MAKAHA BRIDGES 3 & 3A HAER No. HI-90
Spanning Makaha Stream at Farrington Highway
Honolulu
Honolulu County
Hawaii

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Pacific West Regional Office
Oakland, California

HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO PHOTOGRAPHS

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David Franzen, Photographer, July 2009

HI-90-1	BRIDGE NO. 3, FROM FARRINGTON HIGHWAY, VIEW FROM THE SOUTHWEST
HI-90-2	BRIDGE NO. 3, FROM FARRINGTON HIGHWAY, VIEW FROM THE NORTHEAST.
HI-90-3	BRIDGE NO. 3, FROM UPSTREAM, VIEW FROM THE NORTH.
HI-90-4	BRIDGE NO. 3, FROM DOWNSTREAM, VIEW FROM THE SOUTH.
HI-90-5	BRIDGE NO. 3, CHARRED BENTS, VIEW FROM THE NORTHEAST
HI-90-6	BRIDGE NO. 3A, FROM FARRINGTON HIGHWAY, VIEW FROM THE NORTHWEST
HI-90-7	BRIDGE NO. 3A, FROM FARRINGTON HIGHWAY, VIEW FROM THE NORTHEAST.
HI-90-8	BRIDGE NO. 3A, FROM UPSTREAM, VIEW FROM THE NORTHWEST.
HI-90-9	BRIDGE NO. 3A, FROM DOWNSTREAM, VIEW FROM THE SOUTH.
HI-90-10	BRIDGE NO. 3A, BENTS, VIEW FROM THE NORTHEAST.

HISTORIC AMERICAN ENGINEERING RECORD

MAKAHA BRIDGES 3 & 3A

HAER No. HI-90

Location:	Farrington Highway near Kili Drive Makaha Stream City & County of Honolulu Hawaii USGS 7.5 minute series topographic map, Waianae, HI 1998 Universal Transverse Mercator (UTM) coordinates: Bridge 3: 04.2128579 15813163 Bridge 3A: 04.2128629 1581302
Date of Construction:	1937
Engineers & Builders:	Louis Cain, Chief Engineer
Present Owner:	State of Hawaii
Present Occupant:	Not Applicable
Present Use:	Road
Significance:	Makaha Bridges 3 and 3A are significant for their associations with the development of Oahu's highway system during the 1930s. They reflect their period in their materials, method of construction, workmanship, and design.
Report Prepared by:	Don J. Hibbard, Ph.D. Architectural Historian Mason Architects, Inc. 119 Merchant Street, Suite 501 Honolulu, HI 96813
Date:	August 2009

GENERAL DESCRIPTION AND LOCATION

The Makaha Bridges 3 & 3A are located in front of Makaha Beach Park, and carry Farrington Highway over Makaha Stream, which flows intermittently. The bridges are located .03 and .11 miles beyond mile marker 14, and stand to either side of the intersection of Farrington Highway and Kili Drive. The highway and bridges run parallel to the shoreline. Approximately 30' downstream of each bridge masonry footings and abutments may be observed. These are foundations for the trestles which carried the former Oahu Railway and Land Company's tracks over Makaha Stream. Upstream of Bridge 3 is an approximately 8' high, mid-stream lava rock pier flanked by masonry abutments on either bank of the stream, which was built at the same time as Bridge 3 and carried the Waianae Plantation railroad tracks across the stream.

Bridge 3 is a 60' long, three span, timber bridge with a girder and floor beam structural system. Its maximum span is 19'. The bridge's road width is 36.1' and a 4' wide wood plank sidewalk sits 10" above the roadway on the upstream side of the deck. Wood post and rail, guard rails, painted white, traverse the length of the bridge on either side. The bridge is approximately 8' above the stream bed.

The bridge has a laminated, 2" x 6" plank deck covered with asphalt, which is carried by fourteen 6" x 18" timber girders with 2" x 4" cross bridging. The girders are carried by 32' long concrete abutments and a pair of cross braced timber bents with battered piles. The girders sit on 6" x 8" sill beams that rest on the abutments. The bents are composed of 12" x 12" beams and piers, with 3" x 10" cross bracing, held together by large steel nuts and bolts. They are two bays long, with each bay being 17' in length, and feature five piers spaced 7'on center. The Douglas fir structural timbers are all creosoted.

The bents sit on a battered, 4' high lava rock foundation with a 12" thick concrete cap. The foundations are 36'-6" long and measure 3'-8" wide at their base and 2'-6" wide at the top. The slope of the foundation sides is 1:8. The foundations are tapered at both ends. Twelve inch thick lava rock and mortar walls set at a 1:1 slope provide protection against erosion for the stream banks under and adjacent to the bridge.

The guard rail is comprised of ten posts spaced 6'-4" on center from each other, and two rails. It is bolted together with steel carriage bolts. Steel nuts and bolts affix it to the bridge's sides. The 8" x 8" posts are 4' long and terminate with a truncated four sided pyramidal top. The rails are made of 2" x 4" lumber affixed to the inside face of the posts. Scuppers to drain the deck are centered between the downstream posts, and a battered 10" x 12" wide wheel guard runs along the base of the guard rail on the downstream side.

On July 27, 2006 an arsonist set Bridge 3 on fire. The girders and bents are all charred as a result of this conflagration, and the structure has been reinforced with modern lumber.

The lava rock pier in the middle of the stream bed on the upstream side of Bridge 3 once carried the Waianae Plantation's railway across the stream. It is tapered at both ends, and is approximately 8' high, 15'-6" long and 5'-3" wide. The former Waianae Plantation railroad bridge and the highway bridge were spaced 35' apart, on center. The reinforced concrete abutments that carried the railroad bridge are 16' long.

Bridge 3A is similar to Bridge 3 in its design, construction, and materials. However, it is longer, measuring 78.1' in length, and is comprised of four spans, which have a maximum span length of 19'. It sits approximately 11' above the stream bed. The structural system is the same, but with three bents instead of two and its guard rail has thirteen posts.

HISTORICAL CONTEXT

Makaha Bridges 3 & 3A are significant for their associations with the development of Oahu's highway system during the 1930s.

The bridges were two of nine timber bridges constructed as part of the Kaena Point Road project, which was constructed by the Hawaiian Contracting Company in 1937. The road went from Kaupuni in Waianae to Makua, running parallel to the Oahu Railway and Land Company's railroad track on the inland side.

Intended to, "provide all-weather access to the westernmost portion of Oahu, hitherto inaccessible in rainy weather," [1] the Kaena Point Road was viewed as part of a larger plan to construct a belt highway for the island of Oahu. It was conceived as a segment of Farrington Highway which was planned to run around Kaena Point and connect with Kamehameha Highway at Haleiwa Junction. With the completion of Farrington, Kamehameha and Kalanianaole highways motorists would be able to circle Oahu, an aspiration which never saw fruition. Following this 1937 project the Kaena Point Road was extended as far as Yokohama Beach, but the dirt road from Yokohama Beach to Mokuleia was never paved or well maintained.

Makaha Bridges 3 and 3A are significant for their associations with the development of Oahu's highway system during the 1930s. They reflect their period in their materials, method of construction, workmanship, and design. Funded as a U.S. Works Progress Administration (WPA) highway project, the

[1] *Superintendent of Public Works' Report for 1937*, page 22

bridges are also important for their associations with this federal program. In March 1933, as many as fifteen million people, a quarter of the United States' workers, had no jobs. In an effort to relieve the unemployment problem while maintaining individual dignity, President Franklin D. Roosevelt established the Works Progress Administration in 1935 by presidential proclamation. With Harry Hopkins at its head, the program not only provided jobs, but helped transform the physical face of the nation. Over its eight year existence it distributed ten-and-a-half billion dollars and provided work to eight and a half million persons.

The foundations for the WPA were laid during the winter of 1933-1934, when the Civil Works Administration (CWA) was brought into existence as a result of President Franklin Delano Roosevelt's dissatisfaction with the slow pace of jobs growth under the Public Works Administration (PWA), which was charged with constructing large-scale public works projects. Expanding upon the precepts set forth in the Civilian Conservation Corps (CCC) and the Federal Emergency Relief Act (FERA)'s work programs, the CWA was charged with getting people off the dole, by putting them to work on public improvement projects. Brought into existence by the issuance of an executive order on November 9, 1933, the new program was administered by Harry Hopkins and funded with PWA moneys. Hopkins set in place a streamlined project approval process, and on November 23, 1933, the CWA's first payday, 800,000 workers received checks, and by mid-December over 2.6 million people were at work on CWA projects. While most workers funded by the CWA were laborers, approximately 50,000 of the four million were teachers in the public education system, and while window dressers were sent to museums to help build displays, historians and architects were dispatched to compile the beginnings of the Historic American Buildings Survey. With its funding running out, the CWA began to demobilize in late February 1934, and on March 31, 1934 its construction program concluded.

Following overwhelming Democratic Party victories in the mid-term Congressional election of 1934, talks of re-instituting a work program emerged, and Congress passed the Emergency Relief Appropriations (ERA) Act, appropriating 4.8 billion dollars. In May 1935 the president formed the Works Progress Administration (WPA) to implement the expenditure of the dollars, with Harry Hopkins at the helm. Through its eight years of existence the program was responsible for the construction of 650,000 miles of road, 78,000 bridges, 125,000 civilian and military buildings, 800 airports, and produced 475,000 works of art.

As with the CWA, moneys were not only allocated to the nation's states, but also to its territories. For the year starting August 1, 1935 through July 31, 1936 Hawaii was awarded $3,500,000. The program was overseen by the Territorial Welfare and Relief Commission, and at the urging of Harry Hopkins and Hawaii Governor Joseph B. Poindexter, the commission named F. H. Locey to administer the program. This commission previously handled the CWA and

FERA moneys. The approximately $300,000 a month allocated to Hawaii could only be used to pay wages. Any materials, equipment, etc. to undertake projects had to be provided by the Territory. The need for the Territory of Hawaii to provide materials for the WPA projects, when coupled with modest traffic demands, may be the reason for the use of wood rather than the more commonly utilized reinforced concrete in these Kaena Point Road bridges. Another cost savings may have been affected with the foundations for the bents. These are primarily composed of local lava rock capped by a band of concrete. This construction method is not found anywhere else on Oahu other than in the Kaena Road bridges.

The first three projects approved by the governor were for a Kailua-Lanikai mosquito survey, the continuation of the city-wide street re-numbering project, and the completion of Kaneohe Bay Drive. The Territorial Superintendent of Public Works, Louis Cain, partially funded a number of projects with a portion of the initial WPA moneys after the Public Works Administration (PWA) turned down the Territory's request to fund such projects as the Ala Moana Boulevard bridge, the Tax Office Building, the expansion of the Girl's Industrial Reform School, the Molokai and Honokaa libraries, Lihue Courthouse, Wailuku Armory, Kawaihae cattle wharf, Port Allen, and the Lahaina Sea Wall. The Welfare and Relief Commission lost $1,000,000 of the initial appropriation when the federal government decided that these moneys should go directly to the Army to fund the construction of Kolekole Pass.

For 1937 the Kaena Point Road was one of 59 highway projects the WPA funded in Hawaii. During that year, the program employed approximately 5,500 people a month island wide, with around 2,100 positions funded on Oahu. The Kaena Point Road project, which included the construction of the two Makaha timber bridges, employed 124 men. The August 21, 1937 *Honolulu Star Bulletin* reported, "the improvement of existing roads and streets on all islands, as well as the construction of several new roads, was termed by Mr. Locey the greatest accomplishment of the year."

This diversion of WPA moneys to the Army for the Kolekole Pass was a precursor of things to come. In February 1938 the federal government announced that all of Hawaii's WPA moneys would be controlled by the U. S. Army Corps of Engineers. Despite the protests of Governor Poindexter and Hawaii's Congressional delegates, the Army took control of the program, and the moneys were primarily devoted to preparing for the United States' eventual entry into World War II. On October 31, 1941 WPA funding for Hawaii was terminated, although the federal program continued in the United States until July 1944.

SOURCES

Original Drawings

"Standard Details for Timber Bridges on Tangent", Territorial Highway Department, Sheet 1 of 2, no date.

"Standard Details for Timber Bridges on Tangent with Two Sidewalks", Territorial Highway Department, Sheet 1 of 2, August 1939.

"Standard Details for Timber Bridges on Curves", Territorial Highway Department, no date.

"Bridge No. 3 & Plantation R.R. Bridge", Sheet 2 of 2, Territorial Highway Department, August 1936.

"Bridge 3A", Territorial Highway Department, Sheets 1 and 2 of 2, August 1936.

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Honolulu Advertiser

"$3,500,000 Works Program Given Territory, Scheduled to Go into Effect August 1," July 18, 1935, page 1.

"New Relief Program is Worked Out," July 20, 1935, page 1.

"Governor Puts OK on Program for Works Here," September 13, 1935, page 4.

"Cain Offers WPA Plans," October 8, 1935, page 1.

"'Lost'" Relief Funds Found," December 15, 1935, page 1.

"Hawaii Gets WPA Funds," July 2, 1936, page 1.

"WPA Employment Service Provides Many Jobs Here," September 15, 1936, page 1.

"Army Wins Control of WPA Here," February 2, 1938, page 1.

Honolulu Star Bulletin

"Farrington Highway New Belt Road Name," February 11, 1935, page 1.

"Local Firm is to Build New Road on Oahu," November 24, 1936, page 1.

"Four Million Spent by WPA," August 21, 1937, page 2.

"208 Projects Started Here," October 16, 1937, page 12.

"WPA to Close Here October 31," October 27, 1941, page 1.

"Program Ends," November 1, 1941, page 1.

"An Old Man Passes," July 3, 1944, page 4.

McDermott, Matt, and Jon Tulchin, *Archaeological Inventory Survey for the Proposed Replacement of Makaha Bridges 3 & 3A,* Kailua, Hawaii: Cultural Surveys Hawaii, Inc., March 2006.

Rader, Frank J., "Works Progress Administration and Hawaii's Preparedness, 1935-1940," *Military Affairs*, February 1979, pp. 12-17.

State of Hawaii Department of Transportation, Highways Division, Bridge Inventory Sheets, August 17, 1983.

Superintendent of Public Works' Annual Reports, 1935-1940.

Taylor, Nick, *American-Made, When FDR Put the Nation to Work*, New York: Bantem Books, 2008.

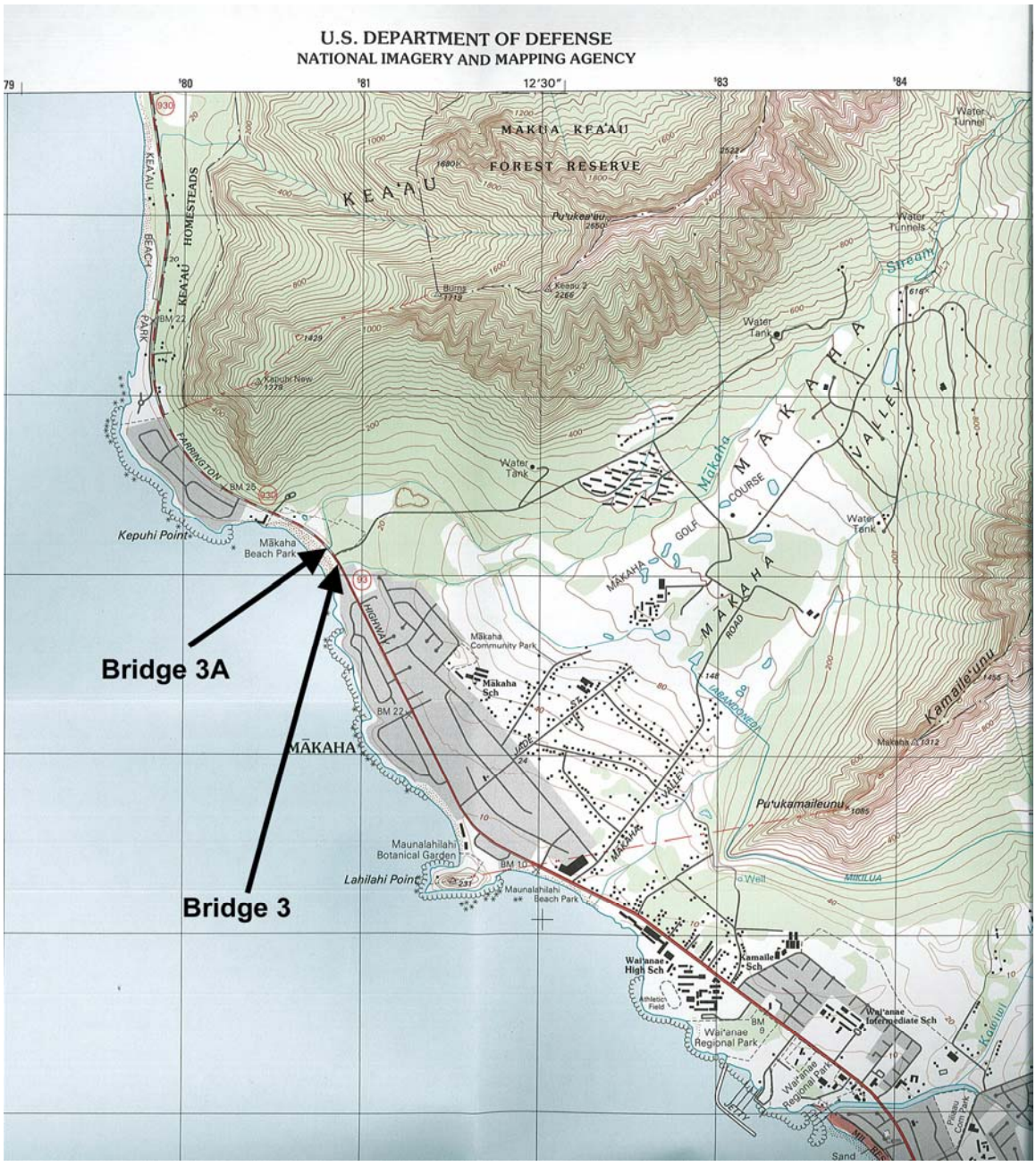
Thompson, Bethany, *Historic Bridge Inventory, Island of Oahu*, Honolulu: State of Hawaii Department of transportation, 1983.

PROJECT INFORMATION

The following documentation was prepared in response to the proposal to realign Farrington Highway and remove Makaha Bridges 3 & 3A. The purpose of this documentation is to historically and photographically record the two bridges. The State of Hawaii Department of Transportation (DOT) and the Hawaii State Historic Preservation Division (SHPD) have agreed that the bridges are over fifty years old and appear to meet the criteria for listing in the Hawaii and National Registers of Historic Places. SHPD recommended that Historic American Engineering Record (HAER) documentation be completed as a means of mitigating the loss of these historic properties. The DOT agreed to the SHPD's request for documentation following HAER standards.

The project manager for the HAER documentation was Polly Cosson Tice of Mason Architects, Inc. Don J. Hibbard, Ph.D. of Mason Architects was the researcher and author of the report. Both Polly Cosson Tice and Don Hibbard are architectural historians who meet the Secretary of the Interior's Professional Qualifications in architectural history. Carol Stimson of Mason Architects assisted with the editing and production of the reports. The large-format photographs were taken by David Franzen of Franzen Photography.

Location Map
U.S.G.S. Waianae, Hawaii, 1998:



Site Map: R.M. Towill Corporation project base map, dated January 2010. MAI additions of Trestle and Railway Ruins and select notations added August, 2010.

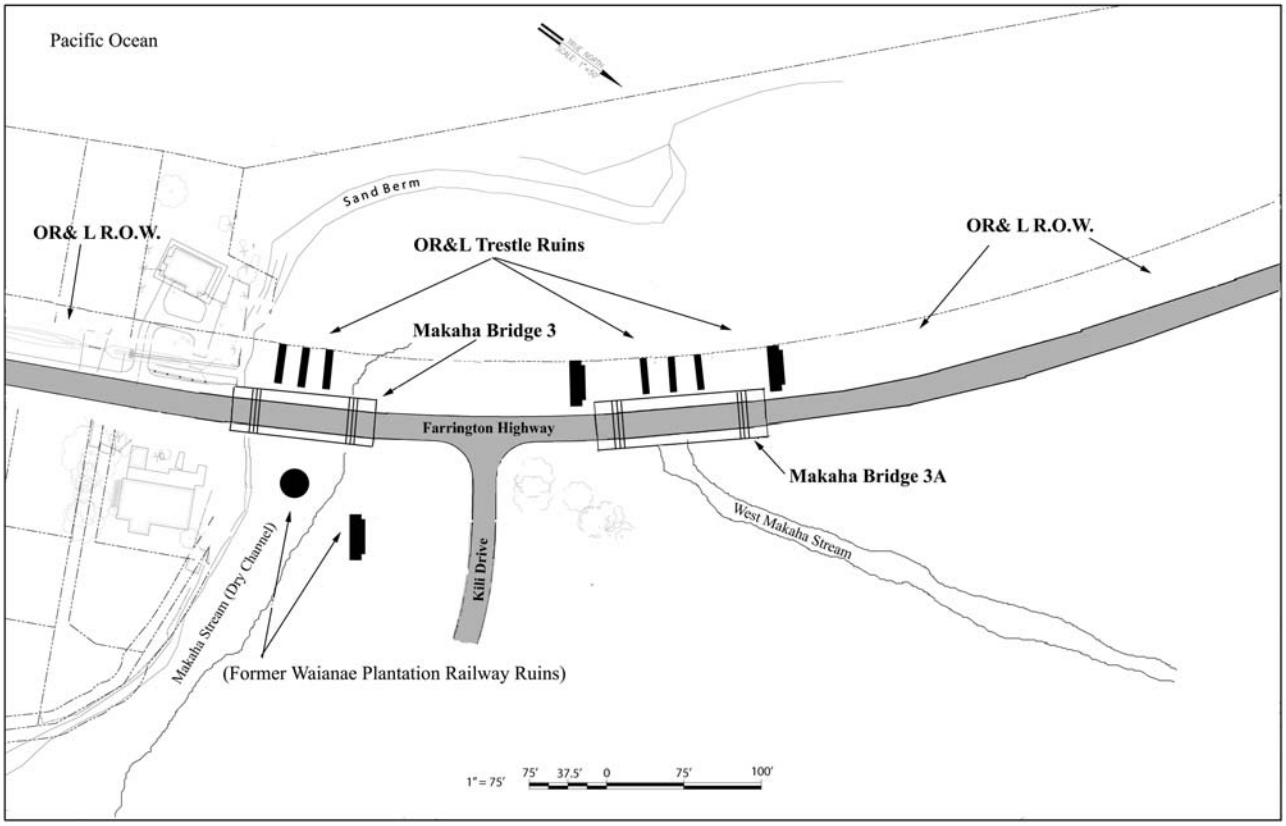


Fig. 2: Photograph of Bridge No. 2, which was built at the same time and following same standard plans as Bridges 3 & 3A. ***Superintendent of Public Works Report for 1940*****.**

Bridge No. 2 (Timber) Project F.A.P. 10-C (1).

Fig 3: Map of Oahu, Territorial Highway System, July 1935

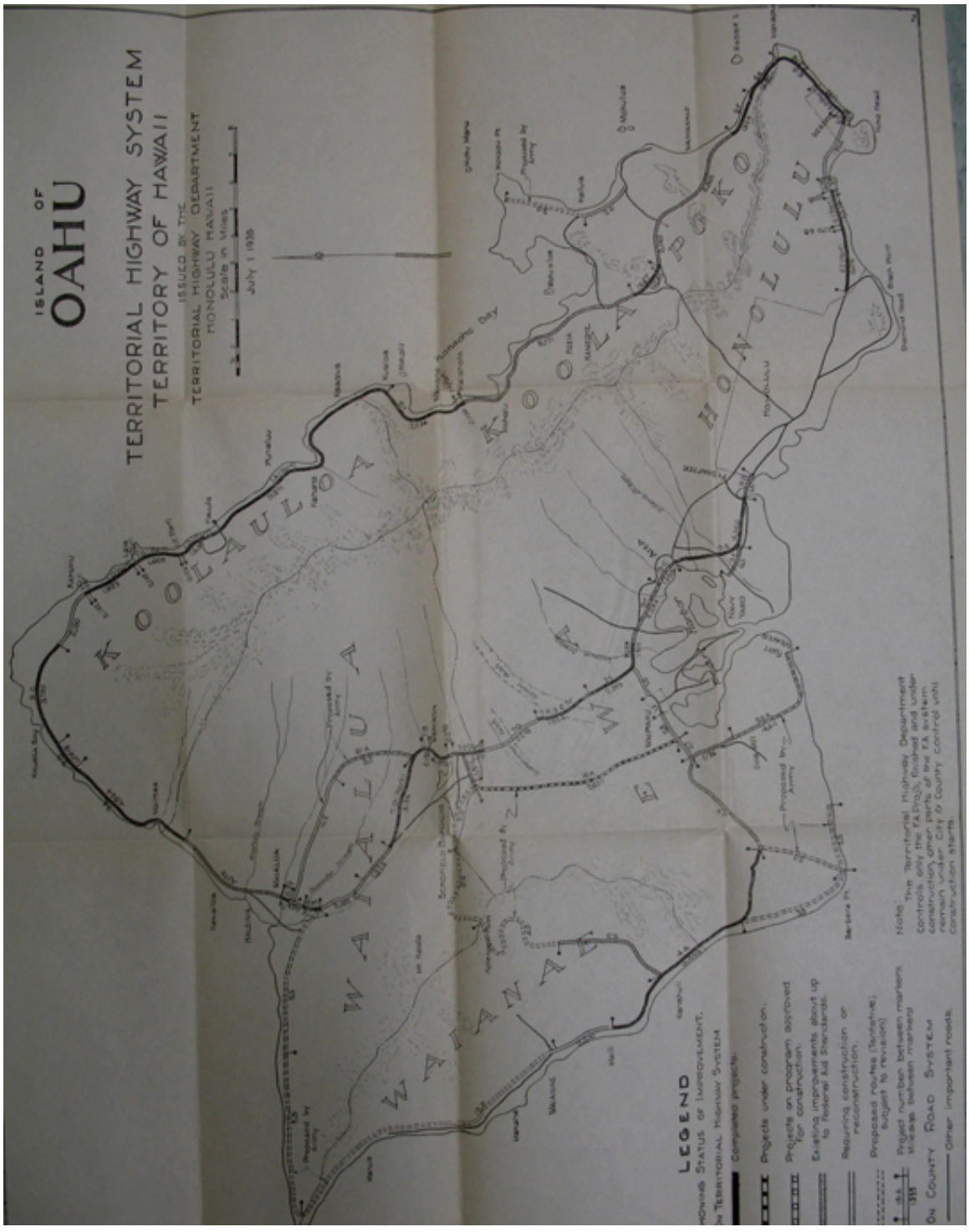


Fig. 4: Map of Oahu, Territorial Highway System, July 1936

Fig. 5: Original Drawing, Standard Details for Timber Bridges on Tangent, Territory of Hawaii Public Works Department, Sheet 1 of 2

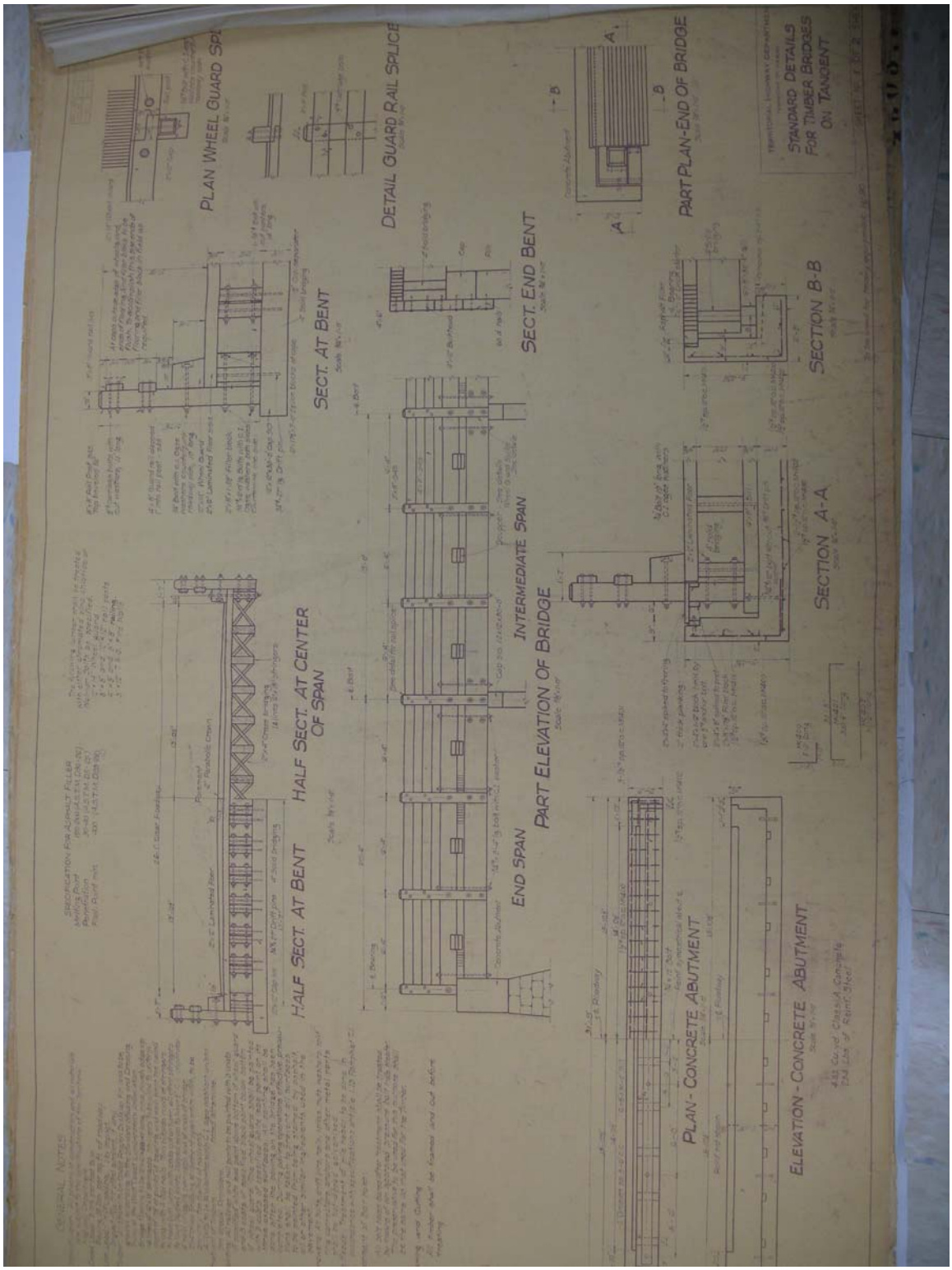


Fig. 6: Original Drawing, Bridge No. 3A, Territory of Hawaii Public Works Department, Sheet 1 of 2

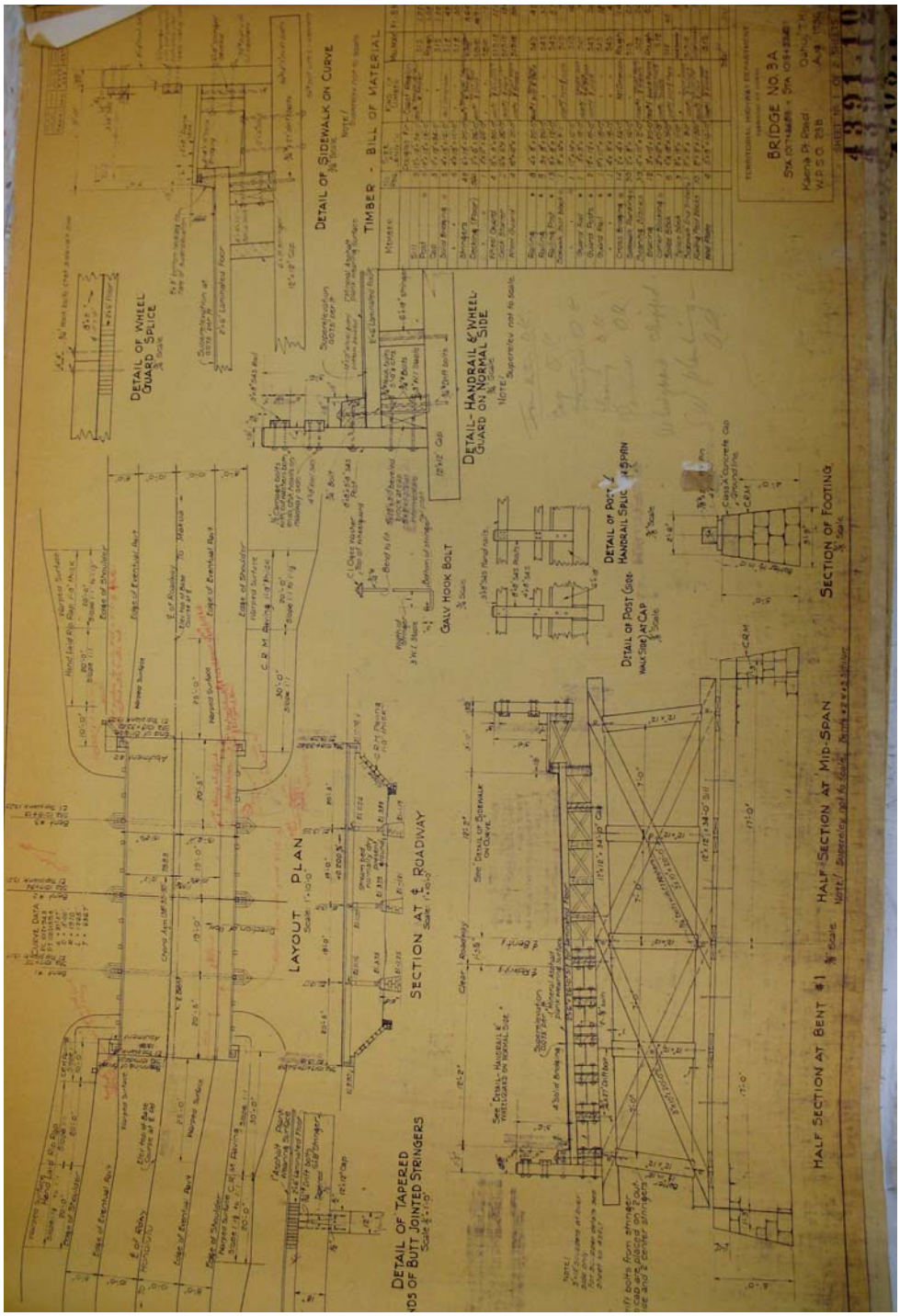
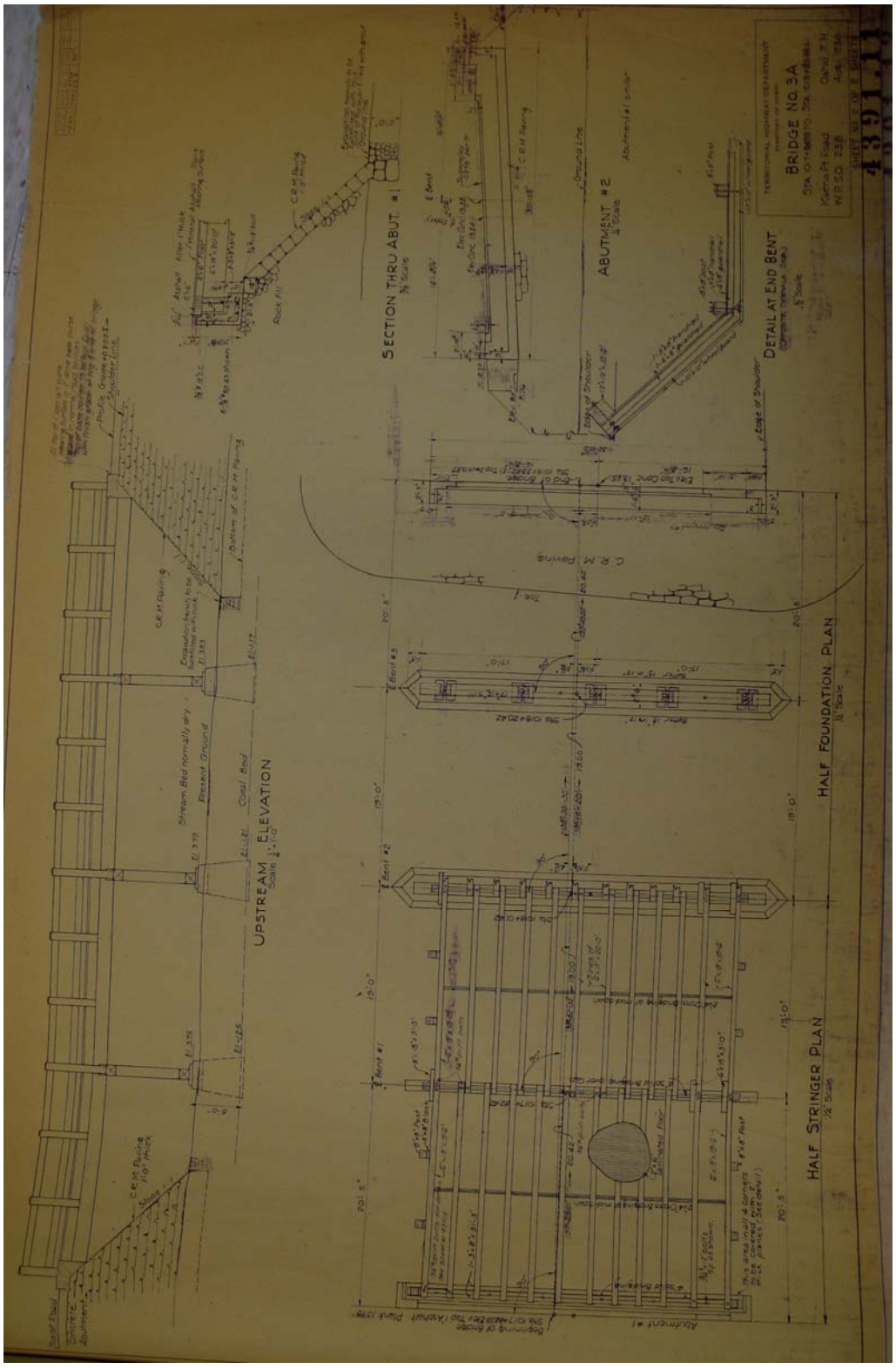


Fig. 7: Original Drawing, Bridge No. 3A, Territory of Hawaii Public Works Department, Sheet 2 of 2



HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HABS No. HI-90-1

HISTORIC AMERICAN ENGINEERING RECORD
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HABS No. HI-90-2

HISTORIC AMERICAN ENGINEERING RECORD
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HABS No. HI-90-3

HISTORIC AMERICAN ENGINEERING RECORD
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HABS No. HI-90-4

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HABS No. HI-90-5

HISTORIC AMERICAN ENGINEERING RECORD
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HABS No. HI-90-6

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HABS No. HI-90-7

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HABS No. HI-90-8

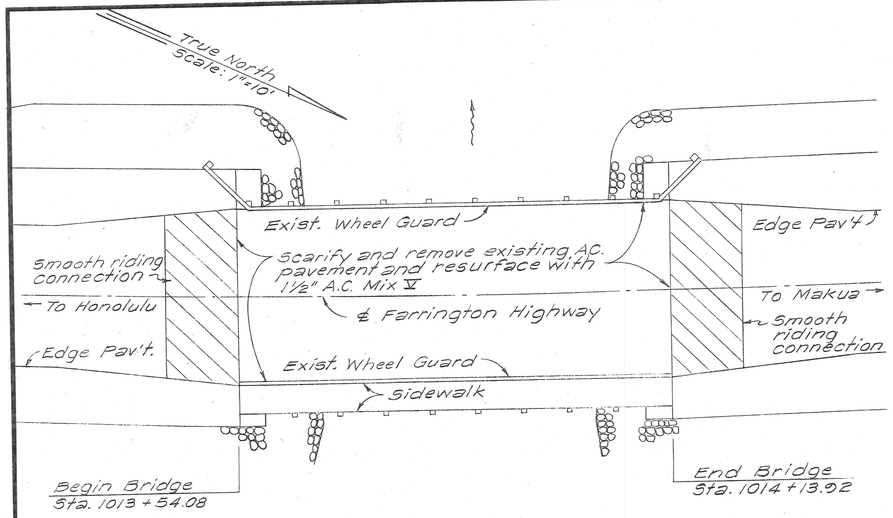
HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

HABS No. HI-90-9

HISTORIC AMERICAN ENGINEERING RECORD
SEE INDEX TO PHOTOGRAPHS FOR CAPTION

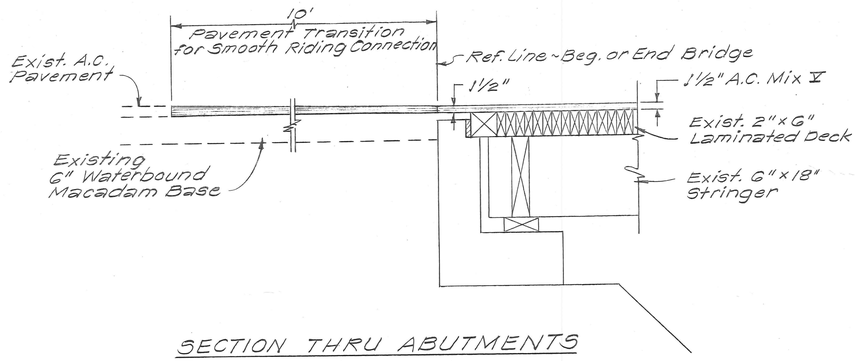
HABS No. HI-90-10

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	93B-01-77M	1977	2	6



PLAN ~ MAKAHA BRIDGE NO.3

Scale: 1"=10'



SECTION THRU ABUTMENTS

Scale: ¾"=1'-0"

GENERAL NOTES

1. The Contractor shall remove the existing asphalt concrete pavement on Makaha Bridge No. 3 and expose the existing timber deck, as shown on the plans. At pavement transition areas, the pavement shall be removed to the top of existing base course. The Contractor shall exercise due care in scarifying the asphalt pavement so as not to damage the existing timber bridge. Damaged portion shall be restored to original condition at the Contractor's expense.

2. The Contractor shall replace all deteriorated or timber found on the bridge deck as deemed necessary by the Engineer. All new timber shall be treated to saturation with creosote and shall be of same size, species and grade as the original timber (See Sheet 3). All timber work done in replacing portions of the bridge deck shall conform to Section 502 - Timber Structure, of the Specifications. Payment for replacing deteriorated or soft timber on the bridge deck shall be made on a Force Account basis in accordance with subsection 109.04 - Extra and Force Account Work, of the Specifications or as mutually agreed to by the Engineer and Contractor.

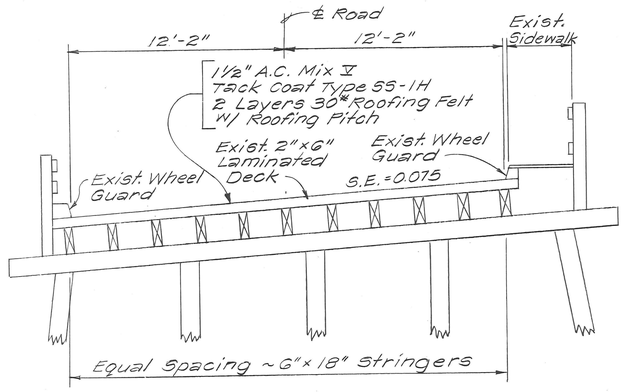
3. The exposed timber deck shall be coated with a new application of creosote oil to a "black" color. Two layers of 30 lb. roofing felt shall be placed on the deck. Hot roofing pitch shall be applied to the deck and between layers of the roofing felts. Lapping of the felt shall be at least 4" inches. For additional requirements, see Subsection 502.03 of the Special Provisions.
Creosote oil shall be Type P2 and shall conform to the requirements of Section 714.02 - Preservatives, of the Specifications. Creosote, roofing felt, hot roofing pitch, nails, and other miscellaneous items not specifically listed in the proposal shall be considered incidental to the various items of work and will not be paid for separately.

4. The thickness of the resurfacing shall be 1½ inches minimum of Asphalt Concrete Mix V except for areas of transition where the thickness varies. Prior to resurfacing, tack coat Type SS-1H conforming to the requirements of Section 407 - Bituminous Tack Coat, of the Specification shall be applied. Tack Coat shall be considered to be incidental to Asphalt Concrete pavement.

5. The Contractor shall keep one traffic lane open for public use during normal working hours and two traffic lanes during non-working hours. The Contractor's attention is directed to Subsection 104.04 - Maintenance of Traffic, of the Special Provisions. Maintenance and control of traffic through the project site shall not be paid for separately but shall be considered to be incidental to the various items of work.

6. Plan sheet numbers 3 to 6 are provided for information and guidance to the Contractor. These plans were used in the construction of Makaha Bridge No. 3.

7. The Contractor shall verify the location of the project site with the Engineer.



TYPICAL SECTION THRU BRIDGE

Scale: ¼"=1'-0"

ESTIMATED QUANTITIES

ITEM NO.	ITEM	APPROX. QUANT.
202.0430	Removal of Existing A.C. Pavement.	214 S.Y.
401.0500	Asphalt Concrete Pavement Mix No. V.	22 Tons
502.0300	Repair and Rehabilitate Timber Structure.	F.A.

ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FARRINGTON HIGHWAY
MAKAHA BRIDGE NO. 3
WATERPROOFING & RESURFACING
BRIDGE DECK
PROJECT No. 93B-01-77M

Scale: As Shown Date: Feb. 1977

SHEET No. 1 OF 1 SHEETS