Paauilo Mauka Road across Waikaaluku and Kaapahu Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

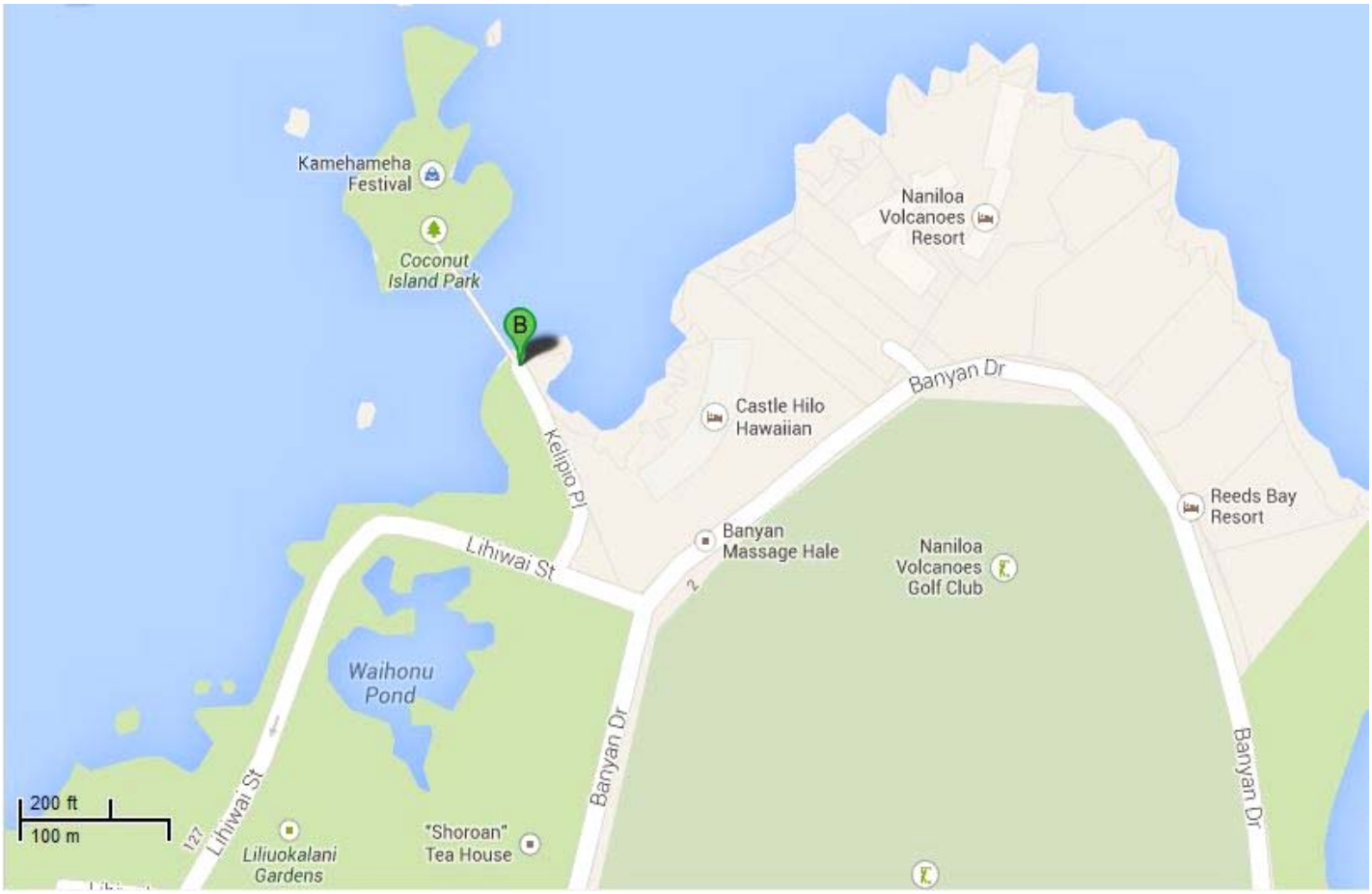
Inventory Form
(County/Private)

General Information

Bridge Number: 001210001100001	
Popular Name: Coconut Island Bridge	
Feature Crossed: Pacific Ocean	
Feature Carried: Pedestrian Walkway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-04m-05.45s	**Latitude:** 19d-43m-43.56s

Location: TMK: 2-1-03:19
Historic Name: Coconut Island Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1967	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 80.0 ft.	**Total Length:** 240.0 ft.	**Deck Width:** 9.0 ft.
Superstructure: Prestressed Concrete Single-Tee			
Substructure: Concrete Abutment Wall and Concrete Single Column Pier			
Floor/Decking: Concrete Deck			
Parapets/Railings: Metal Picket			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Pedestrian Walkway Bridge	**Historic Function:** Pedestrian Walkway Bridge	
Area of Significance: Engineering		

Narrative Description:

The Coconut Island Bridge is a pedestrian walkway that connects the small island off the coast of Hawaii with the Big Island. This reinforced concrete tee beam walkway is in its original location, is generally in good condition, and its materials remain intact. The bridge has metal railings, a concrete deck, and concrete abutments. It has tall masonry posts with tapered caps at the beginning of the walkway that leads to the bridge.

Significance Statement:

This bridge is a typical post war bridge however, the Coconut Island Bridge is eligible under Criterion C for unique bridge function. This is a good example of an interisland pedestrian bridge that connects a small outer island to a main island Hawaii.

Inventory Form
(County/Private)

General Information

Bridge Number: 001290001100003

Popular Name: Hakalau Stream Bridge

Feature Crossed: Hakalau Stream

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-07m-56.19s **Latitude:** 19d-53m-49.96s

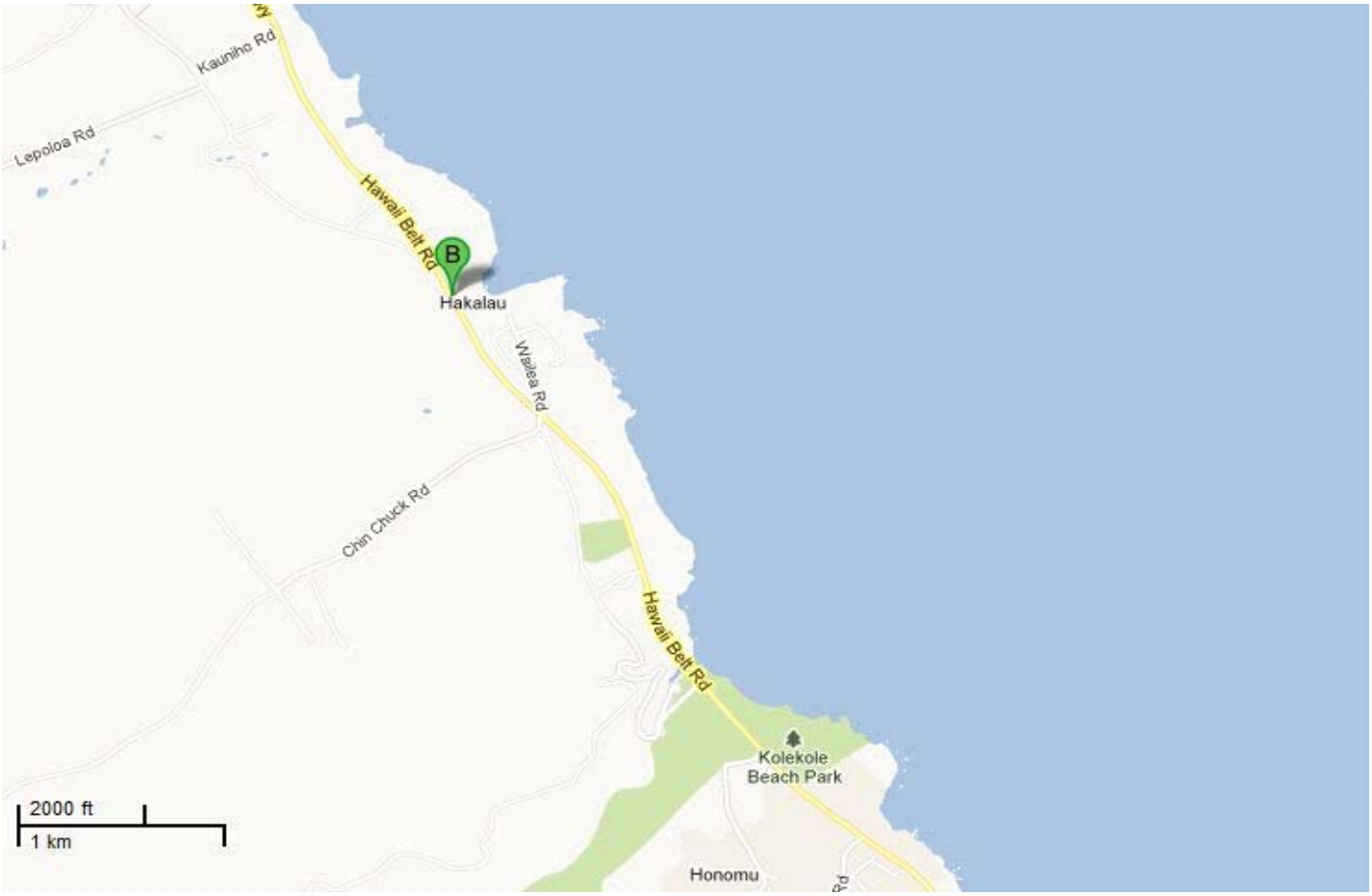
Location: TMK: 2-9-002:025

Historic Name: Hakalau Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 67.0 ft.	**Total Length:** 67.0 ft.	**Deck Width:** 22.4 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

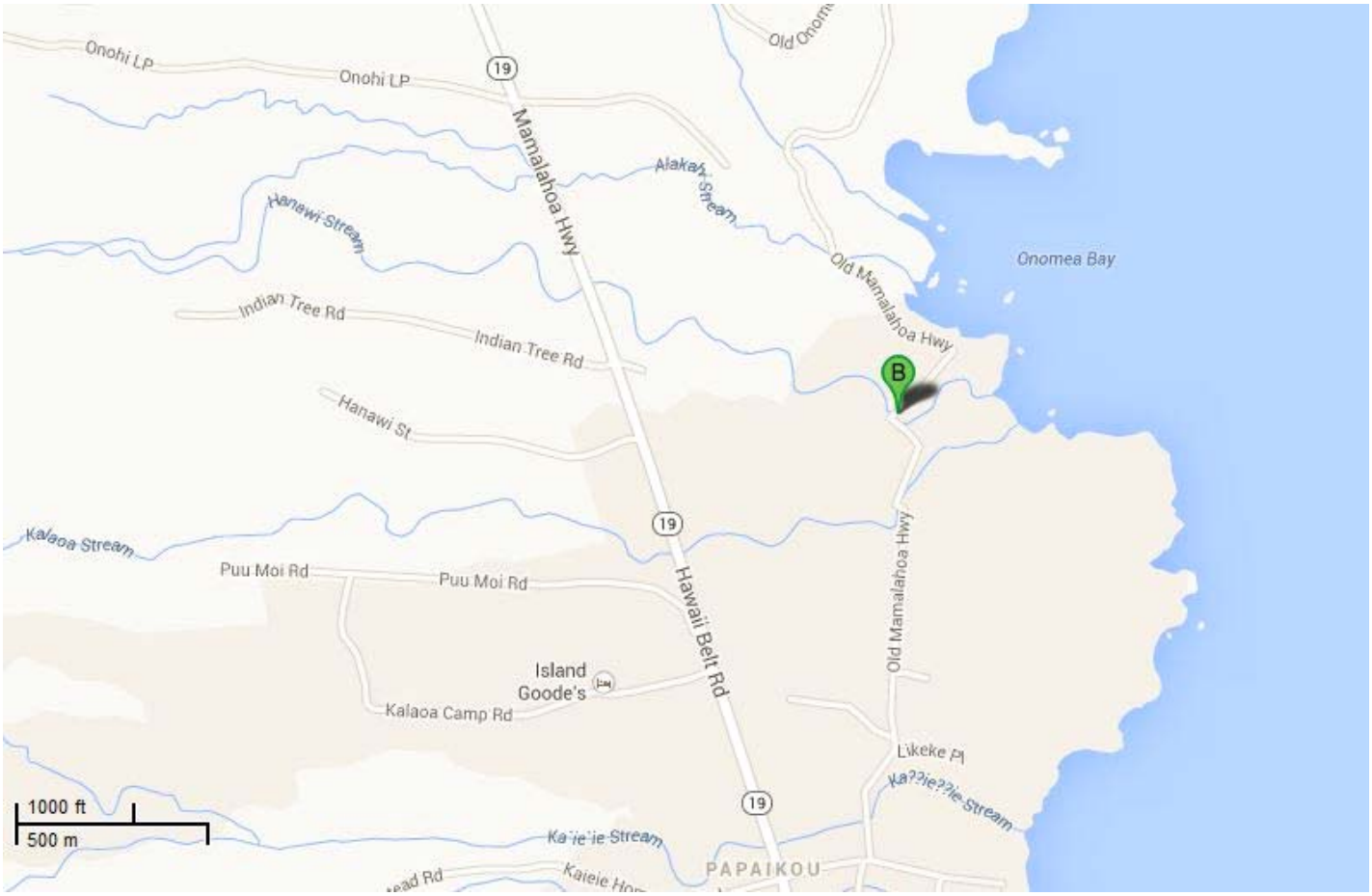
Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100005	
Popular Name: Hanawi Stream Bridge	
Feature Crossed: Hanawi Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-35.95s	**Latitude:** 19d-48m-15.98s

Location: TMK: 2-7-09:13
Historic Name: Hanawi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1922	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 39.0 ft.	**Total Length:** 79.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

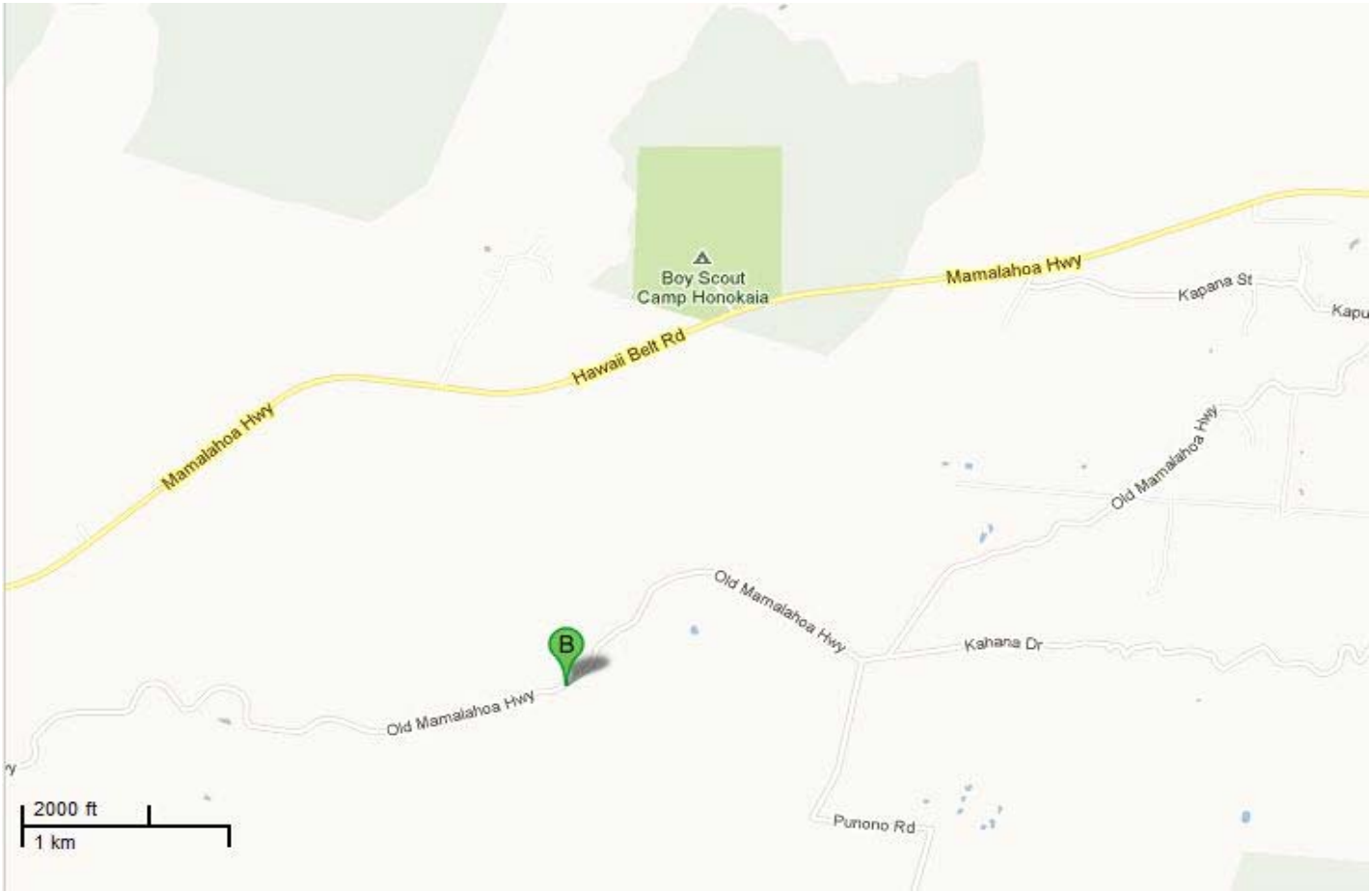
Inventory Form
(County/Private)

General Information

Bridge Number: 001470001100001	
Popular Name: Honokaia Gulch East Branch Bridge	
Feature Crossed: Honokaia Gulch	
Feature Carried: Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-31m-37.33s	**Latitude:** 20d-02m-57.00s

Location: TMK: 4-6-011:013
Historic Name: Honokaia Gulch East Branch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 30.0 ft.	**Total Length:** 33.0 ft.	**Deck Width:** 17.7 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

Concrete girders were repaired in 2010.
See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001470001100002	
Popular Name: Honokaia Gulch West Branch Bridge	
Feature Crossed: Honokaia Gulch	
Feature Carried: Mamalahoa Highway	
Milepost: **County Private:** Hawaii	
Longitude: 155d-32m-14.67s **Latitude:** 20d-02m-46.78s	
Location: TMK: 4-6-007:010	
Historic Name: Honokaia Gulch West Branch Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 28.0 ft.	**Deck Width:** 18.5 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

Concrete girders were repaired in 2010.
See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100006

Popular Name: Honolii Stream Bridge

Feature Crossed: Honolii Stream

Feature Carried: Kahoa Street

Milepost: **County Private:** Hawaii

Longitude: 155d-05m-45.44s **Latitude:** 19d-45m-29.80s

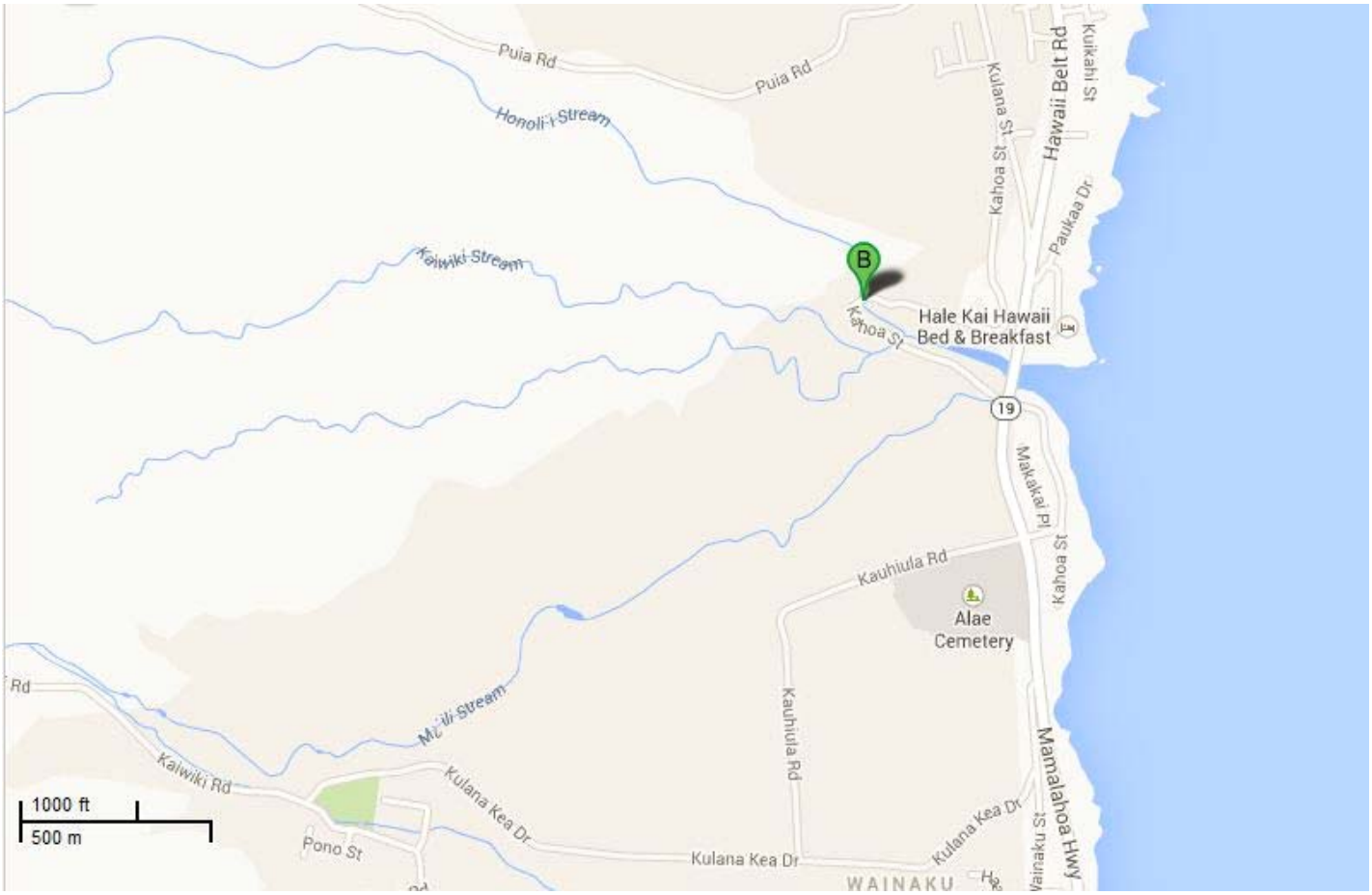
Location: TMK: 2-6-12:34

Historic Name: Honolii Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1911	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 6	**Max Span:** 70.0 ft.	**Total Length:** 203.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

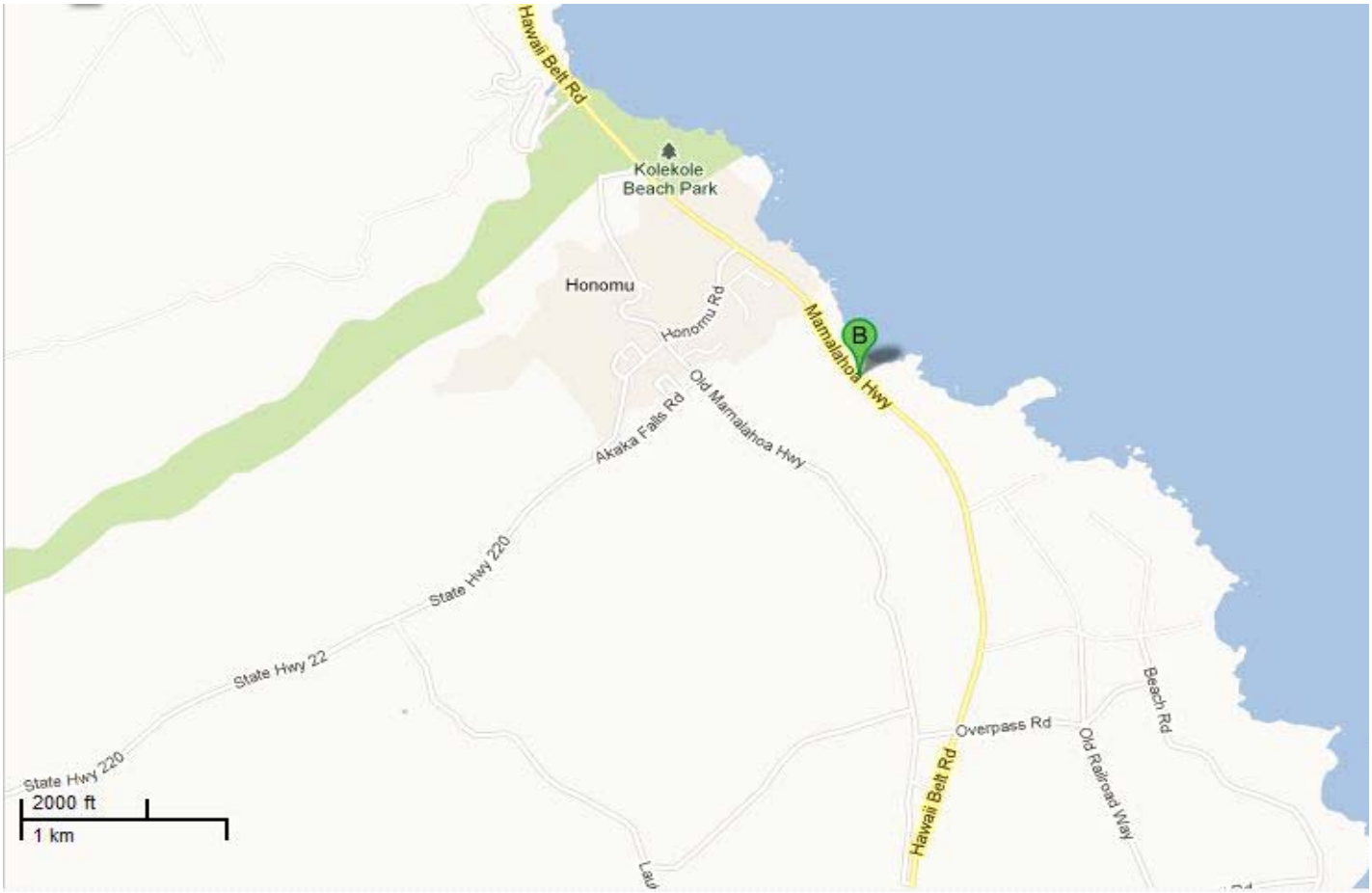
Inventory Form
(County/Private)

General Information

Bridge Number: 001280001100002	
Popular Name: Honomu Stream Bridge	
Feature Crossed: Honomu Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-06m-37.93s	**Latitude:** 19d-51m-58.63s

Location: TMK: 2-8-013:003
Historic Name: Honomu Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 2002	**Replaced?** Yes
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 92.0 ft.	**Total Length:** 95.0 ft.	**Deck Width:** 30.0 ft.
Superstructure: Concrete Box Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Non-Contributing	**Criteria:** n/a	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: n/a		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is a non-contributing feature of the Mamalahoa Historic District due to complete replacement of the original 1935 bridge in 2002. It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100005

Popular Name: Inoino Gulch Bridge

Feature Crossed: Inoino Gulch

Feature Carried: Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-31m-03.02s **Latitude:** 20d-03m-05.64s

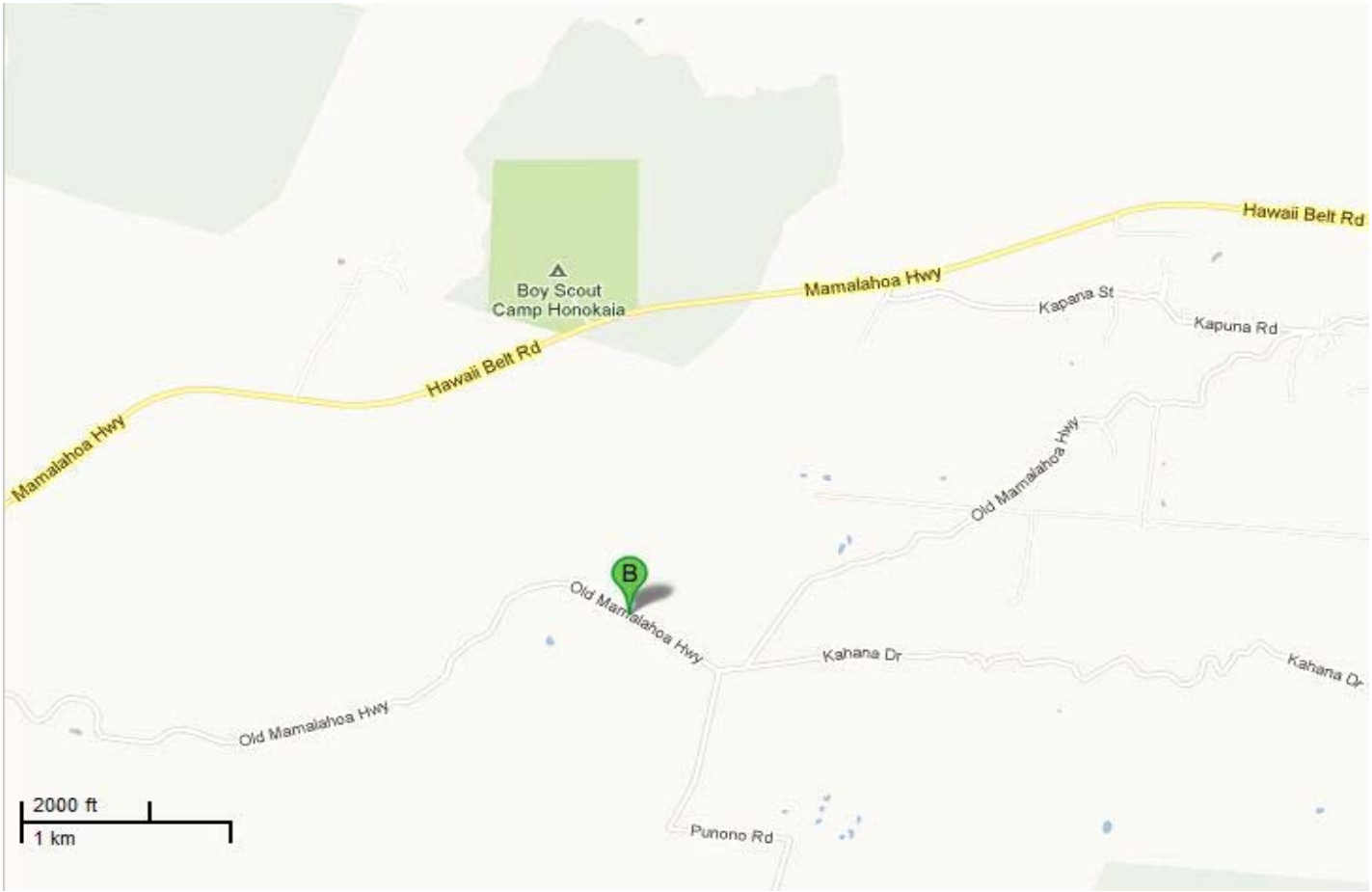
Location: TMK: 4-6-011:035

Historic Name: Inoino Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Girder	**Construction Date:** 1924	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 56.0 ft.	**Total Length:** 60.0 ft.	**Deck Width:** 31.0 ft.
Superstructure: Prestressed Concrete I-Girder			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

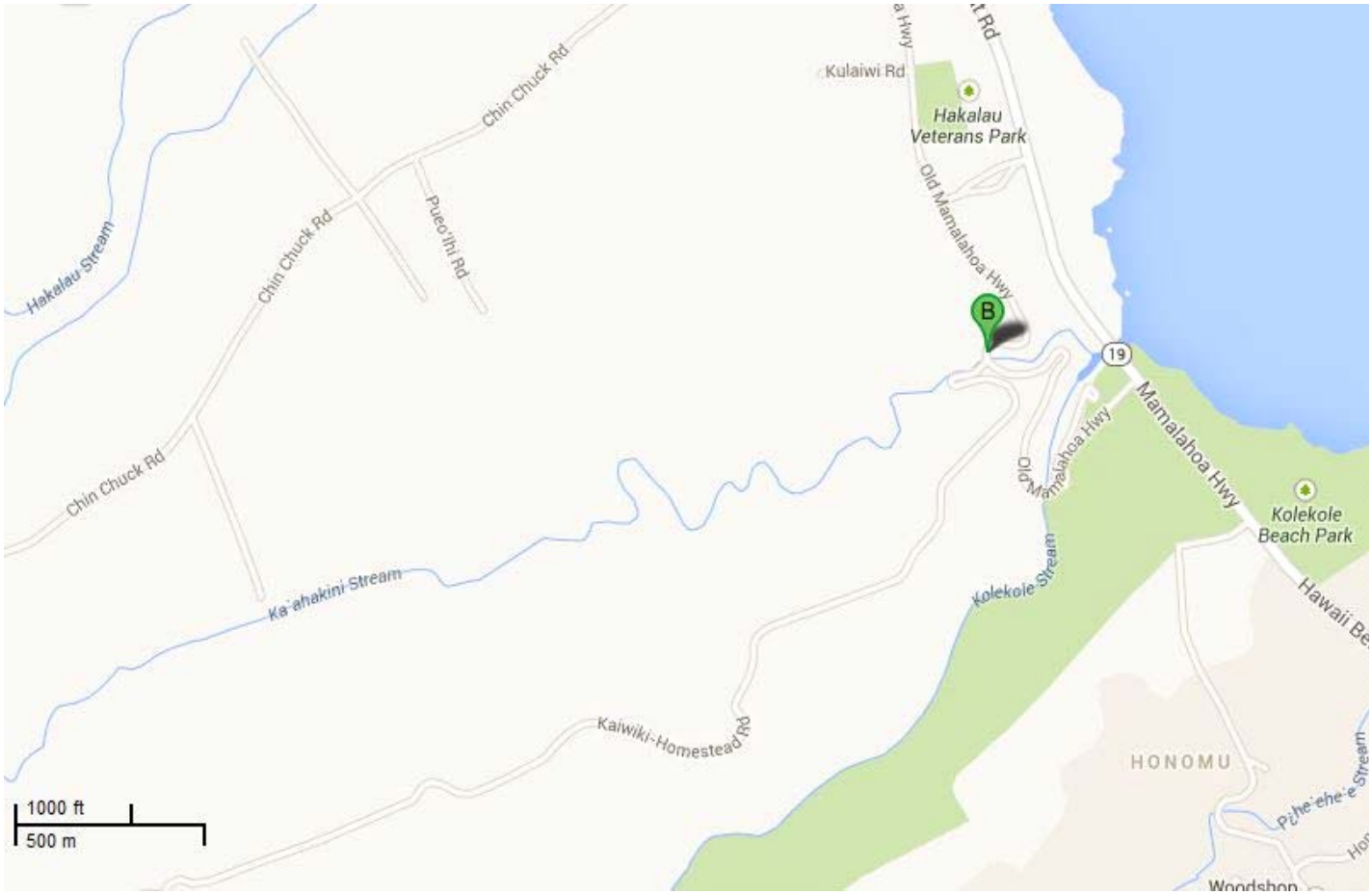
See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001290001100001	
Popular Name: Kaahakini Stream Bridge	
Feature Crossed: Kaahakini Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-07m-20.67s	**Latitude:** 19d-52m-58.08s
Location: TMK: 2-9-03:39	
Historic Name: Kaahakini Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 49.0 ft.	**Total Length:** 50.0 ft.	**Deck Width:** 22.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

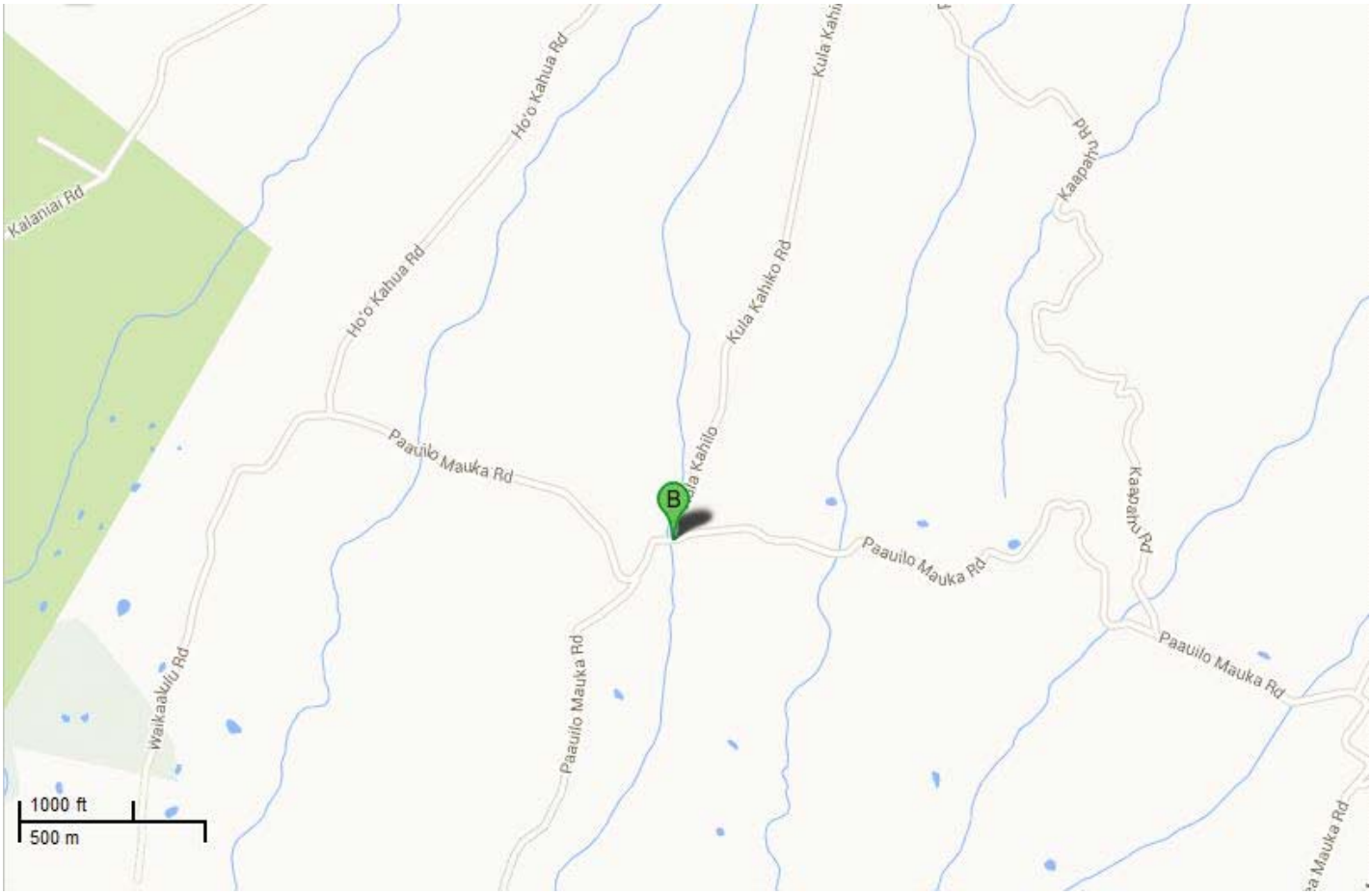
Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100001	
Popular Name: Kaapahu Gulch Bridge	
Feature Crossed: Kaapahu Gulch	
Feature Carried: Paauilo Mauka Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-25m-16.47s	**Latitude:** 20d-01m-49.61s

Location: TMK: 4-4-11:12
Historic Name: Kaapahu Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 17.0 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaapahu Gulch Bridge carries Paauilo Mauka Road across Kaapahu Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and reinforced concrete abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

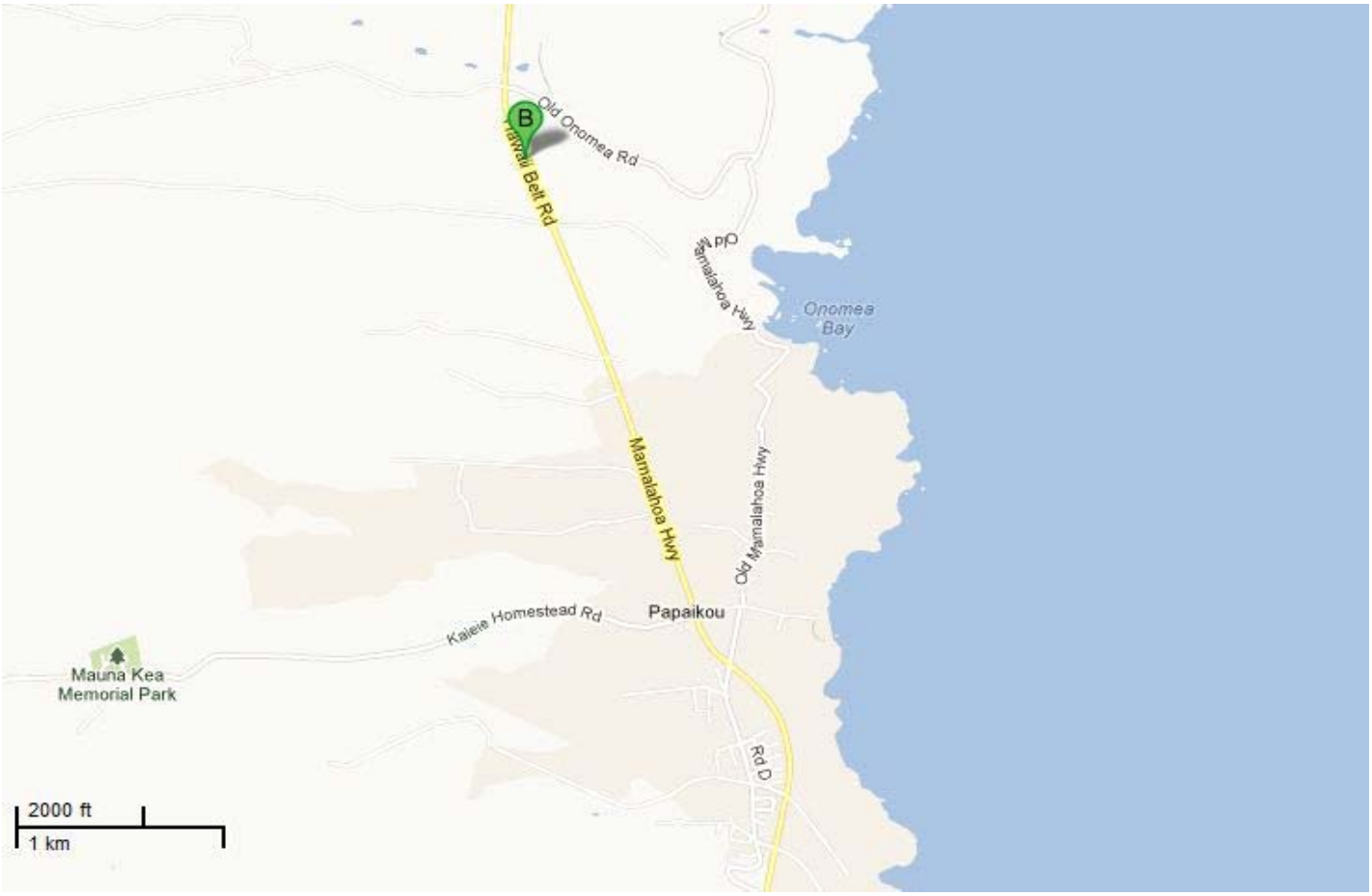
Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100006	
Popular Name: Kahalii Stream Bridge	
Feature Crossed: Kahalii Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-44.87s	**Latitude:** 19d-48m-39.29s

Location: TMK: 2-7-010:014
Historic Name: Kahalii Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 36.0 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100010

Popular Name: Kahawailiilii Gulch Bridge

Feature Crossed: Kahawailiilii Gulch

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-26m-21.32s **Latitude:** 20d-03m-54.71s

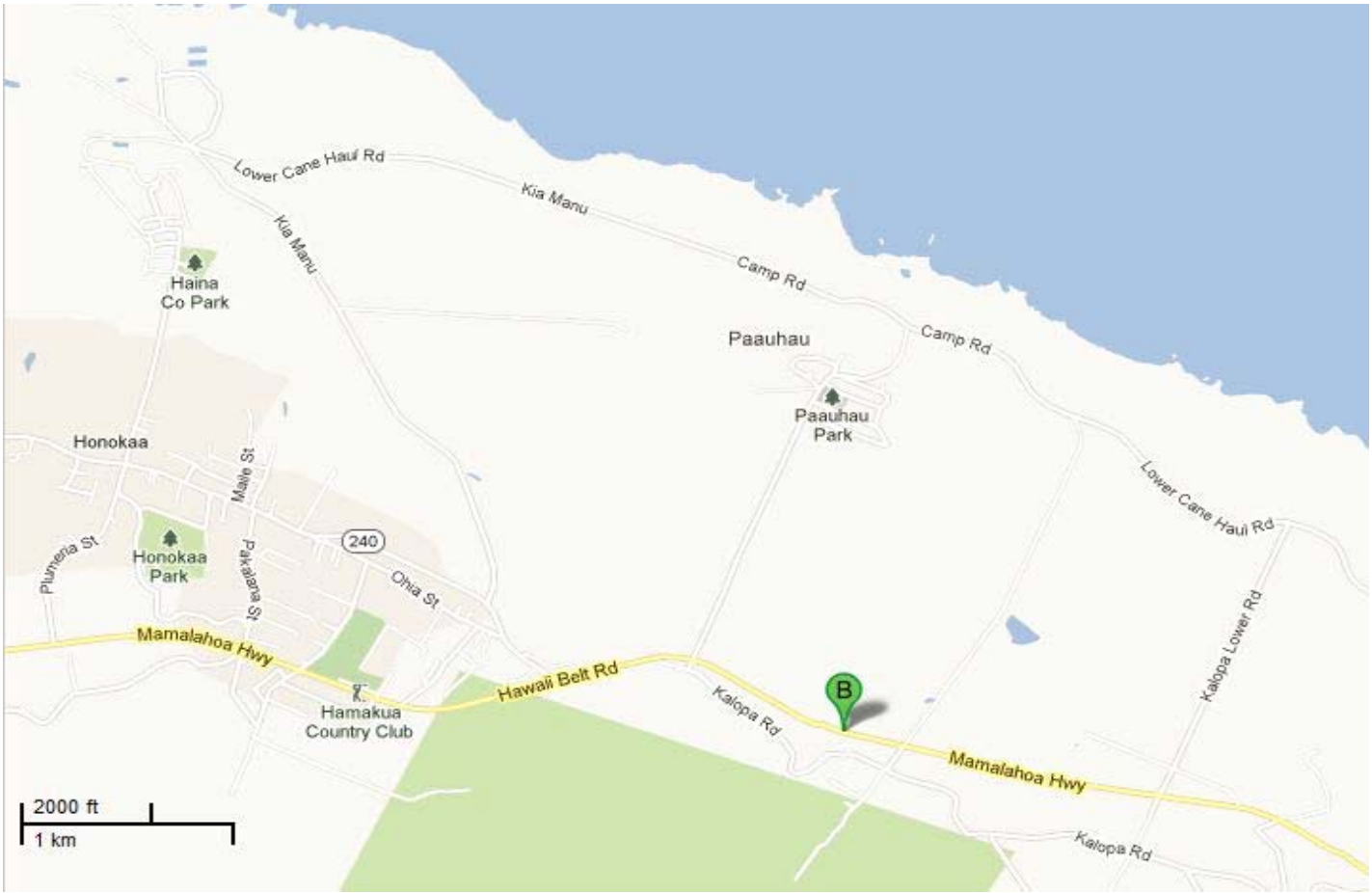
Location: TMK: 4-4-004:004

Historic Name: Kahawailiilii Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1919	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 26.0 ft.	**Total Length:** 32.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001750001100004	
Popular Name: Kahului Bridge	
Feature Crossed: Relief	
Feature Carried: Alii Drive	
Milepost:	**County Private:** Hawaii
Longitude: 155d-59m-09.04s	**Latitude:** 19d-37m-26.27s

Location: TMK: 7-5-019:008
Historic Name: Kahului Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1937	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 8.0 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 30.7 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Rubble Masonry Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kahului Bridge carries Alii Drive across the relief for the waterway. This cast in place concrete bridge is in its original location but in poor condition. The bridge has concrete solid panel parapets with flat caps. The concrete deck is supported by concrete masonry rubble pier wall and abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling. The bridge is programmed for replacement in 2016.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. The rock abutments are a potentially eligible historic resource.

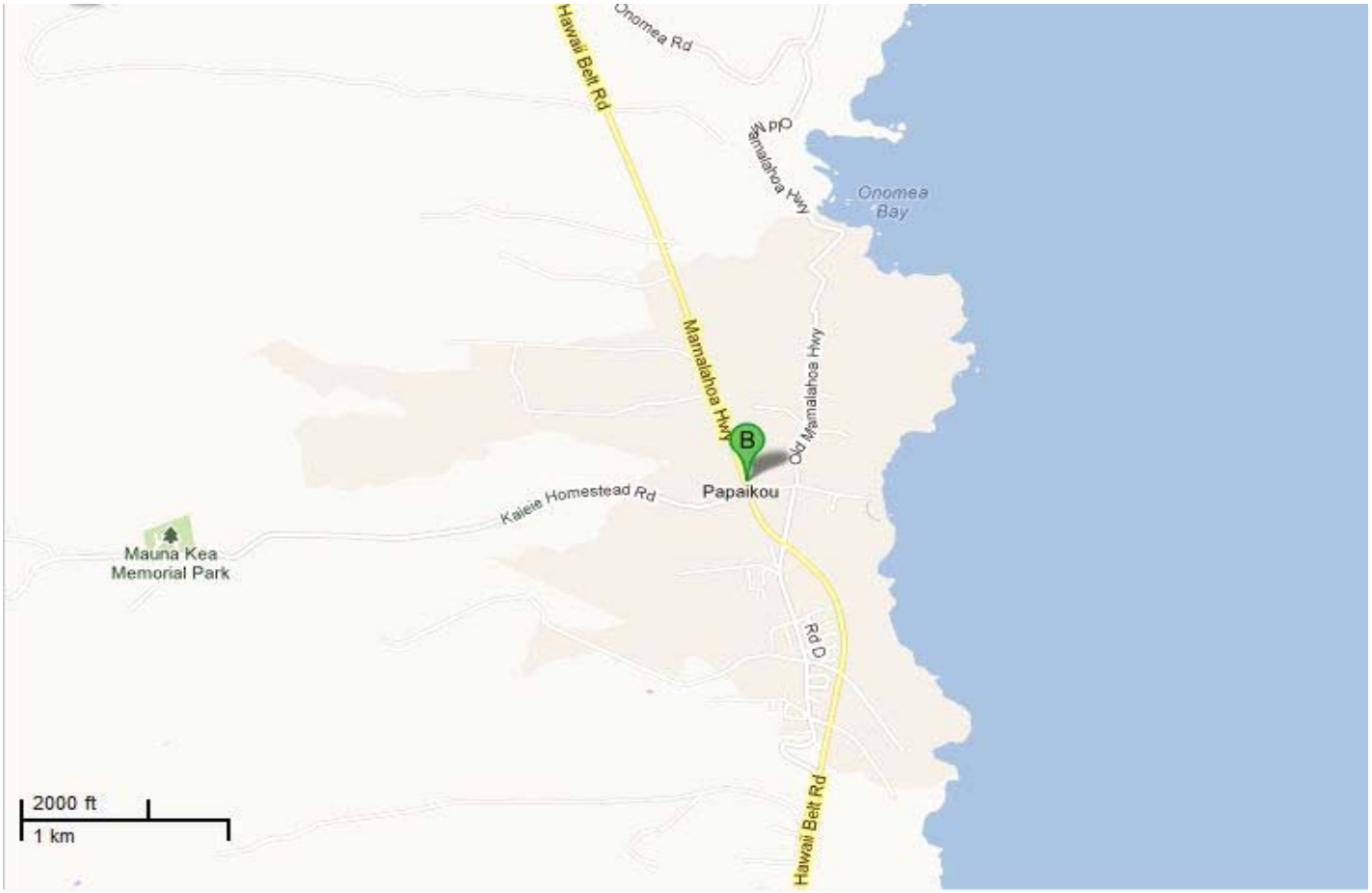
Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100003	
Popular Name: Kaieie Stream Bridge	
Feature Crossed: Kaieie Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-38.62s	**Latitude:** 19d-47m-41.97s

Location: TMK: 2-7-035:012
Historic Name: Kaieie Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 45.0 ft.	**Total Length:** 49.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100005

Popular Name: Kaiwiki Bridge No. 1

Feature Crossed: Kaiwiki Stream

Feature Carried: Kahoa Street

Milepost: **County Private:** Hawaii

Longitude: 155d-05m-42.41s **Latitude:** 19d-45m-26.48s

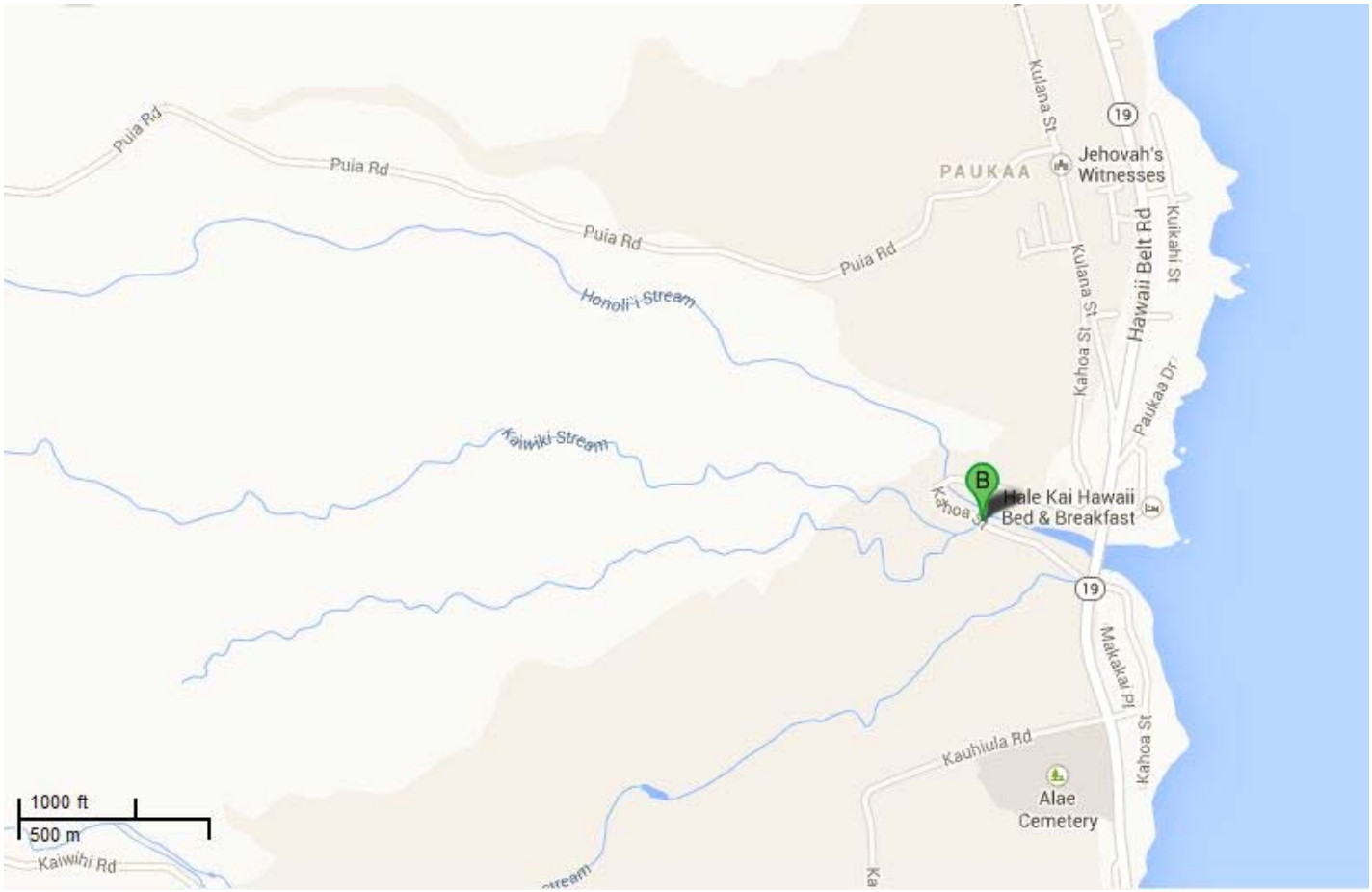
Location: TMK: 2-6-12:33

Historic Name: Kaiwiki Bridge No. 1

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 32.0 ft.	**Total Length:** 66.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100007

Popular Name: Kaiwiki Homestead Road Bridge

Feature Crossed: Unnamed Stream

Feature Carried: Kaiwiki Homestead Road

Milepost: **County Private:** Hawaii

Longitude: 155d-09m-27.94s **Latitude:** 19d-45m-32.69s

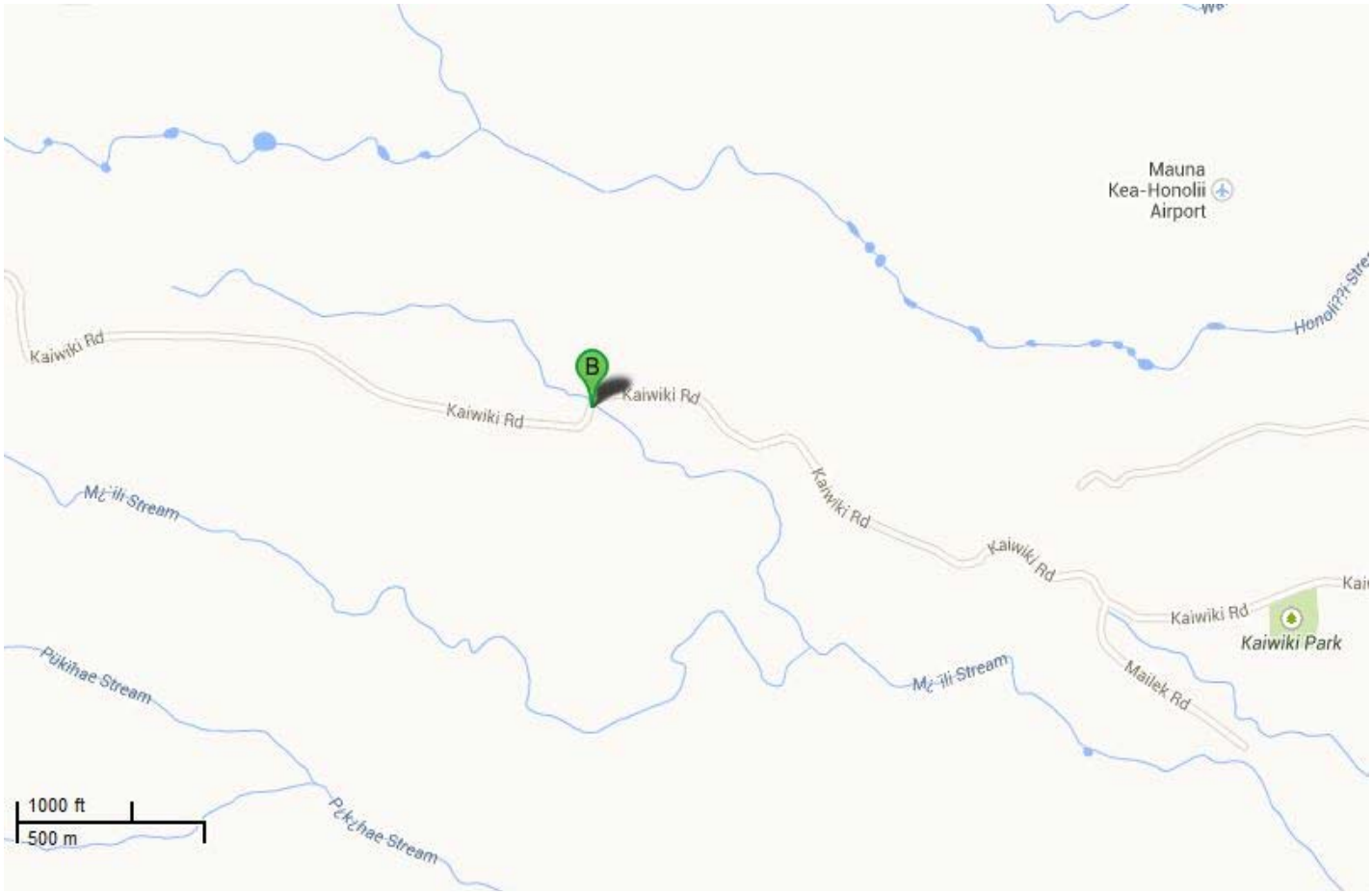
Location: TMK: 2-6-011:015

Historic Name: Kaiwiki Homestead Road Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2010	
Alteration Type(s):		
Alteration Description(s): The timber deck, stringers and railings were replaced. The north abutment was reconstructed and the south abutment was repaired.		

Bridge Information

Number of Spans: 4	**Max Span:** 21.0 ft.	**Total Length:** 71.0 ft.	**Deck Width:** 13.0 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaiwiki Homestead Road Bridge carries Kaiwiki Homestead Road across Unnamed Stream. This timber bridge is in its original location and is generally in good condition. The bridge was rehabilitated in 2010, only the elements of the bridge was replaced. The bridge has wood railings, wood deck and concrete abutments. According to the inspection report, the north concrete abutment was rebuilt. The simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C as a good example of the timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

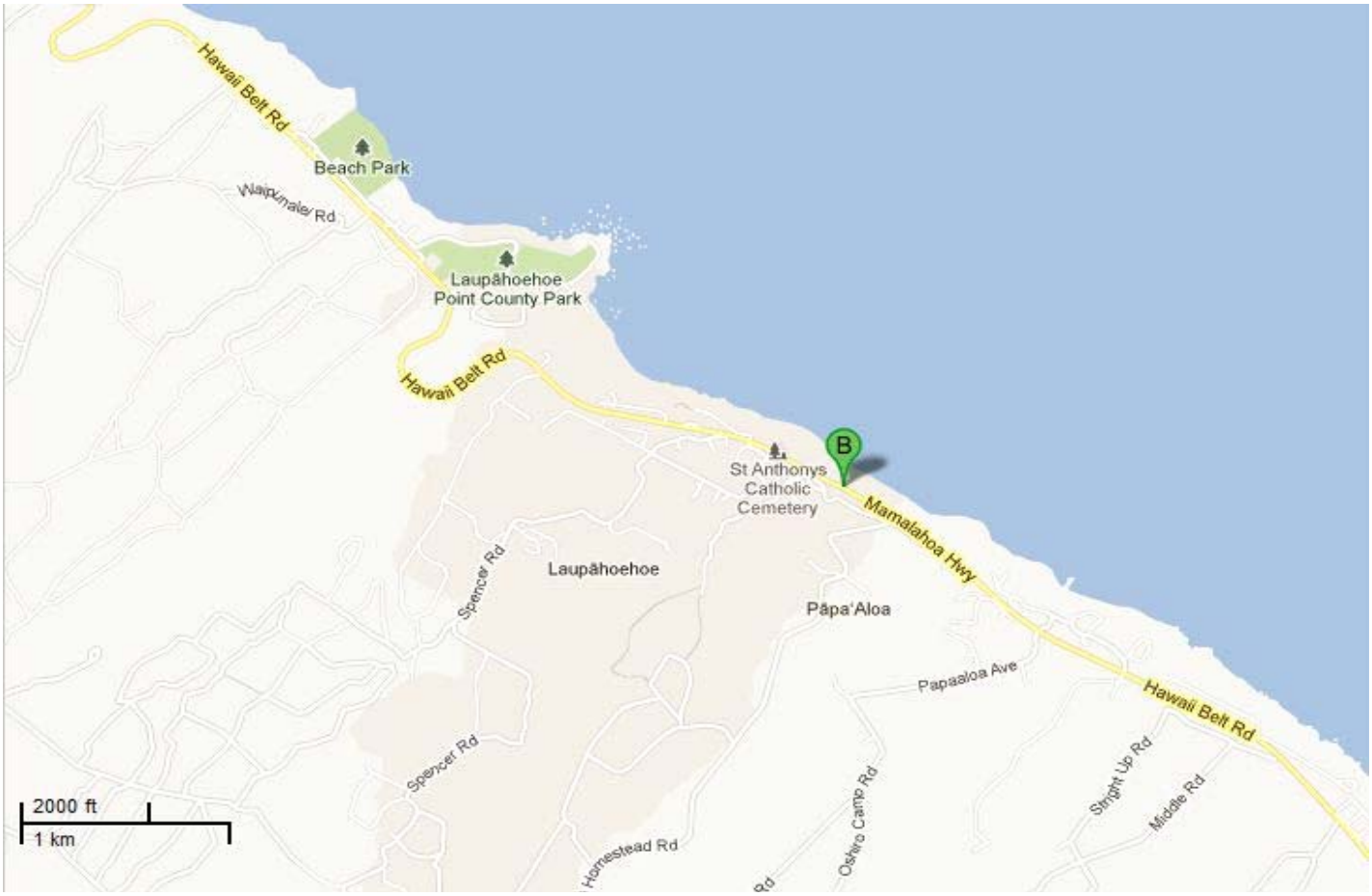
Inventory Form
(County/Private)

General Information

Bridge Number: 001350001100001	
Popular Name: Kaiwilahilahi Stream Bridge	
Feature Crossed: Kaiwilahilahi Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-13m-08.88s	**Latitude:** 19d-58m-34.24s

Location: TMK: 3-5-003:073
Historic Name: Kaiwilahilahi Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1923	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 110.0 ft.	**Total Length:** 162.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100002

Popular Name: Kalalau Stream Bridge

Feature Crossed: Kalalau Stream

Feature Carried: Wainaku Street

Milepost: **County Private:** Hawaii

Longitude: 155d-05m-35.14s **Latitude:** 19d-44m-03.74s

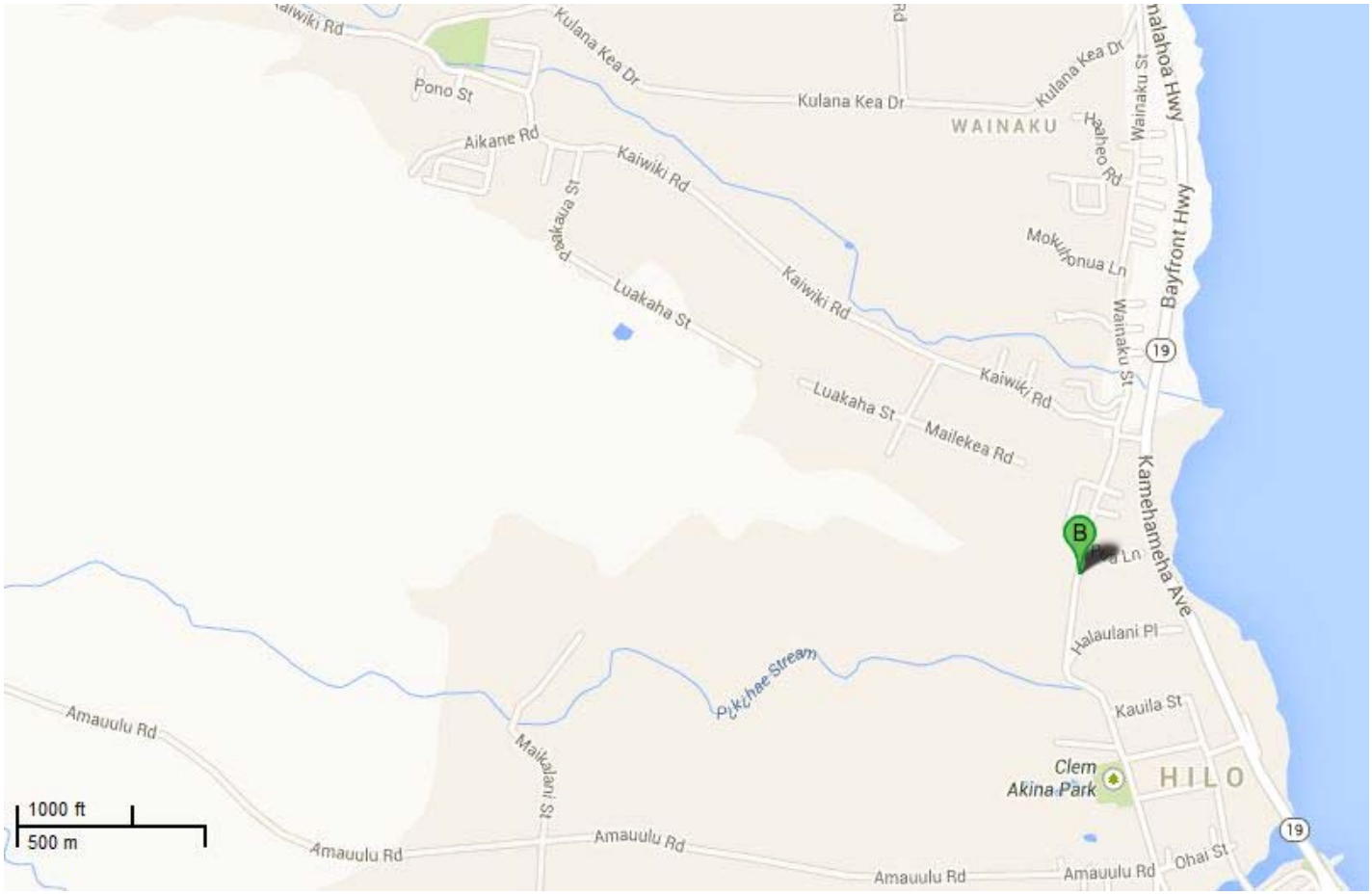
Location: TMK: 2-6-06:22

Historic Name: Kalalau Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 64.0 ft.	**Deck Width:** 33.0 ft.
Superstructure: Masonry Closed Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

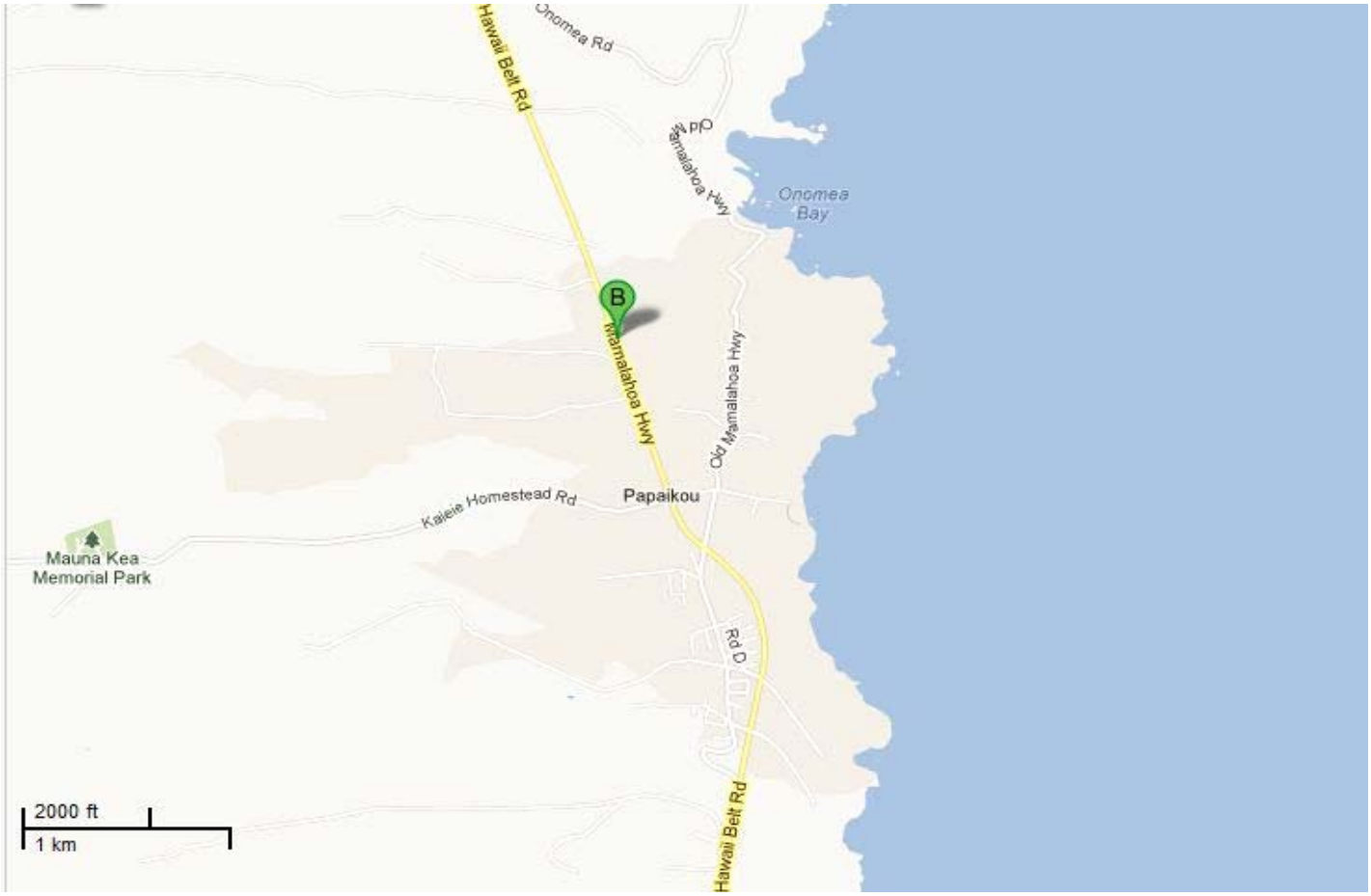
This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100004	
Popular Name: Kalaoa Stream Bridge	
Feature Crossed: Kalaoa Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-35.36s	**Latitude:** 19d-48m-05.94s
Location: TMK: 2-7-008:013	
Historic Name: Kalaoa Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

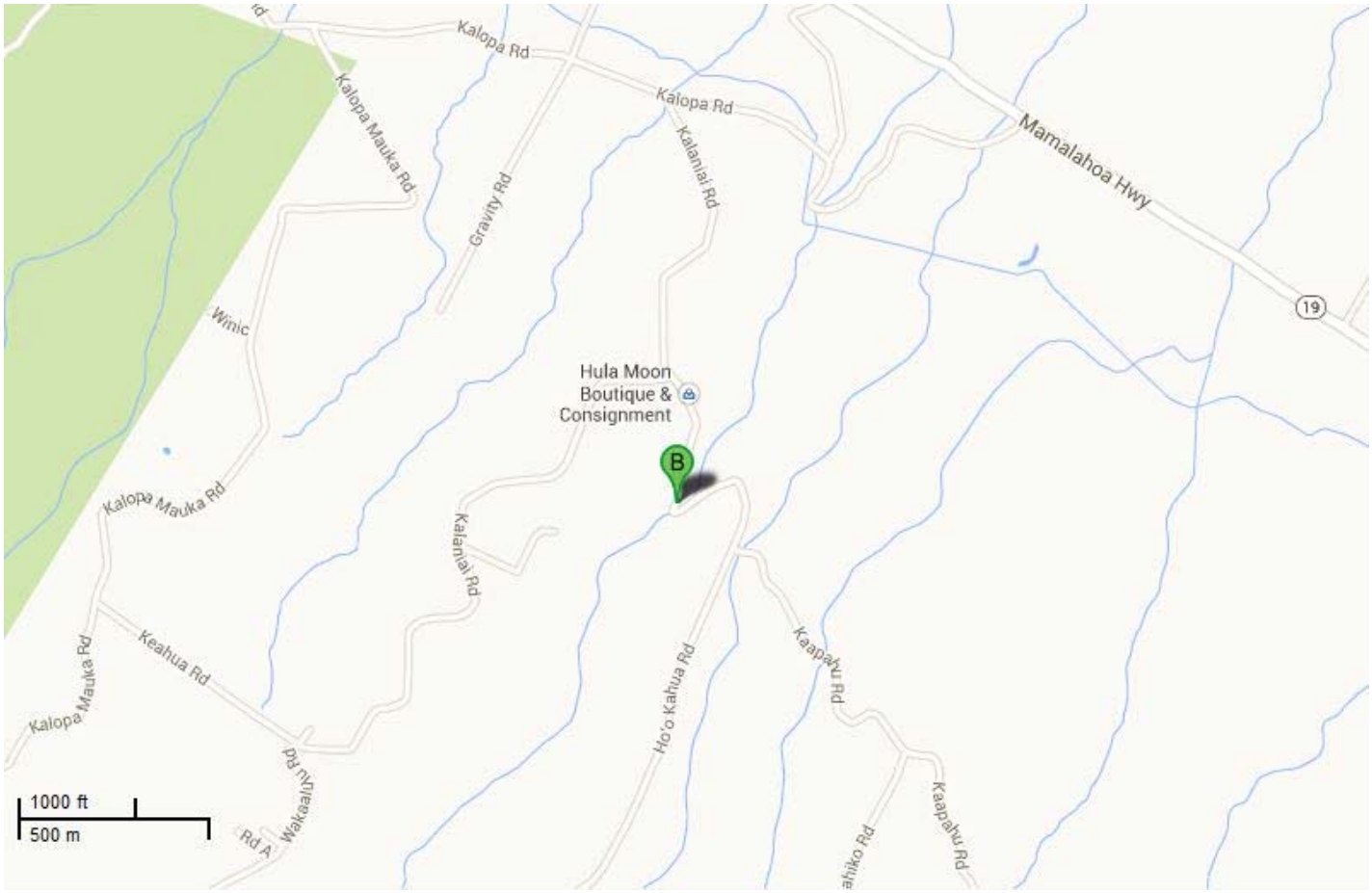
Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100007	
Popular Name: Kalopa Gulch Bridge	
Feature Crossed: Kalopa Gulch	
Feature Carried: Kaapahu Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-25m-17.15s	**Latitude:** 20d-03m-04.61s

Location: TMK: 4-4-08:02
Historic Name: Kalopa Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1919	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 20.0 ft.	**Total Length:** 48.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kalopa Gulch Bridge carries Kaapahu Road across the Kalopa Gulch. This cast in place concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panel parapets with flat caps. The workmanship of the bridge has not been obscured by addition or repair and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1910's cast in place concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100009

Popular Name: Kalopa Gulch Bridge

Feature Crossed: Kalopa Gulch

Feature Carried: Kalopa Road

Milepost: **County Private:** Hawaii

Longitude: 155d-25m-04.43s **Latitude:** 20d-03m-29.36s

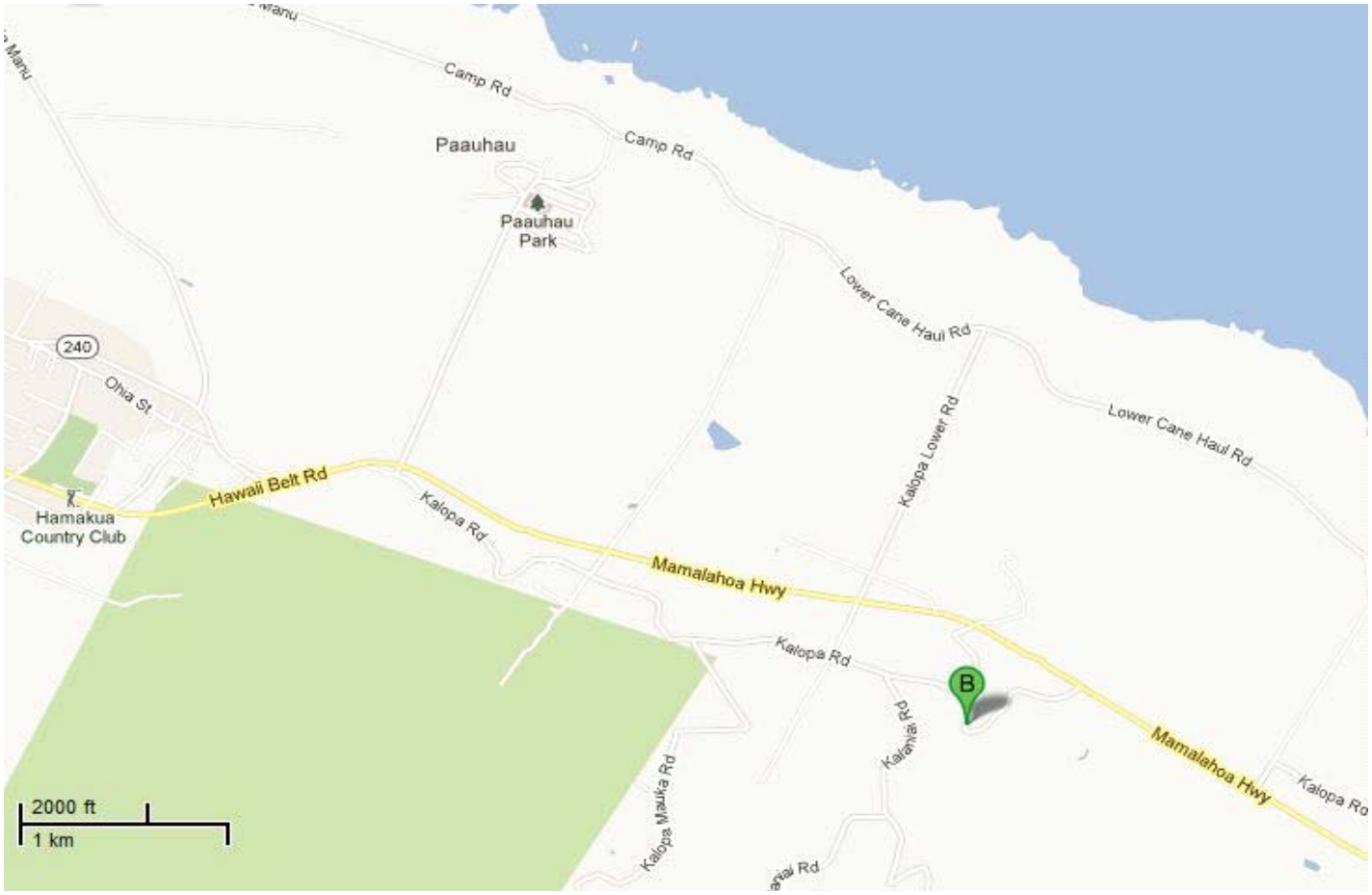
Location: TMK: 4-4-02:07

Historic Name: Kalopa Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2009	
Alteration Type(s):		
Alteration Description(s): Bridge was replaced in-kind in 2009.		

Bridge Information

Number of Spans: 3	**Max Span:** 15.0 ft.	**Total Length:** 53.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Double Column Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

This timber bridge was reconstructed in-kind in 2009.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100001

Popular Name: Kapue Stream Bridge

Feature Crossed: Kapue Stream

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-05m-39.12s **Latitude:** 19d-46m-55.14s

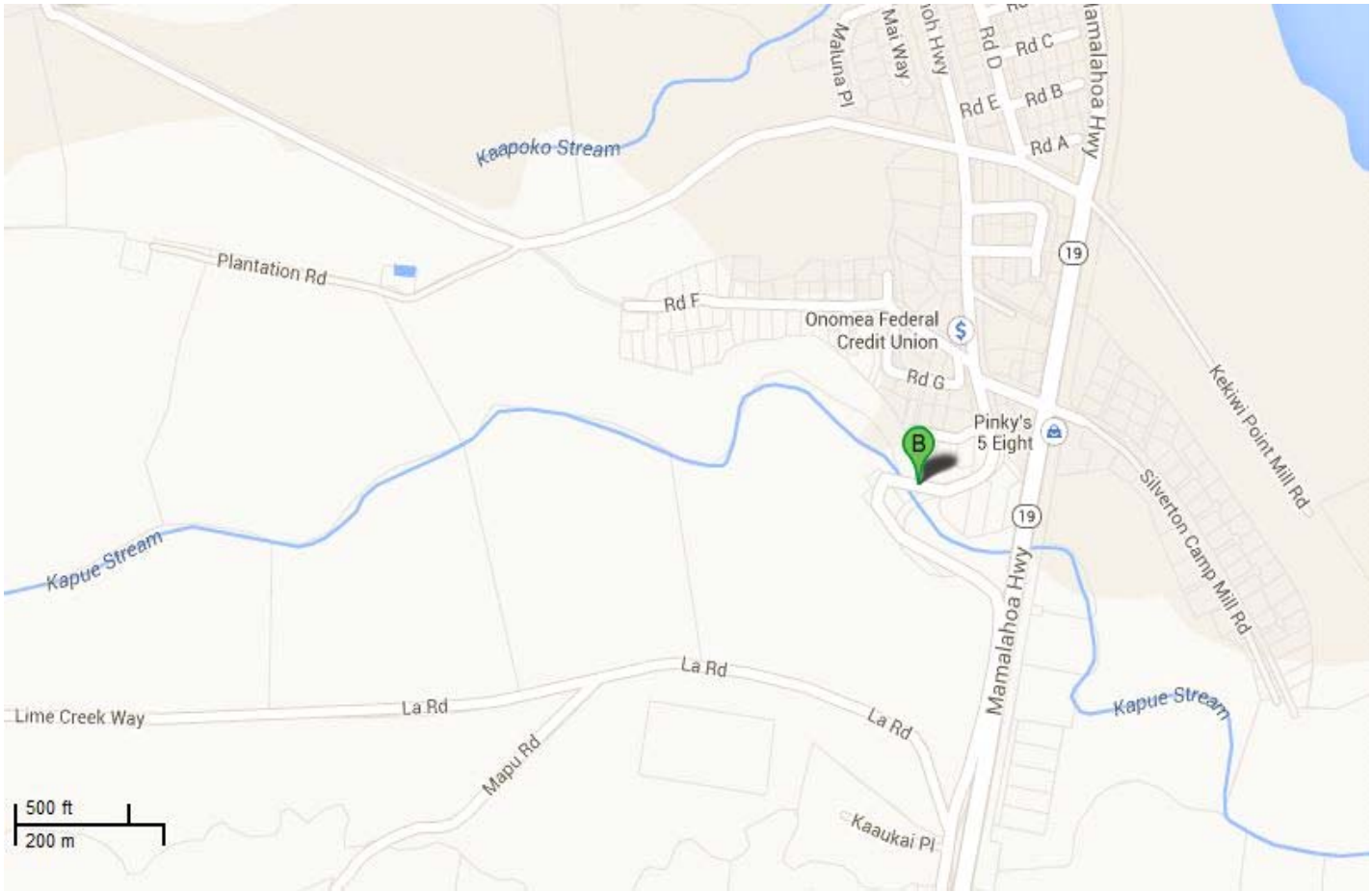
Location: TMK: 2-7-04:23

Historic Name: Kapue Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1935	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 55.0 ft.	**Total Length:** 68.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

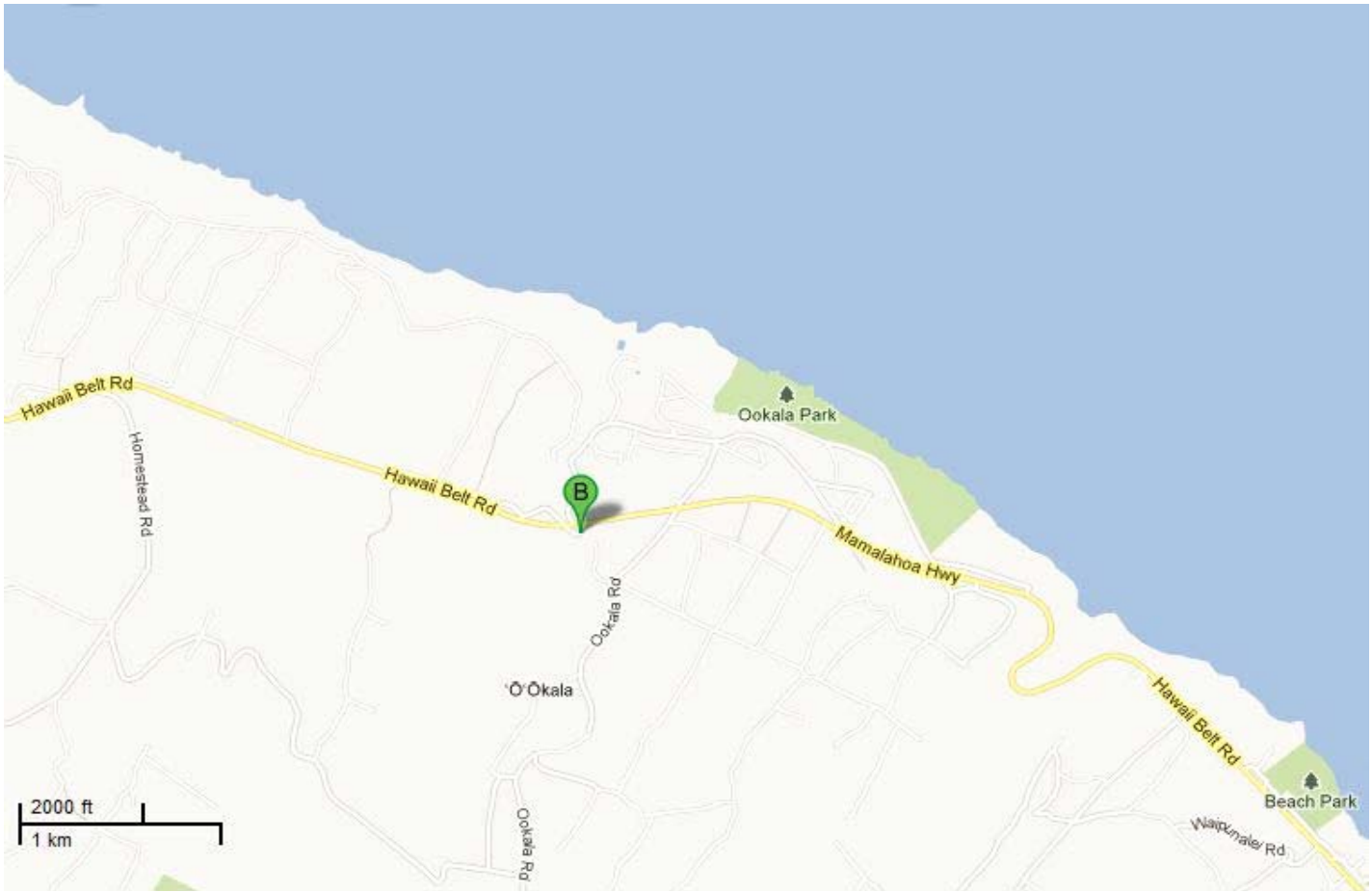
Inventory Form
(County/Private)

General Information

Bridge Number: 001410001100001	
Popular Name: Kaula Gulch Bridge	
Feature Crossed: Kaula Gulch	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-17m-09.65s	**Latitude:** 20d-00m-34.08s

Location: TMK: 4-1-01:15
Historic Name: Kaula Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1928	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 17.0 ft.	**Total Length:** 52.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

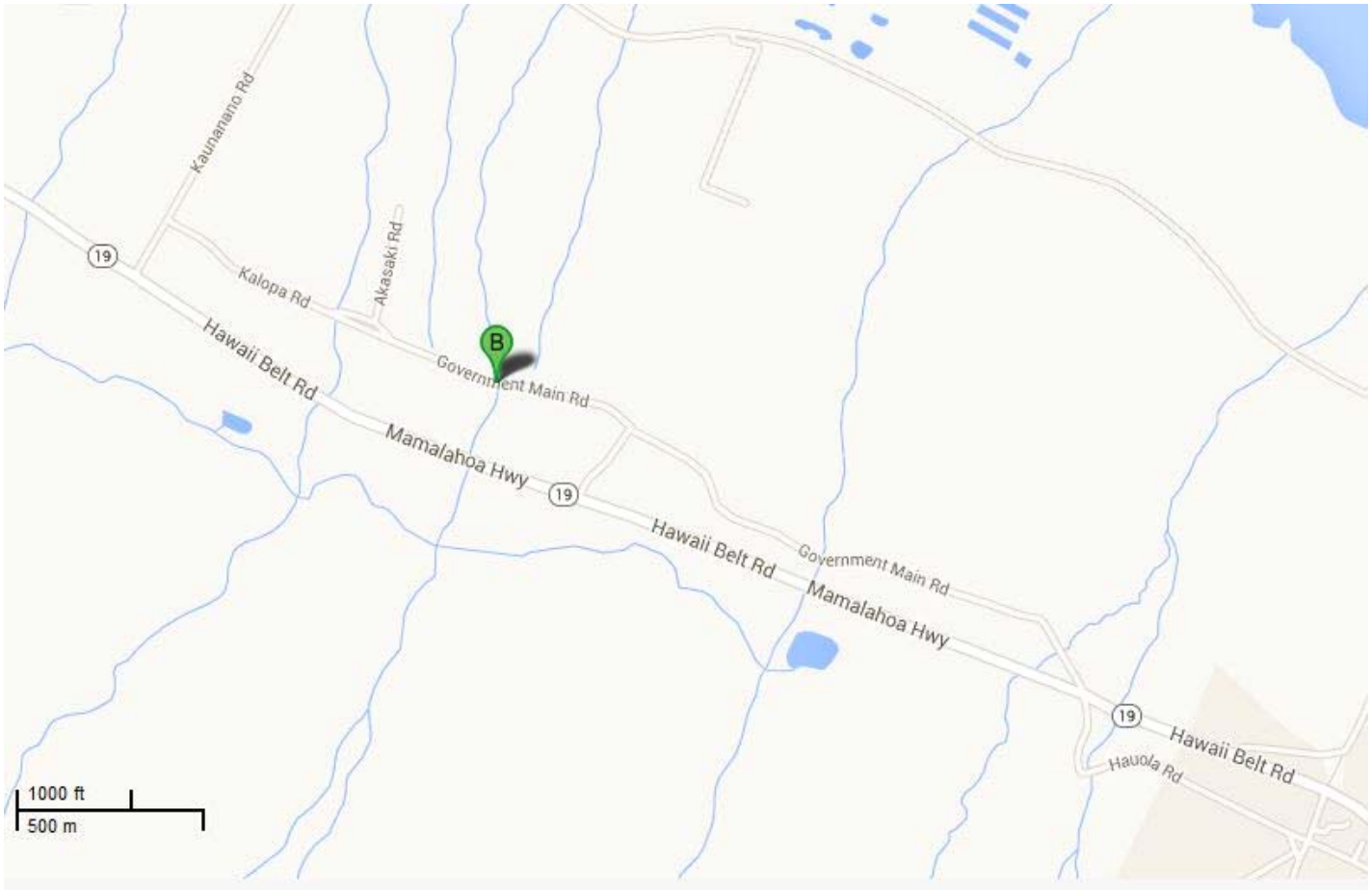
See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001430001100002	
Popular Name: Kaumoali Gulch Bridge	
Feature Crossed: Kaumoali Gulch	
Feature Carried: Old Government Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-23m-43.50s	**Latitude:** 20d-03m-10.29s
Location: TMK: 4-3-05:07	
Historic Name: Kaumoali Gulch Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1932	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 15.0 ft.	**Total Length:** 55.0 ft.	**Deck Width:** 24.0 ft.
Superstructure: Masonry Closed Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

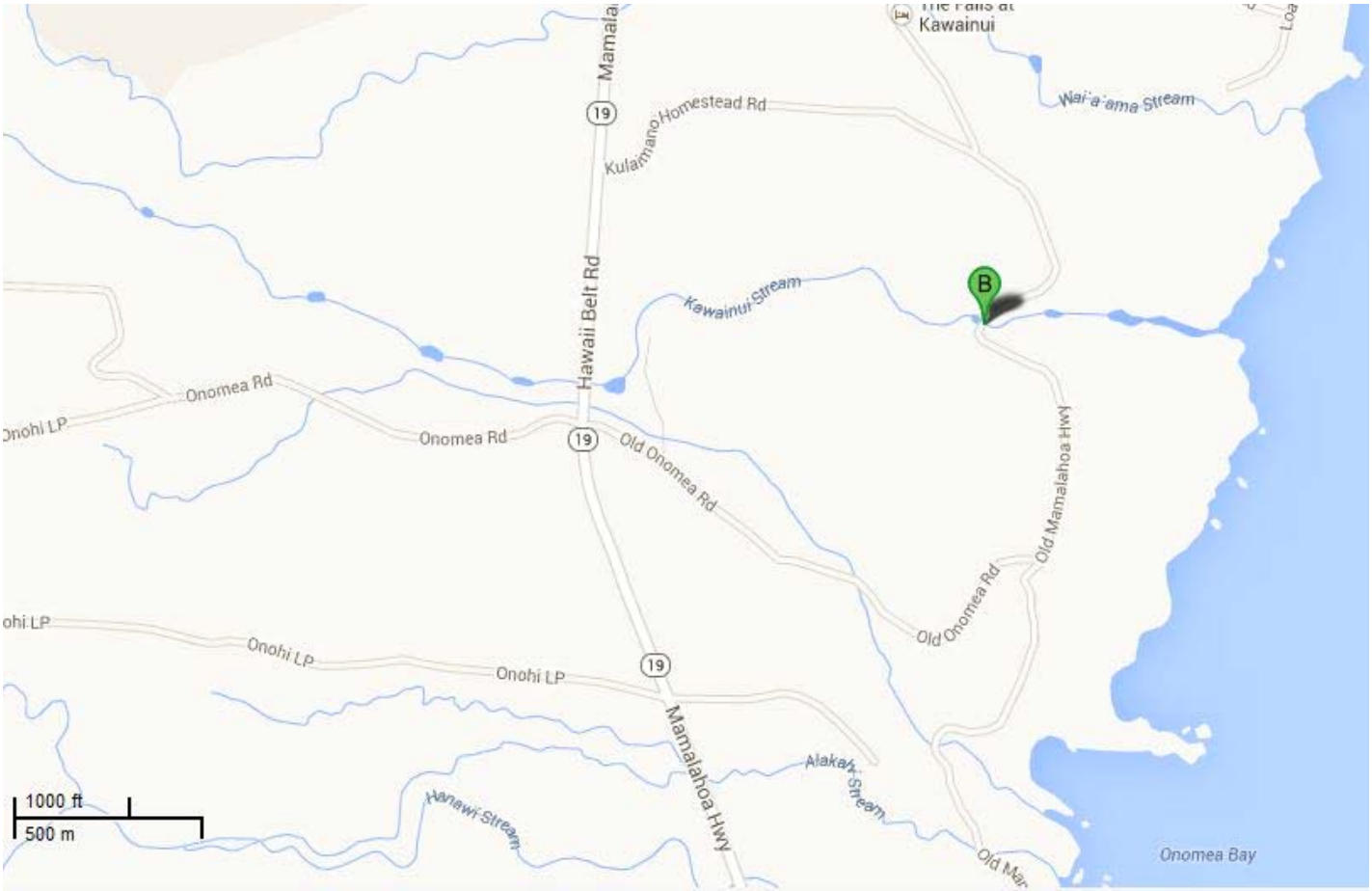
Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100007	
Popular Name: Kawainui Stream Bridge	
Feature Crossed: Kawainui Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-41.32s	**Latitude:** 19d-49m-13.18s

Location: TMK: 2-7-011:002
Historic Name: Kawainui Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1900	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 20.0 ft.	**Total Length:** 79.0 ft.	**Deck Width:** 15.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Double Column Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

This bridge is scheduled to be replaced in-kind.

Significance Statement:

See Mamalahoa historic district description.

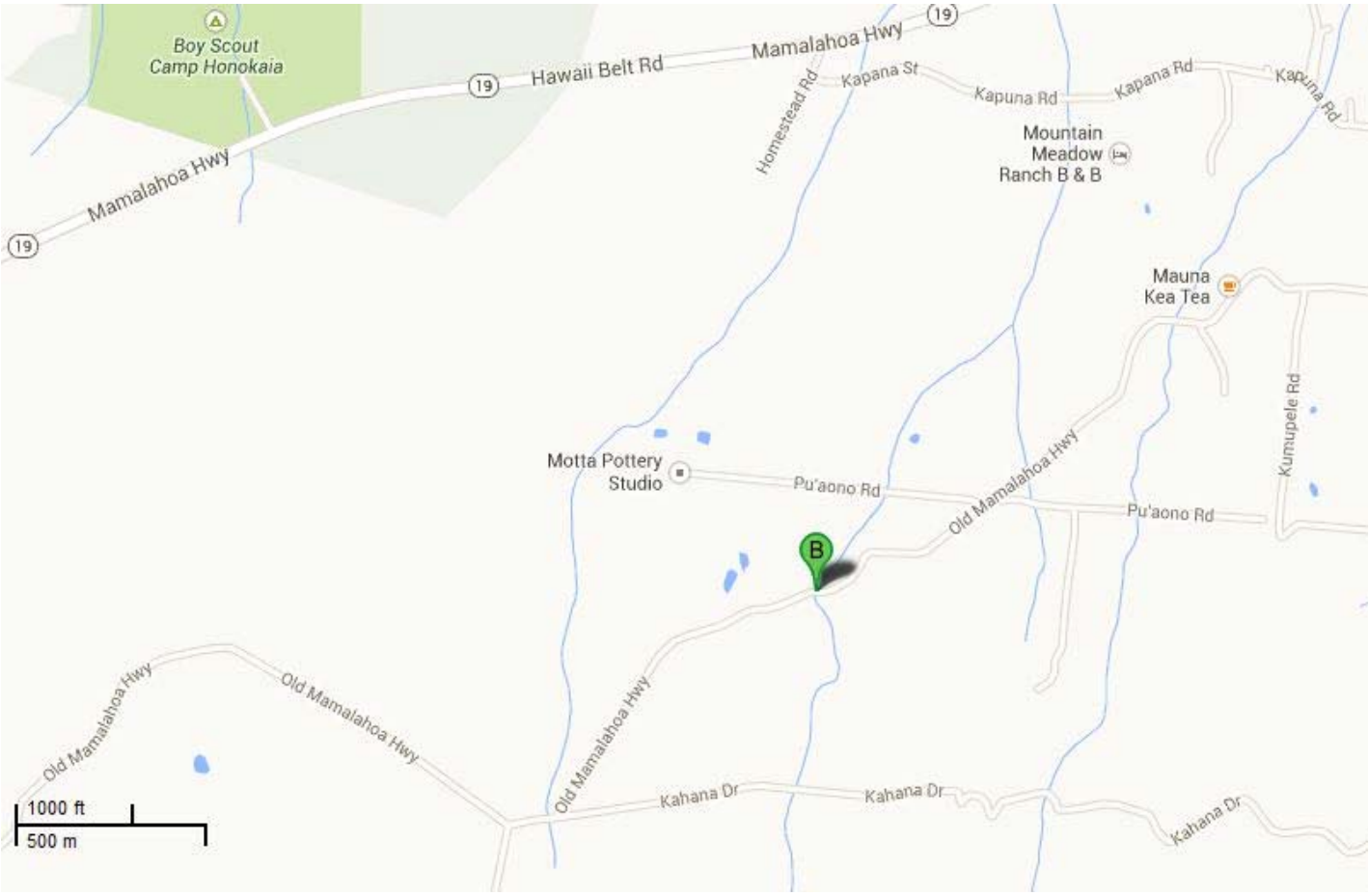
Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100004	
Popular Name: Keaakaukau Gulch Bridge	
Feature Crossed: Keaakaukau Gulch	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-30m-24.20s	**Latitude:** 20d-03m-17.75s

Location: TMK: 4-6-009:036
Historic Name: Keaakaukau Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1925	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 12.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100008

Popular Name: Keaakaukau Stream Bridge

Feature Crossed: Keaakaukau Gulch

Feature Carried: Kahana Drive

Milepost: **County Private:** Hawaii

Longitude: 155d-30m-26.22s **Latitude:** 20d-03m-01.25s

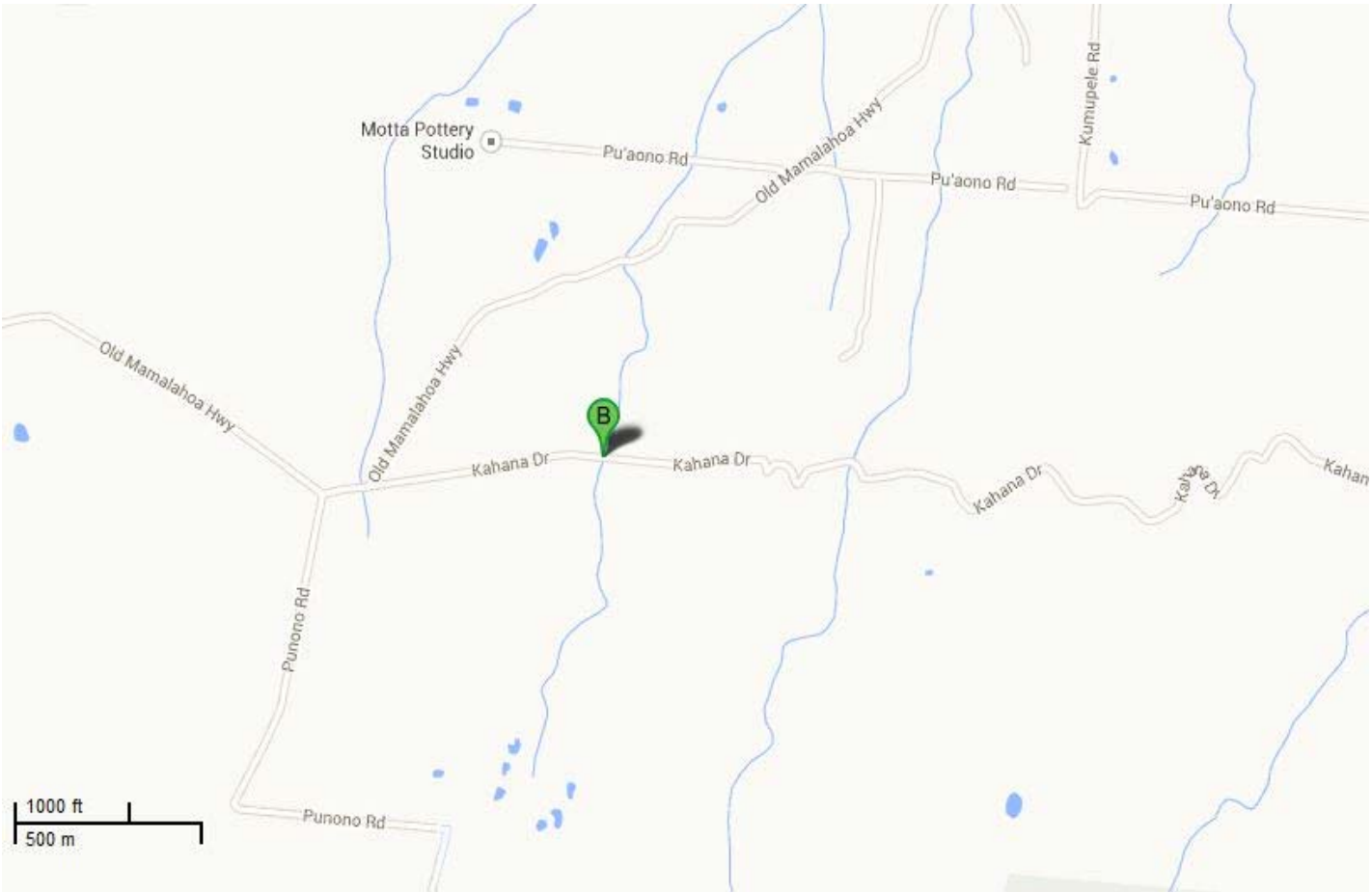
Location: TMK: 4-6-09:044

Historic Name: Keaakaukau Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 22.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 12.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Keaa Kaukau Stream Bridge carries Kahana Drive across Keaa Kaukau Stream. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

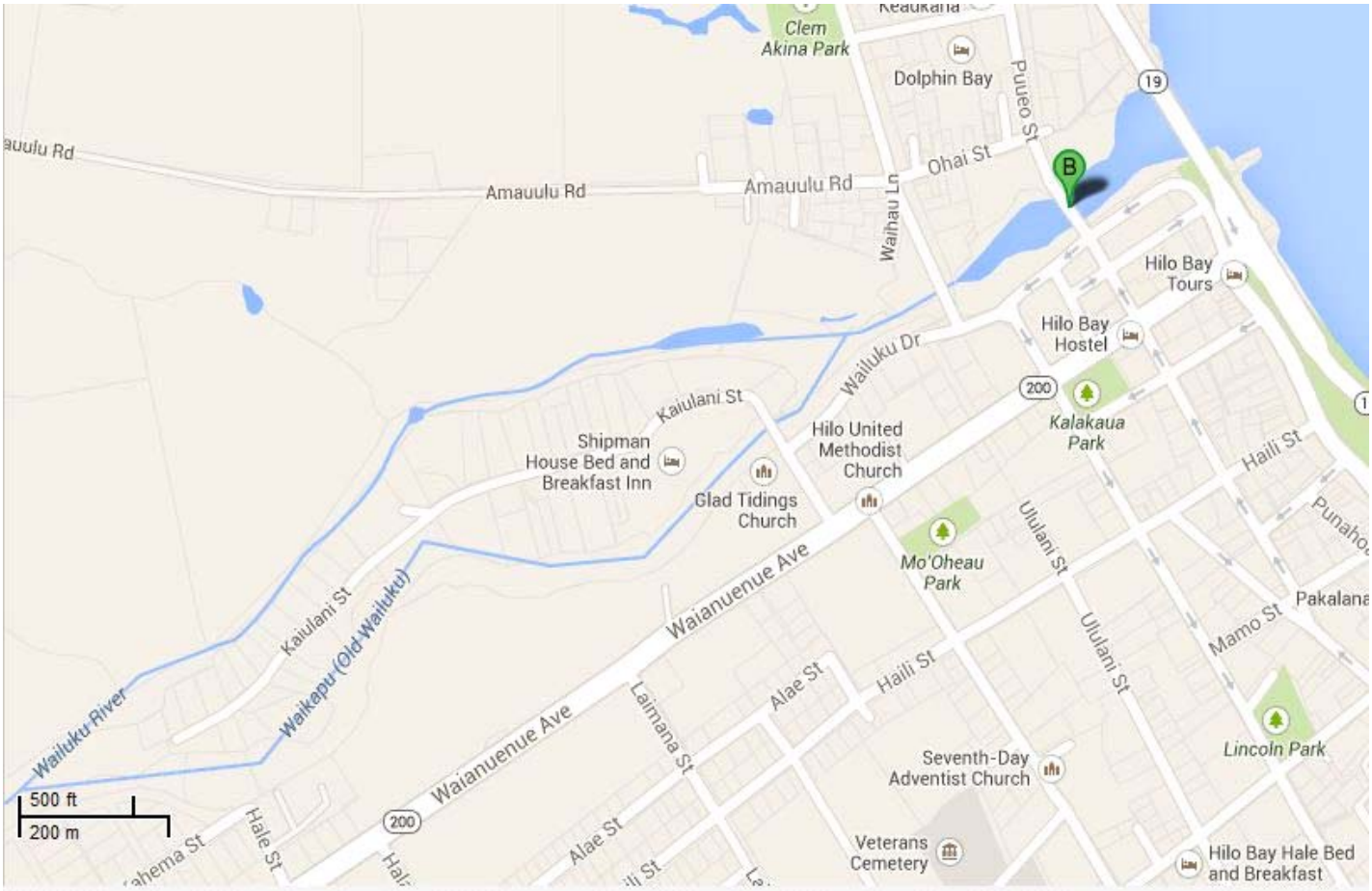
Inventory Form
(County/Private)

General Information

Bridge Number: 001230001100001	
Popular Name: Keawe-Wailuku Bridge	
Feature Crossed: Wailuku River	
Feature Carried: Keawe Street / Puueo Street	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-19.99s	**Latitude:** 19d-43m-37.93s

Location: TMK: 2-3-05:4
Historic Name: Keawe-Wailuku Bridge
Designer/Engineer: William Hoy Chun
Builder/Contractor: H. Isemoto Contracting Co.

Location Map:



Construction Information

Bridge Type: Rainbow Arch	**Construction Date:** 1938	**Replaced?** No
Altered? Yes	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s): Original street lamps replaced		

Bridge Information

Number of Spans: 1	**Max Span:** 171.0 ft.	**Total Length:** 171.0 ft.	**Deck Width:** 51.5 ft.
Superstructure: Concrete Through Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features: Sidewalk on both sides; decorative concrete end piers with incised bridge name and date of construction; raised concrete medallions at outside of pier columns; metal commemorative plaques and street lamps(replaced) on four ends of arch			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

The Keawe Street-Wailuku River Bridge crosses the Wailuku River at the north border of downtown Hilo, historically a busy shipping port and the center of commerce on the island of Hawaii. The Keawe Street Bridge is located at the site of the first major bridge built on the island of Hawaii and is only the third bridge at this location. The bridge is a concrete open spandrel through-deck arch, also known as a "Rainbow" or Marsh arch. It is one of two remaining examples of this bridge type in the state.

The bridge remains in its original location. Its setting in historic downtown Hilo also remains essentially unchanged. With the exception of the replacement of the original street lamps, the bridge retains its original design features and materials. The bridge is the product of successful partnership between William Hoy Chun, master designer for the Hawaii County Department of Public Works and H. Isemoto, Contractor of Hilo. The workmanship is of an exceptionally high caliber, and the bridge is the pride of downtown Hilo. The bridge's historic associations, as an important civic structure associated with the development of Hilo, are readily apparent to all observers. Interpretation is aided by commemorative plaques announcing the engineer’s and contractor’s names and date of construction. The bridge retains its historic feeling due to the picturesque appearance.

Significance Statement:

The Keawe Street-Wailuku River Bridge is significant in the areas of engineering and transportation in Hawaii. The Keawe Street Bridge is eligible under Criterion A for its associations with public works efforts by the County of Hawaii, and as an important civic structure associated with the development of Hilo. The bridge is eligible under Criterion C since it is one of two remaining “rainbow” or Marsh arch bridges in the state. Further, the bridge is representative of the “work of a master”: William Hoy Chun with the Hawaii County Department of Public Works.

By the mid-nineteenth century the town of Hilo was well-established at Hilo Bay, the island’s best port. Yet communications between Hilo and the rich agricultural land to the north were hampered by the formidable and treacherous Wailuku River. The Kingdom’s Ministry of the Interior, established in 1846, set as one of its first priorities the spanning of this river.(1) The first bridge built was constructed in 1859 by R.A.S. Wood, Superintendent of the Bureau of Internal Improvements.(2) It was an "experimental" suspension bridge and certainly the most impressive bridge on the island during its lifetime, when most other bridges were timber or stone, small in size and too often temporary in nature. Unfortunately, the bridge collapsed seven weeks after its completion. The suspension bridge was rebuilt with double the strength and served the community faithfully for forty years, with one major reconstruction in 1884. The road leading to it (Keawe Street) was known for fifty years as Bridge Street. The bridge's success was a spur to bridge building throughout the islands.(3)

The second bridge at this site, a steel through-truss, was completed in 1903. Between 1884 to 1904, several American-manufactured steel or iron truss bridges were erected in the islands. The bridge was constructed by contractors Louis M. Whitehouse and Robert Hawxhurst. A Hilo Tribune writer called it "the biggest and best in the Hawaiian Islands."(4) Steel truss bridges proved very expensive to maintain since the salt water spray from the ocean caused them to rust quickly. The Wailuku steel truss bridge was replaced by the current reinforced-concrete through-arch or “rainbow” bridge in 1938. It is the only bridge on Hawaii Island that received Public Works Administration moneys from the U.S. government during the Great Depression.(5)

Rainbow arches are also known as "Marsh Arches" after their designer and patentee, James B. Marsh. This distinctive form of reinforced-concrete bridge construction was used extensively in portions of the mid-west from 1912 (the patent date) through the early 1930s.(6) In Hawaii, only two examples of this type remain - the Anahulu Bridge on Oahu, built in 1921,(7) and the Keawe Street Bridge. Other known examples, since destroyed, include two over Nuuanu Stream in downtown Honolulu and a six-arch rainbow bridge over the Wailua River on Kauai.(8) Arch bridges are also an uncommon bridge type.

The Keawe Street-Wailuku River Bridge was designed by William "Cappy" Chun, the project engineer and the designer of the Wailoa bridge in Hilo (previously listed on the National Register of Historic Places and since demolished). Chun was a graduate of the Illinois Institute of Technology. He also designed the sewer system of Hilo in the 1930s and served as the chief engineer for the Hilo Water Works until 1961.(9) The contractor, H. Isemoto, was a Japanese immigrant who apprenticed in stone masonry and, in 1925, began his own contracting company. He worked on some of the territorial highway bridges near Papaikou before securing this contract. His son Arthur, later a Deputy County Engineer, remembers that his father constructed the concrete forms for the Keawe Street Bridge on the beach next to the Wailoa Bridge, because there was no place to do this near the steep slopes of the Wailuku worksite and then floated the pieces around Hilo Bay and up the river.(10)

(1) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 150.
(2) Pacific Commercial Advertiser (June 23, 1859), 1.
(3) Honolulu Advertiser (September 17, 1859), 2.
(4) Honolulu Advertiser (March 18, 1904), 5.
(5) Patricia Alvarez, HAER Inventory: Keawe Street/ Wailuku River Bridge, prepared for the State of Hawaii, Department of Transportation and the U.S. Department of the Interior, Historic American Engineering Record (HAER) (Honolulu, 1987c).
(6) William P. Chamberlin, Historic Bridges – Criteria for Decision Making, National Cooperative Highway Research Program, Synthesis of Highway Practice 101 (Washington, D.C.: Transportation Research Board, 1983), 21.
(7) Bethany Thompson, Historic Bridge Inventory, Island of Oahu, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highway Administration (Honolulu, 1983).
(8) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 153.

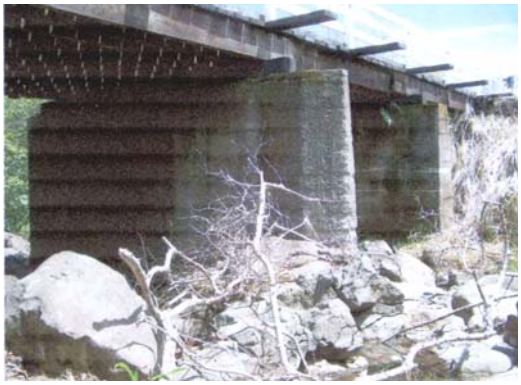
(9) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 153.
(10) Patricia Alvarez, Historic Bridge Inventory and Evaluation: Island of Hawaii, prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987b), 153.

Inventory Form
(County/Private)

General Information

Bridge Number: 001360001100002

Popular Name: Kilau Stream Bridge



Feature Crossed: Kilau Stream

Feature Carried: Manowaiopae Homestead Road

Milepost: **County Private:** Hawaii

Longitude: 155d-14m-49.87s **Latitude:** 19d-58m-33.25s

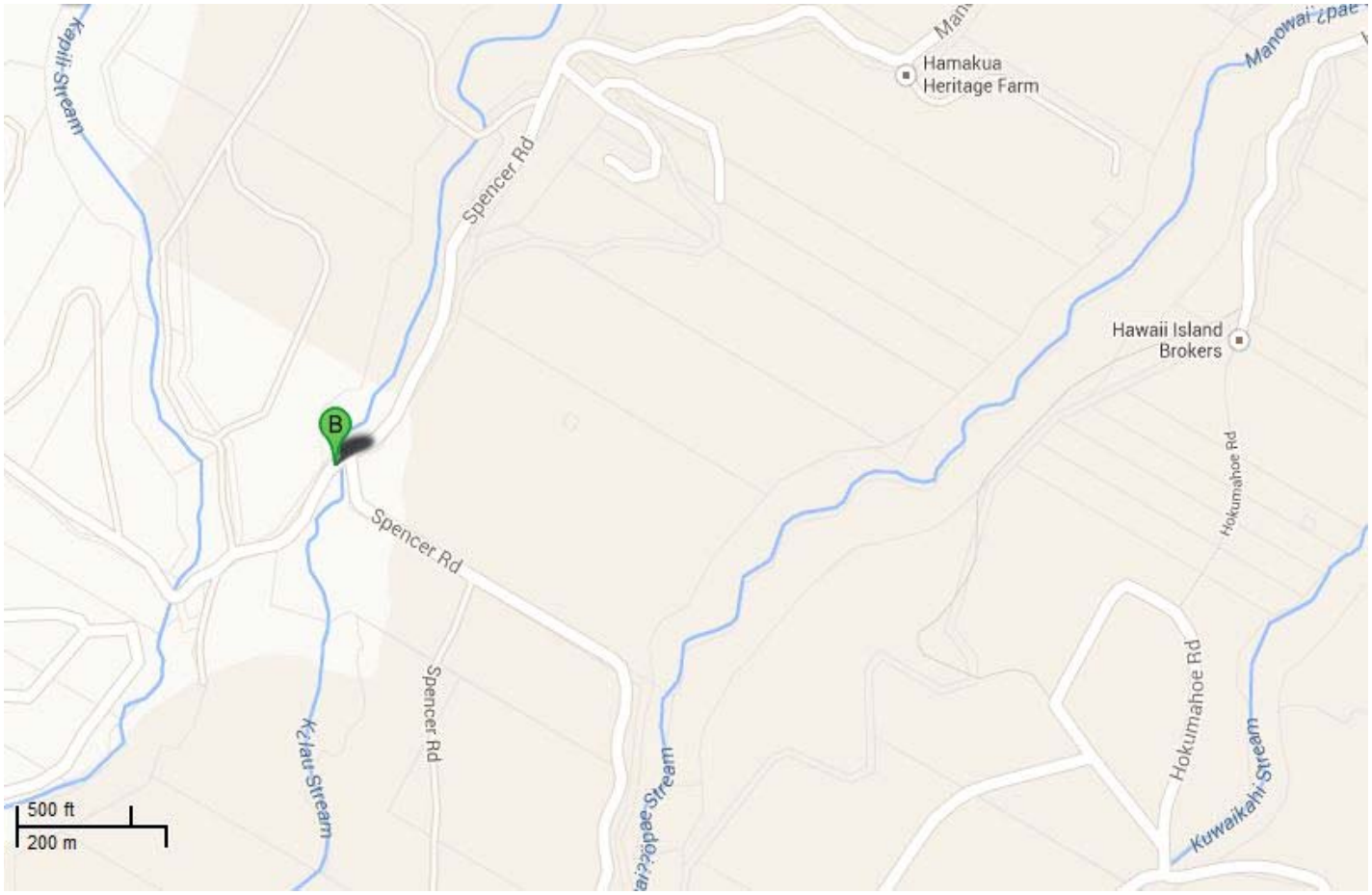
Location: TMK: 3-6-003:012

Historic Name: Kilau Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 16.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kilau Stream Bridge carries Manowaiopae Highway Road across Kilau Stream. This timber girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and reinforced concrete pier and abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001280001100004

Popular Name: Kolekole Stream Bridge

Feature Crossed: Kolekole Stream

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-07m-15.25s **Latitude:** 19d-52m-46.52s

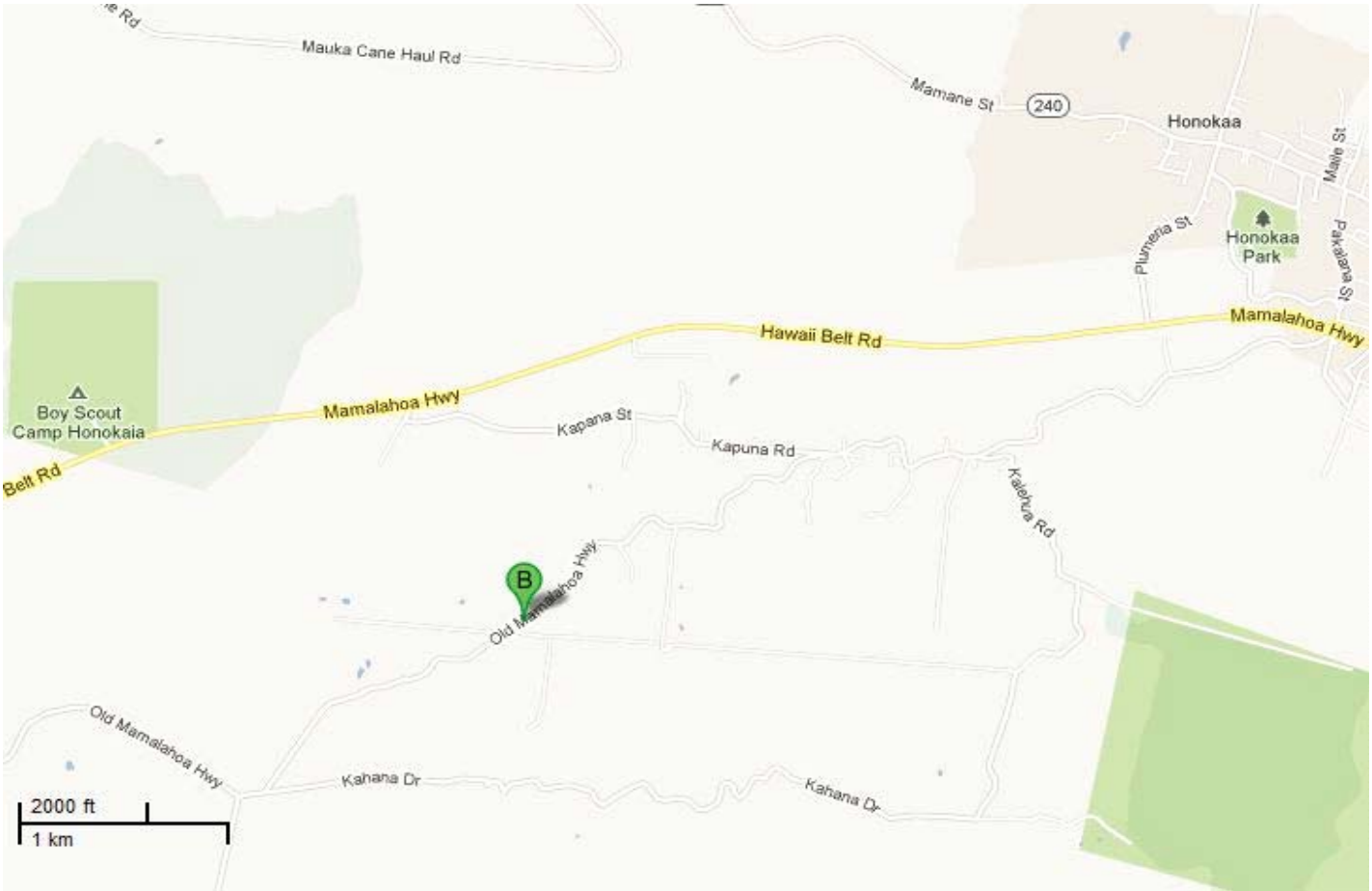
Location: TMK: 2-8-15:16

Historic Name: Kolekole Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 62.0 ft.	**Total Length:** 91.0 ft.	**Deck Width:** 23.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Arched			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

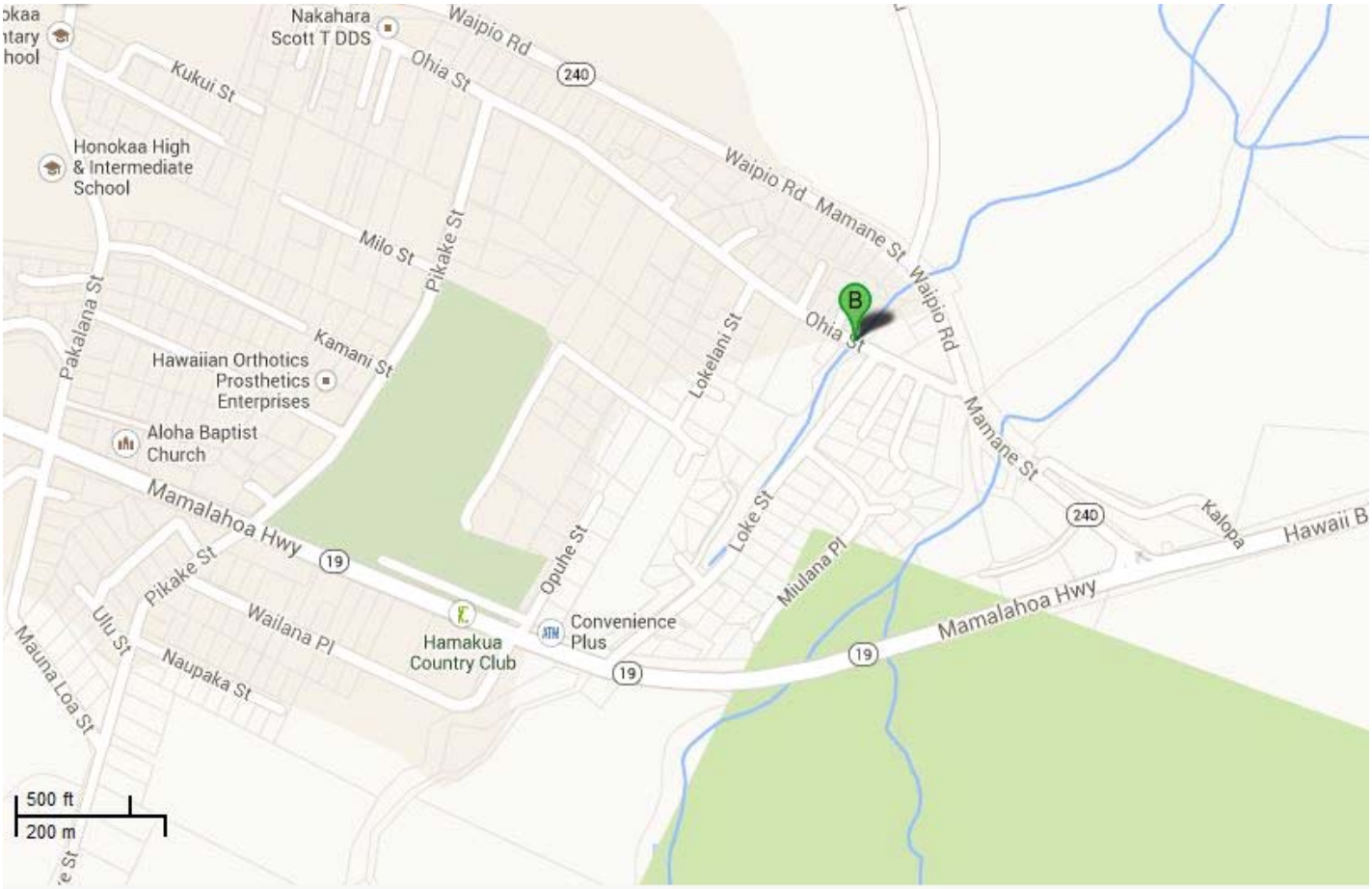
Inventory Form
(County/Private)

General Information

Bridge Number: 001450001100001	
Popular Name: Kukuiaonanipahu Gulch Bridge	
Feature Crossed: Kukuiaonanipahu Gulch	
Feature Carried: Ohia Street	
Milepost:	**County Private:** Hawaii
Longitude: 155d-27m-14.18s	**Latitude:** 20d-04m-19.80s

Location: TMK: 4-5-20:041
Historic Name: Kukuiaonanipahu Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 12.0 ft.	**Total Length:** 17.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kukuiaonanipahu Gulch Bridge carries Ohia Street across Kukuiaonanipahu Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

The bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

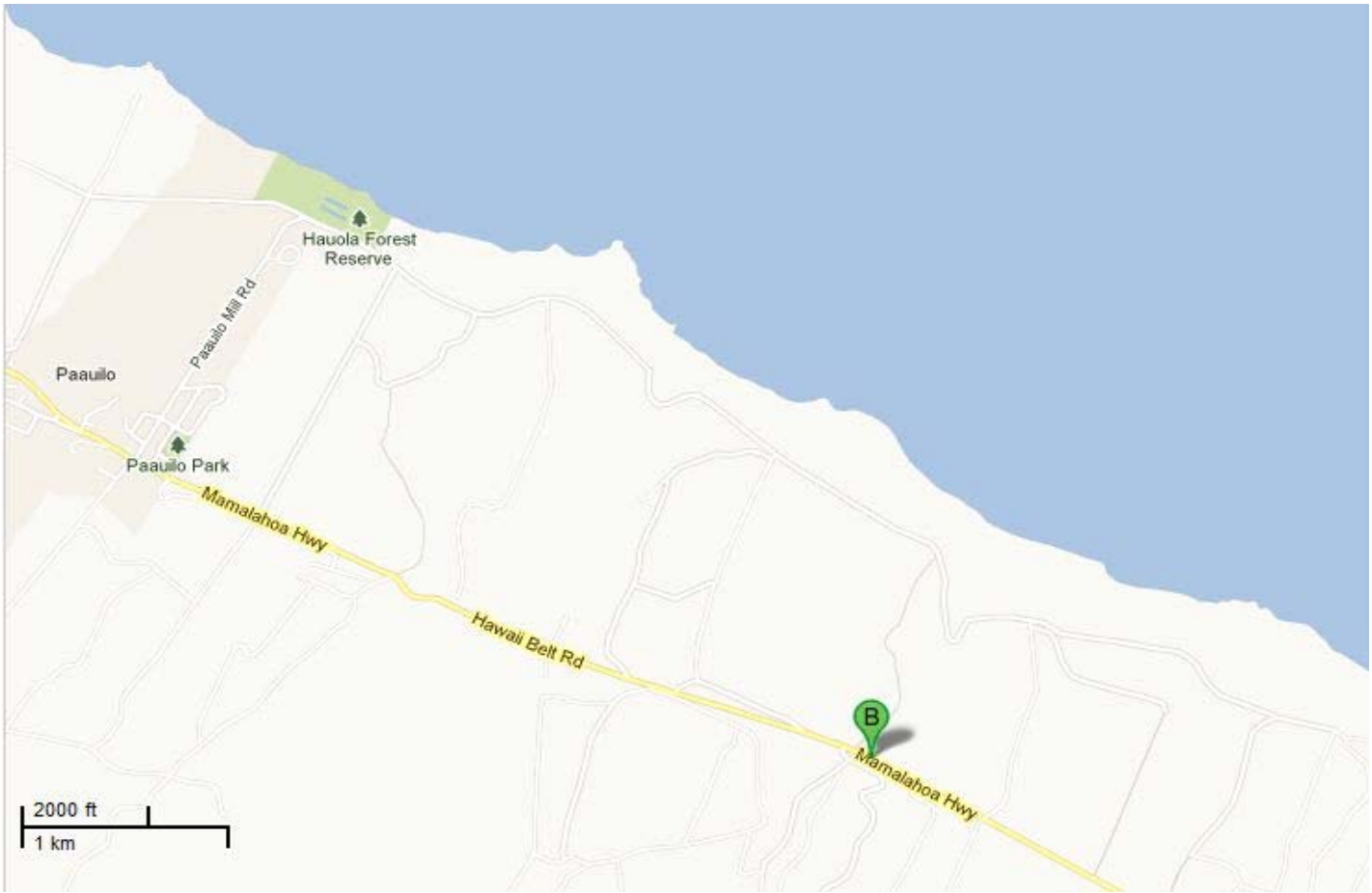
Inventory Form
(County/Private)

General Information

Bridge Number: 001420001100001	
Popular Name: Lauhala Gulch Bridge	
Feature Crossed: Lauhala Gulch	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-20m-01.04s	**Latitude:** 20d-01m-28.59s

Location: TMK: 4-2-002:020
Historic Name: Lauhala Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 11.0 ft.	**Total Length:** 36.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001360001100001

Popular Name: Laupahoehoe Gulch Bridge

Feature Crossed: Laupahoehoe Gulch

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-14m-44.45s **Latitude:** 19d-59m-23.90s

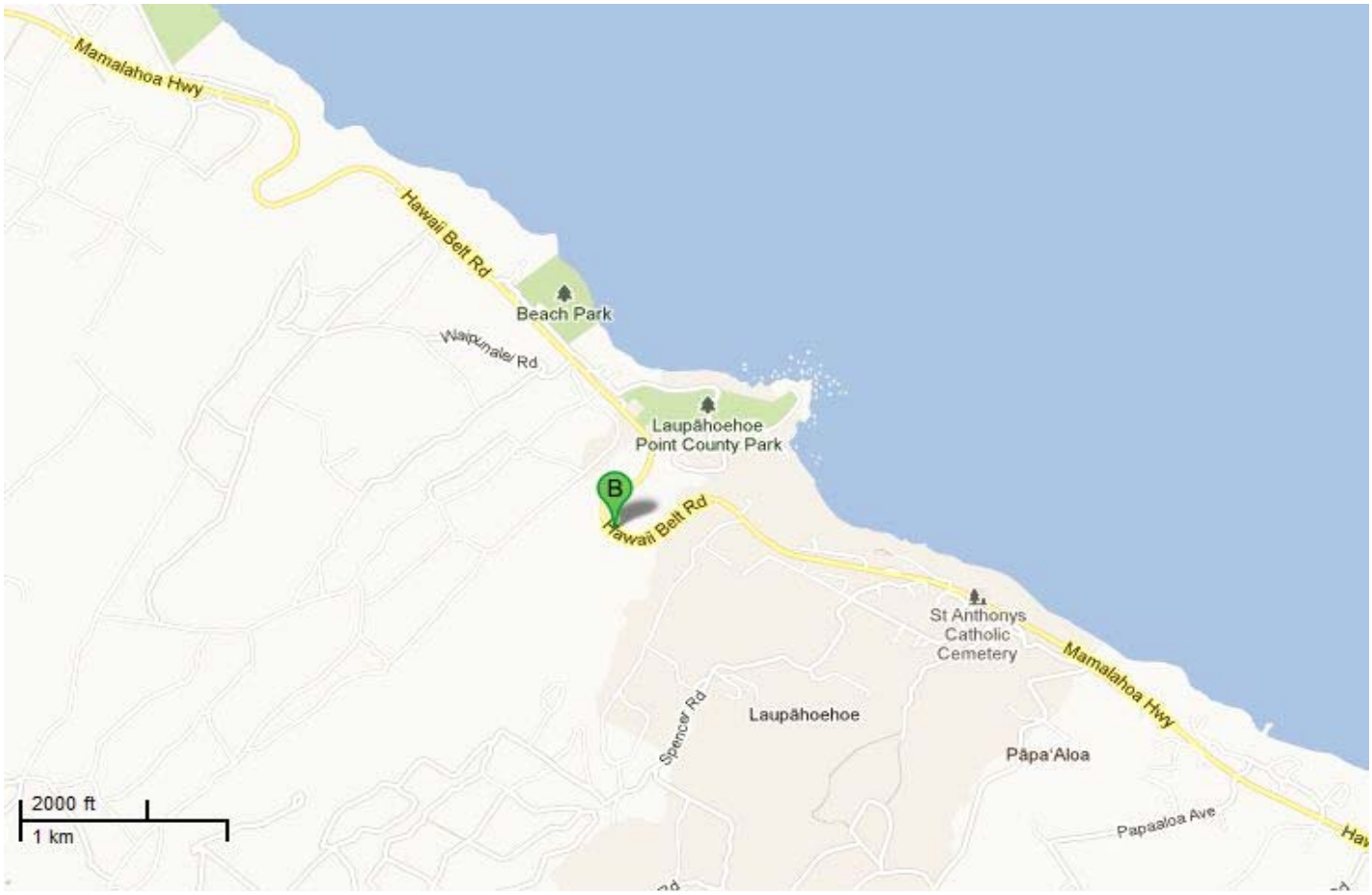
Location: TMK: 3-6-002:012

Historic Name: Laupahoehoe Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 15.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Masonry Closed Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

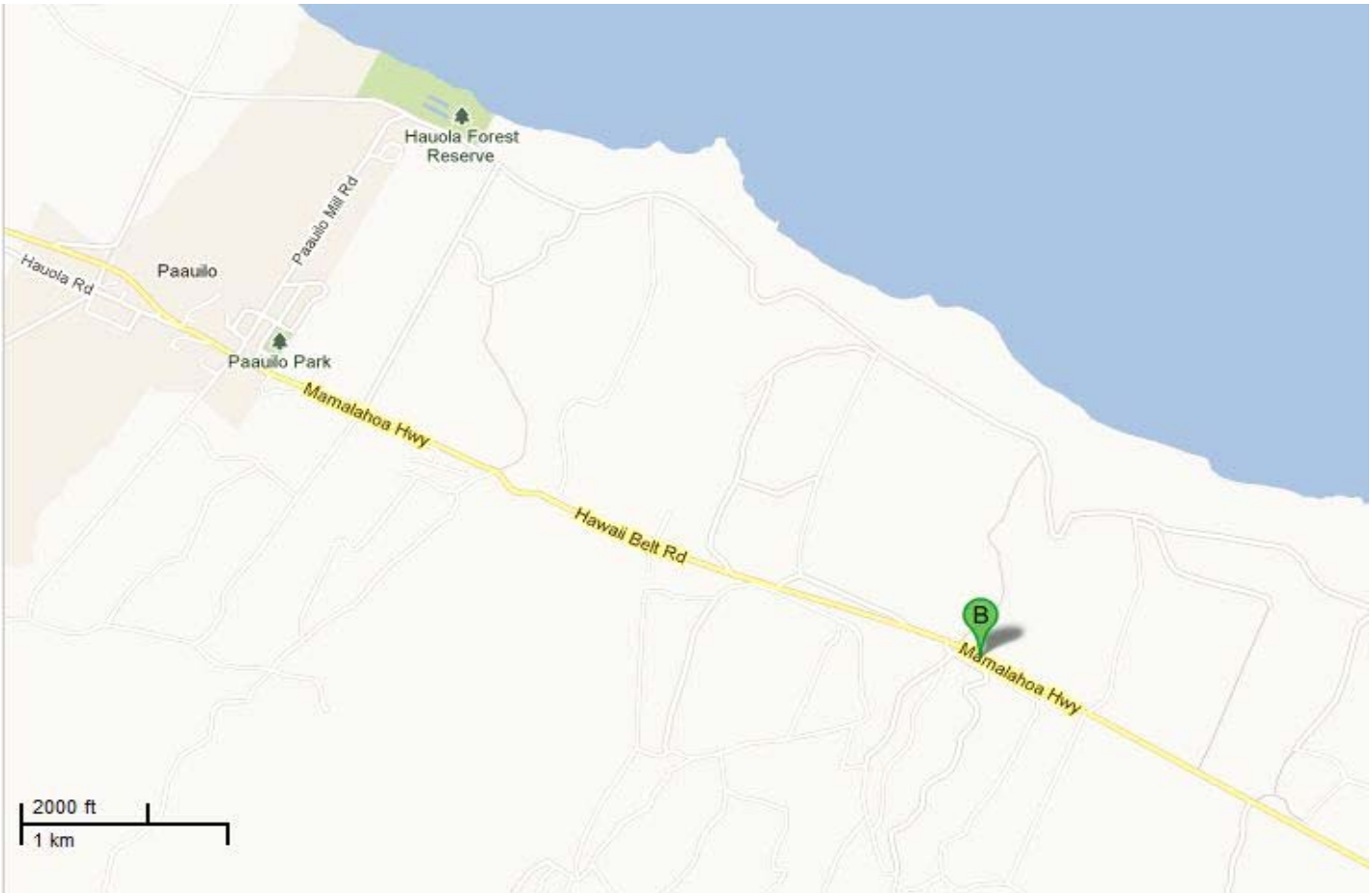
Inventory Form
(County/Private)

General Information

Bridge Number: 001420001100002	
Popular Name: Mahuna Gulch Bridge	
Feature Crossed: Mahuna Gulch	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-20m-04.73s	**Latitude:** 20d-01m-30.55s

Location: TMK: 4-2-02:19
Historic Name: Mahuna Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 4	**Max Span:** 16.0 ft.	**Total Length:** 44.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

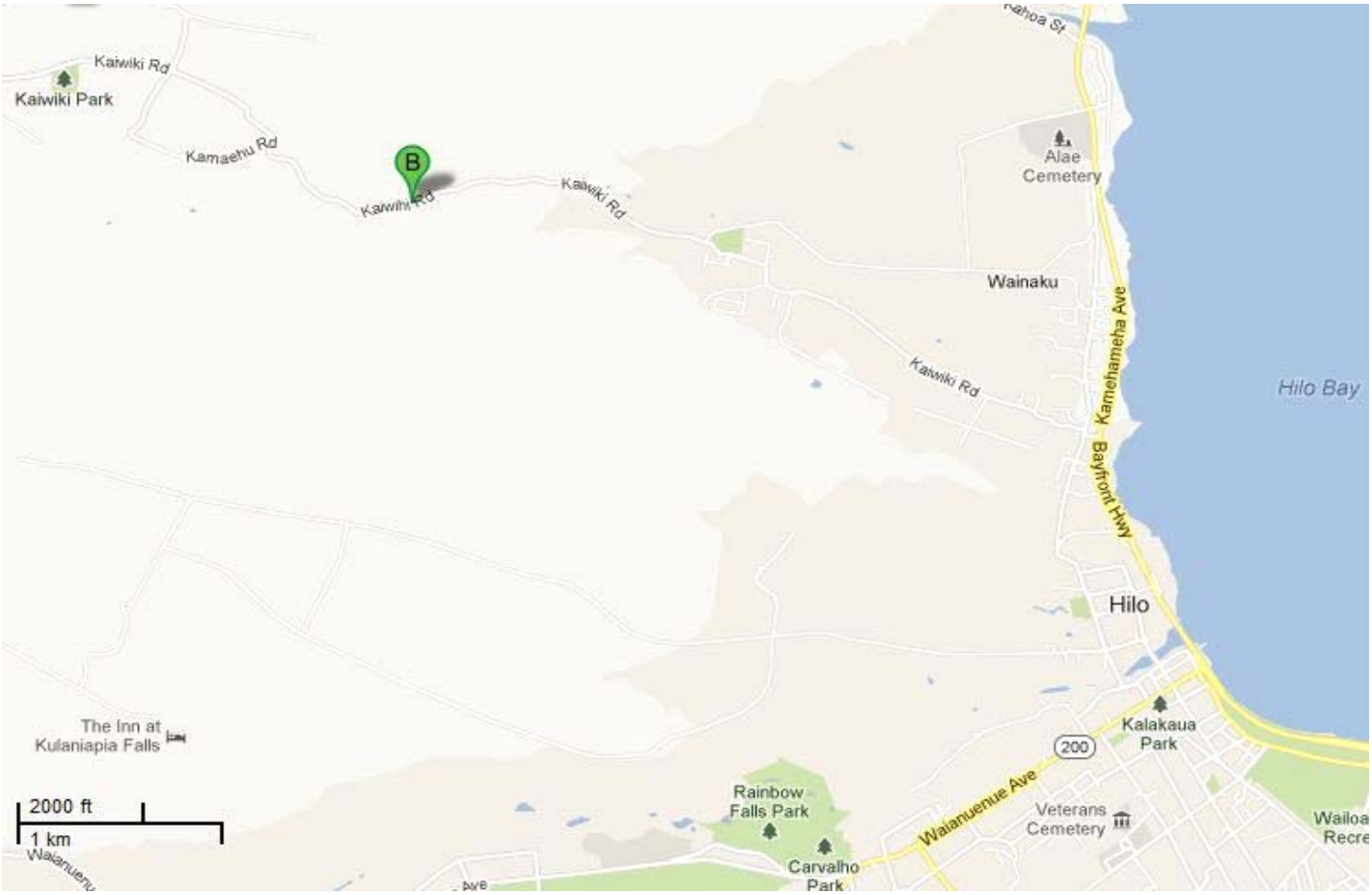
Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100003	
Popular Name: Maili Stream Bridge	
Feature Crossed: Maili Stream	
Feature Carried: Kaiwiki Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-07m-23.86s	**Latitude:** 19d-44m-54.40s

Location: TMK: 2-6-009:010
Historic Name: Maili Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1900	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 18.0 ft.	**Total Length:** 49.0 ft.	**Deck Width:** 14.4 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Kaiwiki Road Bridge carries Kaiwiki road across Maili Stream. This timber bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings and the timber deck is supported by a concrete pier and concrete rubble masonry abutments. The concrete pier looks to be added later but the workmanship of the bridge has not been obscured. The simple design of the bridge retains its historic feeling. This bridge is scheduled to be replaced in-kind.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1910's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

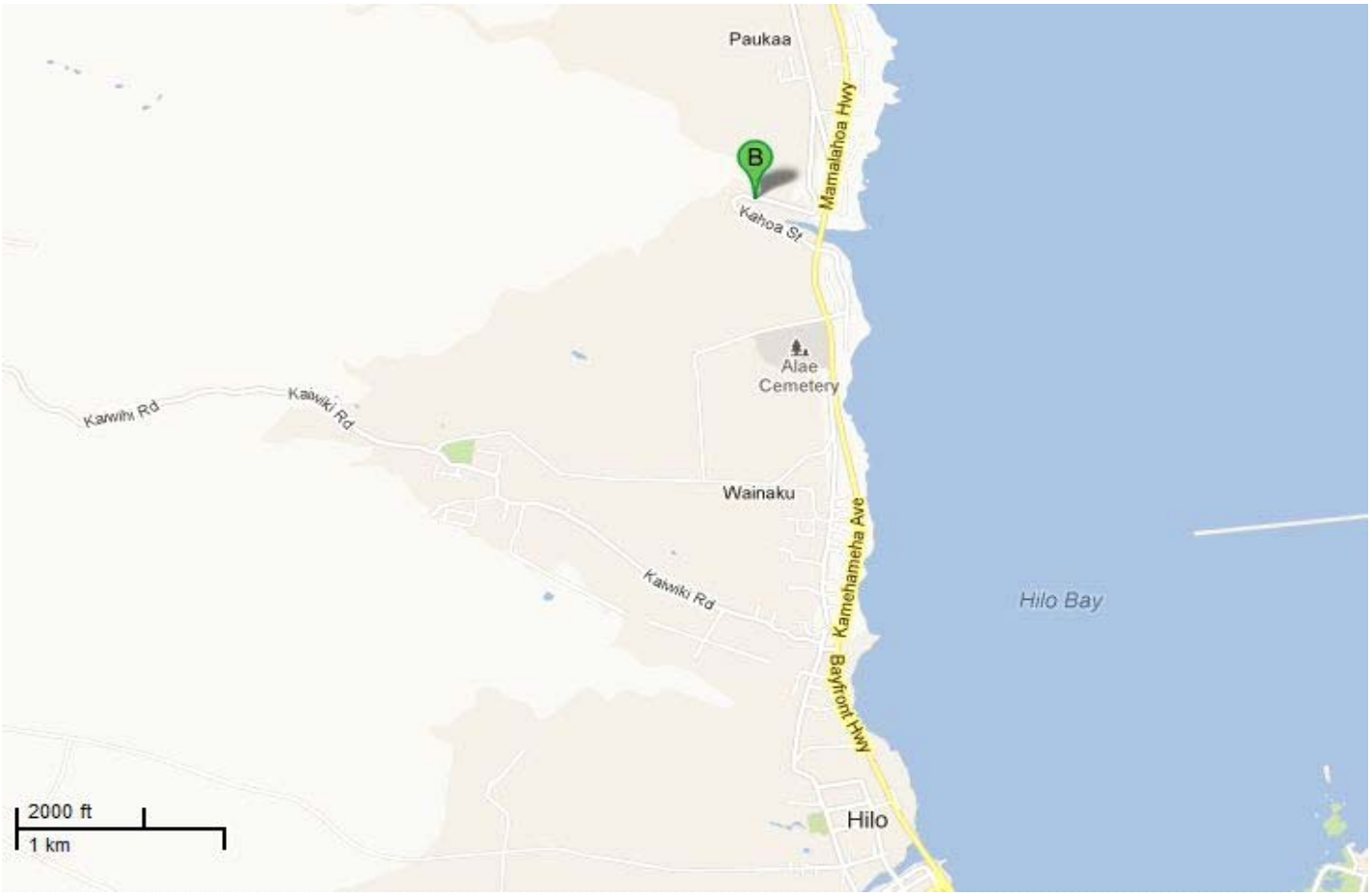
Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100004	
Popular Name: Maili Stream Bridge	
Feature Crossed: Maili Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-33.20s	**Latitude:** 19d-45m-21.50s

Location: TMK: 2-6-12:45
Historic Name: Maili Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1916	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 37.0 ft.	**Total Length:** 69.0 ft.	**Deck Width:** 20.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001430001100006

Popular Name: Manienie Gulch Bridge

Feature Crossed: Manienie Gulch

Feature Carried: Pohakea Mauka Road

Milepost: **County Private:** Hawaii

Longitude: 155d-24m-19.49s **Latitude:** 20d-01m-04.09s

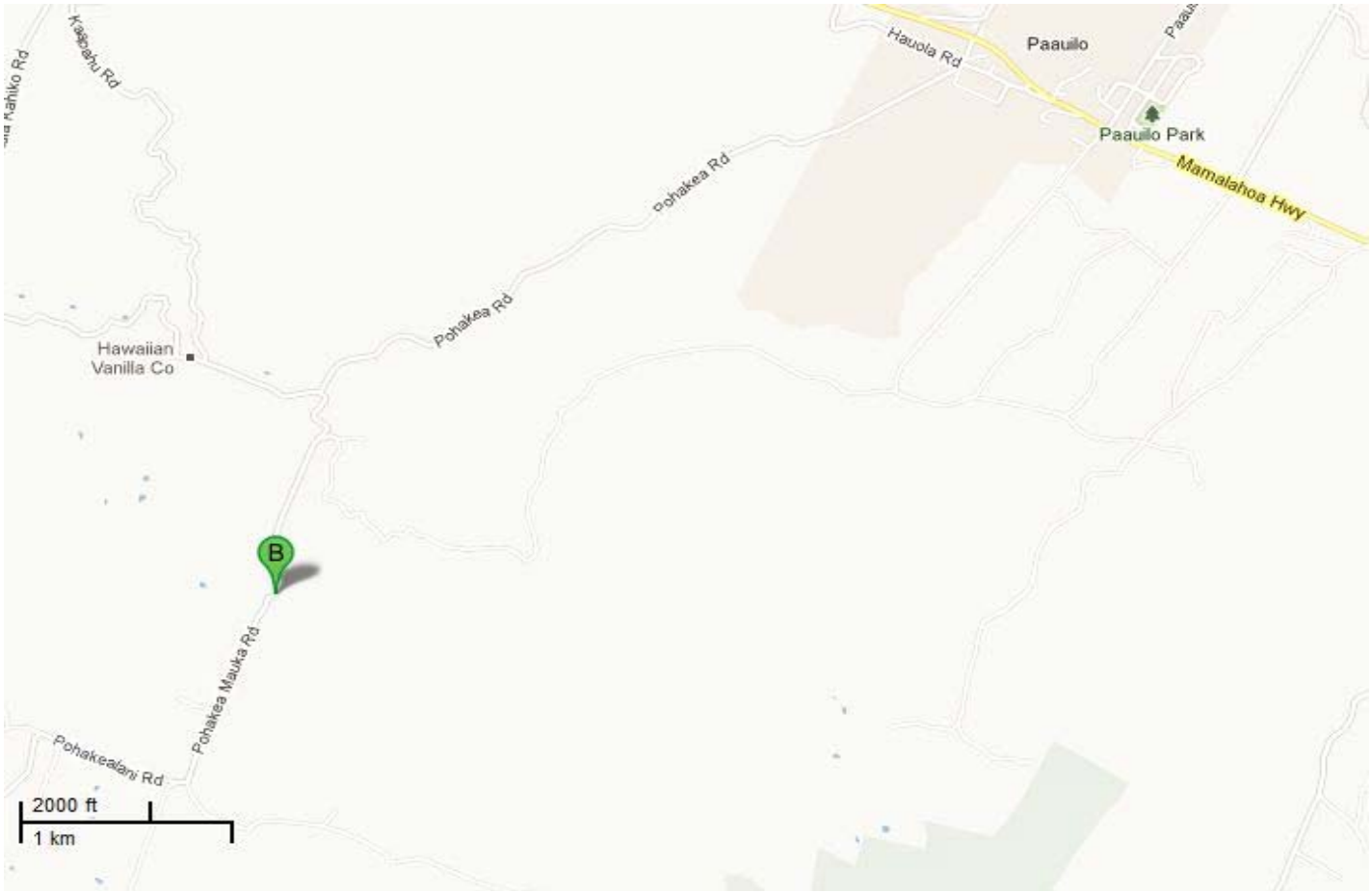
Location: TMK: 4-3-12:13

Historic Name: Manienie Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2012	
Alteration Type(s):		
Alteration Description(s): Timber deck was replaced and the abutments and center pier were rehabilitated.		

Bridge Information

Number of Spans: 2	**Max Span:** 11.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Manienie Gulch Bridge carries Pohakea Mauka Road across Manienie Gulch. This timber girder bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and concrete rubble masonry and reinforced concrete abutments. In 2012, several planks were replaced and the abutments were rehabilitated. The simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

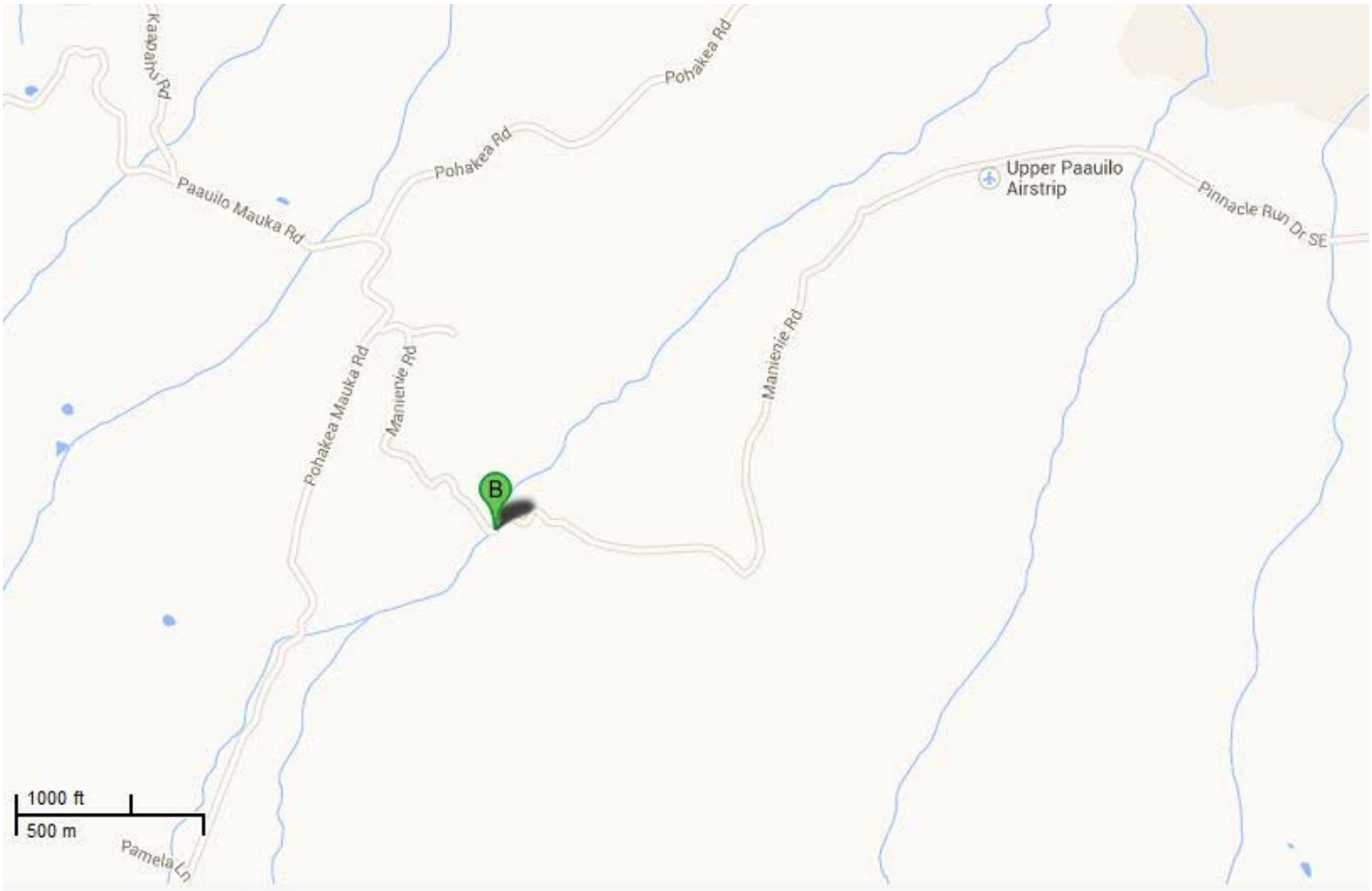
Inventory Form
(County/Private)

General Information

Bridge Number: 001430001100007	
Popular Name: Manienie Gulch Bridge	
Feature Crossed: Manienie Gulch	
Feature Carried: Manienie Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-24m-02.28s	**Latitude:** 20d-01m-12.26s

Location: TMK: 4-3-12:03
Historic Name: Manienie Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 25.0 ft.	**Deck Width:** 15.5 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Manienie Gulch Bridge carries Manienie Road across Manienie Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks and concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

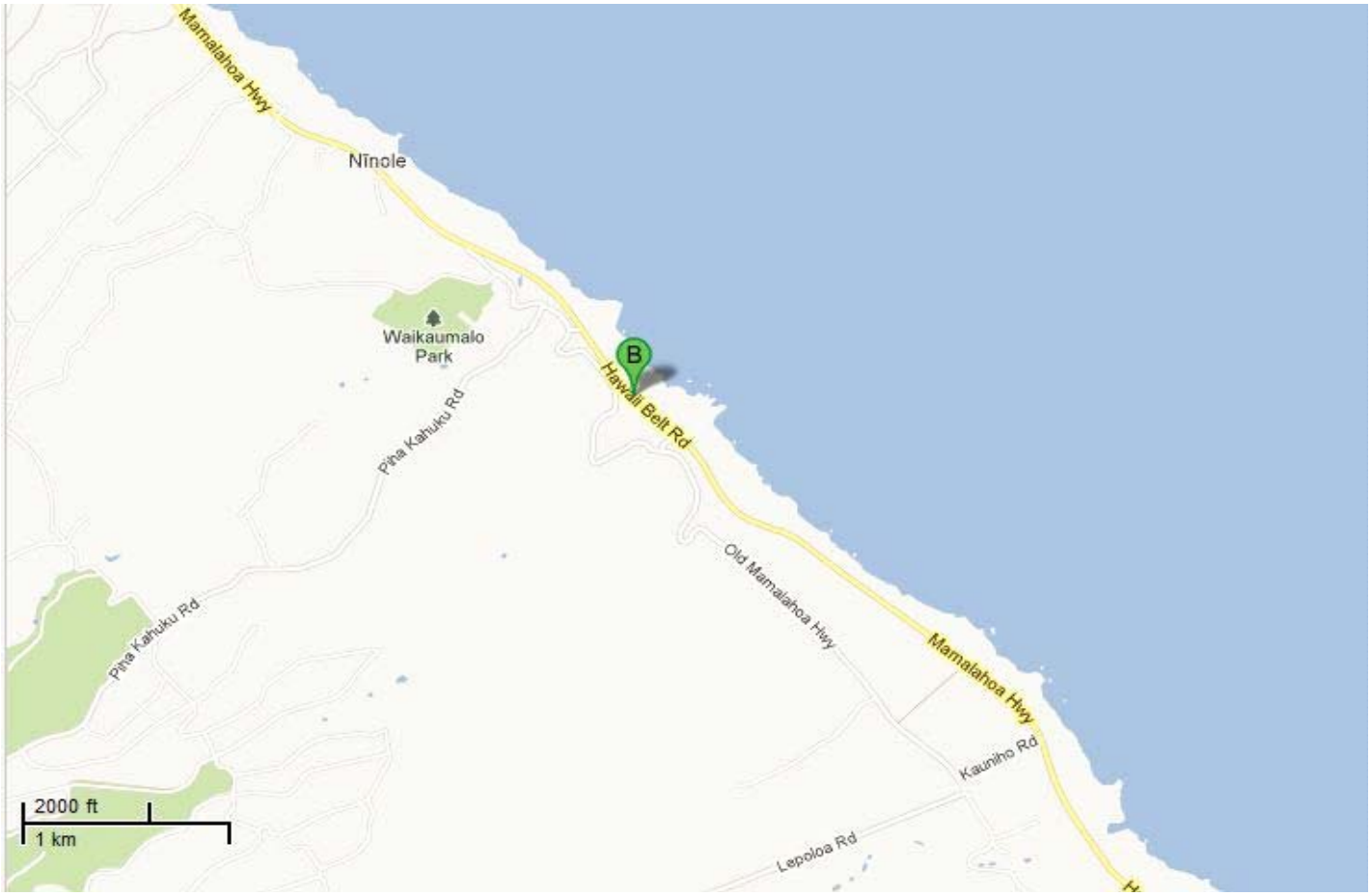
Inventory Form
(County/Private)

General Information

Bridge Number: 001320001100001	
Popular Name: Nanue Stream Bridge	
Feature Crossed: Nanue Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-09m-31.82s	**Latitude:** 19d-55m-29.67s

Location: TMK: 3-2-001:017
Historic Name: Nanue Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 36.0 ft.	**Total Length:** 73.0 ft.	**Deck Width:** 22.4 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

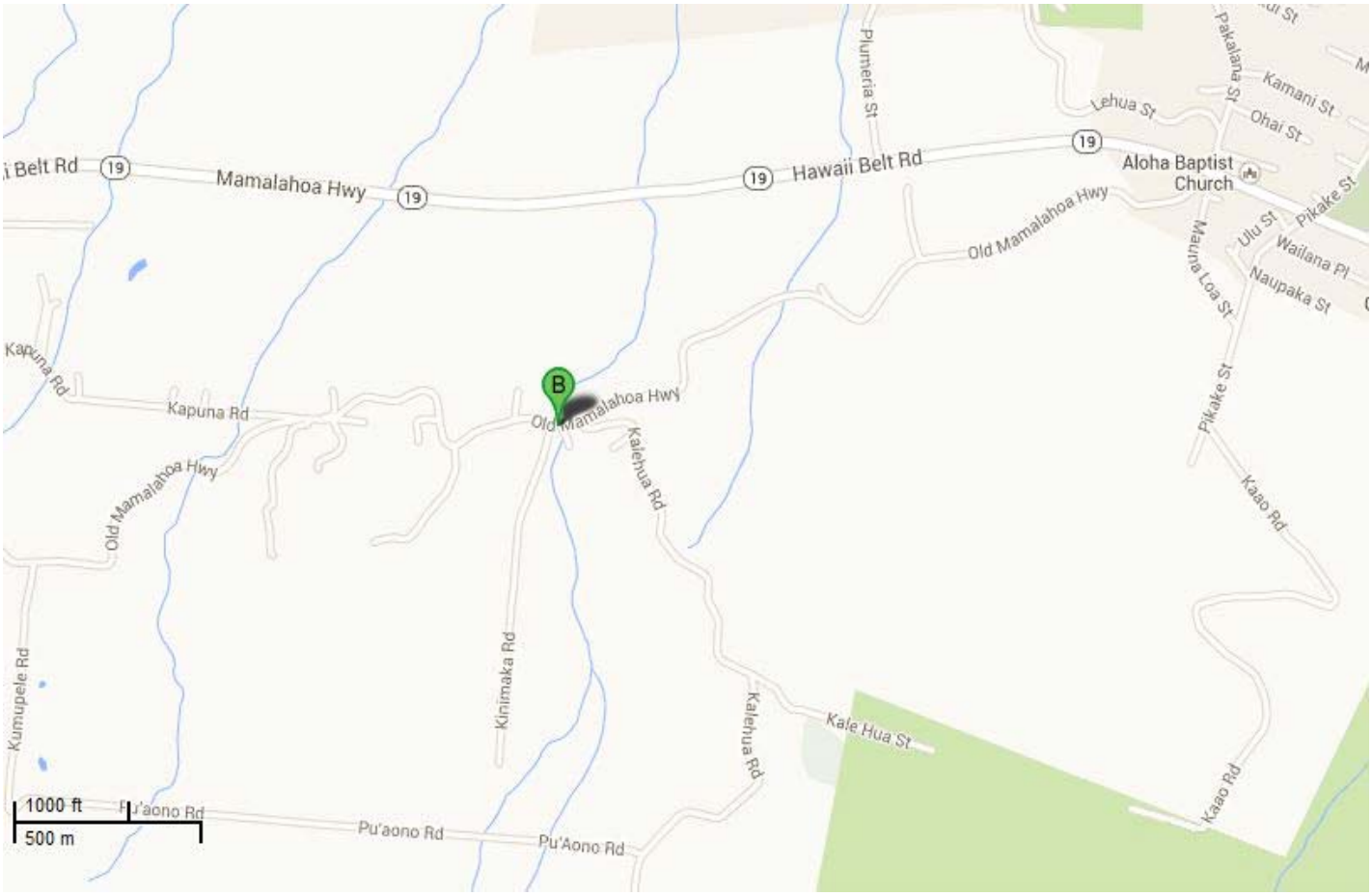
Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100001	
Popular Name: Nienie Gulch Bridge	
Feature Crossed: Nienie Gulch	
Feature Carried: Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-28m-51.69s	**Latitude:** 20d-03m-54.28s

Location: TMK: 4-6-007:049
Historic Name: Nienie Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1923	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 25.0 ft.	**Total Length:** 50.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

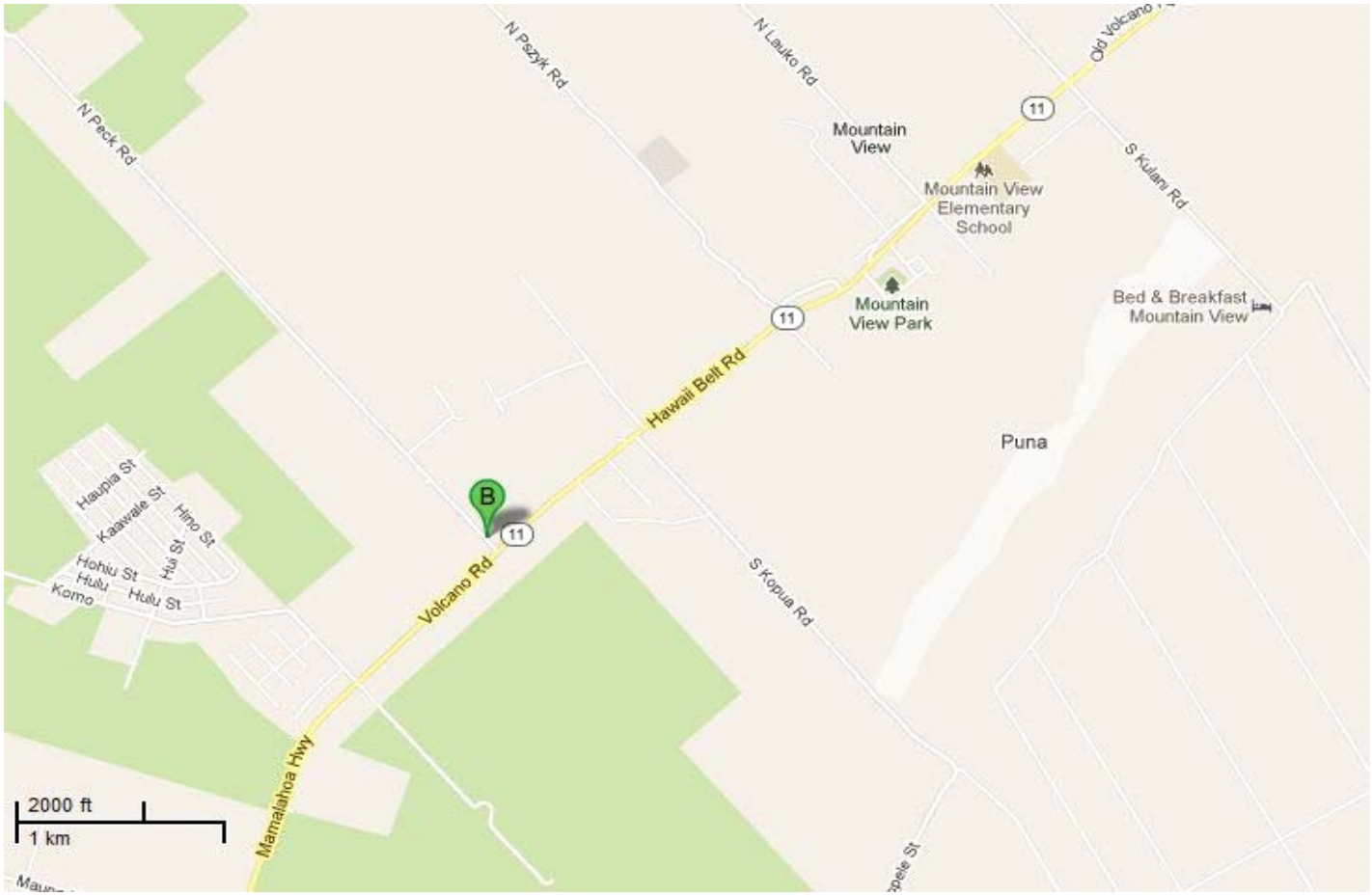
Inventory Form
(County/Private)

General Information

Bridge Number: 001180001100003	
Popular Name: North Peck Road Bridge	
Feature Crossed: Relief	
Feature Carried: North Peck Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-07m-32.97s	**Latitude:** 19d-32m-14.46s

Location: TMK: 1-8-005:021
Historic Name: North Peck Road Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1940	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 15.5 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The North Peck Road Bridge carries North Peck Road. This timber bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has a timber deck and wood railings. The timber deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by addition or repair and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its construction type built in Hawaii in this period. Most of the bridges built during the 40's are the concrete bridges however, this bridge is a single span timber bridge. It is a good example of a 1940's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001290001100002

Popular Name: Old Railroad Crossing Bridge

Feature Crossed: Railroad Crossing

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-07m-34.14s **Latitude:** 19d-53m-43.70s

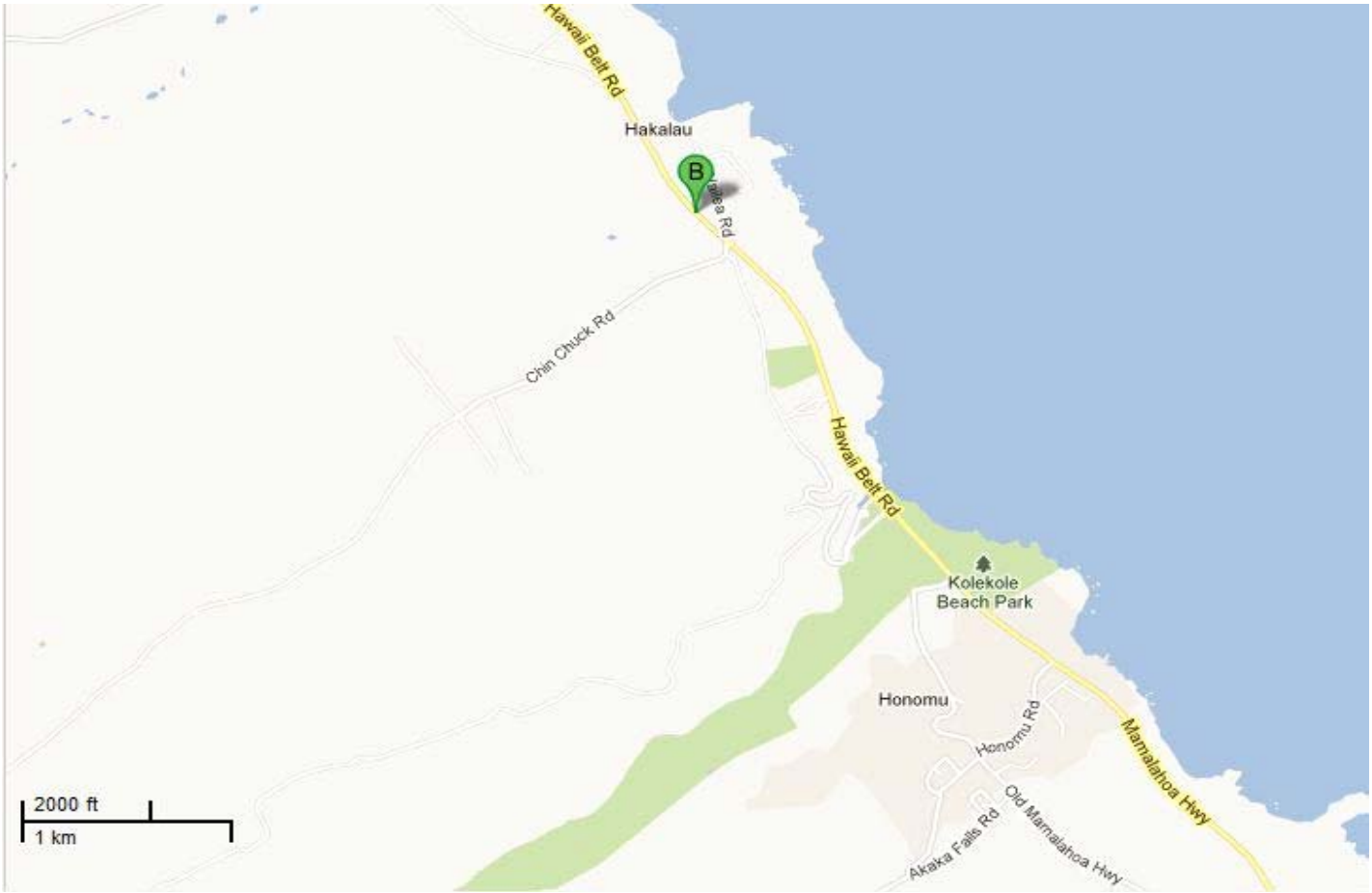
Location: TMK: 2-9-002:024

Historic Name: Old Railroad Crossing Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

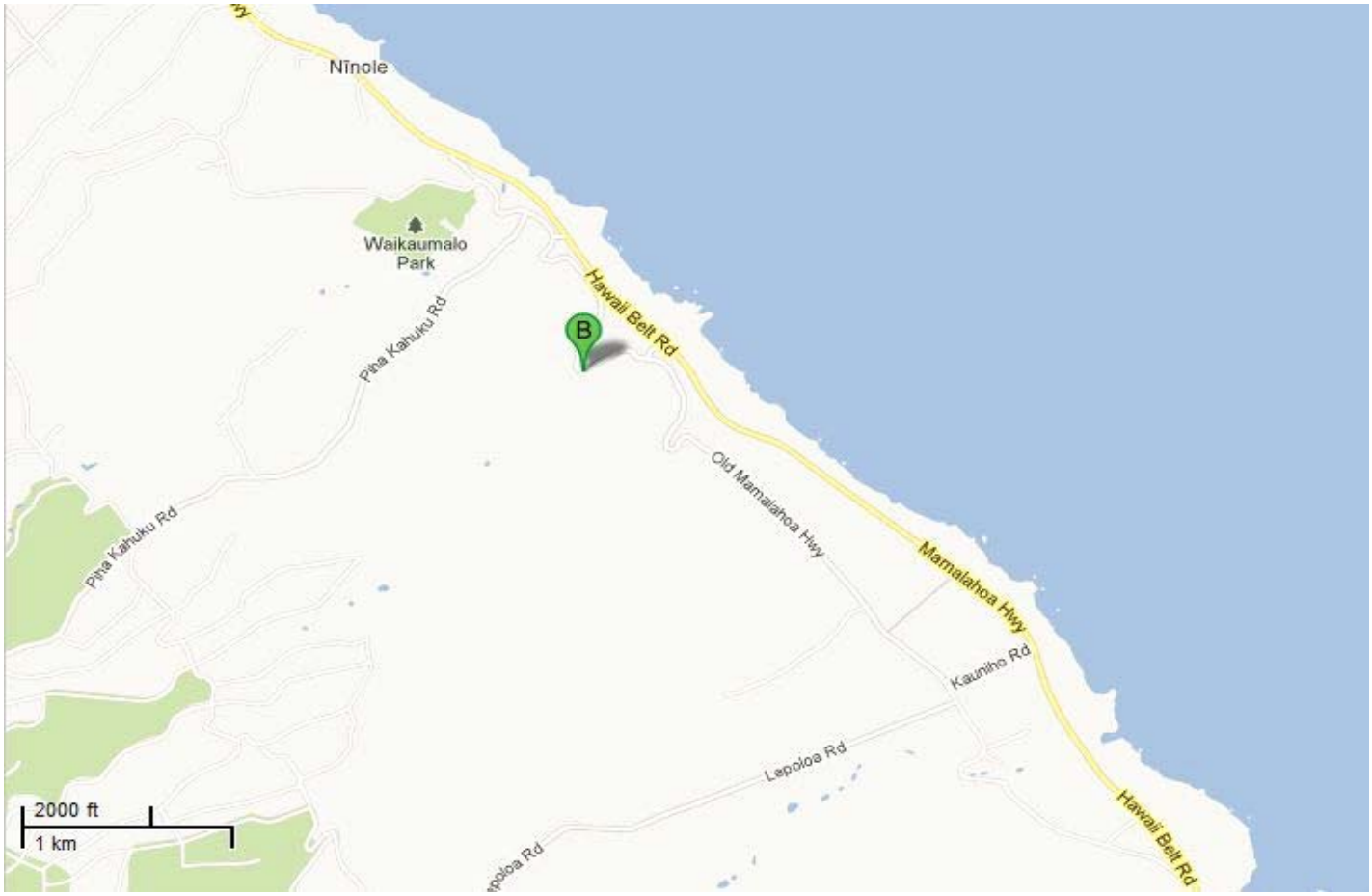
The rock abutments are a potentially eligible historic resource.

Inventory Form
(County/Private)

General Information

Bridge Number: 001310001100002	
Popular Name: Opea Stream Bridge	
Feature Crossed: Opea Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-09m-17.44s	**Latitude:** 19d-55m-16.78s
Location: TMK: 3-1-03:17	
Historic Name: Opea Stream Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1912	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 40.0 ft.	**Deck Width:** 18.6 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001280001100003	
Popular Name: Paheehee Stream Bridge	
Feature Crossed: Paheehee Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-06m-59.34s	**Latitude:** 19d-52m-20.38s

Location: TMK: 2-8-015:004
Historic Name: Paheehee Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1929	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 30.0 ft.	**Total Length:** 61.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

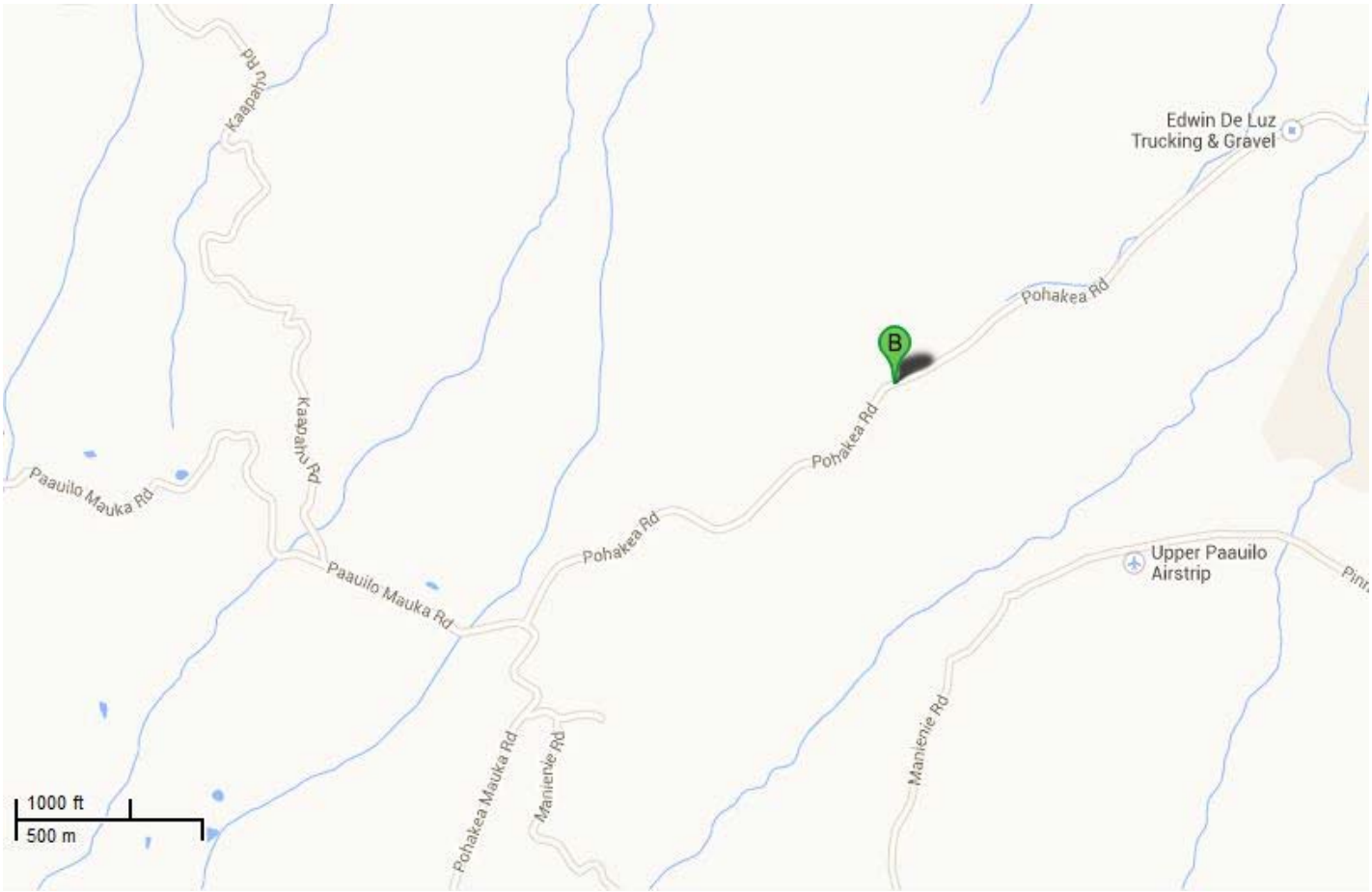
See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001430001100005	
Popular Name: Pohakuhaku Gulch Bridge	
Feature Crossed: Pohakuhaku Gulch	
Feature Carried: Paauilo Pohakea Road	
Milepost: **County Private:** Hawaii	
Longitude: 155d-23m-39.26s **Latitude:** 20d-01m-56.86s	
Location: TMK: 4-3-06:10	
Historic Name: Pohakuhaku Gulch Bridge	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1936	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 37.0 ft.	**Total Length:** 39.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Vertical			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Pohakuhaku Gulch Bridge carries Paauilo-Pohakea Road across Pohakuhaku Gulch. This reinforced concrete tee beam bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete open vertical parapets with flat caps and wide end posts. The concrete deck is supported by concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

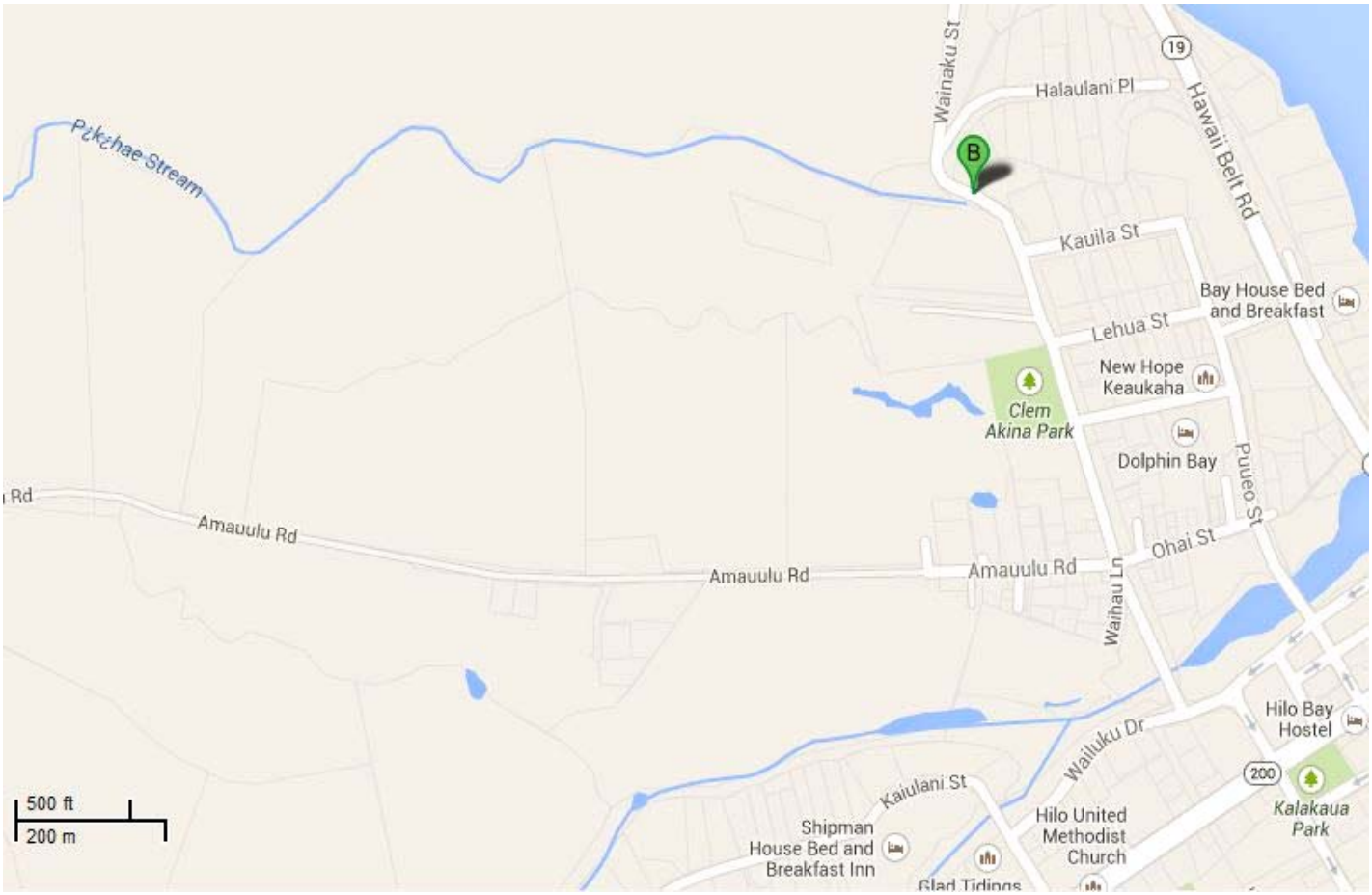
Inventory Form
(County/Private)

General Information

Bridge Number: 001260001100001	
Popular Name: Pukihae Stream Bridge	
Feature Crossed: Pukihae Stream	
Feature Carried: Wainaku Street	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-34.75s	**Latitude:** 19d-43m-54.59s

Location: TMK: 2-6-05:19
Historic Name: Pukihae Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Masonry Arch	**Construction Date:** 1904	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 35.0 ft.	**Total Length:** 65.0 ft.	**Deck Width:** 33.0 ft.
Superstructure: Masonry Closed Spandrel Arch			
Substructure: Masonry Abutment			
Floor/Decking: AC Pavement			
Parapets/Railings: Masonry Rock with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

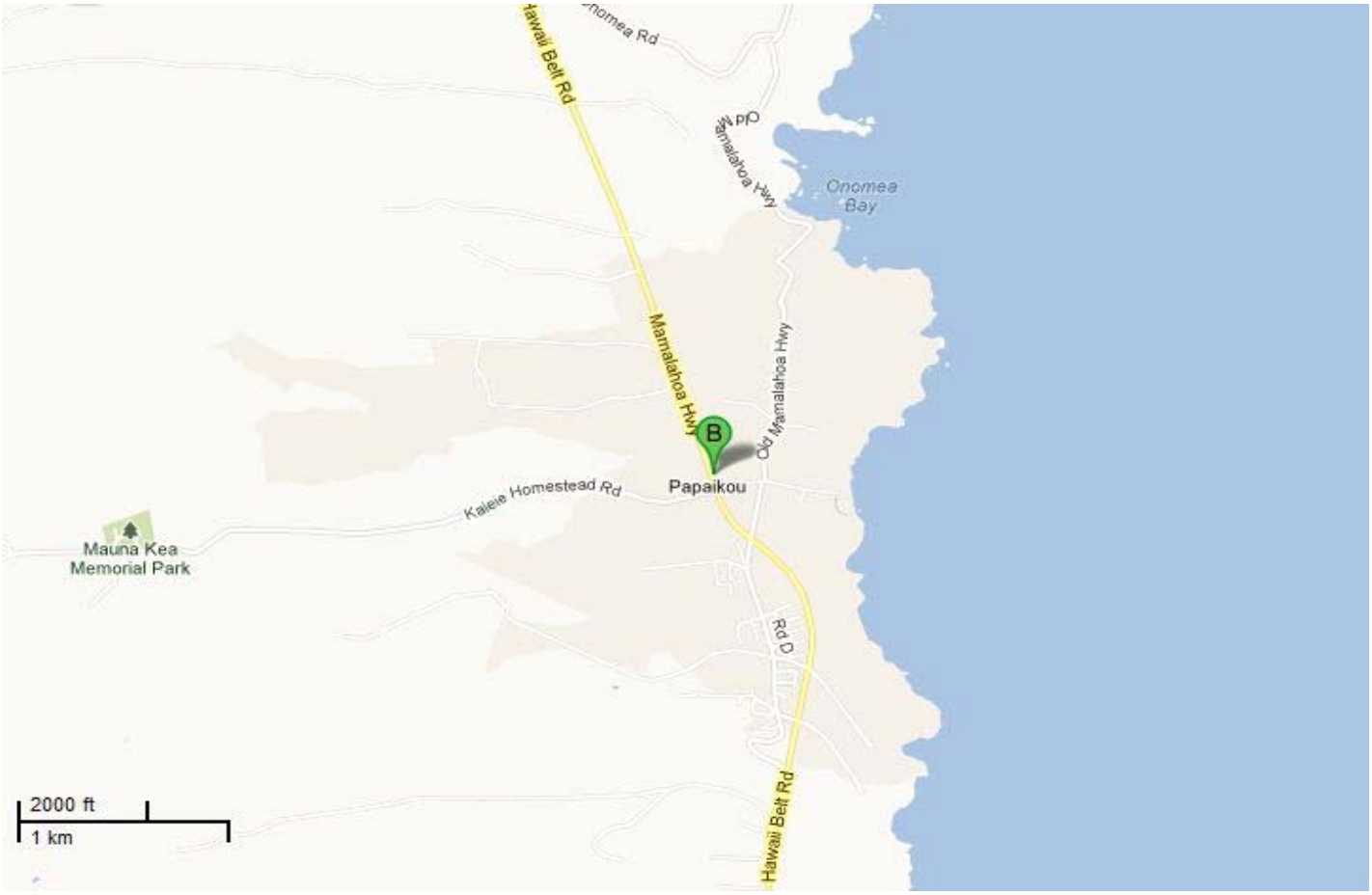
This bridge is one of the oldest masonry bridges remaining in Hawaii. Arch bridges are also an uncommon bridge type. See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100002	
Popular Name: Puuokalepa Bridge No. 1	
Feature Crossed: Puuokalepa Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-39.20s	**Latitude:** 19d-47m-36.65s
Location: TMK: 2-7-035:013	
Historic Name: Puuokalepa Bridge No. 1	
Designer/Engineer:	
Builder/Contractor:	

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1904	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 32.0 ft.	**Total Length:** 76.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

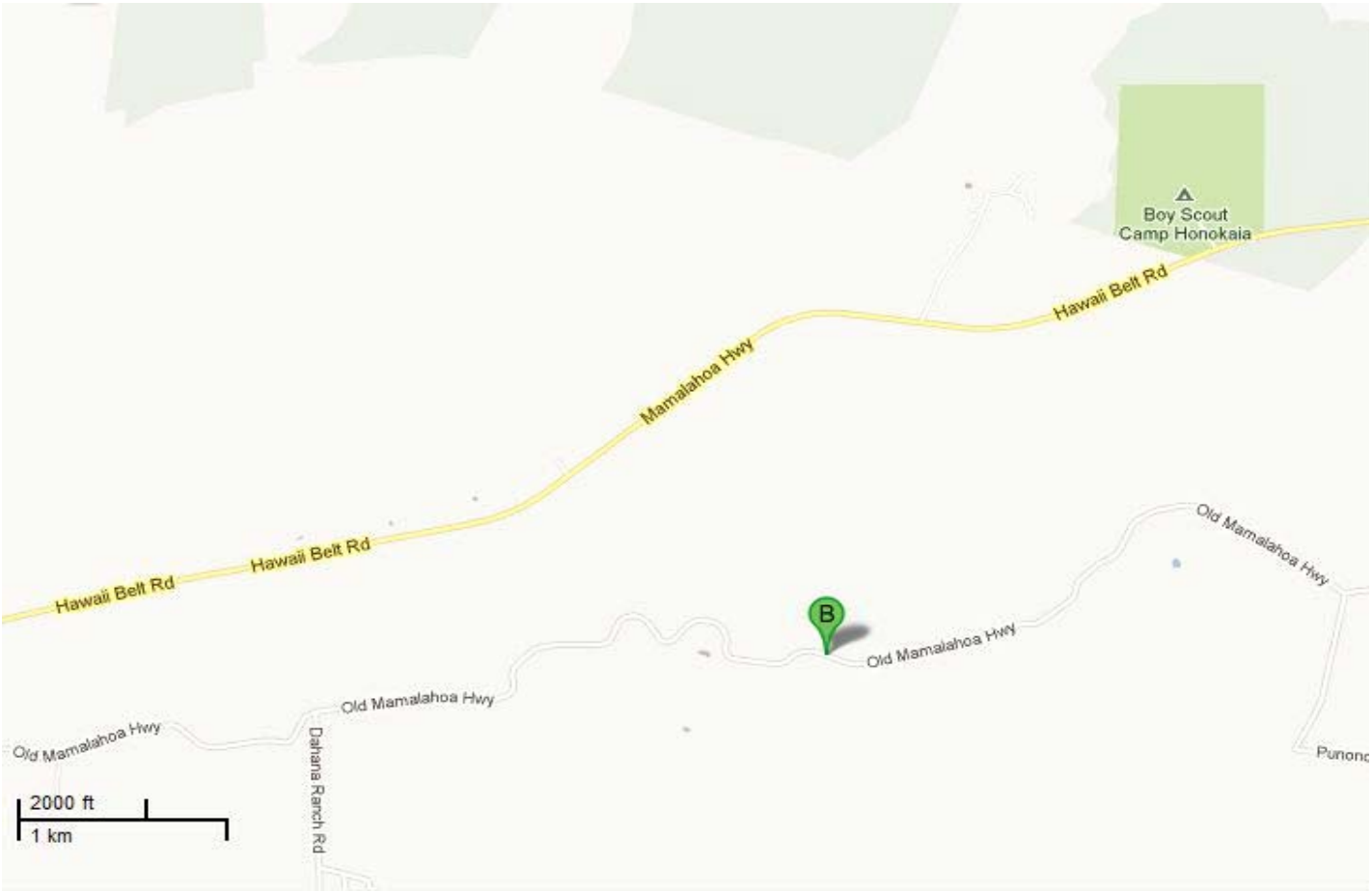
Inventory Form
(County/Private)

General Information

Bridge Number: 001470001100003	
Popular Name: Relief Elevation 2760 Bridge	
Feature Crossed: Relief	
Feature Carried: Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-32m-17.74s	**Latitude:** 20d-02m-48.06s

Location: TMK: 4-7-007:010
Historic Name: Relief Elevation 2760 Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1924	**Replaced?** No
Altered? Yes	**Alteration Date(s):** Unknown	
Alteration Type(s):		
Alteration Description(s): New galvanized pipe railing		

Bridge Information

Number of Spans: 3	**Max Span:** 28.0 ft.	**Total Length:** 76.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Metal Horizontal			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

The railings have been replaced.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001460001100010

Popular Name: Relief Stream Bridge

Feature Crossed: Relief

Feature Carried: Kahana Drive

Milepost: **County Private:** Hawaii

Longitude: 155d-29m-50.76s **Latitude:** 20d-02m-57.59s

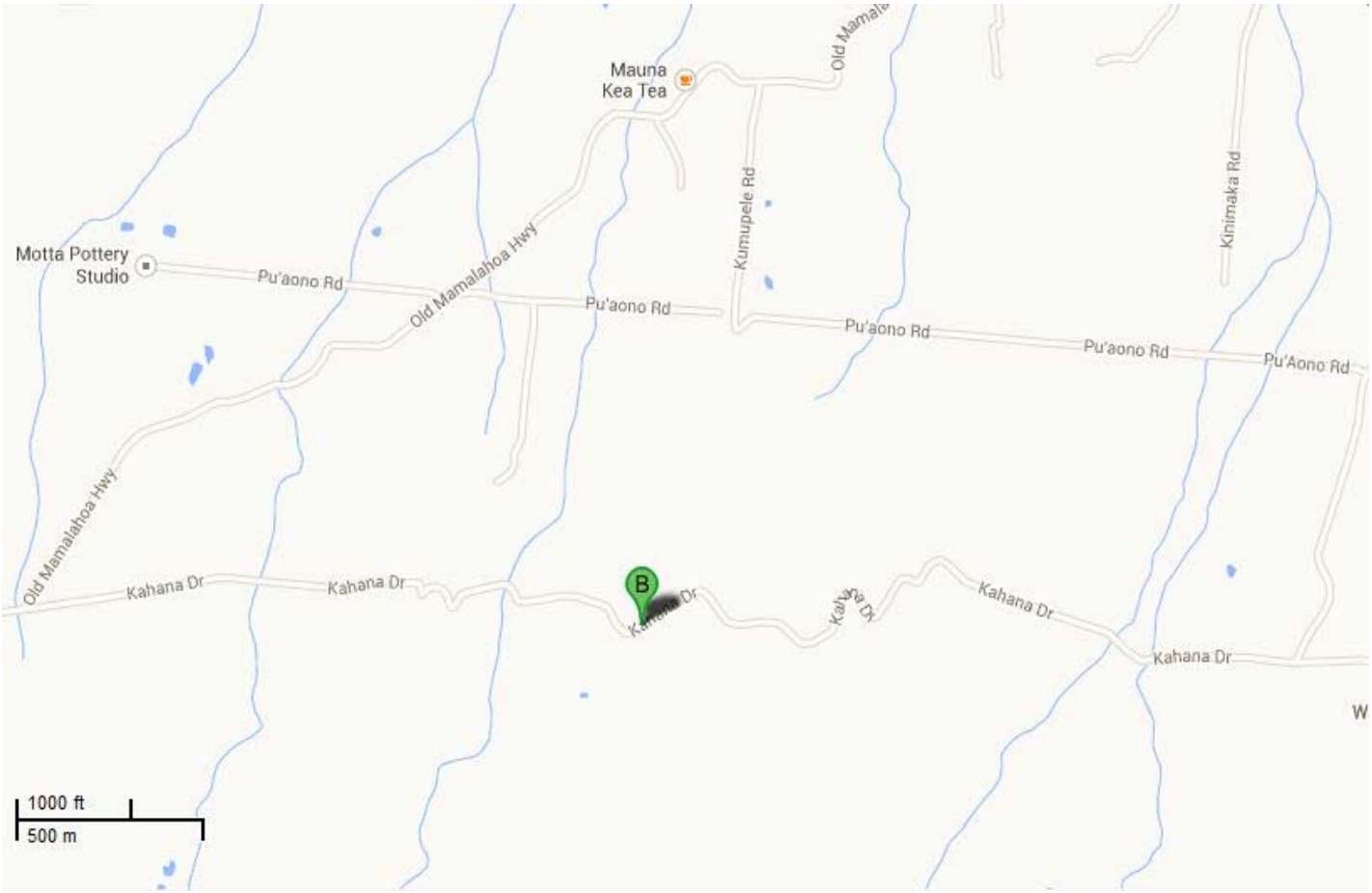
Location: TMK: 4-6-009:002

Historic Name: Relief Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 11.0 ft.	**Total Length:** 17.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Relief Stream Bridge carries Kahana Drive across Relief Stream. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

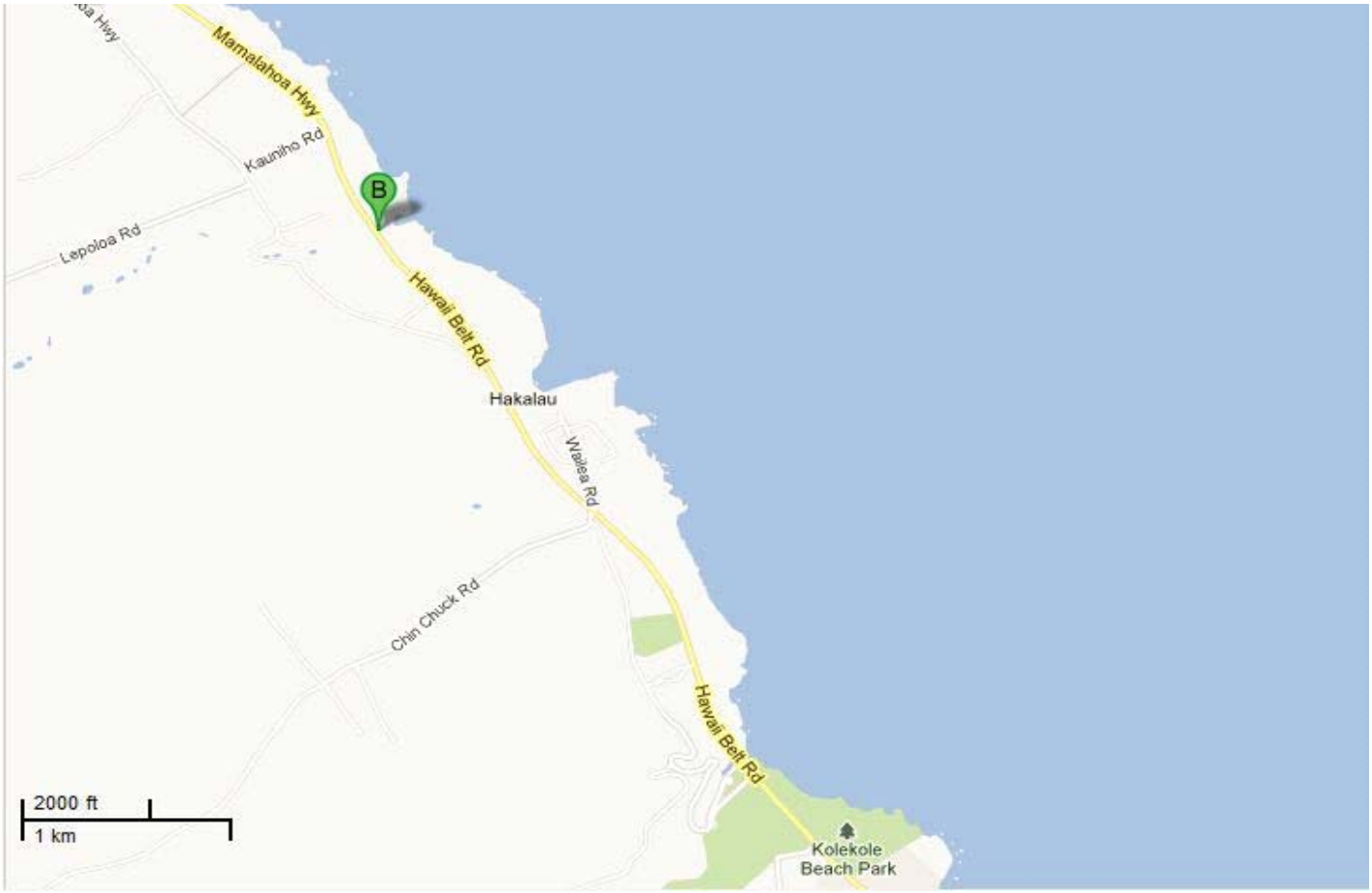
Inventory Form
(County/Private)

General Information

Bridge Number: 001310001100001	
Popular Name: Umauma Stream Bridge	
Feature Crossed: Umauma Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-08m-28.01s	**Latitude:** 19d-54m-22.07s

Location: TMK: 3-1-01:27
Historic Name: Umauma Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 33.0 ft.	**Total Length:** 110.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Tee Beam			
Substructure: Masonry Abutment and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

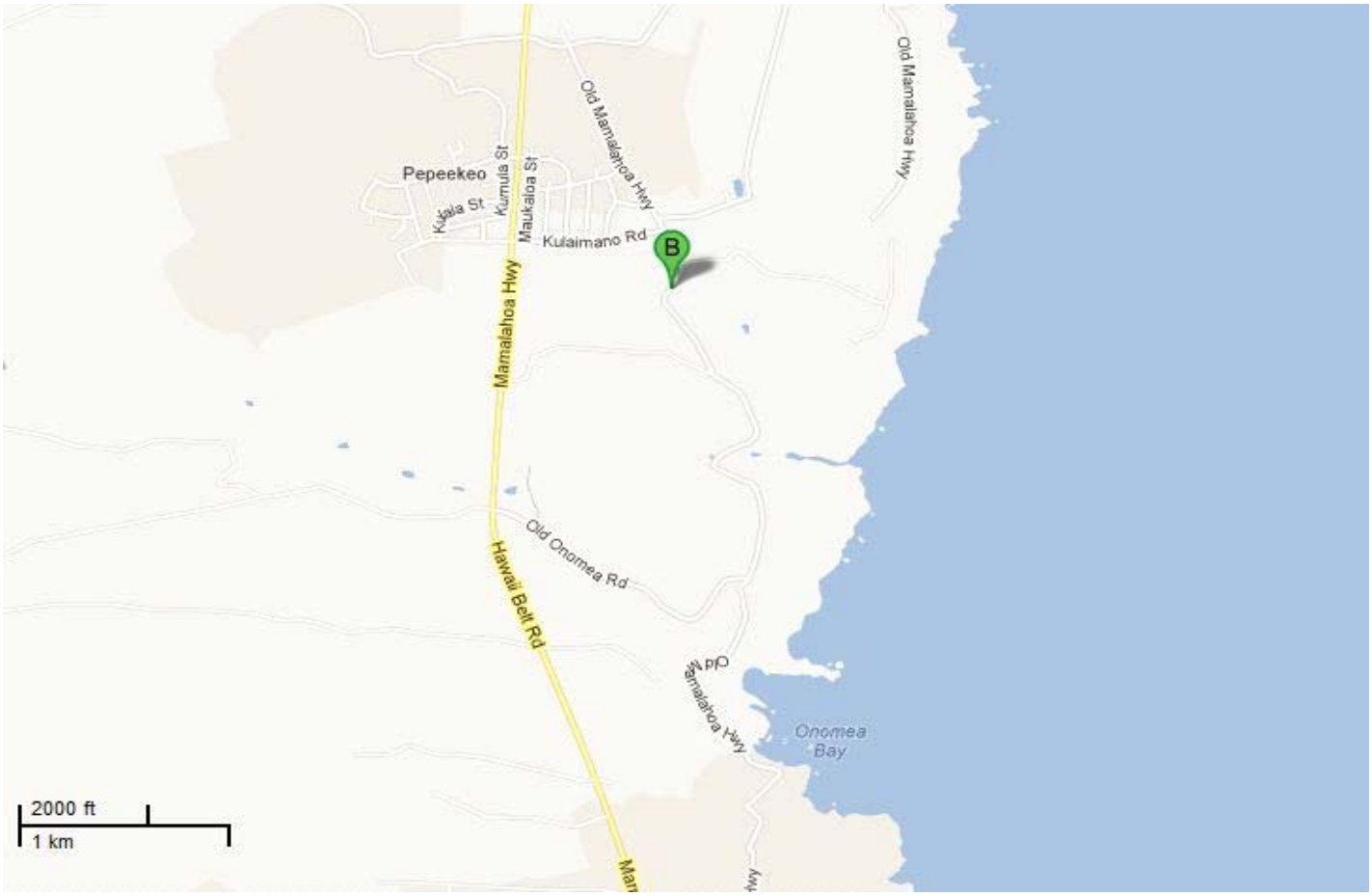
Inventory Form
(County/Private)

General Information

Bridge Number: 001270001100008	
Popular Name: Waiaama Stream Bridge	
Feature Crossed: Waiaama Stream	
Feature Carried: Old Mamalahoa Highway	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-48.62s	**Latitude:** 19d-49m-42.04s

Location: TMK: 2-7-11:04
Historic Name: Waiaama Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 40.0 ft.	**Total Length:** 72.0 ft.	**Deck Width:** 17.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001960001100001	
Popular Name: Waiakaloa Gulch Bridge	
Feature Crossed: Waiakaloa Gulch	
Feature Carried: Wood Valley Homestead Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-28m-25.52s	**Latitude:** 19d-16m-08.96s

Location: TMK: 9-6-008:002
Historic Name: Waiakaloa Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:

Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1935	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 21.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waiakaloa Gulch Bridge carries Wood Valley Homestead Road across the Waiakaloa Gulch. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid panels. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001960001100002

Popular Name: Waiakaloa Gulch Bridge

Feature Crossed: Waiakaloa Gulch

Feature Carried: Wood Valley Homestead Road

Milepost: **County Private:** Hawaii

Longitude: 155d-28m-58.50s **Latitude:** 19d-16m-28.25s

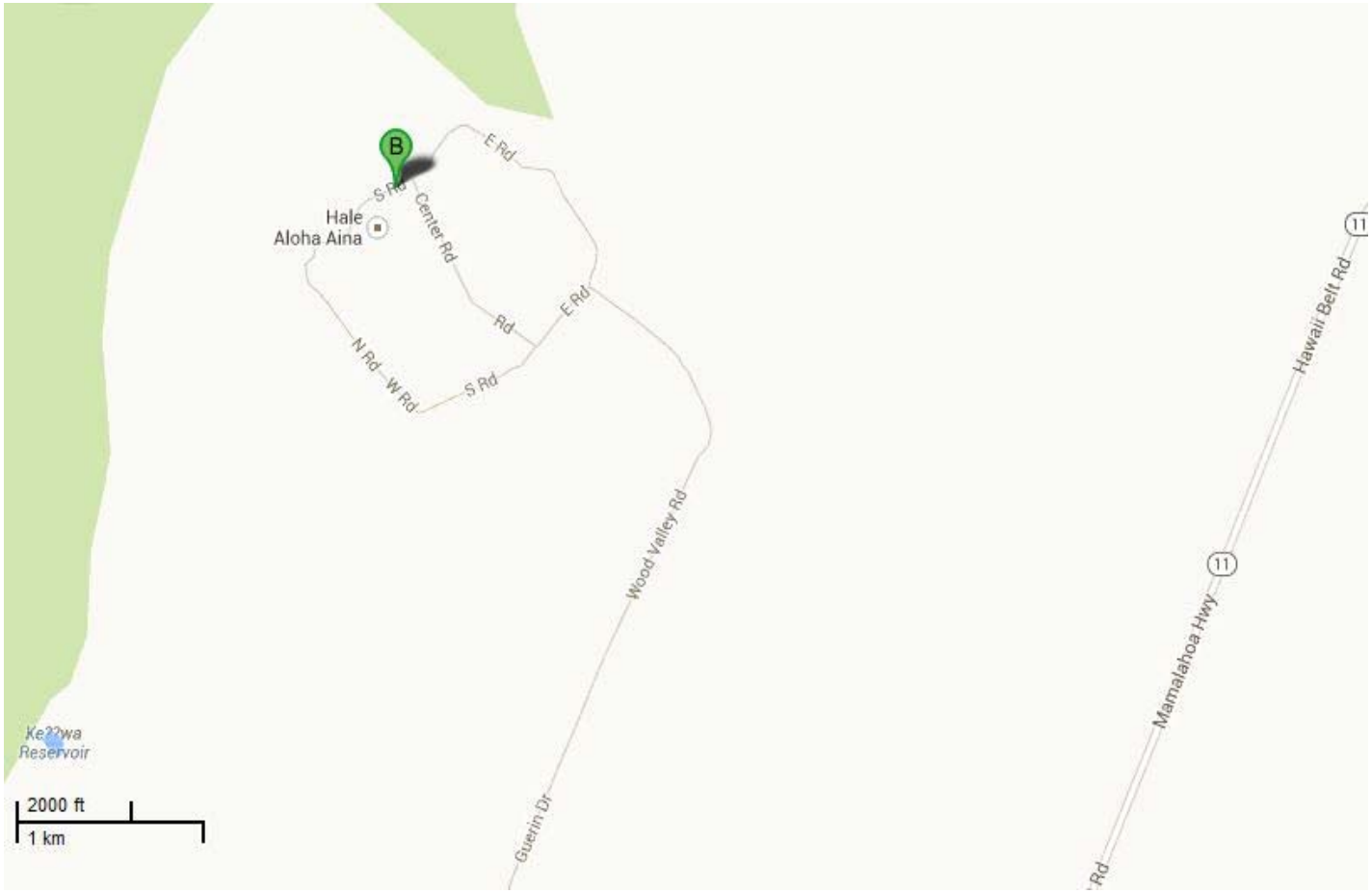
Location: TMK: 9-6-08:009

Historic Name: Waiakaloa Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1935	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Concrete Slab			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: No Parapet/Railing			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waiakaloa Gulch Bridge carries Wood Valley Homestead Road across the Waiakaloa Gulch. This reinforced concrete bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid bottom with metal railings on top which were bent and no longer functional. The concrete deck is supported by concrete rubble masonry abutments. Except the railings, the workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in concrete bridge construction in Hawaii. It is a good example of a 1930's reinforced concrete bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001027201400020

Popular Name: Waianuenue Bridge

Feature Crossed: Ainako Stream

Feature Carried: Waianuenue Avenue

Milepost: 0.20 mi. **County Private:** Hawaii

Longitude: 155d-06m-20.52s **Latitude:** 19d-43m-01.36s

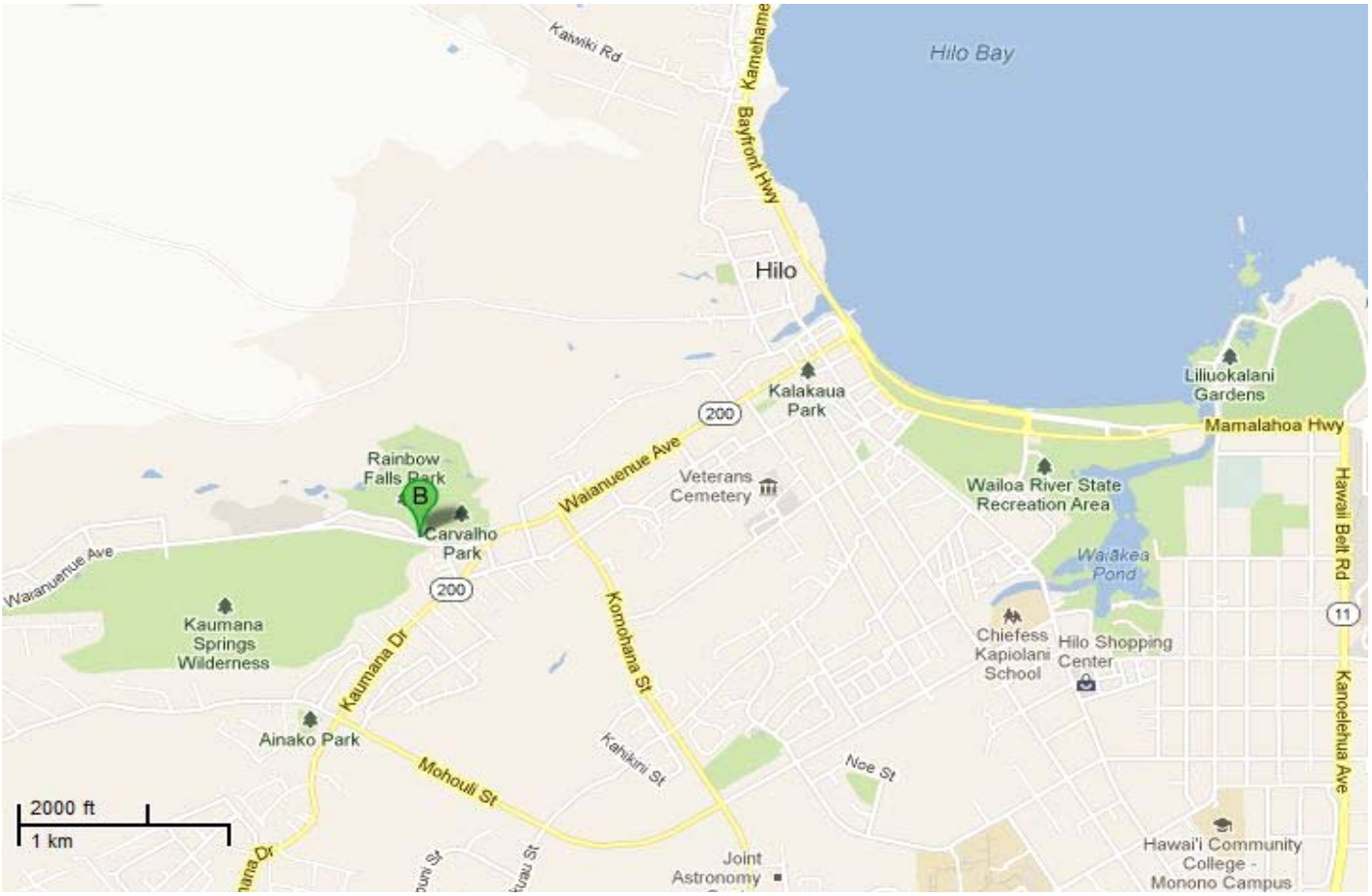
Location: TMK: 2-3-32

Historic Name: Waianuenue Bridge

Designer/Engineer: En Leong Wung

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1924	**Replaced?** No
Altered? Yes	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s): Street lamps on each of four end piers removed sometime after 1951		

Bridge Information

Number of Spans: 1	**Max Span:** 45.0 ft.	**Total Length:** 45.0 ft.	**Deck Width:** 33.4 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering, Transportation		

Narrative Description:

The Ainako Stream-Waianuenue Avenue Bridge was constructed in 1924 to carry Waianuenue Avenue across the Ainako Stream in Hilo on the island of Hawaii. The bridge is a reinforced-concrete, single-span, parabolic-shaped solid-spandrel arch. The neo-classical or “Italianate” design and graceful concrete elliptical arch of the Ainako Stream-Waianuenue Avenue Bridge make it one of the most decorative bridges on the island of Hawaii.

The Ainako Stream-Waianuenue Avenue Bridge is in its original location and its residential setting has continued to develop. The bridge's original solid-spandrel arch design and reinforced-concrete materials remain intact, with the exception of minor spalling concrete on the parapets. The bridge is obviously the work of skilled builders, who constructed the ornate concrete bridge. The workmanship of the bridge has not been obscured by additions or repairs. The bridge’s superstructure is highly visible from the roadway. The bridge's historic association, as a significant civic statement reflecting Hawaii County’s aspirations for Hilo as a beautiful and urbane city, are readily apparent to informed observers; the bridge retains its historic feeling due to its ornamental nature and now uncommon structural type.

Significance Statement:

The Ainako Stream-Waianuenue Avenue Bridge is significant for its contributions to the fields of engineering and transportation in Hawaii. The 1924 bridge is an excellent example of reinforced-concrete solid-spandrel arch construction in the Italianate style. The Ainako Stream-Waianuenue Avenue Bridge is eligible under Criterion A for its associations with public works efforts by the County of Hawaii, and as an important civic structure associated with the development of Hilo. Moreover, the bridge contributed to the development of Hilo by providing reliable vehicular access to the recently established residential area along the banks of the Wailuku River. It is eligible under Criterion C as a rare remaining example of this once common bridge type, as well as for its aesthetic merit. Arch bridges are also an uncommon bridge type.

The bridge is representative of County Engineer En Leong Wung's work. The design of the bridge reflects the popular neo-classical architectural style of the early twentieth-century. The design of public improvements in the mode popular on the United States mainland reflects Hawaii's striving for legitimacy as an American territory. The World's Columbian Exposition in Chicago in 1893 served as the inspiration for the City Beautiful movement and the ensuing neo-classical revival in the United States. The City Beautiful movement reached its height on the U.S. mainland between 1900-1910, but affected Hawaii somewhat later. This movement is characterized by an attempt to create beautiful and functional cities. Aesthetic principles such as beauty, order, system, and harmony found physical realization in urban design. Architecture and public works projects, such as road and sewer systems, became civic statements which strengthened the identification of Hawaii to the U.S. mainland. The improved physical environment would persuade urban dwellers, many of them recent immigrants to Hawaii from Asia, to become imbued with civic patriotism and better disposed toward community needs.

The Ainako Stream-Waianuenue Avenue Bridge is the earliest of the decorative arch bridges built by the county in the 1920s and 30s. The bridge was designed by En Leong Wung of the County Engineers office. Little is known of Leong, however much of the work done during this time was in collaboration with another County Engineer, William Hoy Chun. Chun was educated as an engineer at the Illinois Institute of Technology.

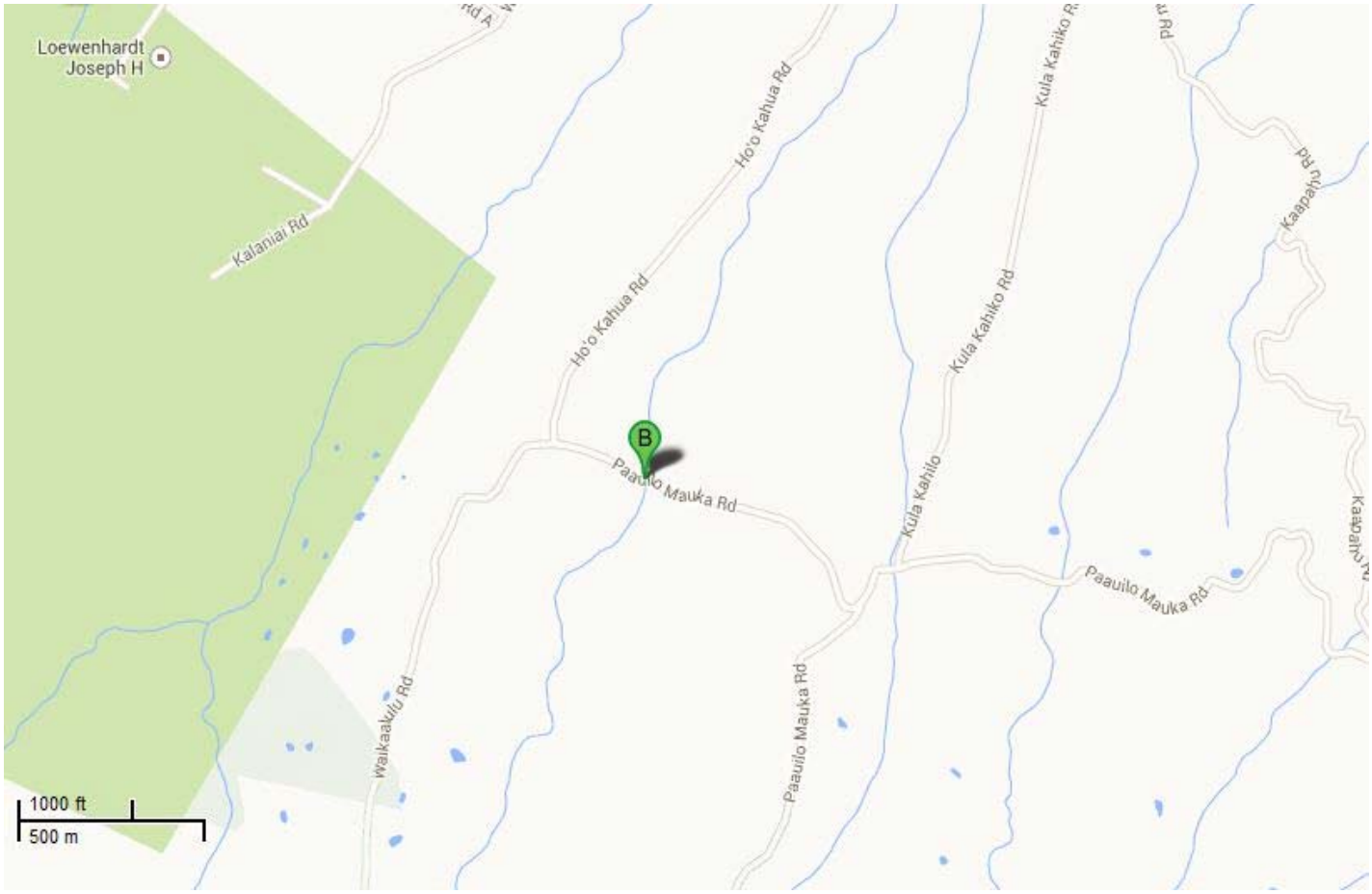
Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100005	
Popular Name: Waikaalulu Gulch Bridge	
Feature Crossed: Waikaalulu Gulch	
Feature Carried: Paauilo Mauka Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-25m-39.65s	**Latitude:** 20d-01m-56.99s

Location: TMK: 4-4-11:13
Historic Name: Waikaalulu Gulch Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 18.0 ft.	**Total Length:** 22.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikaaluku Gulch Bridge carries Paauilo Mauka Road across Waikaaluku Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, and reinforced concrete abutment on east side and concrete rubble masonry abutment on west side. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100006

Popular Name: Waikaalulu Gulch Bridge

Feature Crossed: Waikaalulu Gulch

Feature Carried: Kaapahu Road

Milepost: **County Private:** Hawaii

Longitude: 155d-25m-11.50s **Latitude:** 20d-03m-00.67s

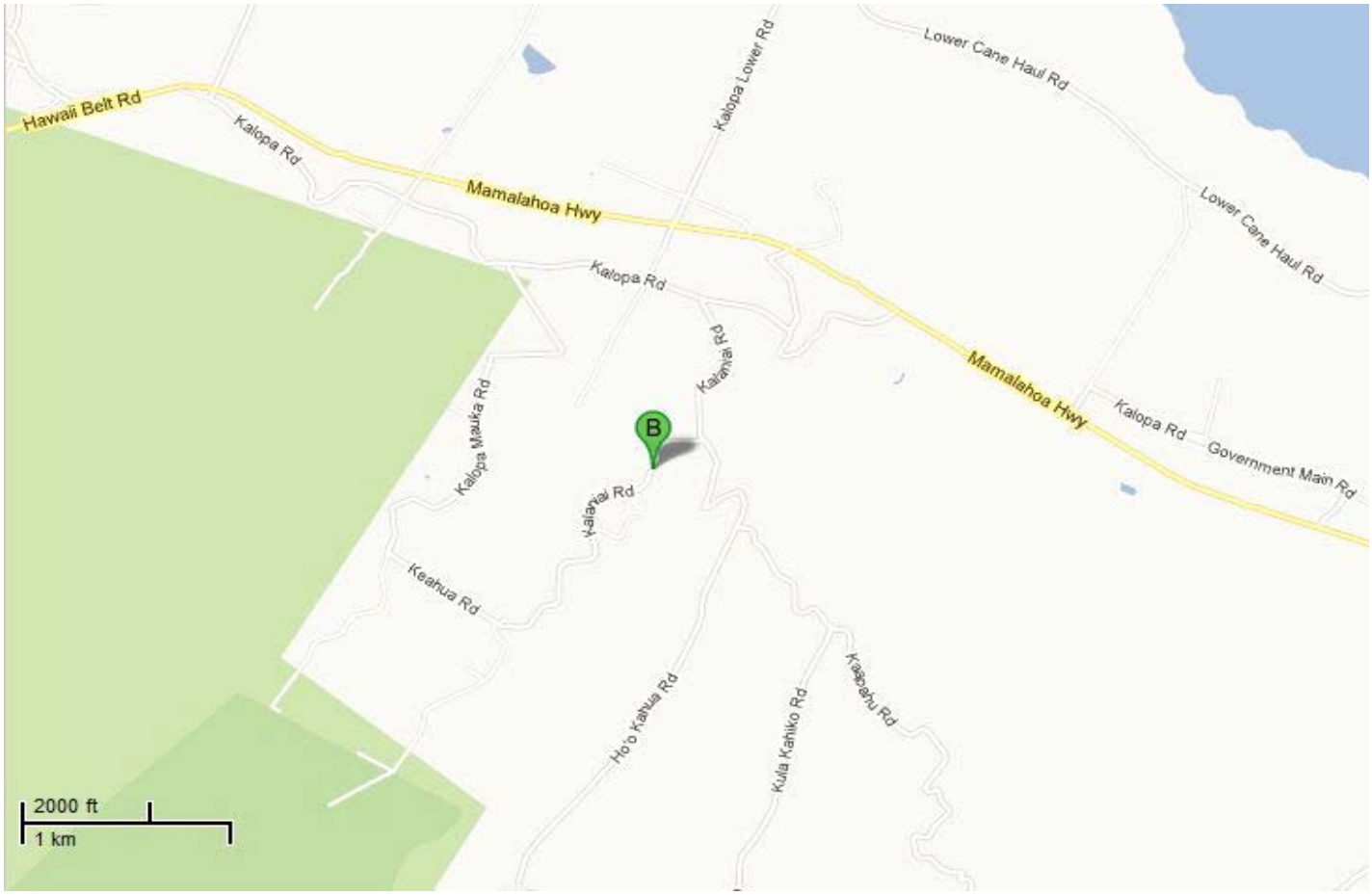
Location: TMK: 4-4-09:09

Historic Name: Waikaalulu Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 20.0 ft.	**Total Length:** 24.0 ft.	**Deck Width:** 16.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikaaluku Gulch Bridge carries Kaapahu Road across Waikaaluku Gulch. This timber stringer bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has timber railings, timber planks, concrete rubble masonry abutments. The workmanship of the bridge has not been obscured and the simple design of the bridge retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C for its association with early developments in timber bridge construction in Hawaii. It is a good example of a 1930's timber bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design.

Inventory Form
(County/Private)

General Information

Bridge Number: 001440001100008

Popular Name: Waikaalulu Gulch Bridge

Feature Crossed: Waikaalulu Gulch

Feature Carried: Kalopa Road

Milepost: **County Private:** Hawaii

Longitude: 155d-24m-49.05s **Latitude:** 20d-03m-34.90s

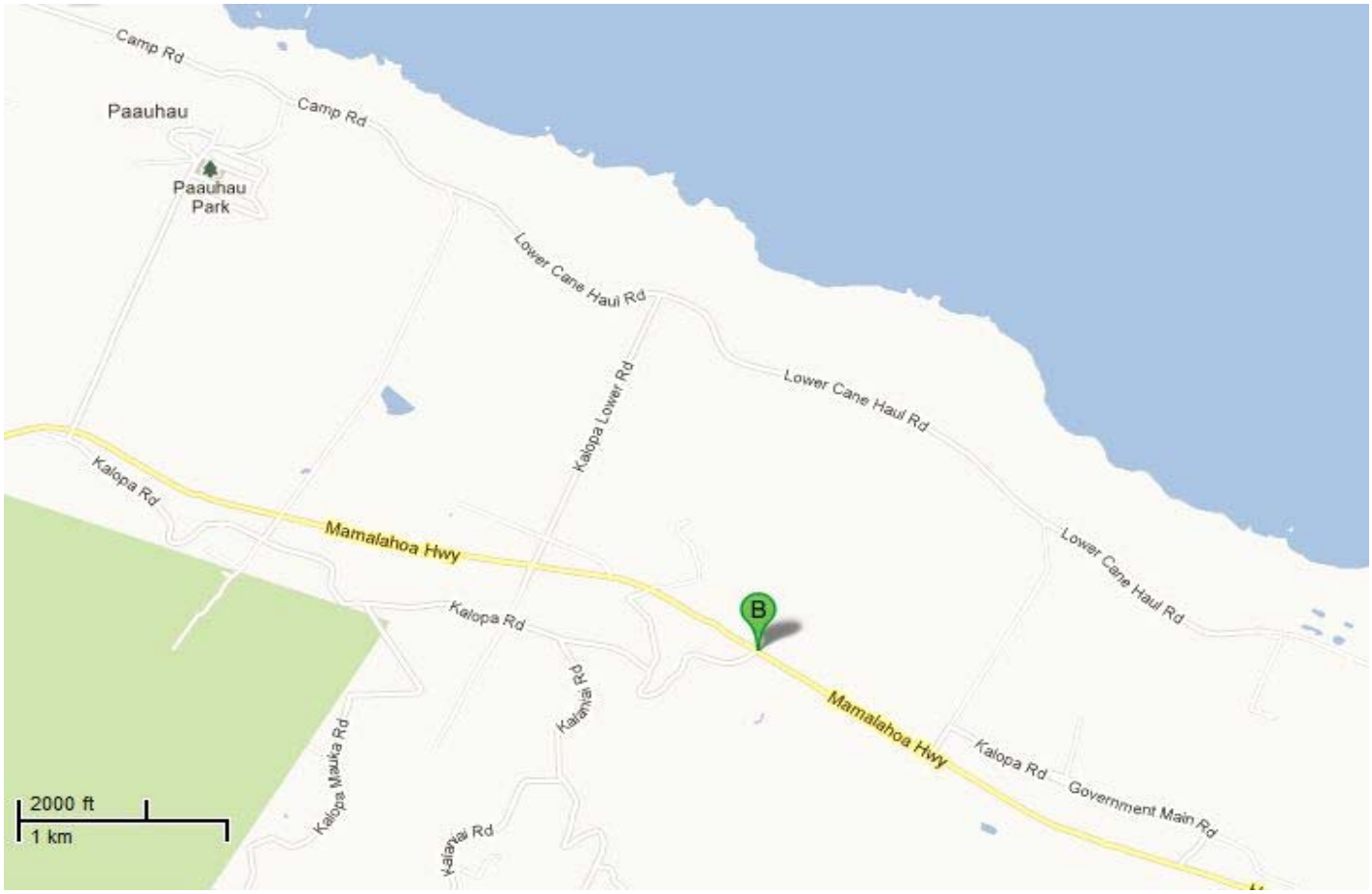
Location: TMK: 4-4-02:06

Historic Name: Waikaalulu Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2009	
Alteration Type(s):		
Alteration Description(s): Bridge was replaced in-kind in 2009.		

Bridge Information

Number of Spans: 3	**Max Span:** 20.0 ft.	**Total Length:** 51.0 ft.	**Deck Width:** 18.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Concrete Multi-column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

This timber bridge was reconstructed in-kind in 2009.

Significance Statement:

It is one of the seven bridges listed under the 2000 MOA which includes: Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu, and Kaahakini.

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001320001100002

Popular Name: Waikaumalo Stream Bridge

Feature Crossed: Waikaumalo Stream

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-09m-45.26s **Latitude:** 19d-55m-57.08s

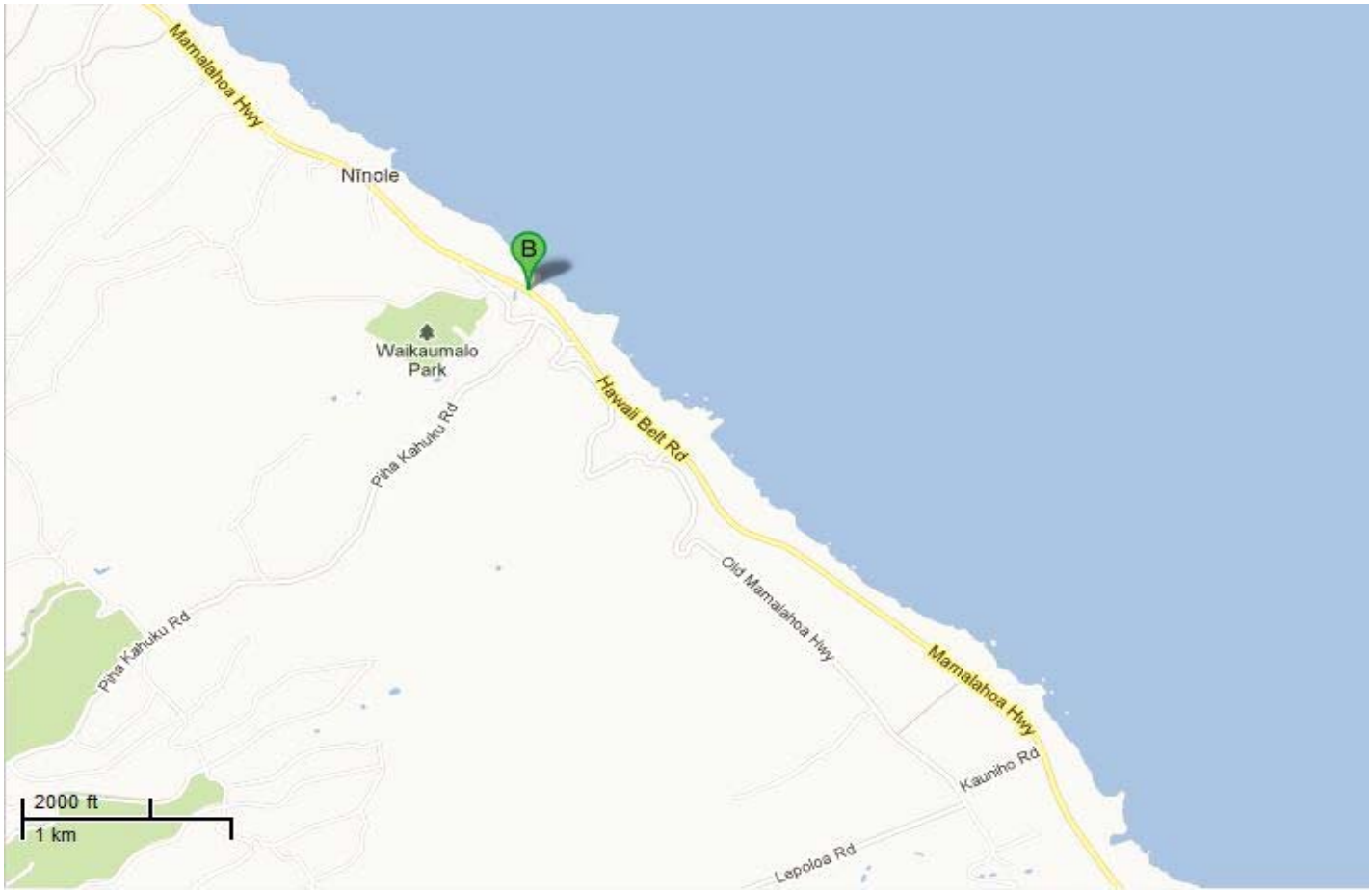
Location: TMK: 3-2-002:062

Historic Name: Waikaumalo Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1920	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 5	**Max Span:** 30.0 ft.	**Total Length:** 109.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Timber Stringer			
Substructure: Masonry Abutment and Timber Multi-Column Bent			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Parts of the bridge were replaced in kind throughout the years as a way to preserve the integrity of the wooden structure.

Significance Statement:

See Mamalahoa historic district description.

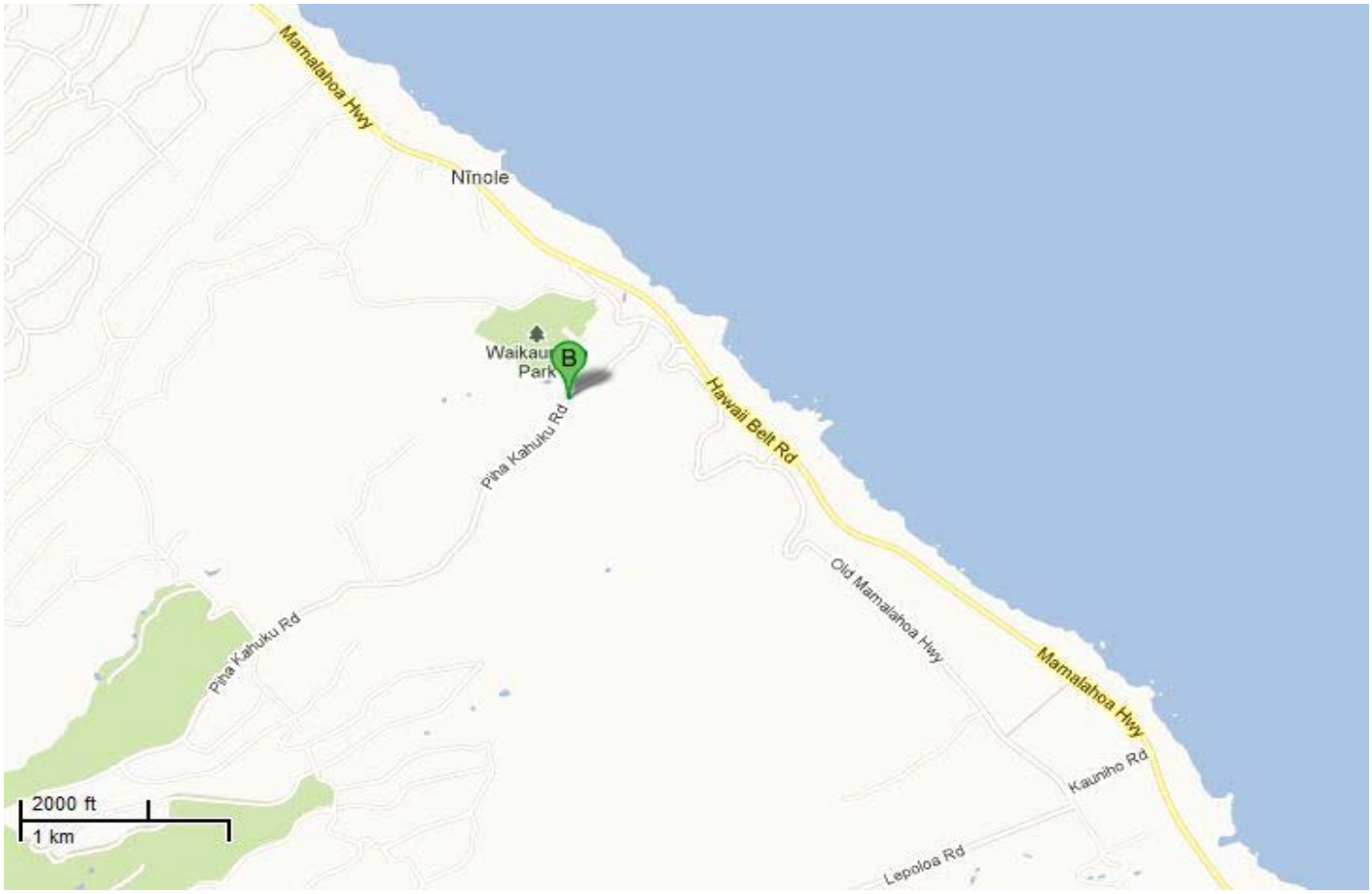
Inventory Form
(County/Private)

General Information

Bridge Number: 001320001100003	
Popular Name: Waikaumalo Stream Bridge	
Feature Crossed: Waikaumalo Stream	
Feature Carried: Unnamed Road off Piha Kahuku Homestead Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-10m-51.04s	**Latitude:** 19d-55m-06.68s

Location: TMK: 3-2-004:027
Historic Name: Waikaumalo Stream Bridge
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Timber Stringer	**Construction Date:** 1930	**Replaced?** No
Altered? Yes	**Alteration Date(s):** 2011	
Alteration Type(s):		
Alteration Description(s): Half the bridge replaced in-kind		

Bridge Information

Number of Spans: 2	**Max Span:** 21.0 ft.	**Total Length:** 41.0 ft.	**Deck Width:** 14.0 ft.
Superstructure: Timber Stringer			
Substructure: Concrete Abutment Wall and Concrete Double Column Pier			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waikaumalo Stream Bridge carries unnamed road off Piha Kahuku Road across Waikaumalo Stream. This two span timber stringer bridge is in its original location and is generally in good condition. The bridge has timber railings, timber deck, concrete columns and abutments. One span (half of the bridge) was replaced in-kind in 2011 as part of routine maintenance.

Significance Statement:

This bridge is eligible under Criterion C as a good example of a 1930's timber bridge. Although half the bridge was replaced in 2011, the materials were replaced in-kind allowing the bridge to retain its historic character.

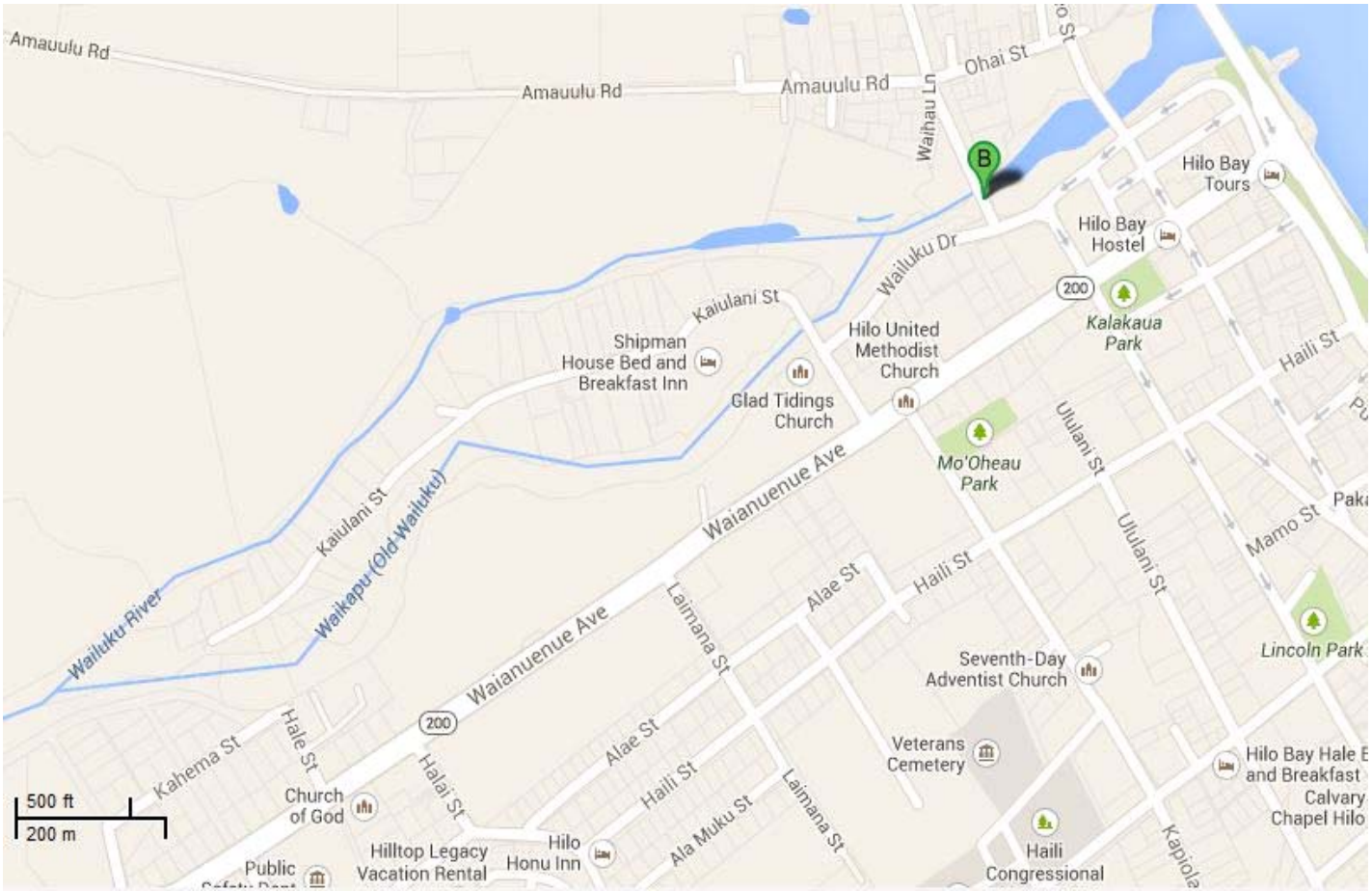
Inventory Form
(County/Private)

General Information

Bridge Number: 001230001100002	
Popular Name: Wailuku Bridge No.1	
Feature Crossed: Wailuku River	
Feature Carried: Wainaku Street	
Milepost:	**County Private:** Hawaii
Longitude: 155d-05m-25.63s	**Latitude:** 19d-43m-34.24s

Location: TMK: 2-3-14:4
Historic Name: Wailuku Bridge No.1
Designer/Engineer:
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Tee Beam	**Construction Date:** 1919	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 2	**Max Span:** 63.0 ft.	**Total Length:** 129.0 ft.	**Deck Width:** 41.2 ft.
Superstructure: Concrete Tee Beam			
Substructure: Concrete Abutment Wall and Concrete Wall Pier			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001280001100001

Popular Name: Waimaauau Stream Bridge

Feature Crossed: Waimaauau Stream

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-05m-57.66s **Latitude:** 19d-50m-03.53s

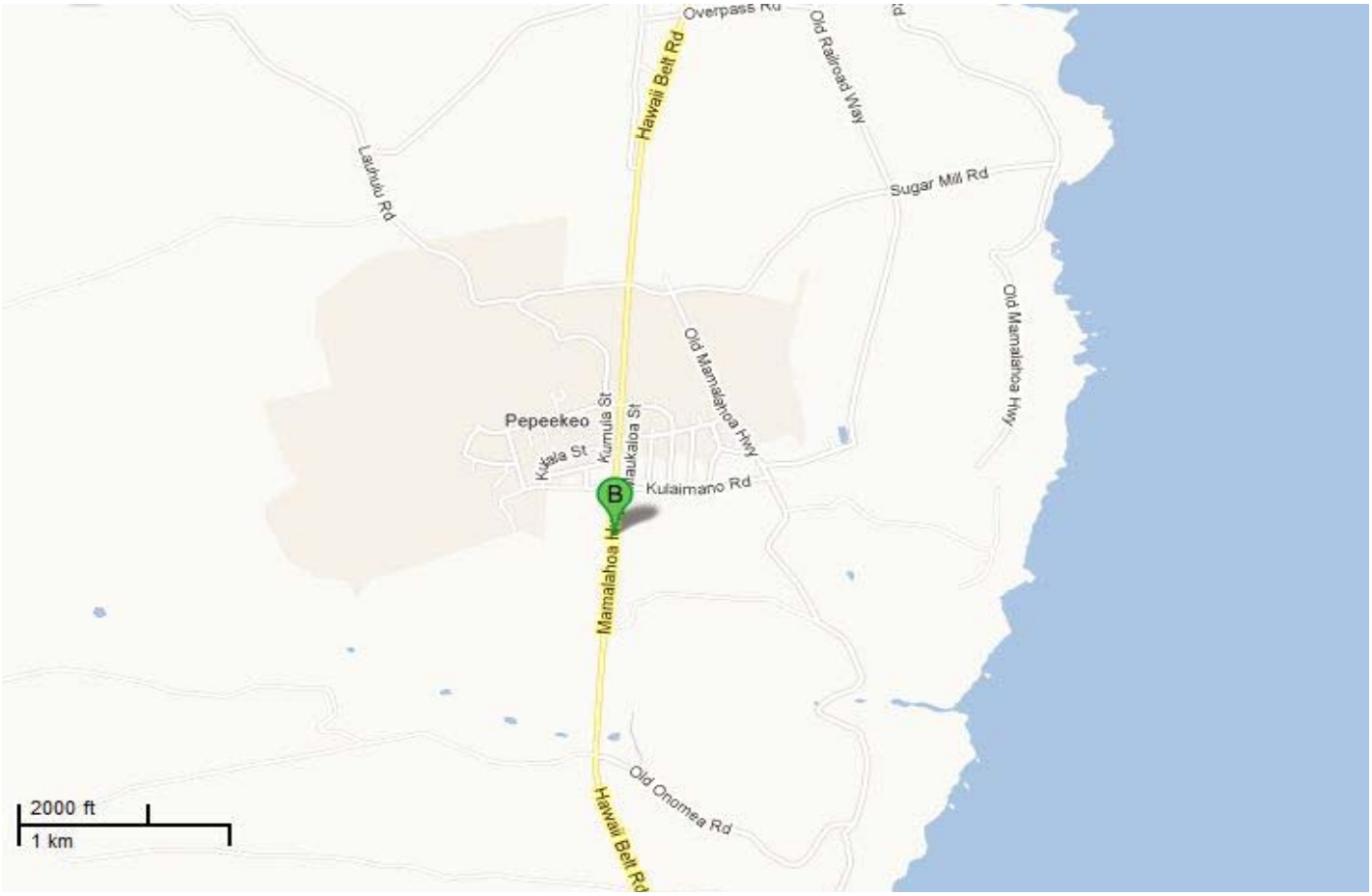
Location: TMK: 2-8-07:06

Historic Name: Waimaauau Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Concrete Slab	**Construction Date:** 1930	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 17.0 ft.	**Total Length:** 20.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Concrete Slab			
Substructure: Masonry Abutment			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Solid Panel			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

Significance Statement:

See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information

Bridge Number: 001020001400450

Popular Name: Waipahoehoe Stream Bridge

Feature Crossed: Waipahoehoe Stream

Feature Carried: Kaumana Drive

Milepost: 4.60 mi. **County Private:** Hawaii

Longitude: 155d-07m-18.49s **Latitude:** 19d-41m-40.46s

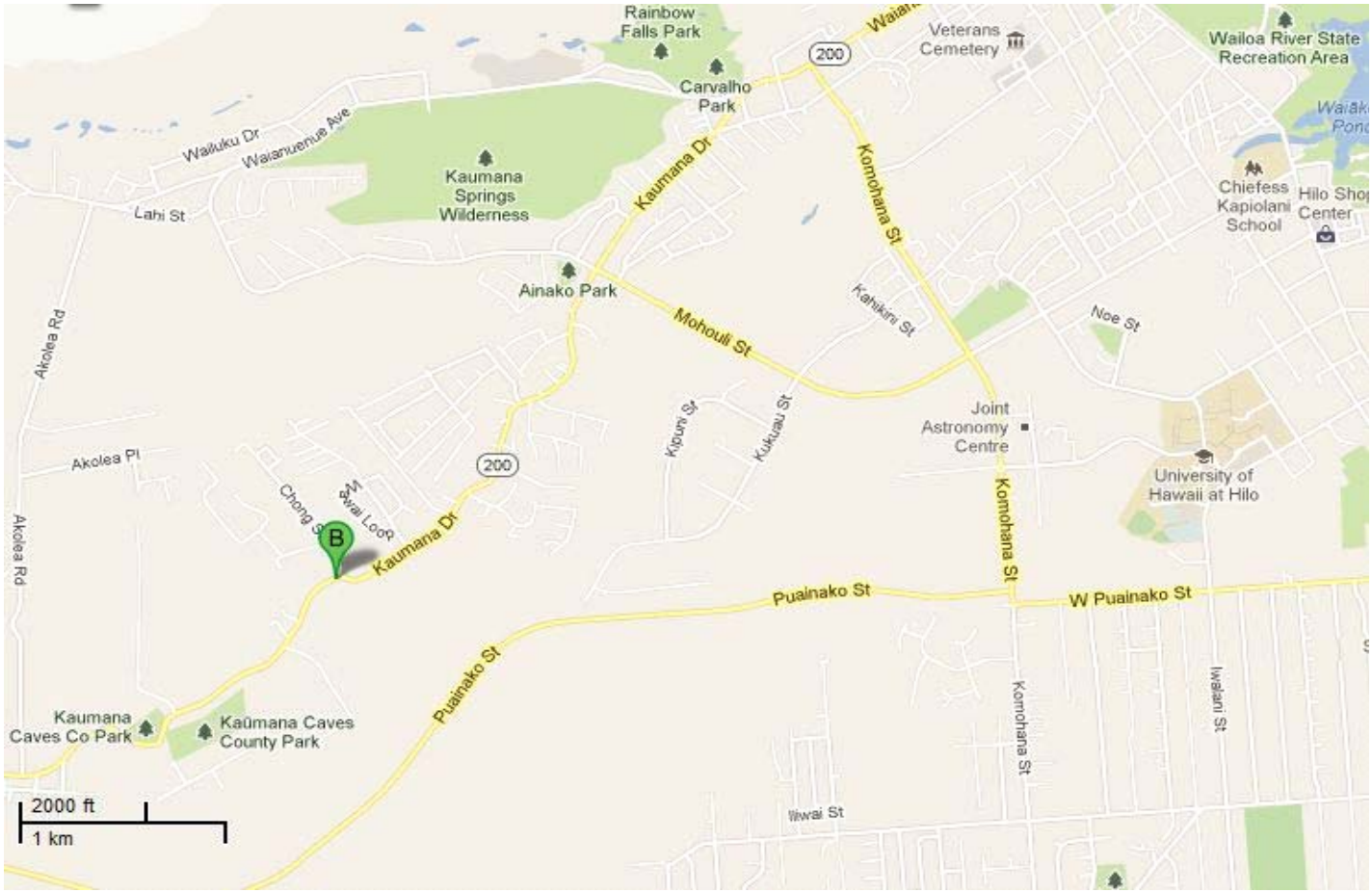
Location: TMK: 2-5-011:016

Historic Name: Waipahoehoe Stream Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Closed Spandrel Arch	**Construction Date:** 1924	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 24.0 ft.	**Total Length:** 34.0 ft.	**Deck Width:** 30.0 ft.
Superstructure: Concrete Closed Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: AC Pavement			
Parapets/Railings: Concrete Solid with Cap			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Engineering		

Narrative Description:

The Waipahoehoe Stream Bridge carries Kaumana Drive across Waipahoehoe Stream. This cast in place concrete arch bridge is in its original location, is generally in good condition, and its materials remain intact. The bridge has concrete solid parapets with curved caps. The concrete deck is supported by concrete abutments. The workmanship of the bridge has not been obscured by additions or repairs. The simple design of the parapet retains its historic feeling.

Significance Statement:

This bridge is eligible under Criterion C as a rare example of a 1920's reinforced concrete round arch bridge that is typical of its period in its use of materials, method of construction, craftsmanship, and design. Arch bridges are also an uncommon bridge type.

Inventory Form
(County/Private)

General Information

Bridge Number: 001430001100001

Popular Name: Waipunahina Gulch Bridge

Feature Crossed: Waipunahina Gulch

Feature Carried: Old Mamalahoa Highway

Milepost: **County Private:** Hawaii

Longitude: 155d-22m-48.63s **Latitude:** 20d-02m-37.42s

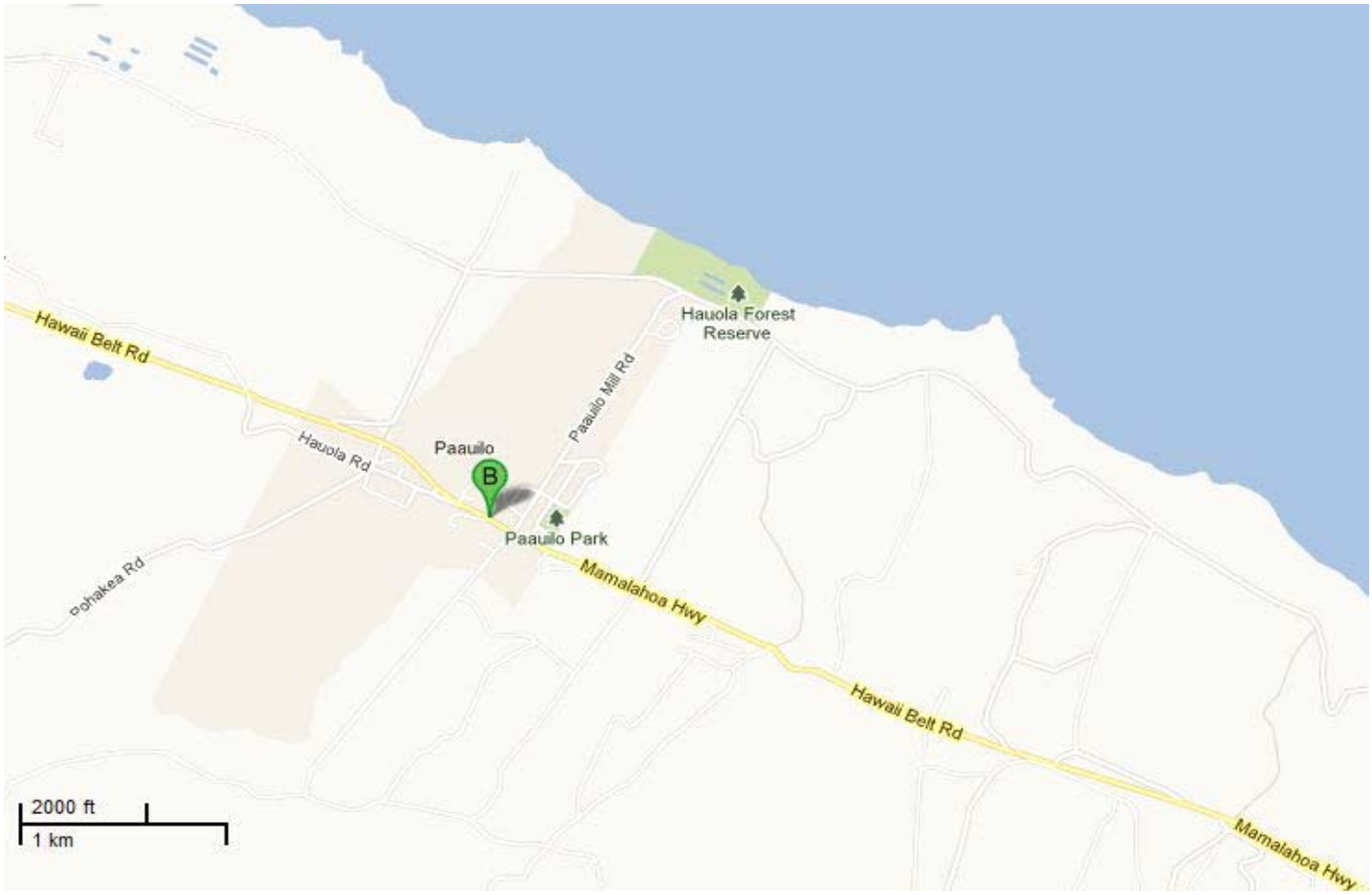
Location: TMK: 4-3-03:31

Historic Name: Waipunahina Gulch Bridge

Designer/Engineer:

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Open Spandrel Arch	**Construction Date:** 1928	**Replaced?** No
Altered? No **Alteration Date(s):**		
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 3	**Max Span:** 80.0 ft.	**Total Length:** 118.0 ft.	**Deck Width:** 23.0 ft.
Superstructure: Concrete Open Spandrel Arch			
Substructure: Concrete Abutment Wall			
Floor/Decking: Concrete Deck with AC Overlay			
Parapets/Railings: Concrete Open Decorative			
Setting:			
Other Features:			

Historic Association

Eligibility Status: High Preservation Value	**Criteria:** A, C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Transportation, Engineering		

Narrative Description:

See Mamalahoa historic district description.

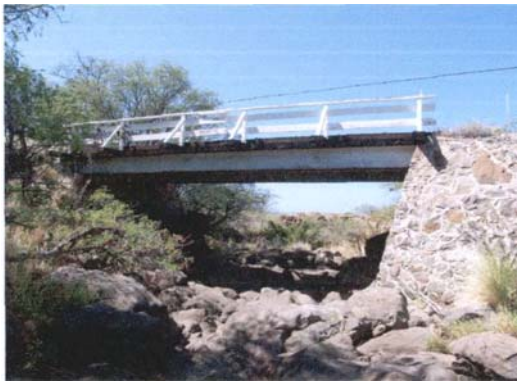
In 2006 the Kiholo Bay Earthquake damaged the Hamakua side of the bridge. Repairs made in-kind were completed in September 2010.

Significance Statement:

This bridge is an arch bridge which is an uncommon bridge type. See Mamalahoa historic district description.

Inventory Form
(County/Private)

General Information



Bridge Number: 001620001100001

Popular Name: Waiulaula Gulch Bridge

Feature Crossed: Waiulaula Gulch

Feature Carried: Old Puako Road

Milepost: **County Private:** Hawaii

Longitude: 155d-49m-18.99s **Latitude:** 20d-00m-44.51s

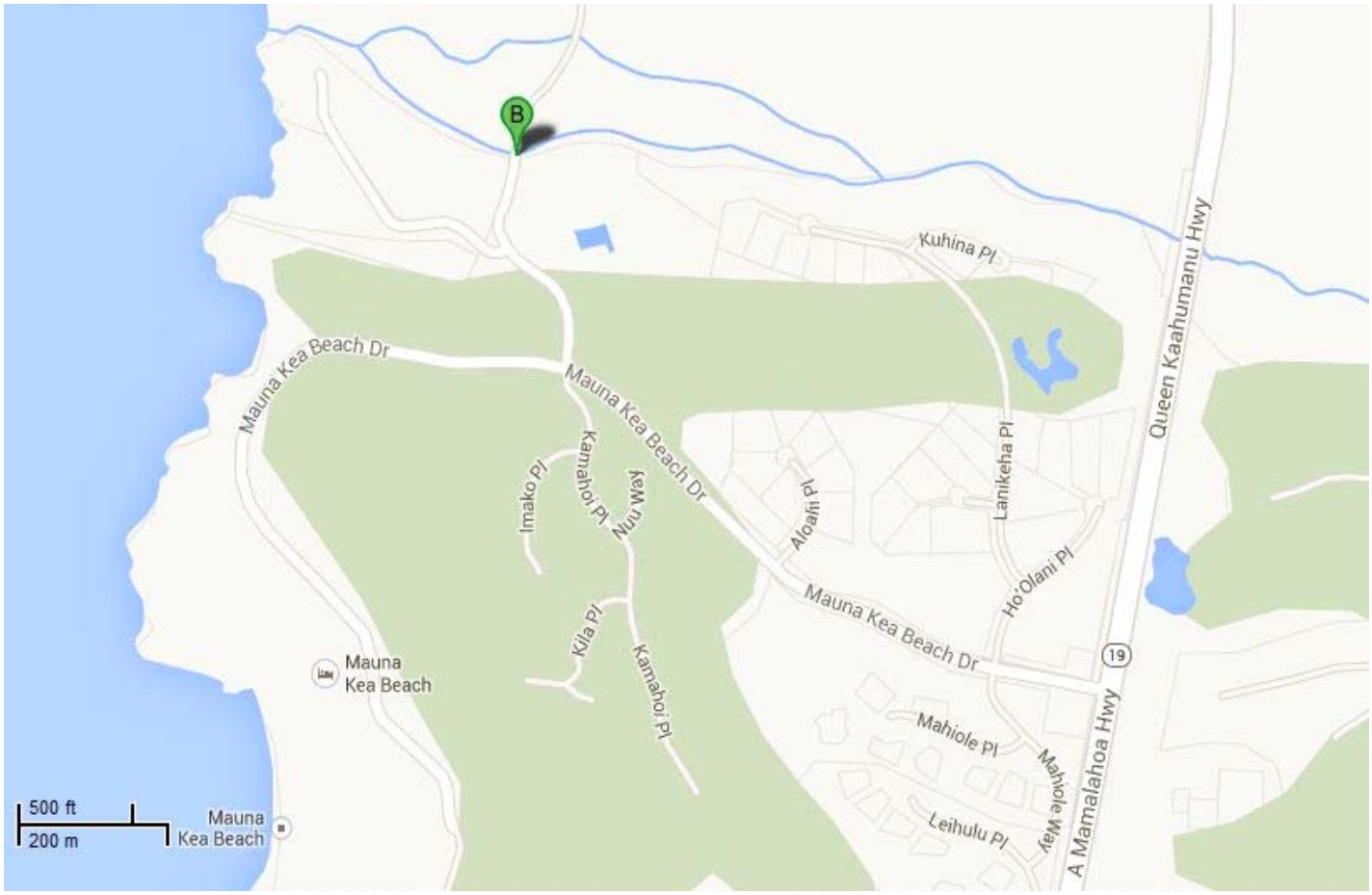
Location: TMK: 6-2-02:005

Historic Name: Waiulaula Gulch Bridge

Designer/Engineer: Y. Inaba and A. W. Bryie

Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1951	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 37.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 19.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Structural type		

Narrative Description:

The Waiulaula Gulch Structure #1 is a steel girder structure, constructed in 1951 to carry Old Puako Road (Kawaihae-Puako Road) over Wailaula Gulch. It was planned to assist with the construction of Kawaihae-Puako Road from Kawaihea Park through the Puako Beach Subdivision. The rural setting is surrounded by the lush vegetation at the Mauna Kea Resort and Puako subdivision nearby. There has been no change to the original design or materials. The engineering of the bridge is neither complex nor typical for the era, but the workmanship of the bridge is good, and is not obscured by repairs or additions. The superstructure consists of stringers laid on the diagonal. The guardrails are painted wood and the decking is made up to 3x12 timbers. The timber decking is consistent with the original design and materials and is an important element of this bridge's rating. Nuts and washers securing the planks to the steel stringers are missing in places. The rustic setting along with the painted wood railing, unfinished wood decking and narrow width contribute greatly to the overall historic feeling of the bridge.

This bridge is located on private land and in 2013 the County of Hawaii was in the process of turning over the ownership to the private property owner.

Significance Statement:

The Waiulaula Gulch Structure #1 is eligible under Criterion C due to its distinct structural type for the area. Steel stringers were constructed in Hawaii primarily for industrial and railroad bridges. Ornamentation, if any, was usually limited to the pattern of the railings. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type.

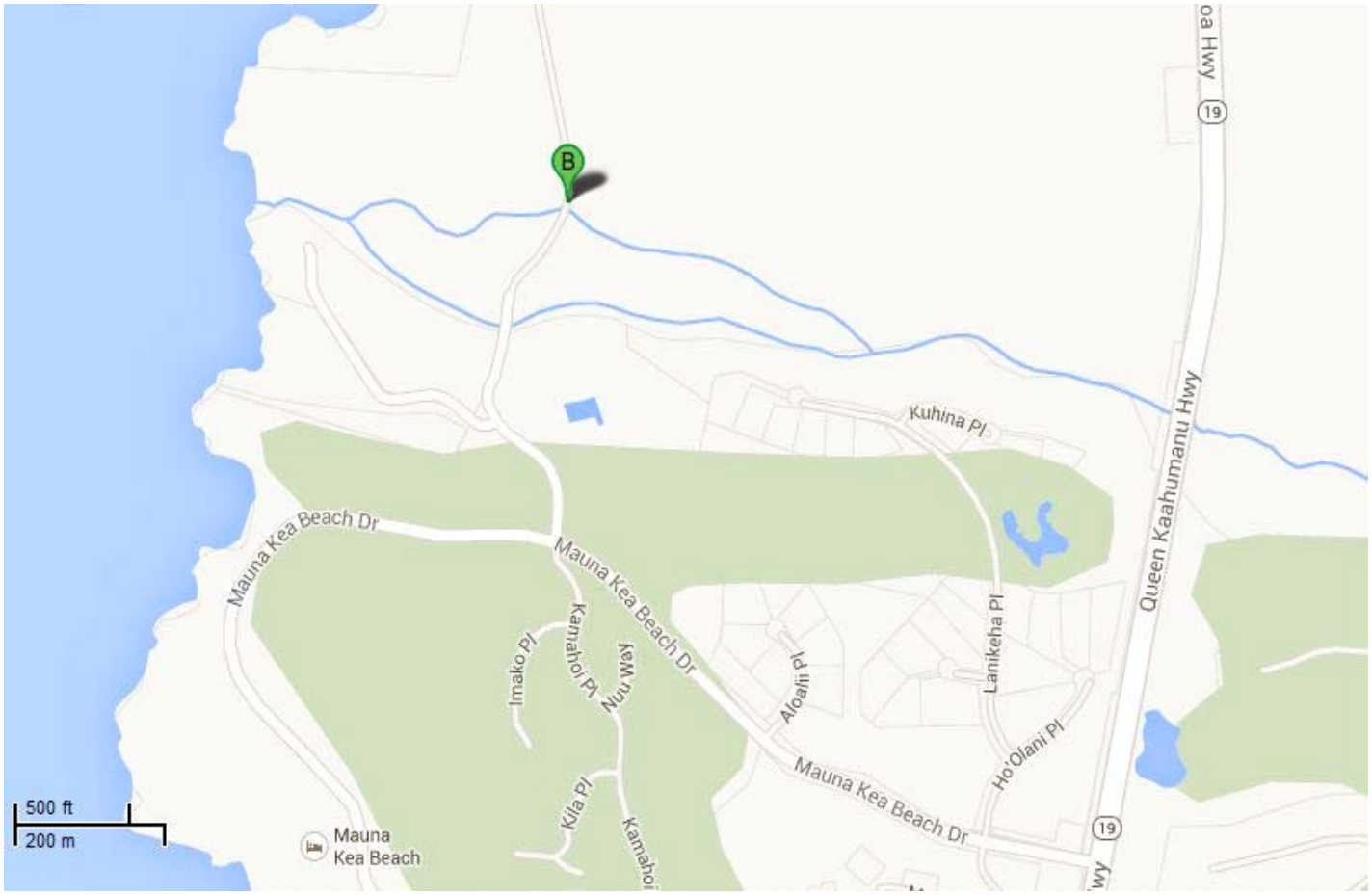
Inventory Form
(County/Private)

General Information

Bridge Number: 001620001100002	
Popular Name: Waiulaula Gulch Bridge	
Feature Crossed: Waiulaula Gulch	
Feature Carried: Old Puako Road	
Milepost:	**County Private:** Hawaii
Longitude: 155d-49m-16.25s	**Latitude:** 20d-00m-49.78s

Location: TMK: 6-2-002:006
Historic Name: Waiulaula Gulch Bridge
Designer/Engineer: Y. Inaba and A. W. Bryie
Builder/Contractor:

Location Map:



Construction Information

Bridge Type: Steel Stringer	**Construction Date:** 1951	**Replaced?** No
Altered? No	**Alteration Date(s):**	
Alteration Type(s):		
Alteration Description(s):		

Bridge Information

Number of Spans: 1	**Max Span:** 37.0 ft.	**Total Length:** 42.0 ft.	**Deck Width:** 20.0 ft.
Superstructure: Steel Multi-Girder			
Substructure: Masonry Abutment			
Floor/Decking: Timber Deck			
Parapets/Railings: Wood			
Setting:			
Other Features:			

Historic Association

Eligibility Status: Eligible	**Criteria:** C	**State/National Registered?** No
Current Function: Bridge	**Historic Function:** Bridge	
Area of Significance: Structural type		

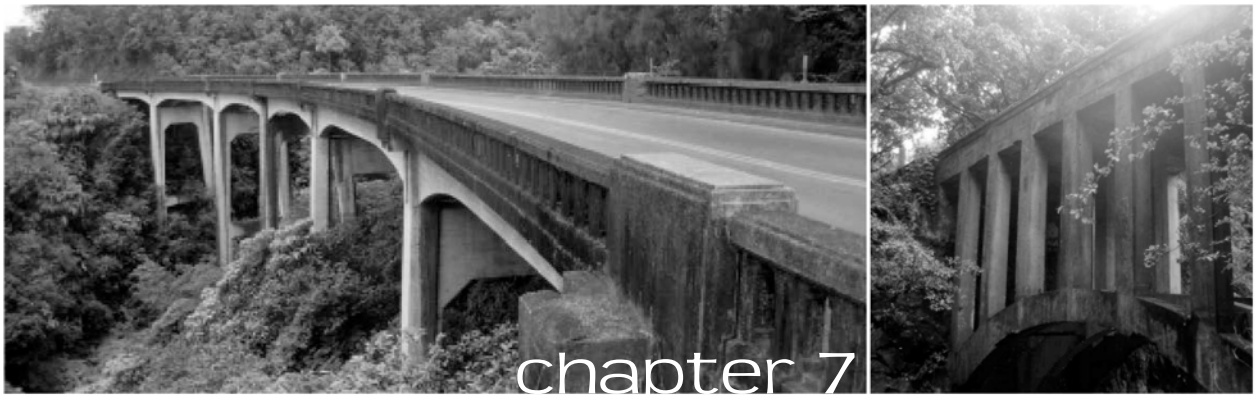
Narrative Description:

The Waiulaula Gulch Structure #2 is a steel girder structure, constructed in 1951 to carry Old Puako Road (Kawaihae-Puako Road) over Wailaula Gulch. It was planned to assist with the construction of Kawaihae-Puako Road from Kawaihea Park through the Puako Beach Subdivision. The rural setting is surrounded by the lush vegetation at the Mauna Kea Resort and Puako subdivision nearby. There has been no change to the original design or materials. The engineering of the bridge is neither complex nor typical for the era, but the workmanship of the bridge is good, and is not obscured by repairs or additions. The superstructure consists of stringers laid on the diagonal. The guardrails are painted wood and the decking is made up to 3x12 timbers. The timber decking is consistent with the original design and materials and is an important element of this bridge's rating. Nuts and washers securing the planks to the steel stringers are missing in places. The rustic setting along with the painted wood railing, unfinished wood decking and narrow width contribute greatly to the overall historic feeling of the bridge.

This bridge is located on private land and in 2013 the County of Hawaii was in the process of turning over the ownership to the private property owner.

Significance Statement:

The Waiulaula Gulch Structure #2 is eligible under Criterion C due to its distinct structural type for the area. Steel stringers were constructed in Hawaii primarily for industrial and railroad bridges. Ornamentation, if any, was usually limited to the pattern of the railings. The use of steel was uncommon in Hawaii due to the extreme marine environment. Since very little steel is used for bridge construction in Hawaii, this bridge is eligible under Criterion C for its distinctive structural type.



chapter 7

c o n c l u s i o n

VII. PROCEDURES FOR THE CONTINUOUS REVIEW AND STUDY OF POTENTIALLY HISTORIC BRIDGES

OVERVIEW

The conclusion of this project does not mean an end of efforts to preserve Hawaii's historic bridges. On the contrary, the process of evaluation and preservation is a continuing responsibility. Future bridge projects that involve the replacement or rehabilitation of a National Register eligible or nominated structure or structures may be lost through unforeseen circumstances such as a natural disaster or accident. Revisions of the historic bridge inventory will be necessary as more recent bridges become eligible for the NRHP. Therefore, it is recommended that this inventory be updated every five years.

IDENTIFICATION

The procedure for the initial selection of historic bridges has been outlined in Section III (*Summary of Identification and Evaluation Methods*) of this report and has been accepted by the Bridge Committees. The NRHP criteria identifies historic resources as buildings, structures, objects, sites, and districts over fifty years of age (unless they are properties of exceptional importance) with sufficient historic integrity to be eligible for the NRHP. However, it should be noted that this report is only valid through 2018.

Completion of updated "historic context statements" and any additional "associated property types" which relate to bridge construction in the latter half of the twentieth century is needed.

Additionally, through this inventory, other possible districts and contexts were noted and should be included in the next update. Revisions to the evaluation criteria or survey methods will also need to be noted in future versions of the inventory. A summary report should be prepared which highlights the amendments and changes to the inventory.

EVALUATION

The procedures for the evaluation of historic bridges are also outlined in the *Summary of Identification and Evaluation Methods* section of this report. The methodology applied to this survey is applicable to further inventory and evaluation efforts and should be utilized for consistency. Any updates or alterations to the methodology should be brought before an updated Bridge Committee.

In addition to surveying new potentially historic bridges, bridges already listed on the National Register must be reviewed during each survey to determine whether they are being maintained in a manner consistent with Federal guidelines for historic structures. This would involve an evaluation of the structure's historically significant features and characteristics, the condition of its materials, and the integrity of the surrounding context. If the bridge has been altered or has otherwise lost its historic integrity, it may be removed from the NRHP with the approval of the DLNR, SHPD.

RECOMMENDED FUTURE INCLUSIONS TO INVENTORY

Not only is it important to review and update the inventory periodically, but it is also important to utilize this inventory to help with the future planning of funding opportunities and to work towards a preservation plan or a programmatic agreement to aid in the review process for bridges. We recommend that the inventory be updated within the next five years and completed in 2018; thus, the next update should start in 2016. Including bridges for a 10-year look ahead should be considered.

In addition, it is recommended that further historic context studies include the following:

- Within the Nuuanu area, many bridges are notably similar in style and were likely built for the same residential development in the 1930s. These bridges may form a multiple property nomination or may be part of an historic district within Nuuanu. This will be better determined with an historic context study.
- Updated and more in-depth research on the engineers and contractors who did significant bridge work.
- Since the next update will include the completion of H-1, the variety of bridges should be studied in detail. Of particular note are the bridges and overpasses designed by locally renowned architects and engineers such as the Alapai pedestrian overpass built in 1969, designed by Dr. Alfred Yee.
- A study of road features such as planters and look-outs should be considered as part of a larger HDOT inventory.

appendices

A. GLOSSARY

DEFINITION OF TERMS

The definitions of terms used in the inventory report are provided below. For identification of bridge types and individual bridge components, please see Chapter 1. All terms marked with an asterisk (*) are defined by the U.S. Department of the Interior, National Park Service.

(a) ADVISORY COUNCIL ON HISTORIC PRESERVATION (ACHP).

An independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy.

(b) AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (AASHTO).

A non-governmental organization that publishes specifications, test protocols and guidelines utilized in highway design and construction. In 1973, the American Association of State Highway Officials (AASHO) changed its name to AASHTO in order to reflect a broader scope of representation, which now includes not only highways, but also air, rail, water, and public transportation. Where referred to in this inventory report, the organization is thus referred to in context as “AASHO” prior to 1973, and as “AASHTO” in contexts from 1973 to the present day.

(c) *BASE HIGHWAY NETWORK*.

The Base Highway Network includes the through-lane (mainline) portions of the IHS, rural/urban principal arterial system and rural minor arterial system. Ramps, frontage roads and other roadways are not included in the Base Highway Network.

(d) *BRIDGE*.

The NBI Standards published in 23 CFR 650.3 give the following definition: A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

(e) *BRIDGE MANAGEMENT SYSTEM.*

A system designed to optimize the use of available resources for the inspection, maintenance, rehabilitation and replacement of bridges.

(f) CERTIFIED LOCAL GOVERNMENT (CLG).*

A certified local government is a local government (e.g., a City or County) officially certified to carry out some of the purposes of the National Historic Preservation Act, as amended. CLGs are granted authority for reviewing various cultural resources projects which might otherwise require federal review. In addition, CLGs may receive special grants for cultural resources activities.

(g) ***COMMONLY RECOGNIZED (CoRe) STRUCTURAL ELEMENTS*****.**

A group of structural elements endorsed by AASHTO as a means of providing a uniform basis for data collection for any bridge management system, to enable the sharing of data between States, and to allow for a uniform translation of data to NBI Items 58, 59, 60 and 62.

(h) CONTRIBUTING RESOURCE.*

A building, site, structure, or object adding to the historic significance of a property.

(i) ***CULVERT*****.**

A structure designed hydraulically to take advantage of submergence to increase hydraulic capacity. Culverts, as distinguished from bridges, are usually covered with embankment and are composed of structural material around the entire perimeter, although some are supported on spread footings with the streambed serving as the bottom of the culvert. Culverts may qualify to be considered "bridge" length.

(j) ***DISTRICT.****

A significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

(k) FEDERAL AID PRIMARY (FAP).

A system of connected main highways of the Interstate System and important routes, selected by each state highway department subject to the approval of the Bureau of Public Roads.

(l) ***FOREST HIGHWAY.***

A road, under the jurisdiction of, and maintained by, a public authority and open to public travel; wholly or partly within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. (23 CFR 660).

(m) FOREST SERVICE DEVELOPMENT ROAD.

A forest road wholly under the jurisdiction of the Forest Service, which may be “open to public travel”. Bridges on Forest Service Development Roads which are “open to public travel” are subject to the NBIS.

(n) HAWAII STATE REGISTER OF HISTORIC PLACES (HSRHP).

A statewide program to identify, evaluate, register and protect Hawaii’s historical resources.

(o) ***HIGHWAY PERFORMANCE MONITORING SYSTEM*****.**

The Highway Performance Monitoring System is a database of universe and sample data that describes the nation's public road mileage. The data are annually updated and submitted to FHWA by the State Highway Agencies, Puerto Rico and the District of Columbia. The universe data provides some basic characteristics of all public road mileage while the sample of the arterial and collector systems allows for assessment of the condition, performance, usage and additional characteristics of the nation's major highway systems.

(p) HISTORIC AMERICAN ENGINEERING RECORD (HAER).*

A nationwide documentation program producing a permanent collection of architectural, engineering and landscape documentation at the Library of Congress consisting of measured and interpretive drawings, large-format black and white and color photographs, written historical and descriptive data, and original field notes.

(q) *INTEGRITY*.*

Authenticity of a property's historic identity, evi–denced by the survival of physical characteristics that existed during the property's historic or prehistoric period.

(r) *INVENTORY ROUTE*.

The route for which the applicable inventory data is to be recorded. The inventory route may be on the structure or under the structure. Generally inventories along a route are made from west to east and south to north.

(s) *LAND MANAGEMENT HIGHWAY SYSTEM.*

Consists of adjoining state and local public roads that provide major public access to Bureau of Land Management administered public lands, resources, and facilities.

(t) *NATIONAL BRIDGE INSPECTION STANDARDS*.

Federal regulations establishing requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a State bridge inventory. The National Bridge Inspection Standards apply to all structures defined as bridges located on all public roads.

(u) *NATIONAL BRIDGE INVENTORY (NBI).*

The aggregation of structure inventory and appraisal data collected to fulfill the requirements of the National Bridge Inspection Standards. Each State shall prepare and maintain an inventory of all bridges subject to the National Bridge Inspection Standards.

(v) *NATIONAL BRIDGE INVENTORY (NBI) RECORD*.

Data which has been coded according to the Guide for each structure carrying highway traffic or each inventory route which goes under a structure. These data are furnished and stored in a compact alphanumeric format on magnetic tapes or disks suitable for electronic data processing.

(w) NATIONAL REGISTER OF HISTORIC PLACES (NRHP).*

The official list of recognized properties of national, state and local significance in American history, architecture, archeology, engineering, and culture, maintained and expanded by the National Park Service on behalf of the Secretary of the Interior.

(x) *PRESERVATION*.*

Preservation places a premium on the retention of all historic fabric through conservation, maintenance and repair. It reflects a building's continuum over time, through successive occupancies, and the respectful changes and alterations that are made.

(y) ***PUBLIC ROAD*****.**

Any road under the jurisdiction of and maintained by a public authority and open to public travel.

(z) RECONSTRUCTION.*

Reconstruction establishes limited opportunities to re-create a non-surviving site, landscape, building, structure, or object in all new materials.

(aa) ***REHABILITATION*****.***

Rehabilitation emphasizes the retention and repair of historic materials, but more latitude is provided for replacement because it is assumed the property is more deteriorated prior to work. (Both Preservation and Rehabilitation standards focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character.)

(bb) ***RESTORATION*****.***

Restoration focuses on the retention of materials from the most significant time in a property's history, while permitting the removal of materials from other periods.

(cc) ***SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES.****

Intended to promote responsible preservation practices that help protect our Nation's irreplaceable cultural resources.

(dd) ***STRATEGIC HIGHWAY CORRIDOR NETWORK.***

A system of highways which are strategically important to the defense of the United States. It includes the Interstate Highways and 25,215 kilometers of other non-interstate highways. The Military Traffic Management Command Report SE 89-4b-27, Strategic Highway Corridor Network, January 1991, contains additional information on the Network.

(ee) ***STRUCTURE INVENTORY AND APPRAISAL SHEET*****.**

The graphic representation of the data recorded and stored for each NBI record in accordance with this Guide.

(ff) WORKMANSHIP.*

Quality of integrity applying to the physical evidence of the crafts of a particular culture, people, or artisan.

B. SIGNIFICANT PERSONS LIST

SIGNIFICANT DESIGNERS OF HISTORIC HAWAII BRIDGES

BARTELS, WILLIAM R. (THD)

As Chief Engineer for the THD, William R. Bartels was responsible for all major territorial bridge projects constructed from 1932 to 1956. In addition to displaying a refined aesthetic sensibility, bridges designed by Bartels characteristically utilized the latest technology and involved a high degree of engineering complexity.

Bartels was a German born engineer who briefly worked for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. He designed most of the territorial bridges for the next 25 years. Bartels was responsible for the largest and most sophisticated bridge construction projects in Hawaii during this time, and there was a marked shift towards construction of large deck girder and rigid frame bridges.

In 1950, the THD, under the direction of William R. Bartels, and the Independent Iron Works of Oakland, California undertook the "Seismic Wave Damage Rehabilitation Project." Plans were developed to adapt the existing steel railroad trestles into highway bridges. Utilizing remnants of railroad trestles and trusses, road beds were widened and strengthened. The two remaining truss spans of the Wailuku River Railroad Bridge were incorporated into the reconstruction of the Kolekole Highway Bridge. Two concrete piers from the truss bridge remain in use under the present Wailuku Bridge, which carries the Hawaii Belt Road (FAP 19) over the river.

Bartels ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard age of retirement, but he was kept on by special permission and out of necessity because his abilities were so great.

BELT, ROBERT M. (Kauai)

Robert M. Belt served as Resident Engineer and then District Engineer for the THD on Kauai during the first half of the 20th century. Belt's contributions include several bridges significant to the development of the Kauai Belt Road System, as well as bridges that exemplify the geometric styling and increasing complexity characteristic of the late 1930s.

At 365 feet in length, the Waimea Bridge, designed by Belt, was one of the longest bridges on Kauai when it was built in 1940; the engineering of this bridge and the curved lines of its concrete substructure would have been considered complex for its time. An article about the opening of the Waimea Bridge stated that "from an engineer's point of view… it has been one of the most satisfactory construction jobs on the island."

From his work supervising construction of the Wahiawa Bridge on Kauai, Belt reported that the construction process was difficult because the foundations had to be dug quite deep. Subsequently, he wrote about the event in a poem entitled "Prayer of the Inspecting Engineer." He is noted to have written several other poems about early engineering in Hawaii.

CHUN, WILLIAM HOY (Hawaii)

William Hoy "Cappy" Chun acted as project engineer for the County of Hawaii during the 1920s and 1930s. Born and raised in Hawaii, Chun was a graduate of the Illinois Institute of Technology. In 1925, Chun was appointed Assistant County Engineer for the County of Hawaii where he was responsible for the "investigations, surveys and preparations of plans and specifications for highways, waterways, sewerage, bridges and reinforced concrete

structures" in the County of Hawaii under the Engineer's Department.[1] During 1931-1932 he participated in Federal Aid Programs where he surveyed and planned the first Federal Aid Highway System on the island of Hawaii, made the first traffic census, and surveyed the North Kona, South Kona, Kohala Mountain, and Hamakua Road projects which totaled forty miles of road.[2]

Chun was the designer of the Wailoa bridge in Hilo (previously listed on the NHRP and since demolished); the Mamalahoa-Waipunahina and Ainako Stream-Waianuenue Bridges (both feature Italianate balustrades and are two of the most ornate open-spandrel arch bridges in the state); and many early concrete slab and girder bridges built for the county during the 1920s along the Mamalahoa Highway.

He also designed the sewer system of Hilo in the 1930s and was the chief engineer for Hilo Water Works until 1961.[3] Working with Chun on many projects was En Leong Wung of whom little is known. Wung designed many important county bridge projects and later served as County Engineer until he stepped down in 1946.

DAWSON, G. K. (Oahu)

G. K. Dawson, an engineer with the City and County of Honolulu, is credited with designing the steel truss Kaukonahua Bridge (also known as the Karsten Thot Bridge) in 1932. The Karsten Thot Bridge was constructed at a major crossing, the north fork of the Kaukonahua Stream, north of Wahiawa, a sugar plantation town in central Oahu. The bridge was an important transportation link for the central Oahu region and contributed to the growth of Wahiawa, in particular.

The Karsten Thot Bridge is the only steel truss erected in Hawaii during the Depression-era. The construction and material choice was likely made possible due to cost considerations regarding the bridge's long span (210 feet) required by the Kaukonahua Stream; it was authorized by the City and County of Honolulu, despite the THD's policy against the use of metal bridges due to salt water corrosion problems. It is one of only three metal trusses in the islands and the only bridge of its type on Oahu.

GARLINGOUSE, RALPH L. (Kauai)

Ralph L. Garlinghouse was one of two main County Engineers for Kauai during the early 20th century. Garlinghouse and Joseph H. Moragne, who acted as County Engineer during the early 1900s, designed and/or oversaw most of Kauai's early bridge construction projects.

Bridges designed by Garlinghouse include: Koloa Bridge (1928), constructed to by-pass and straighten out the old belt road; the Waipa Bridge extension (1925), which added a 90-foot long, five span, cast-in-place concrete structure; and the Lawai Bridge widening (1928), a reinforced concrete solid-spandrel arch deck bridge originally constructed circa 1907 – it is the only remaining arch deck structure on Kauai.

[1] L.C. Newton, ed., *Who's Who of the Island of Hawaii, Vol. I* (Hilo: John A. Lee, 1939), 52-53.
[2] Ibid.
[3] Ibid.

HOWELL, HUGH (Maui)

Hugh Howell served as the County of Maui Engineer from 1905-1913 and as a private roads contractor from 1913-1921. Howell was responsible for much of the initial road and bridge construction work on the Hana Belt Road in both his public and private professional capacities.

MORAGNE, JOSEPH HUGHES (Kauai)

Joseph Hughes Moragne, was born and educated in Alabama. Prior to his arrival in Hawaii in 1898, he served in the U.S. 2nd Regiment, 5th Engineer Battalion during the Spanish-American War. He worked with the Territorial Survey Department and the Territorial DPW until he became the first County Engineer for the County of Kauai Engineer's Office in 1907.[4]

Following a recommendation from the SPW to use concrete arch bridges "wherever the span is not too great," Moragne popularized the use of reinforced concrete on Kauai beginning in 1909.[5] He also engineered the Kauai Belt Road, constructed from 1910-1920, engineered the Kokee irrigation system, and during the 1920s designed the Hanalei and Kaapoko Tunnels, which spanned 6,028 feet and 3,558 feet, respectively.

Significant bridges designed by Moragne include: the Waioli Bridge (1912), the earliest concrete girder bridge on Kauai and in the state at the time of its construction; the Huleia Cane Haul Bridge (1909), the first reinforced concrete bridge built in Hawaii; and the Hanalei River Bridge (steel truss, 1912) and the Waipa Stream Bridge (concrete, 1912), some of the earliest examples of road construction progress and development through formal engineering expertise and industrial technology funded by the new Territorial Government.

OHRT, FRED (Oahu)

Previously of the firm Libby, McNeill & Libby, Fred Ohrt became the first Manager and Chief Engineer of the Honolulu Board of Water Supply in 1929 and remained in the position until 1952. Among his many endeavors as Chief Engineer, he also established a primary principle that construction necessary to support a utility need not spoil the surrounding landscape, thus balancing aesthetics, functionality, and nature unique to the islands.[6]

Along with fellow designer Guy Rothwell, Ohrt is credited with designing the Anahulu Stream Bridge (1921), which carries Kamehameha Highway across the Anahulu Stream in Haleiwa. This unique double "rainbow" or Marsh through-deck arch bridge constructed of reinforced concrete exhibits the work of highly skilled craftsmen and designers. The bridge's historic association as an important civic structure associated with the development of Haleiwa can be readily discerned by pedestrian and automobile traffic along Kamehameha Avenue.

[4] "Civil Engineer Joseph H. Moragne," *The Garden Isle* (Lihue, HI), April 21, 2013.
[5] Ibid.
[6] "Engineers and Architects of Hawaii, EAH History," https://sites.google.com/site/eahawaii2/eahhistory (accessed August 23, 2013).

ROTHWELL, GUY (Oahu)

Guy Rothwell attended Oahu College and graduated from the University of Washington with a degree in architectural engineering. He began his career as a Navy Yard draftsman in Puget Sound, Washington, and worked as a ship draftsman at the Navy Yard in Pearl Harbor during the First World War. In 1924, he became a Registered Professional Engineer and Architect within the Territory of Hawaii.

Along with fellow designer Fred Ohrt, Rothwell is credited with designing the Anahulu Stream Bridge (1921), which carries Kamehameha Highway across the Anahulu Stream in Haleiwa. This unique double "rainbow" or Marsh through-deck arch bridge constructed of reinforced concrete exhibits the work of highly skilled craftsmen and designers. The bridge's historic association as an important civic structure associated with the development of Haleiwa can be readily discerned by pedestrian and automobile traffic along Kamehameha Avenue.

Rothwell's other buildings include: Palama Settlement in Kalihi, the Harris Memorial Church in Nuuanu, Roosevelt High School, Honolulu Hale (City Hall), the Honolulu Stadium, the original gymnasium at the University of Hawaii at Manoa, and the Beretania, Kalihi, and Kaimuki pumping stations for the Sewer and Water Commission of Honolulu.[7]

WAY, W. F. (Oahu)

W.F. Way designed the Puowaina Drive Bridge (at Auwaiolimu Street), constructed in 1936. The bridge, a reinforced concrete continuous tee beam structure built on reinforced concrete trestles, exhibits a high level of complexity for its time due to the continuous tee beam design of the structure, which eliminates the need for expansion joints in the deck, and because of its exceptional height.

YOUNG, JOHN MASON (Hawaii)

John Mason Young was born in Lewisburg, Tennessee in 1847. Following his military stint in the Spanish American War as a young man, Young became Professor of Mechanical Engineering at the University of Florida, his alma mater. While obtaining additional engineering degrees from Cornell University, Young worked for various companies on the east coast designing bridges and cableways.[8]

In 1908, he became the first Professor of Engineering at the University of Hawaii at Manoa and was instrumental in helping to draw up plans for the campus and oversee construction of four campus buildings: Hawaii Hall, Miller Hall, Dean Hall, and Crawford Hall. That same year, he also founded the Pacific Engineering Company, which helped construct many significant buildings in Hawaii.[9]

Young worked with William R. Bartels on the design of several steel trestle bridges constructed during the 1950s along the Hawaii Belt Road (FAP 19). The five steel trestle bridges associated with Young include: the Paheehee Stream Bridge (1950), Kapue Stream Bridge (1950), Nanue Stream Bridge (1952), Umauma Stream Bridge (1952), and Hakalau Stream Bridge (1953) – one of the longest bridges in the Territory at 774.9-feet long at the time of its construction.

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[7] "Descendants of Captain Robert Brown, 1809 – 1894," http://www.captainbrown.net/famtree/nti/nti00550.html (accessed August 23, 2013).
[8] Victor N. Kobayashi, ed., *Building a Rainbow: A History of the Buildings and Grounds of the University of Hawaii's Manoa Campus* (Honolulu: Hui O Students, University of Hawaii at Manoa, 1983), 21-23.
[9] Ibid.

C. NATIONAL REGISTER FORMS

KAUAI NOMINATION FORMS

KAUAI BELT ROAD (NORTH SHORE SECTION)

NORTH SHORE ROUTE

HANALEI BRIDGE

WAIPA BRIDGE – KUHIO HIGHWAY

WAIOLI BRIDGE – KUHIO HIGHWAY

MANOA STREAM FORD – KUHIO HIGHWAY

LIMAHULI STREAM CROSSING – KUHIO HIGHWAY

HAENA BRIDGE NUMBER 1 – KUHIO HIGHWAY

HAENA BRIDGE NUMBER 2 – KUHIO HIGHWAY

WAIKOKO BRIDGE – KUHIO HIGHWAY

WAINIHA BRIDGE #1, #2, #3 – KUHIO HIGHWAY

PU‘U‘ŌPAE BRIDGE

PU‘U‘ŌPAE BRIDGE MISCELLANEOUS

OPAEKAA ROAD BRIDGE

KAPAIA SWINGING BRIDGE

4. National Park Service Certification

I, hereby certify that this property is: Signature of Keeper Date of Action

✓ entered in the National Register Beth Boland 2/11/04
__ See continuation sheet. _____

___ determined eligible for the National Register
__ See continuation sheet. _____

___ determined not eligible for the National Register

___ removed from the National Register

____ other (explain): _____

5. Classification
Ownership of Property
(Check as many boxes as apply)

___ private

___ public-local

_X_ public-State

___ public-Federal

Category of Property
(Check only one box)

___ building(s)

_X_ district

___ site

___ structure

___ object

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of Resources within Property

Contributing	Noncontributing	
____	_____	buildings
2	_____	sites
13	2	structures (bridges and culverts)
_____	_____	objects
15	2	Total

Number of contributing resources previously listed in the

National Register N/A

6. Function or Use

Historic Functions (Enter categories from instructions)

Cat: Transportation Sub: road-related

Current Functions (Enter categories from instructions)

Cat: Transportation Sub: road-related

7. Description

Architectural Classification
(Enter categories from instructions)

Other: roadways; bridges: steel, reinforced concrete, girder, flat slab, wood, masonry (basalt or lava rock)

Materials
(Enter categories from instructions)

foundation _____

roof _____

walls _____

_____

other asphalt, concrete, steel, wood, masonry (basalt or lava rock)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

__X__ A Property is associated with events that have made a significant contribution to the broad patterns of our history.

____ B Property is associated with the lives of persons significant in our past.

__X__ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations

(Mark "X" in all the boxes that apply.)

Property is:

____ A owned by a religious institution or used for religious purposes.

____ B removed from its original location.

____ C a birthplace or a grave.

____ D a cemetery.

____ E a reconstructed building, object, or structure.

____ F a commemorative property.

__X__ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

Engineering _____

Social History _____

Transportation _____

Commerce _____

Period of Significance

1900 to 1957

Significant Dates

1900 to 1957

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

Designers and builders were County Engineers, including J. H. Moragne and R. L. Garlinghouse. Builders were county employees and private contractors, including George Mahikoa. Designers also included Hamilton and Chambers of New York.

9. Major Bibliographical References Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)

___ preliminary determination of individual listing (36 CFR 67) has been requested

___ previously listed in the National Register

_X_ previously determined eligible by the National Register
1978: Hanalei Bridge, Wai'oli Bridge, Waipā Bridge

___ designated a National Historic Landmark

___ recorded by Historic American Buildings Survey

_____

___ recorded by Historic American Engineering Record

_____

Primary Location of Additional Data

___ State Historic Preservation Office

_X_ Other State agency

___ Federal agency

_X_ Local government

___ University

___ Other

Name of repository:

State of Hawai'i Department of Transportation; County of Kaua'i Department of Public Works.

10. Geographical Data Acreage of Property _ 54

UTM References
(Place additional UTM references on a continuation sheet)

Zone	Easting	Northing	Zone	Easting	Northing
1	04 451000	2456460	3	04 449820	2456220
2	04 450980	2456220	4	04 449280	2455500

_X_ See continuation sheet.

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)
The boundaries of the nominated district are delineated by the course of Route 560, the Kaua'i Belt Road. The right-of-way is variable along the entire length of the road. The boundaries are coterminus with the road's historic right-of-way. The historic district begins at Mile Marker 0 on Route 560 and continues to its termination at Mile Marker 10 at Hā'ena State Park.

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)
The beginning and end points were selected to encompass the portion of the Kaua'i Belt Road that retains the greatest historic integrity and character. This section of roadway is relatively unaltered and is the most spectacular portion of Kaua'i's historic belt road system, both in its historic character and its scenery. It is the only portion of the Kaua'i Belt Road that retains historic integrity. Elsewhere, the Kaua'i Belt Road has been significantly altered with new alignments and widened roadways and bridges. The boundaries of the proposed historic district include thirteen contributing historic bridges and culverts that date to 1912.

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NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 10 Geographical Data Page _____

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

UTMs continued:

	zone/easting	northing
5	04 448980	2455410
6	04 447720	2455110
7	04 447030	2455480
8	04 446760	2455820
9	04 444420	2456410
10	04 443700	2456840
11	04 443680	2456880
12	04 443480	2457730
13	04 441450	2457600
14	04 440310	2457770
15	04 439640	2457710

11. Form Prepared By

name/title Dawn E. Duensing, historian
organization on behalf of the Hanalei Roads Committee date 4/8/02
street & number P.O. Box 888 telephone 808)572-6583
city or town Makawao state HI zip code 96768

Additional Documentation. Submit the following items with the completed form:

Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.

A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs

Representative black and white photographs of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner(Complete this item at the request of the SHPO or FPO.)

name State of Hawai'i, Department of Transportation
street & number 869 Punchbowl Street telephone (808)587-2150
city or town Honolulu state Hawai'i zip code 96813

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 7 Page 1

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

The Kaua'i Belt Road between Princeville and Hā'ena traverses ten miles along the island's north shore and is coterminous with its historic right-of-way. This portion of Kaua'i's "belt road" was part of Kaua'i's original belt-road system, which extended from Hā'ena on the north shore to Mānā on Kaua'i's west shore. Although belt-road systems in the Hawaiian Islands were intended to circumvent each island, Kaua'i's road, like the Hawai'i Belt Road, never completely encircled the island due to the rugged topography of Nā Pali Coast. The north shore section of the Kaua'i Belt Road begins at State Route 560's Mile Marker 0 at Princeville and passes through the communities of Hanalei, Wainiha and Hā'ena, ending at Mile Marker 10 at Hā'ena State Park.

The proposed historic district includes the road, the Hanalei Valley Scenic Overlook, and thirteen historic bridges and culverts. The period of significance for the north shore section of the Kaua'i Belt Road is from 1900 when the Territory of Hawai'i Superintendent of Public Works began roadway improvements until 1957 when the Wainiha Bridges were rebuilt after a tidal wave.

The Kaua'i Belt Road between Princeville and Hā'ena retains historic significance and character in its location, alignment, design, setting, and association. The Kaua'i Belt Road between Princeville and Wainiha was built during the 1910s, and from Wainiha to Hā'ena circa 1928. Most of the roadway alignment is unaltered and predates the road's construction. The road passes through rural areas along Kaua'i's North Shore, connecting communities much as it did in the early twentieth century when it was built. In many areas, the road was built over a trail used by Hawaiians and nineteenth-century travelers. There is no shoulder along most of the roadway, except near Princeville. The road has been widened since its construction, but is still narrow in many locations. The roadbed varies between 18' and 20' wide, being narrower as it hugs the sea cliffs and wider as it passes through valleys and residential communities. Near Princeville and Hanalei, the road is 22' wide. For most of the road's length, there are no guardrails, which contributes to the road's historic feeling. Lava-rock guardwalls, some dating to the 1920s, remain along the road in many locations, although many have been undermined by soil erosion. In a few locations, timber guardrails remain along the road. Only a few steel w-beam guardrails have been installed along the road in recent years.

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CONTINUATION SHEET

Section 7 Page 2

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)
The Hanalei Valley Scenic Overlook has been a feature on the Kaua'i Belt Road since the early 1900s. This scenic site, located near Mile Marker 0 in Princeville, provides a stunning view of the Hanalei Valley and its *kalo lo'i* (taro patches) approximately 160' below. Photographer Alonzo Gartley documented this scenic view in 1912, and R. J. Baker photographed the site in 1915.

Most of the bridges and culverts on the Kaua'i Belt Road are one-lane wide and date to the early 1900s. The bridges represent two popular types of construction in early twentieth century Hawai'i: steel truss and reinforced-concrete flat slab. The reinforced concrete bridges feature solid concrete parapets. In addition, there are also several pipe culverts with masonry rock headwalls that were probably constructed in the first half of the twentieth century.

Physical description: The Kaua'i Belt Road, State Route 560, begins near Princeville at Mile Marker 0. The Hanalei Valley scenic overlook is located at the east end of State Route 560 near Mile Marker 0. Just west of Mile Marker 0 at Princeville, the Kaua'i Belt Road winds around a large hairpin curve and then begins its descent (approximately 6 percent grade) to the Hanalei Bridge. After crossing the Hanalei Bridge, the road follows the Hanalei River west to Hanalei town. The road traverses through the commercial district and historic heart of Hanalei, then continues through residential areas between Wai'oli Bridge and Waipā Bridge. After crossing Waipā Bridge, the road follows the beach along the west shore of Hanalei Bay. The road then winds up and around the mountain ridge as it proceeds to Lumaha'i Valley. As it winds over the ridge, the road reaches an elevation of nearly 160' above sea level. Descending into Lumaha'i Valley, the road again follows the beach before crossing Lumaha'i Bridge and leaving the valley. Another mountain ridge is traversed before entering Wainiha Valley, where the road crosses the three Wainiha Bridges and passes through the small village of Wainiha. From Wainiha, the thoroughfare traverses a level plain between the mountains and ocean as it proceeds through the residential district of Hā'ena. Just east of Mānoa Stream, the road again follows a beach, passing the landmark Hā'ena "Dry Cave" before a slight ascent up the mountain ridge as it follows a narrow strip of coast. The road follows along the narrow base of the mountains until it ends at Kē'ē Beach in Hā'ena State Park at Mile Marker 10.

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CONTINUATION SHEET

Section 7 Page 3

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)

EARLY TRANSPORTATION ALONG KAUA'I'S NORTH SHORE

With extensively cultivated *kalo* (taro) regions and fishing areas that provided an abundant food supply, the North Shore of Kaua'i was well populated in ancient times.[1] Traditionally, Hawaiians relied on their well-developed navigational skills and would have traveled along the coast by canoe. The Hawaiian population living in the north shore valleys may have also traveled along an ancient foot trail that connected communities between Hanalei and Hā'ena.

Foreigners, among them American missionaries, were the first to travel primarily by land and introduced horses to the Hawaiian Islands in 1803.[2] The journal of William DeWitt Alexander provides an early written account of a day-long excursion along Kaua'i's North Shore in 1849. Alexander's destination was Hā'ena and its "celebrated caves." His party departed from Wai'oli near Hanalei, "all mounted on good horses and in high spirits." Their six-mile journey was through beautiful scenery and crossed three river valleys. Rivers were crossed by canoes or by fording.[3]

In 1865, William T. Brigham's account of his sightseeing journey to Hā'ena noted several improvements in river crossings, including scows on the Hanalei and Lumaha'i rivers. Other rivers still had to be forded and were difficult to cross. The trip to Hā'ena took the entire day, much as it had for Alexander in 1849.[4]

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[1] E. S. Craighill Handy and Elizabeth Green Handy, *Native Planters in Old Hawai'i: Their Life, Lore, and Environment.* (Honolulu: Bishop Museum Press, 1972), 269.
[2] Ralph Kuykendall, *The Hawaiian Kingdom, 1854-1874.* V. 2 (Honolulu: University of Hawai'i Press, 1953), 23.
[3] Kaua'i Historical Society, *The Kaua'i Papers.* (Līhu'e, Hawai'i: Kaua'i Historical Society, 1991), 126-127.
[4] *The Kaua'i Papers,* 138.

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Section 7 Page 4

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)

By 1893, a number of transportation improvements had been built in the Hanalei District, including a bridge across the Hanalei River. Traveler Eric Knudsen detailed his 1895 trip, describing the road and hill above the Hanalei River, "The road in those early days almost dived straight down to the bridge. It was steep and in wet weather very slippery. No wonder that when any one took a trip in a carriage they had to be escorted by a couple of cowboys on strong horses to help pull the carriage up the steep grades or hold them back while descending."[5] An 1893 Hawaiian Government Survey map illustrated this section of road as a series of switchbacks descending the hill.[6]

Knudsen's journal is valuable for its description of the historical alignment of the trail/road from Hanalei Hill (above the Hanalei Bridge) to Kē'ē Landing at the end of the road in Hā'ena. After crossing the Hanalei Bridge, Knudson reported that the road followed the winding course of the Hanalei River for "quite a distance." He noted that the wagon road ended after Hanalei, and travelers followed the beach in order to ford the rivers where they entered the ocean. West of Waikoko Stream, Knudsen related that the trail climbed over the bluff and then descended straight down to the ocean before turning back and running along the beach again. After the valley, the winding trail proceeded "up and out and over" the narrow hogback into Lumaha'i Valley, where there was no difficulty fording the stream. Knudsen did not describe how travelers crossed the next ridge into Wainiha Valley. The trail then proceeded over the flat lands of Wainiha and Hā'ena, passing both the dry and wet caves before reaching Kē'ē Landing.[7]

According to historian Ralph Kuykendall, nineteenth century Hawai'i roads, "or what were called roads," came into existence by a familiar historical process, "the trail became a road." Many roads, especially in the rural districts like Kaua'i's North Shore, were little more than cleared rights-of-way.[8]

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[5] *The Kaua'i Papers*, 153-154.
[6] W. A. Wall, Map of Hanalei, Makai, Kaua'i. (Honolulu: Hawaiian Government Survey Registered Map No. 1833, 1893).
[7] *The Kaua'i Papers*, 154-155.
[8] Kuykendall, *The Hawaiian Kingdom, 1854-1874*. V. 2, 25-26.

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Section 7 Page 5

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)

Early Transportation Improvements on Kaua'i's North Shore

The earliest bridges on Kaua'i were constructed of wood and steel. Wood was a prevailing construction material throughout the Hawaiian Islands during the nineteenth century; it was widely available, relatively inexpensive, and fairly durable. By the end of the nineteenth century, steel represented the latest in industrial technology and was a preferred construction material for its strength. Although steel bridges had to be imported from the United States or Great Britain, the strength of steel provided a feasible solution for spanning Kaua'i's wide rivers. Steel was also used throughout the islands to erect the substantial bridges required to carry railroads over Hawai'i's rivers and rugged gulches.

During its first year of operation in 1900, the territorial public works department purchased a steel bridge for the Hanalei River from the Wilson & Whitehouse firm. Built by the Missouri River Bridge Company, the steel bridge had a span of 110' with a 14'-wide roadbed constructed of wood. The bridge probably replaced the structure mentioned in Knudsen's journal, which most likely was built of wood and had washed away in a storm. The Territory of Hawai'i Superintendent of Public Works' (SPW) annual report noted that the new steel bridge for Hanalei was to be built on stone abutments at an elevation above the river's flood stage.[9] Building bridges to withstand floods was an important consideration in areas like Kaua'i's North Shore, which was prone to storms and flash floods.

By 1904 timber bridges spanned the rivers at Wainiha, Waikoko, and Waipā, and plans were made for a steel bridge over the Lumaha'i River. The Department of Public Works probably built both the Wainiha and Waipā bridges in 1904. The Waipā Bridge was a simple wood structure, and the Wainiha a wood through-truss bridge.[10] A. A. Wilson finally began construction on the

[9] Superintendent of Public Works, *Report for 1900*, 209.
[10] Photograph Album 43, "Public Works Projects, 1904-1905," 24, 26; Superintendent of Public Works, *Report for 1904*, 38.

Narrative Description (continued)

new steel bridge at Lumaha'i in 1905.[11] Other public works projects along the North Shore provided for relocating and reconstructing the road between Hā'ena and Hanalei.[12]

In its 1904 annual report, the SPW emphatically advised against the construction of steel bridges. He observed that steel bridges were inappropriate for Hawai'i's coastal areas and expensive to maintain. The SPW noted that several steel bridges, including Wailua Bridge on Kaua'i, were in "exceedingly bad condition" with corrosion that materially affected the strength of the bridge components. He strongly advocated that concrete-arch rather than steel bridges be built wherever the span was not too great.[13] Despite the strong recommendations to use concrete or wood, Kaua'i's wide rivers required long spans, and the steel bridge over the Lumaha'i River was completed as planned.[14] Other improvements were also made, which included relocating some portions of the road and removing excessive grades. The assistant superintendent commented that the trip to Hā'ena would "be made easy and much more enjoyable than at present."[15]

Building Kaua'i's Belt Road

By the end of the nineteenth century, each of the major Hawaiian Islands dreamed of building a "belt" road system. The idea for belt roads dated to the early Hawaiians, who had built such roads on the islands of Maui and O'ahu. Belt roads that circumvented the islands played an important role in Hawai'i's transportation history, connecting isolated communities to their island's economic, political and social centers. In 1911, the territorial legislature established a "loan fund," which provided the bonding needed for each island to build its belt roads and bridges. A Loan Fund Commission (LFC) was appointed for each island, and Kauai's board wasted no time in getting down to business. During its first five years, it engaged in a number of construction projects that quickly improved the north shore portion of the belt road as far as the

[11] Superintendent of Public Works, *Report for 1905*, 31.
[12] Superintendent of Public Works, *Report for 1904*, 66.
[13] Superintendent of Public Works, *Report for 1904*, 3-5.
[14] Superintendent of Public Works, *Report for 1905*, 79, 65, 75.
[15] Superintendent of Public Works, *Report for 1906*, 23.

distant community of Hā'ena. By 1917, Kaua'i considered its belt road complete, a feat that was accomplished earlier than any other island.[16]

In 1911 the Loan Fund Commission initiated several major projects for Hanalei, including a new steel bridge over the Hanalei River and improvements to "Hanalei Hill".[17] A major goal in advancing overland travel on Kaua'i was to eliminate sharp curves and steep grades. The new grades replaced steep inclines that had been suitable for carriage roads, but could not be easily negotiated by the automobiles that were introduced to island roads in the early 1900s. Although newspaper accounts provide only a general description of the "Hanalei Grade," the project probably realigned the road by replacing the steep switchbacks that descended to the Hanalei River (as described by Knudsen in 1895) with a new section of road built on an easier grade. Construction of the new Hanalei Hill grade most likely realigned the road to its current route between the Hanalei Bridge and Princeville. The Hanalei Grade was constructed in two sections, the first of which was completed by December 1911.[18] The second section was expected to be ready by March 1912 if the weather cooperated.[19]

Concurrent with the construction of the new grade descending to the Hanalei River was the plan to build a new steel bridge at Hanalei. Although the SPW had strongly recommended that concrete be used in new construction, the LFC authorized $3,500 for a steel bridge over the Hanalei River.[20] Commissioners had approved funding for a number of concrete bridges for Kaua'i, but did not explain why the new bridge at Hanalei would be constructed of steel. In all likelihood, a steel bridge was chosen due to the long span required to cross the Hanalei river. In addition, the bridge was built on high abutments in order to keep the structure above the flood stage. A concrete bridge over the Hanalei River would have required the construction of high piers, which would have been more expensive and more technically difficult.

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[16] "A Happy Day In Sight," *Garden Island,* July 10, 1917.
[17] "County Fathers in Busy Meeting," *Garden Island,* June 13, 1911.
[18] "Loan Fund Meets," *Garden Island,* December 11, 1911.
[19] "Loan Fund Members Hold Monthly Meet," *Garden Island,* January 16, 1912.
[20] "Loan Commission Holds Meeting," *Garden Island,* July 25, 1911.

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CONTINUATION SHEET

Section 7 Page 8

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)

The advertisement for bids on the Hanalei Bridge called for a Pratt truss steel bridge with "all necessary bolts and rivets for erecting." The 16'-wide structure was to have a floor system of steel beams, wooden stringers, and a wooden floor. The bridge was designed to carry a "16-ton traction engine trailing three 10 ton wagon [sic] on 10 foot wheel bases." The commission demanded that the bridge be delivered "entirely free of rust."[21] The LFC purchased the bridge, which was prefabricated in New York by Hamilton and Chambers, from the Honolulu Iron Works Company.[22] Records do not indicate who installed the bridge; it may have been constructed by LFC or territorial laborers. The new Hanalei Bridge was 113'-feet long with a span of 106' and a horizontal clearance of 17'.[23] The bridge opened to traffic at the end of 1912.[24]

Kaua'i's bridge-building program was extensive in 1912. During a special meeting in May, the LFC decided to build "a number of bridges" near Hanalei, including Waikoko, Waipā, and Wai'oli. The LFC instructed Moragne to prepare plans and specifications for concrete structures, and he designed three flat-slab bridges with solid concrete parapets.[25] Within months of Moragne's assignment, contracts were authorized for George Mahikoa to build the Wai'oli and Waikoko bridges; and George Ewart to build Waipā Bridge.[26] Work on the new bridges began almost immediately and was none too soon. In August 1912, three of the timber bridges that were to be replaced collapsed under the strain of wagons delivering crushed rock for the new concrete bridges.[27]

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[21] "Tenders, Steel Bridge," *Garden Island,* August 8, 1911.
[22] "Meeting of the Loan Fund Commission," *Garden Island,* September 12, 1911; "Loan Com. In Busy Meeting," *Garden Island,* September 26, 1911; original bridge plaque notes Hamilton & Chambers as designers.
[23] "Loan Com. In Busy Meeting," *Garden Island,* September 26, 1911; "Hamilton and Chambers" noted on plaque on Hanalei Bridge.
[24] "Kaua'i Loan Fund Meets," *Garden Island,* January 21, 1913.
[25] "Loan Fund Commission," *Garden Island,* May 29, 1912.
[26] "Loan Fund Meets," *Garden Island,* July 16, 1912.
[27] "Bridges Collapse," *Garden Island,* August 6, 1912.

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Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Description (continued)

In November 1912, Moragne reported that bridge construction in the Hanalei District was progressing satisfactorily. Waipā Bridge was completed. Wai'oli and Waikoko, along with the Hanalei Bridge, were expected to be completed by the end of the year.[28] With the completion of another bridge at Kīlauea, the Hanalei District had five new bridges in 1912. The local newspaper, the *Garden Island,* remarked that Hanalei's new concrete bridges stood out in comparison to the unsatisfactory roads in the area.[29]

Despite the charge of bad roads in the Hanalei area, the LFC had also appropriated small sums to do road work between Hanalei and Hā'ena. In 1911 the commission instructed Moragne to prepare plans for straightening the road.[30] By early 1912 "considerable" repair work had been accomplished with "telling results," including the correction of two "disagreeable" curves.[31] With Moragne's $1,000 budget for road work spent, the LFC added another $2,000 to continue work between Hanalei and Hā'ena.[32]

Completion of the Kaua'i Belt Road entered its final phase in early 1915 when Supervisor Menefoglio proposed a $100,000 bond to complete the road from Mānā (Barking Sands) to Hā'ena. He estimated that by immediately funding the road work through bonds, Kaua'i could finish the belt road in two years. He noted that if the LFC continued to rely on funding from the territorial legislature, finishing the belt road would take another eight years. He emphasized that Kaua'i would immediately benefit from a good road, as it would increase property values and provide a "great advertisement" for the island. Moragne also favored building the road immediately, agreeing that a two-year project would save money in the long run.[33]

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[28] "County Work is progressing," *Garden Island,* November 19, 1912.
[29] "Hanalei's Bridges," *Garden Island,* January 7, 1913.
[30] "Minutes of a Special Meeting of the Members of the Kaua'i Loan Fund Commission Held at Līhu'e, Kaua'i, August 17, 1911," *Garden Island,* August 22, 1911.
[31] "County Roads Are Getting Into Shape," *Garden Island,* February 6, 1912.
[32] "Loan Fund Commissioners in Meet," *Garden Island,* May 14, 1912.
[33] "Chamber of Commerce," *Garden Island,* February 9, 1915.

Narrative Description (continued)

Instead of completing work on the belt road with bonds, Moragne apparently "plugged away" at the reconstruction and macadamizing of the belt road using money from his regular budget. By August 1916, the final section of the Hanalei portion of the belt road, a stretch of road popularly known as the "Hanalei Road," was ready to be paved from Moloa'a to Hā'ena. Moragne was quite pleased with the county's excellent progress. A year later, work was proceeding rapidly and the belt road that connected Wahiawa in west Kaua'i to Wainiha on the North Shore was nearly completed. The *Garden Island* noted that Kaua'i was the first island in Hawai'i to complete its belt road, even though the road only went about halfway around the island.[34]

Continuing Progress and Completing the Road to Hā'ena

After the concentrated efforts to complete the Kaua'i Belt Road, Moragne and his successor, R. L. Garlinghouse, continued the program of bridge construction and maintenance. Bridges were built at Wainiha and Hā'ena, the Waipā Bridge was extended, and the Lumaha'i Bridge was reinforced. In addition, the belt road was improved and extended to Hā'ena.

By 1921, three bridges were required to carry the road over the Wainiha River. At least one bridge crossed the Wainiha River between 1904 and 1918, a two-span timber truss structure located on the site of what is today known as Wainiha Bridge #3.[35] In 1918, county financial records indicated that $4,188 was disbursed for the Wainiha Bridge from the "permanent improvement fund."[36] That year, J. H. Moragne prepared plans for a two-span Wainiha Bridge, which indicated that the circa 1904 bridge was completely replaced. Moragne's plans provided for new concrete abutments and included a detailed list of lumber, iron, and nails required for construction. The 1918 plans specified a taller truss and larger members than the earlier bridge,

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[34] "Final Stretch of the Hanalei Road," *Garden Island,* August 15, 1916; "A Happy Day In Sight," Garden Island, July 10, 1917.

[35] Photograph Album 43, "Public Works Projects, 1904-1905," 26. There is also a 1907 Wainiha Bridge plan by J. H. Moragne, County Road Supervisor that postdates construction and may have been drawn to facilitate bridge maintenance and/or repairs.

[36] "Receipts and Disbursements, 1918, County of Kaua'i," *Garden Island,* January 21, 1919.

which provided a greater load capacity.[37] The 1918 plans indicated two 75'-6" spans, which were quite close to the current bridge's length of 146'.

In January 1921 the Wainiha River cut a new channel during a storm, which necessitated another bridge, as flooding had carved a "long slim island out of the agricultural land of the valley." The *Garden Island* reported that the new bridge would "make three bridges in the valley, in within [sic] a distance of about 500 yards."[38] This third structure at Wainiha became known as Wainiha Bridge #2. Plans for a new single-span bridge of 75' were drawn in 1922. The design was a timber-truss structure that complemented the adjacent timber-truss bridge (Wainiha #3).[39] Even though the plans were drawn in February 1922, a construction date was not determined. The Territorial Highway Department records state that the bridge was constructed in 1931.[40] No information was located to indicate when the original Wainiha Bridge #2 was built, although it may have been built as early as the first decade of the twentieth century.

In 1925, the Kaua'i Board of Supervisors decided to extend the Belt Road from the end of its pavement at Wainiha to the Dry Cave at Hā'ena. The Superintendent of Public Works expected to obtain additional funding to extend the road to the Wet Caves. Since a road already ran to Hā'ena and there was an existing trail from Hā'ena to Kē'ē Beach,[41] the "Hā'ena Road Extension" project probably improved the existing road to Hā'ena and built a new road from Hā'ena to Kē'ē Beach. The road was macadamized in 1926.[42] Almost $3,000 in additional funding was

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[37] J. H. Moragne, "Wainiha Bridge, Two Spans, County of Kaua'i" plans, January 21, 1918; J. H. Moragne, "Wainiha Bridge" plans, 1907.
[38] "Destruction at Wainiha," *Garden Island*, January 25, 1921.
[39] County of Kaua'i, District of Hanalei. "75 Ft. Bridge for Wainiha" plans, February 1922.
[40] Territory of Hawai'i, Territorial Highway Department, Hawai'i Highway Planning Survey, *Bridge Inventory for the Island of Kaua'i.* In cooperation with the U.S. Department of Commerce, Bureau of Public Roads. 1950. Bridge Data Sheets for Wainiha Bridge #1, #2, and #3.
[41] United States Geological Survey. Topographic Map of the Island of Kaua'i, Kaua'i County, Hawai'i. (Washington, D.C.: USGS, 1912.)
[42] Kaua'i County Clerk, Index File: Kaua'i Board of Supervisors, Resolution No. 2, Approved January 6, 1926.

appropriated for the extension in 1927,[43] and land was taken in mid 1928.[44] This additional appropriation and land may have provided for the road to be extended to the Wet Caves/Kē'ē Beach.

The road improvements near Hā'ena included two small concrete-frame bridges with solid concrete parapets constructed in 1926. County appropriations funded the structures, one of which was near the Hā'ena School and the other near the Dry Cave. The Hā'ena bridges were designed by County Engineer R. L. Garlinghouse[45] and built by contractor George W. Mahikoa.[46] The structures may have been the first concrete-frame bridges built on Kaua'i.[47] The Hā'ena bridges reflected the trend towards wider roads and were built approximately 18' wide, significantly wider than most of the other bridges on the North Shore. When Kaua'i began its road-building program in the early 1900s, the average road width was 12', and nearly all the North Shore bridges were less than 14' wide. To meet the needs of increasing traffic, Kaua'i began widening its major roads and bridges to approximately 20' in 1926.

According to Territorial Highway Department reports, the Waipā Bridge was modified and assumed its unusual design of two different bridges in 1925.[48] The original design plans for the Waipā Bridge indicated there was an existing "old" timber bridge over the river in 1912.[49] In

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[43] "Supervisors Hold Regular Meeting," *Garden Island,* January 18, 1927.
[44] "Supervisors Hold Regular Meeting," *Garden Island,* May 15, 1928.
[45] R. L. Garlinghouse, plans for "County of Kaua'i, Hā'ena Road Bridge No. 1," March 1926; plans for "County of Kaua'i, Hā'ena Road Bridge No. 2," March 1926.
[46] Kaua'i County Clerk, Index File: Hā'ena Road Bridges No. 1 & No. 2, Contract for Construction, Geo. W. Mahikoa, n.d.
[47] R. L. Garlinghouse, plans for Ka'awaloa Bridge, October 1926; Kapāhili Gulch Bridge, May 1927; and Kalāheo Bridges Nos. 1 and 2, March 1928.
[48] Territorial Highway Department, *Bridge Inventory for the Island of Kaua'i,* 1950. Bridge Data Sheet for Waipā Bridge. No construction plans or other information was located to confirm the 1925 construction date.
[49] J. H. Moragne, plans for "Waipā Culvert, District of Hanalei," 1912.

addition, a photograph shows that the 1912 concrete bridge served as an extension of the timber bridge and was probably built to span a widened river channel. The photograph shows that one of the timber bridge spans had collapsed, so the second concrete bridge at Waipā apparently became a replacement for the timber bridge.[50] The Waipā Bridge collapsed in 1919 and a temporary trestle of "light construction" was built to span the washout.[51] No plans were found for the new concrete bridge extension, although County Engineer R. L. Garlinghouse drew a similar concrete-slab bridge design for another structure in 1925.[52] The Waipā extension bridge had five spans for a total length of 90'.[53] It was an unusual structure as it did not match the original bridge's width, wall design, or wall height.

Disasters Strike the North Shore Bridges

Various disasters struck some of the North Shore bridges between 1946 and 1968, necessitating repairs and replacements of the structures. In 1946 and 1957 tidal waves destroyed or damaged bridges at Wainiha and Waikoko. In 1966 and 1968 old age affected bridges at Wainiha and Lumaha'i, causing them to collapse.

Hawai'i's well-known April Fool's Day tidal wave of 1946 inflicted Kaua'i's most severe damage in the Hanalei region. At Wainiha, the tidal wave inundated shoreline areas up to the 27' elevation and destroyed both spans of the highway bridge.[54] Waikoko Bridge was also damaged when the tidal wave undermined its eastern abutment, which caused the bridge to sink on one

[50] McKay, Helen, Photograph Album #47b, ca. 1912-1930.
[51] "Meeting of Supervisors," *Garden Island,* April 8, 1919.
[52] R. L. Garlinghouse, plans for "Ma'ulili Bridge Reinforced Concrete Slab, District of Kōloa," February 1925.
[53] Territorial Highway Department, *Bridge Inventory for the Island of Kaua'i,* 1950. Bridge Data Sheet for Waipā Bridge.
[54] Department of the Army, Corps of Engineers, Pacific Ocean Division. *Flood Hazard Information, Island of Kaua'i, Report R49.* (Honolulu: U.S. Army Corps of Engineers, 1973), 12.

side.[55] The bridge settled to rest at an angle of nearly 30 degrees. Several days after the tidal wave, the County Board of Supervisors instructed the county engineer to make plans to rebuild the Wainiha and Waikoko bridges.[56] The Board of Supervisors minutes noted that repairs on the damaged "main" Wainiha Bridge (#3) had begun by mid April.[57] Plans drawn in April 1946 illustrated the Wainiha Bridge #1 replacement. The new timber bridge was 38'-6" long and built on two concrete pile bents and new concrete abutments. The bridge was built of 4" x 14" timber stringers and featured wood railings constructed of 6" x 6" posts and 4" x 6" rails braced to the flooring with 3" x 4" lumber.[58] Waikoko Bridge was repaired by filling the collapsed end of the bridge to a level grade and laying a new roadbed on the bridge. The original bridge still rests on an angle, resulting in a quite unusual looking structure. Rocks were used to rebuild the sunken eastern half of the parapet walls at some point after 1950.[59]

Natural disasters struck the Wainiha bridges on two occasions in 1957. On March 9, three tidal waves struck Wainiha Valley, destroying the west span and small approach span of Wainiha Bridge #3 as well as Wainiha Bridges #1 and #2. The only span that remained after the tidal wave was the east (Hanalei side) span of Wainiha #3.[60] In December, flooding from Hurricane Nina damaged Wainiha Bridge #3 again, making it impassable to traffic until it was repaired.[61]

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[55] Territorial Highway Department, *Bridge Inventory for the Island of Kaua'i*, 1950. Bridge Data Sheet for Waikoko Bridge.

[56] Kaua'i County Clerk, Index File: Wainiha Bridge (and Waikoko Bridge), April 3, 1946

[57] Kaua'i County Clerk, Index File: Wainiha Bridge, April 17, 1946.

[58] County of Kaua'i, Department of Public Works, plans for "Construction of Wainiha Bridge, Wainiha Stream Crossing, Wainiha, District of Hanalei, April 1946."

[59] Territorial Highway Department, *Bridge Inventory for the Island of Kaua'i*, 1950. Bridge Data Sheet for Waikoko Bridge.

[60] Corps of Engineers, *Flood Hazard Information*, 12.

[61] "Wainiha Bridge May Take Six Weeks for Repair Job, Cost Figured at $20,000," *Garden Island*, December 4, 1957.

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Narrative Description (continued)

Kaua'i Department of Public Works plans provided details regarding the replacement bridges erected after the March 1957 tsunami. The new bridges were constructed on existing concrete abutments and piers. The concrete pile bents from the 1946 Wainiha Bridge #1, however, were removed during the 1957 reconstruction. The standard design for each new structure used steel I-beams and 4" x 4" x 1/4" iron-L bracing forming an inverted truss. The bridges had 4" x 12" timber floor joists and 4" x 12" and/or 2" x 12" wood flooring. Each bridge featured 2" x 4" wood railings and "wheel guards" or curbs constructed of 4"-wide lumber. Bridges #2 and #3 were 8'-10" wide, and Bridge #1 was 8'-3" wide. Wainiha Bridge #2 was built on a skew. The Wainiha Bridge #3 plans revealed that the structure, while always referred to as having two spans, was a three-span bridge constructed on two concrete piers. The west pier was only 22' from the west abutment and supported the bridge approach from the Hā'ena side. This short span was also rebuilt in 1957. Several plans noted that the bridges built in 1957 were "temporary."[62]

CULVERTS

Numerous reinforced-concrete pipe culverts are located between Mile Marker 8.9 near Hā'ena Beach County Park and the end of the road at Mile Marker 10. Although unable to date the structures' construction, the culverts appear to be of historic significance. The structures are simple in construction and feature a small concrete headwall on both sides of the road (see photograph #20). In addition, several pipe culverts (near Mile Marker 1.3 and 1.4) along the Hanalei River feature headwalls constructed of rubble masonry (photograph #21).

[62] County of Kaua'i, Department of Public Works, "Location Map Showing Wainiha Stream Crossing, Wainiha, Hanalei, Kaua'i"; the following plans also illustrated the work completed at Wainiha: "Temporary Bridge No. 3B for Wainiha;" "Temporary Bridge No. 2 for Wainiha;" "Wainiha [#3], Hanalei Side;" "Wainiha Bridge No. 3C Hā'ena Side Approach;" "Dimension Diagram Bridge No. 1A & Bridge #2."

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Narrative Description (continued)

VISTAS and VIEWS

The Kaua'i Belt Road between Princeville and Hā'ena rewards motorists with a variety of scenic views throughout its course, including beaches, ocean, mountains, waterfalls, vernacular architecture, native and exotic vegetation, and traditional landscapes. Many of these views are unchanged since the 1920s when the road was completed.

Viewpoints and pullouts are scattered throughout the Kaua'i Belt Road corridor. Motorists can also stop at beaches to enjoy the views. Many of the pullouts are recent additions to the roadway, for example, the pullout on the hairpin curve descending from Princeville to the Hanalei Bridge that provides a view of Hanalei Bay and the North Shore. The most impressive view from the Kaua'i Belt Road between Princeville and Hā'ena is that from the Hanalei Valley Scenic Overlook, which is considered a contributing resource and located near Mile Marker 0. The overlook provides a stunning view of the Hanalei Valley approximately 160' below. Travelers have enjoyed this view throughout twentieth century. In 1912, Alonzo Gartley photographed the expansive Hanalei Valley from this point. Ray Jerome Baker photographed the valley in 1915.

The Kaua'i Belt Road along the island's north shore provides one of Hawai'i's finest opportunities to view traditional cultural landscapes. *Kalo lo'i* (taro patches) are visible in Hanalei Valley, Wainiha Valley, and near Hā'ena State Park. Each of the North Shore's river valleys has numerous *kalo lo'i*. Hanalei Valley, now a National Wildlife Refuge, is considered to be Hawai'i's major producer of *kalo*.

Native vegetation along the Kaua'i Belt Road includes hala, coconut, and naupaka. For the most part, the roadside vegetation is dominated by exotics, including the abundant ironwood trees.

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Narrative Description (continued)

Alterations

In September 1966, the east span of Wainiha Bridge #3 collapsed. The 1918 truss bridge that survived two tidal waves and flooding had outlived its expected twenty to thirty year operational life. A new span was built using the same plan as the 1957 Wainiha bridges.

In 1967, the 1905 Lumaha'i Bridge fell into the river. The Hawaiian Dredging and Construction Company was already working on a new reinforced-concrete bridge a short distance upstream of the old bridge. The work had been underway for three months and was expected to take another seven months to complete.[63] The new eight-span Lumaha'i Bridge was super-elevated and built on a 60 degree skew. The two-lane structure was 535' long and 28' wide. Construction included a realignment of the bridge approaches, relocating the bridge and road away from the beach and on a wide curve. The new alignment replaced a sharp 45-degree turn on the west approach of the old bridge.[64] The massive new bridge was a sharp contrast to the small-scale early twentieth century bridges built on Kaua'i's North Shore. The road realignment appears to be the only change to the historic alignment since the Hanalei Grade replaced the switchbacks in 1913. A large abutment from the old Lumaha'i Bridge is on the beach east of the river.

In order to strengthen the aging Hanalei Bridge, a new steel Warren truss was added to the existing Pratt truss in 1967. Transverse floor beams were also added below the existing floor beams. Additional plates and welds were installed on the Hanalei Bridge in 1973.[65] In 1988 the Hanalei Bridge was restored, which included strengthening the Warren trusses and adjusting the Pratt trusses; cleaning and painting the structural steel; replacing the timber deck and stringers; installing reinforcing plates and angles; and adjusting the tensioning rods under the floor beams.[66]

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[63] "Old bridge collapses at Hanalei," *Honolulu Star-Bulletin*, October 20, 1967.
[64] State of Hawai'i, Department of Transportation, plans for "Lumaha'i Bridge," 1967.
[65] State Department of Transportation, "Kaua'i Belt Road Kalihiwai to Hā'ena: Preliminary Case Report, Hanalei, Wai'oli & Waipā Bridges," 2-3.
[66] State of Hawai'i, Department of Transportation, "As-Built" Plans for Kūhiō Highway Rehabilitation of the Hanalei Bridge, Project No. 56D-01-87M, 1988.

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Narrative Description (continued)

In the early 1980s, Hā'ena Bridge #2 was substantially modified when the existing concrete parapets were removed and w-beam guardrails and rub rails were installed to serve as bridge walls. The abutments were rebuilt and at some point a new concrete flat slab was added. The bridge retains no historic integrity and is considered a non-contributing structure. Other minor alterations on the Kaua'i Belt Road over the years include the addition of left-turn lanes and curbs in Hanalei. Near Princeville, the road is wider and has shoulders. Reflectors have been added in many areas along the road.

With the exception of the 1968 Lumaha'i Bridge and the rebuilt Hā'ena Bridge #2, the Kaua'i Belt Road from Princeville to Hā'ena maintains a great measure of historic integrity. The remaining bridges are unaltered. Although most historic bridges in Hawai'i have been altered with the addition of w-beam guardrail approaches, the bridges on Kaua'i's North Shore have not been marred by guardrails. The road's construction materials have changed over the decades, with the original roadbed being dirt. Sections of the road near Hanalei were first paved with macadam circa 1916. In recent decades the road was repaved with asphalt. Although the road itself no longer features original construction materials, other aspects of the route, especially the original alignment, location, rural coastal setting, and narrow width are important features that contribute to the road's integrity as a historic site. For most of the length of the road, there are no guardrails. A few concrete-post and timber-beam guardrails remain, most notably at the Hanalei Valley Scenic Overlook and near Mile Marker 5.6. The road also retains many historic lava-rock walls built to protect motorists along the road's precipitous drop-offs. Many of these rock walls have been undermined by collapsing soil or through the additional layers of asphalt that reduce the wall height. In early 2002, the state DOT installed w-beam guardrails in a few areas. In several locations, several grated drop inlets and concrete gutters have also been installed

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Narrative Description (continued)

Inventory of Contributing and Non-contributing Overlooks, Bridges, and Significant Culverts
Listed in geographical order west from Mile Marker 0 at Princeville:

Kaua'i Belt Road, Princeville to Hā'ena, Mile Marker 0 - 10. A contributing site, the road maintains historic integrity in its original location and alignment, rural coastal setting and feeling. The road is still narrow in many locations and has no shoulder (except near Princeville.)

Hanalei Valley Scenic Overlook: A contributing site, the Hanalei Valley Scenic Overlook has been an established viewpoint since at least the early twentieth century. In 1912, Alonzo Gartley photographed Hanalei Valley from this point. Ray Jerome Baker photographed from this site in 1915. The site features timber guardrails.

Hanalei Bridge. built 1912, steel through truss (Pratt truss); timber deck and stringers; reinforced concrete abutments; one span; 106'; total bridge length 113'; bridge width 17'; minimum overhead clearance 15'. Designer: Pratt truss by Hamilton and Chambers, New York. Altered: Warren truss added to original Pratt truss in 1967. Restored 1989. Determined eligible for the National Register in 1978.

Culvert #1: concrete-frame with solid concrete parapet; one span 10'; total length 15'; culvert width 28'. (Located near Mile Marker 2.0.)

Culvert #2: flat-slab concrete on CRM abutments, solid concrete parapet with square concrete rail cap; one span 15'; total length 17'; culvert width 23'. (Located near Mile Marker 2.4.)

Culvert #3: concrete-frame with solid concrete parapet; one span, 12'; total length 17'; culvert width 30'. (Located near Mile Marker 2.6.)

Wai'oli Bridge: built 1912; concrete flat slab; solid concrete parapet with square concrete rail cap; three spans, 28'; total length 90'; bridge width 13'. Designer: J. H. Moragne, County Engineer. Builder: George W. Mahikoa. Determined eligible for the National Register in 1978.

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Narrative Description (continued)

Waipā Bridge: built 1912; concrete flat slab; three spans, 16'; total length 45'; bridge width 13'. Designer: J. H. Moragne, County Engineer. Builder: George R. Ewart, Jr. Extension bridge: built circa 1925; concrete flat slab; five spans, 16'; total extension length 90'; bridge width 16'. Both bridge parapets are solid concrete with rail caps. Bridges are different widths and parapets are different heights. Determined eligible for the National Register in 1978.

Waikoko Bridge: built 1912; concrete flat slab; solid concrete parapet with rail cap; one span, 43'; total length 45'; bridge width 13'. Designer: J. H. Moragne, County Engineer. Builder: George W. Mahikoa. East abutment undermined in 1946 tidal wave; parapets rebuilt with lava rock.

Lumaha'i Bridge: built 1967, two lanes, eight spans.

Wainiha Bridge #1: built 1957 on existing reinforced concrete abutments (1946); steel truss with timber deck; timber railings; one span, 39'; total length 42'; bridge width approximately 11'.

Wainiha Bridge #2: built 1957 on existing reinforced concrete abutments (circa 1922-1930); steel truss with timber deck; timber railings; one span, 74'; total length 78'; bridge width approx. 10'.

Wainiha Bridge #3: west span built 1957, east span built 1966; reinforced concrete abutments built 1918; steel truss with timber deck; timber railings; two spans, 73'; total length 146'; bridge width approximately 11'.

Hā'ena Bridge #1: built 1926; concrete frame; concrete parapet with rail cap; one span, 11'; total length 22'; bridge width 18'. Designer: R. L. Garlinghouse, County Engineer. Contractor: George W. Mahikoa. Bridge has settled to one side and rests at a slight angle.

Hā'ena Bridge #2: built 1926. Lost historic integrity in early 1980s when concrete parapets were removed and w-beam guardrails and rubrails were installed as bridge walls.

Mānoa Ford: construction probably dates to circa 1928 when "Hā'ena Extension" road was built. Ford width approximately 18'.

Limahuli Culvert: construction probably dates to circa 1928 when "Hā'ena Extension" road was built. Flat slab on CRM pier and abutments. Culvert width is 16'-8". No parapets.

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Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

The Kaua'i Belt Road achieves state and local significance in the areas of engineering, transportation, and social history under criteria A and C. The construction of bridges and a road from 1900 to 1957 was a major transportation achievement, as the County of Kaua'i and private contractors improved an old trail/road system and built bridges to span the North Shore's wide rivers. Thirteen bridges and culverts built between 1912 and 1957 remain along the route as an example of bridge engineering and construction in Hawai'i during the early twentieth century. The completion of an automobile route to Hā'ena circa 1928 provided modern, convenient transportation to the North Shore and its scenic and natural features. The road connected north shore residents with the rest of Kaua'i and provided an overland transportation for agricultural enterprises. The Kaua'i Belt Road is the only remaining intact example of the old belt road system on the island of Kaua'i. The Kaua'i Belt Road from Princeville to Hā'ena retains historic integrity in its original road alignment, narrow lanes, bridges, and spectacular setting along Kaua'i's north coast.

Engineering

Several segments of the north shore section of the Kaua'i Belt Road were impressive engineering feats for early twentieth-century Hawai'i. Although there was an existing trail over the ridges that separated the river valleys, improved roads across those ridges had to be blasted out of the mountainsides. One of the most notable construction projects was the "Hanalei Grade" or "Hanalei Hill," built in 1912 and 1913. The Hanalei Grade was one of the Kaua'i Loan Fund Commission's earliest projects, reflecting the commission's efforts to eliminate sharp curves and steep grades on the island's belt road. The "Hanalei Grade" replaced the steep switchbacks that descended the Hanalei Hill from Princeville to the Hanalei Bridge. This type of road improvement transformed old carriageways into roads that could be easily negotiated by the automobiles that were introduced to the islands in the early 1900s. Although maps to confirm the 1913 realignment of the road descending Hanalei Hill have not been located, there is no physical evidence of other nearby road alignments, indicating that the road alignment descending to the Hanalei Bridge from Princeville dates to 1913. (The old switchback road is still evident.) Building this section of road from 1911 to 1913 was not an easy task. Only one

contractor, George Mahikoa, bid on the project. The work was dangerous, and one worker almost died when he was buried in an excavated section that had collapsed.[67]

The majority of bridges on Kaua'i's North Shore were built using construction methods and materials typical in Hawai'i during the early twentieth century. The steel bridges at Lumaha'i and Hanalei reflected a popular technology at the end of the nineteenth century and early twentieth century. Numerous steel bridges were built throughout the Hawaiian Islands, as builders favored the material's strength over long spans. Today, only a handful of steel bridges remain in the Hawaiian Islands, including the Hanalei Bridge, which is one of two remaining Pratt-truss structures in the state. The Hanalei Bridge is a quite unusual structure because of the addition of a Warren truss in 1967. One bridge engineer deemed the added truss as an "ingenious solution" for strengthening the bridge.[68]

By the 1910s, reinforced concrete became the favored construction material for bridges in Hawai'i due to the corrosive nature of the Pacific Ocean's salt air and the presence of wood-boring insects that made the use of steel and timber bridges less practical in Hawai'i than in the mainland United States. Engineers and the Loan Fund Commissions observed that although concrete was more expensive to build, the increased cost was justified due to concrete's durability as well as lower maintenance and repair costs. Three north shore bridges built in 1912, Wai'oli, Waipā, and Waikoko, were flat-slab reinforced concrete construction. Designed by the County Engineer J. H. Moragne and built by local contractors, these bridges were simple in appearance, but functional. The bridges are a fine representation of engineering technology and design in the early twentieth century. The use of reinforced concrete indicated that the Territory of Hawai'i and the County of Kaua'i were committed to building permanent public works improvements.

The Wainiha Bridges (#1, #2, and #3) are unique in Hawai'i. Designed to be built quickly and inexpensively, the bridges were an expedient response to the destructive 1957 tidal wave that stranded residents on the west side of the Wainiha River. The county Department of Public

[67] "Hanalei Road-Hand Buried Under Cave-In," *Garden Island,* September 5, 1911.
[68] Jan TenBruggencate, "This Bridge Breathes," *Garden Island,* April 22, 1986.

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 8 Page 3

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Statement of Significance (continued)

Works wasted no time designing new bridges to reconnect the north shore communities, and plans were ready within weeks. The designers used materials that were readily available and had been traditionally used on Kaua'i: steel I- beams, 12" lumber for decks, and 2" x 4"s for railings. Almost fifty years later, the bridges are an important feature of the North Shore's rural landscape and an integral part of its historic belt road.

Talented local engineers were responsible for the design and construction of the belt road and its bridges. The *Garden Island* newspaper credited County Engineer J. H. Moragne with designing and building the Kaua'i Belt Road. Moragne was a road supervisor in 1911 when the Kaua'i Loan Fund Commission appointed him to the position of County Engineer. He had a civil engineering degree from Auburn Technical Institute and came to Hawai'i in 1898. Although his major accomplishment as a public employee was the completion of the Kaua'i Belt Road, Moragne was also associated with numerous other engineering projects on Kaua'i. He had considerable experience as a plantation engineer, designing and building irrigation systems, tunnels, bridges, and reservoirs. He also designed and installed the water-collection system for the Wainiha Power Plant.[69] Little is known about Moragne's successor, R. L. Garlinghouse. His name appears on numerous 1920s bridge plans for the island of Kaua'i, including the concrete-frame Hā'ena Bridges #1 and #2, built in 1926.

Transportation, Commerce, and Social History

Belt road projects were a significant element in the transportation history of the Hawaiian Islands. The roads served to connect isolated communities to their island's economic, political, and social centers. Kaua'i congratulated itself on being the first island to achieve the completion of its belt road system. Although its belt road only stretched between Wahiawa and Wainiha by 1917, not Mānā to Hā'ena as expected, Kaua'i boasted that no other island had achieved such an accomplishment. By the late 1920s, the road was extended and improved to Hā'ena. Jealousy from other islands was apparent, with one Maui legislator complaining that Maui was "the only

[69] Carol Wilcox, *Sugar Water: Hawai'i's Plantation Ditches.* (Honolulu: University of Hawai'i Press, 1996), 70.

island on which you cannot traverse by road around it."[70] Although Maui's belt road to Hāna was opened in 1926, the entire belt road around east Maui was not completed until the 1950s. Like Kaua'i, the island of Hawai'i, due to its rugged topography, never achieved a belt road that completely encircled the island.

The completion of the belt road along Kaua'i's North Shore was a significant achievement for area residents. One Hanalei citizen reported that the road between Wainiha and Kalihiwai was in good condition, which was valuable because the weekly steamer no longer served the area. The belt road was essential for local merchants who had to haul their goods to Hanalei.[71]

The Kaua'i Belt Road was a testament to civic pride on Kaua'i during the early twentieth century. Although the road did not cover as much territory as Supervisor Menefoglio had envisioned, civic pride in Kaua'i's belt road achievement was abundant. The *Garden Island* bragged that Kaua'i would "have the finest road system on the Islands" and "a blessing that no other island enjoys." The writer expected the other islands would try to belittle Kaua'i's accomplishment by pointing out that the island was small and the belt road went only halfway around it. He was not discouraged, however, pointing out, "We've got our road and are enjoying it . . . we would advise you to put your energy in your own roads."[72] Kaua'i was making tremendous progress even if its belt road did not completely encircle the island. The island began macadamizing its roads in 1906, and by 1917 planned to have all the main roads paved.[73] It also adopted a policy of oiling all macadamized roads "in the interest of travel comfort" and to improve the life of the roads. Parapet rock walls were built to protect drivers along more dangerous areas.[74]

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[70] "Roads First Need View of Fassoth," *The Maui News*, February 11, 1921.
[71] "Hanalei Notes," *Garden Island*, May 20, 1919.
[72] "A Happy Day In Sight," *Garden Island*, July 10, 1917.
[73] "Road Maintenance on Kaua'i," *Garden Island*, September 25, 1917. In contrast to Kaua'i's early paving achievements, Maui's Belt Road to Hāna was completed in 1926 but not completely paved until the 1960s.
[74] "Road Progress," *Garden Island*, July 24, 1917.

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 8 Page 5

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

Narrative Statement of Significance (continued)

Kaua'i residents enthusiastically noted that their roads were the best in the Territory of Hawai'i. Most of the road between Līhu'e and Waimea was supposedly as "smooth as a parlor floor." A *Garden Island* writer noted that elsewhere in Hawai'i, particularly on the Big Island, the roads were so rough and rocky that automobile tires were worn out every few hundred miles. He mentioned a car that recently drove around the Big Island and consumed eight new tires in the process. The writer observed, "It pays to construct the best and most durable roads that can be made. . . Kaua'i is prety [sic] well up to date."[75] Some considered good roads a community's most valuable asset, especially on Kaua'i where a variety of scenic roads appealed to tourists.[76] With the belt road completed, a 1918 Hawai'i Tourist Bureau guide to Kaua'i was already promoting activities in the Hanalei area, including "splendid sea bathing," driving and riding trips to the surf at Lumaha'i Beach, the interesting caves at Hā'ena, and even the Wainiha Power House. During the summer, a trip by outrigger canoe was "guaranteed to thrill even the most unimaginative."[77]

Today, a trip along the north shore section of the Kaua'i Belt Road provides an opportunity for motorists to view much of what excursionists would have seen in the late 1920s. The road provides spectacular scenery, with views of Kaua'i's natural beauty: beaches, ocean, and verdant mountains. It provides access to the same activities that attracted tourists in 1918, including beaches, kayaking/canoeing, and the caves at Hā'ena. The rural thoroughfare also affords an important glimpse into Hawai'i's past. Motorists passing through Hanalei may visit the Wai'oli Mission Historic District, which dates to the mid-nineteenth century missionary era. Driving the Kaua'i Belt Road corridor provides a look into Hawai'i's ancient past, as motorists view the *kalo lo'i* and traditional cultural landscapes. The Kaua'i Belt Road along the north shore, with its curvilinear alignment that gently follows the topography, continues to provide motorists a pleasing, scenic journey much as it did in the early twentieth century.

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[75] "Kaua'i's Good Roads, *Garden Island,* January 15, 1918.
[76] "Kaua'i Has the Best Roads in the Territory," *Garden Island,* June 18, 1918.
[77] H. E. Newton. *Kaua'i, Hawaiian Islands.* ([Honolulu]: Hawai'i Tourist Bureau, 1919).

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 9 Page 1

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

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National Park Service

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CONTINUATION SHEET

Section Additional Documentation: Photographs Page 1

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

All photographs were taken by Dawn E. Duensing, who also has all negatives.

1. Kaua'i Belt Road (North Shore section)
2. Kaua'i County, Hawai'i
3. Dawn E. Duensing
4. February 9, 2002
5. Dawn E. Duensing
6. Hanalei Bridge, view looking east
7. Photograph #1

4. March 27, 2002
6. Culvert #1, view looking mauka (towards the mountains)
7. Photograph #2

4. March 27, 2002
6. Culvert #2, view looking mauka
7. Photograph #3

4. March 27, 2002
6. Culvert #3, view looking makai (towards the ocean)
7. Photograph #4

4. February 9, 2002
6. Wai'oli Bridge, view looking makai (toward the ocean)
7. Photograph #5

4. February 9, 2002
6. Waipā Bridge, view looking west
7. Photograph #6

4. February 9, 2002
6. Waikoko Bridge, view looking mauka (toward the mountains)
7. Photograph #7

United States Department of the Interior
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NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section Additional Documentation: Photographs Page 2

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

4. October 15, 2001
6. Wainiha Bridge #1, view looking west
7. Photograph #8

4. October 15, 2001
6. Wainiha Bridge #2, view looking east/makai
7. Photograph #9

4. October 15, 2001
6. Wainiha Bridge #3, view looking makai
7. Photograph #10

4. October 15, 2001
6. Hā'ena Bridge #2, view looking mauka
7. Photograph #11

4. February 9, 2002
6. Mānoa Ford, view looking east
7. Photograph #12

4. March 27, 2002
6. Limahuli Culvert, view looking mauka
7. Photograph #13

4. February 9, 2002
6. road along Hanalei Bay, view looking west at Waikoko Bridge
7. Photograph #14

4. March 27, 2002
6. Hanalei Valley scenic overlook with historic timber guardrails, view looking mauka
7. Photograph #15

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section Additional Documentation: Photographs Page 3

Name of property Kaua'i Belt Road
County and State Kaua'i County, Hawai'i

4. October 15, 2001
6. serpentine road with lava rock parapets, vicinity Mile Marker 6, view looking east
7. Photograph #16

4. October 15, 2001
6. pullout, historic timber guardrails, vicinity Mile Marker 5.2, looking west
7. Photograph #17

4. October 15, 2001
6. serpentine road descending to beach, vicinity Mile Marker 4.5, native hala trees alongside road; looking east towards Waikoko Beach
7. Photograph #18

4. February 9, 2002
6. road ascending mountain ridge west of Waikoko Bridge, view looking west
7. Photograph #19

4. October 15, 2001
6. typical concrete culvert and headwall located in Hā'ena area, this culvert near Mile Marker 9.
7. Photograph #20

4. March 27, 2002
6. CRM headwall, one of two located along Hanalei River near Mile Marker 1.3.
7. Photograph #21

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC North Shore Route

AND/OR COMMON

2 LOCATION

STREET & NUMBER from Hanalei Bridge to Haena — __NOT FOR PUBLICATION

CITY, TOWN Hanalei District — __ VICINITY OF — CONGRESSIONAL DISTRICT

STATE Kauai — CODE — COUNTY — CODE

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
X DISTRICT	X PUBLIC	__OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
__STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	PUBLIC ACQUISITION	ACCESSIBLE	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME State of Hawaii

STREET & NUMBER Department of Transportation

CITY, TOWN Lihue, Kauai 96766 — __ VICINITY OF — Hawaii STATE

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC. Department of Transportation

STREET & NUMBER Lihue, Kauai

CITY, TOWN — Hawaii STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE Bridge Data Sheet — Environmental Impact Statement (to be released by DOT)

DATE October 20, 1950 — __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS Department of Transportation

CITY, TOWN Lihue, Kauai, Hawaii 96766 — STATE

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	X DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

see attached architectural description of bridges and photographs

SIGNIFICANCE

PERIOD

—PREHISTORIC
—1400-1499
—1500-1599
—1600-1699
—1700-1799
—1800-1899
—1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

—ARCHEOLOGY-PREHISTORIC
—ARCHEOLOGY-HISTORIC
—AGRICULTURE
—ARCHITECTURE
—ART
—COMMERCE
—COMMUNICATIONS
—COMMUNITY PLANNING
—CONSERVATION
—ECONOMICS
—EDUCATION
—ENGINEERING
—EXPLORATION/SETTLEMENT
—INDUSTRY
—INVENTION
—LANDSCAPE ARCHITECTURE
—LAW
—LITERATURE
—MILITARY
—MUSIC
—PHILOSOPHY
—POLITICS/GOVERNMENT
—RELIGION
—SCIENCE
—SCULPTURE
—SOCIAL/HUMANITARIAN
—THEATER
X TRANSPORTATION
—OTHER (SPECIFY)

SPECIFIC DATES 1912-1920 BUILDER/ARCHITECT

STATEMENT OF SIGNIFICANCE

see attachement B

The road that skirts Kauai's North Shore gives access to historic buildings, topographical landmarks associated with legendary and historical events and some of the most photographed vistas of Hawaiian life and landscape.

The road itself includes one of the few remaining one-lane-wood and steel truss bridges in the state, and other one-lane stone, cast-in-place concrete, and wood bridges, and a shallow ford.

The integrity of the winding route is threatened by impending pavement widenings, replacement of all of the one-lane bridges and the ford, a new airport and a proposed shopping center.

It is our intention to preserve this route as one of Kauai's historic and economic resources. The historic and economic value of this route merit public recognition and protection by law.

The route gives access to the following structures as noted on the Kauai Historical Society's Historic Buildings list:

1. Hanalei Huleia Church
2. Waioli Mission Church and Belfry
3. Waioli Pastor's House
4. Waioli Mission House
5. Hanalei School
6. Hanalei Fire Station
7. Dr. Bell's Beach House
8. Gaylord Wilcox Beach House
9. Malolo Road House Complex
10. Lily-Pond House
11. Ching Young Store
12. Japanese School
13. Hanalei Museum
14. Taro Shack
15. Wainiha Power House
16. Waihiha Valley House
17. Wainiha Taro Schack
18. Waimiha Store

The Garden Island Newspaper

File of the County Clerk, Lihue, Kauai

Department of Transportation Bridge Descriptions
File of the Kauai Historical Society

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A			
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE
Julia Neal, Director, Historic Buildings Kauai, Project — Nov. 10, 1976

ORGANIZATION — DATE
Kauai Historical Society Box 248 — 245-6931

STREET & NUMBER — TELEPHONE
Lihue, Kauai, Hi. 96766

CITY OR TOWN — STATE

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 897

ATTACHMENT A-1

ARCHITECTURAL DESCRIPTION AND MERIT

(Also, see Attachment B)

The North Shore Route bridges are interesting architecturally in that they are unobtrusive structures that permit the motorist and pedestrian full view of the environment.

The most ostentacious is the Hanalei Bridge, a simple steel truss structure that provides a gateway to Hanalei Valley and the Na Pali Coast. The majority of the bridges are of stone and concrete and that has been weathered into textures that are contiguous with the rocky streams that they cross.

They are the only one lane bridges in Hawaii that remain in tact, in a series, and in an environment that is harmonious with their design.

WET AND DRY CAVES BRIDGE :

The Wet and Dry Caves Bridge is constructed of an indiginous rock foundation, mounted by a concrete slab. The absence of rails, and other barriers allows the driver and pedestrian an unobstructed view of the stream. The bridge was built close enough to the water so that crossing simulates driving through the stream bed.

HAENA FORD:

The Haena Ford is a shallow crossing made of concrete agregate, that is easily traversed by cars and pedestrians. Floods occuring once in every few years prevent crossing for a few hours.

SHIFTED BRIDGE:

The shifted Bridge is a cast-in-place concrete bridge with a paved deck. It has low, unornamented rails that slant approximately four inches from one end of the bridge to the other. The bridge remains structurally sound.

WAIKOKO BRIDGE:

The Waikoko Bridge is a cast-in-place concrete structure, modified by indigenous rock construction that was added when the bridge fell during the

tidal wave of 1946. The indigenous rock su pports the road built up to meet one end of the fallen concrete bridge and provides low rock wall railings.

WAIPA BRIDGES:

The Waipa Bridges consist of a cast-in place bridge built in 1912 with pointed cap railings and cast-in-place structure with square-topped railings that was added when the 1946 tidal wave changed the course of the stream. The older part of the structure is double-span. The railings have a beveled trim and the bridge shows less wear then the newer, multispan section.

WAIOLI BRIDGE

The Waioli Bridge is a multi-span, cast-in-place concrete bridge with pointed cap railings, built in 1917. It reamins in good condition.

The significance of the North Shore Route was recognized by the Assistant Director of the West Coast Office of the National Trust for Historic Preservation, in a trip report made on July 9, 1976.

In the report, Carol Galbraeth stated: "The road is indeed an exceptionally scenic one and its present character worthy of preservation. Several bridges, especially the Hanalei Bridge and the Wainiha Bridges are worthy of recognition.

She suggested that forms be submitted to the Naltional Register and that the State Office of Historic Preservation request a determination from the Secretary of the Interior concerning their eligibility.

Local concern about the route was shown at a public hearing in the Fall of 1975, which was attended by many Hanalei District residents who stated that they prefer to maintain the integrity of the road. As a result of that hearing the DOT is rewriting the Environmental Impact Statement and will hold another hearing in 1977.

Historical Notes:

The route along Kauai's North Shore has been significant since the prewestern days. Taro, grown in the valleys, was traded for fish caught along the coast, and it was along the coastal route that Hawaiians travelled to Haena to see the fireworks that were thrown off the Na Pali cliffs.

Heiaus remain near the route today and may be affected by any road realignment. Archaeological Research Center Hawaii is reviewing the possible effects of a new highway widening and will submit comments on the heiaus after the DOT releases their new plans.

Westerners began to use the route in the early 1800s. In 1816, Anton Scheffer, a doctor working for the Russian American

Company befriended Kamaulii and made a deal to control the sandalwood business on Kauai. In late September or early October, he raised a Russian flag over Hanalei Valley and called it Schafferthal. He built a Russian Fort approxiamatly one mile from the North Shore Route.

In the 1820's the roadway became an occasional trade artery for bananas, coconuts, breadfruits, sweet potatoes, chickens and pigs, which were exchanged for nails, cloth and other goods brought on ships.

In the 1830's, Hawaiians traded with the missionaries for soap, cloth and household implements. Near the route, some 2,000 local people constructed a grass meeting house as the first structure at Waioli Mission. Today, the remaining buildings at Waioli Mission are listed on the National Register of Historic Places.

The North Shore Route soon became the road that serviced many agricultural experiments that were new to Hawaii. In the 1840s, cattle and sugar were raised and shipped from Hanalei Port. Charles Titcomb started a silk worm venture and Godfrey Rhodes and John Bernart started the first commercial coffee venture in the islands. The September, 1847 issue of Polynesia states that coffee was flourishing in Hanalei.

In the 1850s the road serviced the first commercial tobacco industry in Hawaii. Joseph Gardener began cotton and wool processing. The route became increasingly travelled by visitors.

Queen Emma visited the area in 1856 and mainlanders that were connected with the Gold Rush came to Hanalei by ship in the winters. Many Hawaiians from Haena and the Na Pali Coast travelled down the route to Hanalei to join whaling ships.

In the late 1800s the rice industry began and by 1885, 300 Chinese lived in rice camps in Hanalei District. Hanalei

grew to become the largest area under rice cultivation in Hawaii and its two rice mills were serviced by the North Shore Route.

The exact date of the building of the first bridges along the road is unknown. Early tour guides refer to barges that carried travellers and goods across Hanalei and Lumahai Rivers. According to the island's newspaper, The Garden Island, there were bridges by the early 1900s and by 1912 they were ready for replacement:

The Garden Island, August 6, 1912:

"A telephone message was received from Hanalei at noon today to the effect that three bridges in the Hanalei District which are to be replaced with new ones, had collapsed. One bridge had been but fairly cleared by a loaded wagon, when it fell and crashed into the stream, while a second bridge went down carrying part of the wagon with it. Fortunately, the team had secured sound footing and were able to withstand the strain. A third bridge collapsed with no great loss, as the timbers were useless."

"The cause of this wholesale collapsing of bridges is attributed to the constant strain on the old timbers during the last week when wagons, loaded with crushed rock have passed over them."

The bridges that are listed on the North Shore Route in this proposal are those that replaced the ones that were mentioned in the 1912 telephone message. The records of their construction have been lost by the County of Kauai, and are not to be found with the DOT which now has them under its jurisdiction.

A Garden Island article in the first issue of 1913 describes the Hanalei Bridges:

"Standing out in contrast to the present unsatisfactory conditions of the roads as does the diamond outstrip its bed

of mucky surroundings, new concrete bridges now under construction are assuming a finished appearance. A new steel bridge has also replaced the old structure across the Hanalei River."

The bridges have been repaired and some of them have been slightly modified to increase their strengths. Two of the bridges stand as monuments to the 1946 tidal wave.

The Waikokos Bridge fell in the tidal wave, but was modified by indigenous rock which was added to one side to build it up to a level roadway. From the beach, the bridge is an interesting spectacle that looks as though it is fallen and unuseable, when in fact, it remains sturdy.

The Waipa Bridge was elongated in 1946 with an additonal span, after the tidal wave changed the course of the stream that it crosses.

Since the bridges were built, the North Shore Route has become and increasingly significant scenic and historic attraction, and a destination for low key tourism by car and by both persons from off the island and residents from other places on Kauai.

TERRITORIAL HIGHWAY DEPARTMENT
HONOLULU, T. H.

BRIDGE DATA SHEET

Date of Original Inventory: October 20, 1950 Island: Kauai

Bridge Number: 40

Name of Bridge: Hanalei

Location

General Location: Hanalei

Name of Road: Kauai Belt Road Route Number: FAS 243

Name of Road Project: Project Number:

Name of Stream: Hanalei River

Name of Railroad: Number of Tracks:

Map Location: Map - U.S.G.S. Latitude N

Quadrangle: Kapaa Longitude W

Scale: 1/62,500 Coordinates: 833280-2783480

Description (See sketch on reverse side)

Kind of Crossing: Bridge over River

Type of Bridge: Steel Through Truss

Number of Spans:	Length of Spans:	Type:
1	106 ft.	Pratt Truss

Total Length of Center Line of Road: 113 ft.

Materials Used

Substructure:	Superstructure:	Pavement:
Abutments: Reinf. Conc.	Steel	Timber

Construction Data

Date of Construction: 1912; repaired in 1934

Load Limits; Design: Estimated: Posted: 10 Tons

Plans on File with: File No.:

Approach Roadway;

	Width:	Grade:	Alignment:	Surface:
NE	17 ft.			Bit. Surface Tren
SW	17 ft.			" "

Bridge Roadway Width: 17 ft.

Sidewalk Widths; Right: 0 Left: 0

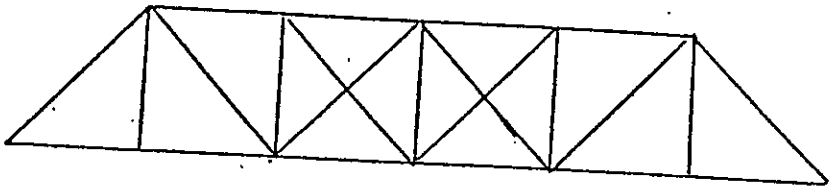
Surface of road to stream bed: 25.5 ft.

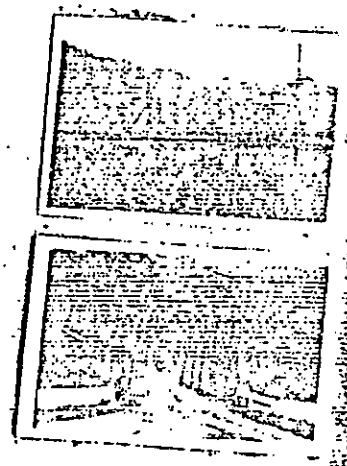
Clear distance of opening above stream bed: 22 ft.

Surface of road to bottom of portal - Minimum overhead clearance 15 ft.

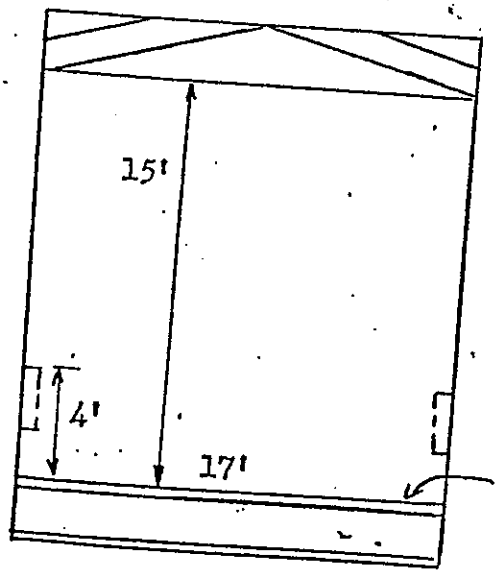
SKETCH

Elevation

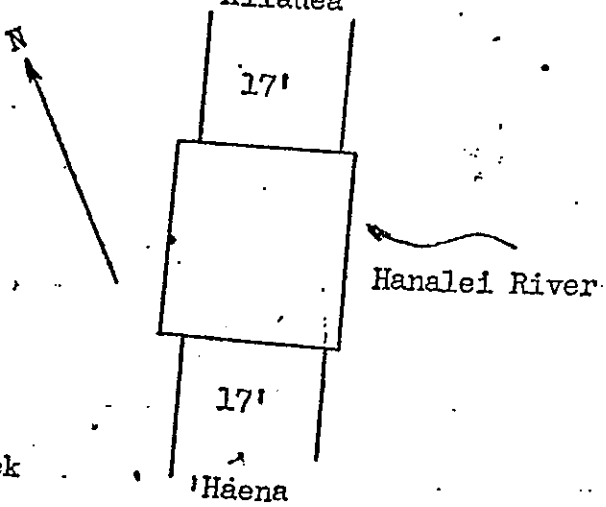




Cross-section



Plan



eneral Condition of Bridge

Superstructure: Fair

Substructure: Fair

Steel beginning to corrode - Railings badly corroded

Date of Inspection: Oct. 20, 1950

Floor: Poor

Paint:

HONOLULU, T. H.

BRIDGE DATA SHEET

Date of Original Inventory: October 20, 1950

Island: Kauai

Bridge Number: 41

Location

Name of Bridge: Waioli

General Location: Hanalei

Name of Road: Kauai Belt Road

Route Number: FAS 243

Name of Road Project: County

Project Number: County

Name of Stream: Waioli Stream

Name of Railroad:

Number of Tracks:

Map Location: Map - U.S.G.S.

Latitude N

Quadrangle: Na Pali

Longitude W

Scale: 1/62,500

Coordinates: 829750-2782330

Description (See sketch on reverse side)

Kind of Crossing: Bridge over Stream

Type of Bridge: Reinforced Concrete

Number of Spans: 3

Length of Spans: 28 ft.

Type: Flat Slab

Total Length of Center Line of Road: 90.5 ft.

Materials Used

Substructure:
Abutments: Reinf. Conc.
Piers: Reinf. Conc.

Superstructure: Reinf. Conc.

Pavement: Bit. Surface Treatment

Construction Data

Date of Construction: 1912

Load Limits; Design:

Estimated: H 15

Posted: None

Plans on File with:

File No.:

Clearances

Approach Roadway;

	Width:	Grade:	Alignment:	Surface:
NE	10 ft.			Bit. Surface Treatment
SW	10 ft.			" " "

Bridge Roadway Width: 13 ft.

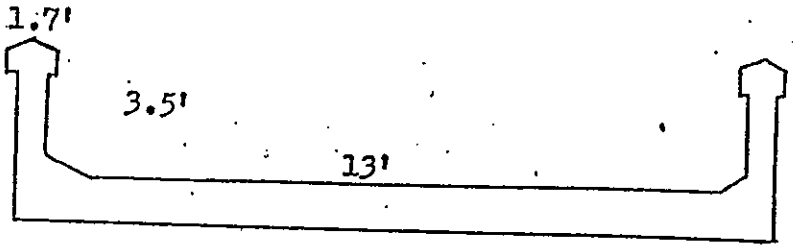
Sidewalk Widths; Right: 0 Left: 0

Surface of road to stream bed: 11 ft.

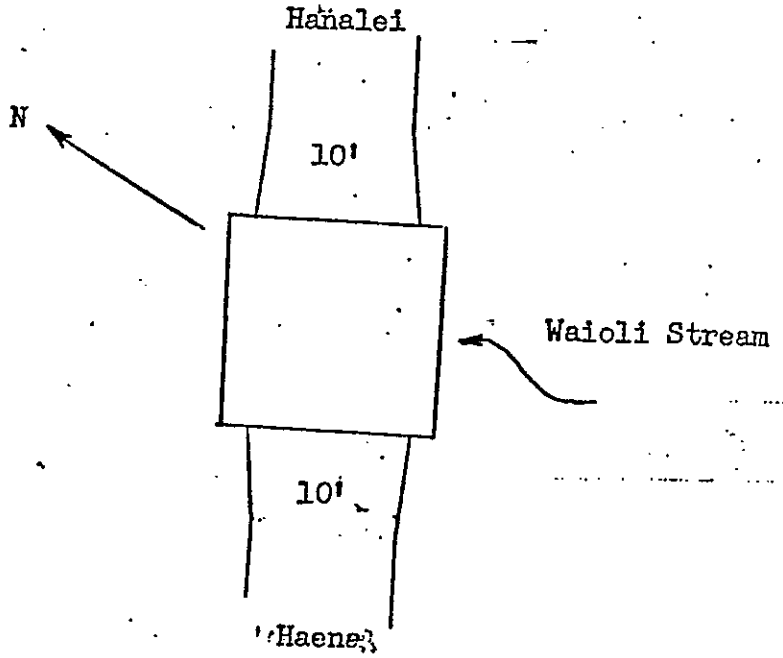
Clear distance of opening above stream bed: 9 ft.

SKETCH

Cross-section



Plan



General Condition of Bridge

Superstructure: Good

Substructure: Good

Date of Inspection: Oct. 20, 1950

Floor: Poor

Paint:

HONOLULU, T. H.

BRIDGE DATA SHEET

Date of Original Inventory: October 20, 1950

Island: Kauai

Bridge Number: 42

Name of Bridge: Waipa

Location

General Location: Hanalei

Name of Road: Kauai Belt Road

Route Number: FAS 243

Name of Road Project: County

Project Number: County

Name of Stream: Waipa Stream

Name of Railroad:

Number of Tracks:

Map Location: Map - U.S.G.S.

Latitude N

Quadrangle: Na Pali

Longitude W

Scale: 1/62,500

Coordinates: 828950-2782750

Description (See sketch on reverse side)

Kind of Crossing: Bridge over Stream

Type of Bridge: Reinforced Concrete

Number of Spans:	Length of Spans:	Type:
8	16 ft.	Flat Slab

Total Length of Center Line of Road: 138.5 ft.

Materials Used

Substructure:	Superstructure:	Pavement:
Abutments: Reinf. Conc. Piers: Reinf. Conc.	Reinf. Conc.	Bit. Surface Treatment

Construction Data

Date of Construction: Original Bridge Built in 1912 Extended in 1925

Load Limits; Design: Estimated: H 15 Posted: None

Plans on File with: County File No.:

Clearances

Approach Roadway;

	Width:	Grade:	Alignment:	Surface:
NW	14 ft.			Bit. Surface Treatment
SE	14 ft.			" " "

Bridge Roadway Width: 13.5 ft. 16 ft.

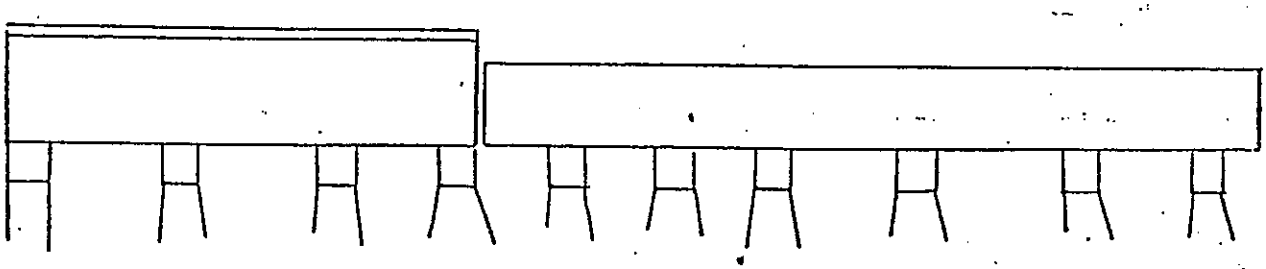
Sidewalk Widths; Right: 0 Left: 0

Surface of road to stream bed: 14 ft.

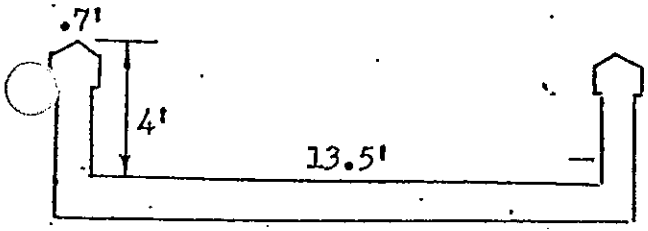
Clear distance of opening above stream bed: 11 ft.

SKETCH

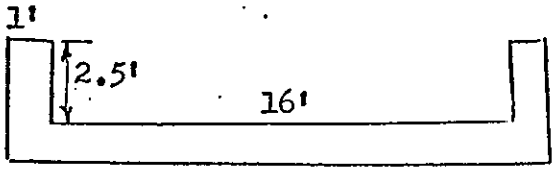
Elevation



Cross-section

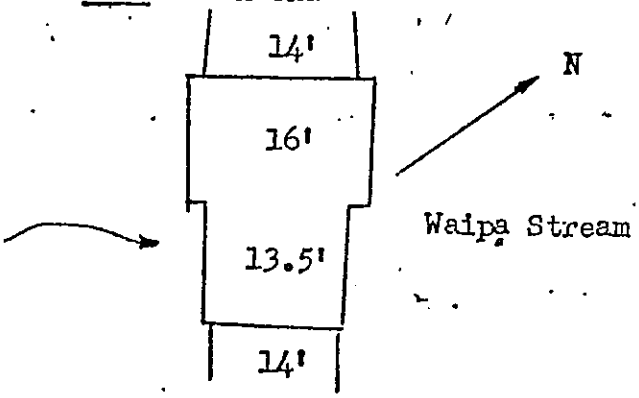


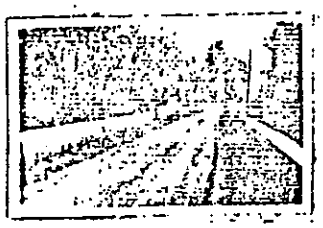
3 spans on pier for 45' length

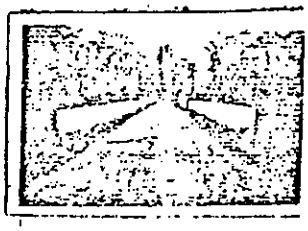


5 spans for 90 ft.

Plan







General Condition of Bridge

Date of Inspection: Oct. 20, 1950

Superstructure: Fair - Railing Chipped Floor: Fair

Substructure: Fair Paint:

TERRITORIAL HIGHWAY DEPARTMENT
HONOLULU, T. H.

BRIDGE DATA SHEET

Date of Original Inventory: October 20, 1950

Island: Kauai

Bridge Number: 43

Name of Bridge: Waikoko

Location

General Location: Hanalei

Name of Road: Kauai Belt Road

Route Number: FAS 243

Name of Road Project: County

Project Number: County

Name of Stream: Waikoko Stream

Name of Railroad:

Number of Tracks:

Map Location: Map - U.S.G.S.

Latitude N

Quadrangle: Na Pali

Longitude W

Scale: 1/62,500

Coordinates: 828670-2783100

Description (See sketch on reverse side)

Kind of Crossing: Bridge over Stream

Type of Bridge: Reinforced Concrete

Number of Spans:	Length of Spans:	Type:
1	43 ft.	Flat Slab

Total Length of Center Line of Road: 45 ft.

Materials Used

Substructure:	Superstructure:	Pavement:
Abutments: Reinf. Conc.	Reinf. Conc.	Bit. Surface Treatment

Construction Data

Date of Construction: 1913

Load Limits; Design: Estimated: H 10 Posted: None

Plans on File with: County File No.:

Approach Roadway;

	Width:	Grade:	Alignment:	Surface:
NW	14 ft.		Tangent	Bit. Surface Treatment
SE	14 ft.		Tangent	" "

Bridge Roadway Width: 13 ft.

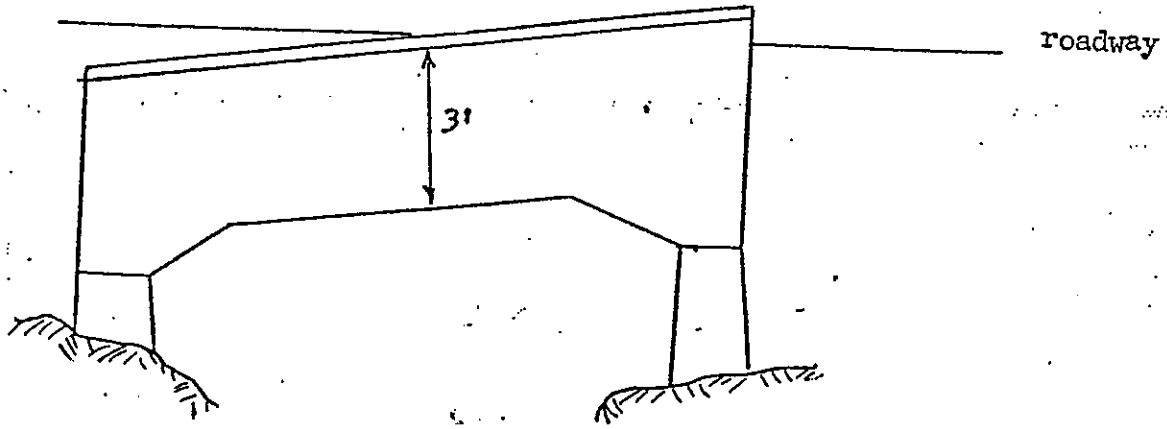
Sidewalk Widths; Right: 0 Left: 0

Surface of road to stream bed: 11 ft.

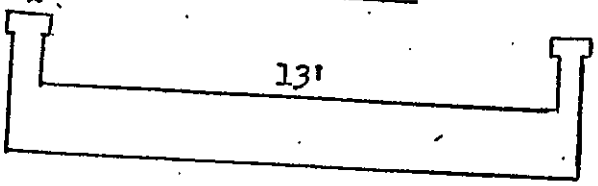
Clear distance of opening above stream bed: 8 ft.

SKETCH

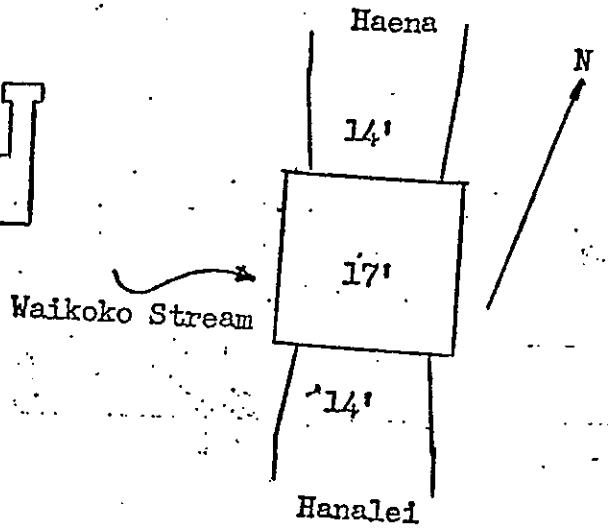
Elevation



Cross-section



Plan



General Condition of Bridge

Superstructure: Poor - Structure sunk on one side due to Tidal Wave

Substructure: Fair

Date of Inspection: Oct. 20, 1950

Floor: Fair

Paint:

DOCUMENTATION FOR DETERMINATION OF ELIGIBILITY FOR INCLUSION IN THE NATIONAL REGISTER

HANALEI BRIDGE

I. DETERMINATION OF ELIGIBILITY - Requested by: Federal Highway Administration.

II. PROPERTY NAME

A. Historic Name - Hanalei Bridge

1. Original Owner - County of Kauai

2. Significant persons or events - Hamilton and Chambers of New York.

3. Unusual characteristics - None

4. Professional, scientific, technical, or traditional name - Pratt Truss Bridge

B. Common Name - Hanalei Bridge

C. Archaeological Site Name - None

III. LOCATION

Kuhio Highway (Kauai Belt Road), Federal-Aid Primary Route 56, Milepost 29.275, Hanalei District, Island of Kauai, State of Hawaii. Crossing of Hanalei River.

IV. CLASSIFICATION

A. Category - Structure

B. Ownership - Public

C. Status - Occupied (in service)

D. Access - Unrestricted

E. Present Use - Transportation

V. OWNER OF PROPERTY

County of Kauai, Department of Public Works, Lihue, Kauai, Hawaii 96766. Note: State of Hawaii has maintenance jurisdiction.

VI. REPRESENTATION IN EXISTING SURVEYS

A. NPS Form No. 10-300 (No SHPO Certification), 11/10/76, Kauai Historical Society.

B. "Kauai Belt Road, Kalihiwai to Haena Section (FAP Route 56, Kauai, Hawaii), Administrative Action, Draft Environmental Impact Statement", Federal Highway Administration, February 23, 1977.

C. "Hawaii Bridges on Kauai Route 56, Kalihiwai to Haena", FHWA memo dated August 29, 1977, HBR-09. (Physical condition survey only).

VII. DESCRIPTION

The structure is a single span, steel through-truss (Pratt Truss) bridge with a total length of 113 feet and a maximum span length of 106 feet. The abutments are of reinforced concrete. The deck has a 17-foot horizontal clearance and is made of timber planks. Design load rating is H-15. Posted capacity is 12 tons.

The structure was prefabricated in New York by Hamilton and Chambers and erected in 1912 at the present location. In 1934, maintenance repairs were made. In 1967, a new steel Warren truss was added to each side of the existing truss and transverse floor beams were added below the existing floor beams. The new truss is laterally supported by the original truss and was designed to carry a portion of the load. Both the old and new structures must be maintained to preserve the structural integrity of the bridge. Repairs were made again in 1973 by strengthening the members and connections through the addition of plates and more welds. The severely corroded joints on the Pratt Truss were tied by welding. The timber stringers were added at that time.

The bridge was not repainted since the required sand blasting would have been detrimental to the existing members which, in many cases, have reduced effective cross sections due to natural deterioration.

The original truss is badly deteriorated. The State DOT estimates that some of the members have only 20% of their original cross sectional areas remaining. The trusses added in 1967 are in fairly good condition but are dependent on the original truss for its load carrying capacity. The condition of the original truss members has deteriorated to the point that it is improbable that any new members can be welded to them.

Refer to Appendix G for additional information on the recent condition of Hanalei Bridge.

VIII. SIGNIFICANCE

Period - After 1900

Area of Significance - Engineering and Transportation

Specific Dates - Original time of erection is 1912

Builder - Prefabrication by Hamilton and Chambers of New York. (The FHWA New York office was not able to locate this firm, it appears they are no longer in business).

Statement:

The 1912 Hanalei Bridge is one of the early examples of the progressive Territorial highway system in Hawaii, on Kauai's North Shore. It is an example of one of the first use of formal engineering expertise in bridge making by the new Territorial Government, shortly after United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1910-1913, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the Island.

Steel bridges for Hawaii were ordered as early as 1890. At Wailua, Kauai, a steel bridge was erected in 1894. In 1900, a steel bridge, made by the Missouri River Bridge Company, was erected at Hanalei River.

IX. BIBLIOGRAPHY

Historic Buildings Task Force, Old Honolulu - A Guide to Oahu's Historic Buildings, Honolulu, 1969.

Minister of the Interior Reports, 1845-1862. Honolulu, Hawaii: State Archives.

Minister of the Interior Reports, 1878-1886 Honolulu, Hawaii: State Archives.

Minister of the Interior Reports 1887-1892 Honolulu, Hawaii: State Archives

Minister of the Interior Reports 1893-1899
Honolulu, Hawaii: State Archives

Superintendent of Public Works Reports, 1900-1904
Honolulu, Hawaii: State Archives

Superintendent of Public Works Reports, 1905-1910
Honolulu, Hawaii: State Archives

X. GEOGRAPHICAL DATA, MAPS AND ACREAGE

UTM Reference 04E450682N2456624

orm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC Hanalei Bridge - Kuhio Highway (Bridge Number: 40)

AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION

CITY, TOWN Hanalei __ VICINITY OF

CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME

State of Hawaii, Department of Transportation

STREET & NUMBER

869 Punchbowl Street

CITY, TOWN Honolulu __ VICINITY OF

STATE Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.

STREET & NUMBER

CITY, TOWN

STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE Bridge Data Sheet

Environmental Impact Statement released February 23, 1977

DATE October 20, 1950

__FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS Department of Transportation

CITY, TOWN Lihue

STATE Hawaii

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	X ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Hanalei Bridge is a 106-foot, single span, steel through-truss(Pratt Truss) bridge built on reinforced concrete abutments, with a 17-foot roadway deck made of timber planks. The bridge was constructed by the Territory of Hawaii in 1912, built by Hamilton & Chambers of New York. The bridge has been continuously used and maintained since 1912, with repairs in 1934 that strengthened the superstructure.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper

Kauai Historical Society Files

File of the County Clerk, County Building, Kauai

Department of Transportation Descriptions of Bridges
State Building, Lihue, Kauai, Hi.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	04	450682	2415624
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Julia Neal, Director, Historic Buildings Kauai, Project — Nov. 10, 1976
ORGANIZATION — DATE

Kauai Historical Society
STREET & NUMBER — TELEPHONE

P. O. Box 1778 — 245-6931
CITY OR TOWN — STATE

Lihue, — Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION
X 1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES 1912 BUILDER/ARCHITECT Hamilton & Chambers, New York

STATEMENT OF SIGNIFICANCE

The 1912 Hanalei Bridge is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911 - 1912, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

HANALEI BRIDGE
04E450682N2456624

159°32'30"
22°14'30"
445000m.E.
30'
27'30
2459000m.N.
12'

P A C I F I C O C E

Kolokolo Point
147
Wainiha Bay
Lumahai Beach
Makahoa Point
WAINIHA 0.3 MI.
Pua Ka Mano
Pohakuopio
WAINIHA RIDGE TRAIL
JEEP TRAIL
Wainiha River
Lumahai
Kuahua Stream
146
144
HANALEI BAY
Waioli Beach Park
Waioli Park
Hanalei
Cem.
Makahuwaa
9300
Hanalei Landing
BM
Well
Fish Pond
Hanalei Park
Water Tank
Observation Point
Princeville Ranch
Water Tanks
HANALEI
Hanalei River Valley
139
Pooku
Puu Poa Point
Kepuhena
Coral Reef
Kaweonui Point
Hensley
Anini Beach
Water Tanks
Stream

orm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Waipa Bridge - Kuhio Highway (Bridge Number: 42)
AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION

CITY, TOWN
Hanalei
__ VICINITY OF

CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.

STREET & NUMBER

CITY, TOWN

STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Bridge Data Sheet
Environmental Impact Statement released February 23, 1977
DATE
October 20, 1950
__FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

In 1912, the Waipa bridge was constructed as a 45-foot triple span reinforced concrete bridge built on reinforced concrete piers and abutments, with a 13½-foot roadway deck made of bitumens surface treatment. This section also featured 4-foot high pointed cap railings.

The bridge was extended in 1925 with the addition of a 90-foot five span cast-in-place reinforced concrete structure with 2½-foot hight square topped railings. This section has a 16-foot roadway deck of bitumens surface treatment. The bridges were constructed by the Territory of Hawaii and have been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
_PREHISTORIC	_ARCHEOLOGY-PREHISTORIC	_COMMUNITY PLANNING	_LANDSCAPE ARCHITECTURE	_RELIGION
_1400-1499	_ARCHEOLOGY-HISTORIC	_CONSERVATION	_LAW	_SCIENCE
_1500-1599	_AGRICULTURE	_ECONOMICS	_LITERATURE	_SCULPTURE
_1600-1699	_ARCHITECTURE	_EDUCATION	_MILITARY	_SOCIAL/HUMANITARIAN
_1700-1799	_ART	X ENGINEERING	_MUSIC	_THEATER
_1800-1899	_COMMERCE	_EXPLORATION/SETTLEMENT	_PHILOSOPHY	X TRANSPORTATION
X 1900-	_COMMUNICATIONS	_INDUSTRY	_POLITICS/GOVERNMENT	_OTHER (SPECIFY)
		_INVENTION		

SPECIFIC DATES 1912 and 1925 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The Waipa Bridge is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-1912, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper

Kauai Historical Society Files

File of the County Clerk, County Building, Kauai

Department of Transportation Descriptions of Bridges
State Building, Lihue, Kauai, Hi.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A	04	414,765	2,455,840	B			
C				D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Julia Neal, Director, Historic Buildings, Kauai, Project — Nov. 10, 1976
ORGANIZATION — DATE

Kauai Historical Society
STREET & NUMBER — TELEPHONE

P. O. Box 1778 — 245-6931
CITY OR TOWN — STATE

Lihue, Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WAIPA STREAM
04 E446765 N2455840

159°32'30" 445000m.E. 30' 27'30"
22°14'30" 2459000m.N.

P A C I F I C O C E A N

Kolokolo Point
147
Wainiha Bay
Lumahai Beach
Makahoa Point
Puu Ka Manu
Pohakuopio
WAINIHA 0.3 MI
Wainiha River
Lumahai
WAIKOKO
HANALEI BAY
Hanalei Landing
BM
Well
Fish Pond
Hanalei Park
Waioli Beach Park
Waioli Park
Cem.
Hanalei
Kuahua Stream
146
144
9300
Makaihuwaa
Kacoa
Kamoo Koleaka
Waioli
Waipa
Kamani
Waiokihi
145
Water Tank
Papaliinaa
Reservoir
Ruins
Observation Point
Princeville Ranch
Water Tanks
BM 17
Water Tank
HANALEI
Hanalei River Valley
TRAIL
JEEP
INDEFINITE
HIGHWAY
HANALEI HOMESTEADS
Gaging Station
139
Pooku
Stream
Anini
Kaiwa
Kaweonui Point
Coral Reef
Honopu
Honono Point
Anini Beach
Water Tanks
Cem
Kenomene
Puu Poa Point
Coral Reef
Coral
Kauikaopua

Form No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC

Waioli Bridge - Kuhio Highway (Bridge Number: 41)

AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION

CITY, TOWN

Hanalei __ VICINITY OF

CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME

State of Hawaii, Department of Transportation

STREET & NUMBER

869 Punchbowl Street

CITY, TOWN

Honolulu, __ VICINITY OF

STATE

Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.

STREET & NUMBER

CITY, TOWN

STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE

Bridge Data Sheet

Environmental Impact Statement ~~released February 23, 1977~~

DATE

October 20, 1950

__FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS

Department of Transportation

CITY, TOWN

Lihue

STATE

Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Waioli Bridge is a 28-foot triple span, reinforced concrete bridge built on reinforced concrete piers and abutments, with a 13-foot roadway deck made of bitumens surface treatment. The bridge was constructed by the Territory of Hawaii in 1912 and has been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION
X 1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES 1912 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The 1912 Waioli Bridge is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-1912, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper Kauai Historical Society Files

File of the County Clerk, County Building, Kauai

Department of Transportation Descriptions of Bridges
State Building, Lihue, Kauai, Hi.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	04	4,4,7,4,6,8	2,4,5,5,4,8,2
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Julia Neal, Director, Historic Buildings, Kauai, Project Nov. 10, 1976
ORGANIZATION DATE

Kauai Historical Society
STREET & NUMBER TELEPHONE

P. O. Box 1778 245-6931
CITY OR TOWN STATE

Lihue, Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

04 E 417168 N 2455482
WAIOLI BRIDGE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

159°32'30" 445000m.E. 30' 27'30"
22°14'30" 2459000m.N.

P A C I F I C O C E A N

Kolokolo Point
147
Wainiha Bay
Lumahai Beach
Makahoa Point
Puu Ka Manu
Pohakuopio
WAINIHA 0.3 MI.
WAINIHA River
LUMAHAI Stream
WAIKOKO
Kuahua Stream
146 144
Kamani
Kapoa
Waipa
Makaihuwaa
HANALEI BAY
Waioli Beach Park
Waioli Park
Hanalei
Cem.
Hanalei Park
Fish Pond
Well
Hanalei Landing
BM 7
Water Tank
Kamoo Koleaka
Waioli
Papaihuwa
Reservoir
Ruin
INDEFINITE
Kaweonui Point
Coral Reef
Kealamene
Puu Poa Point
Honolei
Observation Point
Princeville Ranch
Water Tanks
BM 17
HANALEI
139
Hanalei River Valley
Pooku
Anini Stream
Anini Beach
Honono Point
Honu Pt
Kalihikai
Water Tanks
Gem
Gaging Station
Rain Gage
KALIHIKAI
9300
8-89
12'

rm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC

Manoa Stream Ford - Kuhio Highway

AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION

CITY, TOWN

CONGRESSIONAL DISTRICT

Hanalei __ VICINITY OF

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME

State of Hawaii, Department of Transportation

STREET & NUMBER

869 Punchbowl Street

CITY, TOWN

STATE

Honolulu __ VICINITY OF Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.

STREET & NUMBER

CITY, TOWN

STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE

Environmental Impact Statement

DATE

February 23, 1977 __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR
SURVEY RECORDS Department of Transportation

CITY, TOWN

STATE

Lihue Hawaii

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	XUNALTERED	XORIGINAL SITE
XGOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Manoa Stream Ford is a 15-foot shallow crossing of concrete agregate cast on boulders, with a 22-foot roadway deck. The ford was constructed by the Territory of Hawaii in 1912 and has been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD

__PREHISTORIC
__1400-1499
__1500-1599
__1600-1699
__1700-1799
__1800-1899
X 1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

__ARCHEOLOGY-PREHISTORIC
__ARCHEOLOGY-HISTORIC
__AGRICULTURE
__ARCHITECTURE
__ART
__COMMERCE
__COMMUNICATIONS
__COMMUNITY PLANNING
__CONSERVATION
__ECONOMICS
__EDUCATION
X ENGINEERING
__EXPLORATION/SETTLEMENT
__INDUSTRY
__INVENTION
__LANDSCAPE ARCHITECTURE
__LAW
__LITERATURE
__MILITARY
__MUSIC
__PHILOSOPHY
__POLITICS/GOVERNMENT
__RELIGION
__SCIENCE
__SCULPTURE
__SOCIAL/HUMANITARIAN
__THEATER
X TRANSPORTATION
__OTHER (SPECIFY)

SPECIFIC DATES 1912

BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The Manoa Stream Ford was an integral part of the 1912 Kuhio Highway construction by the Territorial Government.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper Kauai Historical Society
File of the County Clerk, County Building, Kauai
Department of Transportation Description of Bridges
Environmental Impact Statement

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	4	4 1 4 9 4 5	2 4 1 5 7 5 7 8
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE
Robert J. Schleck, President

ORGANIZATION
Kauai Historical Society

DATE
April 1, 1977

STREET & NUMBER
P. O. Box 1778

TELEPHONE
245-6931

CITY OR TOWN
Lihue

STATE
Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE DATE

FOR NPS USE ONLY
I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION
ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

8-94

MANOA STREAM FORD

04 441 445 N 2457578

HAENA QUADRANGLE
HAWAII—ISLAND AND COUNTY OF KAUAI
7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

OCEAN

PACIFIC

Kailiu Point
Corral Reef
Kailiu
Kaa Beach
156
154
Ka Ulu a Paoa Heiau
155
Waikapalae Wet Cave
Lolaus House (Site)
Waikanaloa Wet Cave
Makana
Haena
County Park
Haena Dry Cave
Haena Point
Lae o Kaonohi
Coral Reef
Hale Homaha
Kepuhi Point
Waiamea Bay
Wainiha Bay
140 000 FEET
Maunahou
Pohakukaua
Maunapuhio
1766
Puu Nopili
1087
Wainiha
148
149
150
151
HANALEI 3 MI.
157
Hanakapiai Beach
NAPALI COAST
TRAIL
Hoolulu
1495
Kuianailiia
2003
2196
Waiamea River
Puu Lahia
TRAIL
Limakuli Falls
2205
1555

orm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Limahuli Stream Crossing - Kuhio Highway
AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION
CITY, TOWN
Hanalei __ VICINITY OF
CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS,ETC.
STREET & NUMBER
CITY, TOWN
STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Environmental Impact Statement
DATE
February 23, 1977 __FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR
SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
X EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Limahuli Stream Crossing is a 15-foot double span reinforced concrete flat slab with indigenous rock and concrete abutments and pier. The concrete roadway deck is 17 feet wide. The bridge was constructed by the Territory of Hawaii in 1912 and has been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD

__PREHISTORIC
__1400-1499
__1500-1599
__1600-1699
__1700-1799
__1800-1899
X 1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

__ARCHEOLOGY-PREHISTORIC
__ARCHEOLOGY-HISTORIC
__AGRICULTURE
__ARCHITECTURE
__ART
__COMMERCE
__COMMUNICATIONS
__COMMUNITY PLANNING
__CONSERVATION
__ECONOMICS
__EDUCATION
X ENGINEERING
__EXPLORATION/SETTLEMENT
__INDUSTRY
__INVENTION
__LANDSCAPE ARCHITECTURE
__LAW
__LITERATURE
__MILITARY
__MUSIC
__PHILOSOPHY
__POLITICS/GOVERNMENT
__RELIGION
__SCIENCE
__SCULPTURE
__SOCIAL/HUMANITARIAN
__THEATER
X TRANSPORTATION
__OTHER (SPECIFY)

SPECIFIC DATES 1912 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The 1912 Lumahuli Stream Crossing is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-12, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper Kauai Historical Society Files

File of the County Clerk, County Building, Kauai

Department of Transportation. Descriptions of Bridges
Environmental Impact Statement

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	04	440320	2457000
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Robert J. Schleck, President

ORGANIZATION: Kauai Historical Society

DATE: April 1, 1977

STREET & NUMBER: P. O. Box 1778

TELEPHONE: 245-6931

CITY OR TOWN: Lihue, Hawaii

STATE: Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

LIMAHULI STREAM CROSSING

04E440320 N2457700

HAENA QUADRANGLE
HAWAII—ISLAND AND COUNTY OF KAUAI
7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

140 000 FEET

OCEAN

PACIFIC

Kailiu Point
Corral Reef
Kee Beach
Waikapalae Wet Cave
Ka Ulu a Paoa Heiau
Lailaus House (Site)
Waikanaloa Wet Cave
Makana
Haena Point
Lae o Kaonohi
Coral Reef
Hale Homaha
Kepuhi Point
Haena County Park
Haena Dry Cave
Waiinha Bay
Maunahou
Pohakukaua
Maunapuhio
Puu Nopili
Wainiha
Hanakapiai Beach
Hanakapiai Stream
Kulanailiia
Limakuli Falls
Limahuli Stream
Honopu
Puu Kahia
TRAIL
HANALEI 3 MI.
River

154 155 156 157 148 149 150 151

orm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Haena Bridge Number 1 - Kuhio Highway
AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION
CITY, TOWN
Hanalei __ VICINITY OF
CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.
STREET & NUMBER
CITY, TOWN
STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Environmental Impact Statement
DATE
February 23, 1977 __FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Haena Bridge #1 is a 22-foot single span reinforced concrete box culvert with a 20-foot roadway deck of bitumens surface treat. The bridge was constructed by the Territory of Hawaii in 1912 and has been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
EHISTORIC	ARCHEOLOGY-PREHISTORIC	COMMUNITY PLANNING	LANDSCAPE ARCHITECTURE	RELIGION
400-1499	ARCHEOLOGY-HISTORIC	CONSERVATION	LAW	SCIENCE
1500-1599	AGRICULTURE	ECONOMICS	LITERATURE	SCULPTURE
1600-1699	ARCHITECTURE	EDUCATION	MILITARY	SOCIAL/HUMANITARIAN
1700-1799	ART	X ENGINEERING	MUSIC	THEATER
1800-1899	COMMERCE	EXPLORATION/SETTLEMENT	PHILOSOPHY	X TRANSPORTATION
X 1900-	COMMUNICATIONS	INDUSTRY	POLITICS/GOVERNMENT	OTHER (SPECIFY)
		INVENTION		

SPECIFIC DATES 1912 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The 1912 Haena Bridge #1 is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-1912, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper
Kauai Historical Society Files
File of the County Clerk, County Building, Kauai
Department of Transportation Descriptions of Bridges
Environmental Impact Statement

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	04	443410	2457789
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Robert J. Schleck, President — April 1, 1977
ORGANIZATION — DATE

Kauai Historical Society — 245-6931
STREET & NUMBER — TELEPHONE

P. O. Box 1778
CITY OR TOWN — STATE

Lihue, — Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

HAENA BRIDGE #1

04 E443410 N2457789

HAENA QUADRANGLE

HAWAII—ISLAND AND COUNTY OF KAUAI

7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

140 000 FEET

OCEAN

PACIFIC

Kailiu Point

Corral Reef

Haena Point

Lae o Kaonohi

Coral Reef

Hale Homaha

Kepuhi Point

Kee Beach

156

154

155

Ka Ulu a Paoa Heiau

Lelaus House (Site)

Waikapalae Wet Cave

Waikanaloa Wet Cave

Makana

Haena

County Park

Haena Dry Cave

Wainiha Bay

Maunahou

Pohakukane

Maunapuhio

Puu Nopili

Wainiha

148

149

150

151

157

Hanakapiai Beach

Kuianailila

Stream

Limahuli Falls

Puu Wahia

TRAIL

HANALEI 3 MI.

Form No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Haena Bridge Number 2 - Kuhio Highway
AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION
CITY, TOWN
Hanalei __ VICINITY OF
CONGRESSIONAL DISTRICT

STATE	CODE	COUNTY	CODE
Hawaii	96714	Kauai	

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.
STREET & NUMBER
CITY, TOWN
STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Environmental Impact Statement
DATE
February 23, 1977 __FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR
SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
X GOOD	__RUINS	__ALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Haena Bridge #2 is a 24-foot single span reinforced concrete box culvert with a 20-foot roadway deck of bitumens surface treatment. The bridge was constructed by the Territory of Hawaii in 1912 and has been continuously used and maintained since that time.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
PREHISTORIC	ARCHEOLOGY-PREHISTORIC	COMMUNITY PLANNING	LANDSCAPE ARCHITECTURE	RELIGION
1400-1499	ARCHEOLOGY-HISTORIC	CONSERVATION	LAW	SCIENCE
1500-1599	AGRICULTURE	ECONOMICS	LITERATURE	SCULPTURE
1600-1699	ARCHITECTURE	EDUCATION	MILITARY	SOCIAL/HUMANITARIAN
1700-1799	ART	X ENGINEERING	MUSIC	THEATER
1800-1899	COMMERCE	EXPLORATION/SETTLEMENT	PHILOSOPHY	X TRANSPORTATION
X 1900-	COMMUNICATIONS	INDUSTRY	POLITICS/GOVERNMENT	OTHER (SPECIFY)
		INVENTION		

SPECIFIC DATES 1912 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The 1912 Haena Bridge #2 is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-12, expecially the up-to-date repalcement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper Kauai Historical Society Files
File of the County Clerk, County Building, Kauai
Department of Transportation Description of Bridges
Environmental Impact Statement

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A	04	414206	2,475,710	B			
C				D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Robert J. Schleck, President

ORGANIZATION — DATE

Kauai Historical Society — April 1, 1977

STREET & NUMBER — TELEPHONE

P. O. Box 1778 — 245-6931

CITY OR TOWN — STATE

Hanalei — Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

HAENA BRIDGE #2
04 E442064 N2457910

HAENA QUADRANGLE
HAWAII—ISLAND AND COUNTY OF KAUAI
7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

OCEAN

PACIFIC

Kailiu Point
Corral Reef
Kee Beach
156
154
Ka Ulu a Paoa Heiau
155
Waikapalae Wet Cave
Waikanaloa Wet Cave
Makana
Haena Point
Lae o Kaonoulu
Coral Reef
Hale Homaha
Kepuhi Point
Haena County Park
Haena Dry Cave
Wainiha Bay
140 000 FEET
Naunahou
Pohakukae
Maunapuhio
1766'
Puu Nopili
1087
Wainiha
148
149
150
151
157
Hanakapiai Beach
Kuianailiia
2003
2196'
Intermittent Stream
Hanakoa Stream
Hanakoa Falls
2205
Puu Ahia
TRAIL
Hoolulu Stream
TRAIL
River
FORD
HANALEI 3 MI.
58

LIMAHULI STREAM CROSSING

04E440320 N2457700

HAENA QUADRANGLE
HAWAII—ISLAND AND COUNTY OF KAUAI
7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

140 000 FEET

OCEAN

PACIFIC

Kailiu Point
Corral Reef
Kee Beach
Waikapalae Wet Cave
Ka Ulu a Paoa Heiau
Lailaus House (Site)
Waikanaloa Wet Cave
Makana
Haena Point
Lae o Kaonohi
Coral Reef
Hale Homaha
Kepuhi Point
Haena County Park
Haena Dry Cave
Waimina Bay
Maunahou
Maunapuhio
Pohakukaua
Puu Nopili
Wainiha
Hanakapiai Beach
Hanakapiai Stream
Kulanailiia
Limakuli Falls
Limahuli Stream
Manoa
Puu Kahia
River
HANALEI 3 MI.
TRAIL

154 155 156 157 148 149 150 151

rm No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Waikoko Bridge - Kuhio Highway (Bridge Number: 43)
AND/OR COMMON

2 LOCATION

STREET & NUMBER

__NOT FOR PUBLICATION

CITY, TOWN
Hanalei __ VICINITY OF
CONGRESSIONAL DISTRICT

STATE | CODE | COUNTY | CODE
Hawaii | 96714 | Kauai

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.

STREET & NUMBER

CITY, TOWN
STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Bridge Data Sheet
Environmental Impact Statement released February 23,1977
DATE
October 20, 1950
__FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii 96766

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	X ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Waikoko Bridge is a 43-foot, single span reinforced concrete bridge built on reinforced concrete abutments, with a 13-foot roadway deck of bitumens surface treatment. The bridge was constructed by the Territory of Hawaii in 1913 and has been continuously used and maintained since that time. One major alteration to the structure occured during the 1946 tidal wave, at which time the east abutment dropped below the original road level. This was remedied by building up the fallen section with indigenous rock construction.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION	
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE	
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE	
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN	
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER	
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION	
X 1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)	
		__INVENTION			

SPECIFIC DATES 1913 BUILDER/ARCHITECT Territory of Hawaii

STATEMENT OF SIGNIFICANCE

The 1913 Waikoko Bridge is one of the first examples of the progressive American highway system at work in Hawaii, on Kauai's North Shore. It is also one of the last remaining examples of the first use of formal engineering expertise and industrial-technological experience in American bridge making by the new Territorial Government, in the first decade following United States annexation of Hawaii.

The construction of improved, modern vehicular roads on Kauai in 1911-1913, especially the up-to-date replacement of older, weak, timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of the then relatively isolated North Shore of the island.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper
Kauai Historical Society Files
File of the County Clerk, County Building, Kauai
Department of Transportation Descriptions of Bridges
State Building, Lihue, Kauai, Hi.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	04	4[illegible]2[illegible]	2[illegible]5,6[illegible]8,0[illegible]
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Julia Neal, Director, Historic Buildings, Kauai, Project
DATE: Nov. 10, 1977

ORGANIZATION

Kauai Historical Society

STREET & NUMBER

P. O. Box 1778

TELEPHONE

245-6931

CITY OR TOWN

Lihue

STATE

Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE

DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST:

DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

WAIKOKO BRIDGE
04 E446481 N2456180

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

159°32'30" 445000m.E. 30' 27'30"
22°14'30" 2459000m.N.

P A C I F I C O C E A

Kolokolo Point
147
Wainiha Bay
Lumahai Beach
Makahoa Point
Puu Ka Manu
Pohakupolo
WAINIHA 0.3 MI.
JEEP TRAIL
Wainiha River
Lumahai
HANALEI BAY
Waioli Beach Park
Kemmene
Puu Poa Point
Coral Reef
Kaweonui Point
Hanalei Landing
BM
Well
Fish Pond
Hanalei Park
Water Tank
Observation Point
Princeville Ranch
Water Tanks
BM 17
Anini Beach
Honoko
139
Hanalei River
HANALEI

m No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Wainiha Bridge # 1, #2, #3 - Kuhio Highway
AND/OR COMMON

2 LOCATION

STREET & NUMBER
__NOT FOR PUBLICATION
CITY, TOWN
Hanalei __ VICINITY OF
CONGRESSIONAL DISTRICT
STATE
Hawaii
CODE
96714
COUNTY
Kauai
CODE

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	X PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
X STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	PUBLIC ACQUISITION	ACCESSIBLE	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	__YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	X YES: UNRESTRICTED	__INDUSTRIAL	X TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME
State of Hawaii, Department of Transportation
STREET & NUMBER
869 Punchbowl Street
CITY, TOWN
Honolulu __ VICINITY OF
STATE
Hawaii

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC.
STREET & NUMBER
CITY, TOWN
STATE

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Environmental Impact Statement
DATE
February 23, 1977
__FEDERAL X STATE __COUNTY __LOCAL
DEPOSITORY FOR
SURVEY RECORDS
Department of Transportation
CITY, TOWN
Lihue
STATE
Hawaii

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	__ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The Wainiha Bridge is a 42-foot single span steel bridge with a 12-foot timber deck and wood rails.

The Wainiha Bridge #2 is a 78-foot single span steel bridge with a 12-foot wide timber deck and wood rails.

The Wainiha Bridge #3 is a 146-foot single span steel bridge with a 12-foot wide timber deck and wood rails.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION	
__1000-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE	
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE	
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN	
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER	
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	X TRANSPORTATION	
X 1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)	
		__INVENTION			

SPECIFIC DATES 1957 BUILDER/ARCHITECT

STATEMENT OF SIGNIFICANCE

The Wainiha Bridges #1, 2, 3 were constructed following the 1957 Tsunami. Although Temporary then, they were built in character with the other spans of the North Shore's Kuhio Highway. The Wainiha Bridge replaced three spans (Stringer Span on Piles, Timber Thru Truss, and Timber and Reinforced Concrete Thru Truss) built, respectively in 1922 (#1), 1931 (#2) and 1931 (#3)

9 MAJOR BIBLIOGRAPHICAL REFERENCES

The Garden Island Newspaper Kauai Historical Society Files
File of the County Clerk, County Building, Kauai
Department of Transportation Descriptions of Bridges
Environmental Impact Statement

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY _____

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	6,4	4,4,3,7,2,2	2,4,5,6,8,6,5
B			
C			
D			

VERBAL BOUNDARY DESCRIPTION

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

FORM PREPARED BY

NAME / TITLE
Robert J. Schleck, President

ORGANIZATION
Kauai Historical Society

DATE
April 1, 1977

STREET & NUMBER
P. O. Box 1778

TELEPHONE
245-6931

CITY OR TOWN
Lihue,

STATE
Hawaii 96766

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE DATE

FOR NPS USE ONLY
I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION
ATTEST: DATE

KEEPER OF THE NATIONAL REGISTER

GPO 892-453

WAINIHA BRIDGES #1 #2 #3

04-E443722 N2456865

HAENA QUADRANGLE
HAWAII—ISLAND AND COUNTY OF KAUAI
7.5 MINUTE SERIES (TOPOGRAPHIC)

37'30" 35' 480 000 FEET 159°32'30" 22°14'30"

OCEAN

FIC

Kailiu Point
Corral Reef
Haena Point
Lae o Kaononi
Coral Reef
Hale Homana
Kepuhi Point
Haena
County Park
Haena Dry Cave
Waikapalae Wet Cave
Ka Ulu a Paoa Heiau
Lelauu House (Site)
Makaha
Maunahoui
Pohakukaua
Maunapuhio
Puu Nopili
Wainiha
Wainiha Bay
Hanakapiai Beach
Hoolulu Stream
Limahuli Falls
Kuilanailiia
Puu Kahia
Powerhouse
Penstock
BM 109
Kealawela
Pailkea
TRAIL
JEEP
HANALEI 3 MI.
140 000 FEET
12'

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Pu'u'ōpae Bridge

other names/site number Kalama Stream Bridge, Kapaa Homesteads Bridge #2

2. Location

street & number Pu'u'ōpae Rd., between Kalama & Kīpapa Rds. ☐ not for publication

city or town Kapa'a ☐ vicinity

state Hawai'i code HI county Kaua'i code 007 zip code 96746

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☑ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☑ meets ☐ does not meet the National Register Criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☐ locally. (☐ See continuation sheet for additional comments.)

Signature of certifying official — Date: 4/7/05

State or Federal Agency or Tribal government

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official — Date

State or Federal Agency or Tribal government

4. National Park Service Certification

I hereby certify that this property is:

- ☐ entered in the National Register
  - ☐ See continuation sheet.
- ☐ determined eligible for the National Register
  - ☐ See continuation sheet.
- ☐ determined not eligible for the National Register
- ☐ removed from the National Register
- ☐ other (explain): _____

Signature of Keeper — Date of Action

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☒ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		buildings
		sites
One bridge		structures
		objects
		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

Transportation: road-related

Current Functions
(Enter categories from instructions)

Transportation: road-related

7. Description

Architectural Classification
(Enter categories from instructions)

No style

Materials
(Enter categories from instructions)

foundation Concrete-encased steel

walls

roof

other Masonry (abutments)

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- ☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☐ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations
(Mark "X" in all the boxes that apply.)

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C** a birthplace or a grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

Areas of Significance
(Enter categories from instructions)

___ Social history
___ Exploration/settlement
___ Community planning and development
___ Transportation
___ Commerce

Period of Significance

___ 1915–1936

Significant Dates

___ N/A

Significant Person
(Complete if Criterion B is marked above)

___ N/A

Cultural Affiliation

___ Undefined

Architect/Builder

_ Moragne, Joseph H., County Engineer and
_ Road Supervisor

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

See Continuation Sheets, page 14.

Previous documentation on file (NPS)

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested.
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the Natl Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☒ Local government Kaua'i County
- ☒ University *Garden Island* microfilm
- ☐ Other

Name of repository:
County Clerk's office; Kaua'i Community College

10. Geographical Data

Acreage of Property ___ Less than one acre _____

UTM References
(Place additional UTM references on a continuation sheet) North American Datum, 1983; USGS Kapaa Quadrangle, 1996

	Zone	Easting	Northing		Zone	Easting	Northing
1	/4/N/	/4/6/1/5/1/1/	/2/4/4/0/4/3/9/	3	/__/__/	/__/__/__/__/__/__/	/__/__/__/__/__/__/
2	/__/__/	/__/__/__/__/__/__/	/__/__/__/__/__/__/	4	/__/__/	/__/__/__/__/__/__/	/__/__/__/__/__/__/

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title _____ Patricia L Griffin _____

organization _____ date _____August 9, 2004 _____

street & number _____ 6524 Kalama Rd. _____ telephone _____ 808.639.1019 _____

city or town _____ Kapa'a _____ state __ HI __ zip code _____ 96746 _____

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.

A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white** photographs of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name _____ County of Kaua'i, ATTN: The Honorable Bryan Baptiste, Mayor _____

street & number _____ 4444 Rice St., Suite 235 _____ telephone _____ 808.241.6300 _____

city or town _____ Līhu'e_____ state __ HI __ zip code _____ 96766 _____

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets.)

Pu'u'ōpae Bridge is a one lane, 48-foot long, single span structure that carries Pu'u'ōpae Road over Kalama Stream (a small stream approximately three feet deep and 12 feet wide) in the Kapa'a Homesteads 2nd Series. The height of the soffit of the bridge over the stream is about 11 feet. Built in 1915, it is the earliest bridge included in the *Historic Bridge Inventory: Island of Kauai* to be constructed beyond the island's circumferential Belt Road, in Kaua'i's homesteading lands.

Location. The bridge is in its original location. The placement of Pu'u'ōpae Road is shown on the Hawai'i Territory Survey map of "Kapaa Homesteads 2nd Series: Kapaa–Waipouli–Olohena, Island of Kauai," created in 1912 when the tract was subdivided in preparation for its settlement the following year. (See detail on Continuation Sheet, Section 10, Page 3.)

Design. Pu'u'ōpae Bridge was originally trussed, as evidenced by a small sketch included in correspondence regarding the construction of the bridge in 1915. The truss was removed in 1958, but the bridge's original, concrete-encased steel floor remains in place. According to the Spencer Mason *Historic Bridge Inventory: Island of Kauai,* "only this bridge and the 'Ele'ele Pedestrian Overpass [on the West side of Kaua'i] are classified as having steel girder floor systems on the State Bridge Inventory,"[1] and the Pu'u'ōpae Bridge predates 'Ele'ele by almost a quarter of a century. Pu'u'ōpae Bridge has been neither widened nor extended.

Setting. The setting has not changed substantially. Three houses have been built in the vicinity, on Kalama Road southwest of the bridge, but they have not altered the rural character of the area, which is defined by pastoral and agricultural lands sweeping from the east side of the bridge to the foot of Nounou (Sleeping Giant) Mountain in the distance.

Materials. The concrete deck, steel girder floor system and sections of the abutments are original materials. The endposts may be recycled parts of the nineteenth century Wailua River Bridge that was dismantled in 1919 and used for roads and bridges in the area. (See "Age," below.)

An archæological survey of the bridge in 1996 provided the following description:

> Remnants of a wooden form, probably used in the building of the deck were visible. The decks and steel girders were both encased in concrete and on the underside of the bridge, the concrete deck was imprinted with the grain of wood, left by the wooden form. A few of the original wood

Narrative Description, Continued

pieces used in the form were found on both ends of the bridge adjacent to the abutments still attached to the underside of the deck. The steel soffits, railing supports and railing all seem to be part of one pre-engineered unit. At either end of the bridge on both sides of the abutments and adjacent to the railing are large pieces of steel which have been cut...[2]

Workmanship. The bridge is not in its original condition. Repair data located in the Kaua'i County Engineering office indicates that in 1958, two 48 foot I-beams were installed beneath the concrete and steel girder floor system for structural support. In order to imbed the I-beams, the headwalls above the stone abutments were broken and then repaired with concrete. While the plans indicate that the truss was still in place at the start of the project, it was probably removed after the I-beam support system was in place. (See detail on Continuation Sheet, Section 7, Page 5.) The railings were replaced in 2000, and galvanized W guardrails were substituted for the previous wood guardrails.

Feeling. There is a historic feeling to this bridge because of its narrow width, as well as its location in the back-country, still-agricultural/pastoral lands of Kapaa Homesteads 2nd Series.

Age. Written correspondence between the Territory of Hawai'i's Superintendent of Public Works, Charles R. Forbes, and Kauai County's Road Supervisor and Engineer, Joseph H. Moragne, establishes the bridge's period of construction as being between March and July 1915. An agreement for the Territory to pay the county $800 to construct the bridge and the county to build it was approved by the Kauai Board of Supervisors on April 7, 1915.[3] At the June 8, 1915 meeting of the Board of Supervisors, Moragne reported that construction was in progress; it had been completed by the time of the August report.[4] (See Continuation Sheet, Section 7, pages 6-10.)

2. The end posts have the same dimensions and riveted construction as the top chords and western end posts of the 'Ōpaeka'a Road Bridge.[5] It is known that when the 1890, Scottish-made Wailua Bridge was replaced in 1919, parts of the old bridge were "disposed along the side of the road awaiting removal to some needy spot where they may serve for small bridge trusses, coverings for culverts, etc. Some of them will probably be used on the homestead roads."[6] 'Ōpaeka'a Road Bridge, one mile from the Pu'u'ōpae Bridge, was constructed from parts of the dismantled bridge. The County Road Supervisor's activities report of May 1920, eight months

Narrative Description, Continued

after Wailua Bridge was dismantled, notes that small bridge repairs had been completed in the area: Since the end posts on Pu'u'ōpae Bridge are so similar to the 'Ōpaeka'a Road Bridge top chords and western end posts, they may also have come from the old Wailua Bridge.[7] (Usable parts from the old bridge were still available as late as 1925, when chords from it were put into use as stringers in construction of the Kalama Bridge on Kamalu Rd., near the border between Wailua and Kapa'a Homesteads.)

Artistic Value. The *Historic Bridge Inventory: Island of Kauai* characterizes the bridge as "functional," with little in the way of artistic details. However, it notes, the pattern formed by the rivets is unusual: "It is one of only three bridges on Kaua'i where riveted metal construction is visible."[8] The other two are 'Ōpaeka'a Road Bridge (National Register of Historic Places Site No. 30-08-9377) and the Hanalei River Bridge (National Register of Historic Places Site No. 30-03-736).

Narrative Description, Continued

NOTES

1. Spencer Mason Architects, *Historic Bridge Inventory: Island of Kauai,* (Honolulu: Prepared for the State of Hawaii Department of Transportation Highways Division in cooperation with the U. S. Department of Transportation Federal Highway Administration, 1989), p. 217.

2. Tina Bushnell and Hallett H. Hammatt, "Archaeological Investigation of Pu'uopae (Kalama) Bridge in Wailua Homesteads, South Olohena, Ahupua'a Puna District, Kauai, Hawaii," (Study prepared by Cultural Surveys Hawaii, Inc. for Belt Collins and Associates, December 1996), p. 5.

3. "Blueprints showing data of the proposed Kapaa Homesteads Bridge #2 (Puuopae Rd) + com. Regarding agreement same to be constructed by Kauai County," records of the Kauai County Board of Supervisors, P.1150, April 7, 1915.

4. Some of the road names in the homesteads—including Pu'u'ōpae, Pu'upilo and Kalama—have, confusingly, changed since they were constructed. Pu'u'ōpae Rd. was originally U-shaped. It led south from Olohena then, after Kalama stream, climbed uphill on what is now called Kalama Rd. The section to the southwest that is now the continuation of Pu'u'ōpae was originally named Pu'upilo. In the two Board of Supervisors reports, Moragne mis-located the bridge on Pu'upilo, which intersected with the Pu'u'ōpae U about 40 yards from the bridge.

5. Spencer Mason Architects, p. 216.

6. "Wailua Bridge Finished," *The Garden Island,* September 23, 1919, p 1.

7. "Board of Supervisors Meet," *The Garden Island,* July 8, 1920, p. 4.

8. Spencer Mason Architects, p. 217.

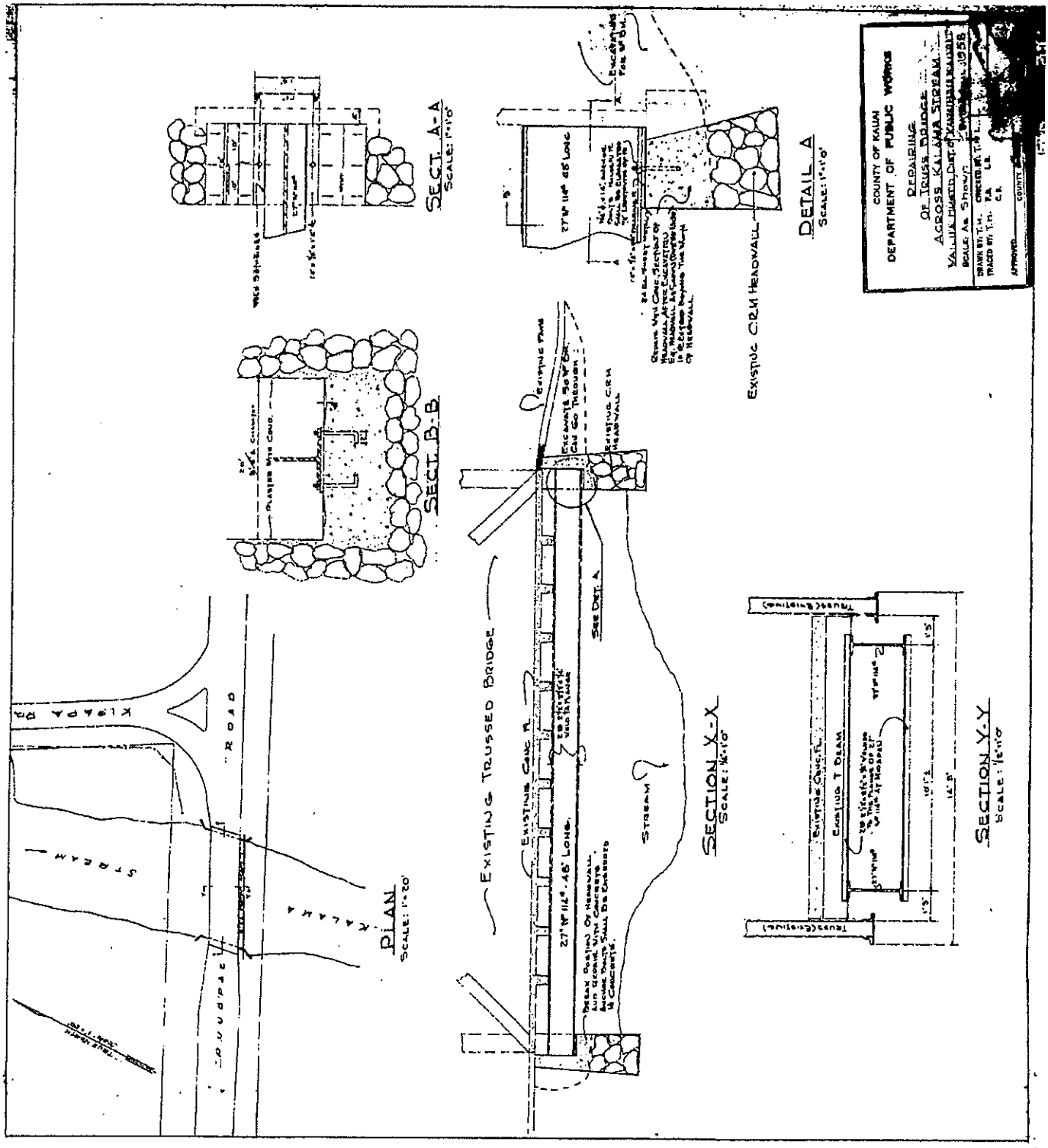
United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section _ 7 _ Page _ 5 of 10 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Narrative Description, Continued

Kaua'i County Department of Public Works. "Repairing of Truss Bridge Across Kalama Stream, Wailua Hmstd, Dist. of Kawaihau, Kauai." 1958.



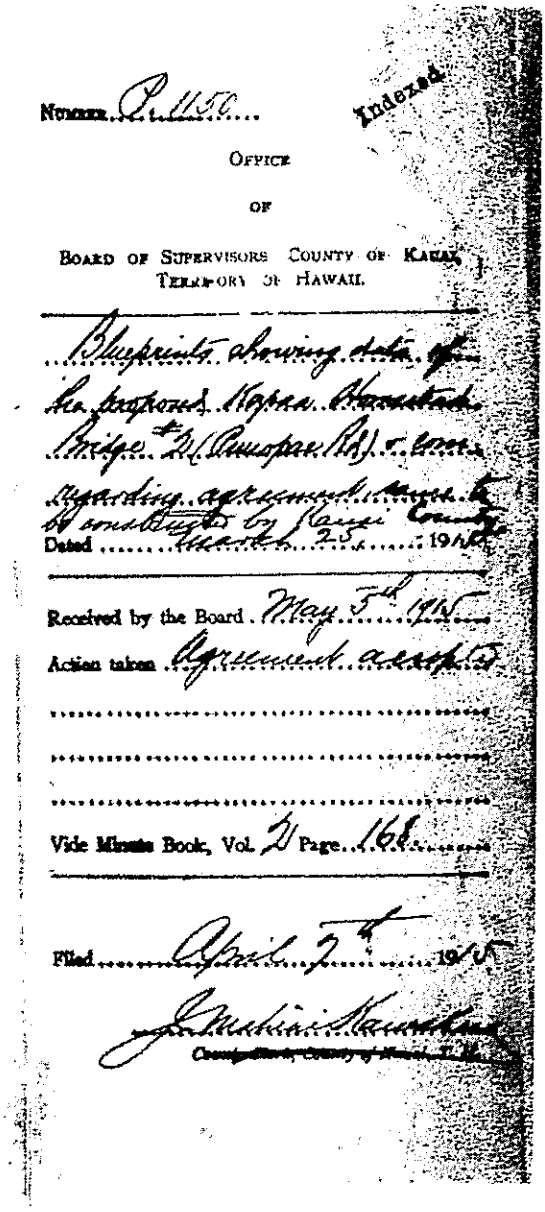
United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section _ 7 _ Page _ 6 of 10 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Narrative Description, Continued

Kaua'i County Board of Supervisors records, P1150



Number P. 1150 Indexed

OFFICE

OF

BOARD OF SUPERVISORS COUNTY OF KAUAI,
TERRITORY OF HAWAII.

Blueprints showing detail of the proposed Hanapepe Bridge #2 (Puuopae Rd.) & form of agreement between Kauai County & ... Dated March 25, 1915

Received by the Board May 5th 1915

Action taken Agreement accepted

Vide Minute Book, Vol. 2 Page 168

Filed April 7th 1915

J. Mahuiai Kaumakaiwa
County Clerk, County of Kauai, T.H.

National Register of Historic Places Continuation Sheet

Narrative Description, Continued

Kaua'i County Board of Supervisors records, P1150

CHAS. R. FORBES
~~J. W. CALDWELL~~
ASSOCIATE MEMBER A.S.C.E.
SUPERINTENDENT

Transcribed

TERRITORY OF HAWAII
DEPARTMENT OF PUBLIC WORKS
HONOLULU, T. H.

March 25, 1915

Mr. J. H. Moragne,
Lihue, Kauai.

Dear Sir:

KAPAA HOMESTEAD BRIDGE, NO. 2.

Replying to your letter of March 19th, I beg to submit herewith two blueprints of Plan No. 2219, showing some data regarding this proposed bridge. I also inclose an agreement showing that the Land Commissioner has set aside the sum of $800.00; the work to be done under my direction.

I therefore turn over to you the expenditure of this fund, such expenditure to be made in connection with the county work on this bridge. This amount will be turned over to the County on the final completion and acceptance of the work.

Very truly yours,
Charles R. Forbes [signature]
Superintendent of Public Works

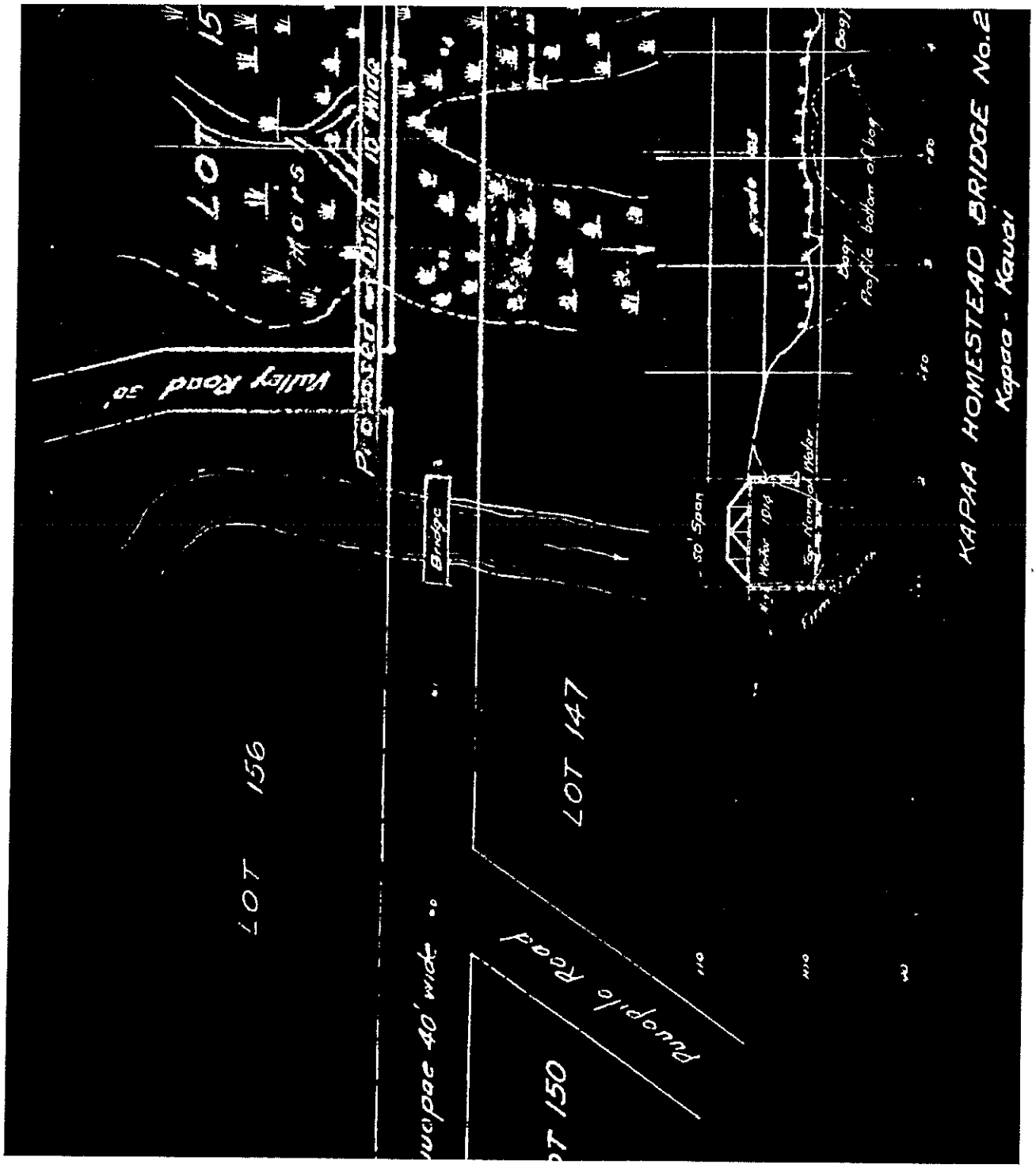
United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section _ 7 _ Page _ 8 of 10 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Narrative Description, Continued

Kaua'i County Board of Supervisors records, P1150



Narrative Description, Continued

Kaua'i County Board of Supervisors records, P1150

Transcribed

A G R E E M E N T

By the authority vested in me by Section 376, Revised Laws, 1915, I hereby agree to set aside the sum of Eight Hundred Dollars ($800.00) to be paid to the County of Kauai for the construction of a Bridge over the Puuopae Road and just above the junction of this road with Valley Road, providing this work is performed under the direction of the Superintendent of Public Works and is finally accepted by him.

Joshua D. Tucker [signature]

Commissioner of Public Lands.

.....March 25.....1915.

Narrative Description, Concluded

Kaua'i County Board of Supervisors records, P1150

OFFICE OF
COUNTY CLERK, COUNTY OF KAUAI.
TERRITORY OF HAWAII.

Transcribed

Lihue, April 10, 1915

Charles R. Forbes, Esq.,
Superintendent, Public Works,
Honolulu, Hawaii.

Dear Sir :-

I beg to notify you that your offer under date of March 25th.last addressed to Mr. J.H. Morange [sic] our County Road Supervisor, of Eight Hundred Dollars ($800.00) for the construction by the County of Kauai of a bridge, known as the Kapaa Homestead Bridge No. 2, the work to be performed under your direction, was duly received by the Honorable Board of Supervisors of the County of Kauai at its last regular monthly business meeting held here on the 7th inst., and that the same has been accepted by the said Board.

Very respectfully yours,

[unsigned]

County Clerk, County of Kauai.
By

Clerk.

National Register of Historic Places Continuation Sheet

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

The construction of Pu'u'ōpae Bridge in 1915, two years after the Kapa'a Homesteads 2nd Series was opened, provided an important transportation conduit that contributed to the successful development of the homesteading lands on the east side of Kauai.

When Hawai'i became a territory of the United States in 1900, land ownership beyond that of the government's significant holdings was highly concentrated in the hands of a few large business interests and the individuals who controlled them. To encourage further settlement of family farmers in the islands, the government opened tracts of territorial land in Kapa'a, Kalāheo and elsewhere in Hawai'i.

The sale of public land as a strategy to increase Hawai'i's population of small, independent farmers was controversial. Most of the early territorial governors supported big sugar interests and showed "little faith in homesteading,"[9] Some governors were openly hostile to the movement: Lucius Pinkham (governor from November 29, 1913 to June 22, 1918) was reported as stating that he was "against the government lands being taken up by homesteaders. Homesteading is not a success; will never be a success and you know it damned well....All the cane lands of the government should remain in the ownership of the government and be leased to the sugar plantation."[10] Critics charged that the government had diminished the chances for homesteading success after it traded its fertile lands to plantations in exchange for unproductive tracts not viable for farming and transferred vital water rights to them as well.[11]

The dominant planter and business interests of the time were less than supportive of the homesteading philosophy themselves. Skeptics of their motives toward homesteaders accused the special interests of a land-grabbing scheme by which they advanced money to "marginal homesteaders" with the goal of becoming "the ultimate owners of every homestead the owner of which is so unfortunate as to be so easily gulled into the trap."[12] The possibility of gaining title to homesteaders' lands aside, sugar plantations were in a position to profit from cane-growing homesteaders through their monopoly of the milling and marketing processes, occasionally setting fees "so onesided and inequitable" that homesteaders across the territory protested.[13]

Despite the formidable opposition, some of Kaua'i's homesteading tracts began to show promise. In 1917 the chairman of the Chamber of Commerce Homestead Committee, E. W. Broadbent, reported that "the wisdom of the Homestead policy had been abundantly justified. On the Olohena-Waipouli tract there are ninety Homesteaders with 3140 acres who harvested this season 31,500 tons of cane, worth $197,000, besides a considerable value in pines." [14]

The Olohena-Waipouli tract that Broadbent referenced was also known as Kapa'a Homesteads 2nd Series. It included 81 lots ranging in size from 17.27 acres to 41.32 acres. The lots were sold by

Narrative Statement of Significance, Continued

lottery at the court house in Līhu'e on Saturday, June 28, 1913. Lottery winners were allowed up to three adjoining parcels, with a maximum of 80 acres. In an attempt to prevent abuse of the program by unscrupulous land speculators, winners were required to live on their property for given percentages of the first 10 years and to actively cultivate their lands. To sell or lease their property was restricted.

Although roads were indicated on the 1912 territorial survey map of the tract, they did not, in fact, exist when the Kapa'a lottery winners sought to move onto and begin farming their land. But the homesteaders were not a group to wait passively in the face of government inactivity. In August 1913, barely a month after the lottery, several of the new homesteaders petitioned the county for roads to "be constructed as soon as practicable for, unless the said roads, particularly 'Olohena', 'Puuopae', and 'Puupilo', are built, leveled, or ruts filled, it will be as it is now hard work for the homesteaders to bring their lumber for building purposes and their effects to their lands."[15] The Board of Supervisors referred the matter to County Engineer and Road Supervisor Joseph H. Moragne for action, but a letter to *The Garden Island* six months later indicated that no discernable progress had been made: "As for roads, there are none, there are cattle trails all over this country and these were followed by oxcarts in hauling firewood from the mountains and there is nothing else in the way of roads there today." [16]

Water, too, was unavailable in Kapa'a Homesteads. In December 1913 the homesteaders petitioned the Supervisors "for water pipes to be laid for their use."[17] The same *Garden Island* letter that complained of the lack of roads described the situation:

> It is true that some of the lots have streams passing through them, but the water all belongs to the Makee Sugar Co., the Governor having sold the water rights to the Company before the tract was opened, the settlers having no right to use the water in any stream, even for household purposes, and they have been so notified by the company, unless they pay a monthly rate. [18]

Makee was in a potentially advantageous position with regard to the Kapa'a homesteaders for other reasons as well. Although many envisioned pineapple as the primary crop for the area, others championed sugar cane (ultimately both would be grown). Both Makee and Lihue Plantation competed to build a railroad into the homesteads—a struggle that Makee eventually won—to collect the farmers' cane and mill it at the company's factory.[19]

The Kapa'a homesteaders continued their efforts throughout the 1910s to advance their positions. One or more of them appeared several times before the Board of Supervisors to urge the county to build or repair roads in the area, especially Olohena Rd., which provided the lifeline between the homesteads and the Belt Road. Several joined to form an association in 1918 to

Narrative Statement of Significance, Continued

"further the interests of the Kapaa homesteaders," and the group successfully secured water for irrigation after sending a delegation to meet with territorial officials in Honolulu. Some homesteaders became active in the Kauai Chamber of Commerce as another forum in which they could seek to redress grievances.

Their achievement in convincing the local and territorial governments to build and maintain roads and bridges in the area was significant. The experience with Kapa'a undoubtedly helped convince officials that roads should be put in place before new homesteading lands in the adjoining Wailua 1st series were lotteried "so that homesteaders may drive up to their prospective front doors just as soon as they have selected the lots."[20]

Kapa'a Homesteads roads and bridges increased in importance after the Wailua Homesteads were opened, because Wailua roads did not flow towards the ocean. Instead, they were connected to the Kapa'a Homesteads roads—Pu'upilo, Pu'u'ōpae and Kamalu (which ran parallel to Pu'u'ōpae along the foot of Nounou Mountain). Olohena funneled both sets of homesteaders from their *mauka* lands to the Belt Road. Wailua Homesteads was not directly linked to the Belt Road until 1936, when Depression-era federal funding constructed the 'Ōpaeka'a Stream Bridge and extended Kuamo'o Road to the ocean. As a result, this network—including Pu'u'ōpae Bridge—remained important throughout the homesteading era.[21]

By the time the 31 lots in adjacent Wailua Homesteads 1st Series were lotteried in December 1919, at least some of the Kapa'a Homesteaders were farming successfully: *The Garden Island* reported in January of that year that Kapa'a homesteader E. M. Cheatham was employing 40 men to harvest his cane and that of his neighbors. But those were the glory days. During the next decade the dropping prices paid for sugar made small-scale cane growing increasingly unprofitable. By 1945 the Land Laws Revision Commission review of homesteading in Hawai'i reported that lot owners had "become landlords to corporate agricultural operators."[22] Its final report to the governor on December 31, 1946 declared that

> in Honolaa, the majority of the homesteads patented suitable for cane are cultivated to cane by the adjoining plantation, either under lease or planting contract....A similar situation exists at Kapaa, Kauai, where the majority of the homesteads patented suitable for pineapples are cultivated to pineapples by the Hawaiian Fruit Packers, Ltd., or Hawaiian Canneries Co.[23]

Many of the Kapa'a homesteaders turned to occupations other than farming. To name but three examples, Elmer Cheatham moved to Makaweli to run a store; his brother-in-law Rolland Israel (who had been optimistic enough about the future of homesteading that he added to his Kapa'a holdings by buying a lot in the Wailua tract when it was opened in 1919) became Game Warden;

National Register of Historic Places Continuation Sheet

Narrative Statement of Significance, Continued

C. K. Amalu served as a judge. Gradually, much of the Wailua and Kapa'a Homesteads was rezoned for residential use. Today, the "bowl" of land adjacent to Pu'u'ōpae Bridge, bordered by Pu'u'ōpae, 'Ōpaeka'a, Kamalu and Olohena roads contains some of the only remaining area of significant agricultural acreage (nearly 400 acres) in the region.

Persons. In the early territorial period, homesteading lands were released by the government in an attempt to increase settlement opportunities for small, independent farmers, especially Hawaiians "who kept up constant pressure through their political leaders to recapture Hawaii's lands for themselves," and recruits whom "Americanizers," hoped would increase the percentage of Anglo Saxons in Hawai'i and strengthen the psychological bonds with the United States.[24] One of the requirements of the lottery winners in Kapa'a Homesteads 2nd Series was that they be American citizens or declare their intention of becoming one.

An example of the Americanizers' intent is evidenced by the reception E. M. Cheatham received when he moved to the Homesteads. Cheatham, who had been employed as manager of B. F. Ehlers & Company (predecessor to Liberty House department store, now Macy's) before acquiring his homesteading lands in Kapa'a, was described by the *Garden Island* as "a real good citizen of the capital city...a live-wire of the Honolulu Ad. Club and an important figure in other organizations at Honolulu."[25] Three months later, under the headline "Homesteaders of the Right Kind," he was described as a man with "business ability, capital and those things that make for good citizenship."[26]

The history of the Kapa'a Homesteads, however, is not the product of a single Great Man who shaped the area but the collective story of a group of settlers who struggled to make a life as independent farmers for themselves and their families. The names of the 1913 Kapa'a Homesteads lottery winners hints at a predominance of the Hawaiian and Caucasian settlers who bought into the homesteading idea, but people from other backgrounds were represented as well: Lino, Contrades, Kauai, Hanohano, Kaui, Kainoa, Kelekoma, Booge, French, Miyashi, Souza, Reis, Wilson, Tracy, Johonnot, Silva, Konda, Nasahiga, Hepa, Reichelt, Soto, Cummings, Louis, Achuck, Cheatham, Livesey, Israel, Cook, Jensen, Ferreira, Victorino, Barreta, Rapoza, Aroong, Ohai, Waiwaiole, Mailehuna, Rodrigues, Amalu, Kaiu, Ventura, Kikaahu.[27]

The actual designer of the bridge has not been established, although Joseph Moragne, who was responsible for much of the early territorial roadwork and bridge design, is definitely associated with its erection through his position as county road supervisor and engineer as well as his correspondence with Charles Forbes about the construction of the bridge.

Narrative Statement of Significance, Continued

Summary. The Pu'u'ōpae Bridge is unusual because of its historical links to the development of the Kapa'a Homesteads, and the direct involvement of that community in pressuring the government to provide adequate stream crossings and roads in the area; its concrete-encased steel girder floor system; and its probable use of recycled parts from the 19th century Wailua Bridge. It remains a valuable historical resource for interpreting the too-little understood, non-plantation-related development of Territorial Hawai'i.

NOTES

9. Robert H. Horwitz et al., *Public Land Policy in Hawaii: An Historical Analysis* (Honolulu: Legislative Reference Bureau, University of Hawaii, 1969), p. 26.

10. "Mr. Pinkham and Homesteading," *The Garden Island*, April 4, 1917, p. 1.

11. "The People Heard at Meeting of the Chamber of Commerce," *The Garden Island*, October 9, 1917, p 1.

12. "Land Law Question," *The Garden Island*, February 25, 1913, p 1.

13. "Some Difference of Opinion Between Homesteaders and Planters," *The Garden Island*, August 13, 1918, p 1. Also, "Homesteaders to Get Consessions," *The Garden Island*, August 27, 1918.

14. "The People Heard at Meeting of the Chamber of Commerce," *The Garden Island*, October 9, 1917, p 1.

15. "Petition from Kapaa for construction of homestead roads in Kapaa mauka," records of the Kauai County Board of Supervisors, P895, August 6, 1913.

16. "Public Lands Question," *The Garden Island*, January 20, 1914, p 4.

17. "Petition from Kapaa homesteaders for pipes to be laid at the homestead for their use," records of the Kauai County Board of Supervisors, P940 and 940a, December 10, 1913.

18. "Public Lands Question," *The Garden Island*, January 20, 1914, p 4.

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Narrative Statement of Significance, Concluded

19. Several articles and editorials between 1914 and 1916 in *The Garden Island* address the two plantations' competition to build a railroad in the homesteads. They include: "Right of Way at Waipouli Tract, April 14, 1914, p. 1; "Makee Sugar Co. Will Build Road to Waipouli," November 17, 1914, p. 1; "Waipouli R. R. Is Now Assured," February 16, 1915, p. 1; "Mr. Forbes Over Proposed Road," March 9, 1915, p. 1; "Kauai Homesteading Threatened," April 4, 1916, p. 8.

20. "The Wailua Homesteads," *The Garden Island,* September 23, 1919, p. 1.

21. Spencer Mason Architects, *Historic Bridge Inventory: Island of Kauai,* p. 128.

22. George W. Luter, *Report on Homesteading in Hawaii: 1839-1961,* (Honolulu, Department of Land and Natural Resources, 1961), p. 20.

23. Ibid, p. 21.

24. Lawrence H. Fuchs, *Hawaii Pono: A Social History* (New York: Harcourt Brace Jovanovich, 1961), p. 251ff.

25. "To Settle On Kauai," *The Garden Island,* January 13, 1914, p. 1.

26. "Homesteaders of the Right Kind," *The Garden Island,* March 31, 1914, p. 1.

27. The names of the lot owners are included on the map of the "Hawaii Territory Survey, Walter E. Wall Surveyor, Kapaa Homesteads 2nd Series, Kapaa–Waipouli–Olohena, Island of Kauai, HTS Plat 3016, Surveyed by S. W. Tay, March–June, 1912," which is located in the Kaua'i Historical Society archives.

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Section _ 9 _ Page _ 1 of 1 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

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_____. "Wonderful Hawaii: A World Experiment Station; II. The Land and the Landless." *The American Magazine*, December, 1911, pp. 201-214.

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Wall, Walter E. "Hawaii Territory Survey: Kapaa Homesteads 2nd Series." HTS Plat 3016. 1912.

_____. "Hawaii Territory Survey: Kapaa Section." HTS Plat 3014. 1914.

_____. "Hawaii Territory Survey: Wailua Govt. Land." HTS Plat 3042. 1923.

_____. "Hawaii Territory Survey: Wailua Homesteads 1st Series." HTS Plat 3033. 1919.

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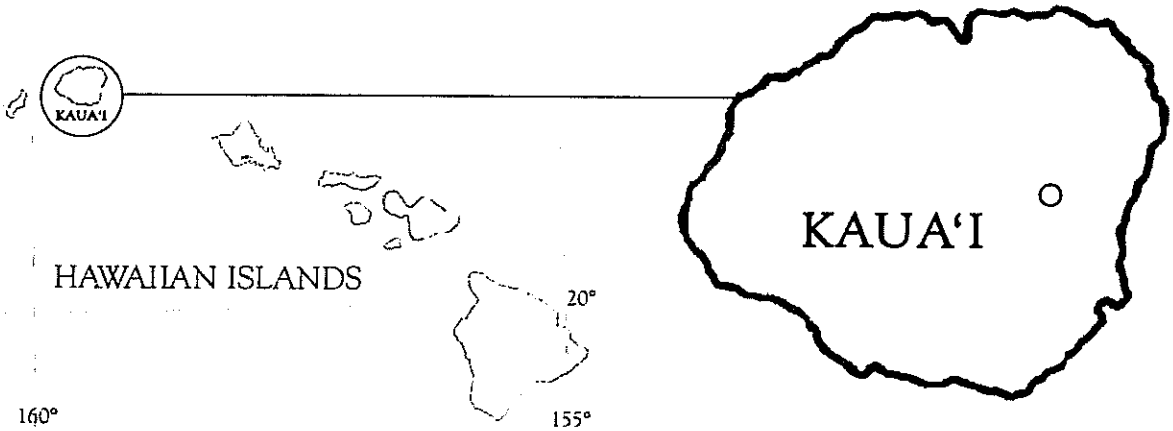
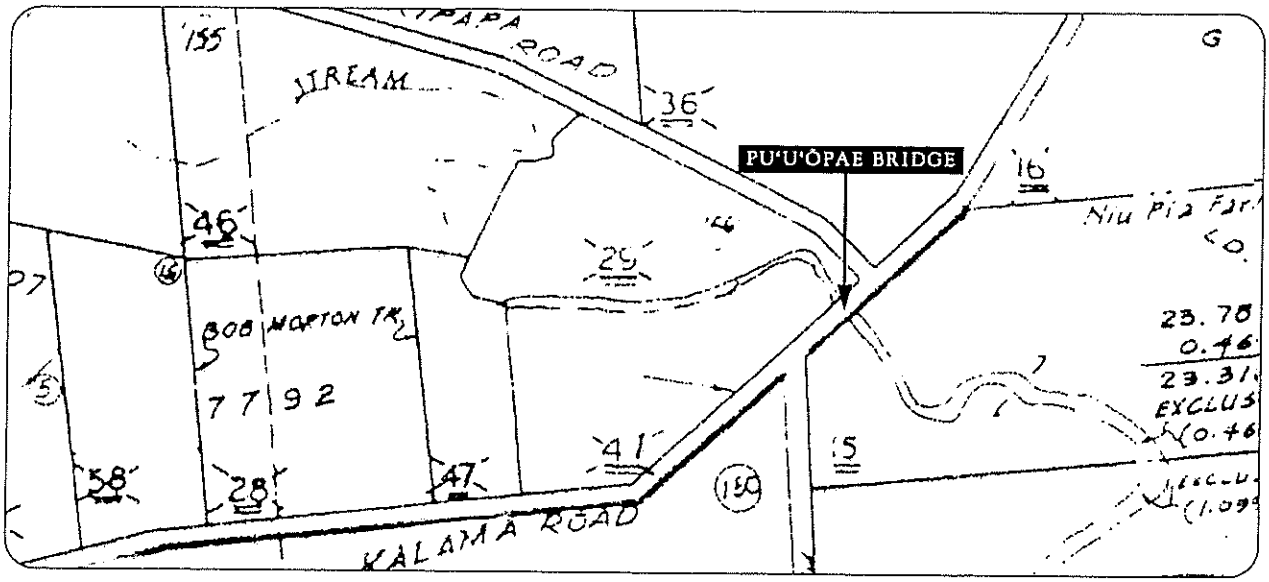
Section _10_ Page ___ 1 of 4 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Geographical Data

Verbal Boundary Description. Pu'u'ōpae Bridge is located in the *ahupua'a* of South Olohena in the Kawaihau District on the East side of the island of Kaua'i, Tax Map Key 4-4-002. The nominated property boundary encompasses only the bridge, its abutments and the ground upon which they stand, approximately 49 feet in length from endpost to endpost and 25.5 feet in width.

Boundary Justification. The nominated property consists exclusively of the bridge.





Above: Tax Maps Branch, State of Hawaii, Tax Map, Fourth District, 4-4-02 detail, Scale: 1" - 200'

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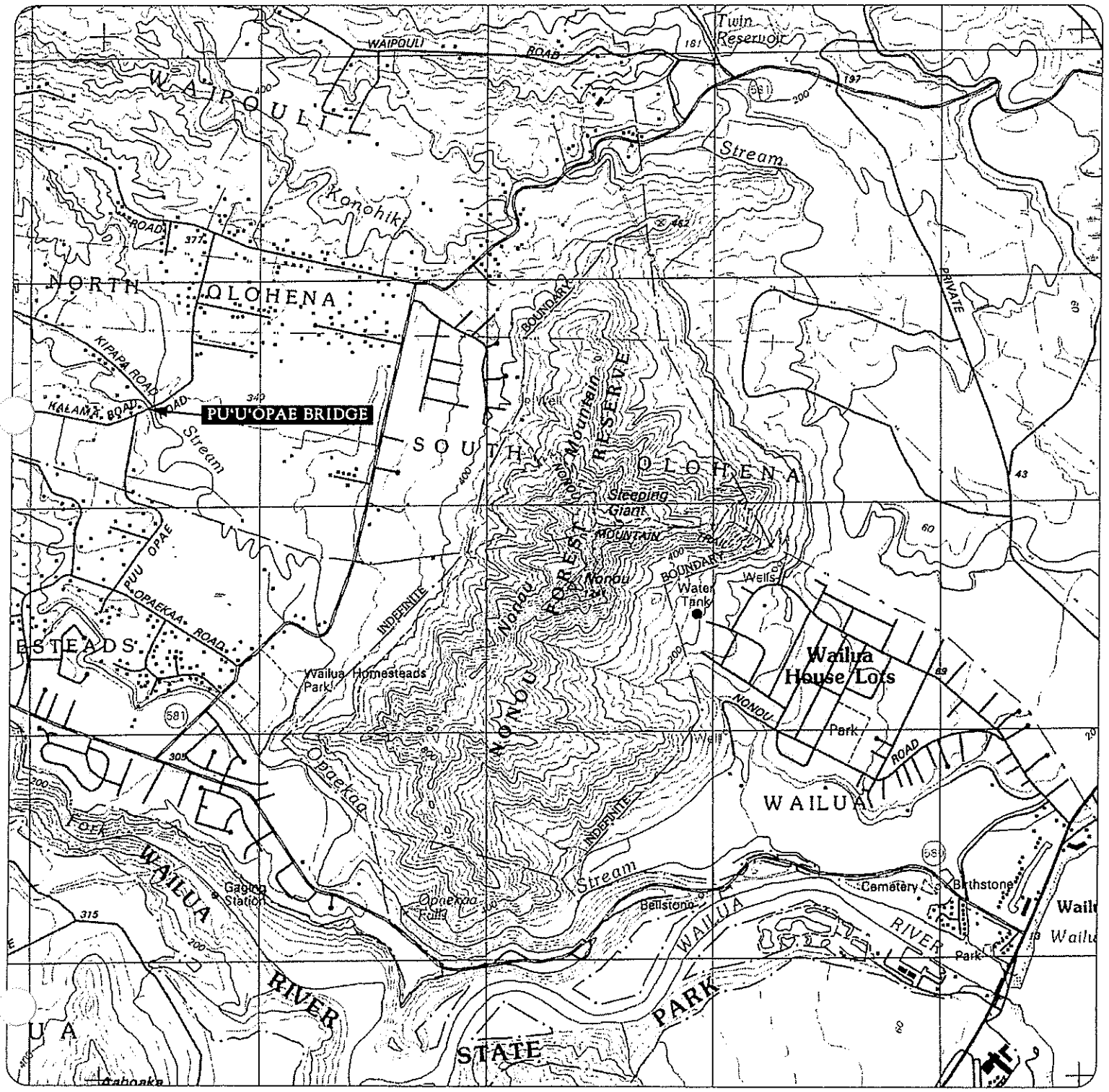
Section _10_ Page ___ 2 of 4 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Geographical Data

Detail of USGS Map, Kapaa Quandrangle, Hawaii-Kauai Co., 7.5-Minute Series (full map is enclosed).



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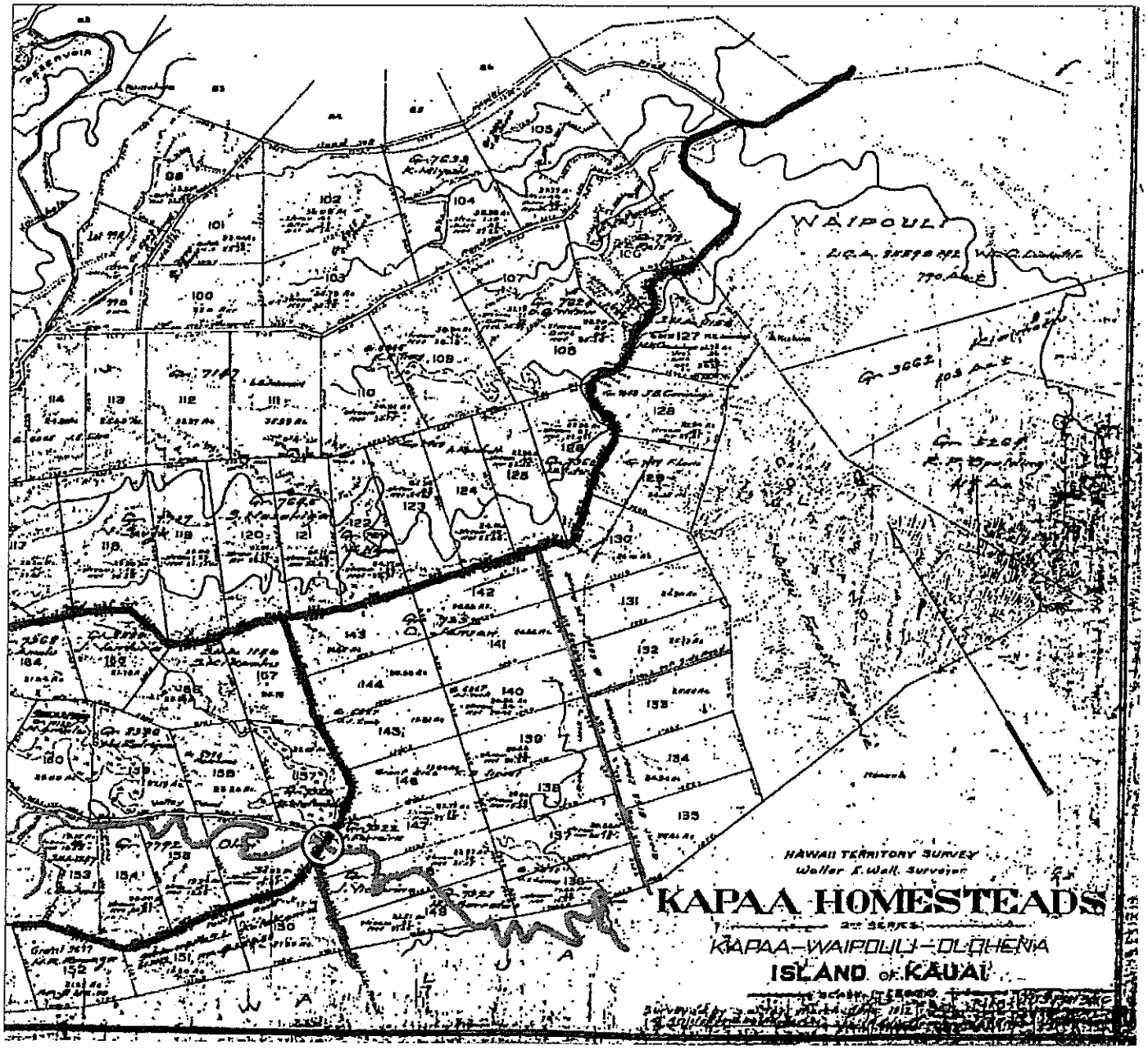
Section _10_ Page __ 3 of 4 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Geographical Data

Map detail: Hawaii Territory Survey: Kapaa Homesteads 2nd Series. HTS Plat 3016. 1912



Pu'u'ōpae Bridge ◯ Olohena Rd. ——— Pu'u'ōpae Rd. ———
Kalama Stream ——— Kamalu Rd. ——— Pu'upilo Rd. ———

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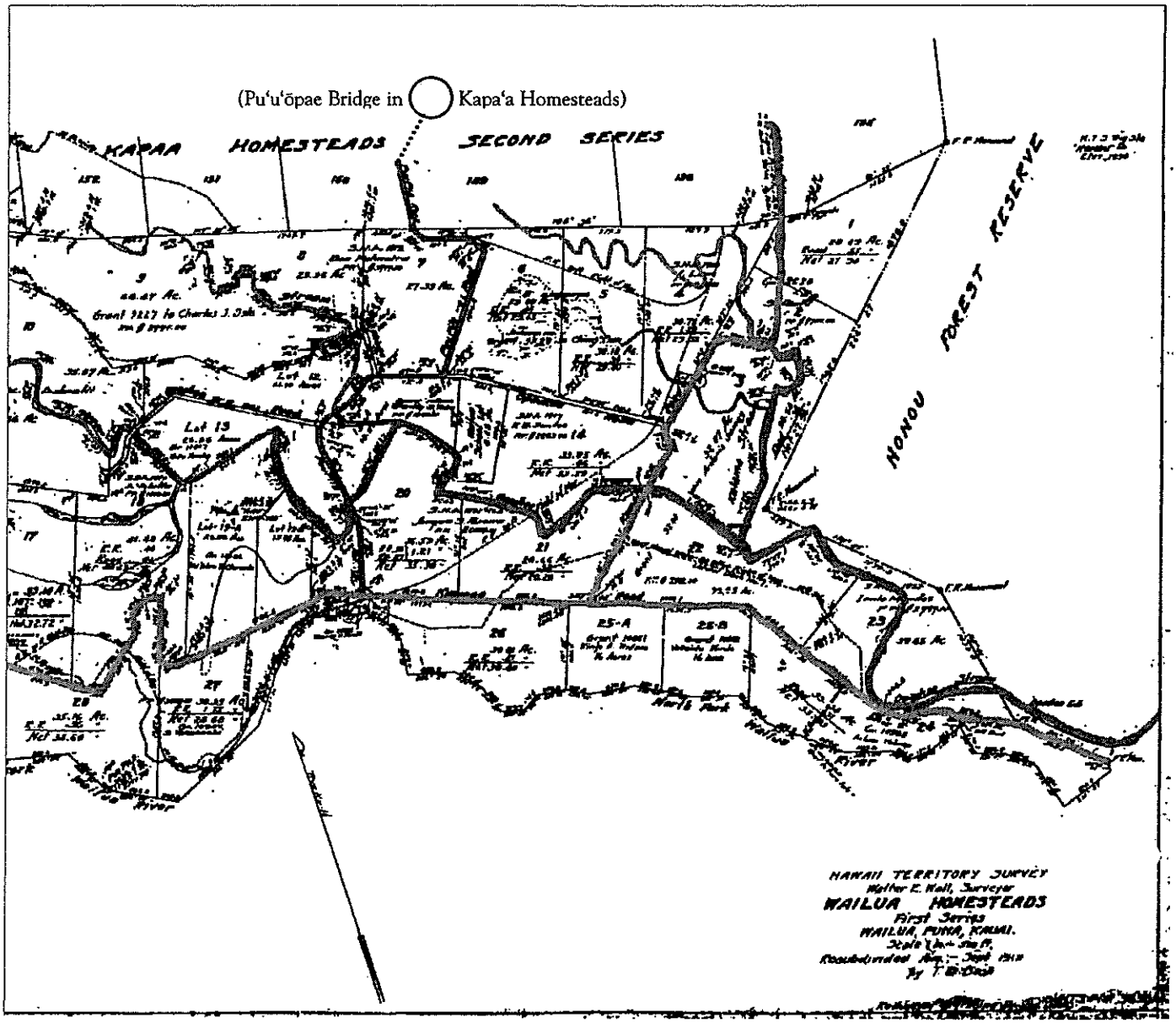
National Register of Historic Places Continuation Sheet

Section _10_ Page ___ 4 of 4 _ Name of property _ Pu'u'ōpae Bridge _ County and State _ Kaua'i, Hawai'i

Geographical Data

Map detail: Hawaii Territory Survey: Wailua Homesteads First Series, HTS Plat 3033. 1919



Pu'u'ōpae Bridge ◯ Kuamo'o Rd. ═══ 'Ōpaeka'a Stream ═══
Kalama Stream ═══ Kamalu Rd. ═══ Pu'upilo Rd. ═══

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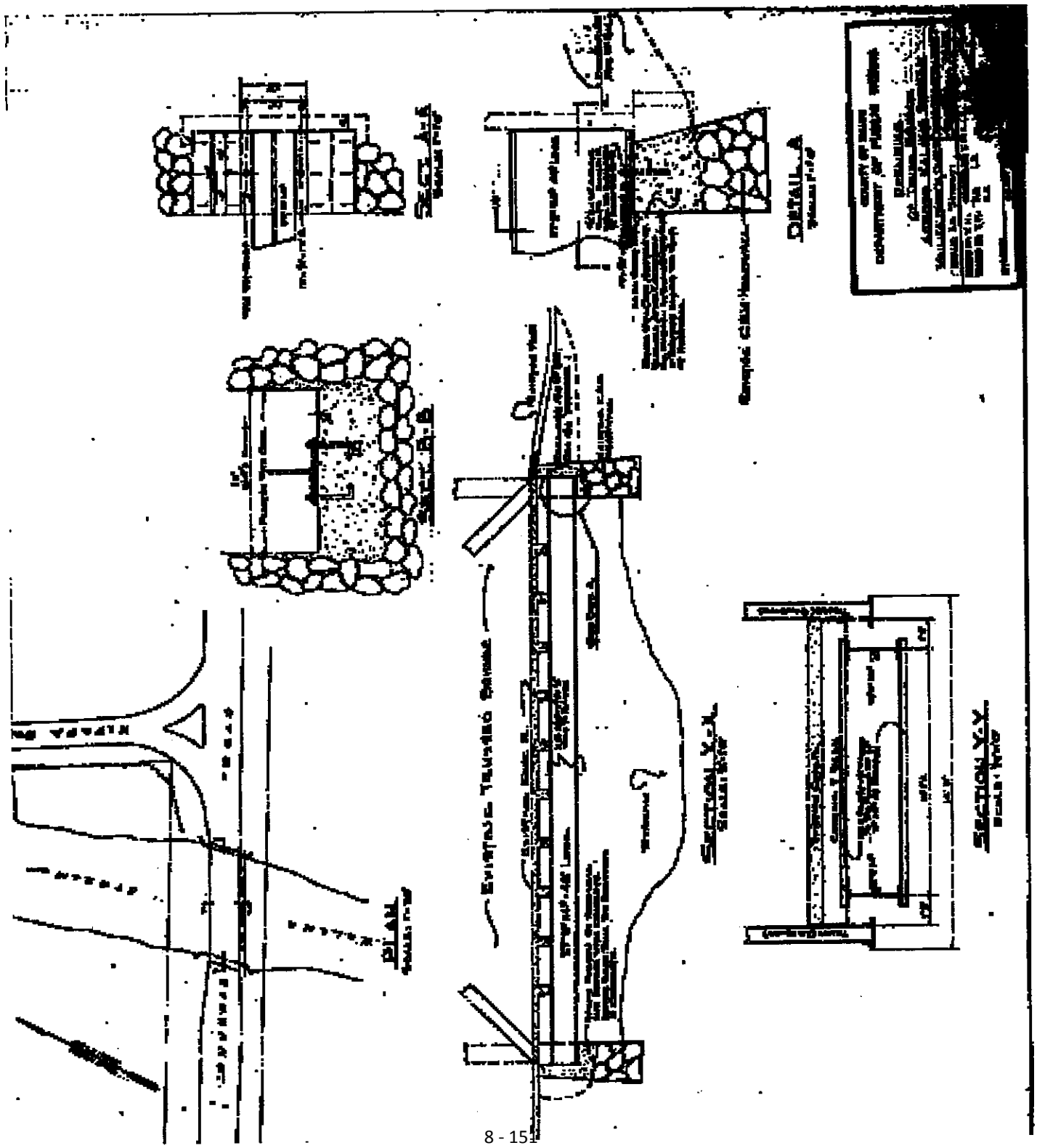
National Register of Historic Places Registration Form Continuation Sheet

Section _ 7 _ Page _ 2 _ Name of property _ Pu'u'ōpae Bridge _ County and State ___ Kaua'i, Hawai'i ___

Narrative Description: Page 5; Workmanship (Detail of Repairs, 1958)



United States Department of the Interior
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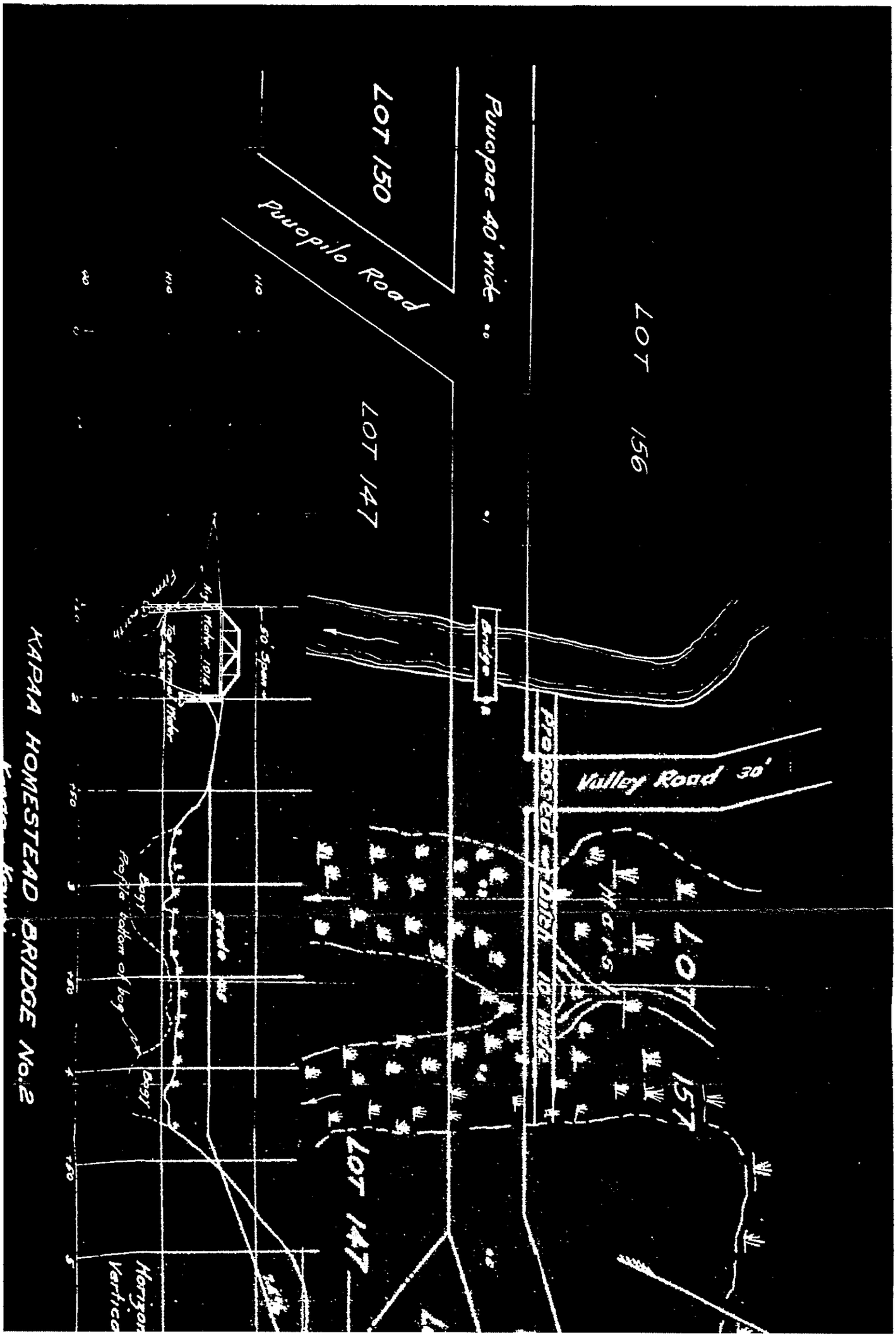
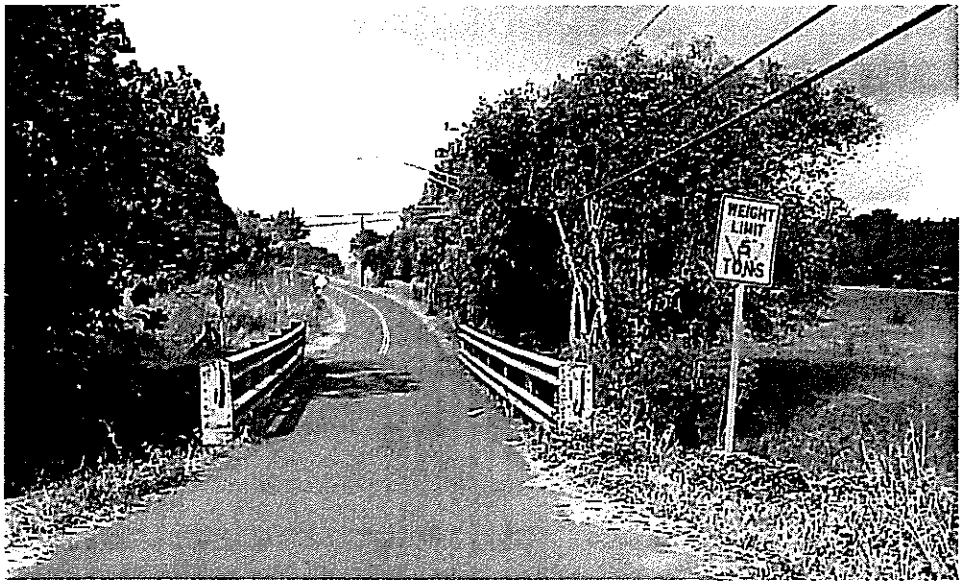
Registration Form Continuation Sheet

Narrative Description: Page 6; Age; Attachment, 5 of 5



PUUOPAE BRIDGE (KALAMA STREAM)

Kapaa Homesteads 2nd Series



APPROACH

VIEW FROM NORTHWEST SIDE

PUUOPAE BRIDGE, ORIGINALLY KNOWN as Kapaa Homesteads Bridge No. 2, was built in 1915. It is the earliest bridge to be constructed beyond the Belt Road, in the island's homesteading lands, that is included in Kauai's *Historic Bridge Inventory.** Puuopae Bridge stands today both as a record of building standards of the era and as a testament to the little-remembered historic homesteading movement in Hawaii.

INTEGRITY

Location. The Puuopae Bridge is in its original location, carrying Puuopae Road over Kalama Stream in the Kapaa Homesteads.** The placement of Puuopae Road is shown on the Hawaii Territory Survey map of "Kapaa Homesteads 2nd Series: Kapaa–Waipouli–Olohena, Island of Kauai," created in 1912 when the tract was subdivided in preparation for its opening the following year. (Appendix B)

Design. Puuopae Bridge was originally trussed, as evidenced by a small sketch included in correspondence regarding the construction of the bridge in 1915, but its original concrete-encased steel floor remains in place. (Appendix C) The bridge has been neither widened nor extended.

Setting. The setting has not changed substantially. Three houses have been built in the vicinity, on Kalama Road southwest of the bridge, but they have not altered the rural character of the area, which is defined by pastoral and agricultural lands sweeping from the east side of the bridge to the foot of Nounou (Sleeping Giant) Mountain in the distance. (Appendix A)

Materials. The concrete deck, steel girder floor system and sections of the abutments are original materials. The endposts may be recycled parts of the nineteenth century Wailua River Bridge that was dismantled in 1919 and used for roads and bridges in the area. (See information under "Age" below.)

Workmanship. The bridge is not in its original condition. Repair data located in the County Engineering office indicates that in 1958, two 48 foot I-beams were installed

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* There is confusion about the name of this bridge. It was originally identified as Kapaa Homesteads Bridge No. 2, and it was occasionally referred to in the road supervisor's reports during construction as Puupilo Bridge, but it has traditionally been called Puuopae Bridge. Although it crosses over Kalama Stream (and one sheet of repair plans in the County Engineer's office refers to it as Kalama Stream Bridge, it is not the Kalama Bridge, which is located *makai* of this bridge on Kamalu Road.

** Underlined clauses are cited from the 1989 *Historic Bridge Intentory: Island of Kauai.*

beneath the concrete and steel girder floor system for structural support. While the plans indicate that the truss was still in place at the start of the project, it might have been removed after the I-beam support system was in place. Rusting and collision damage have also affected the original workmanship.

Feeling. There is a historic feeling to this bridge because of its narrow width, as well as its location in the back-country, still-agricultural/pastoral lands.

Association. The construction of Puuopae Bridge in 1915, two years after the Kapaa Homesteads 2nd Series was opened, provided an important transportation conduit that contributed to the successful development of the homesteading lands on the east side of Kauai.

When Hawaii became a territory of the United States in 1900, land ownership beyond that of the government's significant holdings was highly concentrated in the hands of a few large business interests and the individuals who controlled them. To encourage further settlement of family farmers in the islands, the government opened tracts of territorial land in Kapaa, Kalaheo and elsewhere in Hawaii.

The sale of public land as a strategy to increase Hawaii's population of small, independent farmers was controversial. Most of the early territorial governors supported big sugar interests and showed "little faith in homesteading,"[1] Some governors were openly hostile to the movement: Lucius Pinkham (governor from November 29, 1913 to June 22, 1918) was reported as stating that he was "against the government lands being taken up by homesteaders. Homesteading is not a success; will never be a success and you know it damned well....All the cane lands of the government should remain in the ownership of the government and be leased to the sugar plantation."[2] Critics charged that the government had diminished the chances for homesteading success after it traded its fertile lands to plantations in exchange for unproductive tracts not viable for farming and transferred vital water rights to them as well.[3]

The dominant planter and business interests of the time were less-than-supportive of the homesteading philosophy themselves. Skeptics of their motives toward homesteaders accused the special interests of a land-grabbing scheme by which they advanced money to "marginal homesteaders" with the goal of becoming "the ultimate owners of every homestead the owner of which is so unfortunate as to be so easily gulled into the trap."[4] The possibility of gaining title to homesteaders' lands aside, sugar plantations were in a position to profit from cane-growing homesteaders through their monopoly of the milling and marketing processes, occasionally setting fees "so onesided and inequitable" that homesteaders across the territory protested.[5]

Despite the formidable opposition, some of the homesteading tracts began to show promise. In 1917 the chairman of the Chamber of Commerce Homestead Committee, E. W. Broadbent, reported that "the wisdom of the Homestead policy had

been abundantly justified. On the Olohena-Waipouli tract there are ninety Homesteaders with 3140 acres who harvested this season 31,500 tons of cane, worth $197,000, besides a considerable value in pines."[6]

The Waipouli Homesteads tract that Broadbent referenced was also known as Kapaa Homesteads 2nd Series. It included 81 lots ranging in size from 17.27 acres to 41.32 acres. The lots were sold by lottery at the court house in Lihue on Saturday, June 28, 1913. Lottery winners were allowed up to three adjoining parcels, with a maximum of 80 acres. In an attempt to prevent abuse of the program by unscrupulous land speculators, winners were required to live on their property for given percentages of the first 10 years and to actively cultivate their lands; to sell or lease their property was restricted.

Although roads were indicated on the 1912 survey map of the tract, they did not, in fact, exist when the Kapaa lottery winners sought to move onto and begin farming their land. But the homesteaders were not a group to wait passively in the face of government inactivity. In August 1913, barely a month after the lottery, several of the new homesteaders petitioned the county for roads to "be constructed as soon as practicable for, unless the said roads, particularly 'Olohena', 'Puuopae', and 'Puupilo', are built, leveled, or ruts filled, it will be as it is now hard work for the homesteaders to bring their lumber for building purposes and their effects to their lands."[7] The Board of Supervisors referred the matter to County Road Supervisor Joseph H. Moragne for action, but a letter to *The Garden Island* indicated that no progress had been made six months later: "As for roads, there are none, there are cattle trails all over this country and these were followed by oxcarts in hauling firewood from the mountains and there is nothing else in the way of roads there today."[8]

Water, too, was unavailable in Kapaa Homesteads. In December 1913 the homesteaders petitioned the Supervisors "for water pipes to be laid for their use."[9] The same *Garden Island* letter that complained of the lack of roads described the situation:

> It is true that some of the lots have streams passing through them, but the water all belongs to the Makee Sugar Co., the Governor having sold the water rights to the Company before the tract was opened, the settlers having no right to use the water in any stream, even for household purposes, and they have been so notified by the company, unless they pay a monthly rate.[10]

Makee was in a potentially advantageous position with regard to the Kapaa homesteaders for other reasons as well. Although many envisioned pineapple as the primary crop for the area, others championed sugar cane (ultimately both would be grown). Both Makee and Lihue Plantation competed by build a railroad into the homesteads—a struggle that Makee eventually won—to collect the farmers' cane and mill it at the company's factory.[11]

The Kapaa homesteaders continued their efforts throughout the 1910s to advance their positions. One or more of them appeared several times before the Board of Supervisors to urge the county to build or repair roads in the area, especially Olohena

Rd., which provided the lifeline between the homesteads and the Belt Road. Several joined to form an association in 1918 to "further the interests of the Kapaa homesteaders," and the group successfully secured water for irrigation after sending a delegation to meet with territorial officials in Honolulu. Some homesteaders became active in the Kauai Chamber of Commerce as another forum in which they could seek to redress grievances.

Their achievement in convincing the local and territorial governments to build and maintain roads and bridges in the area was significant. The experience with Kapaa undoubtedly helped convince officials that roads should be in place *before* new homesteading lands in Wailua 1st series were lotteried "so that homesteaders may drive up to their prospective front doors just as soon as they have selected the lots."

Kapaa Homesteads roads and bridges increased in importance after the Wailua Homesteads were opened, because Wailua roads did not flow towards the ocean. Instead, they were connected to the Kapaa Homesteads roads—Puupilo, Puuopae and Kamalu (which ran parallel to Puuopae along the foot of Nounou Mountain). Olohena funneled both sets of homesteaders from their *mauka* lands to the Belt Road. (Appendix B) Wailua Homesteads was not linked to the Belt Road until 1936, when Depression-era federal funding constructed the Opaekaa Bridge and extended Kuamoo to the ocean. As a result, this network—including Puuopae Bridge—remained important throughout the homesteading era.[13]

By the time the 31 lots in adjacent Wailua Homesteads 1st Series were lotteried in December 1919, at least some of the Kapaa Homesteaders were farming successfully: *The Garden Island* reported in January of that year that E. M. Cheatham was employing 40 men to harvest his cane and that of his neighbors. But those were the glory days. During the next decade the dropping prices paid for sugar made small-scale cane growing increasingly unprofitable. By 1945 the Land Laws Revision Commission review of homesteading in Hawaii reported that lot owners had "become landlords to corporate agricultural operators."[14] Its final report to the governor on December 31, 1946 declared that

> in Honolaa, the majority of the homesteads patented suitable for cane are cultivated to cane by the adjoining plantation, either under lease or planting contract....A similar situation exists at Kapaa, Kauai, where the majority of the homesteads patented suitable for pineapples are cultivated to pineapples by the Hawaiian Fruit Packers, Ltd., or Hawaiian Canneries Co.[15]

Many of the Kapaa homesteaders turned to occupations other than farming. To name but three examples, Elmer Cheatham moved to Makaweli to run a store; his brother-in-law Rolland Israel (who had been optimistic enough about the future of homesteading that he added to his Kapaa holdings by buying a lot in the Wailua tract when it was opened in 1919) became Game Warden; C. K. Amalu served as a judge. Gradually, much of the Wailua and Kapaa Homesteads 2nd Series was rezoned for residential use. Today, the

"bowl" of land adjacent to Puuopae Bridge, bordered by Puuopae, Opaekaa, Kamalu and Olohena roads contains some of the only remaining area of significant agricultural acreage (nearly 400 acres) in the region.

AGE

1. Written correspondence between Hawaii Superintendent of Public Works Charles R. Forbes and Kauai County Road Supervisor Joseph H. Moragne establishes the bridge's period of construction as being between March and July 1915. (Appendix C)

On March 3, 1915 Hawaii Superintendent of Public Works Charles R. Forbes visited Kauai for a few days to investigate the surveyed routes for a plantation railroad in the Waipouli homesteads.[16] He might also have discussed with Moragne the lack of adequate roads in the area, because his correspondence dated March 25, 1915 referenced Moragne's letter of March 19. Perhaps plans for Puuopae bridge had already been developed, since Forbes's correspondence included both a blueprint pinpointing the location of the bridge on Puuopae Road (with a small sketch of a truss-style bridge design below it) and an agreement for the Territory to pay the county $800 to construct the bridge. The agreement was approved by the Kauai Board of Supervisors on April 7, 1915.[17]

Work proceeded quickly on the bridge. At the June 8 meeting of the Board of Supervisors, Moragne reported that construction was in progress. It had been completed by the time of the August report.[18]

2. As previously noted, the end posts of the bridge have the same dimensions and riveted construction as the top chords and western end posts of the Opaekaa Bridge. It is known that when the 1890, Scottish-made Wailua Bridge was replaced in 1919, parts of the old bridge were "disposed along the side of the road awaiting removal to some needy spot where they may serve for small bridge trusses, coverings for culverts, etc. Some of them will probably be used on the homestead roads."[19] Opaekaa Stream Bridge one mile from the Puuopae Bridge was constructed from parts of the dismantled bridge. (Usable parts from the old bridge were still available as late as 1925, when chords from it were put into use as stringers in construction of the Kalama Bridge on Kamalu Rd., near the border between Wailua and Kapaa Homesteads.) The County Road Supervisor's activities report of May 1920, eight months after Wailua Bridge was dismantled, notes that small bridge repairs had been completed in the area: Since the end posts on Puuopae Bridge are so similar to the Opaekaa Bridge top chords and western end posts, they may also have come from the old Wailua Bridge.[20]

ADDITIONAL CRITERIA

Events. The Puuopae Bridge and Road have been integral to the story of the Kapaa and Wailua Homesteads' origins and development.

Persons. In the early territorial period, homesteading lands were released by the government in an attempt to increase settlement opportunities for small, independent farmers, especially Hawaiians "who kept up constant pressure through their political leaders to recapture Hawaii's lands for themselves," and recruits whom "Americanizers," hoped would increase the percentage of Anglo Saxons in Hawaii and strengthen the psychological bonds with the United States.[21] One of the requirements of the lottery winners in Kapaa Homesteads 2nd Series was that they be American citizens or declare their intention of becoming one.

An example of the Americanizers' intent is evidenced by the reception E. M. Cheatham received when he moved to the Homesteads. Cheatham, who had been employed as manager of B. F. Ehlers & Company (predecessor to Liberty House, now Macy's) before acquiring his homesteading lands in Kapaa, was described as "a real good citizen of the capital city...a live-wire of the Honolulu Ad. Club and an important figure in other organizations at Honolulu."[22] Three months later, under the headline "Homesteaders of the Right Kind," he was described as a man with "business ability, capital and those things that make for good citizenship." [23]

The history of the Kapaa Homesteads, however, is not the product of a single Great Man who shaped the area but the collective story of a group of settlers who struggled to make a life as independent farmers for themselves and their families. The names of the 1913 Kapaa Homesteads lottery winners hints at a predominance of the Hawaiian and Caucasian settlers who bought into the homesteading idea, but people from other backgrounds were represented as well: Lino, Contrades, Kauai, Hanohano, Kaui, Kainoa; Kelekoma, Booge, French, Miyashi, Souza, Reis, Wilson, Tracy, Johonnot, Silva, Kondà, Nasahiga, Hepa, Reichelt, Soto, Cummings, Louis, Achuck, Cheatham, Livesey, Israel, Cook, Jensen, Ferreira, Victorino, Barreta, Rapoza, Aroong, Ohai, Waiwaiole, Mailehuna, Rodrigues, Amalu, Kaiu, Ventura, Kikaahu.[24]

DISTINCTIVE CHARACTERISTICS

Type. Puuopae Bridge is a rare example of a bridge with a steel girder floor system, an unusual combination of concrete-encased steel floor beams and steel girders. It is one of only two of its structural type....Only this bridge and the Eleele Pedestrian Overpass are classified as having steel girder floor systems on the State Bridge Inventory, and the Puuopae Bridge predates Eleele by almost a quarter of a century.

Period. Puuopae Bridge is an excellent example of the early twentieth century period of homestead bridge construction.

Construction. Its single span is 46 feet and its length is 48 feet. The height of the soffit of the bridge over the stream is about 11 feet.

Work of a Master. The actual design of the bridge has not been established, although Joseph Moragne, who was responsible for much of the early territorial roadwork and bridge design, is definitely associated with Puuopae Bridge through his position as county road supervisor and engineer as well as his correspondence with Charles Forbes about the construction of the bridge. He certainly supervised its construction. Investigations about the designer of this bridge are continuing.

Artistic Value. The bridge is purely functional, and has no artistic characteristics. However, the pattern formed by the rivets is interesting.

Distinguishable Entity. The Puuopae Bridge is a distinguishable entity because it is the earliest bridge in the *Historic Inventory* built in Kauai's homesteading tracts. It is one of only three bridges on Kauai where riveted metal construction is visible. The other two are S-18 Hanalei River Bridge and C-13 Opaekaa Stream Bridge, both of which are listed on the National Register of Historic Places. It also has [a rare] combination of concrete-encased steel floor beams and steel girders.

Unusual Resource. The Puuopae Bridge is an unusual resource because of its historical links to the development of the Kapaa Homesteads, and the direct involvement of the community there in pressuring the government to build adequate stream crossings and roads in the area; its concrete-encased steel girder floor system; and its probable use of recycled parts from the 19th century Wailua Bridge.

SUMMARY

The historical significance of Puuopae Bridge as a very early example of bridge-building in the homesteading lands is great. Although the bridge has lost its truss, its original flooring and dimensions make it a valuable resource for interpreting the too-little understood, non-plantation-related development of Territorial Hawaii.

NPS Form 10-900
(7-81)

OMB NO. 1024-0018
EXP. 10/31/84

United States Department of the Interior
National Park Service

National Register of Historic Places Inventory—Nomination Form

For NPS use only
received
date entered

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

1. Name

historic Opaekaa Road Bridge

and/or common

2. Location

street & number Opaekaa Road over Opaekaa Stream ___ not for publication

city, town Kapaa X vicinity of ~~congressional district~~

state Hawaii code 15 county Kauai code 07

3. Classification

Category	Ownership	Status	Present Use	
___ district	X public	X occupied	___ agriculture	___ museum
___ building(s)	___ private	___ unoccupied	___ commercial	___ park
X structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	___ yes: restricted	___ government	___ scientific
	___ being considered	X yes: unrestricted	___ industrial	X transportation
	N/A	___ no	___ military	___ other:

4. Owner of Property

name County of Kauai

street & number 4396 Rice Street

city, town Lihue ___ vicinity of state Hawaii

5. Location of Legal Description

courthouse, registry of deeds, etc. Bureau of Conveyances

street & number 1151 Punchbowl

city, town Honolulu state Hawaii

6. Representation in Existing Surveys

title Hawaii Historic Places Inventory has this property been determined eligible? ___ yes X no

date 1982 ___ federal X state ___ county ___ local

depository for survey records Department of Land & Natural Resources

city, town Honolulu state Hawaii

7. Description

Condition		Check one	Check one
___ excellent	___ deteriorated	___ unaltered	___ original site
___ good	___ ruins	_X_ altered	_X_ moved date 1919
_X_ fair	___ unexposed		

Describe the present and original (if known) physical appearance

The Opaekaa Road Bridge is a single lane, wrought-iron, Warren truss bridge which terminates with vertical end posts. The bridge is 73 feet long and its trusses consist of 7 panels, each approximately 10 feet in length and 9 feet 8 inches tall. The trusses are 13 feet 4 inches apart, center to center, and the panels form the outline of a slightly elongated equilateral triangle.

The width of the top chords, bottom chords and end posts is 16 inches, and the diagonal web members are 6 inches wide. The bottom chords of the trusses were strengthened in 1919 when 5 rolled steel I-beams were welded to them. These I-beams run perpendicular to the two trusses and serve to connect them structurally. They also support 2 steel I-beams which run parallel to the trusses and assist in supporting the reinforced concrete roadway deck. The 5 perpendicular I-beams extend beyond the edges of the trusses and 3 of them are connected to the top chords by small welded steel members which provide lateral bracing. The end posts at one end of the bridge are reinforced concrete and at the other end are steel boxes welded to the original trusses.

A reinforced concrete deck, which is at least 5 inches thick, rests on top of the trusses' bottom chords and the I-beams. The entire structure rests upon two lava rock masonry abutments and one lava rock masonry pier.

The trusses are formed of simple rolled plates, angles and channels. They were more than likely riveted together in the iron works and apparently employ drilled rivet holes. A wrought-iron plate near one end of the bridge reads,

Alex. Findlay & Co.
Bridge Builders
Motherwell
near
Glasgow 1890

Originally the Opaekaa Road Bridge was part of a longer three-span bridge which crossed the mouth of the Wailua river. The end posts,deck, I-beams and lateral braces all date from the moving of this section of the Wailua Bridge to the Opaekaa Road location.

Since 1919 the bridge has not been altered or moved.

When existing leases on these parcels expired a number of them were subdivided into homesteads, which were sold to people for a modest price.

The Wailua Homesteads first series were opened in December 1919. 908 people applied for the 31 lots, which were distributed by way of a lottery. The roads were constructed prior to the lottery, and the Opaekaa Road bridge was part of this initial government improvement. The Garden Isle of September 23, 1919, applauded the putting in of the roads in advance. The editors found it to be,

> A great improvement over anything we have had heretofore, where in many cases a sure-footed pack mule, or a light-landing aeroplane was the only means of getting near some of them (the homestead lots).[1]

The area serviced by Opaekaa Road still reflects the agricultural orientation associated with the homestead movement, although many more modern residences now dot the landscape. The bridge stands as one of the few man-made reminders of the period when the homesteads were opened.

1. Garden Isle September 23, 1919, p. 1

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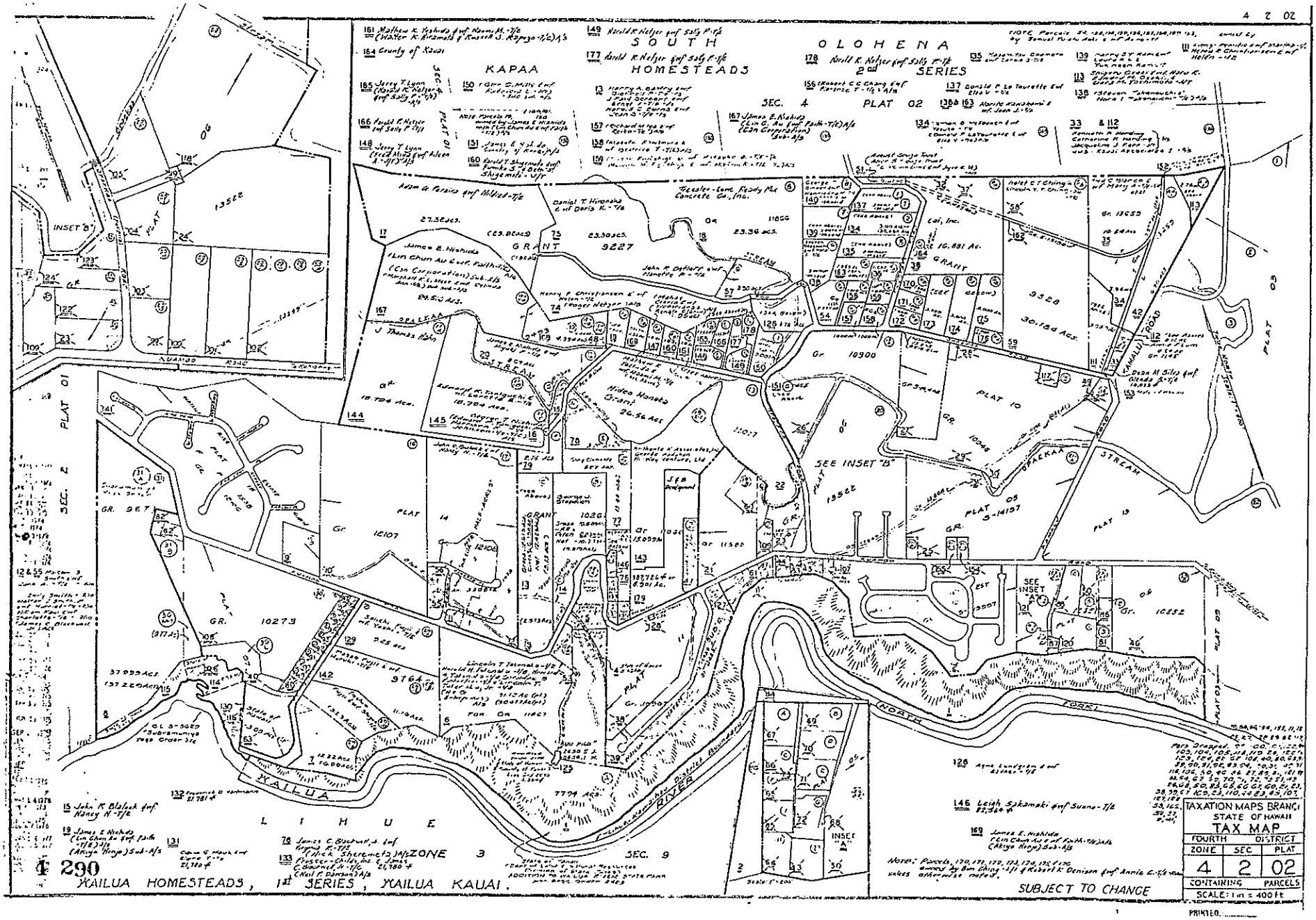
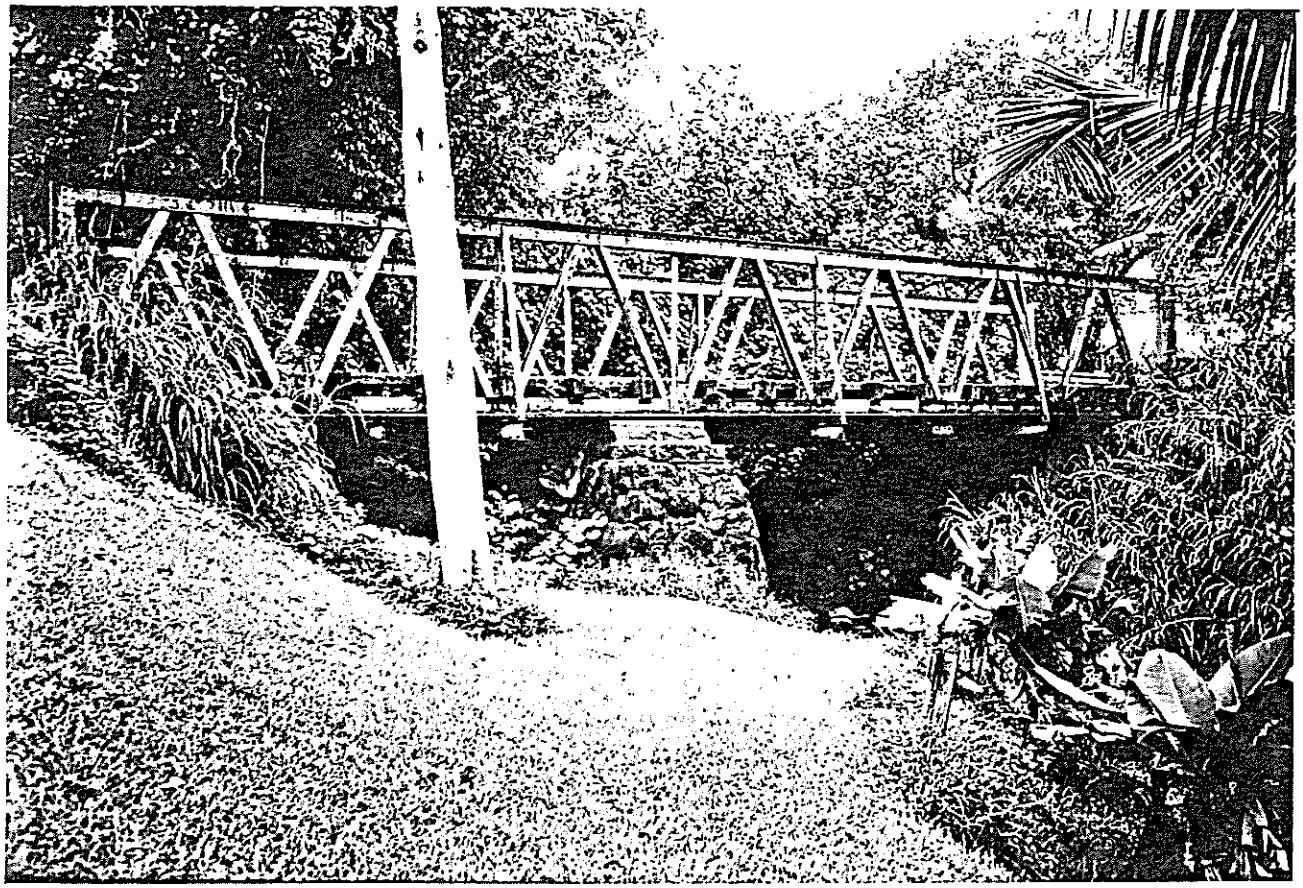
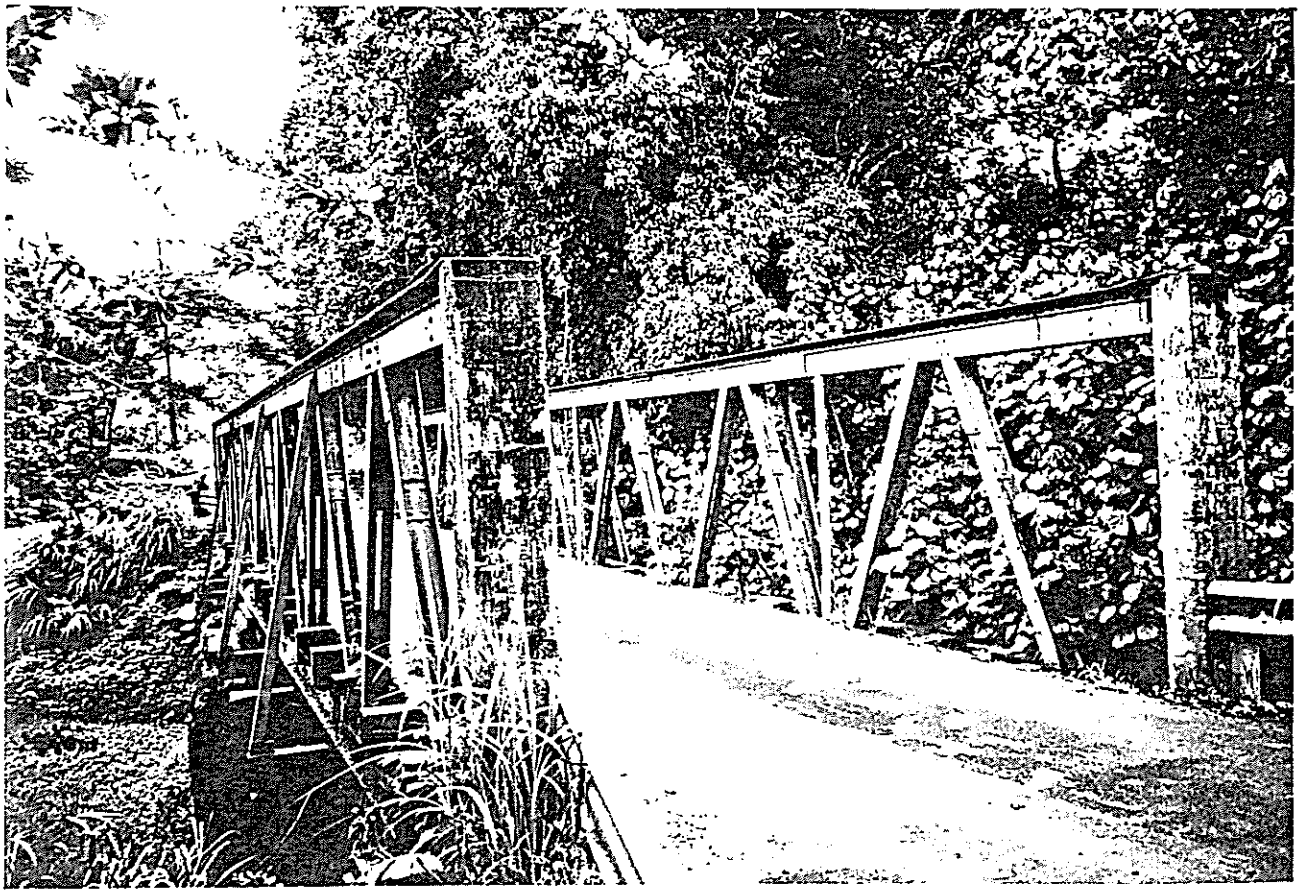
1. Garden Isle September 23, 1919, p. 1


KAPAA
SOUTH HOMESTEADS
OLOHENA 2nd SERIES
SEC. 4 PLAT 02
GRANT 9227
GRANT 9328
30.184 Acs.
KAMALII ROAD
KAWAIHAU ROAD
KAPAHI STREET
PLAT 01
PLAT 03
PLAT 10
PLAT 14
PLAT 19
SEE INSET "B"
SEE INSET "A"
INSET "A"
INSET "B"
KAILUA
LIHUE
NORTH FORK
HANAMAULU DISTRICT
RIVER
SEC. 2
SEC. 9
ZONE 3
4 290
KAILUA HOMESTEADS, 1st SERIES, KAILUA KAUAI.
SUBJECT TO CHANGE
TAXATION MAPS BRANCH
STATE OF HAWAII
TAX MAP
FOURTH DISTRICT
ZONE 4 SEC 2 PLAT 02
CONTAINING PARCELS
SCALE: 1 in = 400 ft
PRINTED





Opaekaa Bridge
vicinity of Kapaa, Kauai, Hawaii

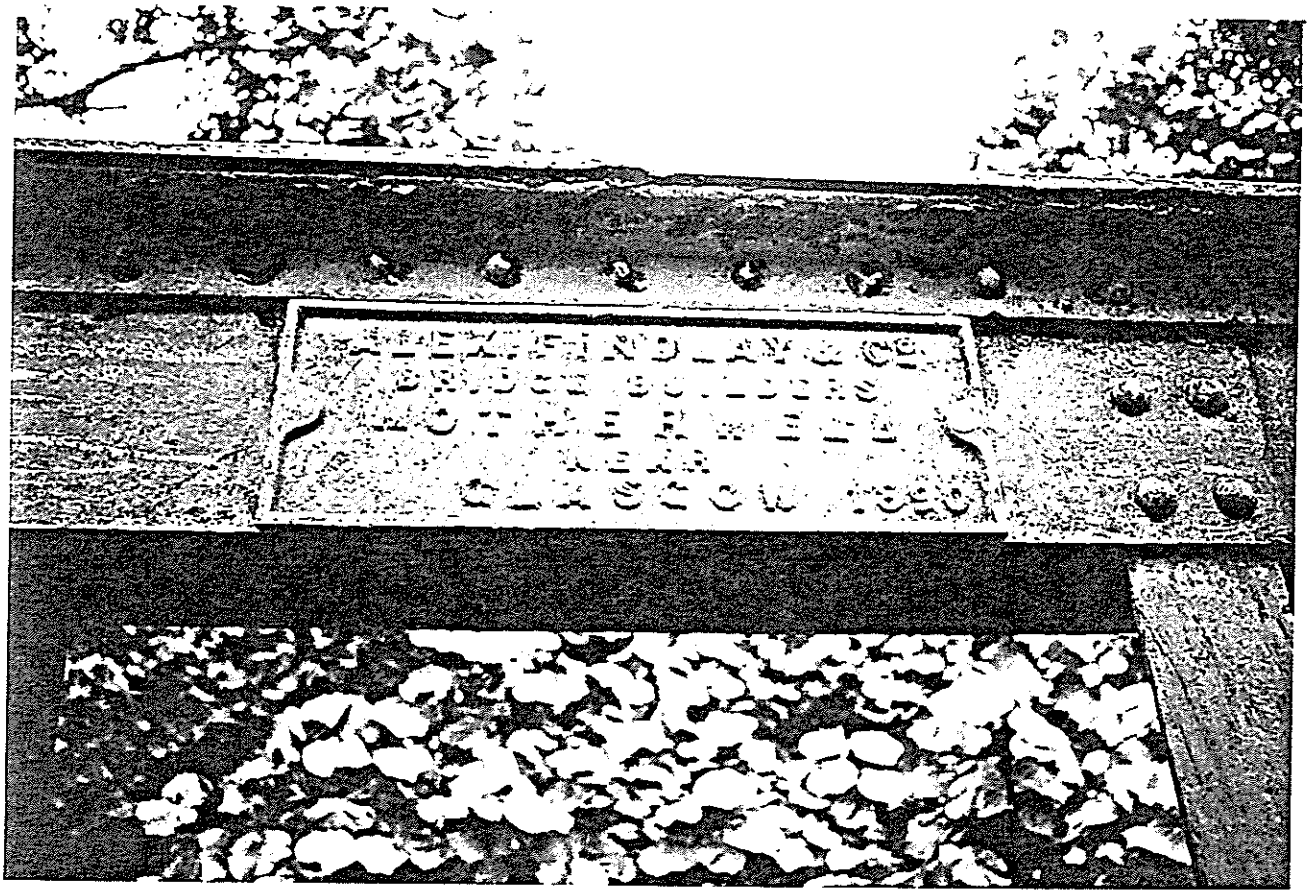
photographer: Don Hibbard
1982

lateral view of the bridge from the southeast
negative in DLNR
1 of 3 photographs

Opaekaa Bridge
vicinity of Kapaa, Kauai, Hawaii

photographer: Don Hibbard
1982

head on view from the north
negative in DLNR
2 of 3 photographs



Opaekaa Bridge
vicinity of Kapaa, Kauai, Hawaii

photographer: Don Hibbard
1982

view of manufacturer's name plate on top chord, west side
negative on file in DLNR
photograph 3 of 3

9. Major Bibliographical References

Donald C. Jackson & Barnes Riznic, "Kauai's Opaekaa Bridge: The Only Know British Truss Bridge in the United States" Industrial Archaeology, vol.13 (Summer 1978) no. 2

10. Geographical Data

Acreage of nominated property less than a quarter acre

Quadrangle name Kapaa **Quadrangle scale** 1:24000

UMT References

	Zone	Easting	Northing		Zone	Easting	Northing
A	04	460700	2439780	B			
C				D			
E				F			
G				H			

Verbal boundary description and justification

This nomination includes the bridge, its footings and the land & water they stand upon and span.

List all states and counties for properties overlapping state or county boundaries

state	code	county	code
state	code	county	code

11. Form Prepared By

name/title Don Hibbard architectural historian

organization DLNR **date** August 31, 1982

street & number 1151 Punchbowl Street **telephone** 548-6408

city or town Honolulu **state** Hawaii

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

__X__ national ____ state ____ local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

State Historic Preservation Officer signature

title State Historic Preservation Officer **date** February 15, 1983

For NPS use only

I hereby certify that this property is included in the National Register

date

Keeper of the National Register

Attest: date

Chief of Registration

8. Significance

Period	Areas of Significance—Check and justify below				
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion	
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science	
___ 1500–1599	___ agriculture	___ economics	___ literature	___ sculpture	
___ 1600–1699	___ architecture	___ education	___ military	___ social/ humanitarian	
___ 1700–1799	___ art	X engineering	___ music	___ theater	
X 1800–1899	X commerce	X exploration/settlement	___ philosophy	X transportation	
X 1900–	___ communications	X industry	___ politics/government	___ other (specify)	
		___ invention			

Specific dates 1890, 1919 **Builder/Architect** Alexander Findlay - Joseph H. Moragne

Statement of Significance (in one paragraph)

The Opaekaa Road Bridge is significant as the only known British-made iron bridge in the United States, and one of the few surviving iron bridges in the state of Hawaii. Also, the bridge is significant because of its associations with the development of the Wailua Homesteads.

In 1888 the Hawaiian legislature approved a bridge for the Wailua river, a major impediment to travel between Lihue and settlements on the northwest coast of Kauai. The bridge was fabricated by Alexander Findlay & Co. of Motherwell, near Glasgow, and was delivered in pre-fabricated sections. Due to insufficient funds the bridge was not immediately erected, but in 1894-1895 was finally set in place, following a loan from G.N. Wilcox to the Provisional government for this purpose.

In 1919 the County of Kauai replaced this iron bridge with a reinforced concrete arch bridge. Joseph H. Moragne, the County's Engineer and Road Superviser, designed and built the new bridge and also was responsible for retaining a part of the former Scottish-made bridge for use over Opaekaa stream.

The Opaekaa Road Bridge is the only known British-made bridge in the United States. It typifies British bridge manufacture of the late nineteenth century with its factory riveted trusses, use of drilled rivet holes, lack of lateral bracing, short height, and use of the bottom chords to support the road deck. This bridge also is one of the few major Nineteenth century, British-manufactured products to still exist in Hawaii, and as such serves as a reminder of the once-strong British presence in the Islands.

The bridge is also one of the few metal truss bridges remaining in the State. Others include the Karsten Thot bridge (Wahiawa, Oahu-1934) and the Hanalei Bridge (Hanalei, Kauai- 1912).

The bridge has further significance for its associations with the opening of the Wailua Homesteads first series. When the United States annexed Hawaii much of the crown lands came under the jurisdiction of the territorial government.

NPS Form 10-900 OMB No. 1024-0018
(Rev. 10-90)

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a).
Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic: Kapaia Swinging Bridge

other names/site number: Kapaia Valley Swinging Bridge; Kapaia Suspension Bridge

2. Location

street & number: end of Laukini Road , across Kapaia Stream to Kapaia Road NAnot for publication

city or town: Kapaia (Lihue) NAvicinity

state: HI code ____ county: Kauai code ____ zip code: 96766

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___

nationally ___ statewide ___locally. (___ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Signature of commenting or other official Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
____ entered in the National Register _____ See continuation sheet.

____ determined eligible for the _____ National Register. See continuation sheet.

____ determined not eligible for the _____National Register

____ removed from the National Register _____

____ other (explain): _____

Signature of Keeper Date of Action _____

5. Classification

Ownership of Property (Check as many boxes as apply)
X private
X public-local
___public-State
___public-Federal

Category of Property (Check only one box)
___ building(s)
___ district
___ site
X structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
NA	NA	buildings
NA	NA	sites
1	2	structures
		objects
1	2	Total

Number of contributing resources previously listed in the National Register
0

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.)
N/A

6. Function or Use

Historic Functions

Cat: TRANSPORTATION
Sub: PEDESTRIAN RELATED=FOOT BRIDGE

Current Functions

Cat: TRANSPORTATION
Sub: PEDESTRIAN RELATED=FOOT BRIDGE

7. Description

Architectural Classification

Other: Suspension Bridge

Materials
foundation: Concrete/Rock

walls: N/A
roof:N/A
other: Wood/Metal/Steel

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

Kapaia Swinging Bridge is nestled in the heart of Kapaia Valley, where only remnants of a once flourishing community existed.

The Immaculate Conception Catholic Church occupied the east side of the Kapaia Stream. Rice fields, a Filipino "camp", taro patches, Hawaiian and Japanese families lived on the inner valley side.

On the west side of the bridge stood the Lihue Hongwanji Buddhist Temple, Korean Methodits Church and Chinese Church. Naganuma Store, Ogata Store, Moriwake and Ah Chock's store lined the road leading up to the main Kuhio Highway.

Most of the immigrant villagers traveled by foot, so using the bridge connecting both sides of the Kapaia Stream was a convenient necessity. Often, heavy rains swept through the Kapaia Stream, washing away the low foot bridge, creating a huge inconvenience for the villagers. Archaeological remnants show that at least 2 attempts were made to rebuild the bridge with cement footings. Finally, in 1948, a suspension bridge was constructed by the County of Kauai.

With the emergence of automobiles as a major form of transportation, and with the closing of sugar plantations, the swinging bridge became less important as a mode of transportation, but very important as a historic symbol of an era in Hawaiian history that permeates every facet of local culture today.

In September, 2006, the Kapaia Swinging Bridge was declared unsafe for use and was closed. Concerned citizens petitioned the county to repair the bridge. The Kauai Council, recognizing its functional and historical value, and unanimously supported the citizen's desire and promptly appropriated $200,000.00 for repairing the bridge.

8. Statement of Significance

Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for
National Register listing)

X **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.

X **B** Property is associated with the lives of persons significant in our past.

X **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

____ **D** Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.)

____ A owned by a religious institution or used for religious purposes.
____ B removed from its original location.
____ C a birthplace or a grave.
____ D a cemetery.
____ E a reconstructed building, object, or structure.
____ F a commemorative property.
____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)

Transportation
Engineering
Ethnic Heritage

Period of Significance

1948

Significant Dates

1948 Construction of Kapaia Swinging Bridge completed

Significant Person
N/A

Cultural Affiliation

Sugar Plantation immigrants to Hawaii. Multicultural

Architect/Builder

County of Kauai, Department of Public Works. Draftsman: Shibao, Harutsuno; Engineer: Omori, Kunji
Contractor: Maeda, I.

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

---

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

1. County of Kauai Engineer's Report 11/ 1947, 3/1948
2. Department of Public Works Communication June 18, 1947; 1/7/1948; 4/7/1948; 11/5/1947
3. Communication from Office of the Chairman and Executive Officer 6/6/1945
4. Lihue Plantation Archives Hamilton Library Ubiversity of Hawaii
5. Hanamaulu Town Celebration Website www.
6. Immaculate Conception Centennial Booklet 1984
7. Tales of Old Kapaia by David Hyun
8. Oral History
   Kimiyo Takemoto Fujimoto
   Ethel Iida Inagaki
   David Hyun

Exhibits:

1. Tales of Old Kapaia by David Hyun
2. County of Kauai construction plans for Kapaia Swinging Bridge 1945
3. "Swinging bridge link to past" article in The Garden Island Newspaper 11/20/06

Map illustration from Tales of O

4. ld Kapaia page XIII

Previous documentation on file (NPS)

___ preliminary determination of individual listing (36 CFR 67) has been requested.

___ previously listed in the National Register

___ previously determined eligible by the National Register

___ designated a National Historic Landmark

___ recorded by Historic American Buildings Survey # _____

___ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

___ State Historic Preservation Office

___ Other State agency
___ Federal agency
X Local government
X University
X Other
Name of repository: _____

10. Geographical Data

Acreage of Property: Less than 1 acre

UTM References (Place additional__ UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	4	_____	_____	3	__	_____	_____
2	__	_____	_____	4	__	_____	_____

___ See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

The boundary includes the essential components of the bridge's structure.

11. Form Prepared By

name/title: Laraine Moriguchi
organization: Save Kapaia Swinging Bridge date: 2/8/2008

street & number: 4453 Laukini Road telephone: 808 246-6812
city or town: Lihue state: HI zip code: 96766

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.

A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs
Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)
name _____

street & number_____
telephone_____

city or town_____ state_____ zip code _____

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.0. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

The Kapaia Swinging Bridge is nestled in the heart of Kapaia Valley. Built first as a low foot crossing, it bridged upper Kapaia to the lower valley.

In the 1920s most of the plantation villagers traveled by foot because they could not afford to own an automobile. The foot bridge was used daily to go to and from work, school, shopping and play. Often, heavy rains swept through the Kapaia Stream, washing away the low foot bridge, creating a huge inconvenience for the villagers. Archaeological remnants show that at least 2 attempts were made to rebuild the bridge with cement footings (Photo 2, & 4 and construction plans Exhibit 2) show old concrete bridge piers. Finally, in 1948, a suspension bridge, funded by the County of Kauai, was constructed by Contractor I. Maeda for the community of Kapaia.

The Kapaia Swinging Bridge is classified a suspension bridge. It is one of 4 known similarly constructed suspension bridges in Hawaii. All are located on Kauai. The wooden deck is suspended from hangers attached to steel cables draped over 2 wooden towers and secured into solid concrete/boulder anchorages at both ends. The cable span between the two 15' 10" tall towers of the Kapaia Swinging Bridge is 80'. The entire bridge is 125' long. A complete and detailed description is included in the construction plans prepared by the County of Kauai Department of Public Works in December, 1945 (Exhibit 2)

With the emergence of automobiles as a major form of transportation, and with the closing of sugar plantations, the swinging bridge became less important as a mode of transportation, but very important as a historic symbol of an era in Hawaiian history that permeates every facet of local culture today. Until barricades were erected, it was still being used by citizens walking between Hanam'ulu and Lihue.

In September, 2006, the Kapaia Swinging Bridge was declared unsafe and was closed. The 1x12 walk planks are rotting and the steel plates, cables and bolts are rusting. A concerned community petitioned the county to repair the bridge. The Kauai Council, recognizing its functional and historical value, and unanimously supported the citizen's desire and promptly appropriated $200,000.00 for repairing the bridge. Unfortunately, the County Administration has chosen not to repair the historic structure, leaving its survival in extreme jeopardy.

The Kapaia Swinging Bridge crosses the Kapaia Stream; whose source is the Kapaia Reservoir and outlet is Hanama'ulu Bay. Kapaia Camp was one of many camps established by Lihue Plantation. Workers from Kapaia irrigated and maintained the sugar cane fields at Hanama'ulu.

Because the Kapaia terrain made it unsuitable for sugar cultivation, Lihue Plantation allowed the area to be used for shops, churches and other agricultural activities. Lands were leased, and later sold to enterprising farmers and businessmen. The interspersion of private landowners, business enterprises and the plantation camp gave the community of Kapaia a truly unique, multicultural character. Chinese and Japanese shops with names like Ah Chock, Naganuma, Ogata and Ihara established themselves to serve the people of the area. Portuguese merchants such as Fernandes and Carvalho opened general merchandising stores.

A historical account of Kapaia Valley in the 1930s is described in a book written and illustrated by Mr. David Hyun, a nationally recognized architect who grew up in Kapaia from 1926 (9 years old) until graduation from Kauai High School in 1935. His book portrays a completely factual version of daily living in Kapaia during the most prolific period of its history. The truth of Mr. Hyun's writings have been collaborated by more than one long time resident of Kapaia Valley. Ethel Iida Inagaki and her cousin, Kimiyo Takemoto Fujimoto, are very close in age to David Hyun. They, as well as others, confirm that everything (with exception to a few minor memory mistakes) written by David Hyun is historically factual.

Tales of Old Kapaia, by David Hyun (Exhibit 1), serves as the most important source of information in our bid to convince you of the historical significance of the Kapaia Swinging Bridge. The magic of Kapaia Valley is revealed through the simple wanderings of a young boy growing up at a time when children were free to explore their pristine surroundings, learning to appreciate the beauty of nature; free to roam the neighborhood, learning to accept, appreciate and thrive on diversity. Mr. Hyun's illustrations and writings stand alone in portraying the historical significance of the Kapaia Swinging Bridge as it relates to the history of Lihue Plantation Company, the people of Kapaia Valley, the island of Kauai and the State of Hawaii.

The Kapaia Foot Bridge, which was rebuilt as the Kapaia Suspension(Swinging)Bridge in 1948, linked Upper and Lower Kapaia Valley into a community bustling with activity.

Exhibit 1a: Map illustration by David Hyun Kapaia 1929

Below 10 (Hanging Foot Bridge):

Much of the plantation housing was located on the "Lower Valley" side of the bridge. The Filipino Plantation Camp as well as many Japanese and Hawaiian households were located on the "Lower Valley" side of the swinging bridge.
Also on the "Lower Valley" side were:
Immaculate Conception Catholic Church
A large cock fighting area
A brothel
Watercress farms
Rice farms
Taro farms

Above 10(Hanging Foot Bridge):

All of the businesss and most of the churches, including the Buddhist Temple, were on the "Upper Valley" side of the swinging bridge.
Also located on the "Upper Valley" side were:
Ah Chock Chinese Store
Naganuma, Moriwake, Ihara, Tanaka, Japanese Stores
Fernandes, Carvalho Portuguese General Stores
A Filipino Dance Hall
Ogata Sewing School
Ogata Pool Hall
Boiser Boxing Gym
Tom Sui Chinese Restaurant
Korean Methodist Church
Chinese Church

Japanese Newspaper Publishing Company
Barber Shop
Doi Auto repair, Service Company

David Hyun's map makes it obvious that the pathway across the swinging bridge was much shorter and more convenient than climbing up Kapaia Road, onto Kuhio Highway, then trekking down Kuhio Highway, to the shops and churches. Old timers will attest to the fact that the bridge was a necessity to the daily life of the plantation immigrants, many of whom did not have the luxury of an automobile.

Most of the traversing was done by people walking from their camp homes, across the bridge, to all of the activity on the "Upper Valley" side of Kapaia Stream. Japanese children from Hanama'ulu and lower Kapaia Valley crossed daily to attend Japanese School. Plantation laborers from the "Upper Valley" met across the bridge at 5 am daily to walk together to Hanama'ulu, where they were trucked to the sugar fields. Housewives walked back and forth the bridge to do their daily grocery shopping and to visit friends. These are just a few examples demonstrating the integral role of the Kapaia Swinging Bridge in the daily life of Kauai's sugar plantation immigrant population.

In the 1950s and early '60s, Lihue Plantation began phasing out camp housing, offering private ownership to their employees in Hanama'ulu, Puhi and elsewhere. By 2000, when Lihue Plantation closed, all of the plantation housing had disappeared and all of the private farms and businesses were gone.

Only remnants of a once flourishing plantation community still exist. The Catholic Church and Buddhist Temple still serve the spiritual needs of the island. A few prized longan trees planted by Chinese immigrants still bear fruit. The "Boiser House" still stands and the swinging bridge remains suspended over Kapaia Stream.

The County of Kauai was maintaining the bridge and its surroundings until a few years ago. In September, 2006, the bridge was closed due to unsafe conditions caused by maintenance neglect. At the present time, our county government has no plans to repair the bridge.

It is our hope that by placing the bridge on the Hawaii Register of Historic Places, our county leaders will recognize the invaluable historical significance of the Kapaia Swinging Bridge. Our ultimate goal is to honor those who came before us by keeping this

historical treasure as a bridge connecting the descendants of the Hawaiian and immigrant laborers to each other; and as a bridge welcoming those desiring to be a part of a truly special culture.

1. County of Kauai Engineer's Report 11/ 1947, 3/1948
2. Department of Public Works Communication June 18, 1947; 1/7/1948; 4/7/1948; 11/5/1947
3. Communication from Office of the Chairman and Executive Officer 6/6/1945
4. Lihue Plantation Archives Hamilton Library Ubiversity of Hawaii
5. Hanamaulu Town Celebration Website www.
6. Immaculate Conception Centennial Booklet 1984
Fujimoto, Kimiyo Takemoto. Interview 2006
Inagaki, Ethel Iida. Interview 2006
Hyun, David. Interview 2006
7. Hyun, David. Tales of Old Kapaia Self Published , 2003
8. Oral History
Kimiyo Takemoto Fujimoto
Ethel Iida Inagaki
David Hyun

Exhibits:

1. Tales of Old Kapaia by David Hyun
2. County of Kauai construction plans for Kapaia Swinging Bridge 1945
3. "Swinging bridge link to past" article in The Garden Island Newspaper 11/20/06

Map illustration from Tales of O

4. ld Kapaia page XIII

Property consist of a wooden deck, abutment on concrete piers spanning the Kapaia Stream. It touches ground on parcel TMK3-7-01:9 Unit B on one the east side, and parcel TMK 3-7-01-1 on the west side of the stream.

The structure is 125' long, 4' wide walking space , 7.5' total length of 3x4' wooden girders.

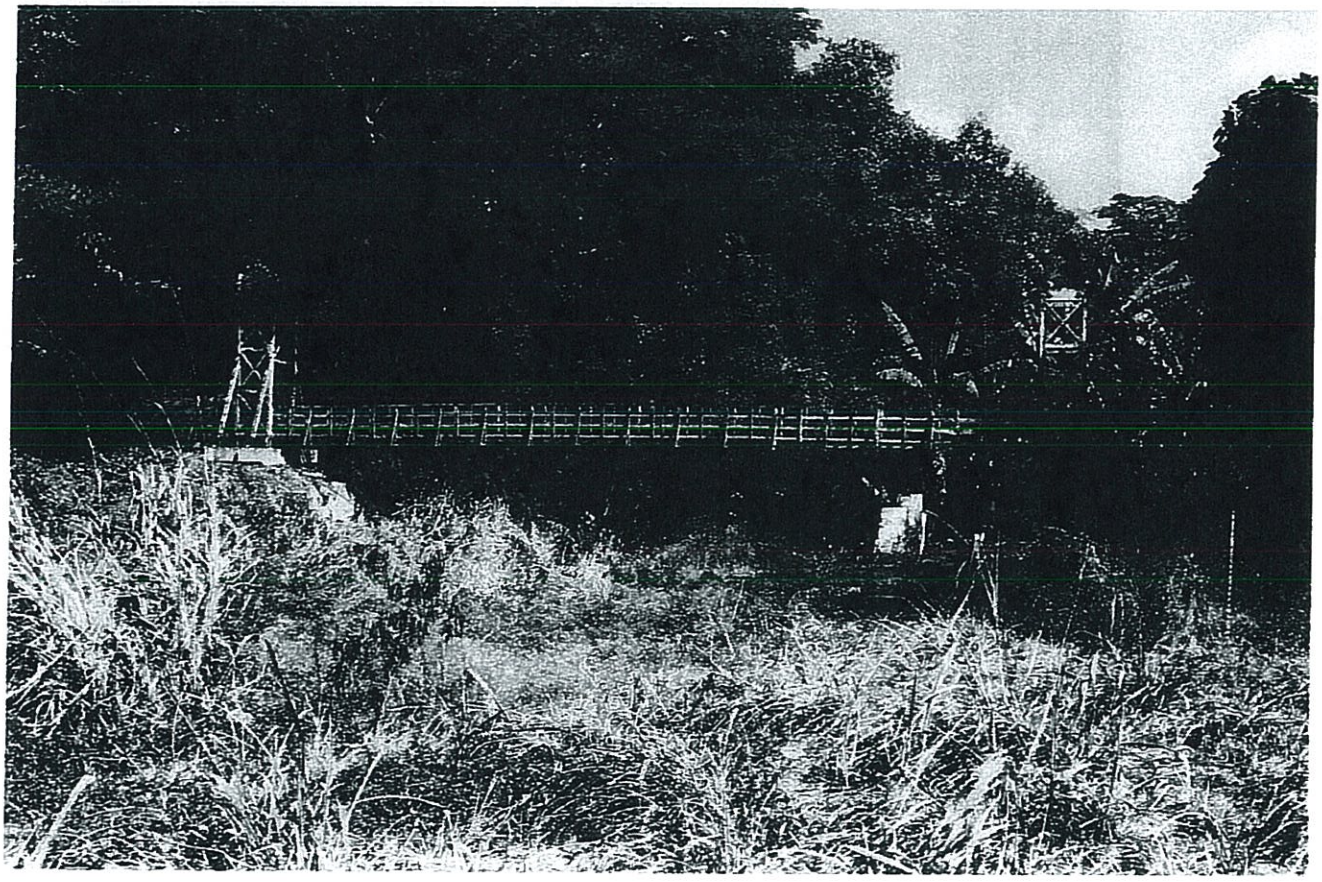
80' span between pier 1 and pier 2. Each pier consists of a concrete base upon which the wooden tower is bolted onto with angle steel plates. Height of tower from bottom steel plates to top of tower is 15' 10"

Boundary is further defined by the Construction plans included with the application Exhibit 2) and the UTM points given in section 10.

NPS Form 10-900-a OMB No. 1024-0018
(8-86)

United States Department of the Interior
National Park Service

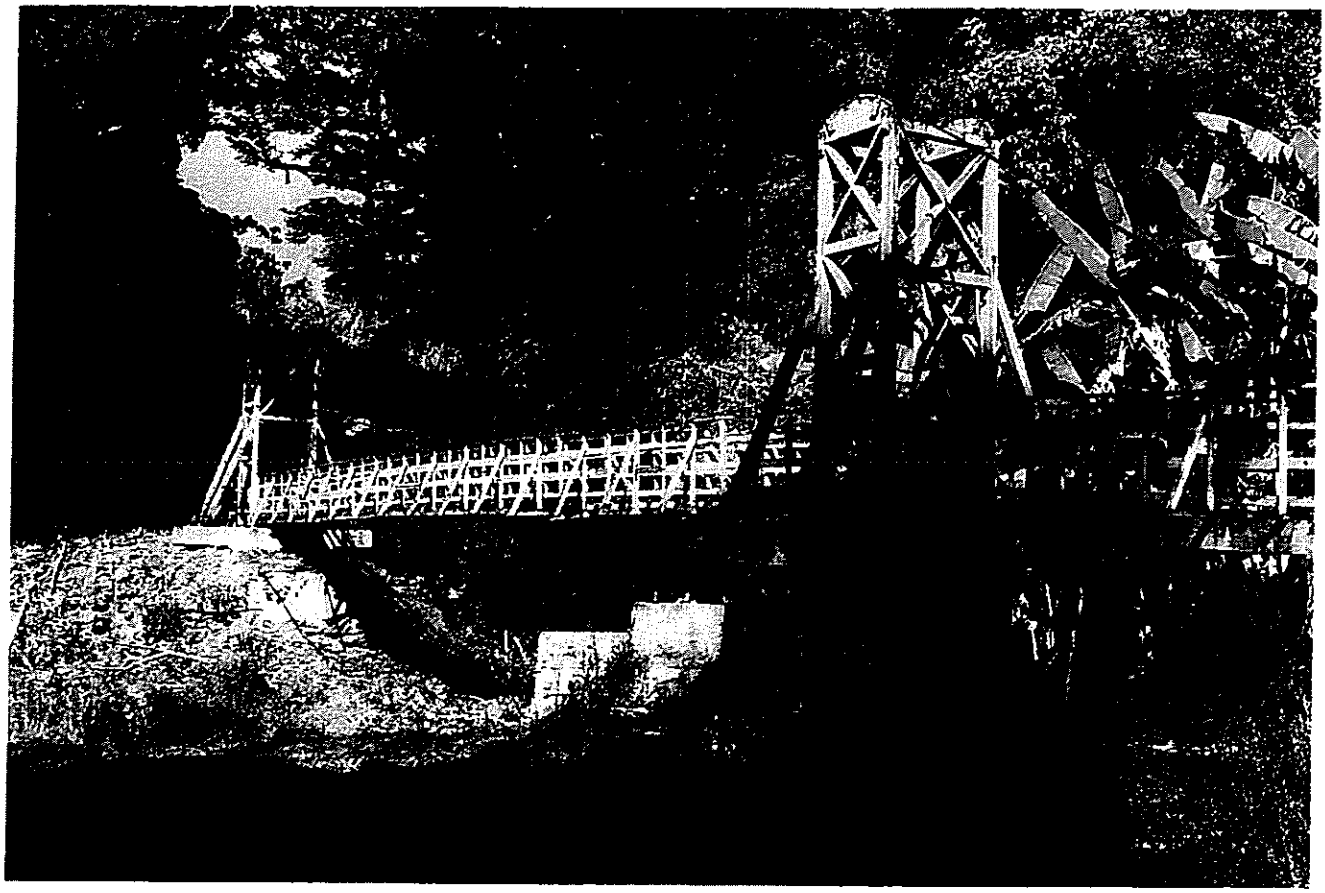
NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET
Section photos Page 1
name of property : Kapaia Swinging Bridge
county and State: Kauai, HI
Photographer: Laraine Moriguchi
Date of photograph: 10/17/2006
Camera facing south, showing north side of bridge
Photo #1 of 5



NPS Form 10-900-a OMB No. 1024-0018
(8-86)

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET
Section photos Page 2
name of property : Kapaia Swinging Bridge
county and State: Kauai, HI
Photographer: Laraine Moriguchi
Date of photograph: 10/17/2006
Camera facing east, showing west to east span of bridge
Photo #2 of 5



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Date of photograph: 10/17/2006
Camera facing east, showing west to east span of bridge
Photo #3 of 5

CERTIFICATE OF THE COUNTY CLERK

I hereby certify that heretofore attached is a true and correct copy of Bill No. 2208, which was passed on first reading and ordered to print by the Council of the County of Kaua'i at its meeting held on February 14, 2007, by the following vote:

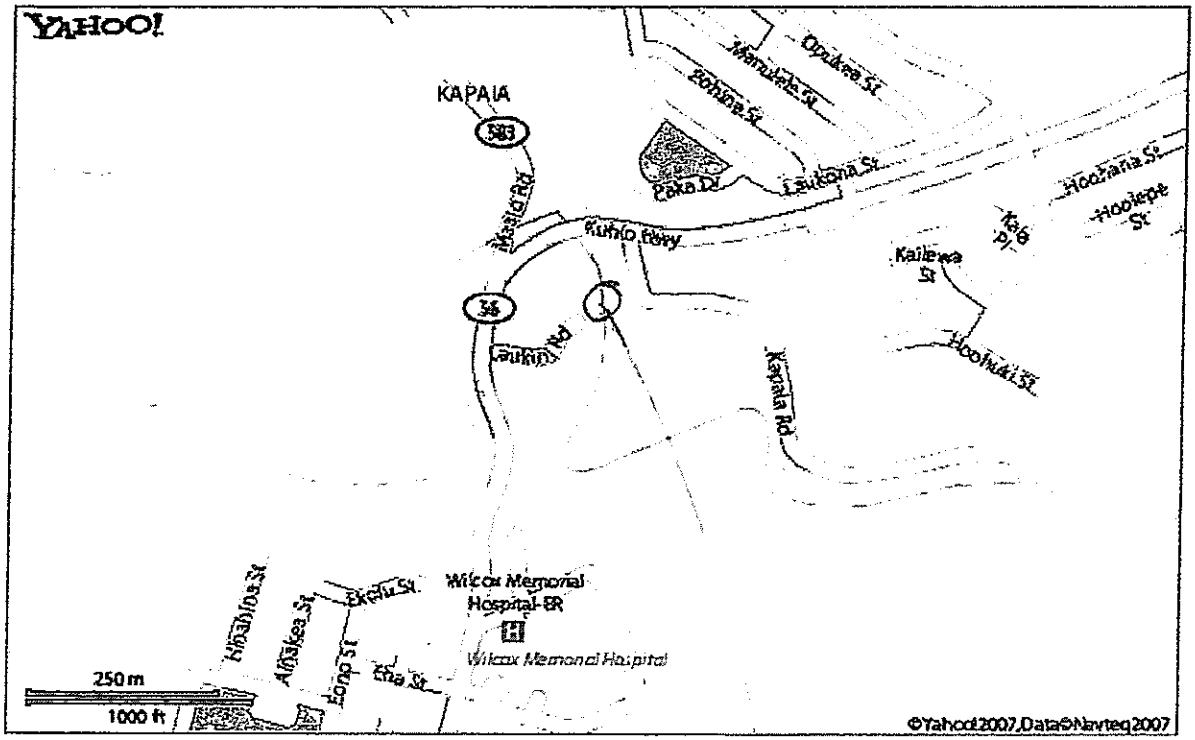
FOR PASSAGE:	Bynum, Furfaro, Iseri-Carvalho, Kouchi, Rapozo, Yukimura, Asing	TOTAL - 7,
AGAINST PASSAGE:	None	TOTAL - 0,
EXCUSED & NOT VOTING:	None	TOTAL - 0.

Līhu'e, Hawai'i
February 14, 2007

Peter A. Nakamura
County Clerk, County of Kaua'i

Yahoo! Maps - Lihue, HI 96766

YAHOO! LOCAL Maps



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Kaoai

Map • Kapaia, Kauai 1926

XIII

OLD KAPAIA, KAUAI
Map of 1929
"Where modern Hawaii was born."

This is a map of real people and places that once existed. It is a true historical map. Together with the "Old Kapaia," this map records the Way that the culture of modern Hawaii began long ago.

Old Kapaia was one of many towns throughout the Islands of Old Hawaii where the culture of Harmonious Diversity was born. Despite the loss of lands, loss of kingdom, and even the loss of life to modern diseases, the Aloha Spirit of the Hawaiian people enabled them to receive the immigrant peoples of the world and to teach them to live together. Immigrants came from East and West: Chinese, Japanese, Koreans, Filipinos - and Portuguese, Spaniards, Scottish, English and U.S. Mainland Haoles (Caucasians).

With the "Tales of Old Kapaia," this map is a genuine record of how modern Hawaii began...Aloha, David Hyun, May 1, 2003.

Numerical Legends to the Map

1 Kapaia River
2 Island Highway
3 Sugar Cane Fields
4 Swimming Hole
5 Swimming Hole
6 Foot Trail
7 Foot Trail
8 Foot Trail
9 Foot Trail
10 Hanging Foot Bridge
11 Side Road
12 Side Road
13 Dirt Road
14 Dirt Road
15 Dirt Road
16 Steep Slope
17 Hillside Slope
18 Road Cut Cliff
19 Guava Bushes
20 Lantana Bushes
21 Island Plum Tree
22 Lichee Tree
23 Star Apple Tree
24 Chinese Grapefruit
25 Abandoned Rice Patch
26 Taro Patch
27 Monkey Pod Tree
28 Kapaia Playground
29 Shoot Marble Circle
30 Volleyball Court
31 Soft Baseball
32 One Basket Basketball
33 Shot-Put Range
34 Japanese Girl Barbers
35 Tom Sui Chop Suey
36 Parking
37 Fernandes Store
38 Ihara Store
39 Fujita Store
40 Service Station
41 Chinese Temple
42 Chinese House
43 Chinese House
44 Chinese House
45 Carvalho Store
46 Watanabe Home
47 Halmoni Home
48 Boiser Home
49 Boiser Boxing Gym
50 store.
51 Naganuma Store
52 Pool Hall
53 Korean Methodist Ch.
54 Hyun Residence
55 Hyun Garage
56 Vegetable Garden
57 Chicken Coop
58 Duck Pond.
59 Buddhist Temple
60 Priest Residence
61 Auditorium-Gym.
62 Teacher's Compound
63 Japanese School
64 Ah Chock Store
65 Ching Residence
66 Chinese Home
67 Chinese Home
68 Chinese Home
69 Lovey Dovey House
70 Ghost House
71 To Waialua waterfalls
72 Old Chinese House
73 Rice Mill & Flume
74 Portuguese Catholic Ch.
75 Nun's Home
76 Hawaiian Family
77 Hunting Dogs Yard
78 Plantation Housing

NPS Form 10-900-a OMB No. 1024-0018
(8-86)

United States Department of the Interior
National Park Service

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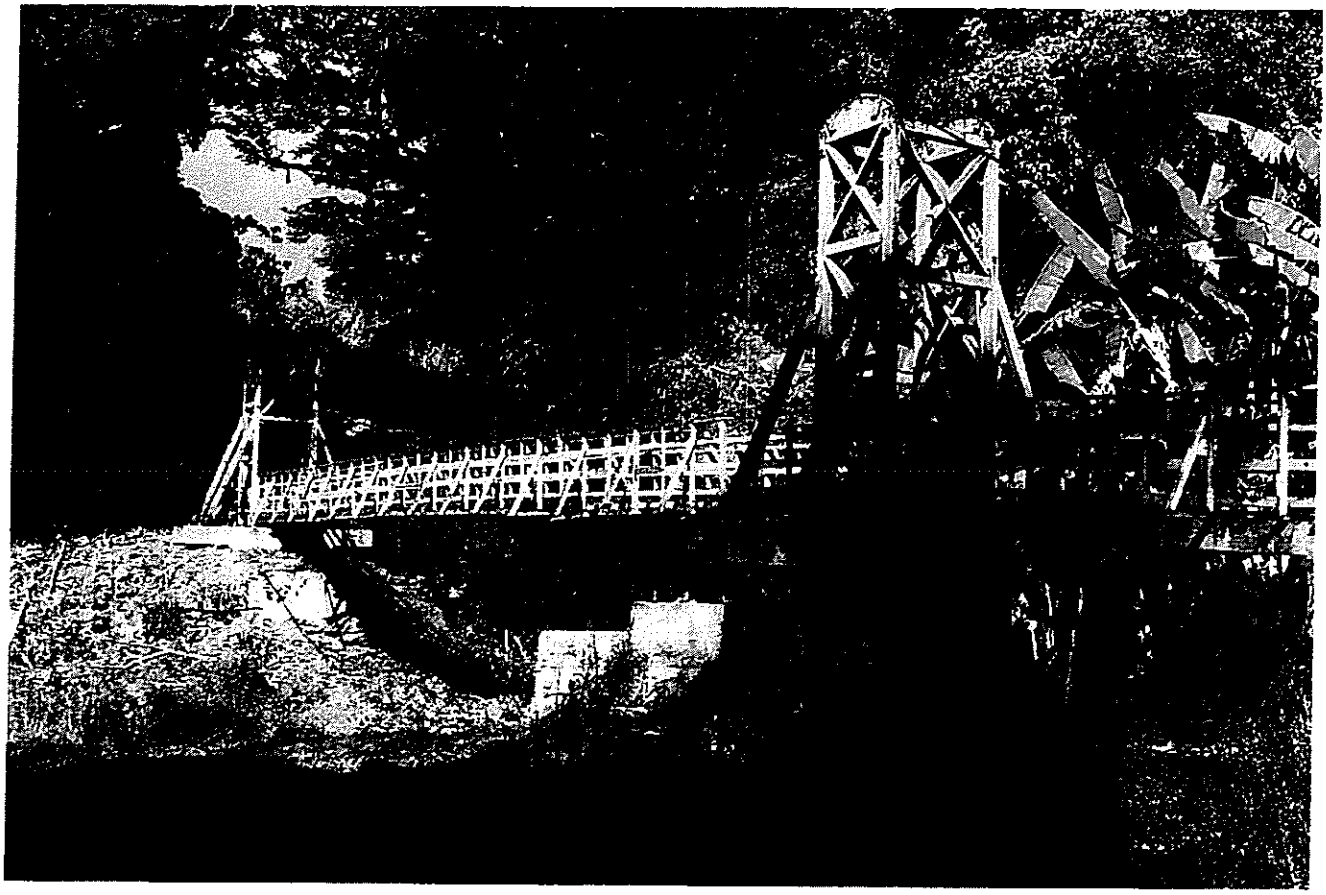

NPS Form 10-900-a OMB No. 1024-0018
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United States Department of the Interior
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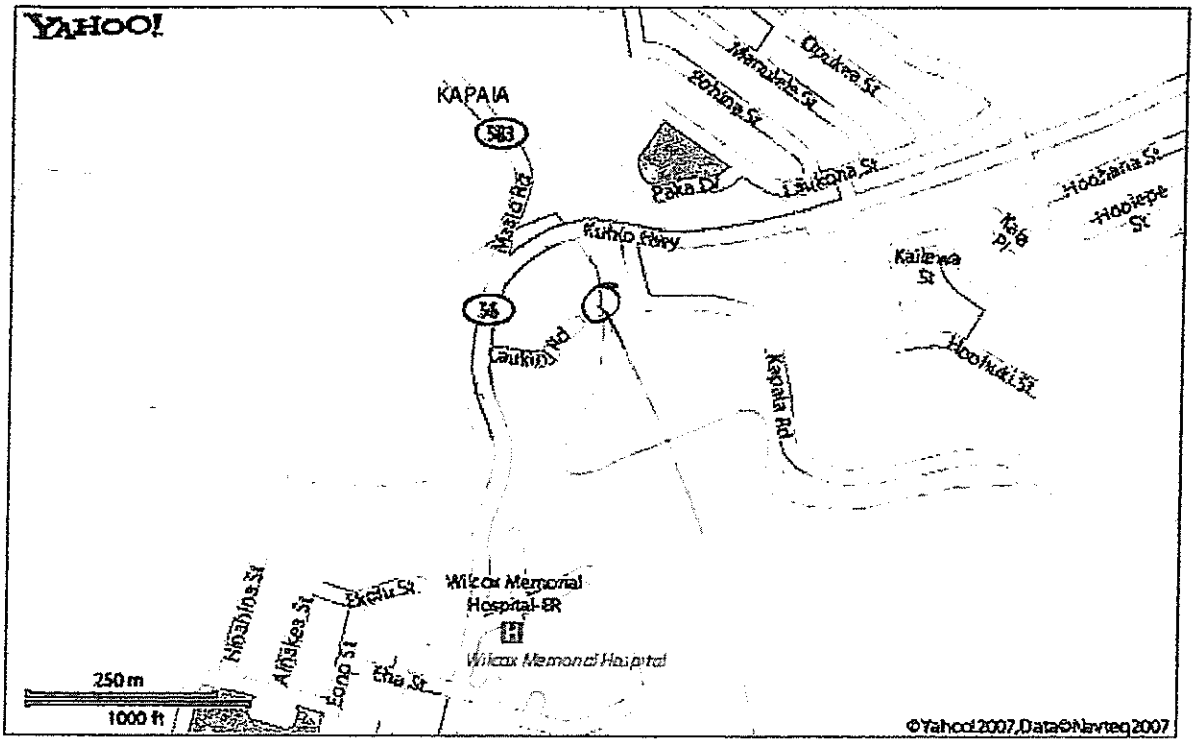

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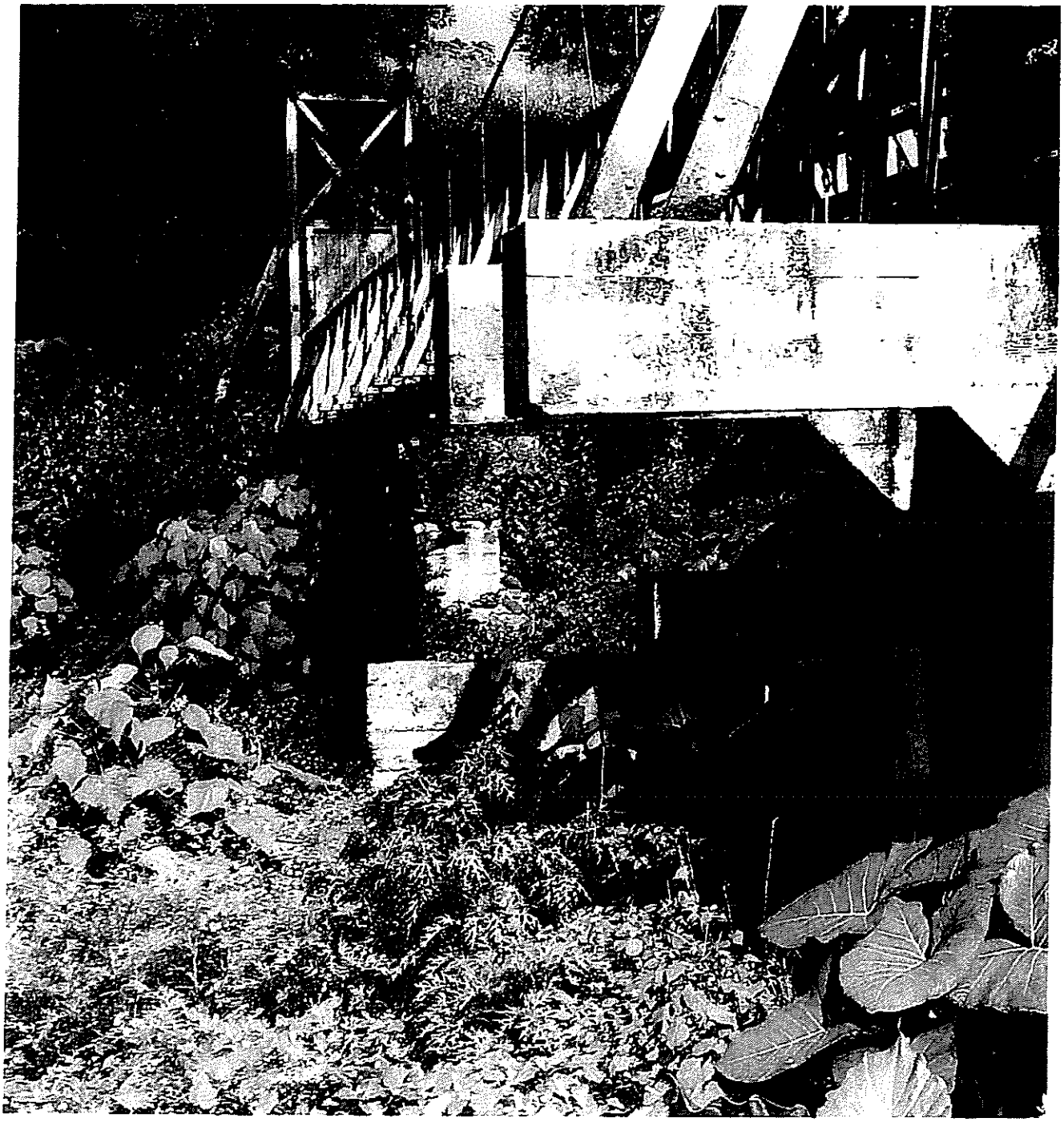
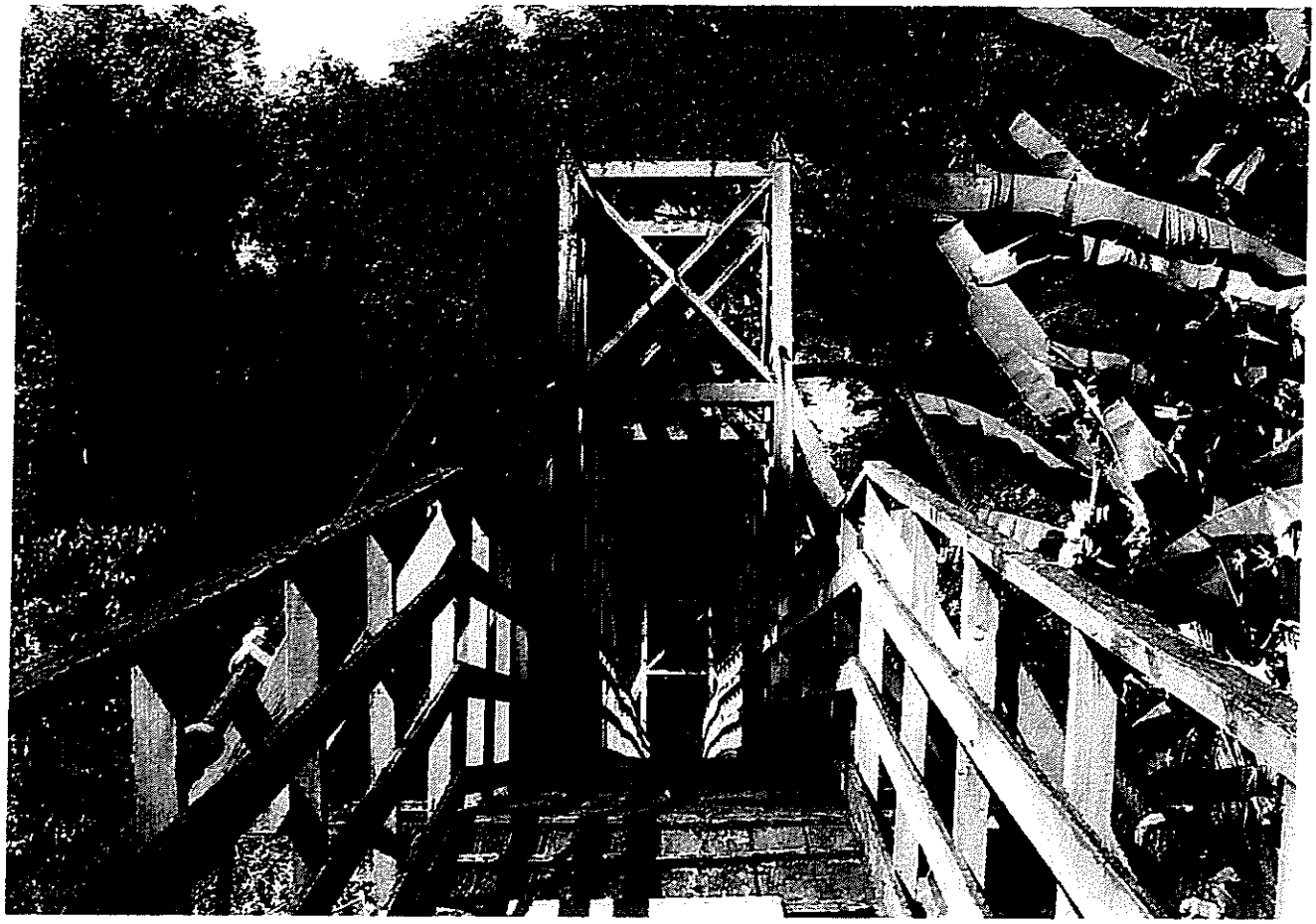
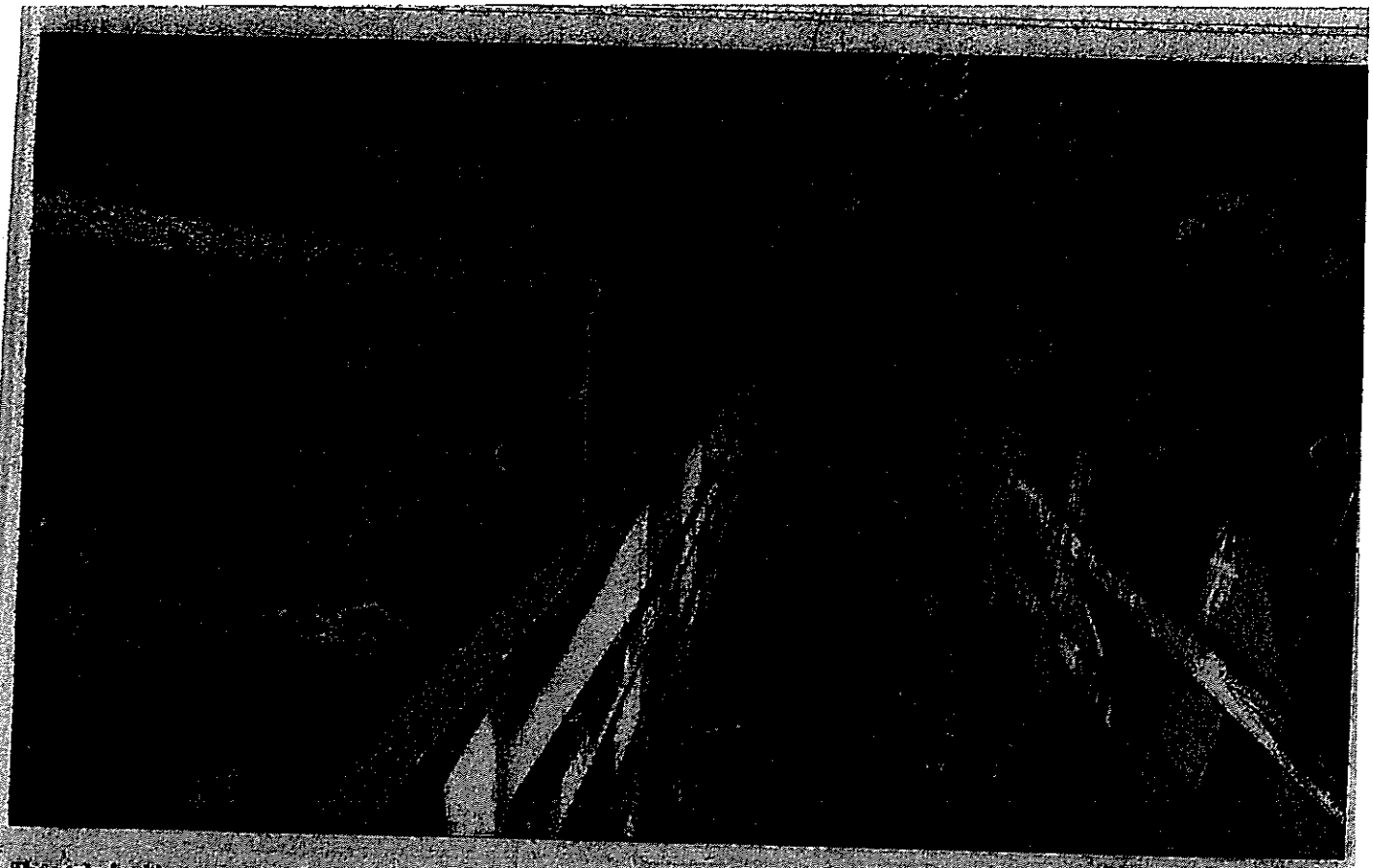


Photo #5 of 5
Photo by Laraine Moriguchi 2006





Kirk Kamiya / The Garden Island

The rusted cable suspensions between the planks on this bridge are hanging on by a thread. The Kapaia Suspension Bridge was built to serve the once bustling community of Kapaia and nearby plantation "camp" homes.

Swinging bridge link to past

Group seeks restoration funds

Lester Chang
The Garden Island

KAPAIA — The Kapaia Swinging Bridge — which enabled generations of Filipino, Portuguese and Chinese plantation workers access to the East Kapaia community for more than 60 years — has fallen into disrepair and has closed since September for safety reasons.

Now a group that includes descendants of those plantation workers wants the Kaua'i County Council to appropriate funds to repair it and make it a functioning landmark for a new generation of Hanapepe area residents.

At a meeting held at the historic County Building yesterday, the council reviewed a petition signed by 300 people urging government to repair the bridge before it falls apart.

James "Kimo" St. John, a Kapaia Valley resident for 20 years who attended the meeting, said the council seemed sympathetic to the funding request.

Without the bridge, the only way for pedestrians to travel between Kapaia and Hanapaha'ihi would be on Kuhio Highway.

"It would be terrible if somebody used the highway bridge and was to get hit by a car," he said.

St. John said he favors restoring the bridge because of its historic value and because of the "safety factor" for people who use the bridge — "children and the humans."

County engineer Donald Fujimoto, who received a letter asking for government intervention, initiated the plea for help, he said.

"It's old, it has historic value," he said before the meeting. "We will probably be coming in with a money bill for repairs."

Fujimoto said the bridge has undergone only minor repairs since Hurricane 'Iniki in 1992.

Fujimoto said the bridge has dry rot and holes in a footboard and wooden pathway leading to the structure.

St. John said the bridge's historic value mandates it be repaired as quickly as possible, before more deterioration occurs.

"There are only four swinging bridges like this on Kaua'i, and the other three are very well taken care of," St. John said during a break in the meeting.

Those three pedestrian bridges are located in Waimea, Hanapepe and in Kapa'a.

Fujimoto said the county administration plans to hire a consultant soon to check the condition of all the bridges.

The bridges were built to offer alternate routes when heavy rains flooded rivers and made roads impassable.

In the letter to Fujimoto, proponents of work on the Kapaia bridge asked why maintenance had been neglected to the point where the structure "is now in danger of falling into the stream below."

Tarama Moniguchi, a co-signer and descendent of plantation labor immigrants, said in the letter the original bridge — a wooden planks one — was built more than 100 years ago.

After succeeding bridges washed away during heavy rains that flooded the stream banks, the suspension bridge that stands now was built in 1945.

The bridge enabled Chinese, Filipino and Portuguese laborers and families to visit each other at their respective plantation camps on both sides of the waterway.

See Bridge, A6

Keh Poeney / The Garden Island

The Kapaia Suspension Bridge *connected the descendants of the Hawaiian and plantation labor immigrants to each other for more than a century. It was originally a small wooden plank which evolved into a cement based wooden foot bridge. After being washed away and rebuilt many times throughout the years, the bridge was suspended in 1945. The County of Kaua'i maintained the bridge and its surrounding area until recently. In September 2006 the bridge was declared unsafe for use and was closed. For more information, email: savekapaiabridge@yahoo.com*

Bridge

Continued from A1

near the bridge, Moriguchi said.

"The Kapaia swing bridge linked extremely diverse cultures to form a unique society found nowhere else in this world," she said in the letter. "Today, remnants of a flourishing plantation community still exist."

Though a valley resident for two decades, St. John was young compared to two other letter-signers. Kinue Fujimoto, 89, and Ethel Inagaki, 90, were both raised in the Kapaia Valley.

Lester Chang, staff writer, can be reached at 245-3681 (ext. 225) or lchang@kauaipubco.com.

F THANKS

)SEPH RAPOZO

h 17,1936-October 28, 2006

tily and I cannot find words how grateful and thankful

Peter K.

Peter K. "Po
died at Queen'
on O'ahu on N
age of 49.

Born in Lih
1957, he was
brother and u
kumu hula. H
Kanikapahuol
in 1980, was

Peter K.
Nishimits

vived by his
and Peggy F
Lorna A. Nis
T. (Gerald W
and nephews
da and Tayl
His ashes
his family, n

BILL NO. 2208

ORDINANCE NO. _____

AN ORDINANCE AMENDING ORDINANCE NO B-2006-646 AS AMENDED, RELATING TO THE CAPITAL BUDGET OF THE COUNTY OF KAUAI, STATE OF HAWAII, FOR THE FISCAL YEAR JULY 1, 2006 THROUGH JUNE 30, 2007, BY REVISING THE SURPLUS ESTIMATED IN THE GENERAL FUND

BE IT ORDAINED BY THE COUNCIL OF THE COUNTY OF KAUAI, STATE OF HAWAII:

SECTION 1. That pursuant to Sec. 19.10A and 19.07B of the Charter of the County of Kauai, as amended, Ordinance No. B-2006-646, relating to the Capital Budget of the County of Kauai, State of Hawaii, for the fiscal year July 1, 2006 through June 30, 2007, be hereby amended as follows:

The sum of $200,000.00, be and is hereby transferred from the item designated as follows:

PROJECT CONTINGENCY	$200,000.00

Of the General Fund and appropriated to the new item entitled:

KAPAIA SWINGING BRIDGE	$200,000.00

SECTION 2. This Ordinance shall take effect upon its approval.

INTRODUCED BY: _____ DATED: _____

JAY FURFARO
(By Request)

DATE OF INTRODUCTION:

February 14, 2007

Lihue, Kauai, Hawaii

OAHU NOMINATION FORMS

THE ALA WAI CANAL

NPS Form 10-900
(Oct. 1990)

9757
OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name The Ala Wai Canal

other names/site number The Waikiki Drainage Canal

2. Location

street & number The Ala Wai Boulevard ☐ not for publication

city or town Honolulu ☐ vicinity

state Hawaii code HI county Honolulu code 003 zip code 96815

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☐ locally. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State of Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is: Signature of the Keeper Date of Action

☐ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register
☐ See continuation sheet.

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain:) _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☐ public-local
- ☒ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☐ site
- ☒ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		buildings
		sites
3 bridges		structures
		objects
		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

EXTRACTION: extractive facility
= canal

RECREATION: outdoor recreation
= boating and fishing

OTHER: drainage facility = canal

Current Functions
(Enter categories from instructions)

RECREATION: outdoor recreation
= boating and fishing

OTHER: drainage facility = canal

7. Description

Architectural Classification
(Enter categories from instructions)

No style

Materials
(Enter categories from instructions)

foundation
walls stone and concrete
roof
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

The Ala Wai Canal
Name of Property

Honolulu County, HI
County and State

10. Geographical Data

Acreage of Property 48.5 acres

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	03	623625	2351500
2	03	620500	2354875
3	03	620125	2354750
4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Erica Steele

organization N/A date May 12, 1992

street & number 3735 Diamond Head Circle telephone (808) 734-3225

city or town Honolulu state Hawaii zip code 96815

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name Department of Land and Natural Resources

street & number Kalanimoku Building telephone

city or town Honolulu state HI zip code 96813

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☐ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C** a birthplace or grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☐ **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

COMMUNITY PLANNING
AND DEVELOPMENT
SOCIAL HISTORY

Period of Significance

1921-1928

Significant Dates

Significant Person
(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Walter F. Dillingham, builder

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☒ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☐ Other

Name of repository:

The Ala Wai Canal
Honolulu County, HI

Description

People smile at her beauty, but sometimes they wrinkle their noses at her aroma.
Joggers sweat their way along her banks. Sunbathers perch on her concrete shores. Lovers watch the reflection of the moon on her surface. Ancient fishermen probe her murky depths for the tasty mullet.
She is the Ala Wai Canal - a delight to tourist and Islanders alike.
But she is much more than an open space next to the sky-crowding high rises. On any given day she is a health clinic, market, rendezvous and serious playground.

Ron Youngblood
November 27, 1969

The Ala Wai Canal is a 2-mile long man-made waterway of variable depth and width located in the Waikiki district of Honolulu. The canal is fed by the Manoa-Palolo drainage ditch which drains from the Manoa and Palolo valleys, as well as a number of smaller streams, drainage ditches and storm sewers which also drain into the canal. It forms the boundary of the Waikiki district, separating Waikiki from the Makiki, Moilili and Ala Moana areas of the city. Since its construction in 1928 the canal has been used for recreational purposes which include boating (motoring, rowing and canoe paddling) and fishing.

Constructed by the Hawaiian Dredging Company between 1921 and 1928, the canal was designed to drain low-lying wetlands in Waikiki and to provide fill that would reclaim over six hundred acres of land in the district. The canal was dredged by the "Kewalo" and consists of two straight segments joined at Kalakaua Avenue by a 45 degree elbow. The first segment of the canal, which opens to the ocean at the Ala Wai Boat Harbor, is 750 meters long and 50 meters wide. The second segment extends 2350 meters from Kalakaua Avenue to Kapahulu Avenue and is 76 meters wide.

There are three venues by which one can cross the waterway - the Ala Moana bridge, the Kalakaua bridge and the McCully bridge. When the Ala Wai Canal was originally constructed, only temporary bridges crossed it, to allow the dredge "Kewalo" to move freely about the area. Upon completion of the dredging, the Kalakaua bridge was built in 1929 by R.E. Woolley; it is a graceful multiple-arch reinforced concrete bridge. Subsequently, the McCully bridge and the bridge at Ala Moana Boulevard were added.

The length of the *makai* (ocean) side of the canal is spanned by a concrete tree-lined sidewalk, which is a popular site for jogging. Only a short stretch of the *mauka* (mountain) portion of the canal has a public walkway between the Kalakaua and Ala Moana bridges and on either side of the canal is a tranquil tree-lined footpath, the makai side of which is run by a graceful concrete arched railing. Sixteen stairwells which run the makai length of the

The Ala Wai Canal
Honolulu County, HI

Description (continued)

canal drop down from the sidewalk to the canal's surface. These additions to the canal landscape were made after the completion of the canal.

A municipal golf course, an elementary school, and a park run along the mauka side of the canal and are among the many changes bordering that side of the canal since the original construction of the Ala Wai. In addition, several high-rise apartment buildings have also been built. The surrounding visual landscape of the canal has seen enormous changes as the Waikiki, McCully and Moilili districts have developed over the years: the landscape has been transformed from an agricultural area into a residential neighborhood and finally, into a congested maze of high-rise condominiums and hotels. These alterations have had a dramatic effect upon the overall integrity of the canal landscape.

Nonetheless, there have been no significant changes to the structure of the canal itself since its original construction. Over the years, the original retaining walls contructed of stone have necessitated some repairs. In 1950 work was done to prevent crumbling masonry from falling into the canal. A new concrete facing was placed in front of the original loose stone wall. In 1992 in ongoing work the Harbors Division (the State agency responsible for the canal) is currently reinforcing portions of the wall. Some portions of the wall are being replaced because of deterioration. The main concern for the integrity of the canal is the health of its waters due to problems of siltation and water pollution caused by the sediments deposited into the canal by streams and storm drains. The sediment has necessitated occasional draining. While the original depth of the canal at the time of its construction was 10 to 25 feet, in 1990 the average depth of the canal was between 6 and 10 feet. Because of this, the canal has been dredged twice since its original construction, once in 1966 and again in 1978. It would appear ready to be dredged again, considering the current very shallow depth of water in the canal.

Despite the problem of pollution the Ala Wai "water sports park" continues to be heavily used by Waikiki residents and visitors, with an estimated daily year-round use by some 4,000 people in 1986. Throughout its history the canal has been a popular site for boating and fishing, and its banks are frequented by joggers and walkers. The Ala Wai Canal has been considered "one of the best courses for crew races in the U.S." and has been used by visiting crew's for training, including the Yale Olympic crew on their way to the games in Melbourne, Australia in 1956. The canal is used regularly by local outrigger canoe clubs, and has been for many years. Until the 1970s numerous commercial boating operations operated along the Ala Wai. For many years fishing has been a popular activity along the banks of the Ala Wai; archival photos show fishermen's perches lining the sides of the canal. Today the perches are gone, though it is not uncommon to see people hanging a line into the Ala Wai's murky waters.

The Ala Wai Canal
Honolulu County, HI

Description (continued)

The Ala Wai Canal provides an important aesthetic dimension to the Waikiki neighborhood with its open space and tranquil waters. While the land surrounding the Ala Wai has undergone incredible change in the last 71 years, the environment at the canal has remained relatively constant.

Statement of Significance

The Ala Wai Canal is historically significant because of its pivotal role in the development of the Waikiki district, first as a residential neighborhood and soon after as a world-renowned resort area. The reclamation project in Waikiki, made possible by the dredging of the Ala Wai Canal, made a significant contribution to the eventual development of the State's tourism-based economy. Without the reclamation of wetlands and fishponds in Waikiki used for agriculture and aquaculture farming through 1920, Waikiki as we know it today, with its 75,000 visitors a day and the $70 million in property taxes it generates for the city, would not have been possible. The structure, which the original proposer of the canal, Lucius E. Pinkham envisioned as a great lagoon to be used for boating and recreational purposes, remains in the midst of so much change, relatively unchanged, and continues to be used regularly used by paddlers and fishermen.

Historical Background and Significance:

Since the 1500s, "Waiatite" was the seat of government for Hawaiian royalty on the island of Oahu. From that time forward Waikiki was also a documented rich and productive agricultural region, until 1921 when construction of the Ala Wai Canal began. For centuries large *loko* (fishponds) and taro *lo'i* (terraces) were fed by the many springs that flowed in Waikiki (literally, "spouting waters") and amply supplied the native Hawaiians living in the area with food. Only in the 1830s and 40s, due to a severe drop in the native population brought on by the introduction of Western diseases, did the wetlands and fishponds fall into an unproductive state. By the late 1800s and early 1900s the wetlands were again fruitful, and native Hawaiian farmers were joined by immigrant farmers who grew rice in the Waikiki area to sell to immigrant workers on the plantations.

Even after 1809, when Kamehameha I moved his court to Honolulu, Waikiki continued to be a favored haunt of Hawaiian royalty. The area was also increasingly popular with the growing number of *haole* (foreigners) living in Honolulu toward the turn of the century. As Waikiki's popularity began to grow, the value of the area could not go unnoticed for long and the community began to develop and change. The wetlands (referred to by many as "swamp lands") could, in the eyes of many in Honolulu, be put to better use than raising ducks and growing rice - but only if the land could be "reclaimed" (filled in).

The Ala Wai Canal
Honolulu County, HI

Statement of Significance (continued)

Bath houses began to be established, the first in 1881. In 1903, the Honolulu Rapid Transit Company inaugurated a service between Honolulu and Waikiki, providing easier access to the area. By 1921, the year construction of the Ala Wai Canal began, five major hotels had been constructed in Waikiki. One project that had considerable influence was the reclamation of Fort DeRussy in the Waikiki area. In the first decade of the twentieth century, the U.S. Department of War acquired 73 acres of land in Waikiki; from 1909 to 1911 the Quartermaster Corps was assigned the task of filling "a portion of the fish ponds which covered most of the fort (Fort DeRussy)." This was the first reclamation of land in the area.

Increased public concern over the mosquito problem and the potential spread of contagious and infectious diseases in Hawaii was one of the most important factors leading to the construction of the Ala Wai and the Waikiki Reclamation Project. The mosquito was accidentally introduced to Hawaii in 1826, and the Waikiki wetlands provided an ideal breeding ground for these insects. In 1909 W. C. Hodby, chief quarantine officer of the U.S. Public Health and Marine-Hospital Service, published a report entitled "The Outlook for Quarantinable Diseases in the Territory of Hawaii." In it he urged a "relentless and unceasing war against mosquitoes..." The Sanitary Commission, created by the Legislature in 1911 to address increasing concern over the danger of contagious and infectious disease introduced in Hawaii, reported that "certain swamps and low lands must be filled in order to protect our public health." With the construction of the Ala Wai Canal the mosquito-breeding wetlands were drained and filled, eliminating what many considered to be a potentially serious health hazard.

One final factor that led to the construction of the canal was the concern over the draining of wetlands on to the shores of Waikiki's beaches, at a time when bathing was becoming increasingly popular and there were a growing number of visitors to Hawaii's beaches. The proposed drainage canal would carry the runoff away from the Waikiki beaches.

The original proposal to build the Ala Wai Canal was put forward in 1906 by Lucius E. Pinkham, then president of the Board of Health of the Territory of Hawaii. In a report to the board, Pinkham recommended the reclamation of the Waikiki district of the city of Honolulu, proclaiming that the lands in Waikiki were in a deleterious and unsanitary condition. He proposed to fill in what he termed swamp lands to create an "attractive and charming" residential neighborhood . This reclamation of 625 acres would be accomplished by the construction of a "great lagoon" that would yield the necessary fill material and "create a quite marvelously beautiful, unique district, a Venice in the midst of the Pacific." He envisaged that the canal would be used for boating, providing an ideal course for racing. Thus while the canal would serve a recreational purpose upon its completion, the primary reason for its construction was to provide the necessary fill for adjacent lands and to drain runoff from the Manoa, Makiki and Palolo valleys away from Waikiki's beaches. While the proposal was shelved

The Ala Wai Canal
Honolulu County, HI

Statement of Significance (continued)

for a number of years, upon his appointment as governor of the Territory by then-president Woodrow Wilson in 1913, Pinkham devoted much of the energy of his four-year term to the implementation of his Waikiki plan.

In 1917 under Act 102, S.L. 1917, $5,000 was appropriated to the Superintendent of Public Works to do a complete survey, map and plans for the area in Honolulu "between King Street and the sea beach, and between Kapahulu road and Sheridan street." This would become the complete area of the reclamation project in the 1920s.

Also in 1917, Act 231 was passed authorizing Governor Pinkham to appoint a commission to devise a plan for the reclamation and improvement of this area of land. The plan was to include a "main lagoon or canal" for drainage and "to receive and take care of the natural flood waters of said area."

Under Governor Pinkham, the legislature appropriated $100,000 for the excavation of the canal and passed Act 14, S.L. 1918 authorizing the Superintendent of Public Works to "acquire for public use, by condemnation, purchase, exchange or otherwise, all necessary lands and rights of way for the purpose of digging and constructing a portion of the drainage canal or lagoon..." Many of the lands in Waikiki were acquired by a practice of land condemnation. Under a 1896 law, Act 61, the Territory of Hawaii's Board of Health could judge whether any land was unsanitary and require the owners to take the necessary steps to improve the land. This usually meant filling the land. While this practice was no great hardship for property owners who were interested in developing their land for residential or commercial purposes, for wetland farmers it essentially meant the eradication of their livelihood. In addition, if under the law land owners were financially unable to fill the land, or unwilling, the government could undertake the improvement and cover the cost through a lien placed on the property. Through this process many wetland farmers in Waikiki lost their land and livelihood.

By June 1920, 85 percent of the land required for the building of the canal had been acquired and bids to dredge the canal were solicited. In December 1920, Lyman Bigelow, Superintendent of Public Works advertised for bids in the Honolulu Star-Bulletin. On December 23, 1920 the bids were opened and the contract for the project was awarded to the Hawaiian Dredging Company, owned by Walter F. Dillingham. Dillingham's bid was one of only two bids received by the Territory for the project.

In the same year under Act 220, S.L. 1921 a resolution was issued on October 14 declaring construction of the Waikiki Drainage Canal "necessary for the proper drainage and sanitation" of Waikiki and appropriating $600,000 for the canal. Act 221 confirmed the boundaries of the reclamation project and provided for a commission to plan for boulevards, streets and parks within the district.

The Ala Wai Canal
Honolulu County, HI

Statement of Significance (continued)

Two contracts were negotiated between the Territory of Hawaii and Hawaiian Dredging Company to contract for the construction of the canal. Unit 1, Job No. 2979 entitled, "Proposal for Dredging a Drainage Canal and Filling and Reclaiming Certain Unsanitary Lands at Waikiki" was the primary agreement which consisted of dredging a canal 60 feet wide some two miles inland from the "sea beach at Ala Moana Road up to and intercepting the Apuakehau Stream" and called for the construction of "a dyke 6 feet high and 10 feet wide at the top along the entire makai (south) side of this Canal." The contract for Unit 2, Job No. 2986, the "Second Unit of the Waikiki Reclamation and Sanitation Project at Waikiki" called for a canal to be dredged "from the sea beach at Ala Moana Road to a point about 500 feet toward the reef."

Construction was begun in 1921, and by January of 1922 Hawaiian Dredging Company had completed the first phase of the project, Unit 2, and was beginning work on Unit 1, Contract 2979. The hydraulic dredge "Kewalo" was used by Hawaiian Dredging Company to dredge the canal. Because of the size of the dredge it could not successfully operate in a width of 60 feet so the canal had to be cut to an approximate width of 150 feet.

By mid-1923 the "Kewalo" had cut its way almost 6,500 feet towards Kapahulu Road, cutting a channel approximately 135 feet wide and 10-20 feet deep. The Superintendent of Public Works, Lyman H. Bigelow, reported that the canal "has now intercepted Apuakehau Stream which flowed by the Outrigger Club and all the filthy waters which previously flowed on to this fine swimming beach have been diverted and now flow out to the sea by way of the canal."

By mid-1924 the canal was 150 feet wide and had been dredged "its entire length" to Kapahulu Road. In his annual report to the Governor in 1924, Bigelow stated that the canal had been excavated its entire length ending at Kapahulu Road. Due to a lack of funds the Diamond Head end of the canal, called for in Lucius Pinkham's original proposal, was put on hold until "some later date, when funds are made available." Pinkham had recommended that the canal should exit back out to the ocean at Kapiolani Park, with tides gates at the both entrances to be closed at high tide and "the waters thus forced through the lagoon to exit at the Ala Moana bridge." This portion of the canal was in fact never completed, though in 1967 the local Rotary club and other civic groups brought the idea up again - with no success.

In order to provide the additional fill material necessary to bring the Waikiki Reclamation Project to completion Act 248, S.L. 1923 was passed authorizing the widening of the canal by 100 feet.

The canal acquired its name in 1925 when the City Planning Commission requested that citizens of Honolulu submit suitable names for the renaming of the Waikiki drainage canal. Jennie Wilson, wife of Mayor Wilson, suggested the name Ala Wai, Hawaiian for "waterway."

The Ala Wai Canal
Honolulu County, HI

Statement of Significance (continued)

The "Kewalo" headed back to McCully Street to begin dredging fill for the McCully tract, a vast area of pondfields and fishponds. By mid-1927 the filling of the McCully tract was completed and the canal was 250 feet wide almost to Kapahulu Road.

In 1928 the "Kewalo" exited the canal in and the construction of the Ala Wai was thus completed. That same year a supplement in the Honolulu Advertiser noted the dramatic increase in the value of land. According to V. Von Holt, president of the realty company Whitney & Von Holt, Ltd., land values had gone from $500 an acre for a piece of agricultural property prior to the construction of the canal to up to $4 a square foot for business property in 1928. With a great increase in available property, numerous residential development projects were undertaken in Waikiki. The number of visitors was also on the rise since the beginning of the reclamation project. Between 1921 and 1927, the number of visitors to Waikiki doubled from 8,000 to 17, 451 according to the Hawaii Visitors Bureau. In addition, in 1927 a total of 19,567 "one-day tourists" visited Hawaii's beaches as they travelled on cruise ships stopping in the islands. This same year the visitor's bureau launched its largest ever campaign to promote Hawaii and "put Waikiki and other attractions of the islands on the resort map," aggressively promoting Hawaii's "third industry" - tourism. Today tourism is the state's number one industry and Waikiki is at its core.

The Ala Wai Canal easily merits inclusion on the National Register of Historic Places, for local and state significance. This project allowed Waikiki to be transformed from an agriculturally productive region to a tourist mecca, upon which the state's economy has become increasingly dependent. Today, Waikiki's 450 acres generate $70 million in property taxes for the city annually, roughly one-third of the total property taxes received by the city. Property values in the region have skyrocketed, from an average of $840 an acre in 1917 to $22 million in 1990. Given the history of the reclamation project and resultant changes in the Waikiki district over the last 70 years, it is impossible not to conclude that the construction of the Ala Wai Canal has had a momentous impact on the development of the surrounding community and its economy, and on the economy of the entire state.

However, despite the significance of the structure, the building of the Ala Wai Canal and the reclamation project tells a sad story. The story is one in which many farmers lost their land and livelihood through a questionable practice of land condemnation and where a tranquil paradise, such as Waikiki was at the close of the 19th century, has been transformed into bustling, recreational playground with no sense of the history of the community from which it came. In fact the Ala Wai Canal is one of the only reminders of the spirit of Waikiki as it was in 1921.

The Ala Wai Canal
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The Ala Wai Canal
Honolulu County, HI

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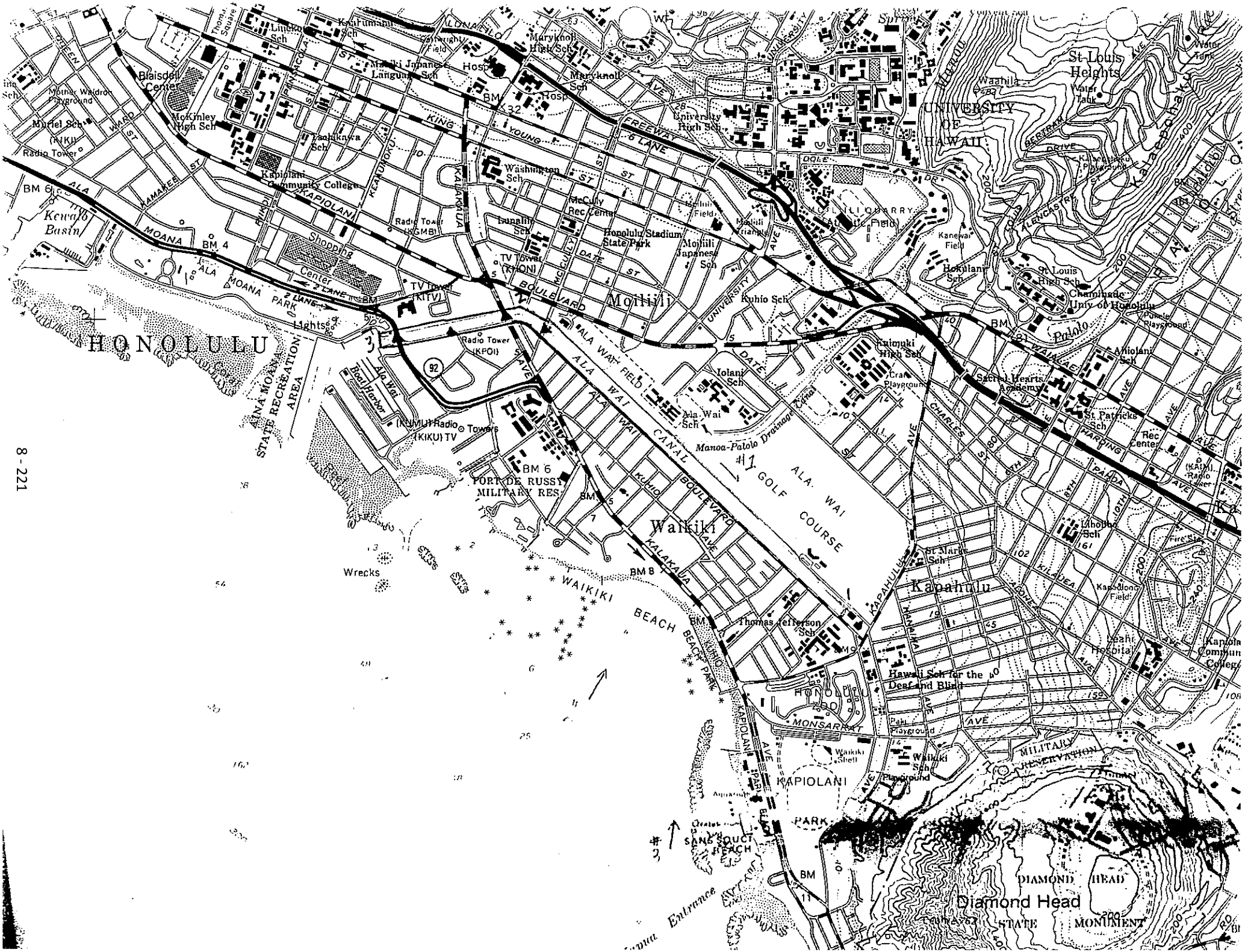
Verbal Boundary Description

The boundary of the nominated property is delineated by the polygon whose vertices are marked by the following UTM reference points: 1) 03 623625/2353500, 2) 03 620500/2354875, 3) 03 620125/2354750.

Boundary Jusitification

The boundary of the nominated property includes the entire parcel of land historically associated with the canal ~~as well as the adjacent boulevards on the makai side of the canal.~~ This area makes up the recreational "water park" that is the Ala Wai Canal today.


HONOLULU
Waikiki
Kapahulu
Moiliili
Palolo
St Louis Heights
UNIVERSITY OF HAWAII
Kewalo Basin
ALA MOANA STATE RECREATION AREA
ALA WAI CANAL
ALA WAI GOLF COURSE
WAIKIKI BEACH
KAPIOLANI PARK
DIAMOND HEAD STATE MONUMENT
Diamond Head
Blaisdell Center
McKinley High Sch
Kapiolani Community College
Washington Sch
Lunalilo Sch
McCully Rec Center
Honolulu Stadium
Moiliili Japanese Sch
Kuhio Sch
Iolani Sch
Ala Wai Sch
Waikiki Sch
Thomas Jefferson Sch
Hawaii Sch for the Deaf and Blind
Kaimuki High Sch
St Louis High Sch
Chaminade Univ of Honolulu
Ala Wai Boat Harbor
Fort De Russy Military Res
Wrecks
Manoa-Palolo Drainage Canal
Kapiolani Blvd
Ala Moana Blvd
King St
Beretania St
Waialae Ave
Kalakaua Ave
Monsarrat Ave
Date St
University Ave
Wilder Ave
Pali Hwy
Freeway 6 Lane
2 Lanes
Shopping Center
Honolulu Zoo
Kapiolani Park
Sans Souci Beach
Military Reservation
Tennis
Golf
Baseball
Football
Soccer
Track
Swimming
Pool
Playground
Rec Center
Fire Sta
Water Tank
Radio Tower (KGMB)
TV Tower (KHON)
TV Tower (KITV)
Radio Tower (KPOI)
(KAIM) Radio Tower
(KUMU) Radio Towers (KIKU) TV
BM 4
BM 6
BM 8
BM 32

MAUI NOMINATION FORMS

KAAUMANU AVE- NANILOA DRIVE OVERPASS

WAIʻALE DRIVE BRIDGE

HĀNA BELT ROAD

(Rev. Aug. 2002) (Expires Jan. 2005)

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Ka`ahumanu Avenue - Naniloa Drive Overpass

other names/site number Naniloa Drive Overpass, Naniloa Drive/Highway Underpass

2. Location

street & number Naniloa Drive at Kaahumanu Avenue not for publication ____
city or town Wailuku vicinity N/A
state Hawai`i code HI county Maui code 009
zip code 96793

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally
___ statewide ___ locally. (___See continuation sheet for additional comments.)

_____ _____
Signature of certifying official Date

_____
State or Federal Agency or Tribal government

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

_____
Signature of commenting official/Title Date

_____
State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that this property is:

____ entered in the National Register _____ _____
___ See continuation sheet.
____ determined eligible for the _____ _____
National Register
___ See continuation sheet.
____ determined not eligible for the _____ _____
National Register
____ removed from the National Register _____ _____

____ other (explain): _____

_____ _____ _____
Signature of Keeper Date of Action

5. Classification

Ownership of Property (Check as many boxes as apply)

___ private
___ public-local
_X_ public-State
___ public-Federal

Category of Property (Check only one box)

___ building(s)
___ district
___ site
_X_ structure
___ object

Number of Resources within Property

Contributing	Noncontributing	
_____	_____	buildings
_____	_____	sites
1	_____	structures
_____	_____	objects
_____	_____	Total

Number of contributing resources previously listed in the National Register N/A

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.) N/A

6. Function or Use

Historic Functions (Enter categories from instructions)
Cat: Transportation Sub: road-related

Current Functions (Enter categories from instructions)
Cat: Transportation Sub: road-related

7. Description

Architectural Classification (Enter categories from instructions)
Other: rigid-frame concrete

Materials (Enter categories from instructions)
foundation
roof
walls reinforced concrete
other concrete, wood, asphalt
masonry (basalt or lava rock)

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

X A Property is associated with events that have made a significant contribution to the broad patterns of our history.

____ B Property is associated with the lives of persons significant in our past.

X C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.)

____ A owned by a religious institution or used for religious purposes.

____ B removed from its original location.

____ C a birthplace or a grave.

____ D a cemetery.

____ E a reconstructed building, object, or structure.

____ F a commemorative property.

____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)
Engineering
Transportation

Period of Significance 1936

Significant Dates 1936

Significant Person (Complete if Criterion B is marked above)
N/A

Cultural Affiliation N/A

Architect/Builder William Bartels, Territorial Highway Engineer

Hawaiian Contracting Company, builder

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

==========

9. Major Bibliographical References

==========

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)
__ preliminary determination of individual listing (36 CFR 67) has been requested.
__ previously listed in the National Register
__ previously determined eligible by the National Register
__ designated a National Historic Landmark
__ recorded by Historic American Buildings Survey # _____
__ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data
__ State Historic Preservation Office
x Other State agency
__ Federal agency
__ Local government
__ University
__ Other
Name of repository: _____

10. Geographical Data

Acreage of Property approximately 2 acres

UTM References (Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	E	760	490	3			
2	11	2.311	874	4			

___ See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

The nominated property is an irregularly shaped parcel at the intersection of Ka`ahumanu Avenue and Naniloa Drive. The bridge is centered on the previously listed UTM reference. A map of the property boundaries is attached.

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

The boundaries encompass the property that is historically associated with the structure. The nominated structure includes the entire bridge, all masonry retaining walls, timber guardrails along the exit/entrance ramps and sidewalk, and the property on which these are situated. The property is entirely within the Hawai`i Department of Transportation right-of-way.

Form Prepared By

name/title Dawn E. Duensing, Cultural Resources Planner

organization Maui County Planning Department date 10/16/04

street & number 250 S. High Street telephone (808)270-7841

city or town Wailuku state HI zip code 96793

Additional Documentation

Submit the following items with the completed form:
Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs

Representative black and white photographs of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(complete this item at the request of the SHPO or FPO.)

name State of Hawai`i Department of Transportation

street & number 869 Punchbowl Street telephone (808)587-2150

city or town Honolulu state HI zip code 96813

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.). A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number.

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to Keeper, National Register of Historic Places, 1849 "C" Street NW, Washington, DC 20240.

Designed by Territorial Highway engineer William Bartels, the Ka`ahumanu Avenue-Naniloa Drive Bridge is a rigid-frame concrete bridge with cantilever ends that spans a gap in Wailuku's "Sand Hills" as it carries Naniloa Drive over Ka`ahumanu Avenue. Prominently situated at the crest of a hill, the bridge has served as a distinctive gateway into Wailuku for nearly seventy years. Built as a grade-separation structure in 1936, the bridge's architectural details and rigid-frame construction are unique on Maui.

The Ka`ahumanu Avenue-Naniloa Drive Bridge is constructed entirely of reinforced concrete. It features parapets with cross-shaped voids and raised rail caps that were typical of many 1930s-era bridges on Maui. The Art Deco ornamentation, expressed on the vertically articulated piers and the horizontal relief on the bridge walls, is unique on Maui. The cross-shaped voids, rail caps, and articulated piers are painted in contrasting colors to highlight the architectural details. The construction date, 1936, is inscribed on the structure's southeast and northwest end piers. The structure's single-span is 51'-0" long; the overall structure length is 63'-0". The bridge height above the road is 14'-7". The bridge's roadway measures 20'-0" wide, with sidewalks on both sides measuring 2'-6" wide. Completed in 1937, the bridge cost $12,700 and was built by the Hawaiian Contracting Company. The structure required 271 cubic yards of concrete and 46,600 pounds of reinforcing steel. The Ka`ahumanu Avenue-Naniloa Drive Overpass is unaltered and in good condition, with only minor repairs. Most of the repairs are the result of vehicle impacts on the bridge's girders.

The Ka`ahumanu Avenue-Naniloa Drive Bridge retains a high level of historic integrity in its location, design, workmanship, materials, and feeling. Its original design and workmanship are evident in the decorative Art Deco piers and railings. When the bridge was built in 1936, the Sand Hills was a residential area and the bridge was flanked by adjacent residences and utility poles. The bridge's setting has urbanized over time; the nearby residential neighborhoods and commercial enterprises now have a higher density. Despite Wailuku's more urbanized setting, the bridge retains its prominent setting at the crest of a long hill where Ka`ahumanu Avenue enters Wailuku. Motorists approaching the bridge still enjoy beautiful views of the West Maui Mountains much as they did in 1936 when the bridge was built. The bridge itself is visible for more than a mile as motorists approach Wailuku.

The Ka`ahumanu Avenue-Naniloa Drive Bridge is complemented by timber guardrails and cut basalt (lava rock) masonry retaining walls that contribute to the bridge's historic feeling. On the west side of the bridge along Ka`ahumanu Avenue are entrance and exit ramps providing access to and from Naniloa Drive. These ramps are protected by timber guardrails on timber posts. On the structure's northeast side, a timber guardrail with concrete posts is situated along a sidewalk that ascends to the overpass. Masonry retaining walls constructed of cut basalt flank all sides of the structure and add to the historic character of the bridge. Another retaining wall, also built of basalt, runs along and above the entrance ramp from Ka`ahumanu Avenue. The basalt masonry walls are excellent examples of traditional local craftsmanship.

The Naniloa Drive - Ka`ahumanu Avenue Bridge achieves state and local significance in the areas of engineering and transportation under criteria A and C. One of the earliest remaining rigid-frame bridges built in the Territory of Hawai`i, the structure is one of two such bridges built in Hawai`i in 1936. The bridge represents the advances in engineering technology being achieved in Hawai`i during the early twentieth century. The Ka`ahumanu Avenue-Naniloa Drive Bridge is one of only two grade-separation structures on Maui, the other being the nearby Wai`ale Drive Bridge, which is already listed on the National Register of Historic Places. The completion of these grade-separation structures, together with a 1.9 mile road linking Wailuku and Kahului, improved travel time and motorist safety while also providing jobs during the Great Depression.

William Bartels, Territory of Hawai`i Bridge Engineer, introduced the rigid-frame bridge to Hawai`i in 1936. Bartels realized that the rigid-frame bridge was an excellent engineering solution for separating the grades at the new intersection at Naniloa Drive and Kaahumanu Avenue. Developed in New York by Arthur Hayden in 1922, the rigid-frame bridge was especially suited for grade-separation structures where the distance between the roadway grades was restricted and the length of the approaches important. Bartels realized that a rigid-frame bridge would fit neatly into the row gap bulldozed through Wailuku's "Sand Hills." From an engineering perspective, he understood that Hayden's sophisticated technology offered greater structural strength than other bridges of the era, especially girder bridges. His bridge derived its strength from the rigid connection between the structure's vertical and horizontal members, which spread the load more evenly throughout the entire bridge. The structure was no longer supported only by its abutments as girder bridges were, instead, the rigid-frame bridge was an integral unit with all members working together to support the structure and its loads. Another attractive feature of rigid-frame construction was its economy. Greater structural strength resulted in a more efficient use of materials, which permitted a narrower cross section that required considerably less excavation and concrete. Greater economy meant that Bartels could further stretch the Territory's dollars for public highway projects.

In addition to being a modern, practical structure, Hayden designed the rigid-frame bridge to be aesthetically pleasing, with a form that mimicked the graceful appearance of conventional arch bridges. Bartels realized that the intrinsic form of the bridge made it a good choice for settings where an aesthetic bridge was required, such as the prominent hilltop at the entrance to Wailuku. The structure was also readily adaptable to a variety of architectural treatments. Although Bartel's choice of a rigid-frame technology was unique on Maui, his open parapet with cross-patterned voids was typical of Hawai`i's 1930s bridges. The Art Deco elements, however, reflected the popular stylistic influences of the era and rendered the structure as one of Maui's most architecturally distinguished bridges. The rigid-frame engineering, unique architectural details, and prominent location at the crest of a hill leading into Wailuku made the Naniloa Drive-Kaahumanu Avenue Overpass an attractive gateway into Maui's county seat. Seventy years after its construction, the bridge has become a crowned Wailuku landmark that is specifically recognized by the county's Wailuku-Kahului Community Plan as culturally significant.

The Naniloa Drive Ka`ahumanu Avenue Overpass is a fine example of Hawai`i's juxtaposition between modern technology and traditional building methods. While the

structure represented the latest in bridge engineering technology, the adjacent retaining walls reflected traditional construction techniques that relied on native lava rock (basalt) masonry. Local basalt was a common bridge construction material in the late 1800s when masonry arch bridges were built. In 1905, the Territorial Superintendent of Public Works recommended that reinforced concrete be used to build Hawai`i's bridges. Even after the superintendent's recommendations, basalt masonry continued to be used for bridge abutments, wingwalls, guardwalls, and retaining walls. Just as the Naniloa Drive Overpass exhibits fine, modern architectural details and workmanship, the cut-rock retaining walls are excellent examples of traditional local craftsmanship.

The Naniloa Drive - Ka`ahumanu Avenue Bridge was part of a major bridge and road-building project on Maui in 1936. These projects demonstrated that Maui directly benefited from the U.S. Government's efforts to improve the nation's transportation facilities, but perhaps more importantly, to improve traffic safety. As with the rest of the nation, transportation funding played a major role in providing jobs during the Great Depression. Although no documentation was located to determine whether federal funding was appropriated for the Naniloa Drive bridge, it is extremely likely that federal funds were used since the U.S. Government funded the other components of this project, the Wai`ale Drive Bridge and the new road into Wailuku.

The Wailuku-Kahului Road, now known as Ka`ahumanu Avenue, was constructed to provide direct access between Maui's port town of Kahului and its county seat and commercial center, Wailuku. The new 1.9-mile road cut through the Sand Hills and replaced a beach road between the two towns, reducing the trip by one mile. Important safety features of the new thoroughfare were grade-separation structures at Naniloa and Wai`ale Drives. The Wai`ale Drive Bridge, funded by the Emergency Relief Appropriation Act of 1935, was built to carry Kaahumanu Avenue traffic over Wai`ale Drive and the adjacent railroad tracks. The other grade-separation structure was built to carry Ka`ahumanu Avenue under Naniloa Drive. Both bridges were built during the federal government's nation-wide effort to improve traffic safety by means of grade-separation structures. The combination of these three projects was a significant transportation achievement on Maui. The new road and grade-separation structures improved travel time between Maui's two main towns while also providing increased safety. These projects were also an important part of the Federal aid highway program in Hawai`i. The mid 1930s were boom years for bridge and road construction in the Territory of Hawai`i, as it was finally granted federal road aid that had been denied between 1917 and 1925. Many of these road and bridge programs were also an important part of Great Depression relief efforts.

The Ka`ahumanu Avenue - Naniloa Drive Overpass was designed by William R. Bartels and built by the Hawaiian Contracting Company. Bartels came to Hawai`i in 1932 and was an engineer for the Territorial Department of Public Works until his retirement in 1957. Hawai`i's most renowned bridge engineer, Bartels was responsible for many of the Territory's major bridge projects including the 1936 Wahiawa Bridge on Kauai, which is also a rigid-frame structure, and the 1936 Kupapaulua Bridge on Hawai`i, a concrete-arch bridge. Bartels is credited with designing and building bridges that combined the most modern technology available with aesthetically-pleasing architectural features, as is evidenced in the Ka`ahumanu Drive - Naniloa Drive Overpass.

Major Bibliographical References

Duensing, Dawn E. *Bronx River Parkway, HAER No. NY-327.* [Washington D.C.]: National Park Service, Historic American Engineering Record, 2001.

Hayden, Arthur G. and Maurice Barron. *The Rigid-Frame Bridge.* Third Edition. NY: John Wiley & Sons, Inc. 1950.

Spencer Mason Architects. *State of Hawai`i Historic Bridge Inventory and Evaluation.* Draft. [Honolulu]: State of Hawai`i Department of Transportation, Highways Division, 1996.

Superintendent of Public Works. *Annual Report.* [Honolulu]: Superintendent of Public Works. 1905, 1936.

Maui News, 1936.

Wailuku - Kahului Community Plan. [Wailuku, HI]: Maui County Council, 2002.

Section Additional Documentation: Photographs

Ka`ahumanu Avenue - Naniloa Drive Overpass
Maui,Hawai`i

==========

Photographs were taken by Dawn E. Duensing, who has the negatives.

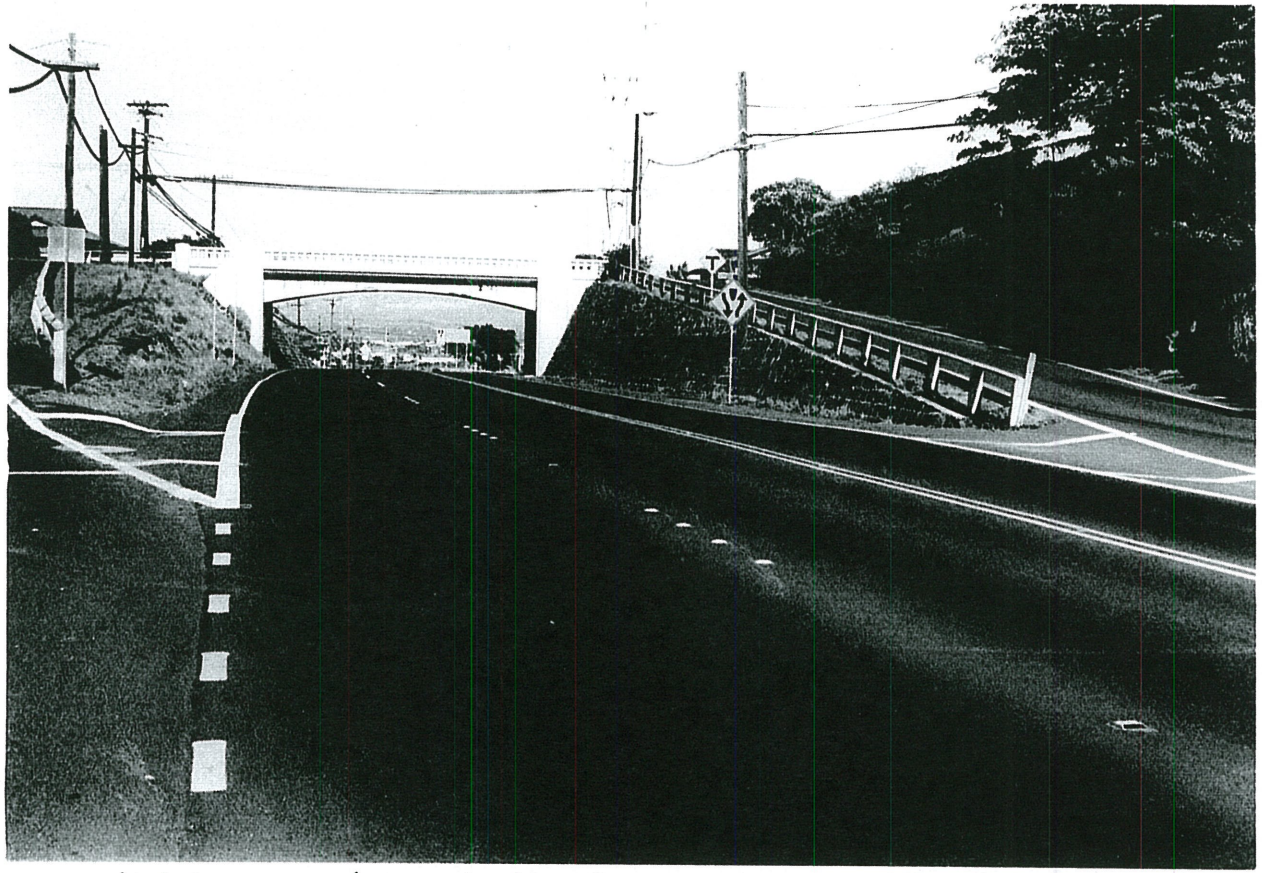
1. Ka`ahumanu Avenue - Naniloa Drive Overpass
2. Maui County, Hawai`i
3. Dawn E. Duensing
4. September 12, 2004
5. Dawn E. Duensing
6. Ka`ahumanu Avenue - Naniloa Drive Overpass, retaining walls and guardrails; view looking west
7. Photograph #1

3. Dawn E. Duensing
4. September 12, 2004
5. Dawn E. Duensing
6. Ka`ahumanu Avenue - Naniloa Drive Overpass, retaining walls and guardrails; view looking east

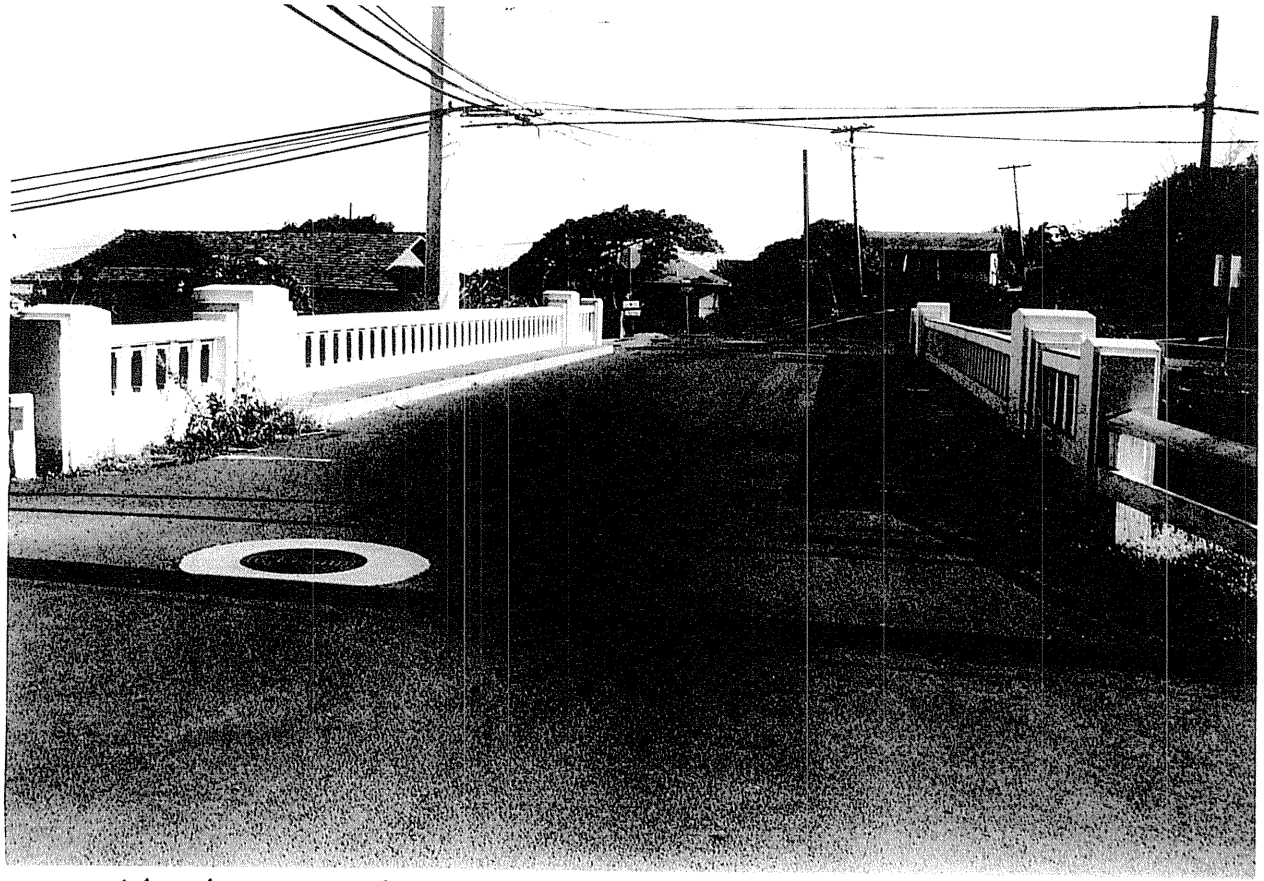
3. Dawn E. Duensing
4. September 12, 2004
5. Dawn E. Duensing
6. Ka`ahumanu Avenue - Naniloa Drive Overpass, view of roadway and bridge; looking north

3. Dawn E. Duensing
4. September 12, 2004
5. Dawn E. Duensing
6. Ka`ahumanu Avenue - Naniloa Drive Overpass, northwest pier with inscribed date of construction; view looking west

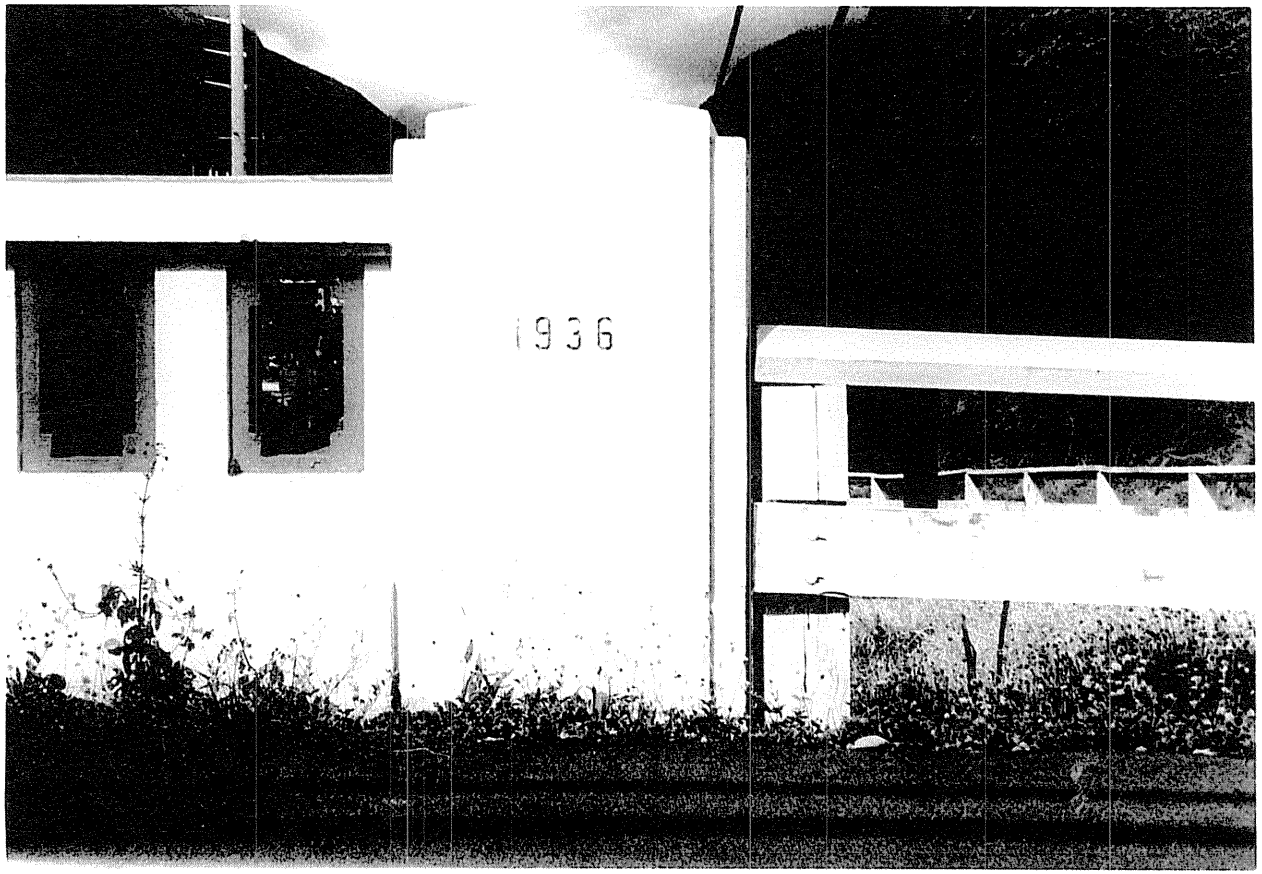
Ka'ahumanu Ave - Naniloa Drive Overpass, Maui, Hawai'i #1



Ka'ahumanu Ave - Naniloa Drive Overpass, Maui, Hawaii, # 2



Ka'ahumanu Ave - Naniloa Drive Overpass, Maui, Hawaii, # 3



Ka'ahumanu Ave - Naniloa Drive Overpass, Maui, Hawai'i #4

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name: WAI'ALE DRIVE BRIDGE

other names/site number: Wai'ale Road Overpass; R. R. Overpass

2. Location

street & number: Ka'ahumanu Avenue, 0.1 miles E of Kinipopo Street — not for publication: N/A

city or town: Wailuku — vicinity: Kahului

state: Hawai'i — code: HI — county: Maui — code: 009 — zip code: 96793

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this _X_ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property _X_ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally _X_ statewide ___ locally. (___ See continuation sheet for additional comments.)

Signature of certifying official — Date: 9-16-98

State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Signature of commenting or other official — Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
___ entered in the National Register
___ See continuation sheet.
___ determined eligible for the National Register
___ See continuation sheet.
___ determined not eligible for the National Register
___ removed from the National Register
___ other (explain): _____

Signature of Keeper — Date of Action

5. Classification

Ownership of Property
(Check as many boxes as apply)

- private
- public-local
- X public-State
- public-Federal

Category of Property
(Check only one box)

- building(s)
- district
- site
- X structure
- object

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

Number of Resources within Property

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	objects
1	0	Total

Number of contributing resources previously listed in the National Register 0

6. Function or Use

Historic Functions (Enter categories from instructions)
Cat: Transportation Sub: Road-related (vehicular); Rail-related

Current Functions (Enter categories from instructions)
Cat: Transportation Sub: Road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER/ Rigid-Frame Steel-Stringer Bridge

Materials
(Enter categories from instructions)
foundation N/A
roof N/A
walls N/A
other Steel, concrete, masonry

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- X **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ____ **B** Property is associated with the lives of persons significant in our past.
- X **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ____ **D** Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations
(Mark "X" in all the boxes that apply.)

Property is:

- ____ **A** owned by a religious institution or used for religious purposes.
- ____ **B** removed from its original location.
- ____ **C** a birthplace or a grave.
- ____ **D** a cemetery.
- ____ **E** a reconstructed building, object, or structure.
- ____ **F** a commemorative property.
- ____ **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)
ENGINEERING
TRANSPORTATION

Period of Significance
1936 (date of original construction)

Significant Dates
1936

Significant Person
(Complete if Criterion B is marked above)
N/A

Cultural Affiliation
N/A

Architect/Builder
(designer/engineer) William R. Bartels (THD)
(builder) Hawaiian Contracting Company
(fabricator) U.S. Steel Products / American Bridge Company

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)
___ preliminary determination of individual listing (36 CFR 67) has been requested.
___ previously listed in the National Register
___ previously determined eligible by the National Register
___ designated a National Historic Landmark
___ recorded by Historic American Buildings Survey #
___
___ recorded by Historic American Engineering Record #
___

Primary Location of Additional Data
___ State Historic Preservation Office
_X_ Other State agency
___ Federal agency
___ Local government
___ University
___ Other (Name of repository):
___

10. Geographical Data

Acreage of Property less than one (1) acre.

UTM References
(Place additional UTM references on a continuation sheet)

Zone	Easting	Northing	Zone	Easting	Northing
1	04	759910	2312320	3			
2				4			

___ See continuation sheet.

Verbal Boundary Description

The nominated property is a rectangular shaped parcel measuring 79 feet by 49.6 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification

The nominated structure includes the bridge's superstructure, substructure, retaining wall on south side, floor system and approach spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title	Barbara Shideler/Architect; Spencer Leineweber/Architect; Ann Yoklavich/Architectural Historian		
organization	Spencer Mason Architects	date	May 21, 1996
street & number	1050 Smith Street	telephone	(808) 536-3636
city or town	Honolulu state Hawai'i	zip code	96817

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps
A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs
Representative black and white photographs of the property.

Additional Items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name	State of Hawai'i, Department of Transportation		
street & number	869 Punchbowl Street	telephone	(808) 587-2150
city or town	Honolulu	state HI	zip code 96813

Narrative Description

The Wai'ale Drive Bridge carries Ka'ahumanu Avenue (State Highway 32) across Wai'ale Drive in Wailuku, Maui. The bridge was designed to provided a grade separation for the now-defunct Wailuku Sugar Company railroad alignment to the mill.[1] This is one of two steel stringer grade separations designed by William R. Bartels of the Territorial Highways Department in 1936, and constructed by the Hawaiian Contracting Company of Honolulu by steel members fabricated by U.S. Steel Products and the American Bridge Company.[2]

The Wai'ale Drive Bridge is in its original location along Ka'ahumanu Avenue. The bridge's original design, a steel rigid-frame structure with cantilever ends, remains intact. The bridge has two main spans, the longest is located over the roadway and the other over the now-defunct railroad alignment. The use of steel, a relatively uncommon material in Hawai'i, can be attributed to the industrial purpose of the bridge. The industrial feeling and mill setting of the area has since become more residential since the bridge was first built. The materials used for the bridge, both steel structure and railing, concrete deck and posts, and masonry (basalt or "lava rock") abutments and wingwalls are original, and no reconstruction or major repair of the bridge has been noted by the State DOT. The workmanship of the bridge is evident, particularly in the coursed basalt abutments. The historic feeling remains intact, primarily due to the relatively narrow roadway, uncommon materials, and evidence of the span over the old railroad line. The association the bridge conveys is somewhat diminished since the railroad line to the mill is now gone, nonetheless, the span over the railroad right-of-way clearly remains.

construction date(s):	1936
construction type:	steel-rigid frame with cantilever ends
construction cost:	unknown
span number:	2
total length:	79'
max. span(s):	51'
roadway width:	34'
height above road:	13.6'
superstructure:	reinforced-concrete flat slab (deck) on steel stringers
substructure:	masonry (lava-rock) abutments and wingwalls; reinforced-concrete intermediate support
floor/decking:	asphalt on concrete deck
parapets:	steel balusters with reinforced-concrete rail, and intermediate and end piers
other features:	bridge name and date of construction incised on end piers; two 2.5' sidewalks on either side of roadway ; masonry and concrete pedestrian stair to roadway below
alterations:	railroad tracks removed beneath bridge

[1]Hawai'i (State), Department of Transportation, Design Plans: *Waiale R. R. Overpass, Sta. 20.* prepared by Territorial Highway Department, Territory of Hawai'i, (Honolulu, October 1935).

[2]Spencer Mason Architects, *Historic Bridge Inventory: Island of Kauai*, Prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1989), 210.

Narrative Statement of Significance

The Wai'ale Drive Bridge is significant for its contributions to the fields of engineering and transportation in Hawai'i. The steel stringer bridge is eligible under Criterion A for its associations with the economic development of Maui by providing economical transportation to the mill for the sugar cane plantations located in the Wailuku region. The Wai'ale Drive Bridge is eligible under Criterion C as a uncommon example of a steel stringer bridge in Hawai'i, as well as a rare example of the use of vernacular materials (the lava-rock abutments) on a Federal Aid bridge. The bridge is representative of the "work of a master": William R. Bartels, the chief designer for the Territorial Highway Department.

The Wai'ale Drive Bridge was constructed as part of the upgrading of the Maui Belt Road undertaken by the Territory in the 1930s utilizing Federal funds. The bridge was built with U.S. Works Program Grade Crossing funding which provided federal money, without the usual match requirement, to build bridges separating railroad and road grades. This is the only bridge on Maui associated with the U.S. Works Program Grade Crossing funding. The bridge spanned the railroad alignment to the Wailuku Sugar Company mill, a vital element of Kahului-Wailuku's economic base.

The Wai'ale Drive Bridge is one of two steel rigid-frame bridges in the state (the other is the Līhu'e Mill Bridge on Kaua'i). The erection of steel stringer bridges was a deliberate effort by the Territorial government in permanent public works improvements requiring the latest technology and utilizing federal assistance. The materials selected for the bridge's construction are an usual mixture of steel and "lava rock", a local basalt. The use of steel is uncommon in Hawai'i due to the extreme marine environment and may reflect the requirements of the U.S. Grade Crossing Program. Local basalts were commonly used in bridge construction in Hawai'i during the nineteenth and early twentieth-centuries. Masonry fell out of favor for bridge construction after reinforced-concrete was introduced to Hawai'i in 1904-05, however the material made a resurgence during the Depression.

The bridge was designed by William R. Bartels and constructed by the Hawai'ian Contracting Company with materials fabricated by U. S. Steel Products and the American Bridge Company. Bartels was responsible for the design of all major Territorial bridge projects between 1932 and his retirement from the department in 1956.[3] His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

[3]Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in *Historic Bridge Inventory and Evaluation: Island of Hawaii*, Prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

Major Bibliographical References

Alvarez, Patricia. "A History of Road and Bridge Development on the Island of Hawaii" in *Historic Bridge Inventory and Evaluation: Island of Hawaii and A History of Road and Bridge Development on the Island of Hawaii.* Prepared for the State of Hawai'i Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, Honolulu, 1987a.

Hawai'i Heritage Center. *Historic Bridge Inventory: Island of Maui* . Prepared for the State of Hawai'i Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, Honolulu, 1990.

Hawai'i (State), Department of Transportation. Structure Inventory and Appraisal (SI&A) Sheets for Structures Built Before 1940. (Computer printout known as the State Bridge Inventory). Honolulu, 1994.

_____. Bridge Inventory Sheets for State-owned Bridges. Unpublished data in Bridge Design Section, Honolulu, 1986.

_____. Design Plans: *Waiale R. R. Overpass, Sta. 20.* prepared by Territorial Highway Department, Territory of Hawai'i. Honolulu, October 1935.

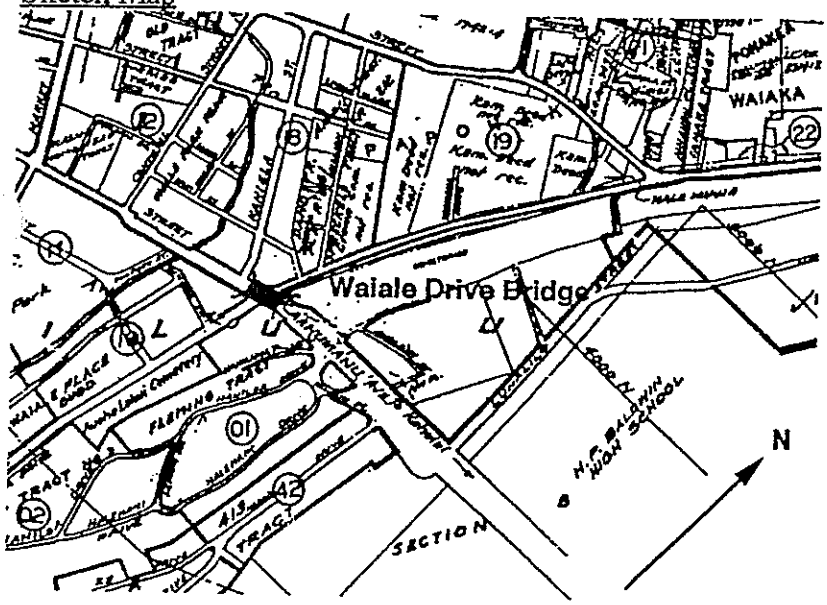
Spencer Mason Architects. *Historic Bridge Inventory: Island of Kauai* . Prepared for the State of Hawai'i Department of Transportation Highways Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, Honolulu, 1989.

Additional Documentation

Geographical Map

A United States Geological Survey (USGS) Map indicating the location of the nominated property is appended to the National Register Multiple Property form for "Historic Highway Bridges of Hawai'i, 1894 - 1941".

Sketch Map



Photographs

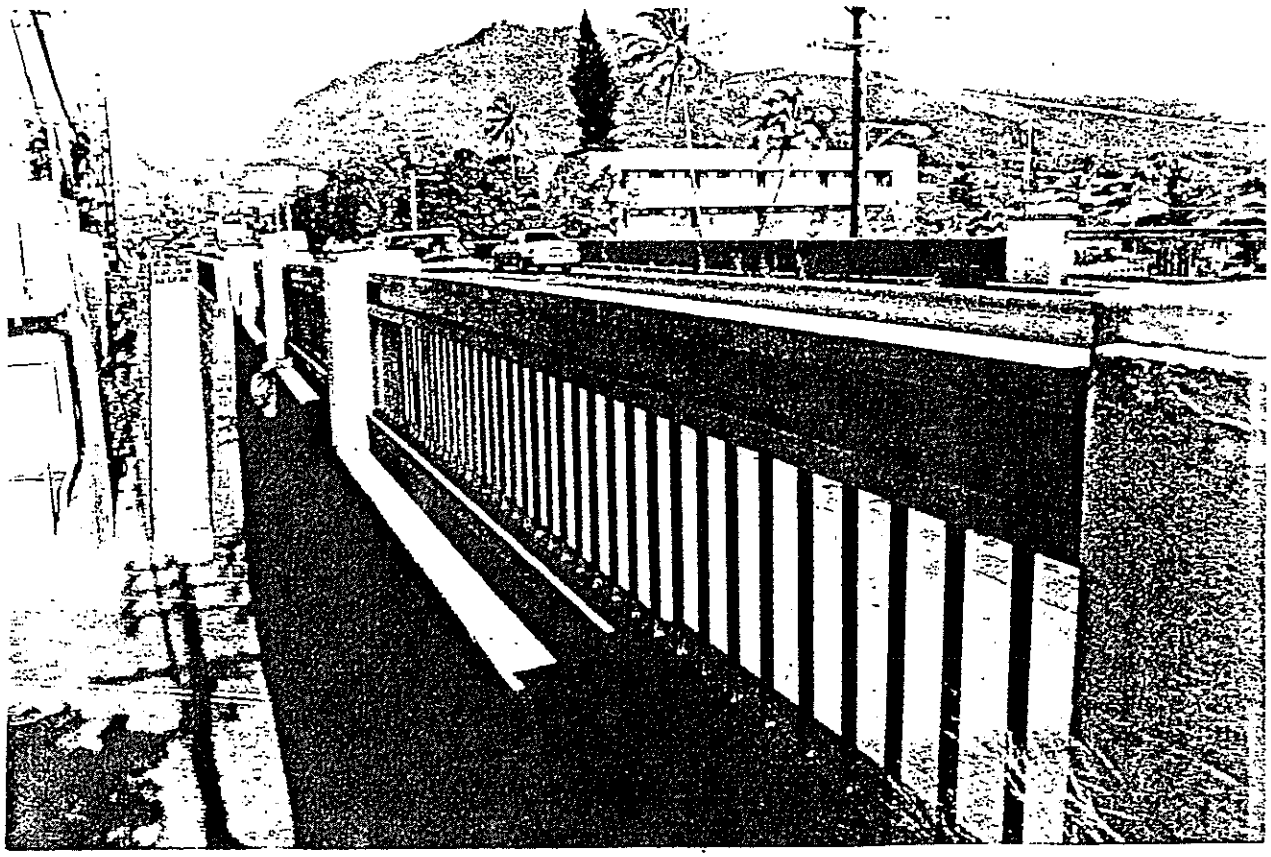
The following information applies to all photographs for this bridge:

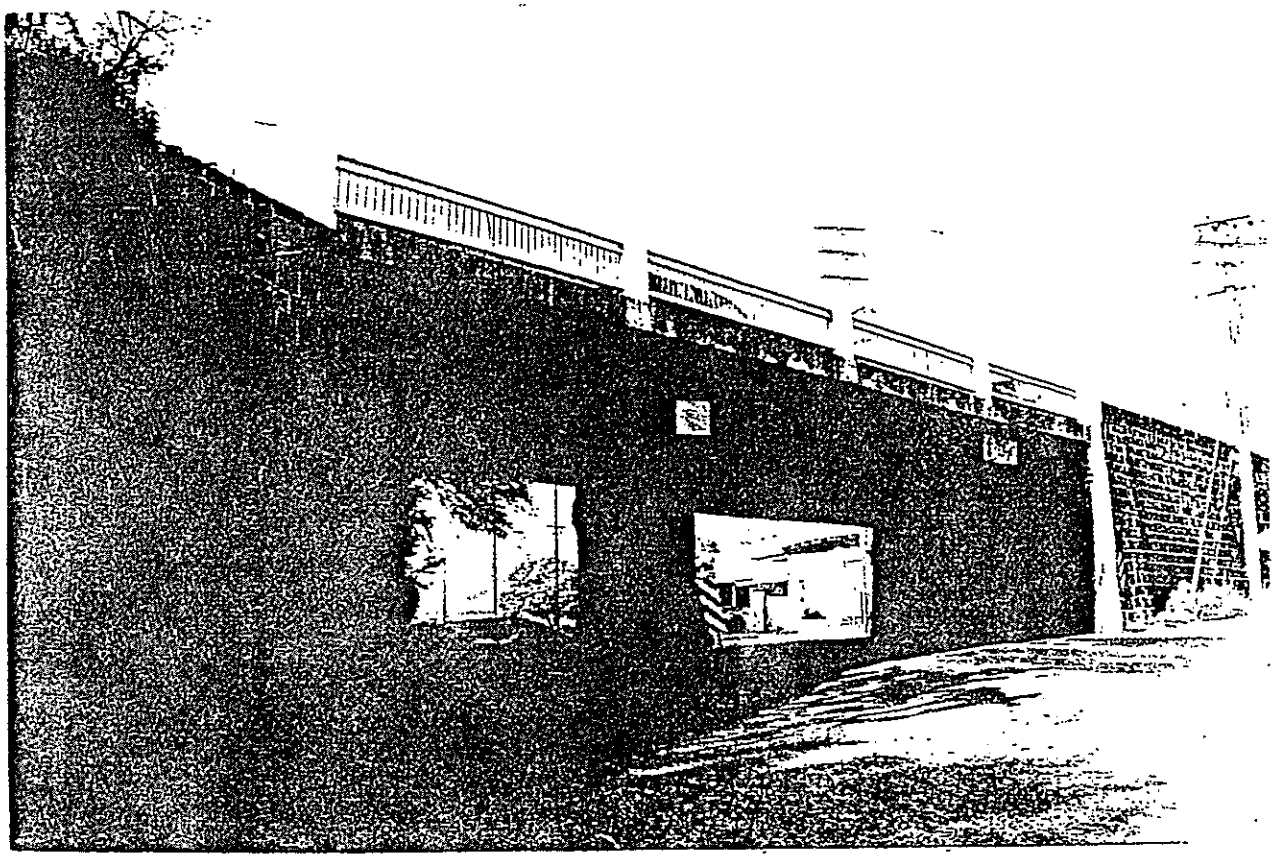
Name of Property:	Wai'ale Drive Bridge
Location:	Wailuku, Maui, Hawai'i
Name of Photographer:	Barbara Sannino Shideler, AIA
Date of Photograph:	May 1994
Location of Original Negative:	State of Hawai'i, Department of Transportation 869 Punchbowl Street, Honolulu, HI 96813
Photograph Number 1:	Detail of rail with view of approach; view from SE.
Photograph Number 2:	Substructure; view from NE.

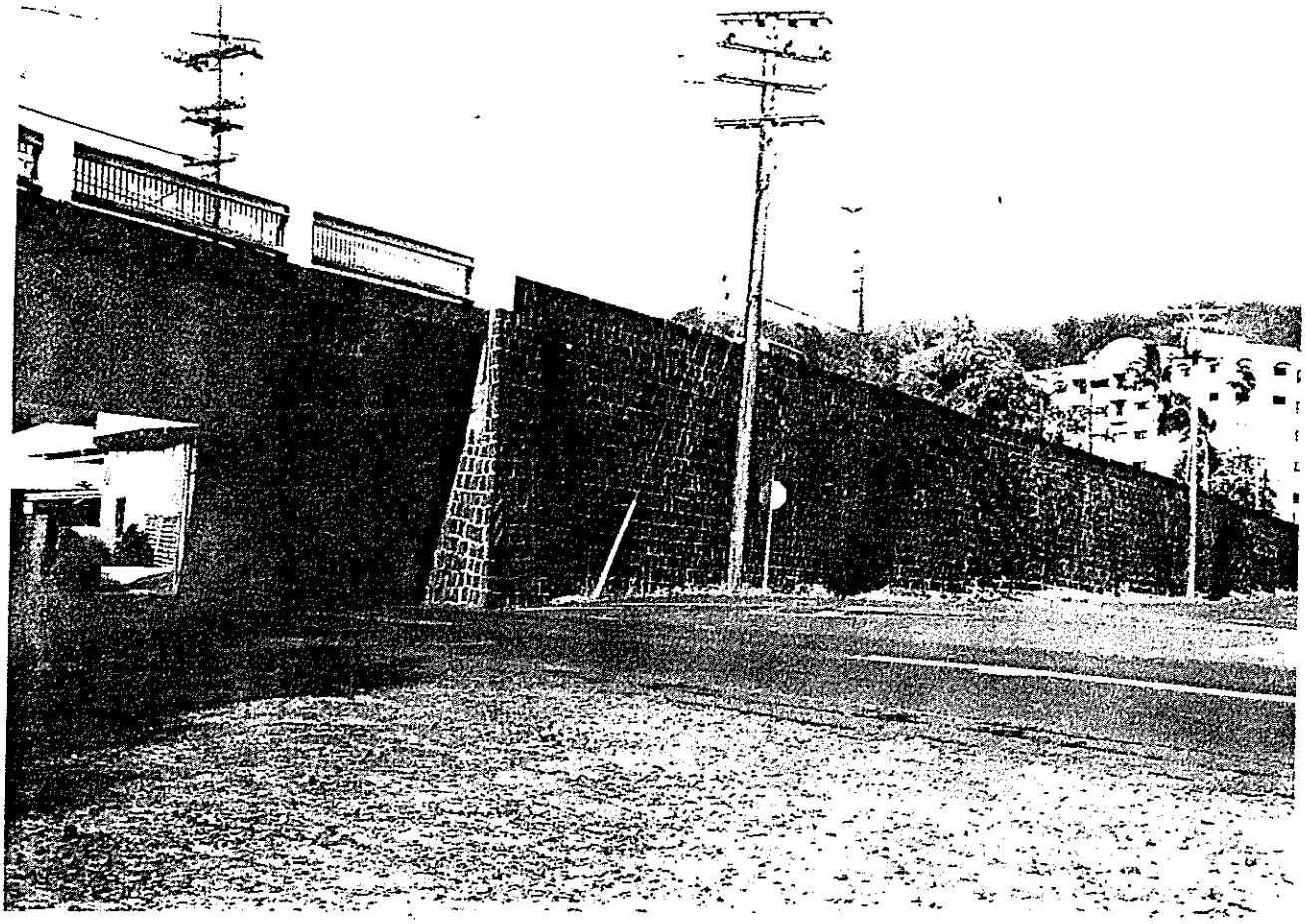
Wai'ale Drive Bridge, Wailuku, Maui, Hawai'i

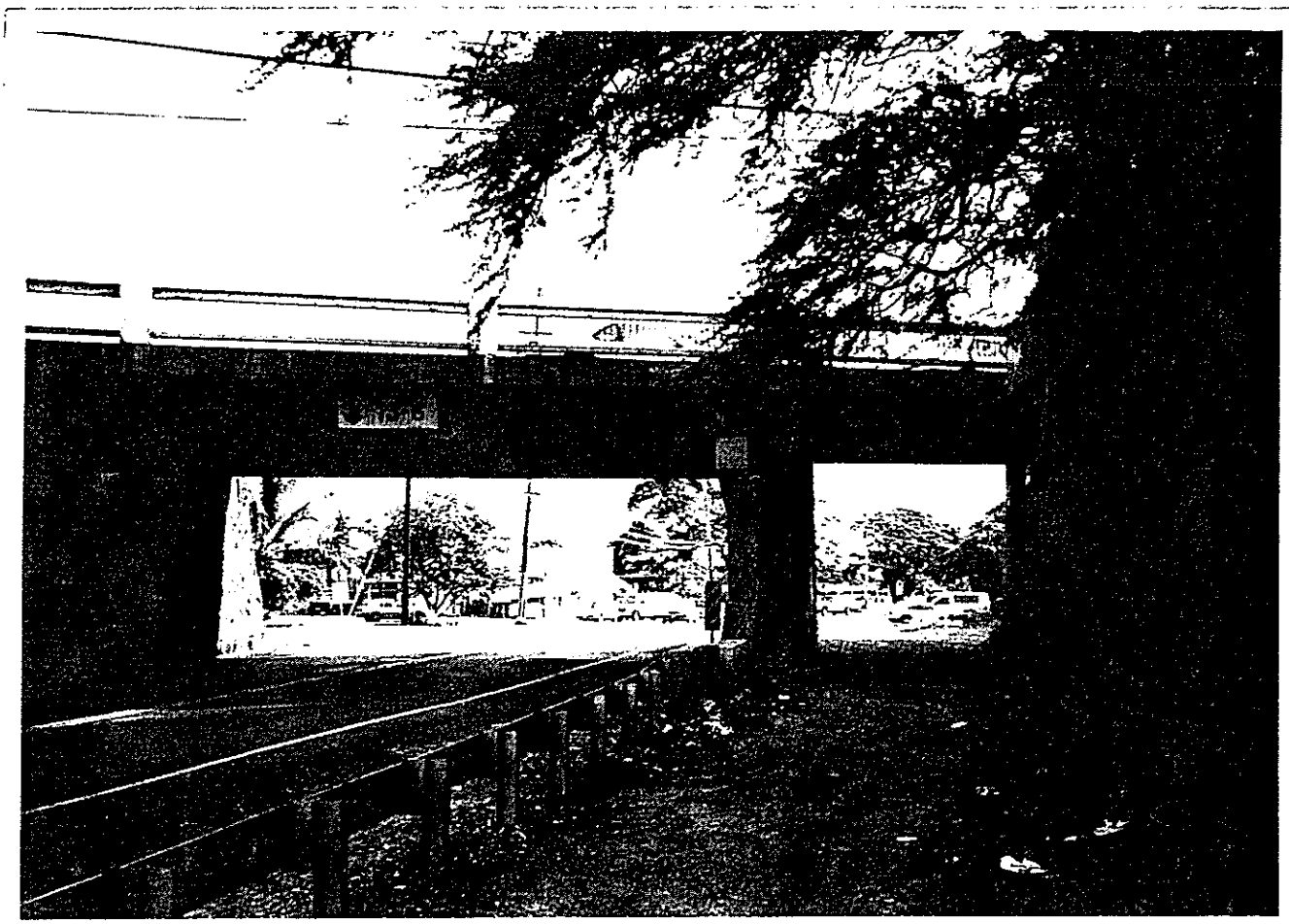
Top: Detail of rail with view of approach; view from SE.

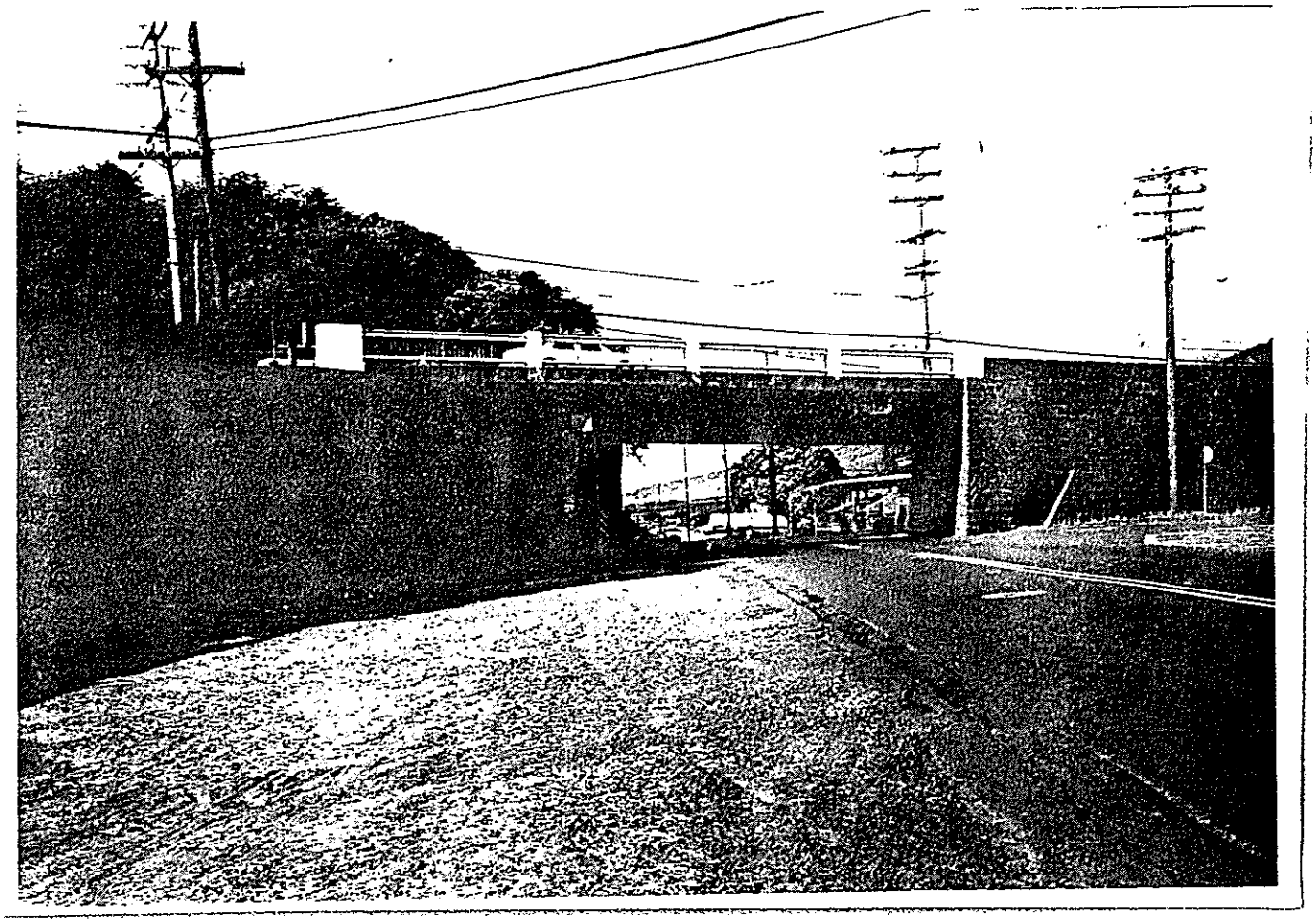
Bottom: Substructure; view from NE.

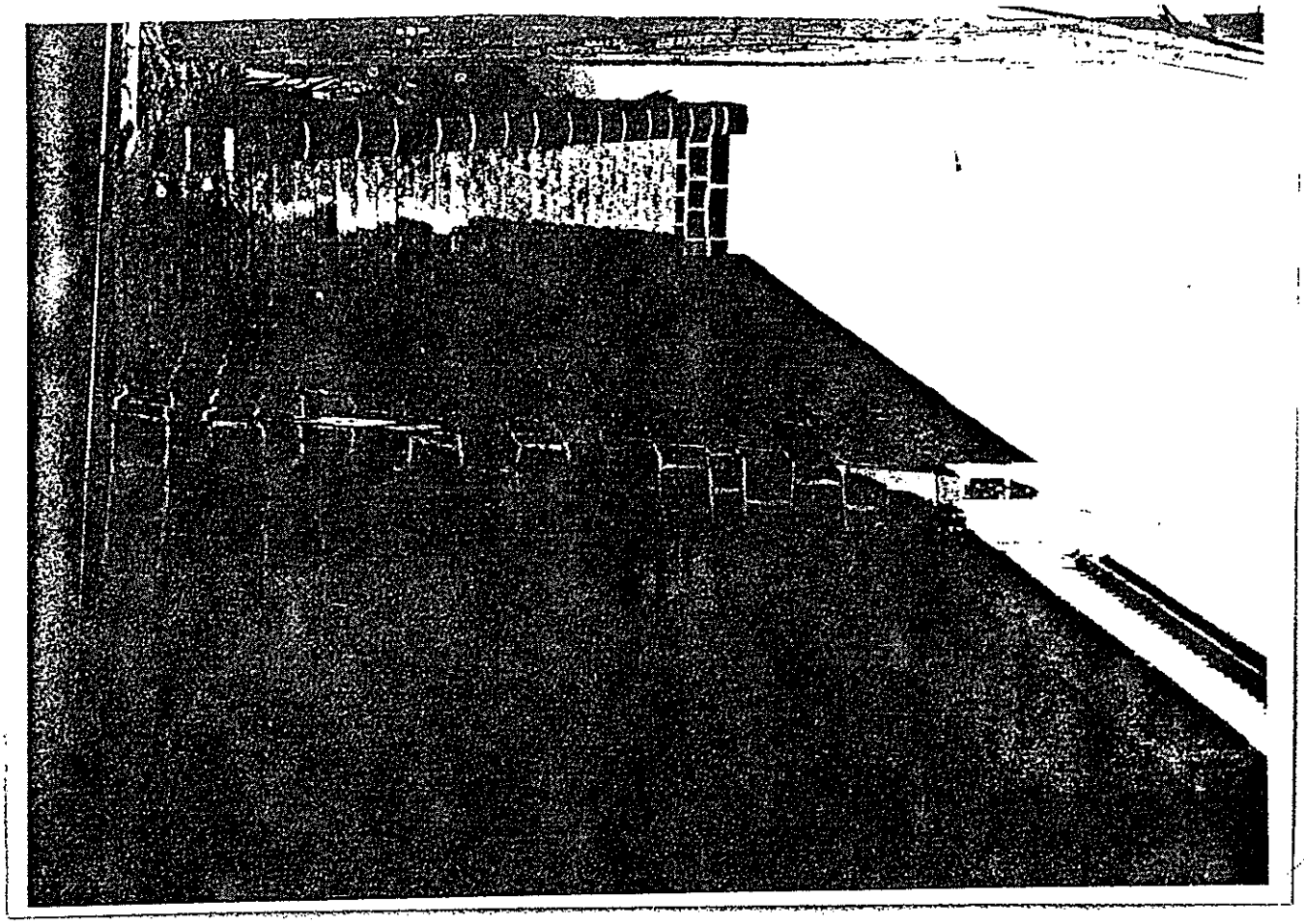




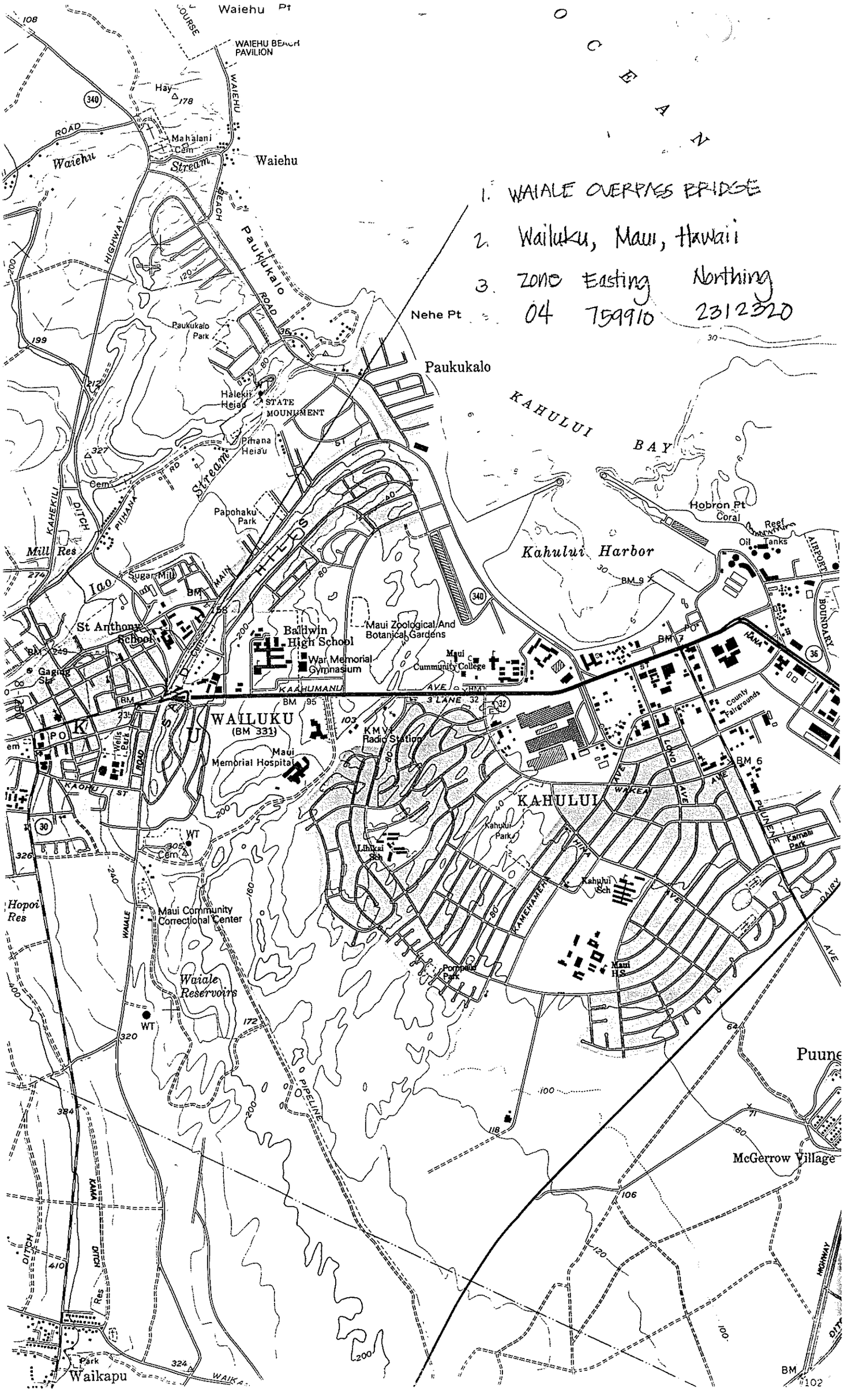








1. Wailuku Drive Bridge
2. Maui County, Hawaii
3. Elizabeth Anderson
4.

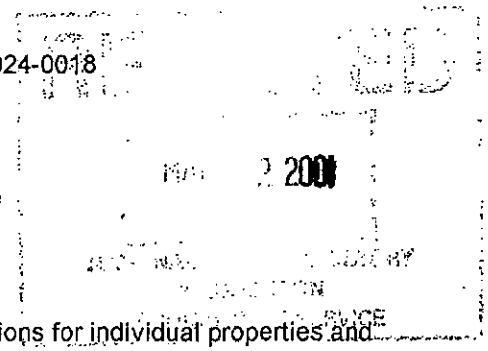

1. WAIALE OVERPASS BRIDGE
2. Wailuku, Maui, Hawaii
3. Zone Easting Northing
04 759910 2312320
Waiehu Pt
WAIEHU BEACH PAVILION
Waiehu
Stream
Mahalani Cem
Hay
ROAD
HIGHWAY
BEACH
Paukukalo
ROAD
Nehe Pt
Paukukalo
Paukukalo Park
Halekii Heiau
STATE MOUNUMENT
Pihana Heiau
Papohaku Park
KAHULUI BAY
Hobron Pt
Coral Reef
Oil Tanks
Kahului Harbor
AIRPORT
BOUNDARY
Mill Res
Sugar Mill
Iao
MAIN
HILLS
St Anthony School
Baldwin High School
War Memorial Gymnasium
Maui Zoological And Botanical Gardens
Maui Community College
KAHUMANU AVE
3 LANE
WAILUKU
(BM 331)
KMVI Radio Station
Maui Memorial Hospital
Wells Park
KAOHU ST
KAHULUI
Kahului Park
Lihikai Sch
Kahului Sch
Maui H.S.
Pomaika Park
Kamaili Park
County Fairgrounds
WAKEA AVE
LONO AVE
PUUNENE AVE
DAIRY
Hopoi Res
Maui Community Correctional Center
WAIALE
Waiale Reservoirs
PIPELINE
KAMA DITCH
Res
Waikapu
Park
WAIKA
McGerrow Village
Puune
HIGHWAY

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM



This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Hāna Belt Road
other names/site number Belt Road, Hāna Road, Hāna Highway, Pi'ilani Highway

2. Location
street & number Hāna Highway (State Rte. 360), Pi'ilani Highway (Rte. 31) not for publication __
city or town Makawao District to Hāna District
vicinity Ha'ikū, Ke'anae, Nāhiku, Hāna, Kīpahulu
state Hawai'i code HI county Maui code 009 zip code __

3. State/Federal Agency Certification
As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ✓ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally ✓ statewide ___ locally. (___ See continuation sheet for additional comments.)

Signature of certifying official — Date 4-20-01

State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Signature of commenting or other official — Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is: Signature of Keeper Date of Action

✓ entered in the National Register
✓ See continuation sheet. Sarah D. Pope 6/15/01

___ determined eligible for the National Register
__ See continuation sheet. _____

___ determined not eligible for the National Register

___ removed from the National Register

____ other (explain): _____

5. Classification
Ownership of Property
(Check as many boxes as apply)

___ private

_x_ public-local

_x_ public-State

___ public-Federal

Category of Property
(Check only one box)

___ building(s)

_x_ district

___ site

___ structure

___ object

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of Resources within Property

Contributing	Noncontributing	
____	_____	buildings
____	_____	sites
73	1	structures (bridges and culverts)
_____	_____	objects
73	1	Total

Number of contributing resources previously listed in the

National Register N/A

6. Function or Use

Historic Functions (Enter categories from instructions)

Cat: Transportation Sub: road-related

Current Functions (Enter categories from instructions)

Cat: Transportation Sub: road-related

7. Description

Architectural Classification
(Enter categories from instructions)

Other: OTHER: roadways; bridges: reinforced concrete, girder, flat slab, masonry (basalt or lava rock)

Materials
(Enter categories from instructions)

foundation _____

roof _____

walls _____

_____

other asphalt, concrete, masonry (lava rock)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

__X__ A Property is associated with events that have made a significant contribution to the broad patterns of our history.

____ B Property is associated with the lives of persons significant in our past.

__X__ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations

(Mark "X" in all the boxes that apply.)

Property is:

____ A owned by a religious institution or used for religious purposes.

____ B removed from its original location.

____ C a birthplace or a grave.

____ D a cemetery.

____ E a reconstructed building, object, or structure.

____ F a commemorative property.

____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

Engineering _____

Social History _____

Transportation _____

Commerce _____

Period of Significance

circa 1900 to 1947

Significant Dates

circa 1900 to 1947

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

County engineers, including Hugh Howell, Paul Low, and A. H. Wong; builders were county employees, prison labor, and private contractors. Private contractors included Wilson and McCandless, Hugh Howell Engineering Company, and Moses Akiona, Ltd. Designers also included William D'Esmond, architect; Joseph Matson, and D. Kapohakimohewa.

9. Major Bibliographical References Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS)

___ preliminary determination of individual listing (36 CFR 67) has been requested

___ previously listed in the National Register

___ previously determined eligible by the National Register

___ designated a National Historic Landmark

___ recorded by Historic American Buildings Survey

_____

___ recorded by Historic American Engineering Record

_____

Primary Location of Additional Data

___ State Historic Preservation Office

_X_ Other State agency

___ Federal agency

___ Local government

___ University

___ Other

Name of repository:

State of Hawai'i Department of Transportation

10. Geographical Data Acreage of Property _ _____

UTM References
(Place additional UTM references on a continuation sheet)

Zone	Easting	Northing	Zone	Easting	Northing
1	04	787810	2314160	3 04	789510	2312640
2	04	788850	2313440	4 04	789860	2312530

_X_ See continuation sheet.

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

The boundaries of the nominated district are delineated by the course of the Hāna Belt Road. The right-of-way is approximately 40' wide and is variable along the entire length of the road. The historic district begins .2 miles west of Mile Marker 3 on the Hāna Highway, State Route 360, near Huelo, and ends on the south end of Koukou'ai Bridge near Kīpahulu on Route 31.

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

The boundaries are coterminus with the Hāna Belt Road's historic right-of-way. The beginning and end points were selected to encompass the portion of the Hāna Belt Road that retains the greatest historic integrity and character. This section of roadway is relatively unaltered and is the most spectacular portion of Maui's historic belt road system, both in its scenery and its historic character. The boundaries include the highest concentration of stylistically consistent historic bridges in the State of Hawai'i.

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 10 Geographical Data Page 2

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

UTMs continued:

	zone/easting	northing	
5	04/790890	2311540	points 1-4: Ha'ikū, Hawai'i quad
6	04/791260	2311740	
7	04/791400	2311610	
8	04/792250	2310930	
9	04/793400	2310360	
10	04/793620	2310280	points 5-17: Ke'anae, Hawai'i quad
11	04/794270	2309800	
12	04/794310	2309020	
13	04/795250	2309060	
14	04/796560	2309440	
15	04/796790	2309280	
16	04/797770	2308430	
17	04/797540	2306640	
18	04/797580	2305320	
19	04/797800	2305090	
20	04/798000	2304760	
21	04/798680	2304860	
22	04/798890	2304800	
23	04/799550	2304630	points 18-32: Nāhiku, Hawai'i quad
24	04/799760	2304420	
25	04/799920	2304330	
26	04/800000	2304410	
27	04/800520	2304260	
28	04/800880	2304190	
29	04/801930	2303950	
30	04/802190	23033830	
31	04/		
32	04/	2303830	

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 10 Geographical Data Page 3

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

UTMs continued:

	zone/easting	northing	
33	04/803810	2303440	
34	04/803910	2303270	
35	04/804000	2303160	
36	04/804170	2303130	
37	04/804290	2303000	
38	04/804900	2303020	points 33-47: Hāna, Hawai'i quad
39	04/805350	2303020	
40	04/805650	2302900	
41	04/806060	2302760	
42	04/807160	2302510	
43	04/807630	2302290	
44	04/812440		
45	04/812960	2295650	
46	04/812960	2293760	
47	04/812580	2292900	
48	04/811030	2290640	
49	04/810240	2290700	
50	04/809900	2290260	
51	04/809480	2290260	
52	04/809190	2290300	
53	04/809070	2290210	points 48-60: Kīpahulu, Hawai'i quad
54	04/808730	2289420	
55	04/808500	2289330	
56	04/808210	2289200	
57	04/808000	2289200	
58	04/807770	2288590	
59	04/807680	2288060	
60	04/805910	2286630	

11. Form Prepared By

name/title Dawn E. Duensing, historian
organization Maui County Cultural Resources Commission date 1/13/01
street & number P.O. Box 888 telephone (808)572-6583
city or town Makawao state HI zip code 96768

Additional Documentation. Submit the following items with the completed form:

Continuation Sheets

Maps

A USGS map (7.5 or 15 minute series) indicating the property's location.

A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs

Representative black and white photographs of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner(Complete this item at the request of the SHPO or FPO.)

name State of Hawai'i, Department of Transportation
street & number 869 Punchbowl Street telephone (808)587-2150
city or town Honolulu state Hawai'i zip code 96813

name County of Maui, Department of Public Works & Waste Management
street & number 200 S. High Street telephone (808)270-7845
city or town Wailuku state Hawai'i zip code 96793

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 7 Page 1

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

The Hāna Belt Road is coterminous with its historic right-of-way. The Hāna Highway portion of the "belt road" traverses approximately fifty-one miles along Maui's north and east coast from Kahului in central Maui to the remote East Maui community of Hāna. After Hāna, the road continues as the Pi'ilani Highway and circles back around East Maui's south side, a distance of thirty-seven miles. Together, these East Maui roads were part of Maui's "belt" road system around the entire island. The proposed historic district includes approximately forty-two miles of road from .2 miles west of Mile Marker 3 on the Hāna Highway near Huelo to Koukou'ai Bridge on Pi'ilani Highway near the Kīpahulu section of Haleakalā National Park. The narrow road winds around more than 600 curves and over fifty-nine bridges. The Hāna Belt Road is famous for its one-lane bridges with sharp approaches and encompasses the highest concentration of unaltered and stylistically consistent historic bridges in Hawai'i. The Belt Road to Hāna is notable for its breathtaking scenery as it passes waterfalls, v-shaped valleys, and small villages, often hugging the precipitous sea cliffs on Maui's rugged coastline. The roadway width varies from less than 16' wide along the sea cliffs and other rugged terrain to approximately 22' wide through level topography and residential areas. Along most of the roadway, there is no shoulder or a very narrow shoulder. The road's alignment dates to its construction in the 1920s. The Belt Road is the only overland automobile route that connects East Maui communities with the rest of the island. The period of significance is circa 1900 when Mauians began calling for an improved road and a rudimentary wagon road was constructed near Nāhiku, to 1947 when the last bridge was built to service the Hāna Belt Road.

TOPOGRAPHY AND EARLY ROAD

The Hāna Belt Road traverses through some of Hawai'i's most rugged topography and rainiest climate. The island of Maui is comprised of two shield volcanoes joined by an isthmus, which constitutes east and west Maui. East Maui, where the Hāna Belt Road is located, is the immense Haleakalā, a dormant volcano more than 10,000' in elevation. In earlier times, lava flows poured into the ocean to create the jagged coastline along which the road is aligned. Centuries of stream erosion from the wet, tradewind climate on Haleakalā's windward (northeastern) slope cut a rugged terrain of great sea cliffs and v-shaped valleys. The wet climate allowed

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NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 7 Page 2

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

dense forests to grow over the rough terrain and helped make the Hāna District in East Maui one of Hawai'i's most isolated and inaccessible areas.

Prior to 1450 A.D., Maui was divided into two separate kingdoms, one with a court at Lahaina, the other with a court in Hāna. The East Maui coastal area was well populated in ancient times, but had little contact with the rest of Maui due to its isolated location. Traditionally, Hawaiians preferred to rely on their highly-developed navigational skills and traveled by canoe. As a result, Hāna was often politically tied to the more accessible communities across the channel on the island of Hawai'i. In the sixteenth century, Maui's King Pi'ilani conquered East Maui and pulled Hāna into his political sphere. Pi'ilani was notable for his public works projects, including the *Alaloa*, or main road, which began in West Maui.[1]

The predecessor trail to the Hāna Belt Road was built by Pi'ilani's son, Kihapi'ilani, in the sixteenth century. The trail was paved with hand-fitted basalt (lava) rocks. The 1848 account of Moses Manu noted, "This road was treacherous and difficult for the stranger, but when it was paved by Kihapi'ilani this road became a fine thing." When completed, the road was 4' to 6' wide, 138 miles long, and encircled the entire island. With the completion of Kihapi'ilani's East Maui trail, known as the King's Highway, Maui became the only island in the Hawaiian chain to have a "belt" road that completely encircled it.[2] In 1828, missionaries noted that the trail was "paved" and extended over thirty miles. They reported that it was a great help in ascending and descending the steep mountains and cliffs in the area. The early trail's switchbacks over the mountains near Honomanū were still visible in the 1940s.[3] Today, intact portions of the King's Highway remain, although most of the road has been obliterated by agriculture or paved over by modern roadways, including the Hāna Belt Road.

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[1] Gail Bartholomew, *Maui Remembers: A Local History.* (Honolulu: Mutual Publishing), 1994, 2.

[2] Bartholomew, *Maui Remembers,* 2; Trust for Public Land and Bay Pacific Consulting, *East Maui Resource Inventory,* Prepared for the Rivers, Trails, and Conservation Assistance Program, National Park Service, U.S. Department of the Interior (Honolulu: 1998), 9.

[3] E. E. Pleasant, "Maui 100 Years Ago: The Old Trail to Hāna." *The Maui News,* June 13, 1942.

United States Department of the Interior
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NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 7 Page 3

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

THE HĀNA BELT ROAD

The modern history of the Hāna Belt Road began in the 1870s when fifteen miles of unpaved road was built from central Maui into East Maui's rain forest to facilitate the construction of the Hāmākua Ditch, which was completed in 1878. The ditch was an extraordinary nineteenth century engineering marvel built to ensure the economic success of sugar by bringing water from rainy East Maui to central Maui's arid plantations. In 1900, Mauians began considering the necessity of extending a good wagon road through to Hāna, which would be part of the island's "belt" (around-the-island) road system. That year, a rudimentary road was built from Ke'anae to Nāhiku to service the Nāhiku Rubber Company. Construction through this country was difficult due to the terrain and climate. The road was surfaced with cinder, but was not adequate for automobile traffic. In 1905, the Superintendent of Public Works reported that the road in East Maui traversed through very rough country and as a result, was built "as narrow as possible in order to construct, with the money available, the maximum length of road."[4] Overland travel continued by horse and many travelers followed the trails along the irrigation ditches. Steamer remained the preferred mode of transportation for travel along the Hāna Coast.[5]

By the early 1900s, Maui leaders began planning for an improved route to Hāna. Beginning in 1908 and reaching a peak in 1911, numerous concrete bridges were built along the Hāna Coast in anticipation of road improvements.[6] In 1914, the Maui County Board of Supervisors lobbied the Territory of Hawai'i Legislature for funding to extend the road from Kailua to Ke'anae. Territorial Governor Pinkham was adamantly opposed to the Hāna Belt Road and blocked most of its funding. Despite the governor's opposition, money was appropriated and the Wilson and McCandless firm completed a "several-mile" section of road between Ke'anae and Nāhiku in

[4] Bartholomew, *Maui Remembers*, 161; Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, prepared for the State of Hawai'i, Department of Transportation, Highways Division. Draft. (Honolulu), 1996, IV 12.

[5] "Raymond Adds Ginger To Loan Fund Meeting," *The Maui News*, May 23, 1914.

[6] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, IV 12.

1914. *The Maui News* reported that this "fine piece of road" was of "practically no benefit" since it ended in a forest reserve miles from any habitation. The newspaper noted that one section of road closely traversed along the mountainside a few thousand feet above sea level, with other sections following the Ko'olau Ditch. The road was praised for passing through some of the most spectacular scenery in the islands. Although money had been pledged to carry the road all the way into Ke'anae, Governor Pinkham refused to approve the appropriation and Maui was left with an inaccessible stretch of road.[7]

By 1920, the belt road from central Maui to Kailua was suitable for modern automobile traffic. Parts of the road were paved with macadam to ensure that it was passable during the rainy season. Keeping the road open was essential as it was the primary transportation route into Maui's pineapple country and muddy roads had periodically shut down pineapple operations. Maui County stretched funding as far as it could by using convict labor on the belt road projects.[8] Territorial funding to extend and complete the coastal highway to Hāna, however, continued to be a problem and was not resolved until Wallace Farrington became governor. Major sections of the Hāna Coast remained inaccessible to automobile traffic, namely the region between Kailua and Nāhiku, the area with the most challenging topography. With Governor Farrington's strong backing, the major portion of today's Hāna Highway was constructed in two separate construction projects between 1923 and 1926. The road between Kailua and Ke'anae was built from 1923 to 1925. Immediately thereafter, a road between Wailua and Nāhiku that connected with the route into Hāna was constructed and opened to the public in 1926.

[7] "Raymond Adds Ginger To Loan Fund Meeting," *The Maui News*, May 23, 1914; "Belt Road Or Nothing Says Board," *The Maui News*, June 20, 1914; "Let's Have The Belt Road Money," *The Maui News*, June 20, 1914; "No Ke'anae Highway Says Governor," *The Maui News*, July 18, 1914; "Road Pau on Nāhiku Part Belt Road," *The Maui News*, November 14, 1914.

[8] "No Money For Belt Road For Two Years," *The Maui News*, May 7, 1920; "Convict Labor to Work on Belt Road," *The Maui News*, September 17, 1920.

United States Department of the Interior
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NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section 7 Page 5

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

Maui County Engineer Paul Low was credited with supervising "one of the most difficult and at the same time finest pieces of road engineering" on Maui.[9] In January 1923, Low presented his estimates to complete the Hāna road as two projects, the first of which was the roadway extension from Kailua to Ke'anae, a distance of 11.67 miles, which would require the excavation of 273,000 cubic yards of earth. The second phase of the project extended the road from Ke'anae to Wailuaiki near Nāhiku, a distance of 5.67 miles that called for almost 30,000 cubic yards of earth to be excavated. Low used earlier survey work done by engineers of the Maui Loan Fund Commission, which had been created by the Territorial Legislature to oversee special funds for Hawai'i's belt road systems. Low credited engineers Harvey and Howell with designing the original plans. (Hugh Howell also served as Maui County engineer between 1906 and 1914.) In addition to the earlier surveys, Low and a team of county surveyors scouted the route for the Hāna Belt Road, took field notes, and prepared plans and specifications. Low's 1923 estimates included engineering costs, excavation, fill, retaining walls, culverts, bridges, macadam pavement, and tunnels to relocate some ditches. The new road was to be built on a 16'-wide bench, with a pavement width of 12'-0".[10]

The Kailua to Ke'anae section of the belt road took two years to build. Crews worked from both ends of the project and met in May 1925. The road opened to the public on June 11, 1925. The new section of road was described as "serpentine" as it passed through a dozen gulches and wound around "mountain sides that dip into the ocean." Although the distance between the two communities was only four miles as the crow flies, the mileage needed to complete the road around the difficult topography was nearly twelve miles. In order to build the new road, workers were lowered by rope over the steep cliffs and gulches to dig a footing, set their drills, bore holes, and set the powder and fuses that would blast the new roadbed. The most spectacular piece of the road was also considered its most impressive engineering feat. This portion of road traversed down the mountainside (west) to the bottom of Honomanū Gulch,

[9] "Steam Shovels Meet Next Week," *The Maui News*, July 31, 1926.

[10] "Itemized Costs Proposed Belt Road Presented," *The Maui News*, January 19, 1923; "Estimate Made Belt Road Cost By Way Kailua," *The Maui News*, January 13, 1923; "Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hāna," *The Maui News*, December 22, 1926.

Narrative Description (continued)

where it crossed a bridge and proceeded up the other mountainside (east side of the gulch) to a peak on the Ke'anae side. Motorists had impressive views from both sides of the gulch, including a view of the road on the other side. Governor Farrington described the scene as a "gorgeous spectacle [with] the blue sea in many places hundreds of feet below you, the white surf beating against the shore line and these wonderful green hills, the many gulches and every playing light, shade and color on the sides of beautiful and majestic Haleakalā." *The Maui News* noted that the road was still rough in many places, unsurfaced, and in need of widening so that cars could pass each other at any point. The article pointed out the road opened up "marvelously beautiful scenery" that most Maui residents had never seen. As a piece of engineering, the editor claimed that there was nothing in the Territory of Hawai'i or perhaps the world quite like the new road to Ke'anae. A Los Angeles-based writer admired the landscape features, including bamboo thickets, mountain apple, and native kukui trees.[11]

Work began immediately on the final link of the Hāna Belt Road project. In 1925, Maui's road program received a substantial boost when President Calvin Coolidge approved a bond issue for the Territory of Hawai'i that included $150,000 to continue construction of the Hāna Belt Road. County Engineer Low reported that finishing work was being done on the newly completed section to Ke'anae, including top-dressing the road, finishing culverts, and improving bridge approaches. Stone masons were building wing walls on the bridges and retaining walls in the valleys. Crews with forty men each had started to build the last link of the road from both the Hāna and Ke'anae sides, which was a length of 3.5 miles. This section was benched at 16'-0" wide, although plans called for the road to eventually be widened to 20'-0" after it had settled. Several bridges near Wailua were also built during this phase, including the Waikani Bridge and the bridge at West Wailuanui. Construction of the last link of road was difficult as

[11] "First Car Runs Over Belt Road Kailua-Ke'anae," *The Maui News*, May 23, 1925; "Dream Of Thirty Years Ago About To Be Realized," *The Maui News*, June 6, 1925; "Hundreds Motor to Ke'anae: Maui Turns Out To See Opening Of Scenic Road," *The Maui News*, June 13, 1925; "Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hāna," *The Maui News*, December 22, 1926; "Maui's New Road," editorial, *The Maui News*, June 17, 1925; "Wonder And Charm Of Maui Scenery To Be Pictured And Told Hundreds Of Thousands Readers On Mainland," *The Maui News*, August 15, 1925.

Narrative Description (continued)

much of the work consisted of blasting the solid rock in the area. Shovels on both sides of the project failed due to the stresses of working on solid rock cuts and the necessity of removing hundreds of tons of rock along the right-of-way. At times, the steam shovels could not do the work without considerable blasting and hand work. Heavy rains disrupted the project as well, causing floods and undermining embankments. In November 1926, a flood in the Wailuanui Valley caused a landslide over the road, washed out the scaffolding on the Waikani Bridge, and carried away 600 bags of cement to be used on the bridge.[12]

The Hāna Belt Road was opened to the public on December 18, 1926. *Honiron*, a publication of Honolulu Iron Works, described the road as "spectacularly chiseled out of abrupt cliffs and precipitous valleys." It noted that miles of the roadway were nothing more than a 16'-wide shelf cut into the mountainside, with towering masses of rock above and sheer drops measuring hundreds of feet to the ocean below. When asked how the scenery of the new section of road compared to the Kailua-Ke'anae section, Low commented that there was no comparison. He admired the section of road above the Wailua Valley that traveled along a narrow ledge for about a mile and provided a lovely panorama of *taro* patches and rice fields in the quaint village of Wailua below. *The Maui News* noted that the newly completed Hāna Belt Road was the "great road making achievement in the Islands, fraught with tremendous difficulties in engineering and construction work" and completed by "dare-devil exploits." The paper claimed the road was the most scenic driveway in the world, with vistas of lofty mountains, the Pacific Ocean, wild canyons, cataracts, waterfalls, and luxurious tropical vegetation. Signs marked "bad turn" and "go slow" were installed to mark dangerous curves and other points in the road. The average speed for driving the Hāna Belt Road was 20 m.p.h. Although Low's

[12] "Coolidge Approves Proposed $2,590,000 Hawai'i Bond Issue," *The Maui News*, August 22, 1925; "Kailua-Kōpili'ula Road Work Making Headway, Says Low," *The Maui News*, March 13, 1926; "Workers Blast Tons Of Rock On Belt Road," *The Maui News*, May 15, 1926; "Builders Progress In Construction Of Belt Road Project," *The Maui News*, April 17, 1926; "Flood Threatens Belt Road Bridge," *The Maui News*, November 17, 1926.

Narrative Description (continued)

1923 estimates to complete the road to Hāna included pavement, the road was not paved when it was opened in 1926.[13]

Approximately six miles west of Hāna, near Upper Nāhiku, the Hāna Belt Road enters a coastal plain, which permits the alignment to run in a relatively straight path. The road passes over some minor gulches via a number of culverts and several bridges. Approximately four miles south of Hāna, the coastal plain ends and the road again passes through East Maui's challenging terrain. South of Ala'ala'ula Bridge, the road traverses through a series of rugged gulches similar to those near Ke'anae. South of Waikakoi Bridge, the road is benched into the high cliffs, around steep mountains and into the deep valley of Wailua Cove, before climbing back out of the valley. This portion of road is similar to the road near Honomanū Gulch near Ke'anae. Near Kīpahulu, the Hāna Belt Road passes through the scenic 'Ohe'o Gulch and Koukou'ai Gulch, which were spanned by concrete arch bridges in 1916 and 1911 respectively. It is uncertain when the belt road between Hāna and Kīpahulu was built, although it was being used for automobile traffic by the time the belt road was completed between Kailua and Hāna in 1926.[14]

BRIDGES and CULVERTS

The Hāna Belt Road includes fifty-nine bridges and numerous culverts constructed between 1908 and 1947. Sixteen of these bridges are located on the Hāna Belt Road south of Hāna (Pi'ilani Highway, Route 31) and forty-three on the Hāna Belt Road between Hāna and Huelo

[13] "Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hāna," *The Maui News*, December 22, 1926; "Honiron Tells Of Maui Road To Hāna," *The Maui News*, March 5, 1927; "Linking Up Maui," *The Maui News*, editorial, December 18, 1926; "Celebration Typical Of Maui," editorial, *The Maui News*, December 22, 1926.

[14] "Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hāna," *The Maui News*, December 22, 1926; "Maui Belt Road Circled," *The Maui News*, January 15, 1927.

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(Hāna Highway, Route 360). The narrowest bridges are approximately 12'-6" wide and the widest bridge is approximately 20'-6". More than half of the bridges are single span.

The majority of bridges in the district were constructed of reinforced cast-in-place concrete. County and territorial engineers utilized structural systems typical for the early twentieth century, including concrete arch, flat slab, girder, and simple tee-beam spans. Eighty percent of the concrete bridges were constructed between 1908 and 1929. Two unique bridges in the proposed historic district are rare surviving examples of masonry arch construction with basalt (lava rock). Many of the bridges have wingwalls, abutments, and piers constructed of concrete rubble masonry with basalt.

The majority of bridges featured two styles of parapet construction. Twenty-four bridges built between 1908 and 1915 had a solid-paneled, reinforced-concrete parapet with a peaked concrete rail cap. From 1916 to 1929, thirty-one bridges were built with a reinforced-concrete parapet of simple vertical concrete balusters and a square concrete rail cap.[15] The Pu'uhaoa Bridge, built in 1910, and the Waiokamilo Bridge, built in 1921, featured a more ornate open-rail parapet. Two bridges constructed in 1947, Kawaipapa and Wailua, are unique along the corridor, with concrete post-and-beam railings. Some of the bridges have construction dates inscribed on the parapets.

Masonry Arch Bridges

Two masonry arch bridges are located on the Hāna Belt Road south of Hāna, the Hāhālawe Bridge and Wai'ele Bridge. Constructed in 1910, both bridges utilized cut basalt blocks to build the abutments and arch rings. The bridges feature solid reinforced-concrete parapets with rail caps. "A.D. 1910" is inscribed on the outer parapet of each bridge. The bridge walls and rock abutments may date to different construction periods, with the concrete parapets being from a later date. The bridges retain their historic integrity, and feature fine craftsmanship and uncommon materials.[16]

[15] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 191.
[16] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 192.

Narrative Description (continued)

Concrete Arch Bridges

After 1904, concrete arch bridges were built in Hawai'i, often using standardized plans. Two types of concrete arch bridges were constructed in Hawai'i, solid and open spandrel. The solid-spandrel bridges were generally arch-deck bridges in which the traffic deck rested upon the arch. Between 1916 and 1926, several bridges of this type were built on Maui, including three bridges built along the Hāna Coast: 'Ohe'o Bridge, Hanawī Bridge, and Kūhiwa Bridge. The 'Ohe'o Bridge spans the scenic 'Ohe'o Gulch in Haleakalā National Park.

The open-spandrel concrete arch bridges demonstrated sophisticated engineering for their day and marked the evolution of concrete technology toward lighter, yet larger structures. Koukou'ai Bridge was the first open-spandrel arch bridge on Maui and is an excellent example of early twentieth century bridge construction in the Hawaiian Islands. Built in 1911, it spans a deep gorge just south of Haleakalā National Park. The other open-spandrel concrete arch bridge on the Hāna Coast is the Waikani Bridge, built in 1926 by the Akiona Contracting Company and designed by local architect William D'Esmond. The bridge dramatically crosses a deep gorge at the end of a long valley and is perhaps the most aesthetically pleasing bridge along the Hāna Belt Road.[17]

Concrete Deck Girder and Flat Slab Bridges

Concrete deck girder, including tee-beam spans and simple deck girder, were the most common types of bridge built along the Hāna Belt Road. Territorial and county engineers realized that these structures were both economical and strong over short spans. As a result, the government began using concrete deck bridges rather than arch or timber bridges after 1911. The majority of these bridges were built between 1911 and 1928. The 1912 Waikamoi Bridge is one of the earliest remaining examples of a concrete slab bridge in Hawai'i. Concrete slab bridges were cast on site using formwork built by local carpenters. The earlier bridges featured a solid-

[17] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 192-194.

Narrative Description (continued)

paneled reinforced-concrete parapet, with the later bridges utilizing simple vertical concrete balusters and a square concrete rail cap.[18] Three bridges date to the 1930s and two were built in 1947. The bridges constructed in 1947 utilized a post-and-beam design that is unique in the Hāna Belt Road corridor.

Culverts

Honolulu Iron Work's publication *Honiron* reported that numerous culverts along the Hāna Belt Road were necessary due to the to the demanding topography. During the 1920s, Calco Corrugated Culverts manufactured from Armco Ingot Iron were used in road construction.[19] Today, there are also culverts constructed of basalt, which are visible from the road. Many of the culverts are topped by lava rock walls on the road. Numerous culverts are not visible from the road and are covered by dense vegetation, which makes it difficult to establish an accurate count of culverts, both contributing and non contributing, along the Hāna Belt Road.

Many culverts along the Hāna Belt Road were built using concrete abutments, concrete slabs, and small concrete parapets. Example of this type of structure include: Culvert #1 between Nā'ili'ilihā'ele Bridge and 'O'opuola Bridge; Culverts #2, #3, and #4 near Ke'anae between Palauhulu Bridge and Waiokamilo Bridge; Culverts #9 and #10 located in the town of Hāna, south of Kawaipapa Bridge near the Hāna Fire Station; and Kalena Culvert north of Koukou'ai Bridge.

Four distinctive culverts (Culverts #5, #6, #7, and #8) constructed of concrete abutments, concrete slabs, and open parapets with simple vertical concrete balusters and concrete rail caps are located west of Hāna and east of Honomā'ele Bridge. These structures vary in span length from 5'-5" to 14'-7". Another distinctive culvert is located adjacent to (east of) Waiokamilo Bridge and spans the Hāna Highway at the "Y" intersection with Wailua Road. Its parapets were built to match those of the Waiokamilo Bridge. Two culverts with concrete abutments,

[18] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 195-198.

[19] "Honiron Tells Of Maui Road To Hāna," *The Maui News*, March 5, 1927.

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concrete slabs, and solid parapets are Mo'omonui Culvert and Maluhiana'iwi Culvert. The construction dates are inscribed on each of these culverts.

To most observers, many of these culverts would be regarded as bridges, even though they are considered to be culverts by the State Department of Transportation. The State of Hawai'i Department of Transportation (DOT) considers a culvert to have a span of less than 10'-0" in accordance with Federal Highway Administration guidelines. Some of these structures measured longer than 10'.

VISTAS and VIEWS

There is hardly a place along the Hāna Belt Road where motorists are not rewarded with a variety of scenic views, including the ocean, mountains, sea cliffs, waterfalls, small villages, native and exotic vegetation, and traditional landscapes.

Although it is sometimes difficult to find pullouts along the narrow road, viewpoints are scattered throughout the Hāna Belt Road corridor. At most of the bridges, motorists can park on either side to view waterfalls and valleys. The most impressive waterfalls are located at the Waikani Bridge, 'Ohe'o Bridge, and Wailua Bridge. The Kīpahulu District of Haleakalā National Park includes the picturesque 'Ohe'o Gulch; its pools are a popular swimming spot. Elements of the East Maui Irrigation Company ditchworks can be seen at numerous bridges along the road, including the Kōpili'ula Bridge. Just after the Kōpili'ula Bridge, the Hāna Belt Road runs parallel to the irrigation ditch for a short distance. Scenic views are provided at Kaumahina State Wayside near Ke'anae and Wailua Valley Lookout Park above the village of Wailua. Pua'a Ka'a State Park is directly adjacent to the road near Nāhiku. Traditional cultural landscapes of taro patches are viewed in the villages of Ke'anae and Wailua. Native vegetation along the Hāna Belt Road includes hapu'u fern, ko'a, kukui, and pandanus forests. Most of the vegetation along the road, however, is exotic, with species such as bamboo and ginger impacting the landscape. On the coastal plain near the town of Hāna are large ranching areas that were formerly used for sugar cane cultivation.

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ALTERATIONS

Maintaining the Hāna Belt Road over the years has been no easy task. Since the earliest days, highway crews have struggled to keep up with damage caused by landslides, rocks, vegetation, downed trees, and floods. A journalist driving the road in 1940 referred to it as a "paved trail following the line of the ditch through the wild jungle."[20] The road was not completely paved until 1962. Over the years, lava-rock retaining walls and guardwalls were constructed in various locations along the road. These walls complement the historic character of the Hāna Belt Road.

In 1969, the State of Hawai'i transferred jurisdiction over the portion of the Hāna Belt Road between Hāna and Kīpahulu, which is now known as the Pi'ilani Highway, to the County of Maui. The Hāna Belt Road between Huelo and Hāna remained under the jurisdiction of the State of Hawai'i. The manner in which the road is maintained and preserved is significantly different between the two government agencies.

Although the state's portion of the Hāna Belt Road (Hāna Highway) between Huelo and Hāna retains its historic character and integrity, there have been alterations along the roadway. The most noticeable change to the state section of the Hāna Belt Road is the addition of w-beam and thrie-beam steel guardrails. It is unknown when the first guardrails were installed along the Hāna Belt Road. Concrete posts from earlier guardrails are still present along the roadside in some areas. Another change over the years has been road widening. There are still many segments of the road that are close to the original 16' width (especially on the cliffs near Ke'anae) and too narrow for cars to pass each other without yielding. The road, however, has been widened in most areas. In a few places where there is a more level topography, as through villages and near the beginning of the road near Huelo, the pavement is up to 22'-0" wide. In several locations, the Department of Transportation has used the new layers of asphalt during

[20] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, IV 14.

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repaving projects to super-elevate curves, particularly in the area east of Wailua. On many bridges, added layers of asphalt have significantly shortened the height of the bridge parapets and asphalt often fills part of the openings between bridge railings. Other changes along the road include painting some bridges and lava rock walls white to increase nighttime visibility, installation of numerous cautionary signs ("one-lane bridge," "narrow road"), reflector signs, and reflectors in the pavement. There have been a few jersey barriers added to the road, usually in places where the roadbed is being undermined alongside a steep cliff.

In the mid 1990s, the road west of Ke'anae that traverses the steep mountainside on the east side of Honomanū Gulch was widened. Work included blasting and removing a large section of the mountain near the road's summit to relocate the damaged road (which was collapsing into the ocean) away from the cliff. A rock wall which does not match the character of the typical basalt parapets seen along the Hāna Belt Road was built between the mountain and the road to catch falling rocks. Concrete gutters were installed and wide shoulders were added. The state Department of Transportation has installed concrete gutters and new culverts in other locations along the road, especially in the area between Wailua and Nāhiku.

The bridges along the Hāna Belt Road retain their historic character. One notable exception is Kawaipapa Bridge. Constructed in 1947, the bridge was altered in 1991 when a new bridge was added to the to the west end of the original structure. The 1991 bridge expansion was modeled on the original bridge, with replications of the post-and-beam bridge walls. The consequence of the expanded bridge was that the original bridge lost its historic integrity and is a non-contributing structure.

The County of Maui section of the Hāna Belt Road, now called the Pi'ilani Highway, has been subjected to fewer changes than the state-maintained portion of the belt road. The county has widened the road in a few locations, but for the most part, the pavement is no widr than 18'-0" and often averages 15' to 16' wide. Some guardrails have been added, but not to the same extent as the state-maintained section of the Hāna Belt Road.

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Although the Hāna Belt Road has been improved over the years, many of the bridges along the road have suffered from a lack of maintenance. Many of the bridge walls originally averaged 34" high. The walls are now shorter due to repeated layers of asphalt. In many cases, the additional asphalt is approximately 12" deep. The majority of the bridges in the Hāna corridor have weeds and vegetation growing in the concrete joints. A few bridge walls have been damaged by accidents. Many of the damaged walls were repaired to match the original design, although in a few cases, damage was not repaired neatly or was repaired with a non-matching element. An example of repaired bridge wall is the Waikani Bridge balustrades, which were severely damaged on the west end. Rather than restoring the end of the bridge wall, the repair consisted of building a rock wall in place of the balustrades. Another example of a bridge alteration that does not match the original structure is Nua'ailua Bridge. Altered in 1940, the *mauka* (mountain side) parapet was replaced with a non-matching concrete wall, most likely as a result of road widening.

The Hāna Belt Road retains its historic character and integrity. For the most part, the road is relatively unaltered. The road's alignment has not been changed since it was completed in 1926, although sections of the road on sea cliffs have collapsed into the ocean and necessitated reconstruction. The road retains its historic character and integrity in its rural location and narrow lanes. The bridges retain historic integrity with sharp and narrow approaches, original materials, and original design. Although a majority of the bridges are quite simple in appearance, several bridges are more elaborate and were designed and built by masters. The bridge designs and materials survive intact, with a few minor exceptions.

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(Describe the historic and current condition of the property on one or more continuation sheets.)

Inventory of Contributing Bridges & Significant Culverts

Listed in geographical order east from Huelo:

Hōlua Bridge: constructed 1929; concrete tee-beam; one span, 48'-0"; total length 49'-0"; bridge width 16'-7"; approximate height above stream 28'-0".

Kailua Bridge: constructed 1929; concrete tee-beam; one span, 39'-0"; total length 40'-0"; bridge width 20'-6"; approximate height above stream 18'-0".

Nā'ili'ilihā'ele Bridge: constructed 1930; concrete tee-beam; three spans, 21'-6"; total length 64'-0"; bridge width 20'-3"; approximate height above stream 20'-6". Designer: County Engineer Office.

Culvert #1: concrete, one span, approximate length 9'-0".

'O'opuola Bridge: constructed 1925, altered 1931; concrete tee-beam; one span, 29'-0"; total length 30'-0"; bridge width 19'-8"; approximate height above stream 18'-6". Designer: County Engineer Office.

Makanali Bridge: constructed 1928; concrete slab; one span, 18'-0"; total length 18'-0"; bridge width 16'-6". Designer/builder: Department of Public Works.

Ka'aiea Bridge: constructed 1928; concrete tee-beam; one span, 20'-0"; total length 22'-0"; bridge width 16'-6"; approximate height above stream 15'-0". Designer/Builder: Department of Public Works.

Waikamoi Bridge: constructed 1912; concrete slab; two spans, 19'-0"; total length 41'-0"; bridge width 12'-9"; approximate height above stream 17'-0". Designer/Builder: Hugh Howell, Senior Engineer.

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Puohokamoa Bridge: constructed 1912; concrete tee-beam; two spans, 25'-0"; total length 56'-4"; bridge width 15'-3", approximate height above stream 13'-0".

Haipua'ena Bridge: constructed 1912; concrete slab; two spans, 16'-0"; total length 34'-6"; bridge width 12'-9"; approximate height above stream 11'-0". Designer/Builder: Hugh Howell, Senior Engineer.

Kōlea (Punala) Bridge: constructed 1911; concrete tee-beam; one span, 30'-0"; total length 34'-0"; bridge width 12'-8"; approximate height above stream 13'-0". Designer/Builder: Hugh Howell, Senior Engineer.

Honomanū Bridge: constructed 1911; concrete tee-beam; two spans, 23'-0"; total length 48'-0"; bridge width 12'-8"; approximate height above stream 15'-0". Designer/Builder: Hugh Howell, Senior Engineer.

Nua'ailua Bridge: constructed 1911/altered 1940; concrete tee-beam; one span, 22'-0"; total length 35'-0"; bridge width 24'-0"; approximate height above stream 13'-0". Designer/Builder: Joseph Matson, Senior Engineer.

Pi'ina'au Bridge: constructed 1916; concrete tee-beam; one span, 27'-0"; total length 28'-5"; bridge width 19'-0"; approximate height above stream 19'-0".

Palauhulu Bridge: constructed 1916; concrete tee-beam; one span, 30'-0"; total length 31'-0"; bridge width 19'-10"; approximate height above stream 20'-6".

Culvert #2: concrete, one span, approximate length 10'-0".

Culvert #3: concrete, one span, approximate length 15'-0".

Culvert #4: concrete, one span, approximate length 13'-0".

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Waiokamilo Bridge: constructed 1921, altered 1937; concrete tee-beam; one span, 20'-0"; total length 24'-0"; bridge width 22'-1"; approximate height above stream 11'-0". Designer: D. K. Kapohakimohewa.

Waiokamilo Culvert: concrete, one span, approximate length 10'-3".

Waikani Bridge: constructed 1926; concrete arch, open spandrel; one span, 82'-6"; total length 108'-0"; bridge width 17'-7"; approximate height above stream 32'-0". Designer: William D'Esmond. Builder: Moses Akiona.

West Wailuaiki Bridge: constructed 1926, altered 1937; concrete tee-beam; three spans, 24'-6"; total length 62'-6"; bridge width 19'-7"; approximate height above stream 15'-0". Designer: A. H. Wong.

East Wailuaiki Bridge: constructed 1926; concrete tee-beam; one span, 31'-0"; total length 34'-5"; bridge width 18'-4"; approximate height above stream 16'-0". Designer/builder: A. P. Low, County Engineer.

Kōpili'ula Bridge: constructed 1926; concrete tee-beam; two spans, 34'-2"; total length 76'-7"; bridge width 14'-4"; approximate height above stream 6'-0".

Pua'aka'a (Waiohue) Bridge: constructed 1926; concrete tee-beam; one span, 19'-6"; total length 20'-2"; bridge width 22'-0"; approximate height above stream 7'-8".

Waiohue Bridge: constructed 1926, altered 1937; concrete tee-beam; two spans, 16'-7"; total length 40'-0"; bridge width 13'-2"; approximate height above stream 10'-0".

Waiohuolua Bridge: constructed 1920, altered 1970; concrete tee-beam; one span, 15'-0"; total length 19'-0"; bridge width 12'-9"; approximate height above stream 8'-0". One bridge wall was replaced by w-beam guardrail; the original bridge wall is in the stream below.

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Bridge #2: constructed 1920; concrete tee-beam; one span, 16'-7"; total length 20'-0"; bridge width 12'-6"; approximate height above stream 8'-0".

Pa'akea Bridge: constructed 1920, altered 1937; concrete tee-beam; two spans, 16'-0"; total length 40'-0"; bridge width 12'-9"; approximate height above stream 8'-0".

Kapā'ula Bridge: constructed 1926; concrete tee-beam; two spans, 21'-0"; total length 49'-0"; bridge width 16'-0"; approximate height above stream 51'-0".

Hanawī Bridge: constructed 1926; concrete arch, solid spandrel; one span, 36'-0"; total length 61'-0"; bridge width 20'-4"; approximate height above stream 19'-0".

East Hanawī Bridge: constructed 1926; concrete tee-beam; one span, 18'-5"; total length 22'-10"; bridge width 15'-11"; approximate height above stream 15'-0".

East Hanawī Culvert: concrete, one span, approximate length 11'-8".

Makapipi Bridge: constructed 1926; concrete tee-beam; two spans, 22'-5"; total length 39'-10"; bridge width 16'-0"; approximate height above stream 12'-0".

Kūhiwa Bridge: constructed 1926; concrete arch, solid spandrel; one span, 36'-6"; total length 60'-0"; bridge width 16'-4"; approximate height above stream 35'-0". Builder: County Engineer's Office.

Kupukoi Bridge: constructed 1926; concrete tee-beam; one span, 21'-5"; total length 24'-7"; bridge width 16'-0"; approximate height above stream 15'-0".

Kahalaowaka Bridge: constructed 1926; concrete tee-beam; one span, 22'-4"; total length 24'-5"; bridge width 15'-0"; approximate height above stream 9'-0".

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Pupape-Manawaikeae Bridge: constructed 1926; concrete tee-beam; one span, 20'-8"; total length 24'-4"; bridge width 16'-2"; approximate height above stream 16'-0".

Kahawaihapapa Bridge: constructed 1922; concrete tee-beam; three spans, 17'-0"; total length 60'-0"; bridge width 16'-0"; approximate height above stream 15'-0". Builder: County Engineer's Office.

Kea'ā'iki Bridge: constructed 1921; concrete tee-beam; one span, 20'-10"; total length 22'-10"; bridge width 16'-1"; approximate height above stream 27'-0". Builder: County Engineer's Office.

West Waioni Bridge: constructed 1920; concrete tee-beam; one span, 24'-5"; total length 29'-5"; bridge width 16'-6"; approximate height above stream 15'-0".

Waioni Bridge: constructed 1920; concrete tee-beam; one span, 20'-7"; total length 24'-5"; bridge width 15'-11"; approximate height above stream 10'-0".

Lanikele Bridge: constructed 1917; concrete tee-beam; two spans, 22'-4"; total length 51'-6"; bridge width 16'-0"; approximate height above stream 13'-0".

Helele'ike'ōhā Bridge: constructed 1917; concrete tee-beam; one span, 23'-7"; total length 28'-6"; bridge width 16'-1"; approximate height above stream 12'-0".

'Ula'ino Bridge: constructed 1914; concrete tee-beam; two spans, 18'-10"; total length 39'-7"; bridge width 16'-0"; approximate height above stream 12'-0".

Mokulehua Bridge: constructed 1908; concrete tee-beam; three spans, 14'-0"; total length 48'-7"; bridge width 13'-11"; approximate height above stream 21'-0".

Oilowai Bridge: constructed 1914; concrete tee-beam; one span, 20'-7"; total length 22'-10"; bridge width 16'-2"; approximate height above stream 22'-0". Builders: Wilson & McCandless.

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

Honomā'ele Bridge: constructed 1924; concrete tee-beam; two spans, 20'-4"; total length 38'-10"; bridge width 16'-1"; approximate height above stream 14'-0". Builders: County Engineer's Office.

Culvert #5: concrete, one span, approximate length 17'-6".

Culvert #6: concrete, one span, approximate length 12'-0".

Culvert #7: concrete, one span, approximate length 5'5".

Culvert #8: concrete, one span, approximate length 13'-0".

Culvert #9: concrete, one span, approximate length 14'-7".

Culvert #10: concrete, one span, approximate length 14'-0".

Mo'omonui Culvert: constructed 1911, concrete, one span approximate length 8'-3".

Haneo'o (Kaholopo) Bridge: constructed 1900, altered 1917; concrete slab; two spans, 10'-0"; total length 22'-6"; bridge width 15'-1".

Kapi'a (Kahawaiokapia) Bridge: constructed 1915, altered 1931; concrete slab; three spans, 17'-6"; total length 58'-4"; bridge width 14'-4"; approximate height above stream 17'-0". Designer/Builder: Wilson and McCandless.

Waiohonu Bridge: constructed 1915; concrete tee-beam; five spans, 18'-6"; total length 97'-6"; bridge width 15'-0"; approximate height above stream 14'-0". Designer/Builder: Wilson and McCandless.

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

Papa'ahawahawa Bridge: constructed 1913; concrete tee-beam and concrete slab; two spans, 22'-0"; total length 40'-4"; bridge width 14'-5"; approximate height above stream 9'-0". Designer/Builder: County Engineer's Office.

Ala'ala'ula Bridge: constructed 1915; concrete slab; one span, 30'-0"; total length 54'-0"; bridge width 12'-6"; approximate height above stream 22'-0".

Waikakoi Bridge: constructed 1911; concrete slab; two spans, 14'-0"; total length 33'-6"; bridge width 15'-4"; approximate height above stream 18'-0".

Pa'ihi Bridge: constructed 1911; concrete slab; one span, 36'-6"; total length 42'-4"; bridge width 13'-9"; approximate height above stream 10'-0".

Wailua Bridge: constructed 1947; concrete tee-beam; one span, 60'-0"; total length 66'-1"; bridge width 14'-0"; approximate height above stream 17'-0".

South Wailua (Honolewa) Bridge: constructed 1911; concrete slab; two spans, 25'-0"; total length 57'-0"; bridge width 15'-2"; approximate height above stream 26'-0".

Pu'uhoao Bridge: constructed 1910; concrete tee-beam; one span, 20'-0"; total length 23'-2"; bridge width 12'-9"; approximate height above stream 13'-0".

Waiele (Paehala) Bridge: constructed 1910; masonry arch; one span, 20'-0"; total length 25'-0"; bridge width 12'-6"; approximate height above stream 7'-0".

Kakiweka (Mahalawa) Bridge: constructed 1910; concrete slab; one span, 28'-6"; total length 30'-10"; bridge width 13'-10"; approximate height above stream 16'-0".

Hāhālawe Bridge: constructed 1910; masonry arch; one span, 22'-0"; total length 25'-0"; bridge width 14'-9"; approximate height above stream 10'-0".

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Description (continued)

Maluhiana'iwi Culvert: constructed 1910; concrete, one span, approximately 13'-9".

Pua'alu'u Bridge: constructed 1910; concrete slab; two spans, 15'-0"; total length 32'-10"; bridge width 14'-5"; approximate height above stream 10'-0".

'Ohe'o Bridge: constructed 1916; concrete arch, solid spandrel; one span, 58'-0"; total length 77'-0"; bridge width 14'-5"; approximate height above stream 44'-0".

Kalena Culvert: concrete, one span, approximate length 13'-5".

Koukou'ai (Kaukau'ai) Bridge: constructed 1911; concrete arch, open spandrel; one span, 31'-10"; total length 58'-0"; bridge width 15'-2"; approximate height above stream 34'-0".[21]

[21] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, prepared for the State of Hawai'i, Department of Transportation, Highways Division. Draft. (Honolulu), 1996, VI 196-198. All bridge widths and culvert span lengths were measured by Dawn Duensing as part of field work in December 2000.

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Section 8 Page 1

Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

The Hāna Belt Road achieves state and local significance in the areas of engineering, transportation, commerce, and social history under criteria A and C. The construction of bridges and a road to Hāna between 1900 and 1947 was a major engineering achievement, as the County of Maui and private contractors benched a road into precipitous mountainsides and through the wilderness of East Maui. Fifty-nine of the bridges built between 1908 and 1947 remain along the route as an example of bridge engineering and construction in Hawai'i during the early twentieth century. The completion of an automobile route to Hāna in 1926 ended that community's isolation from the rest of Maui. The road opened East Maui to settlement, agricultural enterprises, and tourism. The Hāna Belt Road is the best remaining intact example of the old belt road system in Hawai'i. The Hāna Belt Road retains historic integrity in its original road alignment, narrow lanes, bridges, and spectacular setting along Maui's northeast coast.

Engineering

A 1905 Superintendent of Public Works report noted that road construction in the Hāna District was through "very rough country."[22] The plan for a belt road around East Maui was popular with Maui officials and businessmen, but took decades to complete due to high costs and construction difficulties. Building the Hāna Belt Road was an expensive and difficult proposition due to the challenging topography. Miles of road were blasted out of the mountainsides and numerous bridges were required to carry the road across streams and gulches. Construction was complicated by heavy vegetation, torrential rains, and landslides.

The majority of bridges in the Hāna District were built using construction methods and materials typical in Hawai'i during the early twentieth century. Most of the Hāna District bridges (eighty percent) were constructed prior to 1930. County and territorial engineers utilized common structural systems, including concrete arch, flat slab, girder, and simple tee-beam spans. The majority of bridges along the Hāna Belt Road were simple but functional, constructed with tee-beam spans and simple deck girders. The 1912 Waikamoi Bridge is one of

[22] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, IV 12.

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Statement of Significance (continued)

the earliest remaining examples of a concrete slab bridge in Hawai'i. Reinforced concrete was the most prevalent construction material due to the corrosive nature of the Pacific Ocean's salt air and the presence of wood-boring insects that made the use of steel and timber bridges less practical in Hawai'i than in the mainland United States. The Loan Fund Commission, established in 1911 to oversee belt road projects, decided that concrete would be used on Hawai'i's bridges rather than steel. The Commission observed that the concrete was more expensive in the beginning, but realized that the increased cost was justified due to concrete's durability as well as lower maintenance and repair costs. The use of reinforced concrete was an indication of the commitment of the Territory of Hawai'i and Maui County governments to building permanent public works improvements.[23]

Five concrete arch bridges on the Hāna Belt Road remain as excellent examples of early twentieth century bridge construction in the Hawaiian Islands. These bridges used the most modern engineering technology of their day. Today, the bridges make a significant statement regarding Maui's civic pride during the early twentieth century. The open-spandrel concrete arch bridges demonstrated sophisticated engineering and marked the evolution of concrete technology toward lighter yet larger structures. These bridges were constructed for their strength and permanence, although only a few remain in Hawai'i. Koukou'ai Bridge near Kīpahulu was the first open-spandrel arch bridge on Maui and one of the earliest to be built in Hawai'i. The 'Ohe'o Bridge, a solid spandrel concrete arch, spans the scenic 'Ohe'o Gulch in Haleakalā National Park and was declared eligible for the National Register of Historic Places in 1977 as part of the Kīpahulu Historic District (50-17-299). The open-spandrel Waikani Bridge was designed by Maui architect William D'Esmond and built by a well-known contractor, Moses Akiona.[24] D'Esmond designed Maui's County Office Building, built in 1927;

[23] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 191, 195; V 10-12.

[24] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 192-194.

Narrative Statement of Significance (continued)

Pā'ia School, 1926; St. Anthony's School, 1925; and numerous residences on Maui.[25]

Two unique bridges on the Hāna Belt Road are rare surviving examples of masonry arch construction with basalt, Hāhālawe Bridge and Wai'ele Bridge. Fewer than ten masonry arch bridges remain in the state of Hawai'i. Constructed in 1910, both bridges utilized cut basalt blocks for the abutments and arch rings. Basalt arch construction was common in Hawai'i prior to 1898. The bridge walls and rock abutments may date to different construction periods, with the concrete parapets being from a later date. The bridges retain their historic integrity, with each featuring fine craftsmanship and uncommon materials.[26]

The bridges along the Hāna Belt Road present a visual record and timeline of bridge construction technology and innovation on Maui and in Hawai'i. Many bridges are unique due to the use of vernacular materials (basalt). In addition to the masonry arch bridges, a number of bridges used basalt for the construction of abutments, piers and wingwalls. The majority of bridges, however, were built with the latest in construction technology, reinforced concrete. The bridges were built during a period when formal engineering expertise in bridge building was first introduced in Hawai'i and are good examples of the Territory of Hawai'i's progressive highway system. Each county in the territory had a County Engineer's Office, within which was a bridge design office. Many of the bridges on the Belt Road were designed by the County Engineer's Office and the engineers proved themselves to be not only technologically skilled, but also sensitive to aesthetics. In many cases, the bridges also demonstrate the work of skilled builders. The masonry arch and concrete arch bridges show a high degree of detailing and workmanship. Together, the bridges played a integral role in the development of belt roads on

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[25] *The Maui News*, December 4, 1926, section 8; "Drawings and Floor Plans of Proposed St. Anthony School Building," *The Maui News*, March 28, 1925; Dawn E. Duensing, *Historic Architectural Survey of Wailuku, Maui, Hawai'i*, prepared for the County of Maui Department of Planning, 1993, 20.

[26] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 192.

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Statement of Significance (continued)

Maui as well as on other Hawaiian Islands. Today, the Hāna Belt Road bridges remain as the highest concentration of unaltered and stylistically consistent historic bridges in Hawai'i.[27]

Talented local engineers were responsible for the design and construction of the Hāna Belt Road. A substantial portion of the road and bridge design as well as the majority of engineering work was completed by County Engineer's Office. Hugh Howell, who was appointed Maui County engineer in 1906 and again in 1914, had served as an engineer with the Loan Fund Commission and participated in the early survey work for the Hāna Belt Road. He also designed several bridges on the Hāna Belt Road while serving as a county engineer. The Hugh Howell Engineering Company worked on Hāna Belt Road contracts once construction began. Paul Low was Maui County Engineer from 1918 until 1928 and was responsible for supervising the two major phases of Hāna Belt Road construction between 1923 and 1926. He and his county crews used Howell's earlier survey work as the basis for their road design and built the most spectacular sections of road between Kailua and Nahikū. During his tenure as county engineer, Low also supervised a number of Maui's other public works projects, including the County Office Building in 1924. A. H. Wong, who designed the West Wailuaiki Bridge, was appointed county engineer in 1928 to replace Low. After his service with the county, he worked on the construction of Haleakalā Highway and became an engineering supervisor with the Works Progress Administration project building Maui Airport.[28]

Notable local contractors built portions of the Hāna Belt Road and several bridges. The Honolulu firm Wilson and McCandless built the 1914 section of road near Nahikū and Oilowai Bridge. Another important local builder, Moses Akiona, was born in Ke'anae and established his contracting firm, Moses Akiona, Ltd., in 1920. In addition to Waikani bridge, Akiona's firm worked on other Maui projects, including Malulani Hospital, Kula Sanitarium, and the Lahaina

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[27] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, IV 7-9.
[28] Howell noted in *The Maui News*, January 10, 1914; January 9, 1915; and February 4, 1916. Low noted in *The Maui News*, February 15, 1918; October 3, 1928; in Duensing, *Historic Architectural Survey*, 35. Wong noted in *The Maui News*, October 17, 1928.

Narrative Statement of Significance (continued)

Courthouse. His business eventually grew to become one of the largest contracting firms in the territory. In the 1960s, Akiona and his sons built a section of the H-1 freeway on O'ahu.[29]

Transportation & Commerce

Belt road projects are a significant element in the transportation history of Maui. This road-building program was concurrent with the strategy of all the major Hawaiian Islands to develop belt road systems. By 1900, Mauians were concentrating on the Hāna section of the belt road, calling for a good wagon road to connect central Maui and Hāna. "What the Central Pacific was to California, and what the Panama Canal would be to the Islands," *The Maui News* emphasized in 1903, was "relatively what a good road all the way from Pā'ia to Hāna would mean to Maui." A road to Hāna was believed necessary for the economic development of East Maui and its success in sugar, minor industries, and small-scale farming.[30] Prior to the completion of a road from central Maui to Hāna, travel to East Maui villages was by steamship or an unpaved wagon and horse trail. The route along the Hāna Coast was often impassable due to heavy rain. Various sections of the coastal road were built by 1914, but the lack of a continuous road to Hāna was considered a nuisance. One Maui legislator complained that Maui was "the only island on which you cannot traverse by road around it."[31]

The improved transportation provided by the Hāna Belt Road was considered essential for Maui's commercial development. *Maui News* editorials noted that East Maui had plenty of fertile land and emphasized that a road to Hāna would open the area to settlement. Mauians predicted that a road through East Maui to Hāna would make homestead lands available and would also facilitate trade between East Maui and the rest of the island. Benefits to be obtained from improved transportation to Hāna included increased tax revenues, population, and

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[29] Spencer Mason Architects, *State of Hawai'i Historic Bridge Inventory and Evaluation*, VI 191, V 14.

[30] *The Maui News*, editorial, April 25, 1903.

[31] "Roads First Need View of Fassoth," *The Maui News*, February 11, 1921.

production. Roads connecting the various parts of the island, including Hāna, were viewed as essential to Maui as arteries were to the human body. Some Mauians believed that the Hāna Belt Road project was the most needed road in the territory and noted that Maui was ten years behind the other islands in its belt road construction.[32]

The opening of the Hāna Belt Road in 1926 was a major transportation milestone for Maui. *The Maui News* labeled it "the greatest road making achievement in the Island, one fraught with tremendous difficulties in engineering and construction work." The new road eliminated Hāna's reliance on the weekly steamer for its transportation and communication needs to the outside world. With the new road, the trip to Hāna could now be made overland on one's own timetable rather than by the schedule of a steamer or horse trip. Instead of a round-trip journey of a week, the trip was shortened to 3.5 hours each way.[33]

Another significant commercial aspect of the Hāna Belt Road was tourism. By the 1920s, Maui's businessmen and civic leaders recognized the importance of scenic roads and considered them to be commercial enterprises, without which Maui could not develop its tourism industry. As early as 1912, the Hāna Belt Road, as well as a proposed route to the summit of Haleakalā, were planned as the centerpieces of Maui's road-building projects. Mauians realized that building a road to Hāna would open up some of the finest scenery in the Hawaiian Islands and put Maui "on the tourist map." One civic group claimed that a magnificent scenic highway could be one of Maui's greatest assets. Local businessmen argued that tourism would not thrive on Maui unless the island had good roads to accommodate its visitors. One Mauian claimed that the mere mention of the term "horseback ride" scared tourists from visiting Maui. A businessman pointed out that tourists expected to travel comfortably by automobile and were not always willing to climb into the saddle to go sightseeing. Mauians realized that more tourists visited

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[32] *The Maui News*, editorials, June 28, 1902; November 15, 1902; December 27, 1902; March 7, 1903; July 4, 1903; "Advocates Belt Road: Maui is Ten Years Behind in Road Matters," *The Maui News*, November 6, 1909.

[33] "Linking Up Maui," *The Maui News*, editorial, December 18, 1926; "Maui Takes Day Off for Road Opening," *The Maui News*, December 22, 1926.

the Big Island of Hawai'i because that island's attractions, especially Kilauea Volcano, were accessible by automobile, while Maui's attractions remained almost inaccessible. The Hāna Belt Road was a significant piece of a road-building program that aimed to make Maui's scenic attractions easily available. Maui's plans to develop a tourist industry received a tremendous boost with the completion of the Hāna Belt Road in 1926 and the Haleakalā Highway in 1935.[34] These two roads were Maui's crowning achievements in transportation public works projects during the twentieth century. Both highways were important commercial enterprises and remain the island's most popular scenic drives today. The Hāna Belt Road has become an attraction in itself, with tourists driving the route to experience the narrow road and its historic bridges, not just the scenery. Motorists appreciate this unique route that is relatively unchanged from the 1920s and provides an opportunity to visit a rural area that is uniquely Hawaiian.

Social History

The immediate impact of opening the Hāna Belt Road was to end East Maui's centuries of isolation from the rest of Maui. Prior to the belt road's construction, many on Maui maintained that Hāna might as well be on another island.[35] Indeed, in ancient times, Hāna was more connected to communities on the island of Hawai'i that were more easily accessible by canoe. Until the Hāna Belt Road was completed, many Mauians had never seen the 'other side' of Maui, whether they lived in West Maui or East Maui.

The completion of the Hāna Belt Road is a testament to civic pride on Maui during the early twentieth century. The County Act in 1905 authorized the establishment of local governments

[34] "No Ke'anae Highway Says Governor," *The Maui News*, July 18, 1914; "The Key to Progress," *The Maui News*, May 16, 1914; "Road to Ke'anae Now Maui's Best Bet To Draw Tourist Travel, *The Maui News*, October 7, 1925; Connect Maui Up," *The Maui News*, February 11, 1921; Duensing, Dawn E., *Haleakalā Highway, HAER No. HI-52.* [Washington D.C.], National Park Service, Historic American Engineering Record, 1999.

[35] "New Comer Doesn't Like Our Road Policy," *The Maui News*, August 14, 1915; "Connect Maui Up," *The Maui News*, February 11, 1921.

Narrative Statement of Significance (continued)

on Hawai'i's four major islands. On Maui, numerous public works projects during the next thirty years demonstrated residents' keen sense of civic awareness. Substantial public buildings were constructed in the county seat of Wailuku, including the Wailuku Courthouse (built in 1907), County Office Building (1924), Wailuku Library (1928), and Territorial Building (1931). In the Lahaina District, the courthouse was renovated and the Pali Highway was improved in 1925. Prominent schools were built, including the Wailuku Public School in 1905 and Maui High School in 1921, both designed by well-known architect C. W. Dickey. Many of the structures built during this intense period of civil works projects were designed by prominent architects, including Dickey, H. L. Kerr, and William D'Esmond.[36]

The Hāna Belt Road was part of this great, early twentieth century public works movement. First suggested in 1895, the Maui Board of Supervisors sought funding for the road as early as 1900. Although numerous bridges were constructed on the Hāna Belt Road starting in 1908, little money was available for road construction or improvement. Mauians lobbied Hawai'i's governors and legislators for decades before receiving funding to build the dream of an automobile road to Hāna. A 1923 estimate of $692,000 to complete the road was a substantial undertaking for an island with limited resources and a population of approximately 38,000, most of whom were agricultural laborers. Maui's leaders found ways to finance the Hāna Belt Road through the sale of territorial bonds and the savings gained from the use of public employees and prison labor rather than private contractors. In early 1923, the county government demonstrated its determination to go ahead with the project by purchasing a steam shovel and drill and assigning a gang of twenty men to begin work on the new road, even though the territorial legislature had not yet approved the sale of bonds for the project. The county established a prison camp in Kailua to house the fifty convicts expected to work on the road. Within months, leaders purchased another steam shovel and drill so that work could proceed from both ends of the road. Funding eventually was secured from the territorial and federal governments.[37]

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[36] Duensing, *Historic Architectural Survey*, 5-12, 19-20.

[37] "Belt Road Plans Further Advanced," *The Maui News*, February 10, 1923; "Belt Road Funds Knotty Problem Chamber Finds," *The Maui News*, March 9, 1923; "Belt Road Work Will Be

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Name of property Hāna Belt Road
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Narrative Statement of Significance (continued)

A number of bridges on the Hāna Belt Road were significant civic statements for Maui. Altogether, the concrete bridges along the road demonstrated the county's commitment to permanent and modern improvements. Several bridges were visually prominent both in style and location, and also demonstrated fine workmanship. Bridges such as Waikani, Koukou'ai, and 'Ohe'o indicated both the technical and aesthetic sophistication of the community in which they were built. Many of the bridges are examples of exceptional work by important local builders, including Johnny Wilson of Honolulu (in partnership with McCandless) and Moses Akiona. Waikani Bridge is one of the most aesthetically pleasing bridges along the road and was a collaboration of Akiona and D'Esmond. Many other bridges were not quite so grand, but also made pleasing visual statements, including Hanawī Bridge, Kūhiwa Bridge, Waiokamilo Bridge, and Pu'uhaoa Bridge.

The extent of economic development predicted by *Maui News* writers never happened, although many homes and small farms were built along the Hāna Belt Road corridor over the years as land became available and accessible. Census statistics indicate that the Hāna District was home to 3,100 residents in 1920 before the road opened. In 1930, population in the district declined to 2,436. Agriculture remained the dominant activity, with the communities of Ke'anae and Wailua noted for their production of *taro* and rice. Despite the improvements in transportation and the possibilities for more development, the Hāna District's population dwindled to 1,495 by 1950.[38]

The lack of road improvements over the past seventy years has not only preserved the historic character of the Hāna Belt Road, but has also helped to maintain the historic rural character of the Hāna District itself. The absence of an easily-traveled, high-speed traffic artery has served to impede substantial development, which has subsequently allowed Hāna and other communities in East Maui to remain rural. There are no fast food chains, chain stores, strip malls or

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Started By Maui County," *The Maui News*, March 10, 1923; "Belt Road Project Is To Go Forward At Once," *The Maui News*, May 26, 1923, Robert C. Schmitt, *Historical Statistics of Hawai'i*, Honolulu: The University Press of Hawai'i, 1977, 13.

[38] Robert C. Schmitt, *Historical Statistics of Hawai'i*, 13-14.

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

Narrative Statement of Significance (continued)

sprawling subdivisions along the Hāna Belt Road. Travelers along the Hāna Coast are served by the occasional roadside stand and must drive all the way to Hāna for conveniences such as groceries, gas, and restaurants. With a sizable population of residents of Hawaiian ancestry, Hāna is often cited as Maui's "most Hawaiian community." The Hāna community has worked together to "Keep Hāna Hawaiian," as a bumper sticker urges, and preserve its rural lifestyle and values. In the 1990s, residents rallied against the approval of major developments such as a golf course and an adjacent residential community. Many Hāna residents believe that the narrow, winding, and slow Hāna Belt Road is a means to "Keep Hāna Hawaiian."

Today, a trip along the Hāna Belt Road allows a motorist to see much of what would have been viewed in 1926 when the road opened: a spectacular thoroughfare chiseled out of cliffs, passing through huge gullies and past waterfalls, while always presenting stunning views of the Pacific Ocean and East Maui's natural features. Ke'anae still practices traditional ways, with *taro* being farmed and a Hawaiian lifestyle. A three-room rural school is still in operation in Ke'anae. The section of road above the Wailua Valley, which was admired by Engineer Paul Low, still travels along a narrow ledge for a mile, providing a panoramic view of *taro* patches in the quaint village of Wailua below. Along the way motorists view the historic irrigation ditches, weirs, and intakes still used for Maui's sugar industry. The journey to Hāna provides an opportunity to experience a rural way of life that is uniquely Hawaiian and also a way of life that is becoming more rare in the Hawaiian Islands.

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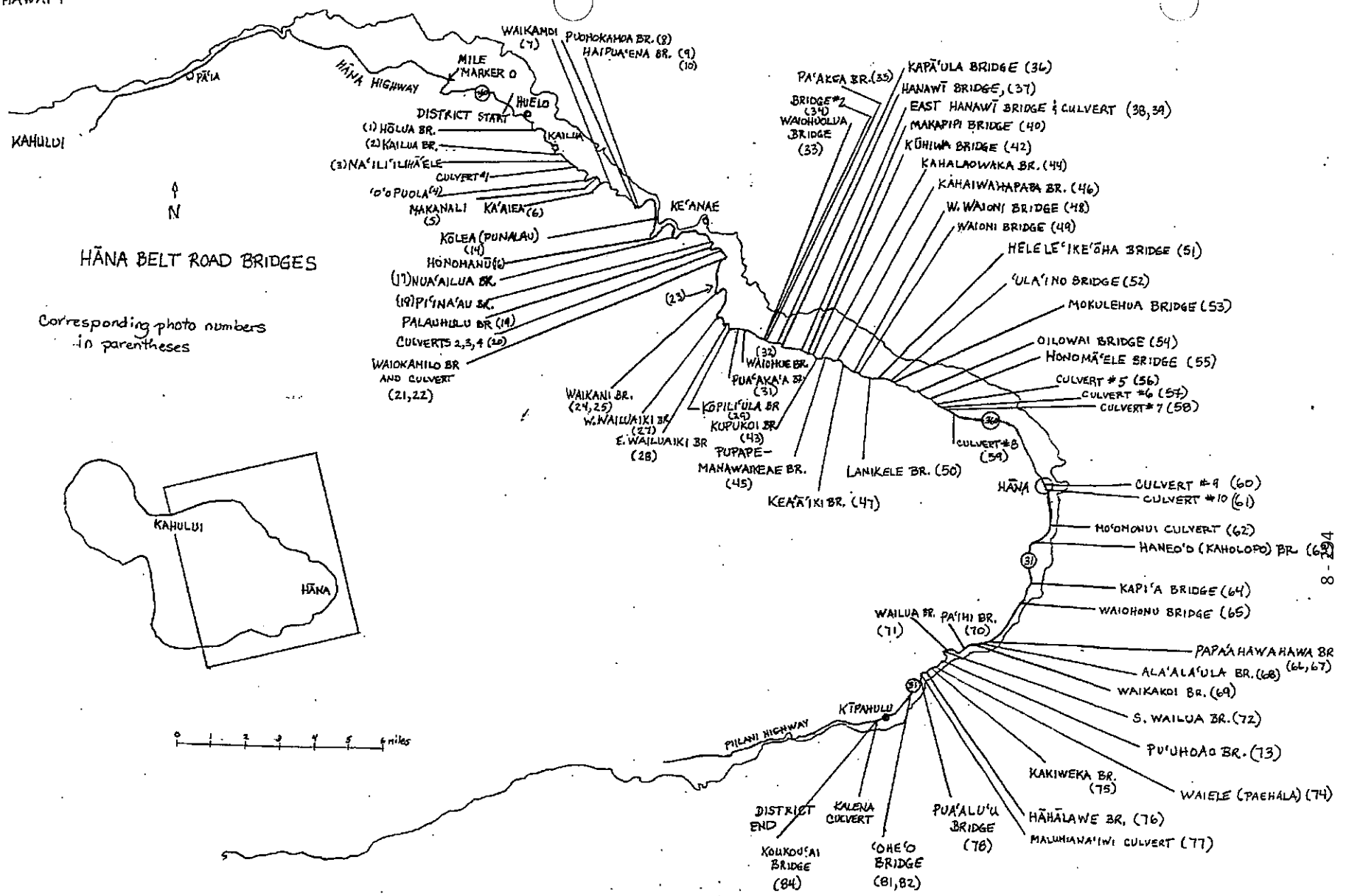
The Maui News, 1900-1950.

MAUI COU HAWAI'I



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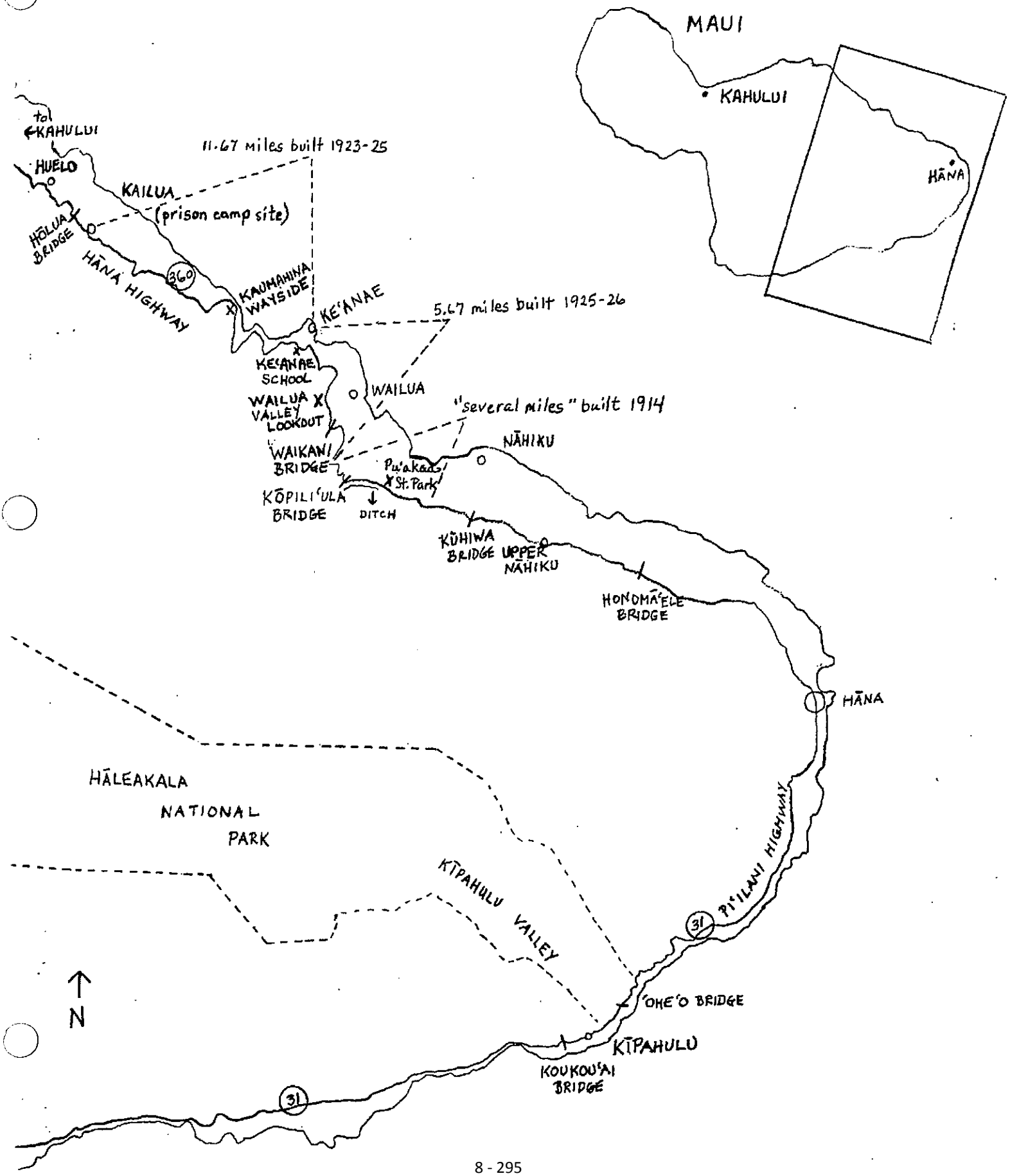
Hāna Belt Road
Maui County, Hawai'i



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SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 01000615 **Date Listed: 06/15/01**

Property Name: Hana Belt Road **County: Maui** **State: HI**

Multiple Name: N/A

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Sarah D Pope 6/15/01

(hx) **Signature of the Keeper** **Date of Action**

Amended Items in Nomination:
The following amendments are hereby made to the documentation and confirmed with the HI SHPO:

Section 5. Classification
The road itself, not just the bridges and culverts, should be counted as a contributing structure. Therefore, the total number of contributing structures is changed to 74. The one (1) non-contributing structure remains the same.

Section 10. Geographical Data
The acreage of the property was not provided. The correct acreage of the district is 153 acres.

DISTRIBUTION:National Register property file;Nominating Authority

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Name of property Hāna Belt Road
County and State Maui County, Hawai'i

All photographs, with the exception of photograph #84 (Koukou'ai Bridge), were taken by Dawn E. Duensing. Dawn E. Duensing has all negatives except for that for #84, which is located at the State of Hawai'i Department of Transportation.

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2. Maui County, Hawai'i
3. Dawn E. Duensing
4. November 19, 2000
5. Dawn E. Duensing
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3. August Riccio, Hawai'i Heritage Center
4. 1990
5. State of Hawai'i Department of Transportation
6. Koukou'ai (Kaukau'ai) Bridge, looking *mauka*
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HAWAII NOMINATION FORMS

STEEL TRESTLE BRIDGES ON THE HAMAKUA COAST

NĀNUE STREAM BRIDGE

UMAUMA STREAM BRIDGE

KAPUʻE STREAM BRIDGE

PĀHEʻEHEʻE STREAM BRIDGE

KOLEKOLE STREAM BRIDGE

HAKALAU STREAM BRIDGE

NPS Form 10-900-b (Rev. 01/2009) OMB No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting property groups relating to one or several historic contexts. See instructions in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items

x New Submission _____ Amended Submission

A. Name of Multiple Property Listing

Steel Trestle Bridges on the Hamakua Coast

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronoligical period for each.)
The Plantation Era of Hamakua Coast on the Island of Hawaii, 1899-1990
The Hilo Railroad (later called the Hawai'i Consolidated Railway), 1909-1946

C. Form Prepared by

name/title Spencer Leineweber, FAIA Professor

organization Heritage Center, University of Hawai'i at Manoa date August 15, 2009

street & number 2410 Campus Road telephone (808) 956-4704

city or town Honolulu state HI zip code 96822

e-mail aspencer@hawaii.edu

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.
(_____ See continuation sheet for additional comments.)

Signature and title of certifying official | Date

State or Federal Agency or Tribal government

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Signature of the Keeper Date of Action

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Fill in page numbers for each section in the space below.

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A. Geographical Considerations in Bridge Building

Statewide Overview: The islands of Hawai'i are the tops of volcanoes, which first erupted from the bottom of the ocean millions of years ago. The landmass that makes up the Hawaiian Islands is comprised almost entirely of basaltic rock and coral reef. Erosion, resulting from the islands' significant rainfall and the constant action of the sea, has carved deep valleys and great *pali* [mountains], thousands of feet high in some places. This mountainous terrain drops steeply to the sea in some areas or meets plains sloping gradually to the shore. The steep mountains, deep valleys and circuitous coastline of the islands have demanded many dramatic bridge construction projects.

Hawai'i Island Overview: Hawai'i Island contains by far the greatest concentration of historic bridges, due to its rural nature and consequent lack of development, as well as an abundance of land for new transportation routes without the destruction of older bridges and roads. Most of the Hawai'i Island's bridges are located along the Hāmākua Coast, north of Hilo, due to the abundant rainfall and consequent streams and gulches. This region is Hawaii's wettest coastal district, starting at 'Upolu Point, the northern tip of the island, and running through Hāmākua and into the Hilo District. From Niuli'i in North Kohala, the coast is a series of deep canyons with rivers flowing down the Kohala Mountains or Mauna Kea. Bridges near the coast span long distances as the erosion is wider and deeper near the sea. This area has the greatest concentration of bridges island wide with fifty-one bridges in 42.5 miles, or more than one bridge per mile.

B. Historical Context Statement for Bridges Statewide

Monarchy and Independent Republic Period: Road and bridge-building in Hawai'i developed in conjunction with an increased need to travel across the land rather than across the sea in the early nineteenth century. Examination of the archival materials and government documents of the Hawaiian Kingdom reveals very limited information concerning bridge building.[1] Considering the dramatic social and political upheavals of Hawaiian history, it is not surprising that few early records about bridge building were retained. After the overthrow of the Hawaiian monarchy in 1893, Hawai'i became an Independent Republic and later an American territory in 1898.

Several bridges remain from this transitional period, including masonry arches built by the Republic of Hawai'i – such as the Māmalahoa-Kalalau, Māmalahoa-Kaumō'ali'i, and Māmalahoa-Laupāhoehoe Bridges on the Island of Hawai'i. The majority of the remaining historic bridges in Hawai'i were constructed by the county and territorial governments.

Bridge Construction During the Early Territorial Period (1900-1924): The Organic Act of 1900 created the Office of the Superintendent of Public Works (SPW) with the responsibility for expending territorial funds on road and bridgework. Five years later, the Territorial Legislature established the county governments on each islar granting them taxing and spending powers in their jurisdictions. Although the counties were granted independe taxing powers, they relied on legislative appropriations to supplement county funds for internal road and bridge improvements. The history of county road-building was closely tied to Territorial and Federal government funding and largesse.[2] Throughout much of the early twentieth century, the county road and bridge-building could not keep up with the economic development and infrastructure needs. In some cases, government funds were so scarce that public roads were maintained by private business so as not to limit expansion and productivity.

In response to a chronic shortage of funds for road construction, the 1911 Legislature recommended the issuance of territorial bonds for Belt Road construction. The purpose of Belt Road construction was to link the communities often in a single road around the island. A Loan Commission, consisting of the SPW, the county Chairman of the Board of Supervisors, and three county residents, was appointed to oversee the fund expenditures.[3] As horses and carriages gave way to automobiles, trucks, and buses, wider and more durable roads were needed to service these vehicles. Originally, bridges were just wide enough to let one horse and buggy cross at a time and no sidewalks were provided for pedestrians, even in urban areas. A Hilo newspaper writer pointed out: "strictly speaking, a pedestrian has no rights which any one is bound to respect."[4] Privately built bridges on plantation roads were often as narrow as eight or nine feet, while those on public roads averaged fourteen or sixteen feet through the first decade of the century. The Loan Fund Commission established eighteen feet as its required road width in 1911, although sixteen feet still was used in rural areas. These road widths prevailed until the 1920s when the recommended width became twenty feet. Sidewalks were generally not added until much later in the 1930s, first on one side, then on both sides by the end of the decade.

During this same period, the Hawaiian Islands witnessed rapid economic growth. The population of the islands more than doubled between 1900 and 1940, primarily due to the importation of laborers for the sugar and pineapple

1 Bethany Thompson,1983, III-4.

2 Hawai'i Heritage Center, 5

3 Alvarez (1987a), 59.

4 Ibid, 63.

industries. This increased the demand for housing, schools, utilities and physical infrastructure. The construction of the Panama Canal in 1915 coincided with these changing social conditions in Hawai'i. Honolulu was eager for the expected economic growth through shipping, trade, and tourism. These prospects mobilized community leaders to increase promotion for Hawai'i, to improve transportation, and to further identify Hawaii as having American cities.[5] Architecture and public works projects, such as road and sewer systems, became civic statements; this strengthened the identification of Hawai'i with the U.S. mainland.

Each county had its own bridge design department located within the County Engineer's Office. Many of the bridge engineers understood the specific construction issues of their islands and built bridges with sophisticated technical expertise and high aesthetic sensitivity. Records for length and sophistication of design were continuously changing; accolades such as "the longest" and "the first" were used repeatedly over the decades to describe the latest achievements.[6]

The bridges constructed with Territorial Loan Funds are among the early examples of the progressive Territorial Highway system in Hawai'i. These bridges are also an example of one of the first uses of formal engineering expertise in bridge making by the new territorial government after the annexation of Hawai'i by the United States. The bridges played a major role in the development of each county's Belt Road plan which connected previously isolated communities with a paved highway and a series of steel-reinforced concrete, timber, or steel bridges.[7] The construction of improved modern vehicular roads, especially the up-to-date replacement of older, weak timber bridges by steel truss and reinforced concrete spans, remedied unsatisfactory road and transportation conditions, improved communications, and helped stimulate the economic and social growth of relatively isolated communities.

The Federal Aid Program (1925-1941): The Federal Aid Highway Systems in Hawai'i consist of three types: the Interstate and Defense Highways; the Federal Aid Primary System; and the Federal Aid Secondary System. The history of bridges in Hawai'i's development as funded by the federal government parallels that of the continental United States, albeit with some construction lag. There was a similar evolution of bridge construction types with the United States due to similar advancements in construction technologies.

Beginning in 1916, in anticipation of its entry into World War I, the U.S. Congress appropriated funds to assist States in developing their transportation networks.[8] Federal Aid funded roads were intended to upgrade existing highways by providing good drainage, clearly marked lanes, improved alignment, grades that could be negotiated in high gear, wide shoulders, safe and wide bridges, and safe bridge approaches. Belt roads, which circled the island, or roads that linked a seaport to federal property (such as military bases or national parks) were usually selected for Federal Aid in Hawai'i.[9] Maintenance of federal roads was to be done by the States from their own funds. Hawai'i was initially excluded from the Federal Aid system although its citizens paid federal taxes. The Hawaiian Legislature passed a Bill of Rights in 1923, demanding equal benefits with the nation's States. President Calvin Coolidge signed

5 Daina Penkiunas, American Regional Architecture in Hawai'i: Honolulu, 1915-1935, (Doctoral dissertation, University of Virginia, 1990), abstract.

6 Ibid.

7 Barnes Riznik, "Theme: The Hanalei Bridge," Hanalei Valley: Protecting a Cultural Landscape (Unpublished paper, 1985), 1

8 Ibid, 67.

9 Ibid.

the Bill into law in March 1924.

Hawai'i received its first federal funds in 1925 and created the Territorial Highway Department (THD) to oversee the expenditure of the funds as required by the Federal Road Aid Act. The THD prepared the designs for new bridges on designated Federal Aid primary roads. Also in 1925, Congress voted to give Hawai'i the federal highway funds it had not received since 1917. By the mid-1930s, yearly federal contributions rose to the million-dollar mark with the passage of the New Deal road aid measures such as the National Industrial Recovery Act, the Emergency Relief Appropriations Act and Aid for Secondary Road systems.[10] By 1940, approximately sixty-five percent of Hawaii's roads had been built with federal funds.[11]

Bridges were a special concern of the federal highway system, and the Territorial Highway Department began a systematic replacement of narrow and hazardous bridges. With ample funds, the Department began to straighten out the Belt roads and build long, high bridges across the mouths of the valleys. The federal government started funding secondary or feeder roads in the late 1930s. Secondary roads outside of municipalities, connected the Federal Aid primary system with rural communities. Reinforced-concrete tee-beam bridges dominate this period. Rail design wa standardized into a few patterns, such as the "Greek-cross void", enabling an easy recognition of THD bridges

Bridge Construction during World War II and the Post-war Period and the National Defense Highway System (1941-1959): After the outbreak of World War II in December 1941, the military constructed many miles of roads in Hawai'i.[12] However, as a Territory of the United States, Hawai'i was not entitled to the same level of federal funding given to other continental States for highway building projects, based on the 1944 Interstate Highway System Act. In 1941, the War Department designated all O'ahu's principal highways as part of a "strategic network of highways." The term "strategic network of highways" implied the route had military importance.[13] Civilian construction virtually halted as manpower and equipment was requisitioned by the military. Highway and bridge construction was restricted to only those projects that materially aided the National Defense System. The military establishment quickly became the largest employer of civilian workers in the Territory.[14]

After World War II, Hawaiian delegates used the Department of Defense's designation of "strategic" to argue that Hawaii's military bases and highway networks were key to National defense. An increased use of motor vehicles and the islands' tourism industry collectively provided pressure to meet growing transportation needs. In 1956, Territorial Highway Engineer Ben E. Nutter provided a "Progress Report on Highways," to the Legislature that detailed highway deficiencies in excess of 50 million dollars - or more than ten times the annual construction budget.[15] The report indicated that the 1954 Hawai'i Federal Aid Highway System was still about 10 years behind in providing modern highways of adequate design and capacity.[16] In the post-war era a sophisticated survey of the island's roads was completed by the Territorial Highway Department. This survey rated roads and bridges on a

10 Ibid, 70.

11 Ibid.

12 Ibid, 76.

13 Balch, D. F. Comparative Report: Nu'uanu Valley Tunnel Route vs. Kalihi Valley Tunnel Rounte. (April 5, 1943), 1

14 James H. Shoemaker. Bank of Hawai'i Dept. of Business Research: Hawai'i and the Business of Defense. Honolulu, Hawai'i. (December, 1954), 8-9

15 Military Backing May Get Federal Aid for T. H. Roads. Honolulu Advertiser. 10/23/1954.

16 Progress Report on Highways. The Territorial Highway Department. December 7, 1956

mathematical "sufficiency rating system."[17] Fewer than half of the Federal Aid system's roads got a passing grade after 25 years of existence.

In 1959 Hawai'i was admitted as the fiftieth state of the United States. The "Hawai'i Statehood Transition Bill" of 1959 made millions of federal dollars available for highway improvement and development. The State Department of Transportation (DOT) was established in January, 1960. At that time, there were about 633.93 miles of roads to build to fill the gaps in the Federal Aid Highway System.[18] Later, in July, 1960, the Interstate Highway System was extended to the State of Hawai'i, which allowed the new Federal Interstate Highway fund to be applied to Hawaii's highway and bridge construction. With Hawaii's significant role in the National defense system, the Interstate Highway fund was intended to serve both military needs and civilian interstate traffic needs.

With adequate federal funds in the post-war era, bridges were usually built as part of large public projects, such as for the construction of the Nimitz Highway, the Tran-Ko'olau Range projects, and the H-1 Interstate Highway. These projects played an important role, tying together military bases and civilian residential districts all over the islands. The distinctive post-war style railing is composed of a reinforced concrete balustrade penetrated with horizontal rectilinear voids with concrete rail caps. Later bridges from this period began the first use of metal in guardrail designs.

Hawai'i Island Road and Bridge Context:
The plantations of South Hilo, North Hilo, and Hāmākua districts were producing raw sugar within a few years after the Reciprocity Treaty of 1876. The treaty allowed Hawaiian sugar to be exported to the American mainland duty-free. The sugar industry developed rapidly in the islands; and by 1900, one-quarter of the sugar produced in the Territory was grown on the Hāmākua coast.[19] The land above the steep coastal bluffs, at the base of the dormant Mauna Kea volcano, was gently sloping fertile with the abundant rainfall. Many plantations were from two to three miles deep, their altitudes ranging from 250 feet closest to the sea to 2,000 feet at their upper boundaries; their ocean frontage varied from two to six miles.[20] The rain, perfect for sugar, also produced deep gulches that had for so long kept the area isolated. The only road to Hilo's harbor was the government wagon trail that was almost impassable in the rainy season with constant bridge washouts. As an alternative to using the road, some plantations had railroads with either locomotive or animal power; others used flumes or cable railways to move cut cane from the high fields to the mills which were usually close to the sea. The mills employed an inventive yet cumbersome method of derricks and pulleys at various landings high above the coast to load their produce on to ships for market. A need for a more efficient transportation system was evident.

Hilo was located at the southern end of this long string of sugar plantations on Hawaii's east coast. Large tracks of prime agricultural land also lay to the south of the town, awaiting development by entrepreneurs with vision and capital. In 1898, Benjamin Franklin Dillingham, a noted Hawaiian businessman, drew up plans for a large sugar mill

17 Ibid, 80.

18 Hawai'i State Highways. 1960. P. 7

19 Alvarez (1987a), 44.

20 Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123.

at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Then he applied for a charter for a railroad that would transport the raw sugar to the wharf in Hilo. The Hilo Railroad Company was incorporated in 1899 by Dillingham; Lorrin Thurston, the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the Monarchy; and Mark Robinson, former Minister of Foreign Affairs for Queen Liliuokalani.[21] The charter for the Hilo Railroad, granted by the Republic of Hawai'i, was issued on March 28, 1899. Under its charter, the Hilo Railroad was authorized - for a period of fifty years - to build a railroad anywhere on the island of Hawai'i, with free use of government lands for the right-of-way, yards, or station areas. Dillingham had just completed a three-foot gauge common carrier on O'ahu. He was aware that the popularity of narrow-gauge for trunk lines was on the wane; he announced that the Hilo Railroad would be built to standard gauge (4'-8 1/2" wide) - the first and only standard-gauge railroad in the islands.[22]

In the first decade of the century, the railroad owners determined that the wharf in Hilo was inadequate to attract the business of large shipping lines. Freighters anchored in deep water had to use lighters, and the whole operation was relatively unprotected from heavy seas during the storm season. A new wharf, sheltered from the sea by a breakwater, was proposed; but its construction was beyond the means of either the railroad or the Territory of Hawai'i. The U.S. Congress financed the breakwater, and the U.S. Army Corps of Engineers designed the project. The railroad had the responsibility for building the wharf. One of the conditions imposed by the government for the improvement of Hilo's harbor was that the railroad company extend its railroad line north along the coast to service the sugar plantations of Hāmākua. [23]

In 1911-12, the Hilo Railroad established a northern rail line to Pa'auilo and sugar was transported to Hilo for shipment from its harbor. The first train began service to Pa'auilo in May 1913.[24] The rail line brought many changes to the Hāmākua coast, including the relocation of many of the mills away from the coast to access the rail service. Trucking sugar to Hilo along the narrow, winding government road (the Old Māmalahoa Highway) was not an economical alternative to the relatively straight run along the rail line. The railroad construction project was a daring engineering feat that crossed the numerous gorges and streams with large steel bridges at the valley mouths and required massive earth cuts for the completion of the comparatively straight roadbed. This was in direct contrast to the previous conservative government policy of roads winding back and forth down sharp grades through valleys. The high cut in the north wall of Hakalau gulch remains as an excellent example of the degree of earth moving accomplished by the railroad engineers.

Work on the first section - 12.7 miles from Hilo to the Hakalau Mill - began in 1908 and was completed in 1911. Construction of the second phase - from Hakalau to Pa'auilo - continued through 1912, with costs of $106,000 per mile, for a total of $3,500,000.[25] The company succeeded in erecting fourteen steel bridges, five wood and steel

21 Ibid, 123-124.

22 Ibid, 125.

23 Ibid.

24 Ken Okimoto, *Exploring the Hamakua Coast: A Pictorial Guide to the Plantation Era*. Hong Kong: Watermark Publishing, 2002. 28.

25 Ibid, 133.

combination bridges, and twenty-four wooden trestles. These bridges, along with two tunnels and expensive grading, gave the Hilo Railroad "one of the highest per-mile construction costs of any railroad under the Stars and Stripes."[26]

John Mason Young was the engineer for the railroad bridges. Young was the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawai'i). Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawai'i.[27] The bridges' components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kaua'i the same year) and were erected by W.W. Beers, described by the *Hilo Tribune* as a New York engineer.[28] All of the steel trestle bridges erected by the railroad were of the same type, deep steel girders with 66- to 72-foot spans set on wide steel trestles and masonry (lava-rock) abutments. The bridges were assembled at the Waiākea railroad yards and shipped out to their sites on railroad cars.

In addition to the steel trestles built by the Hilo Railroad, two multi-span steel truss bridges were constructed over the Wailuku and Wailoa Rivers. These bridges suffered from their positions close to sea level and were the most problematic for the railroad to maintain. The Wailoa drawbridge was destroyed in 1923 by a tidal wave and was remounted on concrete piers.[29] While the Wailuku Bridge was being erected in 1909, a Porter tank engine slipped over its edge into the river. In 1924 "it collapsed in a mysterious manner," its piers folding like dominos.[30] The collapse was attributed to the 1923 tidal wave and was precipitated by the passage of a loaded passenger train.[31] In 1924, the Wailuku Bridge was replaced by a metal truss bridge of three spans, mounted on concrete piers. These bridges lasted in place until the 1946 *tsunami.*

Burdened with debt and unable to meet its obligations, the Hilo Railroad Company was forced into receivership in 1916 and plans for the expansion of the line were abandoned. The railroad was sold for $1,000,000 to the bondholders, and reorganized as the Hawai'i Consolidated Railway. In 1920, the new owners bought three additional passenger coaches as part of a program aimed at catering to the tourist business. In cooperation with the steamship companies, sightseeing specials, operating under the name of *Scenic Express*, were run on the Hāmākua Division when passenger ships were in port. Author Gerald Best described his experience traveling along the coast: "We had seen waterfalls cascading down the slopes of Mauna Kea, passed through magnificent groves of tropical trees and entrancing fields of flowers, and looked upon a completely unforgettable vista of sea and mountains. No wonder the tourists who rode the *Scenic Express* years ago recalled it as the highlight of their visit to Hawaii."[32]

In the 1930s the Depression affected the tourist trade and passenger business dropped off to a low of 16,681 in 1936.[33] Passenger cars were retired, and some cars were converted to haul *bagasse* (sugar cane after the juice has

26 John B. Hungerford, Hawaiian Railroads (Reseda, Ca: Hungerford Press, 1963), 55.

27 John William Siddall, Men of Hawai'i (Territory of Hawai'i: Honolulu Star Bulletin, 1921), 451; and George Nellist, Men of Hawai'i, (Honolulu, 1935), 487-488.

28 Hilo Tribune, (11 April 1911): 3.

29 Hilo Herald-Tribune, (23 February 1923): 2.

30 Thrum (1924), 94.

31 Alvarez (1987a), 50.

32 Best, 155.

33 Ibid, 146.

been pressed out) to the canec manufacturing plant in Hilo. During World War II, passenger business picked up due to gas rationing, and several old coaches were used to transport servicemen from Hilo to Pa'auilo, en route to the U.S. Marine Corp training camp at Waimea. By the end of 1945, the railroad was making money and would soon be out of debt for the first time in its existence.

On April 1, 1946, a tsunami hit Hilo at 7:01 AM. The Hawai'i Consolidated Railroad suffered irreparable damage. Freight cars were floated inland, all the track along the waterfront was washed out, the Hilo station and the adjacent buildings were in shambles, and the first span of the Wailuku River bridge, a steel truss, was washed hundreds of feet up the river. In spite of the breakwater, freight cars on the docks were washed into the bay, some floating out to sea and others thrown up on shore. Twelve miles north of Hilo, the railroad bridge at the mouth of the Kolekole Stream lost its center span. Facing an estimated repair cost of $500,000, the railroad asked shippers to determine whether they would use the line if it were rebuilt or were intending to ship their raw sugar by truck. Only Theo H. Davies Ltd. voted to retain the railroad; the rest voted to use the existing highways, despite their poor condition. Hawai'i Consolidated Railroad then offered its entire right-of-way, including all bridges and tunnels, to the Territorial Highway Department and to the Hawai'i County supervisors. Both agencies declined the railroad's offer.

The entire railroad was sold as scrap to Gilmore Steel & Supply Company of San Francisco for $81,000. About the time the scrappers had finished pulling up the rails and begun dismantling the steel bridges, the Territorial Highway Department changed its mind. They decided to improve the Hawai'i Belt Road, along the Hāmākua Coast by relocating it to the railroad right-of-way and to utilize the railroad trestles as highway bridge supports. They bought the bridges still in place, as well as the parts of bridges already trucked to Hilo, for $303,723.53 - nearly four times the amount Gilmore Steel & Supply Company had paid to Hawai'i Consolidated for the entire railroad. These railroad bridge elements were used for the Hawaii Belt Road, FAP19.

The Hawai'i Belt Road (FAP 19; State Route 19): The Territorial Highway Department's first post-war priority on the Big Island was the Hāmākua Coast Highway. There were several reasons for this immediate attention. The upgrade of the existing roads had been interrupted by the war, and what existed was piecemeal. In addition, the Hawai'i Consolidated Railway service to sugar plantations was destroyed and plantations were forced to truck their sugar to Hilo on the narrow winding Belt Road. This method was dangerous for the large trucks as there were many hairpin turns and periodic bridge washouts. After the tsunami of 1946, construction of the new Hawai'i Belt Road (FAP 19) was accelerated. The original cost estimate for the road was 12 million dollars and included a "Highline" portion of the highway from Pepe'ekeo to 'O'ōkala. The proposed highline portion would realign this twenty-four miles of dangerous highway at a higher elevation where the gulches were less wide. The existing route consisted of 340 curves with narrow bridges varying from 12' to 18' wide. The Hāmākua "Highline" proposal was subsequently not adopted, and the cost of this section of highway grew to 17.5 million dollars by the mid-fifties.

In 1950, the Territorial Highway Department under the direction of William R. Bartels and the Independent Iron Works of Oakland, California undertook the "Seismic Wave Damage Rehabilitation Project." Plans were developed to adapt the existing steel railroad trestles into highway bridges. Utilizing remnants of the purchased railroad trestles and trusses, the road beds were widened and strengthened. The two remaining truss spans of the Wailuku River Railroad Bridge were incorporated into the reconstruction of the Kolekole Stream Bridge. The two concrete piers from the truss bridge remain in use under the present Wailuku Bridge which carries the Hawai'i Belt Road (FAP 19)

over the river.[34] Roughly two-thirds of the Hāmākua road was finished (a total of thirty-five bridges) during the tenure of Highway Commissioner Robert M. Belt, from 1952-1958.[35]

All six bridges listed under this Multiple Property Documentation Form have recently undergone or will be going through modification projects. The Hakalau Stream, Kapu'e Stream, Kolekole Stream, Nānue Stream, and Pāhe'ehe'e Stream Bridges have recently undergone seismic retrofit modifications. Information on the modification for each bridge is described in the nomination forms for that bridge. A modification project for the Umauma Stream Bridge is planned for the year 2011. The bridge will be strengthened and widened to conform the current design standards.

D. Significant Designers

William R. Bartels: The trestle bridges adaptation was the work of a person of significance - William R. Bartels, Chief Engineer for the Territorial Highway Department, who was responsible for all major territorial bridge projects from 1932-1956. Bartels was considered a "cracker-jack" engineer who enjoyed the challenge of a difficult assignment, and his work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges show refined aesthetic sensibility which makes them distinctive from the work of other engineers. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. He designed most of the territorial bridges from then until 1957. Bartels was responsible for the largest and most sophisticated bridge construction projects in Hawai'i during this time and there was a marked shift to large deck girder and rigid frame bridges. He ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard age of retirement, but he was kept on by special permission and out of necessity and respect for his exceptional abilities. Bridges designed by Bartels are hailed for their accomplishment in engineering as well as aesthetics.

John Mason Young: The specifications and design for the original railroad bridges were drawn up by John Mason Young, the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawai'i). Young was born in Lewisburg, Tennessee and was educated at the University of Florida and Cornell University.[36] In 1908, he came to Hawai'i to be the only engineering professor amongst 13-faculty when the College opened its doors.[37] In 1920, Young became president of the Pacific Engineering Company and maintained part-time teaching status until he retired in 1938.[38] Because of his expertise in Hawai'i, he was placed on a two-person committee that was responsible for writing Honolulu's building ordinance.[39] John Mason Young was also well known for his commercial work within the community. He designed the S. M. Damom Building (Bank of Bishop and Company, later First National Bank and then First Hawaiian Bank), now demolished. T.H. Davies and Company Building, Central

34 Spencer Mason Architects Report, 1996, IV-23

35 Alvarez, 79-80.

36 Kobayashi, 22.

37 Kamins, 9.

38 Kamins, 154.

39 Honolulu Star-Bulletin (29 August 1947), 1.

YMCA; Scottish Rite Cathedral, and canneries for Hawaiian Pineapple and Libby, Mc Neill & Libby.[40] He also served as the structural engineer for the Hawai'i Theatre. Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawai'i.[41] Young designed the original railroad bridges between 1910-1911 as an integral part of the Hilo Railroad Company.

E. Prominent Individuals

Benjamin Franklin Dillingham: Benjamin Franklin Dillingham is a noted Hawaiian businessman and one of the three founders of Hilo Railroad Company. Dillingham was born in West Brewster, Massachusetts and worked as the first officer of a bark, Whistler. In 1864, while Whistler was stopped in Honolulu, Dillingham was hospitalized after an accident during a horseback riding. He gave up working as a sailor and married a daughter of a friend, Reverend Lowell Smith.[42] After working as a clerk at a hardware store, H. Dimond & Son for four years, he organized the Dillingham Company in 1869. Dillingham became a pioneer in railroad building and established the Oahu Railway and Land Company in 1888.[43] In response to the demand of the sugar industry on Island of Hawaii, he organized and became the president of Hilo Railroad Company in 1910.

Lorrin Thurston: Lorrin Thurston is one of the three founders of Hilo Railroad Company. Thurston served as the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the monarchy. He was born in Honolulu as the son of American missionaries. At Oahu College, he started studying law and completed his education at Columbia University. Upon returning to Hawaii in 1883, he started a law practice. His involvement in the politics began after the being elected to the Hawaiian legislature. He believed in the need for the reduction of the monarchical power and the elimination of the official corruption. In the 1887 revolution, Thurston served as a leader and became Minister of Interior. Kalakaua died in January 1891. Thurston was involved with the Annexation Club in 1892, and he traveled to Washington to facilitate the U.S. annexation. Thurston served as the main figure in the overthrow of the Hawaiian monarchy.[44]

Mark Robinson: Mark P. Robinson is one of the three founders of Hilo Railroad Company. Robinson was appointed by Queen Liliuokalani in 1892 and served as the Minister of Foreign Affairs. He was born in Hawaii and raised among the royal families. His mother, Rebecca Prever was the daughter of Kamekana, a Maui Chiefess. His father, John James Robinson, founded a shipyard, which brought financial wealth to the family. Mark's sisters were Mary Mikahala Robinson Foster and Victoria Ward.[45] Mark P. Robinson died in 1915 at the age of 62.[46]

40 Ames (1996), 71-73.

41 Siddall (1921), 451 and George Nellist, 487-488.

42 Gardiner, http://www.calodges.org/ncrl/masdirec.html.

43 Siddall (1917), 89

44 *Encyclopedia Britannica*, http://www.britannica.com/EBchecked/topic/594468/Lorrin-A-Thurston.

45 Arcayna, http://archives.starbulletin.com/2006/09/22/features/story06.html.

46 Thrums (1915), 173.

ASSOCIATED HISTORIC BRIDGE PROPERTY TYPES

SELECTION OF HISTORIC BRIDGES

Under this Multiple Property Documentation Form, six steel trestle bridges on the Island of Hawai'i are included. The six bridges are:

Name of the Bridge	Structure Number
Hakalau Stream Bride	001000019030841
Kapu'e Steam Bridge	7001000019030931
Kolekole Stream Bridge	001000190308549
Nānue Stream Bridge	0010000190308146
Pāhe'ehe'e Stream Bridge	00100019038619
Umauma Stream Bridge	001000190308346

These bridges were chosen for their significance as important resources that tell the rich, active past of the area associated with the sugar plantation industry and also for the elaborate trestle structure of the early twentieth-century. All six bridges are significant under the Criteria A for the association with the Hilo Railroad Company, Criteria B for the association with three founders of the Hilo Railroad Company, and Criteria C for the significance as a representative example of early twentieth-century engineering technology as well as a source for information about early twentieth-century steel manufacture and construction. More specific information on each bridge's significance is described in the attached individual nomination forms.

METAL BRIDGES

Description

Although prevalent during the late nineteenth-century, there are only a handful of metal bridges remaining in Hawai'i due to the extremely corrosive nature of the marine environment. These extant metal bridges are of three basic types: steel and wrought iron trusses, steel stringer bridges, and steel trestle bridges.

A truss bridge is "a framework composed of individual members... fastened together that loads applied at the joints produced only direct tension or compression... In its simplest form every truss is a triangle or a combination of triangles."[1] Wrought iron is "a commercial form of iron that is tough, malleable, and relatively soft, contains less than 0.3 percent and usually less than 0.1 percent carbon..."[2]

Stringer bridges are built on "stringers or joists [that] support the floor and in turn are supported by the floor beams. The joists may be supported on the tops of the floorbeams or may be framed into the floorbeam by the use of connection angles."[3]

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1 Milo S. Ketchum. The Design of Highway Bridges of Steel, Timber and Concrete. (New York: McGraw-Hill Book Company, Inc., 1920), 103.

2 Merriam-Webster Online Dictionalry (visited on Sept. 24, 2009)

3 Milo S. Ketchum. The Design of Highway Bridges of Steel, Timber and Concrete. (New York: McGraw-Hill Book Company, Inc., 1920), 141.

Steel trestle bridges are "used for carrying the roadway at a considerable distance above the ground. The tower and intermediate spans are commonly built of plate girders... The tower consists of two trestle bents... braced together by longitudinal bracing... Bracing [with horizontal supports]... is used with either adjustable or rigid diagonal members, while bracing [without horizontal supports]... is used only for rigid members."[4] One of the major difference between steel trestle bridges and trusses or steel stringer bridges is that steel trestle bridges have trestle bents or towers that are directly standing on the ground far below the roadway. As the result, the support structures tend to be much larger and elaborate in appearance in comparison to steel truss or stringer bridges. This nomination concerns the six remaining steel trestle bridges, which were part of the plantation railroad system and converted by the Territory to highway bridges in 1950-53.

Steel Trestle Bridges: Fourteen steel trestle railroad bridges were constructed in 1911 for the Hilo Railroad Company. Five of these (Hakalau, Nānue, Kapue, Pāheʻeheʻe, and Umauma) were reconstructed as territorial highway bridges between 1951 and 1953, the remaining nine were salvaged for use in the reconstruction of Kolekol Stream Bridge. The design concept for each Steel Trestle Bridge is similar in all five bridges. One bridge, the Kolekole Stream Bridge, was constructed using parts from several railroad trestle bridges and has a slightly different design for its concrete piers. The substructure at each bridge is reused 1911-1912 steel trestle railroad supports. These structural steel trestle pieces vary in design dependent on number of spans and height over the valley floor. Bridges composed of additional members are noted in the individual forms. Large steel girders span across the open trestlework. This is essentially the same structural system of the original railroad bridge in each location. Modifications to the railroad trestle systems have been noted in the individual National Register nomination forms. During the FAP 19 project, for the period from 1950-53, each trestle system was topped with a concrete slab deck, sidewalks on both sides, and an asphalt paving system. The same design for the pre-cast concrete railings is used for all bridges. The railing design is an open ten foot by two foot concrete rectangular box topped by a strong horizontal concrete cap. This rail design is typical for territorial bridges constructed during this early 1950s period. Concrete end piers with an incised bridge name and date of construction are part of the 1950s construction. All bridges now have steel guard rails on the approaches at each end. These guard rails obscure the bridge name in some locations. The guard rails are bolted to the concrete piers, and therefore, this installation is reversible.

Significance: The period of significance for the steel trestle bridges begins in 1911, when they were first constructed as railroad bridges and ends in 1953 after their conversion to highway bridges as part of FAP19.

The converted steel trestle bridges have National Register significance under criteria A, B, and C. The railroad line played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the island's sugar production. The Hilo Railroad Company was founded by figures significant in the history of the Hawaiian Islands. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawai'i."[5] Another commentator noted that the completion of the railroad marked nothing less than "an era in the

[4] Milo S. Ketchum. The Design of Highway Bridges of Steel, Timber and Concrete. (New York: McGraw-Hill Book Company, Inc., 1920), 111.

[5] Paradise of the Pacific, (December 1924): 14

development of the Islands."[6] In addition, the converted railroad bridges are the remains of the only standard gauge rail line erected in the islands and can tell us much about early twentieth century steel manufacturing. The steel trestles s represent the "work of a master": John Mason Young, designer of the original railroad line and bridges; as well as the exceptional engineering and creativity of William R. Bartels, of the Territorial Highway Department, who engineered their conversion from railroad to highway use in the 1950s.

Integrity: The trestle bridges retain their integrity of location although pieces have been added from other railroad bridges. The design of the bridge, particularly any changed connections, retains integrity as most changes are bolted connections, which are reversible without diminishing the significant historic characteristics of the original bridge. The setting of the bridges remains relatively unchanged. The quality of the original workmanship remains apparent, particularly from both an engineering and aesthetic standpoint. There is substantial evidence of engineering and builder labor and skill. The bridges retain a high degree of historic feeling and their associations clearly are apparent to the informed observer. The structural support of the steel trestle system of the original railroad bridge is observable in most locations from the edge of the highway or adjacent road and park systems.

Steel trestle railroad bridges are eligible under Criterion A, B, and C. Specific considerations for eligibility under Criterion A include:

1. **Settlement patterns:** The Steel Trestle Bridges on the Hamakua Coast contributed in a meaningful way to the settlement and development of a geographically definable area, facilitated major passage to or through this region, and have been significantly integral to the development of an effective transportation system, such as the Belt Road. The most significant early road and bridge building projects in the islands were associated with Belt Road construction. Many early metal truss bridges were imported to the islands to accommodate the construction of the Belt Roads, such as those at Hanalei and Wailua on Kaua'i. Homestead roads made possible the settlement and development of the rural areas in which they are located.

2. Early and/or prominent product of private enterprise. The converted highway bridges are among the few remaining examples of bridges constructed by private enterprise. The Hilo Railroad Company (later to become the Hawai'i Consolidated Railroad) was a significant economic force on the Island of Hawai'i during the early twentieth-century.

4. Representative of a significant engineering endeavor. The railroad construction project was a daring engineering feat that crossed the numerous gorges and streams with large steel bridges at the valley mouths and required massive earth cuts for the completion of the comparatively straight road bed. This was in direct contrast to the more conservative government policy of winding roads and small concrete or timber bridges in the backs of valleys or down sharp grades to sea level. The adaptation of these bridges for new use to carry the Belt Road also was a remarkable engineering feat as it required new load calculations and increased width accommodation.

6 Thomas Thrum, Hawaiian Almanac and Annual (Honolulu: Hawaiian Gazette Company, 1914), 142.

5. Bridges associated with the primary economic endeavor of the islands (c. 1850 -1950) - sugar production. Sugar production changed the pattern of land ownership in the islands, created a viable-trade-oriented economy and radically altered the demographics of the islands through the importation of wage-earning labor. The infrastructure required to support this massive economic endeavor - primarily for irrigation, transportation, and cultivation of sugar cane - changed the face of the islands forever. Many of the metal bridges were constructed to aid in the overland transport of raw cane to the mills for processing, such as the steel railroad trestles erected along the Hāmākua coast of the island of Hawai'i, as well as to provide reasonable access for workers to the sugar lands.

6. Bridges associated with major historical events or natural disasters. Due to its unique location in the center of the Pacific Basin, Hawai'i is susceptible to *tsunami* (seismic sea wave) inundation from nearly every direction. Earthquakes generated in the Aleutian Islands, South America and Japan have swept large, destructive ocean waves onto Hawaiian shores with a great loss of life and property. While the line was damaged by the devastating tsunami of 1946, most portions of the railroad bridges survived. This disaster forced the closure of the rail line and resulted in the acquisition of these bridges by the Territorial Highway Department.

Specific considerations for eligibility under Criterion B include:

1. Bridges associated with the lives of persons significant in our past. The steel trestles railroad bridges were an integral part of the Hilo Railroad Company founded in 1899 by entrepreneur Benjamin F. Dillingham. His partners included other persons notable in Hawaiian history: Lorrin Thurston, the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the Monarchy; and Mark Robinson, former Minister of Foreign Affairs for Queen Liliuokalani.

Specific considerations for eligibility under Criterion C include:

1. Example of a rare structural type. The steel trestle bridges are the remains of the only standard gauge rail line erected in the islands. In addition, they are a rare example of steel construction, since the majority of other railroad trestles were constructed of wood. Analysis of metal bridges may potentially yield information about early twentieth-century steel manufacture and construction. The steel trestle bridges may yield information regarding the only standard gauge railway in the islands.

2. Exceptional work by an important engineer, architect, or builder. An important engineer/designers includes William R. Bartels, Chief Designer for the Territorial Highway Department. The original railroad bridges were designed by John Mason Young in 1910-11. The steel trestle railroad bridges were erected by W.W. Beers, a New York engineer.

3. Bridges of exceptional aesthetic merit. The steel trestle railroad bridges are spectacularly sited along the ocean at the mouths of steep, verdant valleys. The height of the bridges over the stream bed and quality of craftsmanship displayed in their steel construction contributes to their aesthetic value.

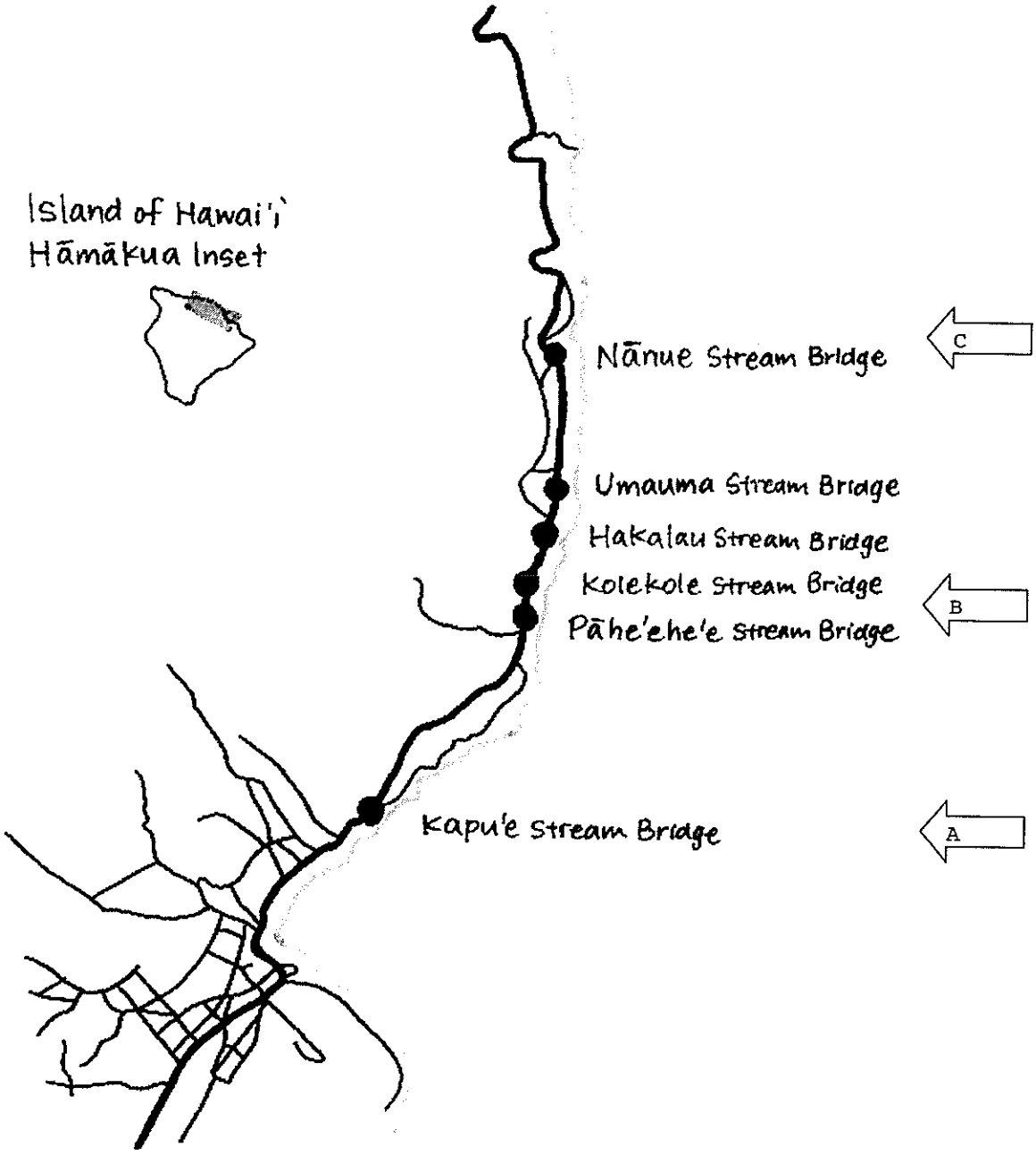
GEOGRAPHICAL DATA

The location of the "Steel Trestle Bridges on the Hāmakua Coast" is the eastern coast line of the Island of Hawai'i in the State of Hawai'i. All six bridges carry the Hawai'i Belt Road (FAP 19).

Traveling north from Hilo the Bridges are located in the following districts:
A. Pāpa'ikou (Kapue Bridge)
B. Honomu (Pāhe'ehe'e Bridge, Kolekole Stream Bridge)
C. Hakalau (Hakalau Highway Bridge, Umauma Stream Bridge, Nānue Bridge)

SKETCH MAP

Island of Hawai'i with Inset of Hamakua Coastline


Island of Hawai'i
Hāmākua Inset
Nānue Stream Bridge
C
Umauma Stream Bridge
Hakalau Stream Bridge
Kolekole Stream Bridge
B
Pāhe'ehe'e Stream Bridge
Kapu'e Stream Bridge
A

SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

Investigation Method

The fieldwork and research was performed during May through August 2009. Field investigations included visual inspections, verification of existing conditions and degree of modifications, and black and white digital photography for each historic bridge.

Documentary Research Methods

The following depositories were researched for materials specific to the bridges; much of the included information was initially researched as part of the Hawai'i State Bridge Inventory. A full bibliography is included in the documentation.

- State of Hawai'i, Department of Transportation
- State of Hawai'i, Historic Preservation Division
- City and County of Honolulu, Department of Public Works
- County of Kaua'i, Department of Public Works
- County of Maui, Department of Public Works
- County of Hawai'i, Department of Public Works
- Bishop Museum Archives
- Hawai'i State Archives
- Hawai'i State Library
- Hamilton Library, University of Hawai'i
- Internet Resources

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United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. **Place additional certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).**

1. Name of Property

Historic name NĀNUE STREAM BRIDGE

Other names/site number Nānue Bridge (structure number 001000190308146)

2. Location

street & number 1.66 miles W of Kauniho Road on FAP 19 ☐ not for publication

city of town Honohina (TMK 3-3-2-01) ☐ vicinity

State Hawai'i code HI county Hawai'i code 001 zip code _____

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ____ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___ national ___ statewide ___local

_____ _____
Signature of certifying official Date

_____ _____
Title State or Federal agency and bureau

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

_____ _____
Signature of commenting official Date

_____ _____
Title State or Federal agency and bureau

4. National Park Service Certification

I, hereby, certify that this property is: Signature of the Keeper Date of Action

___ entered in the National Register _____

___ determined eligible for the National Register _____

___ determined not eligible for the National Register _____

___ removed from the National Register _____

___ other (explain:) _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [ ] private
- [ ] public - Local
- [x] public - State
- [ ] public - Federal
- [ ] private

Category of Property
(Check only one box)

- [ ] building(s)
- [ ] district
- [ ] site
- [x] structure
- [ ] building(s)
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	Objects
0	0	buildings
0	0	**Total**

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

Steel Trestle Bridges on the Hamakua Coast

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

Current Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: Steel girder and trestle bridge

Materials
(Enter categories from instructions)

foundation: N/A
walls: N/A
roof: N/A
other: METAL

Narrative Description

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

Summary Paragraph

Nānue Stream Bridge is a steel girder and trestle bridge with a total length of 531 feet and a roadway width of 28 feet. It is built at the deck elevation of 286' over Nānue Stream along the Hāmākua Coast on the Island of Hawai'i. Nānue Stream Bridge is the tallest bridge on the Island of Hawai'i. The rural setting of the site has been unchanged. The superstructure is composed of a concrete deck on steel girder and the substructure is composed of c. 1912 steel railroad trestle supports with masonry (lava-rock) abutments. Open horizontal concrete rail and cap are placed as parapets.

Narrative Description

The Nānue Stream Bridge carries the Hawai'i Belt Road (FAP 19) over Nānue Stream along the Hāmākua Coast of the Island of Hawai'i. The present highway bridge was reconstructed from older railroad trestle and girder spans. In 1911, fourteen steel trestle girder bridges were erected along the Hāmākua Coast to support railroad tracks for the Hilo Railroad Company.[1] All of the rail bridges along the line were devastated by the tsunami of 1946, and nine of the steel trestle bridges were disassembled and sold as scrap.[2] The remaining five bridges (Hakalau, Nānue, Pāhe'ehe'e, Umauma, and Kapue) were retained and reconstructed as territorial highway bridges between 1950-53.

The bridge remains in its original location; however, the Hawai'i Belt Road, the primary transportation artery for the island, was re-routed in the early 1950s in order to utilize the abandoned railroad alignment. The setting has experienced little change. In 1953, the bridge was widened for use as a highway bridge with members from the disassembled railroad bridges. The reconstruction follows the original trestle design, however bolted rather than riveted connections were utilized. A concrete deck, sidewalks and rail were added to facilitate automobile and pedestrian traffic. The integrity of the original substructure remains intact, and is a remainder of the only standard-gauge railroad constructed in the islands. The bridge's substructure can be viewed from the old Māmalahoa Highway which runs under the highway bridge. The bridge's historic associations are readily apparent to all observers; the bridge retains its historic feeling due to its unusual construction type. Interpretation is aided by the presence of a plaque on the substructure of which reads:

Hamilton & Chambers
Contractors
for Steel Structure
New York, U.S.A.
1912

Nānue Stream Bridge has recently undergone seismic retrofit modifications. The project included addition of hinge restrainers, seat extenders at hinges and abutments, longitudinal concrete edge beams on each side of the deck, and the upgrade of the pier footings.

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[1] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawai'i, prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration, (Honolulu, 1987a), 50.

[2] Ibid.

8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- [X] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [X] B Property is associated with the lives of persons significant in our past.
- [X] C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations

(Mark "x" in all the boxes that apply)

Property is:

- [ ] A owed by a religious institution or used for religious purposes.
- [ ] B removed from its original location.
- [ ] C a birthplace or grave.
- [ ] D a cemetery.
- [X] E a reconstructed building, object, or structure.
- [ ] F a commemorative property.
- [ ] G less than 50 years old or achieving significance within the past 50 years.

Areas of Significance

(Enter categories from instructions)

ENGINEERING

TRANSPORTATION

Period of Significance

1912

1952

Significant Dates

1912

1952

Significant Person

(Complete only if Criterion B is marked above)

Dillingham, Benjamin
Thurston, Lorrin
Robinson, Mark

Cultural Affiliation

N/A

Architect/Builder

Young, John Mason

Bartels, William R.

Period of Significance (justification)

The Nānue Stream Bridge was built in 1911 during the railroad's second phase of construction. In 1952, the Territorial Highway Department, under the direction of William R. Bartels, reconstructed Nānue Stream Bridge as a part of the Hawai'i Belt Road (FAP 19) utilizing members from segments of the demolished railroad bridges.

Criteria Consideratons (explanation, if necessary)

Statement of Significance Summary Paragraph (provide a summary paragraph that includes level of signficance and applicable criteria)

The Nānue Stream Bridge is significant under Criteria A, B, and C,. Criterion A is applicable for the bridge's association with the Hilo Railroad Company. Criterion B is applicable for the bridge's association with three founders of the Hilo Railroad Company. Criterion C is applicable since the bridge is a representative example of early twentieth-century engineering technology.

Narrative Statement of Significance (provide at least **one** paragraph for each area of significance)

Criterion A
The bridge is eligible under Criterion A for its associations with the Hilo Railroad Company, later called the Hawai'i Consolidated Railway, which played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the islands' sugar production. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawai'i."[3] Another commentator noted that the completion of the railroad marked nothing less than "an era in the development of the Islands."[4]

Criterion B
The bridge is eligible under Criterion B for its association with figures significant in the history of the Hawaiian Islands: the Hilo Railroad Company founders - Benjamin Dillingham, Lorrin Thurston, and Mark Robinson. Benjamin Dillingham was a noted businessman who drew up plans for a large sugar mill at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Lorrin Thurston was the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the monarchy. Mark Robinson worked as the Minister of Foreign Affairs for Queen Liliuokalani.[5]

Criterion C
The bridge is eligible under Criterion C as a representative example of early twentieth-century engineering technology. The bridge is a rare remaining example of steel girder and trestle construction and was, for many years, the one of the tallest bridges in the state. The bridge represents the "work of a master": John Mason Young, designer of the original railroad line and bridges; as well as William R. Bartels, of the Territorial Highway Department, who engineered their conversion from railroad to highway use in the 1950s. The structure provides information regarding the only standard gauge railway in the islands.

Developmental history/additional historic context information (if appropriate)

The Nānue Stream Bridge was built in 1911 during the railroad's second phase of construction. The specifications and design of the bridge were drawn up by John Mason Young, the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University

[3] Paradise of the Pacific, (December 1924): 14.

[4] Thomas Thrum, Hawaiian Almanac and Annual (Honolulu: Hawaiian Gazette Company, 1914), 142.

[5] Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123-124

of Hawai'i). Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawai'i.[6] The bridge's components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kaua'i the same year). It was erected by W.W. Beers, described by the *Hilo Tribune* as a New York engineer.[7]

Nānue was one of the most impressive bridges built by the Hilo Railroad. At 207 feet tall, the Nānue Stream Bridge was the tallest bridge on the line, 30 feet taller than the bridge over the Hakalau Stream. After a higher bridge at Māliko Gulch on Maui was demolished in 1967,[8] the Nānue Stream Bridge became the tallest in the state.[9]

In 1952, the Territorial Highway Department, under the direction of William R. Bartels reconstructed Nānue Stream Bridge utilizing members from the railroad bridge. Bartels was responsible for the design of all major territorial bridge projects between 1932 and his retirement from the department in 1956.[10] His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

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6 John William Siddall, Men of Hawaii (Territory of Hawaii: Honolulu Star Bulletin, 1921), 451; and George Nellist, Men of Hawaii, (Honolulu, 1935), 487-488.

7 Hilo Tribune, (11 April 1911): 3.

8 Hilo Tribune, (11 April 1911): 3.

9 Alvarez (1987b), 134.

10 Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawaii, Prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)

See Continuation Sheet.

Previous documentation on file (NPS):

____preliminary determination of individual listing (36 CFR 67 has been requested
____previously listed in the National Register
____previously determined eligible by the National Register
designated a National Historic Landmark
____recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record #_____

Primary location of additional data:

____State Historic Preservation Office
__x__Other State agency
____Federal agency
____Local government
____University
____Other
Name of repository:

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre.
(Do not include previously listed resource acreage)

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	5	274299	2204895	3			
2				4			

Verbal Boundary Description (describe the boundaries of the property)

The nominated property is a rectangular shaped parcel measuring 531 feet by 28 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification (explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system and appropriate spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title Spencer Leineweber, FAIA Professor
organization Heritage Center, University of Hawai'i at Manoa date
street & number 2410 Campus Road telephone (808) 956-4704
city or town Honolulu state HI zip code 96822
e-mail aspencer@hawaii.edu

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.

  A **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.

- **Continuation Sheets**

- **Additional items:** (Check with the SHPO or FPO for any additional items)

Photographs:

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Nānue Stream Bridge

City or Vicinity: Honohina

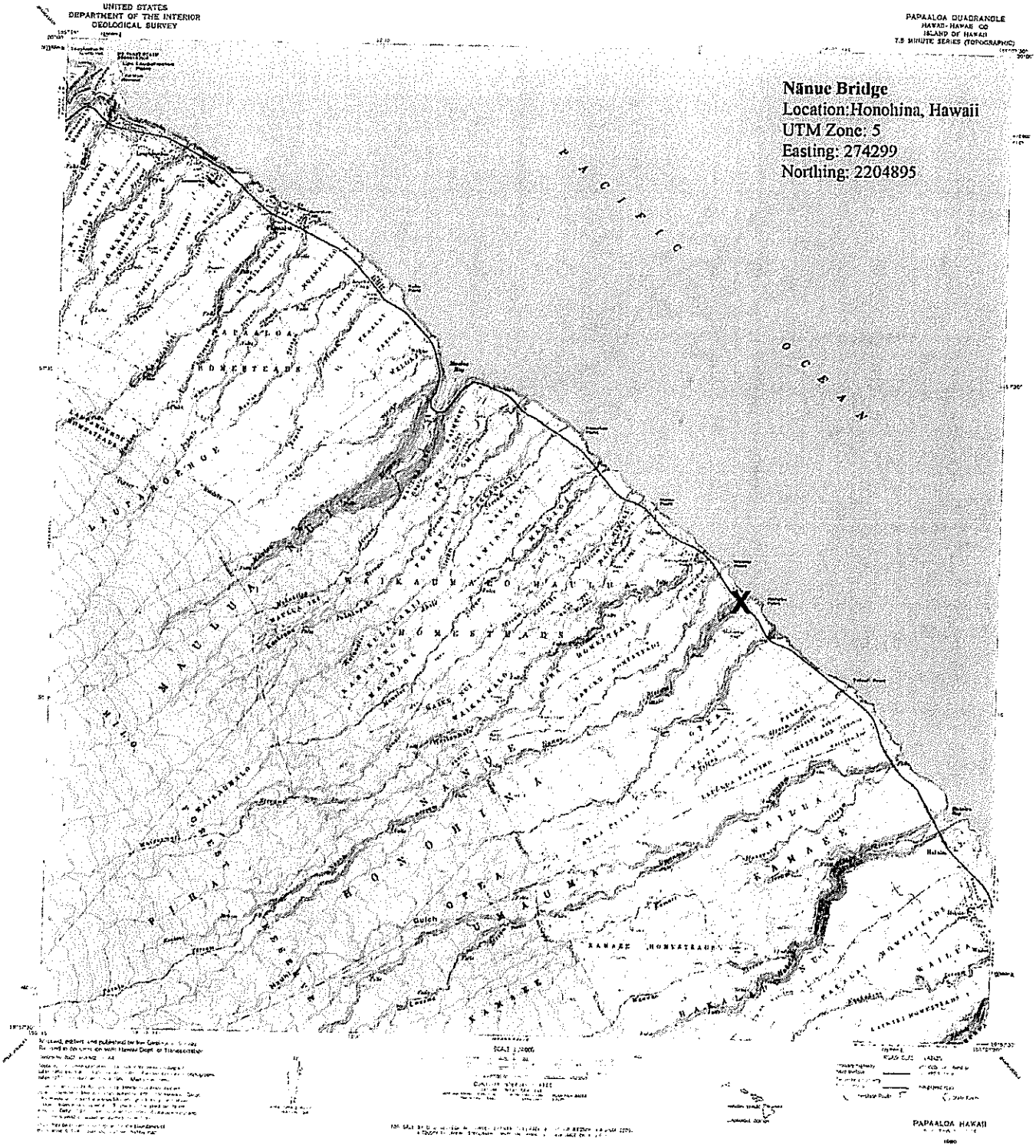
County: Hawai'i **State:** Hawai'i

Photographer: Spencer Leineweber, FAIA/Professor

Date Photographed: June 2009

Description of Photograph(s) and number:

Photo #1: Name
Photo #2: Approach
Photo #3: Structure


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
PAPAALOA QUADRANGLE
HAWAII-HAWAII CO
ISLAND OF HAWAII
7.5 MINUTE SERIES (TOPOGRAPHIC)
Nānue Bridge
Location:Honohina, Hawaii
UTM Zone: 5
Easting: 274299
Northing: 2204895
PAPAALOA HAWAII

Sketch Map

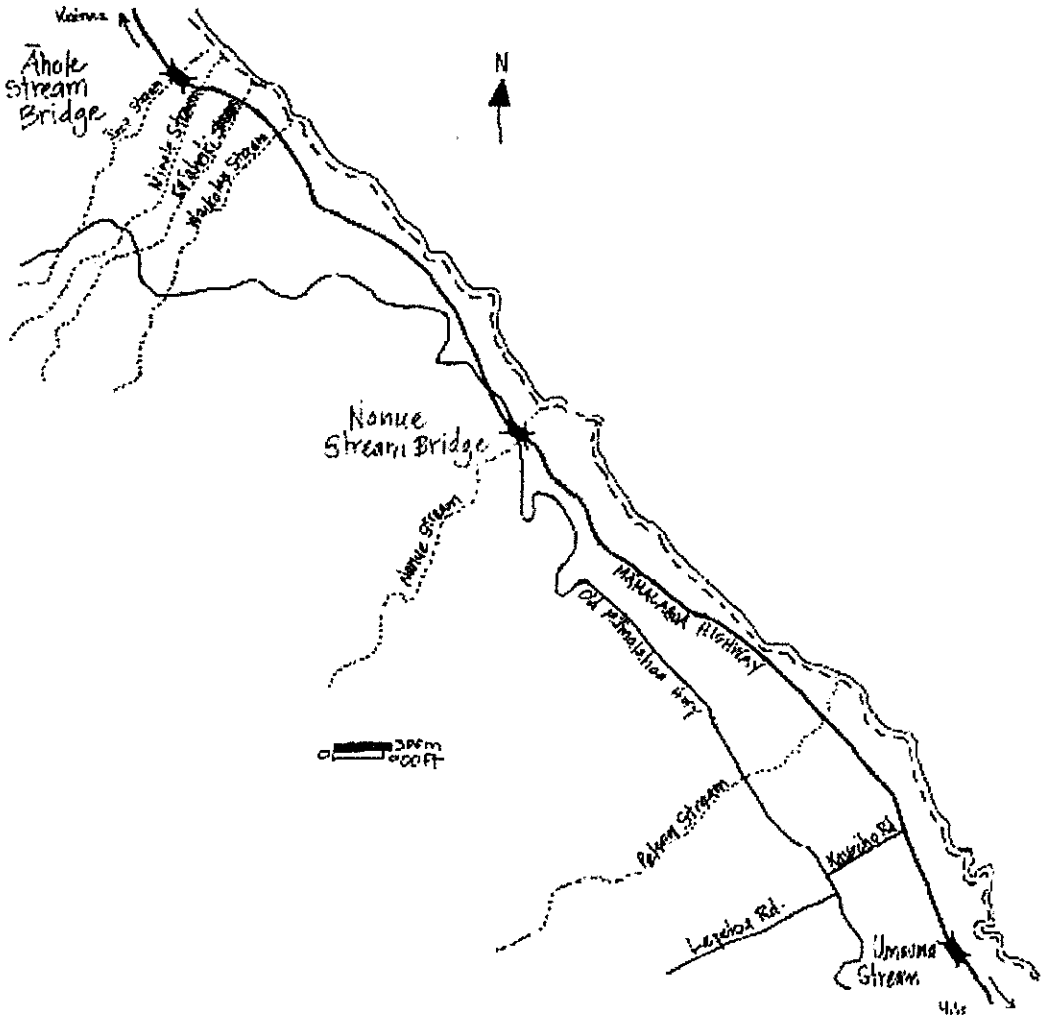

Waimea
Āhole Stream Bridge
N
Nānue Stream Bridge
Nānue Stream
Old Mamalahoa Hwy
Mamalahoa Highway
Pahem Stream
Kaniko Rd.
Laupāhoehoe Rd.
Umauma Stream

Photo #1: Name

Photo #2: Approach

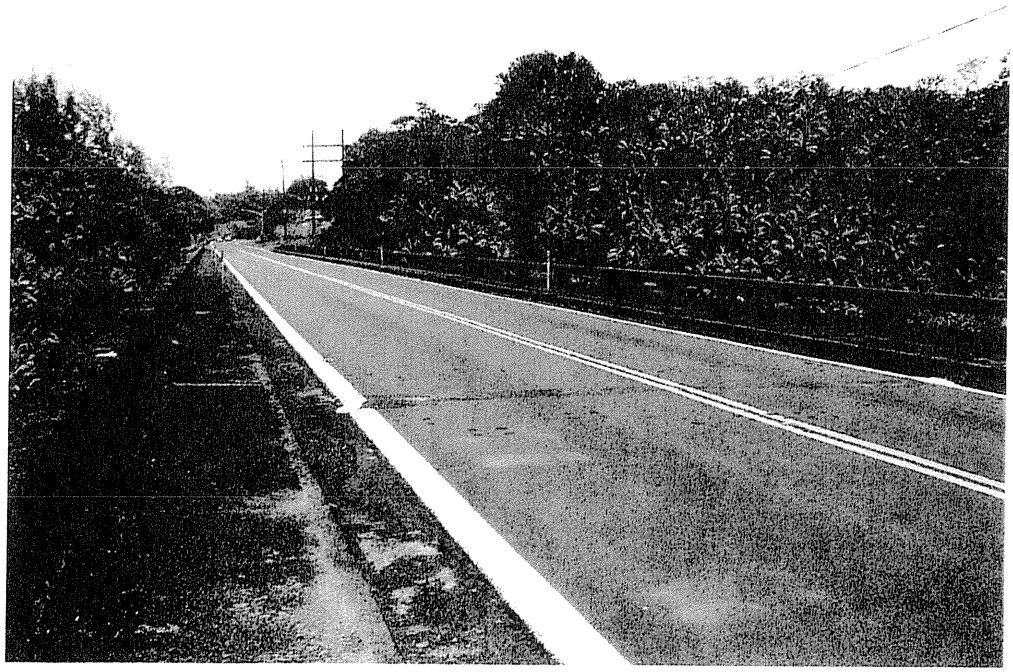


Photo #3: Structure

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. **Place additional certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).**

1. Name of Property

Historic name UMAUMA STREAM BRIDGE

Other names/site number Umauma Bridge (structure number 001000190308346)

2. Location

street & number 0.34 miles E of Kauniho Road on FAP 19 ☐ not for publication

city of town Hakulau (TMK 3-3-1-01) ☐ vicinity

State Hawai'i code HI county Hawai'i code 001 zip code _____

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___ national ___ statewide ___local

Signature of certifying official Date

Title State or Federal agency and bureau

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

Signature of commenting official Date

Title State or Federal agency and bureau

4. National Park Service Certification

I, hereby, certify that this property is: Signature of the Keeper Date of Action

___ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:)

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [ ] private
- [ ] public - Local
- [x] public - State
- [ ] public - Federal
- [ ] private

Category of Property
(Check only **one** box)

- [ ] building(s)
- [ ] district
- [ ] site
- [x] structure
- [ ] building(s)
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	Objects
0	0	buildings
0	0	**Total**

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

Steel Trestle Bridges on the Hamakua Coast

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

Current Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: Steel girder and trestle bridge

Materials
(Enter categories from instructions)

foundation: N/A
walls: N/A
roof: N/A
other: METAL

Narrative Description

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

Summary Paragraph

Umauma Stream Bridge is a steel girder and trestle bridge with a total length of 281 feet and a roadway width of 28 feet. It is built at the deck elevation of 261' over Umauma Stream along the Hāmākua Coast of the Island of Hawai'i.The rural setting of the site remains unchanged. The superstructure is composed of a concrete deck on steel girders, and the substructure is composed of c. 1912 steel railroad trestle supports with masonry (lava-rock) abutments. Open horizontal concrete rail and cap were added as parapets in 1955. Concrete end piers, also added in 1955, have an incised bridge name and date of construction.

Narrative Description

The Umauma Stream Bridge carries the Hawai'i Belt Road (FAP 19) over Umauma Stream along the Hāmākua Coast of the Island of Hawai'i. The present highway bridge was reconstructed from older railroad trestle and girder spans. In 1911, fourteen steel trestle girder bridges were erected along the Hāmākua Coast to support railroad tracks for the Hilo Railroad Company.[1] All of the rail bridges along the line were devastated by the *tsunami* of 1946, and nine of the steel trestle bridges were disassembled and sold as scrap.[2] The remaining five bridges (Hakalau, Nānue, Pāhe'ehe'e, Umauma, and Kapue) were retained and reconstructed as Territorial highway bridges between 1950-53.

The bridge remains in its original location; however, the Hawai'i Belt Road, the primary transportation artery for the island, was re-routed in the early 1950s in order to utilize the abandoned railroad alignment. The setting has experienced little, if any, change. In 1953, the bridge was widened for use as a highway bridge with members from the disassembled railroad bridges. The reconstruction follows the original trestle design, however bolted rather than riveted connections were utilized. A concrete deck, sidewalks and rail were added to facilitate automobile and pedestrian traffic. The integrity of the original substructure remains intact, and is a remainder of the only standard-gauge railroad constructed in the islands. The bridge's substructure can be viewed from the old Māmalahoa Highway nearby. The bridge's historic associations are readily apparent to all observers; the bridge retains its historic feeling due to its unusual construction type. Interpretation is aided by the presence of a plaque on the substructure of which reads:

Hamilton & Chambers
Contractors
for Steel Structure
New York, U.S.A.
1912

A modification project for the Umauma Stream Bridge is planned for the year 2011. The overall intent of the project is to strengthen and widen the roadway to conform to the current design standards including the bridge gurdrails/perapets.

[1] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawaiÿi, prepared for the State of Hawaiÿi, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration, (Honolulu, 1987a), 50.

[2] Ibid.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- [X] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [X] B Property is associated with the lives of persons significant in our past.
- [X] C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply)

Property is:

- [ ] A owed by a religious institution or used for religious purposes.
- [ ] B removed from its original location.
- [ ] C a birthplace or grave.
- [ ] D a cemetery.
- [ ] E a reconstructed building, object, or structure.
- [ ] F a commemorative property.
- [ ] G less than 50 years old or achieving significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

ENGINEERING
TRANSPORTATION

Period of Significance

1912
1952

Significant Dates

1912
1952

Significant Person
(Complete only if Criterion B is marked above)

Dillingham, Benjamin
Thurston, Lorrin
Robinson, Mark

Cultural Affiliation

N/A

Architect/Builder

Young, John Mason (1912)
Bartels, William R. (1952)

Period of Significance (justification)

The Umauma Stream Bridge was built in 1911 during the railroad's second phase of construction. In 1952, the Territorial Highway Department, under the direction of William R. Bartels reconstructed Umauma Stream Bridge utilizing members from segments of the demolished railroad bridges.

Criteria Consideratons (explanation, if necessary)

Statement of Significance Summary Paragraph (provide a summary paragraph that includes level of signficance and applicable criteria)

The Umauma Stream Bridge is significant under Criterions A, B, and C. Criterion A is applicable for the bridge's association with the Hilo Railroad Company. Criterion B is applicable for the bridge's association with three founders of the Hilo Railroad Company. Criterion C is applicable since the bridge is a representative example of early twentieth-century engineering technology.

Narrative Statement of Significance (provide at least **one** paragraph for each area of significance)

Criterion A

The Umauma Stream Bridge is significant for its contributions to the fields of engineering and transportation in Hawai'i. The bridge is eligible under Criterion A for its associations with the Hilo Railroad Company, later called the Hawai'i Consolidated Railway, which played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the islands' sugar production. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawai'i."[3] Another commentator noted that the completion of the railroad marked nothing less than "an era in the development of the Islands."[4] Nonetheless, the steel railroad trestles and truss spans from the original bridge remains intact. The new highway and reconstructed bridges bypassed and straightened-out the old Māmalahoa Highway and the more irregular parts of the Hawai'i Belt Road (FAP 19) providing modern transportation facilities for the island of Hawai'i, thus greatly contributing to its commercial growth in the latter half of the twentieth-century.

Criterion B

The bridge is eligible under Criterion B for its association with figures significant in the history of the Hawaiian Islands: the Hilo Railroad Company founders - Benjamin Dillingham, Lorrin Thurston, and Mark Robinson. Benjamin Dillingham was a noted businessman who drew up plans for a large sugar mill at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Lorrin Thurston was the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the monarchy. Mark Robinson worked as the Minister of Foreign Affairs for Queen Liliuokalani.[5] The bridge is eligible under Criterion C as a representative example of early twentieth-century engineering technology.

Criterion C

The bridge is a rare remaining example of steel girder and trestle construction. The bridge represents the "work of a master": John Mason Young, designer of the original railroad line and bridges; as well as William R. Bartels, of the Territorial Highway Department, who engineered their conversion from railroad to highway use in the 1950s. The Structure provides information about early twentieth-century steel manufacture and construction, as well as information regarding the only standard gauge railway in the islands.

[3] Paradise of the Pacific, (December 1924): 14.

[4] Thomas Thrum, Hawaiian Almanac and Annual (Honolulu: Hawaiian Gazette Company, 1914), 142.

[5] Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123-124

Developmental history/additional historic context information (if appropriate)

The Umauma Stream Bridge was built in 1911 during the railroad's second phase of construction. The specifications and design of the bridge were drawn up by John Mason Young, the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawai'i). Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawai'i.[6] The bridge's components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kaua'i the same year). It was erected by W.W. Beers, described by the *Hilo Tribune* as a New York engineer.[7]

In 1952, the Territorial Highway Department, under the direction of William R. Bartels reconstructed Umauma Stream Bridge utilizing members from segments of the railroad bridge. Bartels was responsible for the design of all major territorial bridge projects between 1932 and his retirement from the department in 1956.[8] His work characteristically utilized the latest technology and involved a high degree of engineering complexity. Nonetheless, his bridges evidence a refined aesthetic sensibility which makes them distinctive from the works of other engineers.

6 John William Siddall, Men of Hawaii (Territory of Hawaii: Honolulu Star Bulletin, 1921), 451; and George Nellist, Men of Hawaii, (Honolulu, 1935), 487-488.

7 Hilo Tribune, (11 April 1911): 3.

8 Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawaii" in Historic Bridge Inventory and Evaluation: Island of Hawaii, Prepared for the State of Hawaii, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration (Honolulu, 1987a), 72.

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)

See Continuation Sheet.

Previous documentation on file (NPS):

____preliminary determination of individual listing (36 CFR 67 has been requested
____previously listed in the National Register
____previously determined eligible by the National Register
____designated a National Historic Landmark
____recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record #_____

Primary location of additional data:

____State Historic Preservation Office
__x__Other State agency
____Federal agency
____Local government
____University
____Other
Name of repository:

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre.
(Do not include previously listed resource acreage)

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	5	276412	2202637	3			
2				4			

Verbal Boundary Description (describe the boundaries of the property)

The nominated property is a rectangular shaped parcel measuring 281 feet by 28 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification (explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system and appropriate spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title Spencer Leineweber, FAIA Professor
organization Heritage Center, University of Hawai'i at Manoa date
street & number 2410 Campus Road telephone (808) 956-4704
city or town Honolulu state HI zip code 96822
e-mail aspencer@hawaii.edu

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.

  A **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.

- **Continuation Sheets**

- **Additional items:** (Check with the SHPO or FPO for any additional items)

Photographs:

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Umauma Stream Bridge

City or Vicinity: Hakalau

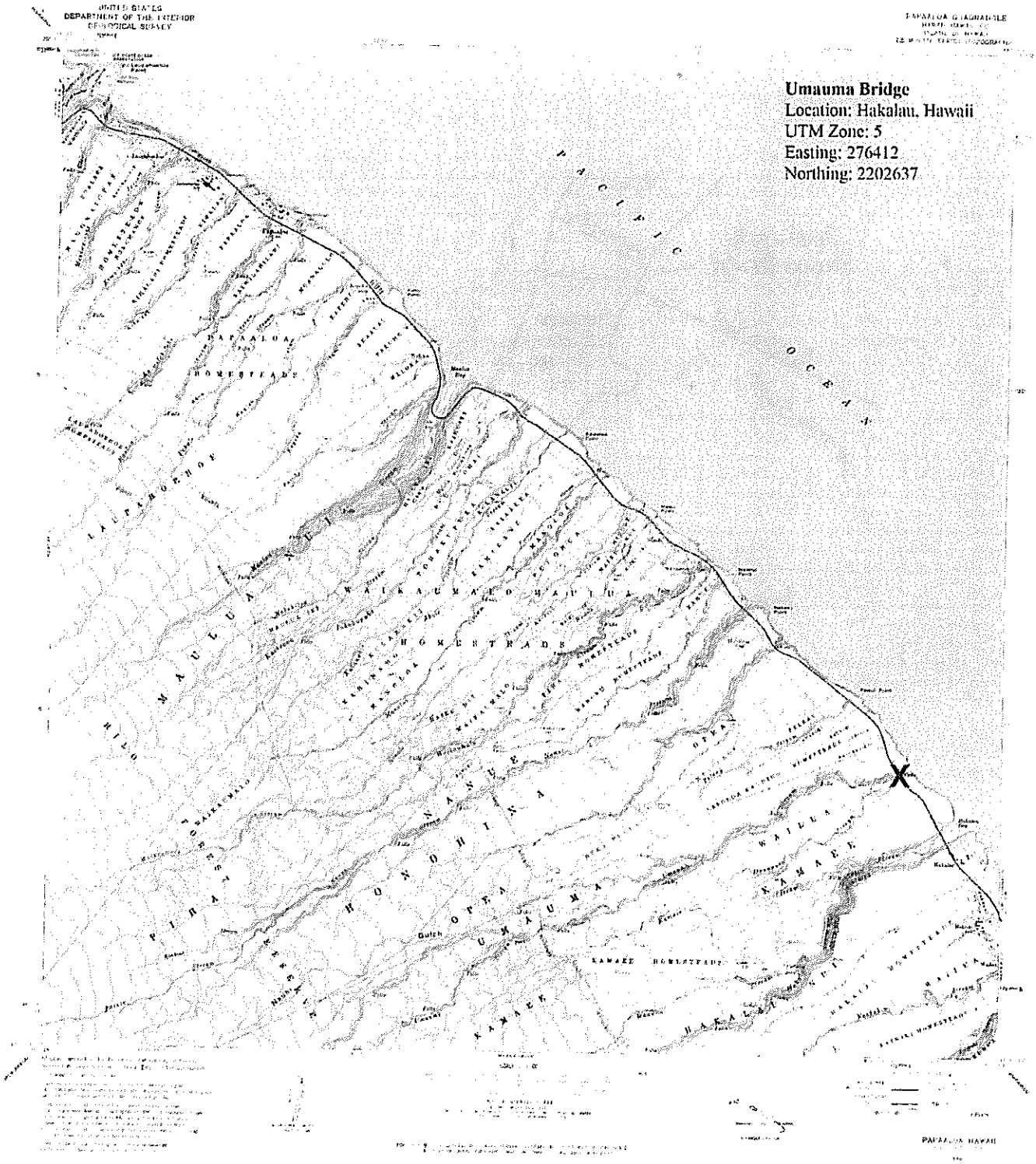
County: Hawai'i **State:** Hawai'i

Photographer: Spencer Leineweber, FAIA/Professor

Date Photographed: August 2009

Description of Photograph(s) and number:

Photo #1: Name
Photo #2: Railing
Photo #3: Structure


Umauma Bridge
Location: Hakalau, Hawaii
UTM Zone: 5
Easting: 276412
Northing: 2202637

Sketch Map

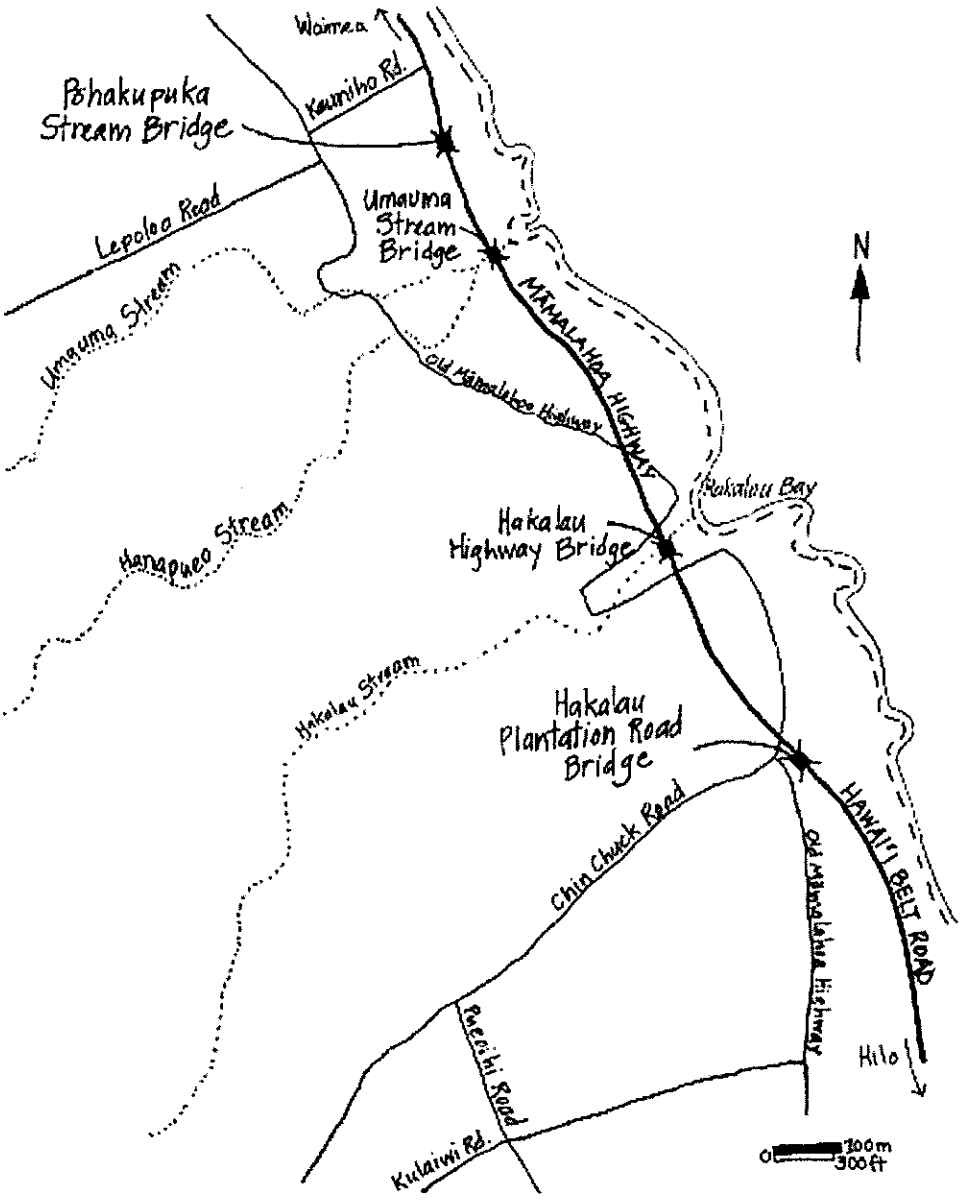

Waimea
Kawaihae Rd.
Pohakupuka Stream Bridge
Lepoloa Road
Umauma Stream Bridge
Umauma Stream
Old Mamalahoa Highway
MAMALAHOA HIGHWAY
N
Hakalau Bay
Hakalau Highway Bridge
Hanapueo Stream
Hakalau Stream
Hakalau Plantation Road Bridge
China Chuck Road
Old Mamalahoa Highway
HAWAI'I BELT ROAD
Hilo
Puaaiki Road
Kulaimi Rd.
0
100m
300ft

Photo #1: Name

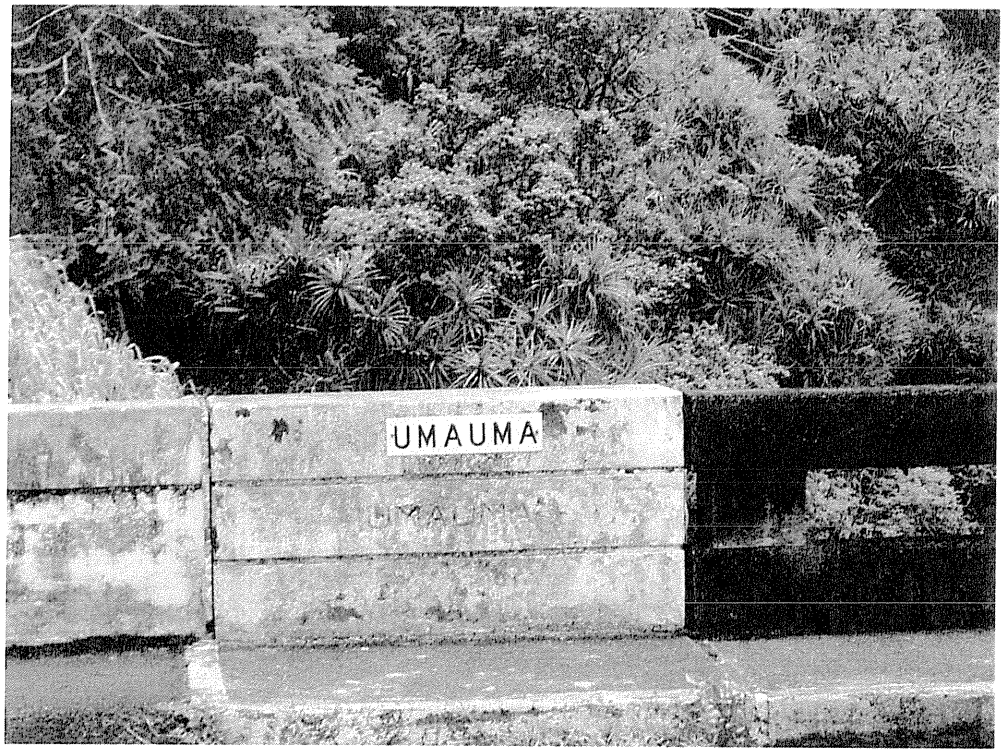


Photo #2: Railing

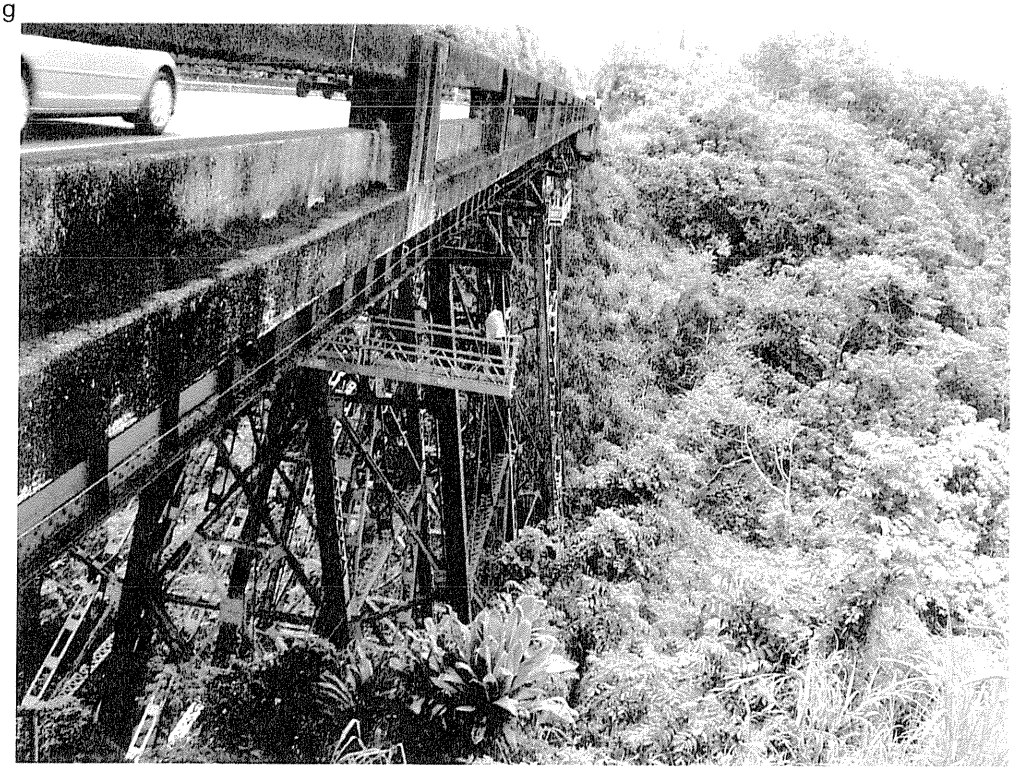


Photo #3: Structure

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. **Place additional certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).**

1. Name of Property

Historic name KAPU'E STREAM BRIDGE

Other names/site number Kapu'e Bridge (structure number 001000190309317)

2. Location

street & number 0.7 miles W of Kaieie Road on FAP 19 ☐ not for publication

city of town Pāpa'ikou (TMK 3-2-7-04) ☐ vicinity

State Hawai'i code HI county Hawai'i code 001 zip code

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___ national ___ statewide ___local

Signature of certifying official Date

Title State or Federal agency and bureau

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

Signature of commenting official Date

Title State or Federal agency and bureau

4. National Park Service Certification

I, hereby, certify that this property is: Signature of the Keeper Date of Action

___ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:)

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [ ] private
- [ ] public - Local
- [x] public - State
- [ ] public - Federal
- [ ] private

Category of Property
(Check only **one** box)

- [ ] building(s)
- [ ] district
- [ ] site
- [x] structure
- [ ] building(s)
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	Objects
0	0	buildings
0	0	**Total**

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

Historic Concrete and Steel Trestle Bridges along Hamakua Coast on the Island of Hawai'i

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: rail-related

Current Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: Steel girder and trestle bridge

Materials
(Enter categories from instructions)

foundation: N/A
walls: N/A
roof: N/A
other: METAL

Narrative Description

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

Summary Paragraph

The Kapu'e Stream Bridge is a steel girder and trestle bridge with a total length of 415 feet and a roadway width of 28 feet. It is built at the deck elevation of 232' over Kapu'e Stream along the Hāmākua Coast of the Island of Hawai'i. The rural setting of the site remains unchanged. The superstructure of the bridge is composed of a concrete deck on steel girders, and the substructure is composed of c.1911 steel railroad trestle supports with masonry (lava-rock) abutments. Open horizontal concrete rail and cap were added as parapets in 1950. Concrete end piers have an incised bridge name and date of construction added in 1950.

Narrative Description

The Kapu'e Stream Bridge carries the Hawai'i Belt Road (FAP 19) over Kapu'e Stream along the Hāmākua Coast of the Island of Hawai'i. The present highway bridge was reconstructed from older railroad trestle and girder spans steel element. In 1911, fourteen steel trestle girder bridges were erected along the Hāmākua Coast to support railroad tracks for the Hilo Railroad Company.[1] All of the rail bridges along the line were devastated by the tsunami of 1946, and nine of the steel trestle bridges were disassembled and sold as scrap.[2] Five bridges (Hakalau, Nānue, Pāhe'ehe'e, Umauma, and Kapue) were retained and reconstructed as territorial highway bridges between 1950-53. A sixth bridge Kolekole Bridge was constructed from pieces of other railroad trestle bridges.

The bridge remains in its original location; however, the Hawai'i Belt Road, the primary transportation artery for the island, was re-routed in the early 1950s in order to utilize the abandoned railroad alignment. The setting has experienced little, if any, change. In 1953, the bridge was widened for use as a highway bridge with members from the disassembled railroad bridges. The reconstruction follows the original trestle design, however bolted rather than riveted connections were utilized. A concrete deck, sidewalks and rail were added to facilitate automobile and pedestrian traffic. The integrity of the original substructure remains intact, and is a remainder of the only standard-gauge railroad constructed in the islands. The bridge's substructure can be viewed from the old Māmalahoa Highway which runs under the highway bridge. The bridge's historic associations are readily apparent to all observers; the bridge retains its historic feeling due to its unusual construction type. Interpretation is aided by the presence of a plaque on the substructure which reads:

Hamilton & Chambers
Contractors
for Steel Structure
New York, U.S.A.
1912

The Kapu'e Stream Bridge has recently undergone seismic retrofit modifications. The project included addition of hinge restrainers and seat extenders at hinges and abutments.

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[1] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawai'i" in Historic Bridge Inventory and Evaluation: Island of Hawai'i, prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration, (Honolulu, 1987a), 50.

[2] Ibid.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- [X] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [X] B Property is associated with the lives of persons significant in our past.
- [X] C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply)

Property is:

- [ ] A owed by a religious institution or used for religious purposes.
- [ ] B removed from its original location.
- [ ] C a birthplace or grave.
- [ ] D a cemetery.
- [ ] E a reconstructed building, object, or structure.
- [ ] F a commemorative property.
- [ ] G less than 50 years old or achieving significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

ENGINEERING
TRANSPORTATION

Period of Significance

1911
1950

Significant Dates

1911
1950

Significant Person
(Complete only if Criterion B is marked above)

Dillingham, Benjamin
Thurston, Lorrin
Robinson, Mark

Cultural Affiliation

N/A

Architect/Builder

Young, John Mason (1911)
Bartels, William R. (1950)

Period of Significance (justification)

The Kapu'e Stream Bridge was built in 1911 during the railroad's second phase of construction. In 1950, the Territorial Highway Department, under the direction of William R. Bartels reconstructed Kapu'e Stream Bridge as a part of the Hawai'i Belt Road (FAP 19) utilizing members from segments of the demolished railroad bridges.

Criteria Consideratons (explanation, if necessary)

Statement of Significance Summary Paragraph (provide a summary paragraph that includes level of signficance and applicable criteria)

The Kapu'e Stream Bridge is significant under Criteria A, B, and C. Criterion A is applicable for the bridge's association with the Hilo Railroad Company. Criterion B is applicable for the bridge's association with three founders of the Hilo Railroad Company. Criterion C is applicable since the bridge is a representative example of early twentieth-century engineering technology.

Narrative Statement of Significance (provide at least **one** paragraph for each area of significance)

Criterion A

The Kapu'e Stream Bridge is significant for its contributions to the fields of engineering and transportation in Hawai'i. The bridge is eligible under Criterion A for its associations with the Hilo Railroad Company, later called the Hawai'i Consolidated Railway, which played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the islands' sugar production. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawai'i."[3] Another writer noted that the completion of the railroad marked nothing less than "an era in the development of the islands."[4] The steel railroad trestles and truss spans from the original bridge remains intact. The new highway and reconstructed bridges bypassed and straightened-out the old Māmalahoa Highway and the more irregular parts of the Hawai'i Belt Road (FAP 19) providing modern transportation facilities for the island of Hawai'i, thus greatly contributing to its commercial growth in the latter half of the twentieth-century.

Criterion B

The Kapu'e Stream Bridge is eligible under Criterion B for its association with figures significant in the history of the Hawaiian islands: the Hilo Railroad Company founders - Benjamin Dillingham, Lorrin Thurston, and Mark Robinson. Benjamin Dillingham was a noted businessman who drew up plans for a large sugar mill at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Lorrin Thurston was the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the monarchy. Mark Robinson worked as the Minister of Foreign Affairs for Queen Liliuokalani.[5]

Criterion C

The bridge is eligible under Criterion C as a representative example of early twentieth-century engineering technology. The bridge is a rare remaining example of steel girder and trestle construction. The bridge represents the "work of a master", John Mason Young, designer of the original railroad line and bridges; as well as William R. Bartels, of the Territorial Highway Department, who engineered their conversion from railroad to highway use in the early 1950s. Analysis of the structure may provide information about early twentieth-century steel manufacture and construction, as well as information regarding the only standard gauge railway in the islands.

United States Department of the Interior

[3] Paradise of the Pacific, (December 1924): 14.

[4] Thomas Thrum, Hawaiian Almanac and Annual (Honolulu: Hawaiian Gazette Company, 1914), 142.

[5] Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123-124

Developmental history/additional historic context information (if appropriate)

The Kapu'e Stream Bridge was built in 1911 during the railroad's second phase of construction. The specifications and design of the bridge were drawn up by John Mason Young, the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawai'i). Young had been involved in steel bridge design and construction on mainland railroads before coming to Hawai'i.[6] The bridge's components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kaua'i the same year). It was erected by W.W. Beers, described by the *Hilo Tribune* as a New York engineer.[7]

The specifications and design of the bridge construction were drawn up by William R. Bartels, the chief engineer of Territorial Highway Department. William R. Bartels was a German born engineer who worked briefly for a sugar plantation on Maui before being hired by the Territorial Highway Department in 1932. In 1950, the Territorial Highway Department, under the direction of Bartels utilized members from segments of the demolished railroad bridges. Bartels designed most territorial bridges from 1932 until 1957. He was responsible for the largest and most sophisticated bridge construction projects in Hawai'i during this time during which there was a marked shift to large deck girder and rigid frame bridges. Bartels ended his tenure as Chief of the Bridge Division at age 70. This was well past the standard retirement age but he was kept on by special permission and out of necessity because his abilities were exceptional. His work characteristically utilized the latest technology and involved a high degree of engineering complexity. His bridges also evidence a refined aesthetic sensibility, which makes them distinctive from the work of other engineers. Bridges designed by Bartels are hailed for their accomplishment in engineering as well as aesthetics.

Kapu'e Stream Bridge was erected by James W. Glover, a well known local entrepreneur who owned Kahuku Ranch in South Point, some farms, restaurants, and even ran for the state Senate. In the 1940s, Glover began work in Hilo to do highway and infrastructure work. Some historic projects include the Hālawa Watershaft, Ala Wai Yacht harbor, Nu'uanu Reservoir, Kawaihae Overseas Terminal, sections of the H-1 Freeway, many of the roads along the Hāmākua Coast, and new Lyman Airfield Runway.

---

6 John William Siddall, Men of Hawai'i (Territory of Hawai'i: Honolulu Star Bulletin, 1921), 451; and George Nellist, Men of Hawai'i, (Honolulu, 1935), 487-488.

7 Hilo Tribune, (11 April 1911): 3. 48Hilo Tribune, (11 April 1911): 3.

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)
See Continuation Sheet.

Previous documentation on file (NPS):

____preliminary determination of individual listing (36 CFR 67 has been requested
____previously listed in the National Register
____previously determined eligible by the National Register
designated a National Historic Landmark
____recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record #_____

Primary location of additional data:

____State Historic Preservation Office
__x__Other State agency
____Federal agency
____Local government
____University
____Other
Name of repository:

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre.
(Do not include previously listed resource acreage)

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	5	280744	2188667	3			
2				4			

Verbal Boundary Description (describe the boundaries of the property)

The nominated property is a rectangular shaped parcel measuring 415 feet by 28 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification (explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system and appropriate spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title Spencer Leineweber, FAIA/Professor
organization Heritage Center, University of Hawai'i at Manoa date
street & number 2410 Campus Road telephone (808) 956-4704
city or town Honolulu state HI zip code 96822
e-mail aspencer@hawaii.edu

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.

  A **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.

- **Continuation Sheets**

- **Additional items:** (Check with the SHPO or FPO for any additional items)

Photographs:

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Kapu'e Stream Bridge

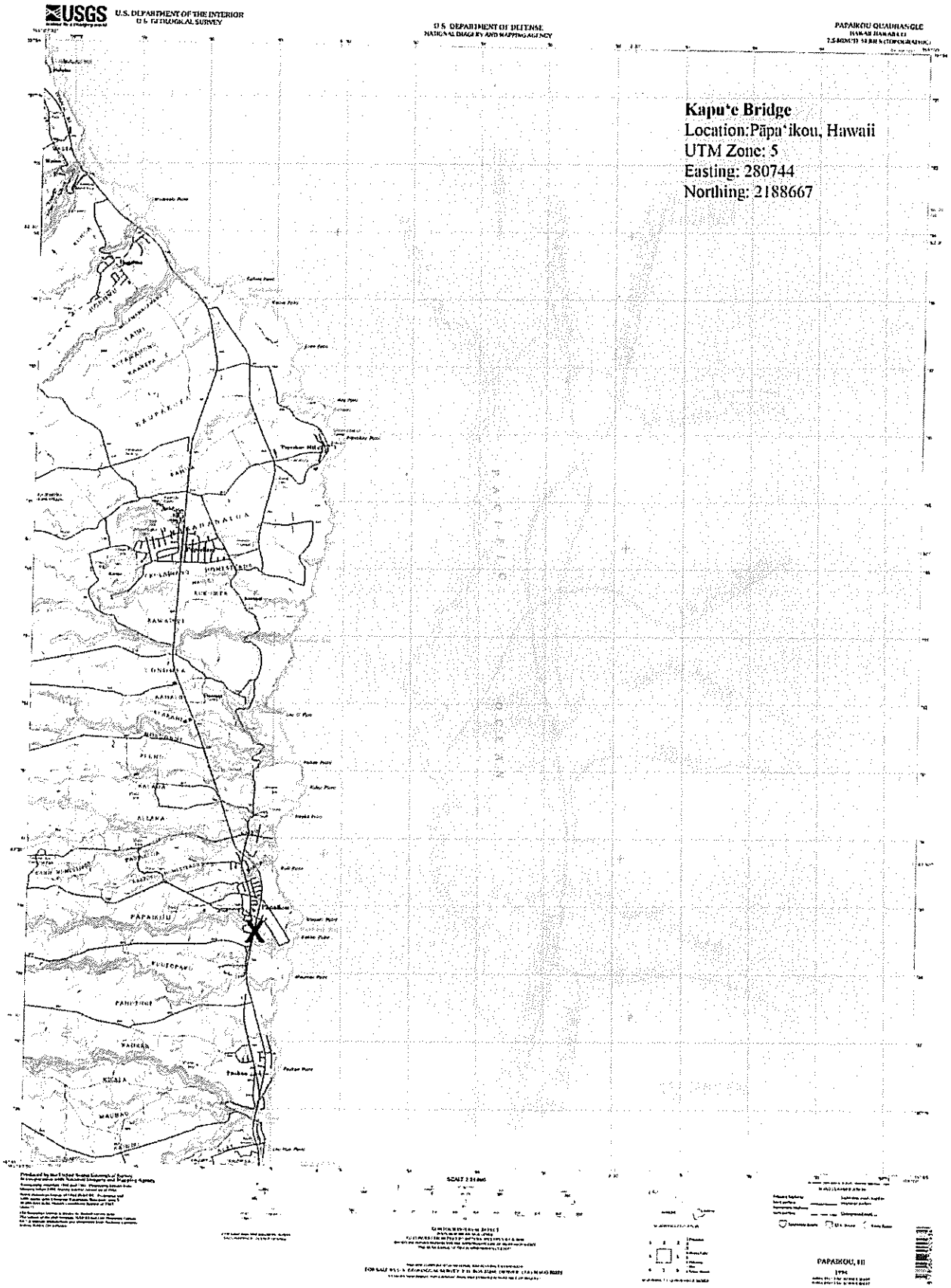
City or Vicinity: Pāpa'ikou

County: Hawai'i **State:** Hawai'i
sdfsdf
Photographer: Spencer Leineweber, FAIA/Professor

Date Photographed:

Description of Photograph(s) and number:

Photo #1: Approach
Photo #2: Name
Photo #3: Railing/Structure


USGS
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
U.S. DEPARTMENT OF DEFENSE
NATIONAL IMAGERY AND MAPPING AGENCY
PAPAIKOU QUADRANGLE
Kapu'e Bridge
Location:Pāpa'ikou, Hawaii
UTM Zone: 5
Easting: 280744
Northing: 2188667
PAPAIKOU, HI

Sketch Map

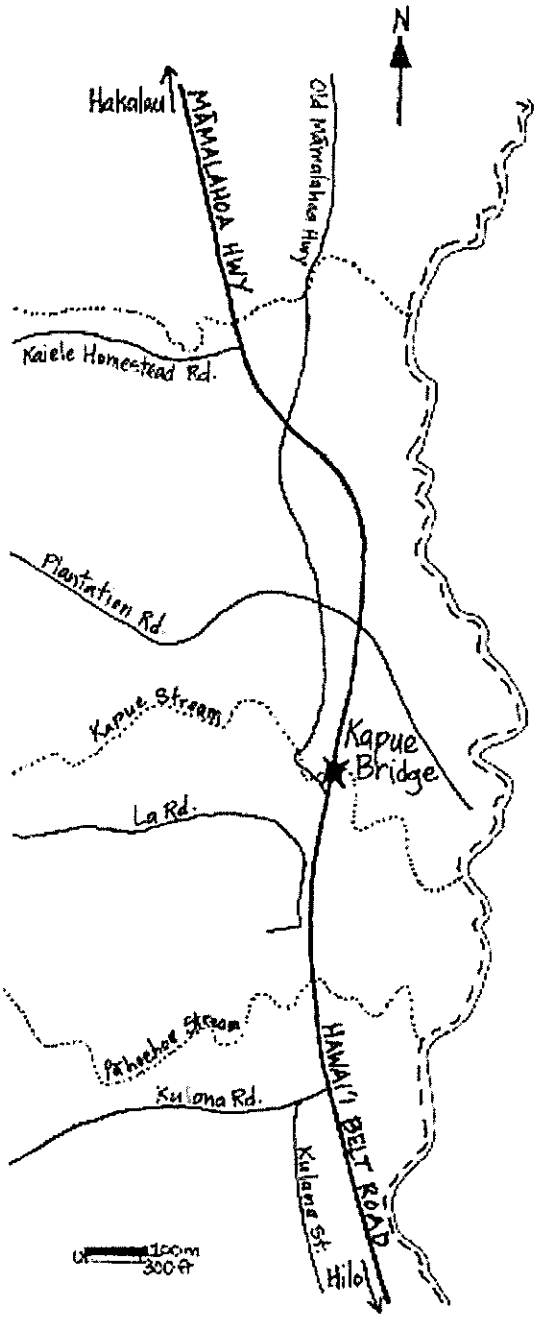

N
Hakalau
MAMALAHOA HWY
Old Mamalahoa Hwy
Kaiele Homestead Rd.
Plantation Rd
Kapue Stream
Kapue Bridge
La Rd.
Pahoehoe Stream
Kulana Rd.
HAWAI'I BELT ROAD
Kulana St.
Hilo
1cm
300ft

Photo #1: Approach

Photo #2: Name

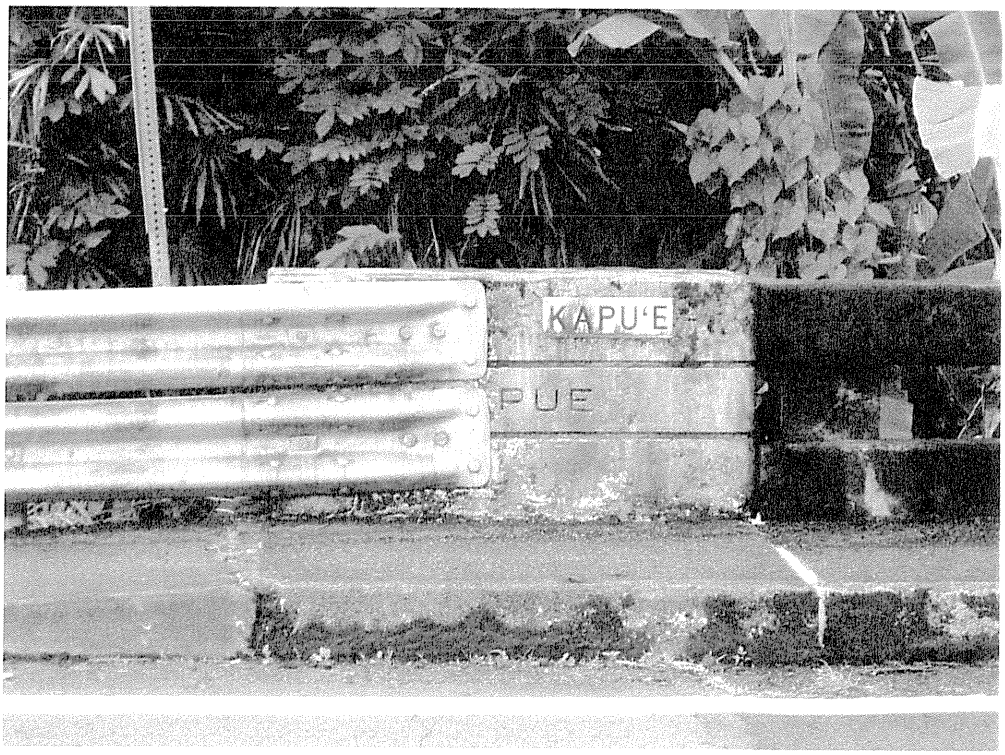
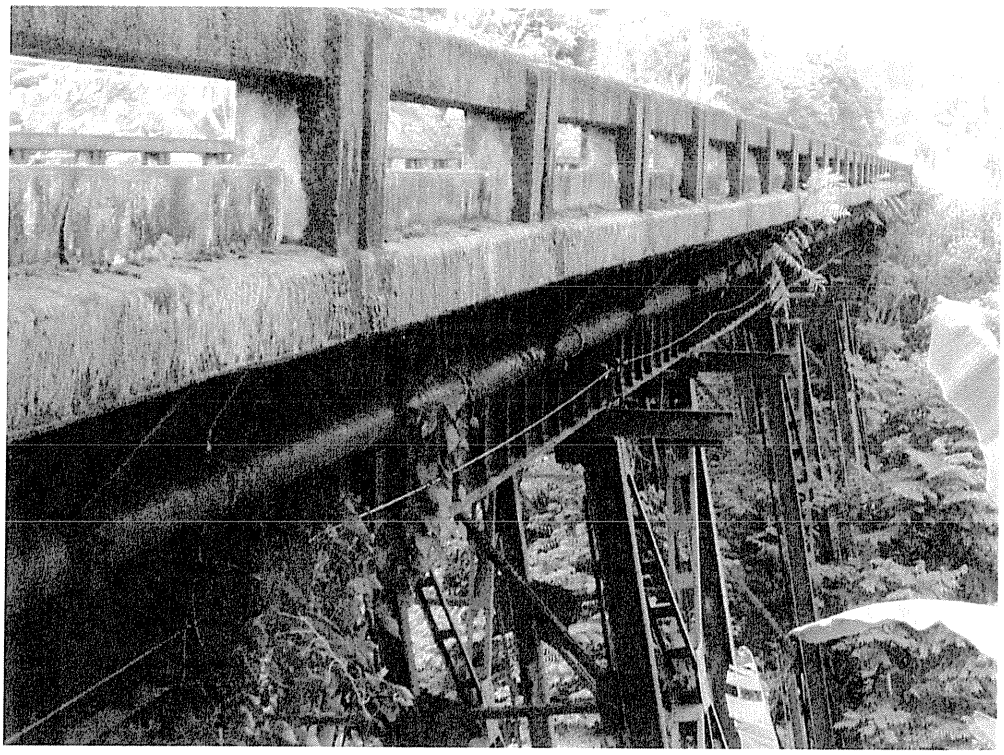


Photo #3: Railing/Structure



United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. **Place additional certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).**

1. Name of Property

Historic name KOLEKOLE STREAM BRIDGE

Other names/site number N/A (structure number 001000190308549)

2. Location

street & number Hawai'i Belt Rd., 0.10MI W/Kolekole Pk Rd ☐ not for publication

city of town Pepe'ekeo (TMK 3-2-9-03) ☐ vicinity

State Hawai'i code HI county Hawai'i code 001 zip code _____

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___ national ___ statewide ___local

_____ _____
Signature of certifying official Date

_____ _____
Title State or Federal agency and bureau

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

_____ _____
Signature of commenting official Date

_____ _____
Title State or Federal agency and bureau

4. National Park Service Certification

I, hereby, certify that this property is: Signature of the Keeper Date of Action

___ entered in the National Register _____

___ determined eligible for the National Register _____

___ determined not eligible for the National Register _____

___ removed from the National Register _____

___ other (explain:) _____

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [ ] private
- [ ] public - Local
- [x] public - State
- [ ] public - Federal
- [ ] private

Category of Property
(Check only one box)

- [ ] building(s)
- [ ] district
- [ ] site
- [x] structure
- [ ] building(s)
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	Objects
0	0	buildings
0	0	**Total**

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

Steel Trestle Bridges on the Hamakua Coast

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

Current Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: Steel girder and trestle bridge

Materials
(Enter categories from instructions)

foundation: N/A
walls: N/A
roof: N/A
other: METAL

Narrative Description

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

Summary Paragraph

The Kolekole Stream Bridge was built with steel girder and F1 beam system. The total length of the bridge is 497 feet and the roadway width is 28 feet. It is built at the deck elevation of 183' over Kolekole stream along the Hāmākua Coast of the Island of Hawai'i. The rural setting of the site remains unchanged. The bridge has reinforced concrete and steel superstructure and substructure.

Narrative Description

The Kolekole Stream Bridge carries the Hawai'i Belt Road (FAP 19) over Kolekole Stream along the Hāmākua Coast of the Island of Hawai'i. The present highway bridge was reconstructed from older railroad trestle and girder spans. This bridge is a part of the "Seismic Wave Damage Rehabilitation Project" (FAP19).

This bridge remains in its original location, however, the Hawai'i Belt Road, the primary transportation artery for the island, was re-routed in the early 1950s in order to utilize the abandoned railroad alignment. Some of the parts and materials of Kolekole Stream Bridge were salvaged from the Wailuku River Bridge and Maulua Gulch Bridge. The setting of the bridge has changed very little and the integrity of the whole structure remains intact. The Bridge was assembled from parts of a number of other railroad bridges. Three types of spanning structure were used in this bridge: steel trusses for spans No.3 and 4; steel girders for spans No.2, 5 and 6; and a concrete approach slab for span No.1. Its unusual construction type contributes to the historic character and feeling of the bridge.

The Kolokole Highway Bridge has recently undergone seismic retrofit modifications. The project included addition of hinge restrainers, seat extenders at hinges and butments, creep blocks or transverse shear connectors, FRP wraps for columns and link beams for confinement and/or added shear capacity, built-up beams/piercaps, and longitudinal restrainers with rock anchors.

8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- [X] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [X] B Property is associated with the lives of persons significant in our past.
- [X] C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations

(Mark "x" in all the boxes that apply)

Property is:

- [ ] A owed by a religious institution or used for religious purposes.
- [ ] B removed from its original location.
- [ ] C a birthplace or grave.
- [ ] D a cemetery.
- [ ] E a reconstructed building, object, or structure.
- [ ] F a commemorative property.
- [ ] G less than 50 years old or achieving significance within the past 50 years.

Areas of Significance

(Enter categories from instructions)

ENGINEERING

TRANSPORTATION

Period of Significance

1950

Significant Dates

1911, 1950

Significant Person

(Complete only if Criterion B is marked above)

Dillingham, Benjamin
Thurston, Lorrin
Robinson, Mark

Cultural Affiliation

N/A

Architect/Builder

Glover, Jas. W.

Period of Significance (justification)

The Kolekole Stream Bridge was built in 1950-1953 as a part of the "Seismic Wave Damage Rehabilitation Project".

Criteria Consideratons (explanation, if necessary)

Statement of Significance Summary Paragraph (provide a summary paragraph that includes level of signficance and applicable criteria)

Kolekole Stream Bridge is significant under Criterions A, B, and C. Criterion A is applicable for the bridge's association with the Hilo Railroad Company. Criterion B is applicable for the bridge's association with three founders of the Hilo Railroad Company. Criterion C is applicable since the bridge is a representative example of early twentieth-century engineering technology.

Narrative Statement of Significance (provide at least **one** paragraph for each area of significance)

Criterion A

The Kolekole Stream Bridge is significant for its contributions to the fields of engineering and transportation in Hawai'i. The bridge is eligible under Criterion A for its associations with Hilo Railroad Company, later called the Hawai'i Consolidated Railway, which played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the islands' sugar production. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawaii." Another commentator noted that the completion of the railroad marked nothing less than "an era in the development of the islands."

Criterion B

The bridge is eligible under Criterion B for its association with figures significant in the history of the Hawaiian Islands: the Hilo Railroad Company founders-Benjamin Dillingham, Lorrin Thurston, and Mark Robinson.[1] Benjamin Dillingham was a noted businessman who drew up plans for a large sugar mill at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Lorrin Thurston was the Minister to Washington during the Republic of Hawai'i and a former Interior Minister under the monarchy. Mark Robinson worked as the Minister of Foreign Affairs for Queen Liliuokalani.[2]

Criterion C

The bridge is eligible under Criterion C as a representative example of early twentieth-century engineering technology. The bridge is a rare remaining example of steel girder and trestle construction. The bridge represents the "work of a master": Jas. W. Glover, a well-known local entrepreneur, who did the highway and infrastructure work in the 1940s. The structure provides information about early twentieth-century steel manufacture and construction, as well as information regarding the only standard gauge railway in the islands.

Developmental history/additional historic context information (if appropriate)

The builder of this bridge was Jas. W. Glover, a well known local entrepreneur who owned Kahuku Ranch in South Point, some farms, restaurants, and even ran for the state Senate. In the 1940s, Glover branched to Hilo to do highway and infrastructure work. Some historic projects include the Hālawa Watershaft, Ala Wai Yacht harbor, Nu'uanu Reservoir, Kawaihae Overseas Terminal, sections of the H-1 Freeway, many of the roads along the Hāmākua Coast, and new Lyman Airfield Runway.[3]

[1] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawai'i" in Historic Bridge Inventory and Evaluation: Island of Hawai'i, prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of transportation, Federal Highways Administration, (Honolulu, 1987a)

[2] Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123-124

[3] Carol Banks Weber, "Jas. W. Glover Celebrates 60th Anniversary" in Building Industry, September 1995, P69-70

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)

See Continuation Sheet.

Previous documentation on file (NPS):

____preliminary determination of individual listing (36 CFR 67 has been requested
____previously listed in the National Register
____previously determined eligible by the National Register
____designated a National Historic Landmark
____recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record #_____

Primary location of additional data:

____State Historic Preservation Office
__x__Other State agency
____Federal agency
____Local government
____University
____Other
Name of repository:

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre.
(Do not include previously listed resource acreage)

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	5	278133	2199902	3			
2				4			

Verbal Boundary Description (describe the boundaries of the property)

The nominated property is a rectangular shaped parcel measuring 497 feet by 28 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification (explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system and appropriate spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title Spencer Leineweber, FAIA Professor
organization Heritage Center, University of Hawai'i at Manoa date
street & number 2410 Campus Road telephone (808) 956-4704
city or town Honolulu state HI zip code 96822
e-mail aspencer@hawaii.edu

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.

  A **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.

- **Continuation Sheets**

- **Additional items:** (Check with the SHPO or FPO for any additional items)

Photographs:

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Kolekole Stream Bridge

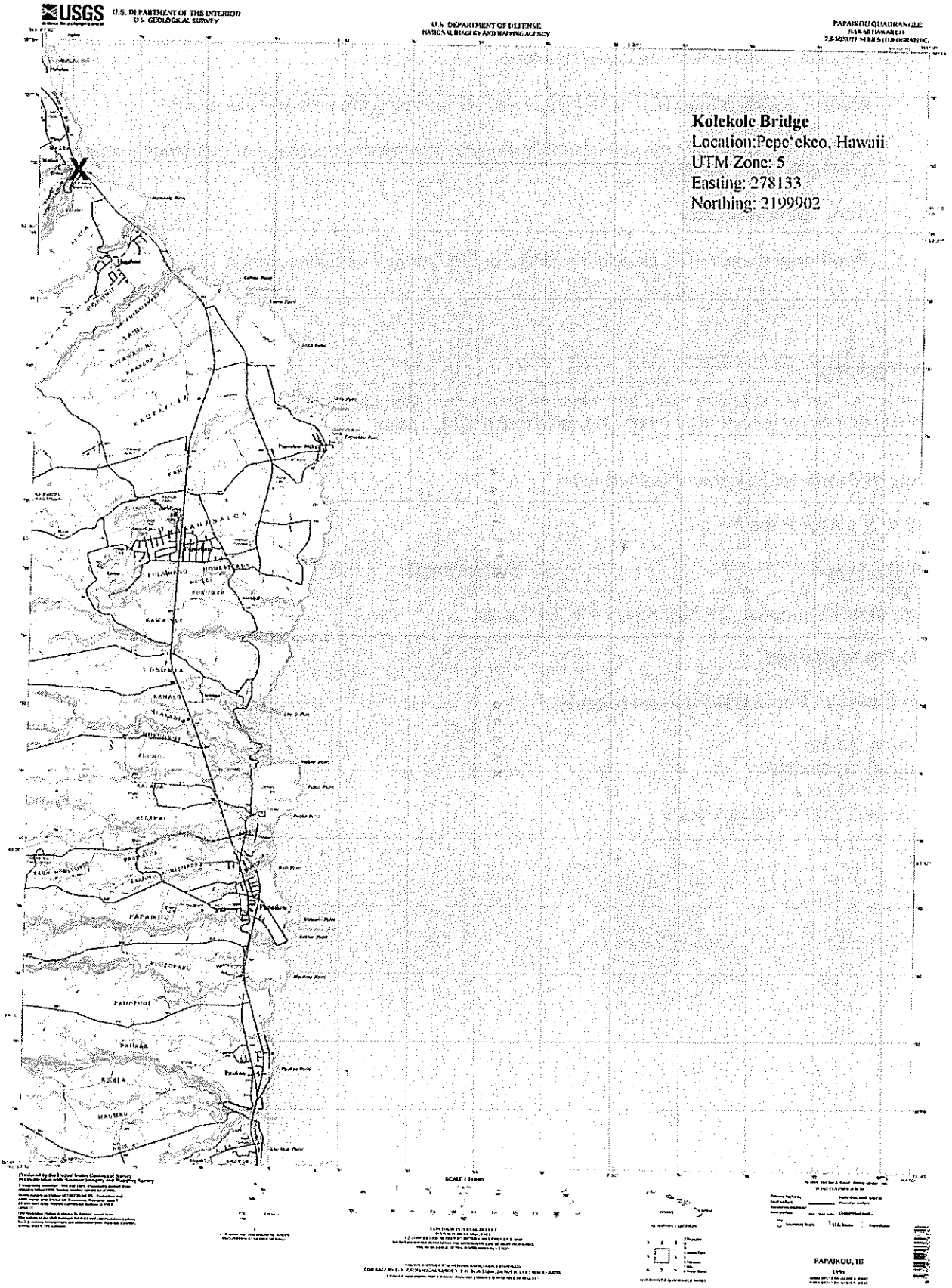
City or Vicinity: Pepe'ekeo

County: Hawai'i **State:** Hawai'i
sdfsdf
Photographer: Spencer Leineweber, FAIA/ Professor

Date Photographed:

Description of Photograph(s) and number:

Photo #1: Name
Photo #2: Approach
Photo #3: Structure
Photo #4: View from Beach Park


USGS
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
U.S. DEPARTMENT OF DEFENSE
PAPAIKOU QUADRANGLE
Kolekole Bridge
Location:Pepe'ekeo, Hawaii
UTM Zone: 5
Easting: 278133
Northing: 2199902
PAPAIKOU, HI

Sketch Map

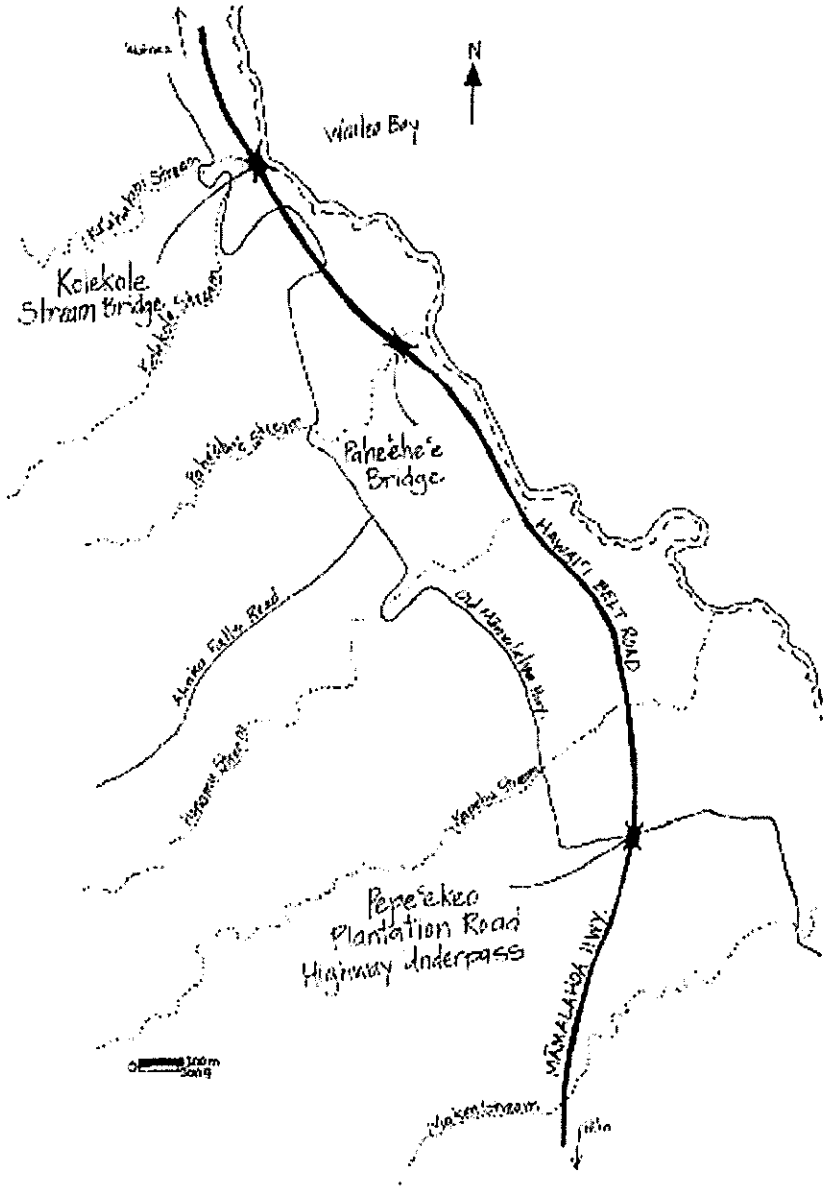

N
Wailea Bay
Kolekole Stream
Kolekole Stream Bridge
Kolekole Stream
Pahe'ehe'e Stream
Pahe'ehe'e Bridge
HAWAI'I BELT ROAD
Alaeko Falls Road
Old Mamalahoa Hwy
Hakalau Stream
Hamakua Ditch
Pepe'ekeo Plantation Road Highway Underpass
MAMALAHOA HWY.
Hakalau Stream
Hilo

Photo #1: Name

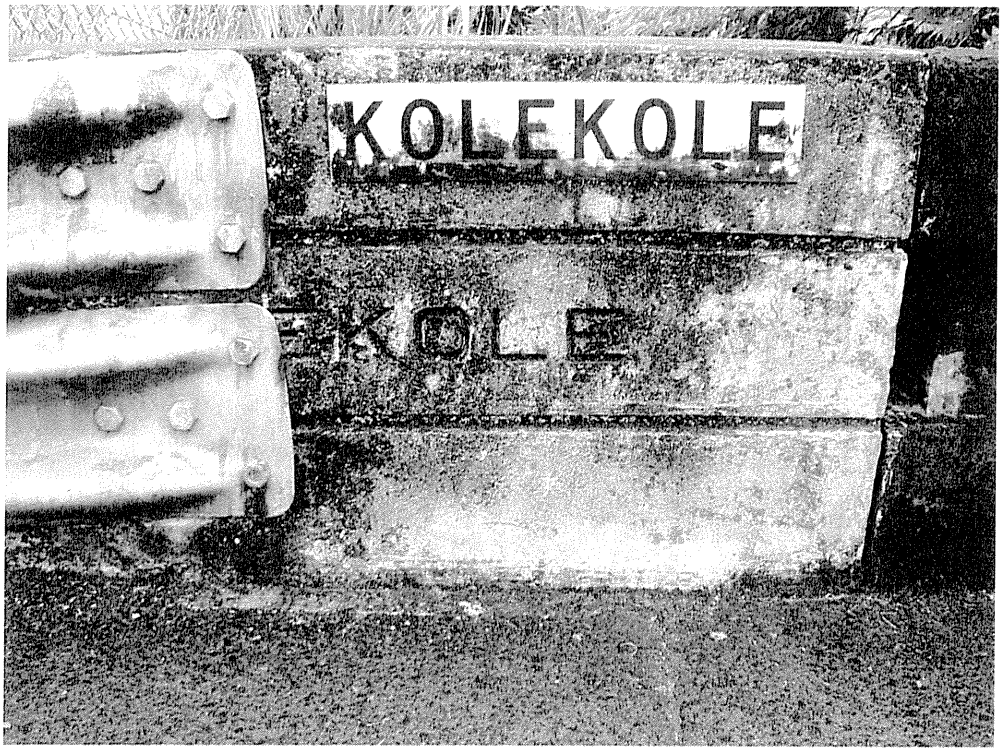


Photo #2: Approach

Photo #3: Structure

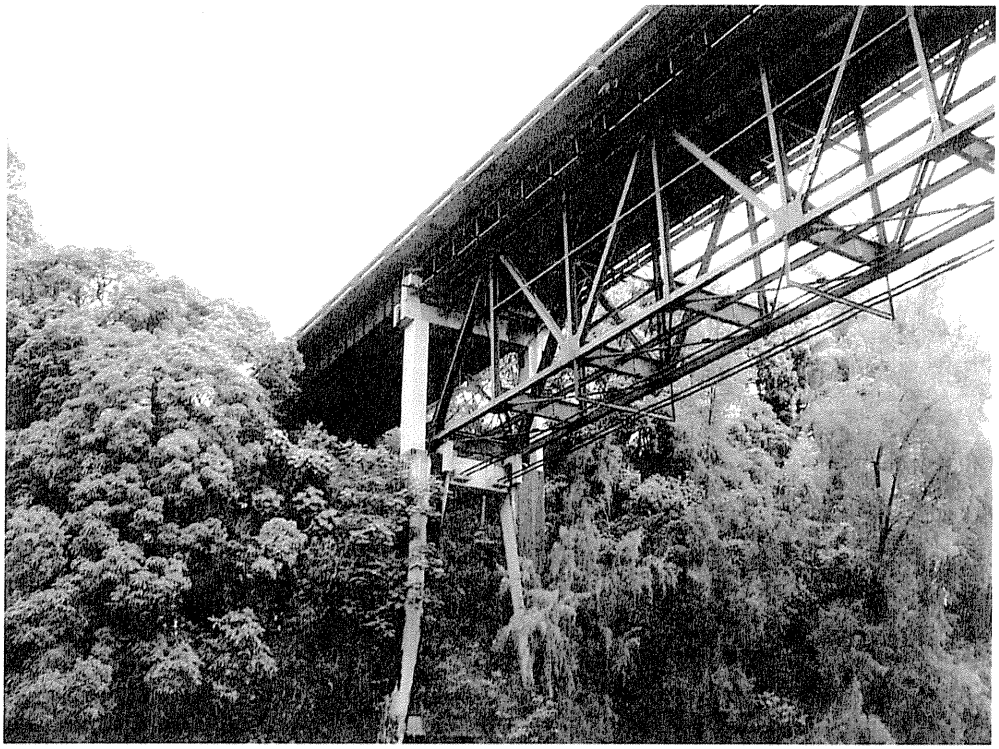
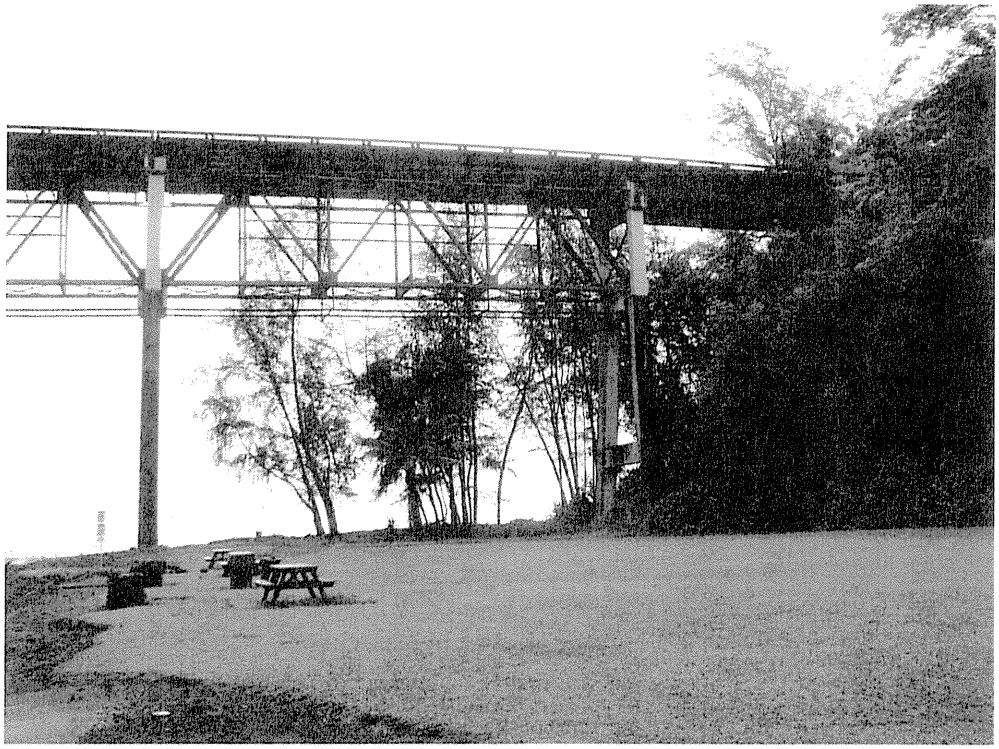


Photo #4: View from Beach Park



United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

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1. Name of Property

Historic name HAKALAU STREAM BRIDGE

Other names/site number Hakalau Highway Bridge (structure number 001000190308410)

2. Location

street & number Hawai'i Belt Road ☐ not for publication

city of town Hakalau (TMK 3-2-9-02) ☐ vicinity

State Hawai'i code HI county Hawai'i code 001 zip code _____

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___ **national** ___ **statewide** ___ **local**

Signature of certifying official — Date

Title — State or Federal agency and bureau

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

Signature of commenting official — Date

Title — State or Federal agency and bureau

4. National Park Service Certification

I, hereby, certify that this property is: Signature of the Keeper Date of Action

___ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:)

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [ ] private
- [ ] public - Local
- [x] public - State
- [ ] public - Federal
- [ ] private

Category of Property
(Check only **one** box)

- [ ] building(s)
- [ ] district
- [ ] site
- [x] structure
- [ ] building(s)
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
0	0	sites
1	0	structures
0	0	Objects
0	0	buildings
0	0	**Total**

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

Steel Trestle Bridges on the Hamakua Coast

Number of contributing resources previously listed in the National Register

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: rail-related

Current Functions
(Enter categories from instructions)

TRANSPORTATION: road-related (vehicular)

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: steel girder and trestle bridge

Materials
(Enter categories from instructions)

foundation: N/A
walls: N/A
roof: N/A
other: METAL

Narrative Description

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

Summary Paragraph

The Hakalau Stream Bridge is a steel girder and trestle bridge with the total length of 775 feet, a 261-feet height over the stream bed, and a roadway width of 28 feet. It is built over Hakalau Stream along the Hāmākua Coast of the Island of Hawai'i and the rural setting of the bridge remains unchanged. The superstructure of the bridge is composed of a concrete deck on steel girders, and the substructure is composed of c.1911 steel railroad trestle supports with masonry (lava-rock) abutments. Open horizontal concrete rail, concrete cap and concrete end piers with incised bridge name and date of construction are portions added in the 1950s rehabilitation.

Narrative Description

The Hakalau Stream Bridge carries the Hawai'i Belt Road (FAP 19) over Hakalau Stream along the Hāmākua Coast of the Island of Hawai'i. The present highway bridge was reconstructed from older railroad trestle and girder spans. In 1911-1912, fourteen steel trestle girder bridges were erected along the Hāmākua Coast to support railroad tracks for the Hilo Railroad Company. All of the rail bridges along the line were devastated by the tsunami of 1946, and nine of the steel trestle bridges were disassembled and sold as scrap. The remaining five bridges (Hakalau, Nānue, Pāhe'ehe'e, Umauma, and Kapue) were retained and modified as territorial highway bridges between 1950-53. Kolekole Bridge was assembled using parts of other demolished railroad trestle bridges.

The railroad bridge remains in its original location; however, the Hawai'i Belt Road, the primary transportation artery for the island, was re-routed in the early 1950s in order to utilize the abandoned railroad alignment and railroad bridge trestle system. The setting has experienced little, if any, change. In 1953, the bridge was widened for use as a highway bridge with members from the disassembled railroad bridges. The reconstruction follows the original trestle design, however bolted rather than riveted connections were utilized. A concrete deck, sidewalks and rail were added to facilitate automobile and pedestrian traffic. The integrity of the original substructure remains intact, and is a remainder of the only standard-gauge railroad constructed in the islands. The bridge's substructure can be viewed from the old Māmalahoa Highway which runs under the highway bridge. The bridge's historic associations are readily apparent to all observers; the bridge retains its historic feeling due to its unusual construction type. Interpretation is aided by the presence of a plaque on the substructure which reads:

Hamilton & Chambers
Contractors
for Steel Structure
New York, U.S.A.
1912

The Hakalau Stream Bridge has recently undergone seismic retrofit modifications. The project included addition of hinge restrainers, seat extenders at hinges and abutments, longitudinal struts at abutments, and the upgrade of pier footings.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- [x] A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [x] B Property is associated with the lives of persons significant in our past.
- [x] C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply)

Property is:

- [ ] A owed by a religious institution or used for religious purposes.
- [ ] B removed from its original location.
- [ ] C a birthplace or grave.
- [ ] D a cemetery.
- [ ] E a reconstructed building, object, or structure.
- [ ] F a commemorative property.
- [ ] G less than 50 years old or achieving significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

ENGINEERING
TRANSPORTATION

Period of Significance

1911
1953

Significant Dates

1911
1953

Significant Person
(Complete only if Criterion B is marked above)

Dillingham, Benjamin
Thurston, Lorrin
Robinson, Mark

Cultural Affiliation

N/A

Architect/Builder

Young, John Mason
Bartels, William R.

Period of Significance (justification)
The Hakalau Stream Bridge was built in 1911 as a railroad bridge during the railroad's second phase of construction to the area north of Hilo. In 1953, the Territorial Highway Department, under the direction of William R. Bartels, reconstructed Hakalau Stream Bridge as a part of the Hawai'i Belt Road (FAP 19) utilizing members of the original railroad trestle support system and additional materials from other railroad bridges.

Criteria Consideratons (explanation, if necessary)

Statement of Significance Summary Paragraph (provide a summary paragraph that includes level of signficance and applicable criteria)

The Hakalau Stream Bridge is significant under Criteria A, B, and C. Criterion A is applicable for the bridge's association with the Hilo Railroad Company. Criterion B is applicable for the bridge's association with three founders of the Hilo Railroad Company. Criterion C is applicable since the bridge is a representative example of early twentieth-century engineering technologyas well as a source for information about early twentieth-century steel manufacture and construction.

Narrative Statement of Significance (provide at least **one** paragraph for each area of significance)

Criterion A
The Hakalau Stream Bridge is significant for its contributions to the fields of engineering and transportation in Hawai'i. The bridge is eligible under Criterion A for its associations with the Hilo Railroad Company, later called the Hawai'i Consolidated Railway, which played a major role in the development of the Hilo and the Hāmākua Coast by providing transportation to the harbor for the island's sugar production. The railroad and its numerous bridges together have been called the "greatest engineering feat in Hawai'i."[1] Another commentator noted that the completion of the railroad marked nothing less than "an era in the development of the islands."[2] The steel railroad trestles and truss spans from the original bridge remain intact with minor modifications for seismic upgrading and bolted connections. The new highway and reconstructed bridges bypassed and straightened-out the old Māmalahoa Highway and the more irregular parts of the Hawai'i Belt Road (FAP 19) providing modern transportation facilities for the island of Hawai'i, thus greatly contributing to its commercial growth in the latter half of the twentieth-century.

Criterion B
The bridge is eligible under Criterion B for its association with figures significant in the history of the Hawaiian islands: the Hilo Railroad Company founders - Benjamin Dillingham, Lorrin Thurston, and Mark Robinson. Benjamin Dillingham was a noted businessman who drew up plans for a large sugar mill at 'Ōla'a, eight miles south of Hilo in the previously uncultivated Puna district. Lorrin Thurston was the Minister to Washington during the former Republic of Hawai'i and a former Interior Minister under the monarchy. Mark Robinson worked as the former Minister of Foreign Affairs for Queen Liliuokalani.[3]

Criterion C

1 Paradise of the Pacific, (December 1924): 14.

2 Thomas Thrum, Hawaiian Almanac and Annual (Honolulu: Hawaiian Gazette Company, 1914), 142.

3 Gerald M. Best, Railroads of Hawai'i (San Marino, California: Golden West Books, 1978), 123-124

The bridge is eligible under Criterion C as a representative example of early twentieth-century engineering technology. The bridge is a rare remaining example of steel girder and trestle construction and was, for many years, the longest span in the state. The bridge represents the "work of a master": John Mason Young, designer of the original railroad line and bridges; as well as William R. Bartels, of the Territorial Highway Department, who engineered their conversion from railroad to highway use in the 1950s. The analysis of the structure may provide information about early twentieth-century steel manufacture and construction, as well as information regarding the only standard gauge railway in the islands.

Developmental history/additional historic context information (if appropriate)

The Hakalau Railroad Trestle Bridge was built in 1911 by the Hilo Railroad Company during the railroad's second phase of construction to support the plantation industry of the island. John Mason Young drew the specifications and design of the bridge. Young was the founder of Pacific Engineering Company of Honolulu and a pioneer faculty member of the College of Agriculture and Mechanic Arts (later the University of Hawai'i).[4] The bridge's components were ordered from the New York firm of Hamilton and Chambers (who also fabricated the steel for the Hanalei River Bridge on Kaua'i the same year). It was erected by W.W. Beers, described by the Hilo Tribune as a New York engineer.[5]

Hakalau Railroad Trestle Bridge was one of the most impressive bridges built by the Hilo Railroad. At 775 feet long and sitting on seven steel towers, the Hakalau Stream Bridge was the second longest bridge on the line, outdistanced only by the Maulua Bridge at more than 1000 feet. After the Maulua Bridge was taken down, Hakalau became the longest highway bridge in the territory for several years.[6] It was also among the tallest, with a height of 261 feet, only 25 feet shy of the tallest bridge over Nānue Stream.

In 1946, the railroad line were devastated by a tsunami. Hakalau Stream Bridge and four other bridges were retained and reconstructed when the rest of the steel trestle bridges were disassembled.[7] A sixth bridge was assembled from remaining parts from other bridges. The Hawai'i Belt Road (FAP 19) was re-routed in the early 1950s to utilize the abandoned railroad alighment since the original Belt Road was too narrow and winding for the large strucks used by the plantation industry in lieu of the devastated railroad. In 1953, Hakalau Stream Bridge was widened for use as a highway bridge with members from the disassembled railroad bridges. The reconstruction follows the original trestle design, however bolted rather than riveted connections were utilized. A concrete deck, sidewalks and rail were added to facilitate automobile and pedestrian traffic.

[4] John William Siddall, Men of Hawai'i (Territory of Hawai'i: Honolulu Star Bulletin, 1921), 451; and George Nellist, Men of Hawai'i, (Honolulu, 1935), 487-488.

[5] Hilo Tribune, (11 April 1911): 3.

[6] Hawai'i (State), Department of Planning and Economic Development, The State of Hawai'i Data Book, 1982. A Statistical Abstract (Honolulu: Department of Planning and Economic Development, 1983), 414.

[7] Patricia Alvarez, "A History of Road and Bridge Development on the Island of Hawai'i" in Historic Bridge Inventory and Evaluation: Island of Hawai'i, prepared for the State of Hawai'i, Department of Transportation, Highways Division in cooperation with the U.S. Department of Transportation, Federal Highways Administration, (Honolulu, 1987a), 50.

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)

See Continuation Sheet.

Previous documentation on file (NPS):

____preliminary determination of individual listing (36 CFR 67 has been requested
____previously listed in the National Register
____previously determined eligible by the National Register
____designated a National Historic Landmark
____recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record #_____

Primary location of additional data:

____State Historic Preservation Office
__x__Other State agency
____Federal agency
____Local government
____University
____Other
Name of repository:

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre.
(Do not include previously listed resource acreage)

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	5	277032	2201749	3			
2				4			

Verbal Boundary Description (describe the boundaries of the property)

The nominated property is a rectangular shaped parcel measuring 772 feet by 28 feet, which is centered on the UTM point listed above. Included within this parcel are the bridge's superstructure, substructure, floor system, and approach spans.

Boundary Justification (explain why the boundaries were selected)

The nominated structure includes the bridge's superstructure, substructure, floor system and appropriate spans and the property upon which they rest. These boundaries encompass, but do not exceed, all of the property that has been historically associated with this bridge.

11. Form Prepared By

name/title Spencer Leineweber, FAIA Professor
organization Heritage Center, University of Hawai'i at Mānoa date August 15, 2009
street & number 2410 Campus Road telephone (808) 956-4704
city or town Honolulu state HI zip code 96822

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** (7.5 or 15 minute series) indicating the property's location.

  A **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.

- **Continuation Sheets**

- **Additional items:** (Check with the SHPO or FPO for any additional items)

Photographs:

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

Name of Property: Hakalau Stream Bridge

City or Vicinity: Hakalau

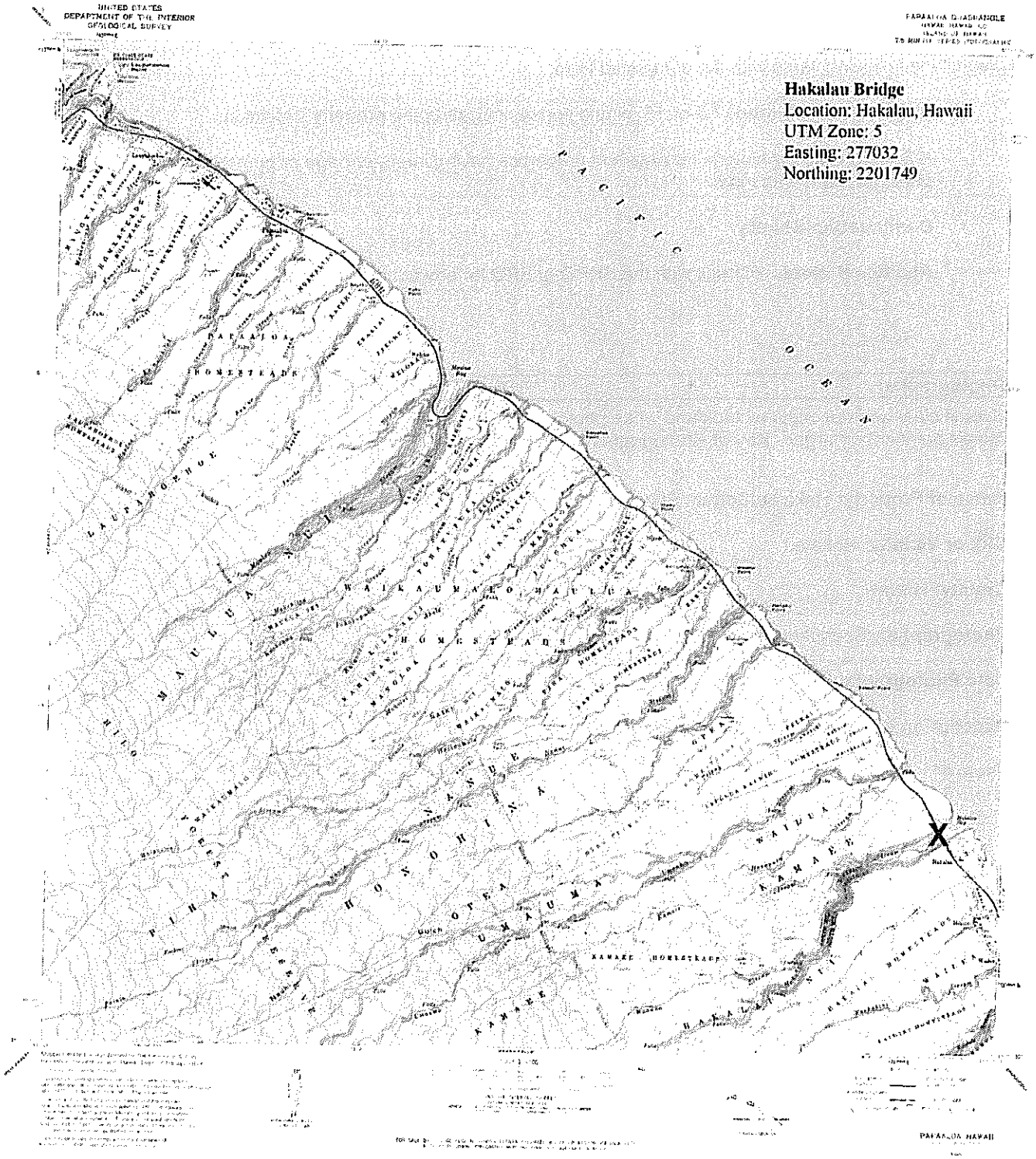
County: Hawai'i **State:** Hawai'i

Photographer: Spencer Leineweber, FAIA/Professor

Date Photographed: August 2009

Description of Photograph(s) and number:

Photo #1: Approach
Photo #2: Name
Photo #3: Trestle Substructure.


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Hakalau Bridge
Location: Hakalau, Hawaii
UTM Zone: 5
Easting: 277032
Northing: 2201749
PAPAALOA HOMESTEADS
HAUPAPAHOE
MAULEA
WAILAUMAEOHAULEA
HOMESTEADS
HOSOHINA
PIHANA
OTEA
UMAUMA
KAMAEE
KAMAEE HOMESTEADS
WAILUA
PAPAALOA HAWAII

Sketch Map

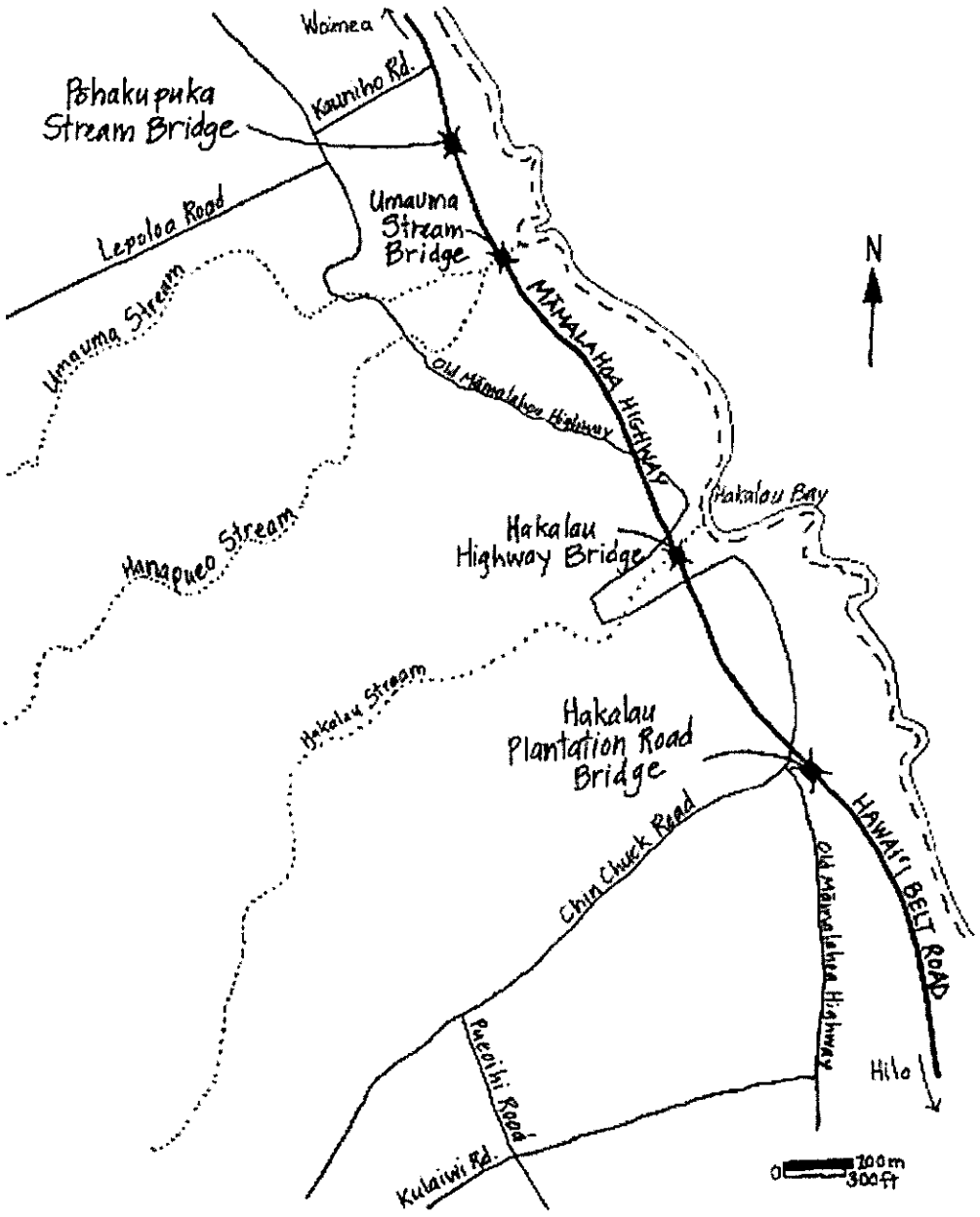

Waimea
Kawiniho Rd.
Pohakupuka Stream Bridge
Lepoloa Road
Umauma Stream Bridge
Umauma Stream
Old Mamalahoa Highway
MAMALAHOA HIGHWAY
N
Hakalau Bay
Hakalau Highway Bridge
Hanapueo Stream
Hakalau Stream
Hakalau Plantation Road Bridge
Chin Chuck Road
HAWAI'I BELT ROAD
Old Mamalahoa Highway
Hilo
Pakalehi Road
Kulaiwi Rd.
0
200 m
300 ft

Photo #1: Approach

Photo #2: Name

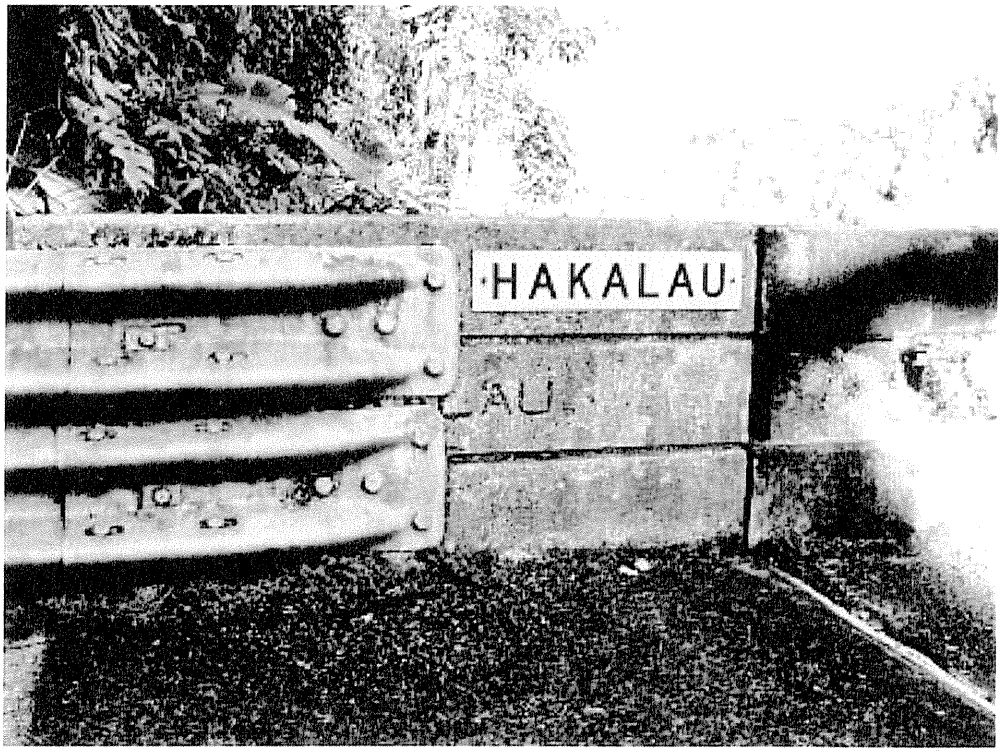
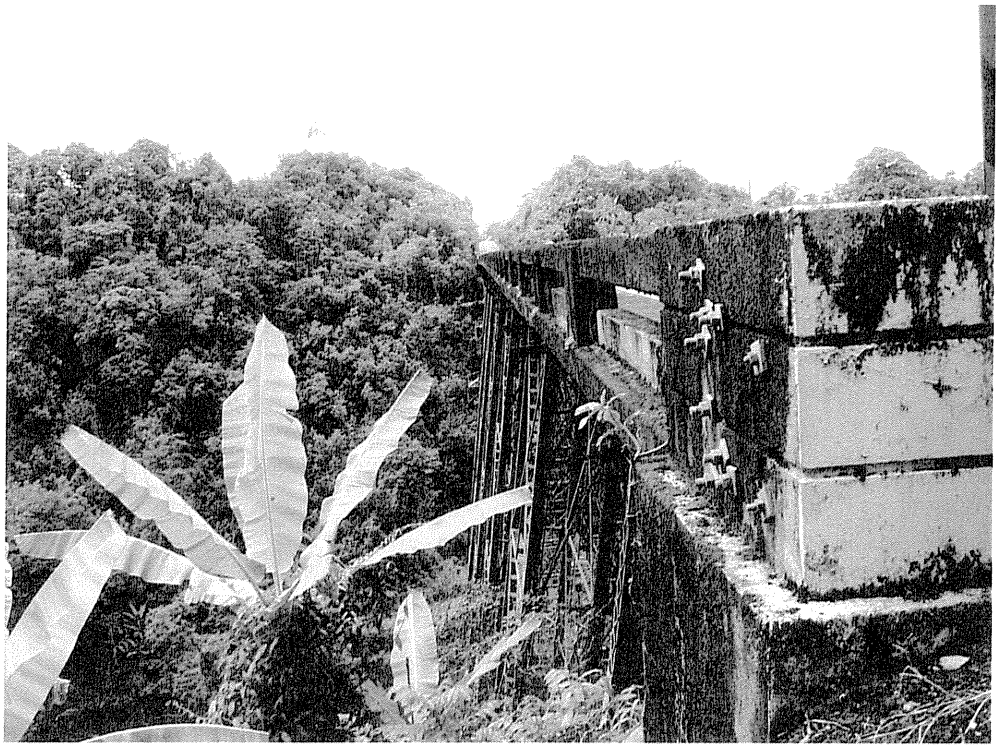


Photo #3: Trestle Substructure



D. BRIDGE REHABILITATION GUIDELINES

STANDARDS AND GUIDELINES FOR THE TREATMENT OF HISTORIC BRIDGES[57]

The principles, priorities, and guidelines for rehabilitating historic bridges comprised in this document are intended as a preliminary guide for evaluating rehabilitation options and determining appropriate treatments of historic bridges. These guidelines should be considered along with other requirements such as safety, cost-effectiveness, and other factors normally considered in bridge rehabilitation projects. The term "historic bridge" is applied to those bridges listed on or determined to be eligible for the NHRP by the application of criteria developed for that purpose.

A coherent approach to the treatment of historic bridges requires (1) identification and evaluation of the resources to be preserved or protected, (2) a comprehensive plan for dealing with the resources identified, and (3) a methodology for the application of appropriate treatments, including standards and guidelines.

The identification and evaluation of structures and a commitment to preservation plans are necessary steps for the retention of historically significant bridges. The successful implementation of a bridge preservation program is dependent upon acceptable guidelines and standards that accommodate the perspectives of both the preservation community and transportation agencies. Because civil engineering structures primarily serve functions in the public domain, their preservation focuses attention on what appears to be diametrically opposed legislative mandates. Thus, today's bridge repair and replacement projects bring together two sets of professionals whose divergent approaches have been established by legislation whose ultimate aim is the public good.

At present, the standards referred to in bridge rehabilitation projects are: *AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications*, adopted by the American Association of State Highway and Transportation Officials (AASHTO), and the Secretary of the Interior's *Standards for Rehabilitation* and *Guidelines for Rehabilitating Historic Buildings.* The first is a detailed manual on bridge design; the second is a set of ten standards and expanded guidelines for the evaluation of proposed rehabilitations. The former must be quantitative and detailed to be useful for safe design practice, while the latter must be qualitative and broad enough to be applicable to a wide variety of historic resources.

Structural inadequacies can be corrected by rehabilitation alternatives which include strengthening the critical members, adding supplemental members, reducing the dead load, modifying the structural system, and repairing or replacing damaged members. The most obvious structural deficiency is inadequate load-carrying capacity for the superstructure. Other, often hidden deficiencies include mechanical problems with joints, bearings or other details, and substructure deterioration or instability. Engineering concerns are compounded by problems of functional obsolescence which include inadequate geometrics (vertical clearance, deck width, and approach alignments), inadequate safety barriers, and inadequate hydraulic capacity. Solutions to correct these defects are complex because bridges are "pure" structures designed to carry maximum loads with minimal materials. Unlike the case for most buildings, the structural framework of most bridges is exposed and unsheathed. Therefore, working on the structural system without affecting the appearance of the structure is extremely difficult.

It is difficult to force an old bridge, designed for the loads, speeds, and vehicles of decades past, into the design mold for a new bridge. This problem has been acknowledged by the FHWA and the ability to grant exceptions to AASHTO standards for historic bridges has been addressed by officials of that agency in the past few years. A report issued by the FHWA in October 1984, "Mitigation Options Related to Historic and Archeological Properties," states:

[57] The Heritage Center, School of Architecture at the University of Hawaii at Manoa, *State of Hawaii Historic Bridge Inventory and Evaluation*, Prepared for the State of Hawaii Department of Transportation, Highways Division, in in cooperation with the U.S. Department of Transportation Federal Highway Administration (Honolulu, 2008).

The standards are unlikely to be changed or modified now or in the near future. However, the frequency of granting exceptions is likely to increase as those standards are being questioned more routinely. Division Administrators are authorized to grant exceptions on a case-by-case basis if they believe the exception is justified.

The AASHTO's issued *Policy on Geometric Design of Highways and Streets* (2004) includes historical significance as a factor for granting exceptions on local roads and streets:

> Existing substandard structures should be improved, but because of their high replacement cost, reasonably adequate bridges and culverts that meet tolerable criteria may be retained. Some of the non-technical factors that should be considered are the esthetic value and the historical significance attached to famous structures, covered bridges, and stone arches.

It is important to recognize throughout the rehabilitative process the need to emphasize public safety. Thus, exceptions are granted on a case-by-case basis, and they specifically state that such exceptions are not to be construed as precedent-setting actions. "Tolerable criteria" have sometimes been interpreted to include engineering studies that support the capacity of a bridge to carry the anticipated loads and traffic safely, and an accident frequency that is not abnormally high. Non-technical factors which should be considered when determining the treatment of historic bridges include the degree of local public interest in the bridge; the importance of the bridge as a representative of the period, type of design, or example remaining in the state; the cost-effectiveness of rehabilitation; and the extent and magnitude of variances from AASHTO standards. The needs of each bridge and its site must be considered in light of the needs of the overall highway network. In cases where a substandard historic bridge meets tolerable criteria, exceptions may be encouraged by local transportation officials when guidelines for the appropriate treatment of historic bridges are readily available.

STANDARDS AND GUIDELINES FOR REHABILITATION OF HISTORIC BRIDGES

The *STANDARDS*, patterned after the Secretary of Interior's "Standards for Rehabilitation," are intentionally general so as to be applicable to all bridges. They are not rigid rules which evaluate all bridges alike. While there is a system of options and alternatives which may apply to most bridges, each historic bridge should be evaluated on its own merits with respect to its historic, character-defining elements. A hierarchy of important elements for each bridge should be established and referred to as rehabilitation plans commence. Thus, creative solutions might be found in the process of designing necessary upgrades.

The *GUIDELINES* consist of a general section that addresses structural upgrading, geometric modification, materials repair and maintenance, and removal to a less demanding site. Following the general guidelines are additional guidelines which may be necessary when considering non-vehicular uses, replacement, or bridges located in historic districts. Through AASHTO, *Guidelines for Historic Bridge Rehabilitation and Replacement* was published in March 2007 and is available for reference online at:

http://environment.transportation.org/cop/groups/historic_bridges/media/p/30.aspx

The concepts contained in this document are intended for use in the treatment of all historic bridges, and should not be restricted solely to bridge rehabilitation and replacement projects. The *STANDARDS* and *GUIDELINES* are applicable to any historic bridge project, including upgrading for safety or other purposes and bridge maintenance. It is hoped that the document will serve as a framework for an expanded version of guidelines that may be compiled as the body of information from successful bridge rehabilitation projects develops.

STANDARDS FOR THE TREATMENT OF HISTORIC BRIDGES

The decision to retain a bridge in service must be based on legislative mandates and considerations such as economy, safety, and the existing and future transportation needs of the overall highway network. The historical importance of the structure at the national, state, and local levels must be fully considered to assure a reasonable, balanced decision. As suggested in AASHTO's most recent policy, where the bridge meets tolerable criteria, exceptions to current accepted engineering standards should be sought.

Regardless of which alternative is chosen for rehabilitation of the historic bridge, the treatment should be carried out with careful consideration of the following standards:

1. Every reasonable effort should be made to continue the historic bridge in some form of useful transportation service. Primary consideration should be given to rehabilitation of the bridge on site. Only when this option has been fully exhausted should other alternatives be explored.

2. The original character-defining qualities or elements of a bridge, its site, and its environment should be respected. The removal, concealment, or alteration of any historic material or distinctive engineering or architectural features should be avoided when possible.

3. All bridges should be recognized as products of their own time. Proposed alterations that have no historical basis and which seek to create a false historical appearance should be discouraged.

4. Changes which have taken place in the course of time may be evidence of the history and development of a bridge, its site, and its environment. These changes may have acquired significance in their own right, and this significance should be recognized, be carefully evaluated, and respected.

5. Distinctive engineering and stylistic features or examples of skilled craftsmanship which characterize a bridge should be treated with sensitivity.

6. Deteriorated structural members and architectural details should be retained and repaired, rather than replaced, whenever possible. In the event replacement is necessary, the new material should match the material being replaced in design, color, texture, and other visual qualities.

7. The surface cleaning and treatments of bridges should be done with processes that will not damage the historic materials.

8. Every reasonable effort should be made to protect and preserve significant archeological and other cultural and environmental resources by or adjacent to any bridge.

9. Contemporary designs for new bridges located in historic districts, should not be discouraged. Contemporary designs for proposed alterations and additions to historic bridges should be compatible with the size, scale, visual quality, and character of the historic district, or of the bridge and its environment, and any alterations and additions should not destroy or conceal significant structural, architectural, or historical materials.

10. Wherever possible, additions or alterations to bridges should be made in such a manner that their subsequent removal would not impair the essential form and integrity of the original bridge.

FEDERAL GUIDELINES FOR THE TREATMENT OF HISTORIC BRIDGES

THE SURFACE TRANSPORTATION AND UNIFORM RELOCATION ASSISTANCE ACT OF 1987

The Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), Section 123 (f), Historic Bridges, established a series of requirements and emphasis areas concerning historic bridges on and off the Federal Aid system.

The legislation encouraged states to give special consideration to rehabilitating, reusing, and preserving historic bridges by explicitly making these activities eligible for reimbursable project costs on bridges in service for motorized vehicles. It is the policy of the Federal Highway Administration (FHWA) to consider a wide range of preservation options; including avoidance, rehabilitation, modified use, marketing, and relocation. If the load capacity and safety features (geometrics) of a historic bridge are adequate to serve on the public road at its existing location, the bridge should be rehabilitated at a reasonable cost, so it can continue to provide service. If the bridge's load capacity and safety features are adequate to serve on a public road at another location, the movement of the bridge to the new location should be considered as part of the original project. If such relocation of the historic bridge is made part of the Federal Aid proposal, then reasonable costs associated with actions to relocate and preserve the historic integrity of the historic bridge are eligible for reimbursement without reference to the cost of demolition.

These actions could include work approved by the FHWA which ensures the historical integrity of design, scale, and materials. This would include replacing portions of historic elements of the structure in-kind, cleaning, repainting, or rehabilitating to maintain (preserve) both the structural and the historic integrity of the historic bridge. At the completion of the project, the bridge may no longer be classified as deficient for purposes of the NBI for at least 10 years.

PRESERVATION

The Surface Transportation and Uniform Relocation Assistance Act (STURAA) of 1987 makes funds, which otherwise would have been used for bridge demolition, available for actions to preserve or reduce the impact of the project on a historic bridge.

In the case of historic bridges which can no longer be used on a public road, reasonable costs associated with preservation could include modification for recreational use, relocation, etc. The FHWA will determine the reasonable level of funding, not exceeding the estimated cost of demolition (based upon professional advice of the state highway bridge engineer). These bridges will be removed from the NBI and are no longer eligible for FHWA funding.

STURAA imposes a requirement that, prior to demolition of a historic bridge, the state shall market (sell or donate) the bridge to a state or local government agency or responsible private entity. This preservation effort is to be coordinated with the SHPO and the local historical society to ensure that a reasonable audience is reached and a good faith effort is made.

In the marketing effort, the state needs to specify what preservation work is needed; that reasonable funding is available for the preservation work; and that any potential recipients must be able to demonstrate their ability to assume legal and financial responsibility for the bridge, including holding highway agencies harmless in any liability action. Any non-governmental party must be able to demonstrate its economic and administrative ability to perform the essential obligations necessary for the operation of the bridge.

If a bridge cannot be sold and a recipient accepts donation of the bridge, the recipient can be reimbursed for costs incurred in such activities as relocation, site preparation, reassembly, etc. Costs eligible for reimbursement to preserve a historic bridge which is no longer used on a public road shall not exceed the estimated cost of demolition. Maintenance costs (including prepaid annuities) are not eligible for reimbursement. No bridge will be marketed or donated to a party unless that. party agrees to; (1) accept title, (2) maintain (preserve) the bridge and the features that give it its historic significance (qualities that qualify it to the National Register), and (3) assume all future legal and financial responsibility for the bridge and to hold the state highway agency and the FHWA harmless in any liability action. In the event that no acceptable party is found by a good-faith effort and within a reasonable period of time, the requirements of the new legislation are satisfied and the FHWA may complete the Section 106 and Section 4(f) processes.

GENERAL GUIDELINES FOR THE TREATMENT OF HISTORIC BRIDGES

The specifics of each historic bridge and its environment will determine whether rehabilitation options for the continued use of the bridge are feasible. In planning the proposed treatment of a historic bridge, the following priorities should be explored.

I. ***Continued Use for Vehicular Purposes***

The preferred use for historic bridges is continued service for vehicular purposes. This alternative will probably require consideration of one or more of the following:

A. *Structural Upgrading*

1. Identify the structural system and its individual character-defining features
    a) The structural system should be evaluated using non-destructive testing techniques, where possible.
    b) Passive solutions which adjust the live load by restricting vehicles should be explored, examples include load posting, signaling, and channeling.
    c) The structural system should be respected, and its visual characteristics should be retained if modifications are necessary.
        (1) The original load-carrying system should be retained, if possible.
        (2) The dead load should be reduced by providing a lighter deck system, if possible.
        (3) If the load-carrying system must be altered, the character-defining visual qualities of the original structural system should be retained. Modified systems which can be visually minimized include the introduction of structure continuity and other methods of reinforcement.

(4) If visual modifications are necessary, they should be kept as unobtrusive as possible.
(a) Modifications may include changing the configuration of isolated members or the addition of helping structures.
(b) Supplemental members should be added as needed under the deck of the structure, if possible.

2. Modifications should follow the following guidelines

a) Visually intrusive structural modifications should be kept as inconspicuous as possible, and should affect only secondary views, if possible. Consideration should be given to whether there is a primary view.
(1) Bridges which carry highways are seen by roadway travelers from afar, in elevation, and while traveling on the bridge deck. Modifications should be made with this in mind.
(2) Where circumstances are such that the primary view is from below the bridge, such as an overpass, modifications should be made accordingly.

b) Modifications should be so designed that there is the least possible loss of historic material, and so that the character-defining features are not obscured, damaged, or destroyed.

c) Structural modifications, or helping structures, should be clearly differentiated from the historic bridge. The design should be compatible in terms of mass, materials, scale, and detail.

d) Traffic railings, or safety barriers, should be designed to meet requisite load requirements, and at the same time should be designed and installed so that character-defining features of the bridge are not obscured or damaged.

e) Deteriorated structural elements should be replaced in kind or with a material which duplicates the visual appearance of the original element.

B. *Geometric Modifications*

1. Evaluate the geometric constraints of the bridge in the context of the overall highway network. Determine realistic needs for geometric parameters in light of connecting highways, projected traffic volumes, accident history, and the proposed nature of future traffic needs.

2. Explore passive (off-bridge) solutions.

a) Adjust alignment of the approaches, restrict the bridge to one-way traffic, or both.
(1) Create holding lanes for traffic at the approaches to a one-lane bridge with appropriate provisions for safety.
(2) Leave the historic bridge in place for one-lane traffic and move a visually compatible historic bridge to an adjacent site to carry the second lane.
(3) Leave the historic bridge in place for one-lane traffic and construct a visually compatible new bridge on an adjacent site to carry the second lane.

b) The flow of approaching traffic should be adjusted by restricting vehicles, restricting speed, or installing signs and traffic signals.

c) Provide sidewalks external to the bridge for pedestrian safety.

d) The bridge should be widened by cantilevering a new deck from either side of the existing structure, where structurally feasible and aesthetically and historically appropriate.

3. Alter the geometric configuration of the bridge to remedy geometric deficiencies.
    a) To increase the vertical clearance on through bridges, the depth of the portal frames and sway frames should be reduced with minimum possible destruction of historic fabric.
    b) To increase the vertical clearance on grade-separation structures, the superstructure should be raised or the roadway lowered.
    c) To increase the roadway width, some types of structures can be modified (e.g., multigirder, some concrete and stone bridges). Modifications should be designed to be compatible with the original structure.

C. *Materials Repair and Maintenance*

1. Identify features that are important in defining the overall historic character of the bridge.
2. Historic materials should be repaired, if possible. If replacement of a feature is necessary, it should be replaced in kind or with a compatible substitute material.
    a) Masonry Superstructure and Substructure
        (1) Drainage and vegetation
            (a) Provide proper deck drainage systems which do not damage or promote deterioration of the superstructure or substructure
            (b) Remove vegetation growing on bridge superstructure or substructure.
        (2) Cleaning
            (a) Clean masonry only when necessary to halt deterioration or to remove heavy soiling.
            (b) Clean masonry with the gentlest method possible.
            (c) Use cleaning method on test patches to determine long-range detrimental effect of cleaning.
        (3) Repointing
            (a) Remove deteriorated mortar by carefully hand-raking the joints to avoid damaging the masonry.
            (b) Duplicate old mortar in strength, composition, color, and texture.
            (c) Duplicate old mortar joints in width and joint profile.
        (4) Repair of deteriorated sections
            (a) Replace extensively deteriorated or missing features in kind or with a compatible substitute material.
            (b) Replace masonry sections that are not repairable, in kind, using the same materials or compatible substitute materials. Dismantle deteriorated sections by hand, and with care.
            (c) Do not apply non-historic coatings, such as stucco, gunite, and sealants, to masonry surfaces as a substitute for repointing and masonry repairs.
    b) Metals
        (1) Cleaning
            (a) Identify metal prior to cleaning and test for gentlest possible cleaning method.
            (b) Use the gentlest possible cleaning methods for cast iron, wrought iron, and steel (structural metals found on historic bridges) to remove paint buildup and corrosion. If hand scraping and wire brushing prove ineffective, low pressure dry grit or walnut shell blasting may be used as long as it does not abrade or damage the surface. Test patches should be cleaned to determine damage.
        (2) Repaint with colors that are appropriate for the historic bridge.

(3) Replace deteriorated or missing decorative elements in kind or with a compatible substitute material.

c) Wood

(1) Repair historic wood features by patching or reinforcing, using recognized preservation techniques.

(2) Replace in-kind historic wood features which need to be replaced. If replacement in-kind is not possible, substitute materials that are compatible in texture and form, and that convey the same visual appearance as the original.

D. *Removal to a Less Demanding Site*

1. If possible, seek a less demanding site on the existing transportation system.
2. If possible, find a new owner for the historic bridge among public agencies such as state parks and recreation departments, or county or municipal parks departments, or state tourism agencies.
3. If a new owner cannot be located in the public sector, an owner in quasi-public or nonprofit groups should be sought.
4. If no recipient can be found in public or quasi-public groups, an owner in the private sector may be sought.
5. Ensure that the recipient of the bridge is prepared to maintain it, and rehabilitate it if necessary. A preservation covenant or restriction may be necessary to ensure this.
6. When possible, undertake the selection and preparation of a relocation site in the proximity of the original site.
7. Prior to removal, make a complete and comprehensive inventory of all bridge parts. The parts should be carefully numbered and referenced to the inventory for identification.
8. If possible, remove the bridge without disassembling.
9. If disassembly is necessary, disassemble the bridge in such a manner as to allow for its reassembly.
10. Reassemble the bridge to duplicate its original configuration.
11. Do any required cleaning or repair of the bridge in conformance with previously stated guidelines as appropriate.

II. ***Continued Use for Non-vehicular Purposes***

If it is not feasible to continue a historic bridge in service for vehicular purposes, priority shall be given to continued use for non-vehicular purposes, at an existing site or at a new site. Preference shall be given to transportation-related uses of the historic bridge. Non-vehicular uses of a historic bridge may include:

A. *Transportation-Related Functions*

1. Where feasible the bridge should be retained in a transportation or transportation-related function.
   a) While the most feasible transportation use may be to leave the bridge in place as a bicycle or pedestrian crossing, or to move it to a public park or recreation area for the same purpose, other uses and other locations should not be precluded, including ones that involve private ownership.

2. Adaptive use *in situ* will often be the only alternative for masonry or concrete bridges because of their nature or size. However, others are movable, particularly metal and timber trusses. In instances where the features in the immediate vicinity of the bridge have an associative value, preference should be given to adaptive use *in situ*. This is particularly important where the bridge is located within the boundaries of a historic district, or is clearly associated with contemporary transportation or industrial features.
3. In choosing among alternatives, greater consideration should be given to those factors that will enhance or protect the historic bridge than to the specific nature of the adaptive use or its location. Such factors include: provision for maintenance; protection from vandalism; accessibility to the public; and opportunities for interpretation.
4. While an adaptive use may reflect a reduced level of loading, structural adequacy for the new use must still be determined, and rehabilitation undertaken when appropriate.
5. The selection and preparation of an alternative site should be undertaken with sensitivity to the historical use and siting of the bridge.
    a) A bridge that has distinctive features that link it with a particular use should be used in its historical context.
    b) Bridges should not be placed where they are clearly too long or too short for the obstruction that they span, and skews generally should be avoided. New abutments should be of compatible design and clearly distinguishable from the historic bridge.
6. Consistent with safety considerations, the structure itself should be returned to its historic configuration by removing visually obtrusive, non-character-defining elements that may have been added to permit the bridge to serve its present function, but which are not required for the new function. These might include elements added to enhance stiffness or load capacity, or secondary features, such as modern decks and guardrails.
7. Elements which have been added to the bridge over the course of its history and which are determined to be character-defining should not be removed.
8. Missing nonstructural elements of the bridge, including decorative features, that are distinctive of the style, type, or period in which the bridge was built should be replaced if they can be replicated from similar elements that survive on the same or a similar bridge.

B. *Non-Transportation-Related Functions*

1. If it is not feasible to retain the bridge in a transportation-related function, consideration should be given to non-transportation-related uses including public recreational uses, use as interpretive sites or museums, or architectural adaptations that could provide residential, commercial, or educational space.
    a) In such instances, the adaptive use should not obscure or alter the essential elements of the structure that impart its identity and significance as a bridge.
    b) If the bridge is to remain or be moved within a historic district, careful consideration should be given to the compatibility of the proposed use with the architectural and historical character of the historic district.
    c) Items A.1, A.2, and A.7 above are equally applicable to architecturally adaptive uses.

C. *Adaptive Re-Use*

If an adaptive use cannot be found, consideration should be given to retaining the bridge either in place or at an alternative location as a historical ruin or monument.

III. ***Replacement with Mitigation***

When alternatives for continued use of a historic bridge for vehicular or non-vehicular uses have been considered and determined to be not feasible or prudent, and the historic bridge must be removed from its site, replacement with mitigation is the remaining alternative. Historic bridges which are scheduled for demolition, or alteration which destroys historic integrity, are documented to mitigate the adverse effect of demolition or alteration. Such documentation should be prepared for inclusion in the HAER collection in the Library of Congress. Additional mitigation options include storage and/or salvage of all or parts of a bridge, an alternative generally applicable to metal bridges. Mitigation options may include:

A. *Documentation*

The primary criterion in documenting historic bridges is whether the bridge can reveal information critical to understanding and interpreting bridge design, fabrication, engineering, and technology. Documenting bridges can contribute to understanding the development of transportation systems in the United States. Moreover, documentation provides information on the lives and works of individuals and engineers who contributed to advancing bridge technology. The following guidelines are recommended for documentation of historic bridges:

1. When a bridge has been determined to be eligible for the NRHP and all alternatives for preservation are exhausted, the federal and state agencies involved should consult with the appropriate Regional Office of the National Park Service (Western Regional Office in San Francisco) to determine the documentation level required. Generally, the levels of documentation correspond to the level of significance of the bridge as follows:
    a) Documentation Level I for bridges of national significance requires:
        (1) measured drawings,
        (2) large-format contemporary photographs,
        (3) photocopies of selected existing drawings (when available),
        (4) historic photographs and illustrations, and
        (5) written data.
    b) Documentation Level II for bridges of state significance requires
        (1) photocopies of selected existing drawings (when available),
        (2) historic photographs and illustrations,
        (3) large-format contemporary photographs, and
        (4) written data.
    c) Documentation Level III for bridges of local significance requires
        (1) dimensioned sketch plans and elevations snowing bridge configuration,
        (2) large-format contemporary photographs, and
        (3) written data.
2. Individuals compiling documentation should be professionally qualified with demonstrable experience in bridge history and in documenting historic bridges.
3. Documentation should focus on the existing bridge and should be an accurate record of existing conditions supplemented by information obtained from reliable secondary sources with documentary limitations clearly stated.
4. Documentation should be prepared in such a manner as to permit the independent verification of information.
5. Documentation should be prepared on materials that are readily reproducible, durable, and of standard sizes that meet accession and archival requirements of the Library of Congress.
    a) Documentation should be clearly and concisely presented.

B. *Storage and/or Salvage*

If storage and/or salvage are part of the mitigation required for the bridge, additional consideration is necessary after documentation, as noted above, has been completed.

1. The goal of salvaging parts or all of the historic bridge should be identified in order to determine appropriate treatment.
2. If future use of the bridge is anticipated, a comprehensive inventory of all bridge parts should be completed. The bridge parts should be carefully numbered and referenced to the inventory for identification.
3. If future use of the entire bridge is anticipated, the bridge should be dismantled with care in such a way as to allow reassembly. The bridge parts should be stored in a place where they will be protected from deterioration.
4. If only portions of the bridge will be salvaged, those portions should be removed with care and stored or delivered to the new owner.
5. Guidelines included in Section I-D: Removal to a Less Demanding Site, may be applicable.

IV. *Special Considerations for Bridges Located in Historic Districts*

Bridges located within the boundaries of designated historic districts may contribute to, or detract from, the overall character of the historic district. Treatment of an existing historic bridge, a replacement bridge, or a new bridge within a historic district should take into consideration the character of the historic district. Considerations for a bridge located within a historic district may include:

A. *Consultation*

In consultation with the SHPO, designated historic districts and their important characteristics should be identified.

1. Identify features which are important in defining the overall historic character of the district.
2. Identify character-defining features of the historic bridge and its relationship to the buildings, streetscapes, and landscapes in the historic district.

B. *Treatment*

The treatment to be given historic bridges should be established with reference to the Priority Levels presented in the section on Standards and Guidelines for the Treatment of Historic Bridges.

1. If the bridge is a historic bridge and/or contributing structure within the designated historic district, rehabilitation options may include:
   Priority I: Continued Use for Vehicular Purposes, or
   Priority II: Continued Use for Non-vehicular Purposes
2. When the bridge cannot be upgraded adequately for continued vehicular use and the site precludes other uses, the historic bridge may need to be replaced. This alternative may require replacement with mitigation, including documentation.
3. In addition to the evaluation of appropriate treatments for the historic bridge, the design of the replacement bridge should include consideration of the new bridge's compatibility within the historic district.

C. *New Bridges*

New bridges built in existing historic districts, whether replacement bridges or not, should be designed to be compatible with the character of the historic district in which they are located.

1. The design and construction of the new or replacement bridge should be compatible with the bridge site and the historic character of the district in terms of size, scale, design, materials, color, and texture.
2. The design of the new or replacement bridge should preserve the historic relationship between the bridge, its site, and the buildings adjacent to it.
3. The design of the new replacement bridge should retain the historic relationship between the overall bridge siting and streetscape and landscape features in the district.
4. If the historic substructure is sound, the replacement bridge should incorporate it as part of the new bridge.

ADDITIONAL RESOURCES

- *Flexibility in Design: A Guide for Achieving Flexibility in Highway Design*
  ©2004 American Association of State Highway and Transportation Officials

- *NCHRP Document 189: Design and Management of Historic Roads* (Web-Only)
  National Cooperative Highway Research Program (NCHRP), Transportation Research Board of the National Academies

  Prepared by: Mary E. McCahon, Larry Sutherland, and Steven Shaup / TranSystems, Inc.
  January 2012

- *NCHRP Document 742: Communicating the Value of Preservation: A Playbook*
  National Cooperative Highway Research Program (NCHRP), Transportation Research Board of the National Academies

  Prepared by: Joe Crossett and Kyle Schneweis / High Street Consulting Group in association with Burns & McDonnell, Parris Communications, and CDM Smith
  © 2012 National Academy of Sciences

- *Guidelines for Historic Bridge Rehabilitation and Replacement*
  American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on the Environment

  Prepared by: J. Patrick Harshbarger, Mary E. McCahon, Joseph J. Pullaro, and Steven A. Shaup / Lichtenstein Consulting Engineers, Inc. in association with Parsons Brinckerhoff Quade & Douglas, Inc.
  March 2007

- *Best Practices and Lessons Learned on the Preservation and Rehabilitation of Historic Bridges*
  American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on the Environment

  Prepared by: Parsons Brinckerhoff, Inc. in association with TranSystems, Inc. and Brelend C. Gowan, JD
  July 2012

- *The Preservation Office Guide to Historic Roads: Clarifying Preservation Goals for State Historic Preservation Offices, Establishing Preservation Expectations for State Transportation Departments*

  Written by: Paul Daniel Marriott, with the generous underwriting of The James Marston Fitch Charitable Foundation
  June 2010

- *The Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*

  Prepared by: Office of Engineering, Bridge Division, Bridge Management Branch
  December 1995

- *Context Sensitive Solutions*
  U.S. Department of Transportation, Federal Highway Administration
  http://contextsensitivesolutions.org

E. 2000 MOA ON COUNTY OF HAWAII BRIDGES

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

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

October 31, 2000

Mr. Galen M. Kuba, Division Chief
Engineering Chief
County of Hawaii
Department of Public Works
25 Aupuni Street, Room 202
Hilo, Hawaii 96720-4252

LOG NO: 26428
DOC NO: 0010tm13
Architecture

Dear Mr. Kuba:

SUBJECT: **Section 106 Compliance**
Photo Documentation of Kaahakini/Mamalahoa Bridge,
Inoino/Mamalahoa Bridge, Waikaalulu/Mamalahoa Bridge
TMK: Various, Island of Hawaii

Thank you for transmitting the photo documentation of the above bridges. This meets the conditions of the Memorandum of Agreement. For your information, we are currently working with the State Department of Transportation and the Federal Highways Administration on accepting one-lane bridges to receive federal funding. We hope to have something tangible in the near future.

Thank you for working with our office. Should you have further questions, please call Tonia Moy at (808)692-8030.

Aloha,

TIMOTHY E. JOHNS
State Historic Preservation Officer

TM:jk

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Hawaii Division
300 Ala Moana Blvd., Room 3-306
BOX 50206
Honolulu, HI 96850

May 20, 1999

IN REPLY REFER TO
HEC-HI

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

Dear Mr. Hayashida:

Subject: National Historic Preservation Act
Section 106 Compliance
Memorandum of Agreement
Replacement of Various Bridges
Mamalahoa Highway Historic Bridge District
Island of Hawaii

Enclosed for your files is a copy of the **revised** Memorandum of Agreement (MOA) accepted by all parties. This acceptance completes the requirements of Section 106 of the National Historic Preservation Act and the regulations of the Advisory Council on Historic Preservation for the referenced project. Please note that the original agreement is kept on file at the Council and a copy will be sent to all signatories.

Thank you for your continued assistance with this project. Please call me at (808) 541-2700, if you should have any questions.

Sincerely yours,

Richelle M. Suzuki

Richelle M. Suzuki
Transportation Engineer

Enclosure

MEMORANDUM OF AGREEMENT
Among the
ADVISORY COUNCIL ON HISTORIC PRESERVATION,
FEDERAL HIGHWAY ADMINISTRATION,
HAWAII STATE HISTORIC PRESERVATION OFFICE, and the
COUNTY OF HAWAII DEPARTMENT OF PUBLIC WORKS
Regarding the Replacement of
HONOMU/MAMALAHOA BRIDGE, KALAOA/MAMALAHOA BRIDGE,
OPEA/MAMALAHOA BRIDGE, KALOPA/MAMALAHOA BRIDGE,
INOINO/MAMALAHOA BRIDGE, WAIKAALULU/MAMALAHOA BRIDGE,
AND KAAHAKINI/MAMALAHOA BRIDGE

WHEREAS, the above named bridges are within the Mamalahoa Highway Historic Bridge District; and

WHEREAS, the Federal Highway Administration (FHWA) has determined that replacement of the subject bridges will have an effect upon the Mamalahoa Highway Historic Bridge District, located along the Hamakua coast of the Island of Hawaii, a district eligible for inclusion in the National Register of Historic Places (NRHP), and has consulted with the Hawaii State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the FHWA has determined that the subject bridges need to be replaced due to structural deficiencies and geometries; and

WHEREAS, the Honomu/Mamalahoa Bridge, Kalaoa/Mamalahoa Bridge, Opea/Mamalahoa Bridge, and the Kalopa/Mamalahoa Bridge have examples of their respective bridge types that remain in-place and parties to this agreement have agreed that their recordation is not necessary;

WHEREAS, the Memorandum of Agreement dated September 22, 1998, is hereby superseded by this Memorandum of Agreement due to the discovery of burial sites in the vicinity of Inoino/Mamalahoa Bridge;

NOW, THEREFORE, FHWA, the SHPO, the Council, and HDOT agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account its effect on historic properties.

STIPULATIONS

FHWA will ensure that the following measures are carried out prior to the initiation of construction:

1. The existing Inoino/Mamalahoa Bridge shall be replaced at the same location. However, Mahuna Gulch Bridge and Lauhala Gulch Bridge shall be maintained as examples of timber bridges.

2. The Kaahakini/Mamalahoa Bridge shall be photo documented as an example of a concrete deck girder bridge prior to demolition. The photographs should be HABS quality, utilizing 4" x 5" negatives and archivally processed. Documentation of the Kaahakini/Mamalahoa Bridge shall be submitted to the Historic Preservation Office, FHWA, and the National Park Service, HABS Program.

3. The Inoino/Mamalahoa Bridge and the Waikaalulu/Mamalahoa Bridge shall be photo documented as examples of a timber girder bridge prior to demolition. The photographs should be HABS quality, utilizing 4" x 5" negatives and archivally processed. Documentation of the Inoino/Mamalahoa Bridge and the Waikaalulu/Mamalahoa Bridge shall be submitted to the Historic Preservation Office, FHWA, and the National Park Service, HABS Program.

4. SHPO shall review the design of the new bridges to ensure compatibility with the historic character of the old highway.

5. Before the replacement of any bridge within the Mamalahoa Highway Historic Bridge District other than those specified in this MOA, a preservation plan shall be developed by the County of Hawaii Department of Public Works for the remaining bridges within the district. The SHPO shall approve the preservation plan.

6. Dispute Resolution:
   a. At any time during the implementation of the measure stipulated in this Agreement, should an objection be raised by a local government or a member of the public, FHWA shall consult with the objecting party, the SHPO, and as needed, with the Council to resolve the objection. A record of the objection and FHWA's actions to resolve the objection shall be retained by the FHWA as part of the project files.

   b. Should an objection be raised by a signatory to this Agreement (ACHP, the SHPO, the Hawaii DOT, the County of Hawaii or Historic Hawaii Foundation) regarding the implementation of the measure stipulated in this Agreement, FHWA shall consult with the objecting party to resolve the objection. A record of the objection and FHWA's action to resolve the objection shall be retained by the FHWA as part of the project files. If FHWA determines that the objection cannot be resolved, it shall nevertheless seek the recommendations of the objecting party, document its consideration of the objecting party's recommendations in the project files and inform the objecting party and the ACHP of that consideration.

Execution of this Memorandum of Agreement and implementation of its terms evidence that FHWA has afforded the Council an opportunity to comment on the replacement of the above named bridges and its effects on historic properties, and that FHWA has taken into account the effects of the undertaking on historic properties.

ADVISORY COUNCIL ON HISTORIC PROPERTIES

By: _____ Date: 5/7/99
John Fowler, Executive Director

FEDERAL HIGHWAY ADMINISTRATION

By: Abraham Wong Date: 3/1/99
Abraham Wong, Division Administrator

HAWAII STATE HISTORIC PRESERVATION OFFICE

By: _____ Date: 3/30/99
Michael D. Wilson, State Historic Preservation Officer

Concurred By:

HAWAII DEPARTMENT OF TRANSPORTATION

By: Kazu Hayashida Date: 3/10/99
Kazu Hayashida, Director

DEPARTMENT OF PUBLIC WORKS

By: _____ Date: 2/24/98
Jiro Sumada, Deputy Chief Engineer

HISTORIC HAWAII FOUNDATION

By: _____ Date: 4-15-99
David Scott, Executive Director

F. MEETING MINUTES

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
February 9th 2012

Project:	HISTORIC BRIDGE INVENTORY AND EVALUATION REPORT Coordination Meeting	
Meeting Date:	February 3rd 2012	
Time:	9:00 AM	
Location:	HDOT Kapolei, Conference Room 611	
Attendees:	HDOT	Todd Nishioka, Misako Mimura, Paul Santo, Rob Miyasaki
	SHPD	Ross Stephenson, Mike Gushard
	MKE	Glenn Miyasato
	HHF	Katie Kissling
	FAI	Louis Fung, Tonia Moy

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introduction
   a. A meeting was held to go over the May 2008 Historic Bridge Inventory and Evaluation report prepared by Spencer Leineweber and how Hawaii Department of Transportation (HDOT) will be moving forward to completing the report. This report was considered final by the consultant; however, there is no documentation that this was accepted by HDOT. HDOT, Historic Hawaii Foundation (HHF), and State Historic Preservation Division (SHPD) had comments to the report and have not considered this final. MKE Associates LLC (MKE) and Fung Associates, Inc. (FAI) may be assisting HDOT in proceeding with the report.

II. Issues with 2008 Report
   a. HDOT has tabbed pages which included bridges replaced and demolished or information outdated.
   b. HDOT hopes to see the report have an executive summary with all other background information be included as part of the appendix.
   c. HHF reviewed and had comments back in 2008. Issues include the integrity and criteria methodology. HHF has mentioned that the report itself is outdated. Bridges may have not been looked at since the 70s and 80s. HHF felt that the report was not reliable since the

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content was outdated. Therefore, they do not use the report and currently conduct their own research. HHF does not support the criteria established by Spencer Leineweber and thus believes that the report needs to be redone.

d. SHPD has mentioned that the report is not user friendly. The report needs a better way to identify the bridges, provide location and area maps, provide color photographs, and provide structure numbers. SHPD hopes to see mitigation standardized (i.e. if this type of railing, this should be done to mitigate). A wish list was provided by SHPD. A five year or more projection of what bridges are going to be 50-years-old should also be included in the report. It was noted that the funding may be an issue so HDOT will have to manage based on funding availability. SHPD uses the report as a resource.

III. Salvageable Information

a. There was discussion on what could be salvaged from the May 2008 draft report. History and background information could be used, but all other materials may be outdated and needs to be re-evaluated. It has been agreed to do a new report and salvage only the history and background information.

IV. Moving Forward

a. In the interim, SHPD will be coordinating and working with HDOT on individual bridges on a case-by-case basis until a new report is completed. With a commitment from HDOT to complete the report, SHPD is willing to move forward on bridge projects that were being delayed until the report is completed.
b. Currently, SHPD has obtained federal funding to view bridges on neighbor islands and will be able to better assist with addressing bridge mitigation.
c. An agreed rating of system should be set and documented for consistency, in case a new administration or new group of personnel works on this.
d. Include the report as part of a Programmatic Agreement.
e. Due to the availability of funds, scope of work was discussed. HDOT will need to determine if funding is sufficient for MKE and FAI to complete the report.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
May 16th 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION	
Meeting Date:	May 16th 2012	
Time:	1:00 PM	
Location:	HDOT Kapolei, Bridge Design Section, Conference Room 611	
Attendees:	HDOT	Misako Mimura, Todd Nishioka Paul Santo, Neil Hasegawa
	FHWA	Domingo Galiciano
	MKE	Glenn Miyasato, Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions
- Notice to proceed on May 7. Project is to update Statewide Bridge Inventory due to dissatisfaction of point system and lack of concurrence from preservation partners in state.
- Ultimate goal for SDOT is to develop a Programmatic Agreement (PA) using the report as the basis for decision-making.

II. Lines of Communication
- Primary contact at SDOT will be Misako Mimura – SDOT Project Manager.
- Glenn Miyasato & Brian Kung are the prime consultants and should be cc'd on all communications though FAI can communicate directly with committee/SDOT, etc.
- Neal Hasegawa – for report information/IT information will be primary contact.
- Mayu Ohama – project coordinator @ FAI.
- Paul Santo – Bridge Engineer, project proponent, has knowledge of history of project.
- Tonia Moy – Project Manager and primary contact @ FAI.
- Domingo Galiciano – FHWA representative to guide through Federal requirements.

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III. Review of Draft Work Plan

a. Bridge Committee development

- Start from one committee group and later on can divided by the islands, committee members will provide their inputs for bridge's ranking.
- Conference can be done by video conference at SDOT office with neighbor island committee members attending at the SDOT offices on each island.
- Neal is main contact for bridge inspection reports. Inspection reports will be emailed or placed on FTP site.

b. Availability of data

- Past reports are all in PDF format. Spencer's report is in Word but might not be same as PDF file. FAI to check accuracy.

c. Use of Access database program

- Agreed to use the Access for the inventories, SDOT has own database program.

d. Report Format

- All bridge's criteria should be same, neighbor island variances will come with the bridge rankings.
- FAI proposes to use Spencer's historic context and include a summary matrix in the report, but all bridge information will stay within the Access database to operate as a searchable database. How this is formatted and distributed will be subject of future consultations.

IV. ACTION ITEMS:

<u>FAI</u>

- Set up the FTP site for this project.
- Check if the Access can lock/unlock the database and certain people can update the data.
- Start the list of name for committee members.
- Ask Ross at SHPD who to contact for committee group members.

<u>SDOT</u>

- Provide all the reports and upload to the FTP site (Spencer's Word report from Paul in particular).
- Provide the link to the list of NHO's from the DOI (Misako).
- Contact their IT person for the Access database format and connection how to distribute.

<u>FHWA</u>

- Provide HABS documentation done by Todd Croteau for Hana Highway bridges.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
July 5th 2012

Project:	HAWAII STATEWIDE BRIDGE INVENTORY EVALUATION	
Meeting Date:	July 5th 2012	
Time:	9:00 AM – 11:00 AM	
Location:	HDOT Offices, Various via video conference	
Attendees:	HDOT	Misako Mimura, Alvin Takeshita, Marshall Ando, Neil Hasegawa, Paul Santo, Todd Nishioka
	HDOT Hawaii	Sal Panem
	HDOT Kauai	Raymond McCormick
	HDOT Maui	Ferdinand Cajigal, Fred Gutierrez
	HDOT Oahu	Pratt Kinimaka
	FHWA	Domingo Galicinao, Pat V. Phung, Mayela Sosa
	SHPD	Ross Stephenson
	HHF	Kiersten Faulkner
	County of Hawaii	Robert Yanabu
	County of Maui	Ty Takeno
	KHPRC	Pat Griffin
	Hanalei Roads Committee	Barbara Robeson
	Community Member	Ron Terry
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions

- Alvin Takeshita, Highway Administrator from HDOT made opening remarks to note the importance of this project to consider safety and historic preservation. The goal is to use this report to help clarify and streamline the decision-making process and to assist in any future design guidelines or Programmatic Agreements (PA).
- Mayela Sosa of FHWA fully backs the project and noted that it is about balancing safety and stewardship.
- This report serves as a preliminary step to aid users in identifying eligible or non-eligible bridges but **will not replace the Section 106 process**. Bridges found

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eligible for listing on the State or National Registers of Historic Places will still need to undergo the Section 106 process. Those not eligible will still need to go Section 106 consultation for any cultural and/or archaeological concerns.

- This report represents a moment in time and will need updating every 5 or 10 years.
- This report is not a PA or a design guideline so it will not address safety issues nor will it take the place of the review process. It is a tool for reviewers and engineers to base design decisions.

II. Comments on May 2008 Statewide Bridge Report

- Historic context is okay but the evaluation method needs improvements and updates.
    - Ranking system needs to be revamped.
- Bridge were marked “non-eligible” without explanation as to why.
- Documentation is geared toward engineers instead of all potential users.
- Lack of community input.

III. Review of Methodology

a) Background Research/Data Collection

- Photos are needed to make an assessment on the bridges. FAI will salvage usable photos from the May 2008 Statewide Bridge Report and from Bridge Inspection Reports, otherwise FAI will request assistance from the counties and the state to acquire photos.
- Ideal photos would document elevations, deck, and important details of a bridge. If any committee member has photographs of a bridge, please put it on the FTP site and *remember to cite the photographer of the photo and provide permission for publication as the photo may be published in the report.*

b) Data Analysis

- Preservation value versus numerical value.
    - <u>Numerical Value</u>
        - Numerical ranks are misleading and may create conflict. For example a bridge that is the only one left of its kind will have full points for distinctive characteristics and style but may not have points for other categories. This numerical rank compared with a bridge that is more common that may receive full points in all the other categories will score *higher* than the one-of-a-kind bridge.
    - <u>Preservation Value</u>
        - All bridges should first be compliant with the National Register Criteria which will categorize each bridge as eligible or non-eligible.
        - “Potentially eligible” category was discussed but will not be used as the National Register Criteria does not consider potentially eligible bridges.
        - All bridges with eligible status will continue on to a to-be-determined ranking system to determine their preservation value within the eligible category.
        - Bridges with non-eligible status will be explained.

- By using the National Register Criteria for eligibility or non-eligibility status as a first pass for the bridges, it will allow early decision-making on how to approach projects.

- Conclusion
  - The report will use eligible and non-eligible based on the National Register of Historic Places criteria as the first pass and then take preservation value into consideration.
  - Bridges in many states are considered under only criteria A and C. This project will consider all criteria, though very few, if any, will be eligible under B or D. See National Register Bulletin 15 for complete discussion on criteria.
  - Eligible and non-eligible bridges will still go through Section 106 review.

c) Community Outreach
- Need committee members' input on the preservation value.
- County of Hawaii and Maui need more community members.
  - Hawaii County Planning Department may have some contacts since they have 3 or 4 staff members assigned to each area's community group.
  - Kiersten from Hawaii Historic Foundation has some contact info.
- There will be sign off sheets (signed by all committee members) for consensus/agreed compromises on decisions.

d) Schedule
- Comments on the methodology, inventory form, and matrix from the committee members are due on **July, 30th.** Committee members are to send their comments to Tonia Moy. tonia@funghawaii.com.
- Next updated draft methodology, inventory form, and matrix are due at the end of August. FAI will clearly address the criteria and evaluation for high preservation value at that time.

IV. Other Comments and Questions
- The final report will be uploaded to the HDOT website. Access data will only be kept at the HDOT office and SHPD will receive a copy of the data file.
- The scope will be kept only to the State and County bridges, even though there are some privately-owned, military-owned, and federally-owned bridges.
- Interstate Highway is only on Oahu.
- Standards and guidelines for treatment will follow the Secretary of Interior Standards: http://www.nps.gov/hps/tps/standguide/.
- Examples of Programmatic Agreement will be provided on the ftp site.
- National Register Criteria: http://www.nps.gov/nr/publications/bulletins/pdfs/nrb15.pdf.

V. ACTION ITEMS:

a. Fung Associates, Inc.
- Set up FTP site for everyone to access.
  FTP Site information:
  ftp://funghawaii.com/
  Username: MKEBridges
  Password: HDOT2012
- A copy of the current methodology, matrix, inventory form, July 5th 2012 meeting agenda, July 5th 2012 meeting minutes, committee list, and the National Historic Preservation Criteria will be downloadable from the FTP site
- Community outreach to find additional Hawaii and Maui County participants
- Provide example of a PA and the National Register criteria for eligibility
- Provide the list of the bridges that needs better photos

b. HDOT
- Upload the 2008 report on to the FTP site

c. Committee members
- Provide comments by July 30
- Upload useful bridge photos along with the permission to use the photos to be publish if needed

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
October 30th 2012

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Kauai County	
Meeting Date:	October 29th 2012	
Time:	1:00 PM – 4:00 PM	
Location:	HDOT Kapolei Office, Conference Room 611; Kauai District Office, 1720 Haleukana Street, Lihue, Kauai 96766	
Attendees:	HDOT	Misako Mimura, Paul Santo
	HDOT Kauai District	Raymond J. McCormick, Fred Reyes
	HHF	Kiersten Faulkner
	County of Kauai DPW	Kuppusamy Venkatesan
	Hanalei Roads	Barbara Robeson
	KHPRC	Pat Griffin
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions
Briefly explained what we included in the final revised package (methodology, introduction, inventory form and matrix) and list of Kauai bridges.

II. Confirmation of the final methodology, evaluation methods, inventory form, and matrix
a. Feedback of the final package

- Definition of bridges as greater than 20' is defined by the federal government as a way to track the funding of projects. For purposes of this report the 20' definition does not apply. It is noted so that the community is aware that some bridges that are less than 20' are not included in the database and may be missed. Some bridges may be noted in the future inventory also.
- Hawaiian punctuation (okina and kahako) will not be used in this project especially since it is difficult to provide consistency for the data base.

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- Inventory Form – Use "Historic Register?" and drop down menu to indicate registered bridges or add check boxes to indicate the registered bridges (Yes Registered, No Not Registered). Will note if contributing or non-contributing to district, Hawaii, National etc.
- Matrix – will add a foot note for the private bridges mentioned by the community, since these bridges will not be included in the inventory/matrix. Footnote will read something to the effect: Private and Federal owned bridges are not included in this inventory.

b. Sign off from the members

- All the members who attended the meeting agreed to the final package with the above corrections.
- Members from Kauai that couldn't attend the meeting were given opportunity to comment and didn't provide any comments by the closing date of 10/26, so we assume they also concur with the final package.

III. Review of the Bridges on Kauai

a. Review of existing list

- List of Bridges – revise the list in alphabetic order by name and street, indicate the National/Hawaii registered bridges, and provide the pdfs to the community members. Also highlight the bridges noted as eligible in the earlier report.
- Route 560 district bridges are missing.
- Wainiha #1, 2, 3 – replaced, but in the historic district, so will be included in the project and note that they were replaced.
- Wailua River (plantation) on the Kauai district bridge #37 was replaced.
- Kainahola Stream bridge on the Kauai district bridge #52 has a new slab.
- Kilauea Stream Bridge on the Kauai County Bridge #19 was replaced in 2008.

b. Community input on the "high preservation bridges" and "eligible bridges"

- Add Wailana Bridge #1, Kalama Bridge (Yasutake's Bridge – wrongly termed PuuOpae, used part of 1919 Wailua Bridge), Kapaia Bridge (Pedestrian bridge), Hanapepe Swinging Bridge (private?), associated bridges with the 1930's belt road construction, Opaekaa #12, Omao Bridge.
- Should look at major periods of development and identify which best represents those periods.
- Wailua Bridge (on the Kauai district bridges #36) should be looked at as high preservation value.

IV. Other Comments and Questions

- After we provide the pdf of the list of bridges, community members will take a look and let us know if bridges are missing or if there are replaced/demolished bridges on the list.
- General information on high preservation bridges recommended by the community will also be needed to locate the correct bridge in the DOT database.
- Barbara from Hanalei Roads Committee will email Tonia a report that touches on the use of terminology by engineers vs. preservation.

V. ACTION ITEMS

- Add and indicate bridges on the Hawaii and National Historic Register to the list.
- Provide (via pdf) and alphabetize the list by name and by street name for the community members.
- Indicate on the inventory form if a bridge is on the Hawaii and National Historic Register.

MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
November 20th 2012

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Hawaii County	
Meeting Date:	November 20th 2012	
Time:	1:00 PM – 2:00 PM	
Location:	HDOT Kapolei, Conference Room 611; Hawaii District Office, 50 Makaala Street, Hilo	
Attendees:	HDOT	Misako Mimura, Paul Santo, Dean Takiguchi
	HDOT Hawaii	Sal Panem
	SHPD	Ross Stephenson
	HHF	Kiersten Faulkner
	Pulama ia Kona	Carolyn Witcher
	Community Member	Ron Terry
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions
Fung Associates, Inc.(FAI) briefly explained what was included in the final revised package (methodology, introduction, inventory form, and matrix) and the list of bridges on the island of Hawaii.

- List of Bridges – it was noted that the list distributed earlier needed to be updated. The pink highlight from Mamalahoa highway bridges should be removed as they are not part of a registered district and however, the Hamakua steel trestle bridges are registered and should be highlighted pink.

II. Confirmation of the final submitted methodology, evaluation methods, inventory form, and matrix
a. Feedback of the submitted package

- At the previous meeting we discussed that in the Inventory Form, use “On Historic Register?” and drop down menu to indicate registered bridges or add check boxes to indicate the registered bridges (Yes Registered, No Not Registered). Will note if contributing or non-contributing to district, Hawaii, National etc.

- Matrix – should be organized by island and include railing types in the character defining feature section.

b. Sign off from the members

- All the members who attended the meeting agreed to the submitted package with the above corrections.
- Members from Hawaii that couldn't attend the meeting were given opportunity to comment and didn't provide any comments by the closing date of 11/14. FAI assumes the other committee members concur with the submitted package.

III. Review of the Bridges on Hawaii

a. Review of existing list

- Constructed year for all the steel Trestle Bridges on the list are incorrect, correct on the list and matrix.
- Kawalii Stream bridge and Wailoa stream bridge (#24 and #58 on the Hawaii District Bridges by street list) have been completely replaced.
- Kealakaha stream bridge is not in use (#26 on the Hawaii District Bridges by street list).

b. Community input on the "high preservation bridges" and "eligible bridges"

- Need wider community input to provide history or significance of the bridges since current committee members have limited resources.
- To reach out, FAI and DOT will set up a Facebook account to request the community's input.
- Ron will be point of contact to reach out to the five Hawaii county developing plan groups (South Kohala, North Kohala, Kona, Puna, Hamakua, Kau) which are supported by the Hawaii planning department.

IV. Other Comments and Questions

- Kiersten suggested to check DOT and SHPD's Memorandum of Agreements (MOA) for commitments made previously.

V. ACTION ITEMS

- Set up the Facebook account and send out to the committee members.
- Revise the bridge lists.
- Make "On Historic Register?" changes to the Access Database.
- Research DOT and SHPD's MOA.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
November 28th 2012

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION County of Honolulu	
Meeting Date:	November 28th 2012	
Time:	1:30 PM – 3:00 PM	
Location:	HDOT Punchbowl, Conference Room; HDOT Kapolei, Conference Room	
Attendees:	HDOT	Misako Mimura, Neil Hasegawa
	FHWA	Domingo Galicinao
	SHPD	Ross Stephenson
	CCH DDC	Michael Yee, Chris Takashige, Stanley Katsura
	HDOT Oahu	Pratt Kinimaka
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions
Briefly explained what we included in the final submitted package (methodology, introduction, inventory form and matrix) and list of Oahu bridges.

II. Confirmation of the final methodology, evaluation methods, inventory form, and matrix
a. Feedback of the final submitted package

- This project is an inventory that evaluates bridge significance and in the future will be used to help develop the programmatic agreement and stream-line the consultation process.
- Add a segment about bridge periods and a definition of similarly words and phrases: special design districts, registered historic districts, etc.
- For the purposes of this report, bridges are defined as vehicular bridges on public roads. It is noted so that the community is aware privately owned bridges are not included in the database. DOT is planning to update the database every five years and some bridges may be noted in the future.

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- Adding the districts (area name ex. North Kohala) into the inventory forms will be difficult as the information is not available.
- Bridges determinations process for MOA (applicable only to federally funded bridge projects):
    - Not Eligible – still needs to go through sec. 106 process and permitting but may be a simple process.
    - Eligible – certain things are allowed to change depending on what is covered in the PA.
    - High Preservation – equivalent to being a registered bridge.
    - Note from SHPD: Best example for each type of the bridge may be focused on this project but still needs to consider maintaining significance feature of the bridges for each projects.
- City & County needs Mayor level approval for bridge determination and lists.
- City & County is concerned about the resulting PA.
    - Concern with opposing community input.

b. Sign off from the members

- The city requests more time to review the package specifically the criteria, will review by mid-December.

III. Review of the Bridges on Oahu

a. Review of existing list

- Bridges that are a part of registered highways may be missing.
- Round Top Drive is a registered road and it may have bridges as a part of the nomination, however the City & County does not own any bridges along the nominated portion of the road.
- Not all bridges are under the jurisdiction of the Department of Design and Construction of the City & County, other departments own some bridges such as Parks and Recreation.
- Bridges that do not have clear ownership may be missing (others may be switching between state and city ownership).

IV. Other Comments and Questions

- Discussion about bridges in harbors and airports- HDOT-Harbors and Airports own vehicular bridges that are accessible by the general public. However, the scope will be limited to bridges in the National Bridge Inventory (NBI) or under the purview of the HDOT-Highways.

IV. ACTION ITEMS:

- Check/find bridges that may be a part of registered highways such as Kuhio Highway, Round Top Drive, etc.
- Update Bridge List.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
December 17th 2012

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION County of Maui	
Meeting Date:	December 17th 2012	
Time:	9:00 AM – 10:30 AM	
Location:	HDOT offices	
Attendees:	HDOT	Misako Mimura, Neil Hasegawa, Leslie Schwab
	FHWA	Meesa Otani
	HDOT Maui	Ferdinand Cajigal
	SHPD	Ross Stephenson
	HHF	Kiersten Faulkner
	CRC Maui	Stanley Solamillo
	County of Maui	Cary Yamashita
	MKE	Glenn Miyasato, Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

The following items were discussed and confirmed at the meeting. Comments and corrections to this report should be addressed to the report preparer within 3 days from the date of the report or these minutes will be recorded.

I. Introductions
Briefly explained what we included in the final submitted package (methodology, introduction, inventory form and matrix) and list of Maui bridges.

II. Confirmation of the final methodology, evaluation methods, inventory form, and matrix
a. Feedback of the final submitted package

- "For the purposes of this report, bridges are defined as vehicular bridges on public roads."
  - It will be changed to," For the purposes of this report, bridges are defined as vehicular bridges on public roads and pedestrian bridges on the national bridge inventory list (NBI)."
- In the Report:
  - Add overall DEM Image maps (which shows topography but not vegetation) with bridge locations will be explored, depending on other Counties. Stanley Solamillo to email committee the example.

b. Sign off from the members

- All the members who attended the meeting agreed to the submitted package with the above corrections.

III. Review of the Bridges on Maui

a. Review of existing list

- CRC Maui is concerned about Hana Highway Bridges and Honolua Bridge.
- Maui County has done a Haleakala Highway inventory and two county bridges along the highway may be affected as it is possible it may become a heritage corridor in the near future. Ross from SHPD can provide a copy of the inventory. Ross will send FAI a copy.
- Four county bridges along the Hana highway have been demolished and replaced or are under construction to be replaced. (Paihi Stream bridge, Papahawahawa Stream Bridge, Waiohonu Stream Bridge, Hanaeoo Stream-Kaholopo #31).
- Bridges in historic districts or historic bridge districts that are replaced will be noted as non-contributing bridges within their respective districts.
    - Replaced bridges refer to replacement of abutment, deck, and railing.
    - Replacement and alteration details will be noted on the bridge inventory form if available.
    - If a bridge has been replaced, it will be noted on the inventory form and marked “Replaced” with the new (bridge) construction date. Thus bridges that have been completely replaced can be tracked. Demolished and replaced bridges will be eliminated from the list of eligible bridges because they will be considered new.

IV. Other Comments and Questions

- Facebook page to reach out to the community may not be available due to the DOT’s new policies regarding social media pages.
- Feedback from all the committee meetings (Kauai, Hawaii, Oahu, and Maui) will be submitted to all committee members from all islands.

IV. ACTION ITEMS

- Update Bridge List.
- Check on GIS DEM images.
- HDOT and FAI will look into other ways to reach out to the community.
- Send out the consolidated minutes and highlight the key changes.

SUMMARY OF COMMITTEE MEETINGS

By: Michelle Cheang and Mayu Ohama
January 10th 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION
Meeting Dates:	October 29th 2012 (Kauai); November 20th 2012 (Hawaii); November 28th 2012 (Oahu); December 17th 2012 (Maui)
Time:	Various times
Location:	HDOT offices on the various islands

I. Scope

- Reminder that this project is an inventory that evaluates bridge significance and in the future will be used to help develop the programmatic agreement to aid in the consultation process.
    - It is not Section 106 consultation or Chapter 6E consultation.
    - Archaeology and cultural issues are not included in this evaluation.
- Types of bridges to include were discussed at various meetings.
    - Included in inventory:
        - Those bridges in the National Bridge Inventory (NBI) or in the HDOT inventory which includes pedestrian overpasses.
    - Excluded from inventory:
        - On Oahu the purview of bridges are spread among various agencies. Therefore, to limit the scope of bridge types to a manageable level, bridges not publicly accessible or are federally or privately owned are excluded from this inventory.
- DOT is planning to update the database every five years and bridges that may be missed will be noted in the future.

II. Comments for submitted methodology, evaluation methods, inventory form, and matrix

- Overall
    - Hawaiian punctuation (okina and kahako) will not be used in this project especially since it is difficult to provide consistency for the data base.
    - Definition of “Bridge”:
        - For the purposes of this report, bridges include vehicular bridges on public roads and pedestrian bridges under the purview of the state or county. It is noted so that privately and federally owned bridges are not included in the database.
        - Definition of bridges as greater than 20’ is defined by the federal government as a way to track the funding of projects. For purposes of this

report the 20' definition does not apply. It is noted so that the community is aware that some bridges that are less than 20' may not be included in the database and may be missed, but should be noted by the community if known.

- City & County of Honolulu needs Mayor level approval for bridge evaluations.

- Methodology:
  - Bridge evaluation process was generally agreed to be:
    - **Eligible, High Preservation Value** to include bridges that are on the Hawaii or National Register of Historic Places are generally unique or possess characteristics of a type and exhibit high degrees of historic integrity. HDOT should use the 4F standard to determine treatment of these bridges when using federal funds.
    - **Eligible** will include bridges that are not the best example of a type and are not unique. HDOT should consider maintaining bridges in this category as through attrition, these may become rare examples at some point in time.
    - **Not Eligible** will include those bridges that have lost considerable historic integrity or do not exhibit any quality that relays historic significance. These bridges will still need to go through consultation for archaeological/cultural concerns.
      - Note from SHPD: HDOT should still consider maintaining significant features of the bridges for each project, whether or not it is high preservation value.
  - A segment will be added concerning bridge periods. FAI is creating a timeline feature for the report.
  - Definitions of similar words and phrases: special design districts, registered historic districts, etc. which are often interpreted differently between engineering disciplines and preservation professionals.
  - Overall island maps will be added.
- Evaluation Methods Update:
  - Culverts will **not** be considered "eligible" unless the culverts exhibit unique adaptations to a site, are part of a historic district, or were the site of an important historic event.
  - The *Program Comment Issued for Streamlining Section 106 Review for Actions Affecting Post-1945 Concrete and Steel Bridges* issued by the Advisory Council on Historic Preservation (see attached) can be followed for all eligible federally funded projects.
    - The Program Comment applies to effects of undertakings on certain common concrete and steel bridges lacking distinction, not previously listed in or determined eligible for listing in the National Register of Historic Places, and not located within or adjacent to historic districts.
    - This Program Comment relieves federal agencies from the Section 106 requirement to consider the effects of undertakings on the bridge types identified in this Program Comment (common designs used extensively throughout the US), except for those considered exceptional or are within or adjacent to historic districts.

        - Thus this project will look for the exceptional bridges such as the first three level overpass (H1 by Pali) in Hawaii and also note bridges that are near or within historic districts. The hundreds of bridges will otherwise be noted as falling under the program comment.
- Inventory Form:
    - Will indicate whether or not a bridge is currently on a historic register. (See attached example).
- Matrix:
    - Will be organized by island and include railing types in the character defining feature section:
        - Will add a foot note for the private bridges mentioned by the community, since these bridges will not be included in the inventory/matrix. Footnote will read something to the effect of: Privately owned bridges such as _____ and federally owned bridges are not included in this inventory.

III. Review of the Bridges

- Community will have input on the list of bridges that are high preservation value and which are eligible.
- Project will look at major periods of development and identify which best represents those periods to determine high preservation bridges vs. eligible bridges.
- Bridges in historic districts or historic bridge districts that are replaced will be noted as non-contributing bridges within their respective districts.
    - Replaced bridges refer to replacement of abutment, deck, and railing.
    - Replacement and alteration details will be noted on the bridge inventory form if available.
    - If a bridge has been replaced, it will be noted on the inventory form and marked “Replaced” with the new (bridge) construction date. Thus bridges that have been completely replaced can be tracked. Demolished and replaced bridges will be eliminated from the list of eligible bridges because they will be considered new.

IV. Comments and Questions

- Need wider community input to provide history or significance of the bridges since current committee members have limited resources.
    - To reach out, FAI and HDOT will set up a Facebook account to request the community’s input.
        - Current status: Facebook page has been created and is seeking approval from DOT.
    - Ron Terry will be point of contact to reach out to the five Hawaii county developing plan groups (South Kohala, North Kohala, Kona, Puna, Hamakua, Kau) which are supported by the Hawaii County Planning Department.

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MEETING MINUTES

By: Michelle Cheang & Mayu Ohama
January 24th 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION	
Meeting Date:	January 24th 2013	
Time:	9:00 AM – 10:00 AM	
Location:	HDOT Kapolei, Conference Room	
Attendees:	HDOT	Misako Mimura, Todd Nishioka, Paul Santo, Leslie Schwab
	SHPD	Ross Stephenson
	MKE	Leilani Nakashima
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

Bridge Parapet Recommendations

I. Comments

- Overall
  - If there are two railings on the bridge, one for the pedestrian and another for the traffic, both railing types will be mentioned on the inventory form, but only the railing that is part of the structure will be included in the database field. The other railing will be noted in the description portion.
  - "Other" category will be added for the unique ones that do not fall under any of the types.
- Concrete
  - Caps – cap types will be mentioned (ex. flat, tapered) in the description, but not as separate categories.
- Metal
  - Metal Truss is a "bridge type" so will be deleted from the parapet/railing types.
  - Metal freeway will be deleted and put under metal horizontal.
- Concrete
  - Concrete open post war rectilinear will be deleted and put under the concrete open horizontal.

II. Other changes

- Added "No railing/parapet" to the types. Ex. Metal truss bridges does not have a railing.

The attached are the final parapet fields per the meeting.

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Bridge Parapet Types

- Concrete solid
- Concrete solid with cap
- Concrete solid panel
- Concrete solid panel with cap
- Concrete solid decorative

- Masonry rock
- Masonry rock with cap

- Metal horizontal
- Metal picket
- Metal Thrie Beam
- Metal decorative

- Concrete open horizontal
- Concrete open vertical
- Concrete open arched
- Concrete open Greek Cross
- Concrete open decorative

- Wood

- Concrete and metal
- Concrete and metal picket
- Concrete and metal decorative

- Other

- No Railing/Parapet

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
July 1st 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Oahu Island Bridges	
Meeting Date:	July 1st 2013	
Time:	8:30 AM – 11:30 AM	
Location:	HDOT Punchbowl, 5th Floor Conference Room; HDOT Kapolei, Conference Room	
Attendees:	HDOT	Misako Mimura, Neil Hasegawa, Sarah Vanapruks
	FHWA	Domingo Galicinao, Meesa Otani
	HHF	Kiersten Faulkner
	SHPD	Ross Stephenson
	C&C of Honolulu	Mark Yonamine, Stanley Katsura, Michael Yee
	HDOT Maintenance	Charles Lee, Dawna Emoto
	MKE	Glenn Miyasato, Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang, Alison Chiu

I. Introductions
   a. Overview of past meetings and reminder that this is an identification project, not Section 106 consultation and not a project to discuss treatment of bridges.

II. Review of Summary of Identification and Evaluation Methods
   a. Program comment bridges—FAI reviewed the basic highlights of the program comments and how it affected the inventory project.
      i. Post-1945 Bridges that are of common construction types are considered program comment bridges:
         1. Steel Multi-Beam or Multi Girder.
         2. Reinforced Concrete Beam and Girder.
         3. Reinforced Concrete Slab.
         4. Culverts and Reinforced Concrete Boxes.
      ii. Through the Program Comment done by FHWA and agreed to by ACHP, no further consultation on the eligibility of the bridges need to be done provided that:
         1. The States identify best examples.
         2. It is one of the goals of the project to identify the best examples.

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b. Current report has non-contributing bridges within a district as eligible so that reviewers will be aware that the bridge should be consulted upon.
    i. It was agreed by those present that instead of noting these bridges as “eligible”, there will be a note: Non-contributing resource in historic property. This will apply to newer bridges within an historic district and not eligible bridges that are part of other properties such as the Ala Moana Blvd. bridge over the Ala Wai Canal.

c. Adjacent properties to all not eligible bridges/culverts may have historic resources or original features associated with the bridge, if these associations remain then they will be noted on the matrix and form.

d. HHF reminded the team that they would like to see graphics showing the components of a bridge included in the report.
e. FAI to check with HART report to ensure eligibility determinations are consistent.
    i. UPDATE: the determinations were consistent, with Waikele Canal (Inbound) evaluated as High Preservation Value in this report.

III. Review of Bridge Matrices
    a. Summary
        i. Order of bridges will be done alphabetical.
        ii. The field for eligibility for program comments will be noted as “Program Comments”.
            1. Definition for each category will be included (eligible/not eligible/program comments/Non-contributing resource… etc.).
        iii. The matrices will be put at the front of each island chapter to act as an index for the chapter.
    b. Bridge status will be altered/changed only for bridges that have already finished the consultation process or are currently in the consultation process. Future replacement or alterations to bridges that has not finished the consultation process will not be included.

IV. Review of Chapter 4 Oahu
    a. Historic Bridge District: Pali Highway is noted as High Preservation Value group of bridges that fall under the program comment time period.
    b. Reviewed Matrices and eligibility recommendations Oahu Bridges. Recommended changes as follows (Red indicates action items / Yellow indicates status change):
        i. Oahu State
            1. **Pauoa Stream Culvert:** Consultation recommended due to connection between culvert and adjacent portion of rock wall channelization project.
            2. **South Punaluu Stream Bridge:** Recently replaced (will still include in matrix).
            3. **Awawanui Stream:** Not publicly accessible.
            4. **North Kahana Stream Bridge:** Also recently replaced.
            5. **Ihiihilauakea Stream Bridge:** Will change to High Preservation Value.
            6. **Laieloa Stream Bridge:** Scheduled for replacement.
            7. **Kipapa Stream Bridge:** Will note aka as Roosevelt Bridge.
            8. **Three of the Unnamed Stream-Makaha 3 and 3A:** Scheduled for replacement; MOA has been completed.

9. **Ala Wai Canal Bridge (Ala Moana Blvd):** Change to non-contributing.
10. **Kawa Stream Bridge (Kaneohe Bay Dr):** Change to High Preservation Value (HPV).
11. **Railroad Crossing @ Farrington Highway:** (Note was incorrect photo – FAI to email correct photo to attendees) – Likely HPV and FAI to check if it crosses over OR&L right of way which is listed
12. **Waikele Canal (Inbound):** Noted by Ross to be HPV as part of the last major accommodation project for railroads.
13. **Farrington Hwy-Waialua Plantation Road:** Change to HPV due to use of steel stringer; (owned by state but doesn't carry public traffic).
14. **Kawainui Stream (inbound and outbound):** Change to HPV as part of important development.
15. **Kawaihapai Stream:** Note that the original railings are still existing.
16. **Waialua Plantation Road:** Correct the post-war comment to war-time.
17. **Sand Island Bascule Bridge:** Will change to HPV.

ii. Oahu County

1. FAI to look at numerous early 1930s bridges in Nuuanu area to see if should be district, or multiple property, such as Nuuanu Pali Drive bridges.
2. **Kimo Drive Bridge:** Date will be corrected to 1925.
3. **Waikele Stream Bridge:** Will change to HPV.
4. **Makiki St. Bridge:** Will change to HPV, because of the arch bridge and age.
5. **Anahulu Stream Bridge:** Change from "1960s" to "1920s" in character defining features on matrix.
6. **North King Street Bridge No.1 – Nuuanu:** Will change to HPV.
7. **Ft. Weaver Rd.:** Will change to HPV because of the arch bridge and age.
8. **Kahala Avenue Bridge No.2 Kapakahi Stream:** Railings replaced 2013.
9. **St. Louis Dr. Bridge:** Will change to HPV because of the arch bridge. Metal horizontal railings will be added in between the existing concrete horizontal railings.
10. **Diamond Head Road Bridge – Upper gully:** Change to HPV, current 2013 project replaces railings.
11. **Fern Street Bridge:** Currently re-habbing, may raise height of rail.
12. **Lusitana Street Bridge-Pauoa Stream:** Currently undergoing rehabilitation.
13. **Nuuanu Ave. Arch Bridge-Nuuanu:** FAI to confirm date, possibly 1902; undergoing current rehabilitation to increase railing height via cap.
14. **3-Lai Road Bridges:** On Private road – will note on matrix private road that is maintained by city.
15. **Puowaina Drive Bridge:** Note the railings were re-done but in same style, just higher to meet current code.
16. **Maunawili Road Bridge #3:** FAI to check with Hugh Liu – (Bridge 444) may have been replaced.
17. **Phillip St. Bridge:** Note not eligible, but abuts possible eligible property.
18. **Kalihi St. Bridge:** Change to HPV, HECO mainly uses the bridge, only six residential beyond the bridge.

19. **Waipio Point Access:** FAI to check on relationship with OR&L ROW.
20. **McCully Street Bridge-Ala Wai**: Scheduled railing modifications; MOA complete.
21. **Malia Street Bridge No.1 –Waialae Nui Stream**: Railings have been modified.
22. **Kumuhau St. Bridge:** Change to HPV; one of the steel bridges.
23. **Waaloa Way Bridges (Nos. 1,2,3,4):** BWS maintenance roads, should not be included.
24. **Liholiho St. Box Culvert/No. Beretaina St. Bridge:** Note not eligible, but abuts possible eligible property; scheduled bid proposal for rehabilitation in 2 months.
25. **North Beretania Street Bridge-Nuuanu Stream:** Note not eligible, but abuts possible eligible property.
26. **Kuliouou Rd Bridge:** Note that may be private bridge, County currently working on conveying to owner.
27. **Ahe Street Bridge:** Built in 1950.
28. **Ahuimanu Road Bridge No. 2:** Private bridge without a construction date and information. It is not maintained by the city.
29. **Hauula Homestead Bridge:** Built in 1930.

V. Review of Appendices
   a. Significant Persons List – will be limited list that includes significant engineers.

VI. Review of Schedule
   a. Committee comments for Draft I due on July 30th.
   b. By August 27th, FAI to update methodology, matrix, inventory sheet set per committee meetings comments and complete the final draft report.
   c. Committee comments for the final electronic draft due on September 17th.
   d. FAI to submit the Final report on October 15th.
   e. Committee comments for the final report by the end of October 2013.

VII. Other Comments and Questions
   a. Facebook update: FAI to send link to HHF and SHPD to provide link through their websites.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
July 3rd 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Maui Island Bridges	
Meeting Date:	July 3rd 2013	
Time:	8:30 AM – 10:30 AM	
Location:	HDOT Punchbowl, 5th Floor Conference Room; HDOT Kapolei, Conference Room; HDOT Maui, Conference Room	
Invitees:	HDOT	Misako Mimura, Neil Hasegawa, Sarah Vanapruks
	FHWA	Domingo Galicinao, Meesa Otani
	HHF	Kiersten Faulkner
	SHPD	Ross Stephenson
	HDOT Maui District	Ferdinand Cajigal
	Planning Maui County	Annalise Kehler
	County of Maui	Cary Yamashita
	MKE	Glenn Miyasato, Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang, Alison Chiu

I. Introductions
   a. Overview of past meetings and reminder that this is an identification project, not Section 106 consultation and not a project to discuss treatment of bridges.

II. Review of Summary of Identification and Evaluation Methods
   a. Program comment bridges—FAI reviewed the basic highlights of the program comments and how it affected the inventory project.
      i. Post-1945 Bridges that are of common construction types are considered program comment bridges:
         1. Steel Multi-Beam or Multi Girder.
         2. Reinforced Concrete Beam and Girder.
         3. Reinforced Concrete Slab.
         4. Culverts and Reinforced Concrete Boxes.

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ii. Through the Program Comment done by FHWA and agreed to by ACHP, no further consultation on the eligibility of the bridges need to be done provided that:
    1. The States identify best examples.
    2. It is one of the goals of the project to identify the best examples.

b. Current report has non-contributing bridges within a district as eligible so that reviewers will be aware that the bridge should be consulted upon.
    i. It was agreed by those present that instead of noting these bridges as "eligible", there will be a note: Non-contributing resource in historic property. This will apply to newer bridges within an historic district and not eligible bridges that are part of other properties such as the Ala Moana Blvd. bridge over the Ala Wai Canal.

c. Adjacent properties to all not eligible bridges/culverts may have historic resources or original features associated with the bridge, if these associations remain then they will be noted on the matrix and form.

III. Review of Chapter 5 Maui and Molokai

a. Historic Bridge District: Team agreed that Hana Highway will be High Preservation Value (43 bridges).

b. Bridge status will be altered/changed only for bridges that have already finished the consultation process or are currently in the consultation process. Future replacement or alterations to bridges that have not finished the consultation process will not be included.

c. Reviewed Matrices and eligibility recommendation Maui Bridges – Recommended changes as follows (Red indicates action items / Yellow indicates status change):
    i. Maui State
        1. **Anakaluahine Stream Bridge:** Will update to eligible, as only railings have changed; deck and rock abutments remain intact.
        2. **Honolua Stream Bridge:** Also change to eligible for same reasons.
        3. **Papanahoa Bridge:** Difficult to tell from available photos; Maui District office will supply most current report with additional pictures; FAI to change the feature crossing to be **Kauaola to Kanoulu.**
        4. **Pohakuokala Bridge on Haleakala Highway:** Add a note that may be eligible in another 10 years; while it does not rise to level of exceptional significance, it has some unique qualities that will make it eligible in the future.
        5. **Waiale Gulch Bridge:** Same as Pohakuokala Bridge.
        6. **Waiale Road Overpass:** Note that railings were replaced in-kind in 2010s.
        7. **Launiupoko Stream, Olowalu B Stream, Olowalu Stream Bridge:** FAI to do more research on what was reconstructed – entire bridge or a portion; Maui District to supply information.
        8. **Molokai bridges:** (Kamiloloa Bridge, Kawela Bridge and Makakupaia Bridge will be looked at to see if one should be considered High Preservation Value as there are so few historic bridges on Molokai) HDOT to check on what is planned for these bridges; based on information received from HDOT, Kawela is in the process of replacement and Makakupaia is scheduled for replacement in 2015 FY; update Kamiloloa status to High Preservation Value.
        9. **Kaupakalua Stream Bridge:** Replaced in 2003; update the info.
        10. **Olowalu Tunnel:** Will be changed to High Preservation Value (HPV).

11. **Kaunakakai 16-Cell Culvert:** Will be changed to eligible due to unique culvert design and long 16-cell span.
12. **Kalialinui B Stream Bridge:** Will be changed to HPV as one of the best examples of a bridge falling within the program comments criteria.
13. **Waiehu Twin 12 ft. Culvert:** Will change to eligible due to the addition of rock facing.

ii. Maui County

1. **Kalialinui No. 2 Gulch:** Will be HPV due to its age and artistry.
2. **Kaupakalua No. 35:** FAI to research its abutments; based on information received from HDOT, it is confirmed that Kaupakalua No.35 has rock wall abutments; status will be changed to eligible.
3. **Paihi No. 25:** Replaced in 2005; will be non-contributing in historic district, FAI to replace photos on the form.
4. **Pauwela No. 39:** Will be HPV due to its age and artistry.
5. **Papahawahawa No. 28, Waiohonu No. 29 and Kaholopo No. 31:** Papahawahawa No. 28 is replaced in 2011, Waiohonu No. 29 is replaced in 2013, and Kaholopo No. 31 is under construction and all will be non-contributing in historic district. No. 31 is also known as Make Man Bridge (pronounced ma-kay).
6. **Makamakaole No. 63:** Change to eligible due to rock wall abutments.
7. **Wailena No. 65:** Change to eligible due to rock wall abutments.
8. **Sam Kalama No. 50 and Kalepa No. 12 Bridges**: Will be noted that not eligible, but abuts a potentially eligible resource (rock wall); Kalepa change construction date to 1993.
9. **Alele No. 13 Bridge:** Change construction date to 1983.
10. **Maliko No. 48:** Change to HPV due to arch construction and rarity of this time period.
11. **Manawainui No. 80:** Change to HPV as it is one of the earliest from Program Comment time period.
12. **Iron Bridge No. 113:** Change to HPV due to use of steel; County to check bridge status.
13. **Iao Stream Bridge No. 59**: Change to HPV due to use of steel; County to check the bridge status.
14. **Kahana Nui No. 93:** Scheduled to be replaced in 2014; in the process of the consultation.
15. **Honokowai No. 91:** Change date to 1988.

IV. Review of Appendices
   a. Significant Persons List – limited list of engineers and designers.

V. Review of Schedule
   a. Committee comments for Draft I due on July 30th.
   b. By August 27th, FAI to update methodology, matrix, inventory sheet set per committee meetings comments and complete the final draft report.
   c. Committee comments for the final electronic draft due on September 17th.

d. FAI to submit the Final report on October 15th.
e. Committee comments for the final report by the end of October 2013.

VI. Other Comments and Questions
a. Facebook update – FAI requested Maui Cultural Resources Commission input through the facebook link so that they do not need to sit through a 3 hour meeting. Analise will follow through with the commission.
b. FAI to place photos of the bridges that have been replaced on a separate CD for SHPD.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
July 12th 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Hawaii Island Bridges	
Meeting Date:	July 10th 2013	
Time:	1:00 AM – 4:00 PM	
Location:	HDOT Punchbowl, 5th Floor Conference Room; HDOT Kapolei, Conference Room	
Attendees:	HDOT	Misako Mimura, Neil Hasegawa, Paul Santo, Sarah Vanapruks
	FHWA	Domingo Galicinao
	SHPD	Ross Stephenson
	HDOT Hawaii	Sal Panem
	County of Hawaii DPW	Cres Rambayon
	Community Member	Ron Terry
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang, Alison Chiu

I. Introductions
   a. Overview of past meetings and reminder that this is an identification project, not Section 106 consultation and not a project to discuss treatment of bridges.

II. Review of Summary of Identification and Evaluation Methods
   a. Program comment bridges—FAI reviewed the basic highlights of the program comments and how it affected the inventory project.
      i. Post-1945 Bridges that are of common construction types are considered program comment bridges:
         1. Steel Multi-Beam or Multi Girder.
         2. Reinforced Concrete Beam and Girder.
         3. Reinforced Concrete Slab.
         4. Culverts and Reinforced Concrete Boxes.
      ii. Through the Program Comment done by FHWA and agreed to by ACHP, no further consultation on the eligibility of the bridges need to be done provided that:
         1. The States identify best examples.
         2. It is one of the goals of the project to identify the best examples.

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b. Current report has non-contributing bridges within a district as eligible so that reviewers will be aware that the bridge should be consulted upon.
    i. It was agreed by those present that instead of noting these bridges as “eligible”, there will be a note: Non-contributing resource in historic property. This will apply to newer bridges within an historic district and not eligible bridges that are part of other properties such as the Ala Moana Blvd. Bridge over the Ala Wai Canal.

III. Review of Bridge Matrices Hawaii
    a. Summary
        i. Order of bridges will be done alphabetical.
        ii. The field for eligibility for program comments will be noted as “Program Comments”.
            1. Definition for each category will be included (eligible/not eligible/program comments/Non-contributing resource… etc.).
        iii. The matrices will be put at the front of each island chapter to act as an index for the chapter.
        iv. It was agreed that steel stringer bridges that fall under Program Comments status, ex. Ninole and Opea Stream Bridges, will be left as Program Comments (even though many were listed as eligible or high preservation value on other islands) because of the higher number of steel stringer bridges on Hawaii.

IV. Review of Chapter 6 Hawaii
    a. Historic Bridge District:
    b. Reviewed Matrices and eligibility recommendations Hawaii Bridges. Recommended changes as follows (Red indicates action items / Yellow indicates status change):
        i. Hawaii State
            1. **Pahoehoe Stream Bridge**: Change to eligible because of the rarity of an arch as a bridge type. Bridge is scheduled to be replaced; bidding to begin at end of month.
            2. **Aamakoa Stream Bridge**: DOT to check on date of alteration/seismic retrofit completed.
            3. **Paheehee Mauka Bridge**: DOT to check on date of alteration/seismic retrofit completed. Confirmed not eligible but abutments a potentially eligible historic resource.
            4. **Waiaka Stream Bridge**: Scheduled replacement and road realignment project; MOA between the Central Federal Lands and DOT; CFL to complete project.
            5. **Makeahua Stream Bridge**: Hawaii District DOT to provide photograph of abutments prior to confirming eligibility status.
            6. **Kaala Stream Bridge**: DOT to check on date of alteration/seismic retrofit completed.
            7. **Kealakaha Stream Bridge**: Bridge is still standing but not in use as it was replaced by a new one adjacent.
            8. **Honolii Stream Bridge**: DOT to check on date of alteration/seismic retrofit completed. Existing chamfered columns altered from original T-shaped columns.

9. **Hilea Stream Bridge**: considered for replacement, MOA between the Central Federal Lands and DOT to complete.
10. **Keamuku Stream Bridge**: Change to not eligible due to its lack of any features, resembling a concrete box culvert.
11. **Ninole Stream Bridge**: Change to high preservation, one of the last district owned timber bridges. Abutments a potentially eligible historic resource. Bridge is considered for replacement and MOA between the Central Federal Lands and DOT to complete.
12. **Hilo Plantation Flume Overpass**: Bridge is maintained by State although it is not in use and ownership is unknown.
13. **Hilo Plantation Road Overpass**: Bridge is maintained by State although it is not in use and ownership is unknown. FAI to check possible association to sugar industry, used to have the sugar mill on the high side.
14. **Kukaiau Stream Bridge**: DOT to check on date of alteration/seismic retrofit completed and painted.
15. **Umauma Stream Bridge**: Altered in 2013 to include concrete pillars inside of trestles.
16. **Hakalau Plantation Road Overpass**: FAI to check association with plantation industry.
17. **Hakalau Stream Bridge**: FAI to check with DOT if the bridge is not in use.
18. **Cane Haul Road Underpass**: FAI to check association with plantation industry.
19. **Kihalani Stream Bridge**: FAI to check association with Cane Haul Road/plantation industry.
20. **Moanalulu Stream Bridge**: FAI to provide additional/better photographs overall and of abutments.
21. **Kalopa Stream Bridge**: Change to high preservation due to longest concrete span bridge.
22. **Ookala Plantation Road Overpass**: FAI to check association with plantation industry.
23. **2-Metal Pipe Culvert (001000110310346)**: FAI to send location info to Sal Panem of Hawaii District in order to verify material.

ii. Hawaii County

1. **Kawainui Stream Bridge**: Scheduled replacement in-kind.
2. **Maili Stream Bridge**: Scheduled replacement in-kind.
3. **Waiaha Bridge**: Bridge was damaged in earthquake 2006; wing walls replaced 2007. (More research needed in the future; county to provide with information.)
4. **Waikaumalo Stream Bridge**: Replaced in-kind.
5. **Waiulili Stream Bridge**: Replaced in 1979 (new date).
6. **Relief Elevation 2760 Bridge**: Railings have been replaced.
7. **Waipahoehoe Stream Bridge**: Change to high preservation value due to rarity of arch bridge type.
8. **Waipunahina Gulch Bridge**: Wing walls repaired on Hamakua side. County to check on date of alteration.

9. **Kaahakini Stream Bridge**: Part of seven-bridge MOA for demolition. UPDATE: Hawaii County sent FAI a copy of original MOA. Seven bridges are Honomu, Kalaoa, Opea, Kalopa, Inoino, Waikaalulu and Kaahakini.
10. **Kalopa Kaumoali Gulch Bridge**: Will be removed from inventory list due to replacement in 2003 (new date).
11. **Old Railroad Crossing Bridge**: Abutments a potentially eligible historic resource, FAI check association with plantation industry.
12. **Onomea Camp Road Bridge**: Will be removed from inventory list due to replacement in 2002 (new date). Abutments a potentially eligible historic resource.
13. **Honomu Stream Bridge**: Part of seven-bridge MOA. Replaced in 2002. Change status to "Non-contributing element in a historic district."
14. **Kahului Bridge**: Programmed replacement in 2016. Abutments a potentially eligible historic resource.
15. **Kalopa Aliipali Gulch Bridge**: Replaced in 2003 (new date).
16. **Kaluiiki Bridge**: Deck replaced in-kind; abutments and railings replaced in 2005.
17. **Oshiro Road Bridge**: Replaced in 2003 (new date).
18. **Reeds Island Bridge**: Currently under construction 2013. Part of six-bridge MOA. Deck to be replaced in-kind under MOA. Will be removed from inventory list due to replacement in 2013 (new date).
19. **51 Mile Bridge**: Abutments potentially eligible historic resource. FAI to check potential association with Saddle Road for this bridge and 53 Mile Bridge.
20. **Waiulaula Gulch Bridges (001620001100001, 001620001100002)**: On county land; in process of turning over ownership to private owner.
21. **Elm Street Bridge**: FAI to check with county if this is a culvert, but abutments are potentially eligible historic resources.
22. **4 Mile Creek Bridge**: County to provide additional photographs re: railings and abutments. Check dates is it replaced/repaired/etc in 1964?
23. **Komohana Street Bridge**: FAI to check with county if the bridge is completely replaced or altered in 2005.
24. **Kawailani Street Bridge**: Will be removed from inventory list due to replacement in 2005 (new date).

V. Review of Appendices
   a. Significant Persons List – will be limited list that includes significant engineers.

VI. Review of Schedule
   a. Committee comments for Draft I due on July 30th.
   b. By August 27th, FAI to update methodology, matrix, inventory sheet set per committee meetings comments and complete the final draft report.
   c. Committee comments for the final electronic draft due on September 17th.
   d. FAI to submit the Final report on October 15th.
   e. Committee comments for the final report by the end of October 2013.

VII. Other Comments and Questions

a. Facebook update: FAI to send link to HHF and SHPD to provide link through their websites.

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MEETING MINUTES

By: Michelle Cheang and Mayu Ohama
July 25th 2013

Project:	HAWAII STATEWIDE BRIDGE INVENTORY AND EVALUATION Kauai Island Bridges	
Meeting Date:	July 23rd 2013	
Time:	8:00 AM – 10:00 AM	
Location:	HDOT Punchbowl, 5th Floor Conference Room; HDOT Kapolei, Conference Room; HDOT Kauai, Conference Room	
Attendees:	HDOT	Misako Mimura, Neil Hasegawa, Sarah Vanapruks
	FHWA	Domingo Galicinao, Meesa Otani
	HHF	Kiersten Faulkner, Tanya Gumpac-McGuire
	SHPD	Angie Westfall, Mike Gushard
	HDOT Kauai District	Raymond J. McCormick, Fred Reyes
	Planning Kauai County	Lee Steinmetz
	County of Kauai DPW	Wallace Kudo, Kuppusamy Venkatesan
	KHPRC	Pat Griffin
	MKE	Brian Kung
	FAI	Tonia Moy, Mayu Ohama, Michelle Cheang

I. Introductions
   a. Overview of past meetings and reminder that this is an identification project, not Section 106 consultation and not a project to discuss treatment of bridges.

II. Review of Summary of Identification and Evaluation Methods
   a. Program comment bridges—FAI reviewed the basic highlights of the program comments and how it affected the inventory project.
      i. Post-1945 Bridges that are of common construction types are considered program comment bridges:
         1. Steel Multi-Beam or Multi Girder.
         2. Reinforced Concrete Beam and Girder.
         3. Reinforced Concrete Slab.
         4. Culverts and Reinforced Concrete Boxes.
      ii. Through the Program Comment done by FHWA and agreed to by ACHP, no further consultation on the eligibility of the bridges need to be done provided that:
         1. The States identify best examples.
         2. It is one of the goals of the project to identify the best examples.

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b. Current report has non-contributing bridges within a district as eligible so that reviewers will be aware that the bridge should be consulted upon.
    i. It was agreed by those present that instead of noting these bridges as "eligible", there will be a note: Non-contributing resource in historic property. This will apply to newer bridges within an historic district and not eligible bridges that are part of other properties such as the Ala Moana Blvd. Bridge over the Ala Wai Canal.
c. Adjacent properties to all not eligible bridges/culverts may have historic resources or original features associated with the bridge; if these associations remain, then they will be noted on the matrix and form.
d. Totally replaced bridges
    i. Change the construction date of bridges that have been reconstructed and place a note similar to: "Original bridge built in 1914" under Character Defining Features.
    ii. Organize the matrix in alphabetical order including reconstructed bridges with new dates.
e. Culverts in the Historic District
    i. Scope of the project was only to include the bridges/culverts on the NBI list and will not include the bridges/culverts that are less than 20 feet in this report even if they are in the historic district. → This will be clarified in the introduction of the report.
    ii. Bridges/culverts that are in the district but less than 20 feet will be mentioned at the beginning of the each island chapter within the narrative on the district.
f. Not eligible bridges/culverts
g. Adjacent properties to all not eligible bridges/culverts may have historic resources or original features associated with the bridge; if these associations remain, then they will be noted on the matrix and form.

III. Review of Bridge Matrices Kauai
a. Summary
    i. Order of bridges will be done alphabetical.
    ii. The field for eligibility for program comments will be noted as "Program Comments".
        1. Definition for each category will be included (eligible/not eligible/program comments/Non-contributing resource… etc.).
    iii. The matrices will be put at the front of each island chapter to act as an index for the chapter.
    iv. Bridge status will be altered/changed only for bridges that have already finished the consultation process or is currently in the consultation process. Future replacement or alterations to bridges that have not finished consultation will not be included.
b. Bridge status will be altered/changed only for bridges that have already finished the consultation process or are currently in the consultation process. Future replacement or alterations to bridges that have not finished the consultation process will not be included.

IV. Review of Chapter 3 Kauai
a. Historic Bridge District.
b. Reviewed Matrices and eligibility recommendations Kauai Bridges. Recommended changes as follows (Red indicates action items / Yellow indicates status change):

i. Kauai State Bridges
   1. **Hanalei River Bridge** (007005600500123): Major alteration in the 1990s check date with DOT; change the description from the wood to steel railings in the database form.
   2. **Waioli Stream Bridge** (007005600500343), **Waipa Stream Bridge** (007005600500396), **Waikoko Stream Bridge** (007005600500427): All three bridges are a part of an ongoing 2013 design project.
   3. **Wainiha Stream Bridge No. 1** (007005600500644): Revise construction date to 2010 as historic bridge is gone, non-contributing, note in character defining feature section: Bridge replaced with the temporary Acrow Bridge.
   4. **Haena Bridge No. 1** (007005600500749): Less than 20' in length; remove from matrix.
   5. **Haena Bridge No. 2** (007005600500844): Less than 20' in length; remove from matrix.
   6. **Wainiha River Bridge No. 2** (007005600500670): Non-contributing; add to character defining feature - temporary Acrow bridge.
   7. **Wainiha River Bridge No. 3** (007005600500673): Non-contributing; add to character defining feature - temporary Acrow bridge.
   8. **Nawiliwili Stream Bridge (Lihue Mill)** (007000500403271): Under construction for significant alteration in 2013; not eligible due to significant change/alteration; Page 3-45 correct description of Lihue Plantation road alignment.
   9. **Kapaa Temporary Bypass Road – Kainahola Stream Bridge** (007056000400161): Rock abutments are a potential historic resource; keep as not eligible because of significant change/alteration; committee member will do site visit to determine eligibility status and DOT will provide more photos; associated with Lihue Plantation.
   10. **Weoweopilau Stream Bridge** (007000500302671): Check on description – location is northeast of Malahia road or southeast.
   11. **Eleele Pedestrian** (007000500001694): What is the other pedestrian overpass built post-war?; change the description of the bridge from post-war to pre-war; FAI to check on past report.
   12. **Wailua River Bridge** (007000560400572): Change to High Preservation Value; one of earliest post-war bridges and best example of program comments.
   13. **Makaweli Flume Overpass** (007000500002033): Change to High Preservation Value for only flume remaining on Kauai.
   14. **Kaumakani Pedestrian Overpass** (007000500001419): FAI to check if it is one of two on Kauai (check with Eleele) – need to check dates; High Preservation Value for the intact post war pedestrian bridge; feature Crossed corrected to Kaumualii Highway.
   15. **Kalihiwai River Bridge** (007000560302497): High Preservation Value because of the long span.

ii. Kauai County

1. **Kokee Bridge** (007120061112001): Railings replaced in 2005; county to verify construction date.
2. **Mana Bridge No. 1** (007120061112002): Artistic value; county to verify construction date.
3. **Nawiliwili Bridge** (007350011135001): Aka Duke's Bridge; county to verify construction date.
4. **Omao Road Bridge** (007270011127001): Change construction date to 2004.
5. **Opaekaa Bridge** (007420151142001): Bridge was placed in the current location in 1919.
6. **Puuopae Bridge** (007440111144001): Change the construction date to 1915; original construction was a truss bridge which was removed/replaced around 1957/1958, railings altered in 2000.
7. **Wailana Bridge No. 4** (007280500728001): High Preservation Value for age; County to check if it was widened and structure was added to later
8. **Kilauea Bridge** (00752020115200): Change construction date to 2008.
9. **Puukumu Bridge** (007520171152002): High Preservation Value for age; change 1920s → 1910s in character defining features.
10. **Kipu Bridge** (007340011134001): High Preservation Value for age.
11. **Lawai Bridge** (007230411123003): Only arch bridge on the island of Kauai.
12. **Hoomana Overpass** (007380021138001): 2013 alteration to rails; building the new Lihue Mill bridge parallel to the Hoomana bridge will impact the left railing; was notable for providing access to nearby historic residential district; delete the Grove Farm section from the description.
13. **Wailana Bridge No. 2** (007280500728003): Change 1903s → 1930s in character defining features.
14. **Kapahi Bridge** (007460021146001): Bridge deck was altered in 1977 change the database form to "yes" under "alteration?"; in 2012 railings were replaced because they were damaged; change the narrative description from "Kapaa Bridge" to "Kapahi bridge"; will maintain to be eligible but unsure if the steel stringer was installed at the 1977 alteration for the timber deck structural support.
15. **Olohena Bridge No. 1** (007430200743001): Change construction date to 2005.
16. **Kainahola Bridge** (007440181144002): County will check if bridge still has steel stringers.

V. Review of Appendices
   a. Significant Persons List – will be limited list that includes significant engineers.

VI. Review of Schedule
   a. Committee comments for Draft I due on July 30th.
   b. By August 27th, FAI to update methodology, matrix, inventory sheet set per committee meetings comments and complete the final draft report.

c. Committee comments for the final electronic draft due on September 17th.
d. FAI to submit the Final report on October 15th.
e. Committee comments for the final report by the end of October 2013.

VII. Other Comments and Questions
a. Facebook update: FAI to send link to HHF and SHPD to provide link through their websites.
b. Report will be only in digital when we submit to the committee members. HDOT will provide CDs with pdf of report to all committee members.
c. DOT will check if they can release the simple version of the Access database to the public.

bibliography

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addendum

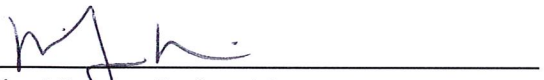
A. BRIDGE COMMITTEE SIGN-OFF SHEETS

Committee Members Sign Off

WE the committee members of the "State Historic Bridge Inventory and Evaluation" project agree to the findings of this report.

Each member focused his/her efforts to provide complete, comprehensive project support to facilitate the identification and evaluation of the bridges within this study.

Agreed to the evaluations of this report by the undersigned:



12/9/13

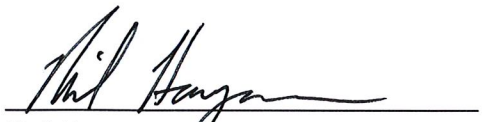
Misako Mimura, Project Manager
State of Hawaii Department of Transportation,
Highways Division, Design Branch,
Environmental Permitting and Project Compliance Section

Date

12/10/13

Paul Santo, Section Head
State of Hawaii Department of Transportation,
Highways Division, Design Branch,
Bridge Design Section

Date



12/10/13

Neil Hasegawa
State of Hawaii Department of Transportation,
Highways Division, Design Branch,
Bridge Design Section

Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Domingo Galicinao
Federal Highway Administration, Hawaii Division

12/11/13
Date

Meesa Otani
Federal Highway Administration, Hawaii Division

12/11/13
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Kiersten Faulkner
Historic Hawaii Foundation

Dec. 9, 2013
Date

Committee Members Sign Off

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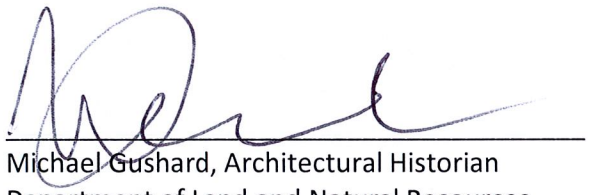
Agreed to the evaluations of this report by the undersigned:

Angie R. Westfall, Architectural Branch Chief
Department of Land and Natural Resources,
State Historic Preservation Division,
Architecture Branch

30 DEC 2013
Date



Michael Gushard, Architectural Historian
Department of Land and Natural Resources,
State Historic Preservation Division,
Architecture Branch

12/18/2013
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Glenn Miyasato
MKE Associates LLC

12/9/13
Date

Brian Kung
MKE Associates LLC

12/9/13
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Tonia Moy, Project Team Project Manager
Fung Associates, Inc.

12-11-13
Date

Mayu Ohama
Fung Associates, Inc.

12 / 11 / 13
Date

Michelle Cheang
Fung Associates, Inc.

12-11-13
Date

Alison Chiu
Fung Associates, Inc.

12-11-13
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Chris Takashige

4-17-14

Chris Takashige, Director
City & County of Honolulu,
Department of Design and Construction

Date

M. Yonamine

4/17/14

Mark Yonamine, Deputy Director
City & County of Honolulu,
Department of Design and Construction

Date

Michael K.H. Yee, Chief Structural Engineer
City & County of Honolulu
Department of Design and Construction,
Civil Division

Date

Stanley Katsura, Chief
City & County of Honolulu
Dept. of Design and Construction,
Civil Division

Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Pratt Kinimaka, District Engineer
State of Hawaii Department of Transportation,
Highway Division, Oahu District

JAN 07 2014
Date

George Abcede
State of Hawaii Department of Transportation,
Highway Division, Oahu District

JAN 7 2014
Date

Committee Members Sign Off

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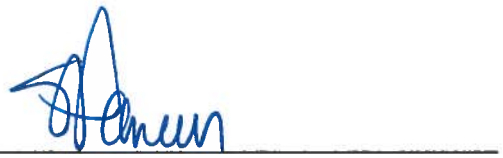

Salvador Panem, District Engineer
State of Hawaii Department of Transportation,
Highway Division, Hawaii District

1/9/14

Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

for

Robert Yanabu, Division Chief
County of Hawaii
Department of Public Works,
Engineering Division

12-19-13
Date

Cres Rambayon
County of Hawaii
Department of Public Works,
Engineering Division

12-13-13
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Geoffery S. Mowrer
Community Member

12/22/2013
Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

_____ _____

Ron Terry Date
Community Member

Ron Terry from the County of Hawaii, cited a conflict of interest and resigned from the committee on January 9, 2014.

Committee Members Sign Off

WE the committee members of the "State Historic Bridge Inventory and Evaluation" project agree to the findings of this report.

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Agreed to the evaluations of this report by the undersigned:

Carolyn A Witcher

Carolyn Witcher
Pulama ia Kona Heritage Preservation Council

21 Jan 14

Date

Committee Members Sign Off

WE the committee members of the "State Historic Bridge Inventory and Evaluation" project agree to the findings of this report.

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Agreed to the evaluations of this report by the undersigned:

Ferdinand Cajigal, District Engineer
State of Hawaii Department of Transportation,
Highway Division, Maui District

Date 12/17/13

Fred Gutierrez
State of Hawaii Department of Transportation,
Highway Division, Maui District

Date 12/17/13

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

See separate sign off sheet

Annalise Kehler, Historic Cultural Resources Planner — Date
County of Maui
Department of Planning

Cary Yamashita, Division Chief — 12/18/13
County of Maui — Date
Department of Public Works Engineering Division

Ty Takeno — 12/18/13
County of Maui — Date
Department of Public Works Engineering Division

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

12/13/2013

Annalise Kehler, Historic Cultural Resources Planner — Date
County of Maui
Department of Planning

See separate sign off sheet

Cary Yamashita, Division Chief — Date
County of Maui
Department of Public Works Engineering Division

See separate sign off sheet

Ty Takeno — Date
County of Maui
Department of Public Works Engineering Division

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Raymond J. McCormick, District Engineer
State of Hawaii Department of Transportation,
Highway Division, Kauai District

12/19/13
Date

Fred Reyes
State of Hawaii Department of Transportation,
Highway Division, Kauai District

Dec. 18, 2013
Date

Committee Members Sign Off

WE the committee members of the "State Historic Bridge Inventory and Evaluation" project agree to the findings of this report.

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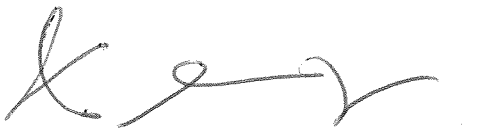
Agreed to the evaluations of this report by the undersigned:



12/19/2013

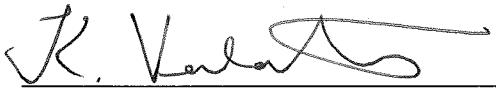
Edmond Renaud, Chief
County of Kauai
Department of Public Works,
Road Division

Date

19 DEC 2013

Wallace Kudo, Chief
County of Kauai
Department of Public Works,
Engineering Division

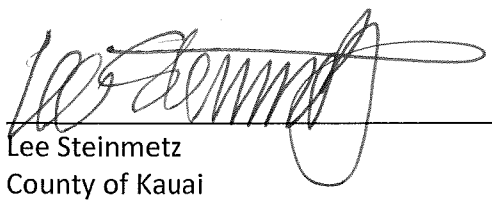
Date



12/19/13

Kuppusamy Venkatesan
County of Kauai
Department of Public Works,
Engineering Division

Date



12/19/13

Lee Steinmetz
County of Kauai
Planning Department

Date

Committee Members Sign Off

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Agreed to the evaluations of this report by the undersigned:

Barbara Robeson — 12-18-2013

Barbara Robeson
Hanalei Roads Committee

Date

WE the committee members of the “State Historic Bridge Inventory and Evaluation” project agree to the findings of this report.

Each member focused his/her efforts to provide complete, comprehensive project support to facilitate the identification and evaluation of the bridges within this study.

Agreed to the evaluations of this report by the undersigned:

Pat Griffin
Kauai Historic Preservation Review Commission

December 6, 2013
Date