

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:

um Manns

- 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

Federal Highway Administration

U.S. Department of Transportation

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, 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 revisiting 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 | Non- | Not | Program | Total |
|----------|----------|-------------------|--------------|----------|----------|-------|
| | | Value | Contributing | Eligible | Comments | |
| Maui | 15 | 49 | | 10 | 13 | 87 |
| District | | | | | | |
| Maui | 4 | 16 | 4 | 7 | | 31 |
| County | | | | | | |
| Kauai | 7 | 14 | 4 | 8 | 20 | 53 |
| District | | | | | | |
| Kauai | 4 | 12 | | 3 | | 19 |
| County | | | | | | |
| Oahu | 48 | 37 | 1 | 31 | 67 | 184 |
| District | | | | | | |
| Oahu | 38 | 14 | | 15 | 77 | 144 |
| County | | | | | | |
| Hawaii | 30 | 23 | | 10 | 34 | 97 |
| District | | | | | | |
| Hawaii | 30 | 43 | 1 | 10 | 8 | 92 |
| County | | | | | | |
| 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 |
| Maui | National | Hana Highway | | 57 |
| Oahu | n/a | | Pali Highway | 21 |

Table of Contents

Acronyms & Abbreviations

Executive Summary

| Chapter | 1 Introduction | |
|---------|--|------|
| I. | General | 1-2 |
| | Overview | |
| | Regulatory Background | |
| | State Law | |
| | Federal Law | |
| | Scope of Survey | |
| | Scope of Work | |
| | Research | |
| | Gather Community and Preservation Partner Input | |
| | Evaluation | |
| | Report Preparation | |
| II. | Methodology | 1-6 |
| | Project Personnel | |
| | Investigation Methods | |
| | Background Research/Data Collection | |
| | Data Analysis | |
| | Community Outreach | |
| | Documentary Research Methods | |
| | Historic Bridge Committee | |
| III. | Summary of Identification and Evaluation Methods | 1-10 |
| | Initial Selection of Historic Bridges from the Draft 2008 Report | |
| | Current Selection of Historic Bridges from the 2013 Inventory Report | |
| | Development of Evaluation Criteria | |
| | National Register Criteria | |
| | Events (Criterion A) | |
| | Persons (Criterion B) | |
| | Design/Construction (Criterion C) | |
| | Information Content (Criterion D) | |
| | Integrity Criteria | |
| | National Register Criteria Considerations | |
| | Moved Properties (Criteria Consideration b) | |
| | Reconstructed Properties (Criteria Consideration e) | |
| | Commemorative Properties (Criteria Consideration f) | |
| | Achieving Significance within the Past 50 Years (Criteria Consideration g) | |
| IV. | Bridge Identification | |
| | Identification of Bridge Components | |
| | Summary of Bridge Types | |
| | Masonry Arch Bridges | |
| | Metal Bridges | |
| | Concrete Arch Bridges | |
| | Concrete Deck Bridges | |
| | Timber Stringer Bridges | 1-37 |

| | Bridge Parapet/Railing Types | 1-39 |
|--------------|--|--------|
| | Solid Parapet Design | |
| | Open Parapet Design | |
| Chanta | v 3 Historia Contanta | |
| - | r 2 Historic Contexts | 2.2 |
| I. | Introduction to the Islands | 2-2 |
| | Timeline | |
| II. | Design and Construction of Bridges and Roads in the Hawaiian Islands: Pre-Contact to 1960s | 2-5 |
| | Overview | |
| | Historical Background | |
| | Bridge and Road Construction in the Kingdom of Hawaii to 1893 | |
| | Bridge and Road Construction in Hawaii: 1894 to 1941 | |
| | Bridge and Road Construction in Hawaii: 1941 to 1960s | |
| III. | The Hana Highway, Maui: Pre-Contact to 1960s | 2-13 |
| | Historical Background | |
| IV. | The Old Mamalahoa Highway, Hawaii Island: Pre-Contact to 1960s | 2-17 |
| | Historical Background | |
| V. | Hawaii Belt Road, Hawaii Island: Pre-Contact to 1960s | . 2-22 |
| | Historical Background | |
| VI. | The Pali Highway, Oahu: Pre-Contact to 1960s | 2-27 |
| | Historical Background | |
| VII. | The Federal Aid Highway System and Interstate Highway System on Oahu: 1911-1953 | 2-35 |
| | Historical Background | |
| VIII. | Military Contribution to Road and Highway Construction in Hawaii 1959 to 1970s | 2-37 |
| | Historical Background | |
| Chanto | r 3 Kauai | |
| l. | Island of Kauai | 2_2 |
| 1. | Map of Kauai | J-Z |
| | Kauai Island History | |
| II. | Bridge Matrix: Kauai | 2 5 |
| | - | |
| III. | Historic Bridge District: Kauai Belt Road | 3-12 |
| | Map of Historic Bridge District: Kauai Belt Road | |
| | Historic Bridge District: Kauai Belt Road | |
| | Historic Bridge District: Kauai Belt Road Matrix | |
| IV. | Inventory Forms: Kauai State Eligible Bridges | |
| V. | Inventory Forms: Kauai County Eligible Bridges | 3-92 |
| Chapte | r 4 Oahu | |
| l. | Island of Oahu | 4-2 |
| | Map of Oahu | |
| | Oahu Island History | |
| II. | Bridge Matrix: Oahu | . 4-5 |
| III. | Historic Bridge District: Pali Highway | . 4-28 |
| | Map of Historic Bridge District: Pali Highway | |
| | Historic Bridge District: Pali Highway | |
| | Historic Bridge District: Pali Highway Matrix | |
| IV. | Inventory Forms: Oahu State Eligible Bridges | 4-33 |
| V | Inventory Forms: Oahu County Fligible Bridges | 4-29 |

| Chapte | r 5 Maui | |
|---------|--|-------|
| I. | Islands of Maui and Molokai | 5-2 |
| | Maps of Maui and Molokai | |
| | Maui and Molokai Island History | |
| II. | Bridge Matrix: Maui and Molokai | 5-5 |
| III. | Historic Bridge District: Hana Highway | 5-17 |
| | Map of Historic Bridge District: Hana Highway | |
| | Historic Bridge District: Hana Highway | |
| | Historic Bridge District: Hana Highway Matrix | |
| IV. | Inventory Forms: Maui and Molokai State Eligible Bridges | 5-24 |
| V. | Inventory Forms: Maui and Molokai County Eligible Bridges | 5-217 |
| Chapte | r 6 Hawaii | |
| l. | Island of Hawaii | 6-2 |
| | Map of Hawaii | |
| | Hawaii Island History | |
| II. | Bridge Matrix: Hawaii | 6-5 |
| III. | Historic Bridge District: Hawaii Belt Road | 6-20 |
| | Map of Historic Bridge District: Hawaii Belt Road | |
| | Historic Bridge District: Hawaii Belt Road | |
| | Historic Bridge District: Hawaii Belt Road | |
| IV. | Historic Bridges: Post-War Hawaii Belt Road | 6-27 |
| | Map of Historic Bridges: Post-War Hawaii Belt Road | |
| | Historic Bridges: Post-War Hawaii Belt Road | |
| | Historic Bridges: Post-War Hawaii Belt Road Matrix | |
| V. | Inventory Forms: Hawaii State Eligible Bridges | |
| VI. | Inventory Forms: Hawaii County Eligible Bridges | 6-191 |
| Chapte | r 7 Conclusion | |
| l. | Procedures for the Continuous Review and Study of Potentially Historic Bridges | 7-2 |
| | Overview | |
| | Identification | |
| | Evaluation | |
| | Recommended Future Inclusions to Inventory | |
| Append | | |
| A. | Glossary | |
| В. | Significant Persons List | |
| C. | National Register Forms | |
| D. | Bridge Rehabilitation Guidelines | |
| E. | 2000 MOA on County of Hawaii Bridges | |
| F. | Bridge Committee Meeting Minutes | 8-413 |
| Bibliog | raphy | 9-2 |
| | | |

Addendum

A. Committee Member Sign-Off Sheets